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NASA CR - 135388
PWA 5549-8

# F100(3) PARALLEL COMPRESSOR COMPUTER CODE AND USER'S MANUAL FINAL REPORT

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Pratt & Whitney Aircraft Group
Commercial Products Division



Prepared for

National Aeronautics and Space Administration
NASA-Lewis Research Center

Contract NAS3-20610

| 1. Report No. | 2. Government Accession No. | 3. Recipient's Catalog No. |
|---|---|---|
| NASA CR NASA CR - 135388 | | |

| 4. Title and Subtitle | 5. Report Date |
|---|---|
| F100 (3) PARALLEL COMPRESSOR COMPUTER CODE AND USER'S MANUAL | May 1978 |
| | 6. Performing Organization Code |

| 7. Author(s) | 8. Performing Organization Report No. |
|---|---|
| R. S. Mazzawy D. E. Haddad<br>D. A. Fulkerson T. A. Clark | PWA 5549-8 |
| | 10. Work Unit No. |

| 9. Performing Organization Name and Address | 11. Contract or Grant No. |
|---|---|
| UNITED TECHNOLOGIES CORPORATION<br>Pratt & Whitney Aircraft Group<br>Commercial Products Division, East Hartford, Connecticut 06108 | NAS3-20610 |
| | 13. Type of Report and Period Covered<br>Contractor Report<br>Mar. 1977 - Feb. 1978 |

| 12. Sponsoring Agency Name and Address | 14. Sponsoring Agency Code |
|---|---|
| National Aeronautics and Space Administraton<br>Washington, D.C. 20546 | |

15. Supplementary Notes

16. Abstract

The Pratt & Whitney Aircraft multiple segment parallel compressor model has been modified to include the influence of variable compressor vane geometry on the sensitivity to circumferential flow distortion. Further, performance characteristics of the F100 (3) compression system have been incorporated into the model on a blade row basis. In this modified form, the distortion's circumferential location is referenced relative to the variable vane controlling sensors of the F100 (3) engine so that the proper solution can be obtained regardless of distortion orientation. This feature is particularly important for the analysis of inlet temperature distortion. Compatibility with fixed geometry compressor applications has been maintained in the model.

| 17. Key Words (Suggested by Author(s)) | 18. Distribution Statement |
|---|---|
| Turbofan Parallel Compressor Model<br>Inlet Flow Distortion<br>Compressor Stall<br>Compressor Modelling | |

| 19. Security Classif. (of this report) | 20. Security Classif. (of this page) | 21. No. of Pages | 22. Price* |
|---|---|---|---|
| | | | |

* For sale by the National Technical Information Service, Springfield, Virginia 22151

NASA-C-168 (Rev. 6-71)

## FOREWORD

This report was prepared for the National Aeronautics and Space Administration, Lewis Research Center, under Contract NAS3-20610. The report documents the modifications of the P&WA multiple segment parallel compressor model required to analyze compression systems with variable vane geometry such as the F100 (3) turbofan engine. Mr. P.G. Batterton was the NASA Project Manager for this effort, assisted by Dr. A. Kurkov, and Mr. R. S. Mazzawy was the P&WA Program Manager. This report was prepared by R. S. Mazzawy, D. A. Fulkerson, D. E. Haddad and T. A. Clark with assistance from other P&WA contributors.

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## SUMMARY

This report documents the modifications to the Pratt & Whitney Aircraft Multiple Segment Parallel Compressor Model which are required for variable vane geometry compressors. These modifications allow for the inclusion of vane angle as well as corrected rotor speed in determining compressor blade row performance. The variable vane control sensor location is also taken into account for positioning the vanes under distorted inlet conditions. This feature provides the appropriate vane position regardless of the distortion type (pressure and/or temperature) and orientation.

The F100 (3) turbofan engine has been modeled to verify the aforementioned modifications. This engine has a variable inlet guide vane in the fan and high pressure compressor. Two stator vanes in the high pressure compressor are also variable. The variable vane schedules used are compatible with NASA LeRC engine XD11. Model predictions for both inlet temperature and inlet pressure distortion test cases agree favorably with experimental component data and engine stability audit calibrations, respectively. In particular, the model predicted that a 180° inlet total pressure distortion amplitude of 0.45, $(P_{t\ max} - P_{t\ min})/P_{t\ avg}$, was required to stall the F100 (3) engine at approximately 80% of design corrected low rotor speed. A value of 0.43 was anticipated on the basis of engine experience.

The details of the distorted flow field have been calculated for the F100 (3) engine with the 180° inlet total pressure distortion. The documented results include individual blade row incidence and loading levels as well as the distortion transfer and attenuation characteristics of this engine. No detailed engine measurements were available to verify the model predictions.

## INTRODUCTION

NASA Lewis Research Center (NASA LERC) and Pratt & Whitney Aircraft have collaborated in the application of a P&WA circumferential distortion model to full-scale turbofan engines. Extensive work has previously been accomplished under a previous contract (NAS3-18535) dealing with the TF30-P-3 engine. Results of that work are detailed in References 1 and 2. Under that contract, the TF30-P-3 engine had fixed compressor geometry. With the evolution of advanced turbofan engines, it has been necessary to modify the distortion model to include a variable vane geometry capability. In the work reported herein the distortion model is applied to the F100(3) turbofan engine which has such variable geometry.

One aspect of variable geometry is the dependence of compressor performance on vane angle as well as corrected rotor speed. Consequently, the blade row performance characteristics for the F100(3) fan and high pressure compressor reflect this dependence. In addition, under conditions of distorted inflow, there may be a circumferential non-uniformity of total temperature at the axial plane of vane-controlling temperature sensors. This requires the model to relate the inlet distortion orientation to a fixed point on the engine. Consequently, the first segment is located at top dead center (0°) and each succeeding segment proceeds in the direction of rotor rotation. Specifying the location of the vane-controlling sensor(s) allows the correct total temperature to be used to set the variable vane positions within the model.

The validity of the program modifications was checked by comparing predicted results with a limited amount of 180° inlet temperature distortion data from a F100(3) high pressure compressor rig. Good agreement was obtained with the data, indicating that the model adequately accounted for the variable vane geometry effects. Additional testing of the model was done using the complete compression system for a 180° inlet total pressure distortion. The distorted compressor performance for this example case is documented for the level of distortion predicted to induce stall on the nominal operating line.

The work herein was done using the U.S. Customary system of Units. The information in this report is provided in those units as well as the International System of Units (SI).

## P&WA MULTIPLE SEGMENT MODEL

Simple parallel compressor theory usually considers the circumference of the compressor to be divided into two flow regions: one of relatively low velocity such as would exist behind a distortion inducing screen and one of relatively high velocity. The multiple segment parallel compressor model expands upon simple parallel compressor theory by using a large number of parallel segments to provide a more detailed definition of the circumferential flow field. In addition, this model accounts for two-dimensional and unsteady flow effects which are not considered in the basic theory. A complete description of the model is contained in Reference 3.

While this model has proven to be both useful and versatile in the analysis of non-uniform flow problems (e.g., References 2, 4), it has been limited in its application to fixed geometry compressors. The increased use of modern turbofan engines with variable vane geometry requires that a better understanding of this additional dimension be acquired under conditions of inlet distortion. Consequently, the multiple segment model has been modified, and variable vane effects were investigated using the F100(3) turbofan engine as the basis for the model.

### Variable Geometry Modifications

The multiple segment model makes use of individual blade row characteristics to describe the quasi-steady uniform flow performance of a compressor. These characteristics (static pressure rise and total temperature rise vs. mass flow parameter) are shown schematically in Figures 1 and 2 for a fixed geometry machine. As noted in the figures, the blade row characteristics are for a single value of compressor corrected rotor speed. However, the variation with rotor speed is generally of second order because the pressure rise, temperature rise and mass flow parameters are scaled with corrected rotor speed. This can be seen by the following definitions:

Pressure Rise Across Blade Row

$$\psi = \frac{\Delta P_S}{P_S} \frac{(N/\sqrt{\theta})^2_{Des}}{(N/\sqrt{\theta})^2}$$

Temperature Rise Across Blade Row

$$\lambda = \frac{\Delta T_T}{T_T} \frac{(N/\sqrt{\theta})^2_{Des}}{(N/\sqrt{\theta})^2}$$

Mass Flow

$$\phi = \frac{W\sqrt{\theta}}{\delta A} \frac{(N/\sqrt{\theta})_{Des}}{(N/\sqrt{\theta})}$$

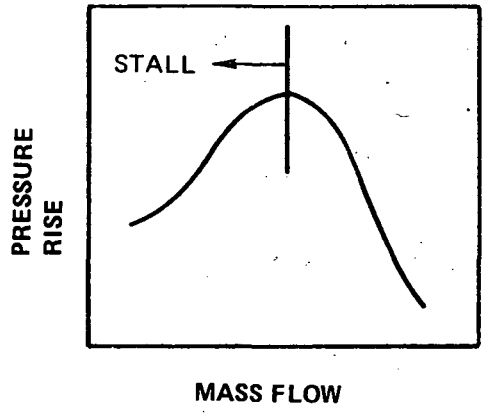
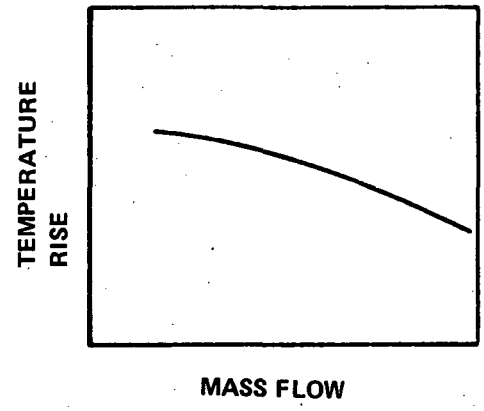



*Figure 1*
*Typical Pressure Rise at Constant Rotational Speed*

*Figure 2*
*Typical Temperature Rise at Constant Rotational Speed*




When similar performance characteristics are produced for a variable geometry compressor, however, the variation with corrected rotor speed becomes much more pronounced as is evidenced in Figures 3 and 4. The reason for this is the wide variation in vane angle that accompanies the rotor speed change. Within the context of the multiple segment model, several problems had to be resolved because of the variable geometry:

1) Axial lengths and vane stagger angles are both important for determining the swirl of a flow distortion pattern and a fluid particle as they progress through the machine from inlet to exit. The model must account for these effects when the vane geometry is variable.

2) The application of performance characteristics to the calculation of a circumferentially nonuniform flow field generally involves a circumferential variation in local corrected rotor speed. The vane angle, must of course, be circumferentially uniform, resulting in a mismatch of these two controlling variables for the different circumferential segments used in the model calculation. A system was required which provided the correct performance regardless of the combination of local rotor speed and angle. The problem is further compounded by the desirability of maintaining the model's compatibility with fixed geometry compressors.

3) Interpolation of performance characteristics between lines of constant rotor speed must be done in a manner which reflects the vane angle differences. The standard procedure for interpolating at constant mass flow was no longer adequate because of the large variation in mass flow range covered by different constant speed lines. Again, compatibility with fixed geometry compressors was desirable.

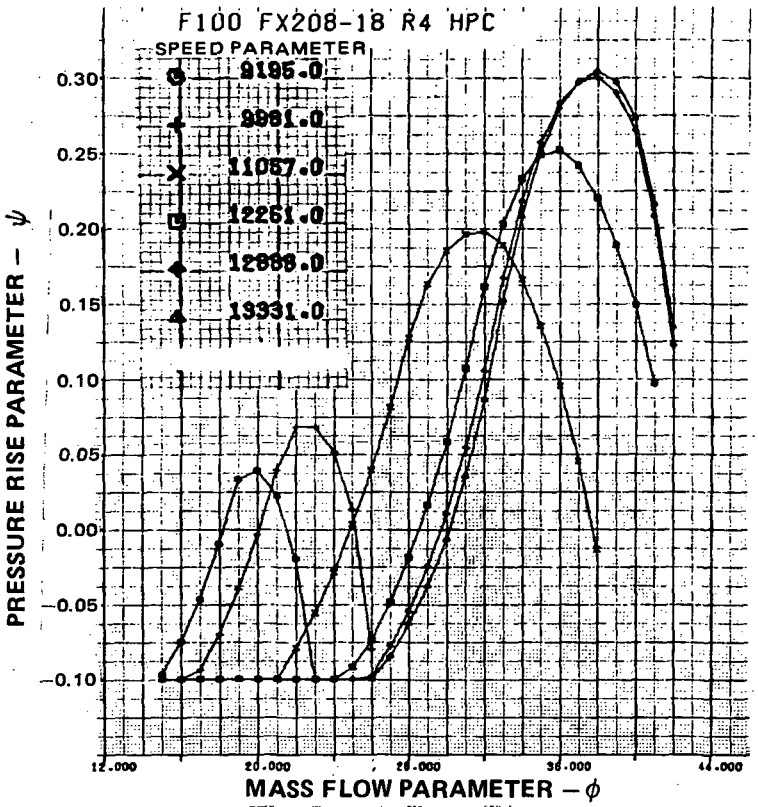



*Figure 3* *Typical Pressure Rise Characteristics For Variable Geometry Compressor*

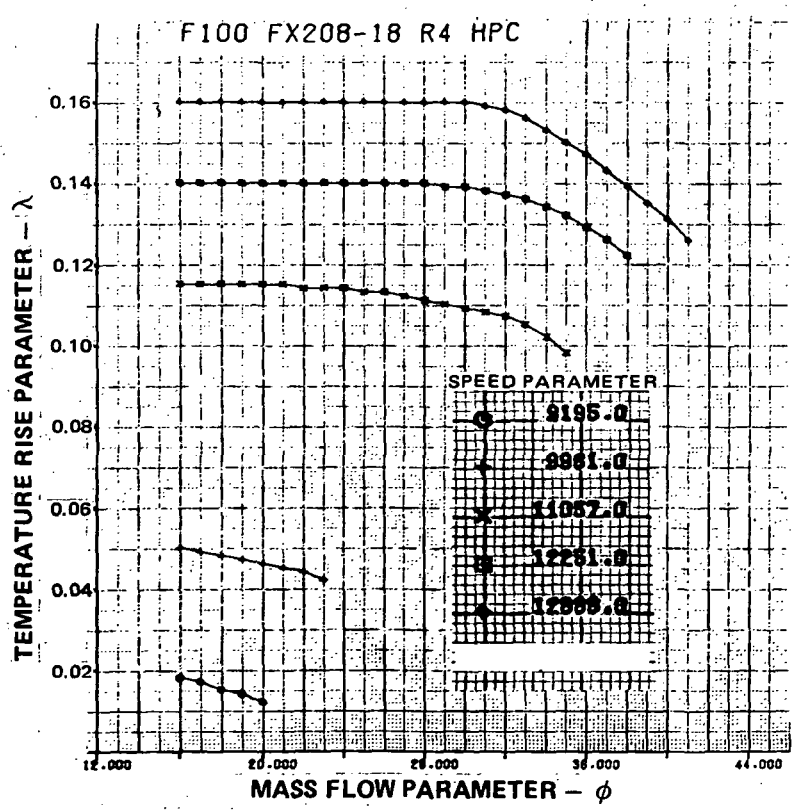



*Figure 4* *Typical Temperature Rise Characteristic For Variable Geometry Compressor*

Procedures have been successfully established within the P&WA computer model to satisfy all of these requirements. These procedures are discussed in some detail in the following sections.

**Axial Length Variation**

This problem is handled by the straightforward application of trigonometric principles. For each variable vane and the upstream and downstream gaps, dimensions and flow angles are adjusted on the basis of the sensed corrected rotor speed and the resultant vane position. This assures that the swirl of the distortion patterns and flow velocity triangles are accurately calculated by the model.

**Non-Uniform Flow Conditions**

When using the model to evaluate performance of a variable geometry compressor, a problem arises due to the circumferential non-uniformity of total temperature under distorted inlet conditions. The blade row characteristic for each circumferential segment is evaluated on the basis of the local (axially and circumferentially) corrected rotor speed. Stator vane angles, however, are determined by a temperature sensor(s) located at some other axial/circumferential location. Consequently, the blade row characteristics must reflect vane angle as well as corrected rotor speed.

Since it was desirable to maintain compatibility with the established fixed geometry calculations and "curve reading" procedures, the solution to the problem took the following form: The compressor characteristics must still be presented in terms of $\psi$ and $\lambda$ vs $\phi$ for various levels of corrected speed. The corrected speed used to interpolate the characteristics, however, must represent both a corrected speed and vane angle. Looking at Figure 5, rig data representing the ratio of local corrected speed (i.e., the corrected speed based on stage inlet conditions) to the compressor inlet corrected speed are plotted as a function of IGV metal angle for the normal operating range of the F100 (3) compressor. If a line was to connect the values plotted for each stage it is easily observed that the slope of these lines would be nearly constant.

A second observation is that the ratio of local to inlet corrected speed for a fixed geometry machine is approximately constant over a reasonable speed range. For example, a stage in the middle of the F100 (3) high pressure compressor would have a temperature which is about 1.5 times the inlet temperature at high power. This converts to a local to inlet corrected speed of about 0.81. If a 10% variation in inlet corrected speed occurs (corresponding to a 20% inlet temperature distortion), the temperature ratio variation at the middle stage would range from 1.45 to 1.55 since temperature rise is proportional to the square of corrected rotor speed. The corresponding ratio of local to inlet corrected speed only varies from about 0.80 to 0.83 which is relatively small for a sizable inlet temperature distortion. This variation would be slightly larger in rear stages and smaller in front stages because of the magnitude of the temperature rise from the inlet.

The conclusion to be drawn from the above observations is that for temperature distortions at a given stage, the ratio of local to inlet corrected speed is primarily affected by changes in inlet guide vane angle. Therefore, a first order approximation to correct for small independent variations of inlet guide vane angle from the nominal inlet corrected speed-inlet guide vane angle relationship is possible in the following manner. First a solid line is drawn with a representative slope through the average of available compressor points shown in Figure 5. Even though the slope of the local to inlet corrected speed ratio with inlet guide vane angle for each stage varies by a small amount from the slope of the solid line, it is felt that this variation would not introduce a significant error to the model calculations. Next, a speed parameter is calculated using the relationship established by the solid line.

$$\text{Speed Parameter} = (N_2/\sqrt{\theta}_{\text{local}}) \Big/ \left[\frac{N_2/\sqrt{\theta}_{\text{local}}}{N_2/\sqrt{\theta}_{2.5}}\right] \text{ From Figure 5.}$$

This "speed parameter" is then used in the interpolation of the compressor characteristics. Note that since only the single solid line of Figure 5 is used to obtain the "speed parameters" for all the compressor stages, the model characteristic curves must now have their equivalent "speed parameters" assigned to them rather than the normal corrected speed values. A typical set of values is shown for stator 6 in Table I.

**TABLE I**

**STATOR 6**

| $N_2/\sqrt{\theta}_{2.5}$ | Actual $N_2/\sqrt{\theta}_{\text{Local}}$ | $\alpha$ IGV | $\frac{N_2/\sqrt{\theta}\ \text{Local}}{N_2/\sqrt{\theta}_{2.5}}$ | Speed Parameter |
|---|---|---|---|---|
| 8436 | 8568 | 31.8° | .917 | 9339 |
| 8958 | 8794 | 38.8° | .899 | 9779 |
| 9499 | 8717 | 54.3° | .859 | 10147 |
| 10385 | 9010 | 74.8° | .806 | 11181 |
| 10708 | 9263 | 75.8° | .803 | 11532 |
| 11144 | 9607 | 75.8° | .803 | 11961 |

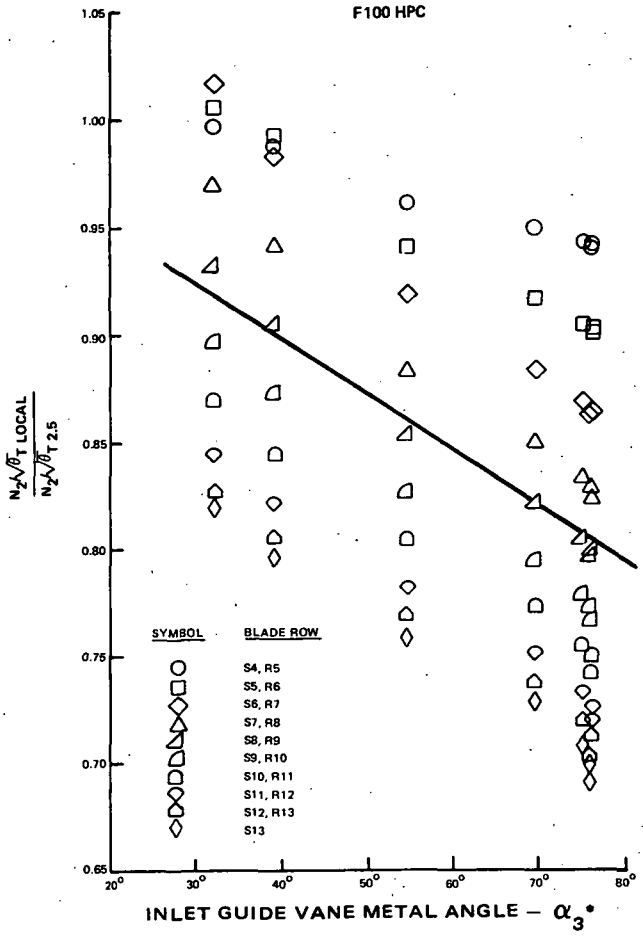



*Figure 5 Influence of Variable Geometry on the Relationship Between Local and Inlet Corrected Rotor Speed*

**Interpolation of Performance Characteristics**

In the process of obtaining the multiple segment parallel compressor solution, non-uniform flow effects are used in conjunction with uniform flow compressor performance to define the circumferential flow distribution. In general, the uniform flow performance is required at some local corrected rotor speed which is not equal to any of the values used to construct the compressor blade row characteristics. Hence, it is required to obtain values for the required parameter ($\psi$ or $\lambda$) from higher and lower rotor speeds, and then interpolate between the speeds. The standard interpolation procedure used in the model for a fixed geometry compressor is based upon a fixed value of $\phi$. This procedure is adequate for fixed geometry because the variation of compressor mass flow with rotor speed is incorporated in the definition of $\phi$. Hence the same $\phi$ can be used to determine $\psi$ or $\lambda$ at the higher and lower rotor speeds. The $\psi$ or $\lambda$ can then be interpolated linearly to define the value at the desired rotor speed.

In a variable geometry compressor, however, the mass flow parameter $\phi$ varies with vane angle as well as rotor speed. Fortunately, there is a linear relationship between maximum flow capacity of a cascade of vanes and the sine of the vane chord angle. Applying this relationship yields the following interpolation procedure:

$$\phi_X = \phi \frac{\text{Sin } \alpha_X}{\text{Sin } \alpha}$$

where:

| | | |
|---|---|---|
| $\phi_X$ | = | $\phi$ at rotor speed "X" which is higher or lower than local rotor speed and lies on a known blade row characteristic used to provide values of $\psi$ and $\lambda$ for interpolation. |
| $\phi$ | = | level of $\phi$ at which values of $\psi$ and $\lambda$ are to be found. |
| $\alpha$ | = | actual vane chord angle (measured from cascade plane) for rotor speed at which performance is required |
| $\alpha_X$ | = | vane chord angle corresponding to known blade row characteristic |

Using this relationship, the appropriate values of $\phi$ are determined for the higher and lower rotor speeds. These individual values of $\phi$ are used to provide two values of $\psi$ or $\lambda$ which are then interpolated linearly on the basis of the "speed parameter".

**Model Verification**

The reproduction of the F100(3) uniform inlet performance by the model serves as a check for the procedures used to set axial lengths and flow angles and to interpolate characteristic performance curves.

Figure 6 shows the predicted uniform inlet fan performance and stall points for the fan in comparison with available data. The good agreement serves to verify the model's validity for this component. Furthermore, a check has been made to compare the fan rig performance with that obtained with the NASA LeRC F100 (3) engine, XD11. This comparison concerned the speed-airflow relation along the nominal engine operating line. The engine and rig airflows were found to be in agreement within 0.5% at a given low rotor corrected speed.

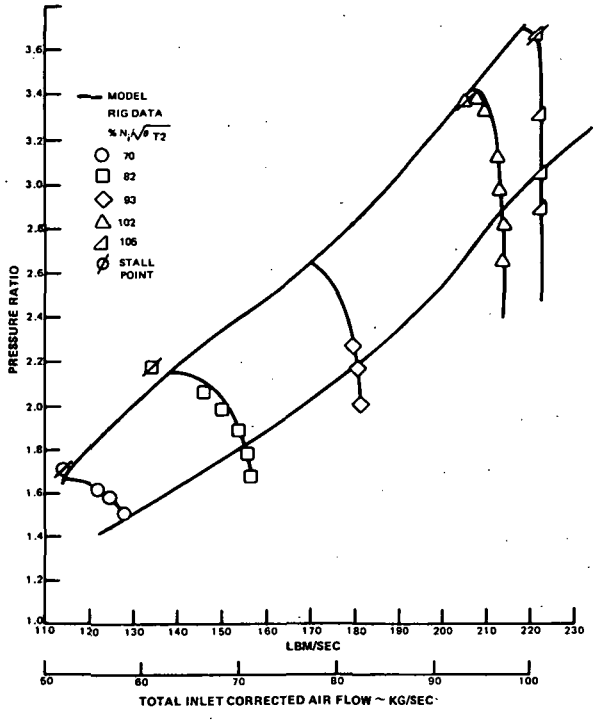



*Figure 6(A)* *Fan OD Performance ~ Comparison of Model and Rig Data*

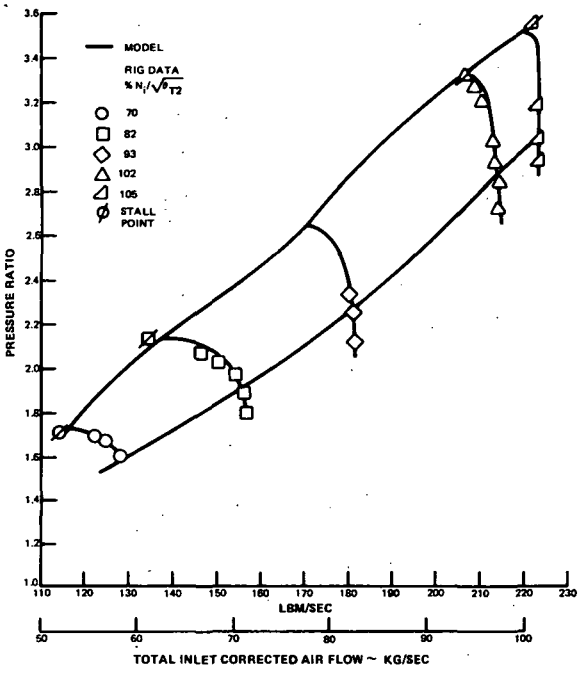



*Figure 6(B)* *Fan ID Performance ~ Comparison of Model and Rig Data*

A similar comparison was made for the high pressure compressor. This comparison revealed that the NASA LeRC engine operates with a different high pressure compressor variable vane schedule (RCVV) than that in FX208, the F100 (3) core engine which was used to generate the model's performance characteristics. Both of these schedules are shown in Figure 7. The primary impact of this difference is a shift in the speed-airflow relation, particularly at lower corrected rotor speeds. Consequently, the model characteristics were altered to provide a high pressure compressor which was more representative of the NASA LeRC engine. The comparison of the model calculations with the FX208 data on Figure 8 shows the expected flow shift consistent with the vane schedule change. Note that two interpolated rotor speed values are also included in Figure 8. These speed lines serve to verify the model's interpolation capability.

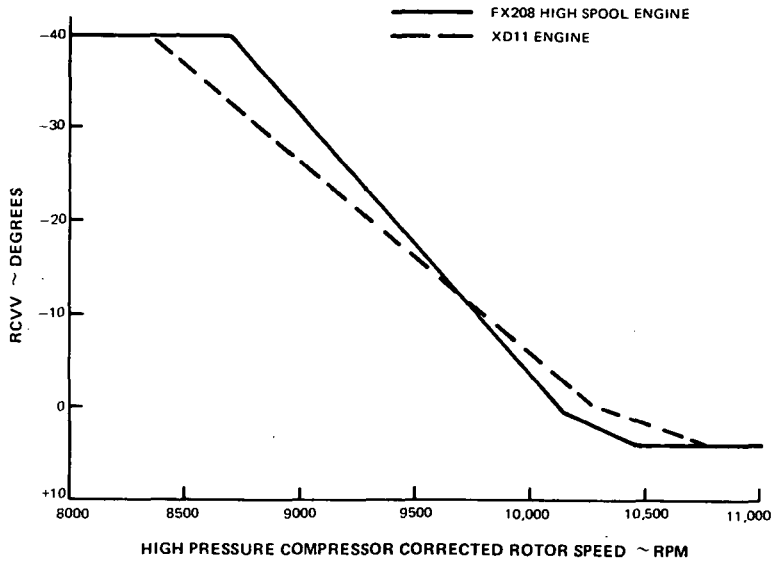



*Figure 7 Comparison of HPC Variable Vane Schedules in FX208 and XD11*

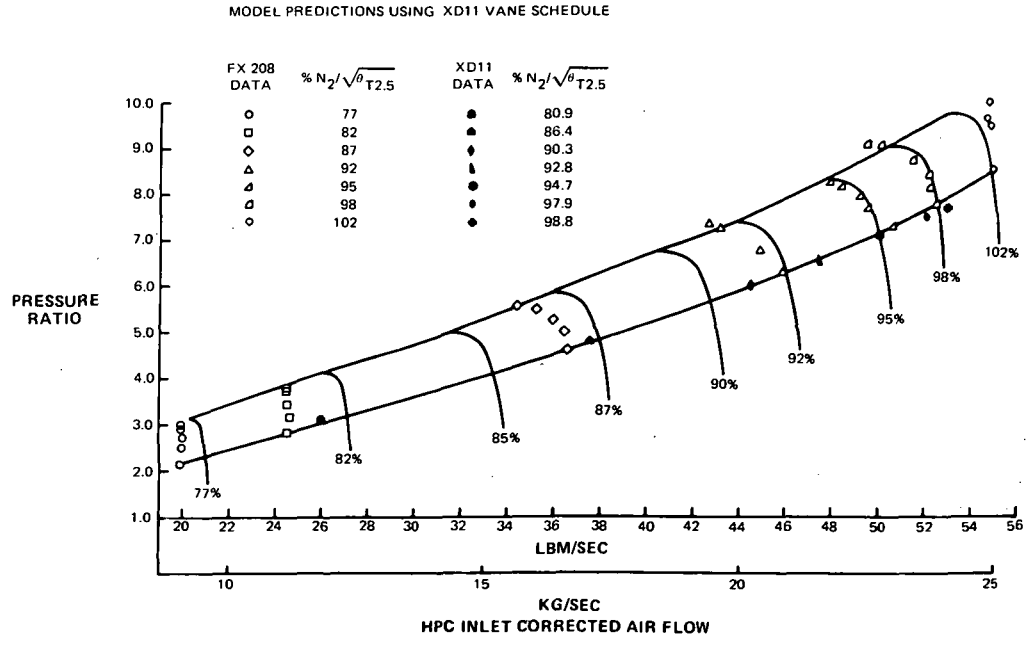



*Figure 8 Verfication of Model Applicability to XD11 Engine High Pressure Compressor*

The most severe test for the non-uniform flow capability concerns inlet temperature distortion. In such a case, there exists a wide range of combinations of vane angle and corrected rotor speed around the circumference. The model's capability for handling this was checked by comparing the model prediction with available F100 high compressor rig data with inlet temperature distortion. The range in inlet temperature was approximately 10% ($T_{TMax} - T_{TMin}/T_{TAvg}$). The rotor speed range covers an area over which the vane schedule varies significantly. The model test case results are compared in Figure 9 with data from an early version of the F100 compressor run at a similar rotor speed. Both the shift in flow capacity and loss in stall line pressure ratio appear to be comparable.

