DISTRIBUTED CONTROL SYSTEM FOR CEMENT FACTORY

1 INTRODUCTION

Distributed Control System has come to be adopted more and more in recent years in cement factories.

Functions required for distributed control system for cement factories are:

(1) Operation through use of CRT's.
(2) Digitalization of instrumentation
(3) Digitalization of motor control.

So that it is necessary to actualize a total system combining the above three functions in an organic way. This report introduces a distributed control system for cement factory accomplished by Fuji Electric's MICREX-P.

2 SYSTEM COMPOSITION

2.1 Classification according to installation place

Distributed control system for cement factory is installed in the central control room and in the electric equipment room considered as local. Further, for electric equipment room, installation is made in three following places: raw mill, kln and cement mill. In the central control room, CRT Console (CRT) constituting a man-machine interface, Hard Copy (HCU), Logging Printer (LPR), Message Printer (MPR), etc. are installed. In the electric equipment room, Process Station (PCS) and Programmable Controller (HDC) are installed.

Also, between each equipment in the central control room and in the electric equipment room, they are interconnected by Micro Data Way (DPC).

2.2 Classification by function

Control function at cement factories can be classified into two: one being instrumentation function and another, total motor control function. Instrumentation function carries out supervision, setting and operating of analog loop as well as input and output of signals. They are actualized, mainly, by CRT Console (CRT) and Process Station (PCS). Motor control function refers to those carrying out supervision of motor operation, successive starting operation, inputting and outputting of signals and issuing of alarms, and these function being actualized mainly by CRT Console (CRT) and Programmable Controller (HCD). The operation method is actualized by using CRT Console (CRT). CRT Console (CRT) displays Plant Panel, Group Panel, Trend Panel, New Alarm Panel, etc. Logging Printer (LPR) can print out daily and monthly reports as process data and production basic units and others. Message Printer (MPR) can print out Alarm printing and operation printing.

3 METHOD OF THE SYSTEM

3.1 Combination of instrumentation and motor control control

By actualizing these two control functions by Process Station (PCS) and Programmable Controller (HDC) produced by an identical architecture, unification of system engineering is devised.

3.2 Adoption of CRT Console

By adoption of CRT Console (CRT), conventional monitoring panels are no longer necessary, and this contributes to reduction of operation space, and thanks to adoption of CRT Console also, as the same console is entrusted with the duties of instrumentation and motor controls, unification of administration can be actualized.

3.3 Adoption of data way

By adoption of data way, wiring cost for transmitting signals are much reduced and data transmission of instrumentation and motor controls through the same data way are made possible.

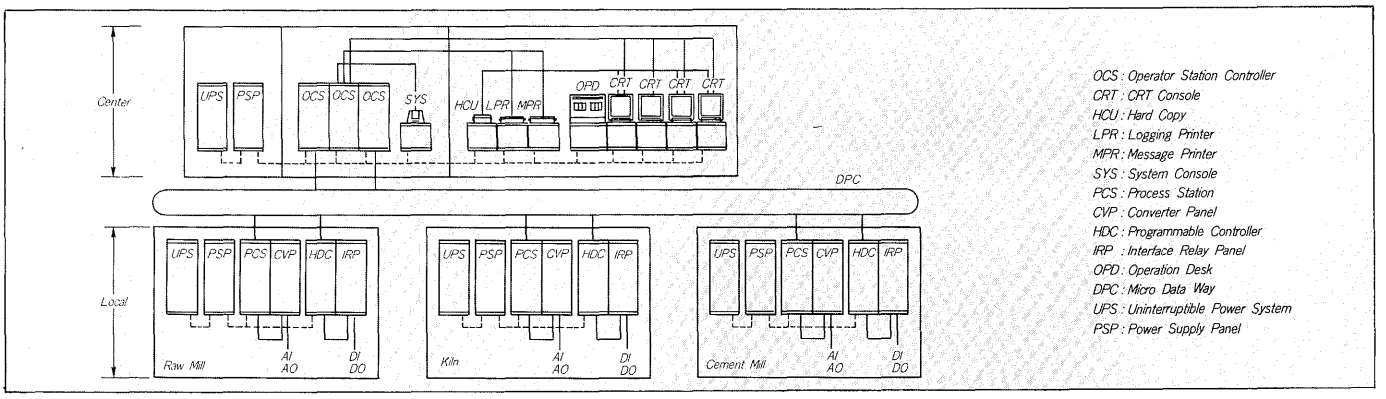
3.4 Adoption of Distributed Type Controller

By adoption of Distributed Type Controller, system modification that would be necessary when installation would be modified due to change in software programming, is made possible, and the risk of the system can be dispersed.

