

Panel Discussion

Magnetics 2016

Jacksonville, Florida

January 22, 2016

**“What’s in Store for the
Global Magnet Industry?”**

Panelists

- **Walt Benecki**, *Moderator, President, Walter T. Benecki LLC*
- **Dr. John Ormerod**, *Sr. Technology Advisor, Magnet Applications Inc.*
- **Steve Constantinides**, *Director of Technology, Arnold Magnetic Technologies Inc.*
- **Yutaka Yoshida**, *Sr. Mgr., Tech. Support at Daido Steel America*

Discussion Outline

- Brief introduction of participants
- 5-6 key questions about the future of the permanent magnet industry
- Questions from the audience

Walter T. Benecki LLC

**The Consultancy Confidentially
Serving the Global Magnet Industry**

**Strategic Planning - Benchmarking - Acquisitions -
Joint Ventures - Dispositions - Pricing Strategy -
Technology Assessments – Business Planning**

3720 S. Ocean Blvd., Suite 702

Highland Beach, FL 33487

Phone: (847) 624-1170

Email: waltbenecki@aol.com

Web Site: www.waltbenecki.com

Walter T. Benecki LLC

New Consultancy Model – Effective April 2016

- *Comprehensive Bi-Monthly Newsletter*
- *Timely Email News Alerts*
- *Unlimited Confidential Telephone or Email Consultation*
- *Two Complimentary Copies of “The Global Permanent Magnet Industry”*
- *Advance Copies* of all presentations and published articles

Magnet Applications, Inc.

- Visit the website at: <http://magnetapplications.com>
- A Bunting Magnetics Company:
<https://buntingmagnetics.com/>
- Largest North American manufacturer of compression bonded NdFeB and injection molded ferrite and NdFeB magnets.
- Supply full range of engineered magnets and magnetic assemblies.
- Located in DuBois, PA – Originally established in UK over 50 years ago – sister company located in Berkhamsted, UK..
- Primary applications are BLDC motors and sensors in the automotive, medical and industrial markets.

Magnet Applications, Inc.

- Pre-production magnetic design services including 3D magnetic modeling
- Industry leading technical services to optimize the material for the application
- Investing in R & D for next generation of magnetic materials
- The backing of strong family ownership – in business for over 55 years
- ITAR / DFARS registered for Defense Industry
- ISO-9001 Certified Quality System with continuous improvement
- Very strong international supply chain for the complete range of permanent magnet materials

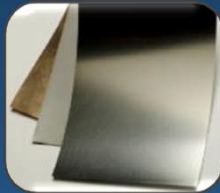
What Arnold does...

Performance materials enabling energy efficiency



Magnet Production & Fabrication

- Rare Earth Samarium Cobalt (RECOMA®)
- Alnico, cast & sintered
- Injection molded
- Flexible magnets



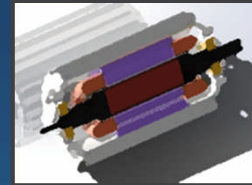
Precision Thin Metals

- Magnetic and non-magnetic metals & Alloys from 1.75 microns
- Sheets, Strips, & Coils
- Milling, Annealing, Coating, Slitting
- ARNON® Motor Lamination



Magnetic Assemblies

- Precision Component Assembly
- Tooling, Machining, Cutting, Grinding
- Rotor Balancing
- Sleeving








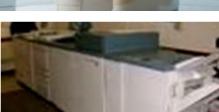


Ultrahigh Performance Motors

- Smaller, faster motors
- Power dense package
- High RPM magnet containment
- >200°C Operation

Engineering | Consulting | Testing
Stabilization & Calibration | Distribution

Broad market base & global presence

	Advertising & Promotional	15%
	Aerospace & Defense	15%
	Automotive	10%
	Consumer & Appliance	10%
	Energy	15%
	Industrial	20%
	Medical	5%
	Reprographic Systems	10%

Facilities, Engineering, Sourcing & Support

– North America

- ~50% of Revenue

– Europe

- ~30% of Revenue

– Asia Pacific

- ~20% of Revenue
- Low cost region manufacturing since 1995

Daido Steel Group Magnet Business

Daido Steel Co., Ltd.



Magnet R & D

Est. 1916, Nagoya/Tokyo, Japan
Specialty steels, forgings, powders,
automotive components, and
electronic/industrial materials

Daido Electronics Co., Ltd.



Est. 1990, Nakatsugawa, Japan
NEOQUENCH-P, NITROQUENCH-P,
NEOQUENCH-DR magnets & applied
products



Daido Electronics (Thailand) Co., Ltd.

