NASA/CR—2003-212476

Efficient, Low-Cost Fan System Research for General Aviation and Commuter Aircraft

G.L. Merrill
Advanced Propulsion, Inc., Phoenix, Arizona

August 2003

The NASA STI Program Office . . . in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA Scientific and Technical Information (STI) Program Office plays a key part in helping NASA maintain this important role.

The NASA STI Program Office is operated by Langley Research Center, the Lead Center for NASA's scientific and technical information. The NASA STI Program Office provides access to the NASA STI Database, the largest collection of aeronautical and space science STI in the world. The Program Office is also NASA's institutional mechanism for disseminating the results of its research and development activities. These results are published by NASA in the NASA STI Report Series, which includes the following report types:

- TECHNICAL PUBLICATION. Reports of completed research or a major significant phase of research that present the results of NASA programs and include extensive data or theoretical analysis. Includes compilations of significant scientific and technical data and information deemed to be of continuing reference value. NASA's counterpart of peer-reviewed formal professional papers but has less stringent limitations on manuscript length and extent of graphic presentations.

- TECHNICAL MEMORANDUM. Scientific and technical findings that are preliminary or of specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.

- CONTRACTOR REPORT. Scientific and technical findings by NASA-sponsored contractors and grantees.

- CONFERENCE PUBLICATION. Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or cosponsored by NASA.

- SPECIAL PUBLICATION. Scientific, technical, or historical information from NASA programs, projects, and missions, often concerned with subjects having substantial public interest.

- TECHNICAL TRANSLATION. English-language translations of foreign scientific and technical material pertinent to NASA's mission.

Specialized services that complement the STI Program Office's diverse offerings include creating custom thesauri, building customized databases, organizing and publishing research results . . . even providing videos.

For more information about the NASA STI Program Office, see the following:

- Access the NASA STI Program Home Page at ***http://www.sti.nasa.gov***

- E-mail your question via the Internet to help@sti.nasa.gov

- Fax your question to the NASA Access Help Desk at 301–621–0134

- Telephone the NASA Access Help Desk at 301–621–0390

- Write to:
  NASA Access Help Desk
  NASA Center for AeroSpace Information
  7121 Standard Drive
  Hanover, MD 21076

NASA/CR—2003-212476

Efficient, Low-Cost Fan System Research for General Aviation and Commuter Aircraft

G.L. Merrill
Advanced Propulsion, Inc., Phoenix, Arizona

Prepared under Contract NAS3–27644

National Aeronautics and
Space Administration

Glenn Research Center

August 2003

Document History

This research was originally published internally as AST020 in December 1997.

Trade names or manufacturers' names are used in this report for identification only. This usage does not constitute an official endorsement, either expressed or implied, by the National Aeronautics and Space Administration.

Note that at the time of printing, the NASA Lewis Research Center was undergoing a name change to the NASA John H. Glenn Research Center at Lewis Field. Both names appear in these proceedings.

Available from

NASA Center for Aerospace Information
7121 Standard Drive
Hanover, MD 21076

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22100

Available electronically at http://gltrs.grc.nasa.gov

EFFICIENT, LOW-COST FAN SYSTEM RESEARCH

FOR GENERAL AVIATION & COMMUTER AIRCRAFT

PREFACE

This investigation was conducted by Advanced Propulsion Inc. of Phoenix, Arizona under Contract NAS3-27644, administered by the National Aeronautics and Space Administration, Lewis Research Center. The Advanced Propulsion Inc. principal investigator was G. L. Merrill. Aerodynamics design and analysis support was provided by B. Cassem. Mechanical/structural design and analysis support was provided by G. Pittard. The NASA Contracting Officers were K. R. Brocone and H. Shaw. The NASA Contracting Officer's Technical Representative, J. D. Eisenberg, provided technical direction for the program.

EFFICIENT, LOW-COST FAN SYSTEM RESEARCH

FOR GENERAL AVIATION & COMMUTER AIRCRAFT

ABSTRACT

Research investigations conducted by Advanced Propulsion Inc., which were intended to validate efficient, low-cost fan system concepts, are described in this report. The report briefly describes the broad range of applicability of the fan system investigated. It defines the expected benefits the fan system would have on new, advanced turbofan engines for specific, lower-speed aircraft applications. The overall concept is shown to apply specifically to future general aviation and commuter aircraft optimized for relatively short-range missions and to typical cruising flight speeds in the range of 200 to 400 knots.

Basic fan design premises are defined that are intended to yield high efficiency level in terms of both stage adiabatic efficiency and turbofan engine propulsive efficiency at lower flight speeds than are now addressed with turbofan propulsion systems designed specifically for executive and commercial jet aircraft.

The premises include system and mission optimized fan pressure ratio ranges for the range of relevant flight speeds of future general aviation private aircraft and low-density, shorthaul airliners that are commonally referred to as commuters. The premises also include the use of current state-of-the-art aerodynamic loading parameters yielding velocity triangles that are very similar to those of current, high pressure ratio, transonic stages in larger turbofans. Such premises are shown to yield very low fan rotational speed versus current practice. In turn, this is shown to yield high potential for use of substantially different materials and mechanical design criteria that can result in dramatically lower manufacturing cost.

Materials, manufacturing, stress, vibration, bird-strike and erosion investigations are reported that sought low-cost solutions for the fan rotor design, given the unique, low-speed characteristics of the predicated fan design. The materials investigations included fiber reinforced plastics and commercially available aluminum alloys. The manufacturing investigations included injection molded blading, precision forged blading with blade-root machining and forged/numerical controlled machined integral wheel (blisk) processing. The aluminum alloy blisk rotor configuration is reported to have the best combination of overall performance, including one and four-pound bird strike capability and lower manufacturing cost. The fan stator system, mechanically integrated with the engine front frame, is described to be most suitable as an assembly of aluminum precision investment cast components having minimal machining.

The report describes parametric aerodynamic design analyses that yielded 91+ percent adiabatic efficiency for a 1.10 pressure ratio, 38.5 pound-per-second fan for a 200-knot-class small turbofan. These results obtained with the USAF UDO300 code suggests that, with follow-on use of an advanced computational aerodynamics code and with a comprehensive component development program, adiabatic efficiencies in the range of 92 to 93 percent may be obtained over the ranges of predicated pressure ratios from 1.08 to 1.35 and flows from 38 to 150 pounds per second.

The report ends with the Advanced Propulsion Inc. conclusions that the investigations carried out in this program substantially validated optimistic preliminary design premises used in prior systems/mission analyses on the applicability of turbofan propulsion to lower-speed general aviation and commuter aircraft.

TABLE OF CONTENTS

EFFICIENT, LOW-COST FAN SYSTEM RESEARCH

FOR GENERAL AVIATION & COMMUTER AIRCRAFT

1.0 INTRODUCTION

The National Aeronautics and Space Administration and the Federal Aviation Administration have missions to facilitate advances in technologies applicable to General Aviation (GA) and Commuter (low-density, shorthaul) aircraft. It is widely perceived that propulsion for these aviation segments is barrier technology. Exactly how significant improvements can be achieved constitutes a pivotal issue.

Definite needs exist for major improvements in propulsion/aircraft performance, fuel efficiency, reduced community noise, lowered chemical emissions, increased reliability and integrity, reduced cabin noise and vibration and dramatically reduced operating and ownership cost. These are, in fact, the essential improvements that mission-optimized, high bypass ratio turbofans have provided over the past few decades for commercial and executive aviation segments. Turbofan propulsion is now the definitive means of propulsion for all aircraft except those that are the subject of this investigative research effort. It is a reasonable assumption that similarly mission-optimized turbofans could yield similar benefits for general aviation and low-density shorthaul aviation.

During the period 1984 to the present, Advanced Propulsion Inc. has performed broad ranging, internally-funded studies based upon this assumption. The studies include turbofan engine and airplane conceptual and preliminary design, comprehensive mission and tradeoff analyses and in-depth cost/business analyses. More than twenty different engine/airplane/mission combinations have been evaluated in these studies, including single and twin-engine private light airplanes, work airplanes such as crop application airplanes and package freighters, as well as low-density shorthaul airliners ranging from twelve to forty four seats. The results of these studies have been very positive in terms of the potential of mission-optimized turbofans yielding major improvements versus all the needs cited above.

In order to proceed with further technical and business developments it is prudent to further validate the assumptions and premises of the studies. Fan system design is a key element of Advanced Propulsion Inc. validation efforts for reasons made clear in the body of this report. In turbofan engines, the fan system design involves nearly all of the aircraft system-level tradeoff and optimization analyses. It is key in all the propulsion system weight, drag and fuel efficiency tradeoffs, in all the aircraft performance trades and in the final economic analyses of new aircraft products. The predications and premises of the investigations conducted in the present research were derived from the systems studies previously conducted by Advanced Propulsion Inc. This report and its conclusions show that the work has yielded a higher level of confidence in the fan system design fundamentals that were addressed.

2.0 TECHNICAL PREMISES OF THE RESEARCH

The overreaching, implied premise of the investigation is that internal momentum exchange propulsion--turbofan jet propulsion can be superior, in the several ways described above, to open propeller propulsion in applications having as little as 200 to 400 knots design flight speeds. (There is a general technical concensus that open-propeller propulsion is more fuel-efficient at these speeds and is an essential imperative for aircraft of this class.) There are no engine/aircraft examples flying that tend to substantiate this turbofan premise. There are no known turbofans mission-optimized for 200 knots cruise speed.

The first technical premise of the present study is that the fan design effort is addressed to aircraft having cruise speeds/altitudes in the shaded box of Figure 1.

The second technical premise is concerned with the selection of fan pressure ratio, a principle determinant of turbofan engine propulsive efficiency.

The ongoing systems and mission analysis work of Advanced Propulsion Inc. deals with the separate elements of overall propulsion system efficiency:

- **CYCLE THERMAL EFFICIENCY**
- **PROPULSIVE EFFICIENCY**
- **SYSTEM WEIGHT EFFICIENCY**
- **SYSTEM DRAG EFFICIENCY**

There are numerous interrelationships between these efficiency elements and between the component and engine design variables that affect them. Furthermore, there are numerous interrelationships between the engine elements and design variables and the aircraft design for which the new propulsion system is intended. A rigorous, systematic approach is required in order to define all the design variables that quantify a best set that meets the overall propulsion system efficiency goals and the aircraft size, performance and cost goals.

Fan pressure ratio is one of the engine design variables that affect the propulsive efficiency element. Selection of the best fan pressure ratio for an aircraft design cruise flight speed involves numerous tradeoffs relating to engine size, weight, nacelle drag and cost. Advanced Propulsion Inc. has made those trades for numerous aircraft point designs having design cruise speeds between 200 and 400 knots. The best solutions fall approximately on a line of pressure ratio versus cruise speed that represents a constant fan-jet ideal propulsive efficiency of 80 percent.

This fan pressure ratio versus aircraft design cruise speed relationship is illustrated in Figure 2. The term, ideal propulsive efficiency, is defined on this figure.

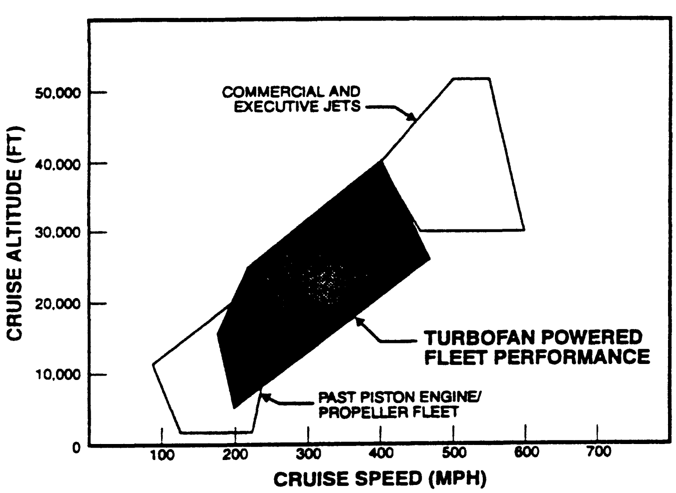


FIGURE 1. Aircraft performance envelope.

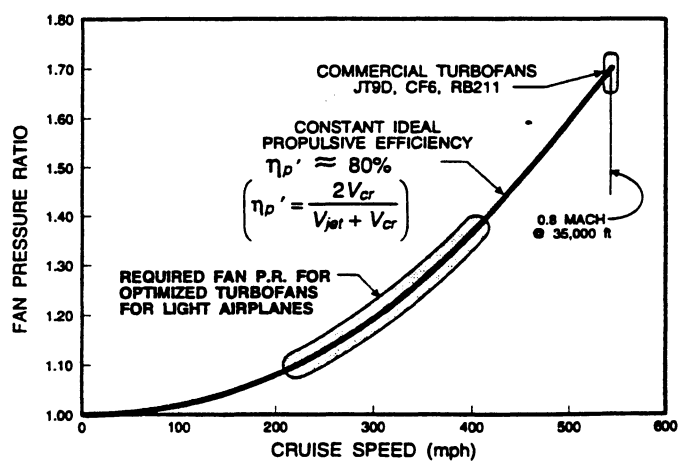


FIGURE 2. Fan pressure ratio vs speed.

2.1 FAN DESIGN BASELINES

Initial proposal baselines for the fan design were further refined as definitive baselines for the investigation. A representative fan stage was selected that would yield the broadest applicability of the study results. The stage was adapted from prior general aviation and commuter system study results. The design parameters were selected to yield very high bypass ratio turbofans suitable for airplanes having design cruise speeds from 200 to 300 knots. The stage is intended to be uprated in increments of flow and pressure ratio as a function of fan speed (rpm) and to be scaleable over a broad range. Because the smallest of the potential applications represents the toughest case for meeting efficiency and production cost goals, it was elected to study a fan sized at 19 inches diameter and corrected flow less than 40 lb/sec. The following table lists data on the selected fan and one representative uprated derivative, and Figure 3 illustrates the basic configuration and additional data.

FAN CONFIGURATION	BASELINE	UPRATE
AIRPLANE SPEED CLASS	200-KNOT	300-KNOT
ENGINE THRUST CLASS	500-LB	800-LB
FAN FLOW	38.45 LB/SEC	47.18 LB/SEC
FAN PRESSURE RATIO	1.10	1.19
TIP SPEED	734 FPS	983 FPS
SPEED	8844 RPM	11,847 RPM
TIP DIAMETER	19.00 IN	19.00 IN
INLET HUB/TIP RATIO	0.316	0.316
BLADE ASPECT RATIO	1.88	1.88
BLADE/STATOR VANE NUMBERS	17/27	17/27

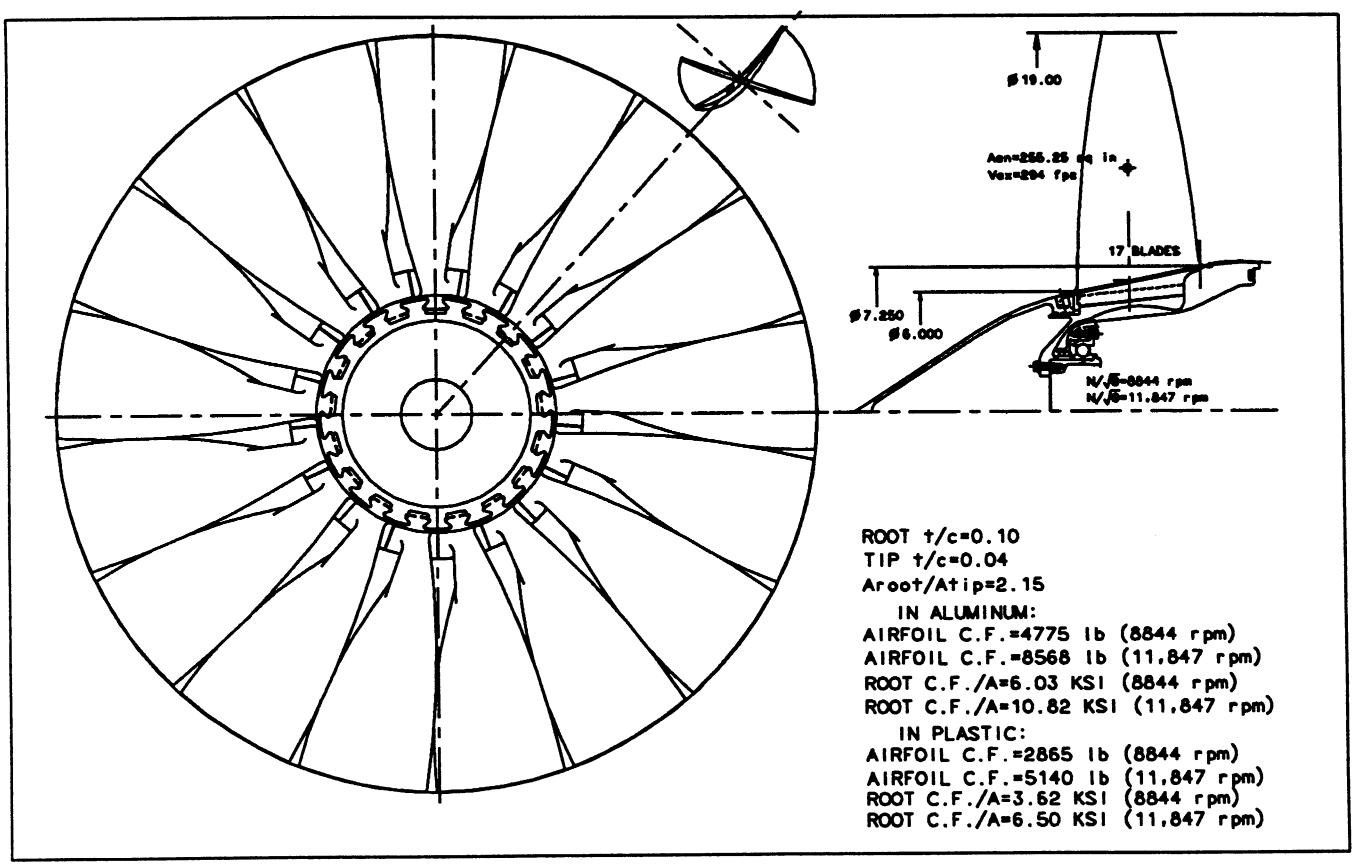


FIGURE 3. Baseline fan configuration for aerodynamic design analyses and manufacturing process/cost studies.

The initial, design-point velocity triangles for the baseline and uprated stages are shown in Figure 4. The close similarity in the triangles confirm that only flowpath adjustments will be required to accomplish both the baseline and the uprated version with the same set of rotor and stator blading. The rotor tip relative Mach number is subsonic on both stages, and the rotor is shown to have about 50 degrees of hub turning in both stages. The aerodynamic loadings, in terms of diffusion factor and other such empirical factors, are similar to the larger transonic fans in executive jets and commercial airliners. Considering these factors, the rational adiabatic efficiency goal for these stages is 92 percent.

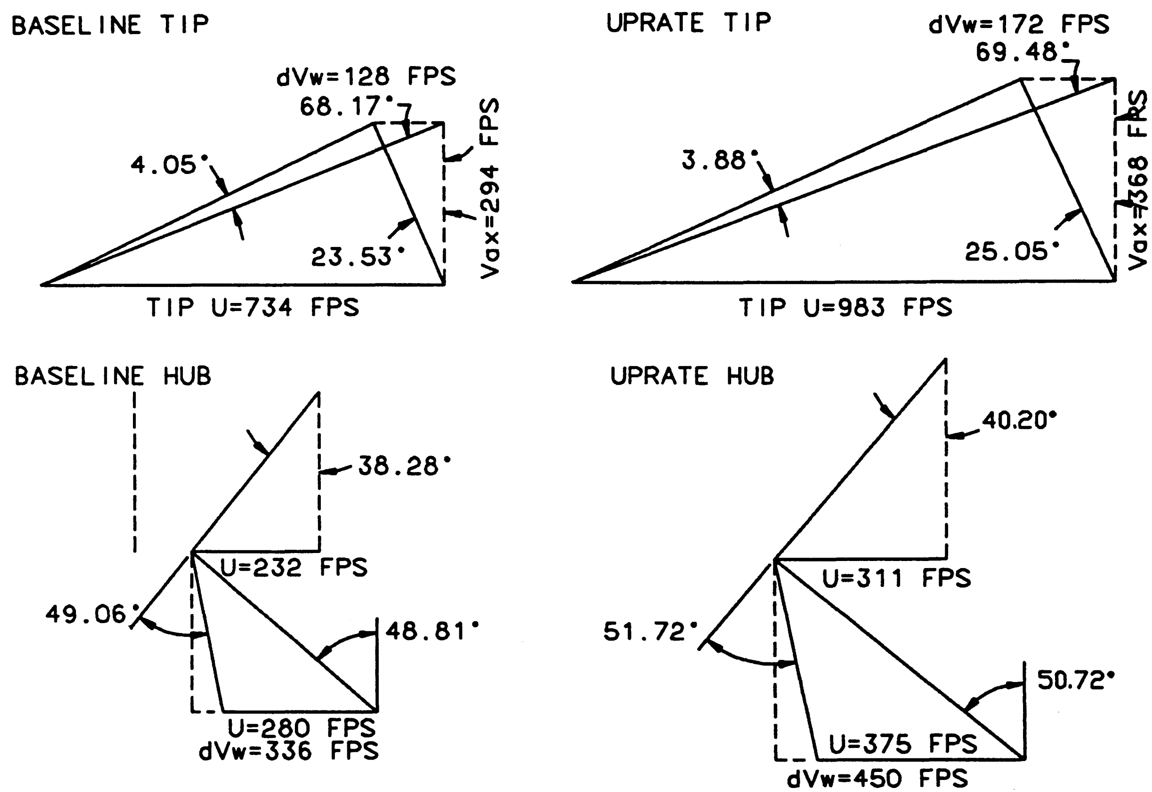


FIGURE 4. Velocity triangles for study baseline and uprated fan stages.

It should be noted that although the sea level static thrust of the uprated engine is about 1.8 times the baseline engine, the thermodynamic power is about 2.25 times as great. The increased flow and pressure ratio of the fan correlates directly with this ratio.

For purposes of this investigation, complete nacelle and bypass-duct system flowpaths were modeled for both the baseline and uprated fan stages. The initial layout of the geometry used in the aerodynamic analyses is depicted in Figure 5. The study baseline is shown above the centerline and the uprated version is shown below the centerline. The gas generator section length differs between the baseline and the uprated version by 1.75 inches. The baseline engine bypass ratio is 18.6, and the higher performance uprated engine is about 13.5. This difference is reflected in the core/bypass splitter and the core inlet flowpath geometries.

Both flowpath layouts depict variable-geometry, two-position fan jet nozzles. Thus far, it has not been determined by engine and aircraft takeoff, climb and cruise performance analyses that the two-position nozzle system is an essential feature for good performance matching. A full set of engine component off-design maps will be required to obtain adequate performance data to make the determination.

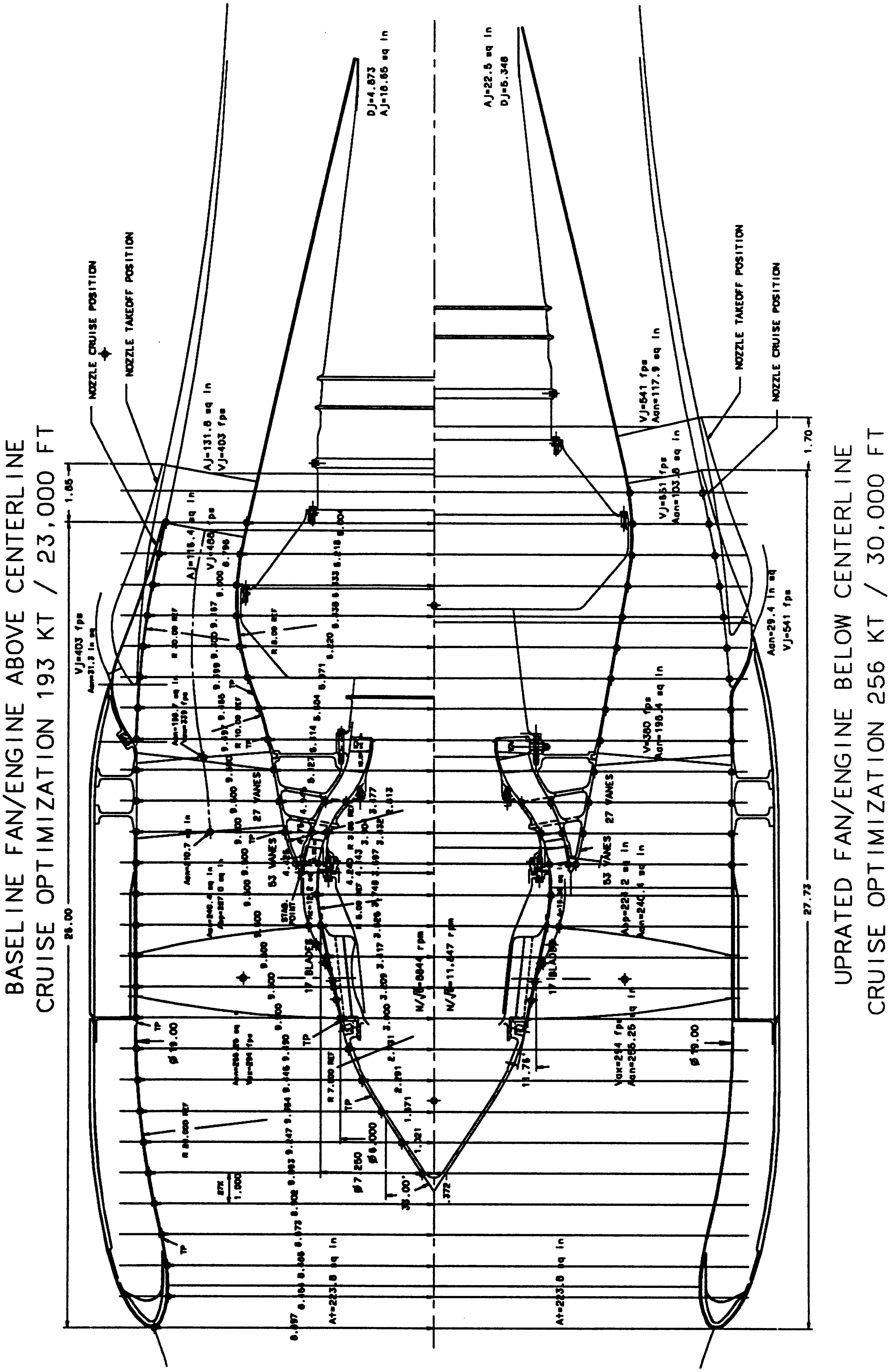


FIGURE 5. Fan system flowpath layouts of baseline and typical uprated turbofans.

3.0 LOW-COST MANUFACTURING INVESTIGATIONS

System studies on general aviation and commuter aircraft are conclusive--substantial cost reductions are required in gas turbine propulsion systems if general aviation and commuter customers are to have the enormous benefits of turbine propulsion. Advanced Propulsion Inc. has determined that there are numerous cost reduction opportunities in predicating new propulsion product lines for these markets. The use of new, lower-cost materials and manufacturing methods applicable to the new classes of is, of course, a fundamental imperative. The fan systems of these potential, new product lines present significant opportunities for advantageous changes in design and manufacture. Larger, more robust fan systems, both rotor and stator elements, and much lower rotor tip speeds are the enabling factors for the future 200 to 400 knot class aircraft propulsion systems that are the subject of this investigation. The change from titanium fan rotors to aluminum or reinforced plastic (composites) has a potential for cost reduction up to a factor of ten. A further substantial cost reduction potential exists for use of these materials in an integrated assembly of fan stator and front frame.

The investigative approach for the present study was to design a 17-bladed fan rotor and a 27-vaned bypass stator/front frame assembly. Such designs could alternatively use aluminum alloys or fiber reinforced plastic, and be produced by relevant high volume rate means.

In the case of aluminum, the rotor could have loose blades and a separate rotor hub. The blades would be precision forged to finished dimensions on all surfaces except the dovetail attachment which would be NC machined. Alternatively, the rotor could be an integrally-bladed (blisk) configuration. Preliminary manufacturing drawings were prepared for these two configurations. These drawings, Figure 6 and Figure 7, were evaluated by several engine parts suppliers. Two clearly best quotations were obtained.

In the case of plastic, an extensive review of candidate materials and production methods was made. The continuous fiber layup method was rejected on the basis much higher cost than the precision injection molding alternative. For the injection molding, a proprietary, graphite fiber/fluorocarbon reinforced polyamide-imide resin was selected on the basis of its having adequate mechanical and heat resistant properties for this application. The drawing prepared for vendor review and quotations is show in Figure 8.

The lowest quotation on the precision forged blade candidate was $86.00 each at volume rates of 2000 per month, with one-time $93,700 tooling charge. The cost was estimated for the forged aluminum, NC-machined hub, assembly and balancing for a total rotor cost of approximately $2500.00. A further estimate was made of the stator elements of a precision investment cast front frame, and the total fan system cost was totaled at about $4000.00 in quantities greater than 1000 units per year. Advanced Propulsion Inc. estimates that this is about 20 percent of the cost a similar-size titanium fan system on a typical low-volume turbofan engine produced for executive jets.

The lowest quotation on the blisk configuration was a ROM estimate of less than $2200.00. Advanced Propulsion Inc. performed cost analyses on its own propritary NC machining and tooling concept. With these methods, total rotor cost is estimated at $1740.00 at production rates between 1000 and 4000 units per year and total fan system cost was estimated at $3800.00 per unit.

The supplier of the proprietary injection molded plastic spent substantial effort in preparing a molded fan blade proposal. Engineering discussions suggested a potential unit price in the area of $25.00. In a separate business decision, the supplier finally declined to submit their quotation. The limited scope of this project prevents further development of injection molded plastic alternatives, despite the low-cost promise.

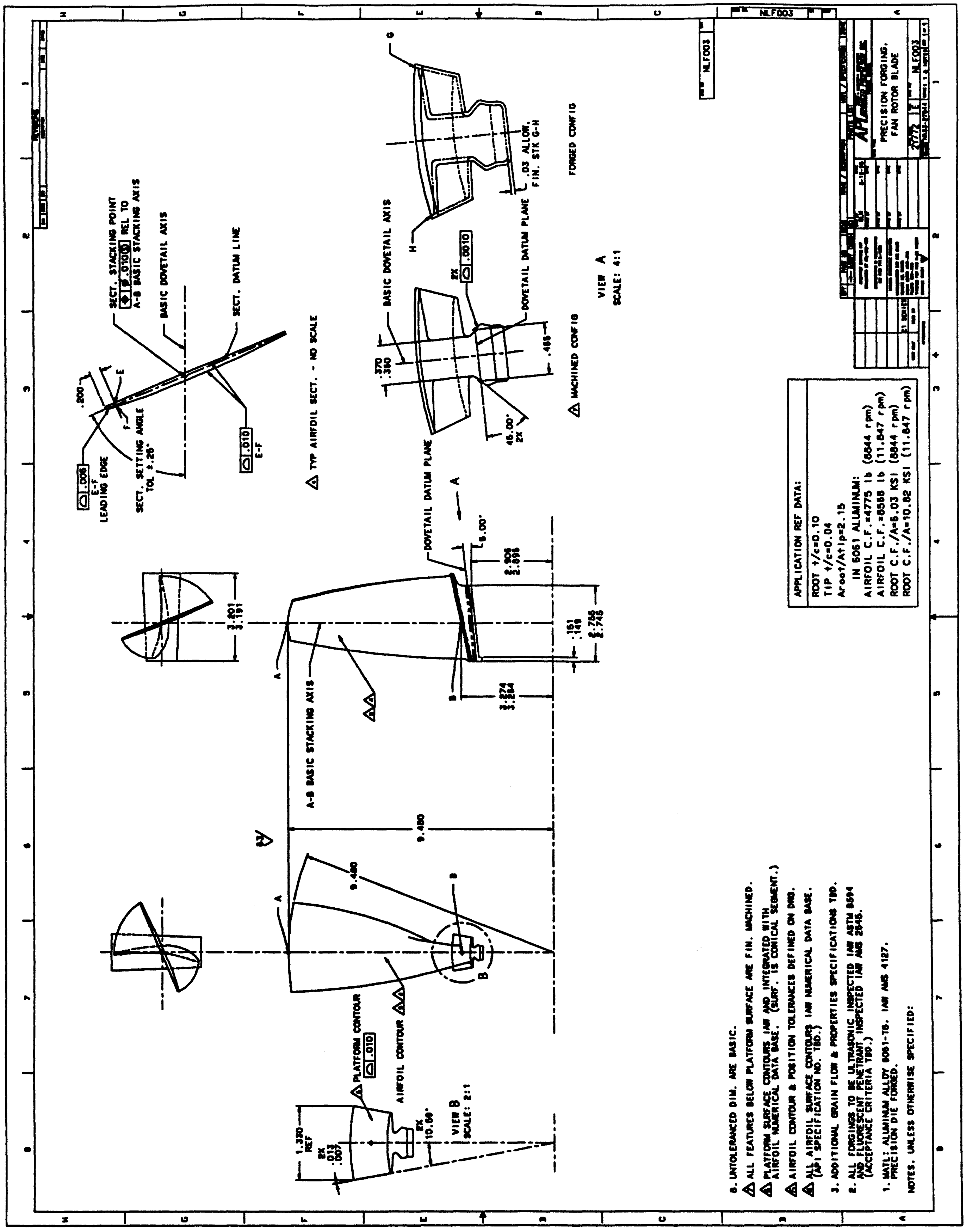
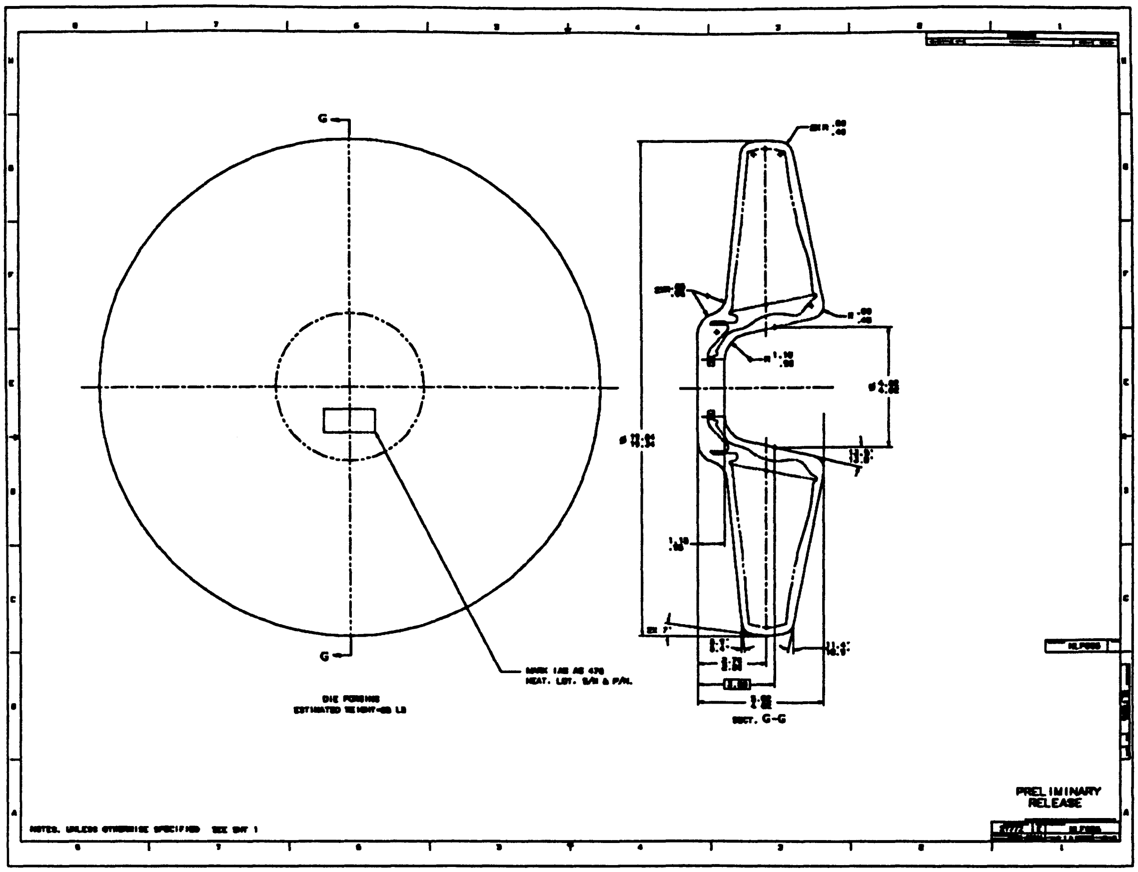


FIGURE 6. Precision forged fan blade preliminary manufacturing drawing.



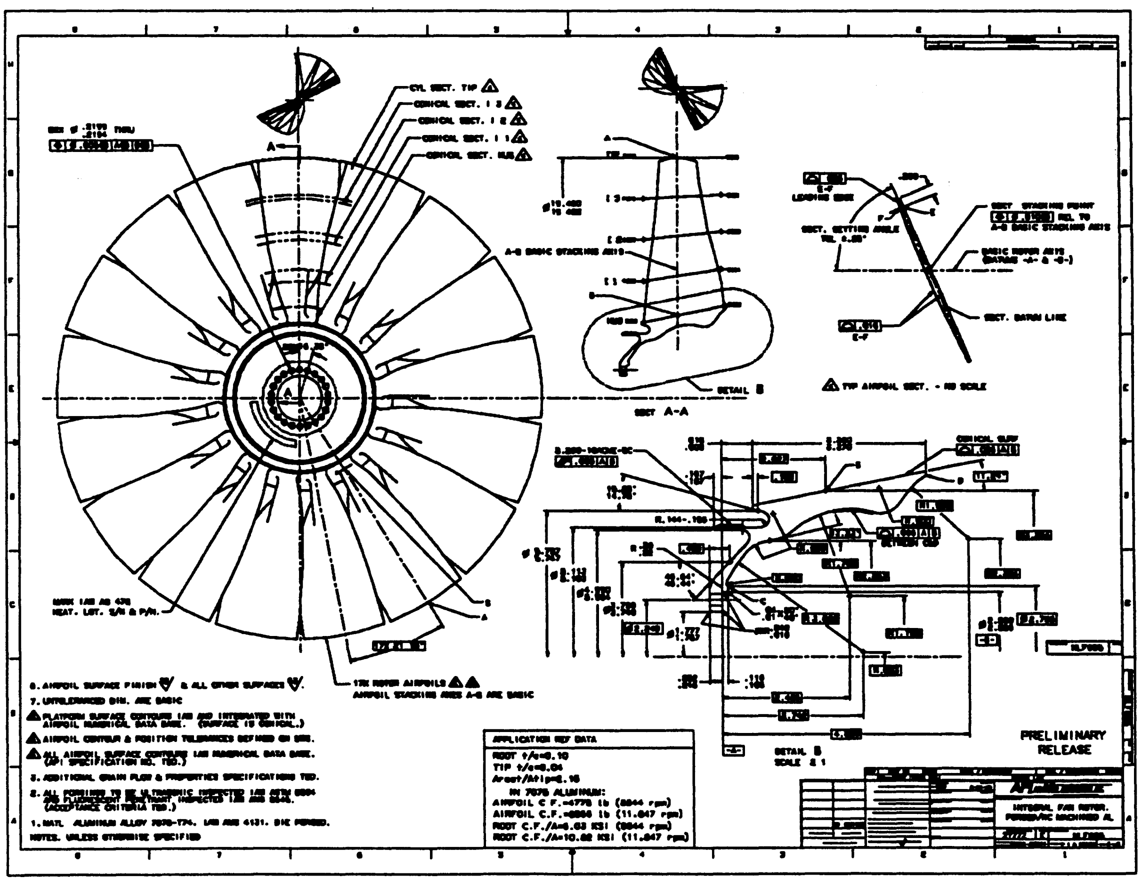


FIGURE 7. Forged aluminum, NC-machined blisk preliminary manufacturing drawing.

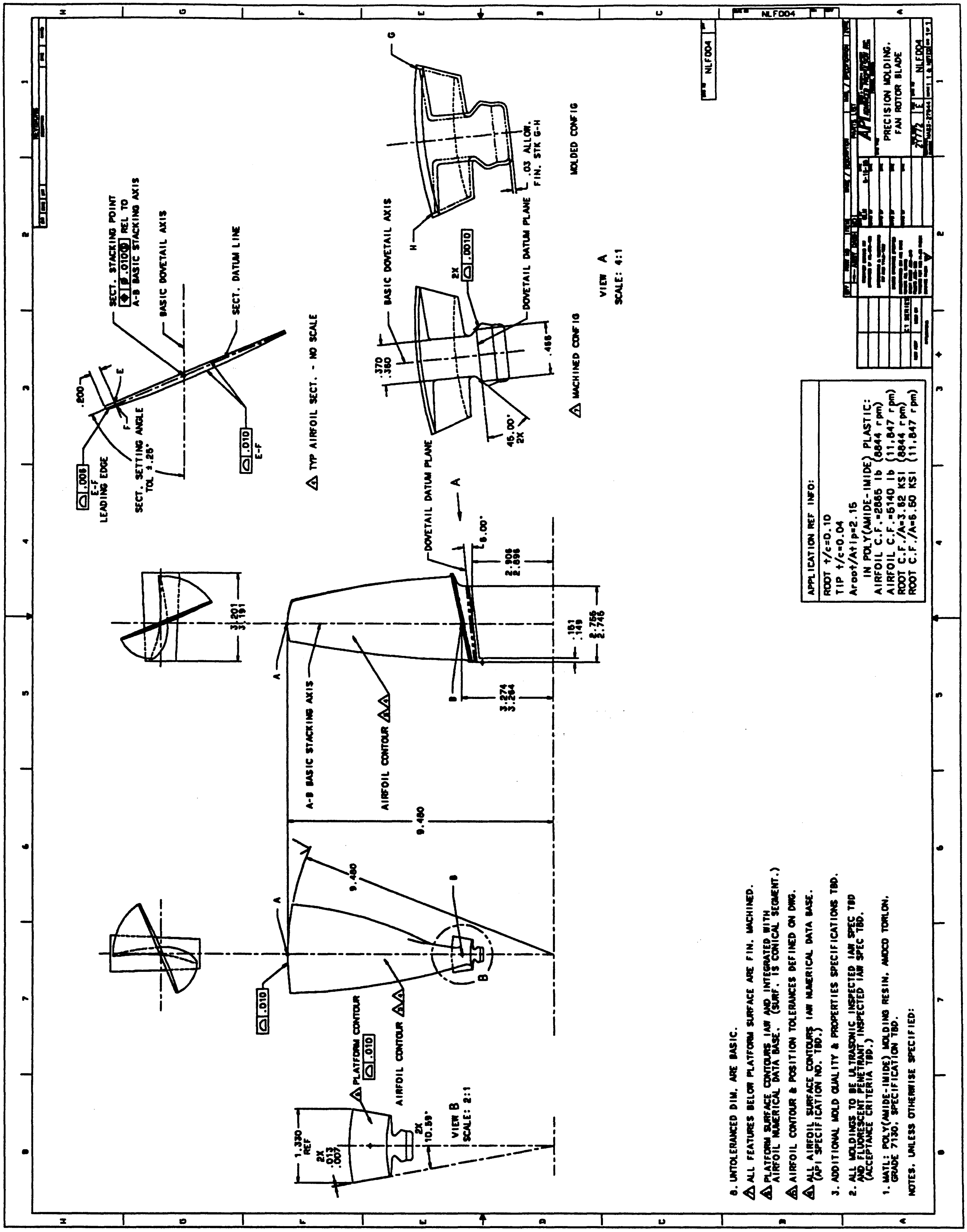


FIGURE 8. Precision molded Torlon fan blade preliminary manufacturing drawing.

4.0 AERODYNAMIC DESIGN AND ANALYSIS

The aerodynamic design and analysis effort was structured to carefully follow the design premises of the baseline stage preliminary design described in Paragraph 2.0 and 2.1. The following is a partial list of the many parameters incorporated in the design/analysis model:

- o Design Corrected Flow, 38.45 lb/sec
- o Design Point Pressure Ratio, 1.10
- o Inlet Axial Velocity, 294 ft/sec
- o Inlet Hub/Tip Ratio, 0.316
- o Inlet Tip Diameter, 19.00 in
- o Rotor Corrected Tip Speed, 734 ft/sec
- o Rotor Corrected Speed, 8844 rpm
- o Rotor Blade Aspect Ratio, 1.88
- o Blade Root Thickness/Chord, 10 percent
- o Blade Tip Thickness/Chord, 4 percent
- o Number of Rotor Blades, 17
- o Stator Vane Aspect Ratio, 1.8
- o Number of Stator Vanes, 27

The commonly-used U.S. Air Force compressor design program, UD0300M, was used to model and perform parametric analyses on the baseline fan stage. (The version of the code obtained from the Air Force lacked an output data plotting routine and did not include provision for splitting core/bypass flow ahead of the fan stator. Writing new code, Advanced Propulsion Inc. was able to correct the latter deficiency but not the former.)

Initial runs of the baseline stage configuration clearly demonstrated that the preliminary design was valid. Appendix A of this report is a complete output of one of these runs showing over 90 percent isentropic efficiency.

It was originally planned to perform a broad range of parametric analyses, including variable parameters such as diffusion factor, aspect ratio, rotational speed, finish and tip clearance. The continuing difficulties in using UD0300M made this impractical, and high efficiency predictions in the early results obviated the need.

The parametrics that were performed were encouraging however. For example, modelled with substantially higher axial velocity and lower diffusion factors, the stage was shown to drop about 1.5 percent in efficiency. This demonstrated that the initial baseline is essentially correct. In a later effort, rotor hub contouring was explored, resulting in a stage efficiency increase of about one percent. This put adiabatic efficiency near the 92 percent efficiency goal.

The final blisk rotor configuration with the beneficial hub modification is shown in full scale in Figure 9.

It is essential that low pressure ratio fans for lower flight-speed airplanes have good operating characteristics, including high surge margins at the design point, broad efficiency islands and broad flow range between surge and choke. In an initial evaluation, the baseline stage was shown to have these desireable characteristics.

The limited scope of this program prevented full development of a definitive fan stage aerodynamic design. The program did achieve a well developed go-foward baseline and the analytical results yielded high confidence in the potential to achieve 92-to-93 percent efficiency with implementation of a computational fluid dyanamics design effort.

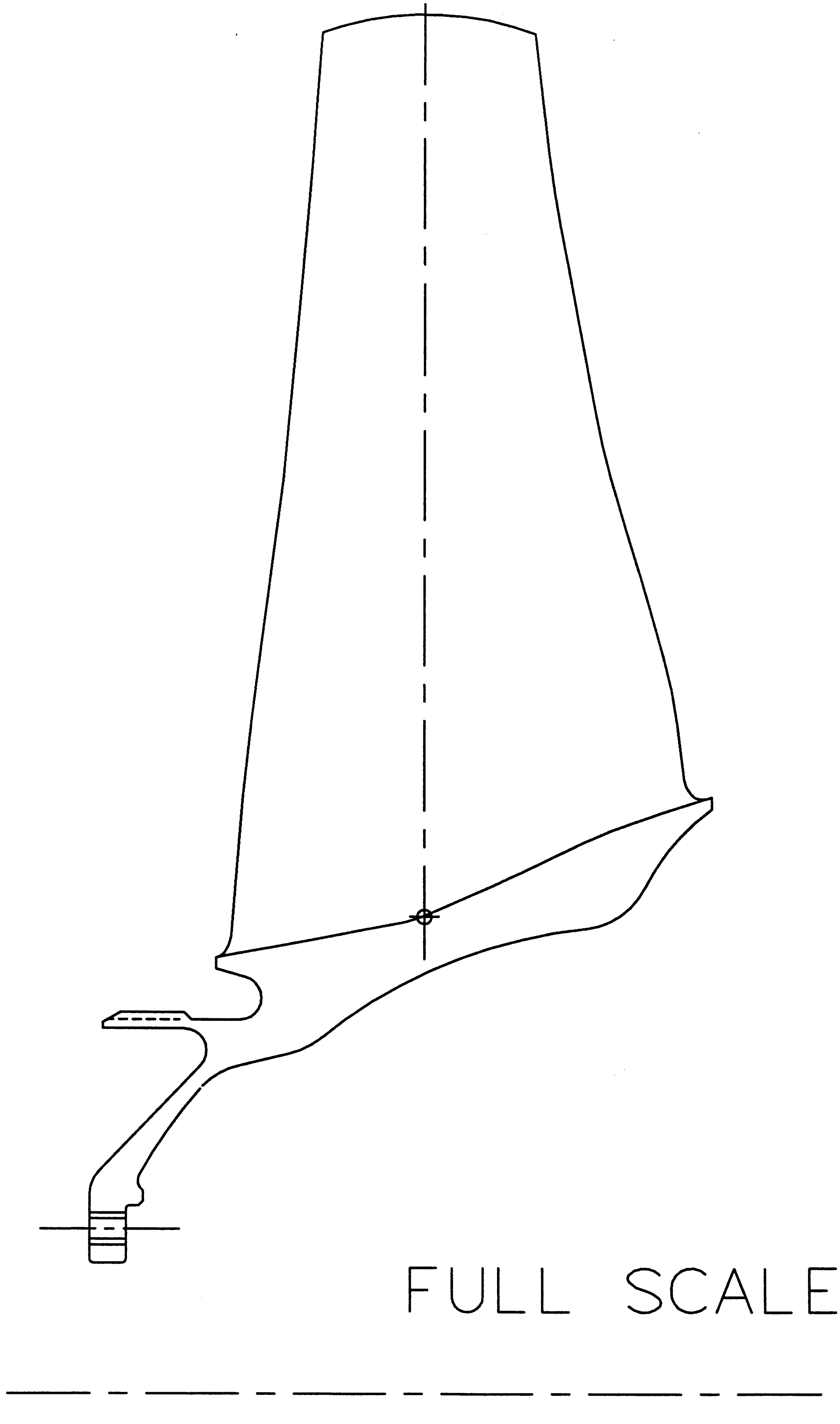


FIGURE 9. Final blisk rotor configuration from aerodynamics design/analysis effort.

5.0 MECHANICAL DESIGN AND STRUCTURAL ANALYSIS

The mechanical design and structural analysis task element of the program was structured as an extensive preliminary design review. It covered essentially all design suitability elements applicable to the fan system of a FAR Part 33 certified turbofan engine. To assure that the low-cost, efficient fan system designed in this program is valid in terms of stringent engine mechanical design criteria, the effort was comprehensive. The list of criteria examined in this program is provided in Figure 10.

The ability of the fan system design to meet one-pound and four-pound bird strike criteria for FAA certification is of utmost significance. It is the usual concensus that only carefully designed and tested, larger titanium fans on engines for executive and commercial aircraft can meet this test. Advanced Propulsion Inc. has determined by extensive analyses that the aluminum, blisk-configuration fan defined in this program will also meet the criteria and pass the one-pound and four-pound bird strike test.

The Figure 11 through Figure 16 show the detailed bird strike evaluation methods and results. The material presented in these figures is comprehensive and self explanatory. It should be noted, however, that the blisk material of choice was changed from aluminum alloy 6061-T6 to alloy 7075-T73 in order to provide substantially greater stress margins for bird strike events and increased fatigue life.

The low blade rotational and relative velocities of the low-cost, efficient fan system design are important factors in the ability to meet bird strike criteria. This same feature of the design contributes to its remarkable resistance to rain and sand erosion. A similar amount of work was done on the erosion problem, but this work is not presented in detail in this report. The basic result is that the low-speed aluminum fan calculated erosion rate is almost exactly equal to the rate on conventional high-speed titanium fans. Also, it was concluded that the performance degradation effects will be less on the aluminum fan because the airfoils have more robust thickness/chord ratios and leading/trailing edge thicknesses, plus, the fact they operate in the low-to-medium subsonic range--not the transonic/supersonic range of typical titanium fans.

The blade airfoils were modelled for extensive computer stress, deflection and vibration analysis under dynamic and aerodynamic loads. The results provided in representative plots included in Appendix B show that the current design is a conservative, successful design. A further indication of this is illustrated in the classic Campbell Diagram depicted in Figures 17 and 18. The various vibratory modes are exactly where they are desired to be versus the rotational speed scale. Figure 17 through Figure 22 show the methods and results of the analyses of vibration margins, low cycle fatigue and high cycle fatigue. The predicated Installation Manual (IM) limits distortion limits are well above typical field distortion. The overall structural analysis results indicate the low-cost, efficient fan design is conservative and successful.

The precision-forged, loose-bladed configuration and the reinforced plastic configuration, as well as the aluminum blisk, were carried through the entire structural analysis task. A complete dovetail design/analysis effort was conducted for both the aluminum and plastic blades, enabling the loose-bladed option to be exercised if it were determined to be the low-cost option. (The blisk configuration was finally selected.)

One of the principal goals of the mechanical design and structural analysis tasking was to assure that the design met a fan system weight goal of less than 15 pounds. The goal was achieved. The solution fan rotor blisk weighs an estimated 9 pounds and the stator elements of the front frame assembly weigh 5 pounds. The total estimated weight of 14 pounds is about one-third the weight of a conventional, constant-speed propeller system capable of absorbing the same 200+ horsepower load.

19 INCH FAN, 17 BLADES
MECHANICAL DESIGN SPEED
9000 RPM, 747 FT/SEC TIP SPEED

FOD
NPRM PROPOSED RULES FOR BIRD
ONE,1.0 LB BIRD @ T/0 CONDITION, V=NORMAL FLIGHT UP TO 1500FT.
75% THRUST POST EVENT
ONE,4.0 LB BIRD @ 200 KNOTS
CONTAINED,MOUNTED,SHUTDOWN,NO FIRE
HAIL

ICE

WATER

BLADE OUT
1.5 BLADE IMBALANCE FOR BLADED DISK
1.0 AIRFOIL IMBALANCE FOR BLISK
NO ATTACHMENT UNZIPPERING

CONTAINMENT
OUTERMOST RETENTION FEATURE FOR BLADED DISK
80% AIRFOIL FOR BLISK

BURST SPEED
135% DISK
135% SHEDDING FOR BLADES

VIBRATION
1/REV OR 2/REV BLADE
FLUTTER PARAMETER GOALS
1.6 TORSION
.33 BENDING
125% MARGIN ON DISK DIAMETRAL VIBES

LCF
100,000 CYCLES BLADE & DISK ATTACHMENT (BLADED DISK)
100,000 CYCLES DISK

GYRO
3.5 RAD/SEC, 10E07 CYCLES

PRELIMINARY DESIGN CRITERIA (PDR)

MATERIALS.
METALLIC
SELECTION REQUIRES MIN ELONGATION = OR >7%
MAX OPERATING TEMP 200 DEG F
ATTACHMENT CONTACT FACE COAT ASSESSMENT REQ'D FOR FRET
AIRFOIL HARDNESS ASSESSMENT REQ'D FOR FOD

BIRD
1.0 LB LOADING TO BE MAXIMIZED BETWEEN 50 AND 150 KNOTS
MAX L.E. SHEAR STRESS < Fsu .
FOLD-OVER DAMAGE ASSESSMENT TO BE MADE FROM BENDING STRESS;
< 1% BLOCKAGE PERMITTED.

4.0 LB LOADING TO BE BASED ON 200 KNOTS.
MAX L.E. SHEAR STRESS < Fsu.
BIRD VELOCITY THAT SETS L.E. SHEAR AT Fsu TO BE DETERMINED.

DISK BURST SPEED
135% OF MECH DESIGN SPEED.
BURST FACTOR = .9
SIG AVG TANG = .9 X Ftu @ 200 DEG F AND N= 1.35 X 9000 RPM.
DISK BORE STRESS
MAX STRESS WITH RING BENDING INCLUDED < Ff @ 100,000 CYCLES.

ATTACHMENT DESIGN (BLADED DISK)
10% STRONGER THAN AIRFOIL ROOT FOR BENDING AND SHEAR LOADS.
135% SHEDDING SPEED REQ'D; LOBE SHEAR < Fsu, LOBE BENDING < 1.5Fty,
NECK TENSILE < Ftu.
OPERATING BEARING STRESS < .67Fty
MAX STRESS WITH Kt < Ff @ 100,000 CYCLES.
HOOP STRESS FIELD TO BE ISOLATED FROM HOOK STRESS FIELD BY ELLIPTICAL FILLET.
INFLECTION POINT FROM RING BENDING TO BE ASSESSED IN DISK SLOT.
CANTED DOVETAIL BEAVER TOOTH OR EQUIV..AXIAL LOAD CAPACITY
135% SHEDDING SPEED
MAX STRESS WITH Kt, < Ff @ 100,000 CYCLES
DOVETAIL FRICTION FACTOR = .05

BLISK RIM DESIGN
20% STRONGER THAN AIRFOIL ROOT FOR BENDING LOADS.
LCF TO BE CONTROLLED IN AIRFOIL SECTION OF TRANSITION FILLET
1ST BENDING MODE WEAK SECTION >20% SPAN

VIBRATION
1/REV BLADE TO HAVE 10% FREQ MARGIN ON 1E @ 105% SPEED
GOAL TO PASS THROUGH 2E @ < 50% SPEED.
INLET DISTORTION(CDI) ALLOWED (2E) OF 3% FOR BLADED DISK, 2% FOR BLISK AT RESONANT 2E SPEED.
2/REV BLADE TO HAVE 10% MARGIN ON 2E @ 105% SPEED.
GOAL TO PASS THROUGH 3E @ LOWEST SPEED POSSIBLE.
CDI ALLOWED (3E) OF 3% FOR BLADED, 2% FOR BLISK @ RESONANT SPEED.

FIGURE 10. Structural design criteria and requirements list for low-cost fan system.

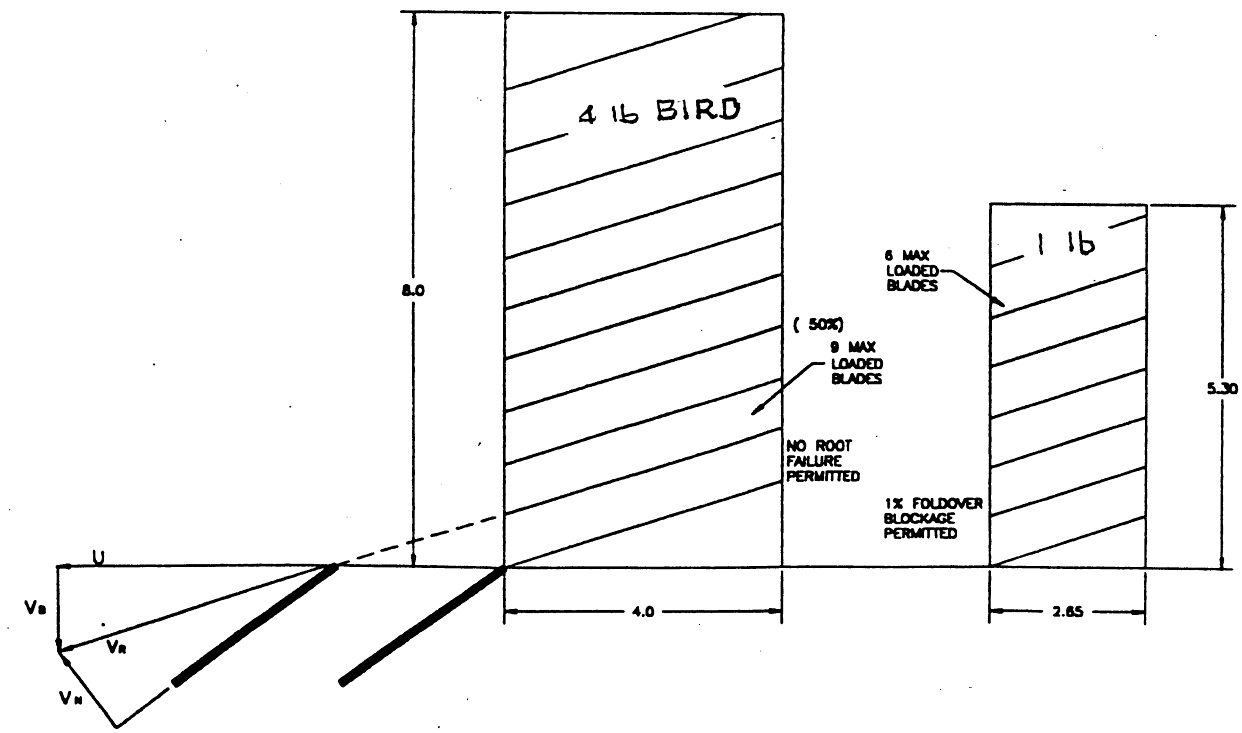


FIGURE 11. Bird slicing at 100 knots -- (maximum MVn at 100 knots).

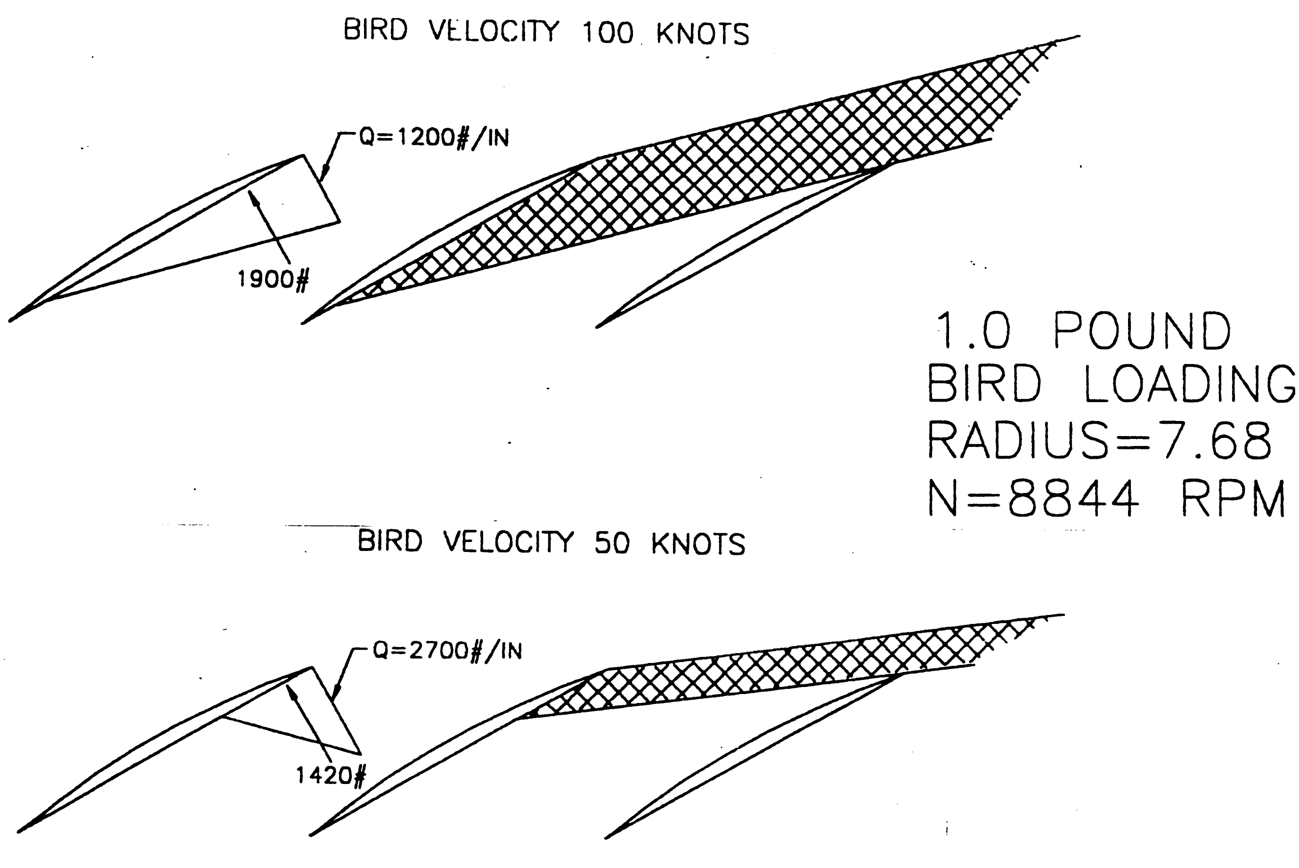


FIGURE 12. Lower bird velocity maximizes unit loading at leading edge.

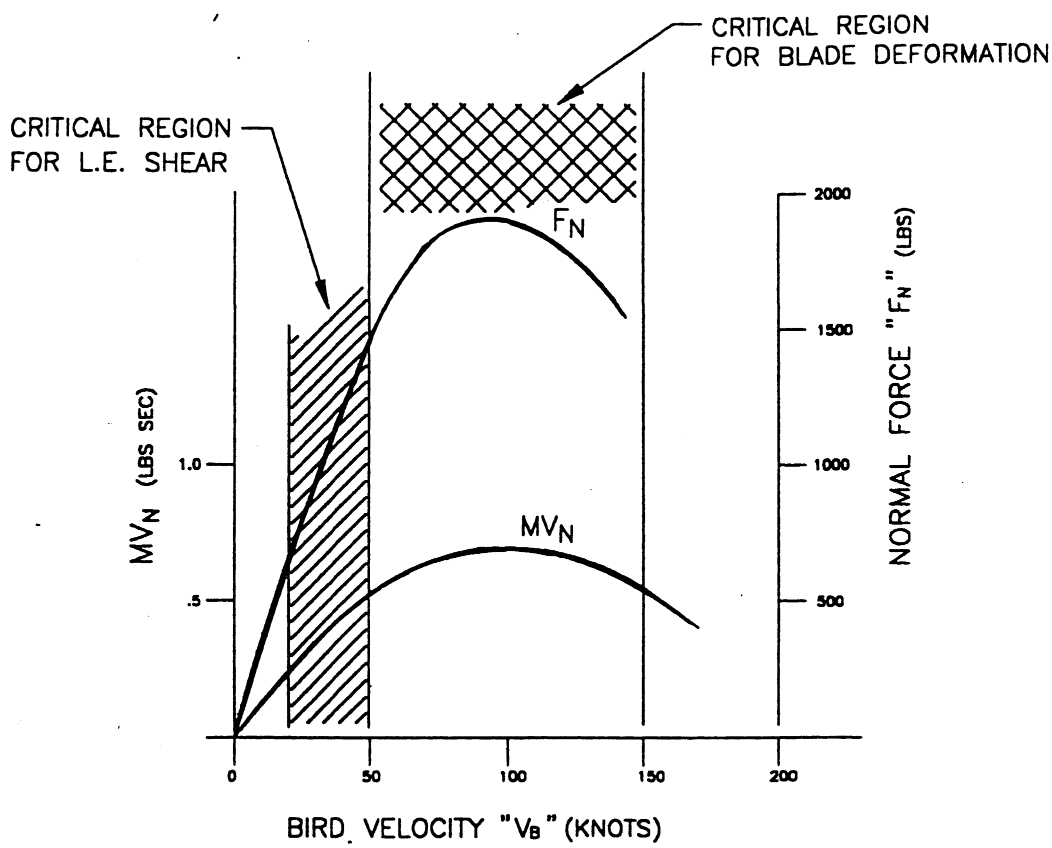


FIGURE 13. One-pound bird strike, 7.68-in radius, 8844 rpm -- two critical regions.

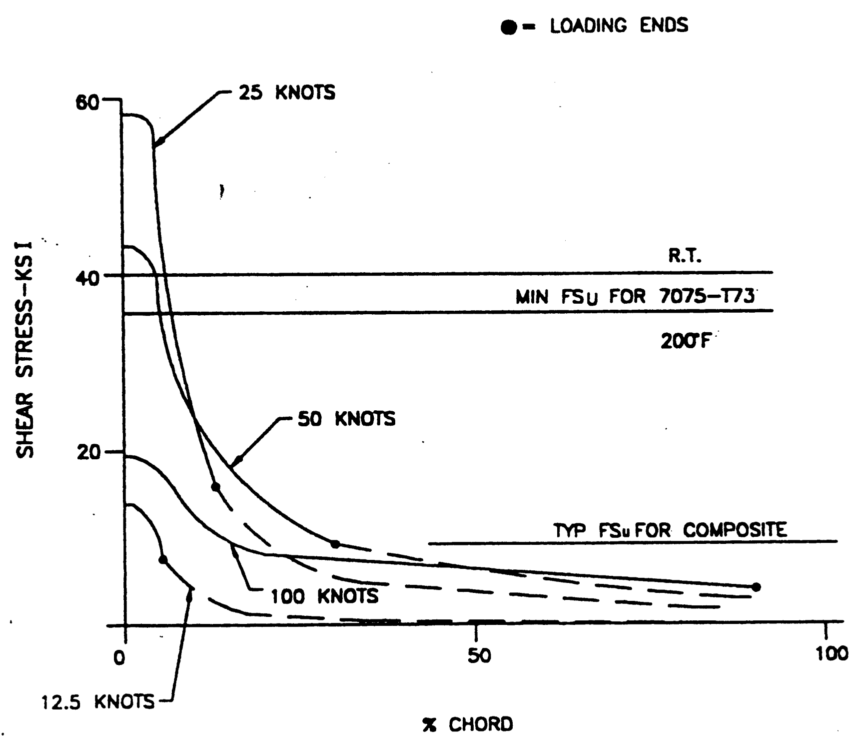
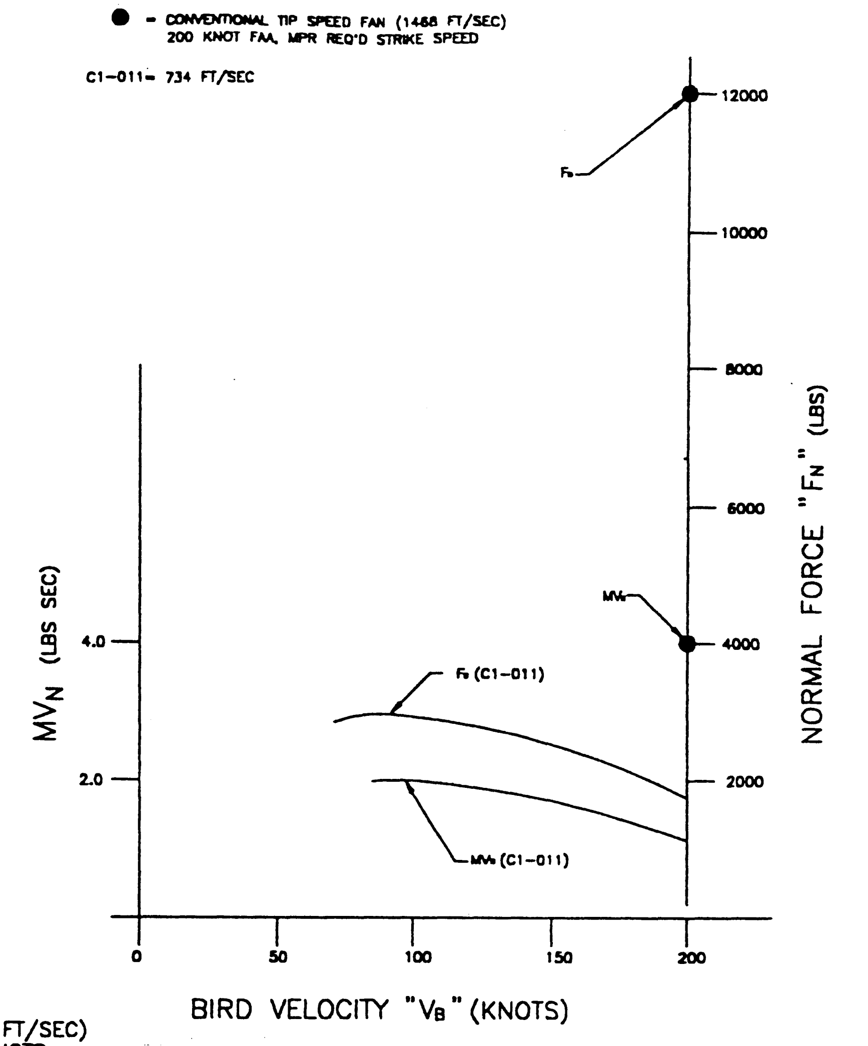


FIGURE 14. One-pound bird strike, 7.68-in radius, 8844 rpm -- shear stress vs chord.