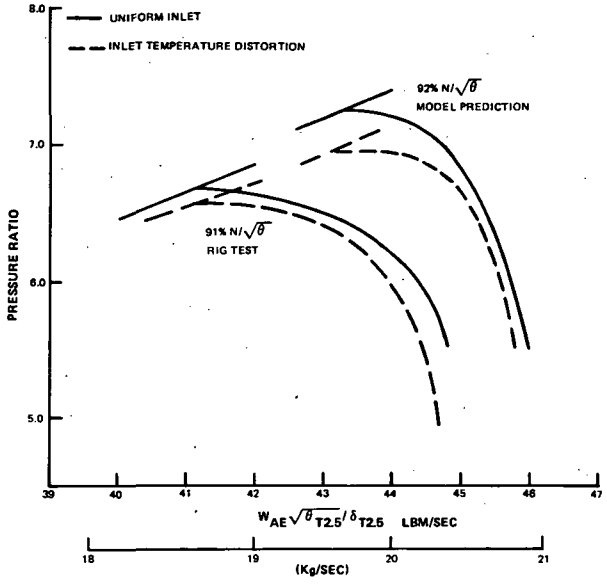



*Figure 9* *Verification of Model Capability For Analyzing Circumferential Temperature Distortion*

A similar treatment is applied to the F100(3) fan characteristics. While no temperature distortion data are currently available to evaluate the entire engine compression system, the isolated compressor results appear to establish the validity of the procedure.

The entire F100 (3) compression system was evaluated, however, for a 180° inlet total pressure distortion. The point of operation selected for this calculation was the following:

| | |
|---|---|
| Total Corrected Airflow | 148.5 lbm/sec. (67.5 Kg/sec.) |
| Bypass Ratio | 1.10 |
| Low Rotor Corrected Speed - $N_1/\sqrt{\theta_{2\ AVG}}$ | 7,700 rpm |
| High Rotor Mechanical Speed | 10,862 rpm |
| High Rotor Corrected Speed - $N_2/\sqrt{\theta_{2.5\ AVG}}$ | 9,839 rpm |
| "Sensed" High Rotor Corrected Speed | 9,882 rpm |

A complete description of the calculated flow properties, including incidence and blade loading parameters, is included in the Appendix for this point under uniform and distorted flow conditions. Note that the "sensed" high rotor corrected speed differs slightly from the actual value. This results from locating the vane control temperature sensors for the high pressure compressor in the fan duct. The difference between the "sensed" and actual corrected speed is a reflection of the lower exit temperature in the fan duct relative to the high pressure compressor inlet.

For the distorted inlet case, the low rotor corrected speed and high rotor mechanical speed were held constant. The inlet distortion was oriented with the low total pressure region centered at the top (0°) of the engine. The distortion amplitude was varied until a calculated stall point was reached with the engine on its normal operating line. The required distortion amplitude was predicted to be 0.45 ($P_t$ max - $P_t$ min)/$P_t$ avg. This level is consistent with available engine stall margin and agrees favorably with the value of 0.43 predicted using the P&WA stability audit calibration for the F100(3) engine at this test case condition.

A distortion of this magnitude results in a significant predicted loss in high pressure compressor flow capacity. This flow capacity shift results in a predicted increase in fan core pressure ratio. Consequently, the average fan core operating point is above the normal operating line for the rotor speed used in this calculation. Under distorted inlet conditions, the actual engine would likely rematch to a condition with different relative values of rotor speed. It is also likely that total corrected airflow would be reduced and bypass ratio increased at the high compressor rotor speed used in these calculations. The multiple segment model is not intended to predict this engine rematch since it deals only with the compression system and does not reflect the other engine components. Consequently, the actual point of engine operation with this distortion is subject to these effects and will be different than that assumed in the model. It is likely, however, that the predicted critical distortion level is not sensitive to the precise match point since available stall margin does not vary significantly over the expected range of operation.

The average distorted operating conditions for the fan and high pressure compressor are shown in Figures 10 and 11, respectively. At the predicted stall point, the range of predicted performance for eighteen individual segments are also shown for both components. Note that the minimum airflow point is below the uniform inlet stall airflow for the high pressure compressor and core portion of the fan but not for the duct portion of the fan. In this example, therefore, it is predicted that the instability is initiated in the engine core stream rather than the fan duct stream. This result agrees with the P&WA F100(3) stability audit.

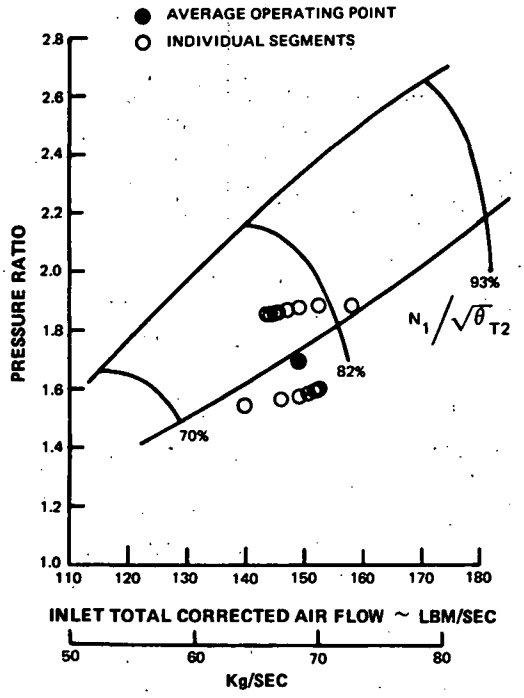



*Figure 10(A)* *Fan Duct Performance With Inlet Distortion ~ 80% $N_1/\sqrt{\theta_{T2}}$ ~ $\Delta P_T/P_T = 0.45$*

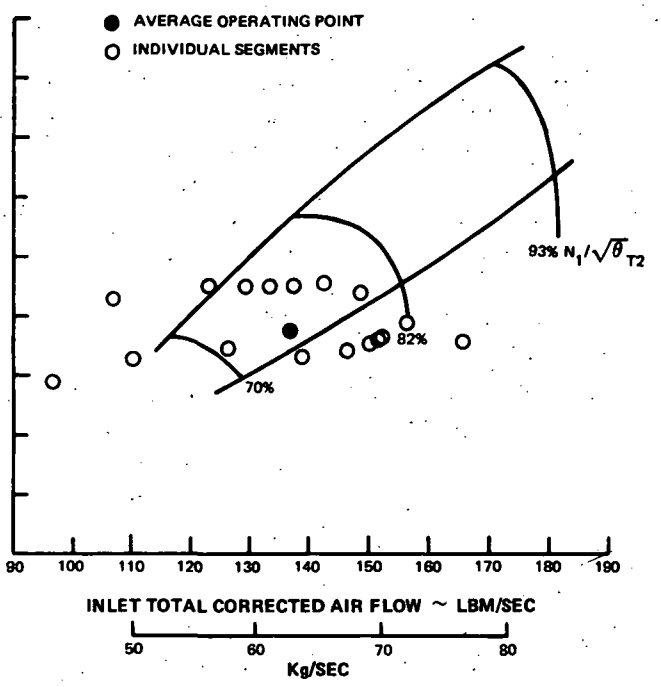



*Figure 10(B)* *Fan Core Performance With Inlet Distortion ~ 80% $N_1/\sqrt{\theta_{T2}}$ ~ $\Delta P_T/P_T = 0.45$*

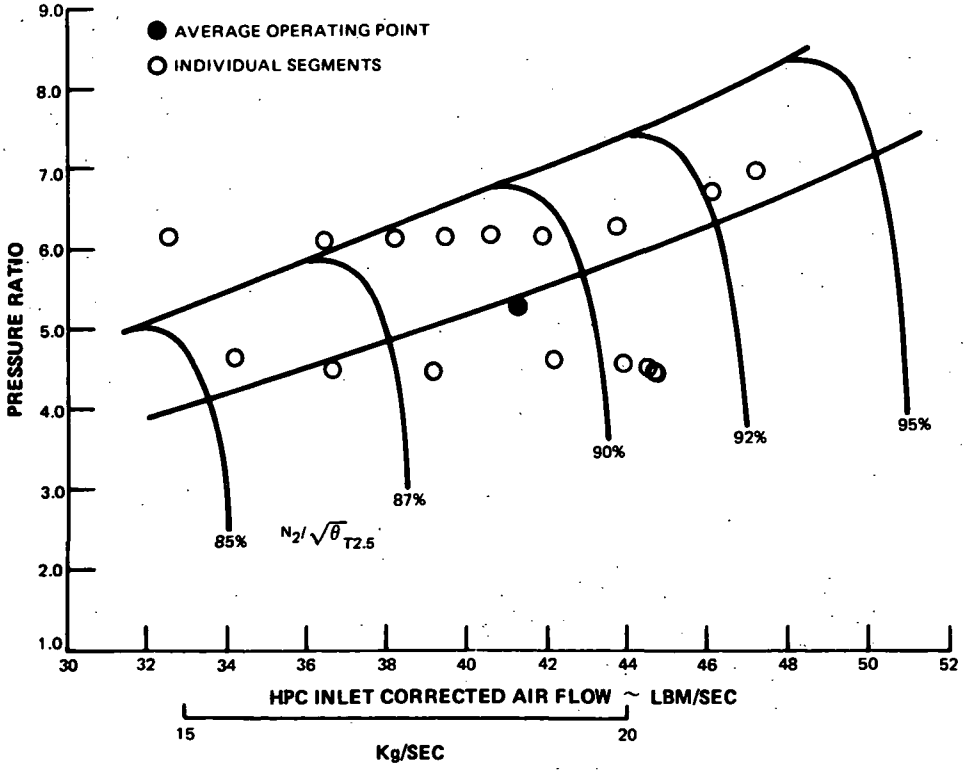



*Figure 11* *High Pressure Compressor Performance With Inlet Distortion ~ 90% $N_2/\sqrt{\theta_{T2.5}}$ $\Delta P_T/P_T = 0.45$*

The transfer and attenuation of the distortion through the F100 (3) engine are depicted in Figures 12 through 14. In these figures the total pressure, static pressure and total temperature distortions are shown at the fan inlet and exit as well as the high pressure compressor inlet and exit stations. As can be seen in these figures, the total pressure distortion is effectively attenuated, particularly in the engine core. Consistent with this attenuation is the large total temperature distortion generated by both the fan and the high pressure compressor. In addition, the distortions have rotated circumferentially as they progressed through the engine. The amount of rotation is related to the acoustic and particle path swirls shown in Figures 15 and 16. As indicated previously, the inlet distortion for this particular case was oriented with the low total pressure region centered at top dead center of the engine. Consequently, the sensor controlling the high pressure compressor variable vanes (located at 157° measured in rotor direction from TDC) measures a temperature which is slightly below the average (see Figure 14). Therefore, the vanes are set at a position consistent with the "sensed" corrected rotor speed which is higher than the true average. A different distortion orientation would therefore be expected to modify the results of the model. This would be particularly true if the sensor was aligned with either the minimum or maximum temperatures shown at 305° and 125°, respectively, in Figure 14. The wide range in predicted temperatures demonstrates the importance of incorporating the variable vane geometry capability in the model.

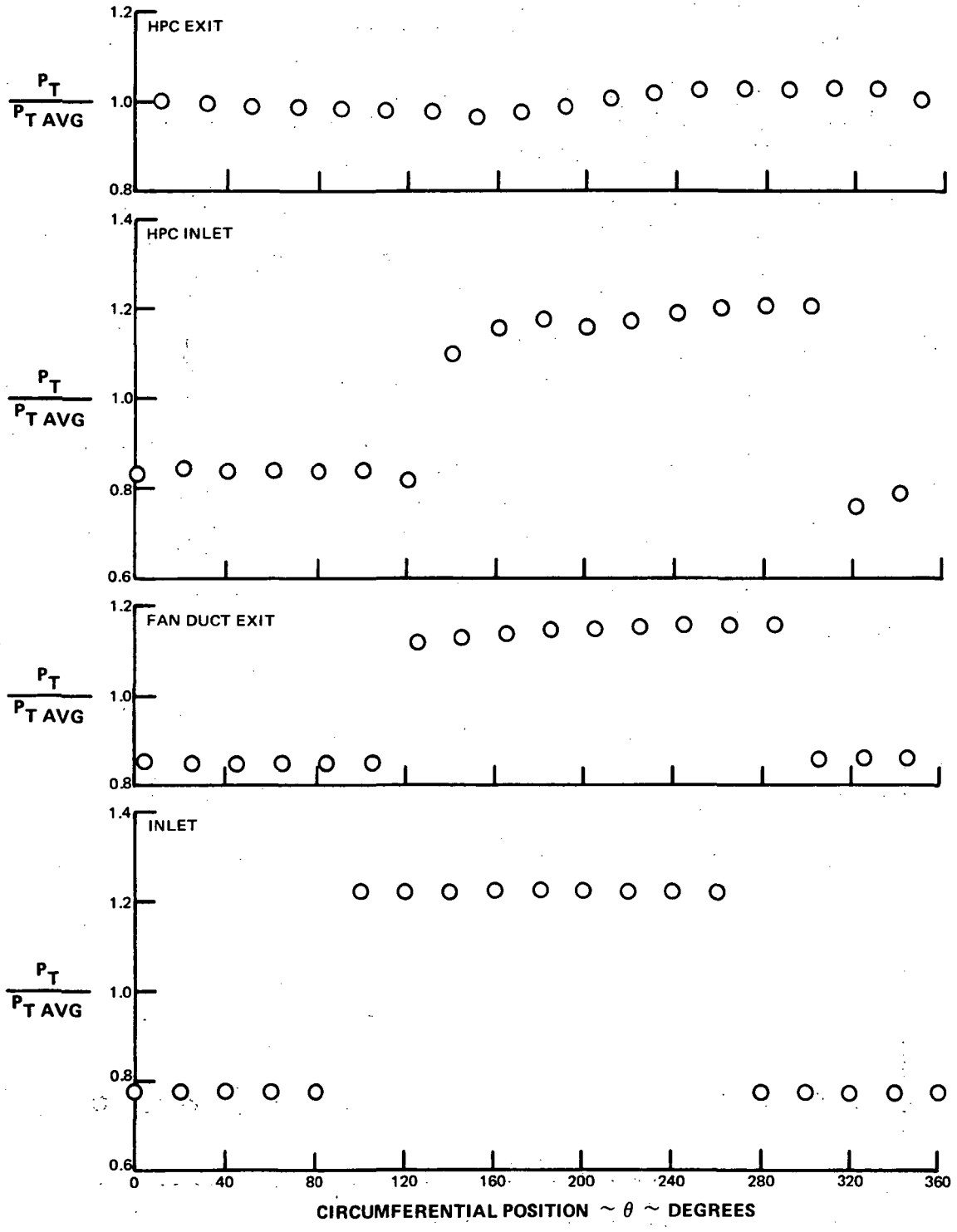



*Figure 12* $\left(\frac{P_T}{P_{T\,avg}}\right)$ *Circumferential Variation of Total Pressure*

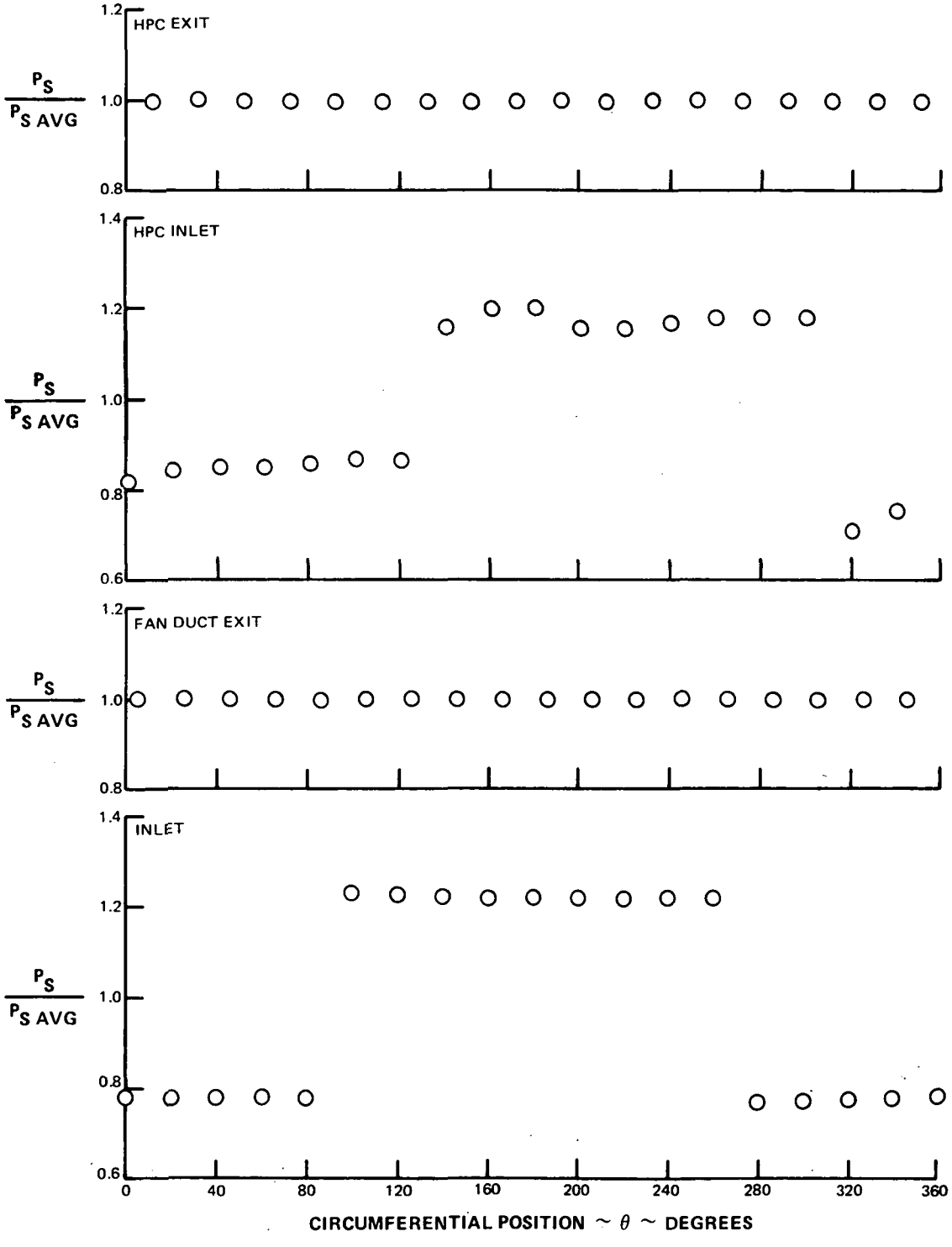



*Figure 13* $\left(\frac{P_S}{P_{S\,avg}}\right)$ *Circumferential Variation of Static Pressure*

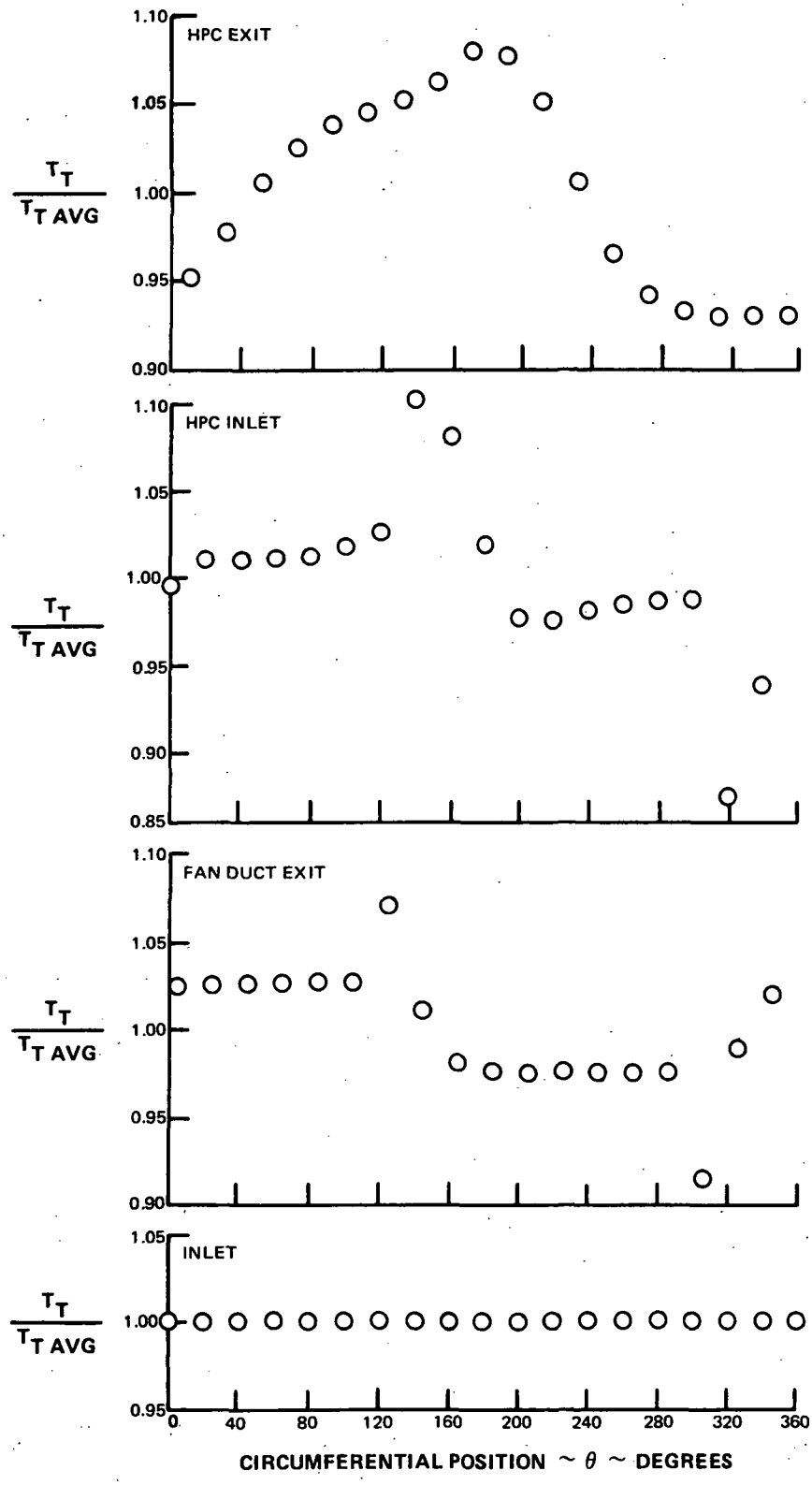



*Figure 14* $\left(\frac{T_T}{T_{T\,avg}}\right)$ *Circumferential Variation of Total Pressure*

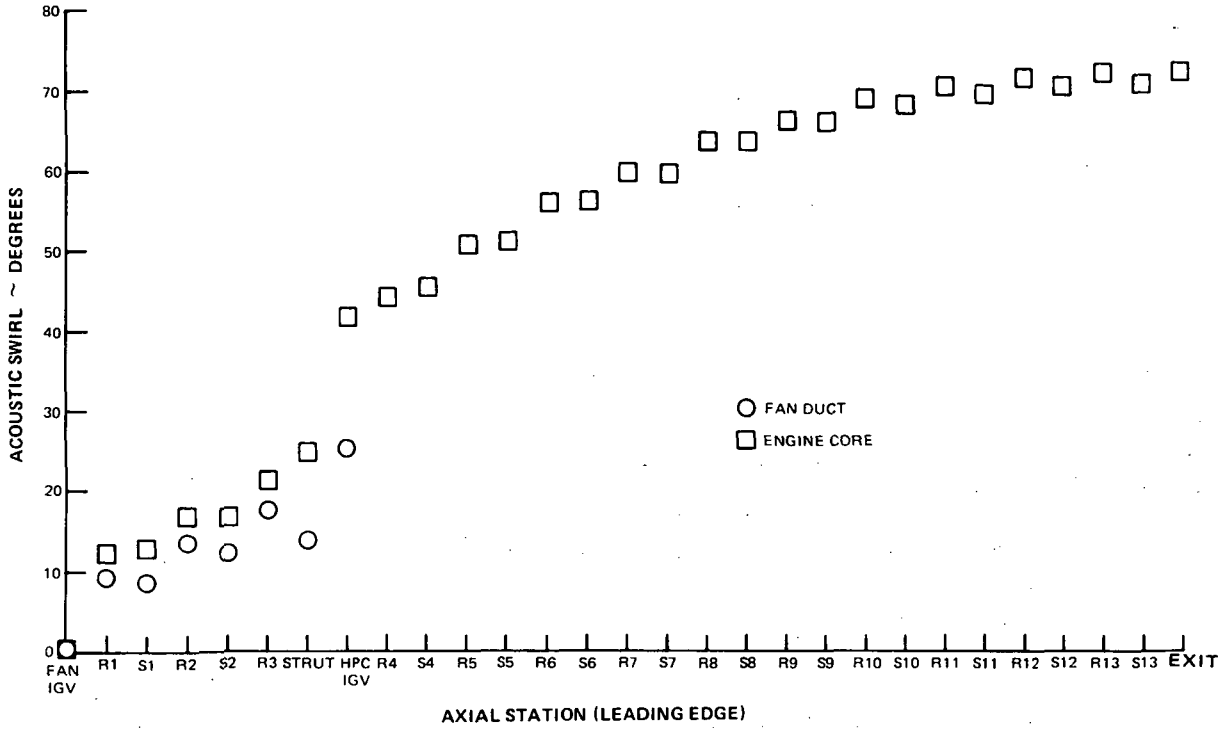



*Figure 15 Predicted Acoustic Swirl From Inlet Distortion Test Case*

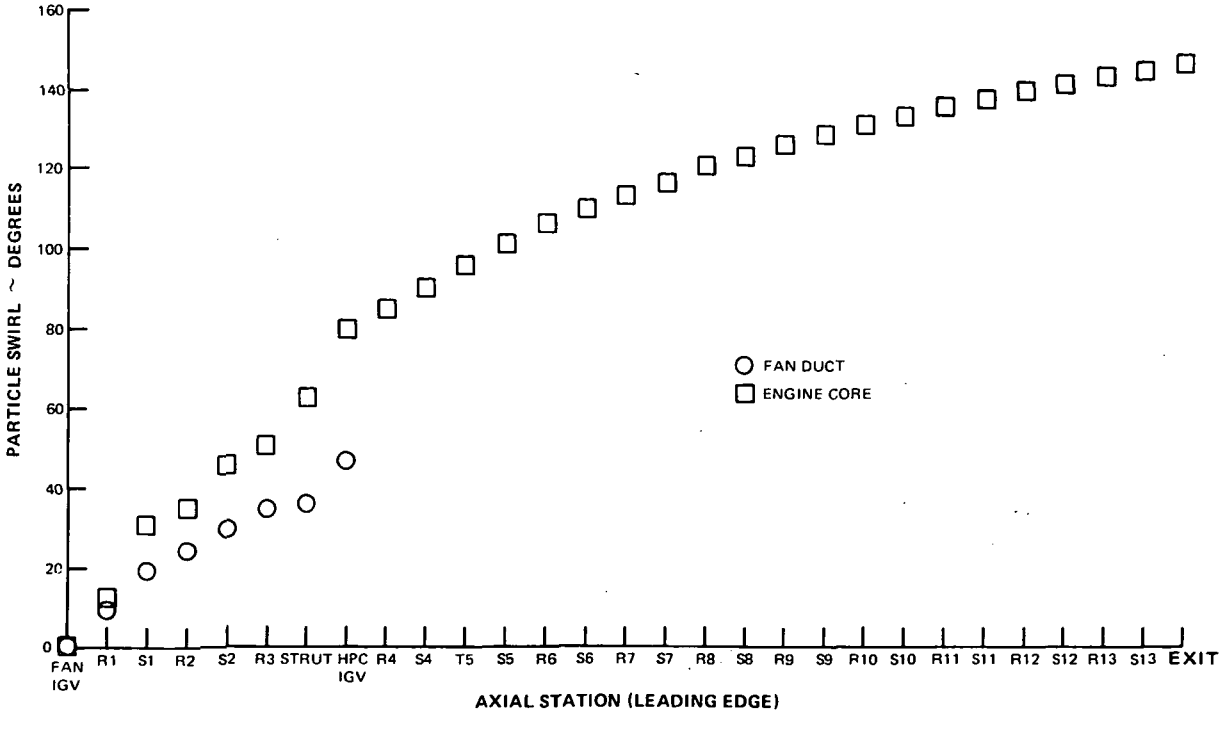



*Figure 16 Predicted Swirl From Inlet Distortion Test Case*

## CONCLUSIONS AND RECOMMENDATIONS

1) The multiple segment parallel compressor model has been upgraded to include capabilities for predicting the distorted flow performance of variable geometry compressors.

