

# 2008 Magnetics Conference

May 15-16 ~ Denver, Colorado ~ Hyatt Regency Denver Tech Center

The Premier Global Conference Focused on the Latest Advancements in Magnetic Applications, Materials & Technology

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## WHO SHOULD ATTEND?

- Developers, integrators and operators of products/systems that utilize magnets and magnetic systems
- Professionals involved in EMC and magnetic shielding technologies
- Professionals involved in magnetic test and measurement
- Manufacturers of magnets, magnetic assemblies & components
- Suppliers of magnets, magnetic materials and assemblies

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## Overview

This two-day conference is a leading global event within the magnetics market, bringing together worldwide magnetics experts. This is a once-a-year opportunity for professionals in the magnetics market to assemble and discuss the latest magnetics developments.

The 2008 Magnetics Conference will focus on the latest advancements in magnetic applications, technology and materials. Serving OEM developers of products that utilize magnets and magnet systems, design engineers, OEM developers involved in EMC technology and magnetic effects, magnetics manufacturers and integrators, and material suppliers in the magnetics industry.

## Who Should Attend?

- Developers, integrators and operators of products/systems that utilize magnets and magnetic systems
- Professionals involved in EMC and magnetic shielding technologies
- Professionals involved in magnetic test & measurement
- Manufacturers of magnets, magnetic assemblies and components
- Suppliers of magnets, magnetic materials and assemblies

## Schedule: Day 1 At-A-Glance

7:00 am	Registration & Continental Breakfast		
8:15 am	Opening Address		
8:20 am	Keynote Presentation		
9:10 am	Keynote Presentation		
10:00 am	Exhibit Hall Opens/Networking Break		
10:45 am	Track 1	Track 2	
11:25 am	Track 1	Track 2	
12:00 pm	Luncheon		
1:00 pm	General Panel Discussion		
2:00 pm	Track 1	Track 2	Track 3
2:40 pm	Track 1	Track 2	Track 3
3:20 pm	Networking Break		
3:50 pm	Track 1	Track 2	Track 3
4:30 pm	Track 1	Track 2	Track 3
5:05 pm	Cocktail Reception in Exhibit Hall		

## Schedule: Day 2 At-A-Glance

7:30 am	Registration & Continental Breakfast		
8:35 am	Keynote Presentation		
9:20 am	Featured Session		
10:00 am	Exhibit Hall Opens/Networking Break		
10:45 am	Track 1	Track 2	
11:25 am	Track 1	Track 2	
12:00 pm	Luncheon		
1:00 pm	Featured Session		
2:00 pm	Track 1	Track 2	
2:40 pm	Track 1	Track 2	
3:15 pm	Conference Conclusion		

## Don't Miss these Keynotes and Featured Presentations!

Thursday, May 15<sup>th</sup>

### A Producer's and Buyer's Perspective - The Permanent Magnet Outlook

Walt Benecki, President, Walter T. Benecki, LLC



### Permanent Magnetic Material Consumption May Be Teetering on the Brink

Terry Clagett, Founder, President and CEO, WebMagnetics, Inc.



### Panel Discussion:

#### Magnetic Measurement Technologies

#### Panelists:

- Philip Keller, Metrolab
  - Ian Walker, GMW Associates
- Additional panelists to be announced

Friday, May 16<sup>th</sup>

### Going Green: The Growing Role of Permanent Magnets in Renewable Energy Production and Environmental Protection

Dr. Gareth P. Hatch, Director of Technology, Dexter Magnetic Technologies



### The Science and Business of Magnetic Digital Data Storage

Dr. Giora Tarnopolsky, Founder, TarnoTek



### Best Practices in Magnetic Manufacturing

Samir Kagalwala, Consultant, Wire Wound Components in Power Electronics



# 2008 Magnetics Conference

## Registration Information

### 2008 Magnetics Conference

Register by April 4 <sup>th</sup>	\$795
Register after April 4 <sup>th</sup>	\$995

### Team Discount

If two people from your company will be attending the conference, \$100 will be deducted from each attendees registration fee. If three or more people from your company will be attending the conference, \$200 will be deducted from each attendees registration fee. (Note: A separate registration form must be submitted for each attendee.)

Government & Utility Pass:	\$495
Single Day Conference Pass:	\$495
Expo Only Pass	\$50

### Pre-Conference Workshop Pricing

#### Basic - Bootcamp I

Register by April 4 <sup>th</sup>	\$395
Register after April 4 <sup>th</sup>	\$495

#### Advanced - Bootcamp II

Register by April 4 <sup>th</sup>	\$395
Register after April 4 <sup>th</sup>	\$495

#### Basic/Advanced Bootcamp Package

Register by April 4 <sup>th</sup>	\$595
Register after April 4 <sup>th</sup>	\$695

#### EMI - From Test Data to Final Filter Design

Register by April 4 <sup>th</sup>	\$495
Register after April 4 <sup>th</sup>	\$695

See page 12 for Workshop Course Descriptions

### 4 Ways to Register

- By Phone: 800-803-9488
- By Fax: 720-528-3771
- Web: [www.MagneticsMagazine.com](http://www.MagneticsMagazine.com)
- By Mail: Webcom Communications, Corp.,  
7355 East Orchard Road, Suite 100,  
Greenwood Village, CO 80111

### Contact

- For **program information** contact Heather Krier at 800-803-9488 or [heatherk@infowebcom.com](mailto:heatherk@infowebcom.com)
- For **exhibit/sponsor** information contact Joan Nelson at 800-803-9488 or [joann@infowebcom.com](mailto:joann@infowebcom.com)
- For **registration information** contact Marsha Grillo at 800-803-9488 or [marshag@infowebcom.com](mailto:marshag@infowebcom.com)

## Hotel Information

### Stay where the conference is!

The 2008 Magnetics Conference will be held at the Hyatt Regency Tech Center.



