



EEC's Assembly Capabilities





About EEC

- A private US company founded in 1970 by Marlin Walmer, a pioneer in the world RE magnets industry
- One of the first RE magnet producers in the world
- Manufacturing facility in Landisville, PA with approximately 130 employees
- State-of-the-art in-house R & D facility rich in engineering expertise
- Worldwide customer base



(Links Ave. location)

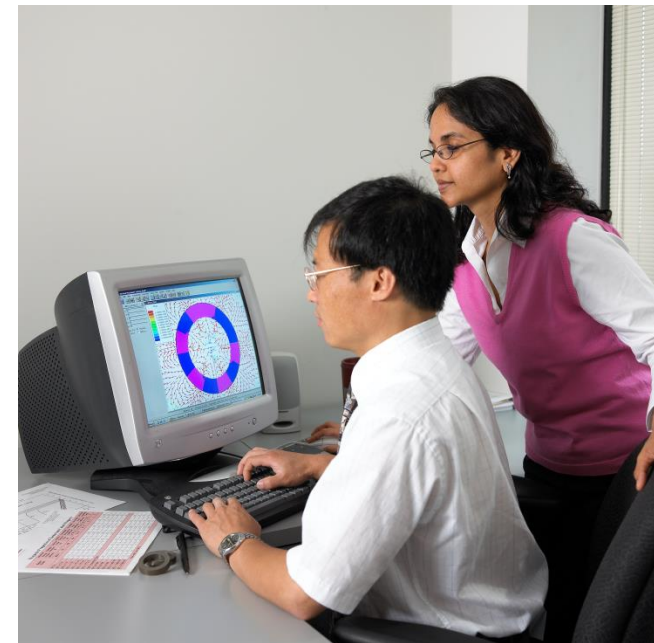


(Running Pump Rd. location)



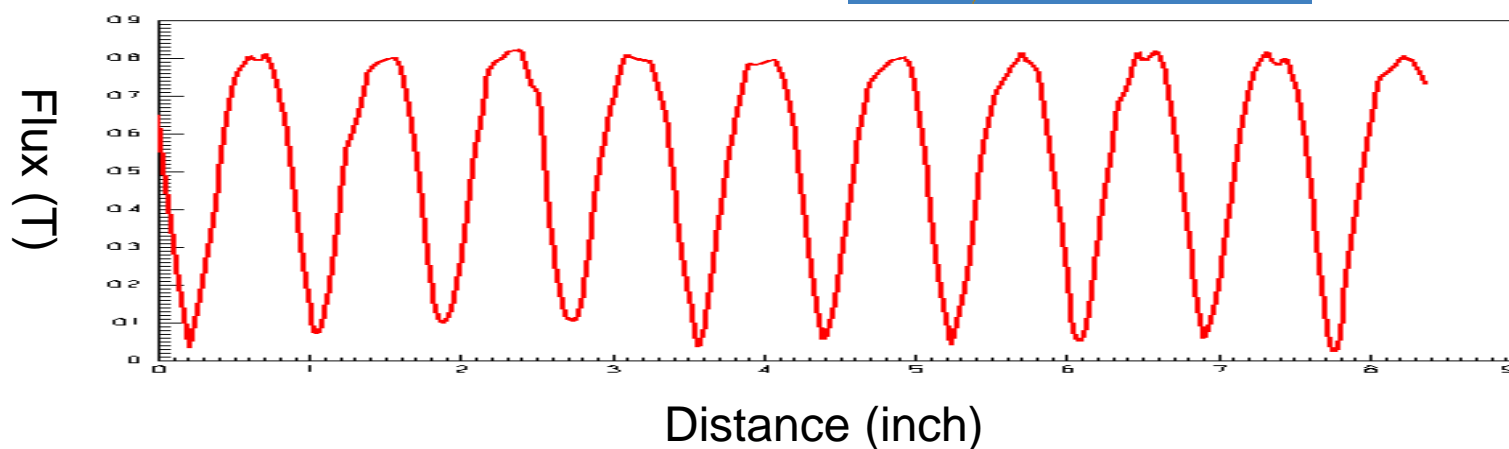
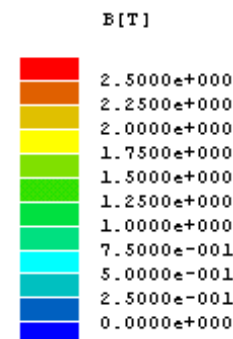
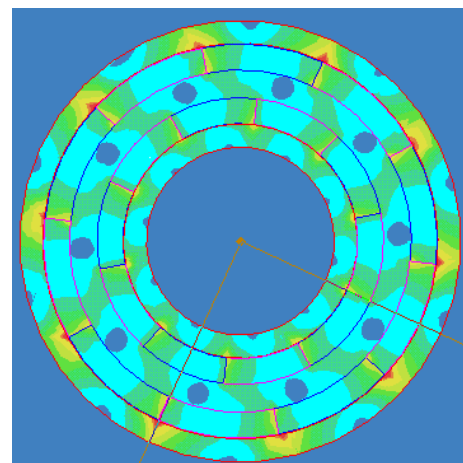
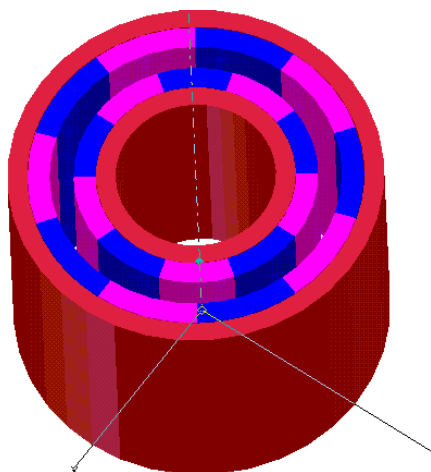
Design & Support

