

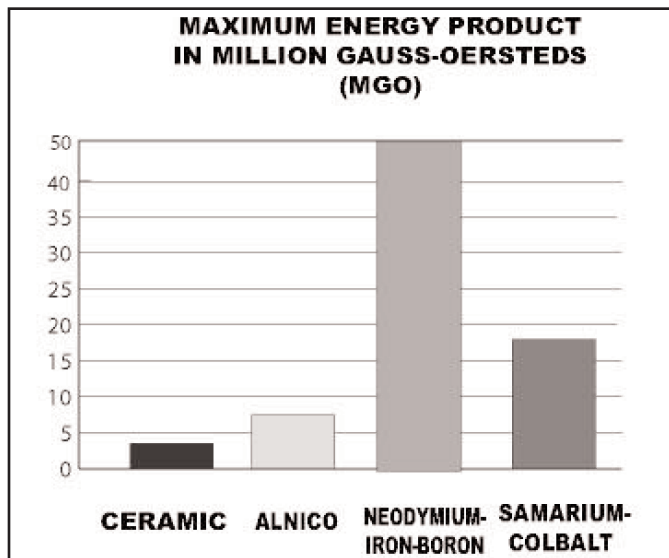
HIGH-ENERGY RARE EARTH MAGNET MATERIAL

HIGH-TECHNOLOGY COMES TO MAGNETS

One of today's greatest breakthroughs in magnetic technology is the introduction and utilization of powerful rare earth material in magnetic applications. Terms such as *curie temperature*, *reversible temperature coefficient*, and *intrinsic coercivity* are common place in the magnet industry's vocabulary. The addition of rare earth magnets brought even more complex formulas and terminologies into the picture. Today, a magnet is really more than "just a magnet". To help you with your responsibilities of planning a magnetic system for a application Magnetic Products, Inc. has taken all this information and presented it in this bulletin.

Simply stated, Rare Earth magnet materials are "high-energy" magnets offering 8 to 10 times the magnetic force of conventional ceramic magnet material and 3 to 5 times that of Alnico magnet materials. This increased magnetic force allows magnetic separation and material handling systems to use a much smaller volume of magnet material, allowing for smaller systems, increased magnetic force, and more efficient removal and retention of ferrous contaminants.

Rare Earth permanent magnet material is currently available in two alloy forms—Neodymium-Iron-Boron ($\text{Ne}_2\text{Fe}_{14}\text{B}$) and Samarium-Cobalt (SmCo_5). The physical properties of both alloys allow for greater magnetic field strengths and stronger holding forces at the magnet's surface than ceramic or alnico alloys. Basic differences between Neodymium-Iron-Boron and Samarium-Cobalt alloys are in their composition, density, maximum energy product, curie temperature, and operating temperature range (see accompanying chart). These differences become important when designing magnets with high temperature environments.



WITHOUT PLANNING, MORE POWER DOES NOT ALWAYS MEAN BETTER...

Increased magnet field strength alone does not assure you of 100% success in your magnetic application. In addition to the magnet's strength, spacing, and pole configuration several

RARE EARTH COMPARISON CHART		
PHYSICAL PROPERTIES	NEODYMIUM-IRON-BORON	SAMARIUM-COBALT
DENSITY	.271 #/CU. IN.	.300 #/CU. IN.
MAX. ENERGY	23 - 40 MGO	16 - 24 MGO
COMPOSITION	IRON	COBALT
OPERATING TEMPERATURE	-40°F to 250°F	-40°F to 450°F
PHYSICAL SHAPES	DISKS AND RECTANGULAR FROM .125" THICK & UP	DISKS AND RECTANGULAR FROM .125" THICK & UP

other factors must be dealt with to design the most effective magnetic circuit. A properly engineered magnetic system utilizing rare earth magnetic material can readily accomplish what previously was thought to be too expensive or too difficult a magnetic application. The ability to compact the magnet, and yet retain its high power, allows for installations that require lighter weight, while offering an efficient operating systems that reduces the overall space requirements as well.

Rare Earth magnetic components and systems can be designed to retrofit your existing equipment, or new custom installations can incorporate this latest technology and improve your tramp iron removal for improved product purity and quality. MPI's magnetic equipment utilizing Rare Earth material include:

- Drawer and housing magnets
- Pneumatic Line Magnets
- Magnetic Grates and Tubes
- Self-Cleaning Spout Magnets
- Round Spout and Standard Plate Magnets
- Magnetic Chutes, both manual and self-cleaning
- Free Flowing Cylinder Magnets, manual and self-cleaning
- Magnetic Drums and Separation Roll Magnets
- A wide variety of Holding and Fixturing Magnets
- Conveying Rails and Pulleys

MPI HAS YOUR "HIGH-ENERGY" SOLUTION

Detailed product bulletins are available on all the above MPI magnetic separators and material handling equipment. Our engineering service and evaluation of your current magnetic system are available free of charge. When requesting information for your requirements, be sure to include the dimensions of your equipment, type of product, rate of flow and magnet application.

With over 100 years of collective experience in the industry, MPI is ready to provide the product testing, recommendations and the assistance to your application requirements. To find out more about how rare earth magnets can improve your existing magnet systems or for a new magnet application, consult your local sales representative or contact our factory.



Magnetic Products, Inc.

Providing Magnetic Solutions for the Material Handling Industry



*Providing Magnetic Solutions
For The Material Handling Industry*

COMPARATIVE PROPERTIES OF MAGNET MATERIAL

MAGNET MATERIAL	RESIDUAL FLUX DENSITY (BR GAUSS)	COERCIVE FORCE (HC)	MAX. ENERGY PRODUCT (MGOe)	MAXIMUM OPERATING TEMP. (°F)
MAGNET RUBBER A*	1,800	1,460	0.8	175°F
MAGNET RUBBER B*	2,300	1,900	1.2	200°F
ALNICO 2	7,500	750	1.7	840°F
ALNICO 5	13,500	740	7.5	930°F
CERAMIC 1	2,250	1,950	1.1	480°F
CERAMIC 5	3,800	2,400	3.4	480°F
CERAMIC 8	3,850	2,950	3.5	480°F
RARE EARTH SAMARIUM COBALT 16	8,200	8,000	16.0	480°F
RARE EARTH SAMARIUM COBALT 18	8,700	8,400	18.0	480°F
RARE EARTH NEODYMIUM-IRON-BORON 27	10,500 / 11,200	8,000 / 9,000	25.0 - 28.0	250°F
RARE EARTH NEODYMIUM-IRON-BORON 30	11,200 / 12,000	8,000 / 9,500	29.0 - 32.0	250°F
RARE EARTH NEODYMIUM-IRON-BORON 35	11,800 / 12,500	8,000 / 10,000	33.0 - 36.0	250°F
RARE EARTH NEODYMIUM-IRON-BORON 40	12,000 / 12,900	8,000 / 12,400	37.0 - 40.0	250°F
RARE EARTH NEODYMIUM-IRON-BORON 45	13,200 / 13,800	10,500 / 11,000	42.0 - 46.0	250°F
RARE EARTH NEODYMIUM-IRON-BORON 48	13,700 / 14,300	10,500 / 11,000	45.0 - 49.0	250°F

* Magnetic Rubber "A" is low energy rubber. Magnetic Rubber "B" is high energy rubber.



Magnetic Products Inc.

P.O. Box 529 • 683 Town Center Dr. • Highland, MI • 48357

TOLL FREE: **800-544-5930 • 248-887-5600**

FAX: **248-887-6100**

EMAIL: **info@mpimagnet.com**

www.mpimagnet.com