7800 East Tufts Avenue  
Denver, CO 80237  
Phone: 303-779-1234 or  
800-233-1234  
Fax: 303-850-7164  
[www.hyatt.com](http://www.hyatt.com)

Special room rate of \$152/night is available for 2008 Magnetics Conference attendees. Be sure to reserve your room by April 13<sup>th</sup>, 2008, and mention Webcom Communicationsto receive this special rate.

### Groundbreaking Sessions From:

**Advanced Magnet Lab**  
**Alliance LLC**  
**Big Horn Valve, Inc.**  
**Crane Aerospace & Electronics**  
**Daido Electronics Co., Ltd.**  
**Dexter Magnetic Technologies**  
**Electron Energy Corp.**  
**Hitachi Metals, Ltd.**  
**Infolytica Corp.**  
**JMA Development**  
**Magnequench International, Inc.**  
**MAGSYS magnet systems**  
**Metrolab Technology**  
**NIST**  
**Ozenbaugh Engineering**  
**PolarisREM, LLC**  
**Quantum Corp.**  
**Quadrant Technology**  
**Rensselaer Polytechnic Institute**  
**RMD, Inc.**  
**SuperPower, Inc.**  
**TarnoTek**  
**Vector Fields Ltd.**  
**Walter T. Benecki, LLC**  
**WebMagnetics, Inc.**  
**West Coast Magnetics**  
**Wire Wound Components in Power Electronics**

### Cancellation policy:

To receive consideration, all cancellations must be received in writing. Upon receipt, a refund or credit will be issued towards a future event produced by Webcom Communications, less a 25% administrative fee. (Cancellations which do not indicate preference will be issued credit.) No refunds will be issued within two (2) weeks of the event. Webcom Communications, Corp. will not be held responsible for cancellations or delays in programming due to acts of God, war, government disorder, curtailment of transportation facilities, or other emergency making it inadvisable, illegal or impossible to hold the meeting.

Track 1 • Track 2 • Track 3

**7:00 A.M. Registration & Continental Breakfast****8:15 A.M. Opening Address****8:20 A.M. KEYNOTE PRESENTATION****A Producer's and Buyer's Perspective -  
The Permanent Magnet Outlook**

This presentation will predict the major shifts that can be expected in the permanent magnet marketplace over the coming decade. Future market growth and size will be forecasted. Major technologies and applications that will influence future market demand will be identified. Raw material supply and prices will be predicted and the anticipated role of China will be discussed. Future structural changes in the North American magnet industry landscape will be summarized with specific projections of who the major North American "industry survivors" will be.

*Walt Benecki, President, Walter T. Benecki, LLC*

**9:10 A.M. KEYNOTE PRESENTATION****Permanent Magnetic Material Consumption May Be  
Teetering on the Brink**

In 2007, the Global Permanent Magnet Market may have reached 800,000 metric tons and \$8.95 billion and is predicted to reach 925,000 metric tons and \$11 billion in 2010. Prices can fluctuate based on raw materials, supply, demand and the global economy. Tonnage is a consistent measure. We will look at those factors that can affect the tonnage of Permanent Magnetic materials sold globally. We will examine the effects of population, per capita consumption in developed and developing portions of the world, and applications. The net effect of increases in population, increases in per capita consumption and more new applications than declining applications results in growth.

*Terry Clagett, Founder, President and CEO, WebMagnetics, Inc*

**10:00 A.M. Exhibit Hall Opens/Networking Break****10:45 A.M.****Magnetic Moment and Susceptibility  
Calibration Standards**

In the past there were available a number of NBS magnetic moment and susceptibility standards for calibrating magnetometers. However, the supply of all those standards was exhausted in 1989. NIST assembled a new precision absolute magnetometer five years ago, and recently finished using it to certify a new series of magnetic standards, including the popular Ni sphere SRM#772a. Here, the measurement technique will be described, along with information on the metallurgy and use of the new standards.

*R.D. Shull, Leader, Metallurgy Division,  
National Institute of Standards and Technology*

**Magnetic Materials - The Classics**

Metallurgical innovations along, with ever-expanding insights into the molecular dynamics of magnet materials, led to the discovery and development of real permanent magnet materials in the early to mid twentieth century. The physical and magnetic properties of some of these materials enable them to maintain their position of being irreplaceable as superior resources for energy storage and energy conversion in many applications. Learn three of these classic permanent magnet materials; alnico, ferrite and Samarium Cobalt. Brief histories, attributes and applications will also be presented.