4 CONCLUSION

MICREX-P used in cement factories that we have described in this report is widely used and under operation not only Japan but also in many countries of the world. Cement factories handle hundreds of instrumentation signals and thousands of motor control signals and for their operation, many knowhows are required.

The system that we have introduced now is the system that only FUJI ELECTRIC could have produced with its long and vaste experience in producing precision control machineries. In the immediate future, we are certain that more and more distributed type control systems would be adopted, and we are convinced with our capability of answering these needs throughout MICREX-P.



AIRCRAFT FUEL PIPE LINE INSTRUMENTATION AND CONTROL SYSTEM FOR NEW TOKYO INTERNATIONAL AIRPORT

1 INTRODUCTION

Air craft fuel pipeline extending from Chiba Harbour to New Tokyo International Airport (Narita Airport) in about 47km that has inaugurated in August, 1983 has a flowrate of about 22,000kℓ max. per day.

Fuji Electric has delivered for this aircraft fuel pipeline, for the first time in application of the Petroleum Pipeline Law, computer system, telemeter and telecontrol system, measurement control system and uninter-ruptible power supply system for these systems, to the New Tokyo International Airport Authority.

2 INSTRUMENTATION CONTROL SYSTEM

2.1 Pipeline oil pressure and flowrate control equipment

Upon starting oil transfer, flow is controlled by a gradient (of a set value) in order to increase the flow, and when it comes to a steady flow (500kℓ/h), pressure control or flow rate control is made. When oil transfer is stopped, flow control will be made in order to decrease the flow by a gradient of predetermined value.

2.2 Sequence control equipment

MICREX-E, a programmable controller is adopted as a control equipment, and as for man-machine interface, mosaic type graphic monitor and control panel is provided to carry out monitoring and control on operating conditions of the entire pipeline.

3 COMPUTER SYSTEM

Computer system, among the entire Aircraft Fuel Pipeline Instrumentation Control System, takes up the highest position in the hierarchy of system composition.

Consequently, in order to actualize a highly reliable computer system, a redundancy system (duplex system) is constructed at each Dispatching terminal and Receiving terminal. In each system, U-1500 is adopted as a central processing unit and for man-to-machine interface, 4000-character color display unit (CRT) and a voice guidance device are adopted, thus each system can offer a high-speed computation and consolidated guidance functions.

Leak detection that is one of the most important application software of the computer system actualizes the following:

(1) Flow rate difference detection method
(2) Pressure detection during operation
(3) Difference pressure and pressure detection during non operating period.

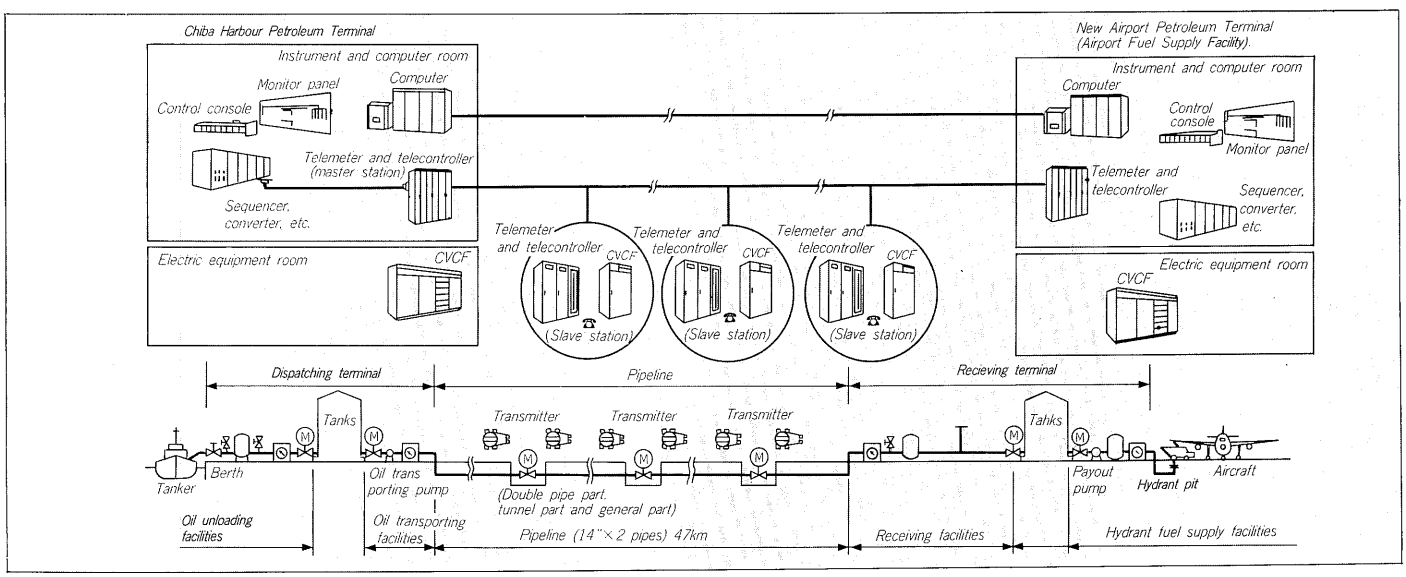
4 TELEMETER AND TELECONTROL EQUIPMENT SYSTEM

