Compact Type Training Simulator for Thermal Power Plant

Recent tendencies in manipulation and monitoring of thermal power plants are toward CRT operation and advanced automation. Accordingly, opportunities for direct handling by operators are fewer, and there is an increasing demand for operational training by simulator. To satisfy this need, a compact simulator to be installed in power plants has been developed. An outline of the simulator is given herein.

1. System outline

As shown in the system configuration in Fig. 1, the compact type training simulator is composed of the following:

- High-performance computer for plant and control model calculation
- Operator station
- CRT for control logic maintenance tool and instructor function
- Event and alarm printer
- Hard copy for recording

Apart from the printer and hard copy, these components are coupled in the network.

The hardware configuration is thus compact, but the number of control stations, plant monitoring functions, and control logic on the CRT is assumed to be equivalent to the actual system.

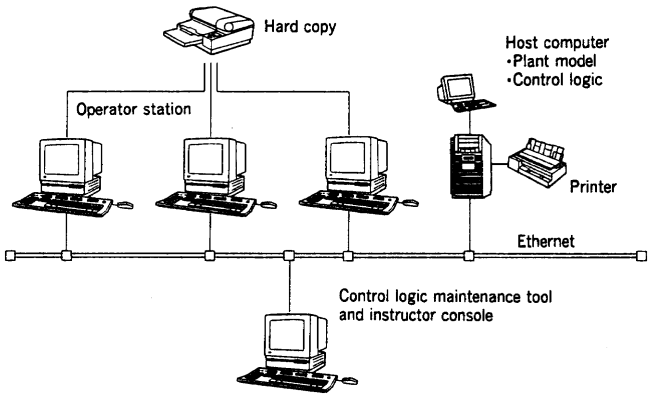

Fig. 1 System configuration

Table 1 Specifications of instructor function

Function item	Specifications
Initial condition set	40 modes
Run/freeze	Selectable at arbitrary timing
Snap shot	Data can be collected at arbitrary timing
Snap shot data preserve	Permanent saving of snap shot data
Back track	Return to 60 minutes before at every 2 minutes
Replay	Data acquisition: reproducible from 60 minutes before at every 5 seconds
Malfunction	100 modes, simultaneous, if desired
Simulation speed change	5 times speed to 1/2 speed
Simulation time change	Arbitrary date/time setting enabled
Operating condition change	Arbitrary setting of ambient temperature, seawater temperature, fuel properties, etc.
Plant condition display	(Trend of) Entire process amount

As the plant manufacturers, we have analyzed and incorporated the dynamic and static characteristics of the plant as required, and the precision plant model fabricated on the basis of data accumulated over decades allows training by simulation that produces the same effect as in the actual system.

As an example of the product, the appearance of the compact simulator for export is shown in Fig. 2.

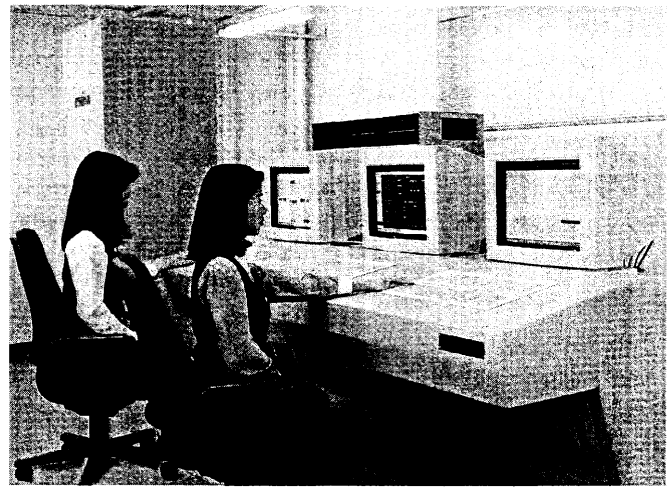

Fig. 2 Overview

2. Features

This compact simulator has the following features.

(1) Universal applications

Easily applicable to natural circulation/once-through boilers, reheat/non-reheat turbines, various other plant types, coal firing, heavy oil firing, gas firing, and multi-fuel firing.

(2) Versatile training modes

- Operational training in plant start-up and shut-down
- Operational training in malfunction
- Special and regular operational training (feed water heater one-side operation, turbine valve testing, etc.)
- Control system adjustment training

(3) Saving of installation space

The host computer, CRT and other devices can be installed on a desk, and no special cabinet is needed.

(4) Ease of system operation

This compact simulator is started by turning on the power, and stopped automatically by command input, and no special operation is needed. The power source is commercial power supply, and there are no special power requirements.

3. Instructor function specification

This simulator incorporates the instructor function as shown in Table 1 to permit efficient training.