History of Magnets

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The story of magnets stretches from ancient discoveries to modern technological marvels.

Ancient Beginnings (c. 600 BC)

- The history of magnets begins with the discovery of **lodestone**, a naturally magnetized form of the mineral **magnetite (Fe_3O_4)**.
- This discovery is often attributed to the ancient Greeks in a region called **Magnesia** (modern-day Turkey), from which the word **"magnet"** is derived.
- According to legend, a shepherd named **Magnes** noticed his iron-nailed shoes and staff were attracted to a magnetic rock.
- In **ancient China**, lodestone was used to create the **first compasses** between 200–100 BC, marking a significant advancement in navigation.

The Scientific Revolution (c. 1600)

- For centuries, magnets were mostly a curiosity.
- In **1600**, **William Gilbert** published **"De Magnete"**, the first major scientific study on magnetism.
- He described the properties of magnets systematically and was the first to propose that **Earth itself is a giant magnet**, explaining why compasses point north.

The Link to Electricity (c. 1820)

- A major breakthrough came in **1820** when **Hans Christian Ørsted** discovered that an **electric current could deflect a compass needle**, demonstrating a connection between electricity and magnetism.
- This led to the invention of the **electromagnet** by **William Sturgeon** in **1824**.

Modern Artificial Magnets (20th Century)

The 20th century saw the development of powerful artificial magnets:

- **KS Steel (1917)** – by **Kotaro Honda** and **Hiroshi Takagi**
- **MK Steel (1931)** – by **Tokushichi Mishima**
- **Ferrite Magnets (1933)** – by **Yogoro Kato** and **Takeshi Takei**
- **Neodymium Magnet (NdFeB, 1982)** – by **Masato Sagawa**, still the **strongest permanent magnet** today.

Properties of Magnets

Magnets have several fundamental properties that define their behavior.

Attractive Property

- Magnets exert a force that attracts **ferromagnetic materials** such as **iron, cobalt,** and **nickel**.
- This attractive force is strongest at the **ends (poles)** of the magnet.

Poles

- Every magnet has two poles: a **North Pole** and a **South Pole**.
- If a magnet is cut in half, you do **not** get separate north and south poles; instead, you get **two smaller magnets**, each with its own north and south pole.

Attraction and Repulsion

- **Opposite poles attract** (North attracts South).
- **Like poles repel** (North repels North, South repels South).

Directive Property

- A freely suspended magnet will align itself with the **Earth's magnetic field**, pointing its north pole toward the **Earth's geographic North Pole**.
- This is the basic principle behind the **compass**.

Magnetic Field

- A magnet produces an **invisible magnetic field** in the space around it.
- This field exerts force on other magnetic materials.
- **Magnetic field lines** form **continuous closed loops**, emerging from the north pole and entering the south pole.

Origin of Magnetism

- At the atomic level, **magnetism is caused by the movement of electric charges**.
- In **permanent magnets**, this is primarily due to the **aligned spins of electrons** within the atoms of the material.

Web References

magnetsource.com

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