Research aimed at finding new magnet materials

Increasing demand and a shrinking supply of rare earth elements such as neodymium and dysprosium for magnets is driving research by a team from Oak Ridge National Laboratory, Tenn., and the University of Minnesota, Minneapolis/St. Paul, to develop magnets made from abundant and inexpensive materials. Of specific interest is an iron-nitride compound having a specific phase that potentially exhibits the highest saturation magnetization ever reported for a material. The team will devise a method to produce this compound and use specialized modeling methods to better understand the role of alloying additions that might stabilize the material so it retains its magnetic properties. The goal is to make bulk quantities of the material and move toward the ultimate goal of replacing neodymium-iron-boride magnets for automotive and other energy technology uses.


New process creates complex-shaped WC components

Total Carbide, an Elektron Technology plc company, Buckinghamshire, UK, launched Intraform, a new process that produces tungsten carbide (WC) components having complex internal forms for use in harsh environments, such as valves operating in high-pressure, highly abrasive, or corrosive environments. The process enables production of “chambers” in WC that cannot be produced using any other standard production method. It allows the creation of complex internal wear critical forms as required in linear and rotary valves, which can last up to ten times longer than equivalent steel parts. The resulting improvement in severe service valve performance and reliability significantly reduces the impact and cost of downtime caused by part failure and maintenance. The components are manufactured as one piece, eliminating the potential of leaks. This allows higher pressure liquid flow rates, giving engineers unprecedented flexibility for the design of flow-control components. www.totalcarbide.com.

Robotic tool developed for manufacturing composites

A robotic machine developed at the University of Delaware Composites Manufacturing Science Lab, Newark, could change the way new materials are evaluated and new processes are designed at UD’s Center for Composite Materials. The custom-designed Automated Materials Placement (AMP) system is configured with swappable modules for
various feed systems, heating sources, and consolidation methods through a Lego-type connection structure. All modules use a common column design, and they slide out the front of the chassis. The AMP can process both thermoplastic and thermosetting materials up to 8 in. (203 mm) wide and can fabricate components in excess of 100 ft² (9.3 m²). The system is designed to be modular so various heating and consolidation methods can be studied and optimized with low risk on hardware investment. The flexible modules can be swapped or reordered to include high-energy infrared heating, volumetric induction heating, roller or shoe consolidation, sprayable bagging, ultrasonic welding, powder impregnation, and in-line fabric stitching. Detailed design studies can be carried out to compare AMP process temperatures, pressures, and velocities on the final microstructure and the structural performance of a number of composite systems. www.udel.edu.

Electron-beam welding materials for automotive sensors

Tanaka Kikinzoku Kogyo K.K., a Tanaka Precious Metals Group company, Tokyo, Japan, expanded its product lineup of electron beam (EB) welding materials used in sliding contacts on various automotive sensors. Seven new types of EB welding materials each combine five precious metals (contact metals) and two copper-base metals, expanding the lineup from one product to a total of eight. EB materials are highly reliable cladding materials (contact materials) able to function by combining metals with different properties when precisely welding the base metal and the contact metal together by using an electron beam as the heat source. In particular, it is most effective using the minimum amount of precious metal required in the manufacture of cladding material in functional shapes such as edge-lay and through-lay because it is possible to perform precision welding with material that has a higher purity than in arc welding, which is currently the mainstream method. The company succeeded in increasing the combinations of electron beam welding materials by optimizing the welding conditions and optimizing the rolling and processing conditions. Website: http://pro.tanaka.co.jp.