FINAL REPORT ON CONTRACT NAS8-31563

STUDY TO DETERMINE PEENING STRESS PROFILE OF ROD PEENED ALUMINUM STRUCTURAL ALLOYS VERSUS SHOT PEENED MATERIAL

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FOREWORD

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Northrop Corporation, Aircraft Division, was the contractor with Mr. R.E. Rosas serving as Program Manager and Mr. B.G. Calfin, Assistant Program Manager, directing all activities. This report has been assigned Northrop No. MRDR 248 for internal control purposes.

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STUDY TO DETERMINE PEENING STRESS PROFILE OF ROD PEENED ALUMINUM STRUCTURAL ALLOYS VERSUS SHOT PEENED MATERIAL

OBJECTIVE

The objective of this program was to determine the peening stress profiles of rod peened aluminum structural alloys versus shot peened material to define the effective depth of the compressed surface layer.

INTRODUCTION

This final report has been prepared in accordance with the terms of NASA Contract NAS8-31563. It covers the work accomplished for the period July 1975 through December 1975. A total of forty-three rod peened and six shot peened profiles were prepared and analyzed for six aluminum alloys (2014, 2024, 2219, 6061, 7075, and 7079).

The introduction of compressive surface stresses in metals to improve fatigue properties and reduce susceptibility to stress corrosion is a concept that has been utilized for a great many years (1, 2, 3, 4, 5). In the authors' opinion shot peening has been proven to be the most cost effective process for introducing the desired compressed layer for the vast majority of industrial applications. Shot peening's major limitations are that portability is limited and it is a relatively dirty operation.

A NASA developed process (U.S. Patent #3,937,055) called rod peening (6) offers an attractive alternative to shot peening for selective applications. Its advantages over shot peening are:

1. Complete portability.
2. Clean operating conditions.
3. Develops deeper compressive layers.

Its limitations are:

1. Requires more operator judgement.
2. Coverage is slower for large, relatively flat areas.

Rod peening utilizes a bundle of radiused rods in a pneumatic gun in place of the round air propelled shot used in shot peening. In other aspects

the process parameters are analogous to shot peening, i.e., air line pressure, impingement geometry (rod tip radius vs. shot size) and time.

The use of X-ray techniques for measuring residual stresses is well documented (7). Basically, an X-ray beam impinging on a metallic surface is diffracted back at an easily determined angle which is primarily a function of lattice spacing, grain orientation and radiation wave length. Only grains having a certain orientation relative to the incident beam are able to reflect. By measuring the diffraction angle (θ) and inserting this into the Bragg equation, the lattice spacing (d) for a given impingement angle (Ψ) is calculated. The lattice spacing for two or more impingement angles is used to calculate lattice strain. This strain can then be converted to stress. By progressively removing discrete layers and taking residual stress readings, a complete stress profile of a given part can be determined.

If an entire layer is removed, the computed residual stress of each subsequent layer should be corrected by applying a thinning factor (8). The thinning factor compensates for the relaxation effect. In this program a "window" technique was employed for profiling. This involves progressively electropolishing within a 12.7mm(0.5 in.) diameter spot on the specimen. We know of no mathematical solutions available for computing the thinning factor for the "window" technique.

Our evaluation of the thinning factor situation indicated the following:

1. The relaxation effect of the "window" technique would be considerably less than that for the entire surface area layer removal method.
2. Formulation and verification of a thinning factor for the "window" technique would be costly and was considered beyond the scope of the program.
3. The lack of a thinning factor does not negate the value of the profiles for comparison purposes within this study, (a) assuming that the relaxation in each case is reasonably constant and (b) recognizing that the calculated stress values are probably higher than those determined by standard surface area procedures.

MATERIALS

NASA supplied four sets of aluminum alloy specimens for residual stress profiling. A description of the sets is given below and summarized in Table I, page 17.

1. Set I - One rod peened 2014-T6 specimen 8mm(0.315 in.) thick by 24.9mm(0.98 in.) wide by 78.7mm(3 in.) long which was used for familiarization and setting up analytical procedures. The rod peening parameters were unidentified by NASA.
2. Set II - One saturated rod peened 7079-T652 forging section (identified as NASA 19-2) and one nonpeened short transverse 7075-T651 plate section. (Rod peening parameters on page 8).
3. Set III - Twelve 6.4mm(0.250 in.) thick by 76.2mm(3 in.) by 76.2mm(3 in.) specimens. These represented three alloys (2014-T651, 2219-T87 and 7075-T651); two rod tip radii, 1.143mm(0.045 in.) and 1.778mm(0.070 in.) and two air line pressures, 241N/m^2(35 psi) and 345N/m^2(50 psi). Seven nonpeened blanks (two 2014-T651, two 2219-T87 and three 7075-T651) were supplied to Northrop for shot peening to a steel Almen intensity of 0.010A with 230 and 330 shot. One 7079-T6 thick plate section with surfaces that were as-machined and rod peened; as-rolled and rod peened, and as-rolled and double rod peened had been sectioned from the plate specimen described in reference 6a, page 2 and shown in Figures 2A and 2B Ibid page 6, identified as "Spec. #1" and "Spec. #3". Rod peening had been accomplished with a Cleco B1-B gun, employing 3.17mm(1/8 in.) diameter hardened steel rods having a tip radii of 1.778-3.3mm(.070-.130 in.), 345N/m^2 (50 psi) air pressure and the gun held in a vertical position at right angle to the surface of the plate. Saturation to an Almen intensity of .011A had been indicated by the test on a steel Almen strip. The peening time had been doubled for the "double peened" area on the 57mm (approximately 2-1/4 in.) thick plate.

4. Set IV - Twenty-five 38.1mm(1.5 in.) wide by 76.2mm(3 in.) long specimens. These represented five alloys (2014-T651, 2024-T3, 2219-T87, 6061-T6, and 7075-T651); two thicknesses, 4.83mm(0.190 in.) and 6.35mm(0.250 in.); three rod tip radii, 1.143mm(0.045 in.), 1.778mm(0.070 in.) and 3.048mm(0.120 in.) and four air line pressures 172N/m^2(25 psi), 241N/m^2(35 psi), 345N/m^2(50 psi) and 552N/m^2(80 psi).

PROCEDURE

X-Ray Diffraction:

Two X-ray diffraction units were used in the program. The Rigaku Strainflex (Figure 1) was the primary unit with the American Analytical Corporation (AAC) Fastress unit (Figure 1a) being used periodically for comparison purposes. The Rigaku Strainflex had a copper X-ray source with a nickel filter and was operated at 30KV and 10ma. The beam was collimated to a rectangular spot size of 1.52mm(0.060 in.) by 3.05mm(0.120 in.). The AAC Fastress had a dual diffractometer with two chromium X-ray sources with vanadium filters. The operating parameters were 15KV and 60ma, the beam sizes were 1.02mm(0.040 in.) in diameter.

All specimen thicknesses were measured prior to analysis. A positioning fixture (Figure 2) was used for all sets III and IV specimens. The fixture allowed the same area to be measured during progressive profiling. The accuracy and the correlation between the Rigaku Strainflex and the ACC Fastress were verified by periodically running stress-free aluminum powder specimens and preloaded tensile specimens on both units, per Northrop Specification (9).

The preloaded 7075-T6 tensile specimen and loading fixture are shown in Figure 3. The specimen is strain gaged front and back. At the 267MPa (40 ksi) load level, both the Rigaku Strainflex and the ACC Fastress agree within 6.90(1) of 13.78MPa (2 ksi). The 267MPa (40 ski) load level was considered optimum because previous experience had shown that for axial strains the correlation between the Rigaku Strainflex, the ACC Fastress and the strain gage was linear.

Profiling:

Both chem-milling and electropolishing (10) were evaluated for profiling during the initial portion of the program (on specimen set I).

The chem-milling procedure is delineated below:

1. Specimen thickness was measured.
2. Specimen was dipped in chem-mill maskant (Butadiene styrene block copoylmer) four times and air dried between applications for thirty minutes each time to build up a total thickness of approximately 0.6mm(0.022 in.).
3. Four windows 6.35mm(0.25 in.) by 6.35mm(0.25 in.) were excised.
4. A 10% by weight solution of sodium hydroxide was heated to 60 °C (140 °F) in a stainless steel beaker with constant stirring using an air driven stirring apparatus.
5. The specimen was lowered into the solution for fifteen second intervals, desmutted in a 5% HNO_3-H_2O solution, rinsed in running water and thickness measured with a micrometer.
6. The chem-mill removal rate was established to be approximately 0.375mm(0.0015 in.) per minute, employing this procedure.

Chem-milling was used only for the initial evaluation specimen on a 2014-T6 specimen (set I). Chem-milling was discontinued due to difficulty in maintaining a constant removal rate. Additionally, the formation of reaction products required two additional cleaning steps. Only Rigaku X-ray measurements were made on the chem-milled surfaces of this specimen. The ACC Fastress was down for maintenance.

Electropolishing:

A Struers Lectro-Pol electropolisher (Figures 4, page 29, and Figure 5, page 30) was used for the electropolishing procedure. This machine consists of a power control console and a separate pump and electrolyte jar. The system is self-contained, automatic, and operates on 110V. The pumping system is variable by means of an orifice control. Electrolytic polishing on the Struers does not ordinarily require a maskant be used on the specimen as with chem-milling. The pump device on the Struers has masks of various sizes and configurations as needed.

A 10.2mm(0.4 in.) diameter mask was utilized for the specimens of sets I and II. In an attempt to reduce the tendency of the cavity to "dish" during progressive profiling, a 25.4mm(1 in.) mask was initially used for specimens of set III.

The 25.4mm(1 in.) mask caused excessive distortion of the cavity and was discontinued. All subsequent electropolishing was accomplished with a 17.2mm(0.5 in.) diameter mask. The built-in cooling coil on the Struers Lectro-Polisher was also used in conjunction with the electropolishing of sets III and IV. The cooling coil, operating at 20 (68) to 21 °C (70 °F) stabilized the electrolyte temperature and resulted in more reproducible metal removal.

The general procedure employed for electropolishing is given below:

1. Specimen thickness was measured.
2. Desired window size was inserted in the unit.
3. An electrolyte identified by Struers A-2* was placed in the electrolyte jar.
4. Polishing parameters were set: current, 0.6 AMP at 25 volts; flow rate, No. 5; window size, $1cm^2$; and time 60 seconds.
5. The specimen was placed face down on the window as above. The automatic polishing sequence button was pushed, polishing was accomplished for two thirty second intervals, followed by a water rinse. A micrometer measurement was made after each interval.
6. These settings resulted in .025mm(0.001 in.) per minute metal removal. No further processing was necessary.

Analysis - Set I:

Set I consisted of a single 8mm(0.315 in.) thick by 24.9mm(0.98 in.) wide by 78.7mm(3 in.) 2014-T6 specimen. The rod peening parameters were unidentified by NASA.

* A-2 solution
78 ml Perchloric acid (must be refrigerated)
120 ml Distilled water
700 ml Ethanol
100 ml Butylcellosolve
Add cold Perchloric acid immediately before use!

This specimen was used to familiarize Northrop with the unique characteristics of rod peening related by X-ray residual stress analysis.

The specimen was identified by four zone numbers (Figure 6, page 31). Surface readings were taken with the Rigaku and Fastress X-ray machines.

Initially a longitudinal strip 8.45mm(0.333 in.) wide was progressively chem-milled down to 0.23mm(0.009 in.), 0.38mm(0.015 in.), and 0.64mm(0.025 in.). Four readings at each level were taken on the etched surface, (locations LC-4C, Figure 6, page 31) and on the as-peened strip (locations 1P-4P, Ibid) using only the Rigaku machine (Table III, page 21).

At this point the electropolishing was started. Two sets of four spots (1P-4P and 1C-4C) each 10.16mm(0.4 in.) diameter were simultaneously etched on the peened and previously chem-milled (to 0.64mm/0.025 in.) strip in 0.05mm(0.002 in.) and 0.09mm(0.0035 in.) increments as shown in Figure 6, page 31 and recorded in Table III, page 21.

ACC Fastress and Rigaku Strainflex averages indicated excellent correlation for the 0mm(0 in.), 0.05mm(0.002 in.) and 0.09mm(0.0035 in.) levels (locations 1P-4P) and no correlation for the deeper readings, 0.69mm(0.027 in.) and 0.72mm(0.0285 in.), (locations 1C-4C). In addition, there were several high tensile readings noted.

Texturing - Set I:

It was at this time that a problem of texturing (11) was first suspected, however, no X-ray diffraction Laue pattern was made to establish the existence of "texturing" or "orientation" effects. A joint discussion was held with B. Calfin (Materials Research Laboratory), W. Sturrock (Materials Engineering), E. Lauchner (Materials Engineering), R. Erwin (Quality Assurance) and R. Rosas (Manufacturing Research and Development) on the anomalous readings. It was decided to utilize a combination of multiple ψ readings (12) and linear regression to determine the actual stress at the last point, 0.72mm(0.0285 in.). Since only the Rigaku Strainflex could be adjusted for varying ψ readings, no correlation was available for the ACC Fastress. The results of seven ψ readings gave what appears to be a more realistic value of 74.5MPa(-10.8 ksi) as opposed to an average of 49.6MPA(-71.9 ksi) for the Rigaku Strainflex and an average of 37.6MPa(-54.5 ksi) for the ACC Fastress. Since in this preliminary evaluation only electropolishing was employed for comparison between the Fastress and Rigaku

measurements or between the Rigaku two vs seven ψ readings, electropolishing was the method selected for subsequent profiling.

Analysis - Set II consisted of two specimens. The first identified as NASA 19-2 was an 8.3mm(0.326 in.) thick by 25.4mm(1 in.) wide by 46mm(1.813 in.) long 7079-T652 section of a strip cut from a large fin forging. The original strip, 25.4 x 203mm(1 x 8 in.), had been rod peened to saturation in a specimen holder recessed to fully support the specimen during peening employing rod tip radii of 1.778-3.0mm(0.070-0.120 in.) with 345N/m^2(50 psi) air pressure. NASA specimen 19-2 was profiled 0.025mm(0.001 in.) at a time to a total depth of 0.965mm(0.038 in.). In order to ascertain possible texturing effects, seven multiple ψ readings were taken through the 0.508mm(0.020 in.) level. After that the normal two ψ reading procedure was followed until zero stress was reached at 0.965mm(0.038 in.). Individual data are shown in Appendix A.

The second specimen of set II was a 7075-T651 nonpeened plate specimen, 6.4mm(0.25 in.) by 18.5mm(0.73 in.) by 146.1mm(5.75 in.). It was a short transverse section of a 146.1mm(5.75 in.) thick plate. A surface scan was taken at six locations, each side in 27.3mm(1.075 in.) increments on the centerline. Individual data are recorded in Appendix A.

Analysis - Set III consisted of twenty specimens. The first nineteen were 6.4mm(0.250 in.) by 76.2mm(3 in.) by 76.2mm(3 in.) specimens (Figures 7, 8, and 9, page 32 through page 34). Twelve were rod peened at MSFC and witnessed by Brent Calfin of Northrop on 1 August 1975. The specimen blanks were sheared and then hand cleaned with MEK prior to rod peening. Seven specimen blanks were provided to Northrop for comparative shot peening.

The twentieth specimen of set III was a 7079-T6 thick plate section (Figure 10, page 35) with surfaces that were as-machined and rod peened, as-rolled and rod peened, and as-rolled and double rod peened. The rod peening parameters were described on page 3.

Rod Peening - Set III:

Four specimens of each alloy were rod peened, employing one for each of four conditions. The individual specimens were inserted approximately 12.7mm(0.5 in.) into a bench vise with a 25.4mm(1 in.) thick aluminum backing plate, the top edge of the blank being free. A Cleco B1-1 gun, serial number A1297 was used for rod peening with a number 3 setting, (i.e., toward the lever).

All rod peening was transverse to the rolling direction for a nominal fifty seconds (see individual data sheets in Appendix B for exact times). The four peening conditions were: 1.143mm(0.045 in.) tip radius/241N/m^2(35 psi); 1.143mm(0.045 in.) tip radius/345N/m^2(50 psi); 1.778mm(0.070 in.) tip radius/345N/m^2(50 psi) and 1.778mm(0.070 in.) tip radius/241N/m^2(35 psi).

Shot Peening - Set III:

The seven remaining specimen blanks were instrumented with Micro-measurements Inc. EA13-250BF-350 strain gages. The gages were positioned on the back side in the center of the specimen parallel to the rolling direction. Six of the blanks, two of each alloy, were individually mounted in the fixture shown in Figure 11, page 36. A 6.4mm(0.250 in.) thick, full size 7075-T651 face sheet was fitted between the specimen and the steel plate. The face of the aluminum spacer was identical to that of Figure 11 except that the holes were oversized and not tapped. An assembled fixture with a specimen mounted and fixture components are shown in Figure 12, page 37.

Shot peening was done in a Model 703 Peenamatic machine by Metal Improvement Company at their Los Angeles facility. The specimens were rotated at 15 rpm with a nozzle to specimen distance of 152mm(6 in.). All specimens were peened to an intensity of 0.010A based on standard steel Almen strips. Specimens 2014-T651(A), 2014-T651(B), 2219-T87(A), 2219-T87(B), and 7075-T651(A) were peened with 230 steel shot at 241N/m^2(35 psi) for one minute. 7075-T651(B) was peened with 330 steel shot at 138N/m^2(20 psi) for three minutes. Specimen 7075-T651(C) was not shot peened. It was used as a strain gage reference specimen.

Prior to electropolishing, plate curvature was measured on all rod peened specimens and is shown in Table II, and stress readings were taken at the center of the surface. Initially a 25.4mm(1 in.) diameter spot was electropolished to a depth of 0.025mm(0.001 in.). Excessive solution heating and arcing was experienced and all subsequent electropolishing was done with a 12.7mm(0.5 in.) diameter mask. Profiling was done at 0.025mm(0.001 in.) increments to a depth of 0.127mm(0.005 in.), then one set of 0.51mm(0.002 in.) to 0.178mm (0.007 in.) and from then on to 0.076mm(0.003 in.) increments. The bulk of the readings were made with the Rigaku Strainflex utilizing a copper tube and with the ACC Fastress chromium tube combination. At the 0.406mm(0.016 in.) level, several multiple ψ readings were taken in addition to a series with the

Rigaku Strainflex chromium tube combination. Individual data are shown in Appendix B.

Strain gage leads on shot peened specimens 2014-T651(B) and 2219-T87(B) of set III were damaged and after repair a new balance zero could not be established. The change in residual stress on the back side for all six shot peened specimens was determined as a function of thickness after profiling by electropolishing and was recorded. Surface readings after shot peening were taken with the Rigaku Strainflex copper tube, Rigaku Strainflex chromium tube, and ACC Fastress chromium tube. Individual data are shown in Appendix E. Readings were taken in 0.025mm(0.001 in.) increments through 0.127mm(0.005 in.) and in 0.076mm(0.003 in.) until zero stress was recorded.

Thick Plate - Set III:

The profiling of the 7079-T6 thick plate section with three surface conditions was accomplished with the 12.7mm(0.5 in.) diameter spot electropolishing technique. The profiling sequence for the as-machined and rod peened surface and the as-rolled and rod peened surface was in 0.025mm(0.001 in.) increments through 0.127mm(0.005 in.), 0.076mm(0.003 in.) through 1.041mm(0.041 in.) and 0.127mm(0.005 in.) increments until tensile stresses were reached. The as-rolled and double rod peened surface was profiled in 0.025mm(0.001 in.) increments through 0.127mm(0.005 in.) and 0.127mm(0.005 in.) increments until tensile values were reached. The individual data are given in Appendix B.

Set IV consisted of twenty-five rod peened specimens and represented two thicknesses; 4.83mm(0.190 in.) and 6.35mm(0.250 in.) and were 38.1mm(1.5 in.) wide by 76.2mm(3 in.) long. The curvature was measured prior to electropolishing and is shown in Table II. The profiling sequence was 0.07mm(0.003 in.) increments through 0.381mm(0.015 in.) and then 0.254mm(0.010 in.) increments until zero stress was reached. The individual data are given in Appendix C.

A Hewlett-Packard 9810A calculator with a statistics block (12) was used to analyze the test data. Both linear and parabolic regression solutions were utilized to minimize the effects of data scatter. Linear regression was required primarily for multiple ψ analysis. The final stress profile curves were plotted with the aid of parabolic regression analysis. The hypothesis was that the first portion of the peening residual stress curves is essentially parabolic in form. The first 0.762mm(0.030 in.) to 1.143mm(0.045 in.) portion

of each data set was assumed to be a parabola and an equation for the curve was then derived. The remainder of the profile was then faired in between the resultant parabola and the remaining data points. The correlation coefficients (r^2) were used as a measure of data scatter (i.e., one equals perfect fit and 0 equals no correlation). The equations and correlation coefficients are recorded on the individual curves.

All data were taken in English units and converted to S.I. units.

RESULTS AND DISCUSSION

Set I:

The results of the 2014-T6 specimen are tabulated in Table III, page 21. ACC Fastress and Rigaku Strainflex average of three (page 21, note 3) indicate excellent correlation for the 0mm(0 in.), 0.05mm(0.002 in.) and 0.09mm(0.0035 in.) levels and no correlation for the deeper levels of electropolished surfaces. The utilization of multiple ψ readings from the Rigaku Strainflex combined with linear regression analysis gave a more realistic value of -74.5MPa(-10.8 ksi) at the 0.72mm(0.0285 in.) level as opposed to an average of -496MPa(-71.9 ksi) for the normal two ψ readings of the Rigaku Strainflex and an average of -376MPa(54.5 ksi) for the ACC Fastress.

Set II:

The residual stress profile of NASA specimen 19-2 is shown in Figure 13, page 38, and summarized in Table IV, page 22. The distribution of the data points is excellent and indicates a nominal surface stress of -361MPa(-52 ksi) going to a maximum of -480MPa(-70 ksi) at a subsurface level between 0.203mm(0.008 in.) to 0.229mm(0.009 in.) and slowly decreasing to zero stress at 0.965mm(0.038 in.).

The surface scan across the thickness of the 146.1mm(5.75 in.) thick 7075-T651 plate specimen is shown in Figure 14, page 39. The average stress of the machined surface within 4.75mm(0.187 in.) of the rolled surface is -284MPa(-41 ksi) and the average interior stress is 170MPa(25 ksi). This short transverse specimen is machined with a surface finish of approximately 16 rms.

Set III:

The residual stress profiles for the 7079-T6 specimen are shown in Figures 15, 16, and 17, pages 40 through 42 and summarized in Table IV, page 22. The machined and rod peened section had the lowest surface stress, -257MPa(-32.7 ksi)

but the deepest total stress layer. There was no apparent significant difference in the as-rolled rod peened and the as-rolled double rod peened sections. The average zero stress depth of 1.31mm(0.052 in.) was deeper than had been expected, based on the previous specimens.

"Peening severity" is defined by the authors as the combination of increased rod tip radii and air line pressure. Table V indicates that within a single alloy grouping increasing air line pressure and tip radii for the 38.1mm(1.5 in.) by 76.2mm(3 in.) group increases specimen curvature. The residual stress profiles for the twelve 76.2mm(3 in.) by 76.2mm(3 in.) specimens are shown in Figures 18 through 29 and summarized in Table V, page 23.

No correlation between "peening severity" and surface stress or maximum stress/depth could be determined. The zero stress depth did tend to increase with "peening severity".

The shot peening profiles are shown in Figures 30, 31, and 32, pages 55 through 57 and summarized in Table VI, page 24. The strain gages which were positioned on the nonpeened side of the six shot peened specimens indicated an average surface stress of 8.73MPa(1.8 ksi) after shot peening. No correlation between profiling depth and change in strain gage readings could be determined. The total compressive stress layer of the shot peened specimens is considerably less than for rod peened specimens of the same alloy and specimen dimensions. The zero stress depth for the 7075-T651/330 shot specimen was 70% greater than the 7075-T651/230 shot specimen. Surface stresses for the shot peened specimen varied from an average of 50% (for 2014-T651) to 90% (for 7075-T651) for the corresponding rod peened specimens.

Set IV:

The residual stress profiles for the twenty-five 38.1mm(1.5 in.) by 76.2mm(3 in.) specimens are shown in Figures 33 through 57, pages 58 through 82 and summarized in Table VII, page 25.

Sets III and IV:

The relationship of rod peening stress to compression yield strength is shown in Figures 58 and 59, pages 83 and 84. Figure 58 shows the curves for the twelve 76.2mm(3 in.) by 76.2mm(3 in.) set III specimens. The average spread between maximum and surface stresses is approximately 75MPa(11 ksi). For the twenty-five 38.1mm(1.5 in.) by 76.2mm(3 in.) set IV

specimens (Figure 59) the average spread is 185MPa(27 ksi). No correlation that would have allowed plotting constant peening parameters in Figures 58 and 59 was ascertained.

RECOMMENDATIONS

1. Further work should be done to define rod peening parameter limits as a function of improved stress corrosion resistance and fatigue life improvement.
2. Multiple specimens for each condition are necessary and would have been beneficial in achieving better data correlation.
3. Rod peened specimen blanks should be mounted in a substantial fixture in order to get more reproducible results.
4. Material thicker than 6.4mm(1/4 in.) and shot peening intensity greater than 0.010A should be employed for better comparison with rod peening.
5. The possible use of rod peening for forming and straightening should be investigated.
6. The effect of rod peening on steel and titanium alloys should be evaluated.

CONCLUSIONS

Based on the peening stress profiles measured for rod peened and shot peened aluminum alloys, the following is concluded.

1. The resulting stress profiles measurements on both rod peened and shot peened specimens indicated the 0.010A Almen intensity employed for comparison was insufficient for valid comparison of both processes.
2. Rod peening imparts an extremely deep compressive layer, approaching the yield strength on aluminum alloys, ranging in strength levels from 6061-T6 to 7075-T651.

3. No correlation of maximum stress/depth with peening severity is apparent from the results of this study.

4. Strain gage readings were not useful for correlating with shot peening profiles due to the minimum relaxation experienced in a "window" profiled specimen.

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11. Marion, R. H. and Cohen, J. B., "Anomalies in Measurement of Residual Stress by X-Ray Diffraction", Technical Report No. 9, Northwestern University, Evanston, Illinois, July 1, 1974, for Office of Naval Research Metallurgy Branch Contract 5345-444, 49 pp. (AD 783677)

12. "Operating Manual, Hewlett-Packard 9810A Calculator Statistics Block" Hewlett-Packard Company, Loveland, Colorado, 1971

TABLE I- PEENING EVALUATION MATERIALS

Material	Set No.	Nominal Thickness mm (in.)	Manufacturer	MSFC Stock No.	No. Specimens
2014-T6	I	8 (0.315)	--	--	1
2014-T651	III & IV	6.35 (0.250)	Reynolds	LN5-7094	12
2024-T3	IV	4.825 (0.190)	Olin	640-4326	4
2219-T87	III & IV	6.35 (0.250)	Alcoa	LN4-8507P	9
6061-T6	IV	6.35 (0.250)	--	--	3
7075-T6	IV	4.825 (0.190)	Reynolds	585-2048	5
7075-T651	III & IV	6.35 (0.250)	Reynolds	LN4-8393T	11
7075-T651	II	146.1 (5.75)	--	--	1
7079-T6	III	58.725 (2.312)	--	--	1
7079-T652	II	8.280 (0.326)	--	--	1

TABLE II

PLATE CURVATURE OF NASA ROD PEENED SPECIMENS PRIOR TO ELECTROPOLISHING

MSFC SPEC NO (1)	MATERIAL	SIZE (2)	ROD PEENING PARAMETERS	CURVATURE ∥ TO R.D. (3) mm	(IN)	CURVATURE ⊥ TO R.D. (4) mm	(IN)
II	2014-T651	A	241N/m^2(35psi)-1.145mm(0.045IN)T.R. (5)	0.381	(0.015)	0.203	(0.008)
XI	2014-T651	A	241N/m^2(35psi)-1.778mm(0.070IN)T.R.	0.330	(0.013)	0.178	(0.007)
V	2014-T651	A	345N/m^2(50psi)-1.145mm(0.045IN)T.R.	0.432	(0.017)	0.330	(0.013)
VIII	2014T651	A	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.406	(0.016)	0.279	(0.011)
I	2219-T87	A	241N/m^2(35psi)-1.145mm(0.045IN)T.R.	0.305	(0.012)	0.254	(0.010)
X	2219-T87	A	241N/m^2(35psi)-1.778mm(0.070IN)T.R.	0.279	(0.011)	0.254	(0.010)
IV	2219-T87	A	345N/m^2(50psi)-1.145mm(0.045IN)T.R.	0.330	(0.013)	0.127	(0.005)
VII	2219-T87	A	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.381	(0.015)	0.178	(0.007)
III	7075-T651	A	241N/m^2(35psi)-1.145mm(0.045IN)T.R.	0.432	(0.017)	0.406	(0.016)
XII	7075-T651	A	241N/m^2(35psi)-1.778mm(0.070IN)T.R.	0.406	(0.016)	0.356	(0.014)
VI	7075-T651	A	345N/m^2(50psi)-1.145mm(0.045IN)T.R.	0.483	(0.019)	0.432	(0.017)
IX	7075-T651	A	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.457	(0.018)	0.406	(0.016)
2	2014-T651	B	172N/m^2(25psi)-1.145mm(0.045IN)T.R.	0.203	(0.008)	0.051	(0.002)
7	2014-T651	B	345N/m^2(50psi)-1.145mm(0.045IN)T.R.	0.305	(0.012)	0.127	(0.005)
12	2014-T651	B	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.330	(0.013)	0.127	(0.005)
16	2014-T651	B	345N/m^2(50psi)-3.048mm(0.120IN)T.R.	0.356	(0.014)	0.152	(0.006)
19	2014-T651	B	552N/m^2(80psi)-1.778mm(0.070IN)T.R.	0.330	(0.013)	0.152	(0.006)
24	2014-T651	B	552N/m^2(80psi)-3.048mm(0.120IN)T.R.	0.356	(0.014)	0.152	(0.006)
4	2024-T3	C	241N/m^2(35psi)-1.145mm(0.045IN)T.R.	0.610	(0.024)	0.305	(0.012)
8	2024-T3	C	345N/m^2(50psi)-1.145mm(0.045IN)T.R.	0.737	(0.029)	0.406	(0.016)
15	2024-T3	C	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.864	(0.034)	0.483	(0.019)
21	2024-T3	C	552N/m^2(80psi)-1.778mm(0.070IN)T.R.	0.838	(0.033)	0.584	(0.023)
10	2219-T87	B	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.330	(0.013)	0.229	(0.009)
17	2219-T87	B	552N/m^2(80psi)-1.778mm(0.070IN)T.R.	0.356	(0.014)	0.178	(0.007)
22	2219-T87	B	552N/m^2(80psi)-3.048mm(0.120IN)T.R.	0.330	(0.013)	0.152	(0.006)

TABLE II

PLATE CURVATURE OF NASA ROD PEENED SPECIMENS PRIOR TO ELECTROPOLISHING

MSFC SPEC NO (1)	MATERIAL	SIZE(2)	ROD PEENING PARAMETERS	CURVATURE ∥ TO R.D.(3) mm	(IN)	CURVATURE ⊥ TO R.D.(4) mm	(IN)
5	6061-T6	B	241N/m^2(35psi)-1.145mm(0.045IN)T.R.	0.229	(0.009)	0.102	(0.004)
6	6061-T6	B	345N/m^2(50psi)-1.145mm(0.045IN)T.R.	0.305	(0.012)	0.127	(0.005)
13	6061-T6	B	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.330	(0.013)	0.203	(0.008)
3	7075-T6	C	241N/m^2(35psi)-1.145mm(0.045IN)T.R.	0.610	(0.024)	0.254	(0.010)
	7075-T6	C	345N/m^2(50psi)-1.145mm(0.045IN)T.R.	0.686	(0.027)	0.305	(0.012)
14	7075-T6	C	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.762	(0.030)	0.279	(0.011)
20	7075-T6	C	552N/m^2(80psi)-1.778mm(0.070IN)T.R.	0.711	(0.028)	0.330	(0.013)
25	7075-T6	C	552N/m^2(80psi)-3.048mm(0.120IN)T.R.	0.762	(0.030)	0.279	(0.011)
1	7075-T651	B	172N/m^2(25psi)-1.145mm(0.045IN)T.R.	0.229	(0.009)	0.076	(0.003)
11	7075-T651	B	345N/m^2(50psi)-1.778mm(0.070IN)T.R.	0.381	(0.015)	0.152	(0.006)
18	7075-T651	B	552N/m^2(80psi)-1.778mm(0.070IN)T.R.	0.406	(0.016)	0.152	(0.006)
23	7075-T651	B	552N/m^2(80psi)-3.048mm(0.120IN)T.R.	0.381	(0.015)	0.152	(0.006)

(1) Roman Numerals are from Set III and Arabic Numerals are from Set IV
(2) A=6.35mm (0.250IN) x 76.2mm (3IN) x 76.2mm(3 in.)
B=6.35mm (0.250IN) x 38.1mm (1.5IN) x 76.2mm(3 in.)
C=4.825mm (0.190IN) x 38.1mm (1.5IN) x 76.2mm
(3) Parallel to the rolling direction
(4) Transverse to the rolling direction
(5) T.R. = Rod tip radii

TABLE III- DATA SUMMARY SET I

2014-T6 ROD PEENED SPECIMEN

Reading Series	Depth mm (mils)	Profiling[1] Method	Instrument	Residual Stress MPa/(ksi) Location (2) 1P	2P	3P	4P	1C	2C	3C	4C
1	0(0)	-	Rigaku[3]	-313 (-45)	-368 (-53)	-278 (-40)	-308 (-45)				
1	0(0)	-	Fastress	-290 (-42)	-276 (-40)	-379 (-55)	-352 (-51)				
2	0.23(9)	C	Rigaku					-214 (-31)	-310 (-45)	-200 (-29)	-441 (-64)
3	0.38(15)	C	Rigaku					-248 (-36)	-262 (-38)	-303 (-44)	-400 (-58)
4	0.64(25)	C	Rigaku					-490 (-71)	-283 (-41)	-531 (-77)	-593 (-86)
5	0.05(2)	E	Rigaku	-290 (-42)	-276 (-40)	-379 (-55)	-352 (-51)				
5	0.05(2)	E	Fastress	-207 (-30)	-427 (-62)	-310 (-45)	-379 (-55)				
6	0.09(3.5)	E	Rigaku	-379 (-55)	-214 (-31)	-455 (-66)	-303 (-41)				
6	0.09(3.5)	E	Fastress	-207 (-30)	-524 (-76)	-241 (-35)	-414 (-60)				
7	0.69(27)	E	Rigaku					-124 (-18)	-455 (-66)	-414 (-60)	-441 (-64)
7	0.69(27)	E	Fastress					-855 (-124)	-552 (-80)	+690 (+100)	+276 (+40)
8	0.72(28.5)	E	Rigaku					-696 (-101)	-400 (-58)	-221 (-32)	-669 (-97)
8	0.72(28.5)	E	Fastress					-538 (-78)	-345 (-50)	-1034 (-150)	+414 (+60)
8	0.72(28.5)	E	Rigaku[4]								-76(-11)

(1) C ≙ Chem Mill & E = Electro-Polish
(2) See Figure 6 for location
(3) Average of three readings taken at different times
(4) Calculated from multi-ψ readings

TABLE IV - DATA SUMMARY ROD PEENED 7079 PLATE & FORGING SPECIMENS

MSFC Spec No.	Set No.	Material/Rod Peening Condition	Surface Stress MPa (ksi)	Max. Stress/Depth MPa (ksi)/mm (in.)	Zero Stress Depth mm (in.)
19-2	II	7079-T652/Saturated rod peened	-361 (-52.4)	-480 (-69.6) 0.28 (0.011)	0.94 (0.037)
B	III	7079-T6/As-machined & rod peened	-257 (-37.3)	-515 (-74.7) 0.42 (0.017)	1.45 (0.057)
B	III	7079-T6/As-rolled & rod peened	-381 (-55.3)	-500 (-72.5) 0.34 (0.013)	1.30 (0.051)
B	III	7079-T6/As-rolled & double rod peened	-385 (-55.8)	-525 (-76.1) 0.36 (0.014)	1.19 (0.047)

TABLE V - DATA SUMMARY - 6.35 mm (0.250 in.) x 76.2 mm (3 in.) x 76.2 mm (3 in.)

ROD PEENED ALUMINUM ALLOY SPECIMENS - SET III

MSFC Spec	Mat'l/Rod Peening Parameters[1]	Surface Stress MPa (ksi)	Max Stress/Depth MPa (ksi)/mm(in.)	Zero Stress Depth mm (in.)
II	2014-T651/241 N /m^2(35 psi)-1.145 mm (0.045 in.)T.R.[2]	-376(-54.5)	-430(-62.4)/0.32(0.013)	1.21(0.048)
XI	2014-T651/241 N /m^2(35 psi)-1.778 mm (0.070 in.)T.R.	-400(58.0)	-440(-63.8)/0.31(0.012)	1.27(0.050)
V	2014-T651/345 N/m^2(50 psi)-1.145 mm(0.045 in.)T.R.	-401(-58.2)	-410(-59.5)/0.25(0.010)	1.32(0.052)
VIII	2014-T651/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R.	-374(-54.2)	-400(-58.0)/0.25(0.010)	1.42(0.056)
I	2219-T87/241 N/m^2(35 psi)-1.145 mm(0.045 in.)T.R.	-227(-32.9)	-370(-53.7)/0.45(0.018)	1.38(0.054)
X	2219-T87/241 N/m^2(35 psi)-1.778 mm(0.070 in.)T.R.	-208(-30.2)	-320(-46.4)/0.42(0.017)	1.35(0.053)
IV	2219-T87/345 N/m^2(50 psi)-1.145 mm(0.045 in.)T.R.	-227(-32.9)	-365(-52.9)/0.38(0.015)	1.49(0.059)
VII	2219-T87/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R.	-315(-45.7)	-320(-46.4)/0.24(0.009)	1.43(0.056)
III	7075-T651/241 N/m^2(35 psi)-1.145 mm(0.045 in.)T.R.	-468(-67.9)	-590(-85.6)/0.37(0.015)	1.37(0.054)
XII	7075-T651/241 N/m^2(35 psi)-1.778 mm(0.070 in.)T.R.	-478(-69.3)	-530(-76.9)/0.26(0.010)	1.22(0.048)
VI	7075-T651/345 N/m^2(50 psi)-1.145 mm(0.045 in.)T.R.	-413(-59.7)	-530(-76.9)/0.39(0.015)	1.52(0.060)
IX	7075-T651/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R.	-443(-64.2)	-565(-81.9)/0.38(0.015)	1.35(0.053)

(1) Time was nominal 50 sec.

(2) T.R. = Rod tip radii

TABLE VI- DATA SUMMARY - 6.35 mm(0.250 in.) x 76.2 mm (3 in.) x 76.2 mm (3 in.)

SHOT PEENED ALUMINUM ALLOY SPECIMENS - SET III

Spec I.D.	Material/Shot Peening Parameters[1]	Surface Stress MPa (ksi)	Max Stress/Depth MPa (ksi)/mm(in.)	Zero Stress Depth mm (in.)
(A)	2014-T651/230 Shot-241 N/m^2(35 psi)-60 Sec-152 mm(6 in.)-15 rpm	-200(-29.0)	-425 (-61.9)0.07(0.003)	0.41(0.016)
(B)	2014-T651/230 Shot-241 N/m^2(35 psi)-60 Sec-152 mm(6 in.)-15 rpm	-200(-29.0)	-420 (-60.9)0.12(0.005)	0.30(0.012)
(A)	2219-T87/230 Shot -241 N/m^2(35 psi)-60 Sec-152 mm(6 in.)-15 rpm	-210(-30.5)	-290 (-42.1)0.08(0.003)	0.42(0.017)
(B)	2219-T87/230 Shot -241 N/m^2(35 psi)-60 Sec-152 mm(6 in.)-15 rpm	-220(-31.9)	-335 (-48.6)0.08(0.003)	0.33(0.013)
(A)	7075-T651/230 Shot -241 N/m^2(35 psi)-60 Sec -152 mm(6 in.) -15 rpm	-335(-48.6)	-580(-84.1) 0.09(0.004)	0.32(0.013)
(B)	7075-T651/330 Shot -138 N/m^2(20 psi)-180 Sec -152 mm(6 in.)-15 rpm	-370(-53.7)	-570(-82.7) 0.07(0.003)	0.57(0.022)

(1) Steel Almen intensity was 0.010A

TABLE VII—DATA SUMMARY - 38.1 mm(1.5 in.) x 76.2 mm (3 in.)

