Material Database for Resistive and Pulse Magnets

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Abstract:

A database for building high field magnets is essential for scientists and engineers to select appropriate materials that enable the magnets to safely achieve the desired magnetic field. Microsoft (MS) Access was utilized to build the conductor database for analyzing and organizing large numbers of data. Additionally, test data organized in Excel is easily compatible with MS Access. MS Access also allows for cross references between relatable tables to reveal relative data and an approach made by combo boxes was used. The conductor database contains necessary material data (tensile and fatigue test performed since 1994 in MagLab) used to build high field pulse and resistive magnets.

Scientists and engineers at the MagLab can use this database for quick, organized access to the data.

Method for building the database:

1. Gather all tensile and fatigue data for the resistive and pulse magnet since 1994 and organize into excel sheets.
2. Transfer the following excel data from excel to MS Access:
   - Pulse Tensile
   - Pulse Fatigue
   - Resistive Tensile
   - Resistive Fatigue
3. Create four tables with the excel sheets in MS Access and define individual relationships for each table. (Relationships are the fundamental structure for the database).
4. Convert each table into an individual form by defining a primary key and data type for each field name. This allows for a more effective interpretation of data.
5. Define a material selection for each form with combo boxes. The user can now select a value directly from a list.

Discussion:

Building the conductor database with MS Access is an efficient method for organizing fatigue and tensile data of materials for the resistive and pulse magnet. Combo boxes on each form enables scientists to quickly access specific materials by selecting mechanical properties. The work order numbers on each form inform the user on which year the fatigue or tensile test was conducted. For example, work order number 17-001 means the tensile test was conducted in 2017. On the bottom of each form the user can use the search tab to browse through different materials and can add new test data to the specific form.

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