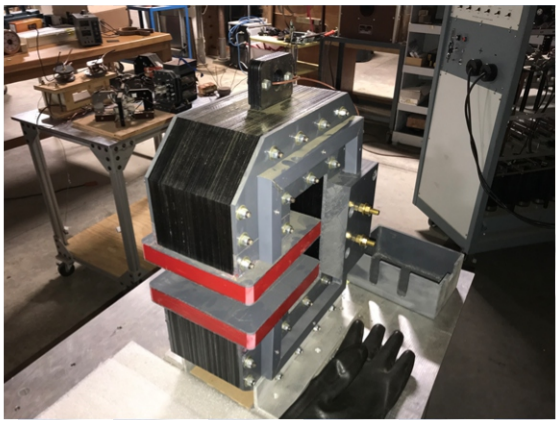
Oersted Technology



“22 Years of Magnetizing your Products”

CATALOG 2018

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version 2018.0

Oersted Technology

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ABOUT US

Oersted Technology offers an innovative line of magnetizers, magnetizing fixtures, and magnetic/electromagnetic equipment for use in manufacturing, research, and development applications. Specifically, we provide products for use in the production and testing of permanent magnets, motors, and electromagnetic systems. Through careful design and testing, Oersted Technology is able to provide you with magnetic/electromagnetic equipment that is both accurate and reliable.

Our magnetizers are extremely versatile and use patented Electronic Capacitance Switching (ECS) technology, which allows the user to switch capacitance electronically.

Our patented magnetizing fixtures are powerful and they produce very high magnetic fields to magnetize your products with high accuracy magnets. All of our fixtures are designed specifically for the user's application and they are very safe. They are used to magnetize Alnico, Ceramic ferrite, Neodymium, Samarium Cobalt magnets, and other special magnet powders. Moreover, we offer a variety of magnetizing fixtures with different configurations to magnetize different magnet geometries. In addition, we have developed and patented new technologies in magnetizing fixtures to reduce power losses and heating during the magnetization process of permanent magnets. Finite element simulations have been performed to analyze our designs to obtain products with a high quality for our customers. In addition to our magnetic product line, we offer customized magnetic equipment and a variety of engineering services valuable to the magnetic and electromagnetic industry, such as prototype magnetizing and magnet measurements.

We hope that this catalogue gives you a clear understanding of the products and services that we offer, and will aid you in finding the best magnetics equipment to fit your application.

CONTENT

MAGNETIZERS
300 Series

FEATURES

Suitable for magnetizing a broad range of magnetic materials, including samarium-cobalt, neodymium-iron, ferrite (ceramic), and Alnico

Utilizes patented ECS (Electronic Capacitance Switching) technology; capacitance is adjustable over a wide range: 1.25mF (min.) to 100mF (max. for Model 330B)

Solid-state SCR switching provides more reliable performance than with older ignitron-based units

Capable of producing 100 to 32,000 Joules (max. for Model 330B)

Variable voltage range from 0 to 800V

Peak current meter displays the peak output current of the magnetizing pulse after it occurs

DESCRIPTION

The Model 300-series magnetizers are designed to handle a variety of magnetizing applications and materials, from small Alnico parts to large blocks of neodymium-iron. Each of these magnetizers feature patented ECS (Electronic Capacitance Switching) technology, which allows the user to change the capacitance of the unit through the front panel. By setting the charging voltage and capacitance of the magnetizer properly, the user can scale the output energy of the unit to match the magnetizing fixture being used. The 300-series magnetizers also includes a peak current meter, which automatically captures the peak current of the magnetizing pulse once it occurs. A safety circuit internally discharges the capacitor banks if mains power is removed from the magnetizer or if the cabinet is opened during operation. When connected to a suitable magnetizing fixture, the magnetizer is able to disable its front panel controls if the fixture overheats. Other features include a lockout keyswitch and a current sense output jack (this connects to an oscilliscope for viewing of the magnetizing pulse). The Model 350B can be upgraded to either a Model 345B or Model 340B. The Model 345B can be upgraded to a Model 340B. All 300-series magnetizers can be modified for computer control, photocell trigger, or autocharge operation.

