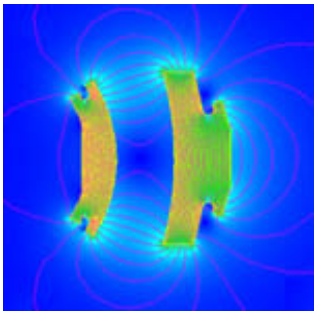
Magnetizing and Equipment

To make a magnet "magnetic" it must be exposed to a strong external magnetic field. This field reorganizes the magnet's crystal domain structure and leaves the magnet with a remanent magnetization (Br). If a magnet is isotropic, the remanent magnetization has the same direction as the external field. Meanwhile, an anisotropic magnet can only be magnetized in its anisotropic direction.



The most common method of magnetizing is to let a very short high energy current pulse go through a conductor or a coil. The short pulse is generated from a magnetizer (figure 1), which is basically a set of powerful capacitors connected together with a controller and ignitor switch, called an Ignitron or SCR . Different materials require different lengths of current pulse, and some materials can be magnetized with a permanent magnet (figure 2a). The resistivity of a material provides a prediction of what the magnetization pulse should look like. A material with high resistivity can be magnetized with a pulse of a few micro-seconds, while a more conductive material may need a pulse lasting several hundreds of a second longer. Also, the volume of a magnet is of importance for the length of the current pulse.

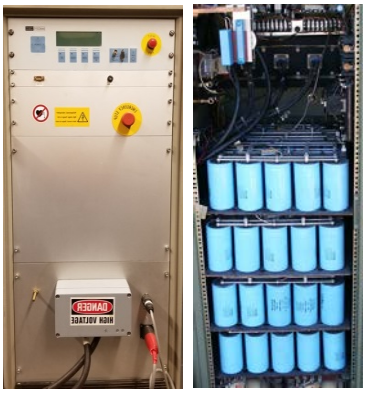


Figure 1

Types of Magnetizers

Different magnetic materials need different strengths of the magnetizing field. Coercive force is the property of the material that decides what magnetic field strength is needed for the magnetization. Ferrites and Alnico magnets can be magnetized using a high energy magnet in a closed circuit or a DC type magnetizer (figures 2a and 2b) while Rare Earth magnets require a capacitive discharge unit (figure 2c).

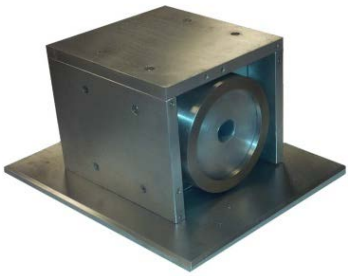


Figure 2a

Figure 2b

Figure 2c

Magnetizing Fixtures

Most magnetizers require a magnetizing fixture in order to complete the process. This is a conductive coil, or set of coils, designed to magnetize a particular magnet shape and grade. It can have a set of specially cut copper plates (figure 3a) or wound copper wire that forms loops to produce magnetic fields in the required direction (figure 3b).

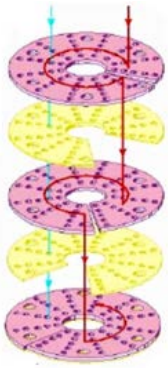
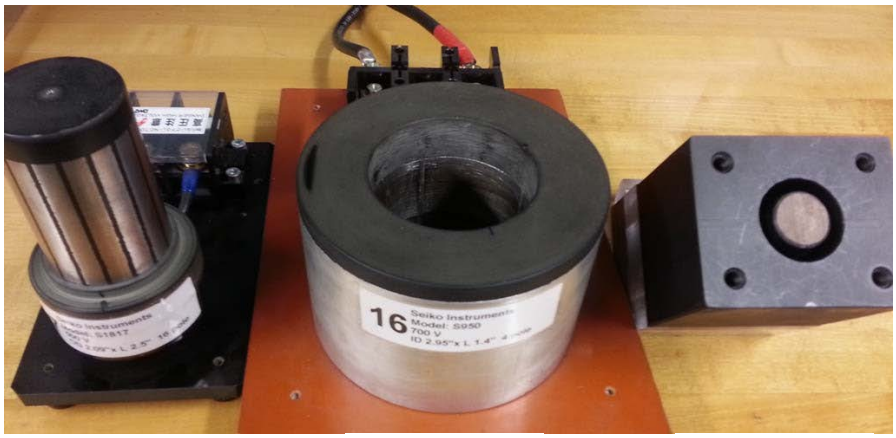


Figure 3a

Figure 3b

While Axial and Diametrical magnetization can be made in standard solenoids (as pictured above) multi-pole, radial, and other complex magnetic patterns require specially built fixtures for that particular magnet (figure 4)



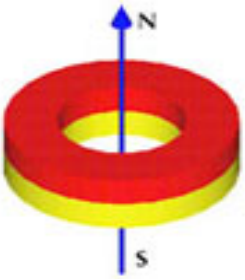
Multipole on the ID

Multipole on the OD

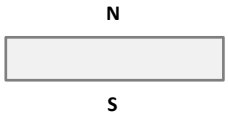
Multipole Radial

Figure 4

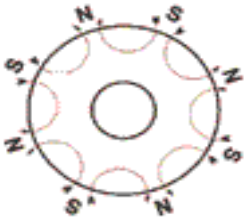
Magnetization Patterns



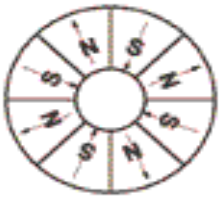
AXIAL

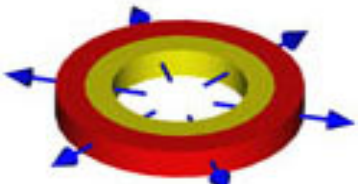


LATERAL

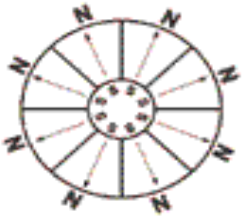


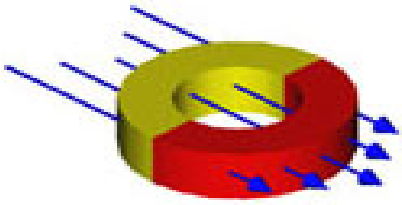
MUTIPOLE



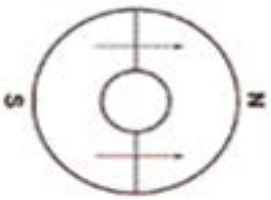


RADIAL





DIAMETRAL



If you have any questions about magnetizers, magnetizing fixtures, or the magnetizing process, please free to call our customer support team at 219-548-3799 or engineering@allianceorg.com

Alliance LLC
Industrial Permanent Magnets