

# Leading Innovations in Rare-Earth-Free Electric Motor Design



At our company, we specialize in advanced engineering and design services that empower manufacturers to transition away from conventional rare-earth-magnet motors. The increasing demand for sustainability, cost-effectiveness, and geopolitical independence has led to groundbreaking developments in electric motor technology.

Here are three promising innovations we actively support and optimize for our clients:

## 1. Machines with Iron Nitride Magnets



Alvier Mechatronics is a preferred design partner for Niron Magnetics, the world's only producer of high performance, rare-earth-free permanent magnets utilizing Iron Nitride. Iron Nitride is an exciting material with unique magnetic properties and utilizes globally abundant raw materials. Our team collaborates closely with Niron to explore integrating this novel new material into your design.

## 2. Ferrite Magnet Machines

We are at the forefront of enhancing ferrite-based motor designs, utilizing abundant and cost-effective ferrite magnets. Our customized rotor designs, optimized magnetic flux pathways, and sophisticated control algorithms dramatically improve performance, making ferrite magnet motors a practical solution for automotive and industrial applications. Our clients benefit from advanced thermal management and innovative manufacturing approaches that significantly close the performance gap compared to rare-earth-solutions. In summary, by partnering with our experts, manufacturers can confidently navigate the transition toward innovative, sustainable, and geopolitically secure electric motor technologies without reliance on rare-earth-elements.

## 3. Externally Excited Machines

Our team provides expert design solutions for externally excited synchronous motors (EESMs), which eliminate dependency on rare-earth-materials through innovative electromagnetic coil designs. We leverage advances in technology, design, material science and inverter capability to significantly enhance motor efficiency, power density, and controllability, helping clients such as automotive manufacturers implement sustainable and tailored solutions. The increasing adoption by leading OEM brands underscores the viability of EESMs as a competitive, future-ready technology.

Contact us at [rare-earth-free@alviermechatronics.com](mailto:rare-earth-free@alviermechatronics.com) to explore how we can work together!

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