ROD PEENED ALUMINUM ALLOY SPECIMENS-SET IV

MSFC Spec	Mat'l/Rod Peening Parameters[1]/THK-mm(in.)[2]	Surface Stress MPa (ksi)	Max Stress/Depth MPa (ksi)/mm(in.)	Zero Stress Depth mm (in.)
2	2014-T651/172 N/m^2(25 psi)-1.145 mm(0.045 in.)T.R./6.35(0.250)	-305(-44.3)	-470(-68.2)/0.39(0.015)	1.16(0.046)
7	2014-T651/345 N/m^2(50 psi)-1.145 mm(0.045 in.)T.R./6.35(0.250)	-188(-27.2)	-405(-58.7)/0.64(0.025)	1.45(0.057)
12	2014-T651/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R./6.35(0.250)	-212(-30.8)	-315(-45.7)/0.50(0.020)	1.60(0.063)
16	2014-T651/345 N/m^2(50 psi)-3.048 mm(0.120 in.)T.R./6.35(0.250)	-256(-37.2)	-415(-60.2)/0.89(0.035)	1.63(0.064)
19	2014-T651/552 N/m^2(80 psi)-1.778 mm(0.070 in.)T.R./6.35(0.250)	-165(-23.9)	-405(-58.7)/0.55(0.022)	1.28(0.050)
24	2014-T651/552 M/m^2(80 psi)-3.048 mm(0.120 in.)T.R./6.35(0.250)	-203(-29.5)	-362(-52.5)/0.64(0.025)	1.50(0.059)
4	2024-T3/241 N/m^2(35 psi)-1.145 mm(0.045 in.)T.R./4.83(0.190)	-258(-37.4)	-400(-58.0)/0.50(0.020)	1.48(0.058)
8	2024-T3/345 N/m^2(50 psi)-1.145 mm(0.045 in.)T.R./4.83(0.190)	-239(-34.6)	-380(-55.1)/0.44(0.017)	1.26(0.050)
15	2024-T3/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R./4.83(0.190)	-196(-28.4)	-535(-77.6)/0.64(0.025)	1.42(0.056)
21	2024-T3/552 N/m^2(80 psi)-1.778 mm(0.070 in.)T.R./4.83(0.190)	-174(-25.2)	-400(-58.0)/0.89(0.035)	1.82(0.072)
10	2219-T87/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R./6.35(0.250)	-128(-18.5)	-390(-56.6)/0.60(0.024)	1.38(0.054)
17	2219-T87/552 N/m^2(80 psi)-1.778 mm(0.070 in.)T.R/6.35(0.250)	-117(-16.9)	-270(-39.2)/0.68(0.027)	1.65(0.065)
22	2219-T87/552 N/m^2(80 psi)-3.048 mm(0.120 in.)T.R./6.35(0.250)	-242(-35.1)	-245(-35.5)/ - -	1.50(0.059)
5	6061-T6/241 N/m^2(35 psi)-1.145 mm(0.045 in.)T.R./6.35(0.250)	-147(-21.3)	-350(-50.8)/0.64(0.025)	1.61(0.063)
6	6061-T6/345 N/m^2(50 psi)-1.145 mm(0.045 in.)T.R./6.35(0.250)	-90(-13.0)	-350(-50.8)/0.70(0.028)	1.40(0.055)
13	6061-T6/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R./6.35(0.250)	-119(-17.2)	-270(-39.2)/0.85(0.033)	1.75(0.069)
3	7075-T6/241 N/m^2(35 psi)-1.145 mm(0.045 in.)T.R./4.83(0.190)	-443(-64.3)	-490(-71.1)/0.64(0.025)	1.41(0.056)
9	7075-T6/345 N/m^2(50 psi)-1.145 mm(0.045 in.)T.R./4.83(0.190)	-419(-60.8)	-560(-81.2)/0.35(0.014)	1.14(0.045)
14	7075-T6/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R./4.83(0.190)	-360(-52.2)	-480(-69.6)/0.46(0.018)	1.66(0.065)
20	7075-T6/552 N/m^2(80 psi)-1.778 mm(0.070 in.)T.R./4.83(0.190)	-279(-40.4)	-530(-76.9)/0.45(0.018)	1.15(0.045)
25	7075-T6/552 N/m^2(80 psi)-3.048 mm(0.120 in.)T.R./4.83(0.190)	-155(-22.5)	-562(-81.5)/0.58(0.023)	1.20(0.047)
1	7075-T651/172 N/m^2(25 psi)-1.145 mm(0.045 in.)T.R./635(0.250)	-474(-68.7)	-630(-91.4)/0.35(0.014)	1.42(0.056)
11	7075-T651/345 N/m^2(50 psi)-1.778 mm(0.070 in.)T.R./635(0.250)	-326(-47.3)	-600(-87.0)/0.52(0.020)	1.43(0.056)
18	7075-T651/552 N/m^2(80 psi)-1.778 mm(0.070 in.)T.R./635(0.250)	-414(-60.1)	-520(-75.4)/0.39(0.015)	1.55(0.061)
23	7075-T651/552 N/m^2(80 psi)-3.048 mm(0.120 in.)T.R./635(0.250)	-306(-44.4)	-460(-66.7)/0.69(0.027)	1.37(0.54)

(1) Time was 100 sec.
(2) T.R. = Rod tip radii

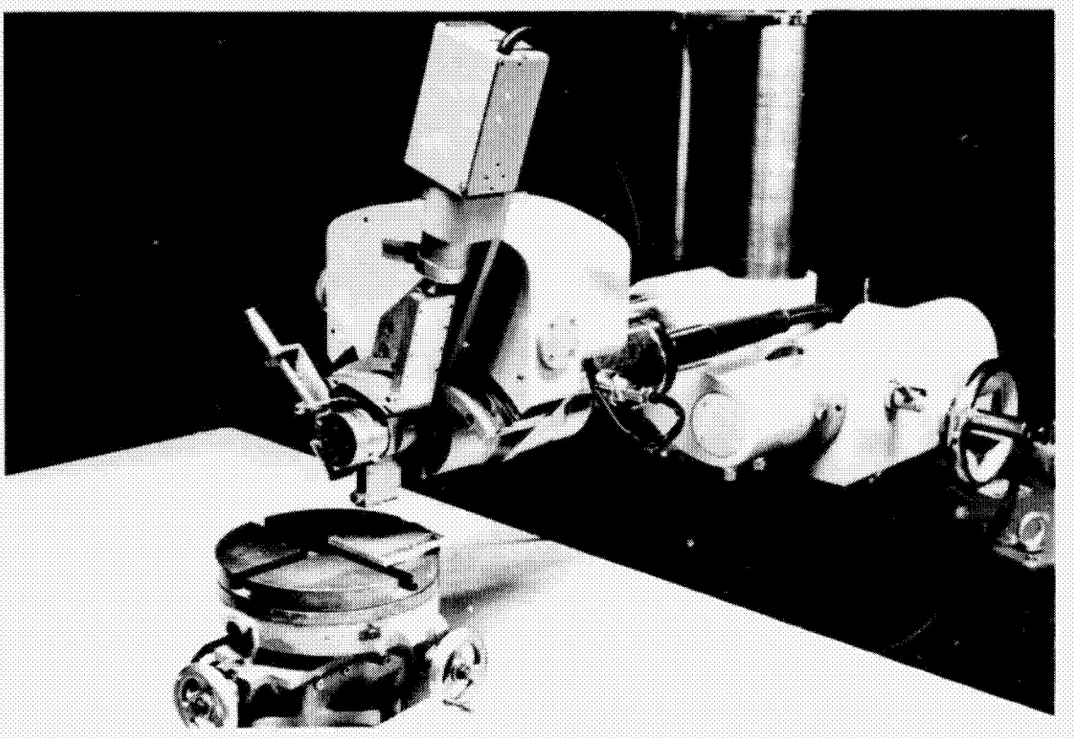


FIGURE 1. RIGAKU STRAINFLEX X-RAY DIFFRACTION UNIT

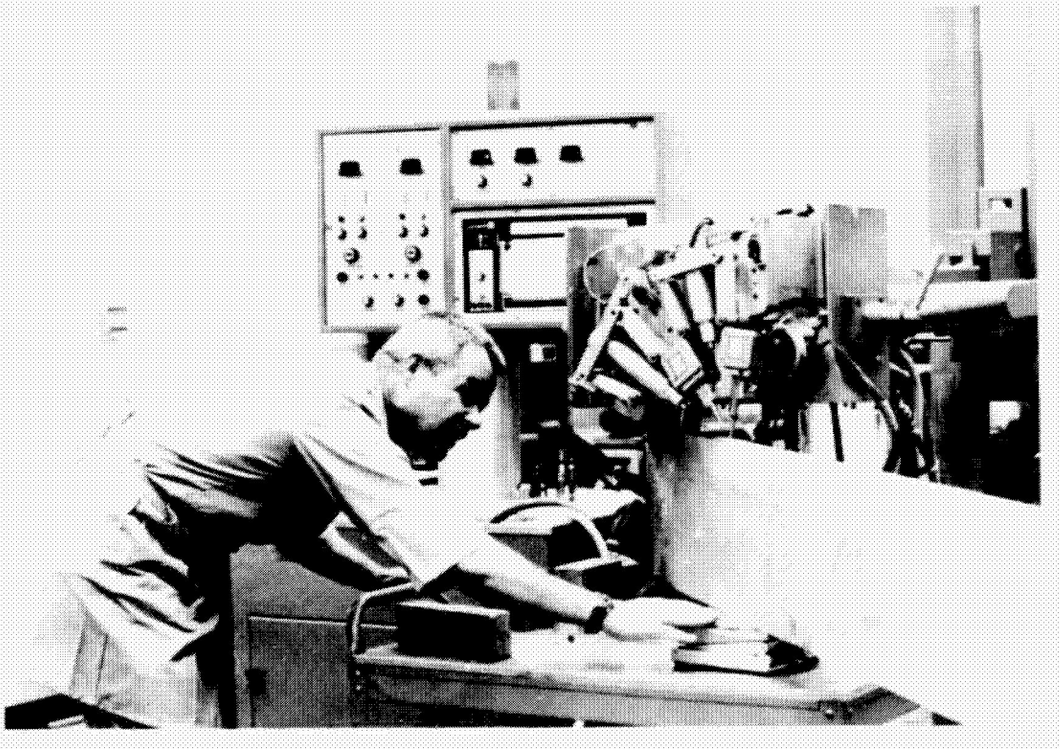


FIGURE 1A. AMERICAN ANALYTICAL FASTRESS X-RAY DIFFRACTION UNIT

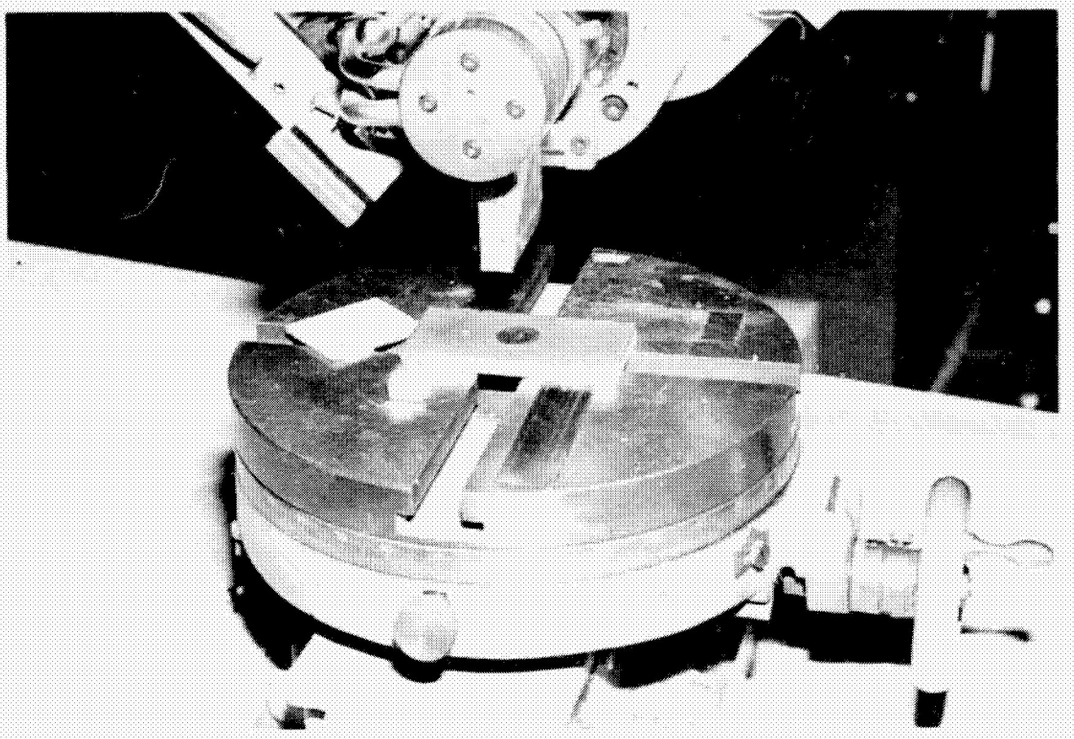


FIGURE 2. RIGAKU STRAINFLEX X-RAY DIFFRACTION UNIT (CLOSEUP)

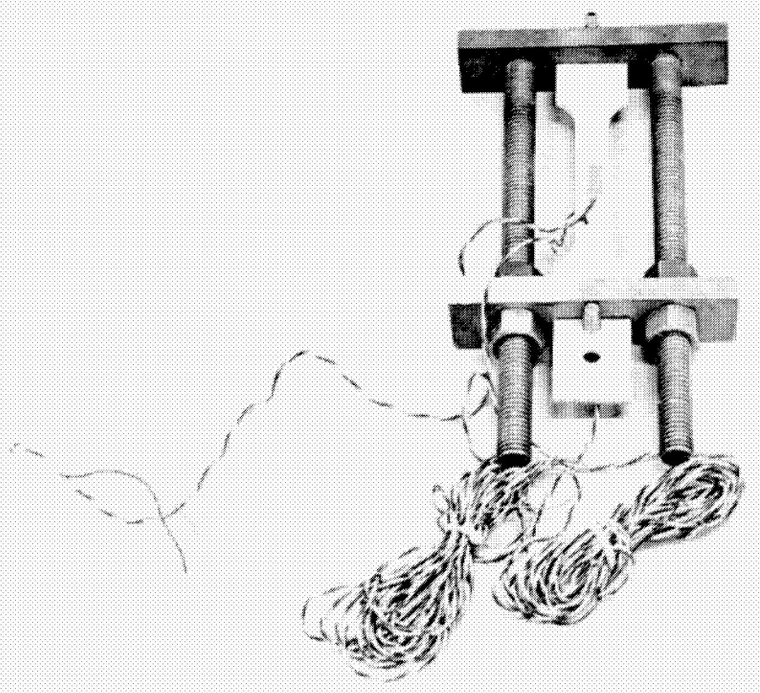


FIGURE 3. X-RAY CALIBRATION FIXTURE WITH 7075-T6 ALUMINUM ALLOY TENSILE SPECIMEN (276 MPa/40 KSI)

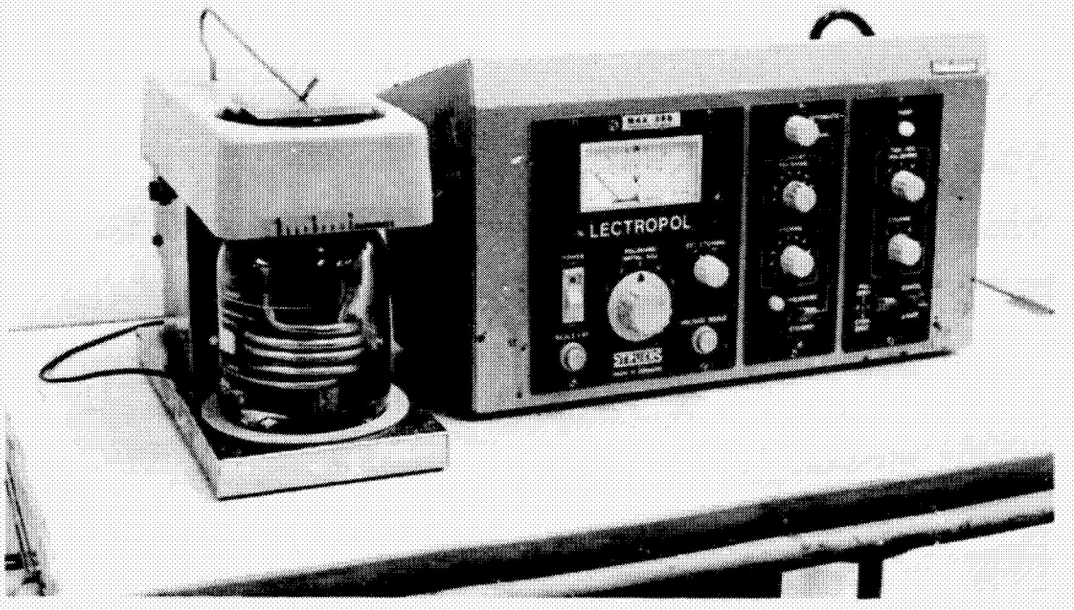


FIGURE 4. STRUERS LECTROPOL ELECTROPOLISHER

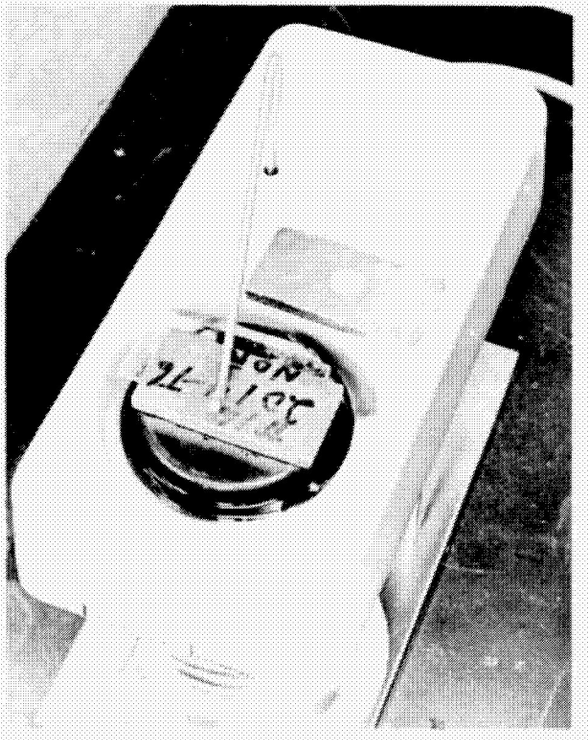


FIGURE 5. STRUERS LECTROPOL ELECTROPOLISHER (CLOSEUP)

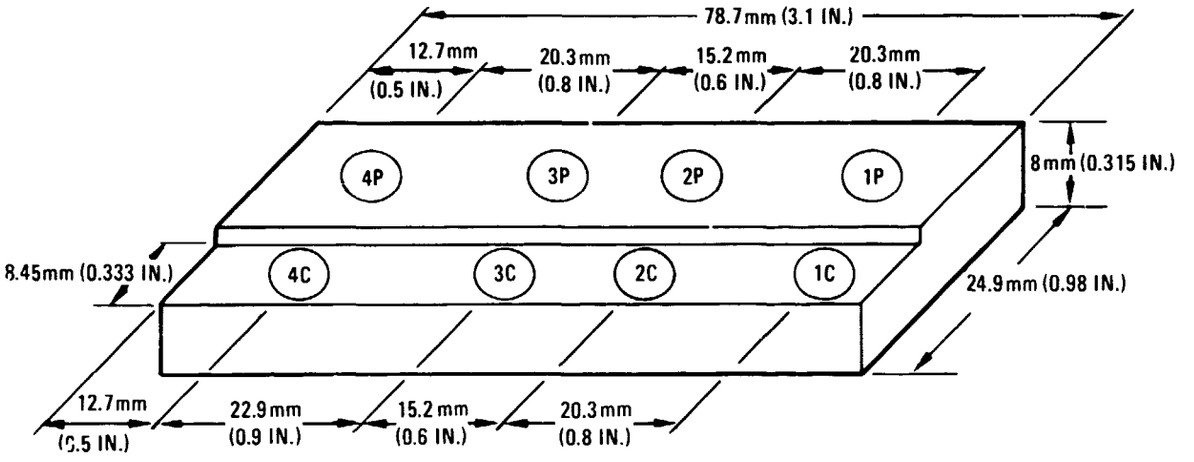


FIGURE 6. X-RAY RESIDUAL STRESS READING LOCATIONS 2014-T6 ROD PEENED SPECIMEN (SET I)

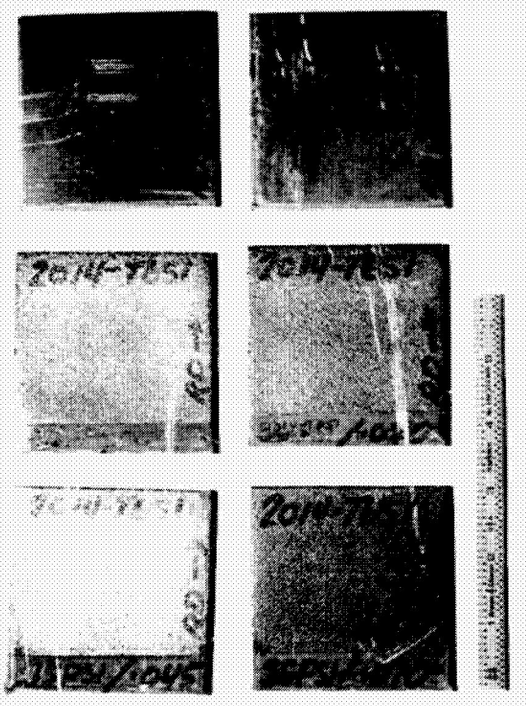


FIGURE 7. 2014-T651 SPECIMENS (SET III) ROD PEENED AND AS RECEIVED

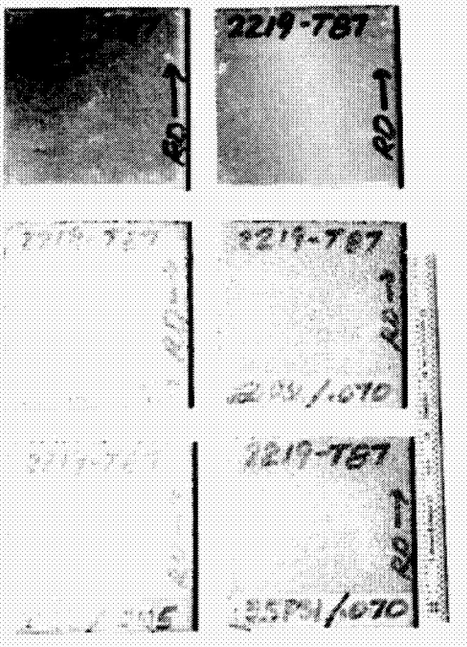


FIGURE 8. 2219-T87 SPECIMENS (SET III) ROD PEENED AND AS RECEIVED

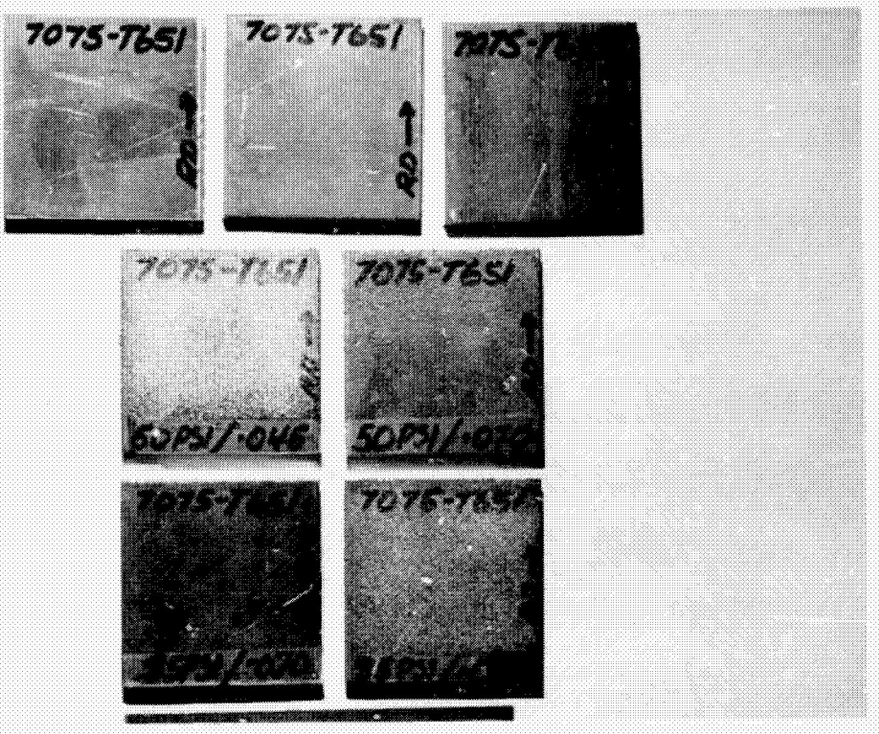


FIGURE 9. 7075-T651 SPECIMENS (SET III) ROD PEENED AND AS RECEIVED

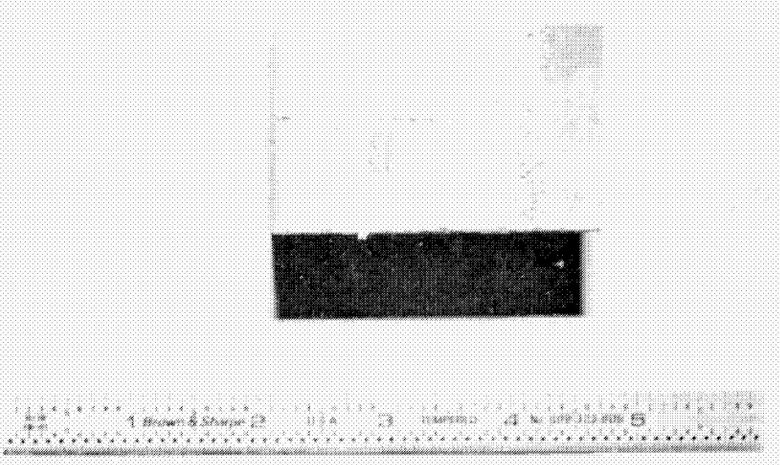
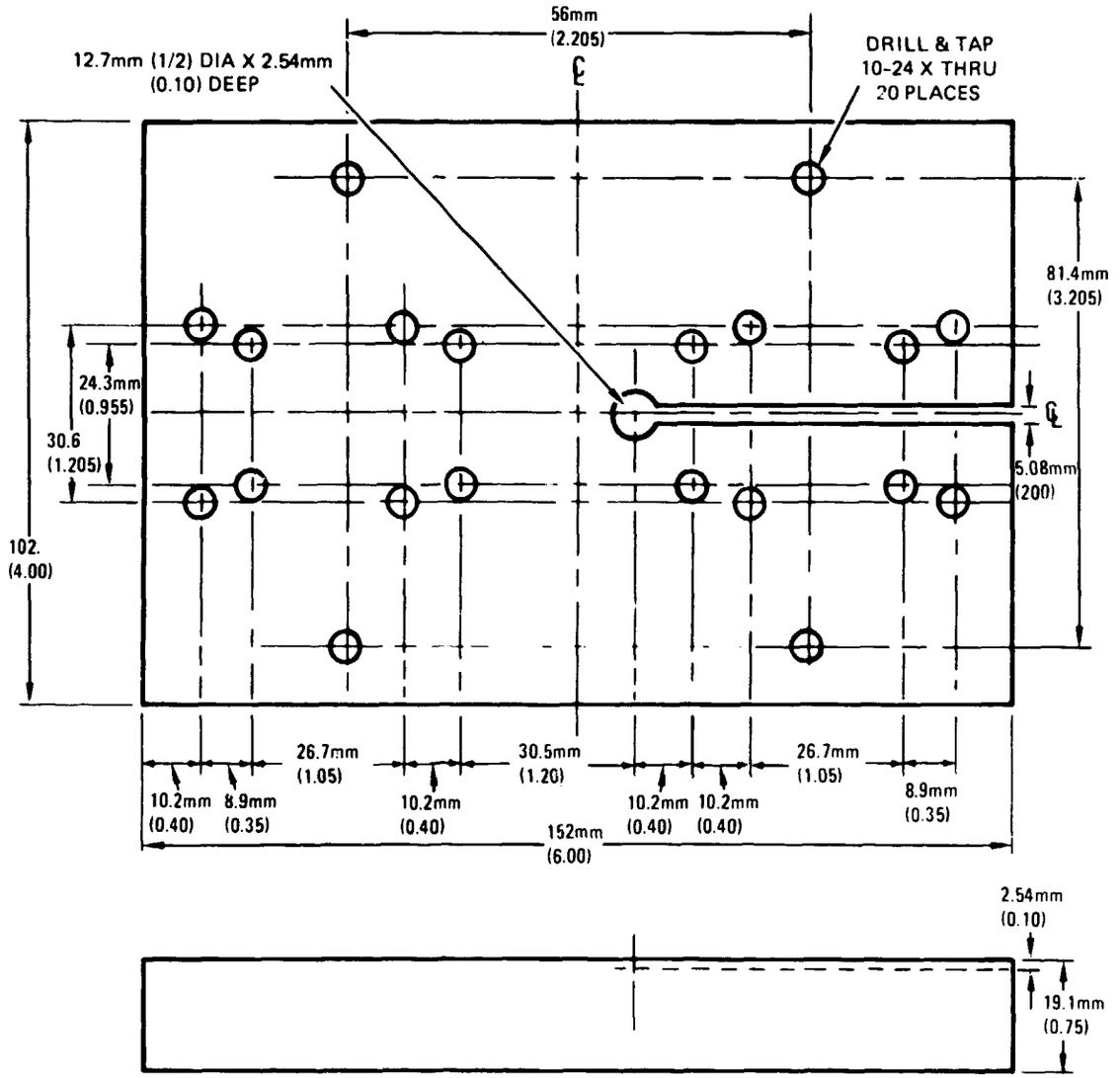


FIGURE 10. 7079-T6 THICK PLATE SPECIMEN (SET III)



TOLERANCES – X.XX = ±0.3mm (±0.010)
X.XX = ± 0.13mm (±0.005)

MATERIAL – 18 N. MARAGING STEEL
300 GRADE

HEAT TREAT – 482°C (900°F), 3 HRS, AC

FIGURE 11. PEENING SPECIMEN HOLDER

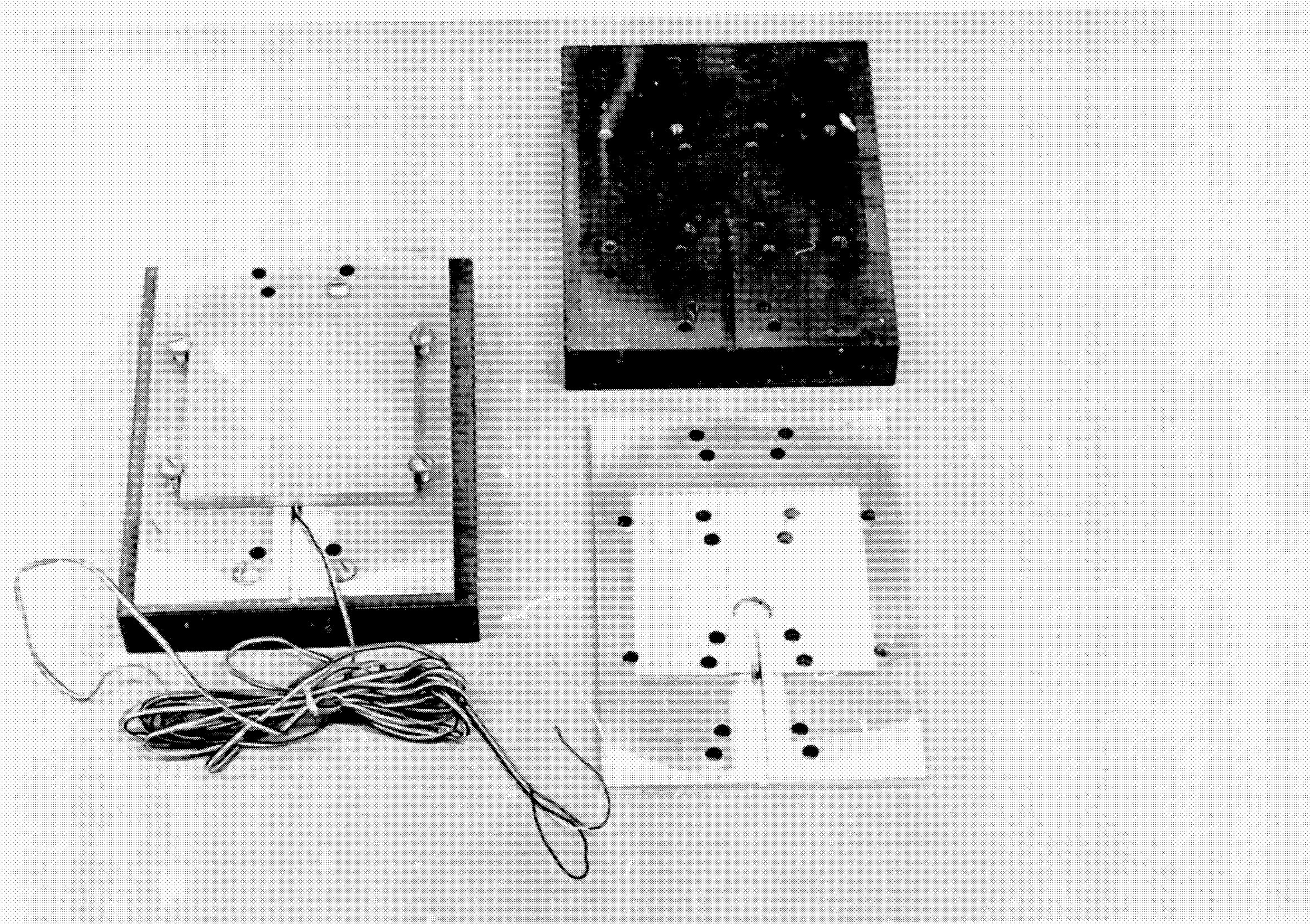


FIGURE 12. PEENING SPECIMEN HOLDER WITH SPECIMEN AND DISASSEMBLED

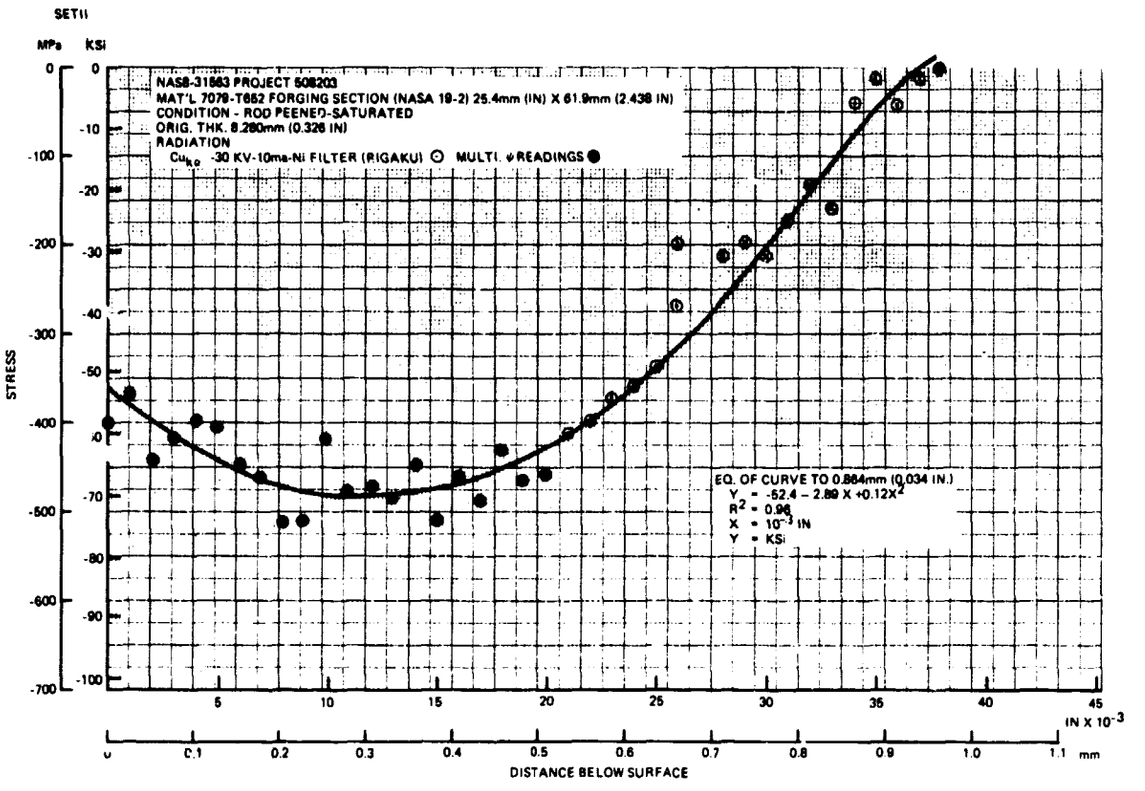


FIGURE 13. ROD PEENING STRESS PROFILE (SET II)

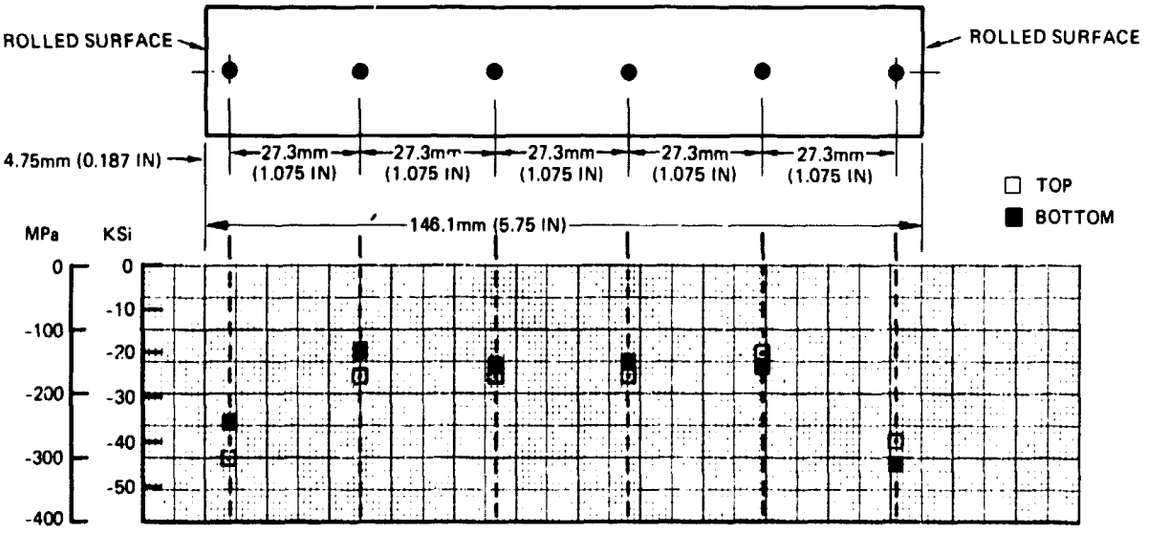


FIGURE 14. SHORT TRANSVERSE SURFACE PROFILE OF 146.1mm (5.75 IN) THICK 7075 T651 PLATE (SET II)

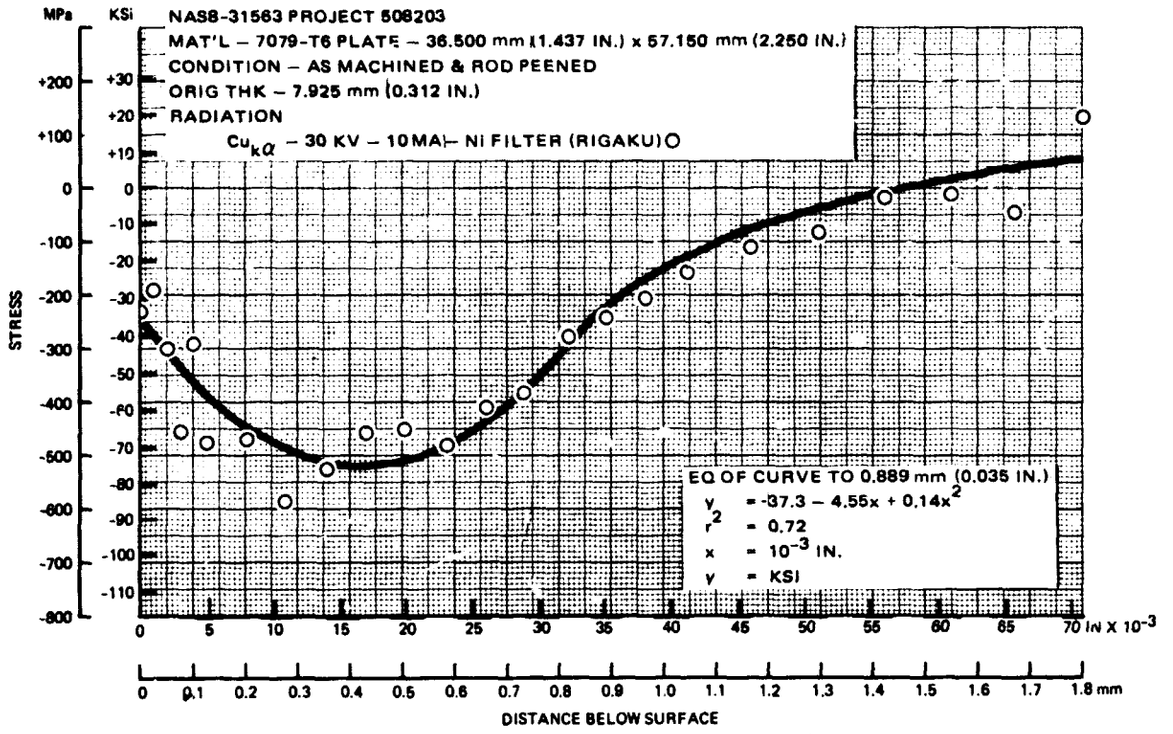


FIGURE 15. ROD PEENING STRESS PROFILE (SET III)

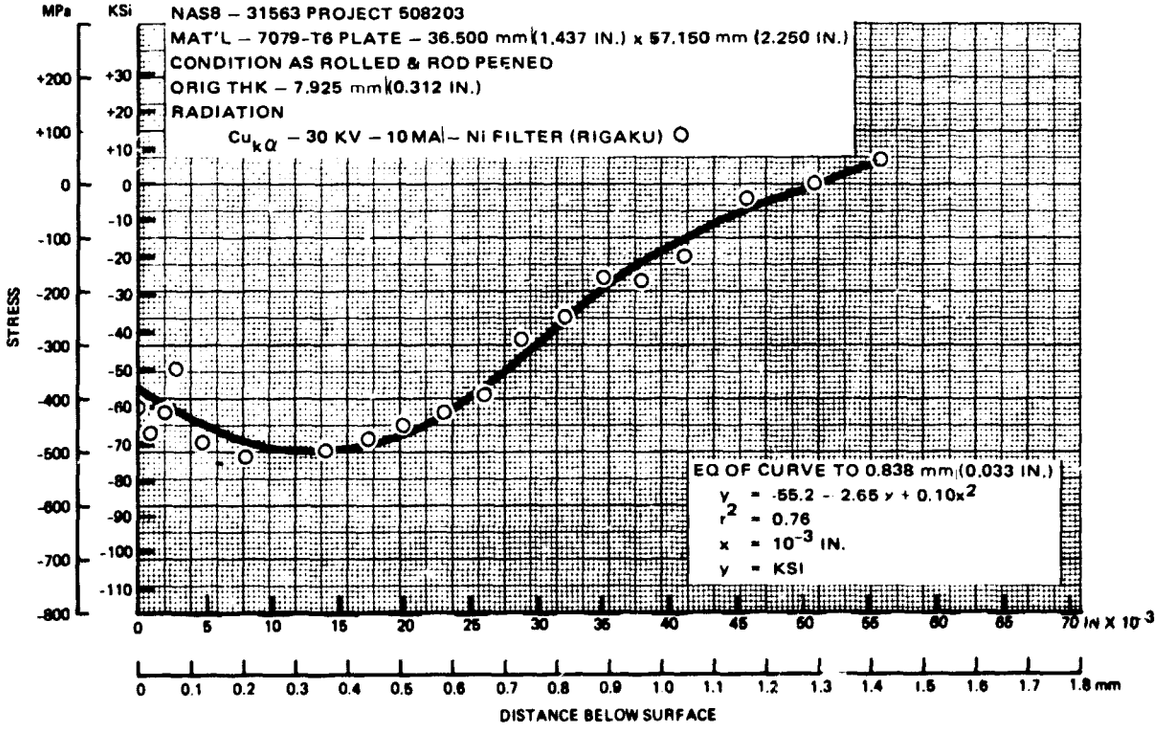


FIGURE 16. ROD PEENING STRESS PROFILE (SET III)