FIGURE 15. Bird loading would be much higher at typical titanium fan tip speed of 1468 fps than on the low-cost aluminum fan for lower-speed aircraft.



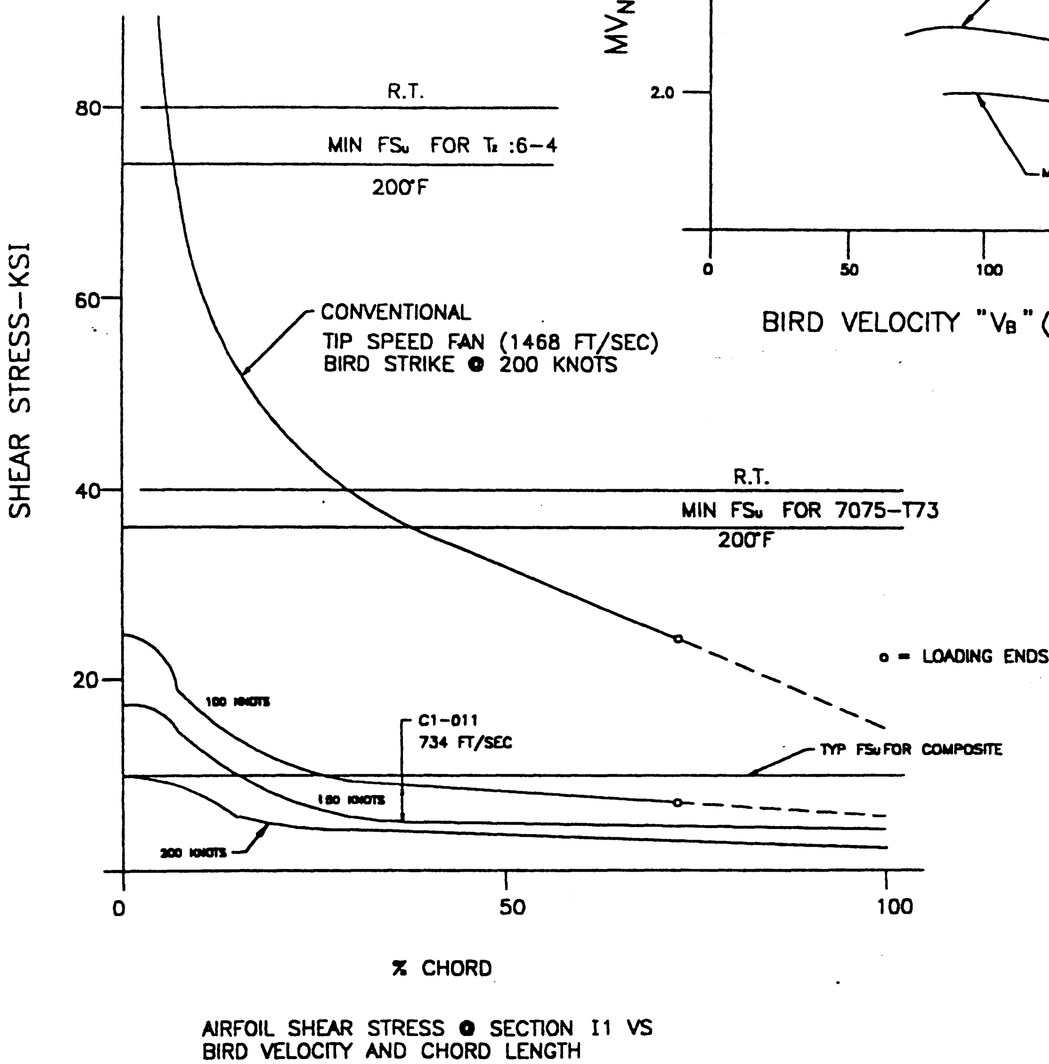


FIGURE 16. Shear stress margin is higher on low-cost aluminum fan than on a conventional, high tip speed titanium fan for 0.8 Mach aircraft.

FIGURE 17. The Campbell diagram for baseline aluminum fan rotor blade.

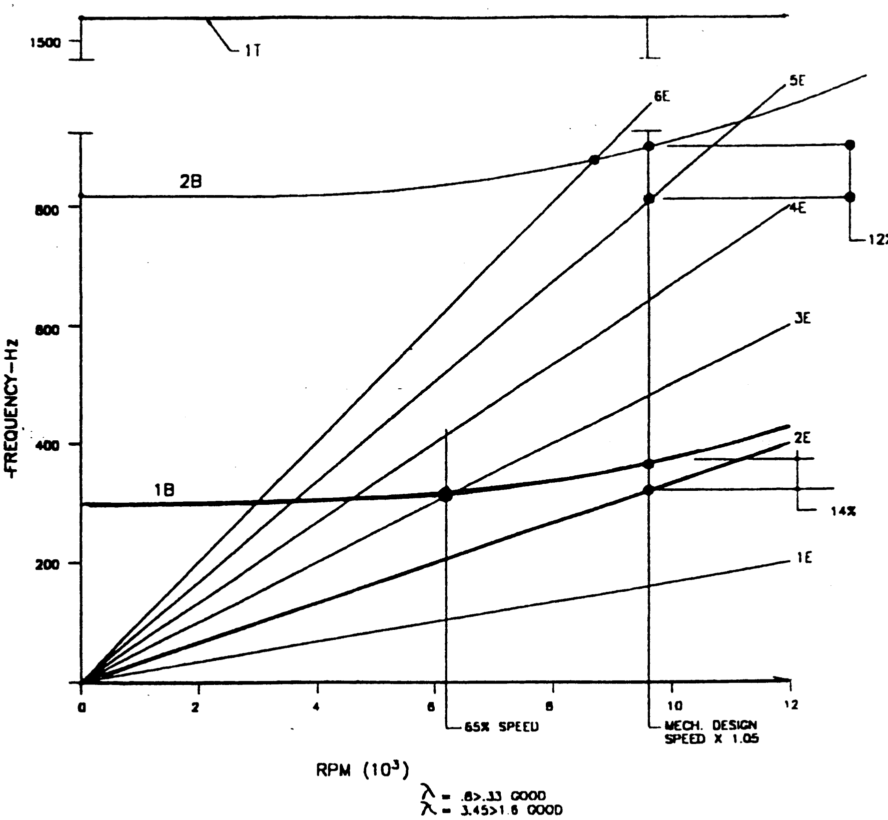
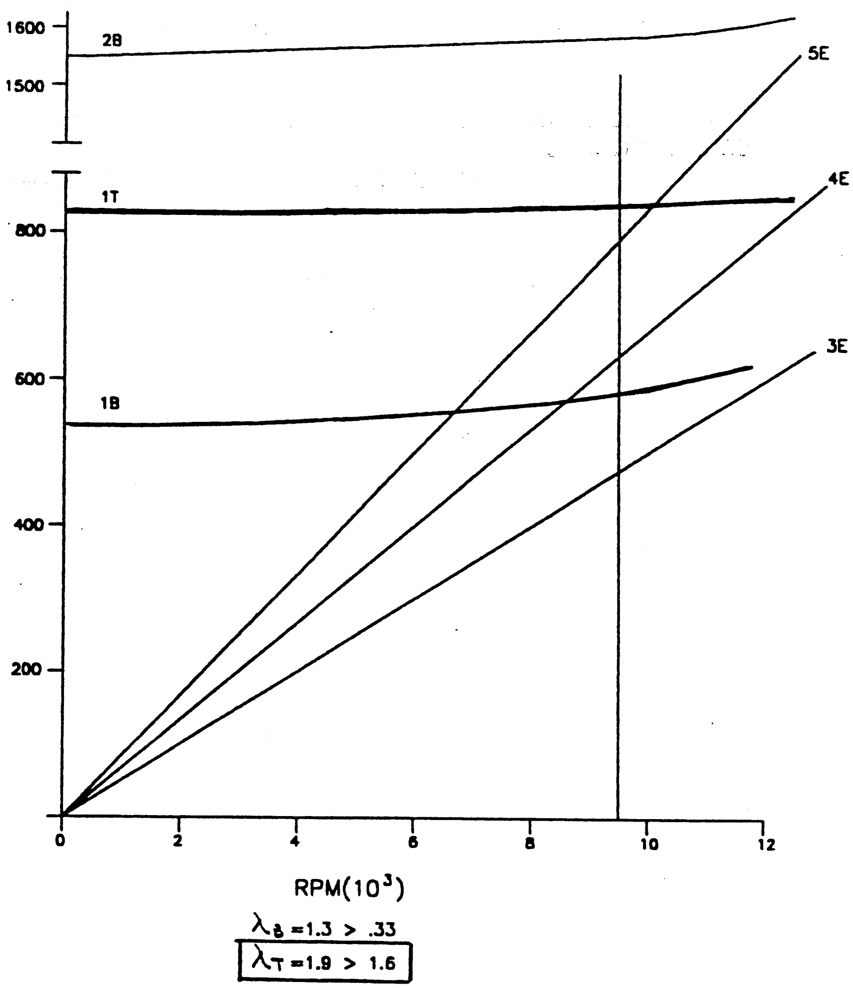


FIGURE 18. Campbell diagram for composite fan rotor blade.



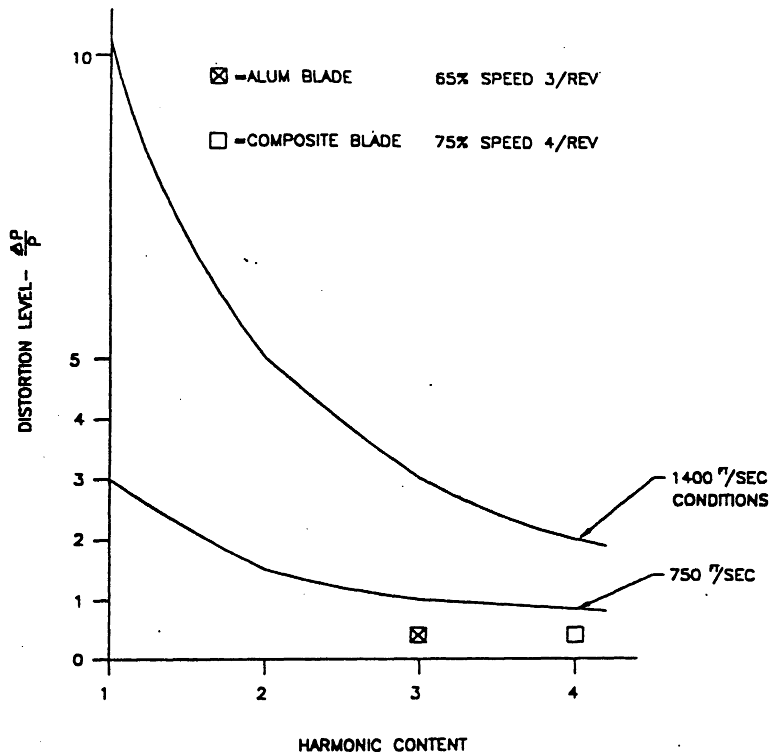


FIGURE 19. Typical inlet distortion decrease with tip speed and harmonic order.

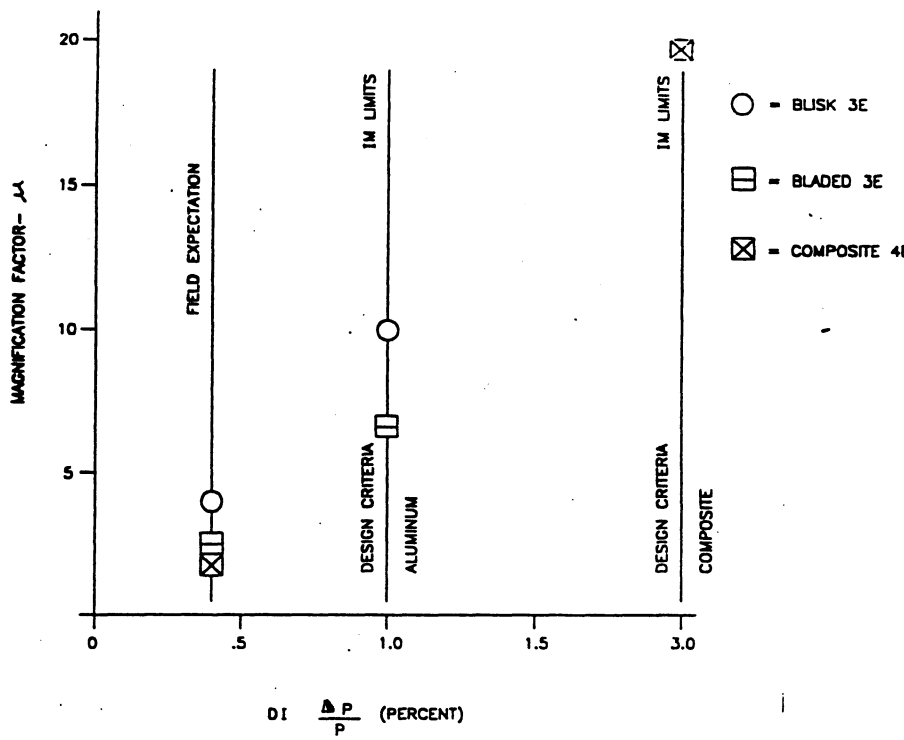


FIGURE 20. IM limits well above field distortion. Composite has high margin.

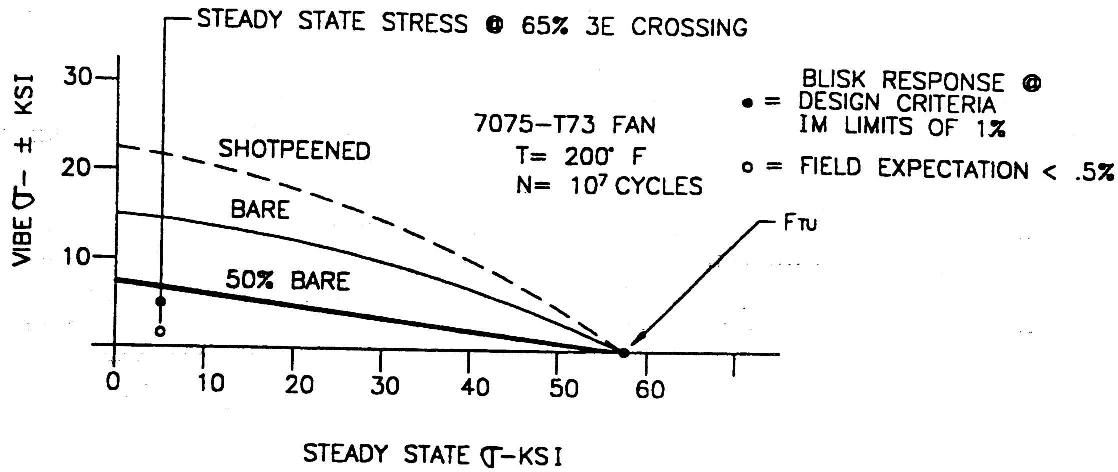


FIGURE 21. Aluminum blade meets 50% criteria for high cycle fatigue at IM limits. Add shot peen processing for increased robustness.

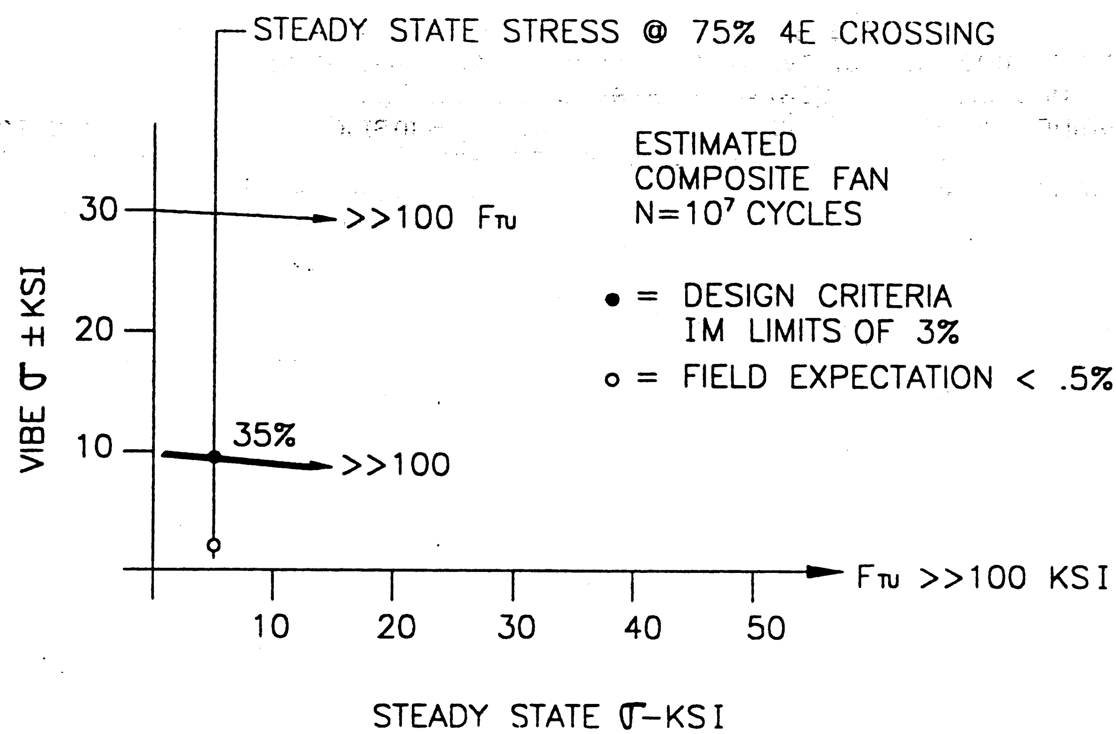


FIGURE 22. Composite blade has high vibration margin. IM limits have factor of three.

6.0 FAN-TECHNOLOGY APPLICATIONS AND BENEFITS

The efficient, low-cost fan system as defined in this investigation is applicable to turbofan engines in the 500-to-5000 pound thrust range, mission-optimized for shorter-range, lower-speed aircraft. General aviation and low-density, shorthaul aircraft represent about eighty five percent of all aircraft in the world. Their missions specifics are such that 200 to 400 knots is the pertinent cruise speed range. Turbofans of much lower fan pressure ratio, and higher consequent bypass ratio, are required for optimal aircraft mission performance in this cruise speed range.

The prior general aviation private aircraft system studies conducted by Advanced Propulsion Inc. provide substantive evidence that fans of this kind are essential to meet future requirements for private aircraft takeoff, climb rate and cruise performance, fuel efficiency, 90% reduction in community noise and 95% reduction in cabin noise and vibration.

6.1 LOW-DENSITY, SHORTHAUL AIRLINERS

Typical missions for low-density, shorthaul airliners dictate performance optimizations for stage lengths ranging from 75 to 250 miles and payload/range capability to give three stages between fuelings. About 10,000 such airplanes in worldwide service have cabin capacities in destinct groupings; e.g., 8-12, 19, 30 and about 45 passengers. Airliners having greater capabilities than this so-called commuter class are properly termed regional airliners.

Past low-density, shorthaul airliners are all powered by piston/propeller and turboprop propulsion systems made available by engine and propeller manufacturers. All these airplanes have cruising speeds in the range of 200 to 300 knots--essentially optimal for the shorter stage lengths on which they are used.

Advanced Propulsion Inc. has conducted extensive system studies of optimized-turbofan propulsion for airliners having exactly the same capacity and performance capabilities as the past, existent world fleet. Figure 23 is a three-view drawing of a 19 passenger study aircraft. It is annotated with a large amount of technical data.

Figure 24 is a table comparing pertinent data on this preliminary design with data on two existent airliners having comparable capacity and performance in every aspect. The salient attributes of the turbofan-powered study airplane are that it is about three-quarters the weight of the turboprops and has about three-quarters the mission fuel consumption. Not shown on the chart are the estimates of 12 EPNdB lower takeoff and sideline noise and about 15 dB(A) reduction in cabin noise and vibration levels.

The engine in this preliminary design would use a fan of the kind that is subject of this investigation. The 29-inch diameter fan would pass 118 lb/sec of corrected airflow and have a pressure ratio of 1.145. The turbofan predicated has 1800 pounds thrust and a bypass ratio of about 15. This turbofan is merely typical of a variety of engines studied that are applicable to 200-to-300 knot class low-density, shorthaul airliners ranging from 12 to 66 passenger capacities.

After two decades of growth in the regional-airline turboprop fleets, a sudden and unexpected change of course is underway. During the past four years, two new turbofan-powered, 50-passenger regional jets have come to dominate this market, garnering orders for about 650 airplanes. Development of additional, smaller and larger turbofan-powered aircraft for the regional market have been announced. All of the new airplanes will be produced by overseas manufacturers. The U.S. producers that once dominated the small turboprop airliner markets are no longer major competitors.

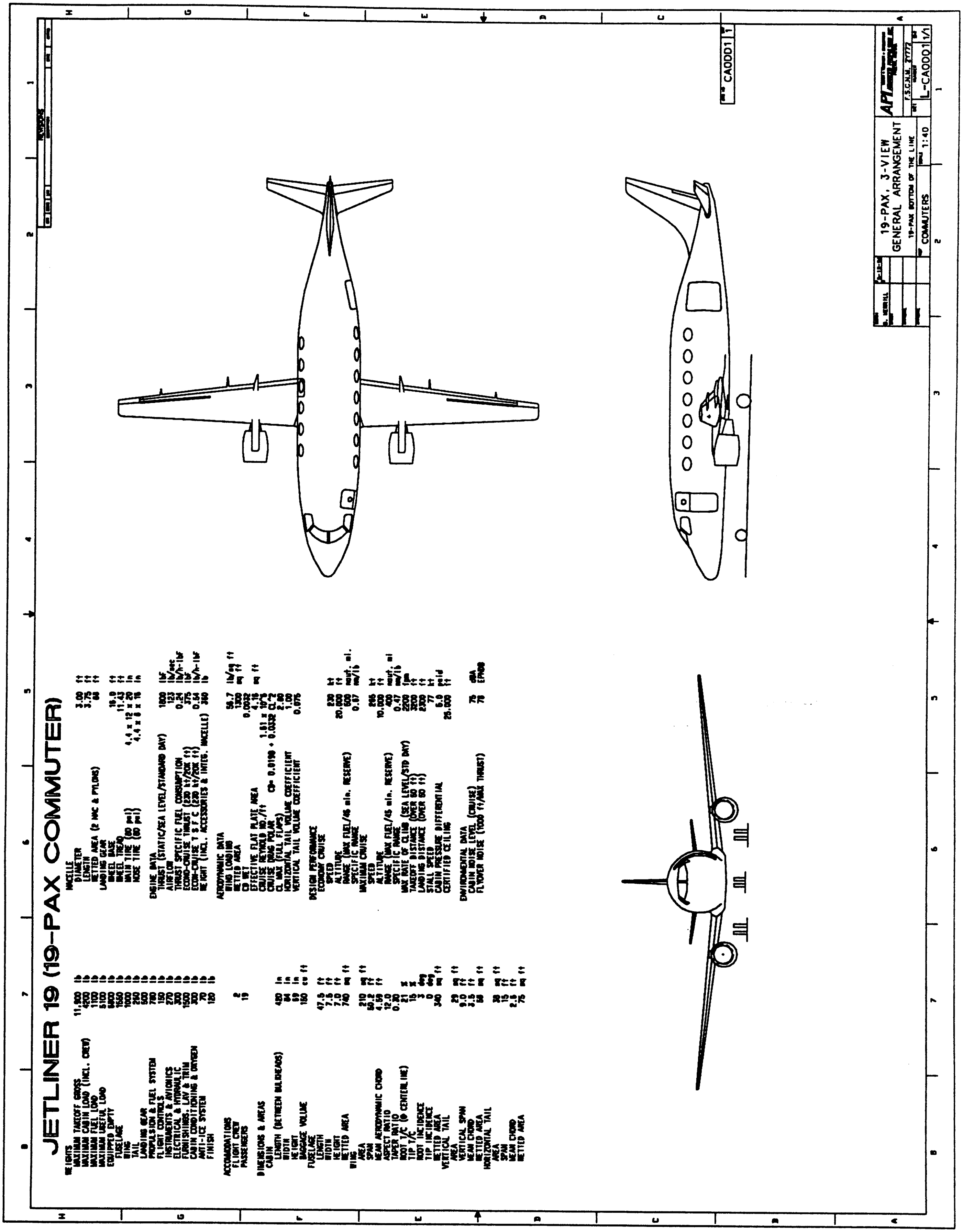


FIGURE 23. 19-Passenger low-density, shorthaul airliner preliminary design study.

	API JETLINER 19	BEECH RAYTHEON 1900C	BAe JETSTREAM 31
PROPULSION SIZE/TYPE	TWO 1800 LBf TURBOFANS	TWO 1100 SHP TURBOPROPS	TWO 940 SHP TURBOPROPS
ACCOMODATIONS	TWO CREW/19 PASSENGERS	TWO CREW/19 PASSENGERS	TWO CREW/19 PASSENGERS
MAX TAKEOFF WEIGHT (lb)	11,900	16,600	15,212
EMPTY WEIGHT (lb)	6800	8700	9570
INST'D. PROPULSION WEIGHT (lb)	720	1890	1690
MAX USEFUL LOAD (lb)	5100	7900	5642
MAX PAYLOAD (lb)	4200	5300	3980
MAX FUEL (lb)	1100	2848	3024
MAX CRUISE SPEED/ALT (kt/ft)	265/12,000	256/8000	263/15,000
ECON CRUISE SPEED/ALT (kt/ft)	230/20,000	235/25,000	230/25,000
MAX RANGE (nm)	500 (PLUS RES.)	794 (PLUS RES.)	675 (PLUS RES.)
MAX SPECIFIC RANGE (nm/lb)	0.67	0.47	0.45
MAX RATE OF CLIMB (ft/min)	2200	2330	2080
TAKEOFF DISTANCE (ft)	3200	3260	3200
STALL SPEED (kt)	77	87	86
WING AREA (sq ft)	210	303	271.3
WING SPAN (ft)	50.2	54.5	52.0
FUSELAGE LENGTH (ft)	47.5	53.1	44
FUSELAGE DIAMETER (ft)	7.50	5.8	6.5
CABIN WIDTH (in)	84	54	73
CABIN HEIGHT (in)	66	57	71
SEAT PITCH(in)	31	30	29
BAGGAGE VOLUME (cu ft)	150	182	90
CABIN NOISE LEVEL (dbA)	75	90	93
ESTIMATED PRICE	$2,700,000	$3,500,000	$3,800,000

FIGURE 24. Favorable comparisons of 19-passenger turbofan study airplane with existent 19-passenger turboprop low-density, shorthaul airliners.

The explosive growth in the new, smaller regional jet market is accounted for by two principal factors. First, passenger acceptance is phenomenal. The airplanes are being used on some routes where passengers have come to expect turboprop service--service that has become increasingly unacceptable to travelers. Second, the airplanes are adequately low in total operating cost on stage lengths averaging 300 miles or greater. Although the turbofan engines on the small regional jets are all optimized for 0.80 Mach in the stratosphere, they provide reasonable seat-mile fuel burns on route stage lengths of 300 miles or more.

An upshot of the new regional jet market is that airlines are withdrawing from short-stage-length commuter markets while expanding into increased-stage-length regional markets. They are, thereby, depriving an increasing number of small communities of scheduled passenger service. Twenty years ago, average low-density, shorthaul stage lengths were about 100 miles. Today, average stage lengths are approaching 200 miles, and they are increasing rapidly.

As new turbofans were the enablers of the new regional jet aircraft and the expanding regional airline markets, it is reasonable to believe that additional, new mission-optimized turbofans could yield new aircraft for a revitalized, true, low-density, shorthaul market. It has been shown that it would be advantageous for the new turbofans to use the fan system designs investigated in this study.

6.2 REDUCED NOISE WITH EFFICIENT, LOW-COST FANS

The low tip speed, low pressure ratio fans that are subject of this investigation are expected to yield engines and aircraft having much lower community noise levels than any previously available examples.

On average, properly matched engines using these fans will have both core and fan jet velocities less than half those of typical executive jet and commercial airliner turbofans. Combining the eighth-power-of-velocity law (applying to jets) and the fact that the engines will be substantially lower in thrust level, the average engine exhaust signature will be about 30 dB quieter than the average executive jet turbofan engine. It will be far quieter in takeoff, sideline and 1000 foot flyover noise than any governmental regulations currently in effect or even visualized.

All but the highest pressure ratio versions of the efficient, low-cost fans premised in this study will have subsonic tip relative Mach numbers. Therefore, the characteristic buzzsaw signature contribution of transonic fans will be subliminal or non-existent. With fan blade passing frequencies of 1000 hertz or less at approach thrust settings, it is expected that approach noise profiles will be about equal to the aircraft on which the engines are installed.

Furthermore, on the smaller turbofans to which this fan technology is applicable, the core compressor, core turbine and fan turbine blade passing frequencies are all well above the audible range of the human ear at normal thrust settings, from flight idle to maximum. Their contributions to aircraft noise will be nil.

A specific evaluation was made of the 500-pound thrust class turbofan using the 19-inch diameter fan subject of this study. In a comparative analysis, it was determined that the 1000-foot maximum-power flyover noise signature of a bare, unattenuated engine would be less than 65 EPNdB. This is less than the background noise level of a typical suburban general aviation airport.

7.0 CONCLUSIONS

The conclusions that Advanced Propulsion Inc. has drawn from the results of i investigation are as follows:

1. Conventional fan design practices and normal blade and vane aerodynam loading parameters can be used to design low-tip-speed fans for turbofan engines th are, in all respects, mission optimized for 200-to-400 knot aircraft.

2. Low-tip-speed fan rotors and their accompanying stators can be produced fro aluminum alloys and some reinforced plastics at substantially lower cost than th titanium alloy fans that are current practice on executive jet and commercial airlin turbofans. Based in the investigation results, the preferred, low-risk configurations a aluminum alloy, integrally-bladed, NC-machined (from near-net-shape forging), blis rotors. For stators, the preferred solution is aluminum alloy, precision-investment-cas integrated stator and front frame assemblies. Total fan system manufacturing cost expected to be less than one-fifth that of similar-size titanium fan systems.

3. When produced in quantities associated with general aviation and low-densit shorthaul aircraft, the efficient, low-cost fan systems will have equal manufacturing co and will weigh about one-quarter as much as constant-speed propellers capable absorbing the same power.

4. The first-cut preliminary design of an example fan system yielded a predicte efficiency of more than 91 percent adiabatic efficiency at 1.10 pressure ratio. It reasonable to expect that design refinement with advanced CFD methods, combine with test rig development, will yield efficiencies in the range of 92 to 93 percent. It expected this level of efficiency can be attained over the range of pressure ratios of 1.(to 1.35 and corrected flows between 35 and 150 pounds per second.

5. Thicker, tailored blade sections and much lower rotational speeds yie substantial structural design margins for meeting FAA certification requirements f 1-pound and 4-pound bird strikes.

6. Similarly, robust, subsonic blade sections and lower rotational speeds yield dus sand and rain erosion resistance equal to or superior to conventional, high-spee titanium fans.

7. Further structural design evaluations confirm the adequacy of low and high-cyc fatigue lives, adequacy of lightweight blade containment and potential for lightweig blade-off design solutions.

8. Future turbofan engines using the efficient, low-cost fan system design metho and parameters used in this investigation will have lower community noise levels, by usual measuring methods, than any previous aircraft propulsion systems, by as mu as 24 to 30 EPNdB.

9. The overall propulsive coefficient, including adiabatic efficiency, ideal propulsi efficiency and nacelle drag, of the efficient, low-cost fan system is greater than t typical, installed efficiency (including additive aircraft drag) of open propellers.

10. Future general aviation private light aircraft and low-density shorthaul airline can benefit from this fan system technology in terms of greater aircraft performanc lower aircraft weights, improved fuel efficiency and much lower levels of commun noise and cabin noise/vibration.

APPENDIX A

FAN STAGE AERODYNAMIC DESIGN

UD0300 PROGRAM OUTPUT FILE

```
1
        PROGRAM UD0300 - COMPRESSOR DESIGN - CONTROL SECTION
        ****************************************************************

        TITLE =  EFFICIENT LOW COST FAN RUN 17  BNC 6/25/95
 =>
        THERE WILL BE AN ENTRY TO THE AERODYNAMIC SECTION
        NUMBER OF ARBITRARY MEANLINE BLADEROWS =  1
        NUMBER OF BLADE DESIGN PASSES =  1
        NO ENTRY TO RECALCULATE WORK DISTRIBUTIONS WILL BE MADE
        THIS OUTPUT FOR BLADE PASS NUMBER  1
1       PROGRAM UD0300 -     VERSION 2.0     - AERODYNAMIC SECTION
        ****************************************************************
        INPUT DATA
        **********

        TITLE                                 =  ROTOR INTERNAL STATIONS
 =>

        IDEAL GAS PROPERTIES SPECIFICATION

          GAS CONSTANT               =  53.345
          GRAVITATIONAL ACCELERATION =  32.174
          JOULES EQUIVALENT          = 778.161

          CP=CP(1)+CP(2)*T+CP(3)*T**2+CP(4)*T**3+CP(5)*T**4+CP(6)*T**5

          N          CP(N)

          1         .240000E+00
          2         .000000E+00
          3         .000000E+00
          4         .000000E+00
          5         .000000E+00
          6         .000000E+00

        NUMBER OF STATIONS                    = 24
        NUMBER OF STREAMLINES                 = 11
        MAX NUMBER OF PASSES                  = 80
        MAX NUMBER OF ARBITRARY PASSES        = 20
        BOUNDARY LAYER CALC INDICATOR         =  0
        NUMBER OF RUNNING POINTS              =  1
        STREAMLINE DISTRIBUTION INDICATOR     =  1
        NUMBER OF LOSS/D-FACTOR CURVE SETS    =  2
        NUMBER OF LOSS/T.E.LOSS CURVE SETS    =  1
        STREAMLINE INPUT INDICATOR            =  1
        STREAMLINE OUTPUT INDICATOR           =  1
        PRECISION PLOT INDICATOR              =  0
        MAX NUMBER OF LINES/PAGE              = 60
        WAKE TRANSPORT CALC INDICATOR         =  0
        MAINSTREAM MIXING CALC INDICATOR      =  0
        NO OF STATIONS FROM ANALYTIC SECN     =  0
        LINE-PRINTER PLOT INDICATOR           =  1
        MOMENTUM EQUATION FORM INDICATOR      =  2

        GRAVITATIONAL CONSTANT                = 32.1740
        JOULES EQUIVALENT                     = 778.160
        LINEAR DIMENSION SCALE FACTOR         = 12.0000
        BASIC TOLERANCE                       =  .00100
        KINEMATIC VISCOSITY                   =  .00018
        B.L. SHAPE FACTOR                     =  .70000

        PLOTTING SCALE FOR DIMENSIONS         =  2.000
        PLOTTING SCALE FOR PRESSURES          =  1.000
        MINIMUM RADIUS ON PLOT                =   .000
        MINIMUM PRESSURE ON PLOT              = 12.000
        MAXIMUM M-SQUARED IN RELAXATION FACTOR =   .6000
        CONSTANT IN RELAXATION FACTOR         =  4.0000

        WAKE TRANSFER CONSTANT                =  .00000
        TURBULENT MIXING CONSTANT             =  .00000
1

        POINTS TO BE COMPUTED

        NO     FLOWRATE    SPEED FACTOR

         1      38.450      8844.000

        ANNULUS / COMPUTING STATION GEOMETRY

        STATION  1  SPECIFIED BY  2 POINTS

             XSTN        RSTN

          -10.0000      .0000
          -10.0000     8.8970

        STATION  2  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -9.0000      .0000
           -9.0000     8.4540

        STATION  3  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -8.0000      .0000
           -8.0000     8.4860

        STATION  4  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -7.0000      .0000
           -7.0000     8.6730

        STATION  5  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -5.0000      .3720
           -6.0000     8.9020

        STATION  6  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -4.0000     1.0210
           -5.0000     9.0930

        STATION  7  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -3.0000     1.6710
           -4.0000     9.2470
1

        STATION  8  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -2.0000     2.2910
           -3.0000     9.3640

        STATION  9  SPECIFIED BY  2 POINTS

             XSTN        RSTN

           -1.0000     2.7310
           -2.0000     9.4450

        STATION 10  SPECIFIED BY  5 POINTS

             XSTN        RSTN

            -.5000     2.7500
            -.6000     4.5000
            -.6650     5.7000
            -.6650     7.7000
            -.5000     9.5000

        STATION 11  SPECIFIED BY 11 POINTS

             XSTN        RSTN

             .0000     3.0000
             .0198     3.6435
             .0492     4.2874
             .0990     4.9351
             .1388     5.5856
             .2085     6.2371
             .2789     6.8907
             .3592     7.5438
             .4497     8.1982
             .5701     8.8507
             .7000     9.5000

        STATION 12  SPECIFIED BY 11 POINTS

             XSTN        RSTN

             .6000     3.1250
             .6127     3.7450
             .6255     4.3698
             .6540     5.0014
             .6692     5.6376
             .7067     6.2769
             .7432     6.9198
             .7851     7.5636
             .8326     8.2098
             .9036     8.8558
             .9800     9.5000
1

        STATION 13  SPECIFIED BY 11 POINTS

             XSTN        RSTN

            1.2000     3.2500
            1.2055     3.8464
            1.2018     4.4522
            1.2090     5.0677
            1.1996     5.6896
            1.2049     6.3168
            1.2075     6.9488
            1.2109     7.5835
            1.2154     8.2215
            1.2371     8.8610
            1.2600     9.5000

        STATION 14  SPECIFIED BY 11 POINTS

             XSTN        RSTN

            1.8000     3.3750
            1.7984     3.9479
            1.7782     4.5345
            1.7641     5.1339
            1.7301     5.7417
            1.7032     6.3566
            1.6717     6.9779
            1.6368     7.6033
            1.5983     8.2331
            1.5706     8.8661
            1.5400     9.5000

        STATION 15  SPECIFIED BY 11 POINTS

             XSTN        RSTN

            2.4000     3.5000
            2.3912     4.0493
            2.3545     4.6169
            2.3191     5.2002
            2.2605     5.7937
            2.2014     6.3965
            2.1360     7.0069
            2.0626     7.6232
            1.9811     8.2448
            1.9041     8.8713
            1.8200     9.5000
1

        STATION 16  SPECIFIED BY 11 POINTS

             XSTN        RSTN

            3.0000     3.6250
            2.9841     4.1508
            2.9308     4.6993
            2.8741     5.2665
            2.7909     5.8457
            2.6996     6.4363
            2.6003     7.0360
            2.4885     7.6430
            2.3640     8.2564
            2.2376     8.8764
            2.1000     9.5000

        STATION 17  SPECIFIED BY  2 POINTS

             XSTN        RSTN

            4.0000     3.7480
            4.0000     9.5000

        STATION 18  SPECIFIED BY  2 POINTS

             XSTN        RSTN
```

RESULTS.OUT 6-25-95 10:23a

Page 1 of 32

1Ć14PRINT

```
    5.0000      4.0110
    5.0000      9.5000

STATION 19  SPECIFIED BY  2 POINTS

       XSTN        RSTN

    6.0000      4.3820
    6.0000      9.5000

STATION 20  SPECIFIED BY  2 POINTS

       XSTN        RSTN

    8.0000      4.7970
    8.5600      9.5000

STATION 21  SPECIFIED BY  2 POINTS

       XSTN        RSTN

    9.0000      5.0080
    9.0000      9.5000

STATION 22  SPECIFIED BY  2 POINTS

       XSTN        RSTN

   10.0000      5.0080
   10.0000      9.5000
1

STATION 23  SPECIFIED BY  2 POINTS

       XSTN        RSTN

   11.0000      5.0080
   11.0000      9.5000

STATION 24  SPECIFIED BY  2 POINTS

       XSTN        RSTN

   12.0000      5.0080
   12.0000      9.5000

STATION CALCULATION DATA

STATION 1 NDATA=  1 NTERP= 0 NDIMEN= 0 NMACH= 0 NPLOT1= 0 NPLOT2= 0

 DATAC     TOTAL PRESSURE    TOTAL TEMPERATURE    WHIRL ANGLE

  .0000       14.6960            518.690              .000

STATION  2
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION  3
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION  4
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION  5
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION  6
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NKIP  =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0
```

```
1

STATION  7
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION  8
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION  9
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION 10
**********
NDATA =  0 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   0 NOUT3  = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0
1

STATION 11
**********
NDATA = 11 NTERP =   0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =   0 NEVAL  = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   1 NOUT3  = 0 NBLADE= 17 NDATA2= 11 NSKIP =  1
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

SPEED =       .00

DATAC      DATA1      DATA2      DATA6

 .0000    14.696    .000000     .0000
 .0990    14.696    .000000     .0000
 .1981    14.696    .000000     .0000
 .2977    14.696    .000000     .0000
 .3978    14.696    .000000     .0000
 .4980    14.696    .000000     .0000
 .5986    14.696    .000000     .0000
 .6990    14.696    .000000     .0000
 .7997    14.696    .000000     .0000
 .9001    14.696    .000000     .0000
1.0000    14.696    .000000     .0000

DAT2C      DAT23      DAT24      DAT25    NWORK=0,5,OR 6 ONLY- DAT21
                                          **********************

3.0000  -14.8614     .02878    2.52234                    -36.3014
3.6639   -9.3584     .02609    2.20658                    -43.2565
4.3322   -4.8159     .02449    1.99146                    -46.9630
4.9903   -2.7693     .02401    1.83861                    -50.3522
5.6442    1.0307     .02379    1.71073                    -53.4250
6.2957    4.2819     .02319    1.57809                    -56.1367
6.9459    6.8642     .02264    1.45354                    -58.3872
7.5909    9.8375     .02210    1.32646                    -60.1894
8.2309   13.9180     .02220    1.19631                    -61.6417
8.8651   18.8490     .02176    1.04895                    -63.0545
9.5000   20.2311     .01963     .88297                    -64.7645
1

STATION 12
**********
NDATA = 11 NTERP =   0 NDIMEN= 3 NMACH =  0 NWORK =  1 NLOSS =  4
NL1   = -1 NL2   =  -1 NEVAL  = 0 NCURVE=  1 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   1 NOUT3  = 0 NBLADE= 17 NDATA2= 11 NSKIP =  1
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

SPEED =     1.00

DATAC      DATA1      DATA2      DATA6

 .0000    15.011    .000000     .0000
 .0973    15.005    .000000     .0000
 .1953    15.001    .000000     .0000
 .2943    14.998    .000000     .0000
 .3941    14.996    .000000     .0000
 .4944    14.995    .000000     .0000
 .5953    14.994    .000000     .0000
```

```
 .6963    14.994    .000000     .0000
 .7976    14.994    .000000     .0000
 .8989    14.995    .000000     .0000
1.0000    14.995    .000000     .0000

DAT2C      DAT23      DAT24      DAT25    NWORK=0,5,OR 6 ONLY- DAT21
                                          **********************

3.1250  -11.6559     .17163    2.52234                    -27.2676
3.7875   -8.7074     .16137    2.20658                    -33.9728
4.4305   -6.1274     .15185    1.99146                    -39.8407
5.0686   -4.1964     .14601    1.83861                    -44.7915
5.7065   -1.5627     .13768    1.71073                    -49.0489
6.3464     .6820     .13446    1.57809                    -52.6586
6.9889    2.3500     .12674    1.45354                    -55.7752
7.6286    4.1450     .11012    1.32646                    -58.5548
8.2593    7.1885     .07449    1.19631                    -61.0716
8.8792   11.3813     .04461    1.04895                    -63.3105
9.5000   12.8858     .03864     .88297                    -65.5371
1

STATION 13
**********
NDATA = 11 NTERP =   0 NDIMEN= 3 NMACH =  0 NWORK =  1 NLOSS =  4
NL1   = -2 NL2   =  -2 NEVAL  = 0 NCURVE=  1 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   1 NOUT3  = 0 NBLADE= 17 NDATA2= 11 NSKIP =  1
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

SPEED =     1.00

DATAC      DATA1      DATA2      DATA6

 .0000    15.327    .000000     .0000
 .0954    15.314    .000000     .0000
 .1924    15.306    .000000     .0000
 .2908    15.300    .000000     .0000
 .3903    15.296    .000000     .0000
 .4907    15.294    .000000     .0000
 .5918    15.292    .000000     .0000
 .6934    15.292    .000000     .0000
 .7954    15.292    .000000     .0000
 .8978    15.293    .000000     .0000
1.0000    15.294    .000000     .0000

DAT2C      DAT23      DAT24      DAT25    NWORK=0,5,OR 6 ONLY- DAT21
                                          **********************

3.2500   -6.7534     .23693    2.52234                    -13.7706
3.8843   -5.0127     .21720    2.20658                    -23.4008
4.5056   -3.6739     .20372    1.99146                    -31.5483
5.1285   -3.0031     .19668    1.83861                    -38.3335
5.7551   -2.0455     .18665    1.71073                    -43.8702
6.3873   -1.0898     .18391    1.57809                    -48.4174
7.0247    -.2905     .17473    1.45354                    -52.3062
7.6609     .5496     .15302    1.32646                    -55.8341
8.2849    2.3145     .10197    1.19631                    -59.0636
8.8939    4.5391     .05692    1.04895                    -61.8077
9.5000    5.2692     .04833     .88297                    -64.0207
1

STATION 14
**********
NDATA = 11 NTERP =   0 NDIMEN= 3 NMACH =  0 NWORK =  1 NLOSS =  4
NL1   = -3 NL2   =  -3 NEVAL  = 0 NCURVE=  1 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =   1 NOUT3  = 0 NBLADE= 17 NDATA2= 11 NSKIP =  1
NPLOT1=  0 NPLOT2=   0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

SPEED =     1.00

DATAC      DATA1      DATA2      DATA6

 .0000    15.642    .000000     .0000
 .0935    15.623    .000000     .0000
 .1893    15.610    .000000     .0000
 .2872    15.601    .000000     .0000
 .3864    15.596    .000000     .0000
 .4868    15.592    .000000     .0000
 .5882    15.591    .000000     .0000
 .6903    15.590    .000000     .0000
 .7932    15.591    .000000     .0000
 .8965    15.592    .000000     .0000
1.0000    15.592    .000000     .0000

DAT2C      DAT23      DAT24      DAT25    NWORK=0,5,OR 6 ONLY- DAT21
                                          **********************

3.3750    4.1709     .23712    2.52234                      .1150
3.9707    3.1637     .20837    2.20658                   -13.3311
```

K/14PRINT

FRACTION OF COMPUTING STATION LENGTH AT BLADE EXIT = 6.2500

FRACTION OF MERIDIONAL CHORD	LOSS/LOSS AT TRAILING EDGE
.0000	.0000
.2000	.2000
.4000	.4000
.6000	.5000
.8000	.8000
1.0000	1.0000

PROPORTIONS OF TOTAL FLOW BETWEEN HUB AND EACH STREAMLINE ARE TO BE AS
=> FOLLOWS

STREAMLINE	1	2	3	4	5	6	7
FLOW	.0000	.0532	.1168	.1908	.2752	.3700	.4752

STREAMLINE	8	9	10	11
FLOW	.5908	.7168	.8532	1.0000

ESTIMATED STREAMLINE COORDINATES

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
1	1	.0000	-10.0000	.0000	1	1
1	2	2.0400	-10.0000	2.0400	1	2
1	3	3.0237	-10.0000	3.0237	1	3
1	4	3.8647	-10.0000	3.8647	1	4
1	5	4.6407	-10.0000	4.6407	1	5
1	6	5.3801	-10.0000	5.3801	1	6
1	7	6.0963	-10.0000	6.0963	1	7
1	8	6.7977	-10.0000	6.7977	1	8
1	9	7.4907	-10.0000	7.4907	1	9
1	10	8.1842	-10.0000	8.1842	1	10
1	11	8.8970	-10.0000	8.8970	1	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
2	1	.0000	-9.0000	.0000	2	1
2	2	2.1102	-9.0000	2.1102	2	2
2	3	3.0941	-9.0000	3.0941	2	3
2	4	3.9187	-9.0000	3.9187	2	4
2	5	4.6737	-9.0000	4.6737	2	5
2	6	5.3886	-9.0000	5.3886	2	6
2	7	6.0736	-9.0000	6.0736	2	7
2	8	6.7300	-9.0000	6.7300	2	8
2	9	7.3532	-9.0000	7.3532	2	9
2	10	7.9326	-9.0000	7.9326	2	10
2	11	8.4540	-9.0000	8.4540	2	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
3	1	.0000	-8.0000	.0000	3	1
3	2	2.2345	-8.0000	2.2345	3	2
3	3	3.1982	-8.0000	3.1982	3	3
3	4	3.9878	-8.0000	3.9878	3	4
3	5	4.7214	-8.0000	4.7214	3	5
3	6	5.4200	-8.0000	5.4200	3	6
3	7	6.0904	-8.0000	6.0904	3	7
3	8	6.7338	-8.0000	6.7338	3	8
3	9	7.3488	-8.0000	7.3488	3	9
3	10	7.9329	-8.0000	7.9329	3	10
3	11	8.4860	-8.0000	8.4860	3	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
4	1	.0000	-7.0000	.0000	4	1
4	2	2.5773	-7.0000	2.5773	4	2
4	3	3.3216	-7.0000	3.3216	4	3
4	4	4.0662	-7.0000	4.0662	4	4
4	5	4.7856	-7.0000	4.7856	4	5
4	6	5.4797	-7.0000	5.4797	4	6
4	7	6.1514	-7.0000	6.1514	4	7
4	8	6.8034	-7.0000	6.8034	4	8
4	9	7.4381	-7.0000	7.4381	4	9
4	10	8.0591	-7.0000	8.0591	4	10
4	11	8.6730	-7.0000	8.6730	4	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
5	1	.3720	-5.0000	.0000	5	1
5	2	2.4290	-5.2411	2.0711	5	2
5	3	3.3706	-5.3515	3.0191	5	3
5	4	4.1637	-5.4445	3.8177	5	4
5	5	4.8977	-5.5306	4.5567	5	5
5	6	5.5988	-5.6128	5.2626	5	6
5	7	6.2783	-5.6924	5.9468	5	7
5	8	6.9430	-5.7703	6.6160	5	8
5	9	7.5976	-5.8471	7.2751	5	9
5	10	8.2478	-5.9233	7.9297	5	10
5	11	8.9020	-6.0000	8.5884	5	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
6	1	1.0210	-4.0000	.0000	6	1
6	2	2.5429	-4.1885	1.5335	6	2
6	3	3.4735	-4.3038	2.4713	6	3
6	4	4.2677	-4.4022	3.2715	6	4
6	5	5.0038	-4.4934	4.0133	6	5
6	6	5.7089	-4.5808	4.7238	6	6
6	7	6.3958	-4.6659	5.4159	6	7
6	8	7.0721	-4.7496	6.0973	6	8
6	9	7.7434	-4.8328	6.7737	6	9
6	10	8.4151	-4.9160	7.4506	6	10
6	11	9.0930	-5.0000	8.1337	6	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
7	1	1.6710	-3.0000	.0000	7	1
7	2	2.7937	-3.1482	1.1324	7	2
7	3	3.6449	-3.2606	1.9910	7	3
7	4	4.4094	-3.3615	2.7621	7	4
7	5	5.1321	-3.4569	3.4912	7	5
7	6	5.8319	-3.5492	4.1969	7	6
7	7	6.5185	-3.6398	4.8896	7	7
7	8	7.1986	-3.7296	5.5755	7	8
7	9	7.8770	-3.8192	6.2599	7	9
7	10	8.5584	-3.9091	6.9471	7	10
7	11	9.2470	-4.0000	7.6417	7	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
8	1	2.2910	-2.0000	.0000	8	1
8	2	3.1067	-2.1153	.8239	8	2
8	3	3.8584	-2.2216	1.5830	8	3
8	4	4.5774	-2.3233	2.3092	8	4
8	5	5.2755	-2.4220	3.0142	8	5
8	6	5.9609	-2.5189	3.7064	8	6
8	7	6.6392	-2.6148	4.3915	8	7
8	8	7.3150	-2.7103	5.0740	8	8
8	9	7.9920	-2.8060	5.7577	8	9
8	10	8.6738	-2.9024	6.4463	8	10
8	11	9.3640	-3.0000	7.1433	8	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
9	1	2.7310	-1.0000	.0000	9	1
9	2	3.3826	-1.0970	.6587	9	2
9	3	4.0740	-1.2000	1.3578	9	3
9	4	4.7522	-1.3010	2.0435	9	4
9	5	5.4227	-1.4009	2.7214	9	5
9	6	6.0887	-1.5001	3.3947	9	6
9	7	6.7528	-1.5990	4.0661	9	7
9	8	7.4175	-1.6980	4.7382	9	8
9	9	8.0857	-1.7975	5.4138	9	9
9	10	8.7604	-1.8980	6.0959	9	10
9	11	9.4450	-2.0000	6.7881	9	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
10	1	2.7500	-.5000	.0000	10	1
10	2	3.5304	-.5440	.7817	10	2
10	3	4.2022	-.5825	1.4545	10	3
10	4	4.8686	-.6218	2.1221	10	4
10	5	5.5298	-.6574	2.7843	10	5
10	6	6.1893	-.6816	3.4438	10	6
10	7	6.8486	-.6886	4.1028	10	7
10	8	7.5085	-.6740	4.7629	10	8
10	9	8.1697	-.6336	5.4255	10	9
10	10	8.8330	-.5723	6.0917	10	10
10	11	9.5000	-.5000	6.7622	10	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
11	1	3.0000	.0000	.0000	11	1
11	2	3.6639	.0205	.6642	11	2
11	3	4.3322	.0523	1.3333	11	3
11	4	4.9903	.1025	1.9933	11	4
11	5	5.6442	.1438	2.6485	11	5
11	6	6.2957	.2150	3.3038	11	6
11	7	6.9459	.2852	3.9578	11	7
11	8	7.5909	.3652	4.6078	11	8
11	9	8.2309	.4550	5.2541	11	9
11	10	8.8651	.5730	5.8992	11	10
11	11	9.5000	.7000	6.5466	11	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
12	1	3.1250	.6000	.0000	12	1
12	2	3.7875	.6134	.6626	12	2
12	3	4.4305	.6279	1.3058	12	3
12	4	5.0686	.6560	1.9446	12	4
12	5	5.7065	.6721	2.5826	12	5
12	6	6.3464	.7109	3.2237	12	6
12	7	6.9889	.7474	3.8673	12	7
12	8	7.6286	.7894	4.5083	12	8
12	9	8.2593	.8372	5.1409	12	9
12	10	8.8792	.9064	5.7646	12	10
12	11	9.5000	.9800	6.3900	12	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
13	1	3.2500	1.2000	.0000	13	1
13	2	3.8843	1.2054	.6343	13	2
13	3	4.5056	1.2022	1.2556	13	3
13	4	5.1285	1.2087	1.8786	13	4
13	5	5.7551	1.1993	2.5053	13	5
13	6	6.3873	1.2055	3.1375	13	6
13	7	7.0247	1.2078	3.7749	13	7
13	8	7.6609	1.2111	4.4110	13	8
13	9	8.2849	1.2168	5.0351	13	9
13	10	8.8939	1.2384	5.6445	13	10
13	11	9.5000	1.2600	6.2510	13	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
14	1	3.3750	1.8000	.0000	14	1
14	2	3.9707	1.7979	.5957	14	2
14	3	4.5690	1.7773	1.1944	14	3
14	4	5.1788	1.7622	1.8044	14	4
14	5	5.7965	1.7272	2.4230	14	5
14	6	6.4219	1.7003	3.0490	14	6
14	7	7.0537	1.6676	3.6817	14	7
14	8	7.6852	1.6317	4.3142	14	8
14	9	8.3037	1.5947	4.9338	14	9
14	10	8.9057	1.5689	5.5364	14	10
14	11	9.5000	1.5400	6.1314	14	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
15	1	3.5000	2.4000	.0000	15	1
15	2	4.0520	2.3911	.5521	15	2
15	3	4.6285	2.3538	1.1298	15	3
15	4	5.2266	2.3170	1.7291	15	4
15	5	5.8359	2.2562	2.3413	15	5
15	6	6.4536	2.1957	2.9620	15	6
15	7	7.0772	2.1280	3.5893	15	7
15	8	7.7008	2.0526	4.2174	15	8
15	9	8.3139	1.9724	4.8357	15	9
15	10	8.9132	1.8988	5.4396	15	10
15	11	9.5000	1.8200	6.0316	15	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
16	1	3.6250	3.0000	.0000	16	1
16	2	4.1365	2.9850	.5117	16	2
16	3	4.6953	2.9312	1.0731	16	3
16	4	5.2804	2.8724	1.6612	16	4
16	5	5.8778	2.7859	2.2648	16	5
16	6	6.4842	2.6920	2.8784	16	6
16	7	7.0959	2.5898	3.4986	16	7
16	8	7.7081	2.4756	4.1214	16	8
16	9	8.3154	2.3520	4.7410	16	9
16	10	8.9145	2.2295	5.3526	16	10
16	11	9.5000	2.1000	5.9523	16	11

STATION	STREAMLINE	RADIUS	AXIAL COORDINATE	L-COORDINATE	I	J
17	1	3.7480	4.0000	.0000	17	1
17	2	4.2979	4.0000	.5499	17	2
17	3	4.8532	4.0000	1.1052	17	3
17	4	5.4175	4.0000	1.6695	17	4
17	5	5.9897	4.0000	2.2417	17	5
17	6	6.5680	4.0000	2.8200	17	6
17	7	7.1508	4.0000	3.4028	17	7
17	8	7.7364	4.0000	3.9884	17	8
17	9	8.3234	4.0000	4.5754	17	9
17	10	8.9112	4.0000	5.1632	17	10
17	11	9.5000	4.0000	5.7520	17	11