2) The model has further been verified for application to the F100 (3) turbofan engine compression system.

3) Model predictions for the F100 high compressor response to inlet temperature distortion compare favorably with available data.

4) Model predictions indicate that a 180° total pressure distortion with an amplitude of 0.45 (MAX-MIN)/AVG. and centered on top dead center will induce a stall in the F100 (3) at 90 percent corrected high rotor on the nominal operating line. No engine data is available to confirm this prediction but the result is in close agreement with the F100 (3) stability audit.

5) The model should be applied for predicting F100 (3) engine response to both pressure and/or temperature distortion. An experimental program should then be carried out to verify its accuracy.

## SYMBOLS

| | |
|---|---|
| $\psi$ | Pressure Rise Parameter |
| $\lambda$ | Temperature Rise Parameter |
| $\phi$ | Mass Flow Parameter |
| P | Pressure |
| T | Temperature |
| W | Mass Flow Rate |
| A | Area |
| N | Rotor Speed |
| $\theta$ | Total Temperature divided by Standard Day Temperature |
| $\delta$ | Total Pressure divided by Standard Day Pressure |
| $\alpha$ | Vane Angle |
| RCVV | High Pressure Compressor Vane Schedule |

### Subscripts

| | |
|---|---|
| S | Static Conditions |
| T | Total or Stagnation Conditions |
| Des | Design Value |
| x | Variable |
| 2 | High Speed Rotor |
| 2.5 | High Compressor Inlet Plane |
| IGV | Inlet Guide Vane |
| 3 | Vane Exit Plane |

### Superscripts

| | |
|---|---|
| * | Metal Angle |

## REFERENCES


1) Mazzawy, R. S. and Banks, G. A., "Modeling and Analysis of the TF30-P-3 Compressor System With Inlet Pressure Distortion", NASA CR-134996, April 1976.

2) Mazzawy, R. S. and Banks, G. A., "Circumferential Distortion Modeling of the TF30-P-3 Compression System", NASA CR-135124, January, 1977.

3) Mazzawy, R. S., "Multiple Segment Parallel Compressor Model for Circumferential Flow Distortion", ASME Journal of Engineering for Power, Vol. 99, No. 2, April, 1977.

4) Mazzawy, R. S., Banks, G. A., and Weber, C. R., "Compressor Critical Response Time Determination Study", AFAPL-TR-76-45, June, 1976.

## APPENDIX

## EXAMPLE CASE PROGRAM OUTPUT

## LEGEND OF SYMBOLS FOR DETAILED DISTORTION DECK PRINT

| Symbol | Description |
|---|---|
| ALPHA IN DEG | Blade inlet flow angle (absolute frame of reference) measured in degrees |
| AXIAL VEL | Axial velocity/average axial velocity |
| AXVELAVG | Circumferential average axial velocity |
| BETA IN DEG | Blade inlet flow angle (relative frame of reference) measured in degrees |
| BYPASS RATIO | Ratio of fan duct flow to engine flow |
| CORR FLOW | Corrected flow |
| DEG | Degrees |
| DEG K | Degrees Kelvin |
| DEG R | Degrees Rankine |
| DF | Diffusion factor |
| EXIT | Axial station located at the exit plane of the last row |
| FLOW SWIRL | Circumferential pressure distortion swirl through the engine |
| FPS | Feet per second |
| HPC | High pressure compressor |
| IGV | Inlet guide vane |
| INCIDENCE IN DEG | Blade incidence angle measured in degrees |
| KG/SEC | Kilograms per second |
| LBM/SEC | Pounds-mass per second |

## APPENDIX (Cont'd)

| Symbol | Description |
|---|---|
| MAX-MIN/AVG | Depth of distortion - Maximum total pressure minus the minimum total pressure over the average total pressure |
| MN | Mach number |
| MPS | Meters per second |
| NICORR | Low rotor speed corrected to the inlet |
| N2CORR | High rotor speed corrected to Station 3.0 |
| N2/N1 (MECH) | Ratio of high rotor mechanical speed to low rotor mechanical speed |
| PA | Pascals (Newton/Square Meter) |
| PARTICLE SWIRL | Circumferential particle swirl through the engine |
| PRESS RATIO | Pressure ratio |
| PS | Static pressure/average static pressure |
| PSAVG | Circumferential average static pressure |
| PSIA | Pounds pressure per square inch absolute |
| PT | Total pressure/average total pressure |
| PTAVG | Circumferential average total pressure |
| REL VEL | Relative velocity/average relative velocity |
| RVELAVG | Average relative velocity |
| SEG NO | Segment number |
| THETA | Circumferential position in direction of rotation |
| THETM | Theta-minus - extent of distortion |
| TT | Total temperature/average total temperature |

## APPENDIX (Cont'd)

| Symbol | Description |
|---|---|
| TTAVG | Circumferential average total temperature |
| U | Mean diameter rotor velocity |
| VEL | Velocity/average velocity (absolute) |
| VELAVG | Circumferential average velocity |
| WBL | Cross flow from segment to external cavity |
| WCORR | Total corrected air flow |

# DETAILED FLOW PROPERTY CALCULATIONS WITH UNIFORM INLET

WCORR=148.5LBM/SEC= 67.4KG/SEC  N1CORR= 7700.RPM  N2CORR= 9839.RPM  N2/N1(MECH)= 1.410

THETM= 0.DEG  BYPASS RATIO=1.100  MAX-MIN/AVG=0.0

FAN OD OUTPUT

| | CORR FLOW | PRESS RATIO | EFFICIENCY |
|---|---|---|---|
| FAN OD PERFORMANCE | 77.79 LBM/SEC<br>35.28 KG/SEC | 1.752 | 0.838 |

---- ROW OUTPUT ----

IGV

FLOW SWIRL= 0.0 DEG  PARTICLE SWIRL= 0.0 DEG  PSAVG= 13.69PSIA = 94405.PA
PTAVG= 14.70PSIA = 101353.PA  TTAVG= 519.0DEG R = 288.3DEG K  VELAVG= 354.1FPS =107.9MPS
RVELAVG=1092.6FPS = 330.0MPS  AXVELAVG= 354.1FPS =107.9MPS  U=1023.FPS = 312.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9. | 1 | 1.000 | 0.3200 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | -.563 | 0.0 | 90.0 | 1.000 | 1.000 |

STAGE 1 ROTOR

FLOW SWIRL= 9.17DEG  PARTICLE SWIRL= 9.17DEG  PSAVG= 13.24PSIA = 91311.PA
PTAVG= 14.75PSIA = 101712.PA  TTAVG= 519.0DEG R = 288.3DEG K  VELAVG= 435.2FPS =132.6MPS
RVELAVG= 915.6FPS = 279.1MPS  AXVELAVG= 389.4FPS =118.7MPS  U=1023.FPS = 312.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9. | 1 | 1.000 | 0.3954 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.275 | 8.33 | 25.2 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 8.46DEG  PARTICLE SWIRL= 18.99DEG  PSAVG= 16.03PSIA = 110541.PA
PTAVG= 18.78PSIA = 129473.PA  TTAVG= 566.3DEG R = 314.6DEG K  VELAVG= 548.3FPS =167.1MPS
RVELAVG= 739.1FPS = 225.3MPS  AXVELAVG= 393.8FPS =120.0MPS  U=1007.FPS = 307.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8. | 1 | 1.000 | 0.4806 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.413 | -2.61 | 45.9 | 1.000 | 1.000 |

STAGE 2 ROTOR

FLOW SWIRL= 13.33DEG  PARTICLE SWIRL= 23.65DEG  PSAVG= 17.35PSIA = 119609.PA
PTAVG= 19.05PSIA = 131379.PA  TTAVG= 566.3DEG R = 314.6DEG K  VELAVG= 424.4FPS =129.4MPS
RVELAVG= 973.3FPS = 296.7MPS  AXVELAVG= 409.0FPS =124.7MPS  U= 997.FPS = 304.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13. | 1 | 1.000 | 0.3686 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.198 | 5.15 | 24.8 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 12.03DEG  PARTICLE SWIRL= 29.32DEG  PSAVG= 20.52PSIA = 141513.PA
PTAVG= 23.25PSIA = 160277.PA  TTAVG= 606.4DEG R = 336.9DEG K  VELAVG= 504.8FPS =153.9MPS
RVELAVG= 833.9FPS = 254.2MPS  AXVELAVG= 423.2FPS =129.0MPS  U= 994.FPS = 303.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12. | 1 | 1.000 | 0.4256 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.027 | -32.97 | 57.0 | 1.000 | 1.000 |

STAG 3

ROTOR

FLOW SWIRL= 17.28DEG PARTICLE SWIRL= 34.57DEG PSAVG= 20.21PSIA = 139354.PA
PTAVG= 23.11PSIA = 159365.PA TTAVG= 606.4DEG R = 336.9DEG K VELAVG= 523.7FPS =159.6MPS
RVELAVG= 927.4FPS = 282.8MPS AXVELAVG= 487.2FPS =148.5MPS U= 982.FPS = 299.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17. | 1 | 1.000 | 0.4422 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | -.171 | -7.47 | 31.7 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 13.85DEG PARTICLE SWIRL= 35.73DEG PSAVG= 22.32PSIA = 153865.PA
PTAVG= 25.99PSIA = 179161.PA TTAVG= 626.7DEG R = 348.2DEG K VELAVG= 566.3FPS =172.6MPS
RVELAVG=1046.1FPS = 318.9MPS AXVELAVG= 559.9FPS =170.4MPS U= 975.FPS = 297.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14. | 1 | 1.000 | 0.4716 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | -.789 | -28.76 | 80.6 | 1.000 | 1.000 |

EXIT

FLOW SWIRL= 25.04DEG PARTICLE SWIRL= 46.93DEG PSAVG= 18.87PSIA = 130082.PA
PTAVG= 25.76PSIA = 177583.PA TTAVG= 626.7DEG R = 348.2DEG K VELAVG= 800.8FPS =244.1MPS
RVELAVG= 0.0FPS = 0.0MPS AXVELAVG= 0.0FPS = 0.0MPS U= 975.FPS = 297.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | AXIAL IN DEG | VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25. | 1 | 1.000 | 0.6822 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

CORE ENGINE OUTPUT

| | CORR FLOW | PRESS RATIO | EFFICIENCY |
|---|---|---|---|
| LOW SPOOL PERFORMANCE | 70.71 LBM/SEC<br>32.08 KG/SEC | 1.802 | 0.841 |
| RAKE CORRECTED PRESSURE RATIO | | 1.802 | |
| HIGH SPOOL PERFORMANCE | 43.30 LBM/SEC<br>19.64 KG/SEC | 5.698 | 0.802 |

---- ROW OUTPUT ----

IGV

FLOW SWIRL= 0.0 DEG  PARTICLE SWIRL= 0.0 DEG  PSAVG= 13.69PSIA = 94405.PA
PTAVG= 14.70PSIA = 101353.PA  TTAVG= 519.0DEG R = 288.3DEG K  VELAVG= 354.1FPS =107.9MPS
RVELAVG= 750.0FPS = 228.6MPS  AXVELAVG= 354.1FPS =107.9MPS  U= 661.FPS = 202.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA AXIAL IN DEG | VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0. | 1 | 1.000 | 0.3200 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | -.295 | 0.0 | 90.0 | 1.000 | 1.000 |

STAGE 1 ROTOR

FLOW SWIRL= 12.06DEG  PARTICLE SWIRL= 12.06DEG  PSAVG= 13.32PSIA = 91810.PA
PTAVG= 14.64PSIA = 100961.PA  TTAVG= 519.0DEG R = 288.3DEG K  VELAVG= 408.8FPS =124.6MPS
RVELAVG= 684.7FPS = 208.7MPS  AXVELAVG= 388.8FPS =118.5MPS  U= 690.FPS = 210.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA AXIAL IN DEG | VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12. | 1 | 1.000 | 0.3708 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.429 | 9.50 | 34.6 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 11.84DEG  PARTICLE SWIRL= 27.58DEG  PSAVG= 15.11PSIA = 104181.PA
PTAVG= 18.52PSIA = 127675.PA  TTAVG= 560.4DEG R = 311.3DEG K  VELAVG= 616.7FPS =188.0MPS
RVELAVG= 477.3FPS = 145.5MPS  AXVELAVG= 408.2FPS =124.4MPS  U= 710.FPS = 216.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA AXIAL IN DEG | VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12. | 1 | 1.000 | 0.5468 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.511 | 3.10 | 41.4 | 1.000 | 1.000 |

STAGE 2 ROTOR

FLOW SWIRL= 16.05DEG  PARTICLE SWIRL= 31.79DEG  PSAVG= 16.88PSIA = 116399.PA
PTAVG= 18.50PSIA = 127580.PA  TTAVG= 560.4DEG R = 311.3DEG K  VELAVG= 417.4FPS =127.2MPS
RVELAVG= 808.9FPS = 246.6MPS  AXVELAVG= 416.2FPS =126.8MPS  U= 726.FPS = 221.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA AXIAL IN DEG | VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16. | 1 | 1.000 | 0.3643 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.411 | 2.24 | 31.0 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 15.15DEG  PARTICLE SWIRL= 40.29DEG  PSAVG= 20.11PSIA = 138620.PA
PTAVG= 23.78PSIA = 163949.PA  TTAVG= 608.4DEG R = 338.0DEG K  VELAVG= 585.2FPS =178.4MPS
RVELAVG= 559.7FPS = 170.6MPS  AXVELAVG= 429.1FPS =130.5MPS  U= 760.FPS = 232.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA AXIAL IN DEG | VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15. | 1 | 1.000 | 0.4957 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.312 | -14.22 | 47.0 | 1.000 | 1.000 |

STAGE 3

ROTOR

FLOW SWIRL= 19.88DEG PARTICLE SWIRL= 45.03DEG PSAVG= 21.04PSIA = 145079.PA
PTAVG= 23.63PSIA = 162894.PA TTAVG= 608.4DEG R = 338.0DEG K VELAVG= 488.0FPS =148.7MPS
RVELAVG= 804.3FPS = 245.2MPS AXVELAVG= 472.0FPS =143.9MPS U= 775.FPS = 236.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20. | 1 | 1.000 | 0.4103 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.219 | -3.33 | 35.9 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 21.42DEG PARTICLE SWIRL= 54.27DEG PSAVG= 22.93PSIA = 158128.PA
PTAVG= 26.50PSIA = 182741.PA TTAVG= 632.2DEG R = 351.2DEG K VELAVG= 554.8FPS =169.1MPS
RVELAVG= 686.0FPS = 209.1MPS AXVELAVG= 471.3FPS =143.7MPS U= 791.FPS = 241.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21. | 1 | 1.000 | 0.4596 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.163 | -6.16 | 58.2 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 38.39DEG PARTICLE SWIRL= 71.24DEG PSAVG= 23.34PSIA = 160947.PA
PTAVG= 26.49PSIA = 182674.PA TTAVG= 632.2DEG R = 351.2DEG K VELAVG= 519.7FPS =158.4MPS
RVELAVG= 913.2FPS = 278.3MPS AXVELAVG= 474.4FPS =144.6MPS U= 992.FPS = 302.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38. | 1 | 1.000 | 0.4294 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | -.103 | 12.80 | 65.9 | 1.000 | 1.000 |

STAGE 4
ROTOR

FLOW SWIRL= 41.17DEG PARTICLE SWIRL= 74.03DEG PSAVG= 22.87PSIA = 157716.PA
PTAVG= 26.56PSIA = 183141.PA TTAVG= 632.2DEG R = 351.2DEG K VELAVG= 563.7FPS =171.8MPS
RVELAVG= 903.6FPS = 275.4MPS AXVELAVG= 513.7FPS =156.6MPS U= 975.FPS = 297.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41. | 1 | 1.000 | 0.4673 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.404 | 5.95 | 34.6 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 42.23DEG PARTICLE SWIRL= 81.55DEG PSAVG= 27.25PSIA = 187864.PA
PTAVG= 35.26PSIA = 243096.PA TTAVG= 695.5DEG R = 386.4DEG K VELAVG= 770.6FPS =234.9MPS
RVELAVG= 689.4FPS = 208.3MPS AXVELAVG= 545.9FPS =166.4MPS U= 955.FPS = 291.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42. | 1 | 1.000 | 0.6189 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.306 | -3.91 | 45.1 | 1.000 | 1.000 |

STAGE 5
ROTOR

FLOW SWIRL= 47.84DEG PARTICLE SWIRL= 87.15DEG PSAVG= 29.55PSIA = 203708.PA
PTAVG= 35.14PSIA = 242300.PA TTAVG= 695.5DEG R = 386.4DEG K VELAVG= 636.0FPS =193.8MPS
RVELAVG= 867.1FPS = 264.3MPS AXVELAVG= 568.7FPS =173.3MPS U= 939.FPS = 286.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48. | 1 | 1.000 | 0.5047 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.238 | -4.09 | 41.0 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 47.98DEG PARTICLE SWIRL= 91.91DEG PSAVG= 33.06PSIA = 227929.PA
PTAVG= 42.08PSIA = 290141.PA TTAVG= 737.4DEG R = 409.7DEG K VELAVG= 768.7FPS =234.3MPS
RVELAVG= 742.5FPS = 226.3MPS AXVELAVG= 596.9FPS =181.9MPS U= 926.FPS = 282.MPS

| THETA | SEG | VEL | MN | PS | PT | TT | WBL | WBL | DF | INCIDENCE | ALPHA | AXIAL | REL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | NO | | | | | | LBM/SEC | KG/SEG | | IN DEG | IN DEG | VEL | VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48. | 1 | 1.000 | 0.5985 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.212 | -12.44 | 50.9 | 1.000 | 1.000 |

STAGE 6
ROTOR

FLOW SWIRL= 53.20DEG PARTICLE SWIRL= 97.12DEG PSAVG= 34.47PSIA = 237659.PA
PTAVG= 41.83PSIA = 288409.PA TTAVG= 737.4DEG R = 409.7DEG K VELAVG= 690.7FPS =210.5MPS
RVELAVG= 907.6FPS = 276.6MPS AXVELAVG= 636.6FPS =194.0MPS U= 915.FPS = 279.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53. | 1 | 1.000 | 0.5341 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.167 | -6.05 | 44.5 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 52.98DEG PARTICLE SWIRL=100.38DEG PSAVG= 37.93PSIA = 261496.PA
PTAVG= 48.47PSIA = 334159.PA TTAVG= 785.3DEG R = 436.3DEG K VELAVG= 799.5FPS =243.7MPS
RVELAVG= 818.8FPS = 249.6MPS AXVELAVG= 670.4FPS =204.3MPS U= 906.FPS = 276.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53. | 1 | 1.000 | 0.6039 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.223 | -11.58 | 57.0 | 1.000 | 1.000 |

STAGE 7
ROTER

FLOW SWIRL= 56.45DEG PARTICLE SWIRL=103.86DEG PSAVG= 41.33PSIA = 284995.PA
PTAVG= 50.26PSIA = 346512.PA TTAVG= 785.3DEG R = 436.3DEG K VELAVG= 716.2FPS =218.3MPS
RVELAVG= 999.6FPS = 304.7MPS AXVELAVG= 694.3FPS =211.6MPS U= 995.FPS = 273.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56. | 1 | 1.000 | 0.5372 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.226 | -5.19 | 44.0 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 56.28DEG PARTICLE SWIRL=106.64DEG PSAVG= 46.65PSIA = 321638.PA
PTAVG= 61.08PSIA = 421160.PA TTAVG= 851.6DEG R = 473.1DEG K VELAVG= 871.6FPS =265.7MPS
RVELAVG= 874.1FPS = 266.4MPS AXVELAVG= 752.3FPS =229.3MPS U= 885.FPS = 270.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56. | 1 | 1.000 | 0.6350 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.176 | -19.67 | 59.7 | 1.000 | 1.000 |

STAGE 8
ROTER

FLOW SWIRL= 60.48DEG PARTICLE SWIRL=110.84DEG PSAVG= 50.88PSIA = 350809.PA
PTAVG= 63.46PSIA = 437529.PA TTAVG= 851.6DEG R = 473.1DEG K VELAVG= 791.6FPS =241.3MPS
RVELAVG= 990.2FPS = 301.8MPS AXVELAVG= 755.0FPS =230.1MPS U= 979.FPS = 298.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60. | 1 | 1.000 | 0.5728 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.139 | -12.28 | 49.7 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 60.12DEG PARTICLE SWIRL=112.93DEG PSAVG= 55.36PSIA = 381692.PA
PTAVG= 73.80PSIA = 508830.PA TTAVG= 910.3DEG R = 505.7DEG K VELAVG= 929.5FPS =283.3MPS
RVELAVG= 927.6FPS = 282.7MPS AXVELAVG= 819.8FPS =249.9MPS U= 872.FPS = 266.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60. | 1 | 1.000 | 0.6572 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.180 | -20.28 | 61.9 | 1.000 | 1.000 |

STAGE 9
ROTOR

FLOW SWIRL= 62.99DEG  PARTICLE SWIRL=115.80DEG  PSAVG= 60.94PSIA = 420171.PA
PTAVG= 76.97PSIA = 530670.PA  TTAVG= 910.3DEG R = 505.7DEG K  VELAVG= 840.8FPS =256.3MPS
RVELAVG=1042.9FPS = 317.9MPS  AXVELAVG= 813.1FPS =247.8MPS  U= 867.FPS = 264.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63. | 1 | 1.000 | 0.5900 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.188 | -12.94 | 51.2 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 62.80DEG  PARTICLE SWIRL=118.16DEG  PSAVG= 69.83PSIA = 481475.PA
PTAVG= 90.08PSIA = 621068.PA  TTAVG= 972.4DEG R = 540.2DEG K  VELAVG= 906.2FPS =276.2MPS
RVELAVG= 922.7FPS = 281.2MPS  AXVELAVG= 805.9FPS =245.6MPS  U= 863.FPS = 263.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63. | 1 | 1.000 | 0.6177 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.156 | -23.20 | 62.8 | 1.000 | 1.000 |

STAGE 10
ROTOR

FLOW SWIRL= 65.55DEG  PARTICLE SWIRL=120.91DEG  PSAVG= 75.76PSIA = 522327.PA
PTAVG= 93.47PSIA = 644446.PA  TTAVG= 972.4DEG R = 540.2DEG K  VELAVG= 825.7FPS =251.7MPS
RVELAVG=1005.2FPS = 306.4MPS  AXVELAVG= 790.4FPS =240.9MPS  U= 860.FPS = 262.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66. | 1 | 1.000 | 0.5594 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.131 | -14.64 | 51.8 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 64.97DEG  PARTICLE SWIRL=122.94DEG  PSAVG= 86.18PSIA = 594193.PA
PTAVG=107.41PSIA = 740581.PA  TTAVG=1026.9DEG R = 570.5DEG K  VELAVG= 868.2FPS =264.6MPS
RVELAVG= 923.3FPS = 281.4MPS  AXVELAVG= 785.0FPS =239.3MPS  U= 857.FPS = 261.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65. | 1 | 1.000 | 0.5737 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.118 | -20.51 | 64.7 | 1.000 | 1.000 |

STAGE 11
ROTOR

FLOW SWIRL= 67.24DEG  PARTICLE SWIRL=125.21DEG  PSAVG= 90.35PSIA = 622913.PA
PTAVG=109.99PSIA = 759346.PA  TTAVG=1026.9DEG R = 570.5DEG K  VELAVG= 821.9FPS =250.5MPS
RVELAVG=1025.1FPS = 312.4MPS  AXVELAVG= 795.3FPS =242.4MPS  U= 854.FPS = 260.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 67. | 1 | 1.000 | 0.5414 | 1.0000 | 1.0000 | 1.0300 | 0.0 | 0.0 | 0.115 | -11.98 | 50.9 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 66.21DEG  PARTICLE SWIRL=127.08DEG  PSAVG=102.43PSIA = 706202.PA
PTAVG=125.08PSIA = 862398.PA  TTAVG=1084.3DEG R = 602.4DEG K  VELAVG= 851.1FPS =259.4MPS
RVELAVG= 950.3FPS = 289.7MPS  AXVELAVG= 788.4FPS =240.3MPS  U= 851.FPS = 259.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66. | 1 | 1.000 | 0.5463 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.097 | -26.57 | 67.9 | 1.000 | 1.000 |

STAGE 12
ROTOR

FLOW SWIRL= 68.28DEG  PARTICLE SWIRL=129.15DEG  PSAVG=107.91PSIA = 744008.PA
PTAVG=129.40PSIA = 892162.PA  TTAVG=1084.3DEG R = 602.4DEG K  VELAVG= 812.3FPS =247.6MPS
RVELAVG=1027.1FPS = 313.1MPS  AXVELAVG= 789.2FPS =240.6MPS  U= 850.FPS = 259.MPS

| | THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 68. | 1 | 1.000 | 0.5202 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.142 | -13.01 | 50.2 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 67.18DEG PARTICLE SWIRL=130.91DEG PSAVG=120.00PSIA = 827394.PA
PTAVG=141.31PSIA = 974308.PA TTAVG=1120.1DEG R = 622.3DEG K VELAVG= 784.3FPS =239.0MPS
RVELAVG= 917.2FPS = 279.6MPS AXVELAVG= 728.0FPS =221.9MPS U= 850.FPS = 259.MPS

| | THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 67. | 1 | 1.000 | 0.4933 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.145 | -23.97 | 68.2 | 1.000 | 1.000 |

STAGE 13
ROTOR

FLOW SWIRL= 69.01DEG PARTICLE SWIRL=132.74DEG PSAVG=124.47PSIA = 858170.PA
PTAVG=142.84PSIA = 984877.PA TTAVG=1120.1DEG R = 622.3DEG K VELAVG= 721.2FPS =219.8MPS
RVELAVG= 999.5FPS = 304.7MPS AXVELAVG= 706.8FPS =215.4MPS U= 850.FPS = 259.MPS

| | THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 69. | 1 | 1.000 | 0.4520 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.130 | -9.71 | 45.0 | 1.000 | 1.000 |

STATOR

FLOW SWIRL= 67.64DEG PARTICLE SWIRL=134.20DEG PSAVG=135.19PSIA = 932128.PA
PTAVG=153.82PSIA =1060577.PA TTAVG=1139.8DEG R = 633.2DEG K VELAVG= 704.8FPS =214.8MPS
RVELAVG= 903.5FPS = 275.4MPS AXVELAVG= 663.8FPS =202.3MPS U= 850.FPS = 259.MPS

| | THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 68. | 1 | 1.000 | 0.4375 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.370 | -28.17 | 70.4 | 1.000 | 1.000 |

EXIT

FLOW SWIRL= 69.08DEG PARTICLE SWIRL=135.64DEG PSAVG=140.96PSIA = 971887.PA
PTAVG=150.70PSIA =1039045.PA TTAVG=1139.8DEG R = 633.2DEG K VELAVG= 509.2FPS =155.2MPS
RVELAVG= 0.0FPS = 0.0MPS AXVELAVG= 0.0FPS = 0.0MPS U= 850.FPS = 259.MPS

| | THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | | AXIAL IN DEG | VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 69. | 1 | 1.000 | 0.3134 | 1.0000 | 1.0000 | 1.0000 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |

# DETAILED FLOW PROPERTY CALCULATIONS WITH DISTORTED INLET

WCORR=148.5LBM/SEC= 67.4KG/SEC  N1CORR= 7700.RPM  N2CORR= 9800.RPM  N2/N1(MECH)=1.410

THETM= 0.DEG  BYPASS RATIO=1.100  MAX-MIN/AVG=0.449

FAN OD OUTPUT

| | CORR FLOW | PRESS RATIO | EFFICIENCY |
|---|---|---|---|
| FAN OD PERFORMANCE | 77.76 LBM/SEC<br>35.27 KG/SEC | 1.705 | 0.817 |

