

# INDUSTRY NEWS

## Energy Efficiency Offers Relief to Manufacturers, Says Alliance

Today's record-high prices for natural gas and other fuels are forcing U.S. manufacturers to pursue energy-efficient technologies and practices to reduce energy waste (and energy costs) in an economical, cost-effective manner.

According to the Alliance to Save Energy, Washington, D.C., manufacturers can cost-effectively avoid energy waste equivalent to about 21% of their total energy use with effi-

ciency measures. Previously ignored recommended energy improvements due to perceived risks involved and reluctance to make the up-front investments now look like a bargain compared to fuel bills. Alliance director of industrial improvements Christopher Russell says that at today's fuel prices, energy improvements pay for themselves quickly through the savings they generate.

The U.S. Department of Energy and the Alliance to Save Energy provide efficiency guidance through an assortment of websites including technical "how-to" resources at [www.eere.energy.gov/industry/bestpractices/](http://www.eere.energy.gov/industry/bestpractices/), no-cost energy assessments at [www.eere.energy.gov/industry/bestpractices/iacs.html](http://www.eere.energy.gov/industry/bestpractices/iacs.html), and strategies for energy management at [www.ase.org/section/topic/industry/corporate/](http://www.ase.org/section/topic/industry/corporate/).

## Air Products, Houghton in Joint Marketing Agreement

Air Products and Chemicals Inc., Allentown, Pa., entered into a joint marketing agreement with Houghton International (Valley Forge, Pa.)

to provide a broad range of products and technologies to the U.S. metals processing industry including a full line of metalworking fluids, a variety

of industrial gases, services, technology and atmosphere generating equipment, deployed through an industrial gas and fluids management service. The agreement leverages each company's capability to deliver cost-effective manufacturing and after-sale services sustained by expanded industry skill and technical expertise. The joint marketing approach allows both companies to respond to the growing demand from industrial operations for complete solutions, according to Air Products metals market manager Meri Lazar. In addition, the agreement is expected to ultimately result in increased efficiencies and productivity gains for customers.

## Ohio Companies Receive Emerging Technology Awards

Ohio Governor Bob Taft recognized ten small, technology-oriented Ohio companies with Emerging Technology Awards in 2005. The winners continue to build on Ohio's legacy as a worldwide leader in innovation according to Gov. Taft, demonstrating a strong commitment to product development and job creation in Ohio. The Emerging Technology Award recognizes a company's valuable progress in either advancing existing technologies or pursuing cutting-edge, emerging technological developments.

One 2005 Emerging Technology Award winner of interest to industries involved in thermal processing technologies is Queen City Forging Co., Cincinnati, a metal components producer that uses rapid infrared (IR) heating thermal technology to increase processing speed and reduce

costs while providing improved mechanical properties in aluminum components. Working with Oak Ridge National Laboratory (ORNL), Northeastern University, and the Forging Industry Association (FIA), Queen City Forging received a 2004 R&D 100 Award for the use of IR heating in forging operations. To further develop IR heating, the company received funding assistance from The Edison Materials Technology Center (EMTEC), Dayton, Ohio, for research into the use of IR heating for heat treatment of aluminum forgings. Working with EMTEC, Ohio University, ORNL, and FIA, Queen City Forging has demonstrated quality and cost advantages of IR heating over those of conventional heat treating processes. Full commercialization of IR heating technology could offer competitive advantages to other metalworking industries to enhance thermal processing, reduce energy consumption, and improve product quality. [www.qcforge.com/rapidIR](http://www.qcforge.com/rapidIR).



*Rapid heating of forging tooling using infrared heating.*

Houghton supplies chemicals and metalworking fluids to the automotive, aerospace and primary metals industries, as well as to other metal processing arenas. Air Products is a major supplier of industrial gases used in the metals industry including bulk and gaseous nitrogen, hydrogen, oxygen, argon

and helium, and it also provides services, complementary equipment and technologies to the industry.

The metals industry is a mature in-

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dustry with a deeply interconnected value chain, facing heightened competitive pressure resulting from a growing global economy.

For metals processing facilities—those serving the automotive sector, for instance—profitability centers on product or process improvements that increase quality and yields while reducing scrap and defects. Web: [www.airproducts.com](http://www.airproducts.com).

