INTRODUCTION

The industrial installation operated by Cogema at La Hague covers an area of 3 square kilometers. Two commercial reprocessing plants, UP2 and UP3, are operated on the site, which accommodates about 80 buildings where more than 3,000 people are employed.

The numerous operational functions to be implemented in such sophisticated plants, as well as their complexity and interactions, generate considerable data processing requirements.
Specifically, it is necessary to gather, process and retrieve large amounts of data, the nature and origin of which are very different (process units, process control and safety systems, analytical laboratories, spare parts stores, etc.)

Data processing results also have to be supplied to many users, according to their various responsibility levels and needs, at their work location (control room, office, etc.), within the required time.

To meet these requirements effectively, Cogema has installed a number of diversified data processing systems linked by a communications network called Haguenet. The whole system forms the La Hague Total Data Management System (TDMS), which provides each user with data that are properly coded, checked and consistent, in order to make operator tasks easier and shorten response time. Plant productivity and availability are thus improved, since operation and maintenance can be carried out smoothly and more efficiently.

FUNCTIONS

The La Hague TDMS performs a full range of functions for real-time tasks directly related to the process through the control systems. It also performs tasks related to staff, production and maintenance management. These functions include namely:

Production data management

- Operation supervision
- Nuclear materials accountancy
- Wastes management
- Laboratory analyses
- Operating procedures
- Walkdown patrols

Most of these functions have to communicate with the process control systems, which are not within the scope of this paper.

Maintenance data management

- Diagnostic assistance
- Software maintenance
- Intervention demand
- Spare parts management
Technical documentation
- Computer-aided design
- Documents management

Miscellaneous
- Operating staff management
- Radiation dosimetry data management

HAGUENET COMMUNICATIONS NETWORK

In order to provide easy communications between the computer systems that perform the above-mentioned functions, and between all the users, a high-performance Ethernet network called Haguenet was designed and installed in 1986.
In 1992 the network capacity was increased from 10 Mbits/sec to 100 Mbits/sec by changing star structure to FDDI (Fiber Distributed Data Interface) ring structure.

Main design principles

Working stations are multipurpose; consequently, each user has one terminal to access all the authorized applications corresponding to his needs. Operation of this terminal is simple thanks to the use of a centralized entrance access and the same standardized procedures for all the applications. This provides the users complete transparency with regard to the TDMS structure and components.

Haguenet interconnects 135 computers, 120 micro-computers and 1300 terminals from various suppliers. Coaxial cables (20 km) and optical fibers (30 km) are used for these interconnections.

PROCESS OPERATION DATA MANAGEMENT FUNCTIONS

Some examples of the man process data management applications implemented within the La Hague TDMS are briefly described below.
Nuclear materials and waste follow-up

The related system performs three functions:
- a physical follow-up function, which provides qualitative and quantitative information about the internal and external flows of nuclear materials and wastes in the plant;
- an accountability follow-up function, which manages the regulatory recordings particularly within the framework of nuclear materials accountability;
- a commercial follow-up function, which updates the Cogema clients balance in conformity with contractual provisions.

Analytical data management (ANA)

The related system carries out the management of analytical data from initiation of an analysis request by the process operator up to the delivery of results by the laboratory and recording (about 150,000 results a year). Laboratory analysis of samples taken from the process provide important data for process control and production management (nuclear material accounting and products specifications).

Operating procedures management (COGEMO)

The related system displays to the process operators in the control room, at their request, the operating procedures needed to efficiently control the facilities they are in charge of under any conditions (start-up, transients, incidents, etc.). Taking into account this purpose, the human-factors engineering aspects of the man-machine interface were given particular attention.

Site inspection data management (COGESAIR)

The related system helps the operating staff to systematically monitor large amounts of local information and equipment parameters in order to promptly identify all abnormal situations which may affect plant operation and safety.

The system includes two subsystems which can exchange information data. The first one, located in the control room, stores and process all information related to the parameters and equipment to be monitored periodically. The second one, a hand-held unit (pocket type) designed especially for hostile environments, is taken by the field operator on patrols. It is equipped with a laser gun for reading bar codes.
MAINTENANCE DATA MANAGEMENT

Maintenance in a reprocessing plant is a very important permanent function. It requires suitable methods and tools based on experience, a clear organization, operational technical documentation, and spare parts management.

Some examples of the maintenance-related systems implemented within the La Hague TDMS are described below.

Diagnostic assistance system (SAD)

This system is based on an overall approach to the process and its control. Its purpose is to help the user investigate the origin of failures, the effects of which are observed through the control system.

Software maintenance center (CML)

The related system manages the maintenance of all the programs of the process control systems, which include at La Hague: programmable logic controllers, distributed control systems, supervision computers.

Maintenance interventions demand (MDI)

The related system helps the operation and technical department to control the progress of the interventions, from the creation of the request to their completion and reporting.

Spare parts data management (SELAMO)

The related system allows to:
- reduce the delay to find an item in the data bases,
- provide a safe and quick knowledge of the stock quantities and the location of each part in the plant and so reduce the delay to obtain a required spare part,
- manage the stock of spare parts.
DOCUMENTS DATA MANAGEMENT

Operation of the La Hague plant involves the use of a large number of documents and drawings. To ensure the required efficiency, as far as distribution time and information quality are concerned, traditional methods and materials are no longer optimal.

CAD systems applications concern every type of drawings and uses. 3D drawings of active cells can be used for preparation of exceptional maintenance operation.

A new system call SYDDEX is under development, using a technical data base, to manage the documentation related to process control.

CONCLUSION

Due to the complexity of a spent fuel reprocessing plant and its nuclear characteristics, the operators must have real-time access to updated information on many subjects. The La Hague TDMS, which is operating satisfactorily, complies fully with this requirement and can smoothly adapt to future plant operational needs and additional facilities, without service interruptions.

Furthermore, since La Hague is a commercial reprocessing plant, the TDMS also contributes to the profitability of its operation. Thanks to the TDMS, the use of manpower has been optimized in many departments in spite of the increased workload due to commissioning of the UP3 plant.