Data Management Tool Design for Eddy Current Testing of Steam Generator Tube in NPP

Hyun Ju Yoo [a*], Hee Jong Lee [a], Min Woo Nam [a], Chan-Hee Cho [a],
[a]KHNP Central Research Institute, 1312-70, Yusungdaero, Yusung-Gu, Daejeon, 305-343
[*]Corresponding author: yoohi@khnp.co.kr

1. Introduction

Eddy current testing (ECT) is mainly applied for the in-service inspection(ISI) of steam generator tube in Nuclear Power Plants. Presently, there is no domestic ECT system for the steam generator tubes. The maintenance and repair of the imported system cannot be achieved effectively. In order to resolve such problem, new ECT system has now been being developed in KHNP Central Research Institute. In this paper, the composition and functions of the steam generator ECT Data Management are explained.

2. Composition of the System

ECT Data Management System integrates and controls each eddy current data produced during in-service inspection.

2.1 Composition of the System

The acquisition management in the ECT Data Management system is realized based on the file server to store entire data related to the inspection. The tube sheet layouts, inspection plans, landmark tables, indication codes, test results, calibration information, inspection groups and inspection results are included in the data. These data are transmitted to the control unit, PCs for acquisition and analysis, and file server in order to record the ECT data systematically.

In SG ECT System the data are held in common and communicated through LAN. User can access all the data stored in every device in the same LAN using normally established PC.
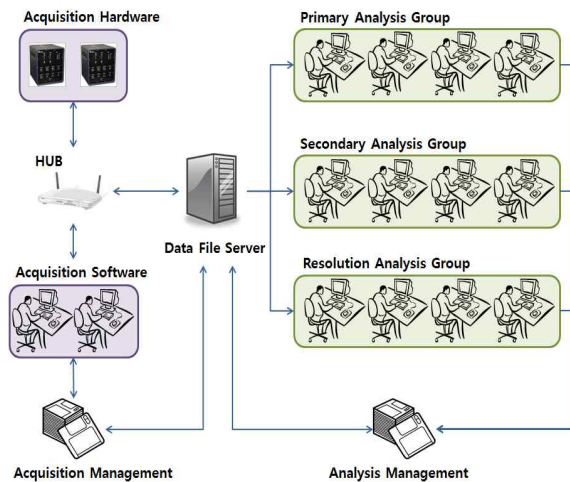
Specific inspection plan through each work guideline is established in the Acquisition Management. The results are displayed in a monitor in order to be controlled by user. When the signals are acquired following the inspection plan, the data are updated. Administrator can confirm the inspection status because the status is displayed in the monitor.

Analysis Management controls the updated acquisition data through the File Server, and each analysis group(Primary, Secondary and Resolution) can analyze the data. After finishing the primary and secondary analyses, the resolution group provides the feed-back to the primary and the secondary groups through the electronic Resolution Process for the reliability of analysis data. The data analyzed by the resolution group are delivered to the Analysis Management and will be Final Report.

2.2 System Design
2.2.1 File Server

The information management is simplified by supporting file classification using the file server resource manager supported by Windows Server 2008 Rev. 2 and applying appropriate method as the classification results. Administrator can classify the files automatically, execute the report, complete the files following the data file classification of the Server, and authorize users.

The manipulation of the system is minimized because the file classification function in Windows Server 2008 Rev. 2 appoints the classification information in the file of the file server automatically and provides the extendable mechanism to allow the authority on menu.

It is easy for users to handle many files in the computer system using file control function. The file control functions as follows:

a. Manipulating files - it provides the functions of the creating, registering, deleting and searching files.
b. Assigning and controlling files - in the case of holding files in common at several works simultaneously, it controls the exclusive assignment and read-only assignment.
c. Managing mass storage domain – it manages newly assigning, expending, reducing and deleting the domain as well as controls the whole mass storage domain.
d. Independent from devices – changing the program is not required in the case of changing

Fig 1. Architecture of SG ECT System

magnetic disk drive or magnetic tape.

e. File organization and access method – it arranges and organizes the files with easy-access type and provides access methods corresponding to the file organization.

2.2.2 NFS

Network File System (NFS) supported by Windows Server 2008 Rev. 2 is a client/server type application program. The NFS client must be in the client PC and the NFS server must be installed in the server. TCP/IP protocol must be installed in the client PC and server because the client PC and server use TCP/IP as a program to transmit and correct files.

Both users and system administrator install all or a part of file system. Each user can access files in the file system with user's own authority. This concept is similar to the common folders in MS-Windows Operating System.
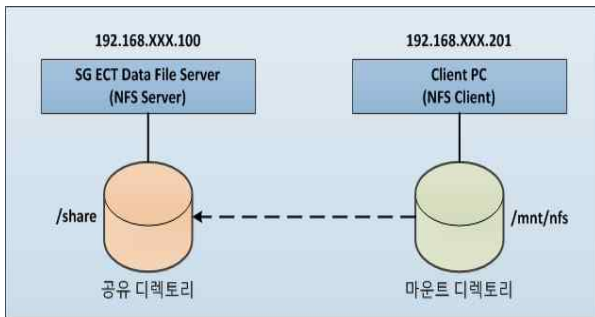

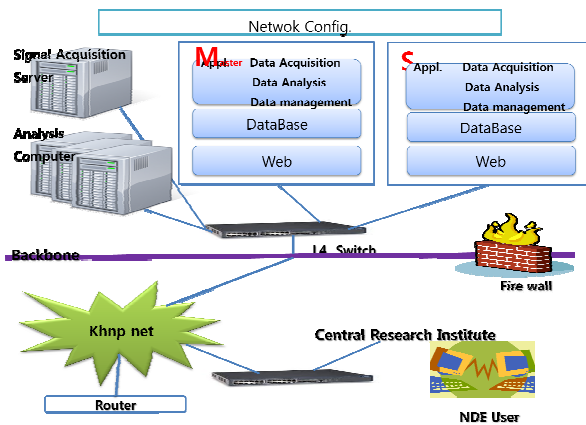
Fig. 2 NFS Diagram

2.2.3 Hardware Specification

Fig. 3 Construction Diagram of Network

The construction diagram of the network and hardware is shown in Fig. 3. The operation system is developed based on Windows 7. The environment of the system is constructed so as that the slave computer could be operated if the master database computer is down because the signal acquisition server, analysis computer and data related to inspection management are combined in a multi-tiered system. Moreover, It is designed that the users authorized through the network can access the information such as result report.

3. Conclusions

An ECT system including the hardware and software has now been being developed in KHNP Central Research Institute. The constitution and functions of the eddy current data management tool are explained in this paper. This system will be applied to the steam generator tube inspection of nuclear power plants. The system will be improved by reflecting the experience and suggestion from the site. The ECT system is supposed to be one of the world best. Then, the ECT inspection will be conducted without foreign technology.

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