K/14PRINT

```
 4.5690    1.8777    .19347   1.99146                              -24.4417
 5.1788     .5299    .18798   1.83861                              -33.3693
 5.7965    -.8134    .18064   1.71073                              -40.3329
 6.4219   -1.5593    .18022   1.57809                              -45.8060
 7.0537   -1.8159    .17290   1.45354                              -50.2746
 7.6852   -1.9514    .15250   1.32646                              -54.1917
 8.3037   -1.6264    .10207   1.19631                              -57.7206
 8.9057   -2.2331    .05651   1.04895                              -60.5740
 9.5000   -3.0052    .04698    .88297                              -62.4810
1

STATION 15
**********
NDATA = 11 NTERP =  0 NDIMEN= 3 NMACH =  0 NWORK =  1 NLOSS =  4
NL1   = -4 NL2   = -4 NEVAL = 0 NCURVE=  1 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =  1 NOUT3 = 0 NBLADE= 17 NDATA2= 11 NSKIP =  1
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

SPEED =     1.00

DATAC      DATA1     DATA2      DATA6

 .0000     15.958   .000000     .0000
 .0916     15.932   .000000     .0000
 .1864     15.915   .000000     .0000
 .2834     15.903   .000000     .0000
 .3823     15.896   .000000     .0000
 .4828     15.891   .000000     .0000
 .5845     15.889   .000000     .0000
 .6872     15.888   .000000     .0000
 .7908     15.889   .000000     .0000
 .8952     15.890   .000000     .0000
1.0000     15.891   .000000     .0000

DAT2C      DAT23     DAT24      DAT25    NWORK=0,5,OR 6 ONLY- DAT21
                                         **********************

 3.5000   20.9195    .16918   2.52234                               14.8815
 4.0520   16.0619    .14096   2.20658                               -2.6276
 4.6285   10.6494    .12832   1.99146                              -17.3561
 5.2266    6.3990    .12516   1.83861                              -28.8282
 5.8359    2.2058    .12252   1.71073                              -37.5611
 6.4536    -.8026    .12446   1.57809                              -44.1768
 7.0772   -2.6944    .12136   1.45354                              -49.2442
 7.7008   -4.2307    .10810   1.32646                              -53.3135
 8.3139   -5.4790    .07380   1.19631                              -56.7688
 8.9132   -9.3492    .04304   1.04895                              -59.4456
 9.5000  -11.9606    .03519    .88297                              -60.7739
1

STATION 16
**********
NDATA = 11 NTERP =  0 NDIMEN= 3 NMACH =  0 NWORK =  1 NLOSS =  1
NL1   = -5 NL2   = -5 NEVAL = 1 NCURVE=  1 NLITER=  0 NDEL  =  2
NOUT1 =  0 NOUT2 =  1 NOUT3 = 0 NBLADE= 17 NDATA2= 11 NSKIP =  1
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

SPEED =     1.00

DATAC      DATA1     DATA2      DATA6

 .0000     16.273   .066000     .0000
 .0895     16.241   .056000     .0000
 .1829     16.219   .056000     .0000
 .2794     16.205   .039000     .0000
 .3780     16.196   .039000     .0000
 .4785     16.190   .025000     .0000
 .5806     16.187   .025000     .0000
 .6839     16.186   .019000     .0000
 .7883     16.187   .019000     .0000
 .8939     16.188   .029000     .0000
1.0000     16.190   .056000     .0000

DAT2C      DAT23     DAT24      DAT25    NWORK=0,5,OR 6 ONLY- DAT21
                                         **********************

 3.6250   41.1943    .02267   2.52234                               30.5876
 4.1365   32.2080    .02067   2.20658                                9.6098
 4.6953   22.1990    .01913   1.99146                               -9.4174
 5.2804   14.4257    .01849   1.83861                              -23.9870
 5.8778    6.8627    .01864   1.71073                              -34.5188
 6.4842    1.0875    .01860   1.57809                              -42.0930
 7.0959   -2.9501    .01858   1.45354                              -47.7344
 7.7081   -6.3959    .01855   1.32646                              -52.0029
 8.3154   -9.4879    .01891   1.19631                              -55.4606
 8.9145  -16.5031    .01854   1.04895                              -57.8722
 9.5000  -20.6508    .01610    .88297                              -58.8382
```

```
        DELC        DELTA

        .0000     10.0000
       1.0000      5.0000

STATION 17
**********
NDATA =  0 NTERP =  0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =  0 NEVAL = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION 18
**********
NDATA =  0 NTERP =  0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =  0 NEVAL = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0
1

STATION 19
**********
NDATA =  0 NTERP =  0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =  0 NEVAL = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE= 27 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION 20
**********
NDATA = 11 NTERP =  0 NDIMEN= 3 NMACH =  0 NWORK =  4 NLOSS =  1
NL1   = -1 NL2   = -1 NEVAL = 2 NCURVE=  0 NLITER=  0 NDEL  =  2
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE= 27 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

SPEED =       .00  RESTAGGER ANGLE (NWORK=7) =     .000

DATAC    DATA1    DATA2    DATA3    DATA4     DATA5     DATA6

 .0000    .000   .08706   .0000   .00000   2.02700   .00000
 .0773    .000   .08500   .0000   .00000   1.90000   .00000
 .1617    .000   .08100   .0000   .00000   1.76400   .00000
 .2525    .000   .06300   .0000   .00000   1.65200   .00000
 .3491    .000   .05500   .0000   .00000   1.55500   .00000
 .4502    .000   .04900   .0000   .00000   1.47000   .00000
 .5552    .000   .04200   .0000   .00000   1.39600   .00000
 .6632    .000   .04500   .0000   .00000   1.33100   .00000
 .7737    .000   .04700   .0000   .00000   1.27500   .00000
 .8862    .000   .05500   .0000   .00000   1.22500   .00000
1.0000    .000   .06000   .0000   .00000   1.18100   .00000

DATAC    DATA7    DATA8    DATA9    DATA10    DATA11

 .0000   .00000   .00000   .00000   .00000    .00000
 .0773   .00000   .00000   .00000   .00000    .00000
 .1617   .00000   .00000   .00000   .00000    .00000
 .2525   .00000   .00000   .00000   .00000    .00000
 .3491   .00000   .00000   .00000   .00000    .00000
 .4502   .00000   .00000   .00000   .00000    .00000
 .5552   .00000   .00000   .00000   .00000    .00000
 .6632   .00000   .00000   .00000   .00000    .00000
 .7737   .00000   .00000   .00000   .00000    .00000
 .8862   .00000   .00000   .00000   .00000    .00000
1.0000   .00000   .00000   .00000   .00000    .00000

        DELC        DELTA

        .0000      5.0000
       1.0000      5.0000

STATION 21
**********
NDATA =  0 NTERP =  0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =  0 NEVAL = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0
1

STATION 22
**********
NDATA =  0 NTERP =  0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =  0 NEVAL = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION 23
**********
NDATA =  0 NTERP =  0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =  0 NEVAL = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
```

```
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

STATION 24
**********
NDATA =  0 NTERP =  0 NDIMEN= 0 NMACH =  0 NWORK =  0 NLOSS =  0
NL1   =  0 NL2   =  0 NEVAL = 0 NCURVE=  0 NLITER=  0 NDEL  =  0
NOUT1 =  0 NOUT2 =  0 NOUT3 = 0 NBLADE=  0 NDATA2=  0 NSKIP =  0
NPLOT1=  0 NPLOT2=  0 NPLOT3= 0 NPLOT4=  0 NPLOT5=  0 NBLEED=  0

BLOCKAGE FACTOR SPECIFICATIONS

STATION   WALL BLOCKAGE   WAKE BLOCKAGE   WAKE DISTRIBUTION FACTOR

   1         .00000          .00000            1.000
   2         .00150          .00000            1.000
   3         .00300          .00000            1.000
   4         .00450          .00000            1.000
   5         .00600          .00000            1.000
   6         .00750          .00000            1.000
   7         .00900          .00000            1.000
   8         .01050          .00000            1.000
   9         .01200          .00000            1.000
  10         .01350          .00000            1.000
  11         .01500          .00000            1.000
  12         .01750          .00000            1.000
  13         .02000          .00000            1.000
  14         .02250          .00000            1.000
  15         .02250          .00000            1.000
  16         .02250          .00000            1.000
  17         .02250          .00000            1.000
  18         .02250          .00000            1.000
  19         .02250          .00000            1.000
  20         .02750          .00000            1.000
  21         .02750          .00000            1.000
  22         .02750          .00000            1.000
  23         .02750          .00000            1.000
  24         .02750          .00000            1.000
1

LOSS PARAMETER / DIFFUSION FACTOR CURVES FOR BLADE TYPE 1
( 15 D-FACTORS GIVEN)

     DIFFUSION      L O S S    P A R A M E T E R S
      FACTORS         HUB          MID         TIP

        .000        .00900       .00900      .00900
        .050        .00900       .00900      .00900
        .100        .00900       .00900      .00900
        .150        .00900       .00900      .00900
        .200        .00900       .00900      .00900
        .250        .00900       .00900      .00900
        .300        .00900       .00900      .00900
        .350        .00920       .00920      .00920
        .400        .00960       .00960      .00980
        .450        .01010       .01010      .01100
        .500        .01110       .01110      .01290
        .550        .01270       .01270      .01590
        .600        .01520       .01520      .02040
        .650        .01890       .01890      .02700
        .700        .02450       .02450      .03770

LOSS PARAMETER / DIFFUSION FACTOR CURVES FOR BLADE TYPE 2
( 15 D-FACTORS GIVEN)

     DIFFUSION      L O S S    P A R A M E T E R S
      FACTORS         HUB          MID         TIP

        .000        .00640       .00340      .00640
        .050        .00690       .00390      .00690
        .100        .00750       .00450      .00750
        .150        .00810       .00510      .00810
        .200        .00900       .00600      .00900
        .250        .01020       .00720      .01020
        .300        .01150       .00850      .01150
        .350        .01320       .01020      .01320
        .400        .01500       .01200      .01500
        .450        .01750       .01450      .01750
        .500        .02020       .01720      .02020
        .550        .02470       .02170      .02470
        .600        .02940       .02640      .02940
        .650        .03480       .03180      .03480
        .700        .04170       .03870      .04170

FRACTIONAL LOSS DISTRIBUTION CURVES FOR BLADE CLASS 1

 6 POINTS GIVEN AT  1 RADIAL LOCATIONS
```

```
STATION  STREAMLINE   RADIUS  AXIAL COORDINATE  L-COORDINATE   I    J

  18         1        4.0110      5.0000           .0000      18    1
  18         2        4.5178      5.0000           .5068      18    2
  18         3        5.0324      5.0000          1.0214      18    3
  18         4        5.5594      5.0000          1.5484      18    4
  18         5        6.0988      5.0000          2.0878      18    5
  18         6        6.6490      5.0000          2.6380      18    6
  18         7        7.2081      5.0000          3.1971      18    7
  18         8        7.7742      5.0000          3.7632      18    8
  18         9        8.3457      5.0000          4.3347      18    9
  18        10        8.9213      5.0000          4.9103      18   10
  18        11        9.5000      5.0000          5.4890      18   11

STATION  STREAMLINE   RADIUS  AXIAL COORDINATE  L-COORDINATE   I    J

  19         1        4.3820      6.0000           .0000      19    1
  19         2        4.7889      6.0000           .4069      19    2
  19         3        5.2355      6.0000           .8535      19    3
  19         4        5.7136      6.0000          1.3316      19    4
  19         5        6.2159      6.0000          1.8339      19    5
  19         6        6.7366      6.0000          2.3546      19    6
  19         7        7.2716      6.0000          2.8896      19    7
  19         8        7.8178      6.0000          3.4358      19    8
  19         9        8.3726      6.0000          3.9906      19    9
  19        10        8.9339      6.0000          4.5519      19   10
  19        11        9.5000      6.0000          5.1180      19   11
1
STATION  STREAMLINE   RADIUS  AXIAL COORDINATE  L-COORDINATE   I    J

  20         1        4.7970      8.0000           .0000      20    1
  20         2        5.1604      8.0433           .3660      20    2
  20         3        5.5587      8.0907           .7671      20    3
  20         4        5.9870      8.1417          1.1984      20    4
  20         5        6.4409      8.1957          1.6556      20    5
  20         6        6.9164      8.2524          2.1344      20    6
  20         7        7.4097      8.3111          2.6312      20    7
  20         8        7.9174      8.3716          3.1425      20    8
  20         9        8.4367      8.4334          3.6654      20    9
  20        10        8.9650      8.4963          4.1974      20   10
  20        11        9.5000      8.5600          4.7362      20   11

STATION  STREAMLINE   RADIUS  AXIAL COORDINATE  L-COORDINATE   I    J

  21         1        5.0080      9.0000           .0000      21    1
  21         2        5.3115      9.0000           .3035      21    2
  21         3        5.6658      9.0000           .6578      21    3
  21         4        6.0631      9.0000          1.0551      21    4
  21         5        6.4952      9.0000          1.4872      21    5
  21         6        6.9548      9.0000          1.9468      21    6
  21         7        7.4360      9.0000          2.4280      21    7
  21         8        7.9344      9.0000          2.9264      21    8
  21         9        8.4463      9.0000          3.4383      21    9
  21        10        8.9690      9.0000          3.9610      21   10
  21        11        9.5000      9.0000          4.4920      21   11

STATION  STREAMLINE   RADIUS  AXIAL COORDINATE  L-COORDINATE   I    J

  22         1        5.0080     10.0000           .0000      22    1
  22         2        5.3331     10.0000           .3251      22    2
  22         3        5.6989     10.0000           .6909      22    3
  22         4        6.0999     10.0000          1.0919      22    4
  22         5        6.5306     10.0000          1.5226      22    5
  22         6        6.9859     10.0000          1.9779      22    6
  22         7        7.4614     10.0000          2.4534      22    7
  22         8        7.9535     10.0000          2.9455      22    8
  22         9        8.4590     10.0000          3.4510      22    9
  22        10        8.9752     10.0000          3.9672      22   10
  22        11        9.5000     10.0000          4.4920      22   11

STATION  STREAMLINE   RADIUS  AXIAL COORDINATE  L-COORDINATE   I    J

  23         1        5.0080     11.0000           .0000      23    1
  23         2        5.3394     11.0000           .3314      23    2
  23         3        5.7108     11.0000           .7028      23    3
  23         4        6.1154     11.0000          1.1074      23    4
  23         5        6.5476     11.0000          1.5396      23    5
  23         6        7.0025     11.0000          1.9945      23    6
  23         7        7.4761     11.0000          2.4681      23    7
  23         8        7.9652     11.0000          2.9572      23    8
  23         9        8.4670     11.0000          3.4590      23    9
  23        10        8.9792     11.0000          3.9712      23   10
  23        11        9.5000     11.0000          4.4920      23   11
1
STATION  STREAMLINE   RADIUS  AXIAL COORDINATE  L-COORDINATE   I    J
  24         1        5.0080     12.0000           .0000      24    1
  24         2        5.3427     12.0000           .3347      24    2
  24         3        5.7171     12.0000           .7091      24    3
  24         4        6.1242     12.0000          1.1162      24    4
  24         5        6.5578     12.0000          1.5498      24    5
  24         6        7.0131     12.0000          2.0051      24    6
  24         7        7.4859     12.0000          2.4779      24    7
  24         8        7.9733     12.0000          2.9653      24    8
  24         9        8.4727     12.0000          3.4647      24    9
  24        10        8.9822     12.0000          3.9742      24   10
  24        11        9.5000     12.0000          4.4920      24   11
1 OUTPUT FOR POINT NO. 1
  ************************
1

STATION  1  FLOW-FIELD DESCRIPTION
**************************************

STREAM  RADIUS  ----------------V E L O C I T I E S---------------
 LINE           MERIDIONAL TANGENTIAL   AXIAL      RADIAL     TOTAL
   1     .0000    306.35       .00      306.35        .00     306.35
   2    2.0400    306.35       .00      305.60      21.45     306.35
   3    3.0237    306.35       .00      305.59      21.50     306.35
   4    3.8647    306.35       .00      305.90      16.52     306.35
   5    4.6407    306.35       .00      306.18      10.09     306.35
   6    5.3801    306.35       .00      306.34       2.63     306.35
   7    6.0963    306.35       .00      306.27      -6.97     306.35
   8    6.7977    306.35       .00      305.65     -20.68     306.35
   9    7.4907    306.35       .00      303.50     -41.71     306.35
  10    8.1842    306.35       .00      297.09     -74.75     306.35
  11    8.8970    306.35       .00      280.10    -124.08     306.35

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE   STATION
 LINE  RADIUS    X-COORD    L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
   1    .0000   -10.0000     .0000       .00       .000       .000
   2   2.0400   -10.0000    2.0400       .00      4.016       .000
   3   3.0237   -10.0000    3.0237       .00      4.025       .000
   4   3.8647   -10.0000    3.8647       .00      3.091       .000
   5   4.6407   -10.0000    4.6407       .00      1.888       .000
   6   5.3801   -10.0000    5.3801       .00       .492       .000
   7   6.0963   -10.0000    6.0963       .00     -1.303       .000
   8   6.7977   -10.0000    6.7977       .00     -3.870       .000
   9   7.4907   -10.0000    7.4907       .00     -7.824       .000
  10   8.1842   -10.0000    8.1842       .00    -14.123       .000
  11   8.8970   -10.0000    8.8970       .00    -23.893       .000

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL    STATIC   WEIGHT
   1     .0000   .2765  14.6960  13.9358  518.690  510.881  .073635
   2    2.0400   .2765  14.6960  13.9358  518.690  510.881  .073635
   3    3.0237   .2765  14.6960  13.9358  518.690  510.881  .073635
   4    3.8647   .2765  14.6960  13.9358  518.690  510.881  .073635
   5    4.6407   .2765  14.6960  13.9358  518.690  510.881  .073635
   6    5.3801   .2765  14.6960  13.9358  518.690  510.881  .073635
   7    6.0963   .2765  14.6960  13.9358  518.690  510.881  .073635
   8    6.7977   .2765  14.6960  13.9358  518.690  510.881  .073635
   9    7.4907   .2765  14.6960  13.9358  518.690  510.881  .073635
  10    8.1842   .2765  14.6960  13.9358  518.690  510.881  .073635
  11    8.8970   .2765  14.6960  13.9358  518.690  510.881  .073635

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY    FLOW    (PHI+GAMMA)
 LINE            TOTAL    STATIC              ANGLE
   1     .0000  124.486  122.611   .975379    .000        .000
   2    2.0400  124.486  122.611   .975379    .000       4.016
   3    3.0237  124.486  122.611   .975379    .000       4.025
   4    3.8647  124.486  122.611   .975379    .000       3.091
   5    4.6407  124.486  122.611   .975379    .000       1.888
   6    5.3801  124.486  122.611   .975379    .000        .492
   7    6.0963  124.486  122.611   .975379    .000      -1.303
   8    6.7977  124.486  122.611   .975379    .000      -3.870
   9    7.4907  124.486  122.611   .975379    .000      -7.824
  10    8.1842  124.486  122.611   .975379    .000     -14.123
  11    8.8970  124.486  122.611   .975379    .000     -23.893
1

STATION  2  FLOW-FIELD DESCRIPTION
**************************************

STREAM  RADIUS  ----------------V E L O C I T I E S---------------
 LINE           MERIDIONAL TANGENTIAL   AXIAL      RADIAL     TOTAL
   1     .0000    278.88       .00      278.88        .00     278.88
   2    2.1102    292.33       .00      290.96      28.27     292.33
   3    3.0941    304.51       .00      303.36      26.46     304.51
   4    3.9187    310.91       .00      310.32      19.11     310.91
   5    4.6737    314.66       .00      314.40      12.68     314.66
   6    5.3886    319.09       .00      319.02       6.38     319.09
   7    6.0736    326.05       .00      326.05       -.96     326.05
   8    6.7300    337.94       .00      337.76     -10.77     337.94
   9    7.3532    359.16       .00      358.27     -25.31     359.16
  10    7.9326    398.13       .00      395.12     -48.89     398.13
  11    8.4540    469.44       .00      460.77     -89.82     469.44

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE   STATION
 LINE  RADIUS    X-COORD    L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
   1    .0000    -9.0000     .0000       .00       .000       .000
   2   2.1102    -9.0000    2.1102     18.77      5.550       .000
   3   3.0941    -9.0000    3.0941     29.97      4.984       .000
   4   3.9187    -9.0000    3.9187     66.31      3.524       .000
   5   4.6737    -9.0000    4.6737     68.02      2.309       .000
   6   5.3886    -9.0000    5.3886     43.84      1.146       .000
   7   6.0736    -9.0000    6.0736     25.26      -.168       .000
   8   6.7300    -9.0000    6.7300     14.03     -1.826       .000
   9   7.3532    -9.0000    7.3532      7.61     -4.041       .000
  10   7.9326    -9.0000    7.9326      4.12     -7.053       .000
  11   8.4540    -9.0000    8.4540      2.33    -11.030       .000

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL    STATIC   WEIGHT
   1     .0000   .2514  14.6960  14.0640  518.690  512.218  .074118
   2    2.1102   .2637  14.6960  14.0026  518.690  511.579  .073887
   3    3.0941   .2748  14.6960  13.9448  518.690  510.974  .073668
   4    3.9187   .2807  14.6960  13.9135  518.690  510.646  .073550
   5    4.6737   .2841  14.6960  13.8949  518.690  510.451  .073480
   6    5.3886   .2882  14.6960  13.8726  518.690  510.218  .073396
   7    6.0736   .2946  14.6960  13.8371  518.690  509.844  .073262
   8    6.7300   .3055  14.6960  13.7748  518.690  509.187  .073026
   9    7.3532   .3251  14.6960  13.6585  518.690  507.956  .072585
  10    7.9326   .3613  14.6960  13.4287  518.690  505.500  .071710
  11    8.4540   .4282  14.6960  12.9560  518.690  500.352  .069898

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY    FLOW    (PHI+GAMMA)
 LINE            TOTAL    STATIC              ANGLE
   1     .0000  124.486  122.932   .975379    .000        .000
   2    2.1102  124.486  122.779   .975379    .000       5.550
   3    3.0941  124.486  122.634   .975379    .000       4.984
   4    3.9187  124.486  122.555   .975379    .000       3.524
   5    4.6737  124.486  122.508   .975379    .000       2.309
   6    5.3886  124.486  122.452   .975379    .000       1.146
   7    6.0736  124.486  122.363   .975379    .000       -.168
   8    6.7300  124.486  122.205   .975379    .000      -1.826
   9    7.3532  124.486  121.909   .975379    .000      -4.041
  10    7.9326  124.486  121.320   .975379    .000      -7.053
  11    8.4540  124.486  120.084   .975379    .000     -11.030
1

STATION  3  FLOW-FIELD DESCRIPTION
**************************************

STREAM  RADIUS  ----------------V E L O C I T I E S---------------
 LINE           MERIDIONAL TANGENTIAL   AXIAL      RADIAL     TOTAL
   1     .0000    234.10       .00      234.10        .00     234.10
   2    2.2345    278.08       .00      270.95      62.58     278.08
   3    3.1982    313.12       .00      311.12      35.40     313.12
   4    3.9878    317.27       .00      316.42      23.34     317.27
   5    4.7214    320.44       .00      319.94      17.90     320.44
   6    5.4201    325.55       .00      325.21      14.80     325.55
   7    6.0905    333.56       .00      333.31      12.97     333.56
   8    6.7339    345.53       .00      345.30      12.66     345.53
   9    7.3488    362.72       .00      362.39      15.35     362.72
  10    7.9329    386.06       .00      385.29      24.26     386.06
  11    8.4860    414.63       .00      412.20      44.87     414.63

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE   STATION
 LINE  RADIUS    X-COORD    L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
   1    .0000    -8.0000     .0000       .00       .000       .000
   2   2.2345    -8.0000    2.2345      5.00     13.005       .000
   3   3.1982    -8.0000    3.1982     52.60      6.492       .000
   4   3.9878    -8.0000    3.9878    110.01      4.218       .000
   5   4.7214    -8.0000    4.7214     60.91      3.202       .000
   6   5.4201    -8.0000    5.4201     35.55      2.606       .000
   7   6.0905    -8.0000    6.0905     22.72      2.228       .000
   8   6.7339    -8.0000    6.7339     15.25      2.100       .000
   9   7.3488    -8.0000    7.3488     10.70      2.425       .000
  10   7.9329    -8.0000    7.9329      8.02      3.603       .000
  11   8.4860    -8.0000    8.4860      6.60      6.212       .000

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL    STATIC   WEIGHT
   1     .0000   .2106  14.6960  14.2486  518.690  514.130  .074812
   2    2.2345   .2507  14.6960  14.0676  518.690  512.255  .074131
   3    3.1982   .2827  14.6960  13.9025  518.690  510.531  .073509
   4    3.9878   .2865  14.6960  13.8818  518.690  510.314  .073430
   5    4.7214   .2894  14.6960  13.8658  518.690  510.146  .073370
   6    5.4201   .2941  14.6960  13.8397  518.690  509.871  .073271
   7    6.0905   .3015  14.6960  13.7979  518.690  509.432  .073113
   8    6.7339   .3125  14.6960  13.7339  518.690  508.755  .072871
```

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT
9	7.3488	.3284	14.6960	13.6384	518.690	507.742	.072509
10	7.9329	.3500	14.6960	13.5022	518.690	506.288	.071990
11	8.4860	.3767	14.6960	13.3253	518.690	504.384	.071315

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.0000	124.486	123.391	.975379	.000	.000
2	2.2345	124.486	122.941	.975379	.000	13.005
3	3.1982	124.486	122.528	.975379	.000	6.492
4	3.9878	124.486	122.475	.975379	.000	4.218
5	4.7214	124.486	122.435	.975379	.000	3.202
6	5.4201	124.486	122.369	.975379	.000	2.606
7	6.0905	124.486	122.264	.975379	.000	2.228
8	6.7339	124.486	122.101	.975379	.000	2.100
9	7.3488	124.486	121.858	.975379	.000	2.425
10	7.9329	124.486	121.509	.975379	.000	3.603
11	8.4860	124.486	121.052	.975379	.000	6.212

1

STATION 4 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	.0000	.00	.00	.00	.00	.00
2	2.5773	378.31	.00	375.45	46.45	378.31
3	3.3217	331.05	.00	330.08	25.23	331.05
4	4.0662	320.87	.00	320.07	22.57	320.87
5	4.7856	320.36	.00	319.57	22.46	320.36
6	5.4797	323.61	.00	322.76	23.48	323.61
7	6.1514	329.03	.00	328.01	25.91	329.03
8	6.8034	336.00	.00	334.60	30.61	336.00
9	7.4381	343.89	.00	341.69	38.88	343.89
10	8.0591	351.40	.00	347.48	52.35	351.40
11	8.6730	355.99	.00	348.53	72.46	355.99

STREAM LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	.0000	-7.0000	.0000	8.25	5.268	.000
2	2.5773	-7.0000	2.5773	-3.40	7.053	.000
3	3.3217	-7.0000	3.3217	-14.25	4.370	.000
4	4.0662	-7.0000	4.0662	-82.40	4.034	.000
5	4.7856	-7.0000	4.7856	102.34	4.020	.000
6	5.4797	-7.0000	5.4797	45.88	4.160	.000
7	6.1514	-7.0000	6.1514	32.31	4.517	.000
8	6.8034	-7.0000	6.8034	25.74	5.227	.000
9	7.4381	-7.0000	7.4381	22.42	6.491	.000
10	8.0591	-7.0000	8.0591	21.87	8.567	.000
11	8.6730	-7.0000	8.6730	25.38	11.745	.000

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT
1	.0000	.0000	14.6960	14.6960	518.690	518.690	.076482
2	2.5773	.3428	14.6960	13.5482	518.690	506.781	.072166
3	3.3217	.2992	14.6960	13.8111	518.690	509.571	.073163
4	4.0662	.2898	14.6960	13.8636	518.690	510.123	.073362
5	4.7856	.2894	14.6960	13.8662	518.690	510.150	.073372
6	5.4797	.2924	14.6960	13.8496	518.690	509.976	.073309
7	6.1514	.2973	14.6960	13.8216	518.690	509.681	.073203
8	6.8034	.3038	14.6960	13.7851	518.690	509.296	.073065
9	7.4381	.3110	14.6960	13.7428	518.690	508.849	.072905
10	8.0591	.3179	14.6960	13.7018	518.690	508.415	.072749
11	8.6730	.3222	14.6960	13.6763	518.690	508.145	.072653

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.0000	124.486	124.486	.975379	.000	5.268
2	2.5773	124.486	121.627	.975379	.000	7.053
3	3.3217	124.486	122.297	.975379	.000	4.370
4	4.0662	124.486	122.429	.975379	.000	4.034
5	4.7856	124.486	122.436	.975379	.000	4.020
6	5.4797	124.486	122.394	.975379	.000	4.160
7	6.1514	124.486	122.324	.975379	.000	4.517
8	6.8034	124.486	122.231	.975379	.000	5.227
9	7.4381	124.486	122.124	.975379	.000	6.491
10	8.0591	124.486	122.020	.975379	.000	8.567
11	8.6730	124.486	121.955	.975379	.000	11.745

1

STATION 5 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	.3720	178.05	.00	165.36	66.01	178.05
2	2.4290	264.40	.00	264.38	3.13	264.40
3	3.3706	290.77	.00	290.18	18.54	290.77
4	4.1637	300.55	.00	299.56	24.34	300.55
5	4.8978	306.23	.00	305.02	27.24	306.23
6	5.5988	310.47	.00	309.04	29.76	310.47
7	6.2784	313.96	.00	312.22	33.02	313.96
8	6.9430	316.74	.00	314.48	37.73	316.74
9	7.5976	318.29	.00	315.17	44.45	318.29
10	8.2478	317.36	.00	312.84	53.40	317.36
11	8.9020	311.50	.00	304.85	64.00	311.50

STREAM LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	.3720	-5.0000	.0000	4.12	21.760	-6.686
2	2.4290	-5.2412	2.0711	7.36	.678	-6.686
3	3.3706	-5.3515	3.0191	19.78	3.657	-6.686
4	4.1637	-5.4445	3.8177	35.37	4.644	-6.686
5	4.8978	-5.5306	4.5568	48.87	5.104	-6.686
6	5.5988	-5.6128	5.2626	58.67	5.501	-6.686
7	6.2784	-5.6924	5.9468	68.17	6.037	-6.686
8	6.9430	-5.7703	6.6160	88.22	6.842	-6.686
9	7.5976	-5.8471	7.2751	208.32	8.027	-6.686
10	8.2478	-5.9233	7.9297	-117.73	9.686	-6.686
11	8.9020	-6.0000	8.5884	-28.08	11.856	-6.686

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT
1	.3720	.1599	14.6960	14.4360	518.690	516.052	.075513
2	2.4290	.2382	14.6960	14.1270	518.690	512.873	.074355
3	3.3706	.2623	14.6960	14.0099	518.690	511.655	.073914
4	4.1637	.2712	14.6960	13.9638	518.690	511.173	.073740
5	4.8978	.2764	14.6960	13.9364	518.690	510.886	.073637
6	5.5988	.2803	14.6960	13.9157	518.690	510.669	.073559
7	6.2784	.2835	14.6960	13.8984	518.690	510.488	.073493
8	6.9430	.2860	14.6960	13.8845	518.690	510.342	.073441
9	7.5976	.2875	14.6960	13.8767	518.690	510.260	.073411
10	8.2478	.2866	14.6960	13.8813	518.690	510.309	.073429
11	8.9020	.2812	14.6960	13.9106	518.690	510.616	.073539

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	.3720	124.486	123.853	.975379	.000	15.074
2	2.4290	124.486	123.089	.975379	.000	-6.008
3	3.3706	124.486	122.797	.975379	.000	-3.030
4	4.1637	124.486	122.682	.975379	.000	-2.042
5	4.8978	124.486	122.613	.975379	.000	-1.583
6	5.5988	124.486	122.561	.975379	.000	-1.186
7	6.2784	124.486	122.517	.975379	.000	-.650
8	6.9430	124.486	122.482	.975379	.000	.155
9	7.5976	124.486	122.462	.975379	.000	1.341
10	8.2478	124.486	122.474	.975379	.000	3.000
11	8.9020	124.486	122.548	.975379	.000	5.169

1

STATION 6 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	1.0210	229.68	.00	192.61	125.10	229.68
2	2.5429	258.15	.00	254.34	44.23	258.15
3	3.4736	281.19	.00	278.80	36.57	281.19
4	4.2678	292.16	.00	290.15	34.22	292.16
5	5.0039	298.15	.00	296.27	33.49	298.15
6	5.7090	301.63	.00	299.72	33.86	301.63
7	6.3959	303.42	.00	301.37	35.27	303.42
8	7.0721	303.70	.00	301.35	37.75	303.70
9	7.7434	302.24	.00	299.41	41.26	302.24
10	8.4151	298.58	.00	295.10	45.50	298.58
11	9.0930	292.34	.00	288.09	49.68	292.34

STREAM LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	1.0210	-4.0000	.0000	1695.52	33.004	-7.062
2	2.5429	-4.1885	1.5336	8.27	9.865	-7.062
3	3.4736	-4.3038	2.4713	16.26	7.472	-7.062
4	4.2678	-4.4022	3.2716	29.29	6.726	-7.062
5	5.0039	-4.4934	4.0133	49.13	6.450	-7.062
6	5.7090	-4.5808	4.7238	84.64	6.445	-7.062
7	6.3959	-4.6659	5.4159	203.86	6.675	-7.062
8	7.0721	-4.7496	6.0974	-423.47	7.140	-7.062
9	7.7434	-4.8328	6.7738	-88.24	7.845	-7.062
10	8.4151	-4.9160	7.4506	-43.94	8.764	-7.062
11	9.0930	-5.0000	8.1337	-28.25	9.784	-7.062

1

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT
1	1.0210	.2066	14.6960	14.2652	518.690	514.300	.074874
2	2.5429	.2325	14.6960	14.1532	518.690	513.145	.074453
3	3.4736	.2535	14.6960	14.0537	518.690	512.111	.074079
4	4.2678	.2635	14.6960	14.0035	518.690	511.587	.073890
5	5.0039	.2690	14.6960	13.9752	518.690	511.293	.073783
6	5.7090	.2722	14.6960	13.9587	518.690	511.119	.073721
7	6.3959	.2738	14.6960	13.9500	518.690	511.029	.073688
8	7.0721	.2741	14.6960	13.9487	518.690	511.015	.073683
9	7.7434	.2728	14.6960	13.9557	518.690	511.089	.073710
10	8.4151	.2694	14.6960	13.9732	518.690	511.272	.073776
11	9.0930	.2637	14.6960	14.0026	518.690	511.578	.073887

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	1.0210	124.486	123.432	.975379	.000	25.942
2	2.5429	124.486	123.155	.975379	.000	2.803
3	3.4736	124.486	122.907	.975379	.000	.410
4	4.2678	124.486	122.781	.975379	.000	-.336
5	5.0039	124.486	122.710	.975379	.000	-.612
6	5.7090	124.486	122.649	.975379	.000	-.617
7	6.3959	124.486	122.647	.975379	.000	-.387
8	7.0721	124.486	122.644	.975379	.000	.078
9	7.7434	124.486	122.661	.975379	.000	.783
10	8.4151	124.486	122.705	.975379	.000	1.702
11	9.0930	124.486	122.779	.975379	.000	2.722

1

STATION 7 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	1.6710	258.90	.00	218.57	138.77	258.90
2	2.7937	271.52	.00	262.01	71.23	271.52
3	3.6450	283.15	.00	278.44	51.46	283.15
4	4.4094	290.01	.00	286.85	42.74	290.01
5	5.1322	294.04	.00	291.54	38.25	294.04
6	5.8319	296.09	.00	293.91	35.92	296.09
7	6.5186	296.54	.00	294.48	34.95	296.54
8	7.1986	295.46	.00	293.39	34.95	295.46
9	7.8771	292.78	.00	290.60	35.65	292.78
10	8.5584	288.36	.00	286.01	36.74	288.36
11	9.2470	282.14	.00	279.58	37.87	282.14

STREAM LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	1.6710	-3.0000	.0000	-55.41	32.411	-7.519
2	2.7937	-3.1482	1.1325	18.61	15.208	-7.519
3	3.6450	-3.2606	1.9911	26.60	10.471	-7.519
4	4.4094	-3.3615	2.7622	41.70	8.474	-7.519
5	5.1322	-3.4569	3.4912	72.03	7.474	-7.519
6	5.8319	-3.5492	4.1970	173.85	6.968	-7.519
7	6.5186	-3.6399	4.8896	-582.68	6.769	-7.519
8	7.1986	-3.7296	5.5756	-106.44	6.794	-7.519
9	7.8771	-3.8192	6.2599	-56.29	6.993	-7.519
10	8.5584	-3.9091	6.9471	-37.30	7.320	-7.519
11	9.2470	-4.0000	7.6417	-27.78	7.714	-7.519

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	PRESSURES STATIC	TEMPERATURES TOTAL	TEMPERATURES STATIC	SPECIFIC WEIGHT
1	1.6710	.2332	14.6960	14.1501	518.690	513.112	.074442
2	2.7937	.2447	14.6960	14.0964	518.690	512.555	.074240
3	3.6450	.2553	14.6960	14.0448	518.690	512.018	.074046
4	4.4094	.2616	14.6960	14.0134	518.690	511.691	.073927
5	5.1322	.2652	14.6960	13.9947	518.690	511.496	.073857
6	5.8319	.2671	14.6960	13.9850	518.690	511.395	.073820
7	6.5186	.2675	14.6960	13.9829	518.690	511.373	.073812
8	7.1986	.2665	14.6960	13.9880	518.690	511.426	.073831
9	7.8771	.2641	14.6960	14.0006	518.690	511.557	.073879
10	8.5584	.2600	14.6960	14.0210	518.690	511.771	.073956
11	9.2470	.2544	14.6960	14.0494	518.690	512.066	.074063

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	1.6710	124.486	123.147	.975379	.000	24.892
2	2.7937	124.486	123.013	.975379	.000	7.689
3	3.6450	124.486	122.884	.975379	.000	2.952
4	4.4094	124.486	122.806	.975379	.000	.954
5	5.1322	124.486	122.759	.975379	.000	-.046
6	5.8319	124.486	122.735	.975379	.000	-.551
7	6.5186	124.486	122.729	.975379	.000	-.750
8	7.1986	124.486	122.742	.975379	.000	-.725
9	7.8771	124.486	122.774	.975379	.000	-.526
10	8.5584	124.486	122.825	.975379	.000	-.199
11	9.2470	124.486	122.896	.975379	.000	.195

1

STATION 8 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL

IC/14PRINT

STREAM LINE	RADIUS	MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	2.2910	305.51	.00	270.31	142.36	305.51
2	3.1068	292.51	.00	281.17	80.67	292.51
3	3.8585	290.68	.00	284.58	59.27	290.68
4	4.5775	292.25	.00	288.29	47.97	292.25
5	5.2756	293.68	.00	290.79	41.10	293.68
6	5.9610	294.23	.00	291.95	36.59	294.23
7	6.6393	293.68	.00	291.76	33.49	293.68
8	7.3151	291.87	.00	290.19	31.27	291.87
9	7.9920	288.68	.00	287.16	29.63	288.68
10	8.6738	284.02	.00	282.60	28.38	284.02
11	9.3640	277.88	.00	276.53	27.37	277.88

STREAM LINE	-----MESH-POINT COORDS------ RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	2.2910	-2.0000	.0000	-8.08	27.774	-8.047
2	3.1068	-2.1153	.8239	-35.82	16.009	-8.047
3	3.8585	-2.2216	1.5831	197.65	11.764	-8.047
4	4.5775	-2.3233	2.3093	118.98	9.447	-8.047
5	5.2756	-2.4220	3.0143	190.93	8.045	-8.047
6	5.9610	-2.5189	3.7065	6652.40	7.144	-8.047
7	6.6393	-2.6148	4.3916	-172.07	6.548	-8.047
8	7.3151	-2.7103	5.0740	-79.74	6.151	-8.047
9	7.9920	-2.8060	5.7577	-50.04	5.892	-8.047
10	8.6738	-2.9024	6.4463	-35.89	5.734	-8.047
11	9.3640	-3.0000	7.1433	-28.19	5.652	-8.047

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	2.2910	.2757	14.6960	13.9399	518.690	510.923	.073650
2	3.1068	.2638	14.6960	14.0018	518.690	511.570	.073883
3	3.8585	.2622	14.6960	14.0103	518.690	511.659	.073916
4	4.5775	.2636	14.6960	14.0030	518.690	511.583	.073888
5	5.2756	.2649	14.6960	13.9963	518.690	511.513	.073863
6	5.9610	.2654	14.6960	13.9937	518.690	511.486	.073853
7	6.6393	.2649	14.6960	13.9964	518.690	511.513	.073863
8	7.3151	.2633	14.6960	14.0048	518.690	511.601	.073895
9	7.9920	.2603	14.6960	14.0195	518.690	511.755	.073950
10	8.6738	.2561	14.6960	14.0409	518.690	511.978	.074031
11	9.3640	.2505	14.6960	14.0685	518.690	512.265	.074135

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	2.2910	124.486	122.622	.975379	.000	19.727
2	3.1068	124.486	122.777	.975379	.000	7.962
3	3.8585	124.486	122.798	.975379	.000	3.717
4	4.5775	124.486	122.780	.975379	.000	1.400
5	5.2756	124.486	122.763	.975379	.000	-.002
6	5.9610	124.486	122.757	.975379	.000	-.904
7	6.6393	124.486	122.763	.975379	.000	-1.500
8	7.3151	124.486	122.784	.975379	.000	-1.897
9	7.9920	124.486	122.821	.975379	.000	-2.155
10	8.6738	124.486	122.875	.975379	.000	-2.313
11	9.3640	124.486	122.944	.975379	.000	-2.395

STATION 9 FLOW-FIELD DESCRIPTION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

STREAM LINE	RADIUS	----------------V E L O C I T I E S---------------- MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	2.7310	349.67	.00	340.76	78.44	349.67
2	3.3826	296.36	.00	286.17	77.02	296.36
3	4.0741	295.92	.00	289.65	60.61	295.92
4	4.7522	295.67	.00	291.44	49.85	295.67
5	5.4228	295.70	.00	292.68	42.15	295.70
6	6.0887	295.37	.00	293.12	36.37	295.37
7	6.7528	294.37	.00	292.66	31.74	294.37
8	7.4176	292.44	.00	291.13	27.67	292.44
9	8.0858	289.28	.00	288.30	23.79	289.28
10	8.7604	284.65	.00	283.94	20.01	284.65
11	9.4450	278.40	.00	277.92	16.34	278.40

STREAM LINE	-----MESH-POINT COORDS------ RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	2.7310	-1.0000	.0000	-2.12	12.963	-8.471
2	3.3826	-1.0971	.6588	-252.85	15.064	-8.472
3	4.0741	-1.2000	1.3579	-246.73	11.819	-8.472
4	4.7522	-1.3010	2.0435	3002.05	9.707	-8.472
5	5.4228	-1.4009	2.7215	-3891.28	8.194	-8.471
6	6.0887	-1.5001	3.3948	-355.92	7.074	-8.471
7	6.7528	-1.5990	4.0662	-148.43	6.190	-8.472
8	7.4176	-1.6980	4.7383	-82.54	5.429	-8.471
9	8.0858	-1.7976	5.4138	-52.62	4.717	-8.472
10	8.7604	-1.8980	6.0959	-37.35	4.032	-8.472
11	9.4450	-2.0000	6.7881	-28.35	3.365	-8.471

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	2.7310	.3164	14.6960	13.7113	518.690	508.516	.072785
2	3.3826	.2674	14.6960	13.9838	518.690	511.382	.073815
3	4.0741	.2670	14.6960	13.9858	518.690	511.403	.073823
4	4.7522	.2667	14.6960	13.9870	518.690	511.416	.073828
5	5.4228	.2668	14.6960	13.9869	518.690	511.414	.073827
6	6.0887	.2665	14.6960	13.9884	518.690	511.430	.073833
7	6.7528	.2656	14.6960	13.9931	518.690	511.479	.073851
8	7.4176	.2638	14.6960	14.0021	518.690	511.574	.073885
9	8.0858	.2609	14.6960	14.0168	518.690	511.727	.073940
10	8.7604	.2567	14.6960	14.0380	518.690	511.948	.074020
11	9.4450	.2510	14.6960	14.0661	518.690	512.241	.074126

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	2.7310	124.486	122.044	.975379	.000	4.491
2	3.3826	124.486	122.732	.975379	.000	6.592
3	4.0741	124.486	122.737	.975379	.000	3.348
4	4.7522	124.486	122.740	.975379	.000	1.236
5	5.4228	124.486	122.739	.975379	.000	-.277
6	6.0887	124.486	122.743	.975379	.000	-1.398
7	6.7528	124.486	122.755	.975379	.000	-2.282
8	7.4176	124.486	122.778	.975379	.000	-3.043
9	8.0858	124.486	122.814	.975379	.000	-3.755
10	8.7604	124.486	122.868	.975379	.000	-4.440
11	9.4450	124.486	122.938	.975379	.000	-5.106

STATION 10 FLOW-FIELD DESCRIPTION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

STREAM LINE	RADIUS	----------------V E L O C I T I E S---------------- MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	2.7500	228.35	.00	221.20	56.67	228.35
2	3.5305	303.00	.00	293.84	73.97	303.00
3	4.2022	298.47	.00	292.33	60.21	298.47
4	4.8685	298.32	.00	294.13	49.83	298.32
5	5.5297	298.24	.00	295.23	42.26	298.24
6	6.1892	298.06	.00	295.92	35.69	298.06
7	6.8486	297.54	.00	295.99	30.33	297.54
8	7.5085	296.77	.00	295.72	24.86	296.77
9	8.1697	295.50	.00	294.89	18.95	295.50
10	8.8330	293.31	.00	293.05	12.16	293.31
11	9.5000	289.85	.00	289.80	5.31	289.85

STREAM LINE	-----MESH-POINT COORDS------ RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	2.7500	-.5000	.0000	1.24	14.371	-3.216
2	3.5305	-.5440	.7817	-19.61	14.130	-3.242
3	4.2022	-.5825	1.4545	-217.79	11.638	-3.350
4	4.8685	-.6218	2.1221	-202.66	9.615	-3.328
5	5.5297	-.6574	2.7842	-541.92	8.146	-2.697
6	6.1892	-.6816	3.4438	-201.51	6.876	-1.425
7	6.8486	-.6886	4.1028	-179.08	5.851	.252
8	7.5085	-.6740	4.7629	-110.43	4.805	2.381
9	8.1697	-.6336	5.4255	-72.50	3.678	4.514
10	8.8330	-.5723	6.0917	-46.59	2.375	5.889
11	9.5000	-.5000	6.7622	-36.85	1.050	6.335

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	2.7500	.2054	14.6960	14.2701	518.690	514.351	.074892
2	3.5305	.2735	14.6960	13.9520	518.690	511.050	.073696
3	4.2022	.2693	14.6960	13.9737	518.690	511.277	.073778
4	4.8685	.2692	14.6960	13.9744	518.690	511.284	.073780
5	5.5297	.2691	14.6960	13.9748	518.690	511.288	.073782
6	6.1892	.2689	14.6960	13.9757	518.690	511.297	.073785
7	6.8486	.2684	14.6960	13.9782	518.690	511.323	.073794
8	7.5085	.2677	14.6960	13.9818	518.690	511.361	.073808
9	8.1697	.2666	14.6960	13.9878	518.690	511.424	.073831
10	8.8330	.2646	14.6960	13.9981	518.690	511.531	.073870
11	9.5000	.2614	14.6960	14.0142	518.690	511.699	.073930

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	2.7500	124.486	123.444	.975379	.000	11.154
2	3.5305	124.486	122.652	.975379	.000	10.888
3	4.2022	124.486	122.707	.975379	.000	8.288
4	4.8685	124.486	122.708	.975379	.000	6.287
5	5.5297	124.486	122.709	.975379	.000	5.449
6	6.1892	124.486	122.711	.975379	.000	5.451
7	6.8486	124.486	122.718	.975379	.000	6.103
8	7.5085	124.486	122.727	.975379	.000	7.187
9	8.1697	124.486	122.742	.975379	.000	8.191
10	8.8330	124.486	122.768	.975379	.000	8.264
11	9.5000	124.486	122.808	.975379	.000	7.385

STATION 11 FLOW-FIELD DESCRIPTION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

STREAM LINE	RADIUS	----------------V E L O C I T I E S---------------- MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	3.0000	331.17	.00	312.81	108.73	331.17
2	3.6638	306.09	.00	298.81	66.37	306.09
3	4.3320	308.55	.00	303.27	56.81	308.55
4	4.9899	308.96	.00	305.34	47.15	308.96
5	5.6438	308.67	.00	306.10	39.79	308.67
6	6.2954	308.33	.00	306.48	33.77	308.33
7	6.9458	309.17	.00	307.75	29.61	309.17
8	7.5910	311.87	.00	310.78	26.06	311.87
9	8.2311	315.85	.00	315.18	20.56	315.85
10	8.8653	317.39	.00	317.19	11.14	317.39
11	9.5000	313.11	.00	313.11	.00	313.11

STREAM LINE	-----MESH-POINT COORDS------ RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	3.0000	.0000	.0000	-2.27	19.167	1.659
2	3.6638	.0205	.6641	-22.20	12.523	1.983
3	4.3320	.0523	1.3330	-18.70	10.611	3.878
4	4.9899	.1025	1.9929	-25.16	8.778	3.805
5	5.6438	.1438	2.6482	-27.52	7.407	4.820
6	6.2954	.2150	3.3036	-43.17	6.289	6.477
7	6.9458	.2852	3.9577	-101.81	5.497	6.466
8	7.5910	.3652	4.6079	81.89	4.793	7.363
9	8.2311	.4550	5.2543	42.10	3.733	9.249
10	8.8653	.5730	5.8994	53.55	2.011	11.236
11	9.5000	.7000	6.5466	.00	.000	11.356

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	3.0000	.2993	14.6960	13.8105	518.690	509.564	.073161
2	3.6638	.2763	14.6960	13.9371	518.690	510.894	.073639
3	4.3320	.2785	14.6960	13.9251	518.690	510.768	.073594
4	4.9899	.2789	14.6960	13.9231	518.690	510.747	.073587
5	5.6438	.2786	14.6960	13.9245	518.690	510.762	.073592
6	6.2954	.2783	14.6960	13.9262	518.690	510.779	.073598
7	6.9458	.2791	14.6960	13.9220	518.690	510.736	.073583
8	7.5910	.2816	14.6960	13.9087	518.690	510.597	.073532
9	8.2311	.2852	14.6960	13.8889	518.690	510.389	.073458
10	8.8653	.2866	14.6960	13.8812	518.690	510.308	.073428
11	9.5000	.2827	14.6960	13.9026	518.690	510.532	.073509

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	3.0000	124.486	122.295	.975379	.000	20.825
2	3.6638	124.486	122.614	.975379	.000	14.506
3	4.3320	124.486	122.584	.975379	.000	14.488
4	4.9899	124.486	122.579	.975379	.000	12.583
5	5.6438	124.486	122.583	.975379	.000	12.227
6	6.2954	124.486	122.587	.975379	.000	12.765
7	6.9458	124.486	122.577	.975379	.000	11.962
8	7.5910	124.486	122.543	.975379	.000	12.157
9	8.2311	124.486	122.493	.975379	.000	12.982
10	8.8653	124.486	122.474	.975379	.000	13.246
11	9.5000	124.486	122.528	.975379	.000	11.356

STATION 11 IS AT THE LEADING EDGE OF A BLADE
ROTATING AT 8844.0 RPM. NUMBER OF BLADES IN ROW = 17.

STREAM LINE	RADIUS	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	INCIDENCE ANGLE
1	3.0000	231.54	404.08	.3652	-34.959	4.006
2	3.6638	282.77	416.71	.3761	-42.732	1.523
3	4.3320	334.33	454.95	.4107	-47.297	1.626
4	4.9899	385.11	493.73	.4457	-51.262	1.713
5	5.6438	435.58	533.86	.4819	-54.677	1.739
6	6.2954	485.87	575.44	.5195	-57.601	1.811
7	6.9458	536.06	618.83	.5586	-60.026	1.853
8	7.5910	585.86	663.70	.5992	-61.973	1.930
9	8.2311	635.27	709.45	.6407	-63.564	2.016
10	8.8653	684.21	754.24	.6812	-65.115	2.092
11	9.5000	733.20	797.25	.7199	-66.875	2.111

STREAM LINE	RADIUS	BLADE ANGLE	LEAN ANGLE	DELTA P A-BLADE
1	3.0000	-30.953	-14.861	.7949
2	3.6638	-41.208	-9.359	.7291
3	4.3320	-45.671	-4.817	.7511
4	4.9899	-49.549	-2.771	.7786
5	5.6438	-52.938	1.028	.8130
6	6.2954	-55.790	4.281	.8634
7	6.9458	-58.173	6.864	.9281
8	7.5910	-60.043	9.838	1.0195

9	8.2311	-61.548	13.920	1.1462
10	8.8653	-63.023	18.850	1.3217
11	9.5000	-64.765	20.231	1.5525

STATION 12 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	3.1250	343.12	81.62	335.91	69.98	352.70
2	3.7872	356.01	65.92	350.00	65.10	362.06
3	4.4300	356.66	55.91	352.67	53.20	361.02
4	5.0681	354.76	48.79	352.01	44.06	358.09
5	5.7060	351.72	43.47	349.79	36.82	354.40
6	6.3460	348.62	39.28	347.14	32.09	350.83
7	6.9886	345.41	35.94	344.16	29.27	347.27
8	7.6285	341.33	33.21	340.19	27.91	342.94
9	8.2594	336.07	30.91	335.25	23.52	337.49
10	8.8793	330.05	28.86	329.75	14.08	331.31
11	9.5000	321.62	26.89	321.62	.00	322.74

STREAM LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	3.1250	.6000	.0000	.00	11.768	1.239
2	3.7872	.6133	.6623	-14.13	10.536	.986
3	4.4300	.6279	1.3053	-15.31	8.579	2.156
4	5.0681	.6560	1.9440	-17.62	7.135	1.856
5	5.7060	.6721	2.5821	-21.72	6.009	2.318
6	6.3460	.7109	3.2233	-26.31	5.282	3.616
7	6.9886	.7473	3.8669	-30.68	4.861	3.379
8	7.6285	.7894	4.5082	-33.69	4.689	3.886
9	8.2594	.8372	5.1410	-49.35	4.013	5.357
10	8.8793	.9064	5.7647	245.68	2.445	6.824
11	9.5000	.9800	6.3900	.00	.000	6.732

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	STATIC	TEMPERATURES TOTAL	STATIC	SPECIFIC WEIGHT
1	3.1250	.3181	15.0114	13.9948	521.966	511.615	.073840
2	3.7872	.3268	15.0047	13.9352	521.897	510.989	.073616
3	4.4300	.3258	15.0004	13.9371	521.871	511.026	.073620
4	5.0681	.3231	14.9976	13.9512	521.866	511.196	.073670
5	5.7060	.3197	14.9958	13.9705	521.876	511.425	.073740
6	6.3460	.3164	14.9947	13.9895	521.892	511.650	.073807
7	6.9886	.3131	14.9942	14.0089	521.916	511.881	.073876
8	7.6285	.3092	14.9941	14.0327	521.944	512.158	.073962
9	8.2594	.3041	14.9942	14.0625	521.969	512.491	.074070
10	8.8793	.2985	14.9945	14.0959	521.981	512.848	.074195
11	9.5000	.2906	14.9948	14.1410	521.972	513.304	.074366

STREAM LINE	RADIUS	ENTHALPIES TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	3.1250	125.272	122.788	.975435	13.381	13.007
2	3.7872	125.255	122.637	.975433	10.490	11.522
3	4.4300	125.249	122.646	.975441	8.909	10.735
4	5.0681	125.248	122.687	.975452	7.831	8.991
5	5.7060	125.250	122.742	.975464	7.045	8.327
6	6.3460	125.254	122.796	.975477	6.428	8.898
7	6.9886	125.260	122.851	.975490	5.940	8.240
8	7.6285	125.267	122.918	.975504	5.558	8.576
9	8.2594	125.273	122.998	.975515	5.255	9.370
10	8.8793	125.276	123.083	.975519	4.997	9.269
11	9.5000	125.273	123.193	.975513	4.780	6.732

STATION 12 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE
ROTATING AT 8844.0 RPM. NUMBER OF BLADES IN ROW = 17.

STREAM LINE	RADIUS	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE
1	3.1250	241.18	378.41	.3413	-24.939	.000
2	3.7872	292.29	421.88	.3808	-32.452	.000
3	4.4300	341.90	457.16	.4126	-38.725	.000
4	5.0681	391.15	493.01	.4449	-43.982	.000
5	5.7060	440.38	530.33	.4784	-48.455	.000
6	6.3460	489.77	569.63	.5138	-52.265	.000
7	6.9886	539.37	610.53	.5505	-55.546	.000
8	7.6285	588.75	652.02	.5878	-58.433	.000
9	8.2594	637.45	693.42	.6249	-61.010	.000
10	8.8793	685.29	734.74	.6619	-63.307	.000
11	9.5000	733.20	776.08	.6988	-65.517	.000

STREAM LINE	RADIUS	BLADE ANGLE	LEAN ANGLE	DELTA P A-BLADE	LOSS COEFF	DIFF FACTOR	DELTA P ON Q
1	3.1250	.000	-11.656	.8271	.00922	.0989	.1383
2	3.7872	.000	-8.709	.8482	.00846	.0183	-.0013
3	4.4300	.000	-6.129	.8688	.00830	.0218	.0070
4	5.0681	.000	-4.198	.8940	.00832	.0250	.0138
5	5.7060	.000	-1.565	.9264	.00844	.0278	.0192
6	6.3460	.000	.681	.9768	.00847	.0296	.0225
7	6.9886	.000	2.349	1.0383	.00850	.0316	.0264
8	7.6285	.000	4.145	1.1194	.00843	.0348	.0324
9	8.2594	.000	7.189	1.2257	.00820	.0395	.0393
10	8.8793	.000	11.382	1.3809	.00763	.0434	.0425
11	9.5000	.000	12.886	1.6002	.00668	.0457	.0416

STREAM LINE	RADIUS	INLET THROUGH STATION 12 PRESS RATIO	ISENT EFF	DELTA H ON H1	STATION 11 THRU STATION 12 PRESS RATIO	ISENT EFF	DELTA H ON H1
MEAN	VALUES-	1.0204	.9284	.0062	1.0204	.9284	.0062
1	3.1250	1.0215	.9631	.0063	1.0215	.9631	.0063
2	3.7872	1.0210	.9635	.0062	1.0210	.9635	.0062
3	4.4300	1.0207	.9575	.0061	1.0207	.9575	.0061
4	5.0681	1.0205	.9503	.0061	1.0205	.9503	.0061
5	5.7060	1.0204	.9421	.0061	1.0204	.9421	.0061
6	6.3460	1.0203	.9338	.0062	1.0203	.9338	.0062
7	6.9886	1.0203	.9251	.0062	1.0203	.9251	.0062
8	7.6285	1.0203	.9168	.0063	1.0203	.9168	.0063
9	8.2594	1.0203	.9101	.0063	1.0203	.9101	.0063
10	8.8793	1.0203	.9078	.0063	1.0203	.9078	.0063
11	9.5000	1.0203	.9113	.0063	1.0203	.9113	.0063

STATION 13 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	3.2500	376.32	155.87	368.41	76.75	407.32
2	3.8843	383.33	127.61	378.80	58.75	404.01
3	4.5055	381.32	109.21	378.55	45.90	396.65
4	5.1284	377.14	95.79	375.25	37.67	389.11
5	5.7550	372.98	85.61	371.61	31.98	382.68
6	6.3870	368.91	77.55	367.82	28.26	376.97
7	7.0242	363.76	71.05	362.86	25.57	370.63
8	7.6604	355.95	65.71	355.17	23.64	361.97
9	8.2846	345.81	61.24	345.24	19.90	351.19
10	8.8937	336.36	57.26	336.10	13.21	341.20
11	9.5000	330.18	53.48	330.18	.00	334.48

STREAM LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	3.2500	1.2000	.0000	*********	11.768	.794
2	3.8843	1.2054	.6343	-34.48	8.816	-.136
3	4.5055	1.2022	1.2556	-28.69	6.913	.309
4	5.1284	1.2087	1.8785	-32.09	5.732	-.186
5	5.7550	1.1993	2.5051	-38.88	4.919	-.333
6	6.3870	1.2055	3.1372	-40.94	4.393	.622
7	7.0242	1.2078	3.7744	-33.17	4.031	.159
8	7.6604	1.2111	4.4106	-23.25	3.808	.250
9	8.2846	1.2168	5.0348	-22.11	3.299	1.297
10	8.8937	1.2384	5.6443	-40.81	2.251	2.242
11	9.5000	1.2600	6.2510	.00	.000	1.946

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	STATIC	TEMPERATURES TOTAL	STATIC	SPECIFIC WEIGHT
1	3.2500	.3675	15.3268	13.9620	525.196	511.391	.073700
2	3.8843	.3645	15.3134	13.9708	525.057	511.474	.073734
3	4.5055	.3577	15.3049	14.0099	525.010	511.918	.073876
4	5.1284	.3507	15.2992	14.0520	525.000	512.401	.074028
5	5.7550	.3448	15.2956	14.0884	525.018	512.833	.074157
6	6.3870	.3395	15.2934	14.1212	525.052	513.227	.074273
7	7.0242	.3336	15.2923	14.1583	525.100	513.670	.074404
8	7.6604	.3256	15.2921	14.2092	525.155	514.253	.074587
9	8.2846	.3157	15.2924	14.2716	525.206	514.943	.074814
10	8.8937	.3066	15.2930	14.3281	525.231	515.544	.075023
11	9.5000	.3004	15.2936	14.3654	525.215	515.906	.075165

STREAM LINE	RADIUS	ENTHALPIES TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	3.2500	126.047	122.734	.975490	22.498	12.562
2	3.8843	126.014	122.754	.975486	18.412	8.680
3	4.5055	126.002	122.860	.975503	15.982	7.222
4	5.1284	126.000	122.976	.975524	14.252	5.547
5	5.7550	126.004	123.080	.975548	12.927	4.586
6	6.3870	126.012	123.174	.975573	11.871	5.015
7	7.0242	126.024	123.281	.975600	11.052	4.190
8	7.6604	126.037	123.421	.975627	10.459	4.058
9	8.2846	126.049	123.586	.975648	10.042	4.596
10	8.8937	126.056	123.731	.975657	9.662	4.493
11	9.5000	126.052	123.817	.975647	9.200	1.946

STATION 13 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE
ROTATING AT 8844.0 RPM. NUMBER OF BLADES IN ROW = 17.

STREAM LINE	RADIUS	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE
1	3.2500	250.83	388.12	.3501	-14.163	.000
2	3.8843	299.79	420.22	.3791	-24.188	.000
3	4.5055	347.73	449.77	.4056	-32.027	.000
4	5.1284	395.80	481.91	.4343	-38.502	.000
5	5.7550	444.16	517.37	.4661	-43.870	.000
6	6.3870	492.94	555.56	.5003	-48.392	.000
7	7.0242	542.12	595.17	.5357	-52.325	.000
8	7.6604	591.22	634.71	.5710	-55.888	.000
9	8.2846	639.39	673.69	.6057	-59.115	.000
10	8.8937	686.40	713.41	.6410	-61.870	.000
11	9.5000	733.20	755.67	.6787	-64.092	.000

STREAM LINE	RADIUS	BLADE ANGLE	LEAN ANGLE	DELTA P A-BLADE	LOSS COEFF	DIFF FACTOR	DELTA P ON Q
1	3.2500	.000	-6.753	.8893	.01844	.1065	.1137
2	3.8843	.000	-5.013	.9043	.01681	.0517	.0236
3	4.5055	.000	-3.674	.9204	.01650	.0643	.0495
4	5.1284	.000	-3.003	.9408	.01658	.0708	.0634
5	5.7550	.000	-2.046	.9725	.01683	.0731	.0683
6	6.3870	.000	-1.090	1.0238	.01688	.0734	.0693
7	7.0242	.000	-.291	1.0849	.01693	.0744	.0719
8	7.6604	.000	.549	1.1612	.01677	.0779	.0786
9	8.2846	.000	2.313	1.2577	.01628	.0841	.0866
10	8.8937	.000	4.539	1.4023	.01518	.0889	.0884
11	9.5000	.000	5.269	1.6305	.01337	.0901	.0808

STREAM LINE	RADIUS	INLET THROUGH STATION 13 PRESS RATIO	ISENT EFF	DELTA H ON H1	STATION 11 THRU STATION 13 PRESS RATIO	ISENT EFF	DELTA H ON H1
MEAN	VALUES-	1.0409	.9278	.0124	1.0409	.9278	.0124
1	3.2500	1.0429	.9628	.0125	1.0429	.9628	.0125
2	3.8843	1.0420	.9633	.0123	1.0420	.9633	.0123
3	4.5055	1.0414	.9573	.0122	1.0414	.9573	.0122
4	5.1284	1.0410	.9500	.0122	1.0410	.9500	.0122
5	5.7550	1.0408	.9416	.0122	1.0408	.9416	.0122
6	6.3870	1.0407	.9333	.0123	1.0407	.9333	.0123
7	7.0242	1.0406	.9245	.0124	1.0406	.9245	.0124
8	7.6604	1.0406	.9163	.0125	1.0406	.9163	.0125
9	8.2846	1.0406	.9097	.0126	1.0406	.9097	.0126
10	8.8937	1.0406	.9071	.0126	1.0406	.9071	.0126
11	9.5000	1.0407	.9101	.0126	1.0407	.9101	.0126

STATION 14 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	VELOCITIES MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
1	3.3750	391.71	222.20	383.48	79.89	450.34
2	3.9709	384.52	184.90	380.73	53.91	426.67
3	4.5694	376.14	159.35	374.00	40.07	408.50
4	5.1792	370.15	140.19	368.70	32.81	395.81
5	5.7968	366.67	125.46	365.59	28.14	387.54
6	6.4220	364.15	113.68	363.32	24.55	381.48
7	7.0534	360.44	104.15	359.85	20.71	375.19
8	7.6846	353.55	96.29	353.16	16.77	366.43
9	8.3031	343.68	89.72	343.43	13.08	355.19
10	8.9054	335.60	83.95	335.46	9.73	345.94
11	9.5000	334.30	78.54	334.30	.00	343.40

STREAM LINE	MESH-POINT COORDS RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	3.3750	1.8000	.0000	*********	11.768	.345
2	3.9709	1.7979	.5959	-66.16	8.059	-1.307
3	4.5694	1.7773	1.1947	-75.45	6.115	-1.641
4	5.1792	1.7622	1.8047	-105.92	5.086	-2.305
5	5.7968	1.7272	2.4233	-119.48	4.402	-3.086
6	6.4220	1.7003	3.0491	-78.88	3.866	-2.506
7	7.0534	1.6677	3.6814	-38.96	3.293	-3.159
8	7.6846	1.6318	4.3135	-21.21	2.719	-3.493
9	8.3031	1.5947	4.9332	-17.31	2.182	-2.916
10	8.9054	1.5689	5.5360	-26.46	1.661	-2.468
11	9.5000	1.5400	6.1314	.00	.000	-2.938