*Mike Guthrie, Director of Engineering, Quadrant Technology*

**11:25 A.M.****A New Generation of Hall Magnetometers:  
Enabling Technologies**

A new generation of Hall magnetometers simplifies the measurement and mapping of magnetic fields in an industrial environment: simultaneous measurement of three axes provides total field; integration of the three axes on a single chip provides a very compact sensor and point-like active volume; four ranges measure fields of up to 20 T; spinning-current techniques minimize offset and offset drift; integrated compensation provides reliable measurements over a wide temperature range; high-speed acquisition permits measurement of AC fields; compact construction enables portable and multi-probe applications; and standardized USB interface permits easy system integration.

*Philip Keller, Marketing & Product Management,  
Metrolab Technology*

**Advances in Samarium Cobalt Magnet Technology  
And US Defense Contractual Considerations**

Discover the most recent advances in samarium cobalt magnet technology and its applications. New advances in temperature compensated samarium cobalt magnet materials and developments in higher performance samarium cobalt grades will be discussed. We will review the final results of the design, fabrication and testing of a 538°C permanent magnet bearing powered by a PM motor operating at these same temperatures with its associated unique test apparatus built under a three year NASA program. Recent US laws and codification of domestic preferences for specialty metals used in US Department of Defense systems continue to change. An up to the moment status report will be provided on the contractual and legal implications to permanent magnets and systems produced for US DOD end uses.

*Peter C. Dent, Director of Business Development,  
Electron Energy Corp.*

**12:00 P.M. Luncheon**

**1:00 P.M. GENERAL PANEL DISCUSSION****Magnetic Measurement Technologies - Panelists:**

- *Stephen Dakel, LE USA Walker Scientific*
- *Philip Keller, Metrolab Technology*
- *Robert Shull, NIST*
- *Ian Walker, GMW Associates*
- *Jeff Dierker, Lake Shore*

**2:00 P.M.**

### Computing Three-Dimensional Magnetic Field from Solid Circular Cylindrical and Axially Polarized Permanent Magnets by Employing Toroidal Functions

A method is developed for computing the three-dimensional magnetic field from an axially magnetized circular cylindrical permanent magnet. This method implements toroidal functions which are well suited for numerical computation. Analytical expressions are developed so that one can more easily perform a parametric study in order to quickly optimize a design. The main purpose of this paper is to develop a method of solution for rapidly computing the magnetic induction field produced by a cylindrical permanent magnet. The method introduced in this presentation should provide a useful analytical tool for accurately predicting the magnetic induction field from circular cylindrical permanent magnets.

*Jerry Selvaggi, Research Scientist, Rensselaer Polytechnic Institute*

### High Performance, Radially Oriented Nd-Fe-B Ring Magnets

This presentation will illustrate the unique characteristics of NEOQUENCH-DR, hot formed radially oriented Nd-Fe-B magnets. The production process utilizes thermo-mechanical alignment during hot extrusion where mechanical deformation at an elevated temperature induces a crystallographic alignment and thus radial magnetic alignment of submicron size Nd<sub>2</sub>Fe<sub>14</sub>B grains, which is quite different from conventional sintered magnets where magnetic field alignment is used. This unique alignment process allows us to go beyond the limitation of field alignment; smaller diameter and large length to diameter ratio magnets can be produced with high uniformity.

*Mitsuaki Uchida, Daido Electronics Co., Ltd.*

### High Magnetic Fields Enabled by 2G High Temperature Superconductors

Recent developments in 2G HTS coil technology are presented highlighting the ability of 2G HTS wire to be used to generate ultra high magnetic fields while functioning under difficult high stress operating conditions. The challenges of using 2G HTS wire in various coil constructions and applications are discussed. The ability of the conductor to operate under high stress levels has been demonstrated in both direct sample measurement and test coils. The high winding current density that is available with SuperPower's thin 2G HTS wire was utilized in a high field insert coil demonstration generating central fields in excess of 26.8 T. This first test and later progress in moving to higher fields will be presented.

*Drew Hazelton, Principal Engineer, SuperPower, Inc.*

**2:40 P.M.**

### Recent Advances in Multi-physics Modelling of Materials for Applications in Electromagnetic Design

Discover the use of multiple independent variable tabular representation of material properties and boundary conditions for multi-physics electromagnetic design simulations using finite element methods. Properties in one of the physical domains depend on the solution of another coupled domain. The presentation shows the flexibility of this approach by focusing on three specialist applications: superconducting coils during "quench"; charging of semi-conducting dielectric materials by charged particle beams; degradation of operational permanent magnet performance due to temperature rise. Practical applications in electromechanics, X-ray tubes and superconducting magnets illustrate the presentation.

*Chris Riley, Director of Projects and Customer Support, Vector Fields Ltd.*

**NEW SESSION:**

### Non Contact Inspection Applications of Magneto-resistive Sensors

Recent advancement of Giant Magneto-Resistive (GMR) sensor technology has many applications in instrumentation and equipment development. AMR (Anisotropic Magnetoresistance), GMR, TMR (Tunneling MR) and MTJ (Magnetic Tunneling Junction) sensors have opened up a wide range of applications pertinent to the measurement of small magnetic fields. While the main thrust of GMR technology lies in the Disk Drive Recording industry, the technology has widespread use in a wide array of devices ranging from Current Switching Devices to MEMS sensors used in automotives, space, compass and guidance applications. Currently there is great interest in the measurement and mapping of small magnetic fields in many areas of Science, Engineering, and Medicine. In this presentation we focus on the non-contact and non-destructive applications as related to the Electronics Industry and Non-Destructive Testing.

