



Service Guide

ADVANCED TECHNOLOGY COMPANY

SEPTEMBER 2017

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General Information

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Company Profile

Advanced Technology Company (ATCo) was founded in 1971 in our present location in Pasadena, California. Over the years, our company has established a nationwide reputation for excellence in materials joining, fabrication, machining, assembly, design, and metallurgy.

Headquartered in a modern 20,000 square foot manufacturing facility, the company has complemented its highly skilled engineering and technical work force with modern equipment and processes.

ATCo purchased the PULSCO Division of Tolo, Inc. in 1999, and manufactures a portion of its product line at the Pasadena facility. Pasadena manufacturing consists of pulsation and noise attenuation products for applications where fluids/gases are pumped under high pressure. ATCo also provides a wide range of product manufacturing for other companies.

ATCo's customer list includes leading companies in such diversified industries as Aerospace, Aviation, Electronics, Energy, Industrial, Medical, Military, Nuclear, Research and Space. ATCo has been surveyed and granted approvals and certifications by over 200 private companies and government agencies.

ATCo is certified to ISO 9001: 2008/AS9100 Rev. C and NADCAP accredited. ATCo is also approved by most major Aerospace, NASA and Defense Organizations.

ATCo's management recognizes the necessity of being fully knowledgeable of technical advances and changes within our industry. To further this knowledge, active memberships are maintained with the Edison Institute of Technology, SAE, SME and the American Welding Society.

Quality Policy

DESCRIPTION

Advanced Technology Company is committed to continuous improvement in metal joining and material cutting. We will endeavor to exceed customer expectations with superior service and on time delivery.

ISO 9001:2008/AS9100 Rev C REGISTERED COMPANY

We are accredited by Nadcap for Welding:

AC7110/3 – Nadcap Audit Criteria for Electron Beam Welding

AC7110/5 – Nadcap Audit Criteria for Fusion Welding (GTAW)

AC7110/6 – Nadcap Audit Criteria for Laser Welding



NASA's GEORGE M. LOW AWARD FOR EXCELLENCE IN MANUFACTURING awarded to ATCO

01. Contract Services in Metal Joining & Cutting



01. Processes & Services Overview

Advanced Technology Company is among the few certified technical support facilities in the Western States offering electron beam welding; laser cutting, drilling and welding; automatic and manual gas tungsten arc welding; and stress relieving.

To complement these modern services and equipment, ATCo has implemented additional in-house services for the "One Stop" convenience of their customers. Because of this diversity in equipment and services, a customer is not locked into one process. ATCo also maintains strong strategic alliances with other companies to provide services like; plating, thermal spraying, anodizing, chem film, and NDT.

People, not just equipment, also play an important part. The engineers, technicians and specialists at ATCo bring a wealth of experience to the customer. All projects utilize the expertise of these professionals to produce work that meets the most demanding standards, while providing the customer with rapid and efficient service.

ATCo services two areas with its core technologies:

1. Contract Services in Metal Joining & Cutting
 - a. Electron Beam
 - b. Laser Welding, Precision Cutting, & Precision Hole Drilling
 - c. Gas Tungsten Arc & Automated GTAW (AcuWeld)
2. Processing Precision Metal Product Fabrication
 - a. CNC & Conventional Machining

01. Electron Beam Welding

OVERVIEW

Advanced Technology Company possesses the technical expertise and broad range of experience necessary to provide the highest level of Electron Beam Welding services. ATCo has four (4) EB Welding machines, featuring various chamber sizes and power ratings.

As part of the EB development process a defined set of weld parameters, weld characteristics, depth, Shape and width are created and maintained as a history of the part. The electron beam's ability to achieve deep narrow welds minimizes heat distortion while providing little or no post weld need for machining.

ATCo provides its customers with both design and metallurgical engineering assistance in the development and successful execution of their welding requirements. Supporting the customer needs is an engineering and technical staff with a combined experience of over 100 years in the EB Welding field.

ATCo's full range of production capabilities includes development, prototype or high volume production runs. Our Electron Beam Welding team is committed to insuring that standards of excellence for quality, on time deliveries, cost competitiveness and service are constantly improved.