## Aerospace Industry Healthy from Balanced Growth

According to a recent report from Aerospace Industries Association (AIA), Arlington, Va., Aerospace sales hit a record level in 2005 in the three main sectors of civil aviation, defense, and space. Sales increased by \$14 billion to reach a record industry-wide level of \$170 billion in 2005, up 9.2% over 2004. AIA Presi-

dent and CEO John Douglass says the statistics are reflections on positive developments over the past year, with civil aviation gaining strength and airlines buying new planes and the new Vision for Space Exploration driving space technologies. The strong defense sales numbers show the administration's dedication to

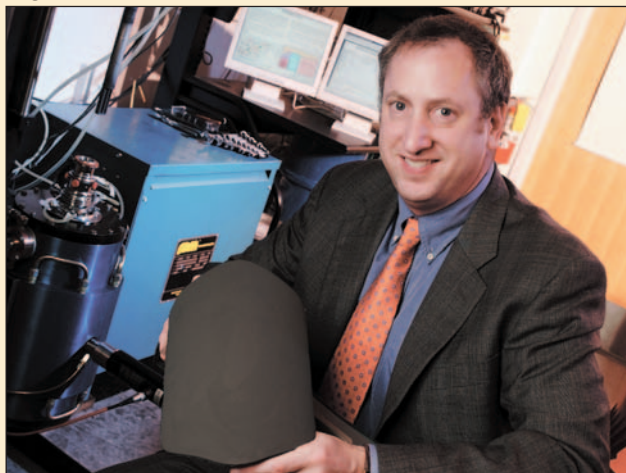
### Better Body Armor Via Improved Sintering Process

A Georgia Institute of Technology, Atlanta, Ga., researcher Robert Speyer, Professor of Materials Science and Engineering, developed a process that increases the hardness and improves the ballistic performance of boron carbide material used by the U.S. military for body armor. Boron carbide powder used to form the armor component has poor performance during conventional sintering, which yields a more porous material that fractures more easily. To better understand the sintering problem, Speyer used a differential dilatometer to measure the expansion and contraction of materials during sintering at temperatures to 4300°F (2370°C).

A green powder compact shrinks 12-15% during sintering, and monitoring the process using a dilatometer allows a better understanding of what is happening at different stages of the sintering process. Combining this information with other materials characterization techniques identified the reasons why boron carbide did not sinter well, which led to the development of a new boron carbide pressureless sintering forming process. The method yields higher relative density (98.4% versus 98.1% using current hot pressing methods) and hardness, and thus better ballistic performance, than currently available boron carbide armor. It also is faster and costs less than hot pressing. Post-sintering hot isostatic pressing (HIP) is used for the most demanding applications, achieving 100% of the theoretical density.

Pressureless sintering allows making complicated, curved shapes for use in form-fitting body armor and other applications. Hot pressing allows for some curvature as long as the parts can stack together, but it cannot produce parts like a single-piece helmet.

Speyer has formed a company called Verco Materials under the advisory support of Georgia Tech's VentureLab, which helps faculty members commercialize their research. Ceramics expert Beth Judson is the company's general manager, and Jon Goldman is the VentureLab commercialization catalyst helping Verco get started. A Georgia Tech patent on Speyer's sintering process for boron carbide is pending, and



*Professor Robert Speyer and his research team developed a pressureless sintering process to produce boron carbide body armor having improved performance properties. Here, Speyer holds a prototype thigh plate.*

when granted, Verco will have access to an exclusive license, Judson said.

The company received two technology commercialization grants totaling \$100,000 from the Georgia Research Alliance to fabricate prototypes for potential military and industrial customers. The Georgia Tech Rapid Prototyping and Manufacturing Institute assisted with fabrication of model armor shapes. Also, VentureLab continues to analyze the company's potential markets. Beyond body armor, potential military applications include aircraft/rotorcraft protective components. Commercial markets include industries that can exploit the phenomenal abrasion resistance of the theoretically dense boron carbide including bearings, blast nozzles, cutting and mining tools, and pump and turbine shafts. The military market is growing rapidly with more than a half billion dollars worth of ceramic armor orders pending in this fiscal year, and is expected to double by 2009. Bearings are a \$27 million market with 5.7% annual growth expected through 2007.

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*Pressureless sintering allows fabricating complicated, curved shapes for use in helmets and other body armor. Here, a small-scale prototype helmet is shown.*

keeping the nation secure. Douglas also noted that aerospace provides a foreign trade surplus and is adding jobs and is also vitally important to national security.

AIA Research Director David Napier predicts an 8.2% growth in 2006 to \$184 billion. Aerospace registered a positive trade balance of \$37 billion, an increase of \$6.4 billion over 2004. Aerospace is one of the few manufacturing sectors of the economy that consistently shows a foreign trade surplus.

