SOFE05-094

MANUFACTURING DEVELOPMENT OF THE NCSX MODULAR COIL WINDINGS*

J.H. Chrzanowski[1], P.J. Fogarty[2], P.J. Heitzenroeder[1], T. Meighan[1], B. Nelson[2], S. Raftopoulos[1], and D. Williamson[2]
[1]Princeton Plasma Physics Laboratory, PO Box 451, Princeton, NJ 08543
[2]Oak Ridge National Laboratory, Bldg . 5700, Oak Ridge, TN 37831-6169
jchrzano@pppl.gov

The modular coils on the National Compact Stellarator Experiment (NCSX) present a number of significant engineering challenges due to their complex shapes, requirements for high dimensional accuracy and the high current density required in the modular coils due to space constraints. In order to address these challenges, an R&D program was established to develop the conductor, insulation scheme, manufacturing techniques, and procedures. A prototype winding named Twisted Racetrack Coil (TRC) was of particular importance in dealing with these challenges. The TRC included a complex shaped winding form, conductor, insulation scheme, leads and termination, cooling system and coil clamps typical of the modular coil design. Even though the TRC is smaller in size than a modular coil, its similar complex geometry provided invaluable information in developing the final design, metrology techniques and development of manufacturing procedures.

In addition a discussion of the development of the copper rope conductor including "Keystoning" concerns; the epoxy impregnation system (VPI) plus the tooling and equipment required to manufacture the modular coils will be presented.

*Work supported by U.S. DOE Contract No. DE-AC02-76CH03073.