---- ROW OUTPUT ----

IGV

FLOW SWIRL= 0.0 DEG  PARTICLE SWIRL= 0.0 DEG  PSAVG= 13.69PSIA = 94401.PA
PTAVG= 14.70PSIA = 101353.PA  TTAVG= 519.0DEG R = 288.3DEG K  VELAVG= 353.3FPS =107.7MPS
RVELAVG=1082.4FPS = 329.9MPS  AXVELAVG= 353.3FPS =107.7MPS  U=1023.FPS = 312.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0. | 1 | 0.977 | 0.3117 | 0.7783 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.565 | 0.0 | 90.0 | 0.977 | 0.997 |
| 20. | 2 | 0.970 | 0.3096 | 0.7790 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.565 | 0.0 | 90.0 | 0.970 | 0.997 |
| 40. | 3 | 0.966 | 0.3082 | 0.7795 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.566 | 0.0 | 90.0 | 0.966 | 0.996 |
| 60. | 4 | 0.963 | 0.3072 | 0.7798 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.566 | 0.0 | 90.0 | 0.963 | 0.996 |
| 80. | 5 | 0.961 | 0.3065 | 0.7801 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.566 | 0.0 | 90.0 | 0.961 | 0.996 |
| 100. | 6 | 0.933 | 0.2975 | 1.2363 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.568 | 0.0 | 90.0 | 0.933 | 0.993 |
| 120. | 7 | 0.979 | 0.3126 | 1.2285 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.565 | 0.0 | 90.0 | 0.979 | 0.998 |
| 140. | 8 | 1.003 | 0.3204 | 1.2243 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.563 | 0.0 | 90.0 | 1.003 | 1.000 |
| 160. | 9 | 1.016 | 0.3247 | 1.2220 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.562 | 0.0 | 90.0 | 1.016 | 1.002 |
| 180. | 10 | 1.024 | 0.3270 | 1.2207 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.561 | 0.0 | 90.0 | 1.024 | 1.002 |
| 200. | 11 | 1.027 | 0.3283 | 1.2201 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.561 | 0.0 | 90.0 | 1.027 | 1.003 |
| 220. | 12 | 1.029 | 0.3290 | 1.2197 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.561 | 0.0 | 90.0 | 1.029 | 1.003 |
| 240. | 13 | 1.031 | 0.3293 | 1.2195 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.561 | 0.0 | 90.0 | 1.031 | 1.003 |
| 260. | 14 | 1.031 | 0.3295 | 1.2194 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.561 | 0.0 | 90.0 | 1.031 | 1.003 |
| 280. | 15 | 1.072 | 0.3430 | 0.7675 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.559 | 0.0 | 90.0 | 1.072 | 1.008 |
| 300. | 16 | 1.029 | 0.3297 | 0.7726 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.561 | 0.0 | 90.0 | 1.029 | 1.003 |
| 320. | 17 | 1.003 | 0.3202 | 0.7755 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.563 | 0.0 | 90.0 | 1.003 | 1.000 |
| 340. | 18 | 0.987 | 0.3150 | 0.7772 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.564 | 0.0 | 90.0 | 0.987 | 0.999 |

STAGE 1 ROTOR

FLOW SWIRL= 9.17DEG  PARTICLE SWIRL= 9.17DEG  PSAVG= 13.24PSIA = 91302.PA
PTAVG= 14.75PSIA = 101709.PA  TTAVG= 519.0DEG R = 288.3DEG K  VELAVG= 434.3FPS =132.4MPS
RVELAVG= 915.7FPS = 279.1MPS  AXVELAVG= 388.7FPS =118.5MPS  U=1023.FPS = 312.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9. | 1 | 0.979 | 0.3956 | 0.7779 | 0.7737 | 1.0000 | 0.0 | 0.0 | 0.311 | 8.99 | 24.5 | 0.978 | 1.000 |
| 29. | 2 | 0.972 | 0.3831 | 0.7783 | 0.7732 | 1.0000 | 0.0 | 0.0 | 0.316 | 9.15 | 24.3 | 0.972 | 1.000 |
| 49. | 3 | 0.967 | 0.3814 | 0.7787 | 0.7729 | 1.0000 | 0.0 | 0.0 | 0.320 | 9.27 | 24.2 | 0.967 | 1.000 |
| 69. | 4 | 0.964 | 0.3802 | 0.7790 | 0.7727 | 1.0000 | 0.0 | 0.0 | 0.323 | 9.35 | 24.2 | 0.964 | 1.000 |
| 89. | 5 | 0.962 | 0.3793 | 0.7792 | 0.7725 | 1.0000 | 0.0 | 0.0 | 0.325 | 9.40 | 24.1 | 0.962 | 1.000 |
| 109. | 6 | 0.936 | 0.3686 | 1.2338 | 1.2166 | 1.0000 | 0.0 | 0.0 | 0.308 | 10.12 | 23.4 | 0.936 | 1.001 |
| 129. | 7 | 0.980 | 0.3867 | 1.2277 | 1.2219 | 1.0000 | 0.0 | 0.0 | 0.279 | 8.91 | 24.6 | 0.980 | 1.000 |
| 149. | 8 | 1.003 | 0.3959 | 1.2244 | 1.2247 | 1.0000 | 0.0 | 0.0 | 0.259 | 8.30 | 25.2 | 1.003 | 1.000 |
| 169. | 9 | 1.016 | 0.4010 | 1.2226 | 1.2262 | 1.0000 | 0.0 | 0.0 | 0.249 | 7.95 | 25.5 | 1.016 | 1.000 |
| 189. | 10 | 1.022 | 0.4038 | 1.2216 | 1.2270 | 1.0000 | 0.0 | 0.0 | 0.245 | 7.77 | 25.7 | 1.022 | 1.000 |
| 209. | 11 | 1.026 | 0.4053 | 1.2210 | 1.2275 | 1.0000 | 0.0 | 0.0 | 0.243 | 7.67 | 25.8 | 1.026 | 1.000 |
| 229. | 12 | 1.028 | 0.4061 | 1.2207 | 1.2277 | 1.0000 | 0.0 | 0.0 | 0.241 | 7.62 | 25.9 | 1.028 | 1.000 |
| 249. | 13 | 1.029 | 0.4065 | 1.2206 | 1.2278 | 1.0000 | 0.0 | 0.0 | 0.241 | 7.59 | 25.9 | 1.029 | 1.000 |
| 269. | 14 | 1.030 | 0.4067 | 1.2205 | 1.2279 | 1.0000 | 0.0 | 0.0 | 0.240 | 7.57 | 25.9 | 1.030 | 1.000 |
| 289. | 15 | 1.070 | 0.4231 | 0.7684 | 0.7803 | 1.0000 | 0.0 | 0.0 | 0.235 | 6.49 | 27.0 | 1.070 | 1.000 |
| 309. | 16 | 1.027 | 0.4057 | 0.7732 | 0.7775 | 1.0000 | 0.0 | 0.0 | 0.265 | 7.64 | 25.9 | 1.027 | 1.000 |
| 329. | 17 | 1.002 | 0.3956 | 0.7755 | 0.7756 | 1.0000 | 0.0 | 0.0 | 0.290 | 8.31 | 25.2 | 1.002 | 1.000 |
| 349. | 18 | 0.987 | 0.3894 | 0.7769 | 0.7744 | 1.0000 | 0.0 | 0.0 | 0.303 | 8.73 | 24.8 | 0.987 | 1.000 |

STATOR

FLOW SWIRL= 8.49DEG PARTICLE SWIRL= 19.06DEG PSAVG= 16.00PSIA = 110300.PA
PTAVG= 18.76PSIA = 129325.PA TTAVG= 566.3DEG R = 314.6DEG K VELAVG= 549.3FPS =167.4MPS
RVELAVG= 737.9FPS = 224.9MPS AXVELAVG= 393.2FPS =119.8MPS U=1007.FPS = 307.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8. | 1 | 1.001 | 0.4814 | 0.7850 | 0.7846 | 1.0016 | 0.0 | 0.0 | 0.459 | -0.26 | 43.6 | 0.970 | 0.970 |
| 28. | 2 | 1.005 | 0.4836 | 0.7834 | 0.7841 | 1.0012 | 0.0 | 0.0 | 0.465 | 0.07 | 43.2 | 0.966 | 0.966 |
| 48. | 3 | 1.007 | 0.4849 | 0.7824 | 0.7838 | 1.0010 | 0.0 | 0.0 | 0.470 | 0.31 | 43.0 | 0.962 | 0.962 |
| 68. | 4 | 1.009 | 0.4859 | 0.7819 | 0.7837 | 1.0008 | 0.0 | 0.0 | 0.473 | 0.49 | 42.8 | 0.960 | 0.960 |
| 88. | 5 | 1.010 | 0.4865 | 0.7815 | 0.7836 | 1.0007 | 0.0 | 0.0 | 0.476 | 0.61 | 42.7 | 0.959 | 0.959 |
| 108. | 6 | 1.071 | 0.5003 | 1.2553 | 1.2702 | 1.0672 | 0.0 | 0.0 | 0.445 | -0.68 | 44.0 | 0.976 | 0.976 |
| 128. | 7 | 1.025 | 0.4956 | 1.1959 | 1.2064 | 0.9954 | 0.0 | 0.0 | 0.414 | -2.49 | 45.8 | 1.000 | 1.000 |
| 148. | 8 | 1.012 | 0.4863 | 1.2032 | 1.2080 | 0.9967 | 0.0 | 0.0 | 0.388 | -3.86 | 47.2 | 1.018 | 1.018 |
| 168. | 9 | 1.002 | 0.4830 | 1.2117 | 1.2123 | 0.9981 | 0.0 | 0.0 | 0.378 | -4.40 | 47.7 | 1.025 | 1.025 |
| 188. | 10 | 0.997 | 0.4801 | 1.2165 | 1.2149 | 0.9988 | 0.0 | 0.0 | 0.373 | -4.67 | 48.0 | 1.029 | 1.029 |
| 208. | 11 | 0.994 | 0.4786 | 1.2192 | 1.2163 | 0.9992 | 0.0 | 0.0 | 0.370 | -4.81 | 48.1 | 1.031 | 1.031 |
| 228. | 12 | 0.992 | 0.4777 | 1.2206 | 1.2171 | 0.9995 | 0.0 | 0.0 | 0.369 | -4.89 | 48.2 | 1.032 | 1.032 |
| 248. | 13 | 0.991 | 0.4773 | 1.2214 | 1.2176 | 0.9996 | 0.0 | 0.0 | 0.368 | -4.93 | 48.2 | 1.032 | 1.032 |
| 268. | 14 | 0.991 | 0.4770 | 1.2218 | 1.2178 | 0.9996 | 0.0 | 0.0 | 0.367 | -4.95 | 48.2 | 1.032 | 1.032 |
| 288. | 15 | 0.944 | 0.4705 | 0.7451 | 0.7396 | 0.9304 | 0.0 | 0.0 | 0.369 | -5.13 | 48.4 | 1.035 | 1.035 |
| 308. | 16 | 0.972 | 0.4662 | 0.7969 | 0.7969 | 1.0043 | 0.0 | 0.0 | 0.403 | -3.16 | 46.5 | 1.009 | 1.009 |
| 328. | 17 | 0.984 | 0.4724 | 0.7925 | 0.7875 | 1.0035 | 0.0 | 0.0 | 0.434 | -1.54 | 44.9 | 0.987 | 0.987 |
| 348. | 18 | 0.994 | 0.4780 | 0.7878 | 0.7857 | 1.0023 | 0.0 | 0.0 | 0.449 | -0.76 | 44.1 | 0.977 | 0.977 |

STAGE 2
ROTOR

FLOW SWIRL= 13.36DEG PARTICLE SWIRL= 23.92DEG PSAVG= 17.30PSIA = 119276.PA
PTAVG= 19.01PSIA = 131094.PA TTAVG= 566.3DEG R = 314.6DEG K VELAVG= 423.9FPS =129.2MPS
RVELAVG= 973.3FPS = 296.7MPS AXVELAVG= 408.5FPS =124.5MPS U= 997.FPS = 304.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13. | 1 | 0.969 | 0.3563 | 0.7874 | 0.7822 | 1.0016 | 0.0 | 0.0 | 0.245 | 5.94 | 24.1 | 0.969 | 0.998 |
| 33. | 2 | 0.965 | 0.3547 | 0.7862 | 0.7803 | 1.0012 | 0.0 | 0.0 | 0.249 | 6.05 | 24.0 | 0.965 | 0.998 |
| 53. | 3 | 0.962 | 0.3535 | 0.7855 | 0.7792 | 1.0010 | 0.0 | 0.0 | 0.253 | 6.12 | 23.9 | 0.962 | 0.997 |
| 73. | 4 | 0.960 | 0.3527 | 0.7851 | 0.7785 | 1.0008 | 0.0 | 0.0 | 0.255 | 6.18 | 23.8 | 0.960 | 0.997 |
| 93. | 5 | 0.958 | 0.3521 | 0.7848 | 0.7780 | 1.0007 | 0.0 | 0.0 | 0.257 | 6.22 | 23.8 | 0.958 | 0.997 |
| 113. | 6 | 0.982 | 0.3496 | 1.2556 | 1.2431 | 1.0672 | 0.0 | 0.0 | 0.183 | 5.62 | 24.4 | 0.982 | 0.999 |
| 133. | 7 | 1.001 | 0.3693 | 1.1978 | 1.1975 | 0.9954 | 0.0 | 0.0 | 0.169 | 5.16 | 24.8 | 1.001 | 1.000 |
| 153. | 8 | 1.019 | 0.3759 | 1.2026 | 1.2063 | 0.9967 | 0.0 | 0.0 | 0.162 | 4.72 | 25.3 | 1.019 | 1.001 |
| 173. | 9 | 1.026 | 0.3783 | 1.2097 | 1.2149 | 0.9981 | 0.0 | 0.0 | 0.159 | 4.54 | 25.5 | 1.026 | 1.002 |
| 193. | 10 | 1.030 | 0.3795 | 1.2137 | 1.2198 | 0.9988 | 0.0 | 0.0 | 0.158 | 4.46 | 25.5 | 1.030 | 1.002 |
| 213. | 11 | 1.031 | 0.3801 | 1.2161 | 1.2225 | 0.9992 | 0.0 | 0.0 | 0.157 | 4.41 | 25.6 | 1.031 | 1.002 |
| 233. | 12 | 1.032 | 0.3805 | 1.2173 | 1.2239 | 0.9995 | 0.0 | 0.0 | 0.157 | 4.39 | 25.6 | 1.032 | 1.002 |
| 253. | 13 | 1.033 | 0.3806 | 1.2180 | 1.2247 | 0.9996 | 0.0 | 0.0 | 0.156 | 4.38 | 25.6 | 1.033 | 1.002 |
| 273. | 14 | 1.033 | 0.3807 | 1.2183 | 1.2251 | 0.9996 | 0.0 | 0.0 | 0.156 | 4.37 | 25.6 | 1.033 | 1.002 |
| 293. | 15 | 1.029 | 0.3935 | 0.7449 | 0.7541 | 0.9304 | 0.0 | 0.0 | 0.210 | 4.46 | 25.5 | 1.029 | 1.002 |
| 313. | 16 | 1.008 | 0.3703 | 0.7940 | 0.7942 | 1.0043 | 0.0 | 0.0 | 0.222 | 4.99 | 25.0 | 1.008 | 1.000 |
| 333. | 17 | 0.986 | 0.3622 | 0.7935 | 0.7905 | 1.0035 | 0.0 | 0.0 | 0.231 | 5.52 | 24.5 | 0.986 | 0.999 |
| 353. | 18 | 0.976 | 0.3586 | 0.7897 | 0.7853 | 1.0023 | 0.0 | 0.0 | 0.239 | 5.78 | 24.2 | 0.976 | 0.998 |

STATOR

FLOW SWIRL= 12.08DEG PARTICLE SWIRL= 29.45DEG PSAVG= 20.40PSIA = 140665.PA
PTAVG= 23.12PSIA = 159429.PA TTAVG= 605.7DEG R = 336.5DEG K VELAVG= 505.5FPS =154.1MPS
RVELAVG= 832.0FPS = 253.6MPS AXVELAVG= 422.2FPS =128.7MPS U= 994.FPS = 303.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12. | 1 | 1.000 | 0.4253 | 0.8006 | 0.7999 | 1.0064 | 0.0 | 0.0 | 0.119 | -28.93 | 52.9 | 0.959 | 0.959 |
| 32. | 2 | 1.002 | 0.4262 | 0.7990 | 0.7987 | 1.0062 | 0.0 | 0.0 | 0.128 | -28.55 | 52.6 | 0.955 | 0.955 |
| 52. | 3 | 1.004 | 0.4268 | 0.7982 | 0.7981 | 1.0062 | 0.0 | 0.0 | 0.134 | -28.27 | 52.3 | 0.952 | 0.952 |
| 72. | 4 | 1.005 | 0.4272 | 0.7977 | 0.7979 | 1.0063 | 0.0 | 0.0 | 0.139 | -28.06 | 52.1 | 0.950 | 0.950 |
| 92. | 5 | 1.005 | 0.4276 | 0.7973 | 0.7976 | 1.0063 | 0.0 | 0.0 | 0.142 | -27.92 | 51.9 | 0.948 | 0.948 |
| 112. | 6 | 1.026 | 0.4209 | 1.2306 | 1.2262 | 1.0802 | 0.0 | 0.0 | -.000 | -34.22 | 59.2 | 1.016 | 1.016 |
| 132. | 7 | 1.028 | 0.4356 | 1.1883 | 1.1944 | 1.0141 | 0.0 | 0.0 | -.030 | -35.53 | 59.5 | 1.029 | 1.029 |
| 152. | 8 | 1.008 | 0.4315 | 1.1833 | 1.1865 | 0.9935 | 0.0 | 0.0 | -.044 | -36.11 | 60.1 | 1.036 | 1.036 |
| 172. | 9 | 1.002 | 0.4288 | 1.1953 | 1.1967 | 0.9945 | 0.0 | 0.0 | -.051 | -36.40 | 60.4 | 1.039 | 1.039 |
| 192. | 10 | 1.000 | 0.4277 | 1.2018 | 1.2023 | 0.9948 | 0.0 | 0.0 | -.054 | -36.54 | 60.5 | 1.040 | 1.040 |
| 212. | 11 | 0.999 | 0.4272 | 1.2053 | 1.2055 | 0.9950 | 0.0 | 0.0 | -.056 | -36.60 | 60.6 | 1.041 | 1.041 |
| 232. | 12 | 0.998 | 0.4269 | 1.2072 | 1.2072 | 0.9951 | 0.0 | 0.0 | -.057 | -36.64 | 60.6 | 1.041 | 1.041 |
| 252. | 13 | 0.998 | 0.4268 | 1.2082 | 1.2081 | 0.9952 | 0.0 | 0.0 | -.057 | -36.66 | 60.7 | 1.041 | 1.041 |
| 272. | 14 | 0.998 | 0.4267 | 1.2088 | 1.2086 | 0.9952 | 0.0 | 0.0 | -.057 | -36.67 | 60.7 | 1.041 | 1.041 |
| 292. | 15 | 0.969 | 0.4339 | 0.7583 | 0.7614 | 0.9086 | 0.0 | 0.0 | 0.046 | -32.06 | 56.1 | 0.993 | 0.993 |
| 312. | 16 | 0.970 | 0.4160 | 0.8056 | 0.8006 | 0.9875 | 0.0 | 0.0 | 0.072 | -31.00 | 55.0 | 0.981 | 0.981 |
| 332. | 17 | 0.990 | 0.4203 | 0.8109 | 0.8078 | 1.0081 | 0.0 | 0.0 | 0.092 | -30.13 | 54.1 | 0.972 | 0.972 |
| 352. | 18 | 0.997 | 0.4236 | 0.8039 | 0.8024 | 1.0068 | 0.0 | 0.0 | 0.107 | -29.45 | 53.4 | 0.965 | 0.965 |

STAGE 3

ROTOR

FLOW SWIRL= 17.32DEG  PARTICLE SWIRL= 34.69DEG  PSAVG= 20.04PSIA = 138178.PA
PTAVG= 22.97PSIA = 158395.PA  TTAVG= 605.7DEG R = 336.5DEG K  VELAVG= 522.7FPS =159.3MPS
RVELAVG= 428.1FPS = 282.9MPS  AXVELAVG= 486.4FPS =148.2MPS  U= 982.FPS = 299.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17. | 1 | 0.948 | 0.4163 | 0.8154 | 0.8014 | 1.0064 | 0.0 | 0.0 | -.050 | -5.75 | 29.9 | 0.948 | 0.995 |
| 37. | 2 | 0.943 | 0.4142 | 0.8148 | 0.7999 | 1.0062 | 0.0 | 0.0 | -.046 | -5.60 | 29.8 | 0.943 | 0.995 |
| 57. | 3 | 0.939 | 0.4126 | 0.8148 | 0.7991 | 1.0062 | 0.0 | 0.0 | -.043 | -5.48 | 29.7 | 0.939 | 0.994 |
| 77. | 4 | 0.937 | 0.4114 | 0.8149 | 0.7987 | 1.0063 | 0.0 | 0.0 | -.040 | -5.39 | 29.6 | 0.937 | 0.994 |
| 97. | 5 | 0.935 | 0.4105 | 0.8150 | 0.7983 | 1.0063 | 0.0 | 0.0 | -.039 | -5.34 | 29.5 | 0.935 | 0.994 |
| 117. | 6 | 1.017 | 0.4322 | 1.2317 | 1.2214 | 1.0802 | 0.0 | 0.0 | -.442 | -7.97 | 32.2 | 1.017 | 1.001 |
| 137. | 7 | 1.037 | 0.4551 | 1.1816 | 1.1880 | 1.0141 | 0.0 | 0.0 | -.396 | -8.58 | 32.8 | 1.037 | 1.003 |
| 157. | 8 | 1.045 | 0.4641 | 1.1709 | 1.1939 | 0.9935 | 0.0 | 0.0 | -.381 | -8.86 | 33.1 | 1.045 | 1.004 |
| 177. | 9 | 1.050 | 0.4659 | 1.1806 | 1.1949 | 0.9945 | 0.0 | 0.0 | -.385 | -8.99 | 33.2 | 1.050 | 1.005 |
| 197. | 10 | 1.052 | 0.4668 | 1.1859 | 1.2010 | 0.9948 | 0.0 | 0.0 | -.388 | -9.06 | 33.3 | 1.052 | 1.005 |
| 217. | 11 | 1.053 | 0.4671 | 1.1890 | 1.2044 | 0.9950 | 0.0 | 0.0 | -.390 | -9.09 | 33.3 | 1.053 | 1.005 |
| 237. | 12 | 1.053 | 0.4674 | 1.1906 | 1.2062 | 0.9951 | 0.0 | 0.0 | -.391 | -9.10 | 33.3 | 1.053 | 1.005 |
| 257. | 13 | 1.054 | 0.4675 | 1.1914 | 1.2071 | 0.9952 | 0.0 | 0.0 | -.392 | -9.11 | 33.3 | 1.054 | 1.005 |
| 277. | 14 | 1.054 | 0.4675 | 1.1919 | 1.2077 | 0.9952 | 0.0 | 0.0 | -.392 | -9.12 | 33.3 | 1.054 | 1.005 |
| 297. | 15 | 0.990 | 0.4594 | 0.7602 | 0.7665 | 0.9086 | 0.0 | 0.0 | -.003 | -7.11 | 31.3 | 0.990 | 0.999 |
| 317. | 16 | 0.975 | 0.4330 | 0.8125 | 0.8062 | 0.9875 | 0.0 | 0.0 | -.050 | -6.62 | 30.8 | 0.975 | 0.997 |
| 337. | 17 | 0.964 | 0.4232 | 0.8217 | 0.8107 | 1.0081 | 0.0 | 0.0 | -.063 | -6.25 | 30.5 | 0.964 | 0.996 |
| 357. | 18 | 0.954 | 0.4193 | 0.8172 | 0.8045 | 1.0068 | 0.0 | 0.0 | -.056 | -5.96 | 30.2 | 0.954 | 0.995 |

STATOR

FLOW SWIRL= 13.96DEG  PARTICLE SWIRL= 35.68DEG  PSAVG= 21.06PSIA = 145222.PA
PTAVG= 24.99PSIA = 172290.PA  TTAVG= 623.7DEG R = 346.5DEG K  VELAVG= 587.5FPS =179.1MPS
RVELAVG=1079.8FPS = 329.1MPS  AXVELAVG= 577.0FPS =175.9MPS  U= 975.FPS = 297.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14. | 1 | 0.914 | 0.4413 | 0.9949 | 0.9622 | 1.0259 | 0.0 | 0.0 | -.526 | -20.63 | 72.6 | 0.892 | 0.892 |
| 34. | 2 | 0.914 | 0.4412 | 0.8926 | 0.8598 | 1.0265 | 0.0 | 0.0 | -.518 | -20.37 | 72.4 | 0.890 | 0.890 |
| 54. | 3 | 0.914 | 0.4409 | 0.8916 | 0.8588 | 1.0272 | 0.0 | 0.0 | -.510 | -20.13 | 72.1 | 0.888 | 0.888 |
| 74. | 4 | 0.914 | 0.4408 | 0.8908 | 0.8580 | 1.0277 | 0.0 | 0.0 | -.505 | -19.98 | 72.0 | 0.886 | 0.886 |
| 94. | 5 | 0.914 | 0.4408 | 0.8901 | 0.8572 | 1.0280 | 0.0 | 0.0 | -.502 | -19.90 | 71.9 | 0.885 | 0.885 |
| 114. | 6 | 1.123 | 0.5358 | 1.0874 | 1.1140 | 1.0705 | 0.0 | 0.0 | -1.213 | -43.70 | 95.7 | 1.140 | 1.140 |
| 134. | 7 | 1.092 | 0.5364 | 1.0992 | 1.1267 | 1.0102 | 0.0 | 0.0 | -1.205 | -41.57 | 93.6 | 1.112 | 1.112 |
| 154. | 8 | 1.083 | 0.5399 | 1.0994 | 1.1298 | 0.9813 | 0.0 | 0.0 | -1.190 | -40.85 | 92.8 | 1.103 | 1.103 |
| 174. | 9 | 1.087 | 0.5428 | 1.1041 | 1.1370 | 0.9767 | 0.0 | 0.0 | -1.197 | -41.03 | 93.0 | 1.105 | 1.105 |
| 194. | 10 | 1.089 | 0.5446 | 1.1073 | 1.1417 | 0.9759 | 0.0 | 0.0 | -1.205 | -41.23 | 93.2 | 1.108 | 1.108 |
| 214. | 11 | 1.091 | 0.5453 | 1.1095 | 1.1446 | 0.9755 | 0.0 | 0.0 | -1.206 | -41.30 | 93.3 | 1.109 | 1.109 |
| 234. | 12 | 1.092 | 0.5459 | 1.1102 | 1.1459 | 0.9753 | 0.0 | 0.0 | -1.209 | -41.36 | 93.4 | 1.110 | 1.110 |
| 254. | 13 | 1.092 | 0.5462 | 1.1106 | 1.1465 | 0.9751 | 0.0 | 0.0 | -1.211 | -41.40 | 93.4 | 1.110 | 1.110 |
| 274. | 14 | 1.092 | 0.5463 | 1.1110 | 1.1470 | 0.9751 | 0.0 | 0.0 | -1.211 | -41.41 | 93.4 | 1.110 | 1.110 |
| 294. | 15 | 0.863 | 0.4409 | 0.8967 | 0.8638 | 0.9147 | 0.0 | 0.0 | -.443 | -17.36 | 69.4 | 0.863 | 0.863 |
| 314. | 16 | 0.900 | 0.4428 | 0.9032 | 0.8710 | 0.9889 | 0.0 | 0.0 | -.537 | -20.67 | 72.7 | 0.892 | 0.892 |
| 334. | 17 | 0.914 | 0.4424 | 0.9028 | 0.8703 | 1.0204 | 0.0 | 0.0 | -.558 | -21.56 | 73.6 | 0.900 | 0.900 |
| 354. | 18 | 0.914 | 0.4418 | 0.8985 | 0.8658 | 1.0251 | 0.0 | 0.0 | -.541 | -21.07 | 73.1 | 0.896 | 0.896 |

EXIT

FLOW SWIRL= 25.04DEG  PARTICLE SWIRL= 46.86DEG  PSAVG= 16.96PSIA = 116948.PA
PTAVG= 25.06PSIA = 172805.PA  TTAVG= 623.7DEG R = 346.5DEG K  VELAVG= 859.1FPS =261.8MPS
RVELAVG= 0.0FPS = 0.0MPS  AXVELAVG= 0.0FPS = 0.0MPS  U= 975.FPS = 297.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25. | 1 | 0.820 | 0.5878 | 0.9997 | 0.8546 | 1.0259 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 45. | 2 | 0.817 | 0.5850 | 0.9991 | 0.8522 | 1.0265 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 65. | 3 | 0.814 | 0.5826 | 0.9997 | 0.8512 | 1.0272 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 85. | 4 | 0.812 | 0.5810 | 0.9999 | 0.9503 | 1.0277 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105. | 5 | 0.811 | 0.5801 | 0.9997 | 0.8495 | 1.0280 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125. | 6 | 1.202 | 0.8757 | 1.0001 | 1.1145 | 1.0705 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145. | 7 | 1.181 | 0.8870 | 1.0002 | 1.1284 | 1.0102 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165. | 8 | 1.170 | 0.8923 | 1.0002 | 1.1351 | 0.9813 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 185. | 9 | 1.176 | 0.8998 | 1.0000 | 1.1441 | 0.9767 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 205. | 10 | 1.191 | 0.9048 | 0.9996 | 1.1498 | 0.9759 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 225. | 11 | 1.183 | 0.9066 | 1.0005 | 1.1531 | 0.9755 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 245. | 12 | 1.185 | 0.9082 | 1.0000 | 1.1547 | 0.9753 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 265. | 13 | 1.186 | 0.9092 | 0.9997 | 1.1555 | 0.9751 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 285. | 14 | 1.186 | 0.9094 | 1.0000 | 1.1561 | 0.9751 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 305. | 15 | 0.792 | 0.6017 | 1.0001 | 0.8645 | 0.9147 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 325. | 16 | 0.825 | 0.6029 | 1.0004 | 0.9654 | 0.9889 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 345. | 17 | 0.833 | 0.5988 | 1.0007 | 0.8629 | 1.0204 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5. | 18 | 0.826 | 0.5922 | 1.0004 | 0.8582 | 1.0251 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

CORE ENGINE OUTPUT

| | CORR FLOW | PRESS RATIO | EFFICIENCY |
|---|---|---|---|
| LOW SPOOL PERFORMANCE | 65.21 LBM/SEC<br>29.58 KG/SEC | 1.754 | 0.765 |
| RAKE CORRECTED PRESSURE RATIO | | 1.754 | |
| HIGH SPOOL PERFORMANCE | 41.21 LBM/SEC<br>18.69 KG/SEC | 5.240 | 0.768 |