Civil aviation sales including commercial jets, general aviation aircraft, helicopters, engines, and parts led all sectors, increasing 20% to \$39 billion. Orders increased 15% to \$187 billion, and 290 commercial jetliners were delivered, an increase of seven over 2004. The backlog of commercial jetliners increased 39% to \$98 billion. Sales of military aircraft increased 7% to \$50 billion, missiles increased 4% to \$15.3 billion, and space increased 3.8% to \$37 billion.

In addition, aerospace employment continued to climb after hitting a 50-year low in February 2004, adding a projected 30,900 jobs in 2005 to reach 623,900. Aerospace accounted for 1/3 of all manufacturing jobs added nationwide since that 50-year low. [www.aia-aerospace.org](http://www.aia-aerospace.org).

## **Seco/Warwick Introduces Multichamber Semicontinuous Vacuum Carburizing**

A multichamber vacuum carburizing system introduced by Seco/Warwick is said to provide expanded production capacity with its Universal HPQ™ single and double chamber units. A new test system is available in the Seco/Warwick R&D facility in Swiebodzin, Poland to run customer trials and process development. Multichamber systems provide expanded capacity with fully automated operation.

The system consists of a modular furnace that combines two or more

# **EQUIPMENT SALES & SERVICE**

## **Vacuum Furnace Sold to Alabama Heat Treater**

Ipsen International delivered an Abar-Ipsen® Model H5448 2-bar TurboTreater® horizontal vacuum furnace to Pinson Valley Heat Treating Co. Inc., Pinson, Ala. The furnace has a work zone size of 36 in. x 36 in. x 48 in. (914 x 914 x 1,219 mm), which is said to provide Pinson an opportunity to expand into new markets. The furnace's patented gas quenching system is designed to provide fast, efficient cooling. The 2,500 lb vacuum processing weight capacity adds to Pinson's current heat treating capabilities including stress relief, oil quench and temper, water quench, aluminum solution treating and aging, normalizing, solution annealing, and precipitation hardening. Pinson Heat Treating is an ISO 9001-2000 ANSI and ISO registered supplier. [www.ipсен-intl.com](http://www.ipсен-intl.com).

## **Vac Aero Poland Supplies Vacuum Furnaces**

Vac Aero Manufacturing Polska, Swiebodzin, Poland, received a contract valued at more than 2.4 million Euro to supply four furnaces to a major forgings producer in Russia. The furnaces are based on designs in service at Vac Aero's Oakville, Ontario, Canada, heat treating facility. The contract also involves tooling, installation services, training, and technology transfer.

The Polish manufacturer also has delivered its first vacuum furnace for the North American (Quebec, Canada) market. The furnace has a 2-bar internal quench system and all metal hot zone for high vacuum processing applications. Electrical and control systems for the furnace will be integrated at Vac Aero International's Canadian furnace manufacturing facilities, and the company also will install and commission the furnace. Vac Aero Manufacturing Polska was formed by Vac Aero International Inc. in December 2004 to serve the company's growing international customer base. [www.vacaero.com](http://www.vacaero.com).

## **VFS Corp. Delivers Three Vacuum Furnaces**

Vacuum Furnace Systems (VFS) Corp., Souderton, Pa., reports the sale of three vacuum furnaces to three different customers. Bulaw Welding and Engineering, Chicago, Ill., ordered a horizontal external quench furnace, model HEQ-5248-2 to perform heat treating and brazing. Chamber size is 36 in. x 30 in. x 48 in. (914 x 762 x 1,219 mm) and includes board-and-felt hot zone insulation and a 2-bar quench system. This is Bulaw's 5th VFS furnace.

Johnson Technology, Muskegon, Mich., ordered a horizontal internal quench furnace, model HIQ-3848 to perform brazing. Chamber size is 24 in. x 24 in. x 48 in. (609 x 609 x 1,219 mm), and includes board-and-felt insulation and a high-performance quench system. This is Johnson's 6th VFS vacuum furnace. Both systems include VFS's exclusive CompuVac supervisory control system.

VFS also will ship a horizontal external quench, model HEQ-3848-2 vacuum furnace to Pratt & Whitney in East Hartford, Conn., for heat treating aircraft components. The furnace has a 24 in. x 24 in. x 48 in. chamber size and includes a graphite-insulated hot zone, VFS's patented GraForm curved graphite heating elements, and a 2-bar quench system. This is the 15th VFS furnace installed at Pratt & Whitney. [www.vfscorp.com](http://www.vfscorp.com).

