

Control Systems Division

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The technological results of the Control Systems Division in 1999 are as described below. The division's aim was to adopt an open FA system, including the development of solutions for the intake of orders for "S-MAC" and technical development, and to develop technologies for further progress.

The projects aimed to: (1) develop Windows NT and VxWorks versions of AML, the company's object-oriented control language that has made full-software controllers a reality, (2) develop form-rolling machine controllers based on "S-MAC" Type C, (3) develop SERCOS I/O and protocol analyzers, (4) develop a super-multi-axis control system based on Device Net, (5) develop an evaluation system for linear servo systems and modularization technology, and (6) develop element technology for all-in-one motors.

These will hopefully make the market more open and find even more uses of "SMS-10," which is an industrial PC already developed. We are positive that these will meet the market needs for openness and network orientation.

Development of NT and VxWorks Versions of AML, an Object-oriented Control Language

AML, an object-oriented control language as the core of the "S-MAC" system, has been running in the execution environment of iRMX, a real-time operating system + DOS.



We have just developed version 6.0 of AML, which is for Windows NT (with RTX as a real-time OS) and VxWorks, which are more widely used. (The CD-ROM in the photo is the U.S. version.)

We believe that this will allow one to develop a developing environment for a PC in the controller and the development-side PC on the same platform and increase system reliability, expandability, and control performance. Windows NT is the world's most widely spread OS, while VxWorks is a reliable, fast OS which has been used for a rocket to be landed on Mars.

Development of Controllers for Rolling Machines with Round Dice as an S-MAC Solution

The "S-MAC" Type C is a full-software controller implemented simply in combination with the object-oriented control language AML without using a motion control card or a hardware sequencer.



The unit controls five servo motors and one hydraulic servo, and consists of a complex system for full close and torque feedback. It has been jointly developed with a machine maker by sharing expertise and experiences. This control system has thus become the object of many patents applied for and the company is proud of it on an international level.

These rolling machines with round dice are for plastic forming. Their importance is now recognized for eco-friendliness purposes as a machining method that generates no chips. They connect to a servo amplifier and I/O devices through a SERCOS network. And they are connected to an HMI PC, which is an operation display, via Ethernet. Networking and openness are made a reality by the AML language.

Development of Element Technologies for All-in-one Motors

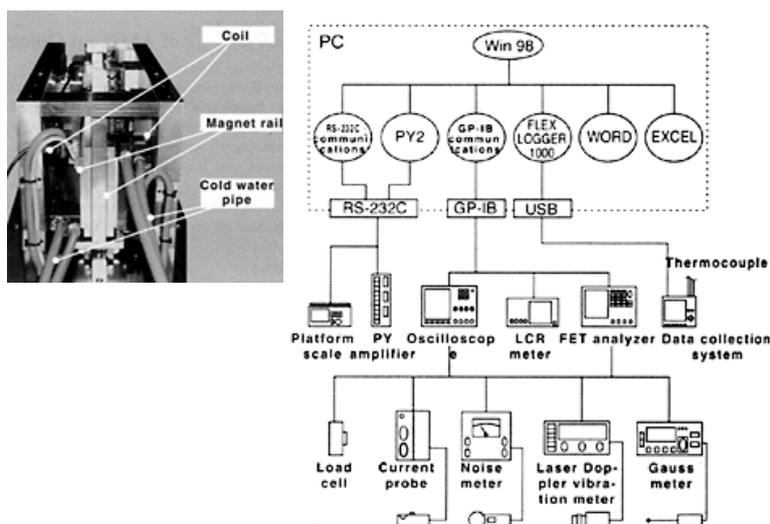
We developed some element technologies for all-in-one motors in an attempt to come up with intelligent motors connectable directly to a network without the intermediary of an amplifier and suited for decentralized control.

1. Downsize the motors and reduce the number of components greatly by using RISC chips that enables the hardware to be software.
2. Modularize software by means of a high-level language.
3. Save power consumption by adopting low-loss FET power devices and using a different drive system.
4. Create a bench model for servo and stepping motors.

Development of an Evaluation System and Modularization Technology for Linear Servo Systems

Unlike rotary motors, linear servo motors only become motors when ball screws, guides, and external sensors are combined. A system including these components (motors and sensors) and a mechanism is called modularization technology. We then built up an evaluation system for that purpose.

An evaluation system is used to assemble and run the above unit. This system is so designed that data is sent from a specific measuring instrument and passes through a GP-IB and an RS-232C interface and sent to a PC for analysis and filing.



Development of SERCOS I/O and Protocol Analyzers

We developed another protagonist in "S-MAC" solution. As an input/output driver, we developed an I/O unit equipped with a SERCOS interface. This can be combined with a traditional motor or amplifier to build up various control solutions.

1. Power supply unit
2. Digital communications unit
3. Analog input/output unit 4/4ch
4. Digital input/output unit 32/32 points



We also developed a small, hand-held SERCOS protocol analyzer as a measuring tool for analyzing data on a system based on SERCOS. Both are the only products produced domestically in Japan. These will hopefully allow the company to establish its position as a leading company in Japan in the field of SERCOS, the world's only open motion network and will help spread SERCOS.

Details of the SERCOS I/O are presented in another feature story.

Development of Super-multi-axis Devices Based on DeviceNet

We developed a control system for 24 to 100 axes using a DeviceNet network, as multi-axis positioning device for use in welding jigs for aircraft and automobiles.

This system consists basically of an industrial PC " SMS-10 " , together with DeviceNet modules and PLC modules that can be contained in the " SMS-10. "

As an operating system, we have adopted WindowsNT Embedded to be incorporated in the device. This allows one to start up the unit by means of a compact flash card and to make a normal reset after a power shutdown during disk access by means of the Write Filter of Embedded.

The servo used in this system is a four-axis-in-one " PB " servo system newly developed by the Servo Systems Division. Since DeviceNet is limited to 64 nodes at the maximum, the system controls four axes per node to implement a 100-axis control system. A cost cut is also ensured.

Note: The product names indicated in the text are either trademarks or registered trademarks.

Shigeharu Matsumoto

Joined company in 1996

Control Systems Division

Worked on development of solutions