- **F.E.A. – Finite Element Analysis & magnetic circuit design**
- **Solid Works models**
- **Unique magnet materials knowledge**
- **Design & engineering support staff**





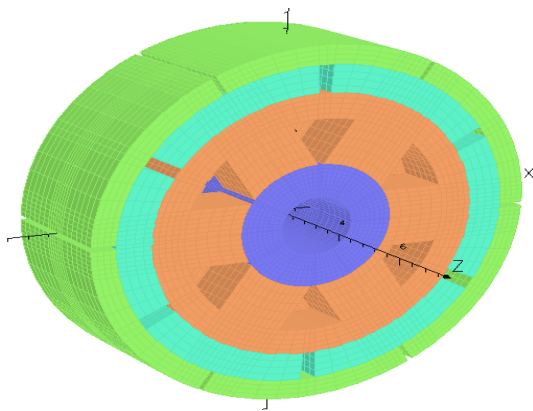
Concentric Coupling System



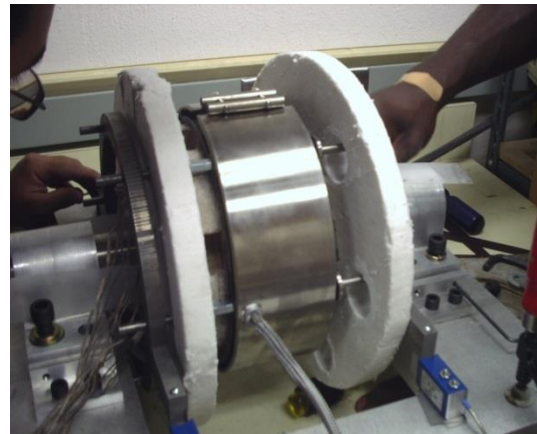


Ultra High Temperature Permanent Magnet

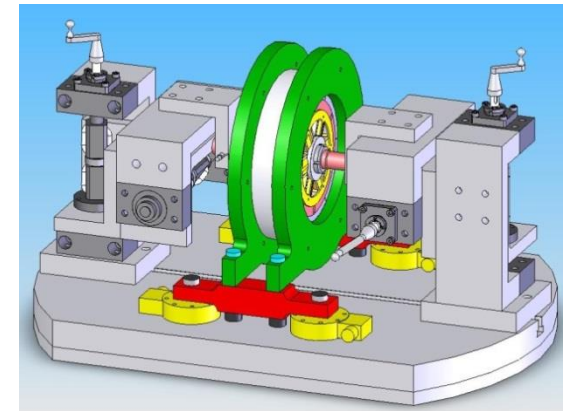
**Bearing modeling, testing, prototyping
for EEC's NASA -GRC SBIR Phase II Contract**