Est. 1994, Ayuthaya, Thailand
NEOQUENCH-P magnets for hard disk drive
spindle motors, also NEOQUENCH-DR



Daido Electronics (Shenzhen) Co., Ltd.

Est. 2002, Shenzhen, China
NEOQUENCH-P magnets for sensors and
small motors



Daido Electronics (Suzhou) Co., Ltd.

Est. 2003, Suzhou, China
NEOQUENCH-DR magnets for EPS and
servo motors



Intermetallics Japan

Est. 2011, Nakatsugawa, Japan
PLP (Press-less Process) NdFeB sintered
magnets



Daido Electronics Europe Office

Est. 2015, Frankfurt, Germany
Sales/technical support

Daido Steel (America) Inc.

Est. 1983, Schaumburg, IL, USA, Sales/technical support



Yutaka Yoshida, Sr. Manager, Technical Support

Daido Steel Group Magnet Business

- NEOQUENCH-P**

Isotropic Polymer-bonded NdFeB (MQ1)

- Injection-molded: 4 - 9 MGOe
- Compression-molded: 7 - 12 MGOe

- NEOQUENCH-DR**

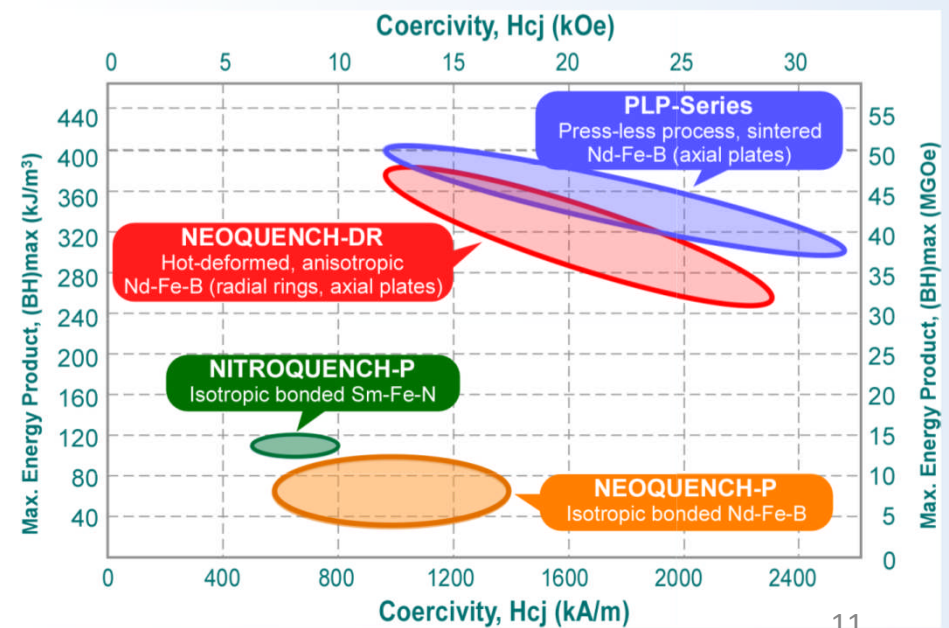
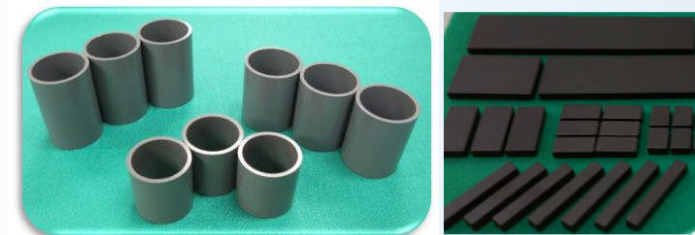
Hot-extruded, radially-oriented NdFeB (MQ3):
31 - 43 MGOe

- NITROQUENCH-P**

Isotropic Polymer-bonded SmFeN:
14 MGOe

- PLP series**

Press-less Process Sintered NdFeB:
38 - 50 MGOe



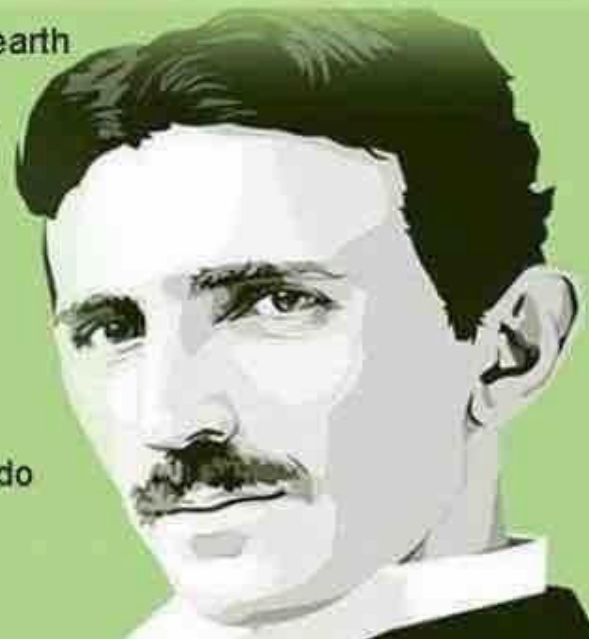
Not to put too much pressure on our esteemed panel....