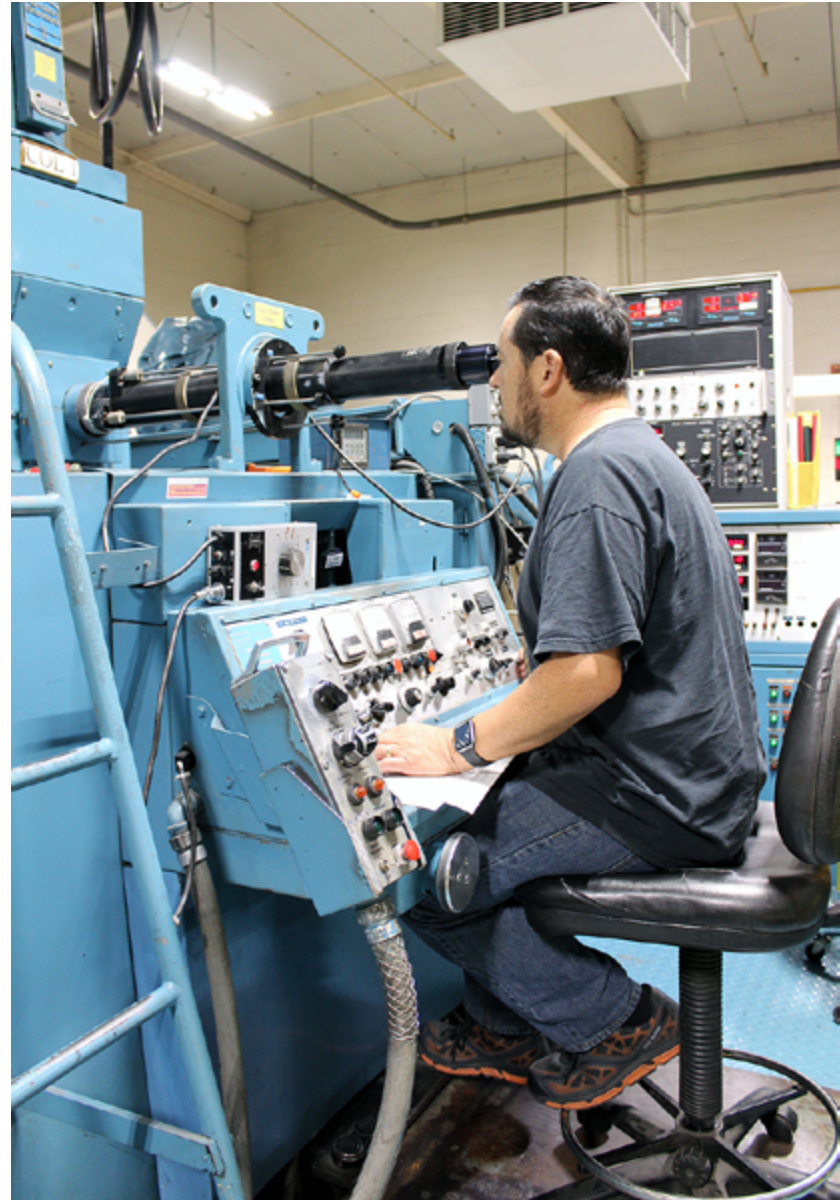


01. Electron Beam Welding

EQUIPMENT

EQUIPMENT TYPE	STANDARD WORK ENVELOPE (LXWXH)	REMARKS
Hamilton Standard 6 kW High Vacuum/ High Voltage type S/N 186	48" x 23" x 24"	Chamber extensions available to increase envelope length.
*Leybold Heraeus 7.5 kW High Vacuum/ High Voltage type S/N 606	52" x 36" x 27"	Chamber extensions available to increase envelope length.
*Hamilton Standard 25 kW High Vacuum/ High Voltage type S/N 231	216" x 56" x 40"	Chamber extensions available to increase envelope length.
*Hamilton Standard 7.5 kW High Vacuum/ High Voltage type S/N 350	108" x 56" x 40"	Chamber extensions available to increase envelope length.

*Computerized X-Y table available for complex weld movements.



01. Electron Beam Welding

MATERIALS

ATCo can accommodate a broad range of materials, part sizes and shapes.

EB Welding is an effective method of joining reactive and refractive materials due to the high vacuum environment required for this process. As a result, contamination associated with most welding processes is eliminated. Welding of thick to thin material and dissimilar materials is easily accomplished. Materials considered unweldable by conventional processes may often be welded using the EB Welding process.

