PROCESS INSTRUMENTATION AND FIELDBUS -ANOTHER EVOLUTION-

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At the start of 21st century, synchronizing with the daily use of the Internet environment in the community, Fieldbus is becoming popular in the Process Instrumentation. Resulting from the flattening of the information flow structure from the traditional pyramid shape, a variety of information is transferred to multiple directions in the Internet environment when compared to a limited, unidirectional flow of minimal information in the past. Within the Internet environment, the distribution of functions and concentrated usage of information is also phenomenal.

In the Process Instrumentation arena, this type of basic movement has also been started. One of the evidences is the growth of Fieldbus usage. The wiring reduction made possible by Fieldbus, connecting multiple field devices to a single pair of wires, is an obvious advantage of this technology. However I would like to stress that the potential of Fieldbus is far greater than that.

The standardization of the field signal has been accomplished in he past by the efforts of our predecessors in Process Instrumentation. Using the current standard of 4 to 20mA analog signals, 1) normalization of various field values such as temperature, flow and pressure into 0 to 100%, 2) standardization of signal interface, and 3) interconnection of control equipment and field devices from various manufacturers have been realized. Thus, the 4 to 20mA signals are widely utilized as a reliable and unified transmission signal standard, although limited by its unidirectional transfer of single information.

FOUNDATION™ Fieldbus is an enhanced realization as the successor of this well-established culture of standardization represented by 4 to 20mA according to the requirement in new era. FOUNDATION™ Fieldbus has been developed to provide Interoperability among control systems and field devices from different manufacturers as top priority objective and realized 1) multiple devices on a single pair of wires, 2) bi-directional communication of various information, 3) distributed intelligence enabling sophisticated diagnoses and control functions. It can be said that FOUNDATION™ Fieldbus in the Process Instrumentation has been positioned and directed as the same structure as the Internet in the Social system. Especially, the architecture of embedding function blocks in the field devices for realization of distributed intelligence should be stressed as the forerunner of Object Oriented and Agent technology.

Another important aspect of the FOUNDATION™ Fieldbus technology is its nature as a pure infrastructure, and its outcome solely depends on how controllers and devices connected to it utilize the potential of it. Since many types of field devices already have microprocessors for signal conversion, compensation and calibration, connecting them to the FOUNDATION™ Fieldbus is a fairly straightforward enhancement of their intelligence. Putting a microprocessor in every device for connecting FOUNDATION™ Fieldbus is similar to giving a PC to everyone in the Internet environment. Nevertheless, a device is different from a human being; you cannot tell the device to “study hard” to learn how to behave in a fieldbus network, but you have to make them FOUNDATION™ Fieldbus compliant. Up to now, eighty-one devices from twenty-six manufacturers are registered by the Fieldbus Foundation and the number is expected to grow continuously.

As for the application of FOUNDATION™ Fieldbus in control systems, there exist various levels of handling, from merely connected to fully integrated. Unfortunately, many of the traditional control systems based on 4 to 20mA signals are not ready yet for full integration of FOUNDATION™ Fieldbus. However, Fieldbus Foundation has gained support from three manufacturers for Host Interoperability Support Test with their control systems.

Yokogawa recognized the necessity and potential of Fieldbus from the very beginning and established Interoperable Systems Project in 1992 with three other manufacturers. The Fieldbus Foundation was established in 1994 as the successor of ISP and Yokogawa contributed as a board company in specification development, field trials and promotion. In 1996, Yokogawa developed a dedicated interface chip for FOUNDATION™ Fieldbus. The chip was not only used in Yokogawa devices but also

provided to other manufacturers to ease the design efforts.

Further, as a total solution supplier offering reduction of TCO to end users in the Process Industry, Yokogawa insistently developed and enhanced its products and engineering capabilities.

In 1997, Yokogawa participated in the field trial at an end user site. In 1998, a pressure/differential pressure transmitter, EJA, and a vortex flow meter YEWFLO*E were registered by the Fieldbus Foundation as the world's first registered devices. Furthermore, CENTUM CS was introduced to the market as a FOUNDATION™ Fieldbus supported system. A large part of Yokogawa's field devices is offered with optional FOUNDATION™ Fieldbus including PID function block. The pH analyzer will follow after DAQSTATION in the lineup.

At the moment, April 2001, Yokogawa has nine models of devices registered by the Fieldbus Foundation and announced CENTUM CS3000 R3 as the world's top level DCS with full integration of FOUNDATION™ Fieldbus. R3 offers: 1) enhanced capacity and performance of H1 Fieldbus connection, 2) redundancy of H1 Fieldbus interface card, 3) integrated operation and integrated engineering environment supporting distributed control functions and 4) online device management functionality. In addition to the Fieldbus related enhancements, R3 has excellent connectivity and openness in the Internet environment, realizing a total network structure from field to boardroom. In September 2000, Yokogawa's control system CENTUM CS3000 took the HIST successfully - the first in the world that supports virtually all functions listed by the Fieldbus Foundation.

Yokogawa believes that the robust, flexible and high performance system has been realized using the flat network environment and positions the FOUNDATION™ Fieldbus as its important element. Yokogawa is determined to further participate in the Fieldbus Foundation and to continue development and promotion of the FOUNDATION™ Fieldbus, and continue insistent efforts on total utilization of FOUNDATION™ Fieldbus in its products and solutions. ◆