## **TevTech Installs Sintering Systems**

TevTech LLC, Wilmington, Mass., installed two silicon carbide-sintering systems in North America (company name not available). The horizontal systems include a 6 ft<sup>3</sup> hot zone and a 100 ft<sup>3</sup> hot zone. The systems incorporate a binder-management system consisting of a retort, thermal oxidizer and binder catch system. The system enables efficient handling of process by products for both positive and partial pressure operation, and

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# EQUIPMENT SALES & SERVICE

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greatly reduces cycle and preventative maintenance. Single or dual zone heaters are used to achieve an operating temperature of 2150°C (3900°F). Each system is fitted with an optional accelerated cooling system to shorten overall cycle time and increase throughput. The systems are controlled via PLC with data acquisition and safety interlocks. [www.tevtechllc.com](http://www.tevtechllc.com).

## CAB System Upgrade to Increase Capacity

Radiadores Viscondes LTDA, located in Guarulhos, Brazil, placed an order to upgrade its Seco/Warwick Convection Preheat/Radiation Braze CAB furnace system (installed in 2003) to meet increased production demand. Seco/Warwick will provide the materials, engineering and fabrication of additional furnace chambers to nearly double the company's current production of radiators and charge-air coolers. In addition to adding total length and heating zones to the existing system, the belt speed will increase along with updated power controls. Convection preheating prior to the radiation braze chamber improves the furnace's overall flexibility, enabling manufacturers to braze products of different mass and dimensions without changing furnace set point parameters. Radiadores Viscondes will install the modifications with supervision from Seco/Warwick. [www.secowarwick.com](http://www.secowarwick.com).

processing chambers and one movable quenching module, which performs double duty as a transfer mechanism and quench chamber for quenching at gas pressures up to 20 bar. The carburizing technology is based on a mixture of three different gases. This patented, low-cost technology provides a very clean process with repeatable results. [www.secowarwick.com](http://www.secowarwick.com).

## Paulo Upgrades Tennessee Facility

Paulo Products Co., St. Louis, Mo., reports that its Murfreesboro, Tenn., facility passed its upgrade audit and has been awarded accreditation to ISO/TS 16949:2002, a standard created by the International Automotive Task Force (IATF), which represents the technical standard of the world's major auto manufacturers. What sets this standard apart from the previous ISO and QS standards is the requirement to continually measure, monitor, and improve, with an emphasis on preventing defects and reducing waste throughout the supply chain. Paulo-Murfreesboro is the second Paulo facility to achieve the accreditation, following Paulo-Nashville, and other company facilities are working toward their accreditations. [www.paulo.com](http://www.paulo.com).

## Laser Technique Speeds Turbine Repair

A laser welding technique developed at Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) Manufacturing

and Infrastructure Technology Div. is repairing power station turbine rotor blades in minutes rather than days. Called in situ laser surfacing, the development is the product of a collective effort by several research institutions and power station operators. It allows flaws from wet steam erosion on the blades of low-pressure steam turbines to be repaired in place without the need for the turbine to be dismantled and the blades removed, says research team leader Dr. Nazmul Alam.

Some power station operators have reported that current blade repair, or replacement, costs \$AU250,000 per turbine per day in downtime or up to \$AU2.5 million in total per turbine. A typical low-pressure steam turbine rotor has 180 last-row blades, each about 1 m (39.37 in.) long, with a replacement cost of \$AU10,000 each if they cannot be repaired to the level of their original aerodynamic precision. The new method uses high-power laser energy to fuse a metal alloy powder to the turbine blade's surface. The rotor only has to be removed from its casing. The laser is a portable unit that is taken to the power station, and the operation is performed by a robotic arm. Conventional repair methods have used TIG (tungsten inert gas) welding, but the heat is difficult to regulate and blades can suffer thermal damage. An initial field trial in 2004 on six blades at Truenergy's Torrens Island power station in Adelaide, Australia, was successful and the company has just completed a second trial on a further 17 blades. [www.cmit.csiro.au](http://www.cmit.csiro.au).

## Rolls-Royce, Timken Expand Helicopter Parts Offering

Rolls-Royce Corp., Chantilly, Va., and The Timken Co., Canton, Ohio, formed an alliance to increase Timken's technology and service capabilities for Model 250 helicopter turboshaft engine parts and component repair. Timken's aerospace business will provide an expanded variety of parts and services under license from Rolls-Royce for new engine production and for the aftermarket.

According to Roll-Royce, Model 250 engine customers and the Model 250 FIRST network of authorized service centers will benefit from improved service and availability using Timken Aerospace's experience and expanded capacity. Timken Aerospace has been expanding its capabilities to produce power transmission parts for small turboshaft engines. Rolls-Royce's original equipment manufacturing experience is expected to help Timken to grow its Aerospace business. Timken has provided aerospace bearings to Rolls-Royce for more than 30 years, and this agreement expands the supply range into other engine parts. [www.timken.com](http://www.timken.com).