

PROCESS TECHNOLOGY



Electron beam welding makes leak-tight rupture disks

An advanced electron beam welding capability to ensure the leak tightness critical to fire suppression, gas-insulated switchgear, and air conditioning applications has been announced by Elfab Ltd., England. To guarantee safety in these industries, rupture disks such as the one shown here are specified to provide a high-integrity, fail-safe pressure relief device. Electron beam welding does not transfer the same level of heat as other welding processes, which is essential for highly temperature-sensitive rupture disks.



For more information: Linda Brewer, Elfab Ltd., England; tel: 011.44.191.293.1220; www.elfab.com.

Microwaving cuts sintering from 15 hours to 15 minutes

Sintering cycle time for microwave sintering is exceptionally short, only 5 to 10 minutes as compared to 15 to 20 hours for conventional sintering cycles, according to a paper to be presented at MS&T'08. The presentation is titled *Microwave and Conventional Sintering of Premixed and Prealloyed Tungsten Heavy Alloys*, by Avijit Mondal, Indian Institute of Technology, Kanpur, India.

In the microwave sintering process, heat is generated internally or volumetrically within the material instead of originating from external heating sources. The aim of the reported investigation is to study the sintering behavior of premixed and prealloyed W-10 Ni-Cu (7:3) powders in both a microwave furnace and a conventional furnace. The comparative analysis is based on the sintered density, densification parameter, hardness, and microstructures of the samples. The present investigation also includes the variation of

matrix composition as a function of temperature by EPMA analysis. The rapid heating rate of microwave sintering greatly restricts tungsten grain coarsening, which resulted in fine tungsten grain distributed in Ni-Cu matrix. Visit www.matscitech.org for details.

Blow forming of magnesium sheet studied in Korea

Blow forming characteristics of the AZ31 magnesium alloy were investigated in terms of grain size, temperature, and forming speed, according to a study to be presented at MS&T'08. Titled *Blow Forming Characteristics of AZ31 Alloy Sheets*, the paper will be presented by Yong-Nam Kwon, Korea Institute of Materials Science.

A series of tensile tests were carried out to evaluate the flow behavior response in terms of grain size, temperature, and

BRIEFS

AMG Advanced Metallurgical Group N.V. announces that its Engineering Systems Division has entered into a supply agreement for its solar silicon melting and crystallization furnace systems. Under this agreement, AMG has received the first purchase order, which is valued in excess of \$90 million. www.amg-nv.com

Researchers at **Auburn University's Samuel Ginn College of Engineering** have produced antimicrobial coatings with single-walled carbon nanotubes mixed with solutions of lysozyme, a natural product with antimicrobial properties found in egg whites. <http://link.abpi.net/1.php?20080715A2>

The **Boeing Co.** and **Alenia Aeronautica**, a **Finmeccanica** company, announce that they are joining forces to help establish Italy's first composite recycling facility, which will be located in Southern Italy. www.boeing.com

Cobalt-base electro-deposited coating replaces hard chromium

TriCom (Cobalt/Co-P-Cr₃C₂) electro-deposited composite coatings with high hardness and corrosion resistance have reportedly been developed at U.S. Chrome Corp., Stratford, Conn. The technology allows replacement of chromium and thermal spray coatings in higher temperature fretting wear applications such as seals in gas turbine engines. A hard version of TriCom (cobalt-phosphorus/Co-P-SiC) electro-composite can replace hard chrome and thermal spray coatings for a variety of components.

The coatings are environmentally friendly and are viable alternatives for industrial hard-chrome plating and HVOF coatings. These technologies have been well received by the aerospace community and are currently in production on a variety of aircraft, including the F-35 Joint Strike Fighter. They are also being evaluated for a variety of industrial applications to replace more expensive thermal-spray coatings.

For more information: Al Kertesz, U.S. Chrome Corp., 175 Garfield Avenue, Stratford, CT 06615; tel: 800/637-9019; www.uschrome.com.

IPG Photonics Corp. announces that its German subsidiary, **IPG Laser GmbH**, has received a major order from the **BMW Group** in Munich, Germany, for multi-kilowatt, continuous-wave ytterbium fiber laser systems totaling 63 kW. They will weld automotive doors, and represent the first large-scale production use of fiber laser systems for BMW. www.ipgphotonics.com

Kyocera Industrial Ceramics Corp. has signed a definitive agreement to acquire **On Time Machining Company (OTM)** from **Kennametal Inc.** OTM, based in Wapakoneta, Ohio, is a manufacturer and supplier of indexable cutting tool products such as drills, end mills, face mills, and counterbores. www.kyocera.com

LAI International Inc. has launched its redesigned web site, unveiling its new brand identity as strategic supplier of precision components and subassemblies for original equipment manufacturers. The site includes case studies, testimonials, and examples of LAI's manufacturing solutions. www.laico.com

strain rate. For all grain sizes, elongation increased with temperature increment, as expected. However, the differences in grain size did not give a larger elongation differences even at the temperature range in which a large elongation would be expected with such fine grains. Blow forming experiments showed similar results.