STREAM LINE	RADIUS	MACH NUMBER	PRESSURES TOTAL	STATIC	TEMPERATURES TOTAL	STATIC	SPECIFIC WEIGHT
1	3.3750	.4063	15.6423	13.9618	528.322	511.446	.073690
2	3.9709	.3843	15.6226	14.1092	528.121	512.972	.074247
3	4.5694	.3675	15.6097	14.2192	528.042	514.157	.074653
4	5.1792	.3558	15.6010	14.2936	528.016	514.979	.074924

```
    5    5.7968    .3482  15.5956  14.3411  528.031  515.534  .075092
    6    6.4220    .3426  15.5921  14.3758  528.067  515.957  .075212
    7    7.0534    .3368  15.5905  14.4131  528.125  516.412  .075341
    8    7.6846    .3288  15.5902  14.4659  528.195  517.021  .075527
    9    8.3031    .3185  15.5907  14.5326  528.259  517.761  .075768
   10    8.9054    .3100  15.5915  14.5866  528.293  518.334  .075965
   11    9.5000    .3077  15.5923  14.6016  528.273  518.460  .076025

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY   FLOW    (PHI+GAMMA)
 LINE             TOTAL   STATIC             ANGLE
    1    3.3750  126.797  122.747  .975517  29.564     12.113
    2    3.9709  126.749  123.113  .975512  25.681      6.752
    3    4.5694  126.730  123.398  .975533  22.961      4.474
    4    5.1792  126.724  123.595  .975559  20.744      2.781
    5    5.7968  126.728  123.728  .975590  18.889      1.316
    6    6.4220  126.736  123.830  .975621  17.337      1.360
    7    7.0534  126.750  123.939  .975655  16.116       .134
    8    7.6846  126.767  124.085  .975688  15.235      -.774
    9    8.3031  126.782  124.263  .975715  14.632      -.734
   10    8.9054  126.790  124.400  .975727  14.044      -.807
   11    9.5000  126.785  124.430  .975714  13.220     -2.938

STATION 14 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE
ROTATING AT  8844.0 RPM. NUMBER OF BLADES IN ROW = 17.

STREAM  RADIUS   BLADE   RELATIVE   RELATIVE   RELATIVE   DEVIATION
 LINE            SPEED   VELOCITY   MACH NO.  FLOW ANGLE    ANGLE

    1    3.3750  260.48   393.57      .3550     -5.581       .000
    2    3.9709  306.47   403.28      .3633    -17.544       .000
    3    4.5694  352.66   422.90      .3805    -27.199       .000
    4    5.1792  399.72   452.07      .4064    -35.035       .000
    5    5.7968  447.39   487.94      .4384    -41.281       .000
    6    6.4220  495.64   527.73      .4740    -46.368       .000
    7    7.0534  544.37   568.96      .5108    -50.691       .000
    8    7.6846  593.08   609.75      .5471    -54.562       .000
    9    8.3031  640.82   649.48      .5823    -58.052       .000
   10    8.9054  687.30   690.41      .6187    -60.916       .000
   11    9.5000  733.20   735.08      .6586    -62.949       .000

STREAM  RADIUS   BLADE   LEAN    DELTA P   LOSS    DIFF    DELTA P

 LINE            ANGLE   ANGLE   A-BLADE   COEFF  FACTOR    ON Q

    1    3.3750   .000   4.171    .9235  .02305   .1208   .1135
    2    3.9709   .000   3.163    .9115  .02099   .1199   .1204
    3    4.5694   .000   1.877    .9131  .02061   .1483   .1716
    4    5.1792   .000    .529    .9284  .02071   .1535   .1822
    5    5.7968   .000   -.814    .9608  .02103   .1483   .1737
    6    6.4220   .000  -1.559   1.0154  .02110   .1401   .1599
    7    7.0534   .000  -1.816   1.0807  .02116   .1339   .1495
    8    7.6846   .000  -1.952   1.1599  .02095   .1319   .1458
    9    8.3031   .000  -1.626   1.2576  .02033   .1341   .1457
   10    8.9054   .000  -2.233   1.4067  .01898   .1357   .1395
   11    9.5000   .000  -3.005   1.6519  .01671   .1338   .1220

STREAM  RADIUS   INLET THROUGH STATION 14    STATION 11 THRU STATION 14
 LINE            PRESS    ISENT   DELTA H   PRESS    ISENT   DELTA H
                 RATIO     EFF     ON H1    RATIO     EFF     ON H1
  MEAN VALUES-  1.0613    .9385    .0183   1.0613    .9385    .0183
    1    3.3750 1.0644    .9684    .0186   1.0644    .9684    .0186
    2    3.9709 1.0630    .9690    .0182   1.0630    .9690    .0182
    3    4.5694 1.0622    .9638    .0180   1.0622    .9638    .0180
    4    5.1792 1.0616    .9575    .0180   1.0616    .9575    .0180
    5    5.7968 1.0612    .9503    .0180   1.0612    .9503    .0180
    6    6.4220 1.0610    .9432    .0181   1.0610    .9432    .0181
    7    7.0534 1.0609    .9356    .0182   1.0609    .9356    .0182
    8    7.6846 1.0608    .9285    .0183   1.0608    .9285    .0183
    9    8.3031 1.0609    .9228    .0184   1.0609    .9228    .0184
   10    8.9054 1.0609    .9204    .0185   1.0609    .9204    .0185
   11    9.5000 1.0610    .9231    .0185   1.0610    .9231    .0185


STATION 15  FLOW-FIELD DESCRIPTION
***************************************

STREAM  RADIUS   ----------------V E L O C I T I E S----------------
 LINE            MERIDIONAL TANGENTIAL    AXIAL      RADIAL     TOTAL
    1    3.5000    381.08     285.52     373.07      77.72     476.18
    2    4.0522    358.35     241.59     354.91      49.53     432.18
    3    4.6289    344.39     209.96     342.36      37.42     403.35
    4    5.2271    337.98     185.64     336.58      30.77     385.61
    5    5.8363    335.82     166.78     334.84      25.72     374.95
    6    6.4539    335.63     151.61     334.97      21.12     368.28
    7    7.0772    335.37     139.35     335.01      15.52     363.17
    8    7.7004    333.70     129.19     333.57       9.36     357.84
    9    8.3134    330.04     120.62     329.99       5.34     351.39
```

```
   10    8.9129    327.41     112.97     327.38       4.53     346.35
   11    9.5000    333.24     105.74     333.24        .00     349.61

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE   STATION
 LINE  RADIUS    X-COORD    L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
    1  3.5000    2.4000      .00008225971.00     11.768      -.142
    2  4.0522    2.3911      .5523     118.34     7.945     -2.493
    3  4.6289    2.3537     1.1302      48.48     6.238     -3.677
    4  5.2271    2.3170     1.7295      55.52     5.223     -4.507
    5  5.8363    2.2561     2.3418     128.31     4.393     -5.919
    6  6.4539    2.1956     2.9623    -184.50     3.608     -5.719
    7  7.0772    2.1280     3.5892     -43.73     2.652     -6.553
    8  7.7004    2.0527     4.2170     -22.26     1.607     -7.326
    9  8.3134    1.9725     4.8352     -17.24      .926     -7.201
   10  8.9129    1.8988     5.4392     -18.53      .793     -7.227
   11  9.5000    1.8200     6.0316        .00      .000     -7.855

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL   STATIC    WEIGHT
    1    3.5000   .4291  15.9577  14.0610  531.526  512.658  .074039
    2    4.0522   .3883  15.9321  14.3591  531.264  515.721  .075159
    3    4.6289   .3617  15.9147  14.5394  531.173  517.635  .075821
    4    5.2271   .3454  15.9030  14.6434  531.154  518.781  .076195
    5    5.8363   .3356  15.8955  14.7033  531.192  519.493  .076402
    6    6.4539   .3295  15.8908  14.7400  531.257  519.971  .076522
    7    7.0772   .3248  15.8887  14.7691  531.357  520.382  .076613
    8    7.7004   .3199  15.8882  14.8007  531.468  520.813  .076713
    9    8.3134   .3140  15.8889  14.8395  531.570  521.296  .076843
   10    8.9129   .3094  15.8901  14.8698  531.623  521.641  .076949
   11    9.5000   .3124  15.8911  14.8519  531.592  521.421  .076889

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY   FLOW    (PHI+GAMMA)
 LINE             TOTAL   STATIC             ANGLE
    1    3.5000  127.566  123.038  .975600  36.842     11.626
    2    4.0522  127.503  123.773  .975591  33.986      5.452
    3    4.6289  127.482  124.232  .975625  31.369      2.561
    4    5.2271  127.477  124.507  .975667  28.779       .715
    5    5.8363  127.486  124.678  .975716  26.410     -1.526
    6    6.4539  127.502  124.793  .975766  24.309     -2.111
    7    7.0772  127.526  124.892  .975821  22.563     -3.901
    8    7.7004  127.552  124.995  .975873  21.164     -5.718
    9    8.3134  127.577  125.111  .975916  20.077     -6.274
   10    8.9129  127.589  125.194  .975935  19.036     -6.435
   11    9.5000  127.582  125.141  .975916  17.604     -7.855


STATION 15 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE
ROTATING AT  8844.0 RPM. NUMBER OF BLADES IN ROW = 17.

STREAM  RADIUS   BLADE   RELATIVE   RELATIVE   RELATIVE   DEVIATION
 LINE            SPEED   VELOCITY   MACH NO.  FLOW ANGLE    ANGLE

    1    3.5000  270.12   381.39      .3436      2.314       .000
    2    4.0522  312.74   365.35      .3282    -11.230       .000
    3    4.6289  357.25   374.57      .3359    -23.154       .000
    4    5.2271  403.42   402.06      .3601    -32.794       .000
    5    5.8363  450.44   439.59      .3935    -40.186       .000
    6    6.4539  498.10   482.40      .4316    -45.912       .000
    7    7.0772  546.21   527.26      .4715    -50.501       .000
    8    7.7004  594.30   572.44      .5117    -54.342       .000
    9    8.3134  641.61   616.73      .5511    -57.647       .000
   10    8.9129  687.88   661.61      .5910    -60.339       .000
   11    9.5000  733.20   710.46      .6348    -62.028       .000

STREAM  RADIUS   BLADE   LEAN    DELTA P   LOSS    DIFF    DELTA P

 LINE            ANGLE   ANGLE   A-BLADE   COEFF  FACTOR    ON Q

    1    3.5000   .000  20.919    .9025  .03688   .1773   .1880
    2    4.0522   .000  16.060    .8570  .03355   .2383   .2952
    3    4.6289   .000  10.646    .8426  .03295   .2799   .3583
    4    5.2271   .000   6.396    .8532  .03313   .2778   .3541
    5    5.8363   .000   2.203    .8840  .03364   .2598   .3248
    6    6.4539   .000   -.804    .9394  .03374   .2384   .2894
    7    7.0772   .000  -2.694   1.0078  .03382   .2198   .2578
    8    7.7004   .000  -4.230   1.0949  .03346   .2061   .2335
    9    8.3134   .000  -5.477   1.2065  .03246   .1980   .2152
   10    8.9129   .000  -9.347   1.3717  .03030   .1919   .1956
   11    9.5000   .000 -11.961   1.6450  .02674   .1840   .1657

STREAM  RADIUS   INLET THROUGH STATION 15    STATION 11 THRU STATION 15
 LINE            PRESS    ISENT   DELTA H   PRESS    ISENT   DELTA H
                 RATIO     EFF     ON H1    RATIO     EFF     ON H1
  MEAN VALUES-  1.0817    .9262    .0245   1.0817    .9262    .0245
    1    3.5000 1.0859    .9620    .0247   1.0859    .9620    .0247
    2    4.0522 1.0841    .9627    .0242   1.0841    .9627    .0242
    3    4.6289 1.0829    .9564    .0241   1.0829    .9564    .0241
    4    5.2271 1.0821    .9489    .0240   1.0821    .9489    .0240
```

```
    5    5.8363 1.0816    .9403    .0241   1.0816    .9403    .0241
    6    6.4539 1.0813    .9319    .0242   1.0813    .9319    .0242
    7    7.0772 1.0812    .9229    .0244   1.0812    .9229    .0244
    8    7.7004 1.0811    .9146    .0246   1.0811    .9146    .0246
    9    8.3134 1.0812    .9078    .0248   1.0812    .9078    .0248
   10    8.9129 1.0813    .9050    .0249   1.0813    .9050    .0249
   11    9.5000 1.0813    .9079    .0249   1.0813    .9079    .0249


STATION 16  FLOW-FIELD DESCRIPTION
***************************************

STREAM  RADIUS   ----------------V E L O C I T I E S----------------
 LINE            MERIDIONAL TANGENTIAL    AXIAL      RADIAL     TOTAL
    1    3.6250    342.88     342.28     338.28      55.94     484.48
    2    4.1366    313.94     293.96     310.44      46.75     430.08
    3    4.6955    302.34     257.13     299.76      39.44     396.90
    4    5.2806    297.65     228.28     295.90      32.27     375.11
    5    5.8781    295.83     205.73     294.75      25.22     360.33
    6    6.4845    295.80     187.50     295.21      18.58     350.22
    7    7.0961    297.38     172.72     297.14      11.89     343.90
    8    7.7082    301.50     160.42     301.45       5.61     341.52
    9    8.3154    307.66     149.91     307.66       1.57     342.24
   10    8.9145    315.17     140.40     315.17        .49     345.03
   11    9.5000    325.40     131.44     325.40        .00     350.94

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE   STATION
 LINE  RADIUS    X-COORD    L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
    1  3.6250    3.0000      .0000      -9.76     9.390      -.665
    2  4.1366    2.9850      .5118      49.17     8.564     -3.698
    3  4.6955    2.9312     1.0733      26.02     7.496     -5.812
    4  5.2806    2.8724     1.6614      33.97     6.225     -6.812
    5  5.8781    2.7859     2.2651      66.29     4.890     -8.827
    6  6.4845    2.6920     2.8787     370.74     3.601     -9.012
    7  7.0961    2.5898     3.4988    -468.65     2.292     -9.988
    8  7.7082    2.4756     4.1215   10864.64     1.067    -11.181
    9  8.3154    2.3520     4.7410   -5844.83      .292    -11.508
   10  8.9145    2.2295     5.3526    -156.17      .089    -11.970
   11  9.5000    2.1000     5.9523        .00      .000    -12.725

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL   STATIC    WEIGHT
    1    3.6250   .4355  16.2731  14.2851  534.627  515.095  .074863
    2    4.1366   .3852  16.2417  14.6618  534.309  518.917  .076271
    3    4.6955   .3547  16.2198  14.8686  534.197  521.089  .077024
    4    5.2806   .3348  16.2048  14.9950  534.173  522.465  .077474
    5    5.8781   .3213  16.1954  15.0774  534.222  523.418  .077758
    6    6.4845   .3121  16.1896  15.1325  534.307  524.101  .077941
    7    7.0961   .3063  16.1869  15.1672  534.433  524.591  .078046
    8    7.7082   .3041  16.1863  15.1806  534.573  524.867  .078074
    9    8.3154   .3047  16.1871  15.1774  534.701  524.954  .078045
   10    8.9145   .3073  16.1886  15.1628  534.766  524.860  .077984
   11    9.5000   .3126  16.1899  15.1294  534.729  524.480  .077868

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY   FLOW    (PHI+GAMMA)
 LINE             TOTAL   STATIC             ANGLE
    1    3.6250  128.310  123.623  .975654  44.950      8.725
    2    4.1366  128.234  124.540  .975644  43.118      4.866
    3    4.6955  128.207  125.061  .975686  40.379      1.683
    4    5.2806  128.202  125.392  .975739  37.487      -.588
    5    5.8781  128.213  125.620  .975800  34.816     -3.937
    6    6.4845  128.234  125.784  .975863  32.370     -5.411
    7    7.0961  128.264  125.902  .975931  30.149     -7.695
    8    7.7082  128.297  125.968  .975996  28.017    -10.114
    9    8.3154  128.328  125.989  .976050  25.977    -11.216
   10    8.9145  128.344  125.966  .976074  24.012    -11.881
   11    9.5000  128.335  125.875  .976051  21.996    -12.725


STATION 16 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE
ROTATING AT  8844.0 RPM. NUMBER OF BLADES IN ROW = 17.

STREAM  RADIUS   BLADE   RELATIVE   RELATIVE   RELATIVE   DEVIATION
 LINE            SPEED   VELOCITY   MACH NO.  FLOW ANGLE    ANGLE

    1    3.6250  279.77   348.53      .3133     10.331       .000
    2    4.1366  319.26   314.96      .2821     -4.606       .000
    3    4.6955  362.39   320.15      .2861    -19.196       .000
    4    5.2806  407.55   347.47      .3101    -31.059       .000
    5    5.8781  453.66   385.99      .3442    -39.966       .000
    6    6.4845  500.46   430.63      .3838    -46.615       .000
    7    7.0961  547.67   478.56      .4263    -51.581       .000
    8    7.7082  594.91   528.85      .4709    -55.242       .000
    9    8.3154  641.77   580.16      .5166    -57.974       .000
   10    8.9145  688.01   631.83      .5627    -60.078       .000
   11    9.5000  733.20   684.10      .6094    -61.598       .000

STREAM  RADIUS   BLADE   LEAN    DELTA P   LOSS    DIFF    DELTA P
```

```
=>
 LINE            ANGLE  ANGLE  A-BLADE  COEFF  FACTOR   ON Q

   1   3.6250    .000  41.194   .4055  .04609  .2817  .3561
   2   4.1366    .000  32.206   .3763  .04192  .3842  .5070
   3   4.6955    .000  22.196   .3701  .04121  .4227  .5504
   4   5.2806    .000  14.423   .3754  .04144  .4096  .5270
   5   5.8781    .000   6.859   .3888  .04207  .3797  .4808
   6   6.4845    .000   1.085   .4134  .04218  .3469  .4290
   7   7.0961    .000  -2.952   .4459  .04228  .3162  .3789
   8   7.7082    .000  -6.396   .4933  .04183  .2892  .3329
   9   8.3154    .000  -9.488   .5607  .04057  .2667  .2917
  10   8.9145    .000 -16.503   .6592  .03785  .2486  .2535
  11   9.5000    .000 -20.651   .8033  .03342  .2353  .2141

STREAM  RADIUS   INLET THROUGH STATION 16   STATION 11 THRU STATION 16
 LINE            PRESS   ISENT   DELTA H    PRESS   ISENT   DELTA H
                 RATIO    EFF     ON H1     RATIO    EFF     ON H1
 MEAN VALUES-   1.1022   .9254   .0304     1.1022   .9254   .0304
   1   3.6250   1.1073   .9616   .0307     1.1073   .9616   .0307
   2   4.1366   1.1052   .9623   .0301     1.1052   .9623   .0301
   3   4.6955   1.1037   .9560   .0299     1.1037   .9560   .0299
   4   5.2806   1.1027   .9484   .0299     1.1027   .9484   .0299
   5   5.8781   1.1020   .9397   .0299     1.1020   .9397   .0299
   6   6.4845   1.1016   .9311   .0301     1.1016   .9311   .0301
   7   7.0961   1.1014   .9220   .0304     1.1014   .9220   .0304
   8   7.7082   1.1014   .9135   .0306     1.1014   .9135   .0306
   9   8.3154   1.1015   .9067   .0309     1.1015   .9067   .0309
  10   8.9145   1.1016   .9039   .0310     1.1016   .9039   .0310
  11   9.5000   1.1017   .9068   .0309     1.1017   .9068   .0309
1

STATION 17  FLOW-FIELD DESCRIPTION
**********************************

STREAM  RADIUS   ----------------V E L O C I T I E S----------------
 LINE            MERIDIONAL TANGENTIAL   AXIAL      RADIAL     TOTAL
   1   3.7480    281.32     331.04     276.27      53.07    434.43
   2   4.2981    295.02     282.92     289.87      54.88    408.75
   3   4.8535    299.73     248.75     295.80      48.35    389.51
   4   5.4179    301.81     222.50     299.22      39.43    374.96
   5   5.9901    303.10     201.88     301.57      30.35    364.17
   6   6.5684    304.43     185.11     303.63      22.03    356.29
   7   7.1512    306.08     171.39     305.72      14.71    350.80
   8   7.7367    308.11     159.83     307.99       8.69    347.10
   9   8.3236    310.30     149.76     310.27       4.22    344.55
  10   8.9113    312.30     140.45     312.30       1.28    342.43
  11   9.5000    313.45     131.44     313.45        .00    339.89

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE  STATION
 LINE  RADIUS   X-COORD   L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
   1   3.7480   4.0000     .0000     7.57     10.874      .000
   2   4.2981   4.0000     .5501    17.46     10.721      .000
   3   4.8535   4.0000    1.1055    34.40      9.283      .000
   4   5.4179   4.0000    1.6699    54.07      7.507      .000
   5   5.9901   4.0000    2.2421    66.48      5.748      .000
   6   6.5684   4.0000    2.8204    69.28      4.149      .000
   7   7.1512   4.0000    3.4032    66.44      2.755      .000
   8   7.7367   4.0000    3.9887    66.17      1.616      .000
   9   8.3236   4.0000    4.5756    76.98       .780      .000
  10   8.9113   4.0000    5.1633   117.36       .235      .000
  11   9.5000   4.0000    5.7520      .00       .000      .000

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL   STATIC   WEIGHT
   1   3.7480    .3891  16.2731  14.6601  534.627  518.922  .076261
   2   4.2981    .3656  16.2417  14.8096  534.309  520.406  .076819
   3   4.8535    .3480  16.2198  14.9170  534.197  521.573  .077203
   4   5.4179    .3347  16.2048  14.9960  534.173  522.474  .077478
   5   5.9901    .3248  16.1954  15.0541  534.222  523.186  .077672
   6   6.5684    .3176  16.1896  15.0965  534.307  523.743  .077808
   7   7.1512    .3126  16.1869  15.1268  534.433  524.193  .077898
   8   7.7367    .3092  16.1863  15.1483  534.573  524.548  .077956
   9   8.3236    .3068  16.1871  15.1641  534.701  524.822  .077996
  10   8.9113    .3049  16.1886  15.1779  534.766  525.009  .078039
  11   9.5000    .3026  16.1899  15.1936  534.729  525.116  .078104

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY    FLOW   (PHI+GAMMA)
 LINE            TOTAL    STATIC              ANGLE
   1   3.7480  128.310  124.541   .975654   49.642     10.874
   2   4.2981  128.234  124.897   .975644   43.801     10.721
   3   4.8535  128.207  125.177   .975686   39.690      9.283
   4   5.4179  128.202  125.394   .975739   36.399      7.507
   5   5.9901  128.213  125.565   .975800   33.666      5.748
   6   6.5684  128.234  125.698   .975863   31.301      4.149
   7   7.1512  128.264  125.806   .975931   29.248      2.755
   8   7.7367  128.297  125.891   .975996   27.418      1.616
   9   8.3236  128.328  125.957   .976050   25.763       .780
```

```
  10   8.9113  128.344  126.002   .976074   24.215       .235
  11   9.5000  128.335  126.028   .976051   22.750       .000
1

STATION 18  FLOW-FIELD DESCRIPTION
**********************************

STREAM  RADIUS   ----------------V E L O C I T I E S----------------
 LINE            MERIDIONAL TANGENTIAL   AXIAL      RADIAL     TOTAL
   1   4.0110    293.75     309.34     280.08      88.55    426.59
   2   4.5180    307.67     269.15     298.81      73.30    408.78
   3   5.0327    312.99     239.90     307.42      58.75    394.35
   4   5.5598    314.94     216.82     311.55      46.12    382.36
   5   6.0992    315.55     198.27     313.56      35.45    372.67
   6   6.6494    315.86     182.85     314.75      26.51    364.97
   7   7.2084    316.22     170.03     315.65      19.06    359.04
   8   7.7744    316.77     159.06     316.51      12.88    354.46
   9   8.3458    317.47     149.36     317.37       7.80    350.85
  10   8.9213    318.23     140.29     318.21       3.60    347.78
  11   9.5000    318.85     131.44     318.85        .00    344.88

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE  STATION
 LINE  RADIUS   X-COORD   L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
   1   4.0110   5.0000     .0000    10.71     17.545      .000
   2   4.5180   5.0000     .5070    21.39     13.783      .000
   3   5.0327   5.0000    1.0217    44.01     10.819      .000
   4   5.5598   5.0000    1.5488    83.99      8.421      .000
   5   6.0992   5.0000    2.0882   129.08      6.450      .000
   6   6.6494   5.0000    2.6384   153.28      4.815      .000
   7   7.2084   5.0000    3.1974   159.93      3.455      .000
   8   7.7744   5.0000    3.7634   171.43      2.330      .000
   9   8.3458   5.0000    4.3348   213.06      1.407      .000
  10   8.9213   5.0000    4.9103   377.26       .649      .000
  11   9.5000   5.0000    5.4890      .00       .000      .000

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL   STATIC   WEIGHT
   1   4.0110    .3818  16.2731  14.7158  534.627  519.484  .076468
   2   4.5180    .3656  16.2417  14.8095  534.309  520.404  .076819
   3   5.0327    .3524  16.2198  14.8854  534.197  521.257  .077086
   4   5.5598    .3414  16.2048  14.9491  534.173  522.008  .077305
   5   6.0992    .3326  16.1954  15.0016  534.222  522.665  .077479
   6   6.6494    .3255  16.1896  15.0440  534.307  523.222  .077615
   7   7.2084    .3201  16.1869  15.0777  534.433  523.706  .077717
   8   7.7744    .3159  16.1863  15.1048  534.573  524.118  .077796
   9   8.3458    .3126  16.1871  15.1273  534.701  524.458  .077861
  10   8.9213    .3097  16.1886  15.1468  534.766  524.701  .077925
  11   9.5000    .3071  16.1899  15.1649  534.729  524.831  .077999

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY    FLOW   (PHI+GAMMA)
 LINE            TOTAL    STATIC              ANGLE
   1   4.0110  128.310  124.676   .975654   46.481     17.545
   2   4.5180  128.234  124.897   .975644   41.179     13.783
   3   5.0327  128.207  125.102   .975686   37.469     10.819
   4   5.5598  128.202  125.282   .975739   34.546      8.421
   5   6.0992  128.213  125.440   .975800   32.142      6.450
   6   6.6494  128.234  125.573   .975863   30.066      4.815
   7   7.2084  128.264  125.689   .975931   28.267      3.455
   8   7.7744  128.297  125.788   .975996   26.662      2.330
   9   8.3458  128.328  125.870   .976050   25.196      1.407
  10   8.9213  128.344  125.928   .976074   23.791       .649
  11   9.5000  128.335  125.960   .976051   22.403       .000
1

STATION 19  FLOW-FIELD DESCRIPTION
**********************************

STREAM  RADIUS   ----------------V E L O C I T I E S----------------
 LINE            MERIDIONAL TANGENTIAL   AXIAL      RADIAL     TOTAL
   1   4.3820    353.28     283.15     339.53      97.61    452.75
   2   4.7890    344.79     253.92     336.32      75.99    428.20
   3   5.2358    338.03     230.59     332.76      59.46    409.19
   4   5.7140    333.41     210.97     330.15      46.49    394.55
   5   6.2162    330.28     194.54     328.31      36.01    383.32
   6   6.7369    328.23     180.47     327.09      27.36    374.57
   7   7.2719    326.90     168.55     326.28      20.09    367.79
   8   7.8180    326.12     158.17     325.82      13.93    362.45
   9   8.3727    325.78     148.88     325.67       8.66    358.19
  10   8.9340    325.85     140.09     325.82       4.08    354.69
  11   9.5000    326.21     131.44     326.21        .00    351.70

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE  STATION
 LINE  RADIUS   X-COORD   L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
   1   4.3820   6.0000     .0000   -10.32     16.039      .000
   2   4.7890   6.0000     .4070   -18.35     12.733      .000
   3   5.2358   6.0000     .8538   -33.26     10.131      .000
   4   5.7140   6.0000    1.3320   -60.61      8.016      .000
   5   6.2162   6.0000    1.8342  -111.22      6.260      .000
```



```
   6   6.7369   6.0000    2.3549  -210.47      4.781      .000
   7   7.2719   6.0000    2.8899  -429.57      3.524      .000
   8   7.8180   6.0000    3.4360 -1002.89      2.449      .000
   9   8.3727   6.0000    3.9907 -2743.54      1.524      .000
  10   8.9340   6.0000    4.5520 -7617.90       .718      .000
  11   9.5000   6.0000    5.1180      .00       .000      .000

STREAM  RADIUS    MACH    ---PRESSURES---   --TEMPERATURES-  SPECIFIC
 LINE            NUMBER   TOTAL    STATIC   TOTAL   STATIC   WEIGHT
   1   4.3820    .4060  16.2731  14.5268  534.627  517.570  .075765
   2   4.7890    .3834  16.2417  14.6751  534.309  519.051  .076320
   3   5.2358    .3660  16.2198  14.7864  534.197  520.264  .076720
   4   5.7140    .3526  16.2048  14.8703  534.173  521.220  .077013
   5   6.2162    .3423  16.1954  14.9345  534.222  521.996  .077231
   6   6.7369    .3343  16.1896  14.9846  534.307  522.632  .077396
   7   7.2719    .3280  16.1869  15.0244  534.433  523.177  .077521
   8   7.8180    .3231  16.1863  15.0568  534.573  523.641  .077619
   9   8.3727    .3192  16.1871  15.0836  534.701  524.025  .077700
  10   8.9340    .3160  16.1886  15.1060  534.766  524.297  .077775
  11   9.5000    .3133  16.1899  15.1249  534.729  524.436  .077852

STREAM  RADIUS   ---ENTHALPIES--   ENTROPY    FLOW   (PHI+GAMMA)
 LINE            TOTAL    STATIC              ANGLE
   1   4.3820  128.310  124.217   .975654   38.711     16.039
   2   4.7890  128.234  124.572   .975644   36.369     12.733
   3   5.2358  128.207  124.863   .975686   34.300     10.131
   4   5.7140  128.202  125.093   .975739   32.324      8.016
   5   6.2162  128.213  125.279   .975800   30.498      6.260
   6   6.7369  128.234  125.432   .975863   28.804      4.781
   7   7.2719  128.264  125.562   .975931   27.276      3.524
   8   7.8180  128.297  125.674   .975996   25.873      2.449
   9   8.3727  128.328  125.766   .976050   24.560      1.524
  10   8.9340  128.344  125.831   .976074   23.265       .718
  11   9.5000  128.335  125.865   .976051   21.946       .000
1

STATION 19 IS AT THE LEADING EDGE OF A BLADE
ROTATING AT       .0 RPM. NUMBER OF BLADES IN ROW = 27.

STREAM  RADIUS   BLADE   RELATIVE   RELATIVE   RELATIVE   INCIDENCE
 LINE            SPEED   VELOCITY   MACH NO.  FLOW ANGLE    ANGLE

   1   4.3820     .00    452.75     .4060     38.711       .000
   2   4.7890     .00    428.20     .3834     36.369       .000
   3   5.2358     .00    409.19     .3660     34.300       .000
   4   5.7140     .00    394.55     .3526     32.324       .000
   5   6.2162     .00    383.32     .3423     30.498       .000
   6   6.7369     .00    374.57     .3343     28.804       .000
   7   7.2719     .00    367.79     .3280     27.276       .000
   8   7.8180     .00    362.45     .3231     25.873       .000
   9   8.3727     .00    358.19     .3192     24.560       .000
  10   8.9340     .00    354.69     .3160     23.265       .000
  11   9.5000     .00    351.70     .3133     21.946       .000

STREAM  RADIUS   BLADE    LEAN    DELTA P
 LINE            ANGLE    ANGLE   A-BLADE

   1   4.3820    .000     .000    -.7936
   2   4.7890    .000     .000    -.7568
   3   5.2358    .000     .000    -.7305
   4   5.7140    .000     .000    -.7102
   5   6.2162    .000     .000    -.6941
   6   6.7369    .000     .000    -.6801
   7   7.2719    .000     .000    -.6680
   8   7.8180    .000     .000    -.6567
   9   8.3727    .000     .000    -.6451
  10   8.9340    .000     .000    -.6318
  11   9.5000    .000     .000    -.6154
1

STATION 20  FLOW-FIELD DESCRIPTION
**********************************

STREAM  RADIUS   ----------------V E L O C I T I E S----------------
 LINE            MERIDIONAL TANGENTIAL   AXIAL      RADIAL     TOTAL
   1   4.7970    356.25       .00      348.70      72.96    356.25
   2   5.1604    358.56       .00      353.50      60.03    358.56
   3   5.5587    357.94       .00      354.67      48.27    357.94
   4   5.9870    355.66       .00      353.60      38.21    355.66
   5   6.4410    353.00       .00      351.73      29.86    353.00
   6   6.9165    350.50       .00      349.75      22.90    350.50
   7   7.4098    348.52       .00      348.10      17.02    348.52
   8   7.9175    347.11       .00      346.91      11.95    347.11
   9   8.4367    346.30       .00      346.22       7.49    346.30
  10   8.9650    346.04       .00      346.02       3.53    346.04
  11   9.5000    346.22       .00      346.22        .00    346.22

STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE  STATION
```

1C/14PRINT

LINE	RADIUS	X-COORD	L-COORD	CURVATURE	SLOPE ANGLE	LEAN ANGLE
1	4.7970	8.0000	.0000	456.97	11.819	6.790
2	5.1604	8.0433	.3660	-65.54	9.637	6.790
3	5.5587	8.0907	.7671	-42.11	7.750	6.790
4	5.9870	8.1417	1.1985	-39.38	6.168	6.790
5	6.4410	8.1958	1.6556	-43.44	4.852	6.790
6	6.9165	8.2524	2.1345	-53.05	3.746	6.790
7	7.4098	8.3111	2.6312	-70.11	2.799	6.790
8	7.9175	8.3716	3.1425	-100.47	1.973	6.790
9	8.4367	8.4334	3.6654	-161.71	1.240	6.790
10	8.9650	8.4963	4.1974	-336.91	.584	6.790
11	9.5000	8.5600	4.7362	.00	.000	6.790

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	4.7970	.3175	16.1675	15.0768	534.627	524.066	.077659
2	5.1604	.3197	16.1680	15.0628	534.309	523.611	.077654
3	5.5587	.3192	16.1672	15.0655	534.197	523.536	.077680
4	5.9870	.3171	16.1659	15.0779	534.173	523.648	.077727
5	6.4410	.3146	16.1657	15.0937	534.222	523.854	.077777
6	6.9165	.3124	16.1657	15.1086	534.307	524.084	.077820
7	7.4098	.3105	16.1659	15.1206	534.433	524.325	.077846
8	7.9175	.3092	16.1659	15.1291	534.573	524.547	.077857
9	8.4367	.3084	16.1658	15.1340	534.701	524.722	.077856
10	8.9650	.3082	16.1659	15.1357	534.766	524.802	.077853
11	9.5000	.3083	16.1657	15.1344	534.729	524.754	.077854

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	4.7970	128.310	125.776	.976100	.000	18.609
2	5.1604	128.234	125.667	.975955	.000	16.428
3	5.5587	128.207	125.649	.975908	.000	14.540
4	5.9870	128.202	125.675	.975903	.000	12.958
5	6.4410	128.213	125.725	.975926	.000	11.643
6	6.9165	128.234	125.780	.975964	.000	10.537
7	7.4098	128.264	125.838	.976020	.000	9.590
8	7.9175	128.297	125.891	.976083	.000	8.763
9	8.4367	128.328	125.933	.976141	.000	8.030
10	8.9650	128.344	125.952	.976170	.000	7.374
11	9.5000	128.335	125.941	.976154	.000	6.790

1

STATION 20 IS WITHIN OR AT THE TRAILING EDGE OF A BLADE
ROTATING AT .0 RPM. NUMBER OF BLADES IN ROW = 27.

STREAM LINE	RADIUS	BLADE SPEED	RELATIVE VELOCITY	RELATIVE MACH NO.	RELATIVE FLOW ANGLE	DEVIATION ANGLE
1	4.7970	.00	356.25	.3175	.000	.000
2	5.1604	.00	358.56	.3197	.000	.000
3	5.5587	.00	357.94	.3192	.000	.000
4	5.9870	.00	355.66	.3171	.000	.000
5	6.4410	.00	353.00	.3146	.000	.000
6	6.9165	.00	350.50	.3124	.000	.000
7	7.4098	.00	348.52	.3105	.000	.000
8	7.9175	.00	347.11	.3092	.000	.000
9	8.4367	.00	346.30	.3084	.000	.000
10	8.9650	.00	346.04	.3082	.000	.000
11	9.5000	.00	346.22	.3083	.000	.000

=>

STREAM LINE	RADIUS	BLADE ANGLE	LEAN ANGLE	DELTA P A-BLADE	LOSS COEFF	DIFF FACTOR	DELTA P ON Q
1	4.7970	.000	.000	-.4221	.06044	.3674	.3150
2	5.1604	.000	.000	-.4094	.04699	.3187	.2475
3	5.5587	.000	.000	-.3985	.03663	.2850	.1948
4	5.9870	.000	.000	-.3876	.02913	.2605	.1556
5	6.4410	.000	.000	-.3778	.02354	.2423	.1262
6	6.9165	.000	.000	-.3686	.01979	.2282	.1029
7	7.4098	.000	.000	-.3607	.01805	.2166	.0827
8	7.9175	.000	.000	-.3536	.01808	.2063	.0640
9	8.4367	.000	.000	-.3467	.01926	.1962	.0457
10	8.9650	.000	.000	-.3392	.02095	.1856	.0274
11	9.5000	.000	.000	-.3302	.02270	.1738	.0089

1

STREAM LINE	RADIUS	INLET THROUGH STATION 20 PRESS RATIO	ISENT EFF	DELTA H ON H1	STATION 19 THRU STATION 20 PRESS RATIO	ISENT EFF	DELTA H ON H1
MEAN VALUES-		1.1000	.9067	.0304	.9981	.0000	.0000
1	4.7970	1.1001	.8994	.0307	.9935	.0000	.0000
2	5.1604	1.1002	.9180	.0301	.9955	.0000	.0000
3	5.5587	1.1001	.9241	.0299	.9968	.0000	.0000
4	5.9870	1.1000	.9247	.0299	.9976	.0000	.0000
5	6.4410	1.1000	.9217	.0299	.9982	.0000	.0000
6	6.9165	1.1000	.9167	.0301	.9985	.0000	.0000
7	7.4098	1.1000	.9095	.0304	.9987	.0000	.0000
8	7.9175	1.1000	.9014	.0306	.9987	.0000	.0000
9	8.4367	1.1000	.8942	.0309	.9987	.0000	.0000
10	8.9650	1.1000	.8906	.0310	.9986	.0000	.0000
11	9.5000	1.1000	.8926	.0309	.9985	.0000	.0000

STATION 21 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
		---------------V E L O C I T I E S---------------				
1	5.0080	414.38	.00	412.14	43.01	414.38
2	5.3115	393.61	.00	392.05	35.02	393.61
3	5.6659	378.30	.00	377.23	28.41	378.30
4	6.0632	367.65	.00	366.93	23.00	367.65
5	6.4953	360.61	.00	360.13	18.50	360.61
6	6.9548	355.94	.00	355.64	14.64	355.94
7	7.4360	352.84	.00	352.66	11.21	352.84
8	7.9344	350.78	.00	350.69	8.08	350.78
9	8.4463	349.50	.00	349.46	5.18	349.50
10	8.9690	348.83	.00	348.82	2.47	348.83
11	9.5000	348.59	.00	348.59	.00	348.59

STREAM LINE	-----MESH-POINT COORDS------ RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	5.0080	9.0000	.0000	-4.86	5.957	.000
2	5.3115	9.0000	.3035	-7.29	5.105	.000
3	5.6659	9.0000	.6579	-11.38	4.307	.000
4	6.0632	9.0000	1.0552	-17.99	3.586	.000
5	6.4953	9.0000	1.4873	-28.20	2.941	.000
6	6.9548	9.0000	1.9468	-43.44	2.357	.000
7	7.4360	9.0000	2.4280	-66.33	1.820	.000
8	7.9344	9.0000	2.9264	-103.73	1.320	.000
9	8.4463	9.0000	3.4383	-178.85	.849	.000
10	8.9690	9.0000	3.9610	-427.09	.406	.000
11	9.5000	9.0000	4.4920	.00	.000	.000

1

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	5.0080	.3706	16.1675	14.7047	534.627	520.338	.076285
2	5.3115	.3517	16.1680	14.8430	534.309	521.417	.076843
3	5.6659	.3377	16.1672	14.9403	534.197	522.289	.077218
4	6.0632	.3280	16.1659	15.0053	534.173	522.926	.077459
5	6.4953	.3216	16.1657	15.0481	534.222	523.402	.077610
6	6.9548	.3173	16.1657	15.0764	534.307	523.764	.077701
7	7.4360	.3144	16.1659	15.0952	534.433	524.073	.077753
8	7.9344	.3125	16.1659	15.1076	534.573	524.334	.077778
9	8.4463	.3113	16.1658	15.1153	534.701	524.536	.077788
10	8.9690	.3107	16.1659	15.1194	534.766	524.640	.077793
11	9.5000	.3105	16.1657	15.1206	534.729	524.617	.077803

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	5.0080	128.310	124.881	.976100	.000	5.957
2	5.3115	128.234	125.140	.975955	.000	5.105
3	5.6659	128.207	125.349	.975908	.000	4.307
4	6.0632	128.202	125.502	.975903	.000	3.586
5	6.4953	128.213	125.616	.975926	.000	2.941
6	6.9548	128.234	125.703	.975964	.000	2.357
7	7.4360	128.264	125.778	.976020	.000	1.820
8	7.9344	128.297	125.840	.976083	.000	1.320
9	8.4463	128.328	125.889	.976141	.000	.849
10	8.9690	128.344	125.914	.976170	.000	.406
11	9.5000	128.335	125.908	.976154	.000	.000

1

STATION 22 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
		---------------V E L O C I T I E S---------------				
1	5.0080	371.26	.00	371.26	.00	371.26
2	5.3331	370.26	.00	370.22	5.17	370.26
3	5.6989	367.56	.00	367.46	8.25	367.56
4	6.0999	364.18	.00	364.05	9.50	364.18
5	6.5306	361.05	.00	360.93	9.45	361.05
6	6.9859	358.40	.00	358.30	8.54	358.40
7	7.4615	356.35	.00	356.28	7.14	356.35
8	7.9535	354.83	.00	354.79	5.47	354.83
9	8.4590	353.82	.00	353.80	3.66	353.82
10	8.9752	353.25	.00	353.24	1.81	353.25
11	9.5000	353.01	.00	353.01	.00	353.01

STREAM LINE	-----MESH-POINT COORDS------ RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	5.0080	10.0000	.0000	.00	.000	.000
2	5.3331	10.0000	.3251	-65.47	.801	.000
3	5.6989	10.0000	.6909	-47.09	1.286	.000
4	6.0999	10.0000	1.0919	-47.11	1.495	.000
5	6.5306	10.0000	1.5226	-54.64	1.499	.000
6	6.9859	10.0000	1.9779	-69.12	1.366	.000
7	7.4615	10.0000	2.4535	-93.31	1.148	.000
8	7.9535	10.0000	2.9455	-135.07	.883	.000
9	8.4590	10.0000	3.4510	-218.63	.592	.000
10	8.9752	10.0000	3.9672	-465.64	.294	.000
11	9.5000	10.0000	4.4920	.00	.000	.000

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	5.0080	.3311	16.1675	14.9855	534.627	523.157	.077323
2	5.3331	.3303	16.1680	14.9915	534.309	522.901	.077392
3	5.6989	.3279	16.1672	15.0072	534.197	522.956	.077464
4	6.0999	.3248	16.1659	15.0266	534.173	523.137	.077538
5	6.5306	.3220	16.1657	15.0454	534.222	523.375	.077600
6	6.9859	.3195	16.1657	15.0616	534.307	523.618	.077647
7	7.4615	.3176	16.1659	15.0743	534.433	523.866	.077676
8	7.9535	.3162	16.1659	15.0836	534.573	524.096	.077690
9	8.4590	.3152	16.1658	15.0898	534.701	524.284	.077694
10	8.9752	.3147	16.1659	15.0934	534.766	524.382	.077698
11	9.5000	.3145	16.1657	15.0945	534.729	524.359	.077707

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	5.0080	128.310	125.558	.976100	.000	.000
2	5.3331	128.234	125.496	.975955	.000	.801
3	5.6989	128.207	125.509	.975908	.000	1.286
4	6.0999	128.202	125.553	.975903	.000	1.495
5	6.5306	128.213	125.610	.975926	.000	1.499
6	6.9859	128.234	125.668	.975964	.000	1.366
7	7.4615	128.264	125.728	.976020	.000	1.148
8	7.9535	128.297	125.783	.976083	.000	.883
9	8.4590	128.328	125.828	.976141	.000	.592
10	8.9752	128.344	125.852	.976170	.000	.294
11	9.5000	128.335	125.846	.976154	.000	.000

1

STATION 23 FLOW-FIELD DESCRIPTION

STREAM LINE	RADIUS	MERIDIONAL	TANGENTIAL	AXIAL	RADIAL	TOTAL
		---------------V E L O C I T I E S---------------				
1	5.0080	362.67	.00	362.67	.00	362.67
2	5.3394	362.45	.00	362.45	1.74	362.45
3	5.7108	361.70	.00	361.69	3.29	361.70
4	6.1154	360.59	.00	360.56	4.38	360.59
5	6.5476	359.51	.00	359.48	4.90	359.51
6	7.0025	358.49	.00	358.46	4.87	358.49
7	7.4761	357.63	.00	357.61	4.37	357.63
8	7.9652	356.94	.00	356.92	3.53	356.94
9	8.4670	356.45	.00	356.44	2.45	356.45
10	8.9792	356.17	.00	356.17	1.24	356.17
11	9.5000	356.03	.00	356.03	.00	356.03

STREAM LINE	-----MESH-POINT COORDS------ RADIUS	X-COORD	L-COORD	RADIUS OF CURVATURE	STREAMLINE SLOPE ANGLE	STATION LEAN ANGLE
1	5.0080	11.0000	.0000	.00	.000	.000
2	5.3394	11.0000	.3314	-325.50	.275	.000
3	5.7108	11.0000	.7028	-182.58	.521	.000
4	6.1154	11.0000	1.1074	-149.51	.696	.000
5	6.5476	11.0000	1.5396	-147.86	.781	.000
6	7.0025	11.0000	1.9945	-165.49	.778	.000
7	7.4761	11.0000	2.4681	-203.95	.701	.000
8	7.9652	11.0000	2.9572	-276.35	.567	.000
9	8.4670	11.0000	3.4590	-427.50	.394	.000
10	8.9792	11.0000	3.9712	-882.66	.200	.000
11	9.5000	11.0000	4.4920	.00	.000	.000

STREAM LINE	RADIUS	MACH NUMBER	---PRESSURES--- TOTAL	STATIC	--TEMPERATURES- TOTAL	STATIC	SPECIFIC WEIGHT
1	5.0080	.3233	16.1675	15.0381	534.627	523.682	.077517
2	5.3394	.3232	16.1680	15.0393	534.309	523.377	.077568
3	5.7108	.3226	16.1672	15.0429	534.197	523.311	.077596
4	6.1154	.3216	16.1659	15.0483	534.173	523.354	.077618
5	6.5476	.3206	16.1657	15.0547	534.222	523.467	.077634
6	7.0025	.3196	16.1657	15.0611	534.307	523.612	.077645
7	7.4761	.3188	16.1659	15.0666	534.433	523.790	.077647
8	7.9652	.3181	16.1659	15.0710	534.573	523.971	.077643
9	8.4670	.3176	16.1658	15.0742	534.701	524.128	.077636
10	8.9792	.3174	16.1659	15.0760	534.766	524.210	.077634
11	9.5000	.3173	16.1657	15.0766	534.729	524.181	.077641

STREAM LINE	RADIUS	---ENTHALPIES-- TOTAL	STATIC	ENTROPY	FLOW ANGLE	(PHI+GAMMA)
1	5.0080	128.310	125.684	.976100	.000	.000
2	5.3394	128.234	125.611	.975955	.000	.275
3	5.7108	128.207	125.595	.975908	.000	.521
4	6.1154	128.202	125.605	.975903	.000	.696

```
     5    6.5476  128.213  125.632  .975926    .000      .781
     6    7.0025  128.234  125.667  .975964    .000      .778
     7    7.4761  128.264  125.710  .976020    .000      .701
     8    7.9652  128.297  125.753  .976083    .000      .567
     9    8.4670  128.328  125.791  .976141    .000      .394
    10    8.9792  128.344  125.810  .976170    .000      .200
    11    9.5000  128.335  125.803  .976154    .000      .000
1

 STATION 24  FLOW-FIELD DESCRIPTION
 **********************************

 STREAM  RADIUS    ----------------V E L O C I T I E S---------------
  LINE              MERIDIONAL TANGENTIAL   AXIAL     RADIAL     TOTAL
    1    5.0080    358.50        .00     358.50        .00     358.50
    2    5.3427    358.47        .00     358.47       1.17     358.47
    3    5.7171    358.31        .00     358.31       2.28     358.31
    4    6.1242    358.10        .00     358.09       3.15     358.10
    5    6.5578    358.08        .00     358.07       3.67     358.08
    6    7.0131    358.12        .00     358.10       3.78     358.12
    7    7.4859    358.18        .00     358.17       3.50     358.18
    8    7.9733    358.23        .00     358.22       2.90     358.23
    9    8.4727    358.26        .00     358.26       2.04     358.26
   10    8.9822    358.29        .00     358.29       1.05     358.29
   11    9.5000    358.25        .00     358.25        .00     358.25

 STREAM -----MESH-POINT COORDS------  RADIUS OF  STREAMLINE   STATION
  LINE  RADIUS    X-COORD   L-COORD  CURVATURE SLOPE ANGLE LEAN ANGLE
    1   5.0080    12.0000     .0000      .00        .000       .000
    2   5.3427    12.0000     .3347      .00        .187       .000
    3   5.7171    12.0000     .7091      .00        .364       .000
    4   6.1242    12.0000    1.1162      .00        .504       .000
    5   6.5578    12.0000    1.5498      .00        .587       .000
    6   7.0131    12.0000    2.0051      .00        .605       .000
    7   7.4859    12.0000    2.4779      .00        .560       .000
    8   7.9733    12.0000    2.9653      .00        .463       .000
    9   8.4727    12.0000    3.4647      .00        .327       .000
   10   8.9822    12.0000    3.9742      .00        .168       .000
   11   9.5000    12.0000    4.4920      .00        .000       .000

 STREAM  RADIUS    MACH     ---PRESSURES---    --TEMPERATURES-  SPECIFIC
  LINE            NUMBER   TOTAL    STATIC     TOTAL    STATIC   WEIGHT
    1    5.0080    .3195  16.1675  15.0633   534.627  523.932  .077609
    2    5.3427    .3196  16.1680  15.0633   534.309  523.616  .077656
    3    5.7171    .3195  16.1672  15.0633   534.197  523.514  .077671
    4    6.1242    .3193  16.1659  15.0633   534.173  523.503  .077673
    5    6.5578    .3193  16.1657  15.0633   534.222  523.553  .077666
    6    7.0131    .3193  16.1657  15.0633   534.307  523.635  .077653
    7    7.4859    .3193  16.1659  15.0633   534.433  523.757  .077635
    8    7.9733    .3193  16.1659  15.0633   534.573  523.895  .077615
    9    8.4727    .3193  16.1658  15.0633   534.701  524.020  .077596
   10    8.9822    .3193  16.1659  15.0633   534.766  524.084  .077587
   11    9.5000    .3193  16.1657  15.0633   534.729  524.049  .077592

 STREAM  RADIUS   ---ENTHALPIES--   ENTROPY    FLOW    (PHI+GAMMA)
  LINE             TOTAL   STATIC              ANGLE
    1    5.0080  128.310  125.744  .976100     .000       .000
    2    5.3427  128.234  125.668  .975955     .000       .187
    3    5.7171  128.207  125.643  .975908     .000       .364
    4    6.1242  128.202  125.641  .975903     .000       .504
    5    6.5578  128.213  125.653  .975926     .000       .587
    6    7.0131  128.234  125.672  .975964     .000       .605
    7    7.4859  128.264  125.702  .976020     .000       .560
    8    7.9733  128.297  125.735  .976083     .000       .463
    9    8.4727  128.328  125.765  .976141     .000       .327
   10    8.9822  128.344  125.780  .976170     .000       .168
   11    9.5000  128.335  125.772  .976154     .000       .000
1

 POINT NO  1   PASS  6   THE CALCULATION IS CONVERGED
 ******************************************************
 SPEED FACTOR =  8844.000  FLOW =  38.450  TOTAL PRESSURE RATIO =  1.10
=> 0
 ISENTROPIC EFFICIENCY = .9067  POWER =  .2062E+03

 LOSS COEFFICIENT DETERMINATION FOR BLADE BETWEEN STATIONS 11 AND 16
 AS INCORPORATED IN ABOVE RESULTS, BLADE TYPE 1
 ******************************************************

 STREAM  INLET   OUTLET  CASCADE    DIFF    LOSS    DIFF    BLADE
  LINE   RADIUS  RADIUS  SOLIDITY  FACTOR   PARAM   LOSS    ANGLE
    1    3.000   3.625   2.5223    .2817  .00899  .04609  30.953
    2    3.664   4.137   2.2065    .3842  .00947  .04191  41.208
    3    4.332   4.696   1.9914    .4227  .00977  .04120  45.671
    4    4.990   5.281   1.8386    .4096  .00965  .04143  49.549
    5    5.644   5.878   1.7107    .3797  .00942  .04206  52.938
    6    6.295   6.485   1.5780    .3469  .00918  .04218  55.790
    7    6.946   7.096   1.4535    .3162  .00904  .04227  58.173
```

```
    8    7.591   7.708    1.3264    .2892  .00899  .04183  60.043
    9    8.231   8.315    1.1963    .2667  .00899  .04057  61.548
   10    8.865   8.915    1.0490    .2486  .00900  .03785  63.023
   11    9.500   9.500     .8830    .2353  .00900  .03342  64.765

 STREAM  INCID   EXPAN    INLET   EXPAND   SHOCK    TOTAL
  LINE   ANGLE   ANGLE    M.NO.   M. NO.    LOSS     LOSS
    1    4.006  14.006    .3652  1.5711   .00000   .04609
    2    1.523  11.016    .3761  1.4697   .00000   .04191
    3    1.626  10.608    .4107  1.4558   .00000   .04120
    4    1.713  10.191    .4457  1.4415   .00000   .04143
    5    1.739   9.716    .4819  1.4252   .00000   .04206
    6    1.811   9.288    .5195  1.4104   .00000   .04218
    7    1.853   8.830    .5586  1.3945   .00000   .04227
    8    1.930   8.411    .5992  1.3799   .00000   .04183
    9    2.016   8.003    .6407  1.3656   .00000   .04057
   10    2.092   7.586    .6812  1.3509   .00000   .03785
   11    2.111   7.111    .7199  1.3340   .00000   .03342
1

 LOSS COEFFICIENT DETERMINATION FOR BLADE BETWEEN STATIONS 19 AND 20
 AS INCORPORATED IN ABOVE RESULTS, BLADE TYPE 2
 ******************************************************

 STREAM  INLET   OUTLET  CASCADE    DIFF    LOSS    DIFF    BLADE
  LINE   RADIUS  RADIUS  SOLIDITY  FACTOR   PARAM   LOSS    ANGLE
    1    4.382   4.797   2.0270    .3674  .01491  .06043    .000
    2    4.789   5.160   1.9000    .3187  .01236  .04699    .000
    3    5.236   5.559   1.7636    .2850  .01038  .03662    .000
    4    5.714   5.987   1.6514    .2605  .00882  .02912    .000
    5    6.216   6.441   1.5546    .2423  .00757  .02353    .000
    6    6.737   6.916   1.4696    .2282  .00673  .01977    .000
    7    7.272   7.410   1.3958    .2166  .00646  .01804    .000
    8    7.818   7.917   1.3308    .2063  .00679  .01807    .000
    9    8.373   8.437   1.2749    .1962  .00755  .01924    .000
   10    8.934   8.965   1.2250    .1856  .00855  .02094    .000
   11    9.500   9.500   1.1810    .1738  .00961  .02269    .000

 STREAM  INCID   EXPAN    INLET   EXPAND   SHOCK    TOTAL
  LINE   ANGLE   ANGLE    M.NO.   M. NO.    LOSS     LOSS
    1     .000   5.000    .4060  1.2565   .00000   .06043
    2     .000   5.000    .3834  1.2565   .00000   .04699
    3     .000   5.000    .3660  1.2565   .00000   .03662
    4     .000   5.000    .3526  1.2565   .00000   .02912
    5     .000   5.000    .3423  1.2565   .00000   .02353
    6     .000   5.000    .3343  1.2565   .00000   .01977
    7     .000   5.000    .3280  1.2565   .00000   .01804
    8     .000   5.000    .3231  1.2565   .00000   .01807
    9     .000   5.000    .3192  1.2565   .00000   .01924
   10     .000   5.000    .3160  1.2565   .00000   .02094
   11     .000   5.000    .3133  1.2565   .00000   .02269
S
1  PROGRAM UD0300 -    VERSION 2.0    - ARBITRARY MEANLINE BLADE SECTION
   ********************************************************************

   TITLE                              =  LOW COST FAN ROTOR RUN 17 BNC 6/25/95
=>
   NUMBER OF STREAMSURFACES          = 11
   NUMBER OF STATIONS                =  6
   NUMBER OF CONSTANT-Z PLANES       = 13
   NUMBER OF BLADE DATA POINTS       = 11
   NUMBER OF POINTS PER SEGMENT      = 10
   NUMBER OF BLADES IN BLADE ROW     = 17
   ISTAK                             =  2
   IPUNCH                            =  0
   IFPLOT                            =  0
   IPRINT                            =  1
   ISPLIT                            =  0
   INAST                             =  0
   JSPUN                             =  0
   JZPUN                             =  0
   ZINNER                            =  2.5000
   ZOUTER                            = 10.0000
   SCALE                             =  2.0000
   STACKX                            =  1.5000
   PLTSZE                            = 11.0000
   TOLLE                             =   .0020
   LEADING EDGE STATION NUMBER       =  1
   TRAILING EDGE STATION NUMBER      =  6
   RADII SPECIFYING DEVIATION        =  5
   RADII SPECIFYING INCIDENCE        = 11
   SENSE OF ROTATION INDICATOR       = -1
   DEVIATION CALCULATION INDEX       =  2
   IDELET                            =  0
   IFLDEG                            =  1

   SHAPE FACTOR                      =   .7000
   SOLIDITY TOLERANCE                =   .0100
```

```
 DEVIATION CURVE  1   NUMBER OF POINTS = 6   RADIUS =  3.6250

 POINT     NORMALIZED MERIDIONAL      NORMALIZED DEVIATION
                  CHORD                   DISTRIBUTION

   1               .0000                     .0000
   2               .2000                     .0600
   3               .4000                     .2000
   4               .6000                     .4300
   5               .8000                     .7000
   6              1.0000                    1.0000
 DEVIATION CURVE  2   NUMBER OF POINTS = 6   RADIUS =  4.2125

 POINT     NORMALIZED MERIDIONAL      NORMALIZED DEVIATION
                  CHORD                   DISTRIBUTION

   1               .0000                     .0000
   2               .2000                     .0600
   3               .4000                     .2000
   4               .6000                     .4300
   5               .8000                     .7000
   6              1.0000                    1.0000
 DEVIATION CURVE  3   NUMBER OF POINTS = 6   RADIUS =  5.3875

 POINT     NORMALIZED MERIDIONAL      NORMALIZED DEVIATION
                  CHORD                   DISTRIBUTION

   1               .0000                     .0000
   2               .2000                     .0000
   3               .4000                     .0700
   4               .6000                     .2500
   5               .8000                     .5800
   6              1.0000                    1.0000
 DEVIATION CURVE  4   NUMBER OF POINTS = 6   RADIUS =  6.5625

 POINT     NORMALIZED MERIDIONAL      NORMALIZED DEVIATION
                  CHORD                   DISTRIBUTION

   1               .0000                     .0000
   2               .2000                     .0000
   3               .4000                     .0000
   4               .6000                     .0850
   5               .8000                     .3600
   6              1.0000                    1.0000
 DEVIATION CURVE  5   NUMBER OF POINTS = 6   RADIUS =  9.5000

 POINT     NORMALIZED MERIDIONAL      NORMALIZED DEVIATION
                  CHORD                   DISTRIBUTION

   1               .0000                     .0000
   2               .2000                     .0000
   3               .4000                     .0000
   4               .6000                     .0850
   5               .8000                     .3600
   6              1.0000                    1.0000

 INCIDENCE AND EXTRA DEVIATION DISTRIBUTION

 INLET RADIUS    INCIDENCE    EXTRA DEVIATION

    3.0000         2.000          4.000
    3.6435         2.000          1.600
    4.2874         2.000           .450
    4.9351         2.000           .050
    5.5856         2.000           .000
    6.2371         2.000           .000
    6.8907         2.000           .000
    7.5438         2.000           .000
    8.1982         2.000           .000
    8.8507         2.000           .000
    9.5000         2.000           .000
1

           STREAMSURFACE GEOMETRY SPECIFICATION

 COMPUTING STATION  1  NUMBER OF DESCRIBING POINTS= 11  IFANGS( 1)=  1

    DESCRIPTION          STREAMLINE     RADII          AIR ANGLE
    X         R            NUMBER

    .0000    3.0000          1          3.0000         -34.9589
    .0198    3.6435          2          3.6638         -42.7315
    .0492    4.2874          3          4.3320         -47.2969
    .0990    4.9351          4          4.9899         -51.2616
    .1388    5.5856          5          5.6438         -54.6769
    .2085    6.2371          6          6.2954         -57.6009
    .2789    6.8907          7          6.9458         -60.0258
    .3592    7.5438          8          7.5910         -61.9726
```

ICM4PRINT

```
      .4497    8.1982        9            8.2311         -63.5641
      .5701    8.8507       10            8.8653         -65.1148
      .7000    9.5000       11            9.5000         -66.8754

COMPUTING STATION  2  NUMBER OF DESCRIBING POINTS= 11  IFANGS( 2)=  1

   DESCRIPTION         STREAMLINE     RADII            AIR ANGLE
   X           R         NUMBER

      .6000    3.1250        1            3.1250         -24.9395
      .6127    3.7450        2            3.7872         -32.4511
      .6255    4.3698        3            4.4300         -38.7246
      .6540    5.0014        4            5.0681         -43.9814
      .6692    5.6376        5            5.7060         -48.4545
      .7067    6.2769        6            6.3460         -52.2649
      .7432    6.9198        7            6.9886         -55.5457
      .7851    7.5636        8            7.6285         -58.4330
      .8326    8.2098        9            8.2594         -61.0099
      .9036    8.8558       10            8.8793         -63.3073
      .9800    9.5000       11            9.5000         -65.5174

COMPUTING STATION  3  NUMBER OF DESCRIBING POINTS= 11  IFANGS( 3)=  1

   DESCRIPTION         STREAMLINE     RADII            AIR ANGLE
   X           R         NUMBER

     1.2000    3.2500        1            3.2500         -14.1629
     1.2055    3.8464        2            3.8843         -24.1876
     1.2018    4.4522        3            4.5055         -32.0266
     1.2090    5.0677        4            5.1284         -38.5020
     1.1996    5.6896        5            5.7550         -43.8699
     1.2049    6.3168        6            6.3870         -48.3918
     1.2075    6.9488        7            7.0242         -52.3249
     1.2109    7.5835        8            7.6604         -55.8880
     1.2154    8.2215        9            8.2846         -59.1150
     1.2371    8.8610       10            8.8937         -61.8697
     1.2600    9.5000       11            9.5000         -64.0915
1

COMPUTING STATION  4  NUMBER OF DESCRIBING POINTS= 11  IFANGS( 4)=  1

   DESCRIPTION         STREAMLINE     RADII            AIR ANGLE
   X           R         NUMBER

     1.8000    3.3750        1            3.3750          -5.5814
     1.7984    3.9479        2            3.9709         -17.5447
     1.7782    4.5345        3            4.5694         -27.1993
     1.7641    5.1339        4            5.1792         -35.0358
     1.7301    5.7417        5            5.7968         -41.2816
     1.7032    6.3566        6            6.4220         -46.3680
     1.6717    6.9779        7            7.0534         -50.6905
     1.6368    7.6033        8            7.6846         -54.5613
     1.5983    8.2331        9            8.3031         -58.0516
     1.5706    8.8661       10            8.9054         -60.9160
     1.5400    9.5000       11            9.5000         -62.9489

COMPUTING STATION  5  NUMBER OF DESCRIBING POINTS= 11  IFANGS( 5)=  1

   DESCRIPTION         STREAMLINE     RADII            AIR ANGLE
   X           R         NUMBER

     2.4000    3.5000        1            3.5000           2.3138
     2.3912    4.0493        2            4.0522         -11.2310
     2.3545    4.6169        3            4.6289         -23.1549
     2.3191    5.2002        4            5.2271         -32.7952
     2.2605    5.7937        5            5.8363         -40.1871
     2.2014    6.3965        6            6.4539         -45.9124
     2.1360    7.0069        7            7.0772         -50.5012
     2.0626    7.6232        8            7.7004         -54.3418
     1.9811    8.2448        9            8.3134         -57.6466
     1.9041    8.8713       10            8.9129         -60.3388
     1.8200    9.5000       11            9.5000         -62.0278

COMPUTING STATION  6  NUMBER OF DESCRIBING POINTS= 11  IFANGS( 6)=  1

   DESCRIPTION         STREAMLINE     RADII            AIR ANGLE
   X           R         NUMBER

     3.0000    3.6250        1            3.6250          10.3315
     2.9841    4.1508        2            4.1366          -4.6063
     2.9308    4.6993        3            4.6955         -19.1965
     2.8741    5.2665        4            5.2806         -31.0597
     2.7909    5.8457        5            5.8781         -39.9671
     2.6996    6.4363        6            6.4845         -46.6154
     2.6003    7.0360        7            7.0961         -51.5813
     2.4885    7.6430        8            7.7082         -55.2424
     2.3640    8.2564        9            8.3154         -57.9736
     2.2376    8.8764       10            8.9145         -60.0779
```

```
     2.1000    9.5000        11          9.5000          -61.5979
1

   SECTION GEOMETRY SPECIFICATIONS

   STREAM  SOLID  LE RAD  MAX TK  TE THK  PT OF   X STAK  Y STAK
    LINE    MOD   /CHORD  /CHORD  /CHORD  MAX TK  OFFSET  OFFSET

     1.0   .000  .00500  .09750  .00500  .55000  .00000  .00000
     2.0   .000  .00500  .09620  .00500  .55000  .00000  .00000
     3.0   .000  .00500  .09270  .00500  .55000  .00000  .00000
     4.0   .000  .00500  .08950  .00500  .55000  .00000  .00000
     5.0   .000  .00500  .08430  .00500  .55000  .00000  .00000
     6.0   .000  .00500  .08340  .00500  .55000  .00000  .00000
     7.0   .000  .00500  .07970  .00500  .55000  .00000  .00000
     8.0   .000  .00500  .07050  .00500  .55000  .00000  .00000
     9.0   .000  .00500  .04750  .00500  .55000  .00000  .00000
    10.0   .000  .00500  .02740  .00500  .55000  .00000  .00000
    11.0   .000  .00500  .02550  .00500  .55000  .00000  .00000

   STREAMSURFACE  1  ITERATION  1  DEVIATION = 11.273  SOLIDITY = 2.5619
                     ITERATION  2  DEVIATION = 11.369  SOLIDITY = 2.5224
                     ITERATION  2  DEVIATION = 11.369  SOLIDITY = 2.5224

   POINT  FRAC. M      Y     Y-D(DEG)    Y-DD   R OF CURV

     1    .00000    .00000 -32.95886    .91824   1.8436
     2    .02222   -.01418 -32.12728    .92085   1.7880
     3    .04444   -.02791 -31.27540    .92870   1.7247
     4    .06667   -.04118 -30.39795    .94177   1.6547
     5    .08889   -.05398 -29.48932    .96007   1.5793
     6    .11111   -.06631 -28.54354    .98360   1.4998
     7    .13333   -.07815 -27.55431   1.01236   1.4175
     8    .15556   -.08949 -26.51495   1.04635   1.3339
     9    .17778   -.10032 -25.41844   1.08557   1.2502
    10    .20000   -.11061 -24.25735   1.13001   1.1677
    11    .22222   -.12034 -23.02675   1.17184   1.0947
    12    .24444   -.12949 -21.73308   1.20319   1.0369
    13    .26667   -.13805 -20.38649   1.22408    .9919
    14    .28889   -.14601 -18.99814   1.23449    .9583
    15    .31111   -.15335 -17.58025   1.23444    .9351
    16    .33333   -.16009 -16.14600   1.22391    .9219
    17    .35556   -.16622 -14.70943   1.20291    .9187
    18    .37778   -.17176 -13.28534   1.17145    .9260
    19    .40000   -.17672 -11.88909   1.12951    .9449
    20    .42222   -.18112 -10.53315   1.08511    .9698
    21    .44444   -.18499  -9.21681   1.04627    .9938
    22    .46667   -.18834  -7.93564   1.01299   1.0161
    23    .48889   -.19119  -6.68475    .98526   1.0360
    24    .51111   -.19355  -5.45890    .96308   1.0526
    25    .53333   -.19544  -4.25259    .94646   1.0653
    26    .55556   -.19686  -3.06007    .93539   1.0737
    27    .57778   -.19782  -1.87543    .92988   1.0771
    28    .60000   -.19832   -.69267    .92993   1.0756
    29    .62222   -.19836    .49348    .93364   1.0712
    30    .64444   -.19793   1.68505    .93912   1.0662
    31    .66667   -.19705   2.88326    .94638   1.0607
    32    .68889   -.19569   4.08928    .95542   1.0547
    33    .71111   -.19387   5.30421    .96623   1.0484

   POINT  FRAC. M      Y     Y-D(DEG)    Y-DD   R OF CURV

    34    .73333   -.19157   6.52908    .97882   1.0418
    35    .75556   -.18878   7.76483    .99319   1.0351
    36    .77778   -.18550   9.01230   1.00933   1.0284
    37    .80000   -.18173  10.27220   1.02724   1.0218
    38    .82222   -.17745  11.54435   1.04500   1.0174
    39    .84444   -.17265  12.82529   1.06067   1.0170
    40    .86667   -.16733  14.11084   1.07425   1.0205
    41    .88889   -.16147  15.39690   1.08574   1.0278
    42    .91111   -.15508  16.67945   1.09514   1.0388
    43    .93333   -.14815  17.95467   1.10246   1.0536
    44    .95556   -.14068  19.21887   1.10768   1.0723
    45    .97778   -.13266  20.46859   1.11081   1.0948
    46   1.00000   -.12409  21.70058   1.11186   1.1213

   DATA POINTS

   POINT  FRAC. M  Y-D(DEG)

     1    .00000 -32.95886
     2    .20000 -24.25734
     3    .40000 -11.88907
     4    .60000   -.69265
     5    .80000  10.27224
     6   1.00000  21.70058
1  STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER  1
   ****************************************************
```

```
   BETA1 =-32.959  (BLADE INLET ANGLE)
   BETA2 = 21.701  (BLADE OUTLET ANGLE)
   YZERO = .00500  (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
   T     = .09750  (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
   YONE  = .00500  (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
   Z     =  .5500  (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
   CORD  = 3.0644  (MERIDIONAL CHORD OF SECTION)

   NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
   BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
   ****************************************************

    BLADE CHORD     = 1.0058

    STAGGER ANGLE   = -7.074

    CAMBER ANGLE    =-54.659

    SECTION AREA    = .06961
    LOCATION OF CENTROID RELATIVE TO LEADING EDGE

           XBAR =  .50914
           YBAR = -.16320

    SECOND MOMENTS OF AREA ABOUT CENTROID

           IX   =  .00015
           IY   =  .00386
           IXY  = -.00044

    ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS = -6.710

    PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

           IPX  = .00010      (AT -6.710 WITH (X) AXIS)
           IPY  = .00391      (AT -6.710 WITH (Y) AXIS)

   POINT      M E A N L I N E   D A T A         SURFACE COORDINATE DATA
   NUMBER     X        Y      ANGLE THICKNESS     X1      Y1      X2     Y2

     1     .00503  .00000-32.959  .01006    .00776  .00422  .00229 -.004
=> 22
     2     .02710 -.01408-32.127  .01607    .03137 -.00728  .02282 -.020
=> 89
     3     .04917 -.02772-31.275  .02201    .05488 -.01831  .04345 -.037
=> 12
     4     .07124 -.04089-30.398  .02784    .07828 -.02889  .06419 -.052
=> 90
     5     .09331 -.05361-29.489  .03355    .10156 -.03900  .08505 -.068
=> 21
     6     .11537 -.06585-28.544  .03913    .12472 -.04867  .10603 -.083
=> 04
     7     .13744 -.07761-27.554  .04453    .14774 -.05787  .12715 -.097
=> 35
     8     .15951 -.08888-26.515  .04975    .17062 -.06662  .14841 -.111
=> 13
     9     .18158 -.09963-25.418  .05477    .19334 -.07489  .16983 -.124
=> 36
    10     .20365 -.10984-24.257  .05958    .21589 -.08269  .19141 -.137
=> 00
    11     .22572 -.11951-23.027  .06416    .23827 -.08999  .21317 -.149
=> 03
    12     .24779 -.12860-21.733  .06849    .26047 -.09679  .23511 -.160
=> 41
    13     .26986 -.13710-20.386  .07257    .28250 -.10309  .25722 -.171
=> 11
1
   POINT      M E A N L I N E   D A T A         SURFACE COORDINATE DATA
   NUMBER     X        Y      ANGLE THICKNESS     X1      Y1      X2     Y2

    14     .29193 -.14500-18.998  .07638    .30436 -.10889  .27950 -.181
=> 11
    15     .31400 -.15229-17.580  .07992    .32607 -.11420  .30193 -.190
=> 39
    16     .33607 -.15898-16.146  .08317    .34763 -.11904  .32450 -.198
=> 93
    17     .35814 -.16508-14.709  .08613    .36907 -.12342  .34720 -.206
=> 73
    18     .38020 -.17058-13.285  .08878    .39041 -.12737  .37000 -.213
=> 78
    19     .40227 -.17550-11.889  .09112    .41166 -.13092  .39289 -.220
=> 09
    20     .42434 -.17988-10.533  .09314    .43286 -.13409  .41583 -.225
=> 66
    21     .44641 -.18372 -9.217  .09483    .45401 -.13691  .43882 -.230
=> 52
    22     .46848 -.18704 -7.936  .09618    .47512 -.13941  .46184 -.234
=> 67
```

RESULTS.OUT 6-25-95 10:23a

Page 13 of 32

K/14PRINT

	23	.49055	-.18987	-6.685	.09718	.49621	-.14162	.48489	-.238
=> 13									
	24	.51262	-.19222	-5.459	.09780	.51727	-.14354	.50797	-.240
=> 90									
	25	.53469	-.19410	-4.253	.09806	.53832	-.14520	.53105	-.242
=> 99									
	26	.55676	-.19551	-3.060	.09792	.55937	-.14662	.55414	-.244
=> 40									
	27	.57883	-.19646	-1.875	.09739	.58042	-.14779	.57723	-.245
=> 13									
	28	.60090	-.19695	-.693	.09647	.60148	-.14872	.60031	-.245
=> 19									
	29	.62297	-.19699	.493	.09517	.62256	-.14941	.62337	-.244
=> 57									
	30	.64503	-.19657	1.685	.09347	.64366	-.14986	.64641	-.243
=> 29									
	31	.66710	-.19569	2.883	.09138	.66480	-.15006	.66940	-.241
=> 32									
	32	.68917	-.19435	4.089	.08890	.68600	-.15001	.69234	-.238
=> 68									
	33	.71124	-.19253	5.304	.08603	.70727	-.14970	.71522	-.235
=> 36									
	34	.73331	-.19025	6.529	.08275	.72861	-.14914	.73802	-.231
=> 36									
	35	.75538	-.18748	7.765	.07908	.75004	-.14830	.76072	-.226
=> 66									
	36	.77745	-.18423	9.012	.07500	.77158	-.14719	.78332	-.221
=> 26									
	37	.79952	-.18048	10.272	.07050	.79323	-.14579	.80580	-.215
=> 16									
	38	.82159	-.17622	11.544	.06559	.81502	-.14409	.82815	-.208
=> 35									
	39	.84366	-.17146	12.825	.06025	.83697	-.14209	.85034	-.200
=> 83									
	40	.86573	-.16617	14.111	.05447	.85909	-.13976	.87237	-.192
=> 59									
	41	.88779	-.16036	15.397	.04825	.88139	-.13710	.89420	-.183
=> 62									
	42	.90986	-.15402	16.679	.04157	.90390	-.13411	.91583	-.173
=> 93									
	43	.93193	-.14713	17.955	.03442	.92663	-.13076	.93724	-.163
=> 51									
	44	.95400	-.13971	19.219	.02680	.94959	-.12706	.95841	-.152
=> 36									
	45	.97607	-.13175	20.469	.01868	.97281	-.12300	.97934	-.140
=> 50									
	46	.99814	-.12324	21.701	.01006	.99628	-.11856	1.00000	-.127
=> 91									

1

NORMALISED PLOT OF SECTION NUMBER

=> 1

1

DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD

BLADE CHORD = 3.08206E+00

L.E.RADIUS = 1.54103E-02 CENTERED AT X= -1.5448E+00 Y= 5.0010E-01

SECTION AREA= 6.53703E-01

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = 1.34447E-02
IY = 3.40031E-01
IXY =-3.89643E-02

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = 8.86027E-03 (AT -6.710 WITH (X) AXIS)
IPY = 3.44616E-01 (AT -6.710 WITH (Y) AXIS)

PT	SURFACE----------ONE		SURFACE----------TWO	
NO	X	Y	X	Y
1	-1.53642E+00	5.13028E-01	-1.55318E+00	4.87168E-01
2	-1.46408E+00	4.77792E-01	-1.49027E+00	4.36085E-01
3	-1.39204E+00	4.43982E-01	-1.42705E+00	3.86345E-01
4	-1.32033E+00	4.11580E-01	-1.36350E+00	3.37990E-01
5	-1.24898E+00	3.80575E-01	-1.29959E+00	2.91070E-01
6	-1.17801E+00	3.50965E-01	-1.23530E+00	2.45641E-01
7	-1.10747E+00	3.22747E-01	-1.17059E+00	2.01779E-01
8	-1.03737E+00	2.95949E-01	-1.10543E+00	1.59542E-01
9	-9.67750E-01	2.70593E-01	-1.03979E+00	1.19008E-01
10	-8.98637E-01	2.46713E-01	-9.73644E-01	8.02622E-02
11	-8.30059E-01	2.24344E-01	-9.06964E-01	4.34015E-02
12	-7.62025E-01	2.03499E-01	-8.39740E-01	8.53652E-03
13	-6.94521E-01	1.84194E-01	-7.71986E-01	-2.42543E-02
14	-6.27527E-01	1.66416E-01	-7.03722E-01	-5.48958E-02
15	-5.61010E-01	1.50137E-01	-6.34981E-01	-8.33277E-02
16	-4.94929E-01	1.35311E-01	-5.65805E-01	-1.09507E-01
17	-4.29230E-01	1.21878E-01	-4.96246E-01	-1.33400E-01
18	-3.63849E-01	1.09771E-01	-4.26369E-01	-1.55008E-01
19	-2.98716E-01	9.89066E-02	-3.56244E-01	-1.74340E-01
20	-2.33762E-01	8.91928E-02	-2.85940E-01	-1.91428E-01
21	-1.68948E-01	8.05415E-02	-2.15495E-01	-2.06316E-01
22	-1.04247E-01	7.28740E-02	-1.44939E-01	-2.19041E-01
23	-3.96320E-02	6.61234E-02	-7.42960E-02	-2.29637E-01
24	2.49212E-02	6.02286E-02	-3.59114E-03	-2.38126E-01
25	8.94350E-02	5.51372E-02	6.71530E-02	-2.44522E-01
26	1.53932E-01	5.08067E-02	1.37914E-01	-2.48833E-01
27	2.18435E-01	4.72180E-02	2.08668E-01	-2.51073E-01
28	2.82968E-01	4.43652E-02	2.79394E-01	-2.51252E-01
29	3.47554E-01	4.22497E-02	3.50066E-01	-2.49373E-01
30	4.12227E-01	4.08784E-02	4.20650E-01	-2.45431E-01
31	4.77025E-01	4.02613E-02	4.91111E-01	-2.39420E-01
32	5.41983E-01	4.04105E-02	5.61410E-01	-2.31330E-01
33	6.07141E-01	4.13426E-02	6.31511E-01	-2.21151E-01
34	6.72537E-01	4.30771E-02	7.01372E-01	-2.08870E-01
35	7.38213E-01	4.56368E-02	7.70954E-01	-1.94471E-01

1

PT	SURFACE----------ONE		SURFACE----------TWO	
NO	X	Y	X	Y
36	8.04212E-01	4.90478E-02	8.40213E-01	-1.77939E-01
37	8.70578E-01	5.33353E-02	9.09105E-01	-1.59248E-01
38	9.37359E-01	5.85358E-02	9.77582E-01	-1.38383E-01
39	1.00461E+00	6.46849E-02	1.04559E+00	-1.15326E-01
40	1.07238E+00	7.18167E-02	1.11308E+00	-9.00636E-02
41	1.14073E+00	7.99631E-02	1.17999E+00	-6.25880E-02
42	1.20971E+00	8.91421E-02	1.24627E+00	-3.28819E-02
43	1.27936E+00	9.93899E-02	1.31187E+00	-9.53495E-04
44	1.34973E+00	1.10731E-01	1.37676E+00	3.31952E-02
45	1.42087E+00	1.23184E-01	1.44088E+00	6.95597E-02
46	1.49280E+00	1.36768E-01	1.50420E+00	1.08132E-01