*Rezaul Karim, Senior Scientist, RMD, Inc*

### Low Q Very Wide Band High Frequency EMI Filters

Learn how and why these EMI filters work. Even though it appears to be a conventional inductor, it really isn't. Applications and design methods will be discussed. Samples of this product will be handed out along with data sheets and application notes. Subjects that will be covered in detail include: decoupling capacitor and how to calculate it (the original way); capacitors in parallel; the disadvantage of this capacitor method; how a very low Q wide band inductor comes to the rescue; what allows the low Q filter inductor to work; applications of this part; and where can it be used (ASICs, SMPs, PLCs, RF, and more).

*Richard Lee Ozenbaugh, President, Ozenbaugh Engineering*

**3:20 P.M. Networking Break**

**3:50 P.M.**

### **Magnetizing in Production Lines**

"Magnetizing in production lines" gives a short guideline for placing magnetizing equipment in industrial production lines. Following a short introduction to magnetization a comparison is made between the implementation of already magnetized magnets and the magnetization after the system is assembled. In both cases advantages and disadvantages of the magnetization result as well as the handling process are discussed.

*André Beumer, Graduate Physicist,  
Hartmut Pagel, Graduate Physicist  
MAGSYS magnet systems*

### **Winding Losses In High Frequency Inductors with Gapped Core Structures**

High frequency inductors often exhibit significant losses due to skin effects. Conventional wisdom has held that litz wire should be employed to moderate skin effects, and that the available winding area should be filled with copper to the greatest extent possible. This conventional wisdom breaks down in the case of gapped core structures. A greater winding fill factor does not always lead to lower winding losses. In many cases the lowest loss design is achieved by selectively winding in certain areas of the bobbin window, leaving other areas devoid of copper. This presentation will examine the source of winding losses in high frequency power inductors and introduce a new computer program.

*Weyman Lundquist, President and CEO,  
West Coast Magnetics*

### **Application of Magnets in the Head Actuators for LTO Tape Drives**

Among the most recent and rapidly growing formats of data storage is Linear Tape Open (LTO) technology. The LTO Ultrium format storage solution is a single-reel, high-performance tape cartridge suitable for backing up, restoring, and archiving applications. This presentation will discuss: modern Neodymium magnets as used by head actuators during the read-write process and more specifically within compact designs and magnet/hall sensor technology used by the head actuator to improve the closed-loop servo functions within a LTO Drive. In connection with these topics, bonded magnet technology as it relates to the above referenced magnet/hall sensor technology, as well as, the employment of dual pole magnetization as used within the extremely compact design of the Head actuator will also be discussed.

*Ash Nayak, Staff Engineer, Quantum Corp.*

**4:30 P.M.**

### **Magnetization of Isotropic Magnet Materials: Considerations for Motor Design**

Isotropic magnets assume the orientation that is imparted to them in the magnetizing fixture. This makes fixture design a necessary integral part of the motor design process, and can be exploited as an advantage when designing with isotropic materials. For motors and generators magnetization can be tuned to reduce the cogging torque and torque ripple when design of the magnetizing fixture is carried out concurrently with the motor design. A PMDC motor case study will be part of the discussion, and the study demonstrates how the fixture design can be used to improve the motor performance.

*David Miller, Director of Research & Development,  
Magnequench International, Inc*

### **Improving Airplane Power Quality through the Implementation of Multiphase Transformers**

The need for electrical power on aircraft has dramatically increased in recent years. The nonlinear nature of loads contributes to an unacceptable level of current distortion. Multiphase transformers can significantly reduce current distortion in power conversion and rectification equipment, allowing distortion limits to be met. In aerospace applications where the AC system frequency is 400 Hz or higher, multiphase transformers offer very attractive, low weight and low cost solutions. Practical multiphase transformer approaches are reviewed with the advantages and disadvantages of each solution. The effects of transformer design parameters on performance results are quantified. Test data from selected demonstration hardware is shared.

*Kaz Furmanczyk, Principal Engineer, Crane Aerospace & Electronics*

### **The Implications of DFARS and Sourcing Magnets From China**

The DFARS Specialty Metals Clause has important implications for magnetic components. This presentation will explore the origin, history and recent changes in the law, and how they impact the sourcing of magnetic components in US weapons systems. Recent US Commerce findings regarding Chinese subsidies for magnetic products, and the potential implications of this finding will also be discussed.

*Ed Richardson, Sales & Marketing Manager, Thomas & Skinner, Inc  
Peter C. Dent, Director of Business Development, Electron Energy Corp.*

**5:00 - 6:30 P.M. Cocktail Reception in Exhibit Hall**

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**7:30 A.M. Registration & Continental Breakfast****8:35 A.M. KEYNOTE PRESENTATION****Going Green: The Growing Role of Permanent Magnets in Renewable Energy Production and Environmental Protection**

The current drive to increase the rate of energy production using renewable sources has led to the development and implementation of a number of innovative permanent magnet technologies. Such technologies are also being applied to improve energy conservation, to increase the energy efficiency of conventional energy sources and to prevent and to mitigate environmental pollution. A number of case studies highlighting specific applications of permanent magnet technologies in these systems will be presented, as well as a discussion on the technical, logistical and resource challenges associated with the increased demand for their use.

