

Eanth

Permanent Magnet Assemblies

From electric motors for the aerospace industry to nuclear magnetic resonance for oil and gas applications, EEC provides highperformance magnetic assemblies and solutions for the world's most demanding industries.

Quality Service, Premium Materials & Innovative Solutions

Electron Energy Corporation (EEC) is an expert developer and leading producer of permanent magnet products and assemblies for a variety of markets, including aerospace, medical, defense, oil, gas, and power generation. Since 1970, EEC has produced high-strength magnets to provide maximum performance for these industries. Through a variety of services and capabilities, EEC works as an extension of the customer's engineering team to provide first-class magnetic solutions.



In-House Production & Manufacturing EEC has a broad range of permanent magnet types, including neodymium iron boron, samarium cobalt, alnico, and ceramic, to fulfill virtually any application requirement. Because EEC produces magnets in-house at our Material Technical Center, customers are provided with a wider selection of products that can be customized quickly and economically.



Engineering & Assembly Support

As a vertically-integrated rare earth magnet producer, EEC engineers have a deep understanding of the magnets and the assembly processes. This not only helps in developing superior products but also shortens the timeto-market by reducing costly time and errors. EEC provides comprehensive before and after-sale engineering support. Your magnet experts are just a phone call away.

Research & Development

R&D is a key element in EEC's history of distinction in magnetic solutions for aerospace and defense applications. Our in-house R&D lab, world-class team of scientists and engineers, and university partnerships allow us to provide innovative solutions to serve both government and commercial sectors.

Prototyping

In an industry where protocols and standards are everchanging, the timely development of new products is critical. EEC helps customers meet their objectives by providing fast, reliable, and more cost-effective proof-ofconcept prototypes and product evaluations in as little as two weeks.



FEA Modeling and Design

Finite element analysis is an essential tool in designing assemblies that involve magnetic components. FEA modeling replaces expensive prototyping steps early on in the design process to enable customers to bring their products to market both faster and less expensive than traditional methods. That is why FEA is such an essential part of the design of the assemblies discussed on the following page. FEA can help to optimize the performance of your assembly as well as limit the need to do multiple iterations of a design. This results in cost savings for the customer and a better product in a shorter timeframe. With FEA we can determine, with great accuracy, how the final assembly will behave before it is even built.

Engineering Services

- Finite element analysis
- Prototyping
- Testing and validation

Application Engineering

- Design expertise
- Material selection
- Assembly development
- Total systems analysis

R&D Specialty Materials

Research grade materials
Customized compositions
R&D projects

Product Platforms

- Samarium-cobalt
- Neodymium-iron-boron
- Alnico
- Assemblies

Premium Quality - Product Innovation - Full-Service Provider

Halbach Assemblies

Halbach arrays are a unique arrangement of magnetic segments that make one side of an array stronger while cancelling the other side to almost zero. The variation of the orientation of the magnet segments in this specific way has the effect of boosting the field of its neighboring



magnet(s). This design can be used to increase the magnetic field on one side of the configuration, which results in a significantly stronger field than when all the segments are aligned with the same direction of magnetization. EEC's engineering team can help customers design, model, and bring to production, Halbach array designs for a variety of applications.

Rotors

EEC produces precision rotor assemblies for high performance motors. Our engineers work with motor companies to optimize every aspect of rotor design including shaft material selection, magnet material selection, adhesive selection, and sleeving options. Applications requiring higher operating temperatures use EEC's 34 Grade of SmCo, which delivers the highest energy product commercially available. EEC is able to provide FEA modeling as well to further optimize rotor designs. Rotors are manufactured on dedicated assembly production lines to provide both economical and high quality solutions.



Beam Focusing

Beam focusing devices utilize permanent magnets to amplify signals commonly used in microwave and communications applications. These assemblies are often made up of magnetic segments of alternating polarity, such as a Halbach configuration, to increase the field. A common beam focusing device is a traveling wave tube (TWT). The field generated from TWTs is used to direct electrons or radiation and restrict the motion into a narrow window. EEC is the market leader in TWTs and other beam focusing magnetic assemblies for the aerospace, defense, and industrial markets.

Large Highly Specialized Assembly

EEC has 50 years of permanent magnet assembly experience and has built assemblies that range from a few ounces to hundreds of pounds. Each assembly opportunity comes with a unique set of challenges and EEC has a multidisciplinary engineering team ready to tackle them. Large assemblies typically made for research purposes take a high degree of control and strategy to put together safely and without damage. Working with and designing such large and powerful components require the specialized application know-how of the EEC engineering team.



Magnetic Couplings

Magnetic couplings transfer force between two shafts without any physical contact between the two components. These assemblies consist of a "driver" and a "follower". The advantage to using magnetic couplings is that there is no physical contact (friction) to wear out over time. In addition to minimal wear, another safety feature built into magnetic couplers is that they will only operate up to a specific torque. Once the maximum torque is exceeded the coupling will slip, which eliminates the risk of damaging your components by applying too much torque. With Finite Element Analysis (FEA), EEC can optimize your magnet assemblies to meet a targeted maximum torque.

Magnetic Bearings

Similar to magnetic couplings, many of the advantages to using magnetic bearings stem from having little to no friction. In a coupling, one component is driving the other component and in a bearing, both components are able to move freely. Without friction, the lifespan of the bearing is much longer than standard bearings and there is no need for lubrication. Magnetic bearings can also utilize magnetic fields to create magnetic levitation. EEC can provide FEA analysis on magnetic bearing design to optimize the magnet size, strength, and performance.





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