However, an interesting feature was that formability of the AZ31 alloy showed different trends depending on the stress condition, which meant that a biaxial stress condition might result in lower temperature and strain rate dependencies compared to uniaxial tension results. Microstructure along with texture observation has shown that grain boundary sliding seemed to be accommodated with slip as well as twinning activity. Visit www.matscitech.org for details.

Laser-welded sandwich panels evaluated for U.S. Navy ships

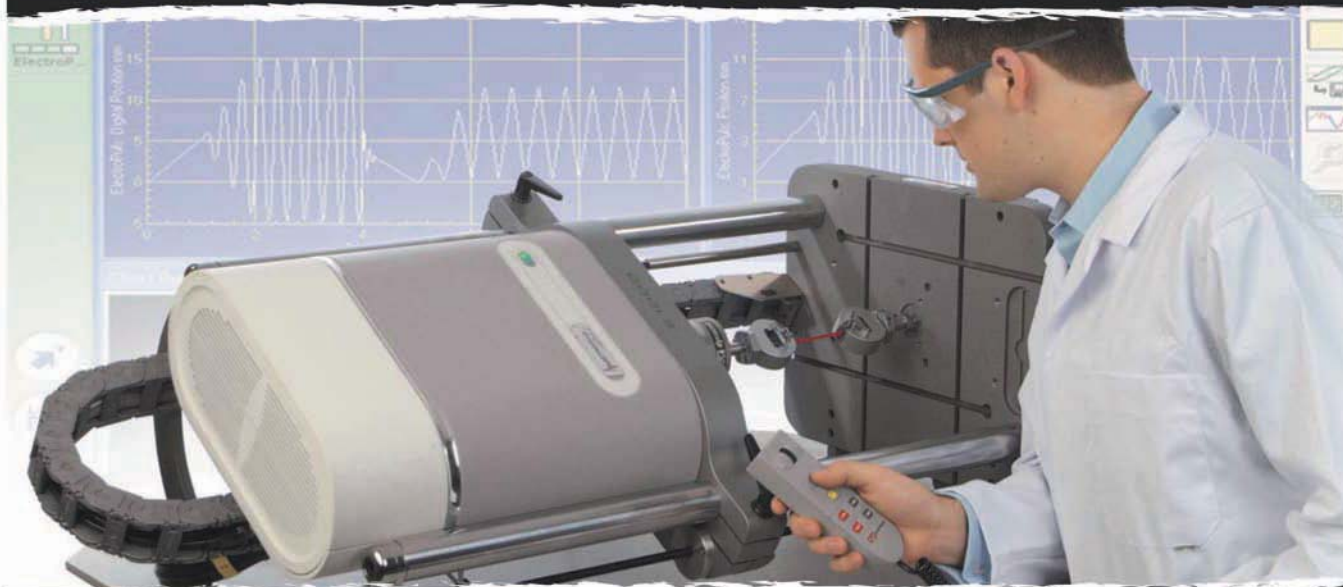
The state of the technology of laser-welded metallic sandwich panels for U.S. Navy ships has been advanced by the Navy Metalworking Center, working with Applied Thermal Sciences Inc.; Naval Surface Warfare Center, Carderock Division; Northrop Grumman Shipbuilding; the Institute for Manufacturing and Sustainment Technologies; and the Navy Joining Center.

Future naval vessels must reduce weight to improve combat effectiveness and maneuverability, while remaining affordable. Improvements in manufacturing and process technology have made laser welded metallic sandwich panels more feasible and economical for naval applications.

The design is similar to corrugated cardboard and consists of two sheets of metal that are joined to a corrugated metal core via laser welding. Preliminary studies have shown that for typical deck applications, a 15 to 35% weight savings can be attained over traditional plate and stiffener structural systems. In ad-

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dition to weight reduction, laser-welded metallic sandwich panels can provide such benefits as enhanced corrosion resistance when constructed of duplex stainless steel, elimination of stiffeners, and reduced understructure.

For more information: Daniel L. Winterscheidt, Concurrent Technologies Corp., 441 Friendship Road, Suite 103, Harrisburg, PA 17111-1204; tel: 814/269-6840; www.ctc.com.

Electric arc melts wires to form adherent coating on substrate

In the Arcspray process, a pair of metallic wires is melted by an electric arc, atomized by a cone of compressed air, and propelled towards the work piece, says Metallisation, England. The molten spray solidifies on the component surface to form a dense, strongly adherent coating suitable for corrosion protection or component reclamation. Sprayed coatings may also provide wear resistance, and electrical and thermal conductivity.

The thickness of the coatings can be locally controlled by the operator, allowing variations in the level of corrosion protection depending on the environment. With increasing transportation costs becoming an issue, the process can easily be installed in-house.

For more information: Stuart Milton, Metallisation, England; tel: 44 (0) 1384 252 464; www.metallisation.com.