*Dr. Gareth P. Hatch, Director of Technology,  
Dexter Magnetic Technologies*

**9:20 A.M. FEATURED SESSION****The Science and Business of Magnetic Digital Data Storage**

The magnetic digital data storage industry advances relentlessly. Last year witnessed recognition for some aspects of the fundamental magnetics that make all of that progress possible: The 2007 Nobel Prize in Physics was shared by Drs. Albert Fert (France) and Peter Grünberg (Germany) for the discovery of giant magnetoresistance in thin ferromagnetic multilayer systems. Giant magnetoresistance, or GMR is not the only exquisite science applied in disk drives. Perpendicular media magnetic multilayer disks, mechanisms, electronics and advanced coding techniques have propelled the applicability and usefulness of HDD's into new realms. In addition to one-terabyte (1 TB = 1 trillion bytes) capacities, at the other end of the capacity scale magnetics advancements have open the possibility of "large" capacity (30 gigabytes) miniature drives of the same size as compact flash cards. The reduction of cost of flash memory has created synergy and cooperation as much as competition between HDD's and solid-state drives (SSD's). This lecture will describe the magnetics of hard disk drives in 2008, and will analyze how these advances are shaping the recording industry.

*Giora Tarnopolsky, Founder, TarnoTek*

**10:00 A.M. Exhibit Hall Opens/Networking Break****10:45 A.M.****Cryocoolers: The Underlying Requirement of Superconductors**

Superconductors offer many benefits and advantages over normal materials, but the successful marketing of superconducting systems depends strongly on the quality of the cryocooler used to maintain the low temperatures. Many types of cryocoolers exist today that will achieve temperatures that may range from about 4 K to 80 K. Their current state of development is such that they are now being used successfully in many applications of superconductors. However, all cryocoolers have potential problems that can hinder their use in some new application areas. Learn these potential problem areas and the current research being conducted to reduce or eliminate these potential problems.

*Ray Radebaugh, Leader Cryogenic Technologies Group,  
National Institute of Standards and Technology*

**Newly-Developed Nd-Fe-B Nanocomposite Magnetic Powders with High Br**

Newly-developed grades of Nd-Fe-B based isotropic magnetic powders, called SPRAX-III, are introduced. These nanocomposite structured compounds have high remanence, Br, more than 1 Tesla, good corrosion resistance and long-term thermal stability compared with conventional rapid-quenched powders because of low Nd content and the existence of the nanocrystalline alpha-iron phase. These advantages can be most utilized in "binder-less magnet" produced by a powder compaction process without using binder resins followed by sintering, and "dual molded magnet rotor" made with resin-bonded magnet and powder magnetic core. The former is suitable for micro-motors and the latter for low cogging torque, high-efficiency motors.

*Toshio Miyoshi, Magnetic Materials Research Laboratory,  
Hitachi Metals, Ltd.*

**11:25 A.M.****Superconducting Magnets: Overview and Opportunities**

Since its discovery almost 100 years ago, superconductivity technology has evolved into what many consider to be the next industrial revolution. A phenomenon characterized by exactly zero electrical resistance, when kept at extremely cold temperatures, superconductivity is a key enabler for numerous magnet opportunities in the fields of medical, energy, research, space and defense. The presentation will provide a general overview of superconductivity, superconducting magnet configurations, technological challenges and opportunities as well as the current and future commercial applications.

*Mark Senti, Vice President, Advanced Magnet Lab*

### Bonded NdFeB Magnets for Fuel Resistant Applications

Bonded NdFeB magnets have been developed for E85 fuels containing 85 percent ethanol. These magnets retain high physical strength after soaking for up to 1,000 hours, unlike conventional magnets. The newly developed magnets also have lower heat aging losses compared to standard magnets. The characteristics of these magnets will be discussed.

*E.E. Welker, V. Panchanathan, PhD., M.L. Spencer, P.E.,  
Polaris Rare Earth Materials, LLC*

### 12:00 P.M. Luncheon

### 1:00 P.M. FEATURED SESSION

#### Best Practices in Magnetic Manufacturing

Keeping up with customers' ever increasing wants such as on-time delivery, better quality, lower cost, reduce cycle time, and smaller size is a daunting task. It is not different in Magnetic Manufacturing except that, it may be even more challenging. The organizations' own internal personality and discords make the situation super dynamic.

Can doctor afford to give up when faced with a difficult patient having multiple diseases? A good doctor relies on best medical practices instead and, uses them to treat. Like wise, there are best magnetic manufacturing practices that come to a rescue. Benefit from the presenter's hands-on experience to gain insight into the best manufacturing practices.

Actual case histories will be presented highlighting the best practices used and the results achieved.

*Samir Kagalwala, Consultant,  
Wire Wound Components in Power Electronics*

### 2:00 P.M.

#### Neodymium Pricing – Global Causes and Effects

This presentation will discuss the global economics of neodymium pricing. The following topics will be reviewed: world reserves by location, the mining, ore processing, environmental issues and the demand for neodymium and the other rare earths by application. These topics will lead to the effect of neodymium pricing on magnet pricing for the end user.

*Robert Wolf, Vice President, Alliance LLC*

### New Stemless Valve Uses Magnetic Coupling

Valve stems are one of the primary areas where valve performance fails. These failures are more serious today than they were 10 years ago because of increased safety and emissions standards that are now being required of industry. We propose the elimination of this problem by the use of a basic new valve based on Venturi Off-Set Technology (VOST). The design uses a magnetic coupling to avoid a mechanical penetration through the valve body, eliminating the need for a valve stem that is necessary with conventional valve designs.

