

Types of magnets essay



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Objects having magnetic field is called as magnets.

Normally magnets are of two types- Permanent magnets and Electro magnets. Permanent magnets are those magnets which occur in nature and do not depend upon external source for their magnetic field. On the other hand electromagnets are those magnets which use electric current to generate magnetic field. Classification of Magnets There are different types of magnets with different physical and magnetic properties and strength.

These magnets are used in various industrial and non industrial applications and be categorized as follow Rare Earth Magnets: Made from alloys of rare earth elements, rare earth magnets are strong permanent magnets. As they are stronger than ferrite or alnico magnets, the magnetic fields produced by them are also higher. Rare Earth magnets re useful in the following ways

- They are used in computer hard drives.
- Rare earth magnets also find their utility in high-end speakers.
- Useful in experiment with diamagnetic levitation.

- Helpful in the study of magnetic field dynamics.
- They are also studied for superconductor levitation.

Alnico Magnets: Alnico is an alloy produced by mixing aluminum, nickel and cobalt with certain addition of other metals like copper, iron and titanium. Capable of producing strong magnetic field, it has an excellent linear temperature characteristics and has wide industrial applications

Types of Alnico Magnets On the basis of manufacturing process and application alnico can be grouped into following types:

- Cast Alnico
- Sintered Alnico
- Bar Alnico

Alnico magnets have applications in the following areas:

- Electric motors
- Electric guitar pickups
- Sensors

- Loudspeakers
- Cow magnets
- Automotive and electronic sensors
- Actuators
- Hall effect sensors
- Magnetron
- Reed switches
- TWT amplifiers

• Communication Bonded Magnets Alnico bonded magnets are those engineering products that are manufactured by using various techniques and various ingredients.

They are available in various shapes, sizes and are used for various industrial applications. They are used in laser printer rolls, motor magnets, color monitors etc

Types Bonded magnets are prepared by using various techniques, materials and methods. Each type of alnico bonded magnets has their own peculiarities, features and applications. Different types of polymer bonded magnets are as follows:

- Injection Molded Magnets
- Flexible Bonded Magnets
- Compression Magnets
- Bonded NDFEB Magnets
- Bonded ALNICO Magnets
- Bonded Samarium Cobalt Magnets
- Bonded Ferrite Magnets

Ceramic Magnets Ceramic magnets are permanent magnets made up of a composite of iron oxide and barium/strontium carbonate. Through pressing and sintering ceramic magnets are made. These magnets are also made in different grades.

They are widely used magnets with good magnetic strength and resistance to demagnetization. The color of ceramic magnet is charcoal gray and they normally appear in the forms of discs, rings, blocks etc

Ceramic magnets find their applications in the following fields:

- DC permanent magnet motors
- DC brushless motors
- Speaker magnets
- Magnetic resonance imaging
- Separators that is it separates ferrous material from non-ferrous materials
- In magnetic assemblies meant for lifting, holding, retrieving, and separating
- Food processing industries

Channel Magnets Channel bar magnets are

permanent magnets which find their applications in removing iron from less contaminated materials like rice, flour, glaze, slip, glass, mineral powder, slurry, chemical, liquid material, food products etc. The channel magnet comes in many shapes, sizes and strength to meet the specific purpose. These magnets are ideally suited to remove tramp iron from material carried in chute. They also have great utility for chemical slurry.

These magnets have pole at their ends which are marked by the arrows The alnico channel bar magnets are used for various purposes like:

- Tool holder
- Sign holder
- License plate holder
- Can be mounted in the track of aluminum windows and sliders

Electro Magnets An electromagnet consists of a coil of wire wrapped on an iron core and generates magnetic flux when electricity is allowed to pass through it. The coil forms the shape of the tube which is called as solenoid. If ferromagnetic material is placed inside the coil much stronger magnetic field can be created. Much stronger magnetic fields can be produced if a “ core” of paramagnetic or ferromagnetic material (commonly iron) is placed inside the coil. Types of Electromagnets On the basis of construction and usage custom electromagnets are of two types:

- Horizontal Electromagnets
- Vertical Electromagnets

Electro magnets have wide industrial and non industrial applications which are as follows:

- Circuit-breakers
- Cars, they are used in electromagnet brakes and clutches.

Electric motors too are electromagnets.