---- ROW OUTPUT ----

IGV

FLOW SWIRL= 0.0 DEG  PARTICLE SWIRL= 0.0 DEG  PSAVG= 13.83PSIA = 95374.PA
PTAVG= 14.70PSIA = 101353.PA  TTAVG= 519.0DEG R = 289.3DEG K  VELAVG= 325.3FPS = 99.1MPS
RVELAVG= 738.0FPS = 225.0MPS  AXVELAVG= 325.3FPS = 99.1MPS  U= 661.FPS = 202.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0. | 1 | 1.001 | 0.2938 | 0.7762 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.298 | 0.0 | 90.0 | 1.001 | 0.999 |
| 20. | 2 | 0.969 | 0.2842 | 0.7792 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.299 | 0.0 | 90.0 | 0.969 | 0.992 |
| 40. | 3 | 0.935 | 0.2742 | 0.7821 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.300 | 0.0 | 90.0 | 0.935 | 0.986 |
| 60. | 4 | 0.888 | 0.2601 | 0.7862 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.302 | 0.0 | 90.0 | 0.888 | 0.978 |
| 80. | 5 | 0.765 | 0.2238 | 0.7958 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.307 | 0.0 | 90.0 | 0.765 | 0.957 |
| 100. | 6 | 0.688 | 0.2010 | 1.2650 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.311 | 0.0 | 90.0 | 0.688 | 0.946 |
| 120. | 7 | 0.789 | 0.2309 | 1.2537 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.306 | 0.0 | 90.0 | 0.789 | 0.961 |
| 140. | 8 | 0.914 | 0.2679 | 1.2379 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.301 | 0.0 | 90.0 | 0.914 | 0.982 |
| 160. | 9 | 1.011 | 0.2968 | 1.2240 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.297 | 0.0 | 90.0 | 1.011 | 1.001 |
| 180. | 10 | 1.072 | 0.3150 | 1.2147 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.295 | 0.0 | 90.0 | 1.072 | 1.013 |
| 200. | 11 | 1.102 | 0.3241 | 1.2099 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.295 | 0.0 | 90.0 | 1.102 | 1.019 |
| 220. | 12 | 1.115 | 0.3279 | 1.2078 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.294 | 0.0 | 90.0 | 1.115 | 1.022 |
| 240. | 13 | 1.118 | 0.3290 | 1.2072 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.294 | 0.0 | 90.0 | 1.118 | 1.022 |
| 260. | 14 | 1.119 | 0.3291 | 1.2072 | 1.2245 | 1.0000 | 0.0 | 0.0 | -.294 | 0.0 | 90.0 | 1.119 | 1.023 |
| 280. | 15 | 1.232 | 0.3634 | 0.7522 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.295 | 0.0 | 90.0 | 1.232 | 1.048 |
| 300. | 16 | 1.153 | 0.3394 | 0.7609 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.294 | 0.0 | 90.0 | 1.153 | 1.030 |
| 320. | 17 | 1.090 | 0.3205 | 0.7675 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.295 | 0.0 | 90.0 | 1.090 | 1.016 |
| 340. | 18 | 1.040 | 0.3055 | 0.7724 | 0.7755 | 1.0000 | 0.0 | 0.0 | -.296 | 0.0 | 90.0 | 1.040 | 1.006 |

STAGE 1 ROTOR

FLOW SWIRL= 12.06DEG  PARTICLE SWIRL= 12.06DEG  PSAVG= 13.43PSIA = 92576.PA
PTAVG= 14.57PSIA = 100458.PA  TTAVG= 519.0DEG R = 288.3DEG K  VELAVG= 376.4FPS =114.7MPS
RVELAVG= 678.1FPS = 206.7MPS  AXVELAVG= 358.0FPS =109.1MPS  U= 690.FPS = 210.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12. | 1 | 1.001 | 0.3409 | 0.7768 | 0.7758 | 1.0000 | 0.0 | 0.0 | 0.490 | 12.11 | 32.0 | 1.001 | 0.997 |
| 32. | 2 | 0.969 | 0.3300 | 0.7793 | 0.7745 | 1.0000 | 0.0 | 0.0 | 0.510 | 13.08 | 31.0 | 0.969 | 0.993 |
| 52. | 3 | 0.937 | 0.3187 | 0.7818 | 0.7731 | 1.0000 | 0.0 | 0.0 | 0.534 | 14.10 | 30.0 | 0.937 | 0.989 |
| 72. | 4 | 0.890 | 0.3026 | 0.7952 | 0.7711 | 1.0000 | 0.0 | 0.0 | 0.568 | 15.57 | 28.5 | 0.890 | 0.984 |
| 92. | 5 | 0.771 | 0.2614 | 0.7923 | 0.7657 | 1.0000 | 0.0 | 0.0 | 0.659 | 19.41 | 24.7 | 0.771 | 0.974 |
| 112. | 6 | 0.695 | 0.2353 | 1.2566 | 1.2036 | 1.0000 | 0.0 | 0.0 | 0.646 | 21.89 | 22.2 | 0.695 | 0.970 |
| 132. | 7 | 0.794 | 0.2695 | 1.2491 | 1.2107 | 1.0000 | 0.0 | 0.0 | 0.614 | 18.65 | 25.5 | 0.794 | 0.976 |
| 152. | 8 | 0.916 | 0.3115 | 1.2369 | 1.2192 | 1.0000 | 0.0 | 0.0 | 0.537 | 14.76 | 29.3 | 0.916 | 0.987 |
| 172. | 9 | 1.011 | 0.3444 | 1.2251 | 1.2256 | 1.0000 | 0.0 | 0.0 | 0.477 | 11.81 | 32.3 | 1.011 | 0.999 |
| 192. | 10 | 1.070 | 0.3650 | 1.2168 | 1.2295 | 1.0000 | 0.0 | 0.0 | 0.441 | 10.00 | 34.1 | 1.070 | 1.007 |
| 212. | 11 | 1.099 | 0.3754 | 1.2124 | 1.2315 | 1.0000 | 0.0 | 0.0 | 0.423 | 9.10 | 35.0 | 1.099 | 1.012 |
| 232. | 12 | 1.112 | 0.3797 | 1.2105 | 1.2324 | 1.0000 | 0.0 | 0.0 | 0.416 | 8.73 | 35.4 | 1.112 | 1.014 |
| 252. | 13 | 1.115 | 0.3810 | 1.2100 | 1.2326 | 1.0000 | 0.0 | 0.0 | 0.413 | 8.63 | 35.5 | 1.115 | 1.014 |
| 272. | 14 | 1.115 | 0.3811 | 1.2099 | 1.2326 | 1.0000 | 0.0 | 0.0 | 0.412 | 8.62 | 35.5 | 1.115 | 1.015 |
| 292. | 15 | 1.229 | 0.4213 | 0.7524 | 0.7835 | 1.0000 | 0.0 | 0.0 | 0.389 | 5.28 | 38.8 | 1.229 | 1.035 |
| 312. | 16 | 1.149 | 0.3930 | 0.7625 | 0.7817 | 1.0000 | 0.0 | 0.0 | 0.399 | 7.61 | 36.5 | 1.149 | 1.020 |
| 332. | 17 | 1.087 | 0.3713 | 0.7690 | 0.7795 | 1.0000 | 0.0 | 0.0 | 0.437 | 9.46 | 34.6 | 1.087 | 1.010 |
| 352. | 18 | 1.039 | 0.3543 | 0.7734 | 0.7774 | 1.0000 | 0.0 | 0.0 | 0.466 | 10.93 | 33.2 | 1.039 | 1.003 |

STATOR

FLOW SWIRL= 12.51DEG  PARTICLE SWIRL= 30.45DEG  PSAVG= 14.96PSIA = 103167.PA
PTAVG= 19.37PSIA = 126666.PA  TTAVG= 557.3DEG R = 309.6DEG K  VELAVG= 615.5FPS =187.6MPS
RVELAVG= 440.8FPS = 134.4MPS  AXVELAVG= 377.0FPS =114.9MPS  U= 710.FPS = 216.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13. | 1 | 0.984 | 0.5376 | 0.7865 | 0.7799 | 1.0022 | 0.0 | 0.0 | 0.569 | 6.58 | 38.0 | 0.997 | 0.997 |
| 33. | 2 | 0.984 | 0.5382 | 0.7930 | 0.7767 | 0.9988 | 0.0 | 0.0 | 0.599 | 7.74 | 36.8 | 0.969 | 0.969 |
| 53. | 3 | 0.981 | 0.5378 | 0.7811 | 0.7746 | 0.9958 | 0.0 | 0.0 | 0.611 | 9.05 | 35.5 | 0.937 | 0.937 |
| 73. | 4 | 0.977 | 0.5360 | 0.7796 | 0.7721 | 0.9921 | 0.0 | 0.0 | 0.644 | 10.94 | 33.6 | 0.892 | 0.892 |
| 93. | 5 | 0.960 | 0.5290 | 0.7750 | 0.7638 | 0.9837 | 0.0 | 0.0 | 0.731 | 15.85 | 28.7 | 0.774 | 0.774 |
| 113. | 6 | 1.084 | 0.5696 | 1.1891 | 1.2068 | 1.0914 | 0.0 | 0.0 | 0.707 | 15.04 | 29.5 | 0.793 | 0.793 |
| 133. | 7 | 1.021 | 0.5631 | 1.1718 | 1.1837 | 0.9881 | 0.0 | 0.0 | 0.685 | 13.42 | 31.1 | 0.832 | 0.832 |
| 153. | 8 | 1.016 | 0.5616 | 1.1938 | 1.2047 | 0.9927 | 0.0 | 0.0 | 0.614 | 9.25 | 35.3 | 0.933 | 0.933 |
| 173. | 9 | 1.016 | 0.5587 | 1.2164 | 1.2247 | 0.9927 | 0.0 | 0.0 | 0.556 | 5.86 | 38.7 | 1.015 | 1.015 |
| 193. | 10 | 1.013 | 0.5552 | 1.2297 | 1.2349 | 0.9997 | 0.0 | 0.0 | 0.521 | 3.77 | 40.8 | 1.066 | 1.066 |
| 213. | 11 | 1.010 | 0.5521 | 1.2369 | 1.2394 | 1.0039 | 0.0 | 0.0 | 0.504 | 2.74 | 41.8 | 1.092 | 1.092 |
| 233. | 12 | 1.008 | 0.5500 | 1.2402 | 1.2407 | 1.0060 | 0.0 | 0.0 | 0.497 | 2.30 | 42.3 | 1.103 | 1.103 |
| 253. | 13 | 1.006 | 0.5488 | 1.2407 | 1.2402 | 1.0070 | 0.0 | 0.0 | 0.494 | 2.13 | 42.4 | 1.107 | 1.107 |
| 273. | 14 | 1.005 | 0.5484 | 1.2399 | 1.2390 | 1.0073 | 0.0 | 0.0 | 0.494 | 2.09 | 42.5 | 1.109 | 1.109 |
| 293. | 15 | 0.966 | 0.5522 | 0.7495 | 0.7511 | 0.9172 | 0.0 | 0.0 | 0.476 | 0.40 | 44.1 | 1.150 | 1.150 |
| 313. | 16 | 0.996 | 0.5407 | 0.7981 | 0.7932 | 1.0143 | 0.0 | 0.0 | 0.480 | 1.25 | 43.3 | 1.129 | 1.129 |
| 333. | 17 | 0.987 | 0.5369 | 0.7970 | 0.7899 | 1.0107 | 0.0 | 0.0 | 0.518 | 3.53 | 41.0 | 1.072 | 1.072 |
| 353. | 18 | 0.985 | 0.5370 | 0.7919 | 0.7848 | 1.0064 | 0.0 | 0.0 | 0.546 | 5.23 | 39.3 | 1.030 | 1.030 |

STAGE 2
ROTOR

FLOW SWIRL= 16.69DEG  PARTICLE SWIRL= 34.63DEG  PSAVG= 16.73PSIA = 115350.PA
PTAVG= 18.13PSIA = 125018.PA  TTAVG= 557.3DEG R = 309.6DEG K  VELAVG= 386.3FPS =117.7MPS
RVELAVG= 796.5FPS = 242.8MPS  AXVELAVG= 385.1FPS =117.4MPS  U= 726.FPS = 221.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17. | 1 | 0.997 | 0.3359 | 0.7868 | 0.7849 | 1.0022 | 0.0 | 0.0 | 0.474 | 4.33 | 28.9 | 0.997 | 0.998 |
| 37. | 2 | 0.969 | 0.3269 | 0.7837 | 0.7787 | 0.9988 | 0.0 | 0.0 | 0.492 | 5.04 | 28.2 | 0.969 | 0.993 |
| 57. | 3 | 0.938 | 0.3168 | 0.7822 | 0.7737 | 0.9958 | 0.0 | 0.0 | 0.514 | 5.83 | 27.4 | 0.938 | 0.987 |
| 77. | 4 | 0.894 | 0.3020 | 0.7810 | 0.7677 | 0.9921 | 0.0 | 0.0 | 0.548 | 7.00 | 26.2 | 0.894 | 0.979 |
| 97. | 5 | 0.778 | 0.2635 | 0.7764 | 0.7519 | 0.9837 | 0.0 | 0.0 | 0.637 | 10.11 | 23.1 | 0.778 | 0.959 |
| 117. | 6 | 0.811 | 0.2610 | 1.1787 | 1.1402 | 1.0914 | 0.0 | 0.0 | 0.582 | 9.20 | 24.0 | 0.811 | 0.965 |
| 137. | 7 | 0.838 | 0.2836 | 1.1745 | 1.1460 | 0.9881 | 0.0 | 0.0 | 0.537 | 8.47 | 24.7 | 0.838 | 0.969 |
| 157. | 8 | 0.935 | 0.3178 | 1.1973 | 1.1849 | 0.9827 | 0.0 | 0.0 | 0.491 | 5.92 | 27.3 | 0.935 | 0.986 |
| 177. | 9 | 1.015 | 0.3439 | 1.2180 | 1.2197 | 0.9927 | 0.0 | 0.0 | 0.438 | 3.86 | 29.3 | 1.015 | 1.002 |
| 197. | 10 | 1.065 | 0.3600 | 1.2299 | 1.2411 | 0.9997 | 0.0 | 0.0 | 0.409 | 2.62 | 30.6 | 1.065 | 1.012 |
| 217. | 11 | 1.090 | 0.3678 | 1.2361 | 1.2523 | 1.0039 | 0.0 | 0.0 | 0.397 | 2.01 | 31.2 | 1.090 | 1.018 |
| 237. | 12 | 1.101 | 0.3711 | 1.2388 | 1.2571 | 1.0060 | 0.0 | 0.0 | 0.394 | 1.75 | 31.4 | 1.101 | 1.020 |
| 257. | 13 | 1.105 | 0.3723 | 1.2390 | 1.2581 | 1.0070 | 0.0 | 0.0 | 0.393 | 1.65 | 31.5 | 1.105 | 1.021 |
| 277. | 14 | 1.106 | 0.3727 | 1.2381 | 1.2574 | 1.0073 | 0.0 | 0.0 | 0.393 | 1.62 | 31.6 | 1.106 | 1.021 |
| 297. | 15 | 1.133 | 0.4008 | 0.7557 | 0.7790 | 0.9172 | 0.0 | 0.0 | 0.401 | 0.98 | 32.2 | 1.133 | 1.027 |
| 317. | 16 | 1.126 | 0.3783 | 0.7960 | 0.8107 | 1.0143 | 0.0 | 0.0 | 0.407 | 1.14 | 32.1 | 1.126 | 1.026 |
| 337. | 17 | 1.070 | 0.3596 | 0.7961 | 0.8032 | 1.0107 | 0.0 | 0.0 | 0.428 | 2.51 | 30.7 | 1.070 | 1.013 |
| 357. | 18 | 1.029 | 0.3463 | 0.7916 | 0.7936 | 1.0064 | 0.0 | 0.0 | 0.454 | 3.52 | 29.7 | 1.029 | 1.005 |

STATOR

FLOW SWIRL= 16.39DEG  PARTICLE SWIRL= 45.01DEG  PSAVG= 19.87PSIA = 136970.PA
PTAVG= 23.53PSIA = 162251.PA  TTAVG= 606.4DEG R = 336.9DEG K  VELAVG= 585.5FPS =178.4MPS
RVELAVG= 517.0FPS = 157.6MPS  AXVELAVG= 395.4FPS =120.5MPS  U= 760.FPS = 232.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16. | 1 | 0.986 | 0.4882 | 0.8004 | 0.7952 | 1.0042 | 0.0 | 0.0 | 0.416 | -9.32 | 42.1 | 0.986 | 0.986 |
| 36. | 2 | 0.986 | 0.4894 | 0.7964 | 0.7919 | 1.0010 | 0.0 | 0.0 | 0.446 | -7.92 | 40.7 | 0.959 | 0.959 |
| 56. | 3 | 0.986 | 0.4899 | 0.7958 | 0.7916 | 0.9988 | 0.0 | 0.0 | 0.481 | -6.28 | 39.1 | 0.926 | 0.926 |
| 76. | 4 | 0.985 | 0.4899 | 0.7981 | 0.7938 | 0.9970 | 0.0 | 0.0 | 0.532 | -3.84 | 36.6 | 0.878 | 0.878 |
| 96. | 5 | 0.986 | 0.4906 | 0.8065 | 0.8025 | 0.9956 | 0.0 | 0.0 | 0.651 | 2.41 | 30.4 | 0.754 | 0.754 |
| 116. | 6 | 1.007 | 0.4789 | 1.1516 | 1.1371 | 1.0890 | 0.0 | 0.0 | 0.574 | -1.23 | 34.0 | 0.827 | 0.827 |
| 136. | 7 | 1.064 | 0.5172 | 1.1723 | 1.1874 | 1.0500 | 0.0 | 0.0 | 0.514 | -4.27 | 37.1 | 0.887 | 0.887 |
| 156. | 8 | 1.021 | 0.5119 | 1.1705 | 1.1815 | 0.9849 | 0.0 | 0.0 | 0.448 | -7.84 | 40.6 | 0.957 | 0.957 |
| 176. | 9 | 1.015 | 0.5085 | 1.1870 | 1.1954 | 0.9851 | 0.0 | 0.0 | 0.362 | -11.97 | 44.7 | 1.036 | 1.036 |
| 196. | 10 | 1.012 | 0.5049 | 1.2077 | 1.2133 | 0.9932 | 0.0 | 0.0 | 0.312 | -14.23 | 47.0 | 1.083 | 1.083 |
| 216. | 11 | 1.008 | 0.5014 | 1.2243 | 1.2271 | 0.9988 | 0.0 | 0.0 | 0.291 | -15.20 | 48.0 | 1.102 | 1.102 |
| 236. | 12 | 1.005 | 0.4990 | 1.2342 | 1.2349 | 1.0020 | 0.0 | 0.0 | 0.284 | -15.52 | 48.3 | 1.109 | 1.109 |
| 256. | 13 | 1.004 | 0.4978 | 1.2381 | 1.2379 | 1.0035 | 0.0 | 0.0 | 0.282 | -15.60 | 48.4 | 1.110 | 1.110 |
| 276. | 14 | 1.003 | 0.4973 | 1.2398 | 1.2392 | 1.0041 | 0.0 | 0.0 | 0.282 | -15.62 | 48.4 | 1.111 | 1.111 |
| 296. | 15 | 0.990 | 0.5201 | 0.7637 | 0.7754 | 0.8971 | 0.0 | 0.0 | 0.290 | -15.33 | 48.1 | 1.105 | 1.105 |
| 316. | 16 | 0.971 | 0.4880 | 0.7948 | 0.7896 | 0.9751 | 0.0 | 0.0 | 0.300 | -14.85 | 47.7 | 1.095 | 1.095 |
| 336. | 17 | 0.985 | 0.4858 | 0.8127 | 0.8062 | 1.0124 | 0.0 | 0.0 | 0.338 | -12.97 | 45.8 | 1.058 | 1.058 |
| 356. | 18 | 0.984 | 0.4866 | 0.8070 | 0.8009 | 1.0083 | 0.0 | 0.0 | 0.382 | -10.91 | 43.7 | 1.017 | 1.017 |

STAGE 3
ROTOR

FLOW SWIRL= 21.09DEG  PARTICLE SWIRL= 49.71DEG  PSAVG= 21.02PSIA = 144916.PA
PTAVG= 23.24PSIA = 160254.PA  TTAVG= 606.4DEG R = 336.9DEG K  VELAVG= 447.9FPS =136.5MPS
RVELAVG= 792.2FPS = 241.5MPS  AXVELAVG= 433.2FPS =132.1MPS  U= 775.FPS = 236.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21. | 1 | 0.979 | 0.3674 | 0.8066 | 0.8006 | 1.0042 | 0.0 | 0.0 | 0.355 | 0.02 | 32.6 | 0.979 | 0.994 |
| 41. | 2 | 0.948 | 0.3562 | 0.8068 | 0.7964 | 1.0010 | 0.0 | 0.0 | 0.382 | 0.97 | 31.6 | 0.948 | 0.989 |
| 61. | 3 | 0.913 | 0.3429 | 0.8110 | 0.7955 | 0.9988 | 0.0 | 0.0 | 0.416 | 2.09 | 30.5 | 0.913 | 0.984 |
| 81. | 4 | 0.863 | 0.3239 | 0.8183 | 0.7957 | 0.9970 | 0.0 | 0.0 | 0.467 | 3.70 | 28.9 | 0.863 | 0.976 |
| 101. | 5 | 0.752 | 0.2819 | 0.9192 | 0.7828 | 0.9956 | 0.0 | 0.0 | 0.586 | 7.31 | 25.3 | 0.752 | 0.963 |
| 121. | 6 | 0.826 | 0.2962 | 1.1621 | 1.1168 | 1.0890 | 0.0 | 0.0 | 0.449 | 4.90 | 27.7 | 0.926 | 0.971 |
| 141. | 7 | 0.882 | 0.3228 | 1.1918 | 1.1584 | 1.0500 | 0.0 | 0.0 | 0.372 | 3.08 | 29.5 | 0.882 | 0.979 |
| 161. | 8 | 0.946 | 0.3581 | 1.1906 | 1.1764 | 0.9849 | 0.0 | 0.0 | 0.301 | 1.05 | 31.5 | 0.946 | 0.989 |
| 181. | 9 | 1.035 | 0.3928 | 1.1882 | 1.1950 | 0.9851 | 0.0 | 0.0 | 0.220 | -1.70 | 34.3 | 1.035 | 1.005 |
| 201. | 10 | 1.089 | 0.4124 | 1.1963 | 1.2161 | 0.9932 | 0.0 | 0.0 | 0.174 | -3.33 | 35.9 | 1.089 | 1.015 |
| 221. | 11 | 1.112 | 0.4202 | 1.2069 | 1.2322 | 0.9988 | 0.0 | 0.0 | 0.157 | -4.01 | 36.6 | 1.112 | 1.020 |
| 241. | 12 | 1.120 | 0.4225 | 1.2142 | 1.2413 | 1.0020 | 0.0 | 0.0 | 0.152 | -4.24 | 36.8 | 1.120 | 1.022 |
| 261. | 13 | 1.122 | 0.4229 | 1.2174 | 1.2449 | 1.0035 | 0.0 | 0.0 | 0.150 | -4.30 | 36.9 | 1.122 | 1.022 |
| 281. | 14 | 1.123 | 0.4230 | 1.2179 | 1.2455 | 1.0041 | 0.0 | 0.0 | 0.149 | -4.31 | 36.9 | 1.123 | 1.022 |
| 301. | 15 | 1.113 | 0.4442 | 0.7541 | 0.7809 | 0.8971 | 0.0 | 0.0 | 0.187 | -4.03 | 36.6 | 1.113 | 1.020 |
| 321. | 16 | 1.102 | 0.4213 | 0.7838 | 0.8008 | 0.9751 | 0.0 | 0.0 | 0.221 | -3.71 | 36.3 | 1.102 | 1.018 |
| 341. | 17 | 1.061 | 0.3974 | 0.9070 | 0.9136 | 1.0124 | 0.0 | 0.0 | 0.277 | -2.49 | 35.1 | 1.061 | 1.010 |
| 1. | 18 | 1.015 | 0.3803 | 0.8079 | 0.8072 | 1.0083 | 0.0 | 0.0 | 0.322 | -1.07 | 33.7 | 1.015 | 1.001 |

STATOR

FLOW SWIRL= 24.39DEG  PARTICLE SWIRL= 61.85DEG  PSAVG= 22.60PSIA = 155828.PA
PTAVG= 26.25PSIA = 180981.PA  TTAVG= 637.2DEG R = 354.0DEG K  VELAVG= 568.2FPS =173.2MPS
RVELAVG= 650.5FPS = 198.3MPS  AXVELAVG= 446.9FPS =136.2MPS  U= 791.FPS = 241.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24. | 1 | 1.022 | 0.4769 | 0.8402 | 0.8451 | 1.0118 | -0.135 | -0.061 | 0.284 | -1.67 | 53.7 | 0.987 | 0.987 |
| 44. | 2 | 1.017 | 0.4748 | 0.8429 | 0.8467 | 1.0118 | -0.127 | -0.057 | 0.339 | 0.68 | 51.3 | 0.953 | 0.953 |
| 64. | 3 | 1.016 | 0.4735 | 0.8515 | 0.8546 | 1.0142 | -0.118 | -0.054 | 0.400 | 3.23 | 48.8 | 0.915 | 0.915 |
| 84. | 4 | 1.014 | 0.4718 | 0.8659 | 0.8681 | 1.0185 | -0.106 | -0.049 | 0.493 | 6.99 | 45.1 | 0.962 | 0.962 |
| 104. | 5 | 1.010 | 0.4676 | 0.8845 | 0.8845 | 1.0268 | -0.085 | -0.039 | 0.683 | 15.31 | 36.7 | 0.738 | 0.738 |
| 124. | 6 | 0.946 | 0.4216 | 1.1612 | 1.1295 | 1.1017 | 0.127 | 0.058 | 0.597 | 11.34 | 40.7 | 0.797 | 0.797 |
| 144. | 7 | 0.969 | 0.4363 | 1.1912 | 1.1685 | 1.0812 | 0.134 | 0.061 | 0.476 | 6.21 | 45.8 | 0.872 | 0.872 |
| 164. | 8 | 0.994 | 0.4574 | 1.1900 | 1.1824 | 1.0181 | 0.125 | 0.057 | 0.356 | 1.36 | 50.6 | 0.943 | 0.943 |
| 184. | 9 | 0.991 | 0.4706 | 1.1481 | 1.1504 | 0.9765 | 0.115 | 0.052 | 0.210 | -4.78 | 56.9 | 1.034 | 1.034 |
| 204. | 10 | 0.990 | 0.4703 | 1.1561 | 1.1581 | 0.9762 | 0.120 | 0.054 | 0.134 | -7.84 | 59.8 | 1.080 | 1.080 |
| 224. | 11 | 0.983 | 0.4656 | 1.1728 | 1.1714 | 0.9813 | 0.126 | 0.057 | 0.107 | -8.90 | 60.9 | 1.097 | 1.097 |
| 244. | 12 | 0.978 | 0.4623 | 1.1840 | 1.1801 | 0.9849 | 0.130 | 0.059 | 0.099 | -9.18 | 61.2 | 1.101 | 1.101 |
| 264. | 13 | 0.976 | 0.4607 | 1.1883 | 1.1832 | 0.9868 | 0.133 | 0.060 | 0.098 | -9.25 | 61.2 | 1.102 | 1.102 |
| 284. | 14 | 0.975 | 0.4601 | 1.1896 | 1.1831 | 0.9876 | 0.136 | 0.061 | 0.097 | -9.27 | 61.3 | 1.102 | 1.102 |
| 304. | 15 | 1.055 | 0.5323 | 0.7169 | 0.7508 | 0.8748 | -0.161 | -0.073 | -.025 | -14.14 | 66.1 | 1.180 | 1.180 |
| 324. | 16 | 1.033 | 0.5013 | 0.7592 | 0.7760 | 0.9390 | -0.155 | -0.070 | 0.034 | -11.64 | 63.6 | 1.140 | 1.140 |
| 344. | 17 | 1.019 | 0.4795 | 0.8182 | 0.8243 | 0.9964 | -0.139 | -0.063 | 0.143 | -7.49 | 59.5 | 1.075 | 1.075 |
| 4. | 18 | 1.020 | 0.4762 | 0.8385 | 0.8430 | 1.0123 | -0.134 | -0.061 | 0.226 | -4.10 | 56.1 | 1.023 | 1.023 |

