

Magnetics: Industry Overview by Walt Benecki

NdFeB Conference Highlights Recent Technology Advancements

On October 15-17, 2003, Gorham Technologies (www.gorhamtech.com) sponsored a conference in Detroit entitled "Sintered & Bonded NdFeB Magnets – 2003". Attendance by magnet users such as Siemens VDO, Robert Bosch GmbH, Visteon Automotive Systems, Baldor Electric and Kollmorgen Inland Motor added to the value of the conference. All those who attended were rewarded with a number of excellent presentations and informative updates covering recent technical advancements.

The keynote speaker for the conference was Dr. Walter McManus, Executive Director, Forecasting and Analytics, J.D. Power and Associates. Dr. McManus offered a stimulating update on vehicle fuel efficiency and consumer influence on alternative power technologies, including diesel and hybrid vehicles. Dr. McManus concluded that fuel efficiency is currently not very important to consumers and factors such as handling, performance and comfort currently represent the automotive buyer's highest priorities.

One conclusion made by Dr. McManus was that consumers are not willing to pay much premium for new technologies such as fuel cell and hybrid vehicles. An additional observation was that, if faced with the prospect of higher fuel costs, consumers would prefer clean diesel over hybrid electric vehicles. McManus forecasted, however, that fuel costs in the U.S. are not expected to climb dramatically over the foreseeable future.

The emergence of the Chinese as leaders in worldwide magnet production was widely discussed during the conference. Dr. Harada, President, Hi-Tech Association Ltd., predicted that the Chinese will become major players in bonded ferrite magnet rolls for reprographics applications as well as disk drive magnets (and assemblies) within the near future.

Peter Dent, Director of Sales & Marketing, Electron Energy Corporation, announced the recent development of NdFeB magnets with improved toughness. Dent reported that these magnets exhibit fracture toughness roughly 75% higher than typical commercial-grade NdFeB and, as a result, are easy to machine. In contrast, today's NdFeB magnets typically require EDM and/or grinding operations. Mr. Dent indicated that a patent application has been submitted covering this technical breakthrough.

Steve Russek, Director, Astronautics Technology Center, Astronautics Corporation of America, presented an interesting overview of recent advancements in magnetic refrigeration. The concept of Active Magnetic Regeneration, according to Russek, has been demonstrated at room temperature. The Astronautics concept for rotary magnetic refrigeration has been proven feasible with a small scale system offering efficiency comparable to thermoelectric systems. The concept involves a rotary design that offers quiet and reliable operation. Although further development work lies ahead, the concept of magnetic refrigeration offers application in numerous consumer, commercial, medical and military applications. If proven to be commercially successful, magnetic refrigeration will require unprecedented quantities of sintered NdFeB magnets.

Mr. Masahiro Tobise, Senior Researcher, Advanced Electronics Research Laboratory, Hitachi Metals Ltd. provided a technical update on the development of isotropic and anisotropic SmFeN bonded magnets. Tobise reported that SmFeN bonded magnets can now be utilized at temperatures up to 150° Centigrade. Recent data indicates that SmFeN magnets exhibit high corrosion resistance, a lower temperature coefficient than NdFeB and superior bending strength. Advancements were reported in surface treatment of SmFeN powders which improve thermal stability and irreversible losses. Tobise reported that SmFeN bonded magnets have application in automotive sensor systems that require both corrosion resistance and thermal stability.

Dr. Hironari Mitarai, Aichi Steel Corporation, provided an overview of the development of anisotropic NdFeB magnets for small motor applications. Dr. Mitarai reviewed recent developments that have improved HDDR treatment technology, resulting in bonded magnets with energy products in the range of 20-25 MGOe. Although aging stability continues to represent a challenge, these recent advancements were shown to offer significant weight and cost reduction opportunities in small automotive motor applications.

Dr. Hitoshi Yamamoto, General Manager, Engineering, Sumitomo Special Metals America provided a comprehensive update of sintered NdFeB materials development at Sumitomo, including current and future applications. In 2002, Sumitomo's production of sintered NdFeB for motor applications reached a record high of approximately 1,300 metric tons. Sumitomo's newest family of sintered Neodymium magnets reaches an energy product of 52 MGOe while newly available thin-walled radial rings are now available at 40-42 MGOe. Dr. Yamamoto summarized a wide range of applications for sintered NdFeB, ranging from high efficiency compressor motors, braking systems, power steering applications and flywheel energy storage systems.

During a concluding panel discussion, Dr. Harada encouraged Japanese bonded magnet manufacturers to maintain high quality, continue technology leadership and achieve meaningful cost reductions. Harada called for a target market price for bonded magnets of \$30-40 per kilogram, a level expected to permit wide application of NdFeB bonded magnets in automotive applications.

Bud Shear, President, Industrial Magnetics Inc., called for alliances between Chinese and western magnet manufacturers to achieve valuable synergy that would combine Chinese low manufacturing costs with western marketing and service strengths.

The conference concluded with a number of participants encouraging The International Magnetics Association (IMA) to consider expanding its membership to include magnet users and to incorporate technical and application papers in future meeting agendas. The IMA (previously MMPA) was officially chartered in 2001 with the mission of promoting the worldwide growth, development and use of magnetic materials.

Walt Benecki is the former president of Group Arnold and a past president of the Magnetic Materials Producers Association (now IMA). Walt has a consulting practice specializing in operations management, industry analysis, acquisitions, dispositions and strategic alliances. For additional information, visit his website: www.waltbenecki.com