SPECIFICATIONS (BY MODEL)

Model	Max. Energy	Max. Current	Voltage Range	Capacitance Range	Input Line Power
350B	6,400 Joules	36,000 A	0 – 800 V	1.25 mF to 20 mF	208 VAC or 120 VAC 50/60Hz
345B	12,800 Joules	36,000 A	0 – 800 V	1.25 mF to 40 mF	208 VAC or 120 VAC 50/60Hz
340B	25,600 Joules	36,000 A	0 – 800 V	1.25 mF to 80 mF	208 VAC or 120 VAC 50/60Hz
330B	32,000 Joules	36,000 A	0 – 800 V	1.25 mF to 100 mF	208 VAC or 120 VAC 50/60Hz

*** standard; also available for 240VAC service**

Please, if you have any questions do not hesitate to contact us: oersted@oersted.com

MAGNETIZERS
Model 412B

FEATURES

Small, desktop design is ideal for magnetizing Alnico, ferrite (ceramic), and smaller Neodymium magnet parts

Utilizes patented ECS (Electronic Capacitance Switching) technology; capacitance is adjustable from 1.25mF to 10mF (in steps of 1.25mF)

Capable of producing 100 to 3,200 joules

Variable voltage range from 0 to 800V

Peak current meter displays the peak output current of the magnetizing pulse after it occurs

Solid-state SCR switching

DESCRIPTION

The Model 412B magnetizer provides many of the features of the Oersted Technology 300-series magnetizers in a small benchtop cabinet. This unit is designed for magnetizing parts which require lower total energy levels due to their size or the magnetic material used. Like the 300-series magnetizers, the 412B is an ECS magnetizer, which allows the user to electronically vary the capacitance of the unit (see previous page for an explanation of ECS technology). The capacitor banks are internally discharged through a safety circuit in case of power failure or accidental power-down. When the 412B is connected to a properly equipped fixture, the front-panels can be inhibited through an overtemperature interlock circuit, preventing the magnetizer from being operated once the fixture begins to overheat. An external output is also provided for monitoring the magnetizing current pulse with an oscilliscope.

SPECIFICATIONS

Maximum Energy	3,200 Joules
Peak Current	5,000 A
Voltage Range	0-800V
Capacitance Range	1.25 mF to 10mF (in 1.25 mF increments)
Input Line Power	120VAC (standard, also available with 208VAC) 50/60 Hz
Output Cables	#10 AWG, flexible, 5 ft. long
Dimensions	21" W x 24" D x 17" H (43 cm x 53 cm x 61 cm)
Weight	78 lbs. (36 kg)

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What is ECS?

Each time a part (or batch of parts) is to be magnetized, a fixture must be chosen as well as a magnetizer which is capable of delivering the proper amount of energy into the fixture. If the energy level is too low, the field created in the fixture will not fully magnetize (saturate) the magnet. If the energy level of the magnetizer is too high, the fixture may overheat or fail due to mechanical stress. In the past, manufacturers have dealt with this by either keeping a variety of magnetizers on hand (with varying energy levels) or by adding and removing capacitors from their magnetizer. Electronic Capacitance Switching (ECS) is our solution to this problem. With an ECS magnetizer, the user can electronically select the voltage and the capacitance necessary for the fixture being used, and can quickly change these settings once a different fixture is to be connected. If the user is uncertain of the settings required for an application, the capacitance and voltage can be adjusted until the right combination is found. This valuable feature effectively allows one machine to mimic a small magnetizer, a large magnetizer, or anything in between.

The following examples demonstrate how capacitance is selected on an Oersted Technology ECS magnetizer:

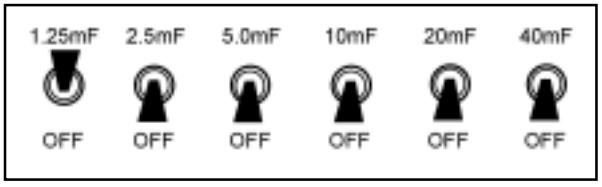


FIGURE 1. Total capacitance selected is 2.5mF.