- Electromagnets are used in solenoid valves and door locks.
- They are also used in a rotary electric motor to produce a revolving magnetic field that spins the rotor.
- In linear motors, they produce a moving magnetic field that thrusts the projectile.

•Electromagnets are used in particle accelerators. •Nuclear magnetic resonance studies •Magnetic susceptibility measurements •Hall effect studies •Magnetic hysteresis studies •It is also used in electric motors •Doorbells •Electric generators •Loudspeakers •Television receivers •Atomic particle accelerator Ferrite Magnets Ferrite magnet sometimes called as ceramics are electrically non-conductive magnets which are manufactured since 1954. It consists of iron oxides such as Hematite (Fe_2O_3) or Magnetite (Fe_3O_4) with traits of other metal oxides. Though with respect to other magnets they provide less energy they are very stable and high resistance to demagnetization.

They have high permeability and in saturated state they conduct a magnetic flux which allows them to store stronger magnetic fields than iron. Ferrite magnets have following applications: •Electronic inductors •Transformers •Computers •Loud speakers •In radar as absorbing particles Industrial automation •Conveyor belts •Electric motors •Magnetic separators •Magnetic resonance imaging Funnel Magnet The funnel magnets are strong anisotropic permanent magnets with special configuration and are normally enclosed in a cylinder. They are available in different sizes and width and are used for different industrial applications. The funnel magnets consist of permanent anisotropic magnets like ferrite or rare earth magnets. Funnel magnets have many industrial applications like: •Ceramic glazes •Colors •Oil •Chemical industries Industrial Magnets Magnets manufactured for industrial usage are called industrial magnets. There are different types of industrial magnets which are meant for serving different purposes.

These include individual magnets, bulk magnet materials, magnetic assemblies, magnetic sweepers, magnetic lifts, magnetic sheet handlers, magnetic retrievers, and permanent electromagnet combinations. Two major aspects which should be considered while selecting these magnets are strength and holding force. The maximum energy product is also known as the magnet strength or grade. The force which the magnet is capable of holding under ideal conditions is called as the holding force. There are certain things like the size and shape of the parts, the surface conditions, motion, vibration, friction, holding angles, and machining forces which affects the holding force of the magnet Shapes and Sizes These magnets come in the following shapes of different sizes: •Block or bar flexible strip or sheet •Sheet or slab •Rod •Powder •Horse shoe or U-shaped •Button or pot •Round ring or disc and sphere bead arc segment •Rotor or poles Types There are different types of industrial magnets with different magnetic strength, flexibility, brittleness, tensile strength, density etc.

The types of magnets which are used for various purposes are ceramic, alnico, neodymium, samarium cobalt, bonded neodymium etc. These magnets have wide applications both industrial and non industrial. Some of the important applications of the industrial magnets are: •Sensors •Rotary motors •In servo motors •Pump couplings •Satellite system •Linear actuators •Computer disc drive •Electric motors •Loudspeaker •Automotive and electronic sensors Latch Magnets Latch magnets are important magnets that are used for locking doors, windows, pool gates etc. These are powerful and reliable safety magnets that are used widely. The latch magnets come in

various shapes, sizes and width depending upon the applications. There are various ways by which latch magnets are created.

For example, ceramic or magnet are placed between two zinc-plated steel pole pieces to form latch magnet assembly which are held together magnetically. Normally the latch magnets have a center hole for mounting.

Types of Latch Magnets Depending on the functions and configuration latch magnets are of following types: •Super Latch Magnets Super latch magnets are powerful magnets which can lift, hold or retrieve metal objects up to hundred times their own weight. Featuring welded solid steel construction, latch magnets can be used to secure gates or doors.

•Universal Latch Magnets Universal latch magnets are normally set in durable red plastic casing with four elongated holes which allows multi-directional and adjustable mounting. Latch magnets have following applications: •Door latch and for holding key rings nameplates nozzles and ferrous metal objects. •Tool holder •Door stops •Magnetic clamps •Fixture holder •Paint fixtures Pot Magnets Pot magnets are strong magnets that are developed for the current industrial needs. They are made up of magnets like NDFEB, SMCO, ALNICO, hard ferrite, plastic, rubber and other components. These magnets can produce a magnetic field on its exclusive surface. Depending on the usage, pot magnets are of different size, shape and width.