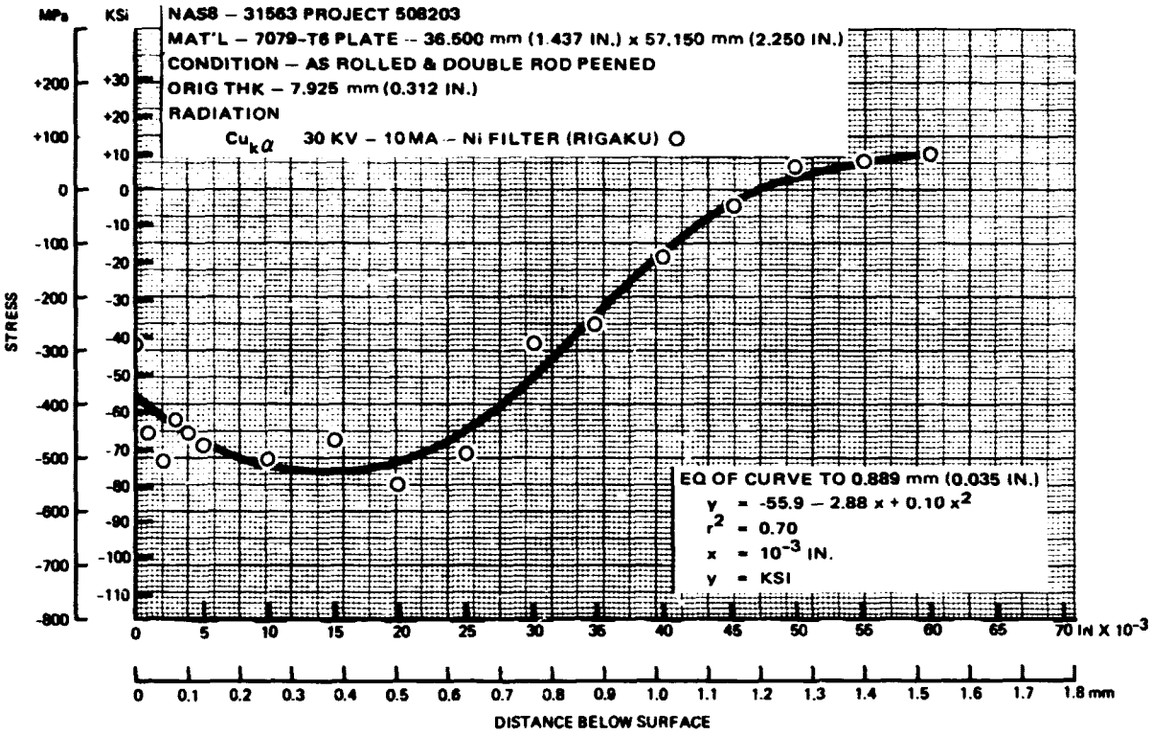


FIGURE 17. ROD PEENING STRESS PROFILE (SET III)

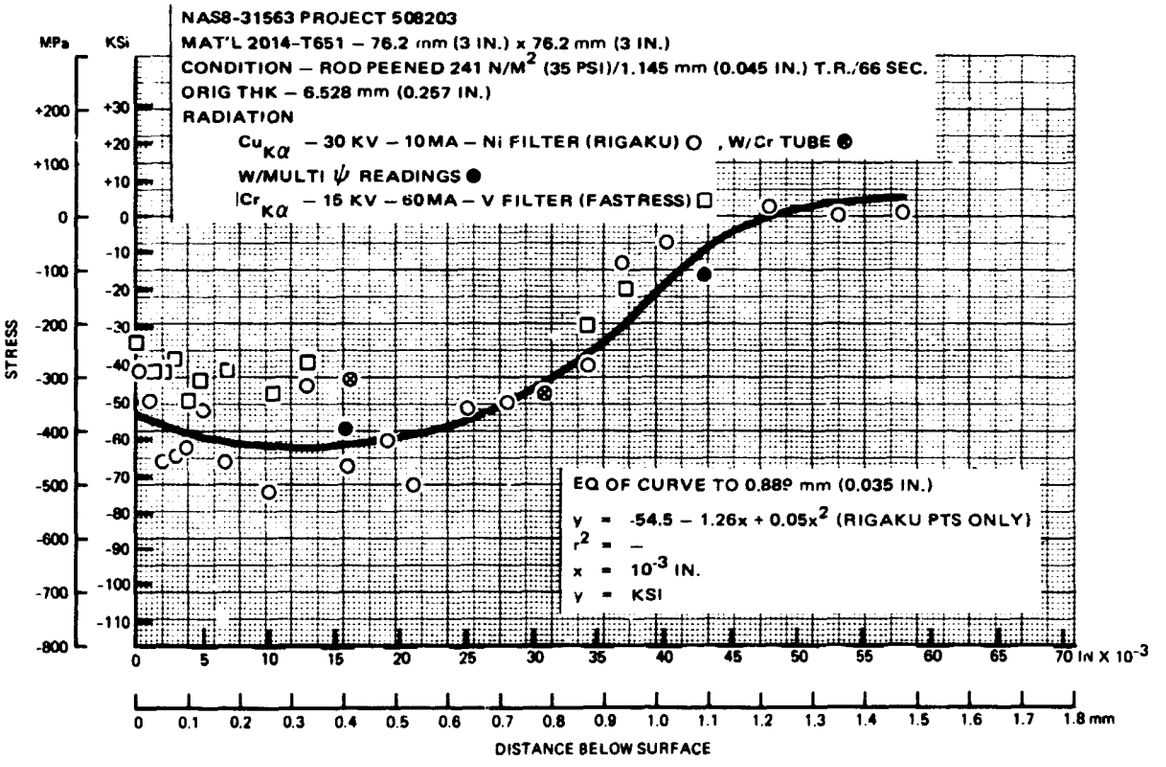


FIGURE 18. ROD PEENING STRESS PROFILE (SET III)

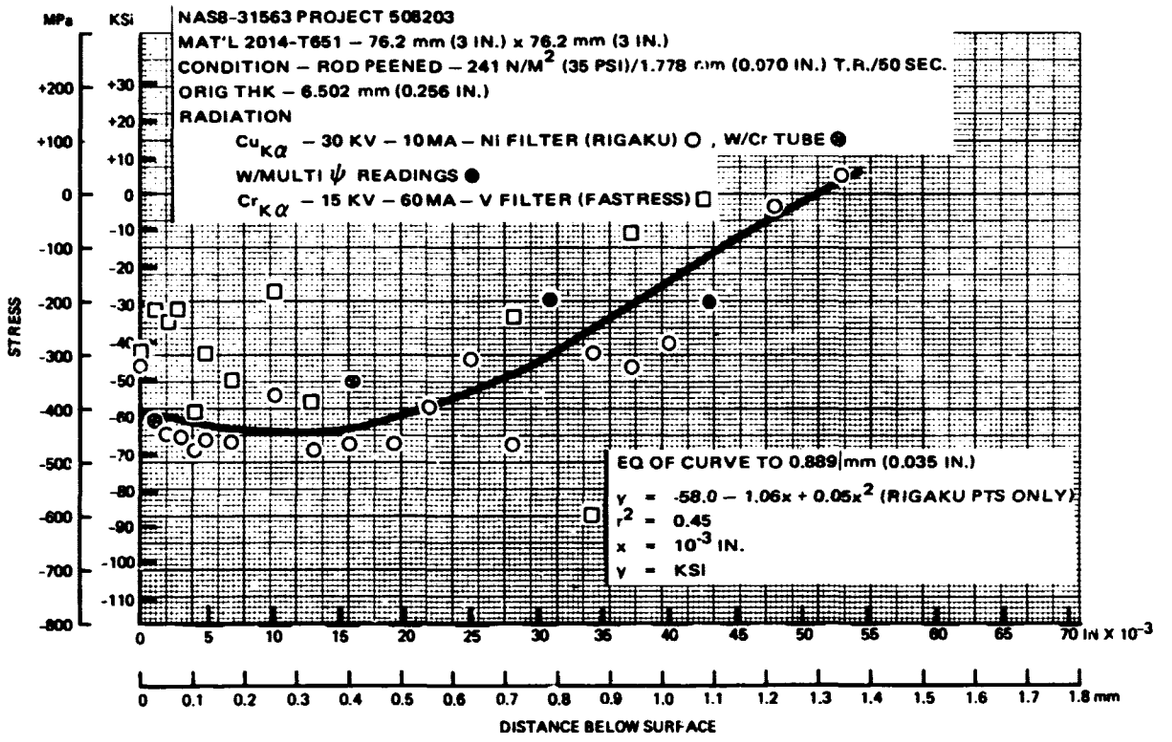


FIGURE 19. ROD PEENING STRESS PROFILE (SET III)

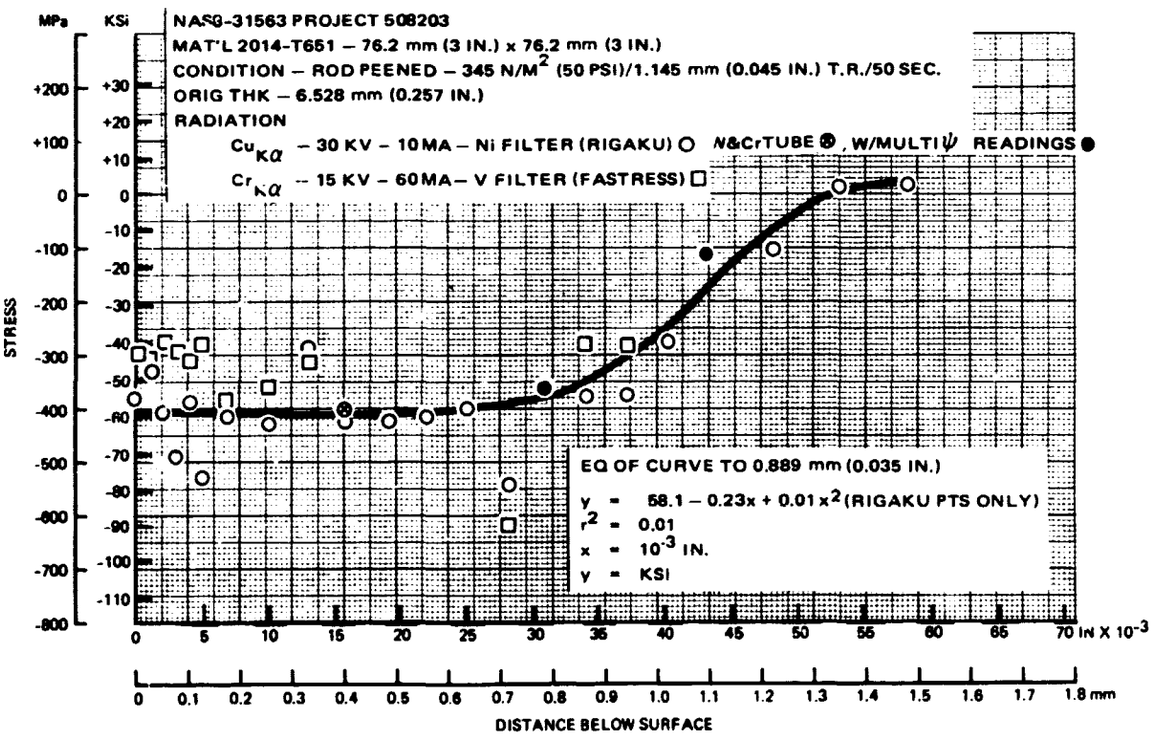


FIGURE 20. ROD PEENING STRESS PROFILE (SET III)

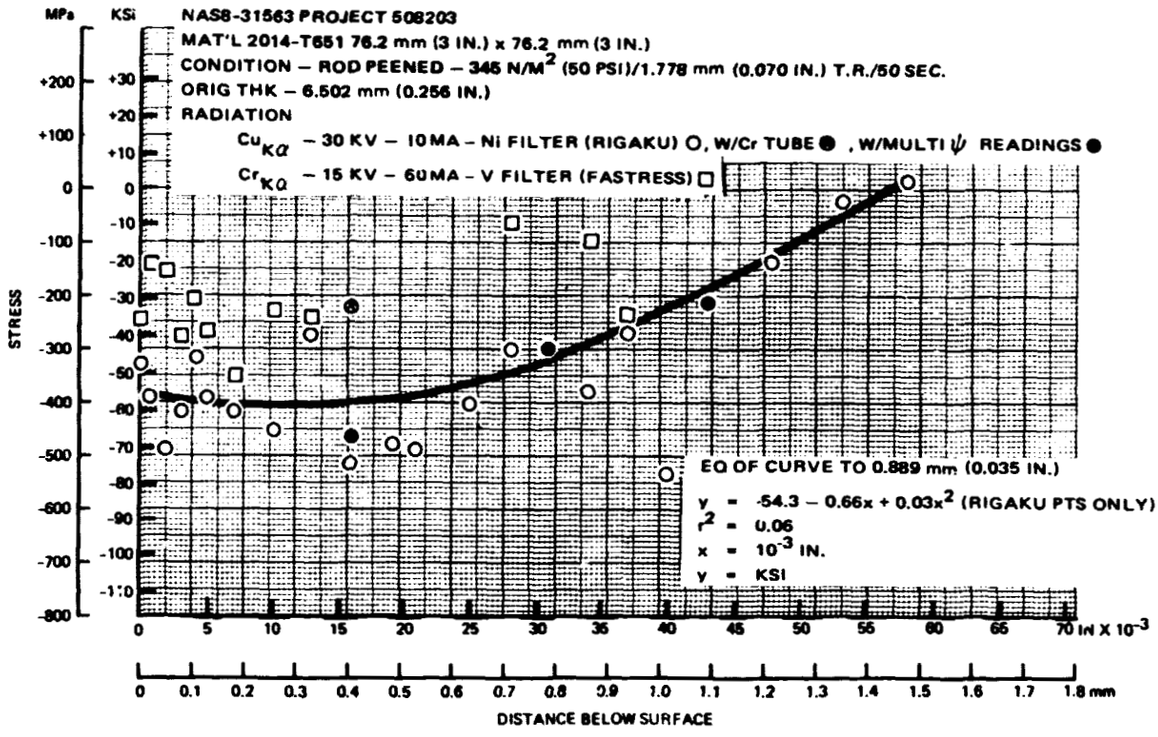


FIGURE 21. ROD PEENING STRESS PROFILE (SET III)

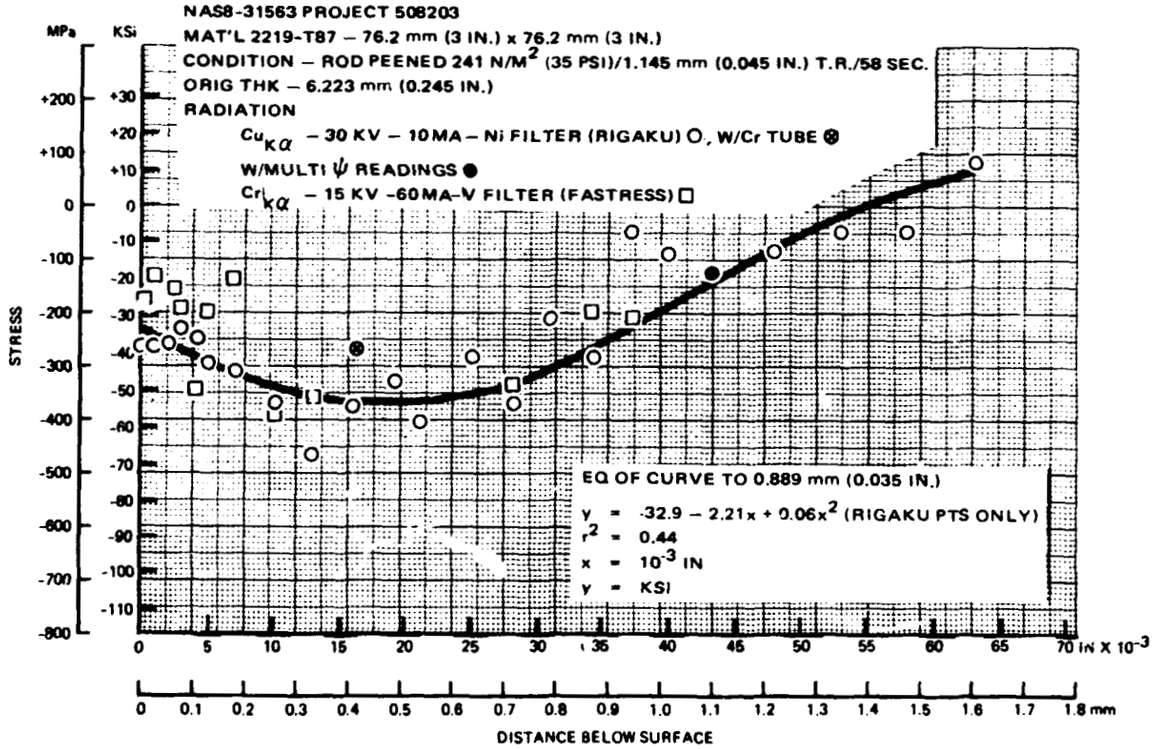


FIGURE 22. ROD PEENING STRESS PROFILE (SET III)

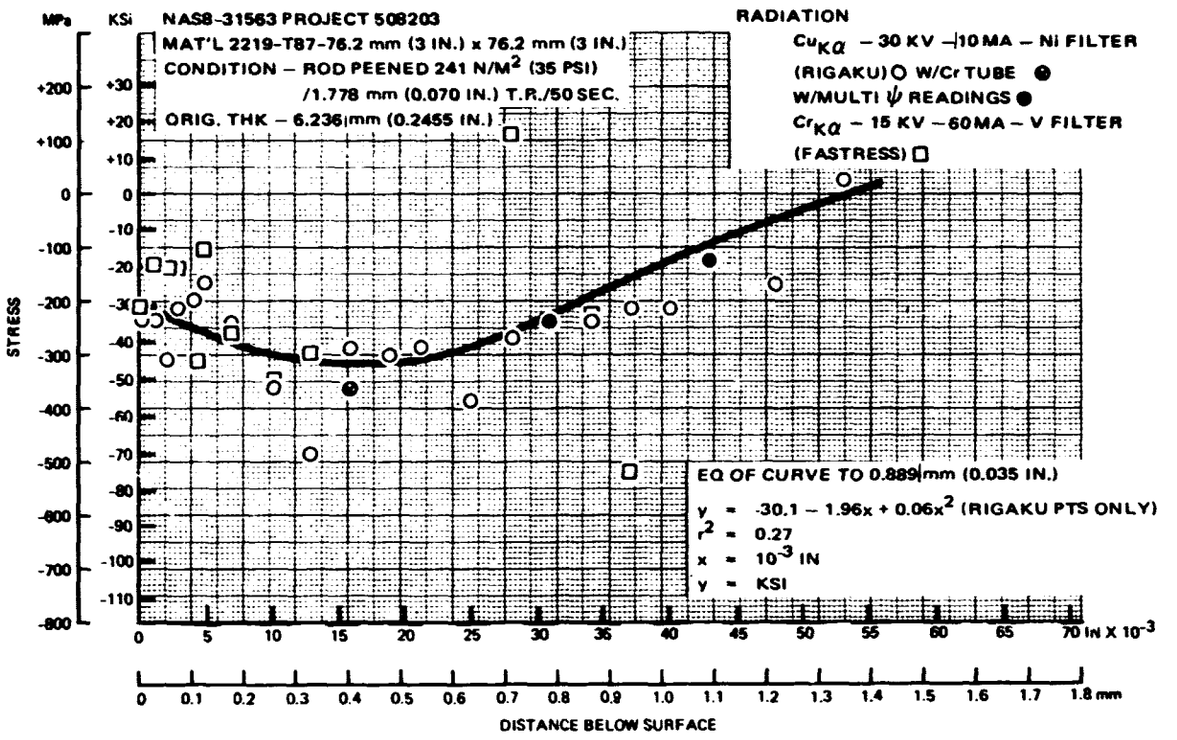


FIGURE 23. ROD PEENING STRESS PROFILE (SET III)

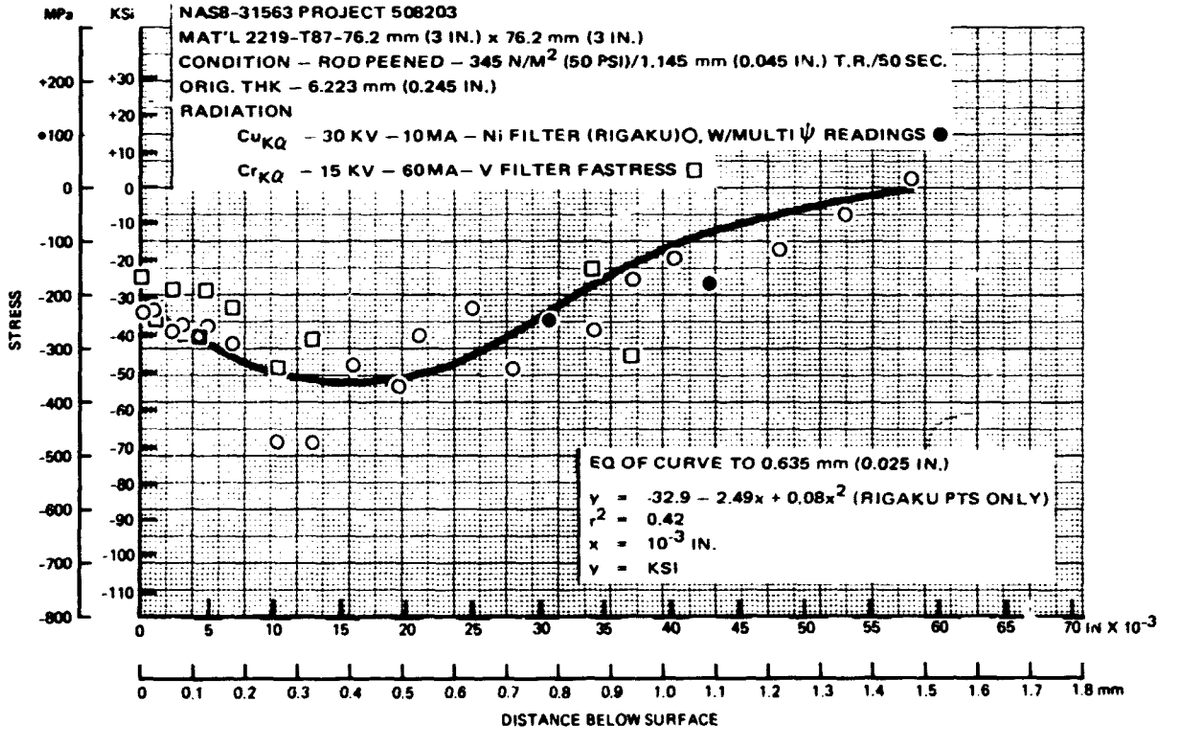


FIGURE 24. ROD PEENING STRESS PROFILE (SET III)

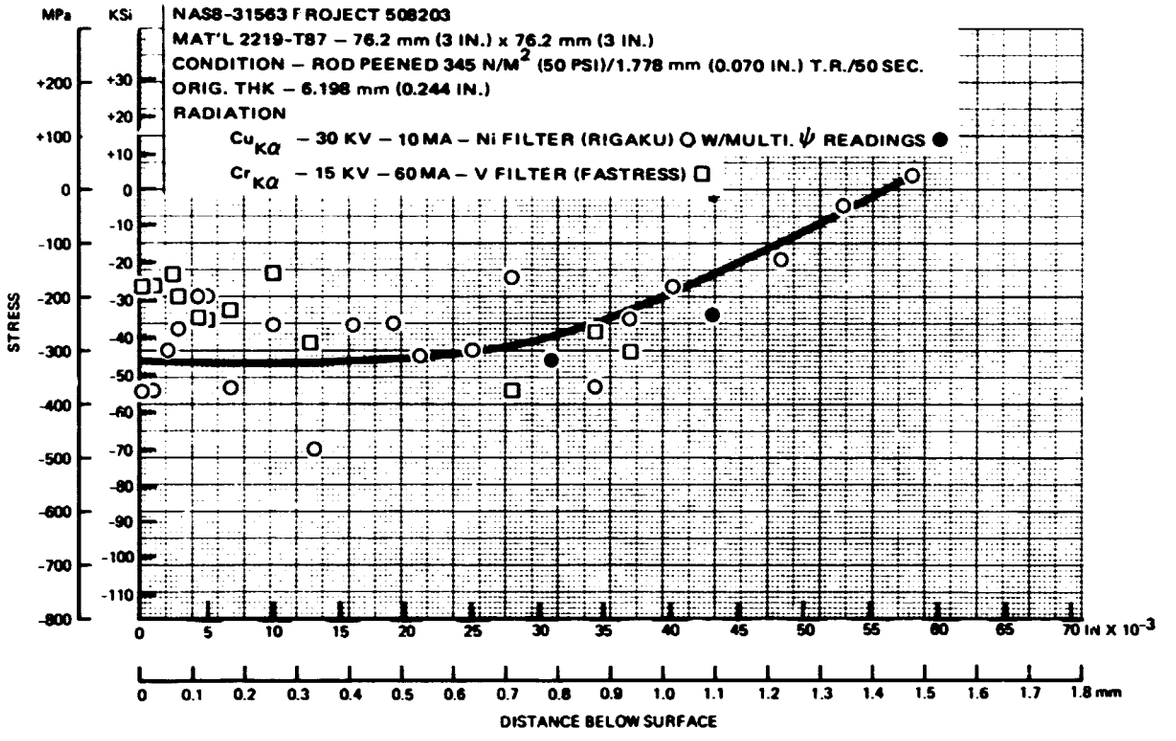


FIGURE 25. ROD PEENING STRESS PROFILE (SET III)

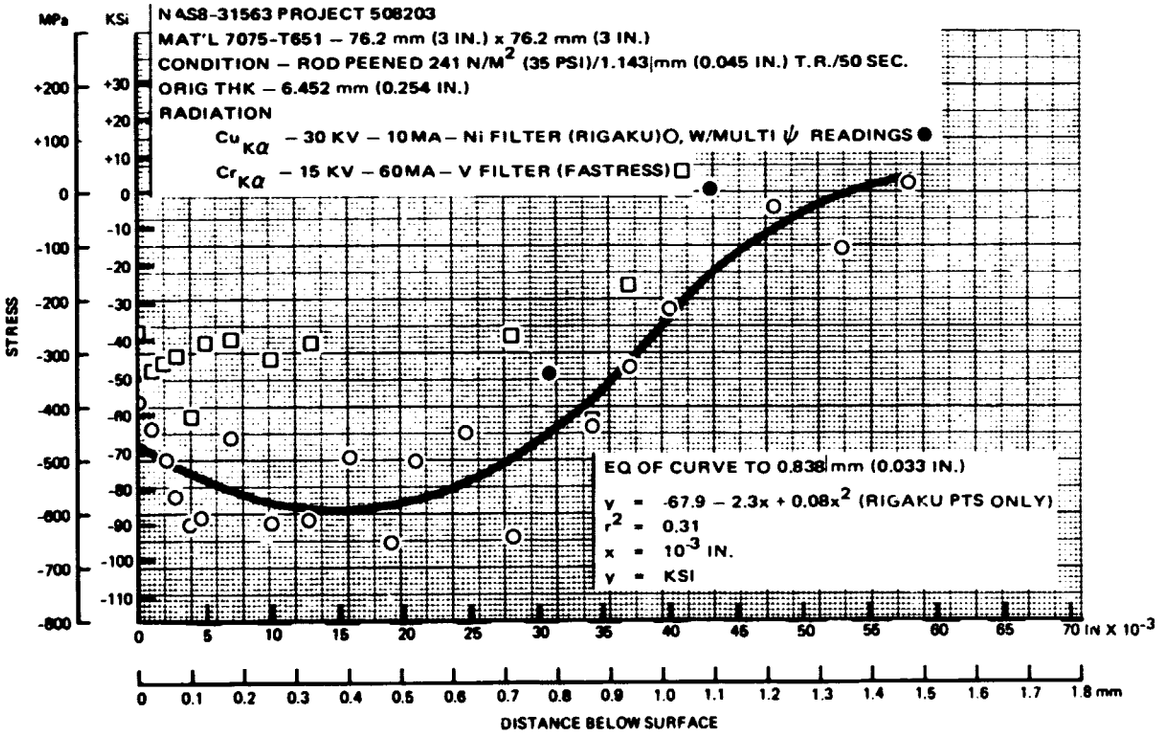


FIGURE 26. ROD PEENING STRESS PROFILE (SET III)

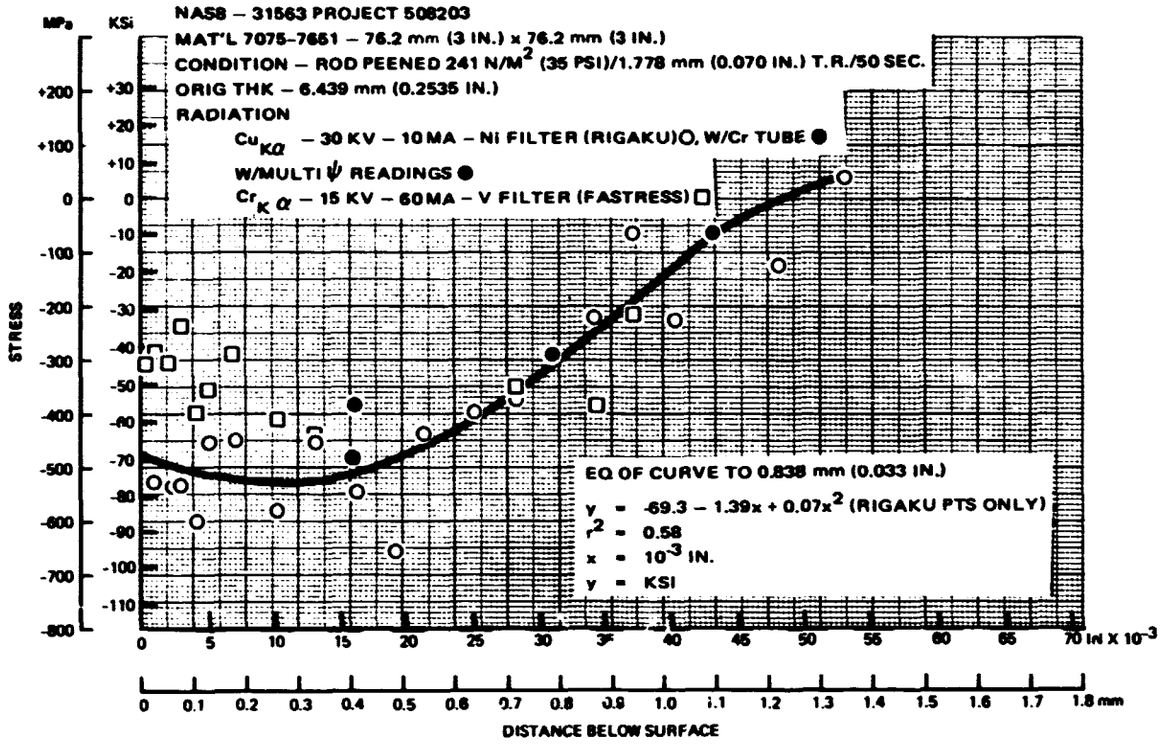


FIGURE 27. ROD PEENING STRESS PROFILE (SET III)

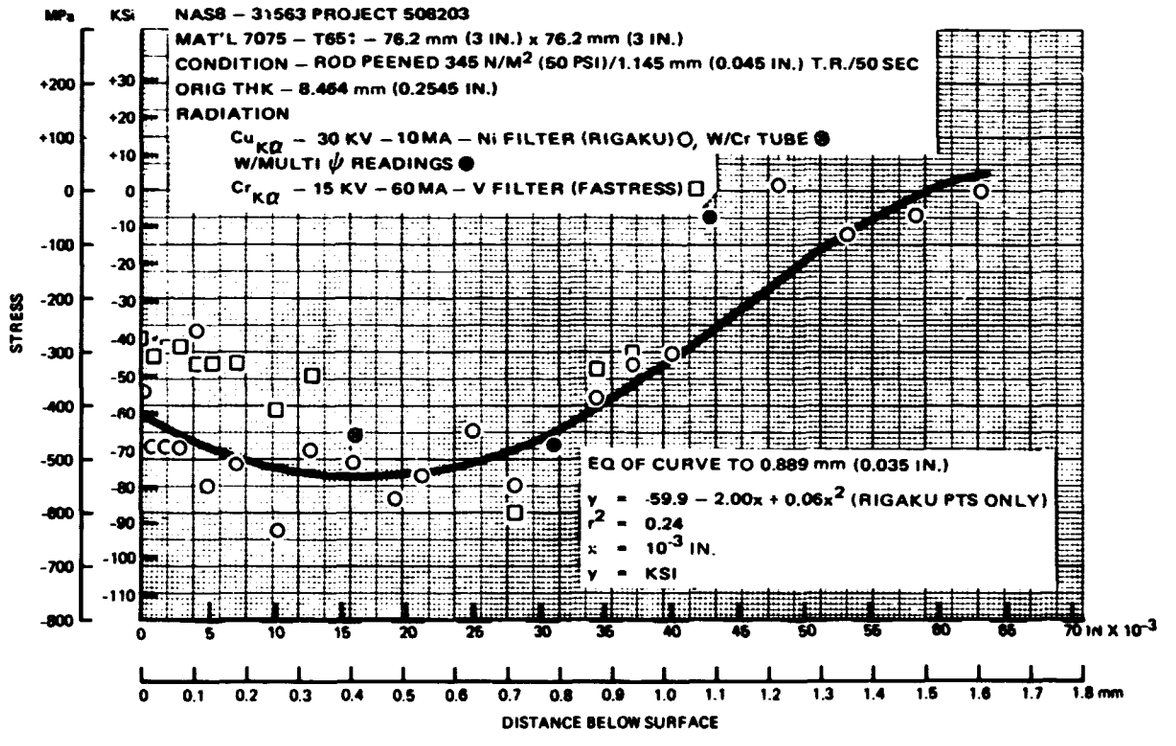


FIGURE 28. ROD PEENING STRESS PROFILE (SET III)

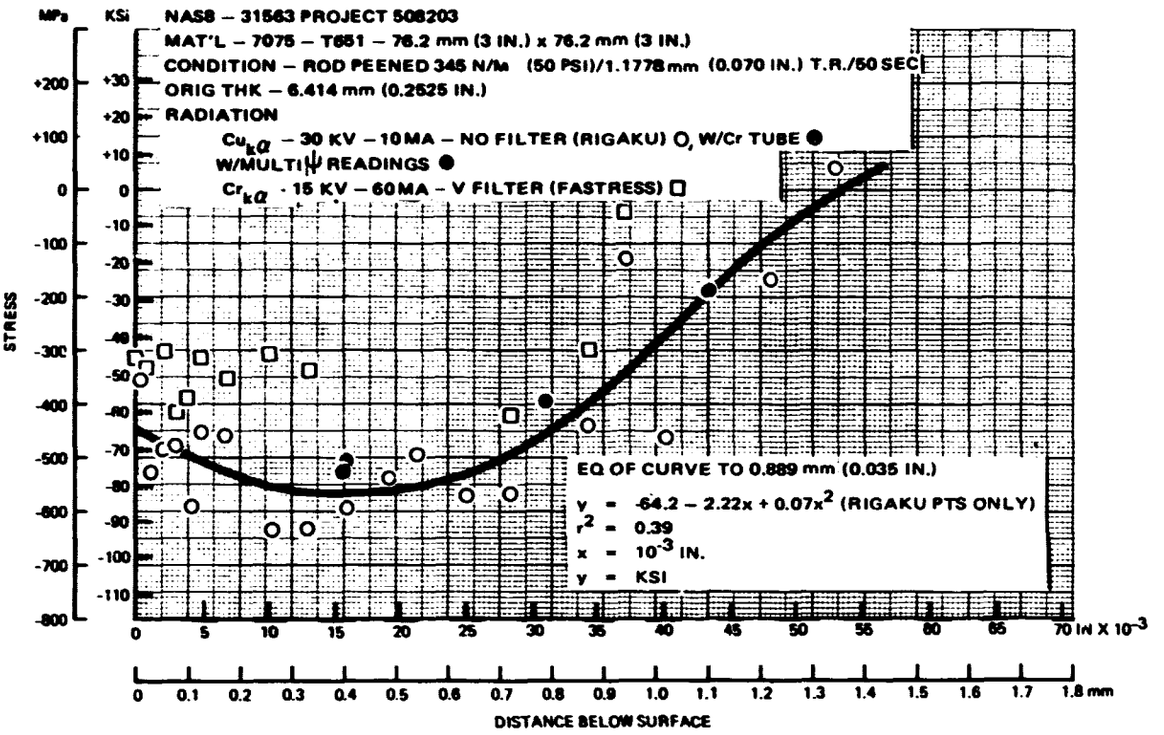


FIGURE 29. ROD PEENING STRESS PROFILE (SET III)

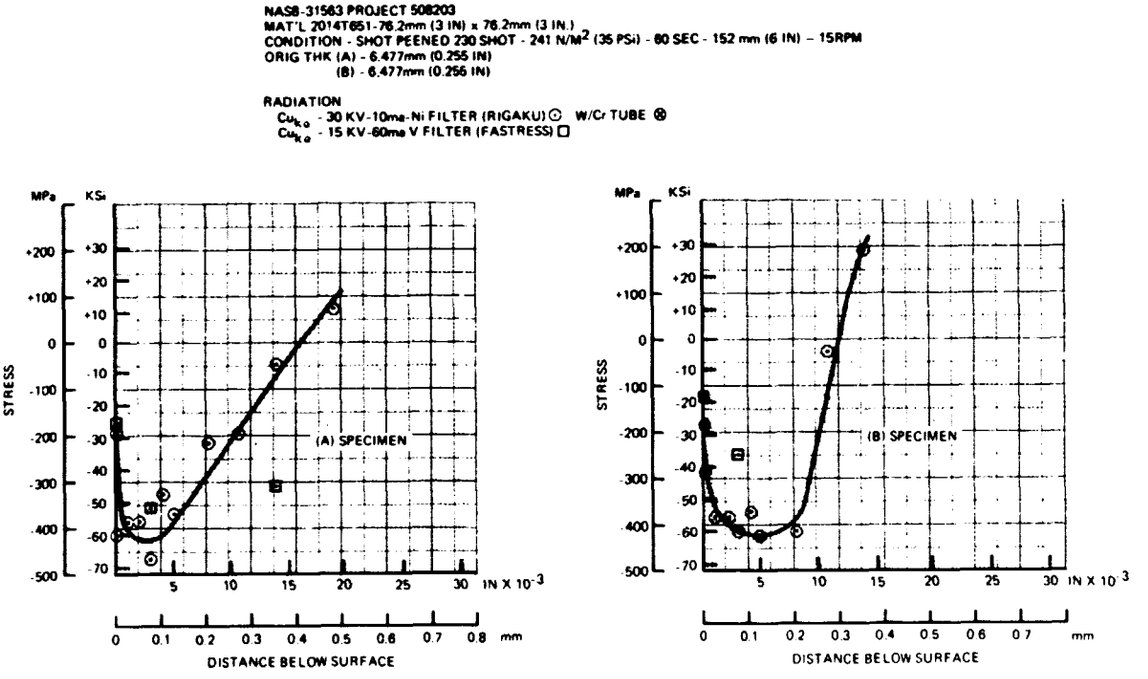


FIGURE 30. SHOT PEENING STRESS PROFILES (SET II)

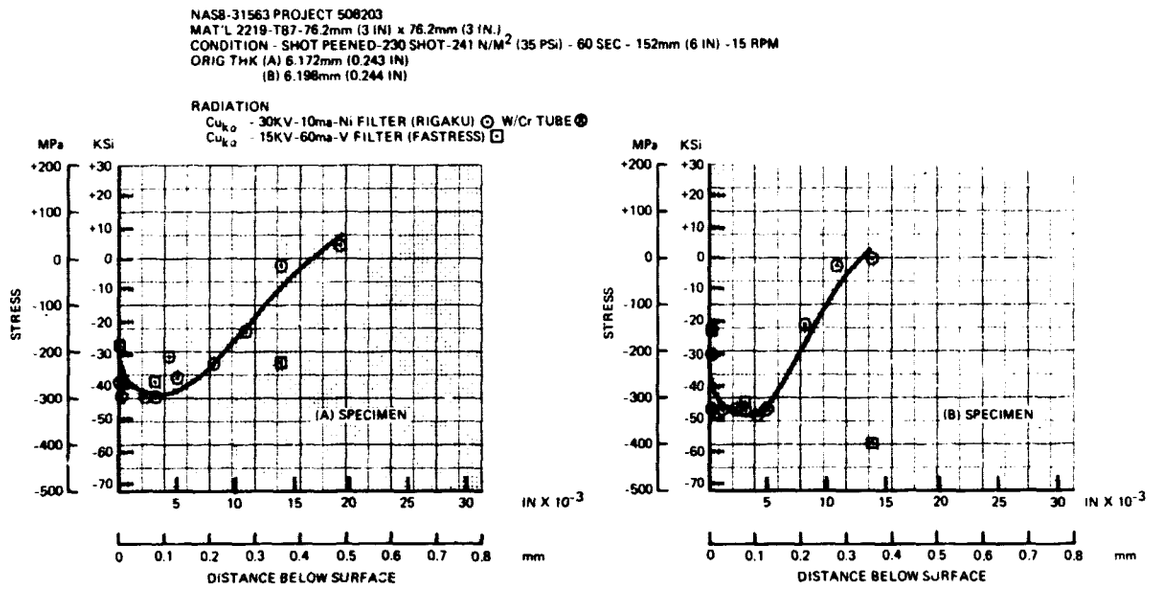


FIGURE 31. SHOT PEENING STRESS PROFILES (SET III)

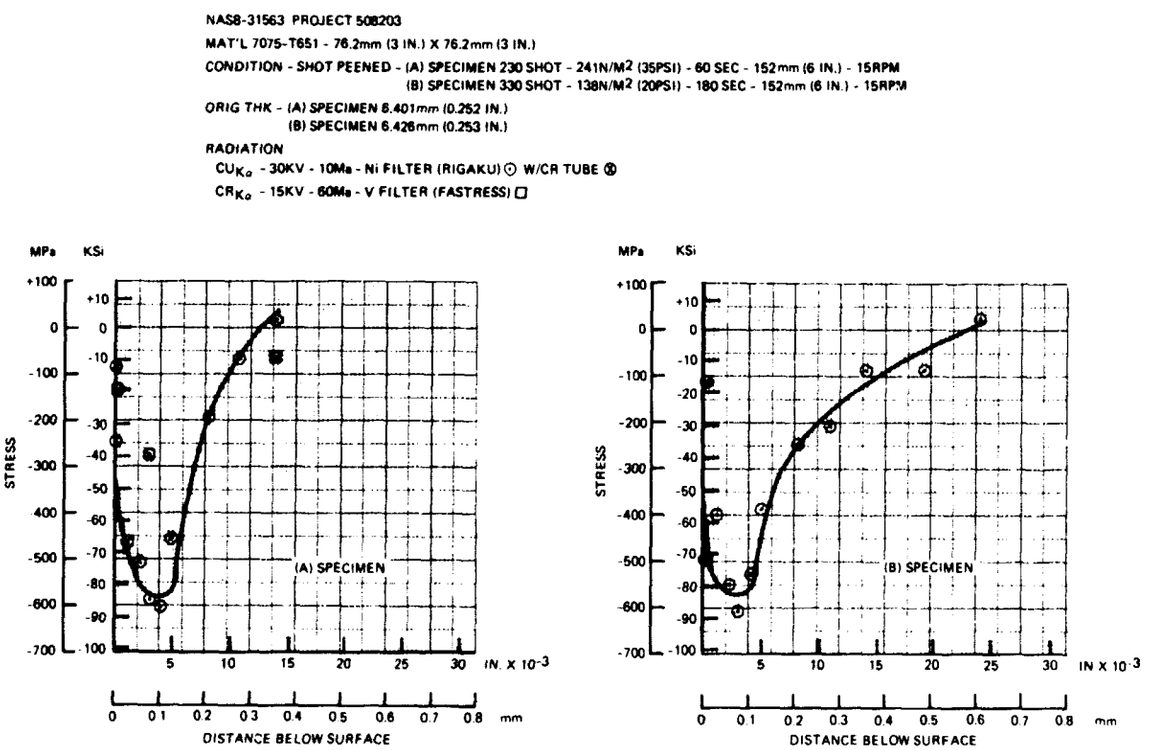


FIGURE 32. SHOT PEENING STRESS PROFILES (SET III)