1

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-1.55318E+00	4.87168E-01
2	-1.55449E+00	4.88115E-01
3	-1.55569E+00	4.89193E-01
4	-1.55677E+00	4.90391E-01
5	-1.55772E+00	4.91695E-01
6	-1.55853E+00	4.93092E-01
7	-1.55918E+00	4.94565E-01
8	-1.55968E+00	4.96099E-01
9	-1.56002E+00	4.97676E-01
10	-1.56019E+00	4.99280E-01
11	-1.56019E+00	5.00893E-01
12	-1.56002E+00	5.02497E-01
13	-1.55969E+00	5.04076E-01
14	-1.55919E+00	5.05610E-01
15	-1.55854E+00	5.07084E-01
16	-1.55773E+00	5.08482E-01
17	-1.55678E+00	5.09787E-01
18	-1.55571E+00	5.10987E-01
19	-1.55451E+00	5.12067E-01
20	-1.55320E+00	5.13016E-01
21	-1.55181E+00	5.13823E-01
22	-1.55033E+00	5.14481E-01
23	-1.54880E+00	5.14980E-01
24	-1.54722E+00	5.15317E-01
25	-1.54562E+00	5.15486E-01
26	-1.54401E+00	5.15487E-01
27	-1.54240E+00	5.15320E-01
28	-1.54082E+00	5.14986E-01
29	-1.53929E+00	5.14488E-01
30	-1.53781E+00	5.13833E-01
31	-1.53642E+00	5.13028E-01

LEADING EDGE AXIAL DIFFERENCE = .0272 NEW DELX = -.0272

1

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-32.95886	.91824	1.8436
2	.02222	-.01418	-32.12728	.92085	1.7880
3	.04444	-.02791	-31.27540	.92870	1.7247
4	.06667	-.04118	-30.39795	.94177	1.6547
5	.08889	-.05398	-29.48932	.96007	1.5793
6	.11111	-.06631	-28.54354	.98360	1.4998
7	.13333	-.07815	-27.55431	1.01236	1.4175
8	.15556	-.08949	-26.51495	1.04635	1.3339
9	.17778	-.10032	-25.41844	1.08557	1.2502
10	.20000	-.11061	-24.25738	1.13001	1.1677
11	.22222	-.12034	-23.02675	1.17184	1.0947
12	.24444	-.12949	-21.73308	1.20319	1.0369
13	.26667	-.13805	-20.38649	1.22408	.9919
14	.28889	-.14601	-18.99814	1.23449	.9583
15	.31111	-.15335	-17.58025	1.23444	.9351
16	.33333	-.16009	-16.14600	1.22391	.9219
17	.35556	-.16622	-14.70943	1.20291	.9187
18	.37778	-.17176	-13.28534	1.17145	.9260
19	.40000	-.17672	-11.88909	1.12951	.9449
20	.42222	-.18112	-10.53315	1.08511	.9698
21	.44444	-.18499	-9.21681	1.04627	.9938
22	.46667	-.18834	-7.93564	1.01299	1.0161
23	.48889	-.19119	-6.68475	.98526	1.0360
24	.51111	-.19355	-5.45890	.96308	1.0526
25	.53333	-.19544	-4.25259	.94646	1.0653
26	.55556	-.19686	-3.06007	.93539	1.0737
27	.57778	-.19782	-1.87543	.92988	1.0771
28	.60000	-.19832	-.69267	.92993	1.0756
29	.62222	-.19836	.49348	.93364	1.0712
30	.64444	-.19793	1.68505	.93912	1.0662
31	.66667	-.19705	2.88326	.94638	1.0607
32	.68889	-.19569	4.08928	.95542	1.0547
33	.71111	-.19387	5.30421	.96623	1.0484
34	.73333	-.19157	6.52908	.97882	1.0418
35	.75556	-.18878	7.76483	.99319	1.0351
36	.77778	-.18550	9.01230	1.00933	1.0284
37	.80000	-.18173	10.27220	1.02724	1.0218
38	.82222	-.17745	11.54435	1.04500	1.0174
39	.84444	-.17265	12.82529	1.06067	1.0170
40	.86667	-.16733	14.11084	1.07425	1.0205
41	.88889	-.16147	15.39690	1.08574	1.0278
42	.91111	-.15508	16.67945	1.09514	1.0388
43	.93333	-.14815	17.95467	1.10246	1.0536
44	.95556	-.14068	19.21887	1.10768	1.0723
45	.97778	-.13266	20.46859	1.11081	1.0948
46	1.00000	-.12409	21.70058	1.11186	1.1213

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-32.95886
2	.20000	-24.25734
3	.40000	-11.88907
4	.60000	-.69265
5	.80000	10.27224
6	1.00000	21.70058

CARTESIAN COORDINATES ON STREAMSURFACE 1

POINT	Z1	X1	Y1	Z2	X2	Y2
1	2.96238	-1.47747	.50248	2.96318	-1.49388	.47665
2	2.98272	-1.40665	.46954	2.98362	-1.43229	.42763
3	3.00239	-1.33612	.43783	3.00307	-1.37040	.37991
4	3.02144	-1.26592	.40725	3.02163	-1.30818	.33332
5	3.03993	-1.19607	.37782	3.03939	-1.24562	.28795
6	3.05788	-1.12659	.34957	3.05640	-1.18268	.24386
7	3.07532	-1.05753	.32244	3.07273	-1.11933	.20110
8	3.09229	-.98891	.29653	3.08847	-1.05553	.15977
9	3.10881	-.92075	.27189	3.10367	-.99128	.11999
10	3.12490	-.85309	.24859	3.11840	-.92652	.08184
11	3.14059	-.78596	.22661	3.13274	-.86125	.04546
12	3.15592	-.71935	.20599	3.14677	-.79543	.01095
13	3.17091	-.65327	.18679	3.16053	-.72910	-.02164
14	3.18558	-.58768	.16904	3.17410	-.66228	-.05219
15	3.19999	-.52256	.15273	3.18753	-.59498	-.08062
16	3.21416	-.45787	.13777	3.20087	-.52726	-.10685
17	3.22812	-.39355	.12411	3.21418	-.45916	-.13086
18	3.24192	-.32955	.11173	3.22748	-.39075	-.15270
19	3.25558	-.26578	.10056	3.24082	-.32210	-.17231
20	3.26912	-.20219	.09051	3.25421	-.25327	-.18972
21	3.28258	-.13874	.08149	3.26768	-.18431	-.20491
22	3.29597	-.07540	.07341	3.28126	-.11524	-.21803
23	3.30931	-.01214	.06624	3.29495	-.04608	-.22908
24	3.32260	.05105	.05992	3.30877	.02314	-.23804
25	3.33585	.11421	.05440	3.32274	.09240	-.24489
26	3.34908	.17735	.04963	3.33686	.16167	-.24962
27	3.36230	.24050	.04554	3.35112	.23094	-.25241
28	3.37550	.30367	.04221	3.36553	.30018	-.25314
29	3.38871	.36690	.03964	3.38009	.36936	-.25177
30	3.40192	.43022	.03785	3.39478	.43846	-.24827
31	3.41515	.49365	.03685	3.40959	.50744	-.24274
32	3.42840	.55725	.03655	3.42449	.57626	-.23517
33	3.44168	.62103	.03705	3.43947	.64489	-.22545
34	3.45501	.68505	.03840	3.45451	.71328	-.21354
35	3.46838	.74935	.04063	3.46956	.78140	-.19948
36	3.48180	.81396	.04378	3.48460	.84921	-.18325

37	3.49528	.87893	.04782	3.49959	.91665	-.16484
38	3.50883	.94431	.05283	3.51448	.98349	-.14415
39	3.52246	1.01015	.05884	3.52923	1.05027	-.12117
40	3.53616	1.07649	.06590	3.54377	1.11633	-.09591
41	3.54994	1.14341	.07410	3.55806	1.18184	-.06836
42	3.56380	1.21093	.08339	3.57203	1.24672	-.03854
43	3.57775	1.27912	.09384	3.58561	1.31095	-.00638
44	3.59179	1.34801	.10547	3.59874	1.37447	.02812
45	3.60590	1.41765	.11835	3.61134	1.43725	.06494
46	3.62009	1.48808	.13263	3.62334	1.49924	.10421

1

POINT	ZSEMI	XSEMI	YSEMI
1	2.96318	-1.49388	.47665
2	2.96277	-1.49516	.47756
3	2.96235	-1.49633	.47860
4	2.96194	-1.49739	.47976
5	2.96154	-1.49832	.48103
6	2.96115	-1.49911	.48239
7	2.96078	-1.49976	.48384
8	2.96043	-1.50024	.48534
9	2.96011	-1.50057	.48689
10	2.95981	-1.50074	.48847
11	2.95955	-1.50074	.49006
12	2.95932	-1.50058	.49165
13	2.95913	-1.50025	.49321
14	2.95898	-1.49976	.49473
15	2.95887	-1.49912	.49620
16	2.95880	-1.49833	.49759
17	2.95877	-1.49741	.49890
18	2.95879	-1.49635	.50010
19	2.95886	-1.49518	.50119
20	2.95896	-1.49390	.50215
21	2.95911	-1.49253	.50298
22	2.95930	-1.49109	.50365
23	2.95953	-1.48959	.50417
24	2.95980	-1.48805	.50453
25	2.96009	-1.48648	.50473
26	2.96042	-1.48490	.50476
27	2.96078	-1.48333	.50463
28	2.96116	-1.48178	.50433
29	2.96155	-1.48028	.50386
30	2.96196	-1.47884	.50325
31	2.96238	-1.47747	.50248

STREAMSURFACE 2 ITERATION 1 DEVIATION = 8.881 SOLIDITY = 2.2746
ITERATION 2 DEVIATION = 9.053 SOLIDITY = 2.2080
ITERATION 2 DEVIATION = 9.053 SOLIDITY = 2.2080

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-40.73150	1.20531	1.9067
2	.02222	-.01884	-39.83870	1.20456	1.8337
3	.04444	-.03708	-38.92322	1.20233	1.7663
4	.06667	-.05473	-37.98584	1.19860	1.7040
5	.08889	-.07179	-37.02752	1.19339	1.6468
6	.11111	-.08826	-36.04935	1.18668	1.5944
7	.13333	-.10414	-35.05261	1.17849	1.5467
8	.15556	-.11944	-34.03875	1.16881	1.5036
9	.17778	-.13416	-33.00940	1.15763	1.4649
10	.20000	-.14831	-31.96638	1.14497	1.4304
11	.22222	-.16190	-30.91173	1.13063	1.4005
12	.24444	-.17493	-29.84798	1.11436	1.3753
13	.26667	-.18741	-28.77792	1.09616	1.3548
14	.28889	-.19934	-27.70458	1.07604	1.3391
15	.31111	-.21075	-26.63116	1.05399	1.3283
16	.33333	-.22163	-25.56104	1.03001	1.3224

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
17	.35556	-.23201	-24.49776	1.00411	1.3217
18	.37778	-.24189	-23.44499	.97628	1.3265
19	.40000	-.25129	-22.40652	.94651	1.3371
20	.42222	-.26022	-21.38547	.91699	1.3508
21	.44444	-.26870	-20.38135	.89046	1.3634
22	.46667	-.27674	-19.39231	.86695	1.3744
23	.48889	-.28435	-18.41634	.84646	1.3832
24	.51111	-.29154	-17.45117	.82898	1.3895
25	.53333	-.29832	-16.49437	.81452	1.3927
26	.55556	-.30470	-15.54333	.80307	1.3925
27	.57778	-.31068	-14.59528	.79463	1.3886
28	.60000	-.31627	-13.64732	.78921	1.3808
29	.62222	-.32147	-12.69677	.78591	1.3705
30	.64444	-.32629	-11.74242	.78370	1.3596
31	.66667	-.33071	-10.78348	.78257	1.3480
32	.68889	-.33475	-9.81912	.78252	1.3358
33	.71111	-.33841	-8.84849	.78355	1.3229
34	.73333	-.34167	-7.87075	.78567	1.3095
35	.75556	-.34455	-6.88504	.78887	1.2955
36	.77778	-.34704	-5.89050	.79315	1.2810
37	.80000	-.34913	-4.88630	.79851	1.2661
38	.82222	-.35084	-3.87194	.80411	1.2522
39	.84444	-.35214	-2.84846	.80904	1.2406
40	.86667	-.35305	-1.81730	.81332	1.2314
41	.88889	-.35355	-.77993	.81694	1.2244
42	.91111	-.35365	.26214	.81991	1.2197
43	.93333	-.35335	1.30739	.82221	1.2172
44	.95556	-.35264	2.35427	.82386	1.2169
45	.97778	-.35152	3.40126	.82484	1.2188
46	1.00000	-.34999	4.44682	.82517	1.2229

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-40.73150
2	.20166	-31.88780
3	.40145	-22.33957
4	.60084	-13.61126
5	.80023	-4.87591
6	1.00000	4.44682

1 STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER 2
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BETA1 =-40.731 (BLADE INLET ANGLE)
BETA2 = 4.447 (BLADE OUTLET ANGLE)
YZERO = .00500 (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
T = .09620 (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
YONE = .00500 (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
Z = .5500 (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
CORD = 3.0030 (MERIDIONAL CHORD OF SECTION)

NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BLADE CHORD = 1.0587

STAGGER ANGLE =-19.290

CAMBER ANGLE =-45.178

SECTION AREA = .07501
LOCATION OF CENTROID RELATIVE TO LEADING EDGE

XBAR = .49457
YBAR = -.25935

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = .00057
IY = .00412
IXY = -.00139

ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS =-19.071

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = .00009 (AT-19.071 WITH (X) AXIS)
IPY = .00460 (AT-19.071 WITH (Y) AXIS)

	POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
	1	.00529	.00000	-40.732	.01059	.00875	.00401	.00184	-.004
=> 01	2	.02739	-.01873	-39.839	.01724	.03291	-.01211	.02187	-.025
=> 35	3	.04948	-.03687	-38.923	.02378	.05695	-.02762	.04201	-.046
=> 12	4	.07158	-.05442	-37.986	.03017	.08087	-.04253	.06229	-.066
=> 31	5	.09368	-.07138	-37.028	.03641	.10464	-.05685	.08271	-.085
=> 91	6	.11577	-.08775	-36.049	.04245	.12826	-.07059	.10328	-.104
=> 91	7	.13787	-.10354	-35.053	.04827	.15173	-.08379	.12401	-.123
=> 30	8	.15996	-.11876	-34.039	.05386	.17504	-.09644	.14489	-.141
=> 07	9	.18206	-.13340	-33.009	.05921	.19819	-.10857	.16593	-.158
=> 22	10	.20415	-.14747	-31.966	.06430	.22117	-.12019	.18713	-.174
=> 74	11	.22625	-.16098	-30.912	.06912	.24400	-.13133	.20849	-.190
=> 63	12	.24834	-.17393	-29.848	.07364	.26667	-.14199	.23002	-.205
=> 87	13	.27044	-.18634	-28.778	.07786	.28918	-.15221	.25170	-.220
=> 46									

1

	POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
	14	.29253	-.19821	-27.705	.08178	.31155	-.16200	.27352	-.234
=> 41	15	.31463	-.20955	-26.631	.08538	.33377	-.17138	.29549	-.247
=> 71	16	.33673	-.22037	-25.561	.08865	.35585	-.18038	.31760	-.260
=> 35	17	.35882	-.23069	-24.498	.09157	.37781	-.18902	.33983	-.272
=> 35	18	.38092	-.24051	-23.445	.09415	.39965	-.19732	.36219	-.283
=> 70	19	.40301	-.24985	-22.407	.09638	.42138	-.20530	.38464	-.294
=> 41	20	.42511	-.25873	-21.385	.09824	.44302	-.21300	.40720	-.304
=> 47	21	.44720	-.26716	-20.381	.09972	.46457	-.22042	.42984	-.313
=> 90	22	.46930	-.27516	-19.392	.10082	.48604	-.22761	.45256	-.322
=> 71	23	.49139	-.28272	-18.416	.10153	.50743	-.23456	.47536	-.330
=> 89	24	.51349	-.28987	-17.451	.10184	.52876	-.24130	.49822	-.338
=> 45	25	.53558	-.29662	-16.494	.10173	.55003	-.24784	.52114	-.345
=> 39	26	.55768	-.30296	-15.543	.10122	.57124	-.25420	.54412	-.351
=> 72	27	.57978	-.30891	-14.595	.10030	.59241	-.26038	.56714	-.357
=> 44	28	.60187	-.31447	-13.647	.09899	.61355	-.26637	.59019	-.362
=> 57	29	.62397	-.31964	-12.697	.09728	.63466	-.27219	.61328	-.367
=> 09	30	.64606	-.32443	-11.742	.09519	.65575	-.27783	.63638	-.371
=> 02	31	.66816	-.32883	-10.783	.09271	.67683	-.28329	.65948	-.374
=> 36	32	.69025	-.33284	-9.819	.08985	.69791	-.28858	.68259	-.377
=> 11	33	.71235	-.33648	-8.848	.08661	.71901	-.29369	.70569	-.379
=> 26	34	.73444	-.33972	-7.871	.08299	.74013	-.29862	.72876	-.380
=> 83	35	.75654	-.34258	-6.885	.07901	.76127	-.30337	.75180	-.381
=> 80	36	.77863	-.34506	-5.891	.07464	.78247	-.30793	.77480	-.382
=> 18	37	.80073	-.34714	-4.886	.06991	.80371	-.31231	.79775	-.381
=> 97	38	.82283	-.34883	-3.872	.06481	.82501	-.31650	.82064	-.381
=> 17	39	.84492	-.35013	-2.848	.05934	.84640	-.32050	.84345	-.379
=> 77	40	.86702	-.35103	-1.817	.05350	.86787	-.32430	.86617	-.377
=> 77	41	.88911	-.35153	-.780	.04728	.88943	-.32789	.88879	-.375
=> 17	42	.91121	-.35163	.262	.04070	.91111	-.33128	.91130	-.371
=> 98	43	.93330	-.35133	1.307	.03374	.93292	-.33447	.93369	-.368
=> 20	44	.95540	-.35062	2.354	.02640	.95486	-.33743	.95594	-.363
=> 81	45	.97749	-.34951	3.401	.01869	.97694	-.34019	.97805	-.358
=> 84	46	.99959	-.34800	4.447	.01059	.99918	-.34272	1.00000	-.353
=> 28									

1 NORMALISED PLOT OF SECTION NUMBER
=> 2

1 DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BLADE CHORD = 3.17940E+00

L.E.RADIUS = 1.58970E-02 CENTERED AT X= -1.4693E+00 Y= 7.7883E-01

SECTION AREA= 6.76473E-01

SECOND MOMENTS OF AREA ABOUT CENTROID

```
IX   = 4.64142E-02
IY   = 3.35137E-01
IXY  =-1.13364E-01
```

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

```
IPX  = 7.22290E-03  (AT-19.071 WITH (X) AXIS)
IPY  = 3.74329E-01  (AT-19.071 WITH (Y) AXIS)
```

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
1	-1.45893E+00	7.90875E-01	-1.47967E+00	7.66783E-01
2	-1.38636E+00	7.42458E-01	-1.41953E+00	7.02704E-01
3	-1.31416E+00	6.95886E-01	-1.35902E+00	6.40332E-01
4	-1.24235E+00	6.51120E-01	-1.29813E+00	5.79700E-01
5	-1.17097E+00	6.08118E-01	-1.23680E+00	5.20838E-01
6	-1.10003E+00	5.66836E-01	-1.17504E+00	4.63775E-01
7	-1.02956E+00	5.27211E-01	-1.11280E+00	4.08554E-01
8	-9.59558E-01	4.89213E-01	-1.05009E+00	3.55182E-01
9	-8.90040E-01	4.52789E-01	-9.86906E-01	3.03681E-01
10	-8.21005E-01	4.17887E-01	-9.23234E-01	2.54072E-01
11	-7.52452E-01	3.84452E-01	-8.59080E-01	2.06372E-01
12	-6.84381E-01	3.52416E-01	-7.94444E-01	1.60608E-01
13	-6.16774E-01	3.21730E-01	-7.29344E-01	1.16779E-01
14	-5.49616E-01	2.92331E-01	-6.63796E-01	7.48940E-02
15	-4.82888E-01	2.64156E-01	-5.97817E-01	3.49593E-02
16	-4.16567E-01	2.37136E-01	-5.31431E-01	-3.02313E-03
17	-3.50630E-01	2.11197E-01	-4.64662E-01	-3.90489E-02
18	-2.85044E-01	1.86275E-01	-3.97541E-01	-7.31312E-02
19	-2.19778E-01	1.62297E-01	-3.30101E-01	-1.05279E-01
20	-1.54800E-01	1.39190E-01	-2.62372E-01	-1.35507E-01
21	-9.00851E-02	1.16887E-01	-1.94380E-01	-1.63834E-01
22	-2.56138E-02	9.53229E-02	-1.26145E-01	-1.90273E-01
23	3.86360E-02	7.44445E-02	-5.76878E-02	-2.14840E-01
24	1.02684E-01	5.42000E-02	1.09709E-02	-2.37544E-01
25	1.66551E-01	3.45443E-02	7.98108E-02	-2.58391E-01
26	2.30261E-01	1.54516E-02	1.48808E-01	-2.77399E-01
27	2.93839E-01	-3.09070E-03	2.17936E-01	-2.94588E-01
28	3.57311E-01	-2.10928E-02	2.87171E-01	-3.09973E-01
29	4.20700E-01	-3.85603E-02	3.56488E-01	-3.23565E-01
30	4.84035E-01	-5.54964E-02	4.25860E-01	-3.35370E-01
31	5.47346E-01	-7.19026E-02	4.95256E-01	-3.45393E-01
32	6.10661E-01	-8.77767E-02	5.64647E-01	-3.53641E-01
33	6.74012E-01	-1.03118E-01	6.34004E-01	-3.60113E-01
34	7.37426E-01	-1.17924E-01	7.03296E-01	-3.64810E-01
35	8.00935E-01	-1.32188E-01	7.72493E-01	-3.67732E-01

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
36	8.64570E-01	-1.45902E-01	8.41565E-01	-3.68877E-01
37	9.28363E-01	-1.59055E-01	9.10479E-01	-3.68243E-01
38	9.92346E-01	-1.71638E-01	9.79203E-01	-3.65825E-01
39	1.05656E+00	-1.83639E-01	1.04770E+00	-3.61618E-01
40	1.12103E+00	-1.95045E-01	1.11593E+00	-3.55620E-01
41	1.18580E+00	-2.05845E-01	1.18387E+00	-3.47829E-01
42	1.25091E+00	-2.16028E-01	1.25147E+00	-3.38247E-01
43	1.31639E+00	-2.25582E-01	1.31870E+00	-3.26875E-01
44	1.38227E+00	-2.34498E-01	1.38552E+00	-3.13717E-01
45	1.44858E+00	-2.42764E-01	1.45191E+00	-2.98780E-01
46	1.51537E+00	-2.50371E-01	1.51783E+00	-2.82069E-01

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-1.47967E+00	7.66783E-01
2	-1.48087E+00	7.67933E-01
3	-1.48195E+00	7.69202E-01
4	-1.48289E+00	7.70578E-01
5	-1.48368E+00	7.72043E-01
6	-1.48431E+00	7.73583E-01
7	-1.48477E+00	7.75180E-01
8	-1.48507E+00	7.76818E-01
9	-1.48519E+00	7.78477E-01
10	-1.48514E+00	7.80140E-01
11	-1.48492E+00	7.81789E-01
12	-1.48452E+00	7.83405E-01
13	-1.48396E+00	7.84972E-01
14	-1.48324E+00	7.86471E-01
15	-1.48236E+00	7.87886E-01
16	-1.48135E+00	7.89202E-01
17	-1.48020E+00	7.90404E-01
18	-1.47893E+00	7.91480E-01
19	-1.47755E+00	7.92417E-01
20	-1.47609E+00	7.93205E-01
21	-1.47455E+00	7.93835E-01
22	-1.47295E+00	7.94302E-01
23	-1.47131E+00	7.94598E-01
24	-1.46965E+00	7.94722E-01
25	-1.46799E+00	7.94672E-01
26	-1.46634E+00	7.94448E-01
27	-1.46472E+00	7.94053E-01
28	-1.46316E+00	7.93491E-01
29	-1.46166E+00	7.92769E-01
30	-1.46024E+00	7.91894E-01
31	-1.45893E+00	7.90875E-01

LEADING EDGE AXIAL DIFFERENCE = -.0177 NEW DELX = .0177

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-40.73150	1.20531	1.9067
2	.02222	-.01884	-39.83870	1.20456	1.8337
3	.04444	-.03708	-38.92322	1.20233	1.7663
4	.06667	-.05473	-37.98584	1.19860	1.7040
5	.08889	-.07179	-37.02752	1.19339	1.6468
6	.11111	-.08826	-36.04935	1.18668	1.5944
7	.13333	-.10414	-35.05261	1.17849	1.5467
8	.15556	-.11944	-34.03875	1.16881	1.5036
9	.17778	-.13416	-33.00940	1.15763	1.4649
10	.20000	-.14831	-31.96638	1.14497	1.4304
11	.22222	-.16190	-30.91173	1.13063	1.4005
12	.24444	-.17493	-29.84798	1.11436	1.3753
13	.26667	-.18741	-28.77792	1.09616	1.3548
14	.28889	-.19934	-27.70458	1.07604	1.3391
15	.31111	-.21075	-26.63116	1.05399	1.3283
16	.33333	-.22163	-25.56104	1.03001	1.3224
17	.35556	-.23201	-24.49776	1.00411	1.3217
18	.37778	-.24189	-23.44499	.97628	1.3265
19	.40000	-.25129	-22.40652	.94651	1.3371
20	.42222	-.26022	-21.38547	.91699	1.3508
21	.44444	-.26870	-20.38135	.89046	1.3634
22	.46667	-.27674	-19.39231	.86695	1.3744
23	.48889	-.28435	-18.41634	.84646	1.3832
24	.51111	-.29154	-17.45117	.82898	1.3895
25	.53333	-.29832	-16.49437	.81452	1.3927
26	.55556	-.30470	-15.54333	.80307	1.3925
27	.57778	-.31068	-14.59528	.79463	1.3886
28	.60000	-.31627	-13.64732	.78921	1.3808
29	.62222	-.32147	-12.69677	.78591	1.3705
30	.64444	-.32629	-11.74242	.78370	1.3596
31	.66667	-.33071	-10.78348	.78257	1.3480
32	.68889	-.33475	-9.81912	.78252	1.3358
33	.71111	-.33841	-8.84849	.78355	1.3229
34	.73333	-.34167	-7.87075	.78567	1.3095
35	.75556	-.34455	-6.88504	.78887	1.2955
36	.77778	-.34704	-5.89050	.79315	1.2810
37	.80000	-.34913	-4.88630	.79851	1.2661
38	.82222	-.35084	-3.87194	.80411	1.2522
39	.84444	-.35214	-2.84846	.80904	1.2406
40	.86667	-.35305	-1.81730	.81332	1.2314
41	.88889	-.35355	-.77993	.81694	1.2244
42	.91111	-.35365	.26214	.81991	1.2197
43	.93333	-.35335	1.30739	.82221	1.2172
44	.95556	-.35264	2.35427	.82386	1.2169
45	.97778	-.35152	3.40126	.82484	1.2188
46	1.00000	-.34999	4.44682	.82517	1.2229

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-40.73150
2	.20164	-31.88780
3	.40145	-22.33957
4	.60084	-13.61126
5	.80023	-4.87591
6	1.00000	4.44682

CARTESIAN COORDINATES ON STREAMSURFACE 2

POINT	Z1	X1	Y1	Z2	X2	Y2
1	3.58785	-1.45332	.77003	3.58840	-1.47359	.74595
2	3.61299	-1.38243	.72512	3.61362	-1.41484	.68495
3	3.63703	-1.31188	.68171	3.63745	-1.35572	.62561
4	3.65998	-1.24168	.63972	3.65999	-1.29620	.56767
5	3.68184	-1.17184	.59917	3.68131	-1.23625	.51117
6	3.70262	-1.10239	.55997	3.70143	-1.17583	.45619
7	3.72233	-1.03333	.52207	3.72041	-1.11490	.40275
8	3.74096	-.96466	.48554	3.73828	-1.05346	.35086
9	3.75851	-.89638	.45035	3.75507	-.99150	.30063
10	3.77499	-.82848	.41647	3.77080	-.92899	.25208
11	3.79048	-.76099	.38378	3.78550	-.86594	.20526
12	3.80509	-.69389	.35232	3.79920	-.80234	.16021
13	3.81889	-.62720	.32208	3.81202	-.73822	.11689
14	3.83199	-.56091	.29303	3.82403	-.67359	.07540
15	3.84448	-.49500	.26511	3.83534	-.60849	.03577
16	3.85644	-.42946	.23815	3.84604	-.54295	-.00201
17	3.86794	-.36428	.21222	3.85623	-.47699	-.03790
18	3.87907	-.29944	.18726	3.86600	-.41066	-.07198
19	3.88989	-.23490	.16320	3.87544	-.34399	-.10415
20	3.90043	-.17064	.13997	3.88464	-.27702	-.13446
21	3.91071	-.10663	.11742	3.89367	-.20979	-.16291
22	3.92073	-.04285	.09557	3.90257	-.14230	-.18953
23	3.93053	.02071	.07437	3.91135	-.07458	-.21435
24	3.94009	.08409	.05379	3.92004	-.00666	-.23733
25	3.94943	.14731	.03377	3.92868	.06146	-.25850
26	3.95856	.21038	.01426	3.93726	.12974	-.27787
27	3.96749	.27333	-.00474	3.94581	.19817	-.29544
28	3.97622	.33619	-.02322	3.95433	.26672	-.31126
29	3.98477	.39898	-.04118	3.96285	.33537	-.32532
30	3.99318	.46172	-.05862	3.97136	.40409	-.33763
31	4.00146	.52445	-.07555	3.97993	.47284	-.34814
32	4.00965	.58719	-.09196	3.98857	.54159	-.35693
33	4.01779	.64996	-.10785	3.99731	.61032	-.36398
34	4.02589	.71280	-.12321	4.00619	.67898	-.36929
35	4.03399	.77573	-.13804	4.01523	.74754	-.37282
36	4.04212	.83877	-.15233	4.02447	.81598	-.37456
37	4.05030	.90197	-.16611	4.03390	.88425	-.37460
38	4.05856	.96534	-.17932	4.04354	.95232	-.37290
39	4.06690	1.02893	-.19193	4.05340	1.02016	-.36940
40	4.07534	1.09277	-.20393	4.06345	1.08772	-.36407
41	4.08387	1.15690	-.21532	4.07366	1.15498	-.35692
42	4.09249	1.22135	-.22620	4.08400	1.22191	-.34812
43	4.10120	1.28617	-.23642	4.09446	1.28846	-.33749
44	4.11002	1.35138	-.24597	4.10499	1.35460	-.32503
45	4.11895	1.41702	-.25484	4.11558	1.42032	-.31074
46	4.12797	1.48313	-.26298	4.12619	1.48557	-.29461

POINT	ZSEMI	XSEMI	YSEMI
1	3.58840	-1.47359	.74595
2	3.58791	-1.47477	.74704
3	3.58742	-1.47582	.74826
4	3.58694	-1.47673	.74958
5	3.58647	-1.47750	.75100
6	3.58602	-1.47812	.75249
7	3.58559	-1.47857	.75404
8	3.58519	-1.47886	.75563
9	3.58482	-1.47898	.75725
10	3.58449	-1.47893	.75888
11	3.58420	-1.47872	.76050
12	3.58395	-1.47833	.76209
13	3.58374	-1.47778	.76364
14	3.58358	-1.47707	.76512
15	3.58347	-1.47622	.76653
16	3.58341	-1.47523	.76784
17	3.58341	-1.47410	.76905
18	3.58345	-1.47286	.77013
19	3.58355	-1.47152	.77108
20	3.58369	-1.47009	.77189
21	3.58389	-1.46858	.77254
22	3.58413	-1.46702	.77304
23	3.58442	-1.46542	.77337
24	3.58475	-1.46380	.77353
25	3.58511	-1.46218	.77352
26	3.58551	-1.46057	.77334
27	3.58594	-1.45899	.77300
28	3.58639	-1.45746	.77248
29	3.58687	-1.45599	.77181
30	3.58735	-1.45461	.77099
31	3.58785	-1.45332	.77003

```
STREAMSURFACE  3  ITERATION  1  DEVIATION =  6.728  SOLIDITY = 2.0804
                  ITERATION  2  DEVIATION =  6.920  SOLIDITY = 1.9942
                  ITERATION  2  DEVIATION =  6.920  SOLIDITY = 1.9942
```

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-45.29691	1.08335	2.6519
2	.02222	-.02219	-44.60616	1.08304	2.5586
3	.04444	-.04384	-43.89900	1.08208	2.4701
4	.06667	-.06495	-43.17550	1.08050	2.3863
5	.08889	-.08554	-42.43576	1.07828	2.3070
6	.11111	-.10559	-41.67993	1.07542	2.2319
7	.13333	-.12511	-40.90823	1.07193	2.1611
8	.15556	-.14410	-40.12092	1.06781	2.0944
9	.17778	-.16256	-39.31834	1.06305	2.0316
10	.20000	-.18050	-38.50086	1.05766	1.9726

```
 11    .22222   -.19792 -37.66934   1.05010    1.9201
 12    .24444   -.21482 -36.82659   1.03848    1.8776
 13    .26667   -.23120 -35.97623   1.02280    1.8448
 14    .28889   -.24708 -35.12225   1.00306    1.8219
 15    .31111   -.26247 -34.26891    .97926    1.8094
 16    .33333   -.27737 -33.42080    .95140    1.8077

POINT  FRAC. M     Y     Y-D(DEG)    Y-DD   R OF CURV

 17    .35556   -.29180 -32.58283    .91948    1.8179
 18    .37778   -.30578 -31.76016    .88350    1.8414
 19    .40000   -.31932 -30.95820    .84346    1.8801
 20    .42222   -.33245 -30.18140    .80324    1.9273
 21    .44444   -.34518 -29.42896    .76726    1.9727
 22    .46667   -.35752 -28.69838    .73553    2.0145
 23    .48889   -.36951 -27.98687    .70805    2.0510
 24    .51111   -.38115 -27.29134    .68481    2.0806
 25    .53333   -.39245 -26.60848    .66583    2.1014
 26    .55556   -.40341 -25.93473    .65109    2.1118
 27    .57778   -.41406 -25.26634    .64059    2.1107
 28    .60000   -.42439 -24.59931    .63435    2.0972
 29    .62222   -.43441 -23.93022    .63024    2.0778
 30    .64444   -.44412 -23.25854    .62613    2.0595
 31    .66667   -.45351 -22.58448    .62203    2.0424
 32    .68889   -.46260 -21.90825    .61793    2.0264
 33    .71111   -.47139 -21.23009    .61382    2.0115
 34    .73333   -.47987 -20.55020    .60973    1.9977
 35    .75556   -.48805 -19.86883    .60563    1.9850
 36    .77778   -.49593 -19.18620    .60153    1.9733
 37    .80000   -.50352 -18.50256    .59743    1.9627
 38    .82222   -.51081 -17.81805    .59357    1.9524
 39    .84444   -.51780 -17.13247    .59016    1.9416
 40    .86667   -.52451 -16.44552    .58721    1.9303
 41    .88889   -.53092 -15.75689    .58471    1.9185
 42    .91111   -.53705 -15.06626    .58267    1.9061
 43    .93333   -.54289 -14.37328    .58108    1.8932
 44    .95556   -.54844 -13.67762    .57994    1.8797
 45    .97778   -.55370 -12.97892    .57926    1.8657
 46   1.00000   -.55868 -12.27683    .57903    1.8511

DATA POINTS

POINT  FRAC. M  Y-D(DEG)

  1    .00000 -45.29691
  2    .20117 -38.45756
  3    .40074 -30.93186
  4    .60008 -24.59692
  5    .79974 -18.51053
  6   1.00000 -12.27683
1      STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER  3
       ************************************************

  BETA1 =-45.297  (BLADE INLET ANGLE)
  BETA2 =-12.277  (BLADE OUTLET ANGLE)
  YZERO = .00500  (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
  T     = .09270  (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
  YONE  = .00500  (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
  Z     =  .5500  (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
  CORD  = 2.9026  (MERIDIONAL CHORD OF SECTION)

NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
***************************************************

  BLADE CHORD    = 1.1433

  STAGGER ANGLE  =-29.191

  CAMBER ANGLE   =-33.020

  SECTION AREA   = .08343
  LOCATION OF CENTROID RELATIVE TO LEADING EDGE

           XBAR =  .48921
           YBAR = -.34515

  SECOND MOMENTS OF AREA ABOUT CENTROID

           IX   =  .00144
           IY   =  .00455
           IXY  = -.00246

  ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS =-28.885

  PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

           IPX  = .00008      (AT-28.885 WITH (X) AXIS)
```

RESULTS.OUT 6-25-95 10:23a

```
             IPY  = .00591      (AT-28.885 WITH (Y) AXIS)

        POINT      M E A N L I N E  D A T A        SURFACE COORDINATE DATA
        NUMBER     X       Y     ANGLE THICKNESS    X1      Y1      X2      Y2

          1      .00572  .00000-45.297  .01143   .00978  .00402  .00165 -.004
  => 02
          2      .02778 -.02203-44.606  .01839   .03424 -.01549  .02133 -.028
  => 58
          3      .04985 -.04353-43.899  .02523   .05860 -.03444  .04110 -.052
  => 62
          4      .07192 -.06450-43.176  .03193   .08285 -.05286  .06100 -.076
  => 15
          5      .09399 -.08495-42.436  .03846   .10697 -.07075  .08101 -.099
  => 14
          6      .11606 -.10486-41.680  .04480   .13095 -.08813  .10116 -.121
  => 59
          7      .13813 -.12424-40.908  .05090   .15479 -.10501  .12146 -.143
  => 48
          8      .16019 -.14310-40.121  .05677   .17848 -.12140  .14190 -.164
  => 81
          9      .18226 -.16144-39.318  .06237   .20202 -.13731  .16250 -.185
  => 56
         10      .20433 -.17925-38.501  .06770   .22540 -.15276  .18326 -.205
  => 74
         11      .22640 -.19655-37.669  .07273   .24862 -.16776  .20417 -.225
  => 33
         12      .24847 -.21333-36.827  .07745   .27168 -.18233  .22525 -.244
  => 33
         13      .27053 -.22960-35.976  .08185   .29457 -.19648  .24649 -.262
  => 72
1
        POINT      M E A N L I N E  D A T A        SURFACE COORDINATE DATA
        NUMBER     X       Y     ANGLE THICKNESS    X1      Y1      X2      Y2

         14      .29260 -.24537-35.122  .08591   .31732 -.21024  .26789 -.280
  => 50
         15      .31467 -.26065-34.269  .08963   .33990 -.22361  .28944 -.297
  => 68
         16      .33674 -.27545-33.421  .09299   .36235 -.23664  .31113 -.314
  => 25
         17      .35881 -.28978-32.583  .09598   .38465 -.24934  .33296 -.330
  => 22
         18      .38088 -.30366-31.760  .09860   .40682 -.26174  .35493 -.345
  => 58
         19      .40294 -.31711-30.958  .10084   .42888 -.27387  .37701 -.360
  => 34
         20      .42501 -.33014-30.181  .10268   .45082 -.28576  .39920 -.374
  => 52
         21      .44708 -.34278-29.429  .10413   .47266 -.29744  .42150 -.388
  => 13
         22      .46915 -.35505-28.698  .10517   .49440 -.30892  .44390 -.401
  => 17
         23      .49122 -.36695-27.987  .10579   .51604 -.32024  .46640 -.413
  => 66
         24      .51328 -.37851-27.291  .10598   .53758 -.33141  .48899 -.425
  => 60
         25      .53535 -.38973-26.608  .10574   .55903 -.34245  .51167 -.437
  => 00
         26      .55742 -.40062-25.935  .10508   .58040 -.35337  .53444 -.447
  => 87
         27      .57949 -.41119-25.266  .10400   .60168 -.36417  .55730 -.458
  => 22
         28      .60156 -.42145-24.599  .10250   .62289 -.37485  .58022 -.468
  => 05
         29      .62363 -.43140-23.930  .10060   .64403 -.38542  .60322 -.477
  => 38
         30      .64569 -.44104-23.259  .09831   .66510 -.39588  .62628 -.486
  => 20
         31      .66776 -.45037-22.584  .09561   .68612 -.40623  .64940 -.494
  => 51
         32      .68983 -.45940-21.908  .09254   .70709 -.41647  .67257 -.502
  => 33
         33      .71190 -.46812-21.230  .08908   .72803 -.42660  .69577 -.509
  => 64
         34      .73397 -.47654-20.550  .08525   .74893 -.43663  .71900 -.516
  => 46
         35      .75603 -.48467-19.869  .08105   .76981 -.44656  .74226 -.522
  => 78
         36      .77810 -.49249-19.186  .07647   .79067 -.45638  .76554 -.528
  => 61
         37      .80017 -.50003-18.503  .07154   .81152 -.46610  .78882 -.533
  => 95
         38      .82224 -.50727-17.818  .06625   .83238 -.47573  .81210 -.538
  => 80
         39      .84431 -.51421-17.132  .06061   .85323 -.48525  .83538 -.543
  => 17
         40      .86638 -.52087-16.446  .05461   .87411 -.49468  .85865 -.547
  => 06
         41      .88844 -.52724-15.757  .04827   .89500 -.50402  .88189 -.550
  => 47
         42      .91051 -.53333-15.066  .04158   .91592 -.51325  .90511 -.553
  => 40
         43      .93258 -.53912-14.373  .03455   .93687 -.52239  .92829 -.555
  => 86
         44      .95465 -.54464-13.678  .02718   .95786 -.53143  .95143 -.557
  => 84
         45      .97672 -.54986-12.979  .01947   .97890 -.54038  .97453 -.559
  => 35
         46      .99878 -.55481-12.277  .01143  1.00000 -.54922  .99757 -.560
  => 39
1                                             NORMALISED PLOT OF SECTION NUMBER
  =>  3

1       DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
        *********************************************************************

          BLADE CHORD = 3.31845E+00

          L.E.RADIUS  = 1.65923E-02  CENTERED AT X= -1.4034E+00 Y=  1.0018E+00

          SECTION AREA= 7.02919E-01

          SECOND MOMENTS OF AREA ABOUT CENTROID

             IX   = 1.02477E-01
             IY   = 3.23082E-01
             IXY  =-1.74954E-01

          PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

             IPX  = 5.95666E-03  (AT-28.885 WITH (X) AXIS)
             IPY  = 4.19602E-01  (AT-28.885 WITH (Y) AXIS)

        PT    SURFACE----------ONE        SURFACE----------TWO
        NO        X              Y            X              Y

         1  -1.39161E+00   1.01352E+00  -1.41519E+00   9.90175E-01
         2  -1.32060E+00   9.56896E-01  -1.35808E+00   9.18894E-01
         3  -1.24989E+00   9.01872E-01  -1.30068E+00   8.49096E-01
         4  -1.17952E+00   8.48412E-01  -1.24294E+00   7.80815E-01
         5  -1.10951E+00   7.96482E-01  -1.18484E+00   7.14081E-01
         6  -1.03988E+00   7.46045E-01  -1.12635E+00   6.48923E-01
         7  -9.70685E-01   6.97050E-01  -1.06744E+00   5.85384E-01
         8  -9.01917E-01   6.49476E-01  -1.00810E+00   5.23476E-01
         9  -8.33595E-01   6.03286E-01  -9.48309E-01   4.63224E-01
        10  -7.65730E-01   5.58441E-01  -8.88062E-01   4.04653E-01
        11  -6.98332E-01   5.14901E-01  -8.27349E-01   3.47788E-01
        12  -6.31409E-01   4.72611E-01  -7.66159E-01   2.92661E-01
        13  -5.64949E-01   4.31533E-01  -7.04508E-01   2.39278E-01
        14  -4.98942E-01   3.91609E-01  -6.42404E-01   1.87651E-01
        15  -4.33375E-01   3.52777E-01  -5.79859E-01   1.37788E-01
        16  -3.68230E-01   3.14967E-01  -5.16892E-01   8.96886E-02
        17  -3.03491E-01   2.78101E-01  -4.53519E-01   4.33538E-02
        18  -2.39128E-01   2.42105E-01  -3.89771E-01  -1.23547E-03
        19  -1.75112E-01   2.06897E-01  -3.25675E-01  -4.40972E-02
        20  -1.11417E-01   1.72388E-01  -2.61258E-01  -8.52570E-02
        21  -4.80282E-02   1.38498E-01  -1.96536E-01  -1.24749E-01
        22   1.50657E-02   1.05156E-01  -1.31518E-01  -1.62603E-01
        23   7.78756E-02   7.22997E-02  -6.62161E-02  -1.98847E-01
        24   1.40410E-01   3.98726E-02  -6.38322E-04  -2.33504E-01
        25   2.02677E-01   7.82803E-03   6.52061E-02  -2.66593E-01
        26   2.64693E-01  -2.38586E-02   1.31302E-01  -2.98144E-01
        27   3.26474E-01  -5.52012E-02   1.97632E-01  -3.28183E-01
        28   3.88034E-01  -8.62105E-02   2.64184E-01  -3.56732E-01
        29   4.49388E-01  -1.16891E-01   3.30941E-01  -3.83803E-01
        30   5.10559E-01  -1.47248E-01   3.97882E-01  -4.09403E-01
        31   5.71569E-01  -1.77287E-01   4.64984E-01  -4.33538E-01
        32   6.32444E-01  -2.07009E-01   5.32220E-01  -4.56219E-01
        33   6.93205E-01  -2.36423E-01   5.99571E-01  -4.77450E-01
        34   7.53875E-01  -2.65533E-01   6.67013E-01  -4.97236E-01
        35   8.14476E-01  -2.94344E-01   7.34524E-01  -5.15586E-01
1
        PT    SURFACE----------ONE        SURFACE----------TWO
        NO        X              Y            X              Y

        36   8.75030E-01  -3.22861E-01   8.02081E-01  -5.32506E-01
        37   9.35562E-01  -3.51082E-01   8.69661E-01  -5.48010E-01
        38   9.96090E-01  -3.79016E-01   9.37245E-01  -5.62099E-01
        39   1.05663E+00  -4.06667E-01   1.00481E+00  -5.74782E-01
        40   1.11722E+00  -4.34036E-01   1.07234E+00  -5.86066E-01
        41   1.17786E+00  -4.61125E-01   1.13981E+00  -5.95958E-01
        42   1.23858E+00  -4.87929E-01   1.20720E+00  -6.04470E-01
        43   1.29939E+00  -5.14454E-01   1.27450E+00  -6.11603E-01
        44   1.36033E+00  -5.40700E-01   1.34167E+00  -6.17360E-01
        45   1.42141E+00  -5.66664E-01   1.40871E+00  -6.21748E-01
```

Page 17 of 32

K/14PRINT

46 1.48264E+00 -5.92345E-01 1.47559E+00 -6.24771E-01

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-1.41519E+00	9.90175E-01
2	-1.41635E+00	9.91472E-01
3	-1.41736E+00	9.92882E-01
4	-1.41822E+00	9.94391E-01
5	-1.41892E+00	9.95981E-01
6	-1.41945E+00	9.97636E-01
7	-1.41980E+00	9.99336E-01
8	-1.41997E+00	1.00106E+00
9	-1.41996E+00	1.00280E+00
10	-1.41977E+00	1.00453E+00
11	-1.41940E+00	1.00622E+00
12	-1.41886E+00	1.00787E+00
13	-1.41814E+00	1.00946E+00
14	-1.41727E+00	1.01096E+00
15	-1.41624E+00	1.01236E+00
16	-1.41507E+00	1.01364E+00
17	-1.41377E+00	1.01480E+00
18	-1.41236E+00	1.01581E+00
19	-1.41085E+00	1.01667E+00
20	-1.40926E+00	1.01737E+00
21	-1.40761E+00	1.01790E+00
22	-1.40591E+00	1.01825E+00
23	-1.40418E+00	1.01842E+00
24	-1.40244E+00	1.01841E+00
25	-1.40072E+00	1.01822E+00
26	-1.39902E+00	1.01785E+00
27	-1.39737E+00	1.01731E+00
28	-1.39579E+00	1.01659E+00
29	-1.39429E+00	1.01572E+00
30	-1.39289E+00	1.01469E+00
31	-1.39161E+00	1.01352E+00

LEADING EDGE AXIAL DIFFERENCE = -.0418 NEW DELX = .0418

1

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-45.29691	1.08335	2.6519
2	.02222	-.02219	-44.60616	1.08304	2.5586
3	.04444	-.04384	-43.89900	1.08208	2.4701
4	.06667	-.06495	-43.17550	1.08050	2.3863
5	.08889	-.08554	-42.43576	1.07828	2.3070
6	.11111	-.10559	-41.67993	1.07542	2.2319
7	.13333	-.12511	-40.90823	1.07193	2.1611
8	.15556	-.14410	-40.12092	1.06781	2.0944
9	.17778	-.16256	-39.31834	1.06305	2.0316
10	.20000	-.18050	-38.50086	1.05766	1.9726
11	.22222	-.19792	-37.66934	1.05010	1.9201
12	.24444	-.21482	-36.82659	1.03848	1.8776
13	.26667	-.23120	-35.97623	1.02280	1.8448
14	.28889	-.24708	-35.12225	1.00306	1.8219
15	.31111	-.26247	-34.26891	.97926	1.8094
16	.33333	-.27737	-33.42080	.95140	1.8077
17	.35556	-.29180	-32.58283	.91948	1.8179
18	.37778	-.30578	-31.76016	.88350	1.8414
19	.40000	-.31932	-30.95820	.84346	1.8801
20	.42222	-.33245	-30.18140	.80324	1.9273
21	.44444	-.34518	-29.42896	.76726	1.9727
22	.46667	-.35752	-28.69838	.73553	2.0145
23	.48889	-.36951	-27.98687	.70805	2.0510
24	.51111	-.38115	-27.29134	.68481	2.0806
25	.53333	-.39245	-26.60848	.66583	2.1014
26	.55556	-.40341	-25.93473	.65109	2.1118
27	.57778	-.41406	-25.26634	.64059	2.1107
28	.60000	-.42439	-24.59931	.63435	2.0972
29	.62222	-.43441	-23.93022	.63024	2.0778
30	.64444	-.44412	-23.25854	.62613	2.0595
31	.66667	-.45351	-22.58448	.62203	2.0424
32	.68889	-.46260	-21.90825	.61793	2.0264
33	.71111	-.47139	-21.23009	.61382	2.0115
34	.73333	-.47987	-20.55020	.60973	1.9977
35	.75556	-.48805	-19.86883	.60563	1.9850
36	.77778	-.49593	-19.18620	.60153	1.9733
37	.80000	-.50352	-18.50256	.59743	1.9627
38	.82222	-.51081	-17.81805	.59357	1.9524
39	.84444	-.51780	-17.13247	.59016	1.9416
40	.86667	-.52451	-16.44552	.58721	1.9303
41	.88889	-.53092	-15.75689	.58471	1.9185
42	.91111	-.53705	-15.06626	.58267	1.9061
43	.93333	-.54289	-14.37328	.58108	1.8932
44	.95556	-.54844	-13.67762	.57994	1.8797
45	.97778	-.55370	-12.97892	.57926	1.8657
46	1.00000	-.55868	-12.27683	.57903	1.8511

1

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-45.29691
2	.20117	-38.45756
3	.40074	-30.93186
4	.60008	-24.59692
5	.79974	-18.51053
6	1.00000	-12.27683

CARTESIAN COORDINATES ON STREAMSURFACE 3

POINT	Z1	X1	Y1	Z2	X2	Y2
1	4.22265	-1.41861	.99014	4.22376	-1.44183	.96690
2	4.24755	-1.34872	.93715	4.24907	-1.38562	.89882
3	4.27129	-1.27911	.88539	4.27292	-1.32911	.83218
4	4.29389	-1.20980	.83484	4.29541	-1.27226	.76671
5	4.31534	-1.14081	.78548	4.31659	-1.21504	.70246
6	4.33567	-1.07217	.73724	4.33649	-1.15742	.63949
7	4.35486	-1.00390	.69013	4.35515	-1.09935	.57787
8	4.37292	-.93600	.64417	4.37261	-1.04082	.51756
9	4.38983	-.86849	.59935	4.38889	-.98182	.45869
10	4.40563	-.80136	.55564	4.40401	-.92232	.40129
11	4.42040	-.73464	.51297	4.41801	-.86231	.34541
12	4.43420	-.66834	.47138	4.43092	-.80178	.29111
13	4.44712	-.60246	.43088	4.44282	-.74075	.23833
14	4.45924	-.53699	.39139	4.45377	-.67923	.18718
15	4.47063	-.47194	.35289	4.46388	-.61724	.13771
16	4.48138	-.40727	.31527	4.47321	-.55480	.08991
17	4.49155	-.34300	.27853	4.48184	-.49193	.04382
18	4.50119	-.27908	.24259	4.48986	-.42866	-.00068
19	4.51038	-.21549	.20738	4.49733	-.36503	-.04350
20	4.51912	-.15222	.17281	4.50435	-.30106	-.08464
21	4.52746	-.08923	.13878	4.51096	-.23677	-.12414
22	4.53539	-.02653	.10526	4.51723	-.17219	-.16203
23	4.54295	.03590	.07219	4.52319	-.10731	-.19841
24	4.55014	.09806	.03952	4.52887	-.04214	-.23323
25	4.55697	.15997	.00720	4.53431	.02330	-.26650
26	4.56347	.22164	-.02484	4.53954	.08901	-.29823
27	4.56962	.28308	-.05655	4.54459	.15495	-.32849
28	4.57546	.34432	-.08794	4.54947	.22113	-.35735
29	4.58101	.40535	-.11900	4.55421	.28753	-.38473
30	4.58631	.46621	-.14975	4.55886	.35411	-.41064
31	4.59138	.52690	-.18026	4.56344	.42087	-.43512
32	4.59626	.58747	-.21047	4.56802	.48776	-.45819
33	4.60099	.64791	-.24038	4.57264	.55476	-.47986
34	4.60559	.70826	-.27000	4.57735	.62186	-.50009
35	4.61009	.76853	-.29933	4.58221	.68901	-.51892
36	4.61453	.82875	-.32839	4.58725	.75621	-.53637
37	4.61893	.88893	-.35719	4.59251	.82341	-.55245
38	4.62330	.94909	-.38571	4.59805	.89060	-.56715
39	4.62764	1.00925	-.41397	4.60388	.95776	-.58050
40	4.63194	1.06945	-.44197	4.60997	1.02486	-.59251
41	4.63620	1.12969	-.46970	4.61633	1.09189	-.60315
42	4.64041	1.19000	-.49719	4.62293	1.15884	-.61246
43	4.64455	1.25040	-.52439	4.62976	1.22568	-.62045
44	4.64864	1.31092	-.55132	4.63681	1.29239	-.62711
45	4.65266	1.37157	-.57796	4.64406	1.35896	-.63241
46	4.65661	1.43238	-.60426	4.65149	1.42537	-.63633

1

POINT	ZSEMI	XSEMI	YSEMI
1	4.22376	-1.44183	.96690
2	4.22326	-1.44296	.96814
3	4.22277	-1.44396	.96949
4	4.22228	-1.44481	.97094
5	4.22180	-1.44550	.97248
6	4.22134	-1.44602	.97408
7	4.22089	-1.44636	.97573
8	4.22047	-1.44653	.97741
9	4.22008	-1.44652	.97910
10	4.21972	-1.44634	.98078
11	4.21940	-1.44597	.98245
12	4.21913	-1.44544	.98406
13	4.21889	-1.44473	.98562
14	4.21871	-1.44387	.98710
15	4.21857	-1.44286	.98849
16	4.21848	-1.44171	.98976
17	4.21844	-1.44043	.99092
18	4.21846	-1.43904	.99193
19	4.21853	-1.43756	.99281
20	4.21865	-1.43599	.99352
21	4.21882	-1.43436	.99407
22	4.21904	-1.43269	.99445
23	4.21931	-1.43099	.99465
24	4.21962	-1.42928	.99468
25	4.21996	-1.42758	.99453
26	4.22035	-1.42591	.99421
27	4.22076	-1.42429	.99371
28	4.22121	-1.42273	.99305
29	4.22167	-1.42125	.99223
30	4.22216	-1.41988	.99125
31	4.22265	-1.41861	.99014

STREAMSURFACE 4 ITERATION 1 DEVIATION = 5.372 SOLIDITY = 1.9495
ITERATION 2 DEVIATION = 5.558 SOLIDITY = 1.8419
ITERATION 2 DEVIATION = 5.558 SOLIDITY = 1.8419

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-49.26162	.97922	3.6742
2	.02222	-.02556	-48.72485	.97928	3.5572
3	.04444	-.05063	-48.17631	.97945	3.4431
4	.06667	-.07523	-47.61565	.97973	3.3321
5	.08889	-.09933	-47.04249	.98013	3.2240
6	.11111	-.12296	-46.45647	.98065	3.1189
7	.13333	-.14610	-45.85721	.98128	3.0168
8	.15556	-.16875	-45.24432	.98202	2.9174
9	.17778	-.19092	-44.61739	.98288	2.8210
10	.20000	-.21261	-43.97602	.98386	2.7273
11	.22222	-.23381	-43.32041	.98216	2.6440
12	.24444	-.25452	-42.65350	.97466	2.5791
13	.26667	-.27475	-41.97930	.96135	2.5321
14	.28889	-.29451	-41.30217	.94223	2.5033
15	.31111	-.31380	-40.62682	.91731	2.4935
16	.33333	-.33265	-39.95837	.88658	2.5045

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
17	.35556	-.35105	-39.30223	.85005	2.5389
18	.37778	-.36903	-38.66418	.80771	2.6007
19	.40000	-.38662	-38.05030	.75956	2.6961
20	.42222	-.40383	-37.46548	.71100	2.8127
21	.44444	-.42069	-36.90880	.66768	2.9297
22	.46667	-.43721	-36.37748	.62959	3.0433
23	.48889	-.45343	-35.86846	.59674	3.1490
24	.51111	-.46935	-35.37843	.56912	3.2417
25	.53333	-.48500	-34.90378	.54674	3.3158
26	.55556	-.50037	-34.44069	.52960	3.3663
27	.57778	-.51548	-33.98514	.51769	3.3883
28	.60000	-.53033	-33.53287	.51102	3.3786
29	.62222	-.54493	-33.08029	.50675	3.3544
30	.64444	-.55928	-32.62701	.50217	3.3336
31	.66667	-.57338	-32.17341	.49726	3.3161
32	.68889	-.58724	-31.71991	.49204	3.3020
33	.71111	-.60086	-31.26694	.48650	3.2914
34	.73333	-.61423	-30.81492	.48065	3.2844
35	.75556	-.62737	-30.36432	.47447	3.2811
36	.77778	-.64027	-29.91558	.46798	3.2816
37	.80000	-.65294	-29.46919	.46116	3.2859
38	.82222	-.66538	-29.02544	.45459	3.2904
39	.84444	-.67760	-28.58391	.44879	3.2908
40	.86667	-.68960	-28.14400	.44377	3.2869
41	.88889	-.70138	-27.70507	.43952	3.2785
42	.91111	-.71294	-27.26647	.43604	3.2654
43	.93333	-.72429	-26.82752	.43333	3.2475
44	.95556	-.73542	-26.38751	.43140	3.2246
45	.97778	-.74634	-25.94571	.43024	3.1967
46	1.00000	-.75704	-25.50138	.42985	3.1639

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-49.26162
2	.20067	-43.95657
3	.40026	-38.04339
4	.59980	-33.53698
5	.79968	-29.47556
6	1.00000	-25.50138

1

STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER 4
****

BETA1 =-49.262 (BLADE INLET ANGLE)
BETA2 =-25.501 (BLADE OUTLET ANGLE)
YZERO = .00500 (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
T = .08950 (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
YONE = .00500 (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
Z = .5500 (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
CORD = 2.7857 (MERIDIONAL CHORD OF SECTION)

K/14PRINT

```
NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM

  BLADE CHORD     = 1.2493

  STAGGER ANGLE   =-37.127

  CAMBER ANGLE    =-23.760

  SECTION AREA    = .09573
  LOCATION OF CENTROID RELATIVE TO LEADING EDGE

            XBAR =  .48909
            YBAR = -.43032

  SECOND MOMENTS OF AREA ABOUT CENTROID

            IX   =  .00294
            IY   =  .00521
            IXY  = -.00382

  ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS =-34.731

  PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

            IPX = .00009      (AT-36.731 WITH (X) AXIS)
            IPY = .00807      (AT-36.731 WITH (Y) AXIS)

POINT        M E A N L I N E  D A T A        SURFACE COORDINATE DATA
NUMBER    X       Y     ANGLE THICKNESS    X1      Y1      X2     Y2

   1    .00625  .00000-49.262  .01249    .01098  .00408  .00151 -.004
=> 08
   2    .02827 -.02533-48.725  .01974    .03569 -.01882  .02085 -.031
=> 84
   3    .05029 -.05018-48.176  .02688    .06031 -.04122  .04028 -.059
=> 14
   4    .07232 -.07455-47.616  .03388    .08483 -.06313  .05980 -.085
=> 97
   5    .09434 -.09845-47.042  .04071    .10924 -.08458  .07944 -.112
=> 32
   6    .11636 -.12186-46.456  .04734    .13352 -.10555  .09921 -.138
=> 17
   7    .13839 -.14479-45.857  .05374    .15767 -.12608  .11910 -.163
=> 51
   8    .16041 -.16724-45.244  .05990    .18168 -.14616  .13914 -.188
=> 33
   9    .18244 -.18922-44.617  .06579    .20554 -.16580  .15933 -.212
=> 63
  10    .20446 -.21071-43.976  .07139    .22925 -.18502  .17967 -.236
=> 40
  11    .22648 -.23172-43.320  .07669    .25279 -.20382  .20017 -.259
=> 61
  12    .24851 -.25225-42.654  .08166    .27617 -.22222  .22084 -.282
=> 27
  13    .27053 -.27230-41.979  .08629    .29939 -.24022  .24167 -.304
=> 37
1
POINT        M E A N L I N E  D A T A        SURFACE COORDINATE DATA
NUMBER    X       Y     ANGLE THICKNESS    X1      Y1      X2     Y2

  14    .29255 -.29188-41.302  .09058    .32245 -.25786  .26266 -.325
=> 90
  15    .31458 -.31100-40.627  .09450    .34534 -.27514  .28381 -.346
=> 86
  16    .33660 -.32967-39.958  .09804    .36808 -.29210  .30512 -.367
=> 25
  17    .35862 -.34791-39.302  .10120    .39068 -.30876  .32657 -.387
=> 07
  18    .38065 -.36573-38.664  .10397    .41313 -.32514  .34817 -.406
=> 33
  19    .40267 -.38316-38.050  .10634    .43544 -.34129  .36990 -.425
=> 03
  20    .42470 -.40022-37.465  .10829    .45763 -.35724  .39176 -.443
=> 20
  21    .44672 -.41693-36.909  .10983    .47970 -.37302  .41374 -.460
=> 83
  22    .46874 -.43331-36.377  .11093    .50164 -.38865  .43585 -.477
=> 96
  23    .49077 -.44938-35.868  .11159    .52346 -.40416  .45807 -.494
=> 60
  24    .51279 -.46516-35.378  .11181    .54516 -.41958  .48042 -.510
=> 74
  25    .53481 -.48066-34.904  .11157    .56673 -.43491  .50289 -.526
=> 41
  26    .55684 -.49590-34.441  .11088    .58819 -.45017  .52548 -.541
=> 62
```

```
  27    .57886 -.51087-33.985  .10975    .60954 -.46537  .54819 -.556
=> 37
  28    .60088 -.52559-33.533  .10818    .63077 -.48050  .57100 -.570
=> 68
  29    .62291 -.54006-33.080  .10619    .65189 -.49557  .59393 -.584
=> 55
  30    .64493 -.55428-32.627  .10377    .67291 -.51059  .61696 -.597
=> 98
  31    .66696 -.56826-32.173  .10094    .69383 -.52554  .64008 -.610
=> 98
  32    .68898 -.58199-31.720  .09770    .71466 -.54044  .66330 -.623
=> 55
  33    .71100 -.59549-31.267  .09406    .73541 -.55529  .68659 -.635
=> 69
  34    .73303 -.60874-30.815  .09002    .75609 -.57008  .70997 -.647
=> 40
  35    .75505 -.62176-30.364  .08560    .77668 -.58483  .73342 -.658
=> 69
  36    .77707 -.63455-29.916  .08078    .79722 -.59954  .75693 -.669
=> 56
  37    .79910 -.64711-29.469  .07559    .81769 -.61420  .78050 -.680
=> 01
  38    .82112 -.65944-29.025  .07002    .83811 -.62883  .80413 -.690
=> 05
  39    .84315 -.67155-28.584  .06408    .85847 -.64341  .82782 -.699
=> 68
  40    .86517 -.68344-28.144  .05777    .87879 -.65797  .85154 -.708
=> 91
  41    .88719 -.69511-27.705  .05111    .89907 -.67249  .87531 -.717
=> 74
  42    .90922 -.70657-27.266  .04408    .91931 -.68698  .89912 -.726
=> 16
  43    .93124 -.71781-26.828  .03671    .93952 -.70144  .92296 -.734
=> 19
  44    .95326 -.72885-26.388  .02898    .95970 -.71587  .94682 -.741
=> 83
  45    .97529 -.73967-25.946  .02091    .97986 -.73027  .97071 -.749
=> 07
  46    .99731 -.75028-25.501  .01249   1.00000 -.74464  .99462 -.755
=> 92
1                                  NORMALISED PLOT OF SECTION NUMBER
=> 4

1
DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM

  BLADE CHORD = 3.48008E+00

  L.E.RADIUS  = 1.74004E-02  CENTERED AT X= -1.3450E+00 Y=  1.1987E+00

  SECTION AREA= 7.42849E-01

  SECOND MOMENTS OF AREA ABOUT CENTROID

      IX   = 1.77235E-01
      IY   = 3.13991E-01
      IXY  =-2.30274E-01

  PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

      IPX  = 5.40113E-03  (AT-36.731 WITH (X) AXIS)
      IPY  = 4.85824E-01  (AT-36.731 WITH (Y) AXIS)

PT     SURFACE----------ONE         SURFACE----------TWO
NO        X             Y              X             Y

 1  -1.33185E+00  1.21008E+00  -1.35822E+00  1.18737E+00
 2  -1.26302E+00  1.14630E+00  -1.30435E+00  1.11002E+00
 3  -1.19443E+00  1.08390E+00  -1.25023E+00  1.03397E+00
 4  -1.12613E+00  1.02285E+00  -1.19584E+00  9.59230E-01
 5  -1.05813E+00  9.63124E-01  -1.14113E+00  8.85843E-01
 6  -9.90482E-01  9.04692E-01  -1.08608E+00  8.13835E-01
 7  -9.23212E-01  8.47514E-01  -1.03065E+00  7.43246E-01
 8  -8.54334E-01  7.91577E-01  -9.74825E-01  6.74092E-01
 9  -7.89868E-01  7.36854E-01  -9.18589E-01  6.06402E-01
10  -7.23832E-01  6.83320E-01  -8.61924E-01  5.40202E-01
11  -6.58241E-01  6.30950E-01  -8.04813E-01  4.75522E-01
12  -5.93111E-01  5.79699E-01  -7.47241E-01  4.12398E-01
13  -5.28434E-01  5.29538E-01  -6.89216E-01  3.50841E-01
14  -4.64208E-01  4.80414E-01  -6.30742E-01  2.90867E-01
15  -4.00423E-01  4.32269E-01  -5.71824E-01  2.32481E-01
16  -3.37070E-01  3.85035E-01  -5.12477E-01  1.75685E-01
17  -2.74134E-01  3.38631E-01  -4.52709E-01  1.20475E-01
18  -2.11597E-01  2.92980E-01  -3.92546E-01  6.68291E-02
19  -1.49432E-01  2.47989E-01  -3.32009E-01  1.47230E-02
20  -8.76205E-02  2.03563E-01  -2.71120E-01 -3.58764E-02
21  -2.61538E-02  1.59615E-01  -2.09885E-01 -8.50139E-02
22   3.49700E-02  1.16064E-01  -1.48307E-01 -1.32730E-01
```

```
23   9.57543E-02  7.28524E-02  -8.63900E-02 -1.79062E-01
24   1.56199E-01  2.99130E-02  -2.41326E-02 -2.24040E-01
25   2.16304E-01 -1.28005E-02   3.84640E-02 -2.67692E-01
26   2.76078E-01 -5.53147E-02   1.01391E-01 -3.10050E-01
27   3.35532E-01 -9.76449E-02   1.64638E-01 -3.51148E-01
28   3.94675E-01 -1.39800E-01   2.28198E-01 -3.91007E-01
29   4.53514E-01 -1.81785E-01   2.92059E-01 -4.29643E-01
30   5.12067E-01 -2.23605E-01   3.56208E-01 -4.67062E-01
31   5.70352E-01 -2.65265E-01   4.20625E-01 -5.03272E-01
32   6.28387E-01 -3.06770E-01   4.85291E-01 -5.38282E-01
33   6.86189E-01 -3.48128E-01   5.50191E-01 -5.72096E-01
34   7.43773E-01 -3.89348E-01   6.15308E-01 -6.04722E-01
35   8.01157E-01 -4.30436E-01   6.80626E-01 -6.36169E-01
1
PT     SURFACE----------ONE         SURFACE----------TWO
NO        X             Y              X             Y

36   8.58355E-01 -4.71401E-01   7.46129E-01 -6.66446E-01
37   9.15387E-01 -5.12246E-01   8.11799E-01 -6.95567E-01
38   9.72263E-01 -5.52983E-01   8.77624E-01 -7.23539E-01
39   1.02900E+00 -5.93620E-01   9.43591E-01 -7.50371E-01
40   1.08560E+00 -6.34162E-01   1.00969E+00 -7.76074E-01
41   1.14209E+00 -6.74614E-01   1.07590E+00 -8.00656E-01
42   1.19848E+00 -7.14975E-01   1.14222E+00 -8.24131E-01
43   1.25477E+00 -7.55253E-01   1.20862E+00 -8.46501E-01
44   1.31099E+00 -7.95450E-01   1.27511E+00 -8.67769E-01
45   1.36714E+00 -8.35567E-01   1.34166E+00 -8.87940E-01
46   1.42324E+00 -8.75606E-01   1.40826E+00 -9.07016E-01

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.       X              Y

   1      -1.35822E+00   1.18737E+00
   2      -1.35933E+00   1.18881E+00
   3      -1.36029E+00   1.19036E+00
   4      -1.36108E+00   1.19200E+00
   5      -1.36170E+00   1.19371E+00
   6      -1.36213E+00   1.19548E+00
   7      -1.36238E+00   1.19729E+00
   8      -1.36243E+00   1.19911E+00
   9      -1.36230E+00   1.20092E+00
  10      -1.36197E+00   1.20271E+00
  11      -1.36146E+00   1.20446E+00
  12      -1.36077E+00   1.20615E+00
  13      -1.35991E+00   1.20775E+00
  14      -1.35888E+00   1.20926E+00
  15      -1.35771E+00   1.21065E+00
  16      -1.35639E+00   1.21191E+00
  17      -1.35495E+00   1.21302E+00
  18      -1.35340E+00   1.21398E+00
  19      -1.35176E+00   1.21477E+00
  20      -1.35005E+00   1.21539E+00
  21      -1.34828E+00   1.21582E+00
  22      -1.34647E+00   1.21606E+00
  23      -1.34465E+00   1.21612E+00
  24      -1.34284E+00   1.21598E+00
  25      -1.34104E+00   1.21566E+00
  26      -1.33929E+00   1.21515E+00
  27      -1.33761E+00   1.21446E+00
  28      -1.33600E+00   1.21360E+00
  29      -1.33450E+00   1.21257E+00
  30      -1.33311E+00   1.21139E+00
  31      -1.33185E+00   1.21008E+00
LEADING EDGE AXIAL DIFFERENCE =       -.0443   NEW DELX =        .0443
1

POINT  FRAC. M     Y     Y-D(DEG)    Y-DD   R OF CURV

  1    .00000   .00000 -49.26162    .97922   3.6742
  2    .02222  -.02556 -48.72485    .97928   3.5572
  3    .04444  -.05063 -48.17631    .97945   3.4431
  4    .06667  -.07523 -47.61565    .97973   3.3321
  5    .08889  -.09933 -47.04249    .98013   3.2240
  6    .11111  -.12296 -46.45647    .98065   3.1189
  7    .13333  -.14610 -45.85721    .98128   3.0168
  8    .15556  -.16875 -45.24432    .98202   2.9174
  9    .17778  -.19092 -44.61739    .98288   2.8210
 10    .20000  -.21261 -43.97602    .98386   2.7273
 11    .22222  -.23381 -43.32041    .98216   2.6440
 12    .24444  -.25452 -42.65350    .97466   2.5791
 13    .26667  -.27475 -41.97930    .96135   2.5321
 14    .28889  -.29451 -41.30217    .94223   2.5033
 15    .31111  -.31380 -40.62682    .91731   2.4935
 16    .33333  -.33265 -39.95837    .88658   2.5045
 17    .35556  -.35105 -39.30223    .85005   2.5389
 18    .37778  -.36903 -38.64418    .80771   2.6007
 19    .40000  -.38662 -38.05030    .75956   2.6961
```

