

The Permanent Magnet Industry Reference Book

by

Walter T. Benecki

It is common to strike up a conversation on an airline flight and be asked the question, "What industry do you work in?" My answer is, "I'm involved in the magnet industry." The resulting blank look on my fellow passenger's face makes it clear that he's reflecting on the realtor's magnetic calendar holding the children's homework on the refrigerator. The average Joe has little appreciation of how many magnets are utilized in everyday products!

Permanent magnets are used in devices for one primary reason: to provide magnetic flux. The magnetic flux is necessary to achieve one of the following: (1) to detect a magnetic field, as it does in sensors, (2) to create a force or torque, as in motors, speakers and actuators, (3) to generate a voltage, as it does in generators and alternators, (4) to create a uniform and strong magnetic field, as in MRI systems, or (5) utilize the magnetic field for holding or separation systems.

Magnets are found in an overwhelming number of end applications, with the majority of the magnets hidden from sight. The breadth of permanent magnet applications is massive, from missile guidance systems to a variety of medical tools, or that calendar hanging on your refrigerator!

No discussion regarding the applications for permanent magnets can overlook the significance of permanent magnet motors. The vast majority of all magnet applications involve permanent magnet motors. They offer a number of distinct advantages to the motor designer and magnet user: (1) PM motors are more energy efficient, (2) they require less maintenance, (3) they offer simplified construction and the flexibility for a smaller package size, and (4) they often offer superior performance characteristics, including higher torque and power density.

Most PM motors are relatively small, some so small that you could easily hold dozens of them in one hand! However, other permanent magnet motors can be rated well over 1,000 horsepower and weigh in excess of five tons! The importance of permanent magnet motor applications can be clearly observed in Table I. Over 50% of all ferrite magnets produced in the world are found in motors!

Table I
2016 Application Mix of Sintered Ferrite Magnets

Primary Applications	% of Total Production by Weight
Automotive Motors	18
Appliance Motors	13
HVAC Motors	12
Industrial/Commercial Motors	12
Loudspeakers	11
Separation Equipment	8
Holding & Lifting Equipment	6
Advertising/ Promotional	5
MRI	3
All Other	12
TOTAL	100%

In January, 2017 we will be formally announcing the availability of the Third Edition of “The Global Permanent Magnet Industry”. This unique 340-page reference book is the result of 1,000’s of hours of research and editing and will include the following: (1) a comprehensive global magnet industry directory, (2) a chapter summarizing the technical basics of permanent magnets written by Dr. Stan Trout, (3) an extensive listing of over 1,200 applications for permanent magnets, (4) a unique glossary of the language of the magnet industry, including both technical and commercial terminology, and (5) a 30-year library of approximately 170 books covering permanent magnet technology, permanent magnet motors, and a variety of other applications that depend on permanent magnets.

The directory section of the book is separated into four segments: (1) The Americas, including North, Central & South America, (2) Europe - Africa, including the Middle East, (3) Mainland China, and (4) Asia-Pacific, including Japan, Russia, India, New Zealand and Australia.

The directory identifies a total of 1,350 companies, including magnet manufacturers, magnet distributors and fabricators of magnetic assemblies. Each listing includes appropriate location and contact information, as well as a description of each company’s products and capabilities. Table II summarizes the overall geographic scope of this directory.

Table II –Listings by Location

Country	#	%
China	670	49.6%
United States	240	17.7
India	76	5.6
Germany	59	4.4
Italy	35	2.6
United Kingdom	32	2.4
Japan	23	1.7
Canada	18	1.3
France	18	1.3
Australia	15	1.1
All Other*	164	12.3%
Total	1,350	100.0%

* Other countries (listed alphabetically) include: Argentina, Australia, Belarus, Belgium, Brazil, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iran, Israel, Italy, Latvia, Luxembourg, Malaysia, Macau, Mexico, The Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, The Slovak Republic, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, U.A.E., Ukraine and Vietnam.

It’s no surprise that the majority of magnet companies are located in Mainland China. Today, over 70% of the world’s production of NdFeB magnets (by tonnage) occurs in China. China has also established itself as the primary producer of most magnetic materials, including sintered ferrite, Alnico and Samarium Cobalt.

Western magnet buyers can certainly purchase directly from Chinese sources, but they should be prepared to fund a minimum of 1-2 trips per year for visits to their magnet suppliers to work through normal service and quality issues. Three challenges must always be dealt with: the geographic and time zone separation, language issues that can occasionally lead to misunderstandings, and basic cultural business differences.

A viable option for Western magnet buyers is to use local distributors who can exercise their purchasing power to manage multiple magnet sources in China. In addition to the advantage of the distributor managing a broader supply base, the distributor can provide local application engineering assistance, and carry inventory to provide for much more reliable delivery performance.

Many Western distributors have their own employees on the ground in China to manage their magnet supply base. Some have actually established their own operations in China to manufacture magnets or magnetic assemblies. In summary, utilizing a local distributor can often represent the magnet user's best option!

Before deciding to purchase products from *any* company, but particularly in Mainland China, it is strongly recommended that one visits the prospective supplier, meets and sizes up their management team, verifies their manufacturing capabilities, and audits their quality and process control procedures. Everything that is claimed in web sites, advertisements, corner offices (or directories) must be verified!

In addition to the directory portion of this book, the reader will benefit from the technical tutorial and the identification of more than 1,200 specific applications for permanent magnets. The unique glossary and library sections of this book also provide the reader with easy reference capability to better understand the language of the magnet industry and the technology and applications of permanent magnets.

This valuable reference book is intended to benefit the following individuals or organizations:

- Magnet producers attempting to identify potential new customers
- Industry participants conducting competitive analysis
- Magnet users seeking to identify new sources for magnets
- Suppliers of goods and services to the permanent magnet industry
- Individuals interested in employment in the magnet industry
- Financial investors considering strategic investments
- Industry participants assessing acquisition or divestment opportunities
- Introducing new employees to the permanent magnet industry

Dr. John Ormerod and Dr. Stan Trout generously assisted in writing or editing a number of sections of this book. We very much appreciate the exceptional contributions made by these esteemed industry colleagues.

We will be presenting additional perspectives on this expanded magnet industry reference book at the Magnetics 2017 Conference, January 18-19 in Orlando, Florida.

About the Author - *Walter T. Benecki was president of Arnold Engineering (now Arnold Magnetic Technologies) from 1989-2001 and served as president of the Magnetic Materials Producers Association from 1994-1997. In 2001, Walt established his consultancy serving the global magnetics industry. Walt has been a principle or strategic advisor for more than fifteen successful acquisitions, dispositions or joint ventures within the global magnetics industry. For additional information, visit: www.waltbenecki.com.*



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