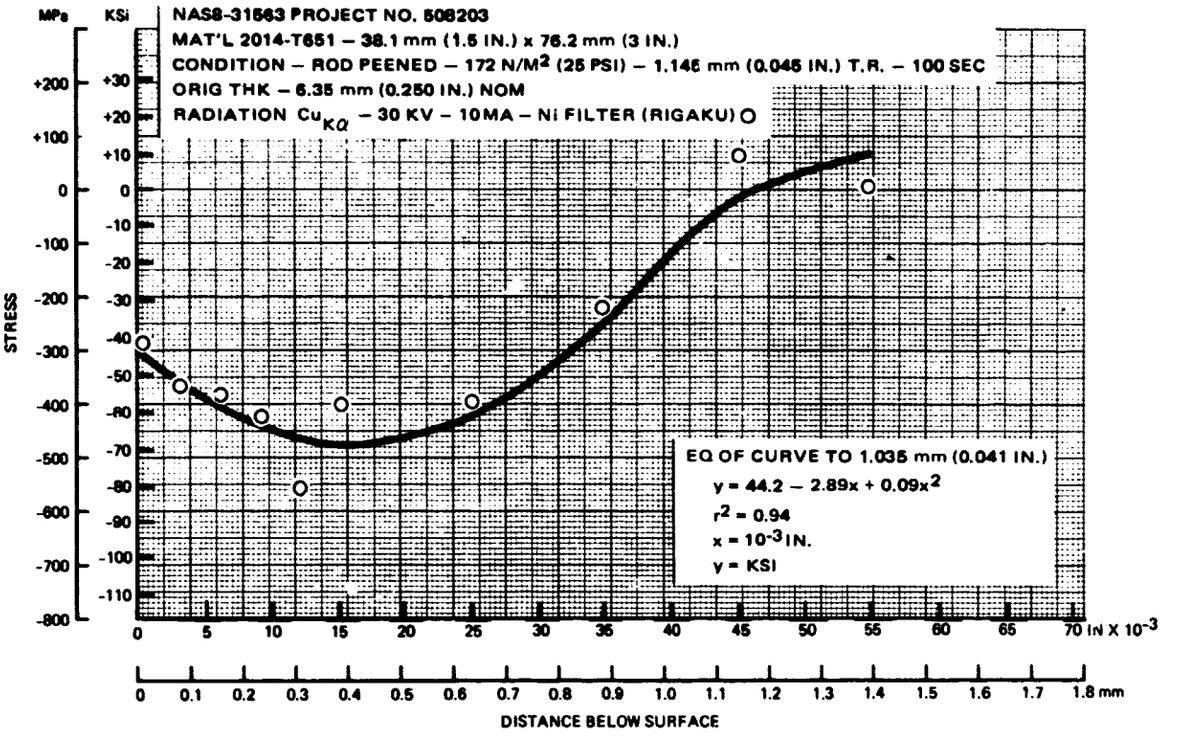


FIGURE 33. ROD PEENING STRESS PROFILE (SET IV)

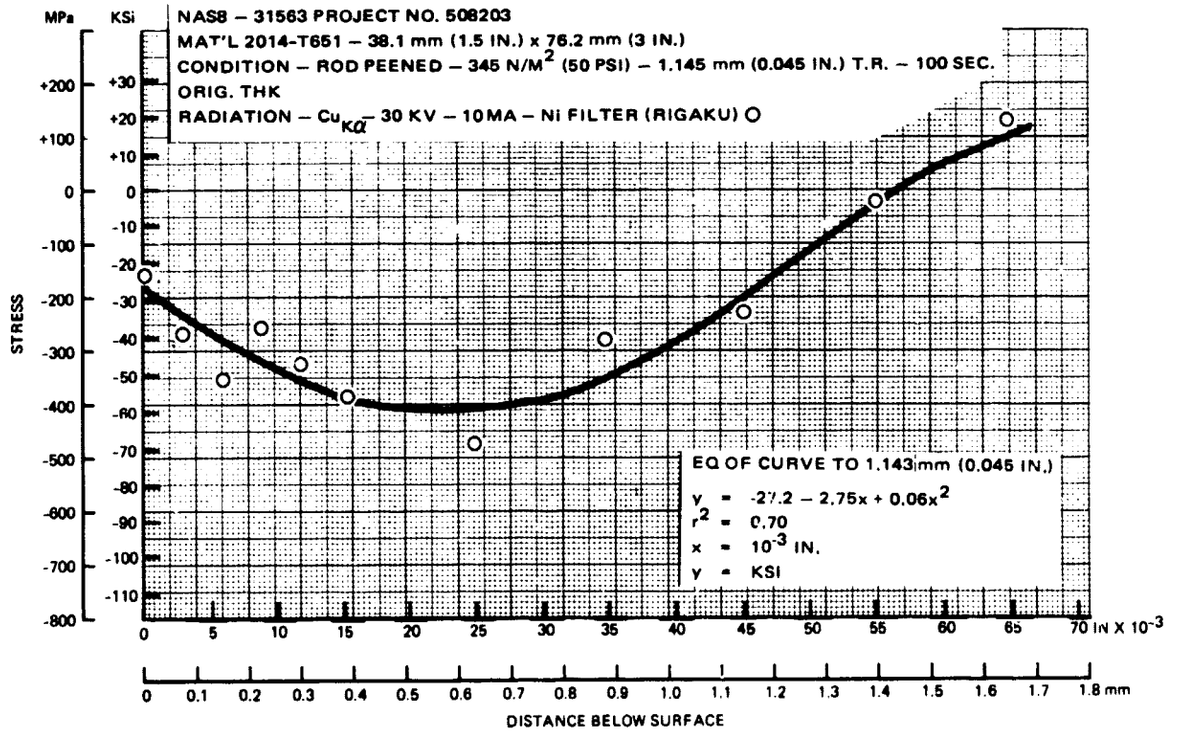


FIGURE 34. ROD PEENING STRESS PROFILE (SET IV)

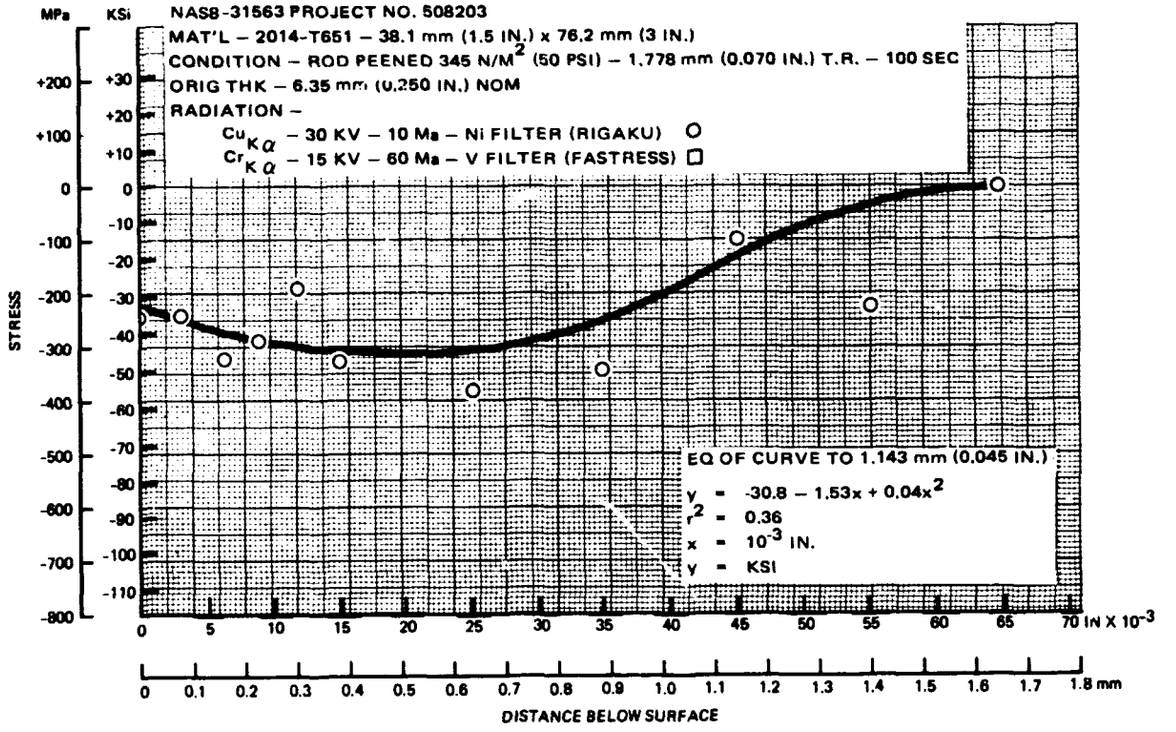


FIGURE 35. ROD PEENING STRESS PROFILE (SET IV)

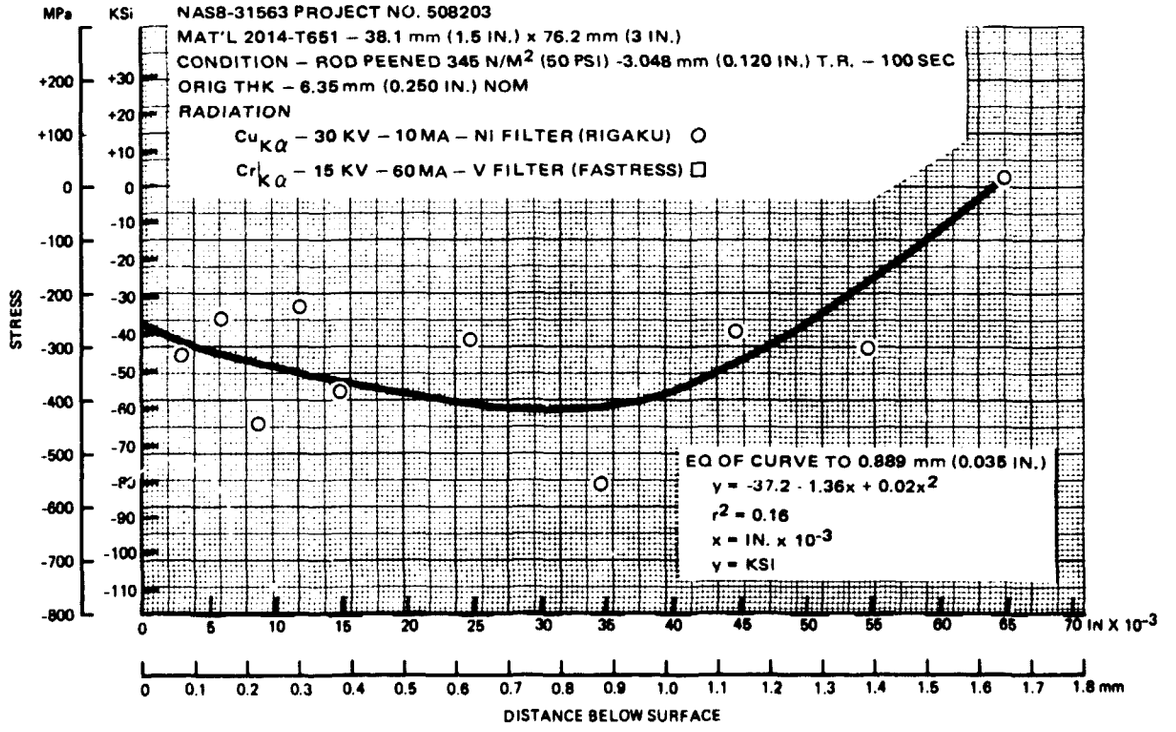


FIGURE 36. ROD PEENING STRESS PROFILE (SET IV)

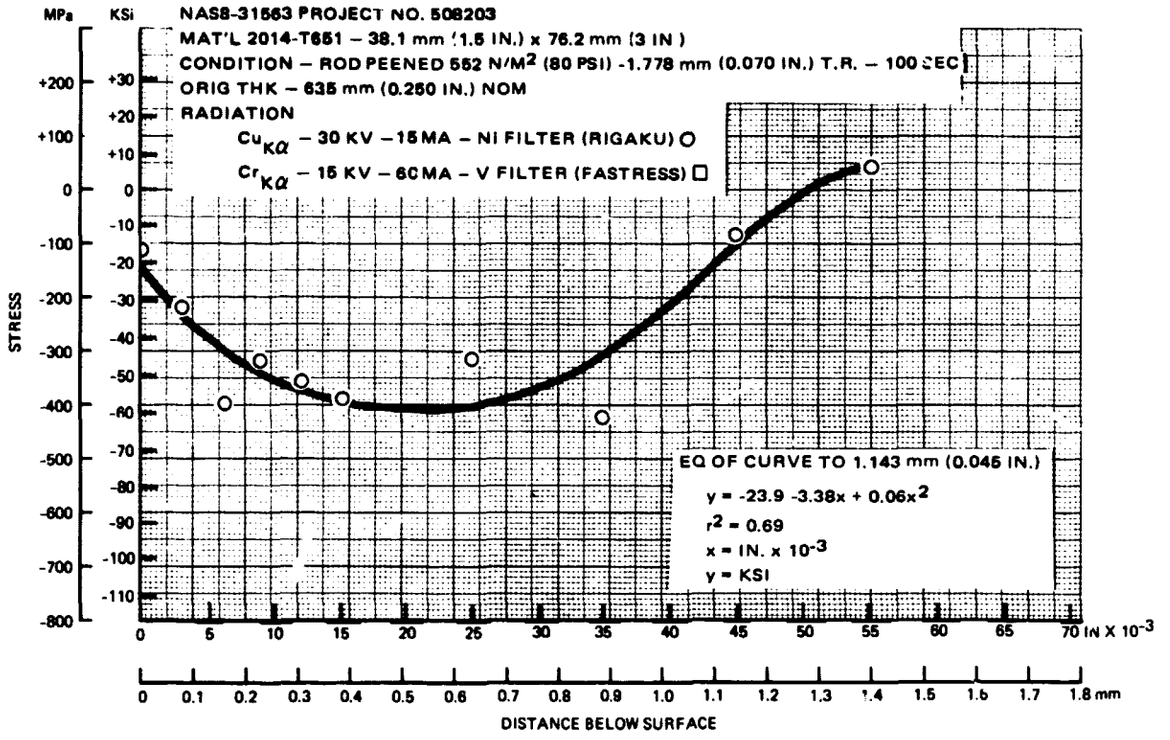


FIGURE 37. ROD PEENING STRESS PROFILE (SET IV)

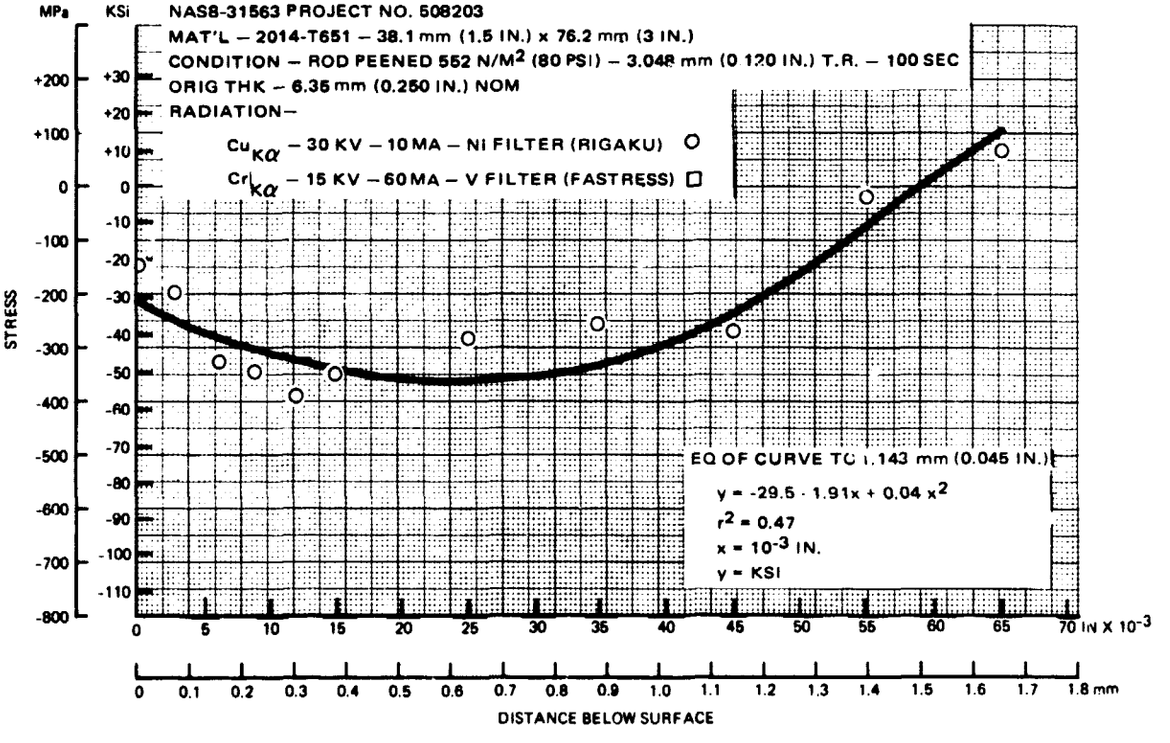


FIGURE 38. ROD PEENING STRESS PROFILE (SET IV)

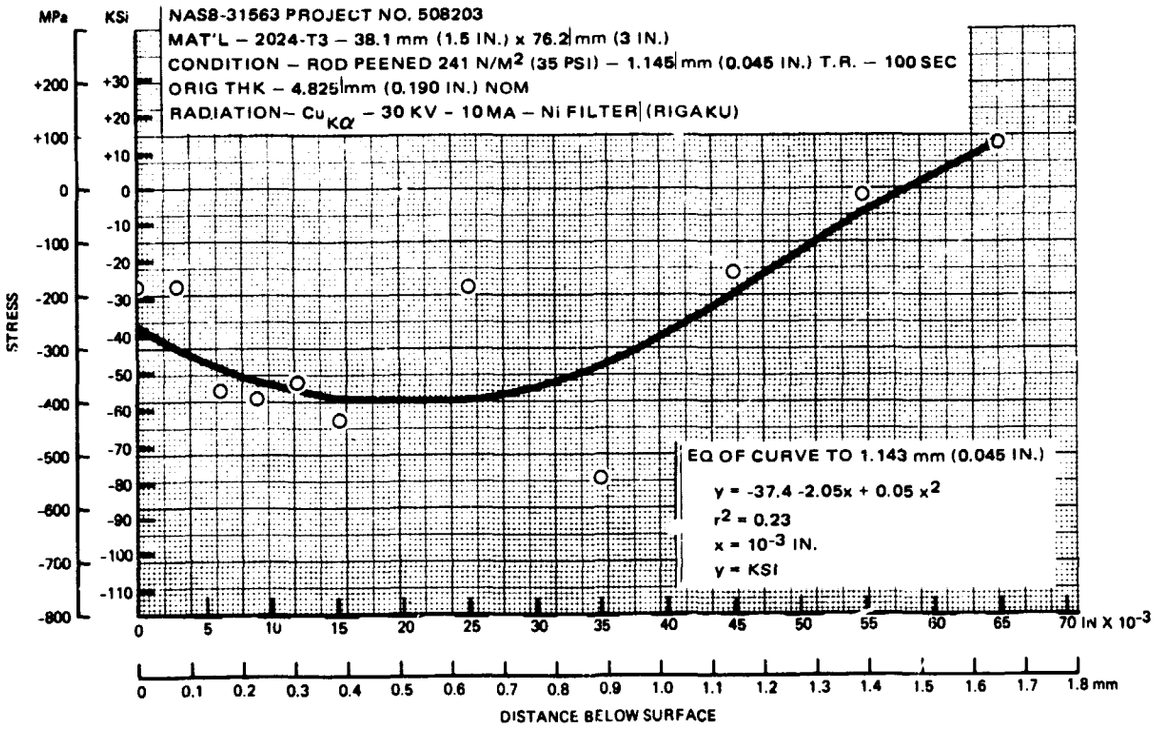


FIGURE 39. ROD PEENING STRESS PROFILE (SET IV)

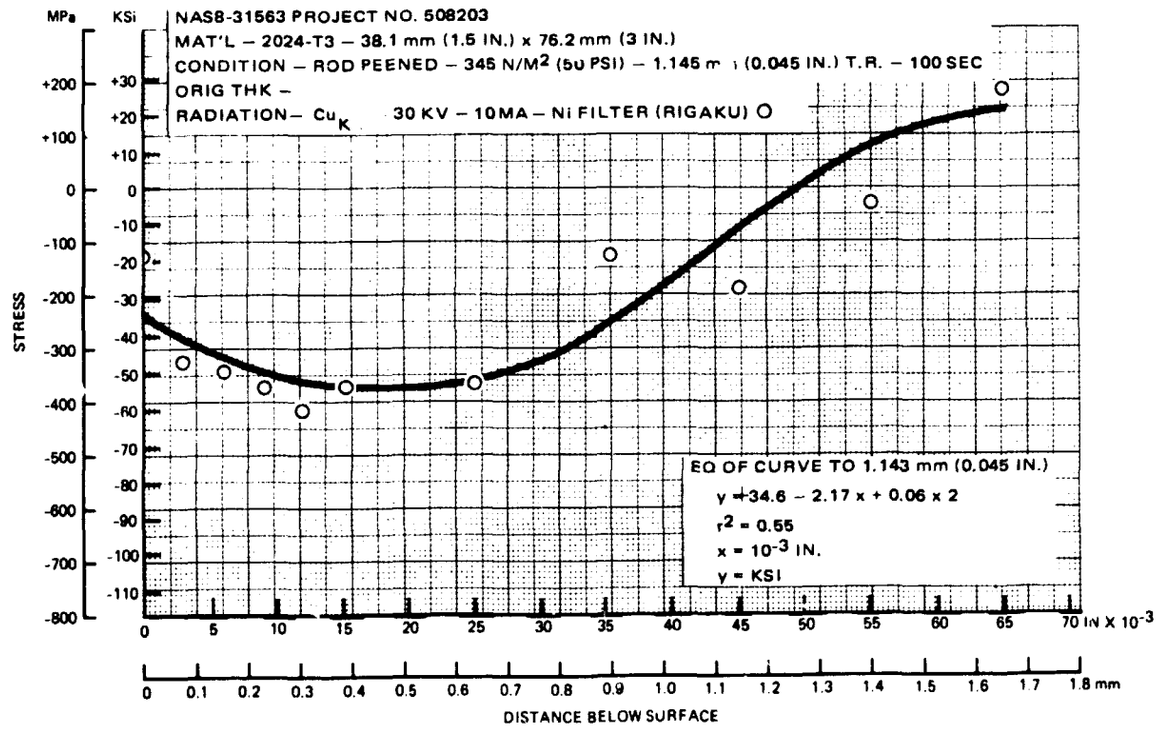


FIGURE 40. ROD PEENING STRESS PROFILE (SET IV)

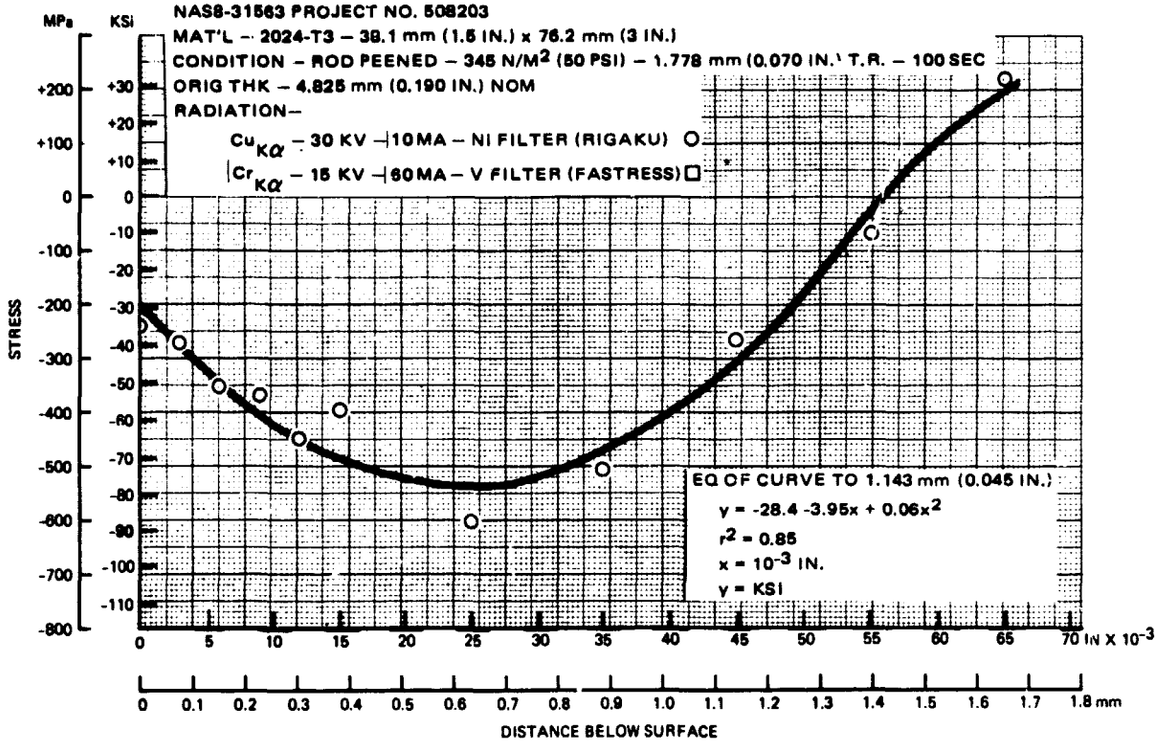


FIGURE 41. ROD PEENING STRESS PROFILE (SET IV)

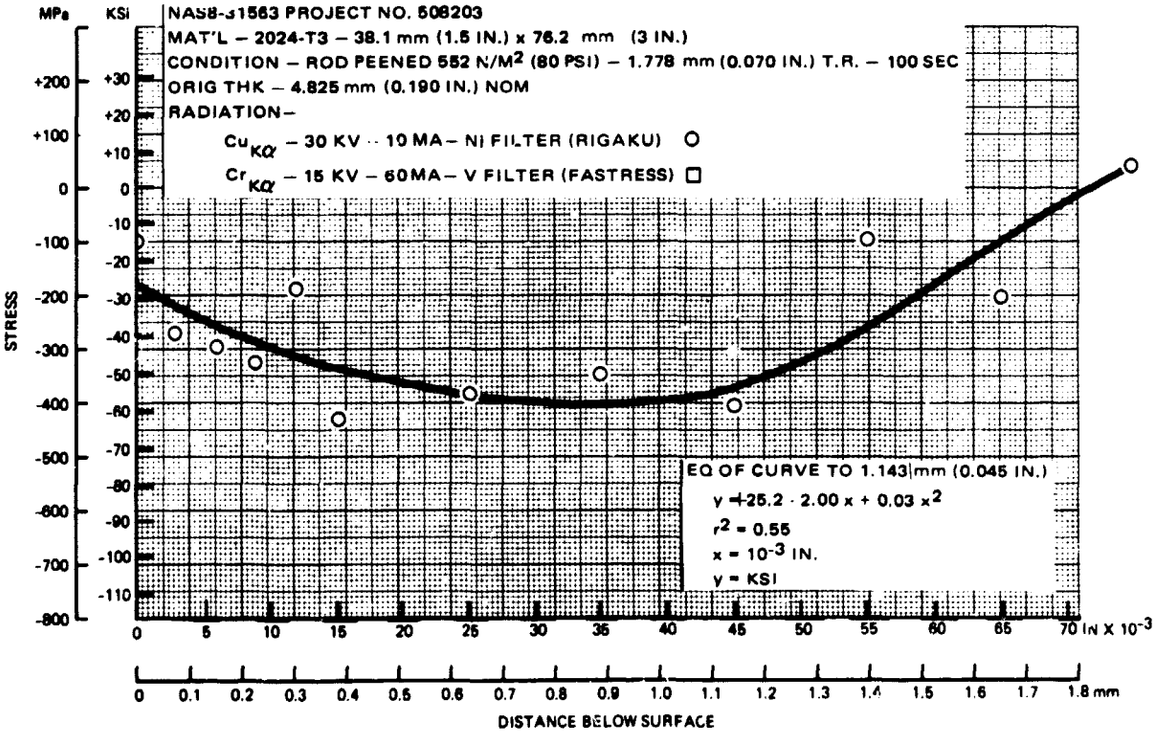


FIGURE 42. ROD PEENING STRESS PROFILE (SET IV)

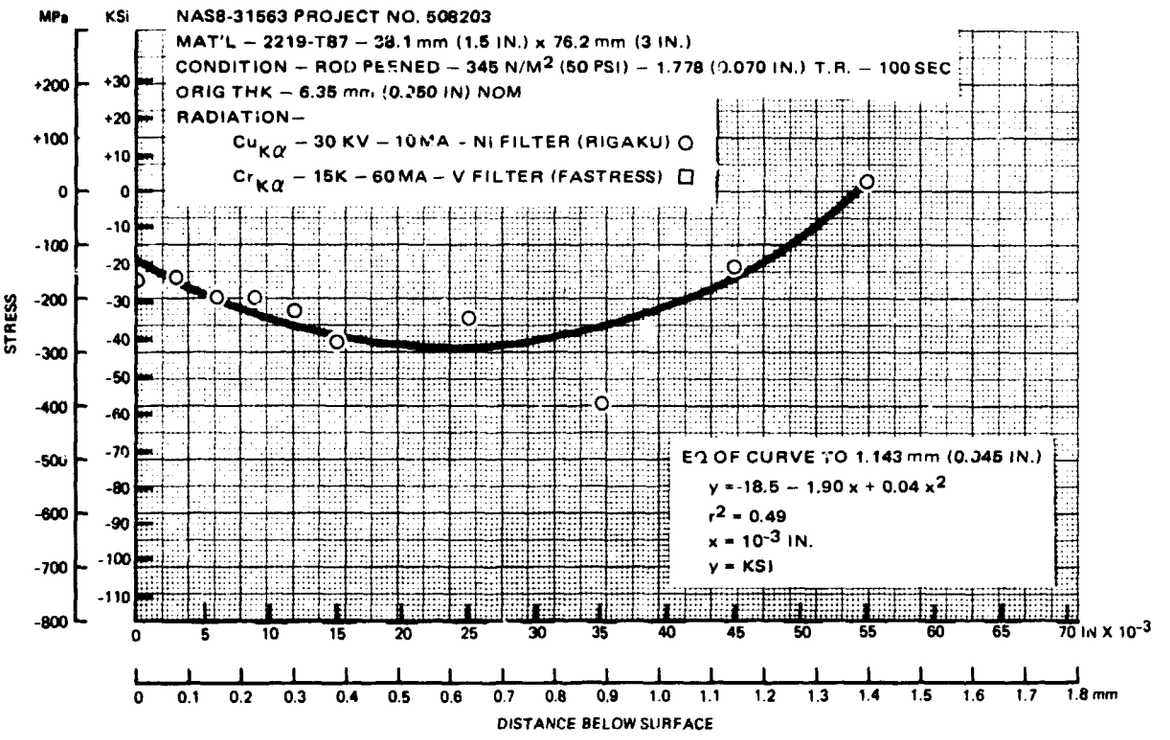


FIGURE 43. ROD PEENING STRESS PROFILE (SET iV)

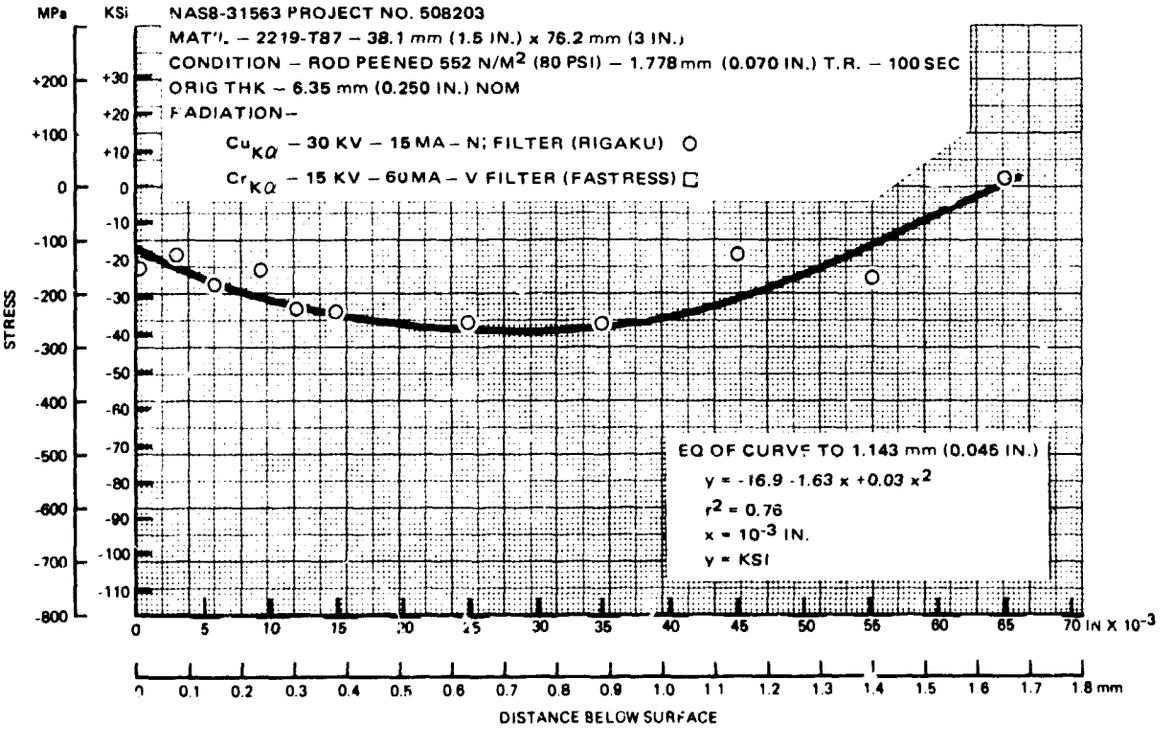


FIGURE 44. ROD PEENING STRESS PROFILE (SET IV)

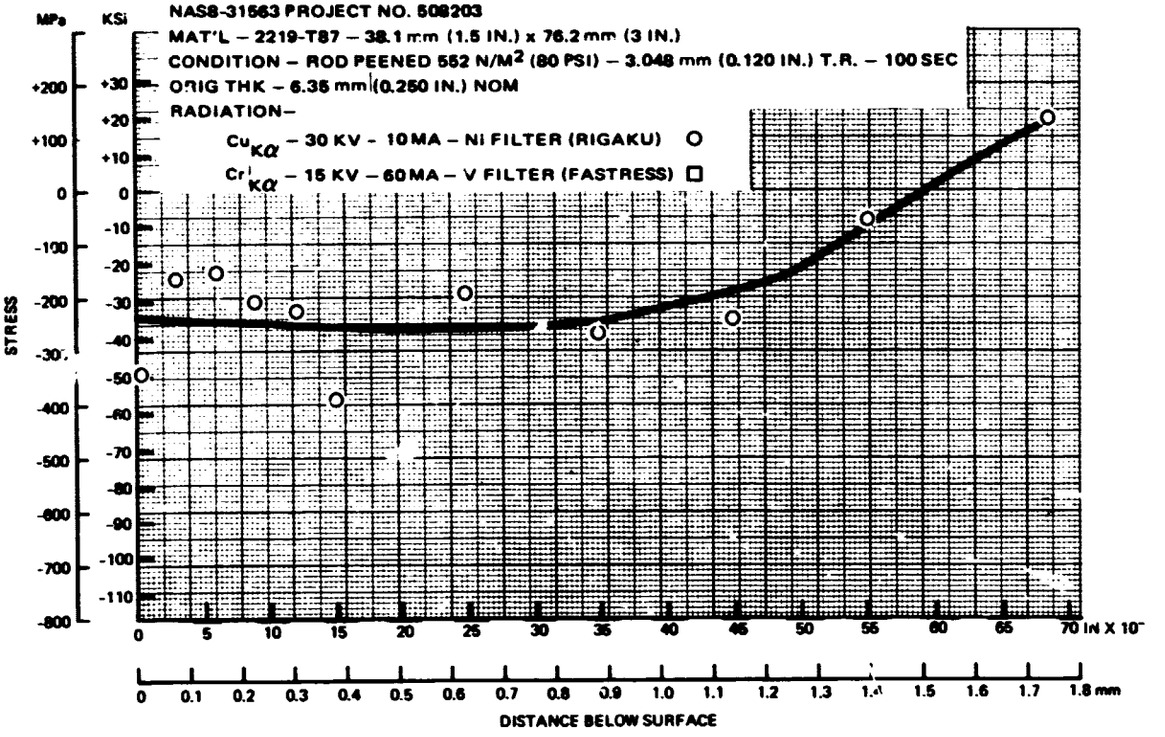


FIGURE 45. ROD PEENING STRESS PROFILE (SET IV)

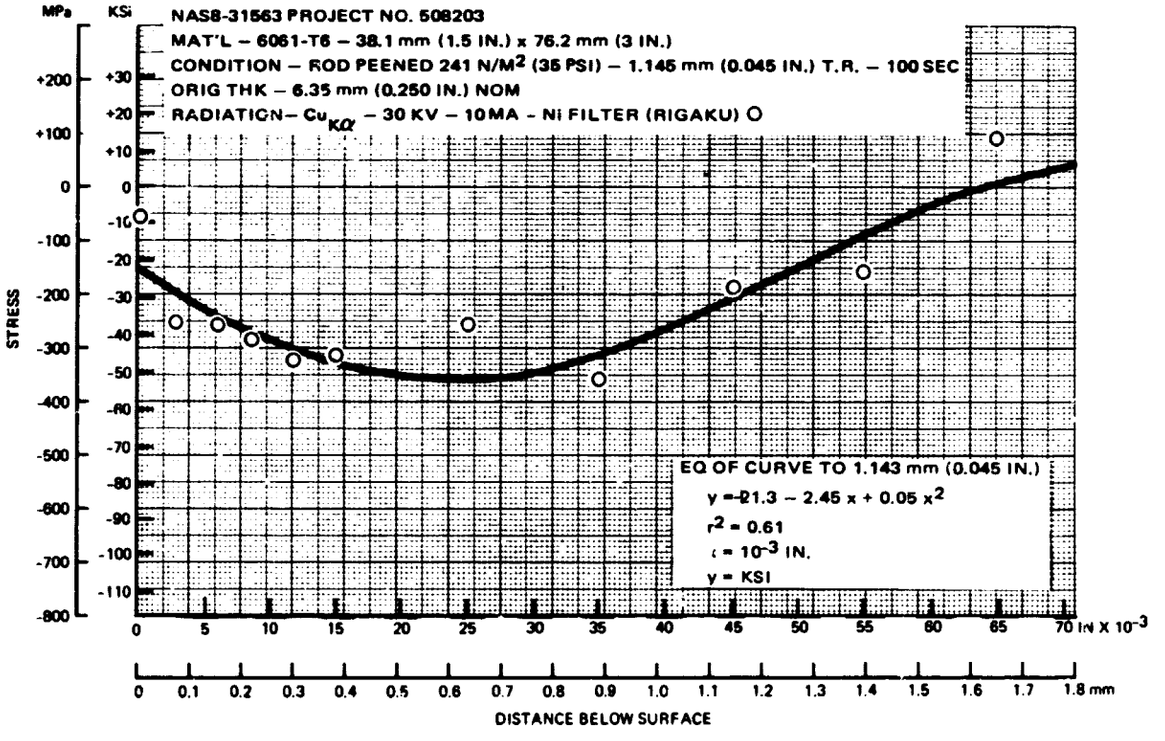


FIGURE 46. ROD PEENING STRESS PROFILE (SET IV)

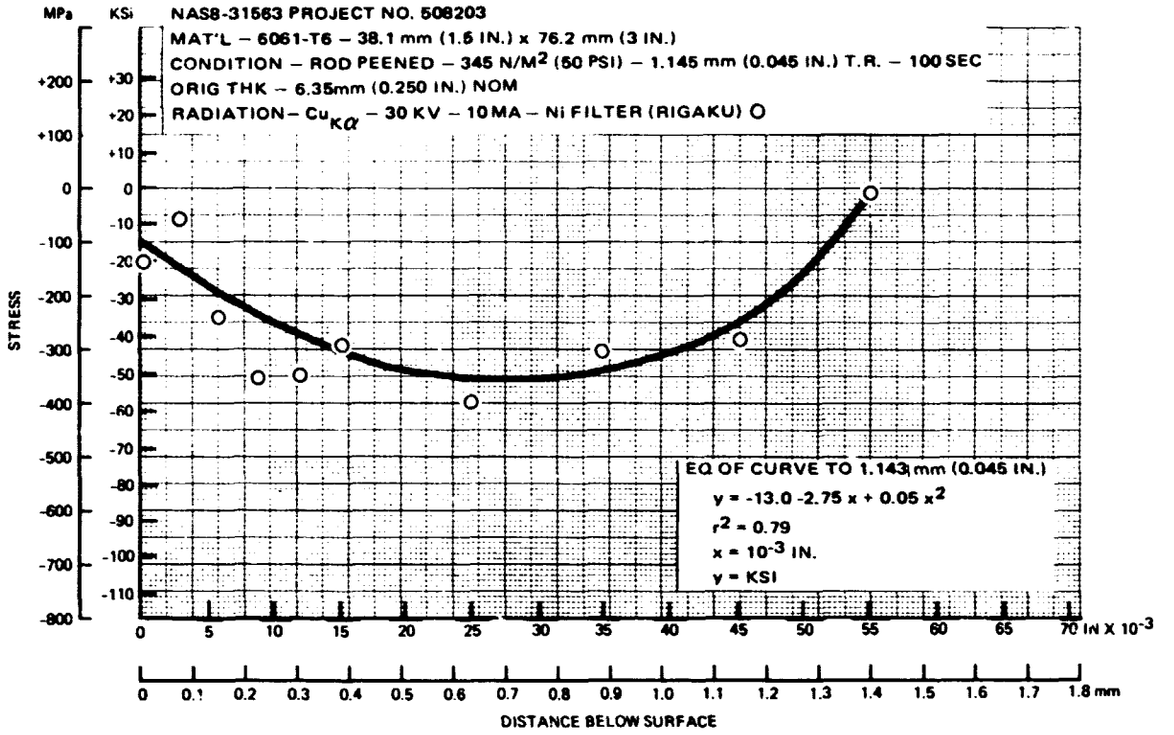


FIGURE 47. ROD PEENING STRESS PROFILE (SET IV)