*Robert K. Burgess CEO/Chairman, Big Horn Valve, Inc.*

### 2:40 P.M.

#### Core Loss Computational Case Studies: BLDC and SRM Machines

In electromagnetic simulations of complex machines (such as BLDC, SRM etc.), iron losses are difficult to estimate and separate into hysteresis and anomalous losses on the one hand and eddy current losses in the laminations on the other. This is due to the unavailability of specific loss data for materials and/or the difficulty of gauging instantaneous loss frequencies applicable during simulations. We have studied some modern approaches to core loss computations and applied it to two case studies; a Brushless DC Motor (BLDC) and a switched reluctance motor (SRM) that are presented in this presentation. The focus of this work is to study the status of core loss computations for such machines, apply some current methods and study the effects of geometrical and temperature variations on core loss values in these machines.

*Dr. Tanvir Rahman, Application Engineer, Infolytica Corp.*

### NEW SESSION

#### Single and Dual Air Gap Rotary Voice Coil Motors

Discover the design and manufacturing of single & dual air gap rotary voice coil motors suitable for use in small form factor external hard disk drives where high capacity and performance along with ultra-low power consumption is essential.

*James B. Money, President, JMA Development*

### 3:15 P.M. Conference Conclusion

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## Meet the Speakers

### **Walt Benecki, President, Walter T. Benecki, LLC**

Walt Benecki graduated from Penn State University in 1961-62 with B.S. and M.S. Degrees in Ceramic Engineering. In 1989, Walt was appointed President of Arnold Engineering. In 2001, he retired from Arnold and established Walter T. Benecki LLC, a consulting practice focused on the worldwide magnetics industry.



### **Terry K. Clagett, Founder, President, CEO, WebMagnetics, Inc.**

Clagett has been involved in the Global Magnetics Industry for more than 30 years. His work experience includes positions with Colt Industries, the Allen-Bradley Company and Crucible Magnetics. He currently serves the industry as a consultant specializing in International Sales & Marketing, Market Analysis and Trends. His company, WebMagnetics, Inc., offers news and information, a comprehensive industry directory, a listing of upcoming events and job listings.



### **Dr. Gareth P. Hatch, Director of Technology, Dexter Magnetic Technologies**

Dr. Gareth P. Hatch is Director of Technology for Dexter Magnetic Technologies, Inc. Dr. Hatch has been with Dexter for more than 10 years, starting as an Applications Engineer; he presently manages the Engineering, R & D and Quality functions there.



### **Dr. Giora Tarnopolsky, Founder, TarnoTek**

Dr. Giora Tarnopolsky is a data storage systems and magnetic recording expert, founder of TarnoTek, a technology and management consultancy in Palo Alto, California. TarnoTek clients include leading data storage technology companies and venture capital partnerships. Dr. Tarnopolsky lectures frequently on disk drive technology and data storage systems. He is a Contributing Editor to *Magnetics Business & Technology* magazine. He has been data-storage-systems consultant to INSIC, the Information Storage Industry Consortium.



### **R.D. Shull, Leader, Metallurgy Division, NIST**

Dr. Shull is a Materials Scientist and the Group Leader of the Magnetic Materials Group at the National Institute of Standards and Technology (NIST). He received his B.S. degree from MIT, his Ph.D. from the University of Illinois at Urbana-Champaign (UIUC), and a post-doctoral fellowship from Caltech.



### **Mark Senti, Vice President, Advanced Magnet Lab**

Mark Senti currently serves as director and vice president for Advanced Magnet Lab, Inc. (AML). Other positions include vice president of Technology, SWF Companies, in packaging automation; president/co-founder, GSMA Systems, Inc., in advanced robotics/automation systems; Manufacturing Engineer, Cray Research, Inc.



### **David Miller, Director R&D, Magnequench International, Inc.**

David Miller is the director of research and development at Magnequench and has been with Magnequench since 1999. Miller has 14 years of design and development experience. His specialties include magnetic circuit design, finite element analysis and the development of magnetization and test equipment.



### **Chris Riley, Director of Projects and Customer Support, Vector Fields Ltd.**

Chris Riley is director of Customer Support and Projects for Vector Fields Ltd. in Oxford UK. He joined Vector Fields in 1986, after previous positions with GEC Power Engineering, Compeda and Liverpool University. He is primarily concerned with applications of design software, with particular interest in electrical machines, magnetic and electric signatures from naval vessels and superconducting magnets.



### **Kaz Furmanczyk, Principal Engineer, Crane Aerospace & Electronics**

Kaz Furmanczyk is currently a principal engineer at Crane Aerospace and Electronics where he has worked for the past 18 years. His education includes a BSEE and MSEE from the Technical University of Stettin, Poland. He has more than 25 years of experience in the design and development of power conversion equipment and electrical power systems for aerospace and telecommunications.



### **Ray Radebaugh, Leader Cryogenic Technologies Group, NIST**

Dr. Radebaugh has been the Group Leader of the Cryogenic Technologies Group for NIST in Boulder, Colo., since 1995 and a physicist there since 1966. He has conducted and supervised research on measurements and models for cryogenic properties and processes, such as refrigeration and heat transfer, at temperatures ranging from about 10 mK to room temperature.