EXAMPLE 1:
The capacitance of the magnetizer is selected by setting a series of ECS select switches on the front panel of the unit. When an ECS switch is on (toggle switch flipped up), the magnetizers's charging voltage will be sent to the capacitor bank associated with that switch. The panel switch itself carries only a low signal-level voltage. In Figure 1, the 1.25mF select switch is on and the other five switches are off, so only the 1.25mF bank is selected. In addition to any selected banks, the magnetizer contains a fixed 1.25mF capacitor bank that is permanently selected. The total capacitance selected for charging is therefore 2.5mF.

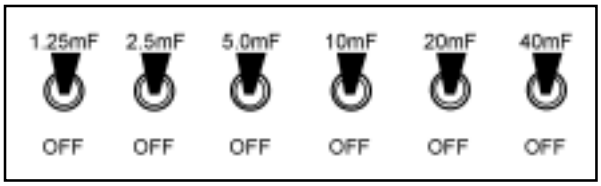


FIGURE 2. Total capacitance selected is 80mF.

EXAMPLE 2:
In Figure 2, all of the ECS select switches are on. All of the magnetizer's capacitor banks will therefore be charged by the selected charging voltage, in addition to the fixed capacitor bank. The total capacitance selected (plus the 1.25mF fixed bank) is 80mF. This is the maximum capacitance available on the Model 340B magnetizer.

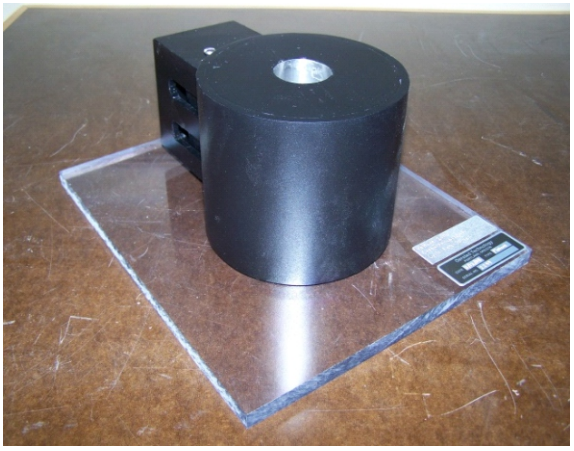
Model	Power Output Cables	Cabinet Dimensions	Weight
350B	Flexible #4 AWG, 8ft. long	22" wide x 31" deep x 62" high (56 cm x 79 cm x 160 cm)	280 lbs. (127 kg)
345B	Flexible #4 AWG, 8ft. long	22" wide x 31" deep x 62" high (56 cm x 79 cm x 160 cm)	300 lbs. (136 kg)
340B	Flexible #4 AWG, 8ft. long	22" wide x 31" deep x 62" high (56 cm x 79 cm x 160 cm)	350 lbs. (159 kg)
330B	Flexible #4 AWG, 8ft. long	22" wide x 31" deep x 80" high (56 cm x 79 cm x 203 cm)	375 lbs. (170 kg)

Please, if you have any questions do not hesitate to contact us: oersted@oersted.com.

MAGNETIZING FIXTURES
Fixture Design Experience

Magnetizing Fixtures

Oersted Technology has designed many hundreds of magnetizing fixtures over the past several years for a variety of applications, including those related to the audio speakers, hard drives, motors, etc. Our magnetizing fixtures are designed to work with our magnetizers. We have designed magnetizing fixtures for different magnet geometries and different magnet materials. Our magnetizing fixtures are very powerful and they can generate very high flux densities to magnetize: Alnico magnets, Ceramic ferrite magnets, Neodymium magnets, Samarium Cobalt magnets, silicone rubber magnets, also 3D printed magnets made of magnetic powders, etc.



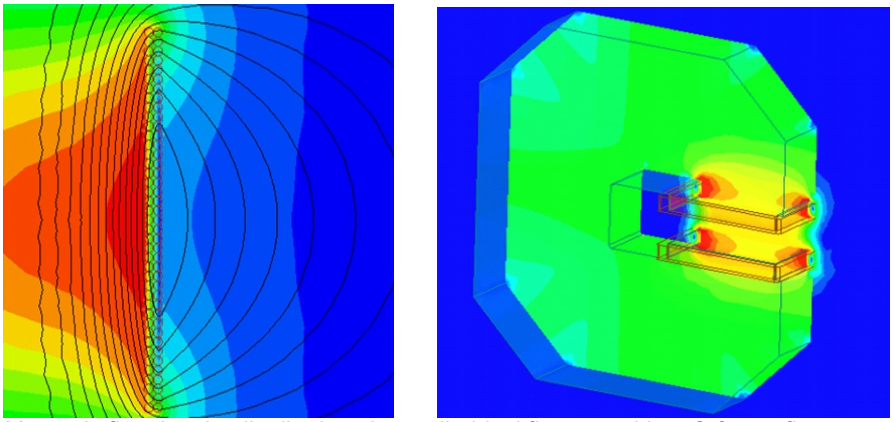
Cylindrical fixture for Samarium Cobalt magnets.