- But here are a few predictions made 90 years ago:

Nikola Tesla describing a cell phone back in 1926...

"When wireless is perfectly applied the whole earth will be converted into a huge brain, which in fact it is, all things being particles of a real and rhythmic whole. We shall be able to communicate with one another instantly, irrespective of distance. Not only this, but through television and telephony we shall see and hear one another as perfectly as though we were face to face, despite intervening distances of thousands of miles, and the instruments through which we shall be able to do all of this, will fit in our vest pockets."

Nikola Tesla 1926



Question #1

- We know that the magnet industry is facing considerable unknowns regarding the current legal battle between Hitachi and the consortium of Chinese manufacturers.
- We're scheduled to hear the US Patent Office's "Decision" very shortly.
- *Is there anything positive here we can look forward to?*

Recent Rare Earth Raw Material Price Trends

(Not much of a trend)



Permanent Magnets Significantly Influence The Global RE Industry

(Quotes from *Argus Consulting Services – Jan 2016 Webinar*)

- Rare earth prices have steadily trended downward since 2011.
- Permanent Magnets account for about 20% of global REO tonnage, but 60% of the total dollars.
- Magnet demand is forecasted to increase 3-4% in the next few years.
- Chinese policies will continue to materially impact REO prices.
- The outlook (for REO prices) is “uncertain”.

Permanent Magnets Significantly Influence The Global RE Industry

(Quotes from Global Rare Earth Metals Market 2015-2019 Report – Jan 2016)

- **Analysts predict the rare earth metals market to grow at a rate of 14% during the forecast period.**
- **Primary growth drivers will be use of rare earth metals in the wind energy sector (magnets!) and NiMH batteries.**
- **Despite a broad scope of application and a growing demand, the supply of these elements (REO's) is geographically concentrated with the dominance of a few countries.**
- **(The) expansion in the (REO) supplier base will drastically change the supplier landscape and is expected to lead to a softening of prices going forward.**

The REO Outlook is Muddled

- **Molycorp is reportedly “Going up for auction” in March.**
- **Lynas continues on with gradual progress.**
- **Projections for future REO demand vary quite a bit.**
- **The Magnet Industry is certainly a significant consumer of Rare Earths.**
- **It appears that China will continue to dominate the global production (and prices) of rare earth materials.**
- **Chinese government policies are like “shifting sands”.**

Question #2

- Molycorp is reportedly “Going up for auction” in March.
- Lynas continues with challenges, but is hanging in there.
- Projections for future REO growth vary quite a bit.
- The Magnet Industry is a significant consumer of Rare Earths.
- It appears that China will continue to dominate the global production (and prices) of rare earth materials.
- Chinese government policies are like “shifting sands”.
- ***How can anyone plan for future price trends?***

New Technology Investments

- **Arpa-E, DARPA and EUREFREE have recently spent many millions of dollars searching for a “breakthrough magnet material” containing no rare earths. But....not much to report at this point!**
- **Most “new” magnet product development by industry over the past 5-7 years could best be described as “incremental”.**

Question #3

- Siemens was recently (in 2015) awarded a US Patent covering **MnBi** permanent magnet technology
- Niron Magnetics continues to pursue **Fe₁₆N₂** magnets with the University of Minnesota
- *Is there any reason to expect a truly significant technology breakthrough in the next few years?*

Question #4

- The Chinese magnet industry is reportedly suffering from severe over-capacity. This appears to be good for buyers and bad for sellers.
- *Is there a chance for any significant consolidation within the Chinese magnet industry? What about Europe or North America?*

Question #5

- A number of companies are currently attempting to recycle rare earth magnets (e.g., from disk drives and PM motors)
- *Is there any reasonable chance such initiatives will prove to be economically viable?*

Question #6

- **Finally, what are the applications that could potentially accelerate future demand for permanent magnets? A few candidates:**
 - Wind turbines
 - Electric vehicles
 - Magnetic refrigeration
 - Advanced consumer electronics
 - Energy efficient PM motors
 - Energy storage systems
 - Additive manufacturing
 - Something not on today's radar screen

Questions from the Audience

*Thank you for your
participation!*