**Mitsuaki Uchida, Daido Electronics Co., Ltd.**

After graduating from Nagoya University in Japan with a major in mechanical thermal fluid dynamics, Mr. Mitsuaki Uchida joined Daido Steel in 1982 where he spent 16 years mainly as a facility engineer at the secondary processing factory. In 1998, he was transferred to one of Daido group companies, Daido Electronics. He now works at Daido Electronics Tokyo sales office.



**Mike Guthrie, Director of Engineering, Quadrant Technology**

Guthrie has been an engineer in the magnetics field for more than 25 years. He has worked for Hitachi Magnetics, the Magnequench business unit of General Motors, Stackpole Magnetics, Crumax Magnetics and Vacuumschmelze. Currently, he is the director of Engineering for the Quadrant Magnetics Group.



**Philip Keller, Marketing & Product Management, Metrolab Technology**

Philip Keller has been responsible for Marketing & Product Management at Metrolab, in Geneva Switzerland, since 2003. His career spans two continents, executive management as well as research positions and a variety of technology industries. He holds Masters degrees in Physics from Ohio State University and International Management from the University of Lausanne in Switzerland.



**Weyman Lundquist, CEO, West Coast Magnetics**

Weyman Lundquist started his career working in business development for, L'Air Liquide, where he learned the basics of introducing new technologies and developing new businesses. At West Coast Magnetics he has learned all sides of managing a company in the electronics industry. He successfully transitioned the company through a major slowdown in and has completed a number of acquisitions.

**Toshio Miyoshi, Magnetic Materials Research Laboratory, Hitachi Metals, Ltd.**

Toshio Miyoshi graduated from Osaka Prefecture University with a master's degree and has been doing research and developing for Nd-Fe-B based nanocomposite magnetic materials for eight years.



**James B Money, President, JMA Development**

James B Money started his career with IBM where he held various technical and management positions in research and engineering. He founded James Money & Associates (JMA) to pursue independent work on leading edge, innovative inventions related to various technically challenging issues confronting the data storage industry.



**Peter C. Dent, Director of Business Development, Electron Energy Corp.**

Dent's 20-year background in magnetics began in engineering for a subsidiary of Intermagnetics General Corp. in closed and open cycle cryogenic refrigerators supporting low and high temperature superconductive magnets for MRI, semiconductor and research applications. Since joining EEC in 2003, Dent has led the company's business development efforts in rare earth magnets and their applications.



**Robert Burgess, CEO/Chairman, Big Horn Valve, Inc.**

Robert "Kevin" Burgess founded BHVI as a valve manufacturing and product development company to develop the VOST valve for irrigation and commercial markets. From 1988 to 1997, Burgess managed Cloud Peak Irrigation, an irrigation service company in northern Wyoming and located in Sheridan, Wyoming.

**Robert Wolf, Vice President, Alliance LLC**

Robert Wolf has more than 25 years experience in the permanent magnet industry. Currently as the president of Data Decisions, a small privately owned consulting company specializing in market research and import / export data, he exclusively represents Alliance LLC as vice president in sales and marketing. He is also an adjunct professor of mathematics at Purdue University North Central.



**E.E. Welker, Staff Development Engineer, Polaris Rare Earth Materials LLC**

Mr. Welker was employed at Delco Remy, Magnequench International and AMR for more than 35 years. He received a BS in Chemistry and an MS in Economics from Ball State University, Muncie, IN. He is the Staff Development Engineer and Sales Coordinator at Polaris, responsible for applications engineering for Polaris customers.



## Meet the Speakers

### **V. Panchanathan, Staff Research Engineer, Polaris Rare Earth Materials LLC**

Dr. Panchanathan was a professor of Metallurgy at the Indian Institute of Technology, Chennai, India. He was employed for more than 20 years in rapidly solidified alloys, magnets and magnet materials at Marko Materials, Magnequench International and Kane Magnetics International. At Polaris, his responsibilities as staff research engineer include market development and technical assistance to customers.



### **M.L. Spencer, President, Polaris Rare Earth Materials LLC**

Mr. Spencer has varied industrial experience from General Motors and Magnequench International in powdered metal processing, industrial fire safety and alloying and rapid solidification of rare earth alloys. He is the

President of Polaris REM, LLC., a provider of rare earth materials and permanent magnets, as well as a manufacturer of magnet assemblies and custom components.



### **Jerry Selvaggi, Research Scientist, Rensselaer Polytechnic Institute**

Dr. Selvaggi received bachelor's degrees in electrical and mechanical engineering from Pratt Institute. He has masters degrees in electrical power engineering and mechanical engineering from Rensselaer Polytechnic Institute; and a masters degree from Courant Institute of mathematical sciences at New York University.



### **NEW Reszul Karim, Senior Scientist, RMD, Inc.**

Dr. Rezaul Karim received his Ph.D. in Experimental Condensed Matter Physics from Northeastern University, Boston in 1990. In 1991 he joined the Physics Department at Colorado State University as a Visiting Assistant Professor. Dr. Karim is currently a Senior Scientist in the Advanced Instrumentation Division at Radiation Monitoring Devices (RMD), Inc., where he conducts research in the field of applications of magnetic sensor technology. He is a full time employee of RMD.

