DESIGN ENHANCEMENTS TO THE NEW NHMFL PULSED MAGNETS FOR IMPROVED PERFORMANCE AND MANUFACTURABILITY

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Introduction
The 65T prototype magnets were the first examples of a new design template for pulsed magnets at the NHMFL Pulsed Field Facility. This report describes enhancements to the design template, applied to the 75T prototype now operating at Los Alamos, and applied to the first set of 65T production magnets scheduled for completion early in 2005.

Design Features
In this design the magnet assembly is a nested pair of separable coils. The inner ‘A’ coil is constructed with the ‘poly layer’ assembly process developed at the NHMFL. The outer ‘B’ coil is monolithic. The coils are connected in series with a joint between the finish lead of the A coil and the start lead of the B coil. The coil lead connections are made to a coaxial lead assembly, which is connected to the magnet power supply feed. The coils are mechanically supported between a pair of end plates with tie rods and Belleville springs. The lead bus is run radially outward toward the coaxial lead.

Design Enhancements

Lead bus
In the 65T prototype design, the conductor functioned as the lead. Leads exited the coils axially, and then were bent radially, fixed into a channel, and then clamped to lugs that connected to the coaxial lead. The long lead wires made assembly and disassembly of the magnets difficult, and increased the risk that a coil would be rendered unusable due to damage at the lead. In the present design, the coil leads are short and bent only once into their final shape. The coil leads are then connected to removable copper bus bars that are in turn connected to the coaxial lead lugs.

Magnet structural and interface components
The start lead bus, supports, end flanges, and the coaxial lead assembly are all common parts, and are therefore interchangeable. The finish lead bus and supports are unique only in their overall length, which is determined by the location of the B coil finish lead. All other features of the finish lead bus are now common.

Program Benefits
By making use of common components and interfaces, the magnet designer is able to minimize the added cost of developing new magnets that take advantage of improved conductor and reinforcement materials. The cost to provide replacement magnets is also minimized, since components may be recovered and reused.

Figure 1.
Cutaway view of 75T magnet