RESULTS.OUT 6-25-95 10:23a

Page 19 of 32

IC/14PRINT

```
  20     .42222   -.40383 -37.46548    .71100    2.8127
  21     .44444   -.42069 -36.90880    .66768    2.9297
  22     .46667   -.43721 -36.37748    .62959    3.0433
  23     .48889   -.45343 -35.86846    .59674    3.1490
  24     .51111   -.46935 -35.37843    .56912    3.2417
  25     .53333   -.48500 -34.90378    .54674    3.3158
  26     .55556   -.50037 -34.44069    .52960    3.3663
  27     .57778   -.51548 -33.98514    .51769    3.3883
  28     .60000   -.53033 -33.53287    .51102    3.3786
  29     .62222   -.54493 -33.08029    .50675    3.3544
  30     .64444   -.55928 -32.62701    .50217    3.3336
  31     .66667   -.57338 -32.17341    .49726    3.3161
  32     .68889   -.58724 -31.71991    .49204    3.3020
  33     .71111   -.60086 -31.26694    .48650    3.2914
  34     .73333   -.61423 -30.81492    .48065    3.2844
  35     .75556   -.62737 -30.36432    .47447    3.2811
  36     .77778   -.64027 -29.91558    .46798    3.2816
  37     .80000   -.65294 -29.46919    .46116    3.2859
  38     .82222   -.66538 -29.02544    .45459    3.2904
  39     .84444   -.67760 -28.58391    .44879    3.2908
  40     .86667   -.68960 -28.14400    .44377    3.2869
  41     .88889   -.70138 -27.70507    .43952    3.2785
  42     .91111   -.71294 -27.26647    .43604    3.2654
  43     .93333   -.72429 -26.82752    .43333    3.2475
  44     .95556   -.73542 -26.38751    .43140    3.2246
  45     .97778   -.74634 -25.94571    .43024    3.1967
  46    1.00000   -.75704 -25.50138    .42985    3.1639
1

 DATA POINTS

 POINT  FRAC. M  Y-D(DEG)

    1     .00000 -49.26162
    2     .20067 -43.95657
    3     .40026 -38.04339
    4     .59980 -33.53698
    5     .79968 -29.47556
    6    1.00000 -25.50138

 CARTESIAN COORDINATES ON STREAMSURFACE  4

 POINT      Z1         X1         Y1         Z2         X2         Y2

    1    4.85170   -1.36635   1.18598    4.85316   -1.39243   1.16344
    2    4.87640   -1.29826   1.12576    4.87846   -1.33915   1.08927
    3    4.89993   -1.23041   1.06656    4.90228   -1.28561   1.01634
    4    4.92229   -1.16282   1.00839    4.92472   -1.23180    .94439
    5    4.94349   -1.09551    .95122    4.94582   -1.17767    .87348
    6    4.96354   -1.02852    .89497    4.96561   -1.12318    .80365
    7    4.98244    -.96187    .83970    4.98412   -1.06830    .73498
    8    5.00019    -.89557    .78540    5.00139   -1.01301    .66744
    9    5.01678    -.82964    .73207    5.01744    -.95729    .60114
   10    5.03225    -.76410    .67971    5.03229    -.90112    .53613
   11    5.04667    -.69896    .62826    5.04598    -.84447    .47246
   12    5.06009    -.63424    .57778    5.05854    -.78734    .41019
   13    5.07259    -.56995    .52823    5.07002    -.72972    .34927
   14    5.08424    -.50609    .47960    5.08050    -.67164    .28981
   15    5.09510    -.44264    .43184    5.09004    -.61309    .23183
   16    5.10524    -.37961    .38487    5.09871    -.55409    .17536
   17    5.11473    -.31698    .33865    5.10658    -.49465    .12041
   18    5.12360    -.25473    .29311    5.11373    -.43480    .06694
   19    5.13192    -.19285    .24818    5.12021    -.37457    .01493
   20    5.13969    -.13131    .20376    5.12610    -.31398   -.03561
   21    5.14696    -.07011    .15974    5.13145    -.25303   -.08472
   22    5.15373    -.00925    .11608    5.13631    -.19173   -.13242
   23    5.16002     .05129    .07271    5.14074    -.13009   -.17878
   24    5.16585     .11149    .02957    5.14476    -.06810   -.22382
   25    5.17122     .17136   -.01336    5.14841    -.00577   -.26755
   26    5.17614     .23091   -.05613    5.15172     .05690   -.31002
   27    5.18063     .29014   -.09874    5.15473     .11990   -.35123
   28    5.18470     .34907   -.14119    5.15746     .18321   -.39122
   29    5.18837     .40770   -.18349    5.15994     .24683   -.43002
   30    5.19167     .46604   -.22564    5.16220     .31074   -.46763
   31    5.19461     .52411   -.26766    5.16429     .37492   -.50403
   32    5.19723     .58194   -.30953    5.16624     .43936   -.53922
   33    5.19954     .63953   -.35125    5.16810     .50403   -.57327
   34    5.20157     .69689   -.39284    5.16991     .56891   -.60618
   35    5.20333     .75406   -.43429    5.17172     .63398   -.63791
   36    5.20483     .81103   -.47568    5.17358     .69924   -.66848
   37    5.20611     .86782   -.51695    5.17551     .76466   -.69794
   38    5.20715     .92445   -.55811    5.17757     .83022   -.72634
   39    5.20795     .98094   -.59916    5.17978     .89591   -.75361
   40    5.20851    1.03728   -.64012    5.18214     .96171   -.77978
   41    5.20881    1.09351   -.68098    5.18466    1.02763   -.80488
   42    5.20885    1.14963   -.72174    5.18733    1.09363   -.82894
   43    5.20862    1.20565   -.76240    5.19015    1.15973   -.85192
   44    5.20811    1.26160   -.80297    5.19311    1.22589   -.87384
   45    5.20733    1.31747   -.84342    5.19621    1.29212   -.89471
   46    5.20627    1.37330   -.88371    5.19945    1.35839   -.91448
1

 POINT    ZSEMI     XSEMI     YSEMI

    1    4.85316  -1.39243   1.16344
    2    4.85266  -1.39353   1.16482
    3    4.85216  -1.39448   1.16631
    4    4.85166  -1.39526   1.16789
    5    4.85116  -1.39587   1.16955
    6    4.85069  -1.39630   1.17126
    7    4.85023  -1.39654   1.17301
    8    4.84979  -1.39660   1.17478
    9    4.84938  -1.39646   1.17655
   10    4.84901  -1.39614   1.17830
   11    4.84867  -1.39564   1.18000
   12    4.84837  -1.39495   1.18165
   13    4.84812  -1.39410   1.18323
   14    4.84791  -1.39309   1.18471
   15    4.84775  -1.39192   1.18608
   16    4.84765  -1.39062   1.18732
   17    4.84760  -1.38920   1.18843
   18    4.84760  -1.38766   1.18939
   19    4.84765  -1.38604   1.19019
   20    4.84775  -1.38435   1.19081
   21    4.84791  -1.38260   1.19126
   22    4.84812  -1.38081   1.19153
   23    4.84838  -1.37901   1.19162
   24    4.84868  -1.37721   1.19151
   25    4.84902  -1.37544   1.19123
   26    4.84940  -1.37371   1.19076
   27    4.84981  -1.37204   1.19012
   28    4.85025  -1.37046   1.18931
   29    4.85072  -1.36897   1.18834
   30    4.85120  -1.36759   1.18723
   31    4.85170  -1.36635   1.18598

 STREAMSURFACE  5  ITERATION  1  DEVIATION =  4.549  SOLIDITY = 1.8379
                   ITERATION  2  DEVIATION =  4.711  SOLIDITY = 1.7142
                   ITERATION  2  DEVIATION =  4.711  SOLIDITY = 1.7142

 POINT  FRAC. M      Y     Y-D(DEG)    Y-DD   R OF CURV

    1    .00000    .00000 -52.67686   .89381    5.0196
    2    .02222   -.02893 -52.25440   .89426    4.8747
    3    .04444   -.05741 -51.82330   .89561    4.7285
    4    .06667   -.08545 -51.38288   .89787    4.5814
    5    .08889   -.11305 -50.93246   .90102    4.4336
    6    .11111   -.14020 -50.47128   .90508    4.2854
    7    .13333   -.16691 -49.99856   .91004    4.1371
    8    .15556   -.19317 -49.51345   .91590    3.9891
    9    .17778   -.21897 -49.01506   .92266    3.8417
   10    .20000   -.24432 -48.50247   .93032    3.6952
   11    .22222   -.26921 -47.97540   .93491    3.5651
   12    .24444   -.29364 -47.43683   .93208    3.4668
   13    .26667   -.31761 -46.89090   .92182    3.3990
   14    .28889   -.34112 -46.34211   .90413    3.3617
   15    .31111   -.36419 -45.79532   .87901    3.3565
   16    .33333   -.38682 -45.25579   .84646    3.3867

 POINT  FRAC. M      Y     Y-D(DEG)    Y-DD   R OF CURV

   17    .35556   -.40904 -44.72912   .80649    3.4579
   18    .37778   -.43085 -44.22127   .75909    3.5792
   19    .40000   -.45230 -43.73849   .70426    3.7649
   20    .42222   -.47339 -43.28588   .64843    3.9980
   21    .44444   -.49417 -42.86274   .59820    4.2449
   22    .46667   -.51465 -42.46659   .55357    4.5003
   23    .48889   -.53485 -42.09471   .51453    4.7568
   24    .51111   -.55480 -41.74412   .48109    5.0043
   25    .53333   -.57452 -41.41161   .45324    5.2303
   26    .55556   -.59401 -41.09378   .43098    5.4207
   27    .57778   -.61328 -40.78705   .41433    5.5606
   28    .60000   -.63235 -40.48767   .40326    5.6368
   29    .62222   -.65123 -40.19234   .39535    5.6747
   30    .64444   -.66990 -39.90006   .38823    5.7049
   31    .66667   -.68839 -39.61034   .38191    5.7265
   32    .68889   -.70669 -39.32268   .37640    5.7388
   33    .71111   -.72480 -39.03656   .37169    5.7410
   34    .73333   -.74272 -38.75145   .36778    5.7326
   35    .75556   -.76047 -38.46677   .36467    5.7131
   36    .77778   -.77804 -38.18197   .36236    5.6821
   37    .80000   -.79542 -37.89643   .36085    5.6395
   38    .82222   -.81263 -37.60965   .35980    5.5906
   39    .84444   -.82966 -37.32142   .35887    5.5406
   40    .86667   -.84651 -37.03168   .35806    5.4896
   41    .88889   -.86319 -36.74031   .35738    5.4374
1
   42    .91111   -.87969 -36.44723   .35682    5.3842
   43    .93333   -.89601 -36.15232   .35639    5.3300
   44    .95556   -.91216 -35.85550   .35608    5.2747
   45    .97778   -.92813 -35.55664   .35589    5.2184
   46   1.00000   -.94393 -35.25564   .35583    5.1612

 DATA POINTS

 POINT  FRAC. M  Y-D(DEG)

    1     .00000 -52.67686
    2     .20052 -48.49032
    3     .40013 -43.73568
    4     .59975 -40.49102
    5     .79968 -37.90050
    6    1.00000 -35.25564
1 STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER  5
  **********************************************

   BETA1 =-52.677  (BLADE INLET ANGLE)
   BETA2 =-35.256  (BLADE OUTLET ANGLE)
   YZERO = .00500  (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
   T     = .08430  (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
   YONE  = .00500  (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
   Z     =  .5500  (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
   CORD  = 2.6528  (MERIDIONAL CHORD OF SECTION)

 NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
 BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
 **************************************************

   BLADE CHORD    = 1.3671

   STAGGER ANGLE  =-43.348

   CAMBER ANGLE   =-17.421

   SECTION AREA   = .10801
   LOCATION OF CENTROID RELATIVE TO LEADING EDGE

             XBAR =  .49120
             YBAR = -.51408

   SECOND MOMENTS OF AREA ABOUT CENTROID

             IX   =  .00512
             IY   =  .00591
             IXY  = -.00540

   ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS =-42.900

   PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

             IPX  = .00010      (AT-42.900 WITH (X) AXIS)
             IPY  = .01093      (AT-42.900 WITH (Y) AXIS)

 POINT        M E A N L I N E   D A T A        SURFACE COORDINATE DATA
 NUMBER     X        Y    ANGLE THICKNESS     X1      Y1      X2     Y2

    1     .00684  .00000-52.677  .01367   .01227  .00414  .00140 -.004
=> 14
    2     .02882 -.02861-52.254  .02098   .03711 -.02219  .02052 -.035
=> 04
    3     .05080 -.05679-51.823  .02819   .06188 -.04808  .03972 -.065
=> 50
    4     .07278 -.08453-51.383  .03526   .08656 -.07353  .05901 -.095
=> 53
    5     .09477 -.11183-50.932  .04218   .11114 -.09854  .07839 -.125
=> 12
    6     .11675 -.13869-50.471  .04890   .13561 -.12313  .09789 -.154
=> 25
    7     .13873 -.16511-49.999  .05540   .15995 -.14730  .11751 -.182
=> 92
    8     .16071 -.19108-49.513  .06166   .18416 -.17107  .13727 -.211
=> 10
    9     .18270 -.21661-49.015  .06766   .20823 -.19442  .15716 -.238
=> 80
   10     .20468 -.24169-48.502  .07338   .23216 -.21738  .17720 -.266
=> 00
   11     .22666 -.26631-47.975  .07879   .25593 -.23993  .19740 -.292
=> 68
   12     .24864 -.29047-47.437  .08388   .27953 -.26210  .21776 -.318
=> 84
   13     .27063 -.31418-46.891  .08863   .30298 -.28390  .23828 -.344
=> 46
1
 POINT        M E A N L I N E   D A T A        SURFACE COORDINATE DATA
 NUMBER     X        Y    ANGLE THICKNESS     X1      Y1      X2     Y2
```

```
=> 55
14    .29261 -.33744-46.342 .09302   .32626 -.30533  .25896 -.369
=> 10
15    .31459 -.36026-45.795 .09706   .34938 -.32642  .27980 -.394
=> 10
16    .33658 -.38265-45.256 .10072   .37234 -.34720  .30081 -.418
=> 57
17    .35856 -.40463-44.729 .10399   .39515 -.36769  .32197 -.441
=> 50
18    .38054 -.42621-44.221 .10686   .41781 -.38792  .34328 -.464
=> 92
19    .40252 -.44742-43.738 .10933   .44032 -.40792  .36473 -.486
=> 83
20    .42451 -.46829-43.286 .11139   .46269 -.42775  .38632 -.508
=> 26
21    .44649 -.48884-42.863 .11302   .48493 -.44742  .40805 -.530
=> 22
22    .46847 -.50910-42.467 .11421   .50703 -.46697  .42992 -.551
=> 74
23    .49045 -.52909-42.095 .11495   .52898 -.48643  .45192 -.571
=> 82
24    .51244 -.54882-41.744 .11525   .55080 -.50583  .47407 -.591
=> 47
25    .53442 -.56832-41.412 .11507   .57248 -.52517  .49636 -.611
=> 72
26    .55640 -.58760-41.094 .11444   .59401 -.54448  .51879 -.630
=> 58
27    .57838 -.60667-40.787 .11335   .61541 -.56376  .54136 -.649
=> 06
28    .60037 -.62554-40.488 .11181   .63667 -.58302  .56407 -.668
=> 15
29    .62235 -.64421-40.192 .10983   .65779 -.60226  .58691 -.686
=> 88
30    .64433 -.66268-39.900 .10741   .67878 -.62148  .60988 -.703
=> 25
31    .66631 -.68097-39.610 .10457   .69965 -.64069  .63298 -.721
=> 25
32    .68830 -.69907-39.323 .10129   .72039 -.65989  .65620 -.738
=> 89
33    .71028 -.71698-39.037 .09760   .74102 -.67908  .67954 -.754
=> 17
34    .73226 -.73472-38.751 .09350   .76152 -.69826  .70300 -.771
=> 10
35    .75425 -.75227-38.467 .08898   .78192 -.71744  .72657 -.787
=> 68
36    .77623 -.76965-38.182 .08406   .80221 -.73661  .75025 -.802
=> 91
37    .79821 -.78685-37.896 .07874   .82239 -.75578  .77403 -.817
=> 79
38    .82019 -.80387-37.610 .07303   .84248 -.77494  .79791 -.832
=> 33
39    .84218 -.82072-37.321 .06692   .86246 -.79411  .82189 -.847
=> 51
40    .86416 -.83739-37.032 .06043   .88236 -.81327  .84596 -.861
=> 34
41    .88614 -.85388-36.740 .05356   .90216 -.83242  .87012 -.875
=> 84
42    .90812 -.87021-36.447 .04632   .92188 -.85158  .89437 -.888
=> 98
43    .93011 -.88635-36.152 .03870   .94152 -.87073  .91869 -.901
=> 78
44    .95209 -.90233-35.855 .03072   .96109 -.88988  .94309 -.914
=> 23
45    .97407 -.91813-35.557 .02238   .98058 -.90903  .96757 -.927
=> 34
46    .99605 -.93375-35.256 .01367  1.00000 -.92817  .99211 -.939
1                                 NORMALISED PLOT OF SECTION NUMBER
=> 5
```

1 DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH

BLADE CHORD = 3.62682E+00

L.E.RADIUS = 1.81341E-02 CENTERED AT X= -1.2849E+00 Y= 1.3638E+00

SECTION AREA= 7.60090E-01

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = 2.53374E-01
IY = 2.92666E-01
IXY =-2.67492E-01

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = 4.80775E-03 (AT-42.900 WITH (X) AXIS)
IPY = 5.41233E-01 (AT-42.900 WITH (Y) AXIS)

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
1	-1.27051E+00	1.37477E+00	-1.29935E+00	1.35278E+00
2	-1.20461E+00	1.30490E+00	-1.24862E+00	1.27083E+00
3	-1.13891E+00	1.23622E+00	-1.19769E+00	1.19001E+00
4	-1.07344E+00	1.16872E+00	-1.14653E+00	1.11034E+00
5	-1.00823E+00	1.10236E+00	-1.09510E+00	1.03185E+00
6	-9.43322E-01	1.03713E+00	-1.04338E+00	9.54563E-01
7	-8.78744E-01	9.73000E-01	-9.91327E-01	8.78526E-01
8	-8.14514E-01	9.09962E-01	-9.38925E-01	8.03755E-01
9	-7.50655E-01	8.48002E-01	-8.86151E-01	7.30280E-01
10	-6.87189E-01	7.87109E-01	-8.32985E-01	6.58131E-01
11	-6.24134E-01	7.27268E-01	-7.79407E-01	5.87339E-01
12	-5.61511E-01	6.68452E-01	-7.25397E-01	5.17945E-01
13	-4.99316E-01	6.10636E-01	-6.70959E-01	4.49964E-01
14	-4.37551E-01	5.53778E-01	-6.16091E-01	3.83413E-01
15	-3.76214E-01	4.97825E-01	-5.60795E-01	3.18299E-01
16	-3.15299E-01	4.42713E-01	-5.05078E-01	2.54621E-01
17	-2.54799E-01	3.88362E-01	-4.48945E-01	1.92372E-01
18	-1.94697E-01	3.34696E-01	-3.92415E-01	1.31529E-01
19	-1.34976E-01	2.81620E-01	-3.35503E-01	7.20623E-02
20	-7.56229E-02	2.29032E-01	-2.78223E-01	1.39313E-02
21	-1.66342E-02	1.76842E-01	-2.20579E-01	-4.29156E-02
22	4.19876E-02	1.24968E-01	-1.62568E-01	-9.85270E-02
23	1.00241E-01	7.33407E-02	-1.04189E-01	-1.52949E-01
24	1.58121E-01	2.18954E-02	-4.54362E-02	-2.06218E-01
25	2.15622E-01	-2.94212E-02	1.36956E-02	-2.58368E-01
26	2.72748E-01	-8.06429E-02	7.32021E-02	-3.09437E-01
27	3.29507E-01	-1.31790E-01	1.33076E-01	-3.59461E-01
28	3.85902E-01	-1.82879E-01	1.93313E-01	-4.08470E-01
29	4.41941E-01	-2.33916E-01	2.53907E-01	-4.56484E-01
30	4.97632E-01	-2.84910E-01	3.14849E-01	-5.03516E-01
31	5.52986E-01	-3.35870E-01	3.76128E-01	-5.49576E-01
32	6.08015E-01	-3.86800E-01	4.37732E-01	-5.94677E-01
33	6.62727E-01	-4.37706E-01	4.99652E-01	-6.38824E-01
34	7.17132E-01	-4.88595E-01	5.61879E-01	-6.82026E-01
35	7.71240E-01	-5.39470E-01	6.24404E-01	-7.24288E-01

1

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
36	8.25060E-01	-5.90334E-01	6.87217E-01	-7.65616E-01
37	8.78606E-01	-6.41185E-01	7.50304E-01	-8.06018E-01
38	9.31884E-01	-6.92027E-01	8.13658E-01	-8.45493E-01
39	9.84905E-01	-7.42862E-01	8.77270E-01	-8.84043E-01
40	1.03768E+00	-7.93690E-01	9.41128E-01	-9.21670E-01
41	1.09022E+00	-8.44512E-01	1.00522E+00	-9.58374E-01
42	1.14253E+00	-8.95323E-01	1.06954E+00	-9.94163E-01
43	1.19464E+00	-9.46129E-01	1.13407E+00	-1.02903E+00
44	1.24654E+00	-9.96929E-01	1.19880E+00	-1.06298E+00
45	1.29824E+00	-1.04773E+00	1.26373E+00	-1.09602E+00
46	1.34977E+00	-1.09852E+00	1.32883E+00	-1.12813E+00

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-1.29935E+00	1.35278E+00
2	-1.30042E+00	1.35435E+00
3	-1.30133E+00	1.35602E+00
4	-1.30205E+00	1.35777E+00
5	-1.30258E+00	1.35959E+00
6	-1.30292E+00	1.36146E+00
7	-1.30306E+00	1.36335E+00
8	-1.30301E+00	1.36525E+00
9	-1.30275E+00	1.36713E+00
10	-1.30230E+00	1.36898E+00
11	-1.30167E+00	1.37076E+00
12	-1.30084E+00	1.37247E+00
13	-1.29985E+00	1.37409E+00
14	-1.29869E+00	1.37559E+00
15	-1.29738E+00	1.37697E+00
16	-1.29593E+00	1.37819E+00
17	-1.29436E+00	1.37926E+00
18	-1.29269E+00	1.38016E+00
19	-1.29093E+00	1.38089E+00
20	-1.28911E+00	1.38142E+00
21	-1.28725E+00	1.38176E+00
22	-1.28535E+00	1.38190E+00
23	-1.28346E+00	1.38185E+00
24	-1.28157E+00	1.38159E+00
25	-1.27973E+00	1.38114E+00
26	-1.27794E+00	1.38050E+00
27	-1.27623E+00	1.37968E+00
28	-1.27462E+00	1.37869E+00
29	-1.27311E+00	1.37753E+00
30	-1.27174E+00	1.37621E+00
31	-1.27051E+00	1.37477E+00

LEADING EDGE AXIAL DIFFERENCE = -.0590 NEW DELX = .0590

1

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-52.67686	.89381	5.0196
2	.02222	-.02893	-52.25440	.89426	4.8747
3	.04444	-.05741	-51.82330	.89561	4.7285
4	.06667	-.08545	-51.38288	.89787	4.5814
5	.08889	-.11305	-50.93246	.90102	4.4336
6	.11111	-.14020	-50.47128	.90508	4.2854
7	.13333	-.16691	-49.99856	.91004	4.1371
8	.15556	-.19317	-49.51345	.91590	3.9891
9	.17778	-.21897	-49.01506	.92266	3.8417
10	.20000	-.24432	-48.50247	.93032	3.6952
11	.22222	-.26921	-47.97540	.93491	3.5651
12	.24444	-.29364	-47.43683	.93208	3.4668
13	.26667	-.31761	-46.89090	.92182	3.3990
14	.28889	-.34112	-46.34211	.90413	3.3617
15	.31111	-.36419	-45.79532	.87901	3.3565
16	.33333	-.38682	-45.25579	.84646	3.3867
17	.35556	-.40904	-44.72912	.80649	3.4579
18	.37778	-.43085	-44.22127	.75909	3.5792
19	.40000	-.45230	-43.73849	.70426	3.7649
20	.42222	-.47339	-43.28588	.64843	3.9980
21	.44444	-.49417	-42.86274	.59820	4.2449
22	.46667	-.51465	-42.46659	.55357	4.5003
23	.48889	-.53485	-42.09471	.51453	4.7568
24	.51111	-.55480	-41.74412	.48109	5.0043
25	.53333	-.57452	-41.41161	.45324	5.2303
26	.55556	-.59401	-41.09378	.43098	5.4207
27	.57778	-.61328	-40.78705	.41433	5.5606
28	.60000	-.63235	-40.48767	.40326	5.6368
29	.62222	-.65123	-40.19234	.39535	5.6747
30	.64444	-.66990	-39.90006	.38823	5.7049
31	.66667	-.68839	-39.61034	.38191	5.7265
32	.68889	-.70669	-39.32268	.37640	5.7388
33	.71111	-.72480	-39.03656	.37169	5.7410
34	.73333	-.74272	-38.75145	.36778	5.7326
35	.75556	-.76047	-38.46677	.36467	5.7131
36	.77778	-.77804	-38.18197	.36236	5.6821
37	.80000	-.79542	-37.89643	.36085	5.6395
38	.82222	-.81263	-37.60965	.35980	5.5906
39	.84444	-.82966	-37.32142	.35887	5.5406
40	.86667	-.84651	-37.03168	.35806	5.4896
41	.88889	-.86319	-36.74031	.35738	5.4374
42	.91111	-.87969	-36.44723	.35682	5.3842
43	.93333	-.89601	-36.15232	.35639	5.3300
44	.95556	-.91216	-35.85550	.35608	5.2747
45	.97778	-.92813	-35.55664	.35589	5.2184
46	1.00000	-.94393	-35.25564	.35583	5.1612

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-52.67686
2	.20052	-48.49032
3	.40013	-43.73568
4	.59975	-40.49102
5	.79968	-37.90050
6	1.00000	-35.25564

CARTESIAN COORDINATES ON STREAMSURFACE 5

POINT	Z1	X1	Y1	Z2	X2	Y2
1	5.48387	-1.32283	1.35149	5.48555	-1.35145	1.32974
2	5.50811	-1.25742	1.28495	5.51046	-1.30110	1.25079
3	5.53118	-1.19220	1.21929	5.53390	-1.25055	1.17294
4	5.55310	-1.12721	1.15450	5.55600	-1.19977	1.09592
5	5.57387	-1.06246	1.09055	5.57678	-1.14871	1.01978
6	5.59351	-.99798	1.02741	5.59626	-1.09736	.94457
7	5.61202	-.93382	.96509	5.61447	-1.04567	.87036
8	5.62939	-.86998	.90363	5.63145	-.99362	.79713
9	5.64565	-.80648	.84301	5.64722	-.94118	.72499
10	5.66080	-.74335	.78325	5.66180	-.88834	.65398
11	5.67491	-.68060	.72433	5.67523	-.83508	.58416
12	5.68804	-.61827	.66627	5.68753	-.78136	.51557
13	5.70024	-.55634	.60907	5.69875	-.72720	.44823
14	5.71156	-.49482	.55274	5.70895	-.67260	.38218
15	5.72207	-.43372	.49718	5.71819	-.61755	.31747
16	5.73181	-.37303	.44235	5.72652	-.56208	.25411
17	5.74085	-.31275	.38821	5.73401	-.50617	.19210
18	5.74922	-.25285	.33470	5.74071	-.44986	.13145
19	5.75696	-.19334	.28173	5.74668	-.39316	.07210

20	5.76409	-.13418	.22917	5.75198	-.33609	.01405
21	5.77064	-.07538	.17694	5.75665	-.27865	-.04274
22	5.77663	-.01694	.12499	5.76075	-.22084	-.09832
23	5.78207	.04114	.07326	5.76432	-.16265	-.15273
24	5.78696	.09885	.02168	5.76739	-.10409	-.20603
25	5.79132	.15618	-.02981	5.76998	-.04514	-.25820
26	5.79515	.21314	-.08124	5.77214	.01418	-.30931
27	5.79847	.26974	-.13262	5.77390	.07387	-.35939
28	5.80127	.32598	-.18396	5.77527	.13393	-.40847
29	5.80358	.38186	-.23524	5.77628	.19435	-.45656
30	5.80541	.43740	-.28649	5.77697	.25512	-.50366
31	5.80675	.49260	-.33772	5.77736	.31623	-.54981
32	5.80763	.54748	-.38890	5.77748	.37766	-.59500
33	5.80805	.60204	-.44006	5.77736	.43941	-.63924
34	5.80803	.65629	-.49119	5.77704	.50147	-.68254
35	5.80757	.71025	-.54230	5.77655	.56382	-.72491
36	5.80667	.76391	-.59340	5.77591	.62646	-.76635
37	5.80535	.81730	-.64446	5.77516	.68937	-.80686
38	5.80361	.87042	-.69549	5.77433	.75254	-.84648
39	5.80143	.92328	-.74648	5.77344	.81597	-.88519
40	5.79882	.97589	-.79742	5.77252	.87964	-.92299
41	5.79578	1.02827	-.84835	5.77157	.94353	-.95988
42	5.79230	1.08042	-.89921	5.77060	1.00765	-.99588
43	5.78838	1.13236	-.95002	5.76962	1.07198	-1.03099
44	5.78402	1.18409	-1.00078	5.76863	1.13651	-1.06519
45	5.77922	1.23563	-1.05147	5.76766	1.20122	-1.09849
46	5.77398	1.28700	-1.10201	5.76670	1.26613	-1.13087

1

POINT	ZSEMI	XSEMI	YSEMI
1	5.48555	-1.35145	1.32974
2	5.48505	-1.35251	1.33125
3	5.48454	-1.35341	1.33286
4	5.48404	-1.35412	1.33456
5	5.48354	-1.35465	1.33632
6	5.48306	-1.35499	1.33813
7	5.48259	-1.35513	1.33997
8	5.48215	-1.35508	1.34181
9	5.48173	-1.35482	1.34365
10	5.48135	-1.35438	1.34544
11	5.48100	-1.35374	1.34719
12	5.48069	-1.35293	1.34886
13	5.48043	-1.35194	1.35044
14	5.48021	-1.35079	1.35191
15	5.48004	-1.34949	1.35326
16	5.47993	-1.34805	1.35447
17	5.47986	-1.34650	1.35553
18	5.47985	-1.34484	1.35642
19	5.47990	-1.34309	1.35714
20	5.47999	-1.34129	1.35768
21	5.48014	-1.33943	1.35804
22	5.48034	-1.33755	1.35820
23	5.48059	-1.33567	1.35816
24	5.48088	-1.33380	1.35794
25	5.48122	-1.33197	1.35753
26	5.48159	-1.33020	1.35693
27	5.48200	-1.32850	1.35615
28	5.48243	-1.32690	1.35521
29	5.48289	-1.32541	1.35412
30	5.48337	-1.32405	1.35287
31	5.48387	-1.32283	1.35149

STREAMSURFACE 6 ITERATION 1 DEVIATION = 4.076 SOLIDITY = 1.7128
ITERATION 2 DEVIATION = 4.201 SOLIDITY = 1.5817
ITERATION 2 DEVIATION = 4.201 SOLIDITY = 1.5817

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-55.60087	.81446	6.8091
2	.02222	-.03225	-55.26696	.81531	6.6316
3	.04444	-.06411	-54.92662	.81787	6.4441
4	.06667	-.09555	-54.57895	.82214	6.2476
5	.08889	-.12660	-54.22303	.82812	6.0431
6	.11111	-.15723	-53.85784	.83580	5.8318
7	.13333	-.18745	-53.48231	.84520	5.6148
8	.15556	-.21725	-53.09531	.85630	5.3935
9	.17778	-.24663	-52.69563	.86910	5.1690
10	.20000	-.27558	-52.28199	.88362	4.9426
11	.22222	-.30410	-51.85379	.89489	4.7420
12	.24444	-.33217	-51.41387	.89738	4.5932
13	.26667	-.35980	-50.96629	.89107	4.4929
14	.28889	-.38699	-50.51542	.87598	4.4402
15	.31111	-.41375	-50.06600	.85209	4.4372
16	.33333	-.44009	-49.62312	.81940	4.4890

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
17	.35556	-.46602	-49.19220	.77793	4.6055
18	.37778	-.49157	-48.77903	.72766	4.8027
19	.40000	-.51676	-48.38964	.66860	5.1075
20	.42222	-.54162	-48.02909	.60761	5.5027
21	.44444	-.56618	-47.69704	.55207	5.9410
22	.46667	-.59047	-47.39155	.50200	6.4204
23	.48889	-.61451	-47.11041	.45738	6.9353
24	.51111	-.63832	-46.85122	.41823	7.4751
25	.53333	-.66192	-46.61140	.38454	8.0223
26	.55556	-.68534	-46.38820	.35630	8.5521
27	.57778	-.70858	-46.17873	.33353	9.0318
28	.60000	-.73166	-45.97997	.31622	9.4239
29	.62222	-.75457	-45.78911	.30296	9.7353
30	.64444	-.77734	-45.60435	.29235	9.9890
31	.66667	-.79997	-45.42421	.28439	10.1706
32	.68889	-.82245	-45.24709	.27908	10.2676
33	.71111	-.84480	-45.07140	.27640	10.2713
34	.73333	-.86701	-44.89548	.27638	10.1782
35	.75556	-.88908	-44.71765	.27900	9.9898
36	.77778	-.91102	-44.53617	.28426	9.7132
37	.80000	-.93281	-44.34925	.29217	9.3600
38	.82222	-.95446	-44.15551	.30087	9.0000
39	.84444	-.97596	-43.95507	.30854	8.6875
40	.86667	-.99731	-43.74852	.31519	8.4163
41	.88889	-1.01851	-43.53642	.32082	8.1816
42	.91111	-1.03954	-43.31938	.32542	7.9795
43	.93333	-1.06042	-43.09799	.32901	7.8072
44	.95556	-1.08113	-42.87290	.33156	7.6624
45	.97778	-1.10168	-42.64474	.33310	7.5433
46	1.00000	-1.12206	-42.41418	.33361	7.4488

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-55.60087
2	.20065	-52.26970
3	.40042	-48.38251
4	.60005	-45.97955
5	.79985	-44.35057
6	1.00000	-42.41418

1
STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER 6
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BETA1 =-55.601 (BLADE INLET ANGLE)
BETA2 =-42.414 (BLADE OUTLET ANGLE)
YZERO = .00500 (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
T = .08340 (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
YONE = .00500 (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
Z = .5500 (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
CORD = 2.4845 (MERIDIONAL CHORD OF SECTION)

NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BLADE CHORD = 1.4917

STAGGER ANGLE =-48.292

CAMBER ANGLE =-13.187

SECTION AREA = .12707
LOCATION OF CENTROID RELATIVE TO LEADING EDGE

XBAR = .49397
YBAR = -.59688

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = .00846
IY = .00696
IXY = -.00755

ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS = 42.156

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = .01530 (AT 42.156 WITH (X) AXIS)
IPY = .00012 (AT 42.156 WITH (Y) AXIS)

	POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
	1	.00746	.00000	-55.601	.01492	.01361	.00421	.00130	-.004
=> 21									
	2	.02940	-.03185	-55.267	.02267	.03872	-.02539	.02009	-.038
=> 31									
	3	.05135	-.06331	-54.927	.03033	.06376	-.05459	.03894	-.072
=> 02									
	4	.07329	-.09436	-54.579	.03785	.08872	-.08339	.05787	-.105
=> 33									
	5	.09524	-.12502	-54.223	.04522	.11358	-.11180	.07690	-.138
=> 23									
	6	.11718	-.15527	-53.858	.05239	.13834	-.13982	.09603	-.170
=> 72									
	7	.13913	-.18511	-53.482	.05934	.16297	-.16745	.11528	-.202
=> 76									
	8	.16107	-.21454	-53.095	.06604	.18748	-.19471	.13467	-.234
=> 37									
	9	.18302	-.24355	-52.696	.07247	.21184	-.22159	.15419	-.265
=> 51									
	10	.20496	-.27214	-52.282	.07861	.23605	-.24809	.17387	-.296
=> 19									
	11	.22691	-.30030	-51.854	.08444	.26011	-.27422	.19370	-.326
=> 38									
	12	.24885	-.32802	-51.414	.08992	.28399	-.29998	.21371	-.356
=> 06									
	13	.27079	-.35531	-50.966	.09505	.30771	-.32538	.23388	-.385
=> 24									

1

	POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
	14	.29274	-.38216	-50.515	.09981	.33126	-.35042	.25422	-.413
=> 89									
	15	.31468	-.40858	-50.066	.10419	.35463	-.37514	.27474	-.442
=> 02									
	16	.33663	-.43459	-49.623	.10818	.37783	-.39955	.29542	-.469
=> 63									
	17	.35857	-.46020	-49.192	.11175	.40086	-.42368	.31628	-.496
=> 71									
	18	.38052	-.48543	-48.779	.11490	.42373	-.44757	.33731	-.523
=> 29									
	19	.40246	-.51030	-48.390	.11762	.44643	-.47125	.35849	-.549
=> 36									
	20	.42441	-.53485	-48.029	.11990	.46898	-.49476	.37984	-.574
=> 95									
	21	.44635	-.55911	-47.697	.12173	.49137	-.51814	.40134	-.600
=> 07									
	22	.46830	-.58309	-47.392	.12309	.51359	-.54143	.42300	-.624
=> 76									
	23	.49024	-.60683	-47.110	.12398	.53566	-.56464	.44482	-.649
=> 02									
	24	.51219	-.63035	-46.851	.12438	.55756	-.58781	.46681	-.672
=> 88									
	25	.53413	-.65366	-46.611	.12429	.57929	-.61097	.48897	-.696
=> 35									
	26	.55608	-.67678	-46.388	.12369	.60085	-.63412	.51130	-.719
=> 44									
	27	.57802	-.69973	-46.179	.12260	.62225	-.65729	.53379	-.742
=> 18									
	28	.59997	-.72252	-45.980	.12103	.64348	-.68047	.55645	-.764
=> 57									
	29	.62191	-.74515	-45.789	.11897	.66455	-.70367	.57927	-.786
=> 63									
	30	.64385	-.76764	-45.604	.11644	.68545	-.72691	.60226	-.808
=> 37									
	31	.66580	-.78998	-45.424	.11343	.70620	-.75017	.62540	-.829
=> 78									
	32	.68774	-.81218	-45.247	.10996	.72679	-.77347	.64870	-.850
=> 89									
	33	.70969	-.83425	-45.071	.10602	.74722	-.79681	.67216	-.871
=> 68									
	34	.73163	-.85618	-44.895	.10162	.76750	-.82018	.69577	-.892
=> 18									
	35	.75358	-.87798	-44.718	.09677	.78762	-.84359	.71953	-.912
=> 36									
	36	.77552	-.89964	-44.536	.09147	.80760	-.86704	.74344	-.932
=> 24									
	37	.79747	-.92116	-44.349	.08573	.82743	-.89051	.76750	-.951
=> 81									
	38	.81941	-.94254	-44.156	.07955	.84712	-.91400	.79170	-.971
=> 08									
	39	.84136	-.96377	-43.955	.07294	.86667	-.93752	.81604	-.990
=> 03									
	40	.86330	-.98486	-43.749	.06589	.88608	-.96106	.84052	-1.008
=> 66									
	41	.88525	-1.00579	-43.536	.05842	.90537	-.98461	.86513	-1.026
=> 96									
	42	.90719	-1.02656	-43.319	.05054	.92453	-1.00817	.88985	-1.044
=> 94									
	43	.92914	-1.04717	-43.098	.04224	.94357	-1.03175	.91471	-1.062
=> 59									
	44	.95108	-1.06763	-42.873	.03353	.96249	-1.05534	.93967	-1.079
=> 91									

K/14PRINT

=> 90

45 .97302-1.08792-42.645 .02442 .98130-1.07893 .96475-1.096

=> 55

46 .99497-1.10805-42.414 .01492 1.00000-1.10254 .98994-1.113

1

=> 6

NORMALISED PLOT OF SECTION NUMBER

1

DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM

BLADE CHORD = 3.70605E+00

L.E.RADIUS = 1.85302E-02 CENTERED AT X= -1.2087E+00 Y= 1.4829E+00

SECTION AREA= 7.84350E-01

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = 3.22379E-01
IY = 2.65090E-01
IXY =-2.87610E-01

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = 5.82767E-01 (AT 42.156 WITH (X) AXIS)
IPY = 4.70160E-03 (AT 42.156 WITH (Y) AXIS)

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
1	-1.19342E+00	1.49340E+00	-1.22400E+00	1.47246E+00
2	-1.13105E+00	1.41984E+00	-1.17733E+00	1.38775E+00
3	-1.06884E+00	1.34729E+00	-1.13050E+00	1.30400E+00
4	-1.00683E+00	1.27574E+00	-1.08347E+00	1.22124E+00
5	-9.45057E-01	1.20517E+00	-1.03620E+00	1.13949E+00
6	-8.83548E-01	1.13556E+00	-9.88665E-01	1.05879E+00
7	-8.22346E-01	1.06690E+00	-9.40825E-01	9.79171E-01
8	-7.61466E-01	9.99177E-01	-8.92664E-01	9.00653E-01
9	-7.00934E-01	9.32395E-01	-8.44154E-01	8.23273E-01
10	-6.40775E-01	8.66549E-01	-7.95272E-01	7.47063E-01
11	-5.81011E-01	8.01637E-01	-7.45994E-01	6.72059E-01
12	-5.21667E-01	7.37641E-01	-6.96297E-01	5.98306E-01
13	-4.62743E-01	6.74547E-01	-6.46180E-01	5.25824E-01
14	-4.04244E-01	6.12319E-01	-5.95637E-01	4.54633E-01
15	-3.46172E-01	5.50911E-01	-5.44667E-01	3.84743E-01
16	-2.88527E-01	4.90264E-01	-4.93271E-01	3.16155E-01
17	-2.31307E-01	4.30304E-01	-4.41449E-01	2.48864E-01
18	-1.74499E-01	3.70955E-01	-3.89216E-01	1.82846E-01
19	-1.18093E-01	3.12124E-01	-3.36581E-01	1.18070E-01
20	-6.20790E-02	2.53710E-01	-2.83553E-01	5.44972E-02
21	-6.45764E-03	1.95622E-01	-2.30133E-01	-7.92820E-03
22	4.87656E-02	1.37776E-01	-1.76315E-01	-6.92571E-02
23	1.03586E-01	8.01005E-02	-1.22094E-01	-1.29538E-01
24	1.57996E-01	2.25278E-02	-6.74625E-02	-1.88813E-01
25	2.11987E-01	-3.50001E-02	-1.24113E-02	-2.47118E-01
26	2.65557E-01	-9.25245E-02	4.30593E-02	-3.04494E-01
27	3.18715E-01	-1.50072E-01	9.89436E-02	-3.60982E-01
28	3.71462E-01	-2.07665E-01	1.55238E-01	-4.16616E-01
29	4.23802E-01	-2.65317E-01	2.11939E-01	-4.71423E-01
30	4.75740E-01	-3.23041E-01	2.69042E-01	-5.25424E-01
31	5.27282E-01	-3.80846E-01	3.26543E-01	-5.78634E-01
32	5.78432E-01	-4.38737E-01	3.84433E-01	-6.31070E-01
33	6.29196E-01	-4.96718E-01	4.42711E-01	-6.82738E-01
34	6.79577E-01	-5.54789E-01	5.01371E-01	-7.33646E-01
35	7.29581E-01	-6.12948E-01	5.60409E-01	-7.83795E-01

1

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
36	7.79213E-01	-6.71189E-01	6.19818E-01	-8.33186E-01
37	8.28484E-01	-7.29501E-01	6.79589E-01	-8.81817E-01
38	8.77397E-01	-7.87876E-01	7.39717E-01	-9.29677E-01
39	9.25965E-01	-8.46305E-01	8.00191E-01	-9.76753E-01
40	9.74198E-01	-9.04781E-01	8.60999E-01	-1.02304E+00
41	1.02211E+00	-9.63296E-01	9.22131E-01	-1.06852E+00
42	1.06971E+00	-1.02184E+00	9.83570E-01	-1.11319E+00
43	1.11701E+00	-1.08042E+00	1.04531E+00	-1.15704E+00
44	1.16402E+00	-1.13902E+00	1.10734E+00	-1.20007E+00
45	1.21076E+00	-1.19764E+00	1.16965E+00	-1.24228E+00
46	1.25722E+00	-1.25629E+00	1.23222E+00	-1.28365E+00

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-1.22400E+00	1.47246E+00
2	-1.22501E+00	1.47412E+00
3	-1.22584E+00	1.47587E+00
4	-1.22649E+00	1.47770E+00
5	-1.22694E+00	1.47958E+00
6	-1.22719E+00	1.48151E+00
7	-1.22723E+00	1.48345E+00
8	-1.22708E+00	1.48538E+00
9	-1.22672E+00	1.48729E+00
10	-1.22617E+00	1.48915E+00
11	-1.22542E+00	1.49094E+00
12	-1.22449E+00	1.49264E+00
13	-1.22339E+00	1.49424E+00
14	-1.22213E+00	1.49571E+00
15	-1.22072E+00	1.49704E+00
16	-1.21918E+00	1.49822E+00
17	-1.21752E+00	1.49923E+00
18	-1.21577E+00	1.50006E+00
19	-1.21394E+00	1.50071E+00
20	-1.21205E+00	1.50115E+00
21	-1.21013E+00	1.50140E+00
22	-1.20819E+00	1.50145E+00
23	-1.20626E+00	1.50130E+00
24	-1.20435E+00	1.50094E+00
25	-1.20249E+00	1.50039E+00
26	-1.20070E+00	1.49964E+00
27	-1.19900E+00	1.49871E+00
28	-1.19740E+00	1.49761E+00
29	-1.19593E+00	1.49635E+00
30	-1.19460E+00	1.49494E+00
31	-1.19342E+00	1.49340E+00

LEADING EDGE AXIAL DIFFERENCE = -.0618 NEW DELX = .0618

1

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-55.60087	.81446	6.8091
2	.02222	-.03225	-55.26696	.81531	6.6316
3	.04444	-.06411	-54.92662	.81787	6.4441
4	.06667	-.09555	-54.57895	.82214	6.2476
5	.08889	-.12660	-54.22303	.82812	6.0431
6	.11111	-.15723	-53.85784	.83580	5.8318
7	.13333	-.18745	-53.48231	.84520	5.6148
8	.15556	-.21725	-53.09531	.85630	5.3935
9	.17778	-.24663	-52.69563	.86910	5.1690
10	.20000	-.27558	-52.28199	.88362	4.9426
11	.22222	-.30410	-51.85379	.89489	4.7420
12	.24444	-.33217	-51.41387	.89738	4.5932
13	.26667	-.35980	-50.96629	.89107	4.4929
14	.28889	-.38699	-50.51542	.87598	4.4402
15	.31111	-.41375	-50.06600	.85209	4.4372
16	.33333	-.44009	-49.62312	.81940	4.4890
17	.35556	-.46602	-49.19220	.77793	4.6055
18	.37778	-.49157	-48.77903	.72766	4.8027
19	.40000	-.51676	-48.38964	.66860	5.1075
20	.42222	-.54162	-48.02909	.60761	5.5027
21	.44444	-.56618	-47.69704	.55207	5.9410
22	.46667	-.59047	-47.39155	.50200	6.4204
23	.48889	-.61451	-47.11041	.45738	6.9353
24	.51111	-.63832	-46.85122	.41823	7.4751
25	.53333	-.66192	-46.61140	.38454	8.0223
26	.55556	-.68534	-46.38820	.35630	8.5521
27	.57778	-.70858	-46.17873	.33353	9.0318
28	.60000	-.73166	-45.97997	.31622	9.4239
29	.62222	-.75457	-45.78911	.30296	9.7353
30	.64444	-.77734	-45.60435	.29235	9.9890
31	.66667	-.79997	-45.42421	.28439	10.1706
32	.68889	-.82245	-45.24709	.27908	10.2676
33	.71111	-.84480	-45.07140	.27640	10.2713
34	.73333	-.86701	-44.89548	.27638	10.1782
35	.75556	-.88908	-44.71765	.27900	9.9898
36	.77778	-.91102	-44.53617	.28426	9.7132
37	.80000	-.93281	-44.34925	.29217	9.3600
38	.82222	-.95446	-44.15551	.30087	9.0000
39	.84444	-.97596	-43.95507	.30854	8.6875
40	.86667	-.99731	-43.74852	.31519	8.4163
41	.88889	-1.01851	-43.53642	.32082	8.1816
42	.91111	-1.03954	-43.31938	.32542	7.9795
43	.93333	-1.06042	-43.09799	.32901	7.8072
44	.95556	-1.08113	-42.87290	.33156	7.6624
45	.97778	-1.10168	-42.64474	.33310	7.5433
46	1.00000	-1.12206	-42.41418	.33361	7.4488

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-55.60087
2	.20065	-52.26970
3	.40042	-48.38251
4	.60005	-45.97955
5	.79985	-44.35057
6	1.00000	-42.41418

CARTESIAN COORDINATES ON STREAMSURFACE 6

POINT	Z1	X1	Y1	Z2	X2	Y2
1	6.12468	-1.25032	1.47197	6.12629	-1.28073	1.45129
2	6.14796	-1.18829	1.40140	6.15019	-1.23432	1.36929
3	6.17013	-1.12643	1.33159	6.17272	-1.18775	1.28824
4	6.19121	-1.06476	1.26249	6.19398	-1.14098	1.20789
5	6.21121	-1.00331	1.19411	6.21398	-1.09397	1.12828
6	6.23013	-.94211	1.12640	6.23276	-1.04669	1.04947
7	6.24799	-.88121	1.05939	6.25033	-.99910	.97151
8	6.26478	-.82061	.99311	6.26673	-.95118	.89441
9	6.28050	-.76034	.92757	6.28197	-.90291	.81825
10	6.29520	-.70042	.86278	6.29608	-.85426	.74309
11	6.30890	-.64089	.79872	6.30909	-.80520	.66898
12	6.32164	-.58175	.73543	6.32102	-.75572	.59597
13	6.33348	-.52303	.67294	6.33191	-.70580	.52410
14	6.34446	-.46472	.61123	6.34181	-.65546	.45338
15	6.35462	-.40683	.55018	6.35076	-.60467	.38386
16	6.36400	-.34935	.48981	6.35881	-.55346	.31558
17	6.37265	-.29230	.43007	6.36601	-.50181	.24853
18	6.38060	-.23565	.37090	6.37240	-.44974	.18270
19	6.38788	-.17939	.31218	6.37804	-.39727	.11803
20	6.39451	-.12352	.25378	6.38297	-.34439	.05453
21	6.40052	-.06804	.19569	6.38723	-.29113	-.00783
22	6.40591	-.01296	.13780	6.39086	-.23746	-.06911
23	6.41070	.04173	.08006	6.39390	-.18338	-.12934
24	6.41489	.09601	.02238	6.39638	-.12889	-.18864
25	6.41849	.14988	-.03530	6.39832	-.07398	-.24696
26	6.42151	.20333	-.09299	6.39976	-.01865	-.30434
27	6.42395	.25637	-.15071	6.40071	.03710	-.36082
28	6.42580	.30900	-.20848	6.40121	.09326	-.41645
29	6.42708	.36123	-.26631	6.40126	.14983	-.47130
30	6.42778	.41306	-.32423	6.40090	.20681	-.52532
31	6.42791	.46449	-.38223	6.40014	.26418	-.57853
32	6.42746	.51554	-.44029	6.39900	.32194	-.63096
33	6.42645	.56620	-.49842	6.39751	.38010	-.68262
34	6.42485	.61648	-.55662	6.39568	.43864	-.73353
35	6.42269	.66639	-.61488	6.39354	.49755	-.78365
36	6.41996	.71592	-.67318	6.39110	.55684	-.83299
37	6.41666	.76510	-.73151	6.38838	.61649	-.88157
38	6.41279	.81392	-.78985	6.38541	.67650	-.92936
39	6.40836	.86239	-.84819	6.38221	.73686	-.97636
40	6.40338	.91053	-.90652	6.37880	.79755	-1.02254
41	6.39783	.95835	-.96485	6.37519	.85857	-1.06791
42	6.39173	1.00587	-1.02313	6.37142	.91989	-1.11244
43	6.38507	1.05308	-1.08137	6.36748	.98151	-1.15618
44	6.37787	1.10000	-1.13955	6.36342	1.04342	-1.19906
45	6.37012	1.14665	-1.19767	6.35924	1.10561	-1.24111
46	6.36185	1.19303	-1.25564	6.35497	1.16807	-1.28230

1

POINT	ZSEMI	XSEMI	YSEMI
1	6.12629	-1.28073	1.45129
2	6.12580	-1.28173	1.45290
3	6.12531	-1.28256	1.45459
4	6.12481	-1.28320	1.45637
5	6.12433	-1.28365	1.45820
6	6.12386	-1.28390	1.46007
7	6.12340	-1.28394	1.46195
8	6.12297	-1.28379	1.46384
9	6.12256	-1.28343	1.46569
10	6.12219	-1.28288	1.46751
11	6.12185	-1.28214	1.46925
12	6.12155	-1.28122	1.47092
13	6.12130	-1.28012	1.47248
14	6.12109	-1.27887	1.47392
15	6.12093	-1.27747	1.47523
16	6.12082	-1.27593	1.47638
17	6.12075	-1.27429	1.47738
18	6.12075	-1.27255	1.47820
19	6.12079	-1.27073	1.47884
20	6.12089	-1.26885	1.47930
21	6.12103	-1.26694	1.47955
22	6.12123	-1.26501	1.47961
23	6.12147	-1.26309	1.47948
24	6.12176	-1.26119	1.47914
25	6.12209	-1.25934	1.47862
26	6.12245	-1.25756	1.47792
27	6.12285	-1.25587	1.47704
28	6.12328	-1.25428	1.47600
29	6.12373	-1.25282	1.47480
30	6.12420	-1.25149	1.47345

```
   31    6.12468  -1.25032   1.47197

 STREAMSURFACE  7  ITERATION  1  DEVIATION =  3.647  SOLIDITY = 1.5838
                   ITERATION  2  DEVIATION =  3.715  SOLIDITY = 1.4577
                   ITERATION  2  DEVIATION =  3.715  SOLIDITY = 1.4577

 POINT  FRAC. M       Y     Y-D(DEG)     Y-DD   R OF CURV

    1    .00000    .00000 -58.02584    .68089    9.8908
    2    .02222   -.03543 -57.78089    .68249    9.6680
    3    .04444   -.07052 -57.53139    .68727    9.4047
    4    .06667   -.10528 -57.27607    .69523    9.1046
    5    .08889   -.13969 -57.01355    .70638    8.7722
    6    .11111   -.17375 -56.74239    .72072    8.4126
    7    .13333   -.20745 -56.46107    .73824    8.0315
    8    .15556   -.24080 -56.16797    .75895    7.6345
    9    .17778   -.27376 -55.86139    .78285    7.2273
   10    .20000   -.30634 -55.53951    .80993    6.8151
   11    .22222   -.33852 -55.20121    .83389    6.4518
   12    .24444   -.37029 -54.84919    .84728    6.1846
   13    .26667   -.40164 -54.48743    .85010    6.0016
   14    .28889   -.43257 -54.12023    .84235    5.8969
   15    .31111   -.46308 -53.75221    .82402    5.8706
   16    .33333   -.49319 -53.38833    .79512    5.9290

 POINT  FRAC. M       Y     Y-D(DEG)     Y-DD   R OF CURV

   17    .35556   -.52291 -53.03386    .75565    6.0858
   18    .37778   -.55225 -52.69442    .70560    6.3662
   19    .40000   -.58125 -52.37588    .64498    6.8146
   20    .42222   -.60992 -52.08326    .58117    7.4147
   21    .44444   -.63831 -51.81649    .52281    8.0967
   22    .46667   -.66644 -51.57390    .46989    8.8648
   23    .48889   -.69434 -51.35364    .42242    9.7193
   24    .51111   -.72203 -51.15366    .38040   10.6529
   25    .53333   -.74954 -50.97179    .34383   11.6478
   26    .55556   -.77687 -50.80569    .31271   12.6707
   27    .57778   -.80405 -50.65294    .28704   13.6694
   28    .60000   -.83108 -50.51101    .26682   14.5730
   29    .62222   -.85799 -50.37742    .25118   15.3500
   30    .64444   -.88477 -50.25028    .23918   15.9910
   31    .66667   -.91143 -50.12778    .23084   16.4423
   32    .68889   -.93797 -50.00808    .22614   16.6588
   33    .71111   -.96441 -49.88929    .22509   16.6133
   34    .73333   -.99073 -49.76952    .22768   16.3023
   35    .75556  -1.01695 -49.64678    .23393   15.7473
   36    .77778  -1.04304 -49.51910    .24382   14.9903
   37    .80000  -1.06902 -49.38443    .25736   14.0851
   38    .82222  -1.09486 -49.24116    .27185   13.2184
   39    .84444  -1.12058 -49.08961    .28464   12.5091
   40    .86667  -1.14615 -48.93058    .29572   11.9255
   41    .88889  -1.17158 -48.76486    .30510   11.4447
   42    .91111  -1.19686 -48.59330    .31277   11.0505
   43    .93333  -1.22198 -48.41673    .31874   10.7308
   44    .95556  -1.24694 -48.23605    .32300   10.4772
   45    .97778  -1.27175 -48.05214    .32556   10.2838
   46   1.00000  -1.29639 -47.86592    .32641   10.1466

 DATA POINTS

 POINT  FRAC. M  Y-D(DEG)

    1    .00000 -58.02584
    2    .20093 -55.52562
    3    .40088 -52.36377
    4    .60035 -50.50882
    5    .79993 -49.38488
    6   1.00000 -47.86592
1  STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER  7
   ***********************************************

   BETA1 =-58.026   (BLADE INLET ANGLE)
   BETA2 =-47.866   (BLADE OUTLET ANGLE)
   YZERO =  .00500  (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
   T     =  .07970  (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
   YONE  =  .00500  (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
   Z     =   .5500  (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
   CORD  =  2.3099  (MERIDIONAL CHORD OF SECTION)

 NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
 BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
 ***************************************************

   BLADE CHORD     = 1.6222

   STAGGER ANGLE   =-52.354

   CAMBER ANGLE    =-10.160

        SECTION AREA   = .14390
        LOCATION OF CENTROID RELATIVE TO LEADING EDGE

              XBAR =  .49644
              YBAR = -.67963

        SECOND MOMENTS OF AREA ABOUT CENTROID

              IX   =  .01282
              IY   =  .00789
              IXY  = -.00991

        ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS = 38.026

        PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

              IPX  = .02057       (AT 38.026 WITH (X) AXIS)
              IPY  = .00015       (AT 38.026 WITH (Y) AXIS)

       POINT        M E A N L I N E   D A T A        SURFACE COORDINATE DATA
       NUMBER     X       Y     ANGLE THICKNESS     X1      Y1      X2     Y2

         1      .00811  .00000-58.026  .01622    .01499  .00430  .00123 -.004
 => 30
         2      .03002 -.03493-57.781  .02408    .04021 -.02851  .01983 -.041
 => 35
         3      .05193 -.06953-57.531  .03185    .06536 -.06098  .03849 -.078
 => 08
         4      .07384 -.10379-57.276  .03950    .09045 -.09311  .05722 -.114
 => 47
         5      .09574 -.13771-57.014  .04701    .11546 -.12492  .07603 -.150
 => 51
         6      .11765 -.17130-56.742  .05434    .14037 -.15640  .09493 -.186
 => 19
         7      .13956 -.20452-56.461  .06145    .16517 -.18755  .11395 -.221
 => 50
         8      .16147 -.23739-56.168  .06832    .18985 -.21838  .13309 -.256
 => 41
         9      .18338 -.26989-55.861  .07493    .21439 -.24887  .15237 -.290
 => 92
        10      .20529 -.30201-55.540  .08126    .23878 -.27902  .17179 -.325
 => 00
        11      .22719 -.33374-55.201  .08727    .26303 -.30883  .19136 -.358
 => 64
        12      .24910 -.36506-54.849  .09294    .28710 -.33830  .21111 -.391
 => 81
        13      .27101 -.39596-54.487  .09826    .31100 -.36742  .23102 -.424
 => 50
1
       POINT        M E A N L I N E   D A T A        SURFACE COORDINATE DATA
       NUMBER     X       Y     ANGLE THICKNESS     X1      Y1      X2     Y2

        14      .29292 -.42646-54.120  .10321    .33473 -.39621  .25111 -.456
 => 70
        15      .31483 -.45654-53.752  .10778    .35829 -.42468  .27137 -.488
 => 40
        16      .33674 -.48622-53.388  .11194    .38166 -.45285  .29181 -.519
 => 60
        17      .35864 -.51552-53.034  .11568    .40486 -.48074  .31243 -.550
 => 30
        18      .38055 -.54445-52.694  .11899    .42788 -.50839  .33323 -.580
 => 51
        19      .40246 -.57304-52.376  .12187    .45072 -.53584  .35420 -.610
 => 23
        20      .42437 -.60131-52.083  .12429    .47340 -.56312  .37534 -.639
 => 50
        21      .44628 -.62930-51.816  .12625    .49590 -.59027  .39666 -.668
 => 32
        22      .46819 -.65703-51.574  .12774    .51822 -.61733  .41815 -.696
 => 73
        23      .49009 -.68454-51.354  .12874    .54037 -.64434  .43982 -.724
 => 73
        24      .51200 -.71183-51.154  .12924    .56233 -.67130  .46168 -.752
 => 37
        25      .53391 -.73895-50.972  .12922    .58410 -.69826  .48372 -.779
 => 63
        26      .55582 -.76589-50.806  .12868    .60568 -.72523  .50595 -.806
 => 56
        27      .57773 -.79269-50.653  .12764    .62708 -.75223  .52838 -.833
 => 15
        28      .59964 -.81934-50.511  .12608    .64829 -.77925  .55098 -.859
 => 43
        29      .62154 -.84587-50.377  .12402    .66931 -.80632  .57378 -.885
 => 41
        30      .64345 -.87227-50.250  .12146    .69015 -.83343  .59676 -.911
 => 10
        31      .66536 -.89855-50.128  .11841    .71080 -.86060  .61992 -.936
 => 51

        32      .68727 -.92472-50.008  .11487    .73127 -.88781  .64327 -.961
 => 64
        33      .70918 -.95079-49.889  .11084    .75156 -.91508  .66679 -.986
 => 49
        34      .73109 -.97674-49.770  .10633    .77167 -.94240  .69050-1.011
 => 07
        35      .75299-1.00258-49.647  .10133    .79160 -.96977  .71438-1.035
 => 39
        36      .77490-1.02831-49.519  .09586    .81136 -.99719  .73844-1.059
 => 42
        37      .79681-1.05391-49.384  .08993    .83094-1.02464  .76268-1.083
 => 19
        38      .81872-1.07940-49.241  .08352    .85035-1.05213  .78708-1.106
 => 66
        39      .84063-1.10475-49.090  .07666    .86959-1.07965  .81166-1.129
 => 85
        40      .86254-1.12996-48.931  .06934    .88868-1.10718  .83640-1.152
 => 74
        41      .88444-1.15503-48.765  .06158    .90760-1.13473  .86129-1.175
 => 32
        42      .90635-1.17995-48.593  .05337    .92637-1.16230  .88634-1.197
 => 60
        43      .92826-1.20472-48.417  .04473    .94499-1.18987  .91153-1.219
 => 56
        44      .95017-1.22933-48.236  .03565    .96346-1.21746  .93687-1.241
 => 20
        45      .97208-1.25378-48.052  .02615    .98180-1.24504  .96235-1.262
 => 52
        46      .99398-1.27808-47.866  .01622   1.00000-1.27264  .98797-1.283
 => 52
1                                        NORMALISED PLOT OF SECTION NUMBER
 => 7
1       DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
        *********************************************************************

          BLADE CHORD = 3.74724E+00

          L.E.RADIUS  = 1.87362E-02  CENTERED AT X= -1.1280E+00 Y=  1.5699E+00

          SECTION AREA= 7.67823E-01

          SECOND MOMENTS OF AREA ABOUT CENTROID

             IX    = 3.64882E-01
             IY    = 2.24757E-01
             IXY   =-2.82108E-01

          PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

             IPX   = 5.85498E-01  (AT 38.026 WITH (X) AXIS)
             IPY   = 4.14136E-03  (AT 38.026 WITH (Y) AXIS)

       PT     SURFACE----------ONE         SURFACE----------TWO
       NO         X            Y              X            Y

        1  -1.11209E+00  1.57979E+00  -1.14388E+00  1.55995E+00
        2  -1.05385E+00  1.50401E+00  -1.10091E+00  1.47436E+00
        3  -9.95740E-01  1.42902E+00  -1.05781E+00  1.38952E+00
        4  -9.37785E-01  1.35479E+00  -1.01455E+00  1.30546E+00
        5  -8.80022E-01  1.28132E+00  -9.71106E-01  1.22220E+00
        6  -8.22480E-01  1.20861E+00  -9.27435E-01  1.13978E+00
        7  -7.65200E-01  1.13665E+00  -8.83503E-01  1.05823E+00
        8  -7.08200E-01  1.06545E+00  -8.39291E-01  9.77584E-01
        9  -6.51509E-01  9.95011E-01  -7.94769E-01  8.97876E-01
       10  -5.95154E-01  9.25355E-01  -7.49912E-01  8.19149E-01
       11  -5.39159E-01  8.56494E-01  -7.04695E-01  7.41449E-01
       12  -4.83552E-01  7.88429E-01  -6.59091E-01  6.64826E-01
       13  -4.28336E-01  7.21159E-01  -6.13094E-01  5.89311E-01
       14  -3.73523E-01  6.54663E-01  -5.66695E-01  5.14933E-01
       15  -3.19118E-01  5.88907E-01  -5.19889E-01  4.41708E-01
       16  -2.65123E-01  5.23844E-01  -4.72671E-01  3.69640E-01
       17  -2.11544E-01  4.59411E-01  -4.25038E-01  2.98730E-01
       18  -1.58371E-01  3.95538E-01  -3.76998E-01  2.28956E-01
       19  -1.05600E-01  3.32142E-01  -3.28558E-01  1.60291E-01
       20  -5.32244E-02  2.69125E-01  -2.79721E-01  9.26962E-02
       21  -1.24890E-03  2.06401E-01  -2.30485E-01  2.61172E-02
       22   5.03187E-02  1.43889E-01  -1.80840E-01 -3.94968E-02
       23   1.01472E-01  8.15187E-02  -1.30782E-01 -1.04195E-01
       24   1.52201E-01  1.92252E-02  -8.02982E-02 -1.68019E-01
       25   2.02494E-01 -4.30490E-02  -2.93791E-02 -2.31005E-01
       26   2.52348E-01 -1.05347E-01   2.19790E-02 -2.93193E-01
       27   3.01768E-01 -1.67698E-01   7.37716E-02 -3.54624E-01
       28   3.50756E-01 -2.30126E-01   1.25996E-01 -4.15331E-01
       29   3.99314E-01 -2.92648E-01   1.78649E-01 -4.75344E-01
       30   4.47446E-01 -3.55277E-01   2.31729E-01 -5.34684E-01
       31   4.95154E-01 -4.18022E-01   2.85234E-01 -5.93369E-01
       32   5.42442E-01 -4.80887E-01   3.39158E-01 -6.51414E-01
```