Materials Processed - The following is a partial list of materials that ATCo has successfully EB welded:

1. Stainless & Precipitation Hardening Steels - 301, 302, 304, 316L, 321, 347, AM 355, 410, 430, 440C, 17-4 Ph, 17-7 Ph, 15-5 Ph, 13-8 Mo, A286, Mar M-247.
2. Low Alloy Steel - 52100, 8620, Nitralloy, D6AC, 300M, Hy 80, 9310.
3. Carbon Steel - 1010, 1018, 1020, 1025, 4130, 4140, 4340, 4330 V.
4. Nickel & Nickel Based Alloys - Inconel 600, 625, 718, 617, 750; Nickel 200, 201, 270; Waspaloy; Rene 41; Incoloy 903; K Monel; Kovar; Invar; Ni-Span-c.
5. Aluminum & Aluminum Alloys - 1100, 2219, 3003, 5083, 5086, 6061, 356 Cast, 260 Cast.
6. Titanium & Titanium Alloys - 6-4 Ti, 10-2-3 Ti, CPTi, 3-2.5 Ti
7. Haynes & Hastelloy Alloys - Haynes 25, Haynes 230, Stelliite, Hastelloy B, Hastelloy C, Hastelloy N, Hastelloy X, Hastelloy W.
8. Metals & Refractory Alloys - Tungsten, Tantalum, Columbium, W-Re, Mo-Re, Molybdenum, TZM, Rhenium, Porous W.
9. Rare Earths - Gadolinium, Dysprosium, Yttrium.
10. Copper & Copper Alloys - Cu, CrCu, OFHC Copper.

01. Laser Processing

OVERVIEW

Advanced Technology Company's laser capabilities include four YAG Lasers that permit the company to meet the majority of its customer requirements.

Laser processing has proven to be a high quality, cost effective manufacturing process. It requires minimal tooling, provides quick computer generated setups which allows fast turnarounds. Laser cutting, drilling and marking provides close tolerances, good edge quality and extremely fast feed rates. The laser systems operating at ATCo offer the following features and capabilities:

CAPABILITIES

Auto Focus Technology that compensates for part deviations.

Narrow recast layer and heat affected zone.

Cutting, Precision Hole Drilling, and Welding of exotic materials.

CNC Laser Processing.

Minimal taper Tolerances of +/-0.001".

Laser Weld penetration from .002" to .060" in Stainless Steel and Inconels.

Drilling 3 Precision Holes per second in 1/8" stainless steel.

Laser welding provides for non-contact processing, minimal heat input, high welding speeds, and weldments in hard to access areas. Finishing after laser welding is minimized.

Recent multi-axis laser technology enhancements have enabled many companies to use the equipment for prototype development, short, and even long production runs. Surface finish and edge quality enhancements, along with reduced scrap and material usage are significant reasons for selecting laser processing.

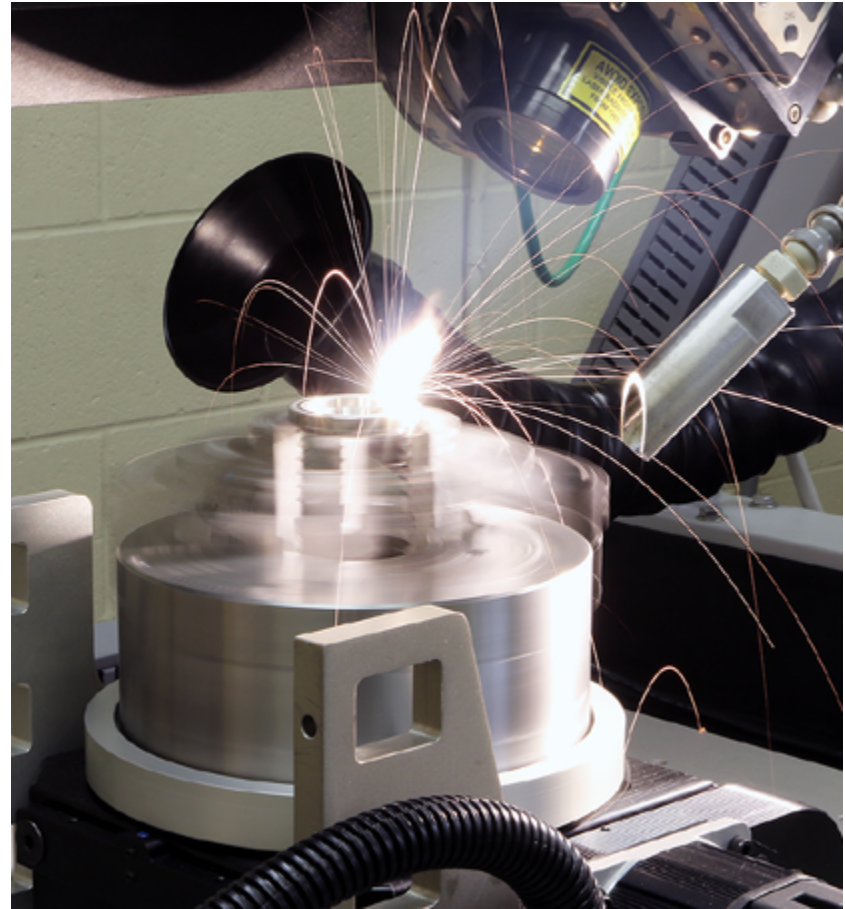
Laser Marking offers a fast and permanent way to label parts with text, logos, serial numbers and even bar codes.

01. Laser Processing

EQUIPMENT

EQUIPMENT TYPE	STANDARD WORK ENVELOPE (LXWXH)	REMARKS
400 Watt (Nd:YAG) GSI JK 704	48" x 48" x 28"	Multi-Axis System 4 Axis CNC Motion 2 Axis Manual Motion Auto Focus Control
400 Watt (Nd:YAG) GSI JK 702	24" x 18" x 28"	4 Axis Motion System 4 Axis CNC Motion 1 Axis Manual Motion
400 Watt (Nd:YAG) SS-500	24" x 18" x 28"	4 Axis Motion System 4 Axis CNC Motion 1 Axis Manual Motion
40W (Nd:YAG) Electrox 600 Group Laser Marker	12" x 12" x 12"	Computer Controlled Galvanometer Motion with Rotary Stage

All lasers are equipped with CCTV Systems for accurate positioning.

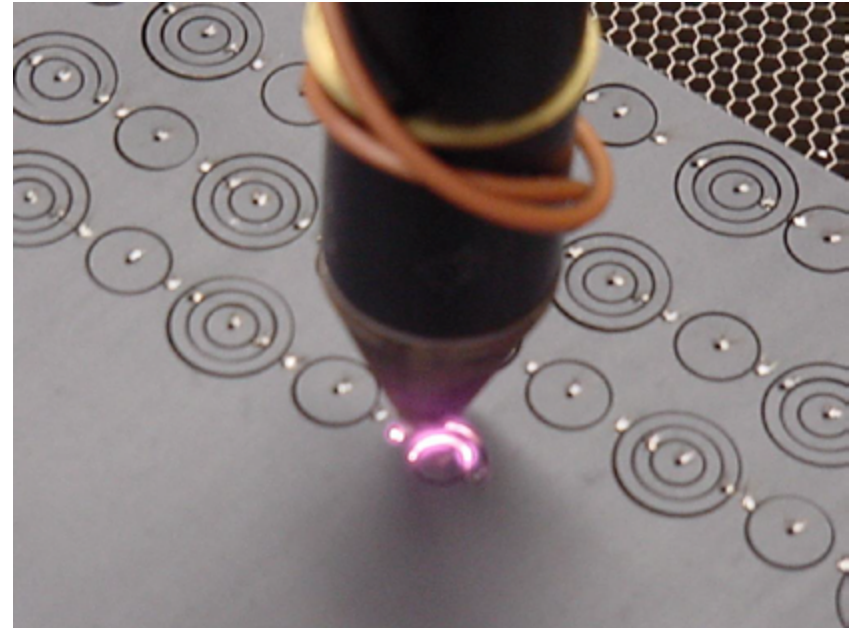


01. Laser Processing

MATERIALS

The following is a partial list of materials that Advanced Technology has successfully laser cut, drilled and/or welded:

1. Aluminum
2. Brass
3. Carbon Steel
4. Cast Iron
5. Coated Steels
6. Composites
7. Copper
8. Free Machine
9. Galvanized Steel
10. Hastelloy"X" Nickel
11. Inconel
12. Kevlar
13. Kovar
14. Laminates
15. Molybdenum
16. Monel
17. Waspaloy
18. Rene "4" Zirconium
19. Silicon Carbide
20. Stainless Steel
21. Tantalum
22. Titanium
23. Tungsten
24. Platinum



01. Gas Tungsten Arc Welding

OVERVIEW

Advanced Technology Company's precision Gas Tungsten Arc Welding (GTAW) capabilities include both conventional and computer-controlled processes. Conventional GTAW is performed by highly trained and certified operators. ATCo has six (6) GTAW stations; two featuring Aerowave Hybrid machines, ideally suited for aluminum alloy welding.

The cornerstone of our computer-controlled GTAW is a Sciaky AcuWeld 5-Axis Welding System. This system utilizes accurate motion and programmable process control which automatically welds with a positioning accuracy of +/- 0.002" while monitoring all process parameters essential in producing quality weldments.

Automatic GTAW can be utilized in a broad range of applications that require weld repeatability and quality. The computerized system ensures that the process operations and weld parameters are continually maintained.



01. Gas Tungsten Arc Welding

EQUIPMENT

- (1) Sciaky AcuWeld Model 500, Automatic Gas Tungsten Arc Welding System with 5-Axes of motion, programmable wire feed system, and a 200 amp power supply.
- (2) Miller SYNCROWAVE 300 AC/DC Welding Machines.
- (1) Miller SYNCROWAVE 350 AC/DC Welding Machine.
- (1) Sciaky two ton capacity, multi-axis, tilt/rotate Positioner.
- (3) Jetline Rotary Positioners (8" dia. faceplate).
- (2) Jetline Rotary Positioners (12" dia. faceplate).
- (1) Jetline CWB-36 GTAW/9900 Circumferential Welding System



01. Gas Tungsten Arc Welding

MATERIALS

1. Aluminum & Aluminum Alloys
2. Magnesium & Magnesium Alloys
3. 300 & 400 Series CRES
4. Precipitation Hardening Stainless Steels
5. Inconel 718
6. Incoloy 901
7. A286
8. Titanium Alloys
9. Niobium

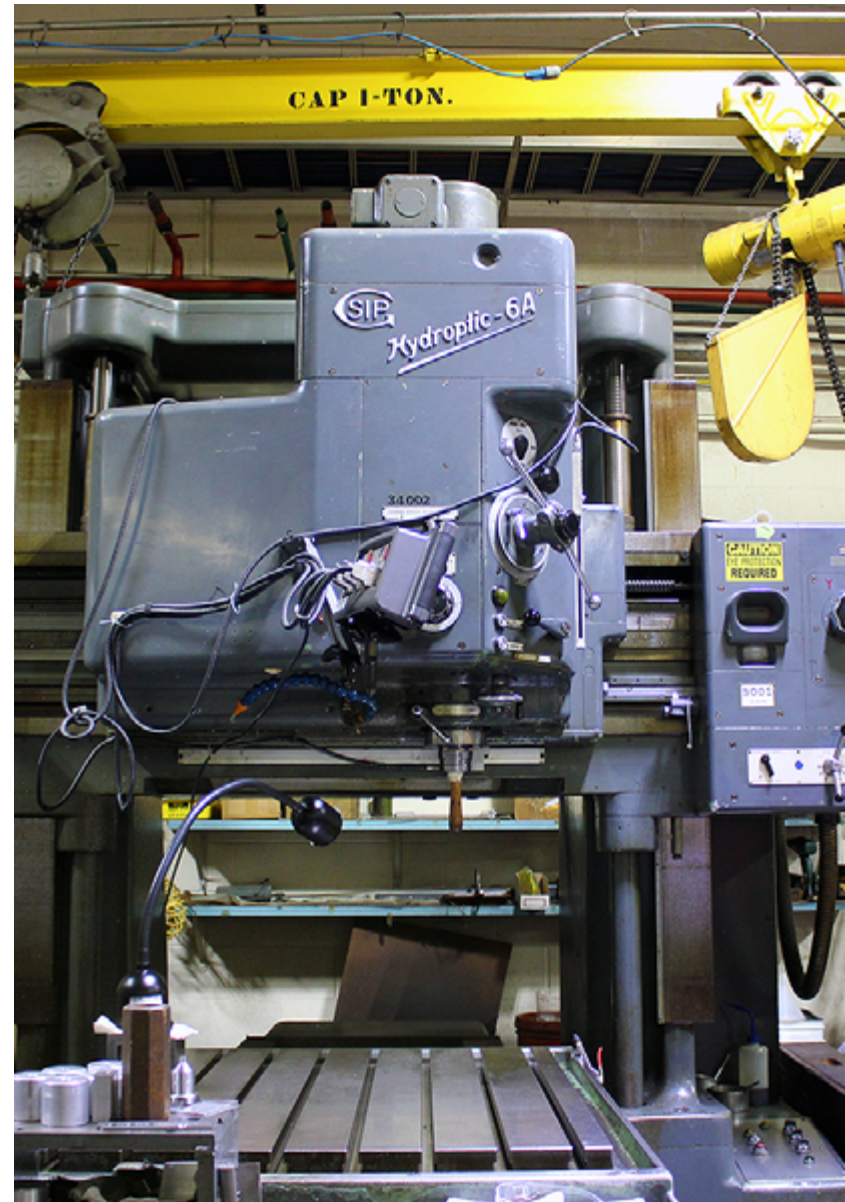


02. CNC & Conventional Machining Services

OVERVIEW

ATCo offers the customer a wide range of machining capabilities to handle the diverse range of parts associated with turbine engine components; as well as aerospace and commercial parts. ATCo's machinists have a wealth of experience in working with a wide range of materials. ATCo has been confronted with numerous challenges, which further enhances the capability to process the difficult or impossible tasks.

ATCo designs and fabricates most of the tooling for its customers. ATCo is adept in working with the customer to develop tooling that provides a high level of dimensional integrity coupled with cost effectiveness. ATCo has dedicated engineering personnel who maximize CAD/CAM programming capabilities.



02. Machine Shop Equipment

EQUIPMENT

Milling

- (1) HAAS VF-4 CNC Machining Center, 4-Axis, 15 HP; (HAAS 12" Rotary Table; 20 Tool Stations; 50" X 20" X 25" (XYZ); Tolerance to 0.0002".)
- (1) HAAS VF-0 4 CNC Machining Center, 4-Axis, 10 HP; (20 Tool Stations; 20" X 16" X 20" (XYZ); Tolerance to 0.0002".)
- (1) HYDROPTIC 6A Jig Bore; (40" X 43" work table Z-axis Digital Read-out.)
- (1) BRIDGEPORT 2 HP Variable Speed Milling Machine; (Power Feed; Digital Read-out; 12" wide X 48" long table.)
- (3) LAGUN Model No. FTV-2, 3 HP Variable Speed 3 Axis Vertical Mills (40" X 10" X 10" (ZYX), 2 with Acu-Rite Read Out, 1 with CNC.
- (1) BRIDGEPORT, 1 HP Milling Machine (Manual Feed; 6" wide X 42" long table.)

Grinding

- (2) BURR KING Belt Sanders.
- (1) BADER Belt Sander.
- (1) CAMPBELL Abrasive Cutting Machine with horizontal feed.
- (1) HARIG Model 612 Surface Grinder, Model 612.
- (2) 1/2 HP 6" Carbide Bench Grinder.
- (1) 1 HP Belt Sander-Grinder Model ISG-00030L.
- (2) Tool Grinder.
- (1) DAREX Tool Sharpener Model No. E-90.

Lathes

- (1) HAAS SL-30 CNC High Precision Lathe; (12 Tool Turret/30 HP 17" maximum turning diameter, 30" maximum swing over bed, precision to .0002".)
- (1) SNK SUT 12 CNC High Precision Lathe; (10 Tool Turret/30 HP 16.5" maximum turning diameter; 23.5" maximum swing over bed; 40.0" between centers; precision 0.0002".)
- (1) HAAS HL-6 CNC High Precision Lathe; (10 Tool Turret/30 HP 25.6" maximum turning diameter, 40" maximum swing over bed, precision to .0002".)
- (1) HARDINGE HLY-H Toolroom Lathe; (11" maximum swing over bed; 18" between centers; 2 axis digital read-out.)
- (1) YAM Gap Bed Engine Lathe, Model 2260; (22" maximum swing over bed; 30" swing over gap; 60" between centers; 2 axis digital readout.)
- (1) YANG Gap Bed Engine Lathe, Model 2233; (22" maximum swing over bed; 30" swing over gap; 33" between centers.)
- (1) YANG Gap Bed Engine Lathe, Model CL56150G; (22" maximum swing over bed; 30" swing over gap; 60" between centers; w/ Anilam digital readout.)
- (1) POLAMCO Manual Lathe; (25" Swing over bed; 35" swing over gap; 2 axis digital read-out.)
- (1) WEBB Gap Bed Engine Lathe; (17" swing over bed; 24" swing over gap; 40" between centers; 2 axis digital readout.)

03. Furnaces & Ovens



03. Air Ovens

A variety of air ovens are available for stress relieving. These air ovens are equipped with a strip chart temperature recorder.

MAXIMUM TEMPERATURE

1300°F (704°C)

1000°F (538°C)

900°F (399°C)

HOT ZONE DIMENSIONS

19" Deep x 23" Wide x 20" High

36" Deep x 36" Wide x 42" High

48" Deep x 48" Wide X 72" High

04. Additional Services— Engineering & Support Facilities



04. Design Assistance & Engineering Services

Advanced Technology Company's technical staff makes a point to meet frequently with key customer personnel with responsibilities in design, materials, metallurgy, manufacturing, purchasing, and quality assurance.

Through this type of interchange ATCo is often able to provide suggestions on part design, specialized tooling, material selection and processes utilized. Benefits derived often include cost savings, improved product reliability and enhanced quality. ATCo's ability to provide constructive support and expertise comes from its many years of diversified experience.

ATCo believes in the TQM philosophy of joint working relationship between Customer and supporting Vendors. Working together as a TEAM is the key element in insuring program success.



04. Metallurgy & Inspection Services

ATCo recognizes that today's environment demands the utmost in quality. It is meeting this challenge by extensive in-process monitoring by all employees. In addition, it maintains a metallurgical and materials lab as well as making sure the final product meets the customer's specification.

METALLURGICAL EQUIPMENT

Unitron Tool Makers Variable Power (30 to 400 X Magnification) Microscope with variable intensity illuminator, filters and camera mounting pad.

Carl Zeiss Metallurgical Microscope with variable intensity illuminator, filters and camera mounting pad.

Wilson Rockwell Hardness Tester, Model 4TT with ball and diamond penetrators for "C" and "B" ranges and standard test blocks.

Buehler Wet/Dry Polishing/Grinding Table with two (2) 8" diameter table mounted polishing wheels.



04. Inspection Equipment

Mitutoyo Coordinate Measuring Machine (CMM), Model BH710H with IBM PSN433DX Computer System, GEOPAK 2000 Software and PHI-TP2 Renishaw Touch Probe System. Range in X-Axis is 28", Y-Axis is 40" and Z-Axis is 24".

Mitutoyo Optical Comparator PHA14 with digital readout

Gradient Lens Hawkeye Bore Scope.

Bausch and Lomb Stereo Zoom Variable Power (7 - 30X magnification) Microscope with variable intensity illuminator.

Mitutoyo Toolmakers Microscope with digital readouts.

Scheenan Electric X-Ray Film Reader with variable intensity illuminator.

36" Long x 24" Wide Granite Surface Plate.

54" Long x 27" Wide Granite Surface Plate.

60" Long x 36" Wide Granite Surface Plate.

72" Long x 48" Wide Granite Surface Plate.

168" Long x 24" Wide Granite Surface Plate.

Electronic height gage plus basic hand and other inspection equipment, such as micrometers, vernier calipers, threaded ring gages, threaded plug gages, pressure gage, bore gage, vacuum gage, height gages, pin gage set, microscopes, dial test indicators, drop indicators, gage block set, thermometers, barometer, optical pyrometer and miscellaneous measuring tools.

VEECO Helium leak tester, Model MS-40, with audio leak indicator and calibration standards.

VIC Leak Detection Helium Leak Detector Model MS-60 with audio leak indicator and calibration standards.

High pressure hydrostatic leak tester, DI Water pressurization to 5000 psi. Low pressure leak tester, DI Water tank, nitrogen pressurization to 100 psi.



04. Manufacturing Systems

ATCo has a manufacturing team that has the background, experience and discipline required to meet the most demanding requirements of its customers. As a result, ATCo is able to provide effective computerized systems covering the following areas:

MANUFACTURING TRACKING SYSTEM

ATCo has a fully integrated and computerized manufacturing system. The system provides accurate data tracking for manufacturing, production control, job costing, and quality assurance functions.

COMPUTER AIDED DESIGN (CAD) SYSTEM

ATCo maintains a trained staff capable of providing computer aided design services for its customers (AUTO CAD and Inventor). Applications include tooling, product design, weld joint configuration, etc.

COMPUTER AIDED MACHINING, ELECTRON BEAM WELDING & LASER PROCESSING

ATCo has a fully operational CAD/CAM system (FeatureCAM) to support its CNC Turning and Milling Centers. The FeatureCAM system is capable of generating CNC machining programs from drawings while providing 3 dimensional surface modeling. This module along with the latest machining technology provides low product cost and high quality machining. This same system is utilized to coordinate the multi-axis operation of the Laser Processing and Electron Beam Welding equipment.

COMPUTER PROGRAMMING

ATCo has a trained staff in systems programming to handle all of the above systems. This capability provides distinct cost and engineering benefit to our customers.

04. Manufacturing Computer System

(1) Multi-user Computer System/fully integrated/computerized tracking system (Global Shop Solutions). This system provides accurate data tracking for manufacturing, production control and quality assurance functions, shop travelers and scheduling.

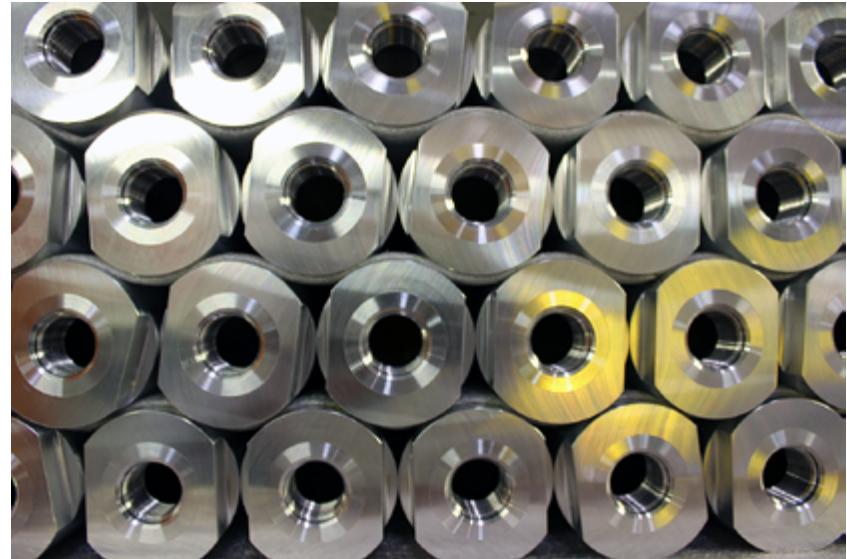
(1) CAD/CAM Programming System with networking to all CNC equipment. Our current system of programming is AutoCad and FeatureCAM CAD/CAM System with 5-Axis capability. Easy to use; both AutoCad and FeatureCAM provide the tools to produce high quality parts faster and with greater ease. FeatureCAM is a powerful CAD/CAM system for (2) 5 Axis milling, turning, wire EDM mold base development, and 3-D design and drafting. The NC Programming System, with (2) 5 Axis Postprocessors, provides gouge-free multi-surface machining and solid-based tool path verification. In-process verification software catches most program errors before ever cutting a chip.

Remote file transfer capabilities include reading drawings in most formats.

04. Support Equipment & Facilities

ATCo realizes that today's customer desires one-stop shopping convenience, so we are equipped to do assembly. In addition, we maintain a range of equipment, as well as having the required strategic alliances to support the "complete" processing philosophy.

- (1) JRI Aqueous Parts Washer
- (2) IMC Super Hone Grit Blaster, Model 3600. Style #3, with a 36" x 36" x 36" work envelope.
- (1) Torit Down Draft, dry type, explosion proof deburring bench.
- (2) Omega, dry type - down draft deburring benches.
- (1) ATCo Demagnetizing Coil with 32" wide x 34" High opening.
- (1) R.B.Annis Co. Portable Demagnetizing Coil.
- (1) Thirty ton capacity Enerpac Hydraulic Press with electric pump.



Thank You