We can design cylindrical fixtures, super coil fixtures, gapped fixtures, linear fixtures, radial fixtures, multi-pole fixtures, etc. We have also designed fixtures to magnetize: ring magnets for audio speakers and headphones, motor rotor ring magnets, swing-arm actuator arc segments, linear actuator sleeve magnets, ring magnets with very high pole counts, and very small magnets of high precision, etc. In order to meet the needs of our customers, we provide fast turn-around time on fixture design and construction.

C-Frame fixture for large magnets.

Each fixture is custom designed for the application. This allows us to efficiently use the energy delivered by the magnetizer, while also keeping fixture heating to a minimum. Our fixtures are designed using analytical equations and complex linear and nonlinear finite element simulations to obtain excellent results during the design steps. In addition, our magnetizing fixtures have excellent magnetic, mechanical, and thermal characteristics.

Furthermore, we have developed C-frame fixtures for magnetizing large magnets. We are constantly developing new magnetizing fixtures utilizing new magnetic materials and new magnetic configurations to increase the magnetizing field and to reduce the mechanical stress and to reduce the temperature in magnetizing fixtures.



Magnetic flux density distributions in a cylindrical fixture and in a C-frame fixture.

Please, if you have any questions do not hesitate to contact us: oersted@oersted.com.

MAGNETIZING FIXTURES
Super Coil Fixture Technology and Fixture Options

Super Coil Fixture Technology

Oersted Technology has developed and patented a new coil fixture technology that significantly reduces power losses and heating in the fixture, while increasing the magnetic field produced within the fixture and making it highly uniform. Magnetizing fixtures of this type are referred to as “Super coil fixtures (SCFs)”.

SCFs have been vital to applications involving fast cycle rates and high-volume magnet production, and has allowed to us to maximize the magnetizing potential of our fixtures. Our SCFs are used to magnetize small and large Neodymium and Samarium Cobalt magnets. Super coils have been utilized to magnetize magnets assembled with steel parts.

Super coil fixture to magnetize ring magnets for audio speakers.

Fixture Options

There are many different options that can be added to our fixtures, which are used to both prolong the lifetime of the fixture and also increase the level of safety for the operator. These include:

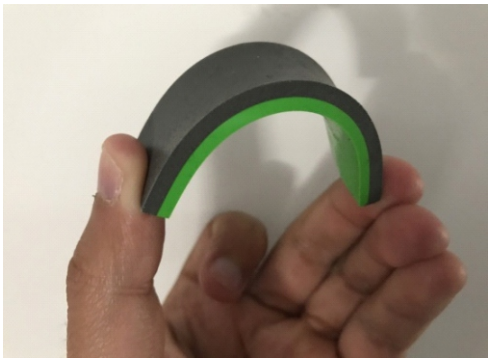
- Internal cooling system for use in conjunction with a chiller system (liquid-based).
- Forced air-cooled designs (especially useful for cleanroom operations or where fluid leaks cannot be tolerated).
- Embedded sensing coils for use with a fluxmeter. Allows peak fields in the fixture to be measured, when connected to a fluxmeter.
- Display of internal temperatures via embedded thermocouples and a temperature display unit.
- Inhibit of magnetizer operation if fixture begins to overheat (requires an Oersted Technology magnetizer with proper interlock circuitry).
- Protective fixture covering to prevent parts from being thrown out of the fixture during magnetizing.
- Magnetic shielding of fixture in order to prevent stray fields from affecting nearby machinery.

Cylindrical fixture with cooling system.

Please, if you have any questions do not hesitate to contact us: oersted@oersted.com.