### **André Beumer, Graduate Physicist, MAGSYS magnet systems**

André Beumer graduated from the "Westfälische Wilhelms-Universität Münster" in 2005, where his area of expertise was in surface science. Presently he designs magnetizing equipment for MAGSYS magnet systems. His work focuses on field simulations and solution-oriented designs countering magnetizing problems, as well as developing drafts for enhanced magnetizing equipment.



### **Hartmut Pagel, Graduate Physicist, MAGSYS magnet systems**

Hartmut Pagel studied physics at the University of Dortmund and graduated in 1992. Since 2000, he has been the International Sales Manager at MAGSYS magnet systems. At MAGSYS, he is responsible for all national sales activities as well as international with an American subsidiary and partners worldwide.



### **Richard Lee Ozenbaugh, President, Ozenbaugh Engineering**

Richard Lee (Oz) Ozenbaugh is a consultant in Checotah, Okla., specializing in magnetics and EMI filters. Previously, he was an EMI design engineer for Hopkins Engineering in San Fernando, Calif., senior filter design engineer for RFI in Long Island, N.Y., and regional engineering manager for Powertronix in Foster City, Calif. Ozenbaugh has more than 30 years of experience in the field.



### **Drew Hazelton, Principal Engineer, SuperPower, Inc.**

Drew Hazelton is currently a Principal Engineer at SuperPower, Inc. where he has worked since its founding in 2000. His education includes a BS degree in Materials Engineering from Rensselaer Polytechnic Institute and an MS degree in Mechanical Engineering from Union College. Drew has more than 27 years of experience in the fabrication and application of superconducting materials.



### **Ash Nayak, Staff Engineer, Quantum Corp.**

Ash Nayak has been working in the field of design and development of electro-mechanical devices for more than 30 years. He has substantial experience in design and application of permanent magnets with emphasis in voice coil actuators for data storage devices such as tape and disk drives. Ash currently works for Quantum.



### **Samir Kagalwala, Consultant, Wire Wound Components In Power Electronics**

Samir Kagalwala has more than 30 years of experience in bridging Design and Manufacturing of Wire Wound Components for improved products and satisfied customers. He worked for Philips Electronics, Motorola and Zenith Electronics in various capacities. He holds an MBA from DePaul University, Chicago, a B.S. in electrical engineering and a B.S. in mechanical engineering.



## Magnetics Bootcamps

These Bootcamp workshops focus on the basics of Magnetics. If you need to understand magnets better for your job, want to get more from the conference presentations or are new to the field, then **Basic - Bootcamp I** is for you. The workshop will cover the essential magnetic concepts such as hysteresis, what is magnetism, units, magnetic materials, basic processing, magnetizing and thermal effects.

If something more advanced is what you are looking for, attend the **Advanced - Bootcamp II**. There will be a brief review of the basics, then move on to self-demagnetization and loadlines, measurements, advanced process, economic analysis fo processing routes, design basics, materials selection and new materials.

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*Presented by Dr. Stan Trout, Spontaneous Materials*

May 14, 2008 (8 a.m. to noon)  
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**Register before April 4, 2008 - \$395**  
**Register after April 4, 2008 - \$495**

Basic - Bootcamp I Summary:  
Background: Assumes that one has little or no background in magnetics. Topics covered: hysteresis, what is magnetism, units, magnetic materials, basic processing, magnetizing and thermal effects

**NOTE - A separate registration fee is required for all pre-conference workshops**

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Advanced-Bootcamp II Summary:  
Background: Assumes someone has either taken a previous Bootcamp, either in Chicago or Bootcamp I, or has some basic understanding of magnetics. Topics covered: Brief review of basics, self-demagnetization and loadlines, measurements, advanced processing, economic analysis of processing routes, design basics, materials selection and new materials.

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Basic - Bootcamp I ( 8 a.m. to noon)  
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#### About the Instructor

Stan Trout has more than 30 years of experience in the permanent and rare earth industries. Dr. Trout has a B.S. in Physics from Lafayette College and a M.S. and a Ph.D. in Metallurgy and Materials Science from the University of Pennsylvania. Dr. Trout is a contributing columnist for *Magnetics Business & Technology* magazine, a consultant in the Magnetics Industry and an adjunct lecturer in physics at Alma College. Spontaneous Materials, his consultancy, provides practical solutions in magnetic materials, the rare earths, technical training and technical writing.



## EMI - From Test Data to Final Filter Design

“Why is my 60 dB filter only giving me 22 dB loss?”

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### Pricing:

#### EMI - From Test Data to Final Filter Design

*Presented by Richard Lee Ozenbaugh,  
Ozenbaugh Engineering*

**Register before April 4, 2008 - \$495**

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all pre-conference workshops**

#### About the Instructor

Richard Lee (Oz) Ozenbaugh is a consultant in Checotah, Okla., specializing in magnetics and EMI filters. He's currently consulting for Linear Magnetics Corp., MTK Electronics, STK International, Cues, Inc., Franklin Electric and several others. Previously, he was an EMI design engineer for Hopkins Engineering in San Fernando, Calif., senior filter design engineer for RFI in Long Island, N.Y., and regional engineering manager for Powertronix in Foster City, Calif. Ozenbaugh has more than 30 years of experience in the field. He received an AA degree in mathematics from the University of Nebraska, Lincoln and an E.E. degree from Capitol Radio Engineering Institute in Washington, D.C.

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