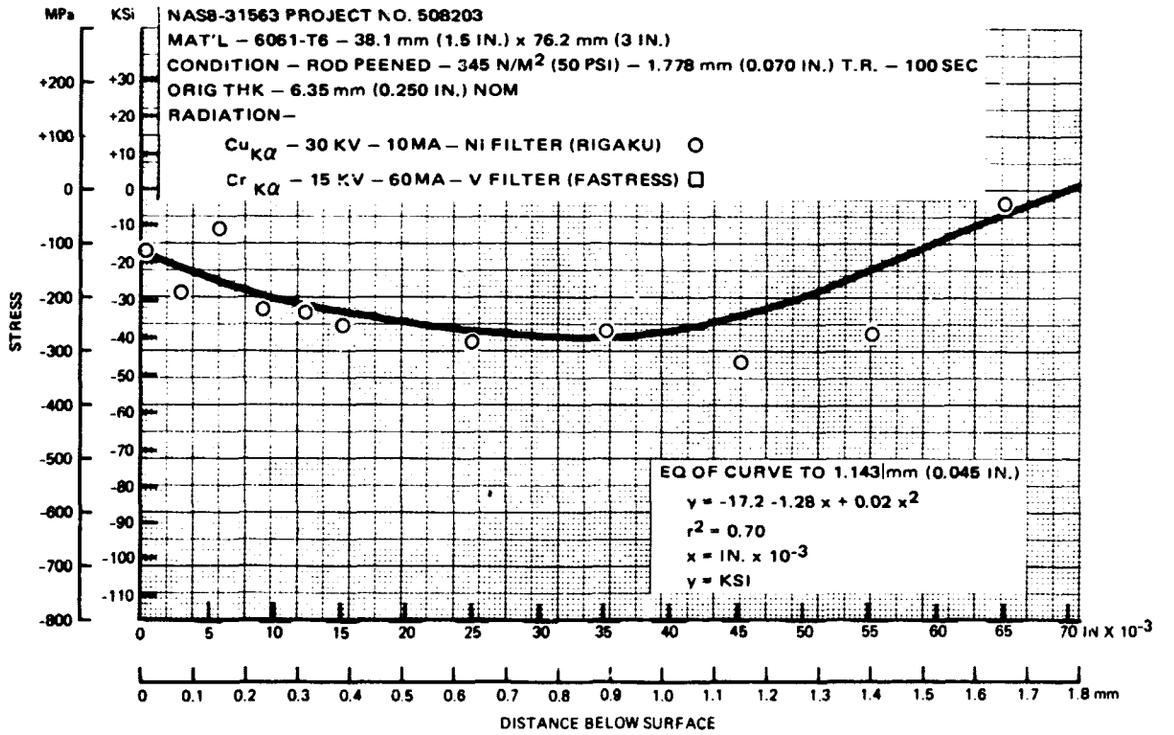


FIGURE 48. ROD PEENING STRESS PROFILE (SET IV)

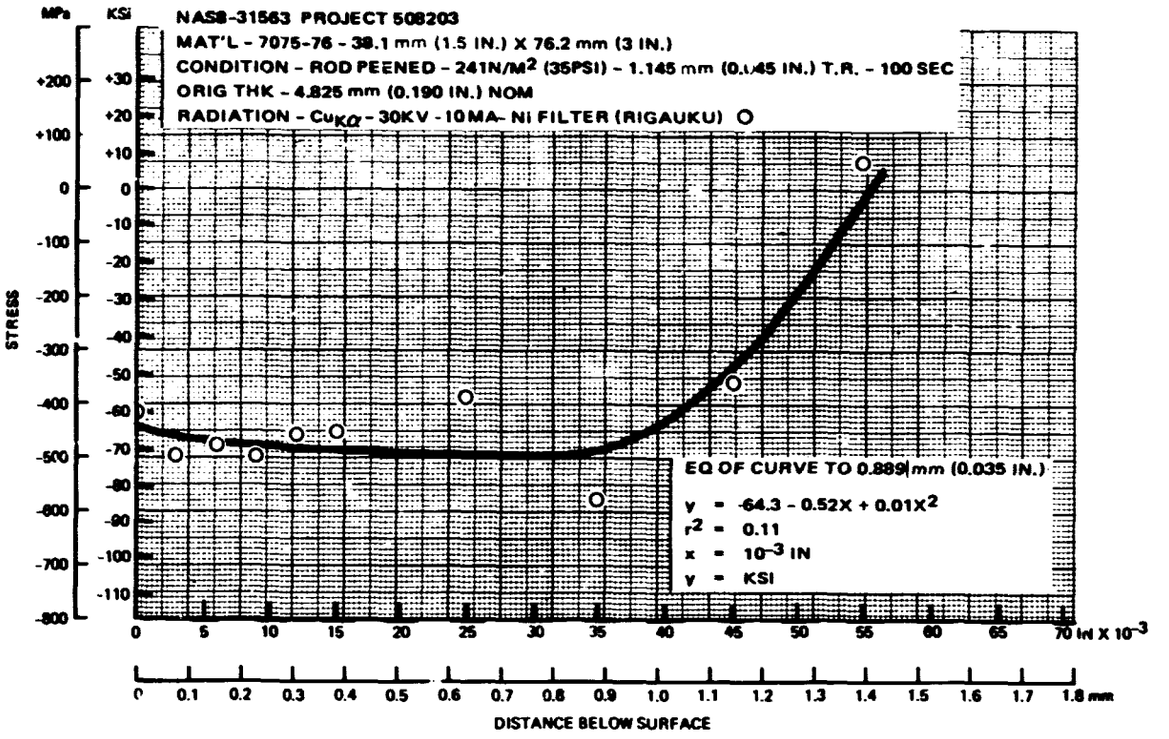


FIGURE 49. ROD PEENING STRESS PROFILE (SET IV)

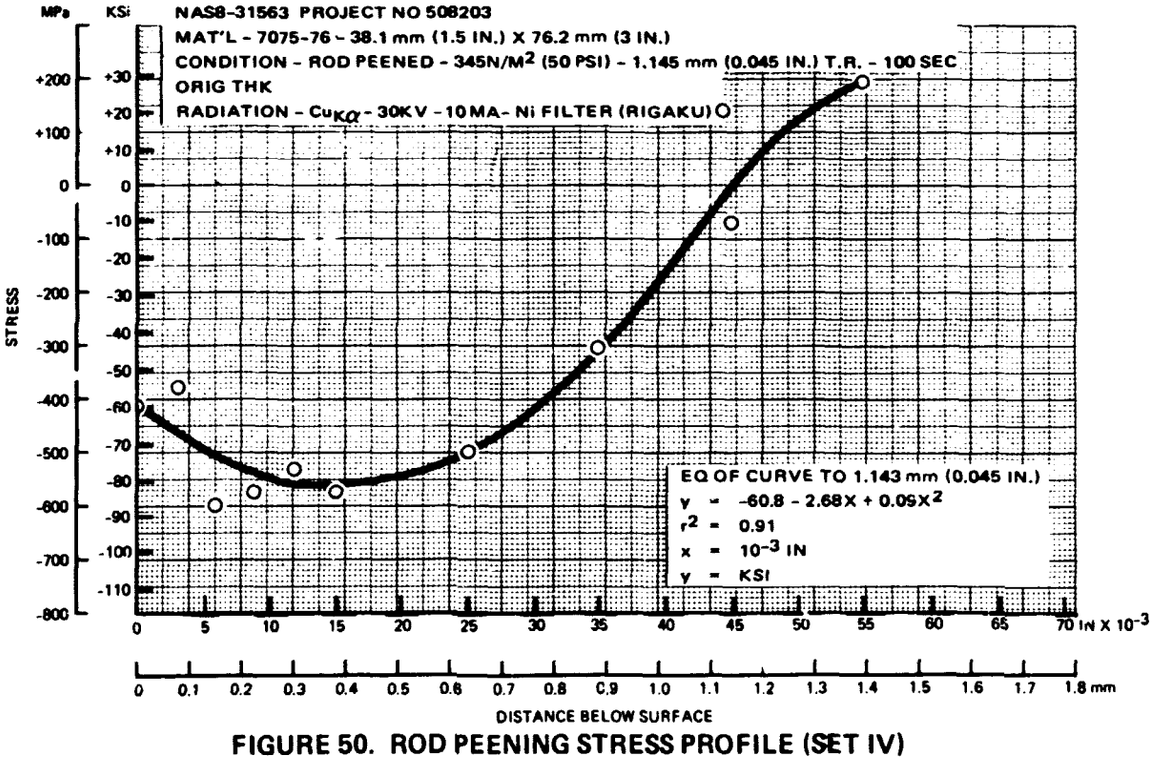


FIGURE 50. ROD PEENING STRESS PROFILE (SET IV)

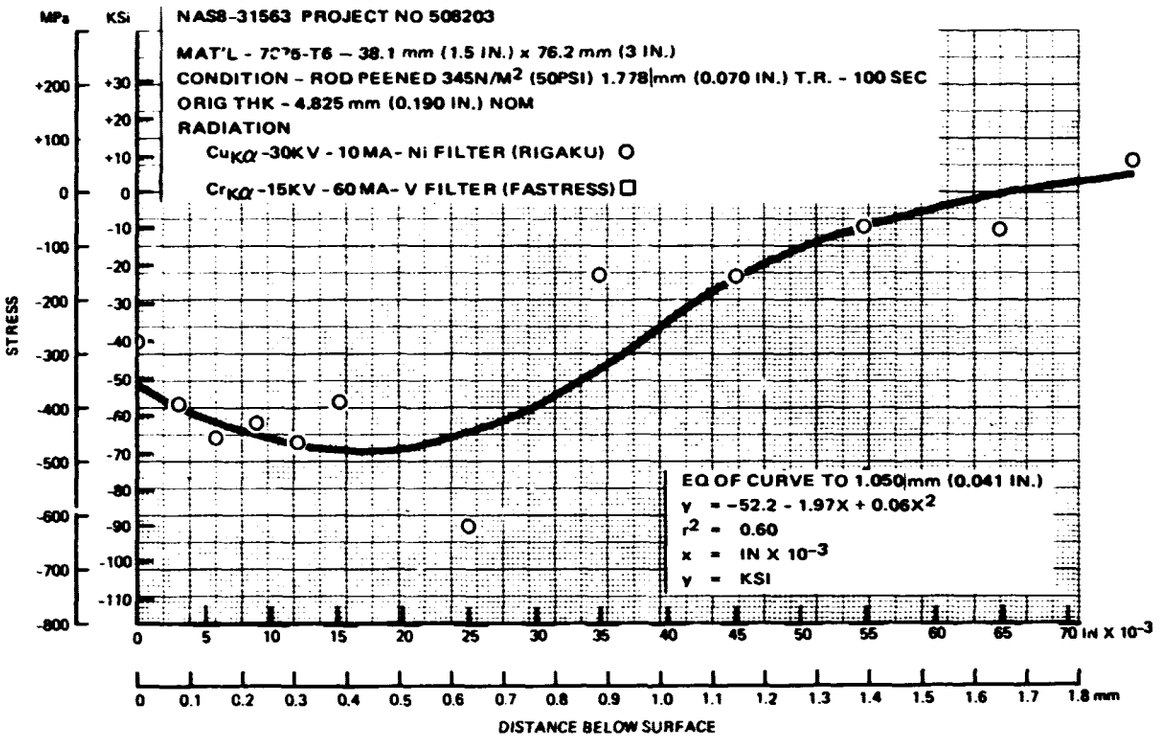


FIGURE 51. ROD PEENING STRESS PROFILE (SET IV)

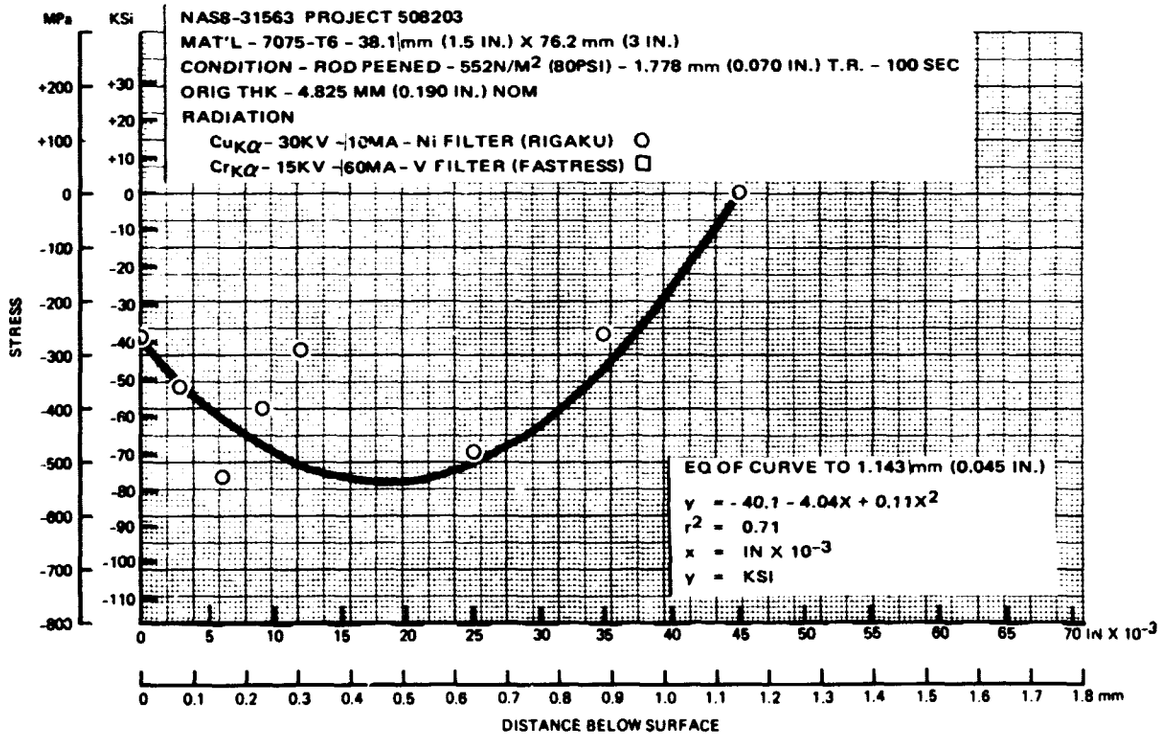


FIGURE 52. ROD PEENING STRESS PROFILE (SET IV)

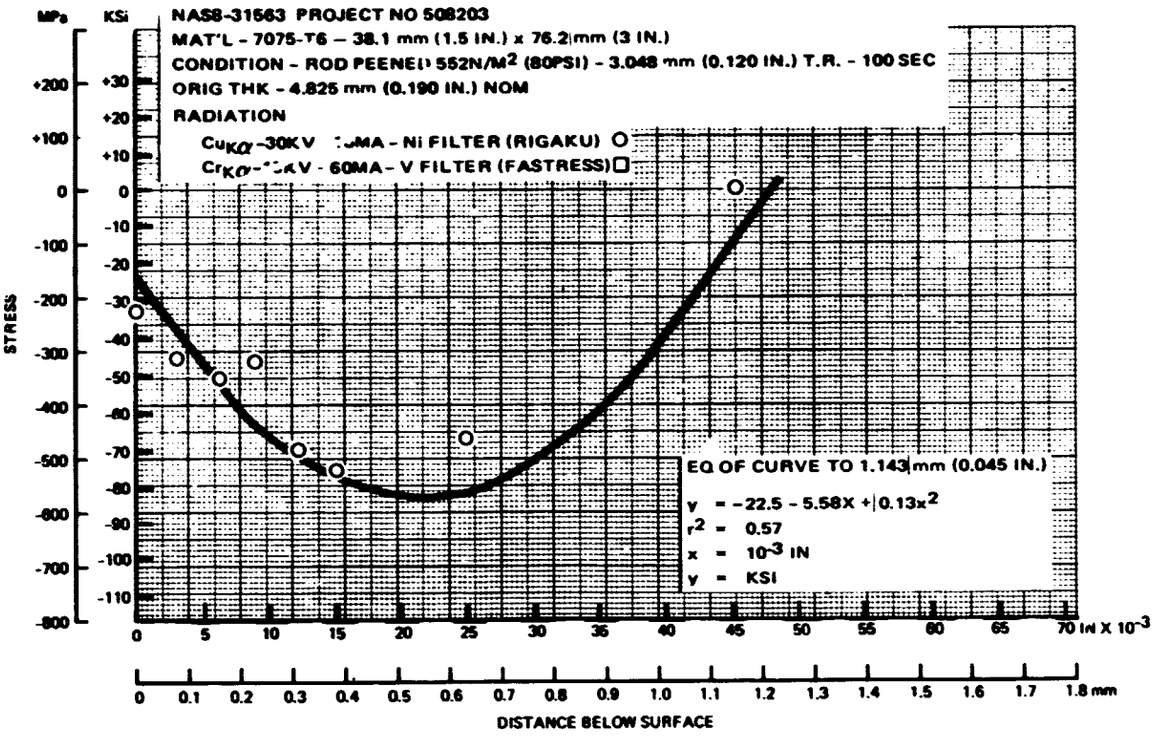


FIGURE 53. ROD PEENING STRESS PROFILE (SET IV)

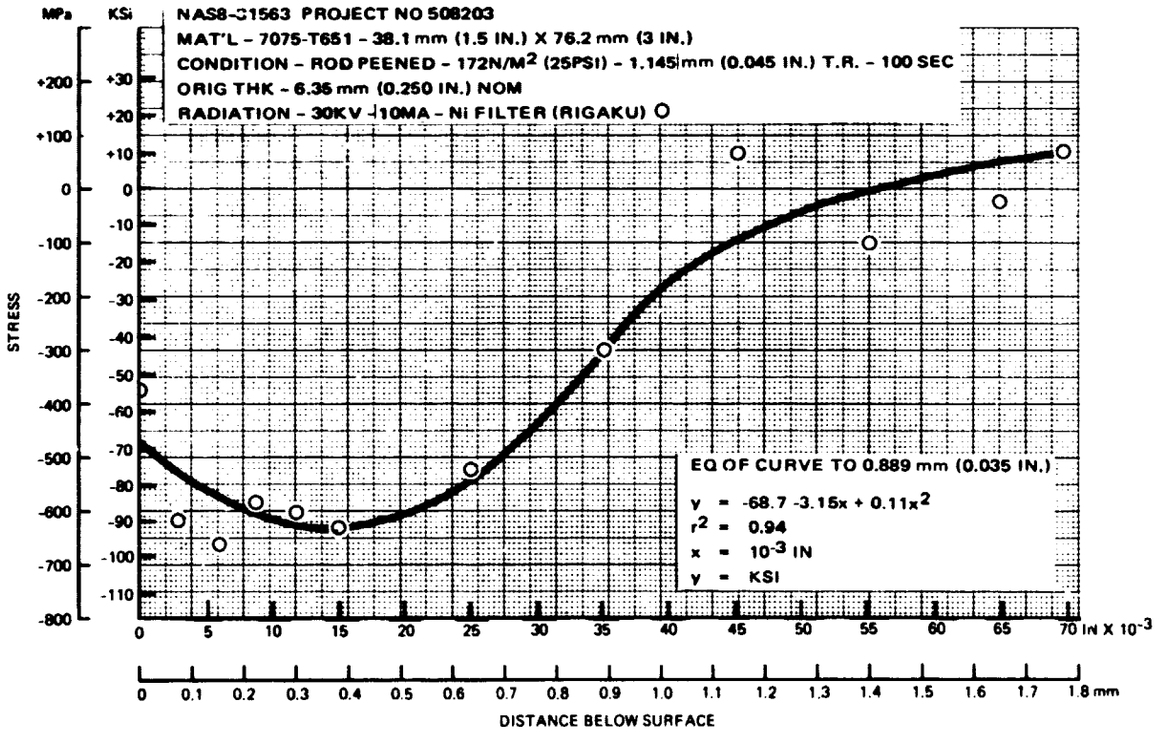


FIGURE 54. ROD PEENING STRESS PROFILE (SET IV)

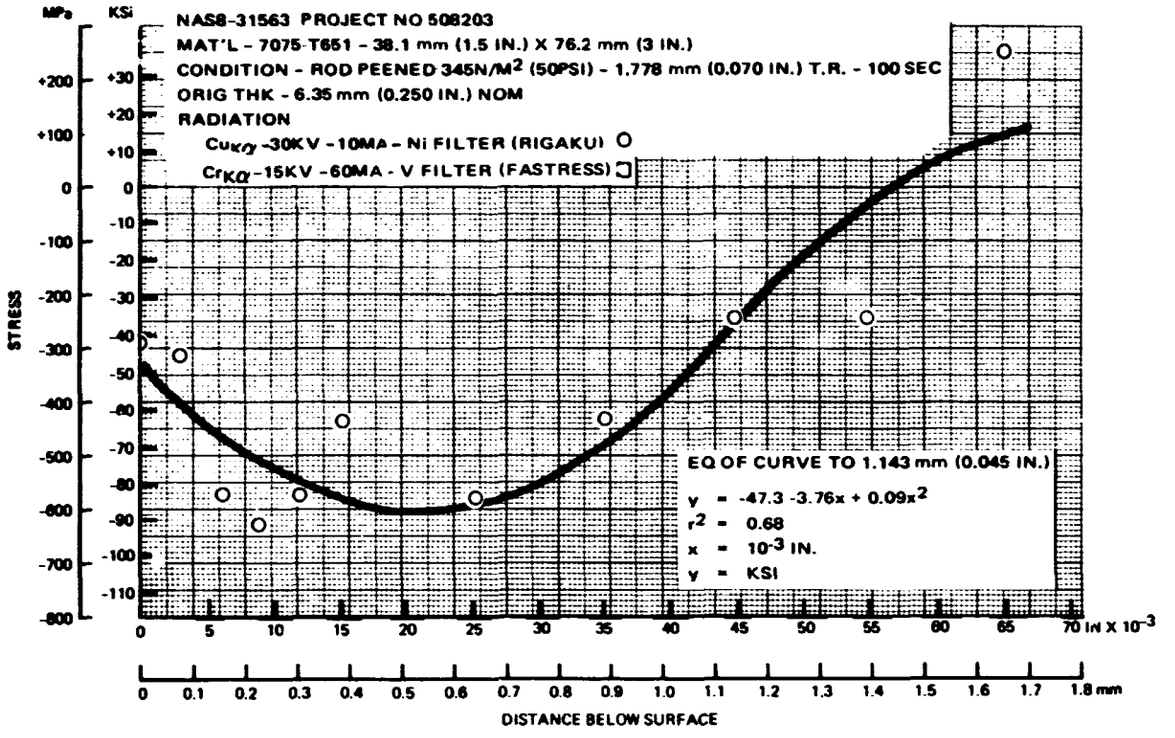


FIGURE 55. ROD PEENING STRESS PROFILE (SET IV)

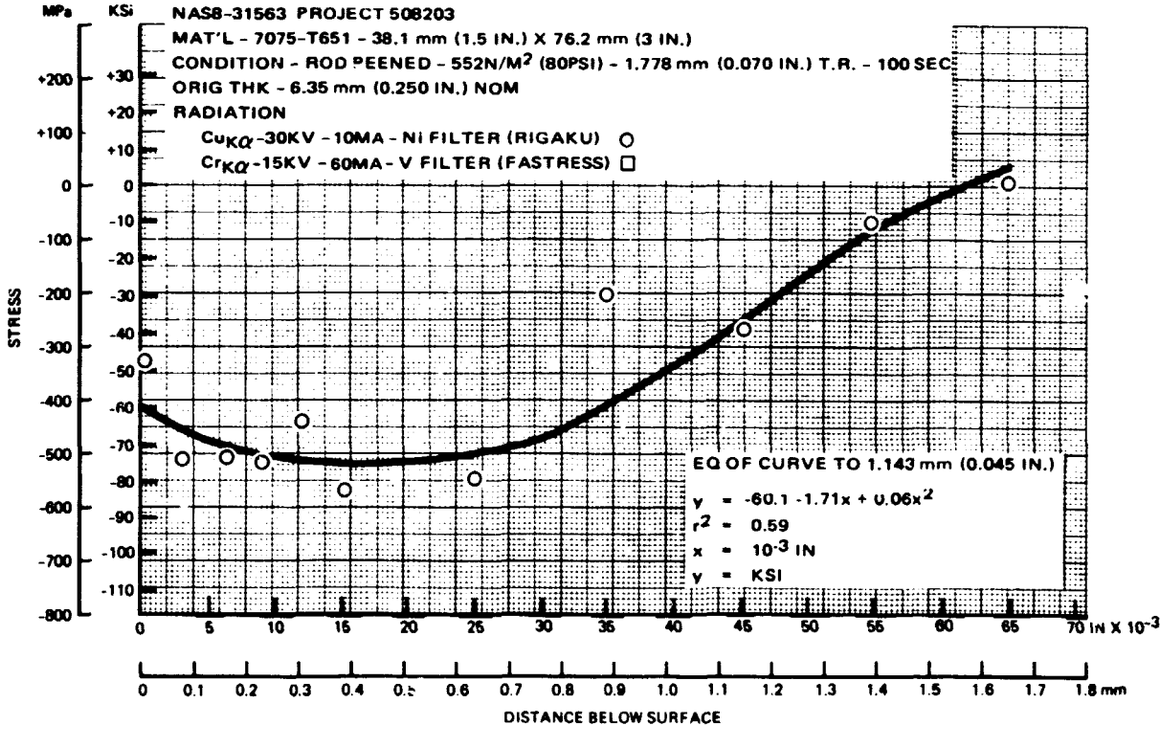


FIGURE 56. ROD PEENING STRESS PROFILE (SET IV)

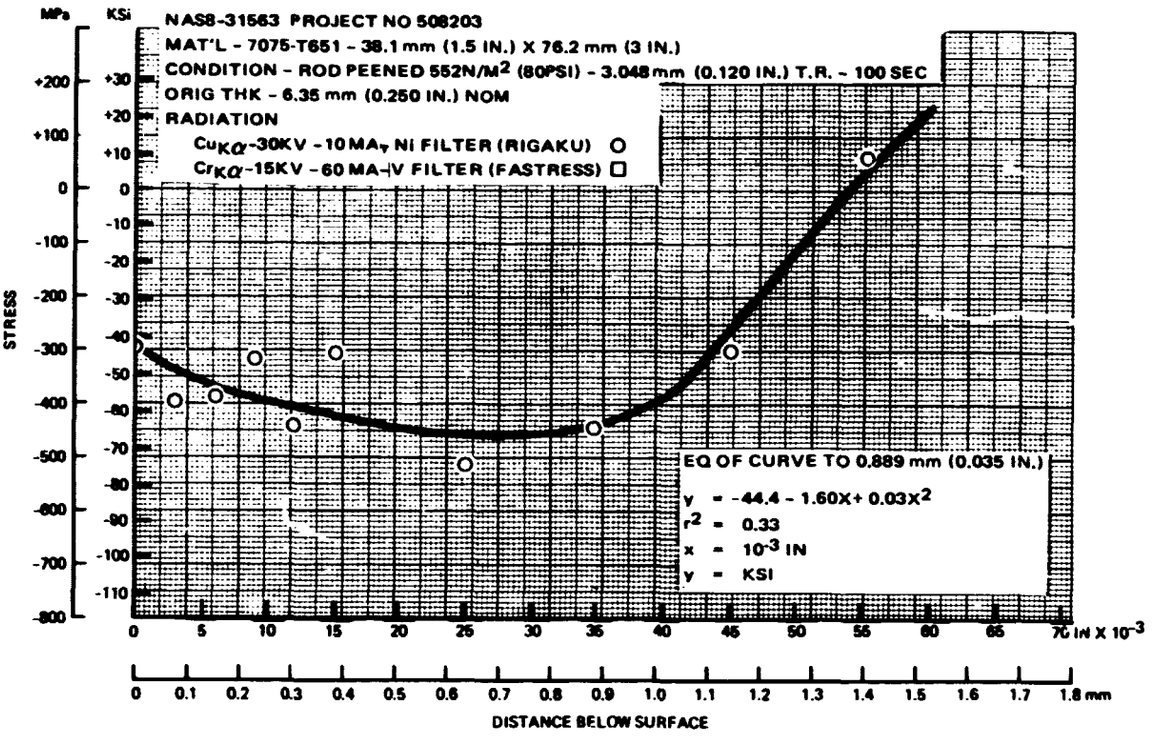


FIGURE 57. ROD PEENING STRESS PROFILE (SET IV)

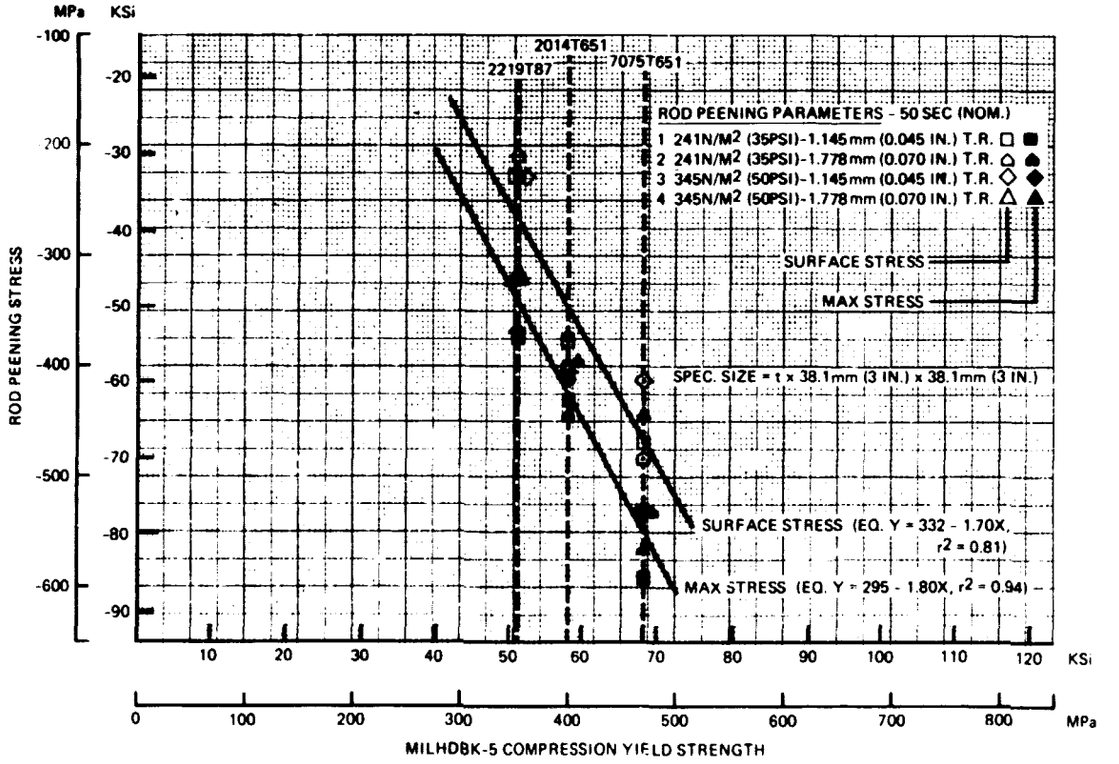


FIGURE 58. ROD PEENING STRESS VS. COMPRESSION YIELD STRENGTH (SET III)

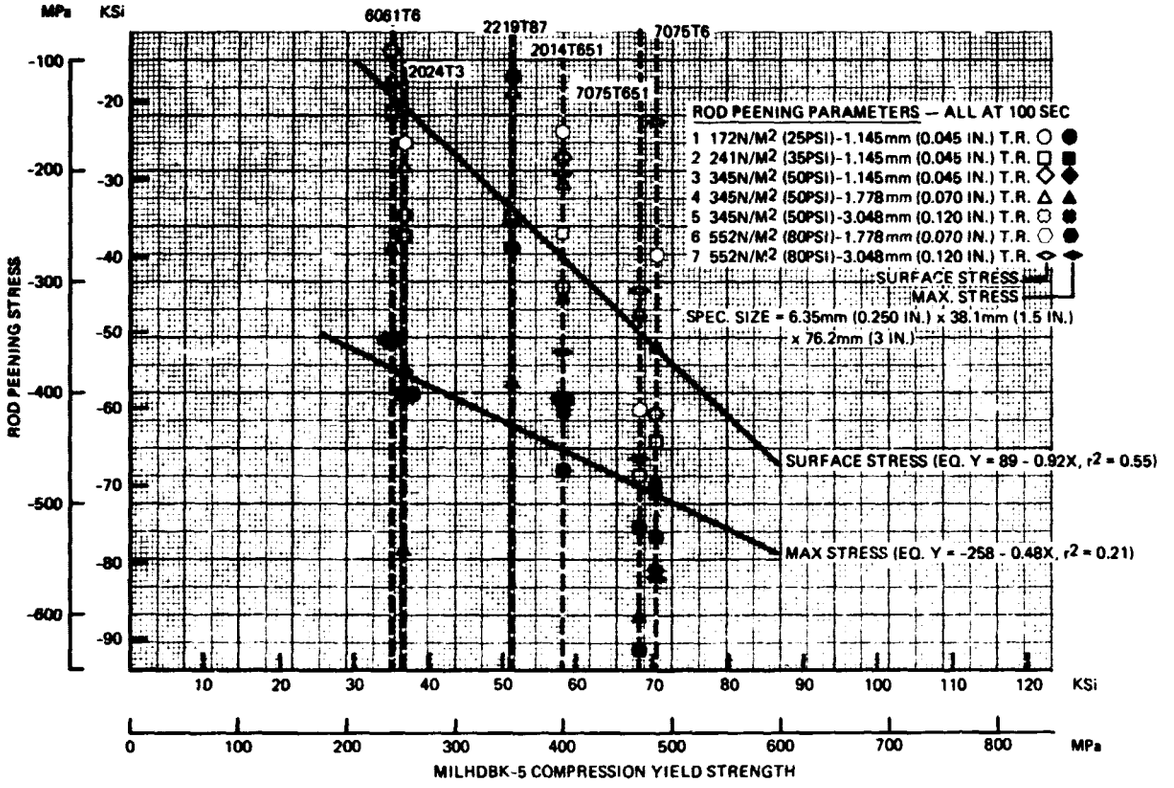


FIGURE 59. ROD PEENING STRESS VS. COMPRESSION YIELD STRENGTH (SET IV)

APPENDIX A

SET II DATA

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T652 Forging Section (NASA 19-2) 1 in x 2 7/16 in (Nom)
CONDITION Rod Peened - Saturated
ORIGINAL THK. 0.326 Inch
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 1.9295 \times 10^{7} \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	Multi	---	---	---	---	-399.9 (-58.0)	
0.025 (1)	Multi	---	---	---	---	-366.1 (-53.0)	
0.051 (2)	Multi	---	---	---	---	-439.9 (-63.8)	
0.076 (3)	Multi	---	---	---	---	-415.7 (-60.3)	
0.012 (4)	Multi	---	---	---	---	-395.1 (-57.3)	
0.127 (5)	Multi	---	---	---	---	-404.0 (-58.6)	
0.152 (6)	Multi	---	---	---	---	-446.8 (-64.8)	
0.178 (7)	Multi	---	---	---	---	-461.3 (-66.9)	
0.203 (8)	Multi	---	---	---	---	-513.7 (-74.5)	
0.229 (9)	Multi	---	---	---	---	-507.5 (-73.6)	
0.254 (10)	Multi	---	---	---	---	-418.5 (-60.7)	
0.279 (11)	Multi	---	---	---	---	-477.8 (-69.3)	
0.305 (12)	Multi	---	---	---	---	-472.3 (-68.5)	
0.330 (13)	Multi	---	---	---	---	-485.4 (-70.4)	
0.356 (14)	Multi	---	---	---	---	-448.9 (-65.1)	
0.381 (15)	-15	157.8	0.9813	0.7856			
0.381 (15)	0	157.9	0.9815	0.7855			
0.381 (15)	15	158.3	0.9821	0.7849			
0.381 (15)	30	160.2	0.9851	0.7825			
0.381 (15)	45	161.0	0.9863	0.7816			
0.381 (15)	60	162.5	0.9884	0.7800		-507.5 (-73.6)	
0.406 (16)	-15	157.6	0.9810	0.7859			
0.406 (16)	0	158.0	0.9816	0.7853			
0.406 (16)	15	158.6	0.9826	0.7845			
0.406 (16)	30	159.9	0.9847	0.7829			
0.406 (16)	45	160.6	0.9857	0.7821			
0.406 (16)	60	162.2	0.9880	0.7803		-457.8 (-66.4)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T652 Forging Section (NASA 19-2) 1 in X 2 7/16 in (Nom)
CONDITION Rod Peened - Saturated
ORIGINAL THK. 0.326 Inch
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 1.9295 \times 10^{7} \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.432 (17)	-15	157.6	0.9810	0.7859			
0.432 (17)	0	158.0	0.9816	0.7853			
0.432 (17)	-15	158.7	0.9828	0.7844			
0.432 (17)	30	160.0	0.9848	0.7828			
0.432 (17)	45	161.0	0.9863	0.7816			
0.432 (17)	60	162.4	0.9882	0.7801		-486.1 (-70.5)	
0.457 (18)	-15	157.9	0.9815	0.7855			
0.457 (18)	0	158.2	0.9820	0.7851			
0.457 (18)	15	158.4	0.9823	0.7848			
0.457 (18)	30	159.8	0.9845	0.7830			
0.457 (18)	45	160.8	0.9860	0.7818			
0.457 (18)	60	161.8	0.9874	0.7807		-428.2 (-62.1)	
0.483 (19)	-15	157.8	0.9813	0.7856			
0.483 (19)	0	157.9	0.9815	0.7855			
0.483 (19)	15	158.4	0.9823	0.7848			
0.483 (19)	30	160.0	0.9848	0.7828			
0.483 (19)	45	160.6	0.9857	0.7821			
0.483 (19)	60	162.2	0.9880	0.7803		-466.1 (-67.6)	
0.508 (20)	-15	157.8	0.9813	0.7856			
0.508 (20)	0	158.0	0.9816	0.7853			
0.508 (20)	15	158.3	0.9821	0.7849			
0.508 (20)	30	159.8	0.9845	0.7830			
0.508 (20)	45	160.5	0.9856	0.7822			
0.508 (20)	60	162.2	0.9880	0.7803		-457.8 (-66.4)	
0.533 (21)	0	157.9	0.9815	0.7855			
0.533 (21)	45	160.3	0.9853	0.7824	-0.0031	-412.3 (-59.8)	
0.559 (22)	0	158.2	0.9820	0.7851			

DATA SHEET NAS 8-31563 Project No. 508203

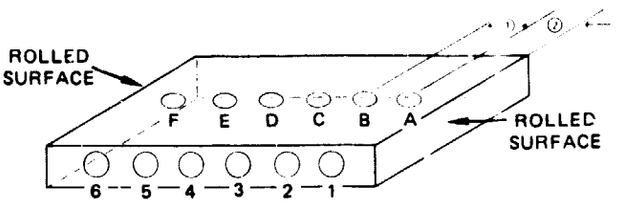
MATERIAL 7079-T652 Forging Section (NASA 19-2) 1 in x 2 7/16 in (Norm)
CONDITION Rod Peened - Saturated
ORIGINAL THK. 0.326 Inch
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 1.9295 \times 10^{7} \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.559 (22)	45	160.6	0.9857	0.7821	-0.0030	-399.2 (-57.9)	
0.584 (23)	0	158.2	0.9820	0.7851			
0.584 (23)	45	160.4	0.9854	0.7823	-0.0028	-372.3 (-54.0)	
0.610 (24)	0	158.4	0.9823	0.7848			
0.610 (24)	45	160.2	0.9851	0.7821	-0.0027	-359.2 (-52.1)	
0.635 (25)	0	158.4	0.9823	0.7848			
0.635 (25)	45	160.4	0.9854	0.7823	-0.0025	-332.3 (-48.2)	
0.660 (26)	0	158.8	0.9829	0.7843			
0.660 (26)	45	160.0	0.9848	0.7828	-0.0015	-199.3 (-28.9)	
0.660 (26)	0	158.7	0.9828	0.7844			
0.660 (26)	45	160.3	0.9853	0.7824	-0.0020	-266.1 (-38.6)	
0.711 (28)	0	158.9	0.9831	0.7841			
0.711 (28)	45	160.2	0.9851	0.7825	-0.0016	-213.1 (-30.9)	
0.737 (29)	0	158.8	0.9829	0.7843			
0.737 (29)	45	160.0	0.9848	0.7828	-0.0015	-199.3 (-28.9)	
0.762 (30)	0	158.6	0.9826	0.7845			
0.762 (30)	45	159.9	0.9847	0.7829	-0.0016	-213.1 (-30.9)	
0.787 (31)	0	158.9	0.9831	0.7841			
0.787 (31)	45	160.0	0.9848	0.7828	-0.0013	-173.1 (-25.1)	
0.813 (32)	0	159.2	0.9836	0.7838			
0.813 (32)	45	160.0	0.9848	0.7828	-0.0010	-133.1 (-19.3)	
0.838 (33)	0	159.7	0.9843	0.7831			
0.838 (33)	45	159.9	0.9847	0.7829	-0.0012	-159.3 (-23.1)	
0.864 (34)	0	159.6	0.9842	0.7833			
0.864 (34)	45	159.8	0.9845	0.7830	0.0003	-40.0 (-5.8)	
0.889 (35)	0	159.7	0.9843	0.7831			
0.889 (35)	45	159.8	0.9845	0.7830	0.0001	-13.1 (-1.9)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T652 Forging Section (NASA 19-2) 1 in x 2 7/16 in (Nom)
CONDITION Rod Peened - Saturated
ORIGINAL THK. 0.326 Inch
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 1.9295 \times 10^{7} \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.914 (36)	0	159.7	0.9843	0.7831			
0.914 (36)	45	160.0	0.9848	0.7828	0.0003	-40.0 (-5.8)	
0.940 (37)	0	159.8	0.9845	0.7830			
0.940 (37)	45	159.9	0.9847	0.7829	9.0001	-13.1 (-1.9)	
0.965 (38)	-15	159.8	0.9845	0.7830			
0.965 (38)	0	159.8	0.9845	0.7830			
0.965 (38)	15	159.8	0.9845	0.7830			
0.965 (38)	30	159.8	0.9845	0.7830			
0.965 (38)	45	159.9	0.9847	0.7829			
0.965 (38)	60	161.9	0.9876	0.7806		0 0	



DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 Plate Section

CONDITION

ORIGINAL THK. 146.1mm (5.75 in.)