K/14PRINT

33	5.89311E-01	-5.43876E-01	3.93501E-01	-7.08826E-01
34	6.35765E-01	-6.06985E-01	4.48259E-01	-7.65611E-01
35	6.81806E-01	-6.70209E-01	5.03430E-01	-8.21768E-01

1

PT	SURFACE----------ONE		SURFACE----------TWO	
NO	X	Y	X	Y
36	7.27439E-01	-7.33538E-01	5.59009E-01	-8.77293E-01
37	7.72671E-01	-7.96956E-01	6.14990E-01	-9.32180E-01
38	8.17507E-01	-8.60450E-01	6.71366E-01	-9.86412E-01
39	8.61956E-01	-9.24005E-01	7.28128E-01	-1.03997E+00
40	9.06029E-01	-9.87610E-01	7.85267E-01	-1.09284E+00
41	9.49737E-01	-1.05125E+00	8.42772E-01	-1.14501E+00
42	9.93094E-01	-1.11492E+00	9.00627E-01	-1.19646E+00
43	1.03611E+00	-1.17862E+00	9.58826E-01	-1.24719E+00
44	1.07879E+00	-1.24233E+00	1.01736E+00	-1.29718E+00
45	1.12114E+00	-1.30606E+00	1.07622E+00	-1.34643E+00
46	1.16318E+00	-1.36980E+00	1.13539E+00	-1.39494E+00

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-1.14388E+00	1.55995E+00
2	-1.14483E+00	1.56167E+00
3	-1.14560E+00	1.56347E+00
4	-1.14617E+00	1.56535E+00
5	-1.14654E+00	1.56727E+00
6	-1.14671E+00	1.56923E+00
7	-1.14668E+00	1.57119E+00
8	-1.14644E+00	1.57313E+00
9	-1.14600E+00	1.57504E+00
10	-1.14536E+00	1.57690E+00
11	-1.14453E+00	1.57868E+00
12	-1.14352E+00	1.58036E+00
13	-1.14234E+00	1.58192E+00
14	-1.14100E+00	1.58336E+00
15	-1.13952E+00	1.58464E+00
16	-1.13791E+00	1.58577E+00
17	-1.13619E+00	1.58672E+00
18	-1.13439E+00	1.58748E+00
19	-1.13251E+00	1.58805E+00
20	-1.13059E+00	1.58843E+00
21	-1.12863E+00	1.58860E+00
22	-1.12667E+00	1.58856E+00
23	-1.12473E+00	1.58832E+00
24	-1.12282E+00	1.58788E+00
25	-1.12096E+00	1.58724E+00
26	-1.11918E+00	1.58641E+00
27	-1.11750E+00	1.58540E+00
28	-1.11594E+00	1.58422E+00
29	-1.11450E+00	1.58288E+00
30	-1.11322E+00	1.58140E+00
31	-1.11209E+00	1.57979E+00

LEADING EDGE AXIAL DIFFERENCE = -.0710 NEW DELX = .0710

1

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-58.02584	.68089	9.8908
2	.02222	-.03543	-57.78089	.68249	9.6680
3	.04444	-.07052	-57.53139	.68727	9.4047
4	.06667	-.10528	-57.27607	.69523	9.1046
5	.08889	-.13969	-57.01355	.70638	8.7722
6	.11111	-.17375	-56.74239	.72072	8.4126
7	.13333	-.20745	-56.46107	.73824	8.0315
8	.15556	-.24080	-56.16797	.75895	7.6345
9	.17778	-.27376	-55.86139	.78285	7.2273
10	.20000	-.30634	-55.53951	.80993	6.8151
11	.22222	-.33852	-55.20121	.83389	6.4518
12	.24444	-.37029	-54.84919	.84728	6.1846
13	.26667	-.40164	-54.48743	.85010	6.0016
14	.28889	-.43257	-54.12023	.84235	5.8969
15	.31111	-.46308	-53.75221	.82402	5.8706
16	.33333	-.49319	-53.38833	.79512	5.9290
17	.35556	-.52291	-53.03386	.75565	6.0858
18	.37778	-.55225	-52.69442	.70560	6.3662
19	.40000	-.58125	-52.37588	.64498	6.8146
20	.42222	-.60992	-52.08326	.58117	7.4147
21	.44444	-.63831	-51.81649	.52281	8.0967
22	.46667	-.66644	-51.57390	.46989	8.8648
23	.48889	-.69434	-51.35364	.42242	9.7193
24	.51111	-.72203	-51.15366	.38040	10.6529
25	.53333	-.74954	-50.97179	.34383	11.6478
26	.55556	-.77687	-50.80569	.31271	12.6707
27	.57778	-.80405	-50.65294	.28704	13.6694
28	.60000	-.83108	-50.51101	.26682	14.5730
29	.62222	-.85799	-50.37742	.25118	15.3500
30	.64444	-.88477	-50.25028	.23918	15.9910
31	.66667	-.91143	-50.12778	.23084	16.4423
32	.68889	-.93797	-50.00808	.22614	16.6588
33	.71111	-.96441	-49.88929	.22509	16.6133
34	.73333	-.99073	-49.76952	.22768	16.3023
35	.75556	-1.01695	-49.64678	.23393	15.7473
36	.77778	-1.04304	-49.51910	.24382	14.9903
37	.80000	-1.06902	-49.38443	.25736	14.0851
38	.82222	-1.09486	-49.24116	.27185	13.2184
39	.84444	-1.12058	-49.08961	.28464	12.5091
40	.86667	-1.14615	-48.93058	.29572	11.9255
41	.88889	-1.17158	-48.76486	.30510	11.4447
42	.91111	-1.19686	-48.59330	.31277	11.0505
43	.93333	-1.22198	-48.41673	.31874	10.7308
44	.95556	-1.24694	-48.23605	.32300	10.4772
45	.97778	-1.27175	-48.05214	.32556	10.2838
46	1.00000	-1.29639	-47.86592	.32641	10.1466

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-58.02584
2	.20093	-55.52562
3	.40088	-52.36377
4	.60035	-50.50882
5	.79993	-49.38488
6	1.00000	-47.86592

CARTESIAN COORDINATES ON STREAMSURFACE 7

POINT	Z1	X1	Y1	Z2	X2	Y2
1	6.77175	-1.17923	1.56022	6.77313	-1.21087	1.54060
2	6.79386	-1.12125	1.48712	6.79570	-1.16810	1.45744
3	6.81496	-1.06340	1.41459	6.81705	-1.12519	1.37503
4	6.83506	-1.00570	1.34257	6.83723	-1.08213	1.29315
5	6.85417	-.94819	1.27109	6.85628	-1.03888	1.21182
6	6.87230	-.89089	1.20011	6.87420	-.99540	1.13112
7	6.88945	-.83384	1.12966	6.89102	-.95166	1.05108
8	6.90562	-.77706	1.05977	6.90675	-.90763	.97173
9	6.92080	-.72058	.99048	6.92142	-.86329	.89315
10	6.93502	-.66442	.92179	6.93504	-.81861	.81540
11	6.94831	-.60861	.85372	6.94762	-.77357	.73852
12	6.96069	-.55318	.78632	6.95920	-.72813	.66260
13	6.97218	-.49813	.71962	6.96981	-.68230	.58766
14	6.98282	-.44347	.65359	6.97946	-.63606	.51372
15	6.99264	-.38921	.58817	6.98821	-.58940	.44085
16	7.00167	-.33535	.52337	6.99608	-.54233	.36906
17	7.00994	-.28191	.45916	7.00311	-.49484	.29838
18	7.01747	-.22886	.39544	7.00935	-.44693	.22879
19	7.02430	-.17621	.33215	7.01482	-.39862	.16022
20	7.03043	-.12394	.26917	7.01955	-.34991	.09269
21	7.03589	-.07208	.20645	7.02359	-.30080	.02617
22	7.04069	-.02061	.14392	7.02696	-.25127	-.03940
23	7.04484	.03045	.08149	7.02969	-.20133	-.10406
24	7.04833	.08108	.01911	7.03181	-.15096	-.16788
25	7.05119	.13129	-.04327	7.03333	-.10015	-.23086
26	7.05341	.18106	-.10569	7.03429	-.04889	-.29305
27	7.05499	.23040	-.16816	7.03469	.00280	-.35447
28	7.05593	.27931	-.23071	7.03455	.05493	-.41515
29	7.05623	.32780	-.29336	7.03390	.10749	-.47514
30	7.05589	.37587	-.35611	7.03274	.16048	-.53446
31	7.05490	.42351	-.41895	7.03110	.21389	-.59310
32	7.05327	.47074	-.48189	7.02898	.26773	-.65108
33	7.05098	.51755	-.54491	7.02640	.32200	-.70840
34	7.04805	.56395	-.60802	7.02336	.37668	-.76509
35	7.04446	.60994	-.67121	7.01989	.43178	-.82112
36	7.04023	.65553	-.73444	7.01599	.48729	-.87648
37	7.03534	.70072	-.79770	7.01168	.54320	-.93116
38	7.02982	.74551	-.86098	7.00697	.59951	-.98516
39	7.02366	.78992	-.92424	7.00187	.65622	-1.03844
40	7.01689	.83396	-.98747	6.99642	.71330	-1.09098
41	7.00949	.87763	-1.05068	6.99062	.77075	-1.14278
42	7.00149	.92095	-1.11383	6.98452	.82856	-1.19380
43	6.99288	.96393	-1.17691	6.97813	.88671	-1.24407
44	6.98368	1.00658	-1.23992	6.97150	.94520	-1.29357
45	6.97390	1.04890	-1.30284	6.96463	1.00401	-1.34227
46	6.96355	1.09091	-1.36557	6.95758	1.06314	-1.39017

1

POINT	ZSEMI	XSEMI	YSEMI
1	6.77313	-1.21087	1.54060
2	6.77266	-1.21182	1.54226
3	6.77218	-1.21258	1.54402
4	6.77171	-1.21315	1.54584
5	6.77125	-1.21352	1.54772
6	6.77080	-1.21369	1.54962
7	6.77036	-1.21365	1.55153
8	6.76995	-1.21342	1.55343
9	6.76956	-1.21298	1.55530
10	6.76921	-1.21234	1.55711
11	6.76889	-1.21151	1.55885
12	6.76861	-1.21051	1.56049
13	6.76837	-1.20933	1.56202
14	6.76818	-1.20800	1.56343
15	6.76803	-1.20653	1.56469
16	6.76794	-1.20493	1.56580
17	6.76789	-1.20322	1.56674
18	6.76789	-1.20142	1.56749
19	6.76794	-1.19955	1.56806
20	6.76804	-1.19764	1.56844
21	6.76819	-1.19569	1.56862
22	6.76839	-1.19374	1.56859
23	6.76863	-1.19180	1.56837
24	6.76891	-1.18990	1.56796
25	6.76923	-1.18806	1.56736
26	6.76959	-1.18629	1.56657
27	6.76998	-1.18461	1.56561
28	6.77039	-1.18306	1.56448
29	6.77083	-1.18163	1.56320
30	6.77129	-1.18035	1.56177
31	6.77175	-1.17923	1.56022

STREAMSURFACE 8 ITERATION 1 DEVIATION = 3.127 SOLIDITY = 1.4357
ITERATION 2 DEVIATION = 3.174 SOLIDITY = 1.3312
ITERATION 2 DEVIATION = 3.174 SOLIDITY = 1.3312

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-59.97257	.43719	18.2532
2	.02222	-.03834	-59.83228	.44010	17.9041
3	.04444	-.07646	-59.68890	.44884	17.3310
4	.06667	-.11436	-59.54048	.46340	16.5654
5	.08889	-.15203	-59.38496	.48379	15.6498
6	.11111	-.18946	-59.22025	.51000	14.6315
7	.13333	-.22664	-59.04412	.54203	13.5560
8	.15556	-.26356	-58.85426	.57989	12.4635
9	.17778	-.30018	-58.64825	.62357	11.3861
10	.20000	-.33650	-58.42353	.67308	10.3477
11	.22222	-.37248	-58.17828	.72004	9.4738
12	.24444	-.40811	-57.91509	.75381	8.8516
13	.26667	-.44337	-57.63809	.77435	8.4209
14	.28889	-.47825	-57.35163	.78165	8.1481
15	.31111	-.51274	-57.06038	.77572	8.0183
16	.33333	-.54684	-56.76928	.75656	8.0313

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
17	.35556	-.58058	-56.48361	.72417	8.2022
18	.37778	-.61396	-56.20893	.67854	8.5666
19	.40000	-.64700	-55.95113	.61968	9.1939
20	.42222	-.67974	-55.71526	.55601	10.0620
21	.44444	-.71220	-55.50132	.49830	11.0452
22	.46667	-.74442	-55.30762	.44658	12.1444
23	.48889	-.77641	-55.13228	.40086	13.3518
24	.51111	-.80821	-54.97331	.36114	14.6448
25	.53333	-.83983	-54.82860	.32742	15.9800
26	.55556	-.87129	-54.69591	.29969	17.2874
27	.57778	-.90260	-54.57293	.27797	18.4703
28	.60000	-.93377	-54.45726	.26224	19.4126
29	.62222	-.96481	-54.34661	.25124	20.0988
30	.64444	-.99573	-54.23944	.24355	20.5721
31	.66667	-1.02652	-54.13433	.23916	20.7904
32	.68889	-1.05720	-54.02990	.23808	20.7281
33	.71111	-1.08776	-53.92469	.24030	20.3819
34	.73333	-1.11820	-53.81723	.24582	19.7712
35	.75556	-1.14852	-53.70602	.25464	18.9352
36	.77778	-1.17872	-53.58952	.26676	17.9254
37	.80000	-1.20878	-53.46616	.28219	16.7980
38	.82222	-1.23871	-53.33472	.29830	15.7441
39	.84444	-1.26848	-53.19554	.31252	14.8819
40	.86667	-1.29810	-53.04934	.32484	14.1722
41	.88889	-1.32757	-52.89688	.33526	13.5869
42	.91111	-1.35686	-52.73891	.34379	13.1061
43	.93333	-1.38599	-52.57623	.35043	12.7153
44	.95556	-1.41494	-52.40964	.35516	12.4038
45	.97778	-1.44372	-52.23997	.35801	12.1646
46	1.00000	-1.47232	-52.06808	.35895	11.9927

DATA POINTS

POINT FRAC. M Y-D(DEG)

```
      1    .00000 -59.97257
      2    .20140 -58.40871
      3    .40143 -55.93528
      4    .60071 -54.45367
      5    .79992 -53.46664
      6   1.00000 -52.06808
1    STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER  8
     ****************************************************

     BETA1 =-59.973  (BLADE INLET ANGLE)
     BETA2 =-52.068  (BLADE OUTLET ANGLE)
     YZERO =  .00500  (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
     T     =  .07050  (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
     YONE  =  .00500  (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
     Z     =   .5500  (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
     CORD  = 2.1144   (MERIDIONAL CHORD OF SECTION)

    NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
    BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
    ****************************************************

     BLADE CHORD     = 1.7606

     STAGGER ANGLE   =-55.816

     CAMBER ANGLE    = -7.904

     SECTION AREA    = .15113
     LOCATION OF CENTROID RELATIVE TO LEADING EDGE

           XBAR =  .49827
           YBAR = -.76380

     SECOND MOMENTS OF AREA ABOUT CENTROID

           IX   =  .01759
           IY   =  .00833
           IXY  = -.01196

     ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS = 34.420

     PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

           IPX  = .02578      (AT 34.420 WITH (X) AXIS)
           IPY  = .00014      (AT 34.420 WITH (Y) AXIS)

    POINT        M E A N L I N E   D A T A           SURFACE COORDINATE DATA
    NUMBER     X       Y     ANGLE THICKNESS      X1      Y1      X2      Y2

      1     .00880  .00000-59.973  .01761     .01642  .00441  .00118 -.004
=> 41
      2     .03068 -.03774-59.832  .02483     .04141 -.03150  .01994 -.043
=> 97
      3     .05255 -.07526-59.689  .03199     .06635 -.06719  .03874 -.083
=> 33
      4     .07442 -.11256-59.540  .03906     .09125 -.10266  .05759 -.122
=> 46
      5     .09629 -.14964-59.385  .04601     .11609 -.13792  .07649 -.161
=> 35
      6     .11816 -.18648-59.220  .05282     .14086 -.17296  .09547 -.200
=> 00
      7     .14004 -.22307-59.044  .05946     .16553 -.20778  .11454 -.238
=> 37
      8     .16191 -.25941-58.854  .06589     .19010 -.24237  .13371 -.276
=> 44
      9     .18378 -.29545-58.648  .07209     .21456 -.27670  .15300 -.314
=> 21
     10     .20565 -.33120-58.424  .07804     .23890 -.31077  .17241 -.351
=> 63
     11     .22753 -.36662-58.178  .08372     .26309 -.34455  .19196 -.388
=> 69
     12     .24940 -.40169-57.915  .08909     .28714 -.37802  .21166 -.425
=> 35
     13     .27127 -.43639-57.638  .09414     .31103 -.41119  .23151 -.461
=> 58
1
    POINT        M E A N L I N E   D A T A           SURFACE COORDINATE DATA
    NUMBER     X       Y     ANGLE THICKNESS      X1      Y1      X2      Y2

     14     .29314 -.47072-57.352  .09884     .33476 -.44405  .25153 -.497
=> 38
     15     .31502 -.50466-57.060  .10320     .35832 -.47661  .27171 -.532
=> 72
     16     .33689 -.53823-56.769  .10718     .38171 -.50887  .29206 -.567
=> 60
     17     .35876 -.57144-56.484  .11077     .40493 -.54086  .31259 -.602
=> 02
     18     .38063 -.60429-56.209  .11396     .42799 -.57260  .33328 -.635
```

```
=> 98
     19     .40250 -.63681-55.951  .11674     .45087 -.60413  .35414 -.669
=> 49
     20     .42438 -.66904-55.715  .11909     .47358 -.63549  .37518 -.702
=> 58
     21     .44625 -.70099-55.501  .12101     .49612 -.66672  .39638 -.735
=> 26
     22     .46812 -.73270-55.308  .12249     .51848 -.69784  .41777 -.767
=> 55
     23     .48999 -.76419-55.132  .12350     .54066 -.72889  .43933 -.799
=> 49
     24     .51187 -.79548-54.973  .12403     .56265 -.75989  .46108 -.831
=> 08
     25     .53374 -.82661-54.829  .12408     .58445 -.79087  .48302 -.862
=> 34
     26     .55561 -.85757-54.696  .12364     .60606 -.82184  .50516 -.893
=> 29
     27     .57748 -.88838-54.573  .12270     .62747 -.85282  .52749 -.923
=> 95
     28     .59936 -.91906-54.457  .12128     .64870 -.88381  .55001 -.954
=> 31
     29     .62123 -.94962-54.347  .11938     .66973 -.91482  .57273 -.984
=> 41
     30     .64310 -.98005-54.239  .11700     .69057 -.94586  .59563-1.014
=> 23
     31     .66497-1.01036-54.134  .11415     .71122 -.97692  .61872-1.043
=> 80
     32     .68684-1.04055-54.030  .11083     .73169-1.00801  .64200-1.073
=> 10
     33     .70872-1.07063-53.925  .10704     .75197-1.03912  .66546-1.102
=> 15
     34     .73059-1.10060-53.817  .10279     .77207-1.07025  .68910-1.130
=> 94
     35     .75246-1.13044-53.706  .09809     .79199-1.10141  .71293-1.159
=> 47
     36     .77433-1.16016-53.590  .09293     .81173-1.13258  .73694-1.187
=> 74
     37     .79621-1.18975-53.466  .08732     .83129-1.16376  .76112-1.215
=> 74
     38     .81808-1.21920-53.335  .08128     .85068-1.19493  .78548-1.243
=> 47
     39     .83995-1.24851-53.196  .07479     .86989-1.22611  .81001-1.270
=> 91
     40     .86182-1.27766-53.049  .06787     .88894-1.25727  .83470-1.298
=> 06
     41     .88370-1.30666-52.897  .06052     .90783-1.28841  .85956-1.324
=> 92
     42     .90557-1.33550-52.739  .05276     .92656-1.31953  .88457-1.351
=> 47
     43     .92744-1.36416-52.576  .04458     .94514-1.35062  .90974-1.377
=> 71
     44     .94931-1.39266-52.410  .03599     .96357-1.38168  .93505-1.403
=> 64
     45     .97118-1.42099-52.240  .02700     .98186-1.41272  .96051-1.429
=> 25
     46     .99306-1.44914-52.068  .01761    1.00000-1.44373  .98611-1.454
=> 55
1                                         NORMALISED PLOT OF SECTION NUMBER
=>  8
1    DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
     *********************************************************************

      BLADE CHORD = 3.72251E+00

      L.E.RADIUS  = 1.86126E-02  CENTERED AT X= -1.0349E+00 Y=  1.6150E+00

      SECTION AREA= 6.75437E-01

      SECOND MOMENTS OF AREA ABOUT CENTROID

         IX   = 3.51541E-01
         IY   = 1.66541E-01
         IXY  =-2.38984E-01

      PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

         IPX  = 5.15302E-01  (AT 34.420 WITH (X) AXIS)
         IPY  = 2.77945E-03  (AT 34.420 WITH (Y) AXIS)

    PT     SURFACE----------ONE          SURFACE----------TWO
    NO        X              Y              X              Y

     1  -1.01880E+00   1.62427E+00  -1.05103E+00   1.60564E+00
     2  -9.65981E-01   1.54836E+00  -1.01136E+00   1.52198E+00
     3  -9.13233E-01   1.47290E+00  -9.71618E-01   1.43877E+00
     4  -8.60587E-01   1.39789E+00  -9.31772E-01   1.35603E+00
     5  -8.08070E-01   1.32334E+00  -8.91798E-01   1.27379E+00
```

```
     6  -7.55709E-01   1.24925E+00  -8.51667E-01   1.19209E+00
     7  -7.03540E-01   1.17563E+00  -8.11345E-01   1.11096E+00
     8  -6.51582E-01   1.10250E+00  -7.70810E-01   1.03045E+00
     9  -5.99865E-01   1.02991E+00  -7.30036E-01   9.50606E-01
    10  -5.48414E-01   9.57884E-01  -6.88995E-01   8.71478E-01
    11  -4.97256E-01   8.86462E-01  -6.47662E-01   7.93128E-01
    12  -4.46416E-01   8.15675E-01  -6.06009E-01   7.15621E-01
    13  -3.95905E-01   7.45542E-01  -5.64029E-01   6.39005E-01
    14  -3.45735E-01   6.76068E-01  -5.21707E-01   5.63320E-01
    15  -2.95915E-01   6.07240E-01  -4.79035E-01   4.88595E-01
    16  -2.46452E-01   5.39029E-01  -4.36006E-01   4.14843E-01
    17  -1.97354E-01   4.71391E-01  -3.92613E-01   3.42072E-01
    18  -1.48616E-01   4.04273E-01  -3.48859E-01   2.70267E-01
    19  -1.00238E-01   3.37603E-01  -3.04746E-01   1.99406E-01
    20  -5.22190E-02   2.71297E-01  -2.60273E-01   1.29453E-01
    21  -4.56508E-03   2.05278E-01  -2.15435E-01   6.03584E-02
    22   4.27142E-02   1.39475E-01  -1.70223E-01  -7.92763E-03
    23   8.96109E-02   7.38264E-02  -1.24628E-01  -7.54492E-02
    24   1.36114E-01   8.27622E-03  -7.86389E-02  -1.42244E-01
    25   1.82211E-01  -5.72243E-02  -3.22444E-02  -2.08346E-01
    26   2.27897E-01  -1.22713E-01   1.45614E-02  -2.73786E-01
    27   2.73175E-01  -1.88212E-01   6.17752E-02  -3.38597E-01
    28   3.18047E-01  -2.53741E-01   1.09395E-01  -4.02806E-01
    29   3.62515E-01  -3.19311E-01   1.57418E-01  -4.66435E-01
    30   4.06583E-01  -3.84930E-01   2.05842E-01  -5.29498E-01
    31   4.50252E-01  -4.50603E-01   2.54664E-01  -5.92006E-01
    32   4.93528E-01  -5.16330E-01   3.03880E-01  -6.53967E-01
    33   5.36413E-01  -5.82112E-01   3.53487E-01  -7.15383E-01
    34   5.78909E-01  -6.47944E-01   4.03483E-01  -7.76256E-01
    35   6.21021E-01  -7.13818E-01   4.53863E-01  -8.36580E-01
1
    PT     SURFACE----------ONE          SURFACE----------TWO
    NO        X              Y              X              Y

    36   6.62752E-01  -7.79723E-01   5.04623E-01  -8.96350E-01
    37   7.04111E-01  -8.45643E-01   5.55756E-01  -9.55555E-01
    38   7.45101E-01  -9.11564E-01   6.07258E-01  -1.01418E+00
    39   7.85731E-01  -9.77471E-01   6.59119E-01  -1.07220E+00
    40   8.26010E-01  -1.04335E+00   7.11332E-01  -1.12961E+00
    41   8.65946E-01  -1.10920E+00   7.63888E-01  -1.18639E+00
    42   9.05554E-01  -1.17499E+00   8.16772E-01  -1.24253E+00
    43   9.44837E-01  -1.24074E+00   8.69980E-01  -1.29802E+00
    44   9.83805E-01  -1.30642E+00   9.23504E-01  -1.35284E+00
    45   1.02247E+00  -1.37204E+00   9.77335E-01  -1.40700E+00
    46   1.06083E+00  -1.43760E+00   1.03147E+00  -1.46048E+00

    POINTS DESCRIBING LEADING EDGE RADIUS

    POINT NO.       X              Y

         1      -1.05103E+00   1.60564E+00
         2      -1.05192E+00   1.60738E+00
         3      -1.05262E+00   1.60919E+00
         4      -1.05312E+00   1.61108E+00
         5      -1.05343E+00   1.61300E+00
         6      -1.05353E+00   1.61494E+00
         7      -1.05343E+00   1.61689E+00
         8      -1.05312E+00   1.61881E+00
         9      -1.05262E+00   1.62070E+00
        10      -1.05192E+00   1.62252E+00
        11      -1.05104E+00   1.62425E+00
        12      -1.04998E+00   1.62589E+00
        13      -1.04876E+00   1.62740E+00
        14      -1.04738E+00   1.62878E+00
        15      -1.04586E+00   1.63001E+00
        16      -1.04423E+00   1.63107E+00
        17      -1.04250E+00   1.63195E+00
        18      -1.04068E+00   1.63265E+00
        19      -1.03880E+00   1.63316E+00
        20      -1.03687E+00   1.63346E+00
        21      -1.03493E+00   1.63357E+00
        22      -1.03298E+00   1.63347E+00
        23      -1.03106E+00   1.63316E+00
        24      -1.02917E+00   1.63266E+00
        25      -1.02735E+00   1.63196E+00
        26      -1.02562E+00   1.63108E+00
        27      -1.02398E+00   1.63002E+00
        28      -1.02247E+00   1.62879E+00
        29      -1.02109E+00   1.62741E+00
        30      -1.01986E+00   1.62590E+00
        31      -1.01880E+00   1.62427E+00
    LEADING EDGE AXIAL DIFFERENCE =      -.0833   NEW DELX =       .0833
1

    POINT  FRAC. M       Y      Y-D(DEG)     Y-DD   R OF CURV

      1     .00000    .00000 -59.97257    .43719   18.2532
      2     .02222   -.03834 -59.83228    .44010   17.9041
```

3	.04444	-.07646	-59.68890	.44884	17.3310
4	.06667	-.11436	-59.54048	.46340	16.5654
5	.08889	-.15203	-59.38496	.48379	15.6498
6	.11111	-.18946	-59.22025	.51000	14.6315
7	.13333	-.22664	-59.04412	.54203	13.5560
8	.15556	-.26356	-58.85426	.57989	12.4635
9	.17778	-.30018	-58.64825	.62357	11.3861
10	.20000	-.33650	-58.42353	.67308	10.3477
11	.22222	-.37248	-58.17828	.72004	9.4738
12	.24444	-.40811	-57.91509	.75381	8.8516
13	.26667	-.44337	-57.63809	.77435	8.4209
14	.28889	-.47825	-57.35163	.78165	8.1481
15	.31111	-.51274	-57.06038	.77572	8.0183
16	.33333	-.54684	-56.76928	.75656	8.0313
17	.35556	-.58058	-56.48361	.72417	8.2022
18	.37778	-.61396	-56.20893	.67854	8.5666
19	.40000	-.64700	-55.95113	.61968	9.1939
20	.42222	-.67974	-55.71526	.55601	10.0620
21	.44444	-.71220	-55.50132	.49830	11.0452
22	.46667	-.74442	-55.30762	.44658	12.1444
23	.48889	-.77641	-55.13228	.40086	13.3518
24	.51111	-.80821	-54.97331	.36114	14.6448
25	.53333	-.83983	-54.82860	.32742	15.9800
26	.55556	-.87129	-54.69591	.29969	17.2874
27	.57778	-.90260	-54.57293	.27797	18.4703
28	.60000	-.93377	-54.45726	.26224	19.4126
29	.62222	-.96481	-54.34661	.25124	20.0988
30	.64444	-.99573	-54.23944	.24355	20.5721
31	.66667	-1.02652	-54.13433	.23916	20.7904
32	.68889	-1.05720	-54.02990	.23808	20.7281
33	.71111	-1.08776	-53.92469	.24030	20.3819
34	.73333	-1.11820	-53.81723	.24582	19.7712
35	.75556	-1.14852	-53.70602	.25464	18.9352
36	.77778	-1.17872	-53.58952	.26676	17.9254
37	.80000	-1.20878	-53.46616	.28219	16.7980
38	.82222	-1.23871	-53.33472	.29830	15.7441
39	.84444	-1.26848	-53.19554	.31252	14.8819
40	.86667	-1.29810	-53.04934	.32484	14.1722
41	.88889	-1.32757	-52.89688	.33526	13.5869
42	.91111	-1.35686	-52.73891	.34379	13.1061
43	.93333	-1.38599	-52.57623	.35043	12.7153
44	.95556	-1.41494	-52.40964	.35516	12.4038
45	.97778	-1.44372	-52.23997	.35801	12.1646
46	1.00000	-1.47232	-52.06808	.35895	11.9927

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-59.97257
2	.20140	-58.40871
3	.40143	-55.93528
4	.60071	-54.45367
5	.79992	-53.46664
6	1.00000	-52.06808

CARTESIAN COORDINATES ON STREAMSURFACE 8

POINT	Z1	X1	Y1	Z2	X2	Y2
1	7.42235	-1.09888	1.60661	7.42336	-1.13098	1.58806
2	7.44275	-1.04628	1.53309	7.44398	-1.09147	1.50659
3	7.46230	-.99374	1.45982	7.46358	-1.05189	1.42552
4	7.48099	-.94131	1.38678	7.48220	-1.01221	1.34471
5	7.49884	-.88900	1.31401	7.49986	-.97239	1.26421
6	7.51582	-.83684	1.24149	7.51655	-.93242	1.18406
7	7.53196	-.78486	1.16924	7.53228	-.89226	1.10430
8	7.54722	-.73309	1.09732	7.54707	-.85188	1.02498
9	7.56162	-.68155	1.02577	7.56092	-.81126	.94618
10	7.57516	-.63027	.95462	7.57384	-.77037	.86795
11	7.58783	-.57928	.88392	7.58584	-.72918	.79037
12	7.59966	-.52859	.81374	7.59694	-.68768	.71351
13	7.61064	-.47823	.74413	7.60715	-.64584	.63744
14	7.62079	-.42819	.67508	7.61649	-.60365	.56217
15	7.63014	-.37850	.60655	7.62499	-.56111	.48777
16	7.63869	-.32916	.53859	7.63266	-.51821	.41429
17	7.64647	-.28017	.47114	7.63953	-.47494	.34173
18	7.65349	-.23154	.40417	7.64563	-.43131	.27010
19	7.65977	-.18326	.33759	7.65098	-.38731	.19933
20	7.66534	-.13533	.27132	7.65561	-.34295	.12944
21	7.67020	-.08776	.20532	7.65952	-.29821	.06039
22	7.67436	-.04055	.13951	7.66275	-.25310	-.00786
23	7.67783	.00627	.07382	7.66531	-.20760	-.07535
24	7.68062	.05271	.00821	7.66722	-.16170	-.14214
25	7.68274	.09875	-.05737	7.66850	-.11539	-.20824
26	7.68417	.14438	-.12294	7.66916	-.06866	-.27367
27	7.68494	.18961	-.18851	7.66921	-.02152	-.33847
28	7.68503	.23444	-.25411	7.66867	.02603	-.40265
29	7.68444	.27887	-.31974	7.66755	.07399	-.46624
30	7.68319	.32290	-.38540	7.66585	.12235	-.52926
31	7.68125	.36654	-.45109	7.66360	.17112	-.59170
32	7.67865	.40979	-.51680	7.66078	.22029	-.65356
33	7.67536	.45265	-.58251	7.65743	.26985	-.71484
34	7.67141	.49513	-.64823	7.65353	.31980	-.77556
35	7.66677	.53722	-.71394	7.64910	.37015	-.83568
36	7.66147	.57894	-.77962	7.64415	.42088	-.89520
37	7.65551	.62028	-.84525	7.63869	.47198	-.95410
38	7.64890	.66126	-.91080	7.63272	.52346	-1.01236
39	7.64165	.70189	-.97626	7.62625	.57531	-1.06996
40	7.63379	.74216	-1.04161	7.61931	.62750	-1.12687
41	7.62531	.78209	-1.10685	7.61193	.68005	-1.18308
42	7.61625	.82169	-1.17195	7.60414	.73292	-1.23858
43	7.60660	.86097	-1.23690	7.59597	.78612	-1.29336
44	7.59638	.89993	-1.30170	7.58746	.83964	-1.34741
45	7.58560	.93859	-1.36634	7.57865	.89346	-1.40072
46	7.57430	.97695	-1.43071	7.56956	.94759	-1.45329

1

POINT	ZSEMI	XSEMI	YSEMI
1	7.42336	-1.13098	1.58806
2	7.42292	-1.13186	1.58975
3	7.42247	-1.13256	1.59152
4	7.42203	-1.13306	1.59336
5	7.42160	-1.13337	1.59523
6	7.42118	-1.13347	1.59714
7	7.42078	-1.13337	1.59904
8	7.42040	-1.13307	1.60092
9	7.42005	-1.13257	1.60277
10	7.41973	-1.13187	1.60455
11	7.41944	-1.13099	1.60626
12	7.41919	-1.12993	1.60786
13	7.41898	-1.12871	1.60936
14	7.41882	-1.12734	1.61071
15	7.41869	-1.12584	1.61193
16	7.41862	-1.12421	1.61298
17	7.41858	-1.12248	1.61386
18	7.41860	-1.12067	1.61456
19	7.41866	-1.11880	1.61507
20	7.41877	-1.11688	1.61538
21	7.41893	-1.11494	1.61550
22	7.41913	-1.11300	1.61542
23	7.41936	-1.11109	1.61514
24	7.41964	-1.10921	1.61468
25	7.41995	-1.10740	1.61402
26	7.42029	-1.10567	1.61318
27	7.42067	-1.10404	1.61217
28	7.42106	-1.10254	1.61099
29	7.42148	-1.10116	1.60966
30	7.42191	-1.09994	1.60820
31	7.42235	-1.09888	1.60661

STREAMSURFACE 9 ITERATION 1 DEVIATION = 2.356 SOLIDITY = 1.2721
ITERATION 2 DEVIATION = 2.398 SOLIDITY = 1.2012
ITERATION 2 DEVIATION = 2.398 SOLIDITY = 1.2012

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-61.56413	.08004	115.7138
2	.02222	-.04102	-61.54053	.08491	108.8365
3	.04444	-.08199	-61.51409	.09950	92.6383
4	.06667	-.12292	-61.48195	.12382	74.2124
5	.08889	-.16378	-61.44126	.15786	57.9790
6	.11111	-.20457	-61.38910	.20164	45.1650
7	.13333	-.24526	-61.32251	.25514	35.4669
8	.15556	-.28582	-61.23845	.31837	28.1955
9	.17778	-.32622	-61.13374	.39133	22.7113
10	.20000	-.36643	-61.00506	.47402	18.5225
11	.22222	-.40640	-60.84996	.55505	15.5891
12	.24444	-.44610	-60.67119	.61905	13.7456
13	.26667	-.48550	-60.47328	.66594	12.5451
14	.28889	-.52456	-60.26091	.69572	11.7757
15	.31111	-.56329	-60.03902	.70839	11.3333
16	.33333	-.60166	-59.81277	.70395	11.1738

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
17	.35556	-.63969	-59.58766	.68240	11.2965
18	.37778	-.67739	-59.36944	.64374	11.7451
19	.40000	-.71476	-59.16419	.58797	12.6288
20	.42222	-.75185	-58.97717	.52514	13.9106
21	.44444	-.78867	-58.80838	.46944	15.3348
22	.46667	-.82527	-58.65587	.42097	16.8770
23	.48889	-.86165	-58.51761	.37973	18.4894
24	.51111	-.89785	-58.39141	.34572	20.0907
25	.53333	-.93388	-58.27500	.31894	21.5634
26	.55556	-.96974	-58.16603	.29940	22.7608
27	.57778	-1.00546	-58.06207	.28708	23.5306
28	.60000	-1.04104	-57.96061	.28199	23.7523
29	.62222	-1.07648	-57.85939	.28173	23.5743
30	.64444	-1.11178	-57.75734	.28332	23.2441
31	.66667	-1.14694	-57.65381	.28674	22.7700
32	.68889	-1.18196	-57.54808	.29201	22.1648
33	.71111	-1.21683	-57.43946	.29913	21.4456
34	.73333	-1.25156	-57.32721	.30808	20.6320
35	.75556	-1.28613	-57.21058	.31887	19.7451
36	.77778	-1.32055	-57.08881	.33151	18.8059
37	.80000	-1.35480	-56.96109	.34599	17.8342
38	.82222	-1.38889	-56.82685	.36055	16.9302
39	.84444	-1.42279	-56.68638	.37341	16.1650
40	.86667	-1.45651	-56.54021	.38455	15.5155
41	.88889	-1.49004	-56.38889	.39397	14.9643
42	.91111	-1.52337	-56.23299	.40169	14.4983
43	.93333	-1.55651	-56.07309	.40768	14.1078
44	.95556	-1.58945	-55.90979	.41197	13.7853
45	.97778	-1.62218	-55.74372	.41454	13.5254
46	1.00000	-1.65471	-55.57554	.41540	13.3247

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-61.56413
2	.20175	-60.99379
3	.40202	-59.14635
4	.60123	-57.95502
5	.80016	-56.96012
6	1.00000	-55.57554

1

STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER 9
****

BETA1 =-61.564 (BLADE INLET ANGLE)
BETA2 =-55.576 (BLADE OUTLET ANGLE)
YZERO = .00500 (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
T = .04750 (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
YONE = .00500 (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
Z = .5500 (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
CORD = 1.8995 (MERIDIONAL CHORD OF SECTION)

NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
****

BLADE CHORD = 1.9093

STAGGER ANGLE =-58.854

CAMBER ANGLE = -5.989

SECTION AREA = .12398
LOCATION OF CENTROID RELATIVE TO LEADING EDGE

XBAR = .49871
YBAR = -.84868

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = .01922
IY = .00710
IXY = -.01161

ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS = 31.210

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = .02625 (AT 31.210 WITH (X) AXIS)
IPY = .00006 (AT 31.210 WITH (Y) AXIS)

	POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
	1	.00955	.00000	-61.564	.01909	.01794	.00455	.00115	-.004
=> 55	2	.03138	-.04030	-61.541	.02380	.04184	-.03463	.02092	-.045
=> 97	3	.05322	-.08056	-61.514	.02848	.06573	-.07377	.04070	-.087
=> 36	4	.07505	-.12078	-61.482	.03313	.08961	-.11287	.06050	-.128
=> 69	5	.09689	-.16093	-61.441	.03771	.11345	-.15192	.08033	-.169
=> 94	6	.11872	-.20101	-61.389	.04222	.13725	-.19090	.10019	-.211
=> 11									

```
         7       .14056 -.24098-61.323  .04662   .16101 -.22980  .12010 -.252
  => 17
         8       .16239 -.28084-61.238  .05091   .18471 -.26859  .14008 -.293
  => 09
         9       .18423 -.32053-61.134  .05507   .20834 -.30724  .16011 -.333
  => 83
        10       .20606 -.36004-61.005  .05907   .23189 -.34573  .18023 -.374
  => 36
        11       .22790 -.39932-60.850  .06289   .25536 -.38400  .20043 -.414
  => 64
        12       .24973 -.43833-60.671  .06653   .27873 -.42204  .22073 -.454
  => 62
        13       .27157 -.47704-60.473  .06995   .30200 -.45980  .24113 -.494
  => 28
1
       POINT        M E A N L I N E  D A T A       SURFACE COORDINATE DATA
       NUMBER     X        Y     ANGLE THICKNESS    X1      Y1      X2      Y2

        14       .29340 -.51543-60.261  .07316   .32516 -.49728  .26164 -.533
  => 57
        15       .31524 -.55348-60.039  .07613   .34822 -.53447  .28226 -.572
  => 49
        16       .33707 -.59118-59.813  .07885   .37115 -.57136  .30299 -.611
  => 01
        17       .35891 -.62855-59.588  .08132   .39397 -.60797  .32384 -.649
  => 13
        18       .38074 -.66559-59.369  .08352   .41667 -.64431  .34481 -.686
  => 86
        19       .40258 -.70231-59.164  .08544   .43926 -.68041  .36590 -.724
  => 21
        20       .42441 -.73875-58.977  .08708   .46172 -.71631  .38710 -.761
  => 19
        21       .44625 -.77493-58.808  .08842   .48407 -.75204  .40843 -.797
  => 83
        22       .46808 -.81089-58.656  .08947   .50629 -.78762  .42988 -.834
  => 16
        23       .48992 -.84664-58.518  .09019   .52838 -.82309  .45146 -.870
  => 19
        24       .51175 -.88221-58.391  .09060   .55033 -.85846  .47317 -.905
  => 95
        25       .53359 -.91761-58.275  .09068   .57215 -.89377  .49502 -.941
  => 45
        26       .55542 -.95285-58.166  .09041   .59383 -.92901  .51702 -.976
  => 70
        27       .57726 -.98795-58.062  .08982   .61537 -.96419  .53915-1.011
  => 71
        28       .59909-1.02291-57.961  .08889   .63677 -.99933  .56142-1.046
  => 48
        29       .62093-1.05773-57.859  .08763   .65803-1.03442  .58383-1.081
  => 04
        30       .64276-1.09241-57.757  .08604   .67915-1.06946  .60638-1.115
  => 37
        31       .66460-1.12696-57.654  .08413   .70014-1.10445  .62906-1.149
  => 47
        32       .68643-1.16137-57.548  .08190   .72099-1.13940  .65188-1.183
  => 34
        33       .70827-1.19564-57.439  .07936   .74171-1.17428  .67483-1.216
  => 99
        34       .73010-1.22976-57.327  .07650   .76230-1.20911  .69791-1.250
  => 41
        35       .75194-1.26373-57.211  .07333   .78276-1.24387  .72112-1.283
  => 58
        36       .77377-1.29755-57.089  .06985   .80310-1.27857  .74445-1.316
  => 52
        37       .79561-1.33120-56.961  .06607   .82330-1.31319  .76792-1.349
  => 21
        38       .81744-1.36469-56.827  .06199   .84339-1.34773  .79150-1.381
  => 65
        39       .83928-1.39800-56.686  .05762   .86336-1.38218  .81520-1.413
  => 83
        40       .86111-1.43113-56.540  .05295   .88320-1.41654  .83903-1.445
  => 73
        41       .88295-1.46408-56.389  .04800   .90294-1.45079  .86296-1.477
  => 37
        42       .90479-1.49683-56.233  .04277   .92256-1.48495  .88701-1.508
  => 72
        43       .92662-1.52939-56.073  .03726   .94208-1.51900  .91116-1.539
  => 79
        44       .94846-1.56176-55.910  .03147   .96149-1.55294  .93542-1.570
  => 58
        45       .97029-1.59392-55.744  .02542   .98079-1.58676  .95979-1.601
  => 07
        46       .99213-1.62588-55.576  .01909  1.00000-1.62048  .98425-1.631
  => 28
1                                              NORMALISED PLOT OF SECTION NUMBER
  =>  9

1       DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
```

```
 ***************************************************************************

  BLADE CHORD = 3.62664E+00

  L.E.RADIUS  = 1.81332E-02  CENTERED AT X= -9.2916E-01 Y=  1.6121E+00

  SECTION AREA= 4.47325E-01

  SECOND MOMENTS OF AREA ABOUT CENTROID

     IX   = 2.50224E-01
     IY   = 9.23697E-02
     IXY  =-1.51100E-01

  PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

     IPX  = 3.41769E-01  (AT 31.210 WITH (X) AXIS)
     IPY  = 8.24801E-04  (AT 31.210 WITH (Y) AXIS)

 PT      SURFACE----------ONE          SURFACE----------TWO
 NO         X              Y              X              Y

  1  -9.13212E-01   1.62069E+00  -9.45103E-01   1.60342E+00
  2  -8.67810E-01   1.54627E+00  -9.07553E-01   1.52473E+00
  3  -8.22430E-01   1.47192E+00  -8.69982E-01   1.44612E+00
  4  -7.77086E-01   1.39766E+00  -8.32374E-01   1.36762E+00
  5  -7.31797E-01   1.32349E+00  -7.94712E-01   1.28925E+00
  6  -6.86580E-01   1.24945E+00  -7.56979E-01   1.21105E+00
  7  -6.41454E-01   1.17556E+00  -7.19153E-01   1.13306E+00
  8  -5.96438E-01   1.10188E+00  -6.81218E-01   1.05534E+00
  9  -5.51550E-01   1.02845E+00  -6.43155E-01   9.77953E-01
 10  -5.06809E-01   9.55351E-01  -6.04945E-01   9.00964E-01
 11  -4.62233E-01   8.82646E-01  -5.66570E-01   8.24453E-01
 12  -4.17841E-01   8.10400E-01  -5.28011E-01   7.48503E-01
 13  -3.73642E-01   7.38665E-01  -4.89259E-01   6.73181E-01
 14  -3.29645E-01   6.67473E-01  -4.50305E-01   5.98541E-01
 15  -2.85859E-01   5.96840E-01  -4.11139E-01   5.24623E-01
 16  -2.42290E-01   5.26763E-01  -3.71758E-01   4.51450E-01
 17  -1.98944E-01   4.57226E-01  -3.32153E-01   3.79034E-01
 18  -1.55820E-01   3.88194E-01  -2.92325E-01   3.07367E-01
 19  -1.12922E-01   3.19617E-01  -2.52272E-01   2.36429E-01
 20  -7.02484E-02   2.51430E-01  -2.11995E-01   1.66184E-01
 21  -2.78059E-02   1.83569E-01  -1.71486E-01   9.65820E-02
 22   1.43983E-02   1.15976E-01  -1.30739E-01   2.75782E-02
 23   5.63578E-02   4.86033E-02  -8.97474E-02  -4.08684E-02
 24   9.80642E-02  -1.85924E-02  -4.85026E-02  -1.08791E-01
 25   1.39509E-01  -8.56460E-02  -6.99600E-03  -1.76218E-01
 26   1.80686E-01  -1.52584E-01   3.47777E-02  -2.43171E-01
 27   2.21598E-01  -2.19421E-01   7.68173E-02  -3.09672E-01
 28   2.62245E-01  -2.86165E-01   1.19122E-01  -3.75735E-01
 29   3.02628E-01  -3.52818E-01   1.61689E-01  -4.41369E-01
 30   3.42751E-01  -4.19380E-01   2.04517E-01  -5.06574E-01
 31   3.82616E-01  -4.85848E-01   2.47603E-01  -5.71351E-01
 32   4.22227E-01  -5.52217E-01   2.90944E-01  -6.35698E-01
 33   4.61585E-01  -6.18482E-01   3.34536E-01  -6.99610E-01
 34   5.00695E-01  -6.84637E-01   3.78378E-01  -7.63081E-01
 35   5.39559E-01  -7.50672E-01   4.22464E-01  -8.26104E-01
1
 PT      SURFACE----------ONE          SURFACE----------TWO
 NO         X              Y              X              Y

 36   5.78182E-01  -8.16577E-01   4.66793E-01  -8.88669E-01
 37   6.16568E-01  -8.82339E-01   5.11358E-01  -9.50765E-01
 38   6.54721E-01  -9.47945E-01   5.56156E-01  -1.01238E+00
 39   6.92646E-01  -1.01338E+00   6.01182E-01  -1.07350E+00
 40   7.30348E-01  -1.07864E+00   6.46431E-01  -1.13410E+00
 41   7.67833E-01  -1.14372E+00   6.91898E-01  -1.19419E+00
 42   8.05108E-01  -1.20859E+00   7.37573E-01  -1.25375E+00
 43   8.42178E-01  -1.27327E+00   7.83455E-01  -1.31277E+00
 44   8.79046E-01  -1.33773E+00   8.29538E-01  -1.37124E+00
 45   9.15719E-01  -1.40199E+00   8.75816E-01  -1.42917E+00
 46   9.52201E-01  -1.46604E+00   9.22285E-01  -1.48654E+00

 POINTS DESCRIBING LEADING EDGE RADIUS

 POINT NO.      X              Y

     1      -9.45103E-01   1.60342E+00
     2      -9.45918E-01   1.60513E+00
     3      -9.46549E-01   1.60692E+00
     4      -9.46990E-01   1.60877E+00
     5      -9.47236E-01   1.61065E+00
     6      -9.47284E-01   1.61255E+00
     7      -9.47132E-01   1.61444E+00
     8      -9.46784E-01   1.61631E+00
     9      -9.46243E-01   1.61813E+00
    10      -9.45515E-01   1.61988E+00
    11      -9.44608E-01   1.62155E+00
```

```
    12      -9.43531E-01   1.62311E+00
    13      -9.42296E-01   1.62455E+00
    14      -9.40918E-01   1.62586E+00
    15      -9.39411E-01   1.62701E+00
    16      -9.37792E-01   1.62800E+00
    17      -9.36078E-01   1.62881E+00
    18      -9.34288E-01   1.62945E+00
    19      -9.32442E-01   1.62989E+00
    20      -9.30560E-01   1.63013E+00
    21      -9.28662E-01   1.63018E+00
    22      -9.26770E-01   1.63003E+00
    23      -9.24904E-01   1.62968E+00
    24      -9.23085E-01   1.62914E+00
    25      -9.21332E-01   1.62841E+00
    26      -9.19665E-01   1.62750E+00
    27      -9.18102E-01   1.62643E+00
    28      -9.16660E-01   1.62519E+00
    29      -9.15355E-01   1.62381E+00
    30      -9.14202E-01   1.62231E+00
    31      -9.13212E-01   1.62069E+00
 LEADING EDGE AXIAL DIFFERENCE =      -.0984   NEW DELX =       .0984
1

 POINT  FRAC. M      Y     Y-D(DEG)    Y-DD   R OF CURV

   1    .00000    .00000 -61.56413   .08004  115.7138
   2    .02222   -.04102 -61.54053   .08491  108.8365
   3    .04444   -.08199 -61.51409   .09950   92.6383
   4    .06667   -.12292 -61.48195   .12382   74.2124
   5    .08889   -.16378 -61.44126   .15786   57.9790
   6    .11111   -.20457 -61.38910   .20164   45.1650
   7    .13333   -.24526 -61.32251   .25514   35.4669
   8    .15556   -.28582 -61.23845   .31837   28.1955
   9    .17778   -.32622 -61.13374   .39133   22.7113
  10    .20000   -.36643 -61.00506   .47402   18.5225
  11    .22222   -.40640 -60.84996   .55505   15.5891
  12    .24444   -.44610 -60.67119   .61905   13.7456
  13    .26667   -.48550 -60.47328   .66594   12.5451
  14    .28889   -.52456 -60.26091   .69572   11.7757
  15    .31111   -.56329 -60.03902   .70839   11.3333
  16    .33333   -.60166 -59.81277   .70395   11.1738
  17    .35556   -.63969 -59.58766   .68240   11.2965
  18    .37778   -.67739 -59.36944   .64374   11.7451
  19    .40000   -.71476 -59.16419   .58797   12.6288
  20    .42222   -.75185 -58.97717   .52514   13.9106
  21    .44444   -.78867 -58.80838   .46944   15.3348
  22    .46667   -.82527 -58.65587   .42097   16.8770
  23    .48889   -.86165 -58.51761   .37973   18.4894
  24    .51111   -.89785 -58.39141   .34572   20.0907
  25    .53333   -.93388 -58.27500   .31894   21.5634
  26    .55556   -.96974 -58.16603   .29940   22.7608
  27    .57778  -1.00546 -58.06207   .28708   23.5306
  28    .60000  -1.04104 -57.96061   .28199   23.7523
  29    .62222  -1.07648 -57.85939   .28173   23.5743
  30    .64444  -1.11178 -57.75734   .28332   23.2441
  31    .66667  -1.14694 -57.65381   .28674   22.7700
  32    .68889  -1.18196 -57.54808   .29201   22.1648
  33    .71111  -1.21683 -57.43946   .29913   21.4456
  34    .73333  -1.25156 -57.32721   .30808   20.6320
  35    .75556  -1.28613 -57.21058   .31887   19.7451
  36    .77778  -1.32055 -57.08881   .33151   18.8059
  37    .80000  -1.35480 -56.96109   .34599   17.8342
  38    .82222  -1.38889 -56.82685   .36055   16.9302
  39    .84444  -1.42279 -56.68638   .37341   16.1650
  40    .86667  -1.45651 -56.54021   .38455   15.5155
  41    .88889  -1.49004 -56.38889   .39397   14.9643
  42    .91111  -1.52337 -56.23299   .40169   14.4983
  43    .93333  -1.55651 -56.07309   .40768   14.1078
  44    .95556  -1.58945 -55.90979   .41197   13.7853
  45    .97778  -1.62218 -55.74372   .41454   13.5254
  46   1.00000  -1.65471 -55.57554   .41540   13.3247
1

 DATA POINTS

 POINT  FRAC. M  Y-D(DEG)

   1    .00000 -61.56413
   2    .20175 -60.99379
   3    .40202 -59.14635
   4    .60123 -57.95502
   5    .80016 -56.96012
   6   1.00000 -55.57554

 CARTESIAN COORDINATES ON STREAMSURFACE  9

 POINT     Z1        X1        Y1        Z2        X2        Y2
```

IC/14PRINT

1	8.07564	-1.00946	1.60615	8.07663	-1.04127	1.58880
2	8.09317	-.96419	1.53369	8.09423	-1.00382	1.51200
3	8.11003	-.91894	1.46114	8.11106	-.96636	1.43516
4	8.12621	-.87372	1.38851	8.12714	-.92885	1.35826
5	8.14170	-.82855	1.31581	8.14247	-.89130	1.28134
6	8.15648	-.78346	1.24308	8.15703	-.85367	1.20444
7	8.17057	-.73846	1.17034	8.17083	-.81594	1.12761
8	8.18394	-.69356	1.09767	8.18386	-.77811	1.05091
9	8.19659	-.64878	1.02511	8.19612	-.74015	.97441
10	8.20850	-.60416	.95275	8.20761	-.70204	.89818
11	8.21968	-.55969	.88064	8.21833	-.66377	.82231
12	8.23011	-.51540	.80889	8.22828	-.62530	.74691
13	8.23980	-.47130	.73756	8.23747	-.58665	.67202
14	8.24874	-.42740	.66670	8.24591	-.54779	.59772
15	8.25694	-.38370	.59633	8.25360	-.50871	.52406
16	8.26441	-.34022	.52644	8.26056	-.46942	.45110
17	8.27116	-.29695	.45704	8.26680	-.42990	.37884
18	8.27720	-.25390	.38813	8.27233	-.39016	.30729
19	8.28254	-.21107	.31963	8.27717	-.35018	.23642
20	8.28720	-.16846	.25149	8.28133	-.30998	.16622
21	8.29118	-.12608	.18364	8.28483	-.26954	.09665
22	8.29450	-.08392	.11603	8.28767	-.22886	.02766
23	8.29716	-.04201	.04864	8.28987	-.18793	-.04077
24	8.29916	-.00035	-.01858	8.29144	-.14674	-.10871
25	8.30052	.04106	-.08568	8.29239	-.10529	-.17613
26	8.30123	.08220	-.15267	8.29272	-.06357	-.24308
27	8.30130	.12308	-.21954	8.29246	-.02157	-.30957
28	8.30073	.16371	-.28632	8.29159	.02069	-.37562
29	8.29953	.20407	-.35297	8.29014	.06322	-.44123
30	8.29768	.24417	-.41952	8.28811	.10602	-.50639
31	8.29520	.28402	-.48594	8.28549	.14907	-.57108
32	8.29209	.32362	-.55223	8.28231	.19239	-.63532
33	8.28834	.36296	-.61837	8.27857	.23596	-.69909
34	8.28397	.40206	-.68435	8.27426	.27978	-.76238
35	8.27898	.44092	-.75015	8.26939	.32385	-.82516
36	8.27337	.47954	-.81578	8.26398	.36817	-.88744
37	8.26714	.51792	-.88119	8.25803	.41273	-.94918
38	8.26032	.55607	-.94637	8.25153	.45752	-1.01039
39	8.25293	.59400	-1.01131	8.24451	.50254	-1.07102
40	8.24497	.63170	-1.07599	8.23699	.54779	-1.13107
41	8.23648	.66918	-1.14042	8.22898	.59325	-1.19052
42	8.22746	.70646	-1.20457	8.22053	.63892	-1.24936
43	8.21794	.74353	-1.26844	8.21165	.68481	-1.30760
44	8.20792	.78040	-1.33201	8.20239	.73089	-1.36521
45	8.19744	.81707	-1.39529	8.19278	.77717	-1.42219
46	8.18651	.85355	-1.45813	8.18283	.82364	-1.47853

1

POINT	ZSEMI	XSEMI	YSEMI
1	8.07663	-1.04127	1.58880
2	8.07624	-1.04208	1.59047
3	8.07585	-1.04271	1.59222
4	8.07546	-1.04315	1.59402
5	8.07508	-1.04339	1.59587
6	8.07471	-1.04344	1.59773
7	8.07435	-1.04329	1.59959
8	8.07401	-1.04294	1.60142
9	8.07370	-1.04240	1.60321
10	8.07341	-1.04168	1.60494
11	8.07315	-1.04077	1.60659
12	8.07293	-1.03970	1.60813
13	8.07273	-1.03847	1.60956
14	8.07258	-1.03709	1.61086
15	8.07247	-1.03559	1.61201
16	8.07239	-1.03397	1.61300
17	8.07236	-1.03227	1.61382
18	8.07237	-1.03048	1.61447
19	8.07242	-1.02864	1.61492
20	8.07251	-1.02676	1.61519
21	8.07264	-1.02487	1.61526
22	8.07281	-1.02298	1.61513
23	8.07302	-1.02112	1.61482
24	8.07326	-1.01931	1.61431
25	8.07353	-1.01756	1.61362
26	8.07383	-1.01590	1.61275
27	8.07416	-1.01434	1.61172
28	8.07450	-1.01290	1.61053
29	8.07487	-1.01160	1.60919
30	8.07525	-1.01045	1.60773
31	8.07564	-1.00946	1.60615

STREAMSURFACE 10 ITERATION 1 DEVIATION = 1.887 SOLIDITY = 1.0960
ITERATION 2 DEVIATION = 1.922 SOLIDITY = 1.0538
ITERATION 2 DEVIATION = 1.922 SOLIDITY = 1.0538

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-63.11479	-.26768	-40.3995
2	.02222	-.04390	-63.18372	-.26079	-41.7642
3	.04444	-.08792	-63.24877	-.24010	-45.6691
4	.06667	-.13206	-63.30645	-.20563	-53.6462
5	.08889	-.17631	-63.35330	-.15737	-70.4416
6	.11111	-.22063	-63.38591	-.09532	-116.6955
7	.13333	-.26499	-63.40086	-.01948	-571.9807
8	.15556	-.30937	-63.39469	.07015	158.7020
9	.17778	-.35371	-63.36383	.17357	63.9363
10	.20000	-.39797	-63.30458	.29078	37.9297
11	.22222	-.44208	-63.21427	.40658	26.8732
12	.24444	-.48599	-63.09589	.50184	21.5071
13	.26667	-.52965	-62.95420	.57649	18.4511
14	.28889	-.57303	-62.79399	.63054	16.5956
15	.31111	-.61610	-62.62026	.66398	15.4844
16	.33333	-.65885	-62.43816	.67682	14.9147

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
17	.35556	-.70125	-62.25312	.66905	14.8115
18	.37778	-.74333	-62.07082	.64067	15.1905
19	.40000	-.78510	-61.89724	.59169	16.1695
20	.42222	-.82657	-61.73758	.53390	17.6421
21	.44444	-.86778	-61.59186	.48339	19.2119
22	.46667	-.90875	-61.45838	.44024	20.8248
23	.48889	-.94950	-61.33531	.40446	22.4008
24	.51111	-.99005	-61.22074	.37604	23.8313
25	.53333	-1.03042	-61.11268	.35499	24.9864
26	.55556	-1.07061	-61.00908	.34130	25.7346
27	.57778	-1.11063	-60.90781	.33498	25.9710
28	.60000	-1.15049	-60.80668	.33603	25.6456
29	.62222	-1.19018	-60.70371	.34197	24.9587
30	.64444	-1.22970	-60.59798	.34968	24.1693
31	.66667	-1.26904	-60.48890	.35915	23.2952
32	.68889	-1.30821	-60.37586	.37038	22.3543
33	.71111	-1.34720	-60.25824	.38337	21.3646
34	.73333	-1.38600	-60.13538	.39812	20.3432
35	.75556	-1.42460	-60.00663	.41464	19.3056
36	.77778	-1.46300	-59.87129	.43291	18.2656
37	.80000	-1.50118	-59.72864	.45295	17.2351
38	.82222	-1.53914	-59.57814	.47278	16.2913
39	.84444	-1.57686	-59.42014	.49028	15.4906
40	.86667	-1.61435	-59.25521	.50545	14.8085
41	.88889	-1.65158	-59.08397	.51829	14.2264
42	.91111	-1.68856	-58.90704	.52879	13.7306
43	.93333	-1.72528	-58.72507	.53695	13.3106
44	.95556	-1.76173	-58.53875	.54279	12.9585
45	.97778	-1.79791	-58.34880	.54629	12.6686
46	1.00000	-1.83383	-58.15595	.54745	12.4370

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-63.11479
2	.20133	-63.30004
3	.40181	-61.88369
4	.60135	-60.80048
5	.80047	-59.72555
6	1.00000	-58.15595

1
STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER 10
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH

BETA1 =-63.115 (BLADE INLET ANGLE)
BETA2 =-58.156 (BLADE OUTLET ANGLE)
YZERO = .00500 (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
T = .02740 (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
YONE = .00500 (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
Z = .5500 (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
CORD = 1.6574 (MERIDIONAL CHORD OF SECTION)

NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH

BLADE CHORD = 2.0593

STAGGER ANGLE =-61.396

CAMBER ANGLE = -4.959

SECTION AREA = .08963
LOCATION OF CENTROID RELATIVE TO LEADING EDGE

XBAR = .49577
YBAR = -.92812

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = .01885
IY = .00558
IXY = -.01024

ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS = 28.526

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = .02442 (AT 28.526 WITH (X) AXIS)
IPY = .00002 (AT 28.526 WITH (Y) AXIS)

	POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
	1	.01030	.00000	-63.115	.02059	.01948	.00466	.00111	-.004
=> 66	2	.03210	-.04306	-63.184	.02289	.04231	-.03790	.02188	-.048
=> 22	3	.05389	-.08625	-63.249	.02519	.06514	-.08058	.04265	-.091
=> 92	4	.07569	-.12955	-63.306	.02747	.08797	-.12338	.06342	-.135
=> 72	5	.09749	-.17295	-63.353	.02974	.11078	-.16628	.08420	-.179
=> 62	6	.11929	-.21643	-63.386	.03197	.13358	-.20927	.10500	-.223
=> 59	7	.14109	-.25995	-63.401	.03416	.15636	-.25230	.12582	-.267
=> 60	8	.16289	-.30348	-63.395	.03630	.17912	-.29535	.14666	-.311
=> 61	9	.18469	-.34698	-63.364	.03837	.20184	-.33837	.16754	-.355
=> 58	10	.20649	-.39039	-63.305	.04038	.22453	-.38132	.18845	-.399
=> 46	11	.22829	-.43366	-63.214	.04230	.24717	-.42413	.20941	-.443
=> 19	12	.25009	-.47673	-63.096	.04413	.26976	-.46675	.23041	-.486
=> 72	13	.27188	-.51957	-62.954	.04586	.29231	-.50914	.25146	-.529
=> 99									

1

	POINT NUMBER	MEANLINE DATA X	Y	ANGLE	THICKNESS	SURFACE COORDINATE DATA X1	Y1	X2	Y2
	14	.29368	-.56212	-62.794	.04748	.31480	-.55127	.27257	-.572
=> 98	15	.31548	-.60437	-62.620	.04899	.33723	-.59311	.29373	-.615
=> 63	16	.33728	-.64630	-62.438	.05037	.35961	-.63464	.31495	-.657
=> 95	17	.35908	-.68790	-62.253	.05163	.38193	-.67588	.33624	-.699
=> 92	18	.38088	-.72918	-62.071	.05275	.40418	-.71683	.35758	-.741
=> 53	19	.40268	-.77015	-61.897	.05373	.42638	-.75749	.37898	-.782
=> 80	20	.42448	-.81083	-61.738	.05456	.44851	-.79791	.40045	-.823
=> 75	21	.44628	-.85125	-61.592	.05525	.47058	-.83811	.42198	-.864
=> 40	22	.46808	-.89144	-61.458	.05579	.49258	-.87812	.44357	-.904
=> 77	23	.48988	-.93142	-61.335	.05616	.51451	-.91795	.46524	-.944
=> 89	24	.51167	-.97120	-61.221	.05637	.53638	-.95763	.48697	-.984
=> 77	25	.53347	-1.01080	-61.113	.05642	.55817	-.99717	.50877	-1.024
=> 42	26	.55527	-1.05022	-61.009	.05629	.57989	-1.03658	.53065	-1.063
=> 86	27	.57707	-1.08948	-60.908	.05599	.60154	-1.07587	.55261	-1.103
=> 09	28	.59887	-1.12858	-60.807	.05553	.62311	-1.11503	.57463	-1.142
=> 12	29	.62067	-1.16751	-60.704	.05490	.64461	-1.15408	.59673	-1.180
=> 94	30	.64247	-1.20628	-60.598	.05410	.66603	-1.19300	.61890	-1.219
=> 56	31	.66427	-1.24488	-60.489	.05314	.68739	-1.23179	.64115	-1.257
=> 96	32	.68607	-1.28330	-60.376	.05201	.70867	-1.27045	.66346	-1.296
=> 16	33	.70787	-1.32155	-60.258	.05073	.72989	-1.30896	.68584	-1.334
=> 13	34	.72966	-1.35961	-60.135	.04929	.75104	-1.34733	.70829	-1.371
=> 88	35	.75146	-1.39747	-60.007	.04770	.77212	-1.38555	.73081	-1.409
=> 39									

IC/14PRINT

```
        36      .77326-1.43514-59.871  .04595  .79313-1.42361  .75339-1.446
  => 67
        37      .79506-1.47259-59.729  .04405  .81408-1.46149  .77604-1.483
  => 69
        38      .81686-1.50983-59.578  .04200  .83497-1.49919  .79875-1.520
  => 46
        39      .83866-1.54684-59.420  .03981  .85580-1.53671  .82152-1.556
  => 96
        40      .86046-1.58361-59.255  .03747  .87656-1.57403  .84436-1.593
  => 18
        41      .88226-1.62013-59.084  .03499  .89727-1.61114  .86725-1.629
  => 12
        42      .90406-1.65640-58.907  .03238  .91792-1.64804  .89019-1.664
  => 77
        43      .92586-1.69242-58.725  .02963  .93852-1.68473  .91319-1.700
  => 11
        44      .94766-1.72818-58.539  .02675  .95906-1.72120  .93625-1.735
  => 16
        45      .96945-1.76368-58.349  .02373  .97956-1.75745  .95935-1.769
  => 90
        46      .99125-1.79891-58.156  .02059 1.00000-1.79347  .98251-1.804
  => 34
1                                       NORMALISED PLOT OF SECTION NUMBER
  => 10

1       DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
        ********************************************************************
```

BLADE CHORD = 3.41312E+00

L.E.RADIUS = 1.70656E-02 CENTERED AT X= -8.0464E-01 Y= 1.5383E+00

SECTION AREA= 2.46211E-01

SECOND MOMENTS OF AREA ABOUT CENTROID

IX = 1.42278E-01
IY = 4.21450E-02
IXY =-7.72482E-02

PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

IPX = 1.84266E-01 (AT 28.526 WITH (X) AXIS)
IPY = 1.57438E-04 (AT 28.526 WITH (Y) AXIS)