**UHTPM Bearing
(Finite Element Model)**



**Radial UHTPM
Bearing (523 °C)**



**Solid Works model of
test stand**



Ultra High Temperature Permanent Magnet (UHTPM) Bearing Innovations

- Uses EEC's Ultra High Temperature, high energy product and high structural strength magnets for majority of static loads
- Lower ohmic loss homopolar design (not heteropolar)
- Fault tolerant with catcher bearing back up
- Compact, light weight design
- Reduced need for electronics
- High speed operation high stiffness
- High temperature dampening possible
- Test stand developed for operating in vacuum



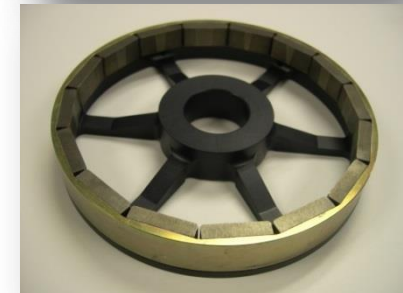
UHTPM Bearing Specifications

- EEC's Ultra High Temperature SmCo-UHT™ Permanent magnets employed (US Patent no. 06,451,132)
- Operation up to 1000 degrees F (522 degrees C)
- Permanent magnets provide key force with electromagnets used only for control
- Bearing weight - 48 lbs
- Load of 500 lbs axial, 750 lbs radial
- Operating speed 25,000 rpm
- Airgap B bias .66 Tesla
- Stiffness K_i 41 lbf/in, K_p -37000 lb/in



Where Are EEC Assemblies Used?

- **Aerospace**
 - Ion Propulsion Engine for Deep Space One Satellite
 - Traveling Wave Tubes
- **Military**
 - Generators
 - Alternators
 - Inertial Guidance Systems
- **Medical**
 - Precision Surgical Hand Tools
- **Commercial**
 - Power Generators
 - Motor Applications





Government/Aerospace Applications

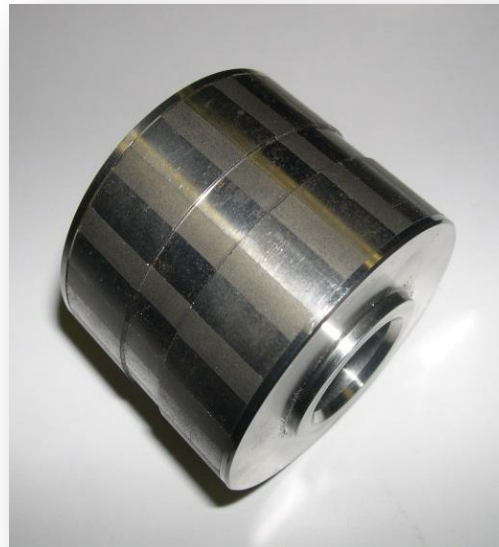


- **3" Diameter Assembly**
- **Balanced**
- **40,000 RPM**





More Assembly Examples



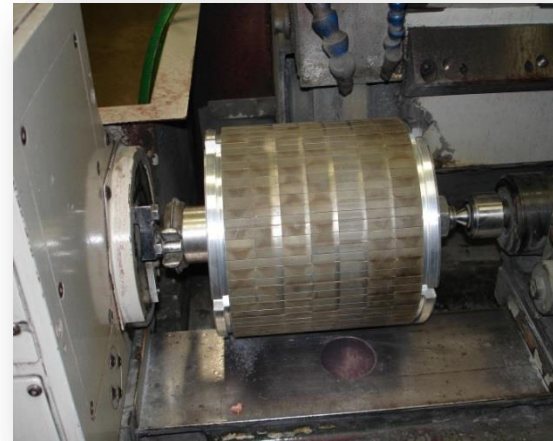


Large Assemblies

- Up to 24 inches O.D.
- Up to 200 pounds
- Manage forces of 2000 lbs between parts
- Precise tolerances held in bucking condition (repelling)
- Various banding approaches & materials
- Various epoxies
- High and ultra high temperature expertise