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

① = 27.31mm (1.075 in.) Typ

② = 4.75mm (0.187 in.) Typ

SURFACE LOCATION	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
A	0	160.4	0.9854	0.7823			
	45	162.2	0.9880	0.7803	-0.0020	-273.7 (-39.7)	
B	0	160.9	0.9861	0.7817			
	45	161.8	0.9874	0.7807	-0.0010	-133.1 (-19.3)	
C	0	160.8	0.9860	0.7818			
	45	162.0	0.9877	0.7805	-0.0013	-177.9 (-25.8)	
D	0	160.8	0.9860	0.7818			
	45	162.0	0.9877	0.7805	-0.0013	-177.9 (-25.8)	
E	0	161.0	0.9863	0.7816			
	45	162.2	0.9880	0.7803	-0.0013	-177.9 (-25.8)	
F	0	160.6	0.9857	0.7821			
	45	162.6	0.9885	0.7799	-0.0022	-301.3 (-43.7)	
1	0	160.5	0.9856	0.7822			
	45	162.6	0.9885	0.7799	-0.0023	-315.1 (-45.7)	
2	0	161.0	0.9863	0.7816			
	45	162.0	0.9877	0.7805	-0.0011	-151.0 (-21.9)	
3	0	161.0	0.9863	0.7816			
	45	162.0	0.9877	0.7805	-0.0011	-151.0 (-21.9)	
4	0	161.2	0.9866	0.7814			
	45	162.3	0.9881	0.7802	-0.0012	-159.3 (-23.1)	
5	0	161.0	0.9863	0.7816			
	45	161.9	0.9876	0.7806	-0.0010	-133.1 (-19.3)	
6	0	160.8	0.9860	0.7818			
	45	162.5	0.9884	0.7800	-0.0018	-246.8 (-35.8)	

APPENDIX B

SET III DATA

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom.) MSFC No. II

CONDITION Rod Peened 35PSI/0.045T. R./66 Sec.

ORIGINAL THK. 0.257 Inch

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
(1) 0.787 (31)	-15	160.9	0.9861	0.7817			
	0	160.8	0.9860	0.7818			
	15	161.6	0.9871	0.7809			
	30	161.8	0.9874	0.7807			
	45	163.4	0.9895	0.7790			
	60	164.0	0.9903	0.7785		-322.0 (-46.7)	
0.864 (34)	0	162.0	0.9877	0.7805			
	45	163.9	0.9901	0.7786	-0.0019	-270.3 (-39.2)	-206.9 (-30)
0.940 (37)	0	162.4	0.9882	0.7801			
	45	163.0	0.9890	0.7795	-0.0006	-85.5 (-12.4)	-131.0 (-19)
1.016 (40)	0	162.3	0.9881	0.7802			
	45	162.6	0.9885	0.7799	-0.0003	-42.7 (-6.2)	
1.092 (43)	-15	162.4	0.9882	0.7801			
	0	162.1	0.9878	0.7804			
	15	162.2	0.9880	0.7803			
	30	162.3	0.9881	0.7802			
	45	162.4	0.9882	0.7801			
	60	163.5	0.9897	0.7790		-106.9 (-15.5)	
1.219 (48)	0	162.9	0.9889	0.7796			
	45	162.7	0.9886	0.7798	+0.0002	+28.8 (+4.1)	
1.346 (53)	0	163.2	0.9853	0.7792			
	45	163.1	0.9891	0.7794	+0.0001	+14.5 (+2.1)	
1.473 (58)	0	163.1	0.9891	0.7794			
	45	163.0	0.9890	0.7795	+0.0001	+14.5 (+2.1)	

(1) Multi ψ on Rigaku

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom.) MSFC No. II
CONDITION Rod Peened - 35PSI/0.045T. R./66 Sec.
ORIGINAL THK. 0.257 Inch
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.3	0.9867	0.7813	---	---	---
0 (0)	45	163.2	0.9893	0.7792	-0.0021	-299.2 (-43.4)	-234.4 (-34)
0.025 (1)	0	161.2	0.9866	0.7814	---	---	---
0.025 (1)	45	163.5	0.9897	0.7790	-0.0024	-342.0 (-49.6)	-289.6 (-42)
0.051 (2)	0	160.7	0.9859	0.7820	---	---	---
0.051 (2)	45	163.7	0.9899	0.7788	-0.0032	-455.8 (-66.1)	-289.6 (-42)
0.076 (3)	0	160.5	0.9856	0.7822	---	---	---
0.076 (3)	45	163.3	0.9894	0.7791	-0.0031	-441.3 (-64.0)	-262.0 (-38)
0.102 (4)	0	160.7	0.9859	0.7820	---	---	---
0.102 (4)	45	163.5	0.9897	0.7790	-0.0030	-427.5 (-62.0)	-344.8 (-50)
0.127 (5)	0	160.7	0.9859	0.7820	---	---	---
0.127 (5)	45	163.0	0.9890	0.7795	-0.0025	-355.8 (-51.6)	-303.4 (-44)
0.152 (6)	---	---	---	---	---	---	---
0.152 (6)	---	---	---	---	---	---	---
0.178 (7)	0	160.5	0.9856	0.7822	---	---	---
0.178 (7)	45	163.5	0.9897	0.7790	-0.0032	-455.8 (-66.1)	-282.7 (-41)
0.254 (10)	0	160.2	0.9851	0.7825	---	---	---
0.254 (10)	45	163.6	0.9898	0.7789	-0.0036	-512.3 (-74.3)	-324.1 (-47)
0.330 (13)	0	160.7	0.9859	0.7820	---	---	---
0.330 (13)	45	162.7	0.9886	0.7798	-0.0022	-313.0 (-45.4)	-262.0 (-38)
0.406 (16)	0	160.4	0.9854	0.7823	---		
0.406 (16)	45	163.5	0.9897	0.7790	-0.0033	-469.5 (-68.1)	
(1) 0.406 (16)	-15	160.8	0.9860	0.7818			
0.406 (16)	0	160.8	0.9860	0.7818			
0.406 (16)	15	161.6	0.9871	0.7809			
0.406 (16)	30	163.1	0.9891	0.7794			
0.406 (16)	45	163.7	0.9899	0.7788			

(1) Multi ψ on Rigaku

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom.) MSFC No. II
CONDITION Rod Peened - 35PSI/0.045T. R./66 Sec.
ORIGINAL THK. 0.257 Inch
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.406 (16)	60	164.7	0.9911	0.7778		-393.7 (-57.1)	
(2) 0.406 (16)	0	155.7	0.9776	1.1717			
0.406 (16)	45	157.2	0.9803	1.1685	-0.0032	-303.4 (-44.0)	
0.483 (19)	0	160.3	0.9853	0.7824			
0.483 (19)	45	163.0	0.9890	0.7795	-0.0029	-413.0 (-59.9)	
0.533 (22)	0	160.6	0.9857	0.7821			
0.533 (22)	45	163.9	0.9901	0.7786	-0.0035	-498.5 (-72.3)	
0.635 (25)	0	160.7	0.9859	0.7820			
0.635 (25)	45	163.0	0.9890	0.7795	-0.0025	-355.8 (-51.6)	
0.711 (28)	0	160.8	0.9860	0.7818			
0.711 (28)	45	163.1	0.9891	0.7794	-0.0024	-342.0 (-49.6)	-579.2 (-84)

(2) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 35 psi/9.070 T. R./50 Sec. MSFC No. XI
ORIGINAL THK. 0.256 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.3	0.9867	0.7813	---	---	---
0 (0)	45	163.3	0.9894	0.7791	-0.0022	-313.0 (-45.4)	-275.8 (-40)
0.025 (1)	0	161.0	0.9863	0.8716	---	---	---
0.025 (1)	45	163.8	0.9900	0.7787	-0.0029	-413.0 (-59.9)	-206.9 (-30)
0.051 (2)	0	160.8	0.9860	0.7818	---	---	---
0.051 (2)	45	163.8	0.9900	0.7787	-0.0031	-441.3 (-64.0)	-220.6 (-32)
0.076 (3)	0	160.7	0.9859	0.7820	---	---	---
0.076 (3)	45	163.6	0.9898	0.7789	-0.0031	-441.3 (-64.0)	-206.9 (-30)
0.102 (4)	0	161.0	0.9863	0.7816	---	---	---
0.102 (4)	45	164.2	0.9905	0.7783	-0.0033	-469.5 (-68.1)	-399.9 (-58)
0.127 (5)	0	160.8	0.9860	0.7818	---	---	---
0.127 (5)	45	163.9	0.9901	0.7786	-0.0032	-455.8 (-66.1)	-289.6 (-42)
0.152 (6)	---	---	---	---	---	---	---
0.152 (6)	---	---	---	---	---	---	---
0.178 (7)	0	160.5	0.9856	0.7822	---	---	---
0.178 (7)	45	163.4	0.9895	0.7790	-0.0032	-455.8 (-66.1)	-344.8 (-50)
0.254 (10)	0	160.6	0.9857	0.7821	---	---	---
0.254 (10)	45	163.0	0.9890	0.7795	-0.0026	-370.3 (-53.7)	-172.4 (-25)
0.330 (13)	0	160.6	0.9857	0.7821	---	---	---
0.330 (13)	45	163.7	0.9899	0.7788	-0.0033	-469.5 (-68.1)	-386.1 (-56)
0.406 (16)	0	160.5	0.9856	0.7822	---	---	---
0.406 (16)	45	163.4	0.9895	0.7790	-0.0032	-455.8 (-66.1)	
(1) 0.406 (16)	0	156.0	0.9781	1.1711			
0.406 (16)	45	157.7	0.9811	1.1675	-0.0036	-341.3 (-49.5)	
0.483 (19)	0	0.9850	0.7827				
0.483 (19)	45	164.0	0.9903	0.7785	-0.0032	-455.8 (-66.1)	
0.559 (22)	0	160.5	0.9856	0.7822			

(1) Cr_k on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 35 psi/0.070 T. R./50 Sec. MSFC No. XI
ORIGINAL THK. 0.256 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.559 (22)	45	163.0	0.9890	0.7795	-0.0027	-384.7 (-55.8)	
0.635 (25)	0	161.0	0.9863	0.7816			
0.635 (25)	45	163.0	0.9890	0.7795	-0.0021	-299.2 (-43.4)	
0.711 (28)	0	160.5	0.9856	0.7822			
0.711 (28)	45	163.4	0.9895	0.7790	-0.0032	-455.8 (-66.1)	-220.6 (-32)
0.787 (31)	-15	161.3	0.9867	0.7813			
	0	161.7	0.9872	0.7808			
	15	161.6	0.9871	0.7809			
	30	162.4	0.9892	0.7801			
	45	163.0	0.9890	0.7795			
	60	163.2	0.9853	0.7792		-189.6 (-27.5)	
0.864 (34)	0	161.4	0.9869	0.7812			
	45	163.2	0.9853	0.7792	-0.0020	-284.8 (-41.3)	-593.0 (-86)
0.940 (37)	0	161.5	0.9870	0.7810			
	45	163.7	0.9899	0.7788	-0.0022	-313.0 (-45.4)	-69.0 (-10)
1.016 (40)	0	161.6	0.9871	0.7809			
	45	163.5	0.9897	0.7790	-0.0019	-270.3 (-39.2)	
1.092 (43)	-15	161.9	0.9876	0.7807			
	0	161.9	0.9876	0.7806			
	15	162.9	0.9889	0.7796			
	30	162.5	0.9884	0.7800			
	45	163.0	0.9890	0.7795			
	60	162.9	0.9889	0.7796		-192.3 (-27.9)	
1.219 (48)	0	162.9	0.9889	0.7796			
	45	163.0	0.9890	0.7795	-0.0001	-14.5 (-2.1)	
1.346 (53)	0	163.1	0.9891	0.7794			
	45	162.8	0.9888	0.7797	+0.0003	+42.7 (+6.2)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 50 psi/0.070 T.R./50 Sec. MSFC No. V
ORIGINAL THK. 0.257 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.0	0.9863	0.7816	---	---	---
0 (0)	45	163.4	0.9895	0.7790	-0.0026	-370.3 (-53.7)	-289.6 (-42)
0.025 (1)	0	161.1	0.9864	0.7815	---	---	---
0.025 (1)	45	163.2	0.9893	0.7792	-0.0023	-327.5 (-47.5)	-303.4 (-44)
0.051 (2)	0	160.9	0.9861	0.7817	---	---	---
0.051 (2)	45	163.7	0.9899	0.7788	-0.0029	-413.0 (-59.9)	-275.8 (-40)
0.076 (3)	0	160.4	0.9854	0.7823	---	---	---
0.076 (3)	45	163.6	0.9898	0.7789	-0.0034	-484.0 (-70.2)	-289.6 (-42)
0.102 (4)	0	160.9	0.9861	0.7817	---	---	---
0.102 (4)	45	163.5	0.9897	0.7790	-0.0027	-384.7 (-55.8)	-310.3 (-45)
0.127 (5)	0	160.5	0.9857	0.7822	---	---	---
0.127 (5)	45	164.0	0.9903	0.7785	-0.0037	-528.2 (-76.6)	-275.8 (-40)
0.152 (6)	---	---	---	---	---	---	---
0.152 (6)	---	---	---	---	---	---	---
0.178 (7)	0	160.8	0.9860	0.7818	---	---	---
0.178 (7)	45	163.6	0.9898	0.7789	-0.0029	-413.0 (-59.9)	-379.2 (-55)
0.254 (10)	0	160.6	0.9857	0.7821	---	---	---
0.254 (10)	45	163.3	0.9894	0.7791	-0.0030	-427.5 (-62.0)	-351.6 (-51)
0.330 (13)	0	160.9	0.9861	0.7817	---	---	---
0.330 (13)	45	162.8	0.9887	0.7797	-0.0020	-284.8 (-41.3)	-317.2 (-46)
0.406 (16)	0	160.8	0.9860	0.7818	---	---	---
0.406 (16)	45	163.6	0.9898	0.7789	-0.0029	-413.0 (-59.9)	
(1) 0.406 (16)	0	155.6	0.9774	1.1719			
0.406 (16)	45	157.6	0.9810	1.1677	-0.0042	-398.5 (-57.8)	
0.483 (19)	0	160.5	0.9857	0.7822			
0.483 (19)	45	163.2	0.9893	0.7792	-0.0030	-427.5 (-62.0)	
0.559 (22)	0	160.6	0.9857	0.7821			

(1) $Cr_k\alpha$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 50 psi/0.045 T. R./50 Sec. MSFC No. V
ORIGINAL THK. 0.257 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.559 (22)	45	163.2	0.9893	0.7792	-0.0029	-413.0 (-59.9)	
0.635 (25)	0	160.9	0.9861	0.7817			
0.635 (25)	45	163.6	0.9898	0.7789	-0.0028	-398.5 (-57.8)	
0.711 (28)	0	160.4	0.9854	0.7823			
0.711 (28)	45	164.0	0.9903	0.7785	-0.0038	-541.3 (-78.5)	-613.6 (-89)
0.78 (31)	-15	160.8	0.9860	0.7818			
	0	161.4	0.9869	0.7812			
	15	161.6	0.9871	0.7809			
	30	162.0	0.9877	0.7805			
	45	163.7	0.9899	0.7788			
	60	164.8	0.9912	0.7777		-367.5 (-53.3)	
0.864 (34)	0	161.3	0.9867	0.7813			
	45	163.6	0.9898	0.7789	-0.0026	-370.3 (-53.7)	-275.8 (-40)
0.940 (37)	0	161.1	0.9864	0.7815			
	45	163.6	0.9898	0.7789	-0.0026	-370.3 (-53.7)	-289.6 (-42)
1.016 (40)	0	161.3	0.9867	0.7813			
	45	163.1	0.9891	0.7794	-0.0019	-270.3 (-39.2)	
1.092 (43)	-15	161.1	0.9864	0.7815			
	0	161.7	0.9872	0.7808			
	15	161.9	0.9876	0.7806			
	30	162.4	0.9882	0.7801			
	45	162.6	0.9885	0.7799			
	60	162.5	0.9884	0.7800		-106.9 (-15.5)	
1.219 (48)	0	162.8	0.9888	0.7797			
	45	163.4	0.9895	0.7790	-0.0007	-100.0 (-14.5)	
1.346 (53)	0	162.9	0.9889	0.7796			
	45	162.8	0.9888	0.7797	+0.0001	+14.5 (+2.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014 T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 50 psi/0.045 T. R./50 Sec. MSFC No. V
ORIGINAL THK. 0.257 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.473 (58)	0	163.0	0.9890	0.7795			
	45	162.8	0.9888	0.7797	+0.0002	+28.3 (+4.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in MSFC No. VIII
CONDITION Rod Peened - 50 Psi/0.070 T.R./50 Sec.
ORIGINAL THK. 0.256 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 2.065 \times 10^7 \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.3	0.9864	0.7815	---	---	---
0 (0)	45	163.2	0.9893	0.7792	-0.0023	-327.5 (-47.5)	-241.3 (-35)
0.025 (1)	0	161.0	0.9863	0.7816	---	---	---
0.025 (1)	45	163.6	0.9898	0.7789	-0.0027	-384.7 (-55.8)	-137.9 (-20)
0.051 (2)	0	160.6	0.9857	0.7821	--	---	---
0.051 (2)	45	163.8	0.9900	0.7787	-0.0034	-484.0 (-70.2)	-158.6 (-23)
0.076 (3)	0	160.6	0.9857	0.7821	---	---	---
0.076 (3)	45	163.2	0.9893	0.7792	-0.0029	-413.0 (59.9)	-275.8 (-40)
0.102 (4)	0	161.2	0.9866	0.7814	---	---	---
0.102 (4)	45	163.2	0.9893	0.7792	-0.0022	-313.0 (-45.4)	-206.9 (-30)
0.127 (5)	0	160.8	0.9860	0.7818	---	---	---
0.127 (5)	45	163.3	0.9895	0.7791	-0.0027	-384.7 (-55.8)	-262.0 (-38)
0.152 (6)	-	--	--	--	---	---	---
0.152 (6)	-	--	--	--	---	---	---
0.178 (7)	0	161.0	0.9863	0.7816	---	---	---
0.178 (7)	45	163.8	0.9900	0.7787	-0.0029	-413.0 (-59.9)	-351.6 (-51)
0.254 (10)	0	160.6	0.9857	0.7821	---	---	---
0.254 (10)	45	163.5	0.9897	0.7790	-0.0031	-441.3 (-64.0)	-220.6 (-32)
0.330 (13)	0	160.8	0.9860	0.7818	---	---	---
0.330 (13)	45	162.6	0.9885	0.7799	-0.0019	-270.3 (-39.2)	-234.4 (-34)
0.406 (16)	0	160.4	0.9854	0.7823	---	---	---
0.406 (16)	45	163.8	0.9900	0.7787	-0.0036	-512.3 (-74.3)	
(1) 0.406 (16)	-15	160.1	0.9850	0.7827			
0.406 (16)	0	160.2	0.9851	0.7825			
0.406 (16)	15	161.6	0.9871	0.7809			
0.406 (16)	30	162.8	0.9888	0.7797			

(1) Multi ψ on Rigaku

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom) MSFC No. VIII
CONDITION Rod Peened - 50 psi/0.070 T.R./50 Sec.
ORIGINAL THK. 0.256 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 2.065 \times 10^7 \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.406 (16)	30	162.8	0.9888	0.7797			
0.406 (16)	45	163.9	0.9901	0.7786			
0.406 (16)	60	164.7	0.9911	0.7778		-450.9 (-65.4)	
(2) 0.0406 (16)	0	156.2	0.9785	1.1706			
0.406 (16)	45	157.3	0.9804	1.1683	-0.0023	-217.9 (-31.6)	
0.483 (19)	0	160.5	0.9857	0.7822			
0.483 (19)	45	163.6	0.9898	0.7789	-0.0023	-469.5 (-68.1)	
0.533 (22)	0	160.6	0.9857	0.7821			
0.533 (22)	45	163.8	0.9900	0.7878	-0.0034	-484.0 (-70.2)	
0.635 (25)	0	160.7	0.9859	0.7820			
0.635 (25)	45	163.2	0.9893	0.7792	-0.0028	-398.5 (-57.8)	
0.711 (28)	0	161.0	0.9863	0.7816			
0.711 (28)	45	163.0	0.9890	0.7795	-0.0021	-299.2 (-43.4)	-55.2 (-8)
0.787 (31)	-15	160.7	0.9859	0.7820			
	0	161.0	0.9863	0.7816			
	15	161.9	0.9876	0.7806			
	30	162.4	0.9892	0.7801			
	45	163.6	0.9898	0.7789			
	60	163.8	0.9900	0.7788		-291.0 (-42.2)	
0.864 (34)	0	161.1	0.9864	0.7815			
	45	163.6	0.9898	0.7789	-0.0026	-370.3 (-53.7)	-96.5 (-14)
0.940 (37)	0	160.9	0.9861	0.7817			
	45	162.7	0.9886	0.7798	-0.0019	-270.3 (-39.2)	-234.4 (-34)
1.016 (40)	0	159.6	0.9842	0.7833			
	45	162.9	0.9889	0.7796	-0.0037	-526.8 (-76.4)	
1.092 (43)	-15	161.2	0.9866	0.7814			

(2) $Cr_{k\alpha}$ on Rigaku -30 kv -10ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom) MSFC No. VIII
CONDITION Rod Peened - 50 psi/0.070 T.R./50 Sec.
ORIGINAL THK. 0.256 in.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 2.065 \times 10^7 \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.092 (43)	0	162.0	0.9877	0.7805			
	15	162.1	0.9878	0.7804			
	30	163.4	0.9895	0.7790			
	45	162.8	0.9888	0.7797			
	60	164.1	0.9904	0.7784		-213.7 (-31.0)	
1.219 (48)	0	161.9	0.9876	0.7806			
	45	162.8	0.9888	0.7797	-0.0009	-128.2 (-18.6)	
1.346 (53)	0	162.6	0.9885	0.7799			
	45	162.7	0.9886	0.7798	-0.0001	-14.5 (-2.1)	
1.473 (58)	0	162.9	0.9889	0.7796			
	45	162.7	0.9886	0.7798	+0.0002	+28.3 (+4.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) MSFC No. I

CONDITION Rod Peened - 35 Psi/0.045 T.R./58 sec

ORIGINAL THK. 0.245 in

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 2.026 \times 10^7 \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.1	0.9864	0.7815	---	---	---
0 (0)	45	162.8	0.9888	0.7997	-0.0018	-251.7 (-36.5)	-179.3 (-26)
0.025 (1)	0	161.1	0.9864	0.7815	---	---	---
0.025 (1)	45	162.8	0.9888	0.7797	-0.0018	-251.7 (-36.5)	-137.9 (-20)
0.051 (2)	0	161.2	0.9866	0.7814	---	---	---
0.051 (2)	45	162.9	0.9889	0.7796	-0.0018	-251.7 (-36.5)	-151.7 (-22)
0.076 (3)	0	161.4	0.9869	0.7812	---	---	---
0.076 (3)	45	162.9	0.9889	0.7796	-0.0016	-223.4 (-32.4)	-193.1 (-28)
0.102 (4)	0	161.2	0.9866	0.7814	---	---	---
0.102 (4)	45	162.9	0.9889	0.7796	-0.0018	-251.7 (-36.5)	-331.0 (-48)
0.127 (5)	0	161.0	0.9863	0.7816	---	---	---
0.127 (5)	45	163.0	0.9890	0.7795	-0.0021	-293.0 (-42.5)	-193.1 (-28)
0.152 (6)	-	--	--	--	---	---	---
0.152 (6)	-	--	--	--	---	---	---
0.178 (7)	0	160.7	0.9859	0.7820	---	---	---
0.178 (7)	45	162.7	0.9886	0.7798	-0.0022	-307.5 (-44.6)	-137.9 (-20)
0.254 (10)	0	160.7	0.9859	0.7820	---	---	---
0.254 (10)	45	163.1	0.9891	0.7794	-0.0026	-363.4 (-52.7)	-386.1 (-56)
0.330 (13)	0	160.6	0.9857	0.7821	---	---	---
0.330 (13)	45	163.7	0.9899	0.7788	-0.0033	-461.3 (-66.9)	-358.5 (-52)
406 (16)	0	160.5	0.9850	0.7822	----	---	---
0.406 (16)	45	163.0	0.9890	0.7795	-0.0027	-377.2 (-54.7)	
(1) 0.406 (16)	0	155.7	0.9776	1.1717	---	---	---
0.406 (16)	45	157.0	0.9799	1.1689	-0.0028	-260.6 (-37.8)	
0.483 (19)	0	160.7	0.9859	0.7820			
0.483 (19)	45	162.8	0.9888	0.7797	-0.0023	-321.3 (-46.6)	

(1) $Cr_k\alpha$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) MSFC No. I
CONDITION Rod Peened - 35 Psi/0.045 T.R./58 sec
ORIGINAL THK. 0.245 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 2.026 \times 10^7 \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.533 (22)	0	160.9	0.9861	0.7817			
0.533 (22)	45	163.7	0.9899	0.7788	-0.0029	-405.4 (-58.8)	
0.635 (25)	0	161.6	0.9871	0.7809			
0.635 (25)	45	163.6	0.9898	0.7789	-0.0020	-279.2 (-40.5)	
0.711 (28)	0	160.8	0.9860	0.7818			
0.711 (28)	45	163.2	0.9893	0.7792	-0.0026	-363.4 (-52.7)	-331.0 (-48)
0.787 (31)	-15	161.6	0.9871	0.7809			
	0	161.6	0.9871	0.7809			
	15	161.6	0.9871	0.7809			
	30	162.2	0.9880	0.7803			
	45	163.3	0.9894	0.7797			
	60	163.4	0.9895	0.7790		-207.5 (-30.1)	
0.864 (34)	0	161.4	0.9869	0.7811			
	45	163.3	0.9894	0.7791	-0.0020	-279.2 (-40.5)	-193.1 (-28)
0.940 (37)	0	162.3	0.9881	0.7802			
	45	162.6	0.9885	0.7799	-0.0003	-42.1 (-6.1)	-206.9 (-30)
1.016 (40)	0	161.9	0.9876	0.7806			
	45	162.5	0.9884	0.7800	-0.0006	-84.1 (-12.2)	
1.092 (43)	-15	16.18	0.9874	0.7807			
	0	162.0	0.9877	0.7805			
	15	161.9	0.9876	0.7806			
	30	162.0	0.9877	0.8705			
	45	162.9	0.9889	0.7796			
	60	163.0	0.9890	0.7795		-118.6 (-17.2)	
1.219 (48)	0	162.2	0.9880	0.7803			
	45	162.8	0.9888	0.7797	-0.0006	-84.1 (-12.2)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) MSFC No. I
CONDITION Rod Peened - 35 Psi/0.045 T.R./58 sec
ORIGINAL THK. 0.245 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.346 (53)	0	162.3	0.9881	0.7802			
	45	162.6	0.9885	0.7799	-0.0003	-42.1 (-6.1)	
1.473 (58)	0	162.5	0.9884	0.7800			
	45	162.8	0.9888	0.7797	-0.0003	-42.1 (-6.1)	
1.600 (63)	0	162.9	0.9889	0.7796			
	45	162.3	0.9881	0.7802	+0.0006	+84.1 (+12.2)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 3 in x 3 in (Nom) MSFC No. X

CONDITION Rod Peened - 35 Psi/0.070 T.R./50 sec

ORIGINAL THK. 0.2455 in

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.4	0.9869	0.7812	---	---	---
0 (0)	45	163.0	0.9890	0.7796	-0.0017	-237.2 (-34.4)	-206.9 (-30)
0.025 (1)	0	161.4	0.9869	0.7812	---	---	---
0.025 (1)	45	163.0	0.9890	0.7795	-0.0017	-237.2 (-34.3)	-124.1 (-18)
0.051 (2)	0	16.10	0.9863	0.7816	---	---	---
0.051 (2)	45	163.1	0.9891	0.7794	-0.0022	-307.5 (-44.6)	-137.9 (-20)
0.076 (3)	0	161.2	0.9866	0.7814	---	---	---
0.076 (3)	45	162.6	0.9885	0.7799	-0.0015	-209.6 (-30.4)	-137.9 (-20)
0.102 (4)	0	161.6	0.9871	0.7809	---	---	---
0.102 (4)	45	163.0	0.9890	0.7795	-0.0014	-195.8 (-28.4)	-310.3 (-45)
0.127 (5)	0	161.6	0.9871	0.7808	---	---	---
0.127 (5)	45	162.8	0.9888	0.7797	-0.0012	-167.5 (-24.3)	-103.4 (-15)
0.152 (6)	-	-	--	--	---	---	---
0.152 (6)	-	-	--	--	---	---	---
0.178 (7)	0	161.3	0.9867	0.7813	---	---	---
0.178 (7)	45	163.0	0.9890	0.7795	-0.0018	-251.7 (-36.5)	-275.8 (-40)
0.254 (10)	0	160.7	0.9859	0.7820	---	---	---
0.254 (10)	45	163.1	0.9891	0.7794	-0.0026	-363.4 (-52.7)	-351.6 (-51)
0.330 (13)	0	160.4	0.9854	0.7823	---	---	---
0.330 (13)	45	163.7	0.9899	0.7788	-0.0035	-488.9 (-70.9)	-303.4 (-44)
0.406 (16)	0	161.0	0.9863	0.7816	---	---	---
0.406 (16)	45	163.0	0.9890	0.7795	-0.0021	-293.0 (-42.5)	
(1) 0.406 (16)	0	155.1	0.9765	1.1730			
0.406 (16)	45	156.3	0.9787	1.1704	-0.0026	-363.4 (-35.1)	
0.483 (19)	0	160.8	0.9860	0.7818			
0.483 (19)	45	162.9	0.9889	0.7796	-0.0022	-307.5 (-44.6)	

(1) $Cr_{k\alpha}$ on Rigaku - 30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 3 in x 3 in (Nom) MSFC No. X
CONDITION Rod Peened - 35 Psi/0.070 T.R./50 sec
ORIGINAL THK. 0.2455 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.533 (22)	0	160.8	0.9860	0.7818			
0.533 (22)	45	162.8	0.9888	0.7797	-0.0021	-293.0 (-42.5)	
0.635 (25)	0	160.8	0.9860	0.7818			
0.635 (25)	45	163.5	0.9897	0.7790	-0.0028	-390.9 (-56.7)	
0.711 (28)	0	161.1	0.9864	0.7815			
0.711 (28)	45	162.9	0.9889	0.7796	-0.0019	-265.5 (-38.5)	+110.3 (+16)
0.787 (31)	-15	161.4	0.9869	0.7812			
	0	161.2	0.9866	0.7814			
	15	161.9	0.9874	0.7807			
	30	162.2	0.9880	0.7803			
	45	163.5	0.9897	0.7790			
	60	163.4	0.9895	0.7790		-235.8 (-34.2)	
0.864 (34)	0	161.3	0.9867	0.7813			
	45	162.9	0.9889	0.7796	-0.0017	-237.2 (-34.4)	-234.4 (-34)
0.940 (37)	0	161.4	0.9869	0.7812			
	45	162.8	0.9888	0.7797	-0.0015	-209.6 (-30.4)	-524.0 (-76)
1.016 (40)	0	161.6	0.9873	0.7809			
	45	163.1	0.9891	0.7794	-0.0015	-209.6 (-30.4)	
1.092 (43)	-15	161.5	0.9870	0.7810			
	0	161.7	0.9872	0.7808			
	15	162.0	0.9877	0.7805			
	30	162.6	0.9885	0.7799			
	45	162.4	0.9882	0.7801			
	60	163.1	0.9891	0.7794		-125.5 (-18.2)	
1.219 (48)	0	162.0	0.9877	0.7805			
	45	162.5	0.9884	0.7800	-0.0005	-69.6 (-10.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 3 in x 3 in (Nom) MSFC No. X

CONDITION Rod Peened - 35 Psi/0.070 T.R./50 sec

ORIGINAL THK. 0.2455 in

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.346 (53)	0	162.6	0.9885	0.7799			
	45	162.4	0.9882	0.7801	+0.0002	+28.3 (+4.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 3 in x 3 in (Nom) MSFC No. IV
CONDITION Rod Peened - 50 Psi/0.045 T.R./50 sec
ORIGINAL THK. 0.245 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.3	0.9867	0.7813	---	---	---
0 (0)	45	162.8	0.9888	0.7997	-0.0016	-223.4 (-32.4)	-165.5 (-24)
0.025 (1)	0	161.3	0.9867	0.7813	---	---	---
0.025 (1)	45	162.8	0.9888	0.7797	-0.0016	-223.4 (-32.4)	-248.2 (-36)
0.051 (2)	0	161.2	0.9866	0.7814	---	---	---
0.051 (2)	45	163.0	0.9890	0.7795	-0.0019	-265.5 (-38.5)	-193.1 (-28)
0.076 (3)	0	161.2	0.9866	0.7814	---	---	---
0.076 (3)	45	162.9	0.9889	0.7796	-0.0018	-251.7 (-36.5)	-275.8 (-40)
0.102 (4)	0	161.0	0.9863	0.7816	---	---	---
0.102 (4)	45	162.9	0.9889	0.7796	-0.0020	-279.2 (-40.5)	-275.8 (-40)
0.127 (5)	0	161.1	0.9864	0.7815	---	---	---
0.127 (5)	45	162.9	0.9889	0.7796	-0.0019	-265.5 (-38.5)	-193.1 (-28)
0.152 (6)	-	--	--	--	---	---	---
0.152 (6)	-	--	--	--	---	---	---
0.178 (7)	0	161.1	0.9864	0.7815	---	---	---
178 (7)	45	163.1	0.9891	0.7794	-0.0021	-293.0 (-42.5)	-220.6 (-32)
(254 (10)	0	160.7	0.9859	0.7820	---	---	---
0.254 (10)	45	163.9	0.9901	0.7786	-0.0034	-475.1 (-68.9)	-331.0 (-48)
0.330 (13)	0	160.7	0.9859	0.7820	---	---	---
0.330 (13)	45	163.9	0.9901	0.7786	-0.0034	-475.1 (-68.9)	-282.7 (-41)
0.406 (16)	0	160.8	0.9860	0.7818	---	---	---
0.406 (16)	45	163.1	0.9891	0.7794	-0.0024	-335.1 (-48.6)	
0.483 (19)	0	160.5	0.9856	0.7822			
0.483 (19)	45	162.9	0.9889	0.7796	-0.0026	-363.4 (-52.7)	
0.533 (22)	0	160.8	0.9860	0.7818			
0.533 (22)	45	162.7	0.9886	0.7798	-0.0020	-279.2 (-40.5)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 3 in x 3 in (Nom) MSFC No. IV

CONDITION Rod Peened - 50 Psi/0.045 T.R./50 sec

ORIGINAL THK. 0.245 in

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.635 (25)	0	161.3	0.9867	0.7813			
0.635 (25)	45	162.8	0.9888	0.7997	-0.0016	-223.4 (-32.4)	
0.711 (28)	0	160.6	0.9857	0.7821			
0.711 (28)	45	162.8	0.9888	0.7997	-0.0024	-335.1 (-48.6)	-744.7 (108)
0.787 (31)	-15	161.2	0.9866	0.7814			
	0	161.5	0.9870	0.7810			
	15	162.1	0.9878	0.7804			
	30	162.7	0.9886	0.7798			
	45	162.5	0.9894	0.7800			
	60	164.4	0.9907	0.7781		-246.2 (-35.7)	
0.864 (34)	0	161.2	0.9866	0.7814			
	45	163.0	0.9890	0.7795	-0.0019	-265.5 (-38.5)	-151.7 (-22)
0.940 (37)	0	161.8	0.9874	0.7807			
	45	163.0	0.9890	0.7795	-0.0012	-167.5 (-24.3)	-312.3 (-45)
1.016 (40)	0	161.8	0.9874	0.7807			
	45	162.7	0.9886	0.7798	-0.0009	-125.5 (-18.2)	
1.092 (43)	-15	161.5	0.9870	0.7810			
	0	161.5	0.9870	0.7810			
	15	161.7	0.9872	0.7808			
	30	162.0	0.9877	0.7805			
	45	162.6	0.9885	0.7799			
	60	163.5	0.9877	0.7790		-181.3 (-26.3)	
1.219 (48)	0	161.7	0.9872	0.7808			
	45	162.5	0.9884	0.7800	-0.0008	-111.7 (-16.2)	
1.346 (53)	0	162.2	0.9880	0.7803			
	45	162.5	0.9884	0.7800	-0.0003	-42.1 (-6.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 3 in x 3 in (Nom) MSFC No. IV
CONDITION Rod Peened - 50 Psi/0.045 T.R./50 sec
ORIGINAL THK. 0.245 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.473 (58)	0	162.7	0.9886	0.7798			
	45	162.6	0.9885	0.7799	+0.0001	+14.5 (+2.0)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) MCFC No. VII
CONDITION Rod Peened 50 Psi/0.070 T.R./50 sec
ORIGINAL THK. 0.244 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.3	0.9853	0.7824	---	---	---
0 (0)	45	162.8	0.9888	0.7797	-0.0027	-377.2 (-54.7)	-172.4 (-25)
0.025 (1)	0	160.3	0.9853	0.7824	---	---	---
0.025 (1)	45	162.8	0.9888	0.7797	-0.0027	-377.2 (-54.7)	-172.4 (-25)
0.051 (2)	0	161.0	0.9863	0.7816	---	---	---
0.015 (2)	45	163.0	0.9890	0.7795	-0.0021	-293.0 (-42.5)	-158.6 (-23)
0.076 (3)	0	160.9	0.9861	0.7817	---	---	---
0.076 (3)	45	162.6	0.9885	0.7799	-0.0018	-251.7 (-36.5)	-200.0 (-29)
0.102 (4)	0	161.4	0.9869	0.7812	---	---	---
0.102 (4)	45	162.7	0.9886	0.7798	-0.0014	-195.8 (-28.4)	-241.3 (-35)
0.127 (5)	0	161.5	0.9870	0.7810	---	---	---
0.127 (5)	45	162.9	0.9889	0.7796	-0.0014	-195.8 (-28.4)	-248.2 (-36)
0.152 (6)	--	--	---	---	---	---	---
0.152 (6)	--	--	---	---	---	---	---
0.178 (7)	0	160.8	0.9860	0.7818			
0.178 (7)	45	163.2	0.9893	0.7792	-0.0026	-363.4 (-52.7)	-220.6 (-32)
0.254 (10)	0	160.9	0.9861	0.7817	---	---	---
0.254 (10)	45	162.6	0.9885	0.7799	-0.0018	-251.7 (-36.5)	-151.7 (-22)
0.330 (13)	0	160.5	0.9856	0.7822	---	---	---
0.330 (13)	45	163.8	0.9900	0.7787	-0.0035	-488.9 (-70.9)	-287.7 (-41)
0.406 (16)	0	161.0	0.9863	0.7816	---	---	---
0.406 (16)	45	162.7	0.9886	0.7798	-0.0018	-251.7 (-36.5)	
0.483 (19)	0	160.9	0.9861	0.7817			
0.483 (19)	45	162.6	0.9885	0.7799	-0.0018	-251.7 (-36.5)	
0.533 (22)	0	161.3	0.9867	0.7813			
0.533 (22)	45	163.3	0.9894	0.7791	-0.0022	-307.5 (-44.6)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) MCFC No. VII
CONDITION Rod Peened 50 Psi/0.070 T.R./50 sec
ORIGINAL THK. 0.244 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.635 (25)	0	161.1	0.9864	0.7815			
0.635 (25)	45	163.1	0.9891	0.7794	-0.0021	-293.0 (-42.5)	
0.711 (28)	0	161.5	0.9870	0.7810			
0.711 (28)	45	162.6	0.9885	0.7799	-0.0011	-153.8 (-22.3)	-372.3 (-54)
0.787 (31)	-15	160.9	0.9861	0.7817			
	0	161.2	0.9866	0.7814			
	15	161.4	0.9869	0.7812			
	30	162.2	0.9880	0.7803			
	45	162.8	0.9888	0.7797			
	60	164.4	0.9907	0.7781		-311.7 (-45.2)	
0.864 (34)	0	160.9	0.9861	0.7817			
	45	163.3	0.9894	0.7791	-0.0026	-363.4 (-52.7)	-262.0 (-38)
0.940 (37)	0	161.3	0.9867	0.7813			
	45	162.9	0.9889	0.7796	-0.0017	-237.2 (-34.3)	-303.4 (-44)
1.016 (40)	0	161.4	0.9869	0.7812			
	45	162.6	0.9885	0.7799	-0.0013	-181.3 (-26.3)	
1.092 (43)	-15	161.5	0.9870	0.7810			
	0	161.2	0.9866	0.7814			
	15	161.7	0.9872	0.7808			
	30	161.9	0.9876	0.7806			
	45	162.6	0.9885	0.7799			
	60	164.0	0.9903	0.7785		-237.2 (-34.4)	
1.219 (48)	0	161.6	0.9871	0.7809			
	45	162.5	0.9884	0.7800	-0.0009	-125.5 (-18.2)	
1.346 (53)	0	162.4	0.9882	0.7801			
	45	162.6	0.9885	0.7799	-0.0002	-28.3 (-4.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) MCFC No. VII
CONDITION Rod Peened 50 Psi/0.070 T.R./50 sec
ORIGINAL THK. 0.244 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.474 (58)	0	162.8	0.9888	0.7797			
	45	162.6	0.9885	0.7799	+0.0002	+28.3 (+4.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened -35 psi/0.045 T.R./50 Sec. MSFC No. III
ORIGINAL THK. 0.2540 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 1.987 \times 10^7 \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.0	0.9848	0.7828	---	---	---
0 (0)	45	162.5	0.9884	0.7800	-0.0028	-383.4 (-55.6)	-262.0 (-38)
0.025 (1)	0	159.8	0.9845	0.7830	---	---	---
0.025 (1)	45	162.7	0.9886	0.7798	-0.0032	-438.5 (-63.6)	-331.0 (-48)
0.051 (2)	0	159.6	0.9842	0.7833	---	---	---
0.051 (2)	45	162.9	0.9889	0.7795	-0.0038	-499.9 (-75.5)	-317.2 (-46)
0.076 (3)	0	159.4	0.9839	0.7835	---	---	---
0.076 (3)	45	163.1	0.9891	0.7794	-0.0041	-561.9 (-81.5)	-303.4 (-44)
0.102 (4)	0	159.0	0.9833	0.7840	---	---	---
0.102 (4)	45	163.0	0.9890	0.7795	-0.0045	-616.4 (-89.4)	-413.7 (-60)
0.127 (5)	0	159.1	0.9834	0.7839	---	---	---
0.127 (5)	4	163.0	0.9890	0.7795	-0.0044	-602.4 (-87.4)	-275.8 (-40)
0.152 (6)	---	---	---	---	---	---	---
0.152 (6)	---	---	---	---	---	---	---
0.178 (7)	0	159.7	0.9843	0.7831	---	---	---
0.178 (7)	45	162.7	0.9886	0.7798	-0.0033	-452.3 (-65.6)	-275.8 (-40)
0.254 (10)	0	158.8	0.9829	0.7843	---	---	---
0.254 (10)	45	162.7	0.9886	0.7798	-0.0045	-616.4 (-89.4)	-310.3 (-45)
0.330 (13)	0	159.0	0.9833	0.7840	---	---	---
0.330 (13)	45	162.9	0.9889	0.7796	-0.0044	-602.4 (-87.4)	-379.2 (-55)
0.406 (16)	0	158.8	0.9829	0.7843	---	---	---
0.406 (16)	45	161.8	0.9874	0.7807	-0.0036	-493.0 (71.5)	
0.483 (19)	0	158.6	0.9826	0.7845			
0.483 (19)	45	162.8	0.9888	0.7797	-0.0048	-657.8 (-95.4)	
0.533 (22)	0	159.0	0.9833	0.7840			
0.533 (22)	45	162.2	0.9880	0.7803	-0.0037	-506.8 (-73.5)	
0.635 (25)	0	159.0	0.9833	0.7840			

