

現場檢査 데이터管理를 위한 컴퓨터 프로그램 - PRISM Prism-Computer Program for Inspection Data Management

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THE PROBLEM

In recent years, manual handling of the voluminous amounts of data associated with nuclear power plant component inspection and testing has become an increasing concern. Utilities have begun to look for new ways to meet needs like these:

1. Manage enormous amounts of data in a more efficient way;
2. Keep up with constantly changing regulatory requirements;
3. Meet audit obligations;
4. Respond quickly to requests for information; and
5. Maintain continuity in management of Section XI programs during personnel transition periods.

A typical power plant contains 9,000 components, not including steam generator tubes. During each interval, 6,000 of these components must be inspected. This amounts to 14,000 examinations. For each component, the following data is tracked: 50 items that contain physical description of the component, 10 items that detail the examination to be performed, and 30 items that summarize the results of each examination. Therefore, over one million elements of data are tracked per interval.

Of the 14,000 examinations that are performed in an interval, 12,000 are weld inspections. The following data is tracked: type of inspection, procedures to be used, reason for inspection, inspector, results, types of indications, and corresponding resolutions.

DATA MANAGEMENT SYSTEM

NUTECH recognized that these needs could best be met through the use of a computerized data management system. A data management system is a group of computer programs, designed for a specific application, that permits access to, retrieval from, and update of an existing data base. Because

it is computerized, the processing of data is handled with much greater speed and accuracy than manual methods afford. A data management system allows a user to add new records to a data base, change existing records, delete records, and request reports with a minimum of time and effort.

Think of all this inservice inspection data as being stored in a complex system of filing cabinets. Each document in a cabinet may be linked to many documents in other cabinets. Perhaps you need to update all documents that refer to a particular Section XI category. It might take hours, or even days, to locate all of these documents. A data management system allows you to locate and update these documents quickly and easily, in a matter of minutes.

Certain features are greatly desirable in a data management system:

1. It should be easy to understand and use. A user should be able to locate the information he needs without resorting to any special knowledge of or experience with computers;
2. It should provide "prompting" assistance. A "prompt" leads the user through each step of the program;
3. It should provide error messages to let the user know when data has been entered incorrectly;
4. It should function interactively, as well as in batch mode;
5. It should allow the user to exit from any function at any time; and
6. It should handle all interface with the computer.

THE SOLUTION – PRISM

PRISM is a data management system that was specifically designed to store, maintain, and report the voluminous amounts of data associated with preservice and inservice inspection of nuclear power plant components and inservice testing of pumps and valves. PRISM can store preservice and inservice inspection related information for more than 9000 components. For each component or weld, it can track over 90 separate elements of information. In addition, PRISM can store inservice testing data for an unlimited number of pumps and valves. Ninety separate elements can be tracked for each pump, and 45 elements for each valve. PRISM is actually composed of a series of data base products. It manages inservice inspection, inservice testing, and steam generator tubing data through three separate modules.

The inservice inspection module, PRISM-ISI, allows for planning, scheduling, and reporting of the results of preservice inspections performed prior to start-up and inservice inspections performed during operation. PRISM-ISI was specifically designed to help a utility meet the requirements of Section XI of the ASME Code, Subsections IWB through IWF. PRISM-ISI was also designed to manage other regulatory and utility defined programs.

The inservice testing module, PRISM-IST, allows for the planning and scheduling of examinations and the reporting and trending of results of examinations performed on pumps and valves during inservice testing. PRISM-IST was specifically designed to help a utility meet the requirements of Section XI of the ASME Code, Subsections IWP and IWV.

In addition, NUTECH is currently in the process of developing a module for the management of steam generator tubing examinations called PRISM-SGT. PRISM-SGT is designed for planning,

scheduling, and reporting of steam generator tubing examinations. Included are eddy current, profilometry, and visual examinations as required by Section XI of the ASME Code, appropriate Regulatory Guides, and plant specific preventive maintenance programs.

The overall structures of PRISIM-ISI, PRISIM-IST, and PRISIM-SGT are very similar. Each module is designed with a separate, structured data base, each is designed to handle large amounts of data, and each is designed to produce reports which help a utility manage its Section XI program and fulfill obligations to regulatory agencies. All three modules share many special features that make PRISIM easy to use.

1. PRISIM is "User friendly": to use it, one does not need any special computer knowledge or skills.
2. PRISIM is menu-driven: for each function, it displays a menu that allows the user to select one of several options.
3. PRISIM utilizes forms-fill-out data entry: when data must be entered, PRISIM displays an input screen with names of data elements next to spaces for data entry. This screen is self-explanatory and can easily be completed by the user.
4. PRISIM provides interactive "prompts" to lead the user through the program, and error messages are generated to let the user know when incorrect data has been entered.
5. PRISIM can store and process data for many units and can be accessed from many different locations.
6. Planning data bases are provided, as well as final data bases, so the user can perform preliminary planning and generate test cases.

PRISIM-ISI, PRISIM-IST, and PRISIM-SGT have each been designed to perform three basic functions: Generation and Maintenance of the Data Base, Generation of Preprogrammed Reports, and Query/Response. During Data Base Generation, large volumes of data can be input through batch processing to create the data base. During Data Base Maintenance, additions, changes, and deletions can be made to the data base through interactive processing. In addition, PRISIM-ISI and -SGT contain powerful mass edit and data replication features that allow the user to make global changes and additions to the data base with a single command. PRISIM-IST facilitates data entry that is keyed to plant-unique surveillance test procedures. In all three modules, data validation occurs when the data base is initially created and every time additions or changes are made. If any errors are discovered during the processing of data, PRISIM will generate error messages and allow the user to make corrections. More than 130 different error messages may be generated during the processing of data. Data validation is a very important feature because it helps to ensure the integrity and accuracy of the data base and the accuracy and completeness of any reports that are produced.

During Preprogrammed Report Generation, the user may request a report from the Report Selection Menu and it will be printed. PRISIM provides more than 25 different preprogrammed reports that can be produced upon request. These reports can be used to satisfy the requirements of a regulatory agency or to fulfill the needs of internal management. The reports contain information like physical component

data, examination requirements, examination histories, testing requirements, test results, test result warnings, schedules, and many more items. Reports are provided in the format that best suits their purpose. Preservice inspection, inservice inspection, and inservice testing information is produced in the form of listings. Pump and valve test results are produced on trending reports. Each trend report contains a separate section for the plot, data table, and maintenance summary. The plot section highlights alert and action ranges. Steam generator tubing indication data is presented in tube map format.

Query/Response is a powerful function which provides access to every element in the data base. Query/Response allows the user to interrogate the data base, search for and retrieve specific information, sort it in any order, and display or print the retrieved information. The information may be selected on the basis of relational criteria that is specified by the user.