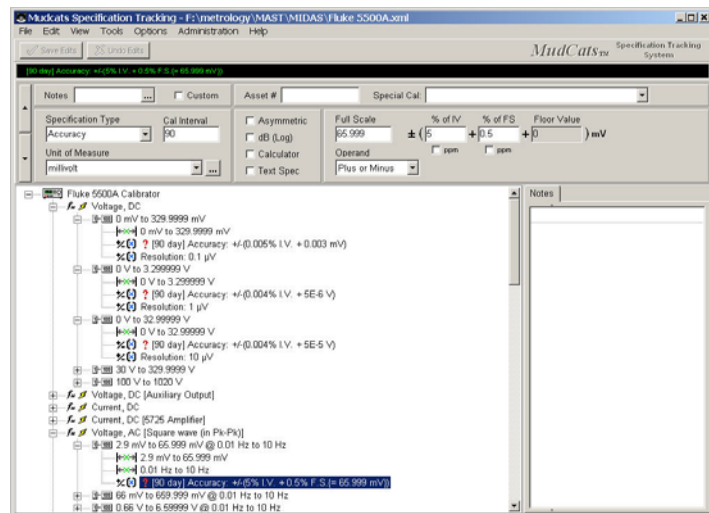


INTRODUCTION

SpecTrack and Units of Measure

SpecTrack is a 32 bit, Windows 98, NT, or 2000 based program, designed for standalone or Client/Server SQL database applications. SpecTrack provides a means for instrument specifications from different manufacturers to be stored in a common format that is usable by other modules in the MudCats suite. These electronic versions of instrument specifications are referred to as *specsheets* and contain detailed information about the capabilities and specifications of an instrument. Specsheets are fully revision controlled using a password protected security system and audit log. All previous revisions of a specsheet are retained in the database when any changes are made, and are retrievable for failure analysis or auditing purposes. In addition, 128 bit unique identifiers are associated with every specification entry to ensure that traceability is maintained.

SpecTrack also provides an interface to manage the intelligent units of measure system used in the MudCats suite. The MudCats unit of measure system maintains a database containing the names and symbols of each unit of measure, and the equations needed to perform conversions from one type of unit to another. These conversions can be performed automatically, as in the Calibration Process Manager, or manually using the Unit of Measure Converter tool.



Specification Tracking

The instrument specification data stored in the SpecTrack database enables MudCats to assign calibration standards, and their related function, range, and accuracy specifications to calibration datasheets at the test point level. This specification data is used to calculate Estimated Measurement Uncertainty (EMU), Test Accuracy Ratio (TAR), and for calibration failure analysis.

When an instrument is calibrated using a MudCats datasheet, detailed information about standard usage is embedded in the calibration file. For each test point calibrated, a unique identifier is saved that references the specification data for each standard used on that test point. Every specification entry in the SpecTrack database has its own unique identifier. These unique identifiers are reassigned any time an instrument specification is revised in SpecTrack, which means that each test point in a calibration is traceable to the exact calibration standard specifications used at the time of the calibration.



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Specsheet Structure

Instrument specifications are arranged in a hierarchical fashion with an instrument identification node at the top level, followed by function nodes, and then range nodes. Each range node in turn contains one or more parameter nodes that indicate the upper and lower limits of the range and the units of measure used. A range node will also contain one or more specification nodes containing accuracy or other specification data. Each node in a specsheet can also have notes attached in the form of footnotes. Specsheets can be saved to files in XML format for import into other applications.

Specification Format

SpecTrack provides several options for entering accuracy specifications. The basic accuracy specification consists of the Cal Interval, Unit of Measure, Full Scale value, % IV, % FS, and a Floor Error value. Asymmetric and dB type specifications are also supported. Custom Calculator equations can be used for more complex accuracy specifications by selecting the calculator option in the SpecTrack editor. Custom Calculator equations are processed at run time by MudCats using the built-in equation system.

The screenshot shows the SpecTrack specification editor interface. It includes a 'Notes' field with a dropdown arrow and a 'Custom' checkbox. There is an 'Asset #' field and a 'Special Cal:' dropdown menu. The main area is divided into several sections: 'Specification Type' (set to 'Accuracy'), 'Cal Interval' (set to '90'), 'Unit of Measure' (set to 'ampere'), and a list of checkboxes for 'Asymmetric', 'dB (Log)', 'Calculator', and 'Text Spec'. The 'Full Scale' field is set to '11'. The accuracy specification is displayed as $\pm (0.038 + 0.021 + 0.00033) A$. There are also checkboxes for '% of IV' and '% of FS' (both set to 'ppm') and an 'Operand' dropdown set to 'Plus or Minus'.

Specifications can also be tagged as being asset specific to allow for instruments that require special calibration of one or more ranges. MudCats will automatically substitute the accuracy specification of the specific asset when it is used as a standard in a calibration. This feature allows MudCats to use the proper specifications even if a substitute standard with special calibration is used.

Units of Measure System

SpecTrack also manages the units of measure system that is used throughout the suite. MudCats employs an intelligent unit of measure system that understands the relationships between different units of measure. Unit of measure names and symbols are required to be unique in the system, and the symbols are case sensitive. Every unit of measure used in MudCats has associated conversion rules that control what other units it can be converted to and how the conversion is to be performed. Additional information such as comments, reference information, or if it is an SI unit is also associated with each unit of measure.

Any time a unit of measure is used in a datasheet, MudCats can automatically perform the conversion required for comparing a UUT tolerance stated in one unit of measure to a standard's specification stated in another unit of measure. This means that an accuracy specification for a standard that reads in grams can be used in the calibration of an instrument reading in ounces, and MudCats will perform the conversion automatically to perform range matching or to determine Test Accuracy Ratio.



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Unit of Measure Converter

The Unit of Measure converter is an interactive tool that is integrated with both SpecTrack and the Calibration Process Manager. The Units Converter tool allows a user to manually perform units of measure conversions using the built-in equation system. Selection of a source unit of measure presents the user with a list of valid conversion target units. The result of a conversion is formatted to the proper number of significant digits and displayed to the user. Detailed information about the source and target units, and the conversion equation used, is also displayed.