Magnetizing Fixtures for Silicone Rubber Magnets

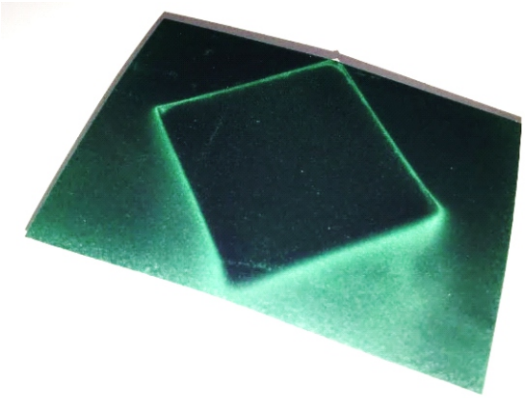
Many companies around the world are producing powerful permanent magnets using powder magnet materials. For example, Neodymium powders are being mixed with silicone to create flexible rubber magnets and rubber magnets for different applications and industries. Oersted Technology has designed and manufactured magnetizing fixtures to magnetize flexible rubber magnets and silicone rubbers with magnet powders for different industries and applications. Our magnetizing fixtures and magnetizers can magnetize silicone rubbers with different loadings of magnetic powder. Our magnetizing fixtures can magnetize large and small volumes of these rubber magnets.



Silicone rubber magnet and flexible rubber magnet.

Magnetizing Fixtures for Polymer-Bonded Magnets

The industry of 3-D printers for different materials is growing very fast all over the world and the magnet industry is not the exception. Powder magnet materials are being mixed with some polymers to create polymer-bonded magnets using 3-D printers. This 3-D printing method process creates powerful permanent magnets with complex geometries and shapes without tooling and with better mechanical, magnetic, and microstructural properties for different applications and industries. Oersted Technology has designed and produced magnetizing fixtures for different bonded magnets produced by 3-D printing methods. Our magnetizing fixtures and magnetizers can magnetize these polymer-bonded magnets with different loadings of magnetic powder.



Magnetized polymer-bonded magnet.

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OTHER EQUIPMENT

Conditioners and Demagnetizers

A conditioner is a device that is used to selectively adjust the magnetic strength of a part to a specified value. In the past, conditioners have been used to simply “knock-down” the magnetic field of low-coercivity magnet parts (such as Alnico and ferrite) until a certain field level was achieved. The resulting part was slightly weaker, but had a field strength that was repeatable.

For modern magnets, a conditioner can also be used to adjust the overall performance of a complete device based on any measurable parameter (not just the magnetic field strength), in order to make the device more accurate. The magnet in this device is knocked-down until the measurable parameter reaches the desired level or is within an acceptable tolerance.

A typical example of the conditioning process involves Form B reed relays. These devices contain a pair of magnetically permeable switch contacts surrounded by a coil of wire with a small biasing magnet next to it. When no voltage is applied to the coil, the magnet pulls the two contacts together. As voltage is applied to the coil, the field of the biasing magnet is opposed. Once the voltage reaches the proper level, the effect of the magnet is cancelled out and the contacts are able to pull apart. In spite of errors caused by the magnet strength, magnet position, number of turns in the coil, and the resistance of the wire, the device can be conditioned so that the contacts open at the same specified voltage for each part. Adjustments like this can be made to considerable accuracy, but require repeated pulses from the conditioner to achieve the desired value. It should also be noted that conditioners are slower and more expensive than magnetizing equipment of equivalent strength, due to the automation and process monitoring involved.

Oersted Technology conditioners and demagnetizers operate under computer control and are designed to process a particular number of parts within a time period selected by the customer. These machines are designed specifically for the customer’s application and can be equipped with automatic part loading, go/no-go indicators, and lightscreens, as well as other options.

An automated system for conditioning reed relays.

Please, if you have any questions do not hesitate to contact us: oersted@oersted.com.

OTHER EQUIPMENT
Automated Systems

An automated system for magnetizing and testing 4-pole rotors.

Automated systems have become important in the magnetics industry, particularly in the production of motors, actuators, and audio speakers. Because all Oersted Technology products allow for some means of remote interfacing, it is possible for us to build customized systems for your particular application. Magnetizing and demagnetizing can be integrated into this system, as well as magnetic measurement through a gaussmeter or fluxmeter. For high-volume applications, automated part loading can also be added. We are willing to either build around an existing system or create a completely unique, self-contained one.