STATOR

FLOW SWIRL= 41.35DEG  PARTICLE SWIRL= 78.81DEG  PSAVG= 22.99PSIA = 158498.PA
PTAVG= 25.78PSIA = 177731.PA  TTAVG= 637.2DEG R = 354.0DEG K  VELAVG= 490.6FPS =149.5MPS
RVELAVG= 911.9FPS = 277.9MPS  AXVELAVG= 447.8FPS =136.5MPS  U= 992.FPS = 302.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41. | 1 | 0.979 | 0.3917 | 0.8493 | 0.8418 | 1.0118 | 0.0 | 0.0 | -.078 | 12.80 | 65.9 | 0.979 | 0.997 |
| 61. | 2 | 0.946 | 0.3784 | 0.8530 | 0.8395 | 1.0118 | 0.0 | 0.0 | -.077 | 12.80 | 65.9 | 0.946 | 0.996 |
| 81. | 3 | 0.911 | 0.3635 | 0.8601 | 0.8402 | 1.0142 | 0.0 | 0.0 | -.077 | 12.80 | 65.9 | 0.911 | 0.995 |
| 101. | 4 | 0.862 | 0.3429 | 0.8697 | 0.8412 | 1.0185 | 0.0 | 0.0 | -.079 | 12.80 | 65.9 | 0.862 | 0.994 |
| 121. | 5 | 0.761 | 0.3007 | 0.8653 | 0.8216 | 1.0268 | 0.0 | 0.0 | -.081 | 12.80 | 65.9 | 0.761 | 0.994 |
| 141. | 6 | 0.903 | 0.3064 | 1.1589 | 1.1028 | 1.1017 | 0.0 | 0.0 | -.091 | 12.80 | 65.9 | 0.803 | 0.994 |
| 161. | 7 | 0.867 | 0.3345 | 1.2007 | 1.1569 | 1.0812 | 0.0 | 0.0 | -.088 | 12.80 | 65.9 | 0.867 | 0.994 |
| 181. | 8 | 0.936 | 0.3729 | 1.2043 | 1.1820 | 1.0181 | 0.0 | 0.0 | -.078 | 12.80 | 65.9 | 0.936 | 0.995 |
| 201. | 9 | 1.025 | 0.4182 | 1.1553 | 1.1619 | 0.9765 | 0.0 | 0.0 | -.073 | 12.80 | 65.9 | 1.025 | 0.999 |
| 221. | 10 | 1.077 | 0.4404 | 1.1548 | 1.1764 | 0.9762 | 0.0 | 0.0 | -.076 | 12.80 | 65.9 | 1.077 | 1.003 |
| 241. | 11 | 1.096 | 0.4473 | 1.1676 | 1.1944 | 0.9813 | 0.0 | 0.0 | -.080 | 12.80 | 65.9 | 1.096 | 1.004 |
| 261. | 12 | 1.101 | 0.4497 | 1.1773 | 1.2052 | 0.9849 | 0.0 | 0.0 | -.082 | 12.80 | 65.9 | 1.101 | 1.004 |
| 281. | 13 | 1.102 | 0.4488 | 1.1810 | 1.2092 | 0.9868 | 0.0 | 0.0 | -.082 | 12.80 | 65.9 | 1.102 | 1.005 |
| 301. | 14 | 1.103 | 0.4488 | 1.1811 | 1.2093 | 0.9876 | 0.0 | 0.0 | -.083 | 12.80 | 65.9 | 1.103 | 1.005 |
| 321. | 15 | 1.196 | 0.5204 | 0.7067 | 0.7580 | 0.8748 | 0.0 | 0.0 | -.055 | 12.80 | 65.9 | 1.196 | 1.013 |
| 341. | 16 | 1.150 | 0.4811 | 0.7510 | 0.7846 | 0.9390 | 0.0 | 0.0 | -.071 | 12.80 | 65.9 | 1.150 | 1.009 |
| 1. | 17 | 1.070 | 0.4331 | 0.8189 | 0.8307 | 0.9964 | 0.0 | 0.0 | -.082 | 12.80 | 65.9 | 1.070 | 1.002 |
| 21. | 18 | 1.015 | 0.4065 | 0.8452 | 0.8444 | 1.0123 | 0.0 | 0.0 | -.080 | 12.80 | 65.9 | 1.015 | 0.999 |

STAGE 4
ROTOR

FLOW SWIRL= 43.99DEG  PARTICLE SWIRL= 81.44DEG  PSAVG= 22.59PSIA = 155756.PA
PTAVG= 25.78PSIA = 177760.PA  TTAVG= 637.2DEG R = 354.0DEG K  VELAVG= 526.0FPS =160.3MPS
RVELAVG= 910.8FPS = 277.6MPS  AXVELAVG= 483.9FPS =147.5MPS  U= 975.FPS = 297.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44. | 1 | 0.979 | 0.4209 | 0.8505 | 0.8417 | 1.0118 | 0.0 | 0.0 | 0.502 | 9.13 | 31.5 | 0.979 | 0.996 |
| 64. | 2 | 0.946 | 0.4063 | 0.8549 | 0.8391 | 1.0118 | 0.0 | 0.0 | 0.525 | 10.21 | 30.4 | 0.946 | 0.993 |
| 84. | 3 | 0.911 | 0.3903 | 0.8622 | 0.8390 | 1.0142 | 0.0 | 0.0 | 0.546 | 11.37 | 29.2 | 0.911 | 0.991 |
| 104. | 4 | 0.863 | 0.3684 | 0.8713 | 0.8394 | 1.0185 | 0.0 | 0.0 | 0.570 | 12.97 | 27.6 | 0.863 | 0.988 |
| 124. | 5 | 0.763 | 0.3236 | 0.8660 | 0.8158 | 1.0268 | 0.0 | 0.0 | 0.638 | 16.30 | 24.3 | 0.763 | 0.985 |
| 144. | 6 | 0.811 | 0.3325 | 1.1499 | 1.0875 | 1.1017 | 0.0 | 0.0 | 0.563 | 14.69 | 25.9 | 0.811 | 0.986 |
| 164. | 7 | 0.874 | 0.3621 | 1.1940 | 1.1451 | 1.0812 | 0.0 | 0.0 | 0.521 | 12.60 | 28.0 | 0.874 | 0.989 |
| 184. | 8 | 0.936 | 0.4007 | 1.2062 | 1.1803 | 1.0181 | 0.0 | 0.0 | 0.479 | 10.54 | 30.1 | 0.936 | 0.993 |
| 204. | 9 | 1.020 | 0.4476 | 1.1613 | 1.1675 | 0.9765 | 0.0 | 0.0 | 0.422 | 7.76 | 32.8 | 1.020 | 1.000 |
| 224. | 10 | 1.075 | 0.4729 | 1.1565 | 1.1809 | 0.9762 | 0.0 | 0.0 | 0.386 | 5.98 | 34.6 | 1.075 | 1.006 |
| 244. | 11 | 1.097 | 0.4817 | 1.1658 | 1.1970 | 0.9813 | 0.0 | 0.0 | 0.373 | 5.27 | 35.3 | 1.097 | 1.008 |
| 264. | 12 | 1.104 | 0.4839 | 1.1735 | 1.2067 | 0.9849 | 0.0 | 0.0 | 0.370 | 5.05 | 35.5 | 1.104 | 1.009 |
| 284. | 13 | 1.106 | 0.4844 | 1.1764 | 1.2100 | 0.9868 | 0.0 | 0.0 | 0.368 | 4.99 | 35.6 | 1.106 | 1.009 |
| 304. | 14 | 1.107 | 0.4845 | 1.1762 | 1.2100 | 0.9876 | 0.0 | 0.0 | 0.368 | 4.96 | 35.6 | 1.107 | 1.009 |
| 324. | 15 | 1.174 | 0.5494 | 0.7199 | 0.7744 | 0.8749 | 0.0 | 0.0 | 0.330 | 2.82 | 37.8 | 1.174 | 1.019 |
| 344. | 16 | 1.143 | 0.5146 | 0.7549 | 0.7924 | 0.9390 | 0.0 | 0.0 | 0.367 | 3.90 | 36.8 | 1.143 | 1.014 |
| 4. | 17 | 1.073 | 0.4671 | 0.8167 | 0.8308 | 0.9964 | 0.0 | 0.0 | 0.427 | 6.04 | 34.6 | 1.073 | 1.005 |
| 24. | 18 | 1.017 | 0.4378 | 0.8442 | 0.8436 | 1.0123 | 0.0 | 0.0 | 0.472 | 7.88 | 32.7 | 1.017 | 0.999 |

STATOR

FLOW SWIRL= 45.28DEG  PARTICLE SWIRL= 89.66DEG  PSAVG= 26.12PSIA = 180120.PA
PTAVG= 33.77PSIA = 232809.PA  TTAVG= 702.2DEG R = 390.1DEG K  VELAVG= 770.2FPS =234.8MPS
RVELAVG= 657.7FPS = 200.5MPS  AXVELAVG= 525.4FPS =160.1MPS  U= 955.FPS = 291.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45. | 1 | 0.985 | 0.6012 | 0.8624 | 0.8710 | 1.0135 | 0.0 | 0.0 | 0.416 | 0.45 | 40.8 | 0.950 | 0.950 |
| 65. | 2 | 0.985 | 0.6011 | 0.8771 | 0.8857 | 1.0140 | 0.0 | 0.0 | 0.440 | 1.59 | 39.6 | 0.927 | 0.927 |
| 85. | 3 | 0.984 | 0.5994 | 0.8690 | 0.8566 | 1.0165 | 0.0 | 0.0 | 0.460 | 2.58 | 38.6 | 0.907 | 0.907 |
| 105. | 4 | 0.980 | 0.5959 | 0.8511 | 0.8366 | 1.0211 | 0.0 | 0.0 | 0.482 | 3.68 | 37.5 | 0.884 | 0.884 |
| 125. | 5 | 0.968 | 0.5857 | 0.8015 | 0.7817 | 1.0278 | 0.0 | 0.0 | 0.542 | 6.82 | 34.4 | 0.821 | 0.821 |
| 145. | 6 | 0.999 | 0.5875 | 1.0249 | 1.0007 | 1.0894 | 0.0 | 0.0 | 0.465 | 3.05 | 38.1 | 0.897 | 0.897 |
| 165. | 7 | 1.014 | 0.5998 | 1.1105 | 1.0946 | 1.0795 | 0.0 | 0.0 | 0.419 | 1.12 | 40.1 | 0.936 | 0.936 |
| 185. | 8 | 1.027 | 0.6214 | 1.1754 | 1.1788 | 1.0372 | 0.0 | 0.0 | 0.378 | -0.91 | 42.1 | 0.978 | 0.978 |
| 205. | 9 | 1.028 | 0.6383 | 1.1601 | 1.1800 | 0.9871 | 0.0 | 0.0 | 0.324 | -3.73 | 44.9 | 1.035 | 1.035 |
| 225. | 10 | 1.019 | 0.6366 | 1.1661 | 1.1844 | 0.9750 | 0.0 | 0.0 | 0.286 | -5.54 | 46.7 | 1.073 | 1.073 |
| 245. | 11 | 1.012 | 0.6309 | 1.1862 | 1.1992 | 0.9786 | 0.0 | 0.0 | 0.269 | -6.17 | 47.4 | 1.086 | 1.086 |
| 265. | 12 | 1.009 | 0.6275 | 1.1983 | 1.2081 | 0.9821 | 0.0 | 0.0 | 0.263 | -6.35 | 47.6 | 1.090 | 1.090 |
| 285. | 13 | 1.008 | 0.6262 | 1.2024 | 1.2109 | 0.9839 | 0.0 | 0.0 | 0.261 | -6.42 | 47.6 | 1.091 | 1.091 |
| 305. | 14 | 1.008 | 0.6258 | 1.2023 | 1.2105 | 0.9847 | 0.0 | 0.0 | 0.259 | -6.45 | 47.6 | 1.092 | 1.092 |
| 325. | 15 | 1.031 | 0.6797 | 0.7616 | 0.8027 | 0.8828 | 0.0 | 0.0 | 0.237 | -8.42 | 49.6 | 1.133 | 1.133 |
| 345. | 16 | 0.990 | 0.6323 | 0.7950 | 0.8049 | 0.9311 | 0.0 | 0.0 | 0.277 | -6.49 | 47.7 | 1.093 | 1.093 |
| 5. | 17 | 0.975 | 0.6033 | 0.8548 | 0.8453 | 0.9858 | 0.0 | 0.0 | 0.336 | -3.34 | 44.5 | 1.027 | 1.027 |
| 25. | 18 | 0.980 | 0.5992 | 0.8813 | 0.8686 | 1.0099 | 0.0 | 0.0 | 0.384 | -1.02 | 42.2 | 0.980 | 0.980 |

STAGE 5
ROTOR

FLOW SWIRL= 50.72DEG  PARTICLE SWIRL= 95.10DEG  PSAVG= 28.37PSIA = 195626.PA
PTAVG= 33.34PSIA = 229849.PA  TTAVG= 702.2DEG R = 390.1DEG K  VELAVG= 607.7FPS =185.2MPS
RVELAVG= 871.5FPS = 265.6MPS  AXVELAVG= 547.8FPS =167.0MPS  U= 939.FPS = 286.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51. | 1 | 0.946 | 0.4491 | 0.8893 | 0.8689 | 1.0135 | 0.0 | 0.0 | 0.362 | -0.02 | 36.9 | 0.946 | 0.990 |
| 71. | 2 | 0.925 | 0.4383 | 0.8839 | 0.8581 | 1.0140 | 0.0 | 0.0 | 0.382 | 0.84 | 36.1 | 0.925 | 0.988 |
| 91. | 3 | 0.908 | 0.4293 | 0.8740 | 0.8440 | 1.0165 | 0.0 | 0.0 | 0.398 | 1.52 | 35.4 | 0.908 | 0.985 |
| 111. | 4 | 0.889 | 0.4191 | 0.8536 | 0.8195 | 1.0211 | 0.0 | 0.0 | 0.417 | 2.28 | 34.6 | 0.889 | 0.983 |
| 131. | 5 | 0.838 | 0.3930 | 0.7932 | 0.7507 | 1.0278 | 0.0 | 0.0 | 0.473 | 4.34 | 32.6 | 0.838 | 0.978 |
| 151. | 6 | 0.904 | 0.4126 | 1.0238 | 0.9791 | 1.0894 | 0.0 | 0.0 | 0.359 | 1.69 | 35.2 | 0.904 | 0.985 |
| 171. | 7 | 0.946 | 0.4345 | 1.1048 | 1.0700 | 1.0795 | 0.0 | 0.0 | 0.315 | 0.01 | 36.9 | 0.946 | 0.990 |
| 191. | 8 | 0.983 | 0.4616 | 1.1751 | 1.1568 | 1.0372 | 0.0 | 0.0 | 0.280 | -1.45 | 38.4 | 0.983 | 0.996 |
| 211. | 9 | 1.032 | 0.4983 | 1.1665 | 1.1759 | 0.9871 | 0.0 | 0.0 | 0.237 | -3.37 | 40.3 | 1.032 | 1.004 |
| 231. | 10 | 1.069 | 0.5204 | 1.1681 | 1.1952 | 0.9750 | 0.0 | 0.0 | 0.204 | -4.78 | 41.7 | 1.069 | 1.011 |
| 251. | 11 | 1.086 | 0.5280 | 1.1811 | 1.2150 | 0.9796 | 0.0 | 0.0 | 0.189 | -5.42 | 42.3 | 1.086 | 1.014 |
| 271. | 12 | 1.092 | 0.5304 | 1.1890 | 1.2251 | 0.9821 | 0.0 | 0.0 | 0.183 | -5.66 | 42.6 | 1.092 | 1.015 |
| 291. | 13 | 1.095 | 0.5312 | 1.1911 | 1.2280 | 0.9839 | 0.0 | 0.0 | 0.181 | -5.76 | 42.7 | 1.095 | 1.016 |
| 311. | 14 | 1.096 | 0.5317 | 1.1903 | 1.2275 | 0.9847 | 0.0 | 0.0 | 0.179 | -5.81 | 42.7 | 1.096 | 1.016 |
| 331. | 15 | 1.118 | 0.5746 | 0.7702 | 0.8197 | 0.8828 | 0.0 | 0.0 | 0.215 | -6.61 | 43.5 | 1.118 | 1.020 |
| 351. | 16 | 1.077 | 0.5372 | 0.8025 | 0.8310 | 0.9311 | 0.0 | 0.0 | 0.259 | -5.08 | 42.0 | 1.077 | 1.012 |
| 11. | 17 | 1.021 | 0.4928 | 0.8579 | 0.8617 | 0.9858 | 0.0 | 0.0 | 0.301 | -2.92 | 39.8 | 1.021 | 1.002 |
| 31. | 18 | 0.976 | 0.4646 | 0.8857 | 0.8736 | 1.0099 | 0.0 | 0.0 | 0.336 | -1.19 | 38.1 | 0.976 | 0.995 |

STATOR

FLOW SWIRL= 51.05DEG  PARTICLE SWIRL=100.38DEG  PSAVG= 31.73PSIA = 218780.PA
PTAVG= 40.25PSIA = 277528.PA  TTAVG= 746.8DEG R = 414.9DEG K  VELAVG= 764.5FPS =233.0MPS
RVELAVG= 713.7FPS = 217.5MPS  AXVELAVG= 573.9FPS =174.9MPS  U= 926.FPS = 282.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51. | 1 | 0.978 | 0.5719 | 0.9094 | 0.8940 | 1.0174 | 0.0 | 0.0 | 0.343 | -6.64 | 45.1 | 0.930 | 0.930 |
| 71. | 2 | 0.977 | 0.5709 | 0.9019 | 0.8961 | 1.0195 | 0.0 | 0.0 | 0.363 | -5.61 | 44.1 | 0.911 | 0.911 |
| 91. | 3 | 0.976 | 0.5693 | 0.8888 | 0.8721 | 1.0220 | 0.0 | 0.0 | 0.379 | -4.80 | 43.3 | 0.896 | 0.896 |
| 111. | 4 | 0.972 | 0.5662 | 0.8655 | 0.8472 | 1.0257 | 0.0 | 0.0 | 0.397 | -3.84 | 42.3 | 0.878 | 0.878 |
| 131. | 5 | 0.959 | 0.5563 | 0.8023 | 0.7797 | 1.0311 | 0.0 | 0.0 | 0.449 | -1.04 | 39.5 | 0.827 | 0.827 |
| 151. | 6 | 0.997 | 0.5659 | 0.9784 | 0.9573 | 1.0804 | 0.0 | 0.0 | 0.328 | -6.90 | 45.4 | 0.935 | 0.935 |
| 171. | 7 | 1.007 | 0.5738 | 1.0623 | 1.0456 | 1.0728 | 0.0 | 0.0 | 0.278 | -9.11 | 47.6 | 0.977 | 0.977 |
| 191. | 9 | 1.017 | 0.5992 | 1.1491 | 1.1445 | 1.0419 | 0.0 | 0.0 | 0.243 | -10.86 | 49.4 | 1.010 | 1.010 |
| 211. | 9 | 1.029 | 0.6107 | 1.1553 | 1.1704 | 0.9958 | 0.0 | 0.0 | 0.205 | -13.13 | 51.6 | 1.054 | 1.054 |
| 231. | 10 | 1.030 | 0.6183 | 1.1530 | 1.1754 | 0.9750 | 0.0 | 0.0 | 0.174 | -14.87 | 53.4 | 1.088 | 1.088 |
| 251. | 11 | 1.027 | 0.6171 | 1.1627 | 1.1841 | 0.9730 | 0.0 | 0.0 | 0.157 | -15.65 | 54.2 | 1.104 | 1.104 |
| 271. | 12 | 1.025 | 0.6155 | 1.1696 | 1.1896 | 0.9746 | 0.0 | 0.0 | 0.150 | -15.95 | 54.5 | 1.110 | 1.110 |
| 291. | 13 | 1.025 | 0.6148 | 1.1713 | 1.1906 | 0.9756 | 0.0 | 0.0 | 0.147 | -16.08 | 54.6 | 1.112 | 1.112 |
| 311. | 14 | 1.025 | 0.6147 | 1.1701 | 1.1993 | 0.9761 | 0.0 | 0.0 | 0.145 | -16.15 | 54.6 | 1.114 | 1.114 |
| 331. | 15 | 1.018 | 0.6391 | 0.8176 | 0.8480 | 0.8949 | 0.0 | 0.0 | 0.194 | -14.40 | 52.9 | 1.079 | 1.079 |
| 351. | 16 | 0.987 | 0.6036 | 0.8492 | 0.8558 | 0.9347 | 0.0 | 0.0 | 0.242 | -12.03 | 50.5 | 1.032 | 1.032 |
| 11. | 17 | 0.975 | 0.5808 | 0.8865 | 0.8776 | 0.9812 | 0.0 | 0.0 | 0.283 | -9.80 | 48.3 | 0.990 | 0.990 |
| 31. | 18 | 0.976 | 0.5732 | 0.9070 | 0.8926 | 1.0086 | 0.0 | 0.0 | 0.317 | -7.98 | 46.5 | 0.955 | 0.955 |

STAGE 6
ROTOR

FLOW SWIRL= 56.13DEG  PARTICLE SWIRL=105.45DEG  PSAVG= 33.07PSIA = 228020.PA
PTAVG= 39.65PSIA = 273392.PA  TTAVG= 746.8DEG R = 414.9DEG K  VELAVG= 661.7FPS =201.7MPS
RVELAVG= 907.5FPS = 276.6MPS  AXVELAVG= 613.4FPS =187.0MPS  U= 915.FPS = 279.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56. | 1 | 0.926 | 0.4642 | 0.9181 | 0.8870 | 1.0174 | 0.0 | 0.0 | 0.309 | -1.19 | 39.7 | 0.926 | 0.981 |
| 76. | 2 | 0.909 | 0.4545 | 0.9103 | 0.8743 | 1.0195 | 0.0 | 0.0 | 0.325 | -0.48 | 39.0 | 0.909 | 0.977 |
| 96. | 3 | 0.896 | 0.4470 | 0.8962 | 0.8569 | 1.0220 | 0.0 | 0.0 | 0.338 | 0.07 | 38.4 | 0.896 | 0.974 |
| 116. | 4 | 0.880 | 0.4384 | 0.8708 | 0.8283 | 1.0257 | 0.0 | 0.0 | 0.354 | 0.69 | 37.8 | 0.880 | 0.971 |
| 136. | 5 | 0.838 | 0.4156 | 0.7998 | 0.7509 | 1.0311 | 0.0 | 0.0 | 0.405 | 2.45 | 36.1 | 0.838 | 0.963 |
| 156. | 6 | 0.940 | 0.4572 | 0.9775 | 0.9402 | 1.0804 | 0.0 | 0.0 | 0.242 | -1.76 | 40.3 | 0.940 | 0.994 |
| 176. | 7 | 0.987 | 0.4824 | 1.0536 | 1.0295 | 1.0728 | 0.0 | 0.0 | 0.186 | -3.60 | 42.1 | 0.987 | 0.995 |
| 196. | 8 | 1.019 | 0.5065 | 1.1400 | 1.1318 | 1.0419 | 0.0 | 0.0 | 0.152 | -4.86 | 43.4 | 1.019 | 1.003 |
| 216. | 9 | 1.055 | 0.5381 | 1.1527 | 1.1699 | 0.9958 | 0.0 | 0.0 | 0.127 | -6.27 | 44.8 | 1.055 | 1.013 |
| 236. | 10 | 1.067 | 0.5612 | 1.1501 | 1.1871 | 0.9750 | 0.0 | 0.0 | 0.107 | -7.45 | 46.0 | 1.067 | 1.022 |
| 256. | 11 | 1.104 | 0.5712 | 1.1557 | 1.2017 | 0.9730 | 0.0 | 0.0 | 0.093 | -8.09 | 46.6 | 1.104 | 1.027 |
| 276. | 12 | 1.112 | 0.5750 | 1.1596 | 1.2092 | 0.9746 | 0.0 | 0.0 | 0.084 | -8.37 | 46.9 | 1.112 | 1.030 |
| 296. | 13 | 1.115 | 0.5766 | 1.1596 | 1.2107 | 0.9756 | 0.0 | 0.0 | 0.079 | -8.50 | 47.0 | 1.115 | 1.031 |
| 316. | 14 | 1.117 | 0.5775 | 1.1577 | 1.2095 | 0.9761 | 0.0 | 0.0 | 0.076 | -8.58 | 47.1 | 1.117 | 1.031 |
| 336. | 15 | 1.066 | 0.5751 | 0.8259 | 0.8617 | 0.8949 | 0.0 | 0.0 | 0.205 | -6.68 | 45.2 | 1.066 | 1.016 |
| 356. | 16 | 1.018 | 0.5354 | 0.8602 | 0.8717 | 0.9347 | 0.0 | 0.0 | 0.248 | -4.84 | 43.3 | 1.018 | 1.003 |
| 16. | 17 | 0.980 | 0.5014 | 0.8964 | 0.9171 | 0.9812 | 0.0 | 0.0 | 0.270 | -3.33 | 41.8 | 0.980 | 0.993 |
| 36. | 18 | 0.950 | 0.4783 | 0.9156 | 0.8925 | 1.0086 | 0.0 | 0.0 | 0.289 | -2.12 | 40.6 | 0.950 | 0.996 |

STATOR

FLOW SWIRL= 56.07DEG  PARTICLE SWIRL=109.14DEG  PSAVG= 36.25PSIA = 249959.PA
PTAVG= 46.14PSIA = 318152.PA  TTAVG= 795.9DEG R = 442.2DEG K  VELAVG= 792.5FPS =241.6MPS
RVELAVG= 789.3FPS = 240.6MPS  AXVELAVG= 646.2FPS =197.0MPS  U= 906.FPS = 276.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56. | 1 | 0.962 | 0.5642 | 0.9427 | 0.9181 | 1.0197 | 0.0 | 0.0 | 0.349 | -4.24 | 49.6 | 0.904 | 0.904 |
| 76. | 2 | 0.959 | 0.5616 | 0.9345 | 0.9084 | 1.0233 | 0.0 | 0.0 | 0.364 | -3.29 | 48.7 | 0.887 | 0.887 |
| 96. | 3 | 0.957 | 0.5594 | 0.9188 | 0.8916 | 1.0256 | 0.0 | 0.0 | 0.376 | -2.56 | 48.0 | 0.874 | 0.874 |
| 116. | 4 | 0.953 | 0.5560 | 0.8917 | 0.8632 | 1.0284 | 0.0 | 0.0 | 0.390 | -1.68 | 47.1 | 0.859 | 0.859 |
| 136. | 5 | 0.937 | 0.5455 | 0.8218 | 0.7894 | 1.0312 | 0.0 | 0.0 | 0.435 | 1.10 | 44.3 | 0.812 | 0.812 |
| 156. | 6 | 0.999 | 0.5732 | 0.9375 | 0.9189 | 1.0687 | 0.0 | 0.0 | 0.286 | -7.79 | 53.2 | 0.967 | 0.967 |
| 176. | 7 | 1.015 | 0.5850 | 1.0041 | 0.9931 | 1.0619 | 0.0 | 0.0 | 0.231 | -10.84 | 56.2 | 1.023 | 1.023 |
| 196. | 8 | 1.029 | 0.6003 | 1.0917 | 1.0926 | 1.0378 | 0.0 | 0.0 | 0.197 | -12.73 | 58.1 | 1.059 | 1.059 |
| 216. | 9 | 1.041 | 0.6210 | 1.1212 | 1.1410 | 0.9992 | 0.0 | 0.0 | 0.172 | -14.24 | 59.6 | 1.089 | 1.089 |
| 236. | 10 | 1.048 | 0.6329 | 1.1275 | 1.1587 | 0.9756 | 0.0 | 0.0 | 0.152 | -15.43 | 60.8 | 1.113 | 1.113 |
| 256. | 11 | 1.051 | 0.6366 | 1.1313 | 1.1661 | 0.9703 | 0.0 | 0.0 | 0.137 | -16.25 | 61.6 | 1.130 | 1.130 |
| 276. | 12 | 1.053 | 0.6379 | 1.1319 | 1.1680 | 0.9703 | 0.0 | 0.0 | 0.128 | -16.72 | 62.1 | 1.139 | 1.139 |
| 296. | 13 | 1.054 | 0.6387 | 1.1295 | 1.1663 | 0.9707 | 0.0 | 0.0 | 0.123 | -16.99 | 62.4 | 1.145 | 1.145 |
| 316. | 14 | 1.055 | 0.6393 | 1.1261 | 1.1634 | 0.9709 | 0.0 | 0.0 | 0.120 | -17.14 | 62.5 | 1.148 | 1.148 |
| 336. | 15 | 0.988 | 0.6158 | 0.8913 | 0.9037 | 0.9109 | 0.0 | 0.0 | 0.250 | -10.40 | 55.9 | 1.015 | 1.015 |
| 356. | 16 | 0.970 | 0.5927 | 0.9199 | 0.9158 | 0.9446 | 0.0 | 0.0 | 0.293 | -7.87 | 53.3 | 0.968 | 0.968 |
| 16. | 17 | 0.966 | 0.5773 | 0.9359 | 0.9206 | 0.9832 | 0.0 | 0.0 | 0.315 | -6.48 | 51.9 | 0.943 | 0.943 |
| 36. | 18 | 0.964 | 0.5685 | 0.9428 | 0.9212 | 1.0089 | 0.0 | 0.0 | 0.332 | -5.35 | 50.8 | 0.923 | 0.923 |