Different types of pot magnets functions in different temperature. However they give same result in the normal temperature. These magnets are versatile magnets which are designed for various industrial applications. The

popular industries in which these magnets are used are as follows: •The metal and steel industry •Tool shops •Used to position ferrous-magnetic work pieces

Rubber Magnets Anisotropic flexible rubber magnets are made by mixing ferrite magnet powder with synthetic rubber or plastic. When barium or strontium ferrite powder is consolidated with polymer matrix, anisotropic flexible rubber magnets are produced. The magnets so produced, have an excellent flexibility in permanent magnetic material field.

These magnets because of their flexible feature can be easily molded and cut into stripes without affecting their magnetic properties. They also have excellent machining characteristics. The different applications of flexible rubber magnets are : •Advertising Motors •Sensors •Learning material •Decoration magnets for refrigerator •Magnets for toys •Vehicle signage •Shelf and bin marking •Craft, hobby, and toys •POP displays

Sheet Magnets Sheet magnets are one of the most inexpensive magnets that are available in the market. These magnets are smooth, nonporous and are all weather resistant.

The strength of the magnets can be increased by either increasing the width of the sheet or through magnetizing method. The magnetic strips can also be supplied with a pressure sensitive adhesive backing or foam tape backing on one side for more bonding strength. For increasing the holding power, in some case, these magnets are also provided with steel backing to increase the holding power. The magnetization and the pole spacing of different sheet magnets are different because different applications require different magnetization. There are two methods of manufacturing magnetic sheet:

- Extrusion process
- Calendaring process

Types Magnetic sheets are of

following types:

- Rolling Magnetic Sheets The rolling magnetic sheets are powerful magnets which find their usage for large-scale advertising ornaments, toys and diversified craft works.

Cutting Magnetic Sheets The cutting magnetic sheets have their utility for instruments, meters, sensors, advertising ornaments, toys and different kinds of craft-work.

- Calendaring Magnetic Sheets The calendaring magnetic sheet too like rolling magnetic sheet is used for advertising ornaments, toys and various craft works.
- Plain Magnetic Sheets These magnets are without any laminations.
- Colored Magnetic Sheets They are laminated with colored vinyl (PVC).
- Self-Adhesive Magnetic Sheet They are laminated with self-adhesive tape.

The sheet magnets have the following applications:

- Craft Items
- Markers
- Signs
- Refrigerator Magnets
- Business Card Magnet
- Advertising Boards
- Advertisement Suspension Magnets

Suspension magnets are permanent magnets which remove iron from wood chips before they are burnt or reused.

Suspended magnets have the capability to remove various impurities like iron parts such as nuts and bolts from coal, coke, ore and other minerals, at extremely high belt speeds, large working distances and high burden depth. As per requirement the magnetic force can be generated either by permanent magnets or by electromagnetic coils. The magnetic flux is concentrated through the integration of magnetic flux. Apart from the electromagnetic coil the shape size structure are also responsible for this. This results in the effective working of the electric top belt magnetic separator despite its compact size, low weight and low power consumption. The main applications of the suspended permanent magnets are in

processing of following materials like: •Sugar •Coal •Minerals •Cereals

•Coffee •Glass •Culet Tube Magnets Tube magnets are strong magnets that remove the different materials like ferrous chips, nuts, bolts, parts unwanted tramp metal.

The tube magnets are easy to handle and simple to operate and are very popular magnets in various industries. The length, diameter and the design of the super tube magnets vary as per industrial requirements. The drift tube magnets due to their effectiveness are applied in various fields which are as follows: •The pole tube magnets can easily penetrate all types of fluids and materials which are loosely packed to pull out and retain fine ferrous materials. •When copper tube magnets are fitted in the hydraulic oil system, they prevent wear and tear on pump seals and pistons. In painting and plating operations too, the pole tube magnets play important role. •It can be well applied for clearing water tanks and removing particles from the places which are hard to reach and where the brooms are ineffective.

•They are also applied in various test stands to prevent metal fines from plugging valves and orifices of associated equipments. •They are very useful engineered item that are utilized in food processing industries like flour, salt, pepper, oils etc. for removing materials. •Apart from above, super tube magnets also find applications in industries like plastics, hydraulic oils, cutting coolants etc.