This system is composed of a master station at both terminals of Dispatching terminal and Receiving terminal, and slave stations along the pipeline, and it includes the following three transmission systems:

(1) Main TM/TC system (Composition, 1:N:1)
(2) Sub-TM system (Composition, (1:1) x 6)
(3) Short-distance carrier equipment system

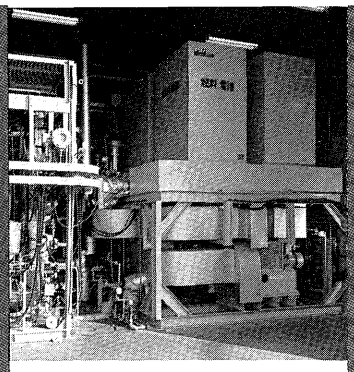
Main TM/TC System carries out control emergency shut down valves of each part of pipeline and collection of various data. For each master station at both terminals, a large-capacity DISTA-1000 is provided, while for slave stations, small-capacity DISTA-212 are provided at 30 stations along the pipeline. Also, as slave stations are installed in a linear form, the transmission line is laid out in a multi-drop type.

For sub-TM system, a digital telementer (DISTA-200) is provided for collecting data on pressure in 6 spots along the pipeline in order to detect leaks under working pressure.



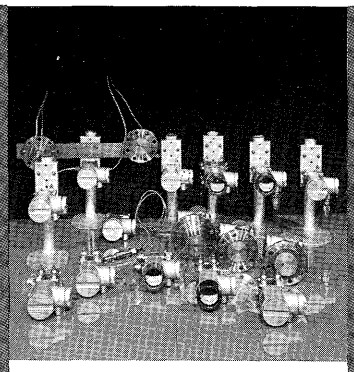
Outline of Products

Power and Industrial Electrical Machinery



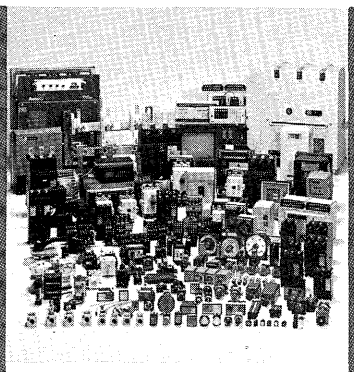
- Nuclear Power
- Power Generation and Distribution
- Transportation
- Environmental Equipment
- Industry
- Electrical Installation
- Mechatronics Equipment

Instrumentation



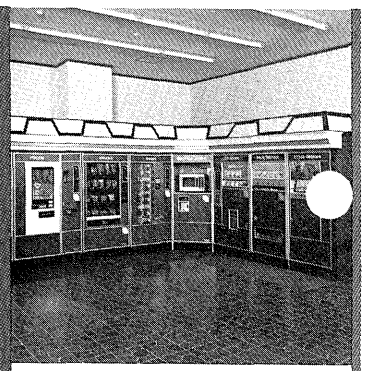
- Industrial Instrumentation
- Water Treatment
- Data Process Engineering

Standard Electrical Products



- IC (Integrated Circuit)
- Semiconductors
- Rotating Machines
- Standard Electrical Equipment

Vending Machines and Specialty Appliances



- Vending Machines
- Freezing & Refrigerating Open Showcases
- P.O.S. for Versatile Purpose Appliances
- Air Conditioning