Control of the system is performed by a computer or a microcontroller, depending on the requirements of the applications. This allows for efficient operation and makes it possible to reprogram and modify the system if needed. Magnetizing is typically performed by one of our standard magnetizer models (except when special requirements exist), allowing the magnetizer to be used as a stand-alone production unit when the system is not in use.

The complexity of an automated system varies greatly, depending on the application. An example of a very simple automated system is one in which parts are passed through a magnetizing fixture by a conveyor belt and magnetized once a photocell is interrupted. An example of a more complex system is a workcell that loads a large multipole magnet part into a fixture, magnetizes each magnet pole (with the desired orientation), and then checks each pole with a gaussmeter to determine whether the part has been properly magnetized. Such a system might also involve a barcode scanner for reading part numbers, audio and visual cues for the operator, and lightscreens to monitor access points to the workcell.

OTHER EQUIPMENT
Helmholtz Coils

FEATURES

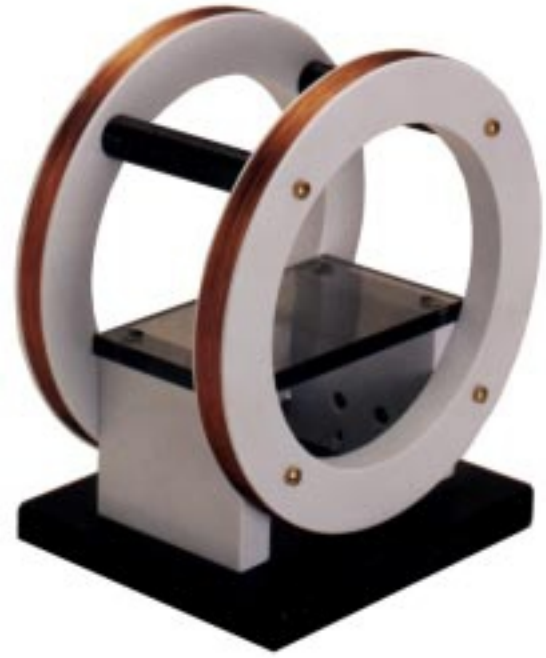
Performs quick, accurate and reliable measurements when connected to a fluxmeter

Measures the magnetic moment of a magnet part

Immune to stray steady magnetic fields

Ideal for performing measurements in an assembly environment

Available with various coil diameters



DESCRIPTION

A Helmholtz coil is actually a pair of specially constructed coils mounted a fixed distance apart from each other on a common base. Current passed through the coils produces an extremely uniform magnetic field in the space between them. For the measurement of magnets, the coils are used in a different manner - they are connected to an integrating fluxmeter, which gives an accurate indication of the overall strength of the magnet once the magnet is withdrawn or rotated a half-turn. If a gaussmeter is used for this same measurement, many measurements may have to be made because of local variations of magnet strength. A Helmholtz coil, on the other hand, measures the entire magnet at once, in a fast and reliable manner. These devices operate on changes of magnetic flux only, and so are unaffected by fixed stray fields, such as the Earth's magnetic field. Helmholtz coils are useful for measuring bar and slab-type magnets (two poles only), but can also measure arc segments by using a correction factor. Because Helmholtz coils do not closely fit the part like a search coil does, it is easy to integrate them into an assembly application or automated system, where parts are moved through the coil by a conveyor system (after magnetization).

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OTHER EQUIPMENT
Experimental Coils and Magnetic Yokes

Experimental Coils

To generate uniform magnetic fields for low and high frequency is necessary the use of experimental coils. Oersted Technology designs and produces several experimental coils for: teaching activities, R&D activities, military applications, biomedical applications, industrial applications, etc. Our experimental coils can be designed to produce small and large volumes of magnetic field with different magnetic field intensities. Our design methodology includes the use of analytical equations and finite element simulations to compute the magnetic field in the center of coils and to compute the volume of uniform magnetic field in the center of the coil systems. We can design and produce the following experimental coils:

- Circular selenoids
- Square selenoids
- Helmholtz coils
- Ruben coils
- Merritt coils
- Multi-coil systems, etc.