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
1	-7.89421E-01	1.54601E+00	-8.19863E-01	1.53058E+00
2	-7.51580E-01	1.47548E+00	-7.85443E-01	1.45836E+00
3	-7.13741E-01	1.40474E+00	-7.51022E-01	1.38595E+00
4	-6.75910E-01	1.33380E+00	-7.16592E-01	1.31335E+00
5	-6.38095E-01	1.26269E+00	-6.82146E-01	1.24059E+00
6	-6.00305E-01	1.19145E+00	-6.47675E-01	1.16771E+00
7	-5.62548E-01	1.12012E+00	-6.13171E-01	1.09477E+00
8	-5.24835E-01	1.04877E+00	-5.78624E-01	1.02183E+00
9	-4.87173E-01	9.77462E-01	-5.44025E-01	9.48947E-01
10	-4.49572E-01	9.06285E-01	-5.09364E-01	8.76219E-01
11	-4.12043E-01	8.35332E-01	-4.74633E-01	8.03735E-01
12	-3.74592E-01	7.64689E-01	-4.39823E-01	7.31590E-01
13	-3.37226E-01	6.94430E-01	-4.04928E-01	6.59865E-01
14	-2.99949E-01	6.24608E-01	-3.69944E-01	5.88626E-01
15	-2.62766E-01	5.55262E-01	-3.34867E-01	5.17920E-01
16	-2.25679E-01	4.86413E-01	-2.99693E-01	4.47781E-01
17	-1.88692E-01	4.18063E-01	-2.64419E-01	3.78227E-01
18	-1.51805E-01	3.50202E-01	-2.29045E-01	3.09255E-01
19	-1.15020E-01	2.82799E-01	-1.93569E-01	2.40852E-01
20	-7.83375E-02	2.15807E-01	-1.57991E-01	1.72986E-01
21	-4.17600E-02	1.49180E-01	-1.22308E-01	1.05614E-01
22	-5.29127E-03	8.28748E-02	-8.65156E-02	3.86971E-02
23	3.10652E-02	1.68544E-02	-5.06113E-02	-2.77968E-02
24	6.73056E-02	-4.89110E-02	-1.45907E-02	-9.38953E-02
25	1.03426E-01	-1.14446E-01	2.15500E-02	-1.59620E-01
26	1.39423E-01	-1.79767E-01	5.78136E-02	-2.24987E-01
27	1.75298E-01	-2.44884E-01	9.41995E-02	-2.90008E-01
28	2.11051E-01	-3.09801E-01	1.30707E-01	-3.54691E-01
29	2.46684E-01	-3.74515E-01	1.67335E-01	-4.19037E-01
30	2.82197E-01	-4.39022E-01	2.04083E-01	-4.83041E-01
31	3.17592E-01	-5.03315E-01	2.40949E-01	-5.46697E-01
32	3.52871E-01	-5.67384E-01	2.77931E-01	-6.09998E-01
33	3.88035E-01	-6.31223E-01	3.15028E-01	-6.72936E-01
34	4.23086E-01	-6.94819E-01	3.52237E-01	-7.35501E-01
35	4.58025E-01	-7.58161E-01	3.89559E-01	-7.97680E-01

1

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
36	4.92855E-01	-8.21236E-01	4.26989E-01	-8.59461E-01
37	5.27579E-01	-8.84027E-01	4.64526E-01	-9.20830E-01
38	5.62198E-01	-9.46519E-01	5.02168E-01	-9.81770E-01
39	5.96715E-01	-1.00870E+00	5.39912E-01	-1.04226E+00
40	6.31133E-01	-1.07055E+00	5.77755E-01	-1.10230E+00
41	6.65454E-01	-1.13206E+00	6.15695E-01	-1.16186E+00
42	6.99683E-01	-1.19323E+00	6.53726E-01	-1.22094E+00
43	7.33822E-01	-1.25403E+00	6.91848E-01	-1.27953E+00
44	7.67873E-01	-1.31448E+00	7.30058E-01	-1.33762E+00
45	8.01840E-01	-1.37456E+00	7.68353E-01	-1.39520E+00
46	8.35724E-01	-1.43427E+00	8.06730E-01	-1.45227E+00

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-8.19863E-01	1.53058E+00
2	-8.20587E-01	1.53221E+00
3	-8.21135E-01	1.53391E+00
4	-8.21503E-01	1.53566E+00
5	-8.21686E-01	1.53743E+00
6	-8.21683E-01	1.53922E+00
7	-8.21492E-01	1.54100E+00
8	-8.21117E-01	1.54274E+00
9	-8.20562E-01	1.54444E+00
10	-8.19832E-01	1.54607E+00
11	-8.18936E-01	1.54762E+00
12	-8.17883E-01	1.54906E+00
13	-8.16685E-01	1.55038E+00
14	-8.15355E-01	1.55158E+00
15	-8.13908E-01	1.55262E+00
16	-8.12359E-01	1.55351E+00
17	-8.10726E-01	1.55424E+00
18	-8.09026E-01	1.55479E+00
19	-8.07278E-01	1.55515E+00
20	-8.05501E-01	1.55534E+00
21	-8.03715E-01	1.55533E+00
22	-8.01939E-01	1.55514E+00
23	-8.00192E-01	1.55477E+00
24	-7.98495E-01	1.55421E+00
25	-7.96864E-01	1.55348E+00
26	-7.95319E-01	1.55259E+00
27	-7.93876E-01	1.55153E+00
28	-7.92551E-01	1.55034E+00
29	-7.91358E-01	1.54901E+00
30	-7.90311E-01	1.54756E+00
31	-7.89421E-01	1.54601E+00

LEADING EDGE AXIAL DIFFERENCE = -.1051 NEW DELX = .1051

1

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-63.11479	-.26768	-40.3995
2	.02222	-.04390	-63.18372	-.26079	-41.7642
3	.04444	-.08792	-63.24877	-.24010	-45.6691
4	.06667	-.13206	-63.30645	-.20563	-53.6462
5	.08889	-.17631	-63.35330	-.15737	-70.4416
6	.11111	-.22063	-63.38591	-.09532	-116.6955
7	.13333	-.26499	-63.40086	-.01948	-571.9807
8	.15556	-.30937	-63.39469	.07015	158.7020
9	.17778	-.35371	-63.36383	.17357	63.9363
10	.20000	-.39797	-63.30458	.29078	37.9297
11	.22222	-.44208	-63.21427	.40658	26.8732
12	.24444	-.48599	-63.09589	.50184	21.5071
13	.26667	-.52965	-62.95420	.57649	18.4511
14	.28889	-.57303	-62.79399	.63054	16.5956
15	.31111	-.61610	-62.62026	.66398	15.4844
16	.33333	-.65885	-62.43816	.67682	14.9147
17	.35556	-.70125	-62.25312	.66905	14.8115
18	.37778	-.74333	-62.07082	.64067	15.1905
19	.40000	-.78510	-61.89724	.59169	16.1695
20	.42222	-.82657	-61.73758	.53390	17.6421
21	.44444	-.86778	-61.59186	.48339	19.2119
22	.46667	-.90875	-61.45838	.44024	20.8248
23	.48889	-.94950	-61.33531	.40446	22.4008
24	.51111	-.99005	-61.22074	.37604	23.8313
25	.53333	-1.03042	-61.11268	.35499	24.9864
26	.55556	-1.07061	-61.00908	.34130	25.7346
27	.57778	-1.11063	-60.90781	.33498	25.9710
28	.60000	-1.15049	-60.80668	.33603	25.6456
29	.62222	-1.19018	-60.70371	.34197	24.9587
30	.64444	-1.22970	-60.59798	.34968	24.1693
31	.66667	-1.26904	-60.48890	.35915	23.2952
32	.68889	-1.30821	-60.37586	.37038	22.3543
33	.71111	-1.34720	-60.25824	.38337	21.3646
34	.73333	-1.38600	-60.13538	.39812	20.3432
35	.75556	-1.42460	-60.00663	.41464	19.3056
36	.77778	-1.46300	-59.87129	.43291	18.2656
37	.80000	-1.50118	-59.72864	.45295	17.2351
38	.82222	-1.53914	-59.57814	.47278	16.2913
39	.84444	-1.57686	-59.42014	.49028	15.4906
40	.86667	-1.61435	-59.25521	.50545	14.8085
41	.88889	-1.65158	-59.08397	.51829	14.2264
42	.91111	-1.68854	-58.90704	.52879	13.7306
43	.93333	-1.72528	-58.72507	.53695	13.3106
44	.95556	-1.76173	-58.53875	.54279	12.9585
45	.97778	-1.79791	-58.34880	.54629	12.6686
46	1.00000	-1.83383	-58.15595	.54745	12.4370

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-63.11479
2	.20133	-63.30004
3	.40181	-61.88369
4	.60135	-60.80048
5	.80047	-59.72555
6	1.00000	-58.15595

CARTESIAN COORDINATES ON STREAMSURFACE 10

POINT	Z1	X1	Y1	Z2	X2	Y2
1	8.73260	-.89381	1.53621	8.73405	-.92423	1.52061
2	8.74606	-.85600	1.46705	8.74751	-.88984	1.44985
3	8.75902	-.81819	1.39757	8.76045	-.85544	1.37868
4	8.77146	-.78040	1.32778	8.77284	-.82104	1.30722
5	8.78338	-.74261	1.25771	8.78467	-.78663	1.23550
6	8.79477	-.70486	1.18738	8.79594	-.75219	1.16355
7	8.80561	-.66713	1.11686	8.80664	-.71771	1.09142
8	8.81592	-.62946	1.04620	8.81676	-.68320	1.01920
9	8.82566	-.59183	.97549	8.82630	-.64863	.94693
10	8.83485	-.55426	.90480	8.83525	-.61400	.87472
11	8.84345	-.51677	.83424	8.84361	-.57930	.80267
12	8.85147	-.47936	.76391	8.85136	-.54452	.73087
13	8.85889	-.44203	.69390	8.85852	-.50966	.65941
14	8.86571	-.40479	.62427	8.86508	-.47471	.58836
15	8.87193	-.36764	.55507	8.87103	-.43967	.51780
16	8.87756	-.33059	.48631	8.87639	-.40453	.44777
17	8.88259	-.29363	.41803	8.88116	-.36929	.37829
18	8.88703	-.25678	.35022	8.88534	-.33395	.30934
19	8.89089	-.22002	.28285	8.88895	-.29850	.24095
20	8.89419	-.18336	.21588	8.89200	-.26296	.17308
21	8.89692	-.14681	.14924	8.89448	-.22730	.10571
22	8.89911	-.11037	.08293	8.89641	-.19154	.03880
23	8.90075	-.07403	.01690	8.89780	-.15566	-.02771
24	8.90186	-.03781	-.04888	8.89867	-.11966	-.09383
25	8.90245	-.00171	-.11443	8.89901	-.08354	-.15957
26	8.90251	.03427	-.17978	8.89884	-.04730	-.22494
27	8.90205	.07012	-.24491	8.89816	-.01093	-.28994
28	8.90108	.10586	-.30982	8.89699	.02555	-.35461
29	8.89960	.14148	-.37451	8.89532	.06217	-.41893
30	8.89761	.17698	-.43896	8.89317	.09890	-.48288
31	8.89511	.21237	-.50320	8.89054	.13575	-.54646
32	8.89209	.24763	-.56717	8.88744	.17272	-.60964
33	8.88856	.28279	-.63088	8.88385	.20980	-.67244
34	8.88452	.31783	-.69430	8.87979	.24700	-.73484
35	8.87997	.35277	-.75741	8.87525	.28431	-.79680
36	8.87492	.38760	-.82022	8.87025	.32174	-.85831
37	8.86936	.42232	-.88269	8.86477	.35927	-.91935
38	8.86331	.45693	-.94480	8.85883	.39691	-.97992
39	8.85680	.49145	-1.00653	8.85243	.43465	-1.03998
40	8.84983	.52587	-1.06786	8.84559	.47249	-1.09952
41	8.84243	.56019	-1.12881	8.83833	.51043	-1.15851
42	8.83461	.59442	-1.18935	8.83068	.54846	-1.21696
43	8.82639	.62855	-1.24946	8.82265	.58658	-1.27485
44	8.81780	.66261	-1.30914	8.81428	.62479	-1.33217
45	8.80884	.69657	-1.36839	8.80558	.66308	-1.38893
46	8.79956	.73045	-1.42702	8.79658	.70146	-1.44510

1

POINT	ZSEMI	XSEMI	YSEMI
1	8.73405	-.92423	1.52061
2	8.73374	-.92495	1.52221
3	8.73343	-.92550	1.52388
4	8.73311	-.92586	1.52560
5	8.73280	-.92605	1.52734
6	8.73249	-.92604	1.52910
7	8.73219	-.92585	1.53086
8	8.73191	-.92548	1.53258
9	8.73164	-.92492	1.53426
10	8.73138	-.92420	1.53588
11	8.73115	-.92330	1.53741
12	8.73094	-.92225	1.53885

K/14PRINT

```
 13   8.73076   -.92105   1.54017
 14   8.73060   -.91972   1.54136
 15   8.73048   -.91828   1.54242
 16   8.73038   -.91673   1.54331
 17   8.73032   -.91510   1.54405
 18   8.73029   -.91340   1.54461
 19   8.73030   -.91165   1.54500
 20   8.73034   -.90988   1.54521
 21   8.73041   -.90809   1.54523
 22   8.73051   -.90632   1.54506
 23   8.73065   -.90457   1.54471
 24   8.73081   -.90288   1.54418
 25   8.73100   -.90125   1.54348
 26   8.73122   -.89970   1.54262
 27   8.73146   -.89826   1.54160
 28   8.73172   -.89694   1.54043
 29   8.73200   -.89575   1.53914
 30   8.73229   -.89470   1.53772
 31   8.73260   -.89381   1.53621

STREAMSURFACE 11  ITERATION  1  DEVIATION =  2.231  SOLIDITY =  .9173
                  ITERATION  2  DEVIATION =  2.275  SOLIDITY =  .8880
                  ITERATION  2  DEVIATION =  2.275  SOLIDITY =  .8880

POINT  FRAC. M      Y    Y-D(DEG)    Y-DD   R OF CURV

  1   .00000   .00000 -64.87535  -.59562  -21.9342
  2   .02222  -.04753 -65.01060  -.58536  -22.6595
  3   .04444  -.09535 -65.13987  -.55456  -24.2690
  4   .06667  -.14345 -65.25874  -.50322  -27.1073
  5   .08889  -.19179 -65.36292  -.43136  -32.0011
  6   .11111  -.24034 -65.44824  -.33896  -41.1242
  7   .13333  -.28906 -65.51057  -.22602  -62.1153
  8   .15556  -.33790 -65.54574  -.09255 -152.3053
  9   .17778  -.38677 -65.54951   .06145  229.4982
 10   .20000  -.43562 -65.51740   .23598   59.5396
 11   .22222  -.48435 -65.44643   .40669   34.2675
 12   .24444  -.53287 -65.34040   .54922   25.0691
 13   .26667  -.58113 -65.20478   .66357   20.4317
 14   .28889  -.62907 -65.04506   .74973   17.7603
 15   .31111  -.67663 -64.86685   .80771   16.1594
 16   .33333  -.72379 -64.67603   .83751   15.2575

POINT  FRAC. M      Y    Y-D(DEG)    Y-DD   R OF CURV

 17   .35556  -.77055 -64.47878   .83913   14.9007
 18   .37778  -.81689 -64.28162   .81256   15.0601
 19   .40000  -.86283 -64.09150   .75782   15.8192
 20   .42222  -.90839 -63.91413   .69397   16.9486
 21   .44444  -.95362 -63.74915   .64011   18.0546
 22   .46667  -.99852 -63.59454   .59623   19.0688
 23   .48889 -1.04313 -63.44813   .56233   19.9096
 24   .51111 -1.08747 -63.30764   .53842   20.4910
 25   .53333 -1.13153 -63.17066   .52448   20.7384
 26   .55556 -1.17534 -63.03473   .52053   20.6048
 27   .57778 -1.21889 -62.89724   .52656   20.0835
 28   .60000 -1.26218 -62.75550   .54257   19.2111
 29   .62222 -1.30520 -62.60727   .56264   18.2494
 30   .64444 -1.34795 -62.45232   .58086   17.4032
 31   .66667 -1.39040 -62.29100   .59724   16.6551
 32   .68889 -1.43257 -62.12362   .61176   15.9917
 33   .71111 -1.47443 -61.95055   .62442   15.4021
 34   .73333 -1.51598 -61.77215   .63524   14.8777
 35   .75556 -1.55722 -61.58880   .64421   14.4116
 36   .77778 -1.59814 -61.40092   .65132   13.9983
 37   .80000 -1.63874 -61.20891   .65658   13.6334
 38   .82222 -1.67901 -61.01318   .66068   13.2995
 39   .84444 -1.71896 -60.81383   .66429   12.9813
 40   .86667 -1.75858 -60.61093   .66742   12.6780
 41   .88889 -1.79787 -60.40456   .67007   12.3889
 42   .91111 -1.83683 -60.19477   .67224   12.1134
 43   .93333 -1.87546 -59.98165   .67393   11.8509
 44   .95556 -1.91375 -59.76528   .67513   11.6011
 45   .97778 -1.95171 -59.54576   .67586   11.3634
 46  1.00000 -1.98934 -59.32318   .67610   11.1374

DATA POINTS

POINT  FRAC. M  Y-D(DEG)

  1   .00000 -64.87535
  2   .20000 -65.51740
  3   .40000 -64.09151
  4   .60000 -62.75551
  5   .80000 -61.20893
  6  1.00000 -59.32318
1
STREAMSURFACE GEOMETRY ON STREAMLINE NUMBER 11
**********************************************
```

```
BETA1 =-64.875  (BLADE INLET ANGLE)
BETA2 =-59.323  (BLADE OUTLET ANGLE)
YZERO = .00500  (BLADE LEADING EDGE RADIUS AS A FRACTION OF CHORD)
T     = .02550  (BLADE MAXIMUM THICKNESS AS A FRACTION OF CHORD)
YONE  = .00500  (BLADE TRAIL. EDGE HALF-THICK. AS A FRAC. OF CHORD)
Z     =  .5500  (LOCATION OF MAX. THICK. AS A FRACTION OF MEAN LINE)
CORD  = 1.4000  (MERIDIONAL CHORD OF SECTION)

NORMALIZED RESULTS - ALL THE FOLLOWING REFER TO A
BLADE HAVING A MERIDIONAL CHORD PROJECTION OF UNITY
***************************************************

 BLADE CHORD    = 2.1921

 STAGGER ANGLE  =-63.312

 CAMBER ANGLE   = -5.552

 SECTION AREA   = .09573
 LOCATION OF CENTROID RELATIVE TO LEADING EDGE

           XBAR =  .49105
           YBAR =-1.00475

 SECOND MOMENTS OF AREA ABOUT CENTROID

           IX   =  .02404
           IY   =  .00599
           IXY  = -.01197

 ANGLE OF INCLINATION OF (ONE) PRINCIPAL AXIS TO (X) AXIS = 26.498

 PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

           IPX  = .03001      (AT 26.498 WITH (X) AXIS)
           IPY  = .00002      (AT 26.498 WITH (Y) AXIS)

POINT        M E A N L I N E  D A T A          SURFACE COORDINATE DATA
NUMBER     X       Y     ANGLE THICKNESS      X1      Y1      X2     Y2

  1     .01096  .00000-64.875  .02192      .02088  .00465  .00104 -.004
  2     .03273 -.04656-65.011  .02410      .04365 -.04147  .02181 -.051
  3     .05450 -.09341-65.140  .02629      .06642 -.08788  .04257 -.098
  4     .07627 -.14052-65.259  .02847      .08919 -.13457  .06334 -.146
  5     .09804 -.18788-65.363  .03063      .11196 -.18150  .08412 -.194
  6     .11981 -.23544-65.448  .03276      .13471 -.22864  .10491 -.242
  7     .14158 -.28317-65.511  .03487      .15744 -.27595  .12571 -.290
  8     .16334 -.33101-65.546  .03692      .18015 -.32337  .14654 -.338
  9     .18511 -.37889-65.550  .03892      .20283 -.37083  .16740 -.386
 10     .20688 -.42674-65.517  .04084      .22547 -.41827  .18830 -.435
 11     .22865 -.47447-65.446  .04269      .24807 -.46560  .20924 -.483
 12     .25042 -.52201-65.340  .04445      .27062 -.51274  .23023 -.531
 13     .27219 -.56929-65.205  .04610      .29312 -.55962  .25126 -.578
1
POINT        M E A N L I N E  D A T A          SURFACE COORDINATE DATA
NUMBER     X       Y     ANGLE THICKNESS      X1      Y1      X2     Y2

 14     .29396 -.61624-65.045  .04765      .31556 -.60619  .27236 -.626
 15     .31573 -.66283-64.867  .04908      .33795 -.65241  .29351 -.673
 16     .33750 -.70904-64.676  .05039      .36027 -.69826  .31472 -.719
 17     .35927 -.75484-64.479  .05158      .38254 -.74373  .33600 -.765
 18     .38104 -.80023-64.282  .05262      .40474 -.78882  .35733 -.811
 19     .40281 -.84524-64.091  .05354      .42688 -.83354  .37873 -.856
 20     .42457 -.88987-63.914  .05431      .44896 -.87793  .40019 -.901
 21     .44634 -.93417-63.749  .05493      .47098 -.92203  .42171 -.946
 22     .46811 -.97817-63.595  .05540      .49292 -.96585  .44330 -.990

=> 65
=> 66
=> 94
=> 48
=> 26
=> 25
=> 40
=> 65
=> 94
=> 20
=> 34
=> 28
=> 95
=> 29
=> 26
=> 82
=> 95
=> 65
=> 93
=> 81
=> 32
=> 48
```

```
 23     .48988-1.02187-63.448  .05572   .51480-1.00941  .46496-1.034
 24     .51165-1.06530-63.308  .05588   .53661-1.05275  .48669-1.077
 25     .53342-1.10847-63.171  .05588   .55835-1.09586  .50849-1.121
 26     .55519-1.15138-63.035  .05571   .58002-1.13875  .53036-1.164
 27     .57696-1.19404-62.897  .05538   .60161-1.18143  .55231-1.206
 28     .59873-1.23645-62.756  .05489   .62313-1.22389  .57433-1.249
 29     .62050-1.27859-62.607  .05424   .64458-1.26612  .59642-1.291
 30     .64227-1.32047-62.452  .05344   .66596-1.30811  .61857-1.332
 31     .66404-1.36206-62.291  .05249   .68727-1.34985  .64080-1.374
 32     .68580-1.40336-62.124  .05139   .70852-1.39135  .66309-1.415
 33     .70757-1.44437-61.951  .05015   .72970-1.43258  .68545-1.456
 34     .72934-1.48507-61.772  .04876   .75082-1.47354  .70786-1.496
 35     .75111-1.52547-61.589  .04723   .77188-1.51423  .73034-1.536
 36     .77288-1.56556-61.401  .04556   .79288-1.55465  .75288-1.576
 37     .79465-1.60533-61.209  .04376   .81382-1.59479  .77548-1.615
 38     .81642-1.64478-61.013  .04182   .83471-1.63465  .79813-1.654
 39     .83819-1.68391-60.814  .03976   .85554-1.67422  .82083-1.693
 40     .85996-1.72273-60.611  .03757   .87632-1.71351  .84359-1.731
 41     .88173-1.76122-60.405  .03525   .89705-1.75251  .86640-1.769
 42     .90350-1.79938-60.195  .03282   .91774-1.79123  .88926-1.807
 43     .92527-1.83722-59.982  .03027   .93837-1.82965  .91216-1.844
 44     .94703-1.87474-59.765  .02760   .95896-1.86779  .93511-1.881
 45     .96880-1.91192-59.546  .02481   .97950-1.90564  .95811-1.918
 46     .99057-1.94879-59.323  .02192  1.00000-1.94319  .98115-1.954
                                          NORMALISED PLOT OF SECTION NUMBER
1
1 DIMENSIONAL RESULTS - ALL RESULTS REFER TO A BLADE OF SPECIFIED CHORD
  *********************************************************************

  BLADE CHORD = 3.06895E+00

  L.E.RADIUS  = 1.53448E-02  CENTERED AT X= -6.7213E-01 Y=  1.4066E+00

  SECTION AREA= 1.87630E-01

  SECOND MOMENTS OF AREA ABOUT CENTROID

    IX   = 9.23661E-02
    IY   = 2.30287E-02
    IXY  =-4.60008E-02

  PRINCIPAL SECOND MOMENTS OF AREA ABOUT CENTROID

    IPX  = 1.15299E-01  (AT 26.498 WITH (X) AXIS)
    IPY  = 9.53513E-05  (AT 26.498 WITH (Y) AXIS)

 PT    SURFACE----------ONE          SURFACE----------TWO
 NO        X              Y              X              Y

  1  -6.58232E-01   1.41316E+00   -6.86018E-01   1.40013E+00
  2  -6.26356E-01   1.34858E+00   -6.56941E-01   1.33433E+00
  3  -5.94475E-01   1.28361E+00   -6.27868E-01   1.26813E+00
  4  -5.62598E-01   1.21825E+00   -5.98791E-01   1.20157E+00
  5  -5.30730E-01   1.15255E+00   -5.69705E-01   1.13467E+00
  6  -4.98880E-01   1.08655E+00   -5.40602E-01   1.06749E+00
  7  -4.67054E-01   1.02032E+00   -5.11474E-01   1.00009E+00
  8  -4.35262E-01   9.53932E-01   -4.82312E-01   9.32536E-01
  9  -4.03512E-01   8.87477E-01   -4.53108E-01   8.64927E-01
 10  -3.71814E-01   8.21061E-01   -4.23852E-01   7.97365E-01
 11  -3.40176E-01   7.54802E-01   -3.94537E-01   7.29966E-01
 12  -3.08605E-01   6.88810E-01   -3.65155E-01   6.62848E-01
 13  -2.77106E-01   6.23178E-01   -3.35699E-01   5.96110E-01
 14  -2.45684E-01   5.57979E-01   -3.06167E-01   5.29833E-01

=> 32
=> 85
=> 08
=> 01
=> 66
=> 01
=> 07
=> 83
=> 26
=> 38
=> 16
=> 60
=> 70
=> 46
=> 86
=> 91
=> 61
=> 94
=> 92
=> 54
=> 79
=> 68
=> 21
=> 38
=> 11
```

RESULTS.OUT 6-25-95 10:23a

Page 31 of 32

KC14PRINT

15	-2.14343E-01	4.93268E-01	-2.76555E-01	4.64082E-01
16	-1.83086E-01	4.29079E-01	-2.46858E-01	3.98901E-01
17	-1.51915E-01	3.65425E-01	-2.17076E-01	3.34315E-01
18	-1.20830E-01	3.02302E-01	-1.87206E-01	2.70331E-01
19	-8.98326E-02	2.39686E-01	-1.57250E-01	2.06938E-01
20	-5.89228E-02	1.77535E-01	-1.27206E-01	1.44105E-01
21	-2.81027E-02	1.15805E-01	-9.70726E-02	8.17919E-02
22	2.62460E-03	5.44585E-02	-6.68462E-02	1.99646E-02
23	3.32567E-02	-6.53604E-03	-3.65245E-02	-4.14065E-02
24	6.37905E-02	-6.72017E-02	-6.10445E-03	-1.02344E-01
25	9.42230E-02	-1.27556E-01	2.44168E-02	-1.62862E-01
26	1.24553E-01	-1.87607E-01	5.50404E-02	-2.22972E-01
27	1.54782E-01	-2.47356E-01	8.57651E-02	-2.82678E-01
28	1.84911E-01	-3.06797E-01	1.16590E-01	-3.41976E-01
29	2.14941E-01	-3.65919E-01	1.47514E-01	-4.00859E-01
30	2.44874E-01	-4.24708E-01	1.78535E-01	-4.59313E-01
31	2.74712E-01	-4.83153E-01	2.09650E-01	-5.17325E-01
32	3.04458E-01	-5.41242E-01	2.40858E-01	-5.74883E-01
33	3.34114E-01	-5.98966E-01	2.72156E-01	-6.31978E-01
34	3.63682E-01	-6.56316E-01	3.03541E-01	-6.88602E-01
35	3.93165E-01	-7.13287E-01	3.35012E-01	-7.44745E-01

1

PT NO	SURFACE----------ONE X	Y	SURFACE----------TWO X	Y
36	4.22565E-01	-7.69871E-01	3.66566E-01	-8.00401E-01
37	4.51885E-01	-8.26064E-01	3.98200E-01	-8.55567E-01
38	4.81127E-01	-8.81864E-01	4.29912E-01	-9.10237E-01
39	5.10293E-01	-9.37266E-01	4.61699E-01	-9.64409E-01
40	5.39386E-01	-9.92271E-01	4.93560E-01	-1.01808E+00
41	5.68407E-01	-1.04687E+00	5.25493E-01	-1.07125E+00
42	5.97361E-01	-1.10107E+00	5.57493E-01	-1.12391E+00
43	6.26248E-01	-1.15487E+00	5.89559E-01	-1.17607E+00
44	6.55071E-01	-1.20826E+00	6.21690E-01	-1.22772E+00
45	6.83831E-01	-1.26125E+00	6.53884E-01	-1.27886E+00
46	7.12532E-01	-1.31383E+00	6.86137E-01	-1.32949E+00

POINTS DESCRIBING LEADING EDGE RADIUS

POINT NO.	X	Y
1	-6.86018E-01	1.40013E+00
2	-6.86623E-01	1.40162E+00
3	-6.87069E-01	1.40316E+00
4	-6.87351E-01	1.40474E+00
5	-6.87467E-01	1.40634E+00
6	-6.87414E-01	1.40795E+00
7	-6.87194E-01	1.40954E+00
8	-6.86809E-01	1.41110E+00
9	-6.86263E-01	1.41261E+00
10	-6.85562E-01	1.41405E+00
11	-6.84714E-01	1.41542E+00
12	-6.83728E-01	1.41669E+00
13	-6.82615E-01	1.41784E+00
14	-6.81387E-01	1.41888E+00
15	-6.80057E-01	1.41978E+00
16	-6.78640E-01	1.42054E+00
17	-6.77152E-01	1.42114E+00
18	-6.75610E-01	1.42159E+00
19	-6.74028E-01	1.42187E+00
20	-6.72426E-01	1.42199E+00
21	-6.70821E-01	1.42193E+00
22	-6.69230E-01	1.42171E+00
23	-6.67671E-01	1.42133E+00
24	-6.66160E-01	1.42078E+00
25	-6.64715E-01	1.42008E+00
26	-6.63351E-01	1.41923E+00
27	-6.62083E-01	1.41825E+00
28	-6.60926E-01	1.41713E+00
29	-6.59890E-01	1.41591E+00
30	-6.58989E-01	1.41458E+00
31	-6.58232E-01	1.41316E+00

LEADING EDGE AXIAL DIFFERENCE = -.1125 NEW DELX = .1125

1

POINT	FRAC. M	Y	Y-D(DEG)	Y-DD	R OF CURV
1	.00000	.00000	-64.87535	-.59562	-21.9342
2	.02222	-.04753	-65.01060	-.58536	-22.6595
3	.04444	-.09535	-65.13987	-.55456	-24.2690
4	.06667	-.14345	-65.25874	-.50322	-27.1073
5	.08889	-.19179	-65.36292	-.43136	-32.0011
6	.11111	-.24034	-65.44824	-.33896	-41.1242
7	.13333	-.28906	-65.51057	-.22602	-62.1153
8	.15556	-.33790	-65.54574	-.09255	-152.3053
9	.17778	-.38677	-65.54951	.06145	229.4982
10	.20000	-.43562	-65.51740	.23598	59.5396
11	.22222	-.48435	-65.44643	.40669	34.2675
12	.24444	-.53287	-65.34040	.54922	25.0691
13	.26667	-.58113	-65.20478	.66357	20.4317
14	.28889	-.62907	-65.04506	.74973	17.7603
15	.31111	-.67663	-64.86685	.80771	16.1594
16	.33333	-.72379	-64.67603	.83751	15.2575
17	.35556	-.77055	-64.47878	.83913	14.9007
18	.37778	-.81689	-64.28162	.81256	15.0601
19	.40000	-.86283	-64.09150	.75782	15.8192
20	.42222	-.90839	-63.91413	.69397	16.9486
21	.44444	-.95362	-63.74915	.64011	18.0546
22	.46667	-.99852	-63.59454	.59623	19.0688
23	.48889	-1.04313	-63.44813	.56233	19.9096
24	.51111	-1.08747	-63.30764	.53842	20.4910
25	.53333	-1.13153	-63.17066	.52448	20.7384
26	.55556	-1.17534	-63.03473	.52053	20.6048
27	.57778	-1.21889	-62.89724	.52656	20.0835
28	.60000	-1.26218	-62.75550	.54257	19.2111
29	.62222	-1.30520	-62.60727	.56264	18.2494
30	.64444	-1.34795	-62.45232	.58086	17.4032
31	.66667	-1.39040	-62.29100	.59724	16.6551
32	.68889	-1.43257	-62.12362	.61176	15.9917
33	.71111	-1.47443	-61.95055	.62442	15.4021
34	.73333	-1.51598	-61.77215	.63524	14.8777
35	.75556	-1.55722	-61.58880	.64421	14.4116
36	.77778	-1.59814	-61.40092	.65132	13.9983
37	.80000	-1.63874	-61.20891	.65658	13.6334
38	.82222	-1.67901	-61.01318	.66068	13.2995
39	.84444	-1.71896	-60.81383	.66429	12.9813
40	.86667	-1.75858	-60.61093	.66742	12.6780
41	.88889	-1.79787	-60.40456	.67007	12.3889
42	.91111	-1.83683	-60.19477	.67224	12.1134
43	.93333	-1.87546	-59.98165	.67393	11.8509
44	.95556	-1.91375	-59.76528	.67513	11.6011
45	.97778	-1.95171	-59.54576	.67586	11.3634
46	1.00000	-1.98934	-59.32318	.67610	11.1374

1

DATA POINTS

POINT	FRAC. M	Y-D(DEG)
1	.00000	-64.87535
2	.20000	-65.51740
3	.40000	-64.09151
4	.60000	-62.75551
5	.80000	-61.20893
6	1.00000	-59.32318

CARTESIAN COORDINATES ON STREAMSURFACE 11

POINT	Z1	X1	Y1	Z2	X2	Y2
1	9.39506	-.77077	1.40815	9.39703	-.79855	1.39490
2	9.40439	-.73889	1.34445	9.40642	-.76947	1.33015
3	9.41334	-.70701	1.28027	9.41543	-.74040	1.26475
4	9.42190	-.67513	1.21565	9.42404	-.71132	1.19892
5	9.43007	-.64326	1.15059	9.43223	-.68224	1.13267
6	9.43782	-.61141	1.08514	9.43999	-.65313	1.06606
7	9.44515	-.57959	1.01937	9.44731	-.62401	.99916
8	9.45204	-.54779	.95337	9.45417	-.59484	.93203
9	9.45848	-.51605	.88721	9.46056	-.56564	.86476
10	9.46446	-.48435	.82101	9.46647	-.53639	.79746
11	9.46996	-.45271	.75489	9.47189	-.50707	.73026
12	9.47498	-.42114	.68898	9.47682	-.47769	.66327
13	9.47952	-.38964	.62339	9.48125	-.44823	.59659
14	9.48359	-.35822	.55820	9.48519	-.41870	.53033
15	9.48717	-.32688	.49349	9.48864	-.38909	.46455
16	9.49030	-.29562	.42926	9.49160	-.35939	.39933
17	9.49296	-.26445	.36557	9.49410	-.32961	.33470
18	9.49519	-.23336	.30241	9.49614	-.29974	.27064
19	9.49697	-.20236	.23977	9.49774	-.26978	.20717
20	9.49834	-.17146	.17760	9.49890	-.23974	.14427
21	9.49929	-.14063	.11583	9.49965	-.20960	.08191
22	9.49984	-.10991	.05447	9.49998	-.17938	.02006
23	9.50000	-.07928	-.00653	9.49991	-.14906	-.04136
24	9.49976	-.04874	-.06719	9.49945	-.11864	-.10232
25	9.49914	-.01831	-.12753	9.49860	-.08812	-.16285
26	9.49815	.01202	-.18758	9.49738	-.05749	-.22295
27	9.49678	.04225	-.24730	9.49580	-.02677	-.28262
28	9.49505	.07238	-.30669	9.49385	.00406	-.34188
29	9.49296	.10241	-.36573	9.49154	.03498	-.40071
30	9.49051	.13234	-.42441	9.48890	.06600	-.45909
31	9.48773	.16218	-.48275	9.48592	.09712	-.51698
32	9.48460	.19193	-.54070	9.48262	.12833	-.57439
33	9.48114	.22158	-.59825	9.47900	.15962	-.63132
34	9.47737	.25115	-.65539	9.47507	.19101	-.68775
35	9.47327	.28063	-.71211	9.47085	.22248	-.74366
36	9.46887	.31003	-.76843	9.46634	.25403	-.79904
37	9.46417	.33935	-.82432	9.46155	.28567	-.85389
38	9.45918	.36859	-.87978	9.45649	.31738	-.90822
39	9.45390	.39776	-.93480	9.45117	.34917	-.96202
40	9.44834	.42685	-.98937	9.44559	.38103	-1.01526
41	9.44251	.45587	-1.04352	9.43978	.41296	-1.06797
42	9.43642	.48483	-1.09723	9.43373	.44496	-1.12012
43	9.43008	.51372	-1.15049	9.42746	.47703	-1.17173
44	9.42348	.54254	-1.20331	9.42098	.50916	-1.22279
45	9.41665	.57130	-1.25567	9.41428	.54135	-1.27330
46	9.40961	.60000	-1.30739	9.40739	.57360	-1.32326

1

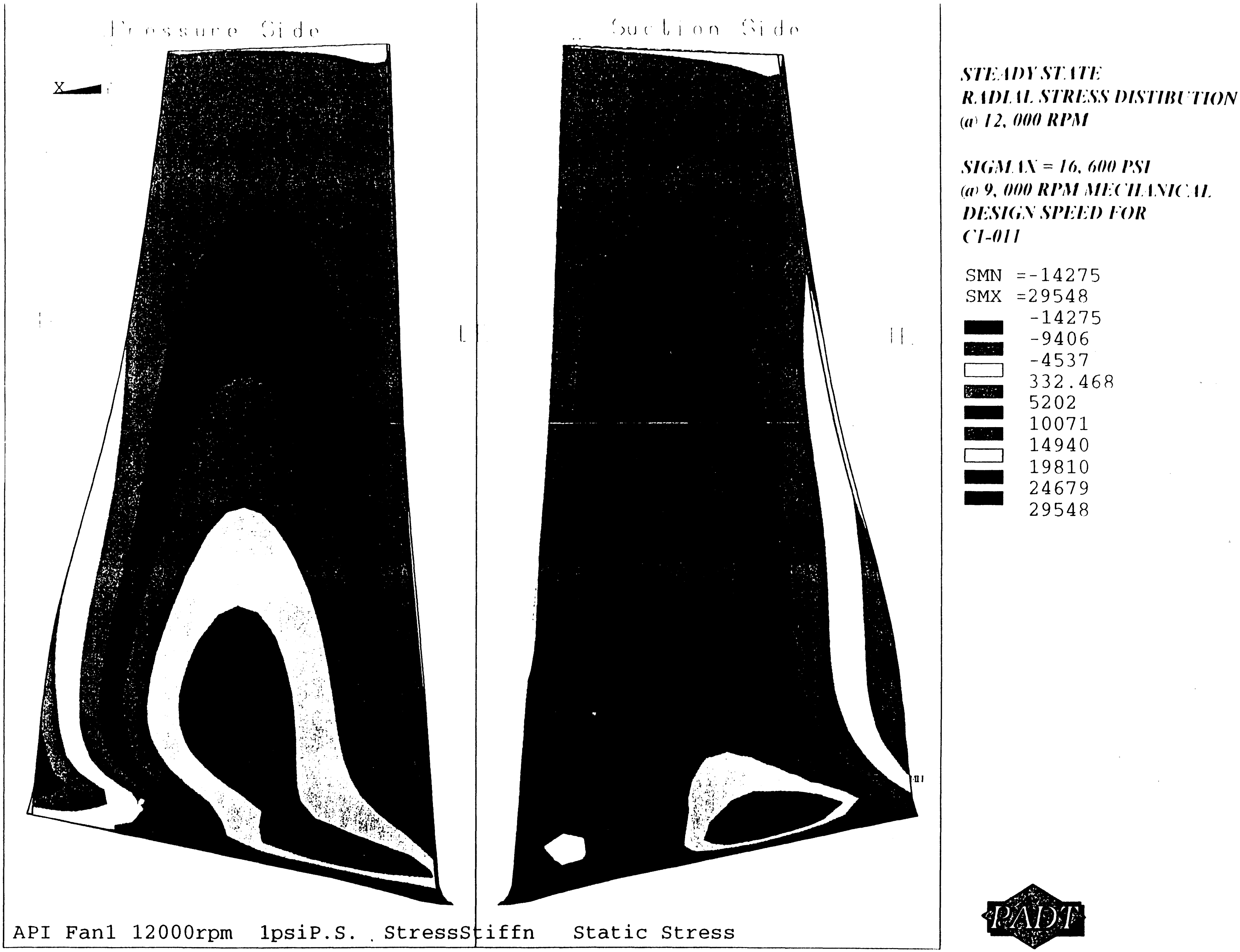
POINT	ZSEMI	XSEMI	YSEMI
1	9.39703	-.79855	1.39490
2	9.39682	-.79916	1.39636
3	9.39659	-.79960	1.39788
4	9.39636	-.79988	1.39944
5	9.39612	-.80000	1.40102
6	9.39589	-.79995	1.40261
7	9.39565	-.79973	1.40419
8	9.39542	-.79934	1.40573
9	9.39520	-.79880	1.40724
10	9.39498	-.79810	1.40868
11	9.39477	-.79725	1.41004
12	9.39458	-.79626	1.41131
13	9.39441	-.79515	1.41248
14	9.39425	-.79392	1.41352
15	9.39411	-.79259	1.41443
16	9.39400	-.79117	1.41520
17	9.39390	-.78969	1.41583
18	9.39383	-.78814	1.41629
19	9.39379	-.78656	1.41660
20	9.39377	-.78496	1.41673
21	9.39377	-.78335	1.41670
22	9.39380	-.78176	1.41650
23	9.39386	-.78020	1.41613
24	9.39394	-.77869	1.41561
25	9.39404	-.77725	1.41493
26	9.39416	-.77588	1.41411
27	9.39431	-.77462	1.41315
28	9.39447	-.77346	1.41206
29	9.39465	-.77242	1.41085
30	9.39485	-.77152	1.40955
31	9.39506	-.77077	1.40815

ICI4PRINT

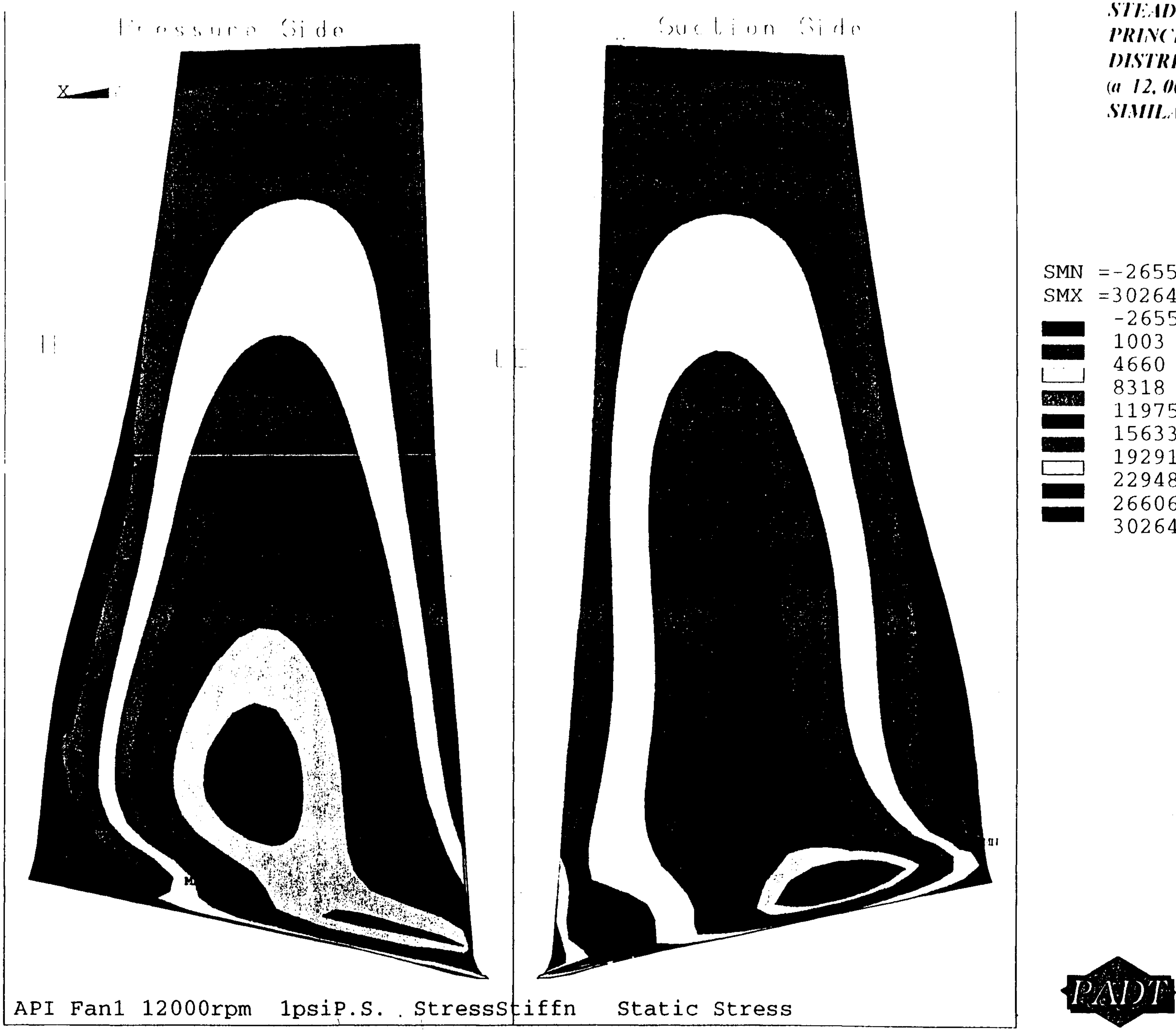
APPENDIX B

FAN ROTOR BLADE STRESS/VIBRATION SOLID MODEL

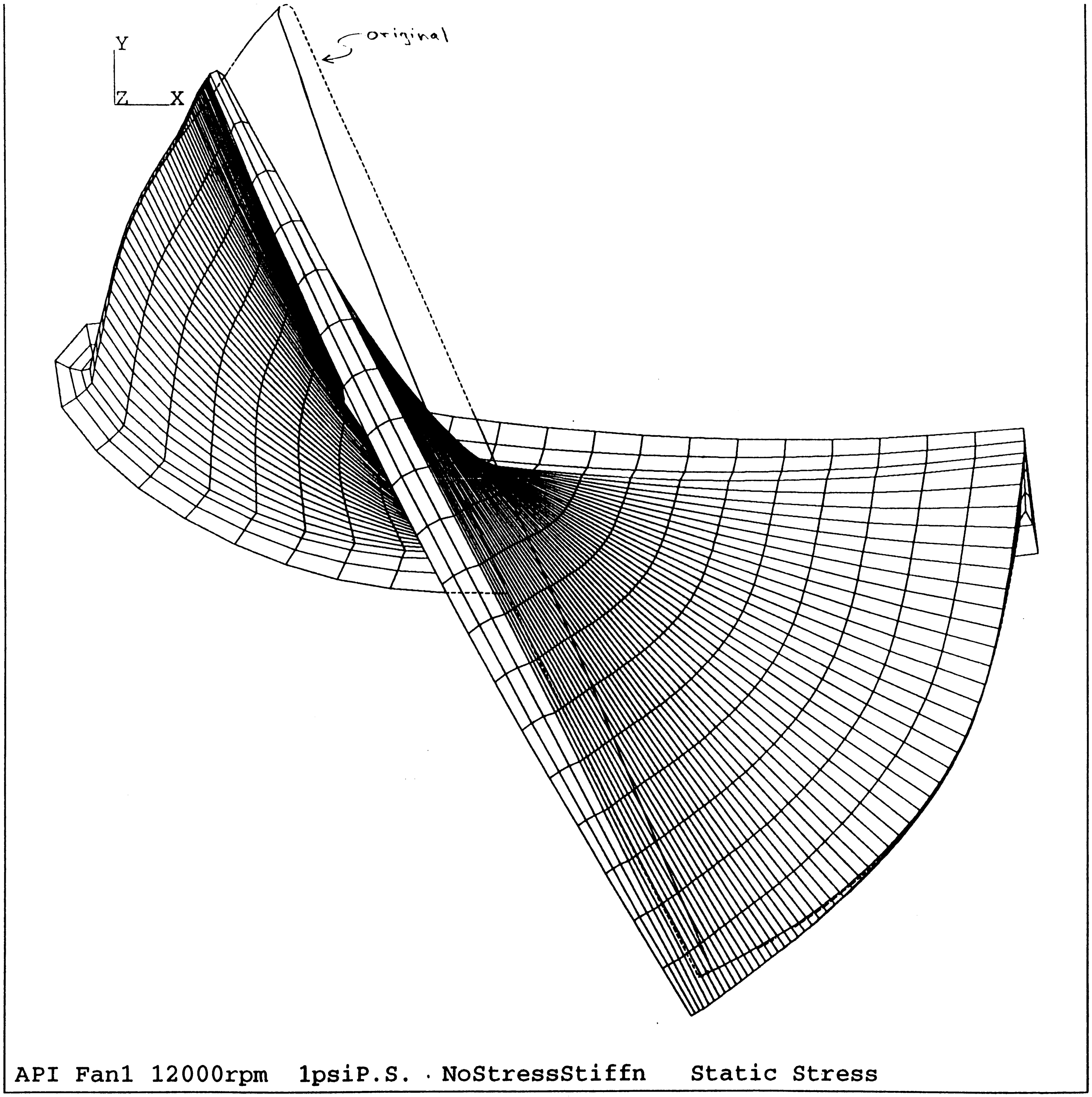
ANSYS OUTPUT GRAPHICS


Pressure Side
Suction Side
STEADY STATE
RADIAL STRESS DISTRIBUTION
@ 12, 000 RPM
SIGMAX = 16, 600 PSI
@ 9, 000 RPM MECHANICAL
DESIGN SPEED FOR
CT-011
SMN =-14275
SMX =29548
-14275
-9406
-4537
332.468
5202
10071
14940
19810
24679
29548
API Fan1 12000rpm 1psiP.S. . StressStiffn Static Stress

STEADY STATE
PRINCIPAL STRESS
DISTRIBUTION
@ 12, 000 RPM
SIMILAR TO RADIAL



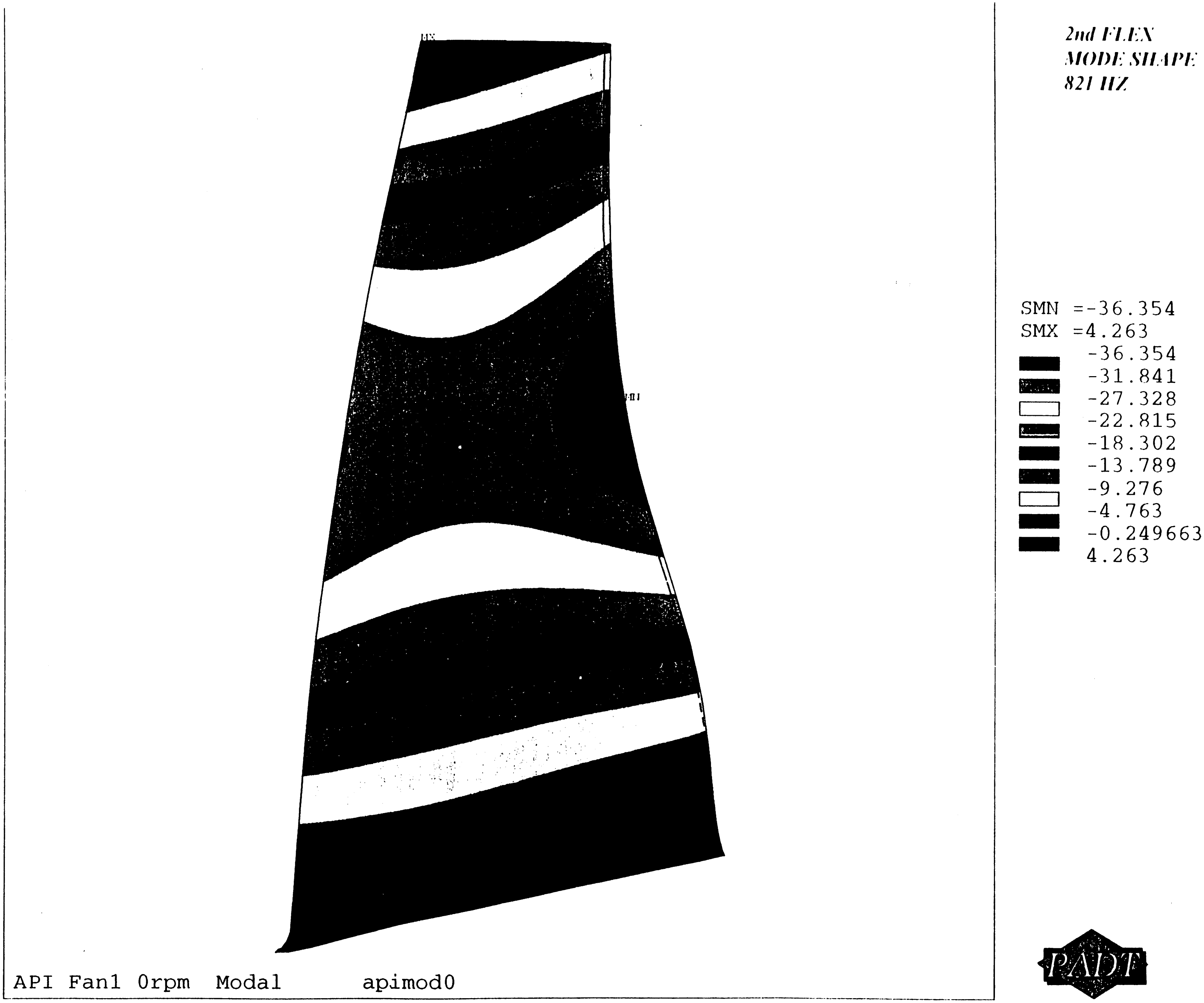

Pressure Side
Suction Side
X
API Fan1 12000rpm 1psiP.S. StressStiffn Static Stress
TANGENTIAL DISPLACEMENT DISTRIBUTION @ 12, 000 RPM
SMN =-0.03545
SMX =0.007805
-0.03545
-0.030644
-0.025838
-0.021032
-0.016226
-0.01142
-0.006614
-0.001808
0.002998
0.007805
PADT

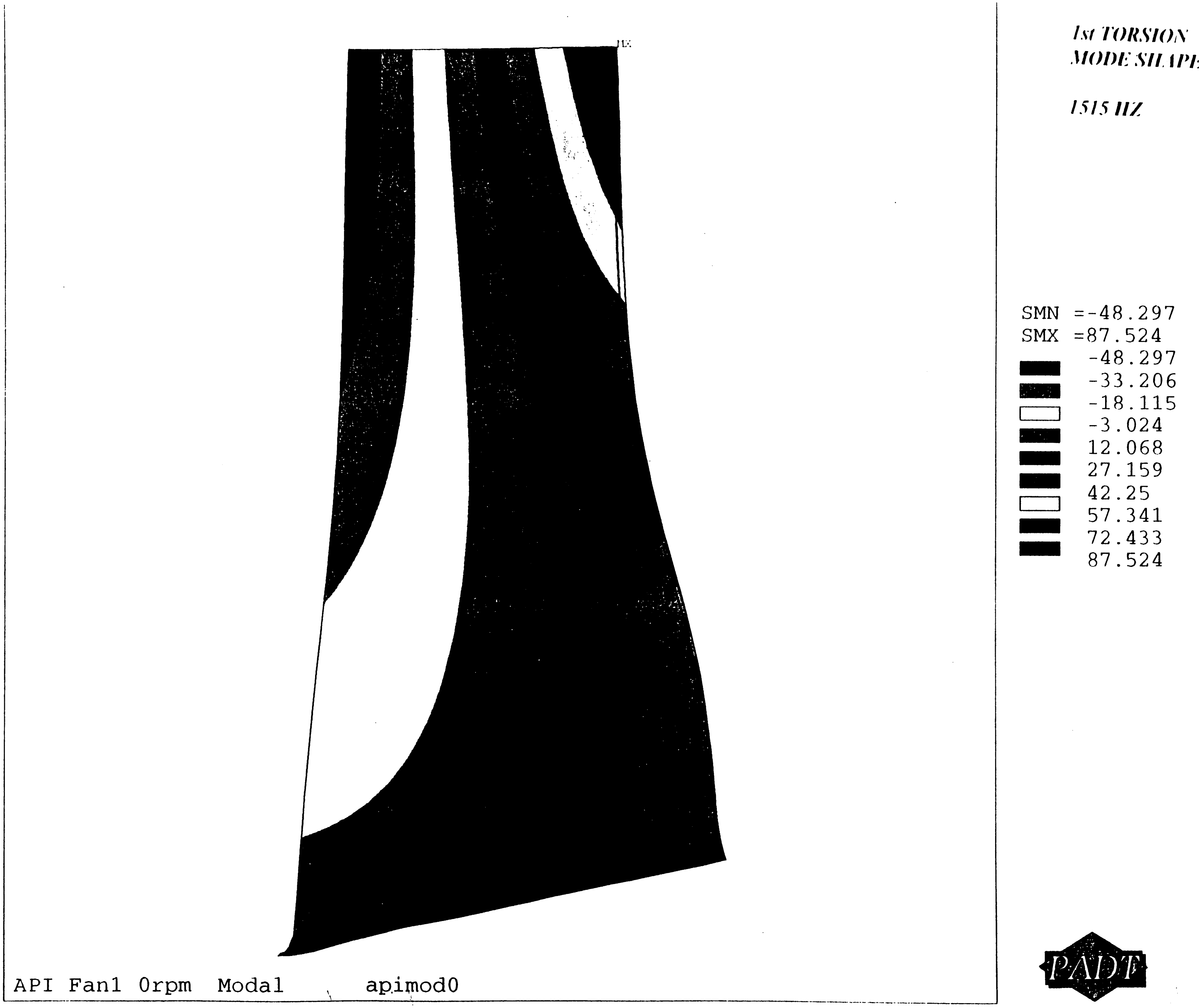


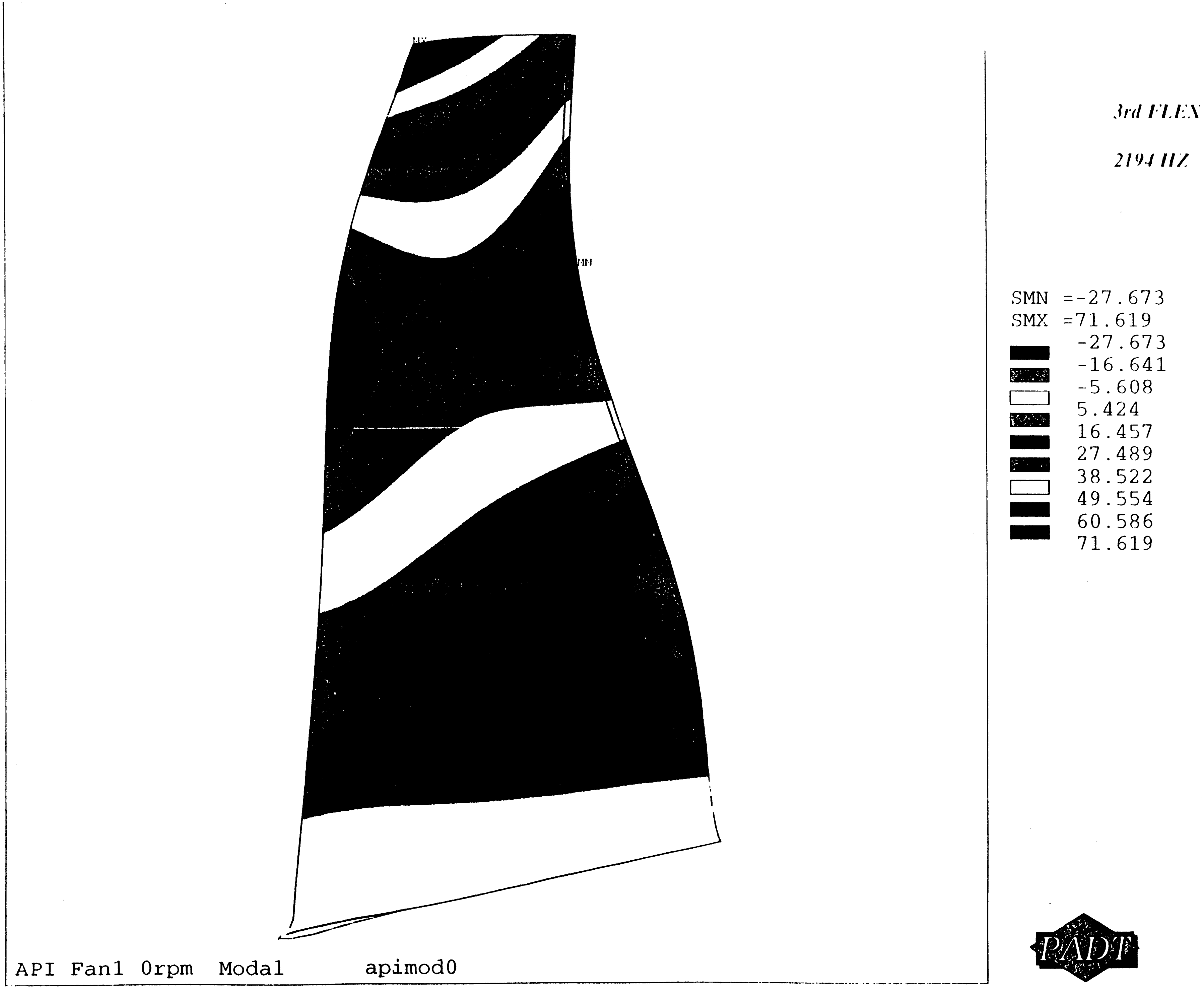
AMPLIFIED DISPLACEMENT DISTRIBUTION AT 12, 000 RPM

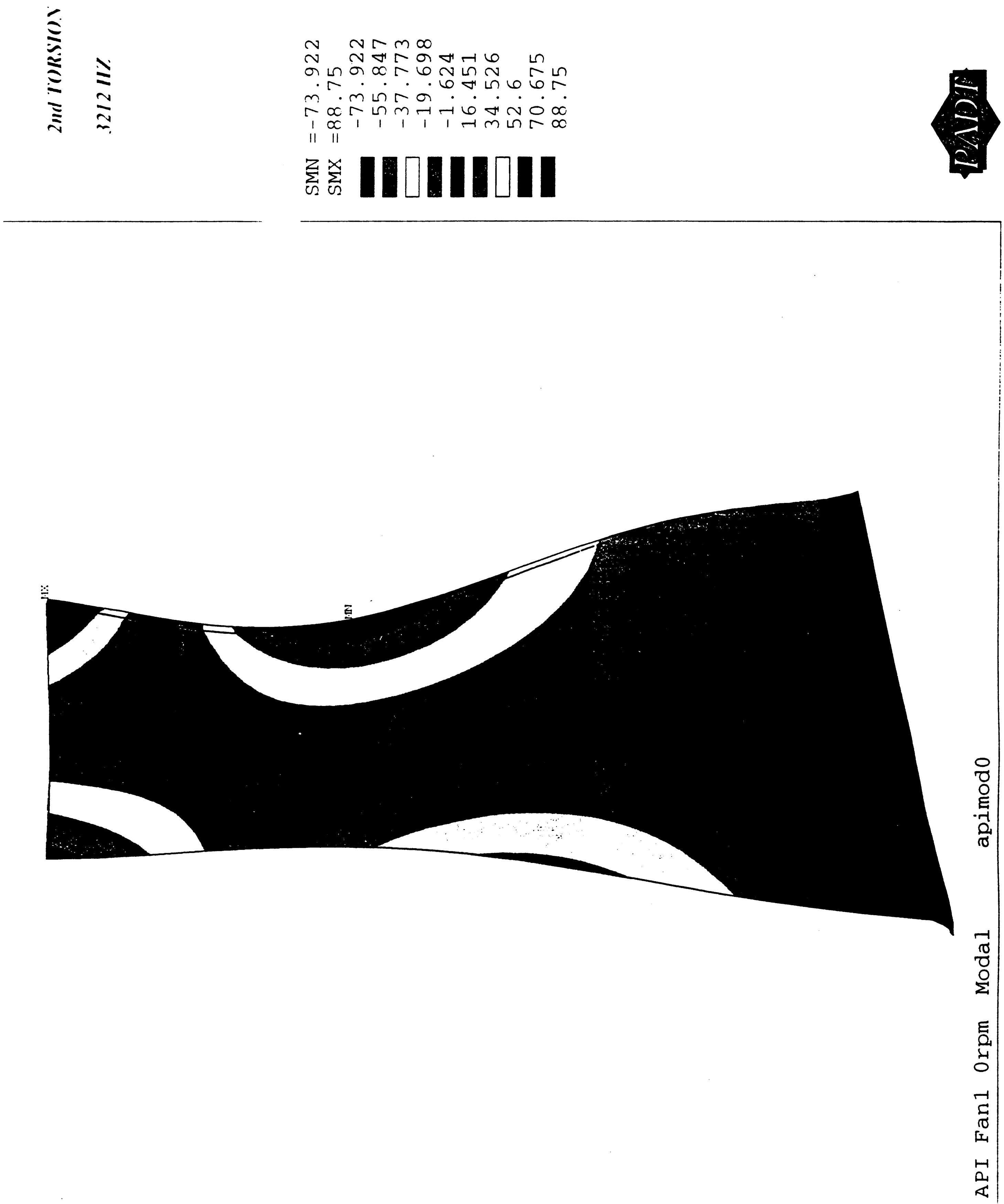
TIP UNTWIST IS SMALL
.85 DEG @ 12, 000 RPM
.45 DEG @ 9, 000 RPM
MECHANICAL DESIGN SPEED FOR C1-04


FIRST FLEX
MODE SHAPE
282 HZ
SMN =-0.769101
SMX =68.726
-0.769101
6.953
14.674
22.396
30.118
37.839
45.561
53.282
61.004
68.726
API Fan1 0rpm Modal apimod0
PADT


2nd FLEX
MODE SHAPE
821 HZ
SMN =-36.354
SMX =4.263
-36.354
-31.841
-27.328
-22.815
-18.302
-13.789
-9.276
-4.763
-0.249663
4.263
API Fan1 0rpm Modal apimod0
PADT


1st TORSION
MODE SHAPE
1515 HZ
SMN =-48.297
SMX =87.524
-48.297
-33.206
-18.115
-3.024
12.068
27.159
42.25
57.341
72.433
87.524
PADT
API Fan1 0rpm Modal
apimod0


3rd FLEX
2194 HZ
SMN =-27.673
SMX =71.619
-27.673
-16.641
-5.608
5.424
16.457
27.489
38.522
49.554
60.586
71.619
API Fan1 0rpm Modal
apimod0


2nd TORSION
3212 HZ
SMN =-73.922
SMX =88.75
-73.922
-55.847
-37.773
-19.698
-1.624
16.451
34.526
52.6
70.675
88.75
API Fan1 Orpm Modal
apimod0


2 STRIPE MODE
3890 HZ
SMN =-37.985
SMX =129.084
-37.985
-19.422
-0.858561
17.705
36.268
54.831
73.394
91.958
110.521
129.084
API Fan1 0rpm Modal apimod0
PADT

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (*Leave blank*)

2. REPORT DATE
August 2003

3. REPORT TYPE AND DATES COVERED
Final Contractor Report

4. TITLE AND SUBTITLE
Efficient, Low-Cost Fan System Research for General Aviation and Commuter Aircraft

5. FUNDING NUMBERS
WU–505–65–10–00
NAS3–27644

6. AUTHOR(S)
G.L. Merrill

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Advanced Propulsion, Inc.
2849 South 44th Street
Phoenix, Arizona 85040

8. PERFORMING ORGANIZATION REPORT NUMBER
E–14014

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
National Aeronautics and Space Administration
Washington, DC 20546–0001

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
NASA CR—2003-212476

11. SUPPLEMENTARY NOTES
This research was originally published internally as AST020 in December 1997. This report is a formal draft or working paper. Project Manager, Joseph D. Eisenberg (retired). Responsible person, Susan M. Johnson, organization code 2200, 216–433–2163.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Unclassified - Unlimited
Subject Category: 07 Distribution: Nonstandard
Available electronically at http://gltrs.grc.nasa.gov
This publication is available from the NASA Center for AeroSpace Information, 301–621–0390.

12b. DISTRIBUTION CODE

13. ABSTRACT ***(Maximum 200 words)***
This document reports research investigations into efficient, low-cost fan system concepts for high bypass turbofans for future general aviation and commuter aircraft. The research specifically addressed lower pressure ratio fans for good propulsive efficiencies in the 200 to 400 knot flight speed regime. Aerodynamic design analyses yielded predicted efficiency in area of 91 to 92 percent (adiabatic). Low-cost manufacturing studies yielded an aluminum blisk rotor and investment cast stator having lowest cost. Structural design analyses yielded a design having excellent vibratory characteristics and the ability to pass One- and Four-pound bird strikes satisfactorily. The low speed and low pressure fans of the study are estimated to have 24 to 30 EPNdB lower community noise levels than larger, high pressure ratio transonic fans.

14. SUBJECT TERMS
Turbofan; Fan system; General aviation; Commuter aircraft

15. NUMBER OF PAGES
76

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	