

Abstract Submitted
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Mechanical and Physical Measurement Tools and Techniques Related to High Field Magnets ROBERT WALSH, National High Magnetic Field Laboratory — Materials properties are the physical limitation in the achievement of higher magnetic fields and the construction of bigger magnets. High-field magnet designers try to use the newest generation of materials (structural and conductors) and design magnets with factors not acceptable in typical machine design or civil engineering applications. Examples of material property limitations on magnet design are introduced that set the stage for the state-of-the-art facilities necessary for characterizing the materials used in NHMFL magnets. Conventional strain measuring techniques (strain gages are the workhorses) are extended to low temperature tests by using cryogenic compatible materials and low temperature calibrations. For structural materials, strain gage based sensors provide accurate determination of yield strength, ductility, fracture toughness and fatigue life data necessary for efficient/reliable design of the magnets. Superconductors (LTS and HTS) are sensitive materials that often require non-contact strain sensing at cryogenic temperatures. A 3D-Digital Image Correlation system is a non-contact strain measuring system that provides whole-field strain measurement and is currently being extended to cryogenic applications of testing superconductors. Additionally, accurate dimensional characterization of test specimens, before and after testing, is enhanced with a contemporary CNC inspection microscope.

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