STAGE 7
ROTOR

FLOW SWIRL= 59.55DEG  PARTICLE SWIRL=112.61DEG  PSAVG= 39.33PSIA = 271149.PA
PTAVG= 47.52PSIA = 327635.PA  TTAVG= 795.9DEG R = 442.2DEG K  VELAVG= 694.2FPS =211.6MPS
RVELAVG= 991.2FPS = 302.1MPS  AXVELAVG= 672.9FPS =205.1MPS  U= 895.FPS = 273.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60. | 1 | 0.899 | 0.4572 | 0.9533 | 0.9097 | 1.0197 | 0.0 | 0.0 | 0.365 | -0.40 | 39.2 | 0.899 | 0.960 |
| 80. | 2 | 0.885 | 0.4488 | 0.9433 | 0.8957 | 1.0233 | 0.0 | 0.0 | 0.377 | 0.14 | 38.7 | 0.885 | 0.962 |
| 100. | 3 | 0.874 | 0.4426 | 0.9262 | 0.8761 | 1.0256 | 0.0 | 0.0 | 0.386 | 0.56 | 38.2 | 0.874 | 0.958 |
| 120. | 4 | 0.861 | 0.4352 | 0.8968 | 0.8447 | 1.0284 | 0.0 | 0.0 | 0.398 | 1.05 | 37.7 | 0.861 | 0.955 |
| 140. | 5 | 0.821 | 0.4137 | 0.8205 | 0.7633 | 1.0312 | 0.0 | 0.0 | 0.441 | 2.61 | 36.2 | 0.821 | 0.944 |
| 160. | 6 | 0.963 | 0.4795 | 0.9443 | 0.9136 | 1.0687 | 0.0 | 0.0 | 0.261 | -2.76 | 41.6 | 0.963 | 0.985 |
| 180. | 7 | 1.022 | 0.5123 | 1.0048 | 0.9934 | 1.0619 | 0.0 | 0.0 | 0.206 | -4.97 | 43.7 | 1.022 | 1.005 |
| 200. | 8 | 1.061 | 0.5393 | 1.0873 | 1.0954 | 1.0378 | 0.0 | 0.0 | 0.167 | -6.21 | 45.0 | 1.061 | 1.019 |
| 220. | 9 | 1.092 | 0.5672 | 1.1143 | 1.1458 | 0.9982 | 0.0 | 0.0 | 0.138 | -7.24 | 46.0 | 1.092 | 1.030 |
| 240. | 10 | 1.118 | 0.5883 | 1.1171 | 1.1673 | 0.9756 | 0.0 | 0.0 | 0.118 | -8.08 | 46.9 | 1.118 | 1.040 |
| 260. | 11 | 1.137 | 0.6007 | 1.1165 | 1.1760 | 0.9703 | 0.0 | 0.0 | 0.104 | -8.69 | 47.5 | 1.137 | 1.047 |
| 280. | 12 | 1.149 | 0.6074 | 1.1141 | 1.1816 | 0.9703 | 0.0 | 0.0 | 0.095 | -9.06 | 47.9 | 1.148 | 1.051 |
| 300. | 13 | 1.155 | 0.6110 | 1.1101 | 1.1807 | 0.9707 | 0.0 | 0.0 | 0.091 | -9.27 | 48.1 | 1.155 | 1.054 |
| 320. | 14 | 1.159 | 0.6131 | 1.1058 | 1.1782 | 0.9709 | 0.0 | 0.0 | 0.088 | -9.39 | 48.2 | 1.159 | 1.056 |
| 340. | 15 | 1.001 | 0.5426 | 0.9047 | 0.9141 | 0.9108 | 0.0 | 0.0 | 0.310 | -4.13 | 42.9 | 1.001 | 0.998 |
| 360. | 16 | 0.955 | 0.5066 | 0.9358 | 0.9220 | 0.9446 | 0.0 | 0.0 | 0.328 | -2.48 | 41.3 | 0.955 | 0.983 |
| 20. | 17 | 0.933 | 0.4842 | 0.9500 | 0.9223 | 0.9832 | 0.0 | 0.0 | 0.340 | -1.67 | 40.5 | 0.933 | 0.976 |
| 40. | 18 | 0.916 | 0.4696 | 0.9550 | 0.9179 | 1.0089 | 0.0 | 0.0 | 0.351 | -1.03 | 39.8 | 0.916 | 0.971 |

STATOR

FLOW SWIRL= 59.52DEG  PARTICLE SWIRL=115.75DEG  PSAVG= 44.10PSIA = 304065.PA
PTAVG= 57.70PSIA = 397855.PA  TTAVG= 861.9DEG R = 478.8DEG K  VELAVG= 866.4FPS =264.1MPS
RVELAVG= 851.1FPS = 259.4MPS  AXVELAVG= 732.4FPS =223.2MPS  U= 885.FPS = 270.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60. | 1 | 0.938 | 0.5791 | 0.9817 | 0.9400 | 1.0203 | 0.0 | 0.0 | 0.312 | -11.51 | 51.5 | 0.871 | 0.871 |
| 80. | 2 | 0.934 | 0.5755 | 0.9707 | 0.9269 | 1.0245 | 0.0 | 0.0 | 0.323 | -10.77 | 50.8 | 0.858 | 0.858 |
| 100. | 3 | 0.931 | 0.5730 | 0.9516 | 0.9069 | 1.0264 | 0.0 | 0.0 | 0.333 | -10.20 | 50.2 | 0.848 | 0.848 |
| 120. | 4 | 0.926 | 0.5692 | 0.9208 | 0.8752 | 1.0282 | 0.0 | 0.0 | 0.345 | -9.46 | 49.5 | 0.835 | 0.835 |
| 140. | 5 | 0.908 | 0.5575 | 0.8431 | 0.7944 | 1.0279 | 0.0 | 0.0 | 0.385 | -6.96 | 47.0 | 0.792 | 0.792 |
| 160. | 6 | 1.002 | 0.6077 | 0.9214 | 0.9016 | 1.0650 | 0.0 | 0.0 | 0.210 | -17.31 | 57.3 | 0.980 | 0.980 |
| 180. | 7 | 1.027 | 0.6250 | 0.9812 | 0.9735 | 1.0617 | 0.0 | 0.0 | 0.154 | -20.54 | 60.5 | 1.045 | 1.045 |
| 200. | 8 | 1.048 | 0.6456 | 1.0580 | 1.0677 | 1.0406 | 0.0 | 0.0 | 0.118 | -22.76 | 62.8 | 1.092 | 1.092 |
| 220. | 9 | 1.065 | 0.6710 | 1.0802 | 1.1140 | 1.0014 | 0.0 | 0.0 | 0.095 | -24.39 | 64.4 | 1.128 | 1.128 |
| 240. | 10 | 1.079 | 0.6995 | 1.0796 | 1.1305 | 0.9757 | 0.0 | 0.0 | 0.079 | -25.58 | 65.6 | 1.156 | 1.156 |
| 260. | 11 | 1.088 | 0.6991 | 1.0751 | 1.1365 | 0.9677 | 0.0 | 0.0 | 0.067 | -26.42 | 66.4 | 1.176 | 1.176 |
| 280. | 12 | 1.093 | 0.7032 | 1.0723 | 1.1378 | 0.9667 | 0.0 | 0.0 | 0.060 | -26.92 | 66.9 | 1.187 | 1.187 |
| 300. | 13 | 1.096 | 0.7052 | 1.0687 | 1.1359 | 0.9669 | 0.0 | 0.0 | 0.055 | -27.19 | 67.2 | 1.194 | 1.194 |
| 320. | 14 | 1.098 | 0.7064 | 1.0648 | 1.1330 | 0.9670 | 0.0 | 0.0 | 0.053 | -27.35 | 67.3 | 1.198 | 1.198 |
| 340. | 15 | 0.939 | 0.6114 | 0.9929 | 0.9656 | 0.9226 | 0.0 | 0.0 | 0.261 | -15.17 | 55.2 | 0.939 | 0.939 |
| 360. | 16 | 0.944 | 0.6062 | 0.9819 | 0.9605 | 0.9479 | 0.0 | 0.0 | 0.280 | -13.93 | 53.9 | 0.914 | 0.914 |
| 20. | 17 | 0.944 | 0.5952 | 0.9827 | 0.9528 | 0.9818 | 0.0 | 0.0 | 0.289 | -13.07 | 53.1 | 0.900 | 0.900 |
| 40. | 18 | 0.941 | 0.5853 | 0.9844 | 0.9471 | 1.0078 | 0.0 | 0.0 | 0.299 | -12.32 | 52.3 | 0.886 | 0.886 |

STAGE 8
ROTOR

FLOW SWIRL= 63.72DEG  PARTICLE SWIRL=119.96DEG  PSAVG= 47.22PSIA = 325583.PA
PTAVG= 58.75PSIA = 405041.PA  TTAVG= 861.9DEG R = 478.8DEG K  VELAVG= 795.7FPS =239.5MPS
RVELAVG= 987.7FPS = 301.0MPS  AXVELAVG= 749.3FPS =228.4MPS  U= 879.FPS = 268.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64. | 1 | 1.000 | 0.5591 | 0.9256 | 0.9184 | 1.0203 | -0.268 | -0.121 | 0.157 | -12.00 | 49.4 | 1.000 | 1.000 |
| 84. | 2 | 0.985 | 0.5491 | 0.9171 | 0.9033 | 1.0245 | -0.263 | -0.119 | 0.173 | -11.42 | 48.8 | 0.985 | 0.993 |
| 104. | 3 | 0.973 | 0.5412 | 0.9008 | 0.8823 | 1.0264 | -0.254 | -0.115 | 0.188 | -10.93 | 48.3 | 0.973 | 0.988 |
| 124. | 4 | 0.957 | 0.5312 | 0.8738 | 0.8499 | 1.0282 | -0.241 | -0.109 | 0.208 | -10.28 | 47.7 | 0.957 | 0.982 |
| 144. | 5 | 0.906 | 0.5017 | 0.8039 | 0.7663 | 1.0279 | -0.209 | -0.095 | 0.273 | -8.20 | 45.6 | 0.906 | 0.962 |
| 164. | 6 | 0.903 | 0.4909 | 0.9557 | 0.9044 | 1.0650 | 0.163 | 0.074 | 0.260 | -8.07 | 45.5 | 0.903 | 0.961 |
| 184. | 7 | 0.926 | 0.5050 | 1.0271 | 0.9911 | 1.0617 | 0.297 | 0.130 | 0.226 | -9.04 | 46.4 | 0.926 | 0.970 |
| 204. | 8 | 0.956 | 0.5275 | 1.1127 | 1.0793 | 1.0406 | 0.364 | 0.165 | 0.188 | -10.25 | 47.7 | 0.956 | 0.981 |
| 224. | 9 | 0.988 | 0.5570 | 1.1413 | 1.1308 | 1.0014 | 0.383 | 0.174 | 0.151 | -11.52 | 48.9 | 0.988 | 0.994 |
| 244. | 10 | 1.018 | 0.5827 | 1.1413 | 1.1528 | 0.9757 | 0.370 | 0.168 | 0.119 | -12.67 | 50.1 | 1.018 | 1.007 |
| 264. | 11 | 1.039 | 0.5982 | 1.1372 | 1.1626 | 0.9677 | 0.362 | 0.164 | 0.096 | -13.47 | 50.9 | 1.039 | 1.016 |
| 284. | 12 | 1.051 | 0.6063 | 1.1333 | 1.1660 | 0.9667 | 0.358 | 0.162 | 0.084 | -13.94 | 51.3 | 1.051 | 1.022 |
| 304. | 13 | 1.058 | 0.6105 | 1.1290 | 1.1653 | 0.9669 | 0.355 | 0.161 | 0.077 | -14.19 | 51.6 | 1.058 | 1.025 |
| 324. | 14 | 1.062 | 0.6125 | 1.1249 | 1.1630 | 0.9670 | 0.355 | 0.161 | 0.074 | -14.32 | 51.7 | 1.062 | 1.026 |
| 344. | 15 | 1.064 | 0.6297 | 0.9204 | 0.9651 | 0.9226 | -0.274 | -0.124 | 0.076 | -14.42 | 51.8 | 1.064 | 1.027 |
| 4. | 16 | 1.056 | 0.6154 | 0.9135 | 0.9467 | 0.9479 | -0.299 | -0.136 | 0.091 | -14.11 | 51.5 | 1.056 | 1.024 |
| 24. | 17 | 1.040 | 0.5942 | 0.9177 | 0.9351 | 0.9818 | -0.290 | -0.132 | 0.112 | -13.50 | 50.9 | 1.040 | 1.016 |
| 44. | 18 | 1.019 | 0.5738 | 0.9247 | 0.9277 | 1.0078 | -0.276 | -0.125 | 0.136 | -12.72 | 50.1 | 1.019 | 1.007 |

STATOR

FLOW SWIRL= 63.38DEG  PARTICLE SWIRL=122.13DEG  PSAVG= 51.26PSIA = 353432.PA
PTAVG= 68.21PSIA = 470285.PA  TTAVG= 920.7DEG R = 511.5DEG K  VELAVG= 926.5FPS =282.4MPS
RVELAVG= 919.2FPS = 280.2MPS  AXVELAVG= 812.4FPS =247.6MPS  U= 872.FPS = 266.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 63. | 1 | 0.990 | 0.6378 | 0.9347 | 0.9212 | 1.0191 | 0.0 | 0.0 | 0.190 | -19.45 | 61.0 | 0.992 | 0.992 |
| 83. | 2 | 0.981 | 0.6298 | 0.9304 | 0.9109 | 1.0243 | 0.0 | 0.0 | 0.203 | -18.56 | 60.2 | 0.973 | 0.973 |
| 103. | 3 | 0.973 | 0.6234 | 0.9180 | 0.8942 | 1.0266 | 0.0 | 0.0 | 0.215 | -17.75 | 59.4 | 0.957 | 0.957 |
| 123. | 4 | 0.961 | 0.6147 | 0.8962 | 0.8669 | 1.0288 | 0.0 | 0.0 | 0.231 | -16.66 | 58.3 | 0.935 | 0.935 |
| 143. | 5 | 0.923 | 0.5888 | 0.8422 | 0.7984 | 1.0288 | 0.0 | 0.0 | 0.285 | -13.09 | 54.7 | 0.867 | 0.867 |
| 163. | 6 | 0.937 | 0.5863 | 0.9864 | 0.9330 | 1.0684 | 0.0 | 0.0 | 0.273 | -13.70 | 55.3 | 0.879 | 0.879 |
| 183. | 7 | 0.958 | 0.6010 | 1.0468 | 1.0015 | 1.0657 | 0.0 | 0.0 | 0.245 | -15.50 | 57.1 | 0.913 | 0.913 |
| 203. | 8 | 0.980 | 0.6220 | 1.1227 | 1.0922 | 1.0463 | 0.0 | 0.0 | 0.216 | -17.54 | 59.1 | 0.953 | 0.953 |
| 223. | 9 | 1.002 | 0.6502 | 1.1400 | 1.1352 | 1.0071 | 0.0 | 0.0 | 0.189 | -19.55 | 61.2 | 0.994 | 0.994 |
| 243. | 10 | 1.022 | 0.6742 | 1.1278 | 1.1464 | 0.9782 | 0.0 | 0.0 | 0.166 | -21.30 | 62.9 | 1.031 | 1.031 |
| 263. | 11 | 1.035 | 0.6878 | 1.1145 | 1.1464 | 0.9671 | 0.0 | 0.0 | 0.150 | -22.50 | 64.1 | 1.059 | 1.059 |
| 283. | 12 | 1.042 | 0.6940 | 1.1066 | 1.1446 | 0.9647 | 0.0 | 0.0 | 0.141 | -23.17 | 64.8 | 1.073 | 1.073 |
| 303. | 13 | 1.046 | 0.6969 | 1.1007 | 1.1414 | 0.9644 | 0.0 | 0.0 | 0.136 | -23.52 | 65.1 | 1.081 | 1.081 |
| 323. | 14 | 1.048 | 0.6983 | 1.0961 | 1.1380 | 0.9644 | 0.0 | 0.0 | 0.133 | -23.70 | 65.3 | 1.085 | 1.085 |
| 343. | 15 | 1.047 | 0.7152 | 0.8999 | 0.9489 | 0.9204 | 0.0 | 0.0 | 0.137 | -23.65 | 65.3 | 1.084 | 1.084 |
| 3. | 16 | 1.034 | 0.6964 | 0.8996 | 0.9326 | 0.9439 | 0.0 | 0.0 | 0.146 | -22.93 | 64.5 | 1.067 | 1.067 |
| 23. | 17 | 1.019 | 0.6724 | 0.9111 | 0.9247 | 0.9772 | 0.0 | 0.0 | 0.159 | -21.85 | 63.5 | 1.043 | 1.043 |
| 43. | 18 | 1.003 | 0.6513 | 0.9267 | 0.9237 | 1.0046 | 0.0 | 0.0 | 0.175 | -20.58 | 62.2 | 1.015 | 1.015 |

STAGE 9
ROTOR

FLOW SWIRL= 66.26DEG  PARTICLE SWIRL=125.00DEG  PSAVG= 56.35PSIA = 388486.PA
PTAVG= 71.04PSIA = 489781.PA  TTAVG= 920.7DEG R = 511.5DEG K  VELAVG= 834.2FPS =254.3MPS
RVELAVG=1039.9FPS = 317.0MPS  AXVELAVG= 806.8FPS =245.9MPS  U= 867.FPS = 264.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66. | 1 | 0.993 | 0.5715 | 0.9334 | 0.9219 | 1.0191 | 0.0 | 0.0 | 0.207 | -12.37 | 50.7 | 0.993 | 0.996 |
| 86. | 2 | 0.975 | 0.5590 | 0.9294 | 0.9095 | 1.0243 | 0.0 | 0.0 | 0.221 | -11.69 | 50.0 | 0.975 | 0.987 |
| 106. | 3 | 0.958 | 0.5486 | 0.9174 | 0.8910 | 1.0266 | 0.0 | 0.0 | 0.235 | -11.07 | 49.4 | 0.958 | 0.980 |
| 126. | 4 | 0.937 | 0.5353 | 0.8957 | 0.8617 | 1.0288 | 0.0 | 0.0 | 0.256 | -10.25 | 48.6 | 0.937 | 0.970 |
| 146. | 5 | 0.872 | 0.4962 | 0.8407 | 0.7876 | 1.0288 | 0.0 | 0.0 | 0.328 | -7.61 | 45.9 | 0.872 | 0.942 |
| 166. | 6 | 0.886 | 0.4947 | 0.9816 | 0.9185 | 1.0684 | 0.0 | 0.0 | 0.294 | -8.16 | 46.5 | 0.886 | 0.948 |
| 186. | 7 | 0.919 | 0.5147 | 1.0425 | 0.9986 | 1.0657 | 0.0 | 0.0 | 0.253 | -9.51 | 47.8 | 0.919 | 0.962 |
| 206. | 8 | 0.957 | 0.5424 | 1.1195 | 1.0823 | 1.0463 | 0.0 | 0.0 | 0.213 | -11.02 | 49.3 | 0.957 | 0.979 |
| 226. | 9 | 0.995 | 0.5764 | 1.1401 | 1.1303 | 1.0071 | 0.0 | 0.0 | 0.180 | -12.46 | 50.8 | 0.995 | 0.997 |
| 246. | 10 | 1.029 | 0.6068 | 1.1301 | 1.1471 | 0.9782 | 0.0 | 0.0 | 0.154 | -13.72 | 52.0 | 1.029 | 1.013 |
| 266. | 11 | 1.055 | 0.6266 | 1.1169 | 1.1518 | 0.9671 | 0.0 | 0.0 | 0.138 | -14.62 | 52.9 | 1.055 | 1.026 |
| 286. | 12 | 1.070 | 0.6371 | 1.1083 | 1.1527 | 0.9647 | 0.0 | 0.0 | 0.130 | -15.15 | 53.4 | 1.070 | 1.033 |
| 306. | 13 | 1.078 | 0.6424 | 1.1019 | 1.1511 | 0.9644 | 0.0 | 0.0 | 0.125 | -15.43 | 53.7 | 1.078 | 1.037 |
| 326. | 14 | 1.082 | 0.6451 | 1.0969 | 1.1484 | 0.9644 | 0.0 | 0.0 | 0.123 | -15.57 | 53.9 | 1.082 | 1.039 |
| 346. | 15 | 1.078 | 0.6584 | 0.9043 | 0.9577 | 0.9204 | 0.0 | 0.0 | 0.135 | -15.43 | 53.7 | 1.078 | 1.037 |
| 6. | 16 | 1.062 | 0.6395 | 0.9028 | 0.9411 | 0.9439 | 0.0 | 0.0 | 0.153 | -14.89 | 53.2 | 1.062 | 1.029 |
| 26. | 17 | 1.040 | 0.6141 | 0.9124 | 0.9315 | 0.9772 | 0.0 | 0.0 | 0.172 | -14.12 | 52.4 | 1.040 | 1.019 |
| 46. | 18 | 1.015 | 0.5897 | 0.9260 | 0.9274 | 1.0046 | 0.0 | 0.0 | 0.191 | -13.20 | 51.5 | 1.015 | 1.006 |

STATOR

FLOW SWIRL= 66.09DEG  PARTICLE SWIRL=127.45DEG  PSAVG= 64.38PSIA = 443904.PA
PTAVG= 83.02PSIA = 572415.PA  TTAVG= 982.8DEG R = 546.0DEG K  VELAVG= 904.8FPS =275.8MPS
RVELAVG= 916.8FPS = 279.4MPS  AXVELAVG= 800.8FPS =244.1MPS  U= 863.FPS = 263.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 66. | 1 | 0.985 | 0.5983 | 0.9405 | 0.9264 | 1.0170 | 0.0 | 0.0 | 0.170 | -22.10 | 61.7 | 0.984 | 0.984 |
| 86. | 2 | 0.976 | 0.5909 | 0.9363 | 0.9170 | 1.0227 | 0.0 | 0.0 | 0.182 | -21.20 | 60.8 | 0.966 | 0.966 |
| 106. | 3 | 0.967 | 0.5844 | 0.9254 | 0.9017 | 1.0250 | 0.0 | 0.0 | 0.195 | -20.29 | 59.9 | 0.948 | 0.948 |
| 126. | 4 | 0.954 | 0.5751 | 0.9070 | 0.8776 | 1.0269 | 0.0 | 0.0 | 0.213 | -18.97 | 58.6 | 0.923 | 0.923 |
| 146. | 5 | 0.910 | 0.5474 | 0.9653 | 0.9206 | 1.0262 | 0.0 | 0.0 | 0.276 | -14.54 | 54.1 | 0.842 | 0.842 |
| 166. | 6 | 0.936 | 0.5531 | 0.9853 | 0.9379 | 1.0656 | 0.0 | 0.0 | 0.247 | -16.44 | 56.0 | 0.876 | 0.876 |
| 186. | 7 | 0.962 | 0.5696 | 1.0348 | 0.9970 | 1.0646 | 0.0 | 0.0 | 0.212 | -18.87 | 58.5 | 0.921 | 0.921 |
| 206. | 8 | 0.988 | 0.5910 | 1.1049 | 1.0819 | 1.0480 | 0.0 | 0.0 | 0.178 | -21.32 | 60.9 | 0.968 | 0.968 |
| 226. | 9 | 1.012 | 0.6175 | 1.1247 | 1.1247 | 1.0111 | 0.0 | 0.0 | 0.151 | -23.40 | 63.0 | 1.011 | 1.011 |
| 246. | 10 | 1.031 | 0.6397 | 1.1159 | 1.1363 | 0.9815 | 0.0 | 0.0 | 0.130 | -25.04 | 64.6 | 1.046 | 1.046 |
| 266. | 11 | 1.043 | 0.6524 | 1.1042 | 1.1365 | 0.9698 | 0.0 | 0.0 | 0.116 | -26.15 | 65.8 | 1.070 | 1.070 |
| 286. | 12 | 1.049 | 0.6577 | 1.0980 | 1.1352 | 0.9659 | 0.0 | 0.0 | 0.108 | -26.75 | 66.4 | 1.083 | 1.083 |
| 306. | 13 | 1.053 | 0.6600 | 1.0935 | 1.1327 | 0.9656 | 0.0 | 0.0 | 0.104 | -27.07 | 66.7 | 1.091 | 1.091 |
| 326. | 14 | 1.054 | 0.6610 | 1.0897 | 1.1297 | 0.9657 | 0.0 | 0.0 | 0.102 | -27.22 | 66.8 | 1.094 | 1.094 |
| 346. | 15 | 1.044 | 0.6700 | 0.9086 | 0.9495 | 0.9236 | 0.0 | 0.0 | 0.113 | -26.63 | 66.2 | 1.081 | 1.081 |
| 6. | 16 | 1.029 | 0.6509 | 0.9110 | 0.9366 | 0.9443 | 0.0 | 0.0 | 0.126 | -25.60 | 65.2 | 1.058 | 1.058 |
| 26. | 17 | 1.012 | 0.6290 | 0.9211 | 0.9299 | 0.9753 | 0.0 | 0.0 | 0.140 | -24.41 | 64.0 | 1.032 | 1.032 |
| 46. | 18 | 0.997 | 0.6105 | 0.9339 | 0.9287 | 1.0020 | 0.0 | 0.0 | 0.156 | -23.19 | 62.8 | 1.006 | 1.006 |

STAGE 10
ROTOR

FLOW SWIRL= 68.84DEG  PARTICLE SWIRL=130.20DEG  PSAVG= 69.70PSIA = 480542.PA
PTAVG= 96.02PSIA = 593068.PA  TTAVG= 982.8DEG R = 546.0DEG K  VELAVG= 821.9FPS =250.5MPS
RVELAVG=1004.1FPS = 306.1MPS  AXVELAVG= 796.7FPS =239.9MPS  U= 860.FPS = 262.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 69. | 1 | 0.994 | 0.5396 | 0.9407 | 0.9270 | 1.0170 | 0.0 | 0.0 | 0.156 | -13.84 | 51.0 | 0.984 | 0.992 |
| 89. | 2 | 0.967 | 0.5283 | 0.9360 | 0.9150 | 1.0227 | 0.0 | 0.0 | 0.171 | -13.17 | 50.4 | 0.967 | 0.994 |
| 109. | 3 | 0.950 | 0.5180 | 0.9246 | 0.8975 | 1.0250 | 0.0 | 0.0 | 0.188 | -12.50 | 49.7 | 0.950 | 0.976 |
| 129. | 4 | 0.927 | 0.5040 | 0.9051 | 0.8704 | 1.0269 | 0.0 | 0.0 | 0.213 | -11.53 | 48.7 | 0.927 | 0.966 |
| 149. | 5 | 0.853 | 0.4625 | 0.8579 | 0.8033 | 1.0262 | 0.0 | 0.0 | 0.297 | -8.40 | 45.6 | 0.853 | 0.935 |
| 169. | 6 | 0.886 | 0.4719 | 0.9777 | 0.9207 | 1.0656 | 0.0 | 0.0 | 0.241 | -9.81 | 47.0 | 0.886 | 0.948 |
| 189. | 7 | 0.927 | 0.4952 | 1.0302 | 0.9947 | 1.0646 | 0.0 | 0.0 | 0.190 | -11.55 | 48.8 | 0.927 | 0.966 |
| 209. | 8 | 0.972 | 0.5244 | 1.1025 | 1.0747 | 1.0480 | 0.0 | 0.0 | 0.140 | -13.36 | 50.6 | 0.972 | 0.986 |
| 229. | 9 | 1.011 | 0.5570 | 1.1250 | 1.1225 | 1.0111 | 0.0 | 0.0 | 0.102 | -14.89 | 52.1 | 1.011 | 1.004 |
| 249. | 10 | 1.043 | 0.5848 | 1.1181 | 1.1392 | 0.9815 | 0.0 | 0.0 | 0.078 | -16.10 | 53.3 | 1.043 | 1.020 |
| 269. | 11 | 1.066 | 0.6025 | 1.1070 | 1.1434 | 0.9688 | 0.0 | 0.0 | 0.063 | -16.94 | 54.1 | 1.066 | 1.031 |
| 289. | 12 | 1.079 | 0.6114 | 1.1005 | 1.1447 | 0.9659 | 0.0 | 0.0 | 0.056 | -17.41 | 54.6 | 1.079 | 1.037 |
| 309. | 13 | 1.086 | 0.6157 | 1.0957 | 1.1436 | 0.9656 | 0.0 | 0.0 | 0.052 | -17.65 | 54.9 | 1.086 | 1.041 |
| 329. | 14 | 1.090 | 0.6178 | 1.0917 | 1.1413 | 0.9657 | 0.0 | 0.0 | 0.050 | -17.78 | 55.0 | 1.090 | 1.043 |
| 349. | 15 | 1.074 | 0.6225 | 0.9134 | 0.9589 | 0.9236 | 0.0 | 0.0 | 0.077 | -17.21 | 54.4 | 1.074 | 1.035 |
| 9. | 16 | 1.052 | 0.6017 | 0.9152 | 0.9449 | 0.9443 | 0.0 | 0.0 | 0.101 | -16.41 | 53.6 | 1.052 | 1.024 |
| 29. | 17 | 1.028 | 0.5777 | 0.9237 | 0.9361 | 0.9753 | 0.0 | 0.0 | 0.122 | -15.54 | 52.7 | 1.028 | 1.012 |
| 49. | 18 | 1.005 | 0.5556 | 0.9350 | 0.9322 | 1.0020 | 0.0 | 0.0 | 0.141 | -14.64 | 51.8 | 1.005 | 1.001 |

STATOR

FLOW SWIRL= 68.28DEG  PARTICLE SWIRL=132.29DEG  PSAVG= 79.99PSIA = 544600.PA
PTAVG= 98.59PSIA = 679732.PA  TTAVG=1037.0DEG R = 576.1DEG K  VELAVG= 869.3FPS =265.0MPS
RVELAVG= 921.0FPS = 280.7MPS  AXVELAVG= 783.1FPS =238.7MPS  U= 857.FPS = 261.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 68. | 1 | 0.979 | 0.5544 | 0.9504 | 0.9355 | 1.0158 | 0.0 | 0.0 | 0.138 | -19.01 | 63.2 | 0.974 | 0.974 |
| 88. | 2 | 0.970 | 0.5473 | 0.9466 | 0.9269 | 1.0223 | 0.0 | 0.0 | 0.151 | -18.06 | 62.3 | 0.956 | 0.956 |
| 108. | 3 | 0.960 | 0.5405 | 0.9376 | 0.9137 | 1.0251 | 0.0 | 0.0 | 0.165 | -17.01 | 61.2 | 0.936 | 0.936 |
| 128. | 4 | 0.945 | 0.5308 | 0.9224 | 0.8928 | 1.0272 | 0.0 | 0.0 | 0.188 | -15.43 | 59.6 | 0.908 | 0.908 |
| 149. | 5 | 0.899 | 0.5042 | 0.8886 | 0.8447 | 1.0274 | 0.0 | 0.0 | 0.265 | -10.29 | 54.5 | 0.821 | 0.821 |
| 168. | 6 | 0.935 | 0.5156 | 0.9841 | 0.9424 | 1.0645 | 0.0 | 0.0 | 0.214 | -13.55 | 57.7 | 0.875 | 0.875 |
| 188. | 7 | 0.964 | 0.5328 | 1.0254 | 0.9936 | 1.0649 | 0.0 | 0.0 | 0.170 | -16.59 | 60.8 | 0.929 | 0.929 |
| 208. | 8 | 0.996 | 0.5553 | 1.0872 | 1.0706 | 1.0502 | 0.0 | 0.0 | 0.127 | -19.62 | 63.8 | 0.985 | 0.985 |
| 228. | 9 | 1.022 | 0.5809 | 1.1063 | 1.1104 | 1.0145 | 0.0 | 0.0 | 0.097 | -21.92 | 66.1 | 1.031 | 1.031 |
| 248. | 10 | 1.041 | 0.6018 | 1.0992 | 1.1214 | 0.9836 | 0.0 | 0.0 | 0.077 | -23.53 | 67.7 | 1.064 | 1.064 |
| 269. | 11 | 1.053 | 0.6137 | 1.0890 | 1.1216 | 0.9689 | 0.0 | 0.0 | 0.064 | -24.54 | 68.7 | 1.085 | 1.085 |
| 288. | 12 | 1.058 | 0.6186 | 1.0843 | 1.1210 | 0.9649 | 0.0 | 0.0 | 0.059 | -25.06 | 69.3 | 1.097 | 1.097 |
| 308. | 13 | 1.061 | 0.6206 | 1.0806 | 1.1191 | 0.9642 | 0.0 | 0.0 | 0.054 | -25.34 | 69.5 | 1.103 | 1.103 |
| 328. | 14 | 1.063 | 0.6215 | 1.0775 | 1.1167 | 0.9642 | 0.0 | 0.0 | 0.052 | -25.46 | 69.7 | 1.106 | 1.106 |
| 348. | 15 | 1.040 | 0.6207 | 0.9177 | 0.9509 | 0.9249 | 0.0 | 0.0 | 0.073 | -24.04 | 68.2 | 1.075 | 1.075 |
| 8. | 16 | 1.020 | 0.6013 | 0.9245 | 0.9432 | 0.9440 | 0.0 | 0.0 | 0.092 | -22.61 | 66.8 | 1.045 | 1.045 |
| 28. | 17 | 1.003 | 0.5916 | 0.9339 | 0.9382 | 0.9733 | 0.0 | 0.0 | 0.109 | -21.29 | 65.5 | 1.018 | 1.018 |
| 48. | 18 | 0.990 | 0.5653 | 0.9448 | 0.9375 | 0.9999 | 0.0 | 0.0 | 0.124 | -20.07 | 64.3 | 0.994 | 0.994 |