The Making Of An Assembly





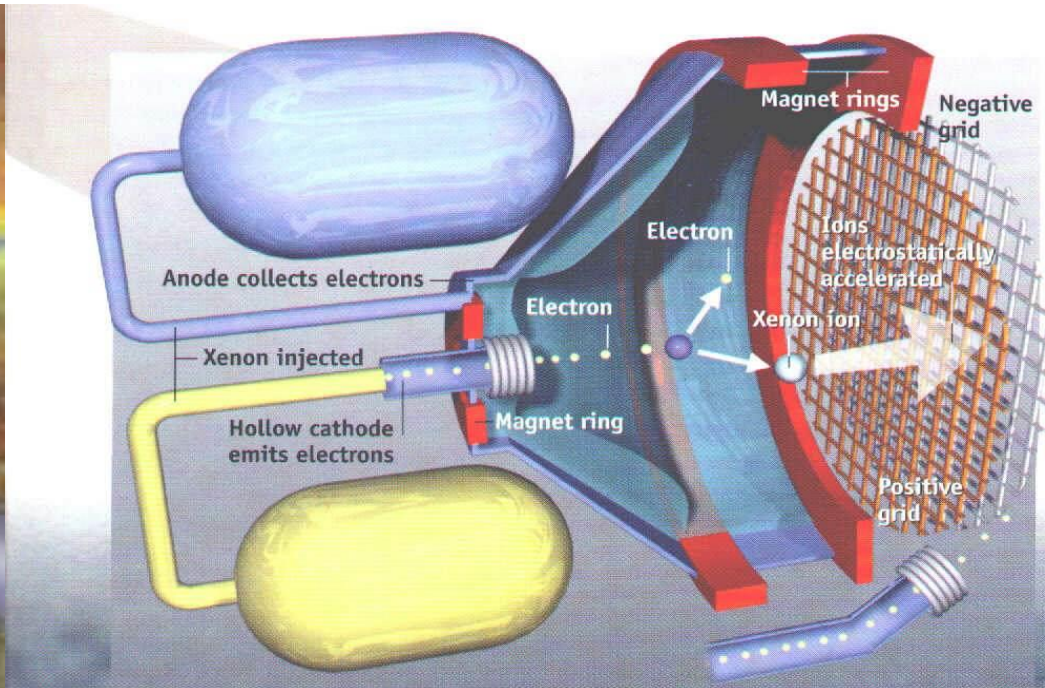
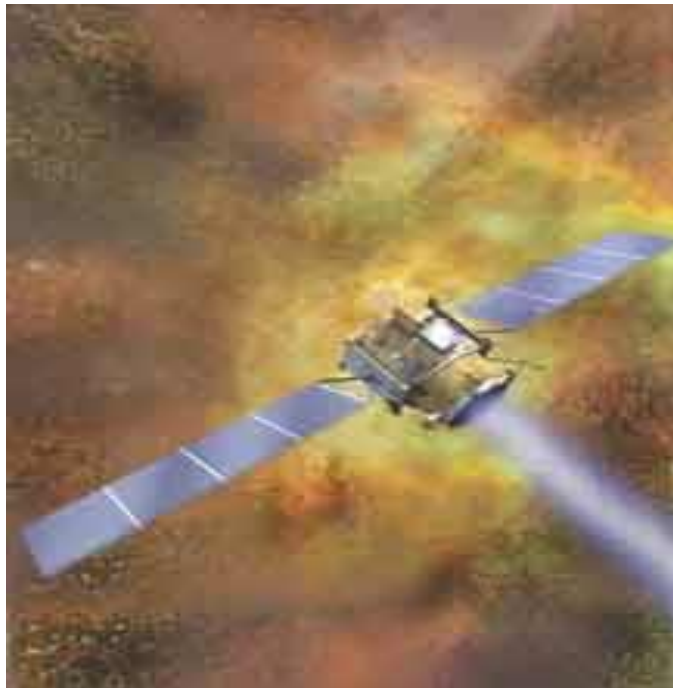
Magnet Assembly for NASA Space Applications



Subjected To 10Gs During Launch



Ion Engine in NASA's Deep Space I



Up to 350°C: 20 kW-50 cm Engine

Up to 550°C: 60 kW-75cm Engine

Life expectancy for Xenon: 12,000 hours = 500 days



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