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened -35 psi/0.045 T.R./50 Sec. MSFC No. III
ORIGINAL THK. 0.2540 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress) $\sigma = 1.987 \times 10^{5} \Delta d$

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.635 (25)	45	161.8	0.9874	0.7807	-0.0033	-452.3 (-65.6)	
0.711 (25)	0	159.6	0.9842	0.7833			
0.711 (28)	45	163.8	0.9900	0.7786	-0.0047	-644.0 (-93.4)	-262.0 (-38)
0.787 (31)	-15	160.5	0.9856	0.7822			
	0	159.4	0.9839	0.7835			
	15	160.2	0.9851	0.7825			
	30	161.2	0.9866	0.7814			
	45	161.6	0.9871	0.7809			
	60	163.2	0.9853	0.7792		-333.6 (-48.1)	
0.864 (34)	0	159.6	0.9842	0.7833			
	45	162.4	0.9882	0.7801	-0.0032	-438.5 (-63.6)	-427.5 (-62)
0.940 (37)	0	160.2	0.9851	0.7825			
	45	162.4	0.9882	0.7801	-0.0024	-328.9 (-47.7)	-172.4 (-25)
1.016 (40)	0	160.4	0.9854	0.7823			
	45	161.8	0.9874	0.7807	-0.0016	-219.3 (-31.8)	
1.092 (43)	-15	161.5	0.9870	0.7810			
	0	160.8	0.9860	0.7818			
	15	160.8	0.9860	0.7818			
	30	161.2	0.9866	0.7814			
	45	161.0	0.9863	0.7816			
	60	161.0	0.9863	0.7816		+6.9 (+1.0)	
1.219 (48)	0	161.8	0.9874	0.7807			
	45	162.0	0.9877	0.7805	-0.0002	-27.6 (-4.0)	
1.346 (53)	0	161.3	0.9867	0.7813			
	45	162.0	0.9877	0.7805	-0.0008	-109.6 (-15.9)	
1.473 (58)	0	161.4	0.9869	0.7812			
	45	161.3	0.9867	0.7813	+0.0001	+13.8 (+2.0)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened -35 psi/0.070 T.R./50 Sec. MSFC No. XII
ORIGINAL THK. 0.2535 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.0	0.9848	0.7828	---	---	---
0 (0)	45	162.5	0.9884	0.7800	-0.0028	-397.2 (-57.6)	-310.3 (-45)
0.025 (1)	0	159.6	0.9842	0.7833	---	---	---
0.025 (1)	45	163.0	0.9890	0.7795	-0.0038	-520.6 (-75.5)	-289.6 (-42)
0.051 (2)	0	159.5	0.9840	0.7834	---	---	---
0.051 (2)	45	162.6	0.9885	0.7795	-0.0039	-534.4 (-77.5)	-310.3 (-45)
0.076 (3)	0	159.3	0.9837	0.7836	---	---	---
0.076 (3)	45	162.8	0.9888	0.7797	-0.0039	-534.4 (-77.5)	-234.4 (-34)
0.102 (4)	0	159.1	0.9834	0.7839	---	---	---
0.102 (4)	45	162.9	0.9889	0.7795	-0.0044	-602.6 (-87.4)	-399.9 (-58)
0.127 (5)	0	159.2	0.9836	0.7838	---	---	---
0.127 (5)	45	162.2	0.9880	0.7803	-0.0033	-452.3 (-65.6)	-358.5 (-52)
0.152 (6)	---	---	---	---	---	---	---
0.152 (6)	---	---	---	---	---	---	---
0.178 (7)	0	159.0	0.9833	0.7840	---	---	---
0.178 (7)	45	161.8	0.9874	0.7807	-0.0033	-452.3 (-65.6)	-289.6 (-42)
0.254 (10)	0	159.0	0.9833	0.7840	---	---	---
0.254 (10)	45	162.8	0.9888	0.7797	-0.0043	-588.8 (-85.4)	-413.7 (-60)
0.330 (13)	0	159.2	0.9836	0.7838	---	---	---
0.330 (13)	45	162.0	0.9877	0.7805	-0.0033	-452.3 (-65.6)	-448.2 (-65)
0.406 (16)	0	158.8	0.9829	0.7843	---	---	---
0.406 (16)	45	162.2	0.9880	0.7803	-0.0040	-548.2 (-79.5)	
(1) 0.406 (16)	-15	158.8	0.9829	0.7843			
0.406 (16)	0	160.5	0.9856	0.7822			
0.406 (16)	15	159.9	0.9847	0.7829			
0.406 (16)	30	161.3	0.9867	0.7813			
0.406 (16)	45	162.5	0.9884	0.7800			

(1) Mult ψ on Rigaku

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened -35 psi/0.070 T.R./50 Sec. MSFC No. XII
ORIGINAL THK. 0.2535 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.406 (16)	60	163.2	0.9893	0.7792		-388.2 (-56.3)	
(2) 0.406 (16)	0	154.4	0.9751	1.1747			
0.406 (16)	45	156.6	0.9792	1.1698	-0.0049	-477.5 (-64.9)	
0.483 (19)	0	158.8	0.9829	0.7843			
0.483 (19)	45	162.6	0.9885	0.7795	-0.0048	-657.8 (-95.4)	
0.533 (22)	0	159.6	0.9842	0.7833			
0.533 (22)	45	162.4	0.9882	0.7801	-0.0032	-438.5 (-63.6)	
0.635 (25)	0	159.3	0.9837	0.7836			
0.635 (25)	45	161.8	0.9874	0.7807	-0.0029	-397.2 (-57.6)	
0.711 (28)	0	159.4	0.9839	0.7835			
0.711 (28)	45	161.6	0.9871	0.7809	-0.0026	-356.5 (-51.7)	-344.8 (-50)
0.787 (31)	-15	160.4	0.9854	0.7823			
	0	160.2	0.9851	0.7825			
	15	160.0	0.9848	0.7828			
	30	162.0	0.9877	0.7805			
	45	161.8	0.9874	0.7807			
	60	163.2	0.9853	0.7792		-306.1 (-44.4)	
0.864 (34)	0	160.6	0.9857	0.7821			
	45	162.0	0.9877	0.7805	-0.0016	-226.2 (-31.8)	-386.1 (-56)
0.940 (37)	0	160.4	0.9854	0.7823			
	45	160.8	0.9860	0.7818	-0.0005	-68.3 (-9.9)	-213.7 (-31)
1.016 (40)	0	160.6	0.9857	0.7821			
	45	161.9	0.9876	0.7806	-0.0016	-226.2 (-31.8)	
1.092 (43)	-15	161.3	0.9867	0.7813			
	0	160.9	0.9861	0.7817			
	15	162.3	0.9881	0.7802			
	30	161.2	0.9866	0.7814			

(2) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened -35 psi/0.070 T.R./50 Sec. MSFC No. XII
ORIGINAL THK. 0.2535 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.092 (43)	45	161.3	0.9867	0.7813			
	60	162.3	0.9881	0.7802		-61.4 (-8.9)	
1.219 (48)	0	161.2	0.9866	0.7814			
	45	162.0	0.9877	0.7805	-0.0009	-123.4 (-17.9)	
1.346 (53)	0	161.5	0.9870	0.7810			
	45	161.3	0.9867	0.7813	+0.0003	+41.4 (+6.0)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 50 psi/0.045 T.R./50 Sec. MSFC No. VI
ORIGINAL THK. 0.2545 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.9	0.9917	0.7829	---	---	---
0 (0)	45	162.3	0.9881	0.7802	-0.0027	-369.6 (-53.6)	-275.8 (-40)
0.025 (1)	0	159.8	0.9845	0.7830	---	---	---
0.025 (1)	45	163.0	0.9890	0.7795	-0.0035	-479.2 (-69.5)	-303.4 (-44)
0.051 (2)	0	159.6	0.9842	0.7833	---	---	---
0.051 (2)	45	162.7	0.9886	0.7798	-0.0035	-479.2 (-69.5)	-289.6 (-42)
0.076 (3)	0	159.4	0.9839	0.7835	---	---	---
0.076 (3)	45	162.5	0.9884	0.7800	-0.0035	-479.2 (-69.5)	-289.6 (-42)
0.102 (4)	0	158.8	0.9829	0.7843	---	---	---
0.102 (4)	45	160.3	0.9853	0.7824	-0.0019	-260.6 (-37.8)	-317.2 (-46)
0.127 (5)	0	159.3	0.9837	0.7836	---	---	---
0.127 (5)	45	162.9	0.9889	0.7796	-.0040	-548.2 (-79.5)	-317.2 (-46)
0.152 (6)	---	---	---	---	---	---	---
0.152 (6)	---	---	---	---	---	---	---
0.178 (7)	0	159.2	0.9836	0.7838	---	---	---
0.178 (7)	45	162.4	0.9882	0.7801	-0.0037	-506.8 (-73.5)	-317.2 (-46)
0.254 (10)	0	159.2	0.9836	0.7838	---	---	
0.254 (10)	45	163.2	0.9893	0.7792	-0.0046	-630.2 (-91.4)	-406.8 (-59)
0.330 (13)	0	159.0	0.9833	0.7840	---	---	
0.330 (13)	45	162.0	0.9877	0.7805	-0.0035	-479.2 (-69.5)	-344.8 (-50)
0.406 (16)	0	159.0	0.9833	0.7840	---	---	---
0.406 (16)	45	162.3	0.9881	0.7803	-0.0037	-506.8 (73.5)	
(1) 0.406 (16)	0	153.6	0.9736	1.1765			
0.406 (16)	45	155.8	0.9778	1.1715	-0.0050	-456.4 (-66.2)	
0.483 (19)	0	158.6	0.9826	0.7845			
0.483 (19)	45	162.2	0.9880	0.7803	-0.0042	-575.7 (-83.5)	
0.533 (22)	0	159.1	0.9834	0.7839			

(1) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 50 psi/0.045 T. R./50 Sec. MSFC No. VI
ORIGINAL THK. 0.2545 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.533 (22)	45	162.4	0.9882	0.7801	-0.0038	-520.6 (-75.5)	
0.635 (25)	0	159.2	0.9836	0.7838			
0.635 (25)	45	161.9	0.9876	0.7806	-0.0032	-441.3 (-64.0)	
0.711 (28)	0	159.0	0.9833	0.7840			
0.711 (28)	45	162.5	0.9884	0.7800	-0.0040	-548.2 (-79.5)	-593.0 (-86)
0.787 (31)	-15	159.5	0.9840	0.7834			
	0	159.1	0.9834	0.7839			
	15	160.2	0.9851	0.7825			
	30	161.1	0.9864	0.7815			
	45	162.2	0.9880	0.7803			
	60	164.1	0.9904	0.7784		-468.9 (-68.0)	
0.864 (34)	0	159.4	0.9839	0.7835			
	45	161.8	0.9874	0.7807	-0.0028	-383.4 (-55.6)	-331.0 (-48)
0.940 (37)	0	159.5	0.9840	0.7834			
	45	161.5	0.9870	0.7810	-0.0024	-328.9 (-47.7)	-310.3 (-45)
1.016 (40)	0	160.2	0.9851	0.7825			
	45	162.2	0.9880	0.7803	-0.0022	-301.3 (-43.7)	
1.092 (43)	-15	161.9	0.9876	0.7806			
	0	160.5	0.9856	0.7822			
	15	160.6	0.9857	0.7821			
	30	161.3	0.9867	0.7813			
	45	161.2	0.9866	0.7814			
	60	161.4	0.9869	0.7812		-48.3 (-7.0)	
1.219 (48)	0	161.0	0.9863	0.7816			
	45	160.9	0.9861	0.7817	+0.0001	+13.8 (+2.0)	
1.346 (53)	0	161.3	0.9867	0.7813			
	45	161.8	0.9874	0.7807	-0.0006	-82.1 (-11.9)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened - 50 psi/0.045 T.R./50 Sec. MSFC No. VI
ORIGINAL THK. 0.2545 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.473 (58)	0	161.3	0.9867	0.7813			
	45	161.5	0.9870	0.7810	-0.0003	-41.4 (-6.0)	
1.600 (63)	0	161.6	0.9871	0.7809			
	45	161.6	0.9871	0.7809	0	0 (0)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened 50 psi/0.070 T. R./50 Sec. MSFC No. IX
ORIGINAL THK. 0.2525 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.0	0.9848	0.7828	---	---	---
0 (0)	45	162.3	0.9881	0.7802	-0.0026	-356.5 (-51.7)	-310.3 (-45)
0.025 (1)	0	159.8	0.9845	0.7830	---	---	---
0.025 (1)	45	163.2	0.9893	0.7792	-0.0038	-520.6 (-75.5)	-331.0 (-48)
0.051 (2)	0	159.8	0.9845	0.7830	---	---	---
0.051 (2)	45	163.0	0.9890	0.7795	-0.0035	-479.2 (-69.5)	-303.4 (-44)
0.076 (3)	0	159.3	0.9837	0.7836	---	---	---
0.076 (3)	45	162.4	0.9882	0.7801	-0.0035	-479.2 (-69.5)	-413.7 (-60)
0.102 (4)	0	159.1	0.9834	0.7839	---	---	---
0.102 (4)	45	162.9	0.9889	0.7796	-0.0043	-588.8 (-85.4)	-386.1 (-56)
0.127 (5)	0	159.8	0.9845	0.7830	---	---	---
0.127 (5)	45	162.8	0.9888	0.7797	-0.0033	-452.3 (-65.6)	-310.3 (-45)
0.152 (6)	---	---	---	---	---	---	---
0.152 (6)	---	---	---	---	---	---	---
0.178 (7)	0	160.1	0.9850	0.7827	---	---	---
0.178 (7)	45	163.1	0.9891	0.7794	-0.0033	-452.3 (-65.6)	-344.8 (-50)
0.254 (10)	0	159.2	0.9836	0.7838	---	---	---
0.254 (10)	45	163.2	0.9893	0.7792	-0.0046	-630.2 (-91.4)	-310.3 (-45)
0.330 (13)	0	159.0	0.9833	0.7840	---	---	---
0.330 (13)	45	163.1	0.9891	0.77940	-0.0046	-630.2 (-91.4)	-331.0 (-48)
0.406 (16)	0	159.0	0.9833	0.7840	---	---	---
0.406 (16)	45	162.8	0.9888	0.7797	-0.0043	-588.8 (-85.4)	
(1) 0.406 (16)	-15	159.1	0.9834	0.7839			
0.406 (16)	0	159.0	0.9833	0.7840			
0.406 (15)	15	159.7	0.9843	0.7831			
0.406 (16)	30	161.4	0.9869	0.7812			
0.406 (16)	45	162.7	0.9886	0.7798			

(1) Multi on Rigaku

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened 50 psi/0.070 T. R./50 Sec. MSFC No. IX
ORIGINAL THK. 0.2525 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.406 (16)	60	163.9	0.9901	0.7786		-510.2 (-74.0)	
(2) 0.406 (16)	0	153.8	0.9740	1.1761			
0.406 (16)	45	156.3	0.9787	1.1704	-0.0057	-520.6 (-75.5)	
0.483 (19)	0	158.9	0.9830	0.7841			
0.483 (19)	45	162.3	0.9881	0.7802	-0.0039	-534.4 (-77.5)	
0.533 (22)	0	159.1	0.9834	0.7839			
0.533 (22)	45	162.2	0.9880	0.7803	-0.0036	-493.0 (-71.5)	
0.635 (25)	0	159.2	0.9836	0.7838			
0.635 (25)	45	162.8	0.9888	0.7797	-0.0041	-561.9 (-81.5)	
0.711 (28)	0	158.8	0.9829	0.7843			
0.711 (28)	45	162.3	0.9881	0.7802	-0.0041	-561.9 (-815.)	-413.7 (-60)
0.787 (31)	-15	160.0	0.9848	0.7828			
	0	159.7	0.9843	0.7831			
	15	160.1	0.9850	0.7827			
	30	160.9	0.9861	0.7817			
	45	162.9	0.9889	0.7796			
	60	163.1	0.9891	0.7794		-373.0 (-54.1)	
0.864 (34)	0	159.4	0.9839	0.7835			
	45	162.2	0.9880	0.7803	-0.0032	-438.5 (-63.6)	-393.0 (-57)
0.940 (37)	0	159.6	0.9842	0.7833			
	45	160.3	0.9853	0.7824	-0.0009	-123.4 (-17.9)	-34.5 (-5)
1.016 (40)	0	159.6	0.9842	0.7833			
	45	162.5	0.9884	0.7800	-0.0033	-452.3 (165.6)	
1.092 (43)	-15	---	---				
	0	160.1	0.9850	0.7827			
	15	161.2	0.9866	0.7814			
	30	161.5	0.9870	0.7810			

(2) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom)
CONDITION Rod Peened 50 spi/0.070 T. R./50 Sec. MSFC No. IX
ORIGINAL THK. 0.2525 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
	45	162.0	0.9877	0.7805			
	60	162.2	0.9880	0.7803		-184.8 (-26.8)	
1.219 (48)	0	159.8	0.9845	0.7830			
	45	160.8	0.9860	0.7818	-0.0012	-164.1 (-23.8)	
1.346 (53)	0	162.4	0.9882	0.7801			
	45	162.1	0.9878	0.7804	+0.0003	+41.4 (+6.0)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom) - A Specimen
CONDITION Shot Peened - 0.010 A/230 Shot/35 psi/60 Sec./6 in/15 RPM
ORIGINAL THK. 0.255 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.6	0.9857	0.7821	---		
(0)	45	163.2	0.9893	0.7792	-0.0029	-413.0 (-59.9)	-172.4 (-25)
(1) 0 (0)	0	156.4	0.9789	1.1702	---		
(0)	45	157.4	0.9806	1.1681	-0.0021	-199.3 (-28.9)	
0.025 (1)	0	161.0	0.9863	0.7816			
(1)	45	163.6	0.9898	0.7789	-0.0027	-384.7 (-55.8)	
0.051 (2)	0	160.8	0.9860	0.7818			
(2)	45	163.3	0.9894	0.7791	-0.0027	-384.7 (-55.8)	
0.076 (3)	0	160.6	0.9857	0.7821			
(3)	45	163.7	0.9899	0.7788	-0.0033	-469.4 (-68.1)	-351.6 (-51)
0.102 (4)	0	161.1	0.9864	0.7815			
(4)	45	163.2	0.9893	0.7792	-0.0023	-327.5 (-47.5)	
0.127 (5)	0	161.0	0.9863	0.7816			
(5)	45	163.4	0.9895	0.7790	-0.0026	-370.3 (-53.7)	
0.203 (8)	0	161.9	0.9876	0.7806			
(8)	45	163.3	0.9894	0.7791	-0.0015	-213.7 (-31.0)	
0.279 (11)	0	161.0	0.9863	0.7816			
(11)	45	162.3	0.9881	0.7802	-0.0014	-199.3 (-28.9)	
0.356 (14)	0	162.4	0.9892	0.7801			
(14)	45	162.7	0.9886	0.7798	-0.0003	-42.7 (-6.2)	-310.3 (45)
0.483 (19)	0	162.3	0.9894	0.7791			
(19)	45	162.9	0.9889	0.7796	+0.0005	+71.2 (+10.3)	

(1) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651 - 3 in x 3 in (Nom) - B Specimen
CONDITION Shot Peened - 0.010 A/230 Shot/35 psi/60 Sec./6 in/ 15 RPM
ORIGINAL THK. 0.255 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.5	0.9870	0.7810	---	---	
(0)	45	163.5	0.9897	0.7790	-0.0020	-284.8 (-41.3)	-124.1 (-18)
(1) 0 (0)	0	156.3	0.9787	1.1704	---	---	
(0)	45	157.2	0.9803	1.1685	-0.0019	-180.0 (-26.1)	
0.025 (1)	0	161.0	0.9863	0.7816			
(1)	45	163.6	0.9898	0.7789	-0.0027	-384.7 (-55.8)	
0.051 (2)	0	160.8	0.9860	0.7818			
(2)	45	163.3	0.9894	0.7791	-0.0027	-384.7 (-55.8)	
0.076 (3)	0	160.9	0.9861	0.7817			
(3)	45	163.7	0.9899	0.7788	-0.0029	-413.0 (-59.9)	-248.2 (-36)
0.102 (4)	0	161.0	0.9863	0.7816			
(4)	45	163.5	0.9897	0.7790	-0.0026	-370.3 (-53.7)	
0.127 (5)	0	160.7	0.9859	0.7820			
(5)	45	163.5	0.9897	0.7790	-0.0030	-427.5 (-62.0)	
0.203 (8)	0	162.0	0.9877	0.7805			
(8)	45	164.9	0.9913	0.7776	-0.0029	-413.0 (-59.9)	
0.279 (11)	0	162.5	0.9884	0.7800			
(11)	45	162.7	0.9886	0.7798	-0.0002	-28.3 (-4.1)	
0.356 (14)	0	163.2	0.9893	0.7792			
(14)	45	161.9	0.9876	0.7806	+0.0014	+199.3 (+28.9)	-620.6 (-90)

(1) $Cr_{k}\alpha$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) A Specimen

CONDITION Shot Peened - 0.010 A/230 Shot/35 psi/60 Sec./6 in/15 RPM

ORIGINAL THK. 0.243 in

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.5	0.9870	0.7810	---		
(0)	45	163.6	0.9898	0.7789	-0.0021	-293.0 (-42.5)	-172.4 (-25)
(1) 0 (0)	0	155.9	0.9780	1.1713	---		
(0)	45	157.2	0.9803	1.1685	-0.0028	-260.6 (-37.8)	
0.025 (1)	0	159.0	0.9833	0.7840			
(1)	45	162.8	0.9888	0.7797	-0.0043	-600.6 (-87.1)	
0.051 (2)	0	160.8	0.9860	0.7818			
(2)	45	162.8	0.9888	0.7797	-0.0021	-293.0 (-42.5)	
0.076 (3)	0	161.0	0.9863	0.7816			
(3)	45	163.0	0.9890	0.7795	-0.0021	-293.0 (-42.5)	-262.0 (-38)
0.102 (4)	0	161.5	0.9870	0.7810			
(4)	45	163.0	0.9890	0.7795	-0.0015	-209.6 (-30.4)	
0.127 (5)	0	161.3	0.9867	0.7813			
(5)	45	163.0	0.9890	0.7795	-0.0018	-251.7 (-36.5)	
0.203 (8)	0	161.4	0.9869	0.7812			
(8)	45	162.9	0.9889	0.7796	-0.0016	-223.4 (-32.4)	
0.279 (11)	0	162.2	0.9880	0.7803			
(11)	45	163.2	0.9893	0.7792	-0.0011	-153.8 (-22.3)	
0.356 (14)	0	162.1	0.9878	0.7804			
(14)	45	162.2	0.9880	0.7803	-0.0001	-13.8 (-2.0)	-220.6 (-32)
0.483 (19)	0	162.7	0.9886	0.7798			
(19)	45	162.5	0.9884	0.7800	0.0002	+27.9 (+4.1)	

(1) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2219-T87 - 3 in x 3 in (Nom) B Specimen
CONDITION Shot Peened 0.010 A/230 Shot/ 35 psi/60 Sec./6 in/15 RPM
ORIGINAL THK. 0.244 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.3	0.9867	0.7813	---	---	
(0)	45	163.5	0.9897	0.7790	-0.0023	-321.3 (-46.6)	-151.7 (-22)
(1) 0 (0)	0	156.0	0.9781	1.1711		---	
(0)	45	157.0	0.9799	1.1689	-0.0022	-204.8 (-29.7)	
0.025 (1)	0	160.9	0.9861	0.7817			
(1)	45	163.1	0.9891	0.7794	-0.0023	-321.3 (-46.6)	
0.051 (2)	0	161.1	0.9864	0.7815			
(2)	45	163.2	0.9893	0.7792	-0.0023	-321.3 (-46.6)	
0.076 (3)	0	161.3	0.9867	0.7813			
(3)	45	163.4	0.9895	0.7790	-0.0023	-321.3 (-46.6)	-310.3 (-45)
0.102 (4)	0	161.1	0.9864	0.7815			
(4)	45	163.3	0.9894	0.7791	-0.0024	-335.1 (-48.6)	
0.127 (5)	0	161.3	0.9867	0.7813			
(5)	45	163.4	0.9895	0.7790	-0.0023	-321.3 (-46.6)	
0.203 (8)	0	161.7	0.9873	0.7808			
(8)	45	162.7	0.9886	0.7798	-0.0010	-140.0 (-20.3)	
0.279 (11)	0	162.2	0.9880	0.7803			
(11)	45	162.3	0.9881	0.7802	-0.0001	-13.8 (-2.0)	
0.356 (14)	0	162.4	---	---	---		
(14)	45	162.4	---	---	---	0 (0)	-399.9 (-58)

(1) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom) A Specimen

CONDITION Shot Peened - 0.010 A/230 Shot/35 psi/60 Sec./6 in/15 RPM

ORIGINAL THK. 0.252 in

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.4	0.9854	0.7823	---		
(0)	45	162.0	0.9877	0.7805	-0.0018	-246.2 (-35.7)	-137.9 (-20)
(1) 0 (0)	0	155.3	0.9769	1.1726	---	---	
(0)	45	155.7	0.9776	1.1717	-0.0009	-82.1 (-11.9)	
0.025 (1)	0	159.4	0.9839	0.7835			
(1)	45	162.4	0.9892	0.7801	-0.0034	-466.1 (-67.6)	
0.051 (2)	0	159.0	0.9833	0.7840			
(2)	45	162.2	0.9880	0.7803	-0.0037	-506.8 (-73.5)	
0.076 (3)	0	159.2	0.9336	0.7838			
(3)	45	163.0	0.9890	0.7795	-0.0043	-588.8 (-85.4)	-275.8 (-40)
0.102 (4)	0	159.1	0.9834	0.7839			
(4)	45	163.0	0.9890	0.7795	-0.0044	-602.6 (-87.4)	
0.127 (5)	0	159.5	0.9840	0.7834			
(5)	45	162.4	0.9892	0.7801	-0.0033	-453.0 (-65.6)	
0.203 (8)	0	160.7	0.9859	0.7820			
(8)	45	161.9	0.9876	0.7806	-0.0014	-191.7 (-27.8)	
0.279 (11)	0	160.6	0.9857	0.7821			
(11)	45	161.0	0.9863	0.7816	-0.0005	-68.3 (-9.9)	
0.356 (14)	0	161.7	0.9873	0.7808			
(14)	45	161.6	0.9871	0.7809	+0.0001	+13.8 (+2.0)	-69.0 (-10)

(1) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 - 3 in x 3 in (Nom) B Specimen
CONDITION Shot Peened - 0.010 A/330 Shot/20 psi/3 min./6 in/15 RPM
ORIGINAL THK. 0.253 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.5	0.9840	0.7834	---	---	
(0)	45	162.7	0.9886	0.7798	-0.0036	-493.0 (71.5)	-275.8 (-40)
(1) 0 (0)	0	154.7	0.9757	1.1740	---	---	
(0)	45	155.2	0.9767	1.1728	-0.0012	-109.6 (-15.9)	
0.025 (1)	0	159.6	0.9842	0.7833			
(1)	45	162.1	0.9878	0.7804	-0.0029	-397.2 (-57.6)	
0.051 (2)	0	159.0	0.9833	0.7804			
(2)	45	162.5	0.9884	0.7800	-0.0040	-548.2 (-79.5)	
0.076 (3)	0	159.1	0.9834	0.7839			
(3)	45	162.6	0.9885	0.7795	-0.0044	-602.6 (-87.4)	-524.0 (-76)
0.102 (4)	0	158.9	0.9831	0.7841			
(4)	45	162.2	0.9880	0.7803	-0.0038	-520.6 (-75.5)	
0.127 (5)	0	159.6	0.9842	0.7833			
(5)	45	162.0	0.9877	0.7805	-0.0028	-383.4 (-55.6)	
0.203 (8)	0	160.5	0.9856	0.7822			
(8)	45	162.1	0.9878	0.7804	-0.0018	-246.8 (-35.8)	
0.279 (11)	0	161.2	0.9866	0.7814			
(11)	45	162.6	0.9885	0.7799	-0.0015	-205.5 (-29.8)	
0.356 (14)	0	161.2	0.9866	0.7814			
(14)	45	161.6	0.9871	0.7809	-0.0006	-82.1 (-11.9)	-137.9 (-20)
0.483 (19)	0	161.0	0.9863	0.7816			
(19)	45	161.5	0.9870	0.7810	-0.0006	-82.1 (-11.9)	
0.610 (24)	0	161.9	0.9876	0.7806			
(24)	45	161.7	0.9873	0.7808	+0.0002	+27.4 (-14.0)	

(1) $Cr_{k\alpha}$ on Rigaku -30 kv -10 ma - Vanadium Filter

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T6 Plate (1.437 in x 2.250 in) (Top)
CONDITION As Machine Rod Peened
ORIGINAL THK. 2.312 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.1	0.9834	0.7839			
	45	160.5	0.9856	0.7822	-0.0017	-233.1 (-33.8)	
0.025 (1)	0	159.9	0.9847	0.7829			
	45	161.1	0.9864	0.7815	-0.0014	-191.7 (-27.8)	
0.051 (2)	0	158.7	0.9828	0.7844			
	45	161.4	0.9869	0.7812	-0.0022	-301.3 (-43.7)	
0.076 (3)	0	158.6	0.0826	0.7845			
	45	161.4	0.9869	0.7812	-0.0033	-452.3 (-65.6)	
0.120 (4)	0	161.4	0.9869	0.7812			
	45	163.3	0.9894	0.7791	-0.0021	-287.5 (-41.7)	
0.127 (5)	0	158.4	0.9823	0.7848			
	45	161.3	0.9867	0.7813	-0.0035	-479.2 (-69.5)	
0.203 (8)	0	158.3	0.9821	0.7849			
	45	161.1	0.9864	0.7815	-0.0034	-466.1 (-67.6)	
0.279 (11)	0	158.0	0.9816	0.7853			
	45	161.5	0.9870	0.7810	-0.0043	-558.8 (-85.4)	
0.356 (14)	0	158.0	0.9816	0.7853			
	45	161.1	0.9864	0.7815	-0.0038	-520.6 (-75.5)	
0.431 (17)	0	157.9	0.9815	0.7855			
	45	101.4	0.9896	0.7812	-0.0033	-452.3 (-65.6)	
0.508 (20)	0	158.0	0.9816	0.7853			
	45	160.7	0.9859	0.7820	-0.0033	-452.3 (-65.6)	
0.584 (23)	0	157.9	0.9815	0.7855			
	45	160.7	0.9859	0.7820	-0.0035	-479.2 (-69.5)	
0.660 (26)	0	158.0	0.9816	0.7853			
	45	160.4	0.9854	0.7823	-0.0030	-410.9 (-59.6)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T6 Plage (1.437 in x 2.250 in) (Top)
CONDITION As Machined Rod Peened
ORIGINAL THK. 2.312 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.737 (29)	0	158.3	0.9821	0.7849			
	45	160.6	0.9857	0.7821	-0.0028	-383.4 (-55.6)	
0.813 (32)	0	158.8	0.9829	0.7843			
	45	160.4	0.9854	0.7823	-0.0020	-273.7 (-39.7)	
0.889 (35)	0	158.8	0.9829	0.7843			
	45	160.2	0.9851	0.7825	-0.0018	-246.8 (-35.8)	
0.965 (38)	0	159.1	0.9834	0.7839			
	45	160.3	0.9853	0.7824	-0.0015	-205.5 (-29.8)	
1.041 (41)	0	159.5	0.9840	0.7834			
	45	160.4	0.9854	0.7823	-0.0011	-151.0 (-21.9)	
1.168 (46)	0	159.6	0.9842	0.7833			
	45	160.2	0.9851	0.7825	-0.0008	-109.6 (-15.9)	
1.295 (51)	0	159.8	0.9845	0.7830			
	45	160.3	0.9853	0.7824	-0.0006	-82.1 (-11.9)	
1.422 (56)	0	159.8	0.9845	0.7830			
	45	159.9	0.9847	0.7829	-0.0001	-13.8 (-2.0)	
1.549 (61)	0	160.0	0.9848	0.7828			
	45	160.1	0.9850	0.7827	-0.0001	-13.8 (-2.0)	
1.676 (66)	0	160.1	0.9850	0.7827			
	45	160.3	0.9853	0.7824	-0.0003	-41.4 (-6.0)	
1.803 (71)	0	159.9	0.9847	0.7829			
	45	159.1	0.9834	0.7839	+0.0010	+137.2 (+19.9)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T6 Plage (1.1437 in x 2.250 in) (Bottom)
CONDITION As Rolled and Rod Peened
ORIGINAL THK. 2.312 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.2	0.9836	0.7838			
	45	161.7	0.9878	0.7808	-0.0030	-410.9 (-59.6)	
0.205 (1)	0	159.0	0.9833	0.7840			
	45	161.9	0.9876	0.7806	-0.0034	-466.1 (-67.6)	
0.051 (2)	0	159.0	0.9833	0.7840			
	45	161.6	0.9871	0.7809	-0.0031	-424.7 (-61.6)	
0.076 (3)	0	159.2	0.9836	0.7838			
	45	161.3	0.9867	0.7813	-0.0025	-342.7 (-49.7)	
0.102 (4)	0	159.4	0.9839	0.7835			
	45	161.4	0.9869	0.7812	-0.0023	-315.1 (-45.7)	
0.127 (5)	0	158.4	0.9823	0.7848			
	45	161.3	0.9867	0.7813	-0.0035	-479.2 (-69.5)	
0.203 (8)	0	158.6	0.9826	0.7845			
	45	161.7	0.9873	0.7808	-0.0037	-506.8 (-73.5)	
0.279 (11)	0	158.0	0.9816	0.7853			
	45	161.5	0.9870	0.7810	-0.0043	-588.8 (-85.4)	
0.356 (14)	0	158.2	0.9820	0.7851			
	45	161.1	0.9864	0.7815	-0.0036	-493.0 (-71.5)	
0.431 (17)	0	158.0	0.9816	0.7853			
	45	160.8	0.9860	0.7818	-0.0035	-479.2 (-69.5)	
0.508 (20)	0	158.0	0.9816	0.7853			
	45	160.7	0.9859	0.7820	-0.0033	-452.3 (-65.6)	
0.584 (23)	0	158.3	0.9821	0.7849			
	45	160.8	0.9860	0.7818	-0.0031	-424.7 (-61.6)	
0.660 (26)	0	158.5	0.9825	0.7847			
	45	160.8	0.9860	0.7818	-0.0029	-397.2 (-57.6)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T6 Plate (1.1437 in x 2.250 in) (Bottom)
CONDITION As Rolled and Rod Peened
ORIGINAL THK. 2.312 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0.737 (29)	0	158.7	0.9828	0.7[illegible]4			
	45	160.4	0.9854	0.7823	-0.0021	-287.5 (-41.7)	
0.813 (32)	0	158.9	0.9831	0.7841			
	45	160.4	0.9854	0.7823	-0.0018	-246.8 (-35.8)	
0.889 (35)	0	159.3	0.9837	0.7836			
	45	160.4	0.9854	0.7823	-0.0013	-177.9 (-25.8)	
0.965 (38)	0	159.6	0.9842	0.7833			
	45	160.7	0.9859	0.7820	-0.0013	-177.9 (-25.8)	
1.041 (41)	0	159.8	0.9845	0.7830			
	45	160.7	0.9859	0.7820	-0.0010	-137.2 (-19.9)	
1.168 (46)	0	160.3	0.9853	0.782[illegible]			
	45	160.5	0.9856	0.7822	-0.0002	-27.6 (-4.0)	
1.295 (51)	0	160.0	0.9848	0.7828			
	45	160.0	0.0948	0.78[illegible]8	0	0 (0)	
1.422 (56)	0	160.2	0.9851	0.7825			
	45	159.9	0.9847	0.7829	+0.0004	+54.5 (+17.9)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T6 Plate (1.437 in x 2.250 in) 3
CONDITION As Rolled and Double Peened
ORIGINAL THK. 2.312 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.7	0.9843	0.7831			
	45	161.5	0.9870	0.7810	-0.0021	-287.5 (-41.7)	
0.025 (1)	0	158.9	0.9831	0.7841			
	45	161.7	0.9873	0.7808	-0.0033	-452.3 (-65.6)	
0.051 (2)	0	158.8	0.9829	0.7843			
	45	161.9	0.9876	0.7806	-0.0037	-506.8 (-73.5)	
0.076 (3)	0	159.0	0.9833	0.7840			
	45	161.6	0.9871	0.7809	-0.0031	-424.7 (-61.6)	
0.102 (4)	0	158.5	0.9825	0.7847			
	45	162.1	0.9878	0.7804	-0.0033	-452.3 (-65.6)	
0.127 (5)	0	158.7	0.9828	0.7844			
	45	161.6	0.9871	0.7809	-0.0035	-479.2 (-69.5)	
0.254 (10)	0	158.6	0.9826	0.7845			
	45	161.6	0.9871	0.7809	-0.0036	-493.0 (-71.5)	
0.381 (15)	0	158.5	0.9825	0.7847			
	45	161.3	0.9867	0.7813	-0.0034	-466.1 (-67.6)	
0.508 (20)	0	158.3	0.9821	0.7849			
	45	161.6	0.9871	0.7809	-0.0040	-548.2 (-79.5)	
0.635 (25)	0	158.2	0.9820	0.7851			
	45	161.1	0.9864	0.7815	-0.0036	-493.0 (-71.5)	
0.762 (30)	0	158.9	0.9831	0.7841			
	45	160.7	0.9859	0.7820	-0.0021	-287.5 (-41.7)	
0.889 (35)	0	159.2	0.9836	0.7838			
	45	160.7	0.9859	0.7820	-0.0018	-246.8 (-35.8)	
1.016 (40)	0	159.7	0.9843	0.7831			
	45	160.5	0.9856	0.7822	-0.0009	-123.4 (-17.9)	
1.143 (45)	0	160.2	0.9851	0.7825			

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7079-T6 Plate (1.437 in x 2.250 in) 3
CONDITION As Rolled and Double Peened
ORIGINAL THK. 2.312 in
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
1.143 (45)	45	160.4	0.9854	0.7823	-0.0002	-27.6 (-4.0)	
1.270 (50)	0	160.5	0.9856	0.7822			
	45	160.2	0.9851	0.7825	+0.0003	+41.4 (+6.0)	
1.397 (55)	0	160.3	0.9853	0.7824			
	45	160.0	0.9848	0.7828	+0.0004	+54.5 (+7.9)	
1.524 (60)	0	160.4	0.9854	0.7823			
	45	160.0	0.9848	0.7828	+0.0005	+68.3 (+9.9)	

APPENDIX C

SET IV DATA

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 2

MATERIAL 2014-T651 -38.1 mm (1.5 in) x 76.2 mm (3 in)
CONDITION Rod Peened -172 N/m^2 (25 psi) -1.145 mm (0.045 in) T.R. -100 Sec.
ORIGINAL THK. 6.35 mm (0.250 in) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.6	0.9871	0.7809			
	45	163.6	0.9898	0.7789	-0.0020	-284.8 (-41.3)	
0.076 (3)	0	161.0	0.9863	0.7816			
	45	163.5	0.9897	0.7790	-0.0026	-370.3 (-53.7)	
0.152 (6)	0	160.8	0.9 '60	0.7818			
	45	163.3	0.9894	0.7791	-0.0027	-384.7 (-55.8)	
0.229 (9)	0	160.7	0.9859	0.7820			
	45	163.5	0.9897	0.7790	-0.0030	-427.5 (-62.0)	
0.305 (12)	0	160.8	0.9860	0.7818			
	45	164.6	0.9910	0.7779	-0.0039	-555.0 (-80.5)	
0.381 (15)	0	160.8	0.9860	0.7818			
	45	163.4	0.9895	0.7790	-0.0028	-398.5 (-51.8)	
0.635 (25)	0	160.8	0.9860	0.7818			
	45	163.4	0.9895	0.7790	-0.0028	-398.5 (-51.8)	
0.889 (35)	0	161.8	0.9874	0.7807			
	45	163.2	0.9893	0.7792	-0.0015	-213.7 (-31.0)	
1.143 (45)	0	163.2	0.9893	0.7792			
	45	162.8	0.9888	0.7797	+0.0005	+71.0 (+10.3)	
1.397 (55)	0	163.4	0.9895	0.7790			
	45	163.3	0.9894	0.7791	+0.0001	+14.5 (+2.1)	
1.651 (65)	0						
	45						

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 7

MATERIAL 2014-T651 -38.1 mm (1.5 in) x 76.2 mm (3 in)
CONDITION Rod Peened -345 N/m^2 (50 psi) -1.145 mm (0.045 in) T.R. -100 Sec.
ORIGINAL THK.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	162.0	0.9877	0.7805			
	45	163.1	0.9891	0.7794	-0.0011	-156.5 (-22.7)	
0.076 (3)	0	161.4	0.9869	0.7812			
	45	163.2	0.9893	0.7793	-0.0019	-270.3 (-39.2)	
0.152 (6)	0	161.1	0.9864	0.7815			
	45	163.4	0.9895	0.7790	-0.0025	-355.8 (-51.6)	
0.229 (9)	0	161.4	0.9869	0.7812			
	45	163.1	0.9891	0.7794	-0.0018	-256.5 (-37.2)	
0.305 (12)	0	161.2	0.9866	0.7814			
	45	163.3	0.9894	0.7791	-0.0023	-327.5 (-47.5)	
0.381 (15)	0	160.9	0.9861	0.7817			
	45	163.4	0.9895	0.7790	-0.0027	-384.7 (-55.8)	
0.635 (25)	0	160.4	0.9854	0.7823			
	45	163.4	0.9895	0.7790	-0.0033	-469.5 (-68.1)	
0.889 (35)	0	161.3	0.9867	0.7813			
	45	163.2	0.9893	0.7793	-0.0020	-284.8 (-41.3)	
1.143 (45)	0	161.6	0.9871	0.7809			
	45	163.2	0.9893	0.7793	-0.0016	-227.5 (-33.0)	
1.397 (55)	0	162.8	0.9888	0.7797			
	45	163.0	0.9890	0.7795	-0.0002	-28.3 (-4.1)	
1.651 (65)	0	163.4	0.9895	0.7790			
	45	162.6	0.9885	0.7799	+0.0009	+128.2 (+18.6)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 12

