



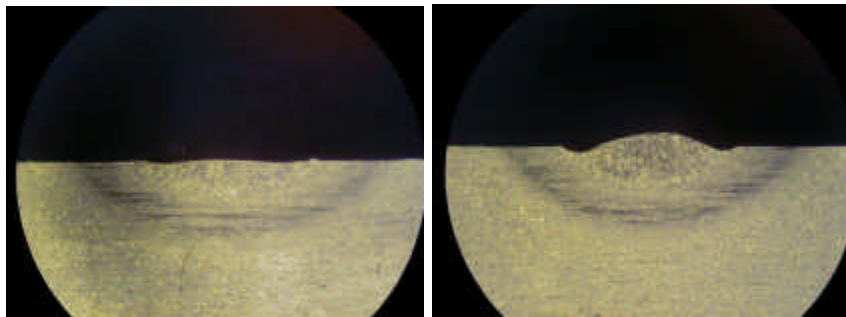
A GATEWAY EDUCATIONAL ENLIGHTENMENT ARTICLE

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New Weld Technology Breakthrough

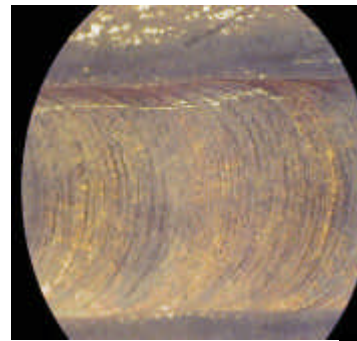
Acceleron, LLC and Dr. Ady Hershcovitch from the Brookhaven National Lab are extremely proud and excited to show the first weld photos produced by an electron beam transmitted through our Plasma Arc Window. The first welds were made on 3-22-04. Although it has taken us more time than expected and at times has been somewhat frustrating for all of us, our continued effort and perseverance have finally paid off. For those people and companies who have been following our progress on the development of the Plasma Arc Window, we hope you find the weld sample cross sections as exciting and promising as we do. Those not familiar with this project, please review our website at www.acceleron-enbeam.com and refer to the first Gateway released article dated January 2004. Additional articles and information pertaining to the plasma Arc Window are also available on our website.

The welds were performed with a low power 7.5 kW electron beam welder that has been retrofitted to function as a non-vacuum machine. The lower power level we are using is in itself quite significant. Most



First welds made with Plasma Arc Window on 3-22-04. The material is 316 Stainless Steel with .015 penetration.

non-vacuum machines are 25kW's or more. Although we have been able to cut and drill for a few months now, we still struggled with achieving a weld. We performed many different tests and modified components that we thought would make the difference. As these changes were instituted, the beam energy output improved but this only allowed us to cut deeper into the material. Concurrent discussions with other experts in



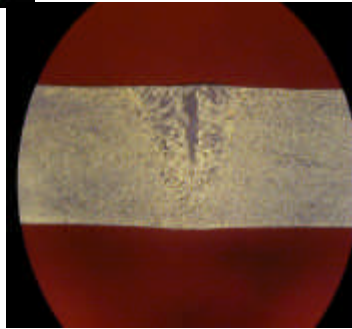
Welds made with Plasma Arc Window on 3-25-04. The material is 316 Stainless Steel with .090 penetration.

(Right) TOP VIEW WELD HEAD (Below) CROSS SECTION VIEW

the field confirmed our belief that "if you can cut, then you can weld". As it turns out, we were all correct on that account.

The initial weld results are much better than what Dr. Ady Hershcovitch anticipated. "The welds are more narrow and deeper with the amount of power used to produce these welds. After just 2 weeks of further weld development, "the welds are truly of text book geometry". Since we have been welding, each time we have made a design change to the Arc itself or to the differential pumping section we continue to witness further improvements to the weld and its geometry.

We are progressing quickly with regards to the weld geometry refinement, operational procedures, design improvements to the Plasma Arc itself, and the differential pumping stages. The primary catalyst to pursue the development of the Plasma Arc was the expected energy savings estimated to be at 80%. These savings have been accomplished as a direct result of one of the Plasma Arc characteristics. Efficient Vacuum Differential Pumping equates to less energy consumption, resulting in large cost savings in the operation of electron beam non-vacuum welding process. One of the major goals is to achieve a satisfactory separation and preservation of the high vacuum area, where the electron beam itself is generated, while enabling its transmission to atmosphere. To date, results have confirmed that we have attained excellent electron beam transmission. The accomplishment of this endeavor in itself has shown results that have significantly more advanced vacuum separation than conventional non-vacuum EBW'S. The improved vacuum stages that are necessary for vacuum separation is attributed to one of



A bad habit never disappears miraculously; it's an undat-yourself project. -- Abigail Van Buren

the functions that the Plasma Arc Window offers. Most of today's Non-Vacuum machines typically require a total pumping capacity of approx. 3200 CFM to attain necessary separation. The Plasma Arc Window which is providing far better energy consumption results with only 42 CFM, or 91.5% less energy consumption. Present efforts are in progress to further reduce our existing vacuum requirements.

Advantages and cost savings over conventional non-vacuum electron beam welding machines are:

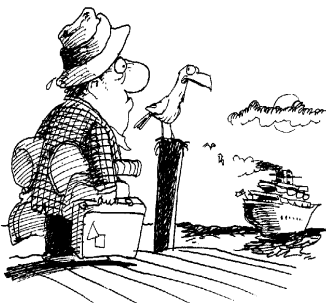
- ?? Energy consumption is 70% more efficient
- ?? 90% reduction in floor space, allotted for vacuum pumps
- ?? Significant noise reduction due to the elimination of large vacuum pumps.

Note: Other technical advantages have not been disclosed. Once the results have been measured and quantified, we will release the information through our website and future articles.

While we proceed with optimizing our present system and design, we are also in the process of constructing a third generation Plasma Arc Window with modified features that have been identified to optimize its overall performance. While this third Arc is being built, we will begin to modify one of our high power 25kW machines to do more extensive weld comparisons. The importance of this next test is imperative, so that we can exhibit side-by-side weld comparisons at the same power levels and processing speeds that are used in the industry market place today. We expect the time frame for the 25kW retrofit to be approximately 3 months.

Interest continues to build for this new technology and to date we have received inquiries and are engaging in active dialogue with companies in Germany, Spain, Great Britain as well as the United States. As we move forward in these projects, we will continue to up date our web-site at www.acceleron-enbeam.com to keep you informed of our progress.

If you have a process, a service or a product that would enlighten our readers, please contact us. You can write the article, or we can do it for you. 200 to 500 words is about right, but we can work with larger articles as well. There is no charge. The Gateway



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