

1-800-913-3773 (within USA)
410-993-5000 (outside USA)
M/S 4016 | Email: surecal@ngc.com



Technical Note TN 02

SureCAL Software Development Plan

SureCAL programmers use a Software Development Plan when creating our commercial-off-the-shelf (COTS) calibration software. Our process is intended to define, convey, and impose standards which ensure the implementation of sound software engineering practices that both government and industry demand. The plan establishes the organization structure, programmers' direction, developer's techniques and methodologies, design standards, and coding standards to ensure product consistency and provide a guideline for compliance with the internationally accepted standards and quality systems requirements. As part of the development process, the method and performance test for each calibration procedure created is documented on a Software Development Data Sheet (SDDS) and maintained within the Northrop Grumman's Documentation Control System. An abstract of the design criteria from the Software Development Plan is as follows:

The SureCAL Automated Metrology System is based upon the philosophy that units are to be tested for their compliance to specifications and are not to be adjusted to nominal values if found to be in tolerance. Testing verifies the continued adequacy of the unit being calibrated. If adjustments are required, SureCAL procedures should aid in performing any necessary re-calibration sequences. The manufacturer's calibration requirements shall be verified and tested to the required tolerances, with at least a four-to-one ratio to the standard. If the process is incapable of meeting the 4 to 1 ratio, the programmer shall document the reason in the Standard Accuracy Requirements section of the SDDS and include the method used to achieve equivalent uncertainty. All OEM specifications, which are traceable to National Institute Standards & Technology (NIST), shall be tested. A requirement is considered to be testable if an objective and feasible test can determine whether the requirement is met by the software. The parameters are tested per the manufacturer's latest specifications at the time of development, and any special customer requirements. The manufacturer's manuals that are supplied with the new equipment are acceptable for development purposes. If the method used to perform the test differs from the OEM manual (ex.: consolidating instrument standards to reduce the number of test instruments), document the test method in the Test Method Utilized section of the SDDS. Add detail sufficient for the technician to properly use and connect the equipment. If the design of the software requires any critical designations for safety, the developer must comply with the SureCAL Safety Plan and is documented on the SDDS. All measuring and testing instruments used during the development process must be calibrated and/or verified before put into service. Calibration procedures should measure the required range and tolerance or uncertainty of each item or unit parameter being tested. All calibration procedures shall include description of the measurement standards and equipment needed with the required parameter, range, tolerances or uncertainties, and specification for performing the measurement of the calibration and recommended types that are capable of performing measurement standards. All software must be tested by exercising the parameters specified in each calibration procedure. Automate testing, whenever practical. Minimize test execution time. Make the user interfaces consistent among all calibration procedures. Design software such that it can easily be reused. Write software in modular structure. Reuse existing code as much as possible, such as the menu structure and test control features, data sheets, error handling, and diagnostic behavior. Use the software development guides, coding standards, standardized header and format as specified in the Programming Style Guide & Coding Standards. Include enough comments and descriptions to assist other developers in reusing or modifying code. All analogic sets must be consistent with nouns, verbs, and commands of other developers. Programming code is secured to prevent tampering. Program code includes error trapping sufficient enough to handle timely run time error and time-outs. All computer software is documented and adequate for use.