Liquid helium treats metals

The ability to utilize liquid helium for cryogenic treatment of materials to temperatures as low as 4K/-268°C/-451°F has been introduced by the Cryogenic Institute of New England Inc., Worcester, Mass. Measurements were recorded by attaching a spring-loaded silicon diode cryogenic temperature sensor rated to 1.4K with a calibrated accuracy of +/-10mK.

The procedure involves a specially modified cryogenic chamber designed and constructed in collaboration with technology partner Applied Cryogenics Inc. The chamber utilizes multiple dedicated delivery systems for introduction of both liquid nitrogen and liquid helium.

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MesoCoat Inc., a wholly-owned subsidiary of **Powdermet Inc.**, was formed in 2007 to commercialize and further develop its line of nanocomposite coating materials and application technologies. PComP (Particulate nanoComposite Powders) combines extremely high wear resistance with high toughness, ductility, and corrosion resistance in a single layer. Free-flowing powder feedstock can be applied by existing thermal spray coating equipment or with the company's new large area electromagnetic fusion application equipment.
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US Synthetic and **Mitsubishi Materials Corp.** announce an exclusive license agreement that grants US Synthetic rights to thermally stable polycrystalline diamond technology for next-generation oil and gas drilling cutters that are more abrasion-resistant, durable, stable, and cost effective.
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tomers who sought extreme temperature cycling for residual stress relief of critical components. The company reports that they have delivered controlled cryogenic treatment profiles at temperatures ranging from 16K to 4K (-257°C/-430°F to -268°C/-451°F) over a dozen times in the past year.

For more information: Ryan M. Taylor, Cryogenic Institute of New England Inc., 90 Ellsworth Street, Worcester, MA 01610; tel: 508/459-7447; fax: 508/459-7426; rtaylor@nitrofreeze.com; www.nitrofreeze.com.

Vertical centrifugal castings made with wrought chemistry

A method has been developed to produce aluminum alloys with wrought chemical compositions by means of vertical centrifugal casting techniques, hot isostatic pressing, and thermal treatments, reports Johnson Centrifugal Technology, Saukville, Wis. In the centrifugal solidification process, molten aluminum is poured into a spinning cylindrical shaped die, resulting in the application of a radial pressure to the melt. The applied pressure from the spinning die in the centrifugal solidification process allows aluminum alloys with poor fluidity to be successfully formed.

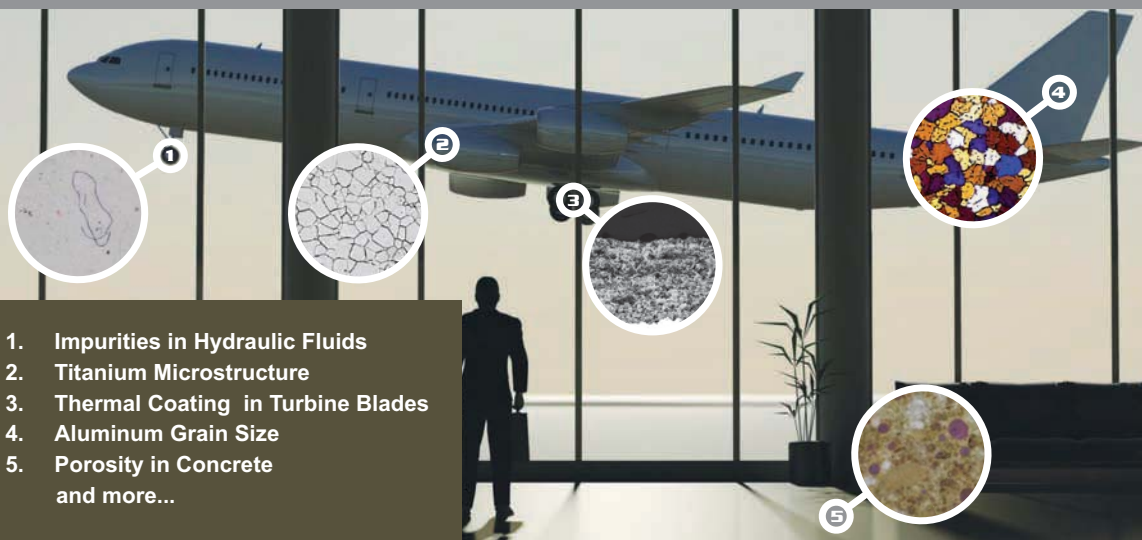
Medium to large castings of both the medium-strength 6061 and the high-strength 7075 have been successfully produced, with mechanical properties similar to that of their wrought counterparts. Both the centrifugally cast 6061 and 7075 alloys have been registered with the Aluminum Association as centrifugally casting alloys 505.0 and 709.0, respectively.

This information was presented at the 2008 Permanent Mold Casting Conference of the American Foundry Society. The paper was titled *The Development of the 505.0 and 709.0 Aluminum Alloys Using the Centrifugal Casting Process*, by A. Montes, Johnson Centrifugal Technology, Saukville, Wis.

For more information: A. Montes, Johnson Centrifugal Technology, Saukville, WI 53080; tel: 262/377-9440; www.johnsoncentrifugal.com.

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