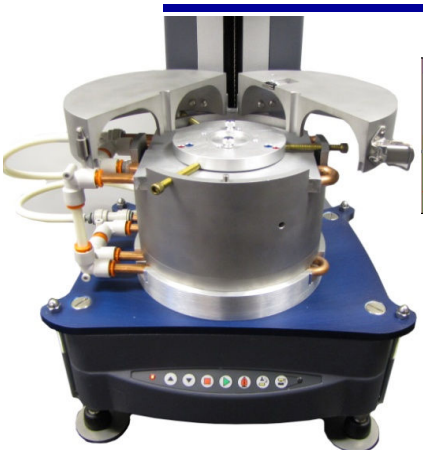
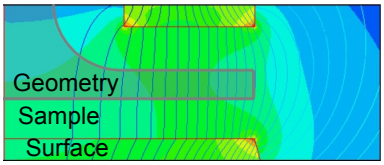
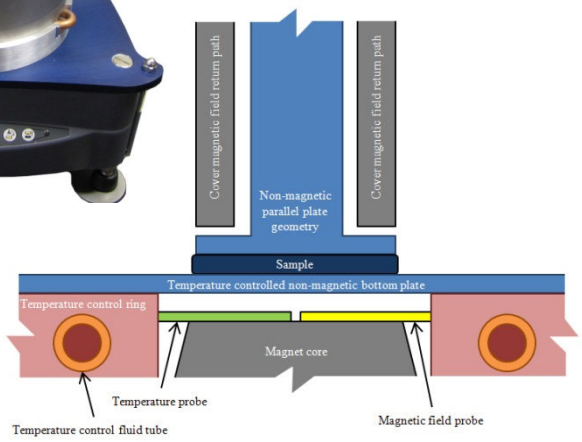
Magnetorheology

Summary

Engineers are increasingly turning to so-called smart fluids to solve complex mechanical problems. One specific type of smart fluid is the magnetorheological fluid (MR fluid) which greatly increases its viscosity to the point of becoming a viscoelastic solid when subjected to a magnetic field. Importantly, the yield stress and viscosity of the fluid when in its active state can be controlled very accurately by varying the magnetic field intensity. CPG has recently developed an MR fluid testing apparatus that integrates with a standard shear rheometer.





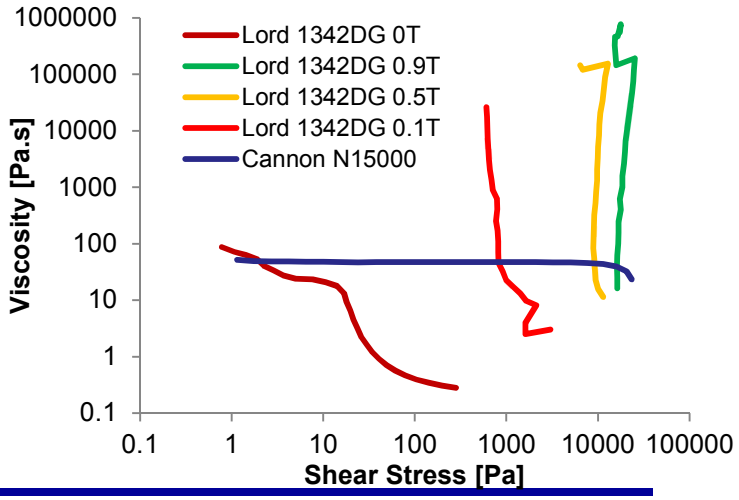


Description

CPG has developed a hardware and software add-on that enables a current commercial shear rheometer to test magnetorheological fluids across temperature and field strengths relevant for a wide range of industries. The MR fixture leverages existing rheometer hardware and uses a parallel plate geometry in a controlled magnetic field over a wide temperature range while monitoring conventional shear viscosity parameters such as stress, strain and viscosity in steady or dynamic shearing modes. The high power magnet of this instrument provides the ability to characterize magnetorheological fluids through the spectrum of magnetic flux ranging from -1 to +1 Tesla, or more and across a broad temperature range.

Specifications

Specification	
Magnetic field accuracy	0.01 Tesla
Maximum magnetic field	+/- 1 Tesla
Temperature control	Bath/Circulator
Minimum temperature	-20°C
Maximum temperature	150°C
Geometry	20 mm Ø parallel plate
Geometry material	Titanium



Markets

- Biomedical (prosthetics)
- Automotive and Aerospace industries
- Military/Defense
- Oil industry

Cambridge Polymer Group

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Cambridge Polymer Group, Inc. is a contract research laboratory specializing in materials. We partner with our clients to solve problems utilizing our multi-disciplinary research team and full service laboratory.

We work with clients throughout the product life cycle to:

- **Develop new materials**
- **Design prototypes for proof-of-concept studies**
- **Create and execute experimental design**
- **Validate and verify manufacturing processes**
- **Perform root-cause analysis in product failures**

Cambridge Polymer Group, Inc. was founded in 1996 to provide a cost-effective resource for testing, research and development to clients who need periodic access to Ph.D.-level scientists and their support structure. We have developed a host of testing methods and materials for our clients, which number more than 300.

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