MATERIAL 2014-T651 -38.1 mm (1.5 in) x 76.2 mm (3 in)
CONDITION Rod Peened -345 N/m^2 (50 psi) -1.778 mm (0.070 in) T.R. -100 Sec.
ORIGINAL THK. 6.35 mm (0.250 in) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.7	0.9873	0.7808			
	45	163.3	0.9894	0.7791	-0.0017	-242.0 (-35.1)	
0.076 (3)	0	161.6	0.9871	0.7809			
	45	163.2	0.9893	0.7792	-0.0017	-242.0 (-35.1)	
0.152 (6)	0	161.4	0.9869	0.7812			
	45	163.6	0.9898	0.7789	-0.0023	-327.5 (-47.5)	
0.229 (9)	0	161.2	0.9866	0.7814			
	45	163.1	0.9891	0.7794	-0.0020	-284.8 (-41.3)	
0.305 (12)	0	161.1	0.9878	0.7804			
	45	163.5	0.9897	0.7790	-0.0014	-199.3 (-28.9)	
0.381 (15)	0	161.9	0.9876	0.7806			
	45	163.4	0.9895	0.7790	-0.0016	-227.5 (-33.0)	
0.635 (25)	0	160.5	0.9856	0.7822			
	45	163.0	0.9890	0.7795	-0.0027	-384.7 (-55.8)	
0.889 (35)	0	160.6	0.9857	0.7821			
	45	162.8	0.9888	0.7797	-0.0024	-342.0 (-49.6)	
1.143 (45)	0	161.9	0.9876	0.7806			
	45	162.6	0.9885	0.7799	-0.0007	-100.0 (-14.5)	
1.397 (55)	0	162.1	0.9878	0.7804			
	45	163.7	0.9899	0.7788	-0.0016	-227.5 (-33.0)	
1.651 (65)	0	163.3	0.9894	0.7791			
	45	163.3	0.9894	0.7791	0	0 (0)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 16

MATERIAL 2014-T651 -38.1 mm (1.5 in) x 76.2 mm (3 in)
CONDITION Rod Peened 345 N/m^2 (50 psi) -3.048 mm (0.120 in) T.R. 100 Sec.
ORIGINAL THK. 6.35 mm (0.250 in) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.7	0.9873	0.7808			
	45	163.6	0.9898	0.7789	-0.0019	-270.3 (-39.2)	
0.076 (3)	0	161.4	0.9869	0.7812			
	45	163.4	0.9895	0.7790	-0.0022	-310.0 (-45.4)	
0.152 (6)	0	161.9	0.9876	0.7806			
	45	163.6	0.9898	0.7789	-0.0017	-242.0 (-35.1)	
0.229 (9)	0	160.7	0.9859	0.7820			
	45	163.6	0.9898	0.7789	-0.0031	-441.3 (-64.0)	
0.305 (12)	0	161.1	0.9878	0.7804			
	45	163.7	0.9899	0.7788	-0.0016	-227.5 (-33.0)	
0.381 (15)	0	160.8	0.9860	0.7818			
	45	163.3	0.9894	0.7791	-0.0027	-384.7 (-55.8)	
0.635 (25)	0	160.8	0.9860	0.7818			
	45	162.7	0.9886	0.7798	-0.0020	-284.8 (-41.3)	
0.889 (35)	0	160.5	0.9856	0.7822			
	45	164.2	0.9905	0.7783	-0.0039	-555.0 (-80.5)	
1.143 (45)	0	161.0	0.9863	0.7816			
	45	162.8	0.9887	0.7797	-0.0019	-270.3 (-39.2)	
1.397 (55)	0	161.6	0.9871	0.7809			
	45	163.7	0.9899	0.7788	-0.0021	-299.2 (-43.4)	
1.651 (65)	0	162.8	0.9887	0.7797			
	45	162.6	0.9885	0.7799	+0.0002	-28.3 (+4.1)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2014-T651-38.1mm (1.5 in.) x 76.2mm (3 in.) MSFC No. 19
CONDITION Rod Peened 552N/m^2 (80PSI) - 1.778mm (0.070 in.) T.R. - 100 Sec
ORIGINAL THK. 6.35mm (0.250 in.) Nom
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.9	0.9876	0.7806			
	45	162.8	0.9887	0.7797	-0.0009	-128.2 (-18.6)	
0.076 (3)	0	161.5	0.9870	0.7810			
	45	163.0	0.9890	0.7795	-0.0015	-213.7 (-31.0)	
0.152 (6)	0	160.7	0.9859	0.7820			
	45	163.2	0.9893	0.7792	-0.0028	-398.5 (-57.8)	
0.229 (9)	0	161.0	0.9863	0.7816			
	45	163.1	0.9891	0.7794	-0.0022	-313.0 (-45.4)	
0.305 (12)	0	161.2	0.9866	0.7814			
	45	163.6	0.9898	0.7789	0.0025	-355.8 (-51.6)	
0.381 (15)	0	161.0	0.9863	0.7816			
	45	163.6	0.9898	0.7789	0.0027	-384.7 (-55.8)	
0.635 (25)	0	161.0	0.9863	0.7816			
	45	163.1	0.9891	0.7794	0.0022	-313.0 (-45.4)	
0.889 (35)	0	160.6	0.9857	0.7821			
	45	163.3	0.9894	0.7791	-0.0030	-427.5 (-62.0)	
1.143 (45)	0	161.8	0.9874	0.7797			
	45	163.3	0.9894	0.7791	-0.0006	-85.5 (-12.4)	
1.397 (55)	0	162.8	0.9887	0.7797			
	45	162.5	0.9884	0.7800	-0.0003	+42.7 (+6.2)	

DATA SHEET NAS 8-31533, Project No. 508203 MSFC No. 24

MATERIAL 2014-T651-38.1mm (1.5 in.) x 76.2mm (3 in.)
CONDITION Rod Peened 552N/m^2 (80 PSI) - 3.048mm (0.120 in.) T. R. - 100 Sec
ORIGINAL THK. 6.35mm (0.250 in.) Nom
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.8	0.9874	0.7807			
	45	162.8	0.9887	0.7797	-0.0010	-142.7 (-20.7)	
0.076 (3)	0	161.5	0.9870	0.7810			
	45	162.9	0.9889	0.7796	-0.0014	-199.3 (-28.9)	
0.152 (6)	0	161.2	0.9866	0.7814			
	45	163.3	0.9894	0.7791	-0.0023	-327.5 (-47.5)	
0.229 (9)	0	161.2	0.9866	0.7814			
	45	163.4	0.9895	0.7790	-0.0024	-342.0 (-49.6)	
0.305 (12)	0	160.9	0.9861	0.7817			
	45	163.4	0.9895	0.7790	-0.0027	-384.7 (-55.8)	
0.381 (15)	0	160.9	0.9861	0.7817			
	45	163.2	0.9893	0.7792	-0.0025	-355.8 (-51.6)	
0.635 (25)	0	161.0	0.9863	0.7816			
	45	162.9	0.9889	0.7796	-0.0020	-284.8 (-41.3)	
0.889 (35)	0	161.1	0.9864	0.7815			
	45	162.8	0.9887	0.7797	-0.0018	-256.5 (-37.2)	
1.143 (45)	0	161.6	0.9871	0.7809			
	45	163.5	0.9897	0.7790	-0.0019	-270.3 (-39.2)	
1.397 (55)	0	162.7	0.9886	0.7798			
	45	162.8	0.9887	0.7797	-0.0001	-14.5 (-2.1)	
1.651 (65)	0	162.9	0.9889	0.7796			
	45	162.4	0.9882	0.7801	+0.0005	+71.0 (+10.3)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 4

MATERIAL 2024-T3-38.1mm (1.5 in.) x 76.2mm (3 in.)
CONDITION Rod Peened - 241N/m^2 (35PSI) - 1.145mm (0.045 in.) T. R. - 100 Sec
ORIGINAL THK. 4.825mm (0.190 in.) Nom
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.4	0.9869	0.7812			
	45	162.6	0.9885	0.7799	-0.0013	-181.3 (-26.3)	
0.076 (3)	0	160.5	0.9856	0.7822			
	45	162.8	0.9888	0.7797	-0.0025	-172.4 (-50.7)	
0.152 (6)	0	160.2	0.9851	0.7825			
	45	162.7	0.9886	0.7798	-0.0027	-377.2 (-54.7)	
0.229 (9)	0	159.9	0.9847	0.7829			
	45	162.4	0.9882	0.7801	-0.0028	-390.9 (-56.7)	
0.305 (12)	0	160.3	0.9853	0.7824			
	45	162.7	0.9886	0.7798	-0.0026	-363.4 (-52.7)	
0.381 (15)	0	159.8	0.9845	0.7830			
	45	162.6	0.9885	0.7799	-0.0031	-433.0 (-62.8)	
0.635 (25)	0	160.5	0.9856	0.7822			
	45	161.6	0.9871	0.7809	-0.0013	-181.3 (-26.3)	
0.889 (35)	0	160.0	0.9848	0.7828			
	45	163.6	0.9898	0.7789	-0.0039	-544.7 (-79.0)	
1.143 (45)	0	161.2	0.9866	0.7814			
	45	162.2	0.9880	0.7803	-0.0011	-153.8 (-22.3)	
1.397 (55)	0	161.8	0.9874	0.7807			
	45	161.9	0.9876	0.7806	-0.0001	-13.8 (-2.0)	
1.651 (65)	0	162.5	0.9884	0.7800			
	45	161.9	0.9876	0.7806	+0.0006	+84.1 (+12.2)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 8

MATERIAL 2024-T3-38.1mm (1.5 in.) x 76.2mm (3 in.)

CONDITION Rod Peened - 345N/m^2 (50PSI) - 1.145mm (0.045 in.) T. R. - 100 Sec

ORIGINAL THK.

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.7	0.9873	0.7808			
	45	162.6	0.9885	0.7799	-0.0009	-125.5 (-18.2)	
0.076 (3)	0	160.6	0.9857	0.7821			
	45	162.7	0.9886	0.7798	-0.0023	-321.3 (-46.6)	
0.152 (6)	0	160.2	0.9851	0.7825			
	45	162.5	0.9884	0.7800	-0.0025	-349.6 (-50.7)	
0.229 (9)	0	160.4	0.9854	0.7823			
	45	162.9	0.9889	0.7796	-0.0027	-377.2 (-54.7)	
0.305 (12)	0	160.1	0.9850	0.7827			
	45	162.8	0.9888	0.7797	-0.0030	-419.2 (-60.8)	
0.381 (15)	0	160.2	0.9851	0.7825			
	45	162.7	0.9886	0.7798	-0.0027	-377.2 (54.7)	
0.635 (25)	0	159.9	0.9847	0.7829			
	45	162.2	0.9880	0.7803	-0.0026	-363.4 (-52.7)	
0.889 (35)	0	160.8	0.9860	0.7818			
	45	161.6	0.9871	0.7809	-0.0009	-125.5 (-18.2)	
0.143 (45)	0	160.6	0.9857	0.7821			
	45	161.7	0.9873	0.7808	-0.0013	-181.3 (-26.3)	
1.397 (55)	0	161.6	0.9871	0.7809			
	45	161.8	0.9874	0.7807	-0.0002	-28.3 (-4.1)	
1.651 (65)	0	163.4	0.9895	0.7790			
	45	162.2	0.9880	0.7803	+0.0013	+181.3 (+26.3)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 2024-T3-38.1 mm (1.5 in.) x 76.2 mm (3 in.) MSFC No. 15
CONDITION Rod Peened 345 N/m^2 (50 psi) -1.778 mm (0.070 in.) T.R. 100 Sec.
ORIGINAL THK. 4.825 mm (0.190 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.6	0.9871	0.7809			
	45	163.2	0.9893	0.7792	-0.0017	-237.2 (-34.4)	
0.076 (3)	0	160.8	0.9860	0.7818			
	45	162.6	0.9885	0.7799	-0.0019	-265.5 (-38.5)	
0.152 (6)	0	160.6	0.9857	0.7821			
	45	162.9	0.9889	0.7796	-0.0025	-349.6 (-50.7)	
0.229 (9)	0	160.4	0.9854	0.7823			
	45	162.8	0.9887	0.7797	-0.0026	-363.4 (-52.7)	
0.305 (12)	0	159.9	0.9847	0.7829			
	45	162.8	0.9887	0.7797	-0.0032	-446.8 (-64.8)	
0.381 (15)	0	160.2	0.9851	0.7825			
	45	162.8	0.9887	0.7797	-0.0028	-390.9 (-56.7)	
0.635 (25)	0	160.0	0.9848	0.7828			
	45	164.0	0.9903	0.7785	-0.0043	-600.6 (-87.1)	
0.889 (35)	0	160.2	0.9851	0.7825			
	45	163.6	0.9898	0.7789	-0.0036	-502.6 (-72.9)	
1.143 (45)	0	160.6	0.9857	0.7821			
	45	162.3	0.9881	0.7802	-0.0019	-265.5 (-38.5)	
1.397 (55)	0	161.4	0.9869	0.7812			
	45	161.8	0.9874	0.7807	-0.0005	-69.6 (-10.1)	
1.651 (65)	0	162.0	0.9877	0.7805			
	45	160.6	0.9857	0.7821	+0.0016	+223.4 (+32.4)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 21

MATERIAL 2024-T3 38.1 mm (1.5 in.) x 76.2 mm (3 in.)
CONDITION Rod Peened 552 N/m^2 (80 psi) -1.778 mm (0.070 in.) T.R. -100 Sec.
ORIGINAL THK. 4.825 mm (0.190 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.6	0.9871	0.7809			
	45	162.3	0.9881	0.7802	-0.0007	-97.9 (-14.2)	
0.076 (3)	0	161.0	0.9863	0.7816			
	45	162.8	0.9887	0.7797	-0.0019	-265.5 (-38.5)	
0.152 (6)	0	160.7	0.9859	0.7820			
	45	162.6	0.9885	0.7799	-0.0021	-293.0 (-42.5)	
0.229 (9)	0	160.5	0.9856	0.7822			
	45	162.6	0.9885	0.7799	-0.0023	-321.3 (-46.6)	
0.305 (12)	0	161.5	0.9870	0.7810			
	45	162.8	0.9887	0.7797	-0.0013	-181.3 (-26.3)	
0.381 (15)	0	160.5	0.9856	0.7822			
	45	163.3	0.9894	0.7791	-0.0031	-433.0 (-62.8)	
0.635 (25)	0	160.0	0.9848	0.7828			
	45	162.4	0.9882	0.7801	-0.0027	-377.2 (-54.7)	
0.889 (35)	0	160.2	0.9851	0.7825			
	45	162.5	0.9884	0.7800	-0.0025	-349.7 (-50.7)	
1.143 (45)	0	160.9	0.9861	0.7817			
	45	163.7	0.9899	0.7788	-0.0029	-405.4 (-58.8)	
1.397 (55)		160.5	0.9856	0.7822			
	45	161.1	0.9864	0.7815	-0.0007	-97.9 (-14.2)	
1.651 (65)	0	162.2	0.9880	0.7803			
	45	163.7	0.9899	0.7788	-0.0015	-209.6 (-30.1)	
1.905 (75)	0	161.6	0.9871	0.7809			
	45	161.4	0.9869	0.7812	+0.0003	+42.1 (+6.1)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 10

MATERIAL 2219-T87-38.1 mm (1.5 in.) x 76.2 mm (3 in.)
CONDITION Rod Peened 345 N/m^2 (50 psi) -1.778 mm (0.070 in.) T.R.-100 sec.
ORIGINAL THK. 6.35 mm (0.250 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.6	0.9871	0.7809			
	45	162.8	0.9887	0.7797	-0.0012	-167.5 (-24.3)	
0.076 (3)	0	161.6	0.9871	0.7809			
	45	162.7	0.9886	0.7798	-0.0011	-153.8 (-22.3)	
0.152 (6)	0	161.4	0.9869	0.7812			
	45	162.7	0.9886	0.7798	-0.0014	-195.8 (-28.4)	
0.229 (9)	0	161.3	0.9867	0.7813			
	45	162.6	0.9885	0.7799	-0.0014	-195.8 (-28.4)	
0.305 (12)	0	161.2	0.9866	0.7814			
	45	162.7	0.9886	0.7798	-0.0016	-223.4 (-32.4)	
0.381 (15)	0	160.9	0.9861	0.7817			
	45	162.8	0.9887	0.7797	-0.0020	-279.2 (-40.5)	
0.635 (25)	0	161.2	0.9866	0.7814			
	45	162.8	0.9887	0.7797	-0.0017	-237.2 (-34.4)	
0.889 (35)	0	160.9	0.9861	0.7817			
	45	163.6	0.9898	0.7789	-0.0028	-390.9 (-56.7)	
1.143 (45)	0	161.6	0.9871	0.7809			
	45	162.6	0.9885	0.7799	-0.0010	-140.0 (-20.3)	
1.397 (55)	0	162.8	0.9887	0.7797			
	45	162.6	0.9885	0.7799	+0.0002	+27.9 (+4.1)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 17

MATERIAL 22197-T87-38.1 mm (1.5 in.) x 76.2 mm (3 in.)
CONDITION Rod Peened 552 N/m^2 (80 psi) -1.778 mm (0.070 in.) T.R. -100 Sec.
ORIGINAL THK. 6.35 mm (0.250 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.7	0.9873	0.7808			
	45	162.8	0.9887	0.7797	-0.0011	-153.8 (-22.3)	
0.076 (3)	0	161.9	0.9876	0.7806			
	45	162.8	0.9887	0.7797	-0.0009	-125.5 (-18.2)	
0.152 (6)	0	161.5	0.9870	0.7810			
	45	162.8	0.9887	0.7797	-0.0013	-181.3 (-26.3)	
0.229 (9)	0	161.6	0.9871	0.7809			
	45	162.7	0.9886	0.7798	-0.0011	-153.8 (22.3)	
0.305 (12)	0	161.3	0.9867	0.7813			
	45	162.8	0.9887	0.7797	-0.0016	-223.4 (-32.4)	
0.381 (15)	0	161.4	0.9869	0.7812			
	45	163.0	0.9890	0.7795	-0.0017	-237.2 (-34.4)	
0.625 (25)	0	161.0	0.9863	0.7816			
	45	162.7	0.9886	0.7798	-0.0018	-251.7 (-36.5)	
0.889 (35)	0	160.8	0.9860	0.7818			
	45	162.5	0.9884	0.7800	-0.0018	-251.7 (-36.5)	
1.143 (45)	0	161.6	0.9871	0.7809			
	45	162.5	0.9884	0.7800	-0.0009	-125.5 (-18.2)	
1.397 (55)	0	162.3	0.9881	0.7802			
	45	163.6	0.9898	0.7789	-0.0013	-181.3 (-26.3)	
1.651 (65)	0	162.7	0.9886	0.7798			
	45	162.6	0.9885	0.7799	+0.0001	+13.8 (+2.0)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 22

MATERIAL 2219-T87-38.1 mm (1.5 in.) x 76.2 mm (3 in.)
CONDITION Rod Peened 552 N/m^2 (80 psi) -3.048 mm (0.120 in.) T.R. 100 Sec.
ORIGINAL THK. 6.35 mm (0.250 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.6	0.9857	0.7821			
	45	162.9	0.9889	0.7796	-0.0025	-349.6 (-50.7)	
0.076 (3)	0	161.8	0.9874	0.7807			
	45	163.0	0.9890	0.7795	-0.0012	-167.5 (-24.3)	
0.152 (6)	0	161.6	0.9871	0.7809			
	45	162.7	0.9886	0.7798	-0.0011	-153.8 (-22.3)	
0.229 (9)	0	161.4	0.9869	0.7812			
	45	162.8	0.9887	0.7797	-0.0015	-209.6 (-30.4)	
0.305 (12)	0	161.4	0.9869	0.7812			
	45	163.1	0.9891	0.7794	-0.0016	-223.4 (-32.4)	
0.381 (15)	0	160.4	0.9854	0.7823			
	45	163.0	0.9890	0.7795	-0.0028	-390.9 (-56.7)	
0.635 (25)	0	161.4	0.9869	0.7812			
	45	162.7	0.9886	0.7798	-0.0014	-195.8 (-28.4)	
0.889 (35)	0	160.8	0.9860	0.7818			
	45	162.6	0.9885	0.7799	-0.0019	-265.5 (-38.5)	
1.43 (45)	0	161.3	0.9867	0.7813			
	45	162.9	0.9889	0.7796	-0.0017	-237.2 (-34.4)	
1.397 (55)	0	162.3	0.9881	0.7802			
	45	162.7	0.9886	0.7798	-0.0004	-55.8 (-8.1)	
1.651 (65)	0	163.6	0.9898	0.7789			
	45	162.7	0.9886	0.7798	+0.0009	+125.5 (+18.2)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 5

MATERIAL 6061-T6-38.1 mm (1.5 in.) x 76.2 mm (3 in.)
CONDITION Rod Peened -241 N/m^2 (35 psi) -1.145 mm (0.045 in.) T.R. -100 Sec.
ORIGINAL THK. 6.35 mm (0.250 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.2	0.9866	0.7814			
	45	161.6	0.9871	0.7809	-0.0005	-66.2 (-9.6)	
0.076 (3)	0	161.0	0.9863	0.7816			
	45	162.8	0.9888	0.7797	-0.0019	-250.3 (-36.3)	
0.152 (6)	0	160.8	0.9860	0.7818			
	45	162.7	0.9886	0.7798	-0.0020	-263.4 (-38.2)	
0.229 (9)	0	160.7	0.9859	0.7820			
	45	162.7	0.9886	0.7798	-0.0022	-289.6 (-42.0)	
0.305 (12)	0	160.6	0.9857	0.7821			
	45	162.9	0.9889	0.7796	-0.0025	-329.6 (-47.8)	
0.381 (15)	0	160.4	0.9854	0.7823			
	45	162.6	0.9885	0.7799	-0.0024	-315.8 (-45.8)	
0.635 (25)	0	160.6	0.9857	0.7821			
	45	162.3	0.9881	0.7802	-0.0019	-250.3 (-36.3)	
0.889 (35)	0	160.4	0.9854	0.7823			
	45	162.9	0.9889	0.7796	-0.0027	-355.8 (-51.6)	
1.143 (45)	0	160.9	0.9861	0.7817			
	45	162.2	0.9880	0.7802	-0.0014	-184.1 (-26.7)	
1.397 (55)	0	161.2	0.9866	0.7814			
	45	162.3	0.9881	0.7802	-0.0012	-157.9 (-22.9)	
1.651 (65)	0	162.7	0.9886	0.7798			
	45	162.0	0.9877	0.7805	+0.0007	+92.4 (+13.4)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 6

MATERIAL 6061-T6-38.1 mm (1.5 in.) x 76.2 mm (3 in.)

CONDITION Rod Peened -345 N/m^2 (50 psi) -1.145 mm (0.045 in.) T.R. -100 Sec.

ORIGINAL THK.

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	161.5	0.9870	0.7810			
	45	162.5	0.9884	0.7800	-0.0010	-131.7 (-19.1)	
0.076 (3)	0	162.2	0.9880	0.7803			
	45	162.6	0.9885	0.7799	-0.0004	-52.4 (-7.6)	
0.152 (6)	0	160.8	0.9860	0.7818			
	45	162.5	0.9884	0.7800	-0.0018	-237.2 (-34.4)	
0.229 (9)	0	161.1	0.9865	0.7815			
	45	162.9	0.9889	0.7796	0.0019	-250.3 (-36.3)	
0.305 (12)	0	160.8	0.9860	0.7818			
	45	162.6	0.9885	0.7799	-0.0019	-250.3 (-36.3)	
0.381 (15)	0	160.6	0.9857	0.7821			
	45	162.6	0.9885	0.7799	-0.0022	-239.6 (-42.0)	
0.635 (25)	0	160.2	0.9851	0.7825			
	45	163.0	0.9890	0.7795	-0.0030	-395.1 (-57.3)	
0.889 (35)	0	160.1	0.9850	0.7827			
	45	162.1	0.9878	0.7804	-0.0023	-302.7 (-43.9)	
1.143 (45)	0	161.5	0.9870	0.7810			
	45	163.6	0.9898	0.7789	-0.0021	-276.5 (-40.1)	
1.397 (55)	0	161.5	0.9870	0.7810			
	45	161.5	0.9870	0.7810	0	0 (0)	
1.651 (65)	0						
	45						

DATA SHEET NAS 8-31563, Project No. 508203

MSFC No. 13

MATERIAL 6061-T6-38.1 mm ($1\frac{1}{2}$ in.) x 76.2 mm (3 in.)

CONDITION Rod Peened 345 N/m^2 (50 psi) -1.778 mm (0.070 in.) T.R. -100 Sec.

ORIGINAL THK. 6.35 mm (0.250 in.) Nom.

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)		161.5	0.9870	0.7810			
	45	162.4	0.9882	0.7801	-0.0009	-118.6 (-17.2)	
0.076 (3)	0	161.3	0.9867	0.7813			
	45	162.6	0.9885	0.7799	-0.0014	-184.1 (-26.7)	
0.152 (6)	0	161.1	0.9878	0.7804			
	45	162.6	0.9885	0.7799	-0.0005	-66.2 (-9.6)	
0.229 (9)	0	160.9	0.9861	0.7817			
	45	162.5	0.9884	0.7800	-0.0017	-224.1 (-32.5)	
0.305 (12)	0	160.9	0.9861	0.7817			
	45	162.5	0.9884	0.7800	-0.0017	-224.1 (-32.5)	
0.381 (15)	0	160.7	0.9859	0.7801	-0.0019	-250.3 (-36.3)	
	45	162.4	0.9882	0.7801	-0.0019	-250.3 (-36.3)	
0.635 (25)	0	160.7	0.9859	0.7820			
	45	162.6	0.9885	0.7799	-0.0021	-276.5 (-40.1)	
0.889 (35)	0	160.6	0.9857	0.7821			
	45	162.4	0.9882	0.7801	-0.0020	-263.4 (-38.2)	
1.143 (45)	0	160.0	0.9848	0.7828			
	45	162.1	0.9878	0.7804	-0.0024	-315.8 (-45.8)	
1.397 (55)	0	161.5	0.9870	0.7810			
	45	163.4	0.9895	0.7790	-0.0020	-263.4 (-38.2)	
1.651 (65)	0	162.5	0.9884	0.7800			
	45	162.7	0.9886	0.7798	-0.0002	-26.3 (-3.8)	
1.905 (75)	0	161.8	0.9874	0.7807			
	45	161.6	0.9871	0.7809	+0.0002	+26.3 (+3.8)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 3

MATERIAL 7075-T6-38.1 mm (1.5 in.)
CONDITION Rod Peened - 241 N/m^2 (35 psi) -1.145 mm (0.045 in.) T.R. -100 Sec.
ORIGINAL THK. 4.825 mm (0.190 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.4	0.9839	0.7835			
	45	162.0	0.9877	0.7805	-0.0030	-410.9 (-59.6)	
0.076 (3)	0	159.3	0.9837	0.7836			
	45	162.5	0.9884	0.7800	-0.0036	-493.0 (-71.5)	
0.152 (6)	0	159.2	0.9836	0.7838			
	45	162.2	0.9880	0.7803	-0.0035	-479.2 (-69.5)	
0.229 (9)	0	159.2	0.9836	0.7838			
	45	162.3	0.9881	0.7802	-0.0036	-493.0 (-71.5)	
0.305 (12)	0	159.0	0.9833	0.7840			
	45	161.8	0.9874	0.7807	-0.0033	-452.3 (-65.6)	
0.381 (15)	0	159.3	0.9837	0.7836			
	45	162.2	0.9880	0.7803	-0.0033	-452.3 (-65.6)	
0.635 (25)	0	159.0	0.9833	0.7840			
	45	161.2	0.9869	0.7812	-0.0028	-383.4 (-55.6)	
0.889 (35)	0	158.9	0.9831	0.7841			
	45	162.6	0.9885	0.7799	-0.0042	-575.0 (-83.4)	
1.143 (45)	0	159.0	0.9833	0.7840			
	45	161.2	0.9866	0.7814	-0.0026	-356.5 (-51.7)	
1.397 (55)	0	160.8	0.9860	0.7818			
	45	160.5	0.9856	0.7822	+0.0004	+54.5 (+7.9)	
1.651 (65)	0						
	45						

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 9

MATERIAL 7075-T6-38.1 mm (1.5 in.) x 76.2 mm (3 in.)

CONDITION Rod Peened - 345 N/m^2 (50 psi) -1.145 mm (0.045 in.) T.R. -100 Sec.

ORIGINAL THK.

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.7	0.9843	0.7831			
	45	162.4	0.9822	0.7801	-0.0030	-410.9 (-59.6)	
0.076 (3)	0	159.6	0.9842	0.7833			
	45	162.0	0.9877	0.7805	-0.0028	-383.4 (-55.6)	
0.152 (6)	0	158.8	0.9829	0.7843			
	45	162.6	0.9885	0.7799	-0.0044	-602.6 (-87.4)	
0.229 (9)	0	159.1	0.9834	0.7839			
	45	162.8	0.9888	0.7797	-0.0042	-575.7 (-83.5)	
0.305 (12)	0	159.2	0.9836	0.7838			
	45	162.6	0.9885	0.7799	-0.0039	-534.4 (-77.5)	
0.381 (15)	0	159.2	0.9836	0.7838			
	45	162.9	0.9889	0.7796	-0.0042	-575.7 (-83.5)	
0.635 (25)	0	158.4	0.9823	0.7848			
	45	161.4	0.9869	0.7812	-0.0036	-493.0 (-71.5)	
0.889 (35)	0	159.0	0.9833	0.7840			
	45	160.8	0.9860	0.7818	-0.0022	-301.3 (-43.7)	
1.143 (45)	0	160.4	0.9854	0.7823			
	45	160.8	0.9860	0.7818	-0.0005	-68.3 (-9.9)	
1.397 (55)	0	161.6	0.9871	0.7809			
	45	160.4	0.9854	0.7823	+0.0014	+191.7 (+27.8)	

DATA SHEET NAS 8-31563, Project No. 508203

MSFC No. 14

MATERIAL 7075-T6-38.1 mm (1.5 in.) x 76.2 mm (3 in.)
CONDITION Rod Peened 345 N/m^2 (50 psi) -1.778 mm (0.070 in.) T.R. -100 Sec.
ORIGINAL THK. 4.825 mm (0.190 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.2	0.9851	0.7825			
	45	162.0	0.9877	0.7805	-0.0020	-273.7 (-39.7)	
0.076 (3)	0	159.6	0.9842	0.7833			
	45	162.1	0.9878	0.7804	-0.0029	-397.2 (-57.6)	
0.152 (6)	0	159.4	0.9839	0.7835			
	45	162.3	0.9881	0.7802	-0.0033	-452.3 (-65.6)	
0.229 (9)	0	159.6	0.9842	0.7833			
	45	162.3	0.9881	0.7802	-0.0031	-424.7 (-61.6)	
0.305 (12)	0	159.6	0.9842	0.7833			
	45	162.4	0.9882	0.7801	-0.0034	-466.1 (-67.6)	
0.381 (15)	0	159.9	0.9847	0.7829			
	45	162.4	0.9882	0.7801	-0.0028	-383.3 (-55.6)	
0.635 (25)	0	158.5	0.9825	0.7847			
	45	162.3	0.9881	0.7802	-0.0045	-616.4 (-89.4)	
0.889 (35)	0	160.4	0.9854	0.7823			
	45	161.4	0.9869	0.7812	-0.0011	-151.0 (-21.9)	
1.143 (45)	0	161.4	0.9869	0.7812			
	45	162.4	0.9882	0.7801	-0.0011	-151.0 (-21.9)	
1.397 (55)	0	160.9	0.9861	0.7817			
	45	161.4	0.9869	0.7812	-0.0005	-68.3 (-9.9)	
1.651 (65)	0	161.3	0.9867	0.7813			
	45	161.7	0.9873	0.7808	-0.0005	-68.3 (-9.9)	
1.905 (75)	0	162.6	0.9885	0.7799			
	45	162.2	0.9880	0.7803	+0.0004	+54.5 (+7.9)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 20

MATERIAL 7075-T6-38.1 mm (1.5 in.) x 76.2 mm (3 in.)
CONDITION Rod Peened 552 N/m^2 (80 psi) -1.778 mm (0.070 in.) T.R. -100 Sec.
ORIGINAL THK. 4.825 mm (0.190 in.) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.7	0.9859	0.7820			
	45	162.4	0.9882	0.7801	-0.0019	-260.6 (-37.8)	
0.076 (3)	0	159.8	0.9845	0.7830			
	45	162.1	0.9878	0.7804	-0.0076	-356.5 (-51.7)	
0.152 (6)	0	159.4	0.9839	0.7835			
	45	161.8	0.9874	0.7797	-0.0038	-520.6 (-75.5)	
0.229 (9)	0	159.7	0.9843	0.7831			
	45	162.3	0.9881	0.7802	-0.0029	-397.2 (-57.6)	
0.305 (12)	0	160.4	0.9854	0.7823			
	45	162.4	0.9882	0.7801	-0.0021	-287.5 (-41.7)	
0.381 (15)	0	158.0	0.9816	0.7853			
	45	162.5	0.9884	0.7800	-0.0053	-726.0 (-105.3)	
0.635 (25)	0	159.4	0.9839	0.7835			
	45	162.5	0.9884	0.7800	-0.0035	-479.2 (-69.5)	
0.889 (35)	0	159.4	0.9839	0.7835			
	45	161.0	0.9863	0.7816	-0.0019	-260.6 (-37.8)	
1.143 (45)	0	161.2	0.9866	0.7814			
	45	160.9	0.9861	0.7817	+0.0003	+4.1 (+6.0)	

DATA SHEET NAS 8-31563, Project No. 508203 MSF No. 25

MATERIAL 7075-T6-38.1mm (1.5 in.) x 76.2mm (3 in.)
CONDITION Rod Peened-552N/M2 (80PSI) 3.048mm (0.120 in.) T. R. .100 Sec
ORIGINAL THK. 4.825mm (0.190 in.) Nom
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.6	0.9857	0.7821			
	45	162.0	0.9877	0.7805	-0.0016	-219.3 (-31.8)	
0.076 (3)	0	160.3	0.9853	0.7824			
	45	162.4	0.9882	0.7801	-0.0023	-315.1 (-45.7)	
0.152 (6)	0	160.0	0.9848	0.7828			
	45	162.2	0.9880	0.7803	-0.0025	-342.7 (-49.7)	
0.229 (9)	0	159.6	0.9842	0.7833			
	45	161.5	0.9870	0.7810	-0.0023	-315.1 (-45.7)	
0.305 (12)	0	159.5	0.9840	0.7834			
	45	162.6	0.9885	0.7799	-0.0035	-479.2 (-69.5)	
0.381 (15)	0	159.1	0.9834	0.7839			
	45	162.2	0.9880	0.7803	-0.0036	-512.3 (-74.3)	
0.635 (25)	0	159.4	0.9839	0.7835			
	45	162.2	0.9880	0.7803	-0.0032	-455.8 (-66.1)	
0.889 (35)	0	158.8	0.9829	0.7843			
	45	163.6	0.9898	0.7789	-0.0053	-754.3 (-109.4)	
1.143 (45)	0	162.6	0.9883	0.7799			
	45	162.5	0.9884	0.7800	+0.0001	+14.5 (+2.1)	
1.397 (55)	0	164.4	0.9907	0.7781			
	45	160.9	0.9861	0.7817	+0.0036	+512.3 (+74.3)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 1

MATERIAL 7075-T651-38.1mm (1.5 in.) x 76.2mm (3 in.)
CONDITION Rod Peened 172N/m^2 (25PSI) -1.145mm (0.045 in.) T. R. - 100 Sec
ORIGINAL THK. 6.35mm (0.250 in.) Nom
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	159.8	0.9845	0.7830			
	45	162.2	0.9880	0.7803	-0.0027	-369.6 (-53.6)	
0.076 (3)	0	159.8	0.9845	0.7830			
	45	164.0	0.9903	0.7785	-0.0045	-616.4 (-89.4)	
0.152 (6)	0	159.4	0.9839	0.7835			
	45	163.2	0.9893	0.7792	-0.0048	-657.8 (-95.4)	
0.229 (9)	0	159.0	0.9833	0.7840			
	45	162.8	0.9888	0.7797	-0.0043	-588.8 (-85.4)	
0.305 (12)	0	159.1	0.9834	0.7839			
	45	162.9	0.9889	0.7795	-0.0044	-602.6 (-87.4)	
0.381 (15)	0	158.8	0.9829	0.7843			
	45	162.8	0.9888	0.7797	-0.0046	-630.2 (-91.4)	
0.635 (25)	0	158.7	0.9828	0.7844			
	45	161.9	0.9876	0.7806	-0.0038	-520.6 (-75.5)	
0.889 (35)	0	160.1	0.9850	0.7827			
	45	162.0	0.9877	0.7805	-0.0022	-301.3 (-43.7)	
1.143 (45)	0	162.3	0.9881	0.7802			
	45	161.8	0.9874	0.7807	+0.0005	+68.3 (+9.9)	
1.397 (55)	0	161.7	0.9873	0.7808			
	45	162.5	0.9884	0.7800	-0.0008	-109.6 (-15.9)	
1.651 (65)	0	161.2	0.9866	0.7814			
	45	161.4	0.9869	0.7812	-0.0002	-27.6 (-4.0)	
1.778 (70)	0	161.5	0.9870	0.7810			
	45	161.1	0.9864	0.7815	+0.0005	+68.3 (+9.9)	

DATA SHEET NAS 8-31563, Project No. 508203

MATERIAL 7075-T651 -38./mm (1.5 in.) x 76.2mm (3 in.) MSFC No. 11

CONDITION Rod Peened - 345N/M^2 (50 PSI) - 1.778mm (0.070 in.) T. R. - 100 Sec

ORIGINAL THK. 6.35mm (0.250 in.) Nom

RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)

$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.6	0.9857	0.7821			
	45	162.5	0.9884	0.7800	-0.0021	-287.5 (-41.7)	
0.076 (3)	0	160.6	0.9857	0.7821			
	45	162.7	0.9886	0.7798	-0.0023	-315.1 (-45.7)	
0.152 (6)	0	159.2	0.9836	0.7838			
	45	162.9	0.9889	0.7796	-0.0042	-575.7 (-83.5)	
0.229 (9)	0	159.0	0.9833	0.7840			
	45	163.0	0.9890	0.7795	-0.0045	-616.4 (-89.4)	
0.305 (12)	0	158.8	0.9829	0.7843			
	45	162.4	0.9882	0.7801	-0.0042	-575.7 (-83.5)	
0.381 (15)	0	160.1	0.9850	0.7827			
	45	163.0	0.9890	0.7795	-0.0032	-438.5 (-63.6)	
0.635 (25)	0	158.8	0.9829	0.7843			
	45	162.5	0.9884	0.7800	-0.0043	-588.8 (-85.4)	
0.889 (35)	0	158.9	0.9831	0.7841			
	45	161.8	0.9874	0.7807	-0.0034	-466.1 (-67.6)	
1.143 (45)	0	160.5	0.9856	0.7822			
	45	162.1	0.9878	0.7804	-0.0018	-246.8 (-35.8)	
1.397 (55)	0	160.3	0.9853	0.7824			
	45	161.9	0.9876	0.7806	-0.0018	-246.8 (-35.8)	
1.651 (65)	0	163.2	0.9893	0.7792			
	45	161.5	0.9870	0.7810	+0.0018	+246.8 (+35.8)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 18

MATERIAL 7075-T651-38.1mm (1.5 in.) x 76.2mm (3 in.)
CONDITION Rod Peened 552N/m^2 (80PSI) -1.778mm (0.070 in.) T. R. - 100 Sec
ORIGINAL THK. 6.35 mm (0.250 in.) Nom
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.6	0.9857	0.7821			
	45	162.8	0.9887	0.7797	-0.0024	-328.9 (-47.7)	
0.076 (3)	0	159.6	0.9842	0.7833			
	45	162.9	0.9889	0.7796	-0.0037	-506.8 (-73.5)	
0.152 (6)	0	159.6	0.9842	0.7833			
	45	162.9	0.9889	0.7796	-0.0037	-506.8 (-73.5)	
0.229 (9)	0	159.6	0.9842	0.7833			
	45	162.9	0.9889	0.7796	-0.0037	-506.8 (-73.5)	
0.305 (12)	0	159.8	0.9845	0.7830			
	45	162.7	0.9886	0.7798	-0.0032	-438.5 (-63.6)	
0.381 (15)	0	159.1	0.9834	0.7839			
	45	162.7	0.9886	0.7798	-0.0041	-561.9 (-81.5)	
0.635 (25)	0	158.9	0.9831	0.7841			
	45	162.4	0.9882	0.7801	-0.0040	-548.2 (-79.5)	
0.889 (35)	0	159.2	0.9836	0.7838			
	45	160.4	0.9854	0.7823	-0.0015	-205.5 (-29.8)	
1.143 (45)	0	161.0	0.9863	0.7816			
	45	162.8	0.9887	0.7797	-0.0019	-260.6 (-37.8)	
1.397 (55)	0	161.2	0.9866	0.7814			
	45	161.6	0.9871	0.7809	-0.0005	-68.3 (-9.9)	
1.651 (65)	0	161.6	0.9871	0.7809			
	45	161.5	0.9870	0.7810	+0.0001	+13.8 (+2.0)	

DATA SHEET NAS 8-31563, Project No. 508203 MSFC No. 23

MATERIAL 7075-T651 -38.1 mm (1.5 in) x 76.2 mm (3 in)
CONDITION Rod Peened 552 N/m^2 (80 psi) -3.048 mm (0.120 in) T.R. -100 Sec.
ORIGINAL THK. 6.35 mm (0.250 in) Nom.
RADIATION $Cu_{k\alpha}$ -30kv -10ma Nickel Filter (Rigaku)
$Cr_{k\alpha}$ -15kv -60ma Vanadium Filter (Fastress)

DEPTH mm (mils)	ψ	2θ	SINθ	d	Δd	RIGAKU MPa (KSi)	FASTRESS MPa (KSi)
0 (0)	0	160.6	0.9857	0.7821			
	45	162.6	0.9885	0.7799	-0.0022	-301.3 (-43.7)	
0.076 (3)	0	160.0	0.9848	0.7828			
	45	162.6	0.9885	0.7799	-0.0029	-397.2 (-57.6)	
0.152 (6)	0	159.7	0.9843	0.7831			
	45	162.2	0.9880	0.7803	-0.0028	-383.4 (-55.6)	
0.229 (9)	0	160.3	0.9853	0.7824			
	45	162.4	0.9882	0.7801	-0.0023	-315.1 (-45.7)	
0.305 (12)	0	159.9	0.9847	0.7829			
	45	162.8	0.9888	0.7797	-0.0032	-438.5 (-63.6)	
0.381 (15)	0	161.0	0.9863	0.7816			
	45	163.1	0.9891	0.7794	-0.0022	-301.3 (-43.7)	
0.635 (25)	0	159.0	0.9833	0.7840			
	45	162.1	0.9878	0.7804	-0.0036	-512.3 (-74.3)	
0.889 (35)	0	159.4	0.9839	0.7835			
	45	162.1	0.9878	0.7804	-0.0031	-441.3 (-64.0)	
1.143 (45)	0	160.0	0.9848	0.7828			
	45	161.8	0.9874	0.7807	-0.0021	-299.2 (-43.4)	
1.397 (55)	0	161.8	0.9874	0.7807			
	45	161.4	0.9869	0.7812	+0.0005	+68.3 (+9.9)	