

The History of Magnets



600 BC *Stone Cold Mystery*

A Greek shepherd named "Magnes" described a mysterious stone that attracted iron and other pieces of the same stone.

What's in a Word?

The word "magnet" came from a city in Asia Minor, called Magnesia, (today called Manisa, in modern day Turkey) where many magnetic stones were found.

1740

The first artificial magnet for commercial use was created by Dr. Gowen Knight (by using powdered iron scales and linseed oil, then molded into shape).



1750

The paper "Treatise of Artificial Magnets" was published by John Mitchell, the father of magnetometry.

1855

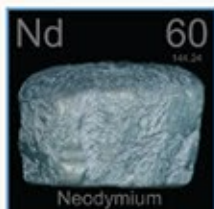
English scientist Michael Faraday furthered the study of electromagnets and discovered electromagnetic induction.



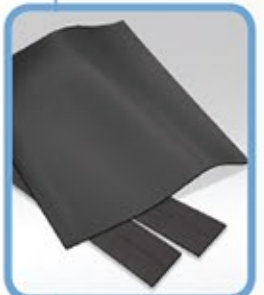
1885 *Finding Neo*



Austrian chemist Carl Auer von Welsbach discovered neodymium by separating it from another element called ceria.



1934 *Be Flexible*



Max Baermann invented the first flexible magnet, also called "magnetic rubber."

1966

Dr. Karl Strnat, a researcher at the U.S. Materials Laboratory, discovered and filed a patent for the rare earth magnet samarium cobalt (SmCo5).

1976 *A New Source*



Master Magnetics, Inc., a.k.a. The Magnet Source, was founded in Castle Rock, Colorado by Jack Nellessen.

1993 *Magnets in Ohio*



Master Magnetics opened a second facility, located in Marietta, Ohio, specializing in flexible magnetic sheeting and strip.

2010 *More, More, More*



Demand for rare earth materials reached 125,000 tons worldwide.



12 BC *Pointing the Way*

Mariners' compasses widely used for exploration.

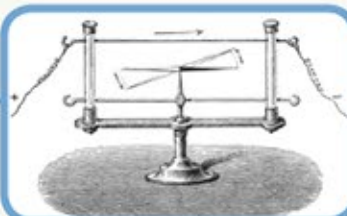


1600 AD

England's William Gilbert wrote the book "De Magnete", which paved the way for more modern science by realizing the Earth itself was magnetic.



1820 *It's Electric!*



Dutch scientist Hans Christian Oersted discovered that an electric current produced a magnetic field, which was the beginning of the study of electromagnetism. French physicist Andre Ampere continued this study.

1880 *What the Flux?*

Flux: Faraday's theories were translated into mathematical expressions by James Maxwell. A unit of magnetic flux is referred to as a Maxwell.

$$\begin{aligned} \nabla \cdot \mathbf{D} &= \rho \\ \nabla \cdot \mathbf{B} &= 0 \\ \nabla \times \mathbf{E} &= -\frac{\partial \mathbf{B}}{\partial t} \\ \nabla \times \mathbf{H} &= \mathbf{J} + \frac{\partial \mathbf{D}}{\partial t} \end{aligned}$$

1917

Cobalt is added to tungsten steel by Honda and Takai to increase the coercive force of permanent magnets.

1931

Alnico magnets containing alloys of iron, nickel and aluminum is invented by T. Mishima.



1952



The Phillips Company began commercial production of ceramic magnets.

1972 *Rare Earth Progress Continues*

Dr. Strnat and Dr. Alden Ray advanced the progress of rare earth magnets with the development of another samarium cobalt compound (Sm2Co17).

1983

The first neodymium magnets were created by General Motors, Sumitomo Special Metals and the Chinese Academy of Sciences. These widely used magnets are a neodymium, iron and boron compound (Nd2Fe14B).



2003 *Patent Relief*

Many rare earth manufacturing patents began expiring in the U.S., which opened the door to new manufacturing opportunities.

2013

U.S. established a \$120M research center, the Critical Material Institute (CMI), to further the development and production of rare earth magnets.

2016 *A Magnetic Milestone*

Master Magnetics, Inc. celebrates its 40th Anniversary.