STAGE 11
ROTOR

FLOW SWIRL= 70.56DEG  PARTICLE SWIRL=134.57DEG  PSAVG= 82.66PSIA = 569905.PA
PTAVG=100.88PSIA = 695545.PA  TTAVG=1037.0DEG R = 576.1DEG K  VELAVG= 821.0FPS =250.3MPS
RVELAVG=1025.9FPS = 312.7MPS  AXVELAVG= 794.4FPS =242.1MPS  U= 854.FPS = 260.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71. | 1 | 0.973 | 0.5188 | 0.9515 | 0.9341 | 1.0158 | 0.0 | 0.0 | 0.148 | -10.94 | 49.8 | 0.973 | 0.986 |
| 91. | 2 | 0.956 | 0.5076 | 0.9474 | 0.9232 | 1.0223 | 0.0 | 0.0 | 0.163 | -10.29 | 49.2 | 0.956 | 0.978 |
| 111. | 3 | 0.938 | 0.4966 | 0.9393 | 0.9076 | 1.0251 | 0.0 | 0.0 | 0.181 | -9.57 | 48.5 | 0.938 | 0.970 |
| 131. | 4 | 0.910 | 0.4810 | 0.9230 | 0.8839 | 1.0272 | 0.0 | 0.0 | 0.210 | -8.47 | 47.4 | 0.910 | 0.958 |
| 151. | 5 | 0.827 | 0.4354 | 0.8873 | 0.8265 | 1.0274 | 0.0 | 0.0 | 0.301 | -5.00 | 43.9 | 0.827 | 0.924 |
| 171. | 6 | 0.880 | 0.4562 | 0.9829 | 0.9267 | 1.0645 | 0.0 | 0.0 | 0.225 | -7.24 | 46.1 | 0.880 | 0.945 |
| 191. | 7 | 0.932 | 0.4841 | 1.0247 | 0.9830 | 1.0649 | 0.0 | 0.0 | 0.165 | -9.34 | 48.2 | 0.932 | 0.967 |
| 211. | 8 | 0.987 | 0.5176 | 1.0966 | 1.0657 | 1.0502 | 0.0 | 0.0 | 0.103 | -11.45 | 50.3 | 0.987 | 0.992 |
| 231. | 9 | 1.031 | 0.5514 | 1.1061 | 1.1110 | 1.0145 | 0.0 | 0.0 | 0.061 | -13.06 | 52.0 | 1.031 | 1.013 |
| 251. | 10 | 1.063 | 0.5788 | 1.0987 | 1.1264 | 0.9836 | 0.0 | 0.0 | 0.035 | -14.20 | 53.1 | 1.063 | 1.029 |
| 271. | 11 | 1.084 | 0.5956 | 1.0881 | 1.1300 | 0.9689 | 0.0 | 0.0 | 0.021 | -14.93 | 53.8 | 1.084 | 1.040 |
| 291. | 12 | 1.095 | 0.6036 | 1.0828 | 1.1314 | 0.9649 | 0.0 | 0.0 | 0.015 | -15.31 | 54.2 | 1.095 | 1.045 |
| 311. | 13 | 1.101 | 0.6074 | 1.0787 | 1.1305 | 0.9642 | 0.0 | 0.0 | 0.012 | -15.52 | 54.4 | 1.101 | 1.049 |
| 331. | 14 | 1.104 | 0.6091 | 1.0753 | 1.1295 | 0.9642 | 0.0 | 0.0 | 0.010 | -15.61 | 54.5 | 1.104 | 1.050 |
| 351. | 15 | 1.071 | 0.6023 | 0.9192 | 0.9600 | 0.9249 | 0.0 | 0.0 | 0.061 | -14.48 | 53.4 | 1.071 | 1.033 |
| 11. | 16 | 1.041 | 0.5782 | 0.9269 | 0.9501 | 0.9440 | 0.0 | 0.0 | 0.092 | -13.43 | 52.3 | 1.041 | 1.018 |
| 31. | 17 | 1.015 | 0.5542 | 0.9361 | 0.9425 | 0.9733 | 0.0 | 0.0 | 0.115 | -12.50 | 51.4 | 1.015 | 1.006 |
| 51. | 18 | 0.992 | 0.5338 | 0.9463 | 0.9388 | 0.9999 | 0.0 | 0.0 | 0.133 | -11.66 | 50.6 | 0.992 | 0.995 |

STATOR

FLOW SWIRL= 69.53DEG  PARTICLE SWIRL=136.47DEG  PSAVG= 93.13PSIA = 642119.PA
PTAVG=114.19PSIA = 787298.PA  TTAVG=1094.0DEG R = 607.8DEG K  VELAVG= 856.3FPS =261.0MPS
RVELAVG= 954.0FPS = 290.8MPS  AXVELAVG= 791.4FPS =241.2MPS  U= 851.FPS = 259.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 70. | 1 | 0.968 | 0.5250 | 0.9651 | 0.9469 | 1.0144 | 0.0 | 0.0 | 0.121 | -24.50 | 65.9 | 0.958 | 0.958 |
| 90. | 2 | 0.958 | 0.5178 | 0.9618 | 0.9389 | 1.0217 | 0.0 | 0.0 | 0.133 | -23.51 | 64.8 | 0.941 | 0.941 |
| 110. | 3 | 0.947 | 0.5105 | 0.9547 | 0.9274 | 1.0249 | 0.0 | 0.0 | 0.148 | -22.33 | 63.6 | 0.920 | 0.920 |
| 130. | 4 | 0.929 | 0.4996 | 0.9442 | 0.9106 | 1.0273 | 0.0 | 0.0 | 0.173 | -20.41 | 61.7 | 0.888 | 0.888 |
| 150. | 5 | 0.879 | 0.4716 | 0.9206 | 0.8721 | 1.0283 | 0.0 | 0.0 | 0.257 | -14.42 | 55.7 | 0.794 | 0.794 |
| 170. | 6 | 0.925 | 0.4996 | 0.9888 | 0.9472 | 1.0614 | 0.0 | 0.0 | 0.186 | -19.22 | 60.5 | 0.868 | 0.868 |
| 190. | 7 | 0.962 | 0.5093 | 1.0200 | 0.9897 | 1.0637 | 0.0 | 0.0 | 0.135 | -23.02 | 64.3 | 0.932 | 0.932 |
| 210. | 8 | 1.005 | 0.5364 | 1.0690 | 1.0568 | 1.0511 | 0.0 | 0.0 | 0.087 | -26.86 | 68.2 | 1.002 | 1.002 |
| 230. | 9 | 1.037 | 0.5641 | 1.0839 | 1.0932 | 1.0174 | 0.0 | 0.0 | 0.057 | -29.52 | 70.8 | 1.053 | 1.053 |
| 250. | 10 | 1.060 | 0.5863 | 1.0750 | 1.1026 | 0.9859 | 0.0 | 0.0 | 0.039 | -31.22 | 72.5 | 1.089 | 1.089 |
| 270. | 11 | 1.072 | 0.5989 | 1.0646 | 1.1027 | 0.9696 | 0.0 | 0.0 | 0.029 | -32.19 | 73.5 | 1.109 | 1.109 |
| 290. | 12 | 1.078 | 0.6039 | 1.0604 | 1.1027 | 0.9647 | 0.0 | 0.0 | 0.024 | -32.64 | 73.9 | 1.119 | 1.119 |
| 310. | 13 | 1.081 | 0.6061 | 1.0571 | 1.1012 | 0.9636 | 0.0 | 0.0 | 0.022 | -32.89 | 74.2 | 1.125 | 1.125 |
| 330. | 14 | 1.083 | 0.6070 | 1.0543 | 1.0991 | 0.9636 | 0.0 | 0.0 | 0.020 | -33.01 | 74.3 | 1.127 | 1.127 |
| 350. | 15 | 1.037 | 0.5910 | 0.9284 | 0.9562 | 0.9277 | 0.0 | 0.0 | 0.056 | -30.20 | 71.5 | 1.067 | 1.067 |
| 10. | 16 | 1.010 | 0.5695 | 0.9416 | 0.9541 | 0.9450 | 0.0 | 0.0 | 0.079 | -28.28 | 69.6 | 1.029 | 1.029 |
| 30. | 17 | 0.992 | 0.5507 | 0.9504 | 0.9498 | 0.9720 | 0.0 | 0.0 | 0.097 | -26.79 | 68.1 | 1.000 | 1.000 |
| 50. | 18 | 0.978 | 0.5355 | 0.9600 | 0.9498 | 0.9979 | 0.0 | 0.0 | 0.110 | -25.55 | 66.8 | 0.977 | 0.977 |

STAGE 12
ROTOR

FLOW SWIRL= 71.61DEG  PARTICLE SWIRL=138.54DEG  PSAVG= 97.79PSIA = 674215.PA
PTAVG=117.96PSIA = 813274.PA  TTAVG=1094.0DEG R = 607.8DEG K  VELAVG= 817.6FPS =249.2MPS
RVELAVG=1032.1FPS = 314.6MPS  AXVELAVG= 794.4FPS =242.1MPS  U= 850.FPS = 259.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72. | 1 | 0.958 | 0.4949 | 0.9665 | 0.9446 | 1.0144 | 0.0 | 0.0 | 0.180 | -11.69 | 48.9 | 0.958 | 0.979 |
| 92. | 2 | 0.942 | 0.4845 | 0.9622 | 0.9341 | 1.0217 | 0.0 | 0.0 | 0.192 | -11.08 | 48.3 | 0.942 | 0.972 |
| 112. | 3 | 0.923 | 0.4733 | 0.9545 | 0.9201 | 1.0249 | 0.0 | 0.0 | 0.211 | -10.32 | 47.5 | 0.923 | 0.963 |
| 132. | 4 | 0.892 | 0.4566 | 0.9429 | 0.8996 | 1.0273 | 0.0 | 0.0 | 0.241 | -9.11 | 46.3 | 0.892 | 0.950 |
| 152. | 5 | 0.864 | 0.4100 | 0.9139 | 0.8489 | 1.0283 | 0.0 | 0.0 | 0.337 | -5.44 | 42.6 | 0.864 | 0.914 |
| 172. | 6 | 0.877 | 0.4411 | 0.9833 | 0.9293 | 1.0614 | 0.0 | 0.0 | 0.239 | -8.48 | 45.7 | 0.877 | 0.943 |
| 192. | 7 | 0.938 | 0.4727 | 1.0159 | 0.9786 | 1.0637 | 0.0 | 0.0 | 0.173 | -10.92 | 48.1 | 0.938 | 0.970 |
| 212. | 8 | 1.005 | 0.5111 | 1.0660 | 1.0527 | 1.0511 | 0.0 | 0.0 | 0.103 | -13.43 | 50.6 | 1.005 | 1.001 |
| 232. | 9 | 1.054 | 0.5463 | 1.0825 | 1.0956 | 1.0174 | 0.0 | 0.0 | 0.064 | -15.17 | 52.4 | 1.054 | 1.024 |
| 252. | 10 | 1.087 | 0.5734 | 1.0752 | 1.1102 | 0.9959 | 0.0 | 0.0 | 0.047 | -16.29 | 53.5 | 1.087 | 1.041 |
| 272. | 11 | 1.106 | 0.5894 | 1.0652 | 1.1134 | 0.9696 | 0.0 | 0.0 | 0.041 | -16.93 | 54.1 | 1.106 | 1.051 |
| 292. | 12 | 1.116 | 0.5965 | 1.0607 | 1.1148 | 0.9647 | 0.0 | 0.0 | 0.040 | -17.25 | 54.5 | 1.116 | 1.056 |
| 312. | 13 | 1.122 | 0.6000 | 1.0570 | 1.1139 | 0.9636 | 0.0 | 0.0 | 0.038 | -17.43 | 54.6 | 1.122 | 1.059 |
| 332. | 14 | 1.124 | 0.6016 | 1.0541 | 1.1121 | 0.9636 | 0.0 | 0.0 | 0.038 | -17.52 | 54.7 | 1.124 | 1.060 |
| 352. | 15 | 1.061 | 0.5769 | 0.9329 | 0.9661 | 0.9277 | 0.0 | 0.0 | 0.114 | -15.41 | 52.6 | 1.061 | 1.028 |
| 12. | 16 | 1.022 | 0.5492 | 0.9476 | 0.9616 | 0.9450 | 0.0 | 0.0 | 0.139 | -14.05 | 51.3 | 1.022 | 1.009 |
| 32. | 17 | 0.995 | 0.5260 | 0.9563 | 0.9546 | 0.9720 | 0.0 | 0.0 | 0.156 | -13.05 | 50.3 | 0.995 | 0.996 |
| 52. | 18 | 0.975 | 0.5081 | 0.9634 | 0.9498 | 0.9978 | 0.0 | 0.0 | 0.169 | -12.31 | 49.5 | 0.975 | 0.986 |

STATOR

FLOW SWIRL= 70.50DEG  PARTICLE SWIRL=140.32DEG  PSAVG=108.22PSIA = 746137.PA
PTAVG=128.09PSIA = 883172.PA  TTAVG=1126.5DEG R = 625.8DEG K  VELAVG= 792.2FPS =241.5MPS
RVELAVG= 924.7FPS = 281.9MPS  AXVELAVG= 734.0FPS =223.7MPS  U= 850.FPS = 259.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71. | 1 | 0.962 | 0.4730 | 0.9793 | 0.9617 | 1.0175 | 0.0 | 0.0 | 0.178 | -21.31 | 65.5 | 0.947 | 0.947 |
| 91. | 2 | 0.954 | 0.4669 | 0.9757 | 0.9544 | 1.0264 | 0.0 | 0.0 | 0.190 | -20.33 | 64.5 | 0.932 | 0.932 |
| 111. | 3 | 0.942 | 0.4601 | 0.9708 | 0.9456 | 1.0312 | 0.0 | 0.0 | 0.208 | -18.99 | 63.2 | 0.910 | 0.910 |
| 131. | 4 | 0.925 | 0.4503 | 0.9637 | 0.9332 | 1.0348 | 0.0 | 0.0 | 0.238 | -16.76 | 61.0 | 0.876 | 0.876 |
| 151. | 5 | 0.879 | 0.4269 | 0.9479 | 0.9055 | 1.0376 | 0.0 | 0.0 | 0.337 | -9.89 | 54.1 | 0.777 | 0.777 |
| 171. | 6 | 0.932 | 0.4473 | 0.9848 | 0.9518 | 1.0657 | 0.0 | 0.0 | 0.239 | -16.62 | 60.8 | 0.874 | 0.874 |
| 191. | 7 | 0.971 | 0.4667 | 1.0053 | 0.9829 | 1.0679 | 0.0 | 0.0 | 0.176 | -21.35 | 65.5 | 0.948 | 0.948 |
| 211. | 8 | 1.022 | 0.4956 | 1.0383 | 1.0341 | 1.0526 | 0.0 | 0.0 | 0.116 | -26.20 | 70.4 | 1.031 | 1.031 |
| 231. | 9 | 1.055 | 0.5218 | 1.0508 | 1.0652 | 1.0157 | 0.0 | 0.0 | 0.084 | -29.01 | 73.2 | 1.084 | 1.084 |
| 251. | 10 | 1.073 | 0.5404 | 1.0472 | 1.0756 | 0.9810 | 0.0 | 0.0 | 0.068 | -30.45 | 74.7 | 1.112 | 1.112 |
| 271. | 11 | 1.081 | 0.5499 | 1.0416 | 1.0774 | 0.9617 | 0.0 | 0.0 | 0.062 | -31.11 | 75.3 | 1.125 | 1.125 |
| 291. | 12 | 1.093 | 0.5532 | 1.0405 | 1.0789 | 0.9550 | 0.0 | 0.0 | 0.059 | -31.37 | 75.6 | 1.131 | 1.131 |
| 311. | 13 | 1.085 | 0.5548 | 1.0383 | 1.0778 | 0.9531 | 0.0 | 0.0 | 0.057 | -31.54 | 75.7 | 1.134 | 1.134 |
| 331. | 14 | 1.086 | 0.5553 | 1.0364 | 1.0762 | 0.9527 | 0.0 | 0.0 | 0.057 | -31.61 | 75.8 | 1.136 | 1.136 |
| 351. | 15 | 1.013 | 0.5232 | 0.9577 | 0.9725 | 0.9278 | 0.0 | 0.0 | 0.114 | -26.65 | 70.8 | 1.039 | 1.039 |
| 11. | 16 | 0.991 | 0.5063 | 0.9701 | 0.9738 | 0.9467 | 0.0 | 0.0 | 0.139 | -24.63 | 68.8 | 1.003 | 1.003 |
| 31. | 17 | 0.978 | 0.4921 | 0.9741 | 0.9685 | 0.9732 | 0.0 | 0.0 | 0.155 | -23.21 | 67.4 | 0.979 | 0.979 |
| 51. | 18 | 0.969 | 0.4810 | 0.9776 | 0.9649 | 0.9996 | 0.0 | 0.0 | 0.167 | -22.20 | 66.4 | 0.962 | 0.962 |

STAGE 13
ROTOR

FLOW SWIRL= 72.33DEG  PARTICLE SWIRL=142.15DEG  PSAVG=112.03PSIA = 772451.PA
PTAVG=129.37PSIA = 891981.PA  TTAVG=1126.5DEG R = 625.8DEG K  VELAVG= 728.2FPS =222.0MPS
RVELAVG=1005.4FPS = 306.4MPS  AXVELAVG= 713.7FPS =217.5MPS  U= 850.FPS = 259.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | BETA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72. | 1 | 0.947 | 0.4264 | 0.9809 | 0.9603 | 1.0175 | 0.0 | 0.0 | 0.182 | -8.16 | 43.5 | 0.947 | 0.977 |
| 92. | 2 | 0.931 | 0.4175 | 0.9770 | 0.9517 | 1.0264 | 0.0 | 0.0 | 0.197 | -7.61 | 42.9 | 0.931 | 0.971 |
| 112. | 3 | 0.911 | 0.4070 | 0.9719 | 0.9413 | 1.0312 | 0.0 | 0.0 | 0.220 | -6.85 | 42.1 | 0.911 | 0.963 |
| 132. | 4 | 0.877 | 0.3909 | 0.9647 | 0.9264 | 1.0349 | 0.0 | 0.0 | 0.259 | -5.58 | 40.9 | 0.877 | 0.951 |
| 152. | 5 | 0.781 | 0.3465 | 0.9473 | 0.8900 | 1.0376 | 0.0 | 0.0 | 0.373 | -1.80 | 37.1 | 0.781 | 0.919 |
| 172. | 6 | 0.876 | 0.3847 | 0.9851 | 0.9428 | 1.0657 | 0.0 | 0.0 | 0.244 | -5.54 | 40.8 | 0.876 | 0.951 |
| 192. | 7 | 0.949 | 0.4174 | 1.0053 | 0.9790 | 1.0679 | 0.0 | 0.0 | 0.155 | -8.24 | 43.5 | 0.949 | 0.978 |
| 212. | 8 | 1.032 | 0.4586 | 1.0369 | 1.0343 | 1.0526 | 0.0 | 0.0 | 0.054 | -11.14 | 46.4 | 1.032 | 1.011 |
| 232. | 9 | 1.085 | 0.4916 | 1.0486 | 1.0680 | 1.0157 | 0.0 | 0.0 | 0.007 | -12.87 | 48.2 | 1.085 | 1.034 |
| 252. | 10 | 1.113 | 0.5138 | 1.0449 | 1.0802 | 0.9810 | 0.0 | 0.0 | -.005 | -13.76 | 49.1 | 1.113 | 1.046 |
| 272. | 11 | 1.126 | 0.5254 | 1.0393 | 1.0831 | 0.9617 | 0.0 | 0.0 | -.005 | -14.17 | 49.5 | 1.126 | 1.052 |
| 292. | 12 | 1.131 | 0.5298 | 1.0382 | 1.0853 | 0.9550 | 0.0 | 0.0 | -.003 | -14.32 | 49.6 | 1.131 | 1.054 |
| 312. | 13 | 1.134 | 0.5321 | 1.0358 | 1.0845 | 0.9531 | 0.0 | 0.0 | -.004 | -14.43 | 49.7 | 1.134 | 1.055 |
| 332. | 14 | 1.136 | 0.5329 | 1.0338 | 1.0831 | 0.9527 | 0.0 | 0.0 | -.004 | -14.48 | 49.8 | 1.136 | 1.056 |
| 352. | 15 | 1.036 | 0.4905 | 0.9602 | 0.9779 | 0.9278 | 0.0 | 0.0 | 0.123 | -11.27 | 46.6 | 1.036 | 1.013 |
| 12. | 16 | 1.000 | 0.4680 | 0.9734 | 0.9771 | 0.9467 | 0.0 | 0.0 | 0.141 | -10.05 | 45.4 | 1.000 | 0.998 |
| 32. | 17 | 0.977 | 0.4502 | 0.9769 | 0.9700 | 0.9732 | 0.0 | 0.0 | 0.158 | -9.23 | 44.5 | 0.977 | 0.989 |
| 52. | 18 | 0.961 | 0.4367 | 0.9797 | 0.9649 | 0.9996 | 0.0 | 0.0 | 0.170 | -8.66 | 44.0 | 0.961 | 0.982 |

STATOR

FLOW SWIRL= 70.96DEG  PARTICLE SWIRL=143.64DEG  PSAVG=120.85PSIA = 833212.PA
PTAVG=139.41PSIA = 954318.PA  TTAVG=1140.0DEG R = 633.3DEG K  VELAVG= 716.3FPS =218.3MPS
RVELAVG= 914.3FPS = 278.7MPS  AXVELAVG= 671.9FPS =204.8MPS  U= 850.FPS = 259.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | ALPHA IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71. | 1 | 0.950 | 0.4169 | 1.0026 | 0.9842 | 1.0259 | 0.0 | 0.0 | 0.409 | -24.37 | 66.6 | 0.932 | 0.932 |
| 91. | 2 | 0.943 | 0.4110 | 1.0021 | 0.9806 | 1.0375 | 0.0 | 0.0 | 0.422 | -23.21 | 65.4 | 0.916 | 0.916 |
| 111. | 3 | 0.931 | 0.4043 | 1.0031 | 0.9779 | 1.0451 | 0.0 | 0.0 | 0.441 | -21.46 | 63.7 | 0.892 | 0.892 |
| 131. | 4 | 0.913 | 0.3950 | 1.0060 | 0.9758 | 1.0523 | 0.0 | 0.0 | 0.474 | -18.50 | 60.7 | 0.852 | 0.852 |
| 151. | 5 | 0.875 | 0.3763 | 1.0114 | 0.9716 | 1.0615 | 0.0 | 0.0 | 0.579 | -9.88 | 52.1 | 0.743 | 0.743 |
| 171. | 6 | 0.926 | 0.3957 | 1.0058 | 0.9759 | 1.0788 | 0.0 | 0.0 | 0.463 | -19.43 | 61.6 | 0.864 | 0.864 |
| 191. | 7 | 0.971 | 0.4163 | 1.0029 | 0.9839 | 1.0765 | 0.0 | 0.0 | 0.391 | -26.01 | 68.2 | 0.956 | 0.956 |
| 211. | 8 | 1.041 | 0.4526 | 0.9989 | 1.0008 | 1.0504 | 0.0 | 0.0 | 0.322 | -33.10 | 75.3 | 1.067 | 1.067 |
| 231. | 9 | 1.082 | 0.4816 | 0.9979 | 1.0181 | 1.0052 | 0.0 | 0.0 | 0.291 | -36.51 | 78.7 | 1.126 | 1.126 |
| 251. | 10 | 1.096 | 0.4981 | 0.9965 | 1.0280 | 0.9650 | 0.0 | 0.0 | 0.282 | -37.63 | 79.8 | 1.147 | 1.147 |
| 271. | 11 | 1.098 | 0.5052 | 0.9957 | 1.0320 | 0.9423 | 0.0 | 0.0 | 0.280 | -37.89 | 80.1 | 1.152 | 1.152 |
| 291. | 12 | 1.097 | 0.5070 | 0.9978 | 1.0355 | 0.9338 | 0.0 | 0.0 | 0.281 | -37.87 | 80.1 | 1.152 | 1.152 |
| 311. | 13 | 1.098 | 0.5086 | 0.9954 | 1.0342 | 0.9307 | 0.0 | 0.0 | 0.280 | -37.99 | 80.2 | 1.154 | 1.154 |
| 331. | 14 | 1.099 | 0.5089 | 0.9941 | 1.0330 | 0.9299 | 0.0 | 0.0 | 0.280 | -38.01 | 80.2 | 1.154 | 1.154 |
| 351. | 15 | 0.986 | 0.4548 | 0.9936 | 0.9977 | 0.9300 | 0.0 | 0.0 | 0.360 | -29.36 | 71.6 | 1.006 | 1.006 |
| 11. | 16 | 0.975 | 0.4443 | 0.9972 | 0.9948 | 0.9507 | 0.0 | 0.0 | 0.376 | -27.71 | 69.9 | 0.981 | 0.981 |
| 31. | 17 | 0.964 | 0.4329 | 0.9989 | 0.9898 | 0.9784 | 0.0 | 0.0 | 0.390 | -26.28 | 68.5 | 0.960 | 0.960 |
| 51. | 18 | 0.957 | 0.4238 | 1.0003 | 0.9859 | 1.0058 | 0.0 | 0.0 | 0.400 | -25.30 | 67.5 | 0.946 | 0.946 |

EXIT

FLOW SWIRL= 72.41DEG  PARTICLE SWIRL=145.08DEG  PSAVG=125.84PSIA = 867607.PA
PTAVG=135.07PSIA = 931264.PA  TTAVG=1140.0DEG R = 633.3DEG K  VELAVG= 516.2FPS =157.3MPS
RVELAVG= 0.0FPS = 0.0MPS  AXVELAVG= 0.0FPS = 0.0MPS  U= 850.FPS = 259.MPS

| THETA | SEG NO | VEL | MN | PS | PT | TT | WBL LBM/SEC | WBL KG/SEG | DF | INCIDENCE IN DEG | IN DEG | AXIAL VEL | REL VEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72. | 1 | 0.933 | 0.2923 | 1.0010 | 0.9884 | 1.0259 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 92. | 2 | 0.917 | 0.2858 | 0.9995 | 0.9844 | 1.0375 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 112. | 3 | 0.894 | 0.2775 | 0.9994 | 0.9811 | 1.0451 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 132. | 4 | 0.855 | 0.2646 | 1.0002 | 0.9773 | 1.0523 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 152. | 5 | 0.751 | 0.2310 | 0.9991 | 0.9653 | 1.0615 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 172. | 6 | 0.868 | 0.2653 | 0.9998 | 0.9771 | 1.0788 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 192. | 7 | 0.957 | 0.2931 | 1.0005 | 0.9881 | 1.0765 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 212. | 8 | 1.066 | 0.3311 | 0.9994 | 1.0029 | 1.0504 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 232. | 9 | 1.126 | 0.3577 | 0.9999 | 1.0160 | 1.0052 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 252. | 10 | 1.146 | 0.3717 | 1.0001 | 1.0234 | 0.9650 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 272. | 11 | 1.150 | 0.3775 | 1.0003 | 1.0266 | 0.9423 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 292. | 12 | 1.150 | 0.3789 | 1.0029 | 1.0301 | 0.9338 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 312. | 13 | 1.152 | 0.3803 | 1.0006 | 1.0285 | 0.9307 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 332. | 14 | 1.152 | 0.3806 | 0.9993 | 1.0273 | 0.9299 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 352. | 15 | 1.003 | 0.3302 | 0.9979 | 1.0014 | 0.9300 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12. | 16 | 0.979 | 0.3186 | 1.0001 | 0.9985 | 0.9507 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 32. | 17 | 0.958 | 0.3076 | 1.0000 | 0.9937 | 0.9784 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 52. | 18 | 0.945 | 0.2992 | 0.9999 | 0.9901 | 1.0058 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |