ACCELERON Beams into the future
Vol.1, No.1, Fall 2001
With News & Information on Electron & Laser Beam Welding, Cutting and Hole Drilling

From the President's Desk . . .

Welcome to our first issue of *Acceleron Beams into the future*. With this newsletter, we hope to strengthen our working relationship with you through frequent communications. In each issue, we will highlight any additional services taking place within Acceleron. As always, we strive to stay current with the latest technology in the Electron Beam and Laser industries.

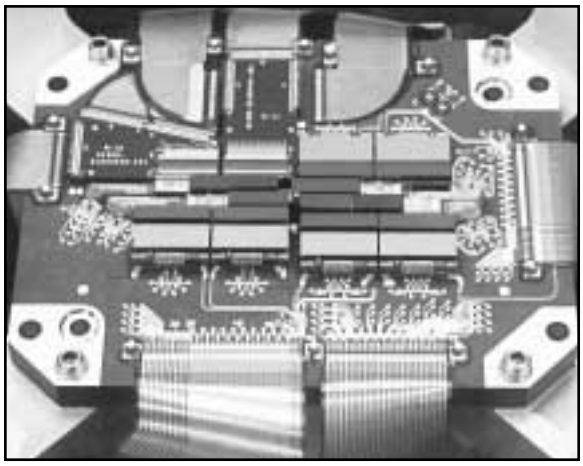
In addition to bringing you the latest in technology, our newsletter will introduce new Acceleron personnel. We would like to invite you to share an article of interest that highlights how Acceleron and your company have worked together to meet a common goal of success. This article could also discuss a product or technology that is new to your business.

Acceleron is dedicated to assisting your company with the best possible solution for your electron beam and laser requirements. As a valued customer, your complete satisfaction is very important to us. Please feel free to call me directly with any suggestions as to how Acceleron can better serve you. We hope that you find this first issue of our newsletter both informative and enjoyable.

Sincerely,

Rory Montano, President

Acceleron Helps NASA and BAE Systems Launch New Technology



Close-up of the focal plane assembly, measuring only 2" x 3".

In September of this year, NASA expects to launch an Atmospheric Infrared Sounder (AIRS) aboard its spacecraft AQUA, as part of its Earth Observing System mission. AIRS is a 390 lb. instrument which utilizes satellite remote sensing technology to provide highly accurate data about the atmosphere, land and oceans for use in climate studies and improved weather predictions. Of particular interest to the general population, AIRS will allow forecasters to significantly improve and extend weather predictions to seven-day forecasts (now, forecasts are considered accurate up to 48 hours). AIRS's high resolution spectrometer precisely samples the Earth's atmosphere from the ground up to 30 miles. The AIRS instrument contains a focal plane array which "observes" the infrared signatures of carbon dioxide and water vapors in order to determine temperature and moisture profiles.

The AIRS concept originated more than 10 years ago, in 1990. The project was contracted by NASA's Jet Propulsion Laboratory to BAE Systems (then Lockheed Martin Infrared & Imaging Systems). When BAE Systems moved from the concept phase to the design and build phase of the project, they realized that the sheer scope and complexity of the dewar assembly was beyond their realm of expertise. The detector/dewar assembly is a sealed vacuum vessel containing the focal plane assembly and infrared transmitting window and electrical feedthroughs that transmit the focal plane signals across the dewar wall to the AIRS system. The technology required to actually build the sensing device involved a multitude of unusual welds. BAE Systems did not have this technology in-house, nor could they find a local source for it. An extensive search for contract welding firms led BAE Systems to Acceleron. BAE Systems brought some sample parts to perform sample welds and reviewed all of Acceleron's capabilities.

"Acceleron had the capabilities, the equipment, and the knowledgeable staff that we knew we needed to successfully complete the AIRS project," said John Talbourdet, Development Engineer at BAE Systems. "What really put Acceleron ahead of the competition was their ability to perform different welding methods and help with the engineering of stress-free welds, along with the

See "Stress-free Welding" on page 2.

Inside . . .

Stress-free Welding *(continued from page 1)*

ability to perform Helium leak tests after each weld to confirm the weld integrity."

As parts for the focal plane assembly were developed, BAE Systems solicited recommendations from Acceleron on which welding techniques to employ. "Stress-free welds were integral to the assembly of the detector. We relied on Acceleron's strong engineering background and experience to develop the right technique," recalled Talbourdet. The focal plane assembly, or sensing device, measures only 2" x 3" and, therefore, required very complex workmanship.

Acceleron's Project Engineer, Bill Ross, particularly remembers one weldment which was to be located very near a delicate piece of glass. The material to be welded was Kovar to Kovar. Acceleron was able to use a laser welding technique that would create a stress-free weld that would not weaken or crack the glass.

Another area in which BAE Systems requested our expertise was the welding of dissimilar metals. One portion of the assembly required the welding of Kovar to Stainless Steel. The configuration called for welding from both sides of the piece and, again, required little or no stress. When faced with what approach to take, engineers from BAE Systems accompanied AIRS project manager, Fred O'Callahan, from NASA's Jet Propulsion Laboratory, to Acceleron to determine how best to proceed. When the final weldments to the dewar (the vessel actually containing the focal plane assembly) were performed, we essentially turned over our lab and operators to BAE Systems for the entire day. Because the AIRS instrument cost approximately $200 million and the infrared imaging device could not be replaced without seriously impacting the project schedule, BAE Systems wanted to ensure absolute success for this final step. By dedicating our lab completely to the project for one day, we had no outside distractions and had all of our engineers on-hand for any troubleshooting that may have been necessary.

"Acceleron was extremely accommodating every step of the way. They provided many weld samples during the design phase and offered the experience of their entire staff whenever necessary. We worked with Engineer Bill Ross, President Rory Montano, Head of the Laser Department Bob Pride, and many others. Whenever we encountered a problem, they never hesitated to bring in an expert from another department," stated Talbourdet.

We at Acceleron would like to offer our expertise to you. From the simplest to the most complex, whether your project takes one day or one decade to complete, we have the knowledge and equipment to meet your needs.

Acceleron Adopts Lean Manufacturing

In an effort to become more efficient, Acceleron has adopted the LEAN MANUFACTURING concept.

The ultimate goal of this system is to produce quality products through cost-reduction activities and a culture that focuses on employee involvement through empowerment. This, in turn, makes Acceleron more competitive, while also shortening the lead-time for quality products.

Acceleron will continue to provide high-quality products and services while retaining employees and fostering a company-wide culture that promotes continuous improvement and empowerment.

Visit our Web site to learn how Acceleron does it all – under one roof!
www.acceleron-enbeam.com

Welding for the New Millennium: *Non-vacuum Electron Beam*

Acceleron has recently been awarded a grant from the U.S. Department of Energy and will work with Brookhaven National Laboratory to bring Electron Beam Welding to a new level. Acceleron has partnered with the Connecticut DEP on this project.

Electron Beam Welding (EBW) is the highest-quality welding technique currently in use. It can efficiently join dissimilar metals without the disadvantages associated with other methods – a growing necessity in high-tech manufacturing. Until now, EBW has had a significant drawback that limited its usefulness in heavy production: standard EBW must be performed in an evacuated chamber under vacuum usually at 1 x 10-4 torr. The chamber size is also a restricting factor when dealing with different parts in a large variety of sizes.

In 1996, Brookhaven National Laboratory's Dr. Ady Hershcovitch received a patent for the *plasma window*. The plasma window permits an electron beam, which must be formed in a vacuum, to propagate efficiently into open air. The plasma "window" is a stabilized gas plasma arc that can reserve the hard vacuum required inside the column but is transparent to the beam and allows it to pass through uninhibited. Deployment of the plasma window will eliminate the need for an EBW vacuum chamber and make mobile EBW possible on workpieces of unlimited size. Eliminating the vacuum chamber will afford a direct energy savings of 30-40% and eliminate pollutants associated with large-scale vacuum pumping.

Acceleron will be the venue providing the working site for this two-year venture, along with the technical staff to assist with the assembly and operation of this prototype machine on an industrial scale. We will be measuring its performance and increased production levels. Visit our Web site at **www.acceleron-enbeam.com** for updates on this project.

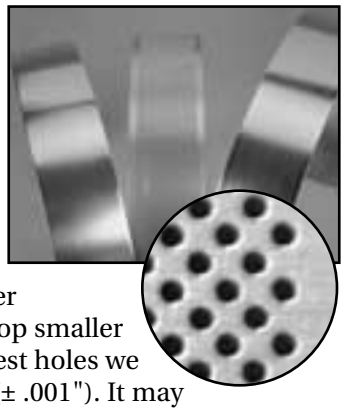
Q&A The Five Most-Commonly Asked Questions About Electron Beam Drilling

Q: What materials can be perforated by Electron Beam Drilling?

A: Most materials can be perforated by Electron Beam, however, most of the Electron Beam Drilling (EBD) performed by En-beaM is on stainless steel in various grades. We can also perforate copper, titanium (various grades), D2 steel, duplex stainless steel and aluminum alloys.

Q: What are the limitations in hole size for EB perforating?

A: Material thickness is the main factor determining the size of the holes that can be drilled. The smallest holes we have drilled to date are .003" dia. with our standard tolerance of ± .001". With some machine modifications and a thinner workpiece, we could develop smaller holes, if required. The largest holes we have drilled are .050" dia. (± .001"). It may be possible to develop even larger holes, if required. The smaller the hole, the faster we can drill, due to available power beam density.



Q: What are the end uses of EB-perforated products?

A: The most common use for these products is filtration. Most of the products perforated by En-beaM are used by the paper industry for dewatering pulp, fiber separation, bleaching of the fibers and removal of inks and dyes in the recycling process.

Q: How does the process of EB perforating work?

A: The workpiece, generally a sheet metal cylinder, is loaded on to a special fixture on a lathe, specially designed to rotate the part in a chamber under the EB gun. The beam is then pulsed from 1-2000 pulses per second while the cylinder rotates and is indexed by CNC control. During each pulse, the beam is columnated and focused by magnetic coils specifically for the diameter of the workpiece. The power and duration of each pulse is specific to the particular hole size selected.

Q: Why is EB perforating utilized when lasers are the cutting edge of technology?

A: EBD has many advantages over laser drilling holes at this time. Speed is one major advantage. Our holes are normally drilled at 500 to 2000 microseconds (or 1 to 2000 holes per second). The second advantage is that the drilling is performed under a vacuum, which limits the amount of recast and microcracking. The third advantage is that the holes have less of a taper, so we can drill a tighter hole pattern.

Sample section (above left) shows .004" dia. holes drilled in .060" thick 316SS.

Personnel Update

Acceleron would like you to join us in extending a warm welcome to two new employees. We are pleased to have them on our team!

Bill Powers – Quality Engineer
Bill comes to Acceleron with extensive experience as a project engineer, floor inspector, toolmaker, programmer and process engineer. Formerly employed by a distinguished manufacturing company for over 25 years, Bill will be working in our Laser Department, setting up processes and inspection methods with existing and new programs.

Sylvain Beaudoin – Laser Technician
Sylvain joins us from TRUMPF Corporation in Farmington, CT, where his background as a Laser Service Engineer includes experience in the areas of laser installation, service technician, programming and CO_2 operator training. He will be responsible for the operations of our new CO_2 laser, including all programming, production operations and process development.

Announcing a New Addition to Acceleron's Laser Facility

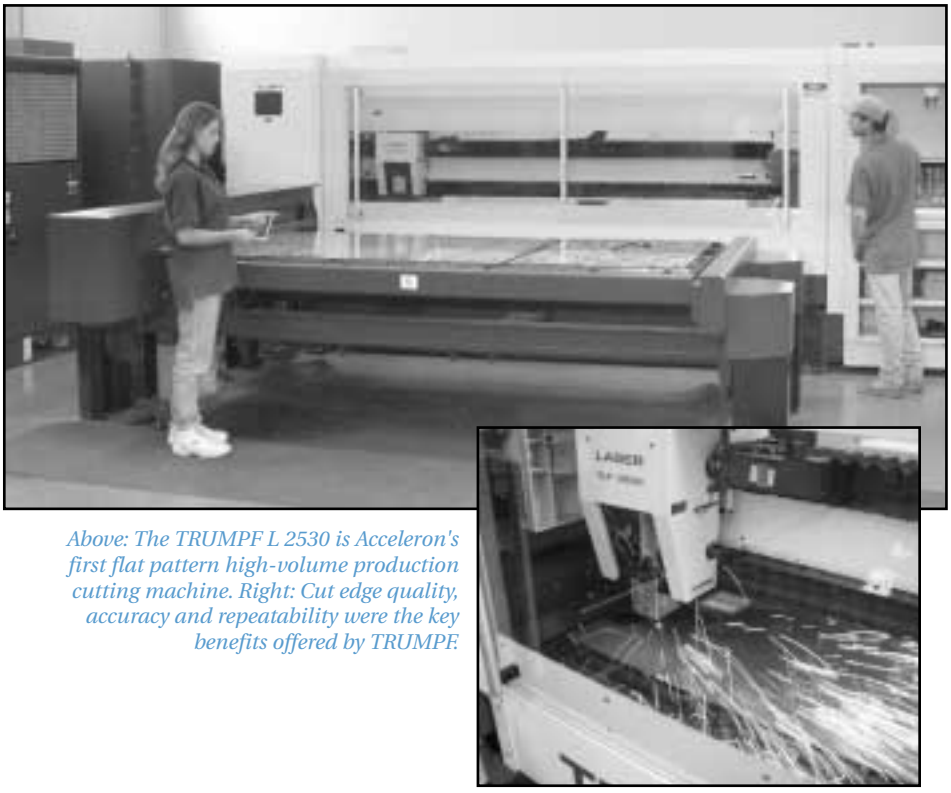
Our new 5 Axis Hybrid Machine has a working envelope of 41" in X, 18" in Y, and 28" in Z, with a maximum weight capacity of 1,500 pounds. This additional equipment will allow us to now service an area of the market from which we have had many requests. Welding, cutting, drilling or scribing . . . whatever your laser need is, Acceleron can assist you!

See page 4 for more on our improved laser cutting capabilities.

Acceleron Has the Latest Noncontact Measuring System

Acceleron is proud to introduce the latest in noncontact measuring technology from the world-class manufacturer Mitutoyo America Corp. This inline inspection system will measure critical features concurrently with laser processing to ensure quality for both our new CO_2 flat sheet cutting machine and our YAG department. "Quick Scope", the CNC noncontact vision system, is capable of measuring simple-to-complex parts to within .0002 of an inch, utilizing manual and/or automatic/cycle mode. This is accomplished with user-friendly, Windows™-based software. In addition, the Quick Scope's capabilities range from a magnification of 21x to 147x, ensuring proper details for accurate measurement.

Included with the Quick Scope is reporting software to generate custom reports for process monitoring and improvements and to ensure customer requirements are met. Another feature of the Quick Scope is the ability to take snapshots of images which can be used for training or emailed for customer correspondence. This is just one of the many ways that we at Acceleron are demonstrating high quality standards in our ongoing commitment to customer satisfaction.



Above: The TRUMPF L 2530 is Acceleron's first flat pattern high-volume production cutting machine. Right: Cut edge quality, accuracy and repeatability were the key benefits offered by TRUMPF.

New Laser Cutting Machine Increases Our Capabilities

Acceleron recently purchased a state-of-the-art flat sheet laser cutting machine from our longtime associate TRUMPF Inc., of Farmington, CT. TRUMPF's Laser Product Manager Peter Bartram and Application Engineer Dave Turner, along with Sales Engineer Robert Jenks of Robert E. Morris Company, were instrumental in our decision to purchase a new TRUMPF machine.

We chose our first flat pattern, high production cutting machine based on TRUMPF's reputation and proven track record in building reliable, high-performance machines, as well as our desire to go beyond our competitors in offering low-cost, high-quality sheet metal cutting. Our new 3000-watt laser gives us the capability to cut up to 0.750 mild steel, 0.500 stainless steel and 0.312 aluminum at faster speeds than our competition.

The TRUMPF L 2530 is designed to be effective for R & D low-volume versions of your latest designs and high-volume production from thin and thick sheet metal. New technology integrated into the machine expedites material changeover on short and long runs. Another feature offered by TRUMPF is ToPs, a special software package that helps us create faster, more accurate quotations for customers.

These technological features are another example of how Acceleron is working to lower customer costs and provide better quality parts. We welcome all new quotations and the opportunity to show you the impressive results of our new 3000-watt L 2530.

ACCELERON® INC.

Acceleron, Inc. specializes in Electron Beam Welding, Electron Beam Drilling, Laser Welding and Laser Cutting.

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