Tri-axial Helmholtz coil.

Helmholtz coils for small volume of magnetic field.

Magnetic Yokes

Magnetic yoke with magnets.

Oersted Technology designs and manufactures gapped magnetic cores with powerful permanent magnets located in the air gap region. These permanent magnets produce a high magnetic field in the air gap region for different applications and studies of magnetic field. Oersted Technology designs the geometry of the permanent magnets or utilizes the information of magnet design of customer to produce a uniform magnetic field in the air gap. Furthermore, we have developed a special mechanical system to assembly the powerful permanent magnets in magnetic yokes. We design magnetic yokes for different activities, applications, institutes, and industries:

- R&D activities
- Universities
- National laboratories
- Military applications
- Private Industry, etc

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MAGNETIC SERVICES

Magnetizing Fixtures for Magnet Customer Assemblies

Oersted Technology designs and builds magnetizing fixtures to magnetize customer assemblies where permanent magnets are coupled with some other electronic components or structural elements made of metallic material, non-magnetic steel, magnetic steel, plastics, etc. Some customers need to magnetize magnets and other structural elements at the same time to save manufacturing and energy costs. For example, a customer need to magnetize a ring magnet mechanically coupled with a ring steel. We can design a powerful magnetizing fixture to magnetize that ring magnet with the coupled steel ring ensuring the complete magnetization of the magnet. Another common case is when an audio speaker manufacturer needs to magnetize a ring magnet mechanically coupled to the pole steel structure of the speaker. Generally, speaker manufacturers magnetize the ring magnets and the pole steel structure at the same time to save costs. Furthermore, it would be impossible to magnetize the ring magnet and then center it and attach it to the steel structure of the speaker.

Custom Magnet Assemblies

In many magnetic applications, the use of magnet assemblies is necessary to produced high magnetic fields for different applications. Oersted Technology offers the service of custom permanent magnet assemblies for customer projects. Utilizing the information of the customer, we can build magnet assemblies using different materials and different mounting methodologies. We have experience to propose, to build, and to mount magnet assemblies for different magnetic configurations. We have worked in different projects where magnet assemblies must be utilized as: small particle accelerators, Halbach arrays for different applications, levitation systems, motor configurations, etc.

Prototype and Small Batch Magnetizing

Oersted Technology is committed to providing for all of our customers' magnetics needs. In some cases, a small batch of parts must be magnetized before a cusomer's magnetizer or magnetizing fixture is completed and shipped. In situations like this, we are able to magnetize prototype parts so that our customers can begin testing of their products immediately.

Assistance to the Speaker Industry

Oersted Technology has a great deal of experience with companies involved in the design and production of audio speakers. We understand the unique magnetics problems associated with magnetizing speakers and are willing to assist you in optimizing the speaker's magnetic structure for the magnetizing process (by reducing eddy currents in the basket structure, for example). We have designed and built C-frame magnetizing fixtures for magnetizing large ferrite car audio speakers and are now using a new method of fixture design that greatly reduces heating (thereby allowing for a faster cycle rate). If you are currently magnetizing your parts manually, Oersted Technology can create an automated magnetizing system that will allow you to increase your production rate and save on labor costs.

Magnetizer Characterization

Oersted Technology provides magnetizer characterization and safety evaluation services to companies who need technical information for an existing magnetizer or group of magnetizers. These services are performed on-site in order to minimize magnetizer down-time and to avoid interruptions in production. To properly design a magnetizing fixture for a given magnetizer, several things must first be known about the magnetizer's operation and electrical properties. This information may have been supplied by the magnetizer's manufacturer, but may not be accurate or may change if the magnetizer is modified. Our tests will give you valuable information about the actual performance and characteristics of your magnetizer, which can then be used to design a magnetizing fixture that is optimized for it.

On-site Training

If your engineers are interested in learning more about magnetic theory and magnetizer operation, we offer training at our facility and your facility. We also offer on-site training at your facility for a fee. If your company would like to learn more about magnetic topics, we offer on-site seminars customized for your area of interest. Our training tell you how to get the most out of your magnetic test instruments and magnetizing equipment, while also providing an informative look into the field of magnetism.

Please, if you have any questions do not hesitate to contact us: oersted@oersted.com.

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