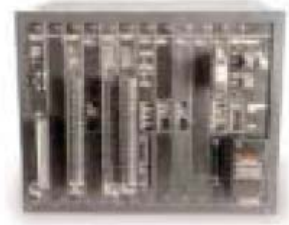# Extending The Life Of Your
GE Fanuc Series Six PLC System

How much could it possibly cost to totally replace a 20-year-old PLC system with hundreds or even thousands of I/O points in multiple racks in a critical process? Plenty. Besides buying all new hardware and enclosures and programming software, you would need to rebuild all the panels, ring out the I/O wiring, rewrite the PLC code, not to mention the cost of downtime required to changeover the field wiring and to troubleshoot the new system. Not many manufacturers would be excited about such a project.

But what advantages could a new PLC provide over the 20-year-old version? Ethernet connectivity, faster processing speeds, more memory, more robust instruction set, and programming software that runs on today's operating systems. But these are all CPU functions – why should you have to tear out your whole system when all you really need is better CPU?

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Qualitrol International provides a conversion program whereby any Series Six CPU can be replaced with a current GE Fanuc Series 90-70 CPU. A special interface card residing in the 90-70 CPU rack interfaces directly to the Series Six parallel I/O structure. No field I/O needs to be rewired and the conversion can be done with minimal system downtime and with assurance that the new system will work as well, if not better, than the existing control system.

As a result of the conversion, the new system will have the following features:

- More robust instruction set, including trigonometric functions, PID function blocks, and parameterized subroutines

- User defined C programming function blocks

- Programming via any standard laptop computer

- Programming software that runs on current Operating Systems

- Ethernet communications fully supported

- Readily available spare parts

- Future expansion capabilities

- No need to eliminate existing Series Six I/O modules, racks, or power supplies

- No elimination of field wiring

- Use of existing CPU cabinets

- Third party processing and specialty cards can be added to the 90-70 CPU rack for increased system functionality

The information that follows outlines the conversion process and cites case studies where the Series Six conversions have been successfully implemented.

SERIES SIX CPU REPLACEMENT – THE TECHNOLOGY

In 1990, GE Fanuc introduced the Series 90-70 system, which incorporated a VME-based CPU and a complete line of I/O and specialty modules. The VME architecture allowed GE Fanuc to introduce third-party VME processing and specialty cards into the 90-70 backplane, greatly expanding the capabilities of the system for specific applications.

One specialty card for the 90-70 is an interface card that allows a 90-70 CPU to control Series Six I/O over the high-speed parallel I/O bus, a significant feature of the Series Six I/O structure. Use of the Series Six I/O interface card has significant impact on today's Series Six users:

• The Series Six CPU can be removed and a 90-70 CPU, housing the I/O interface card, can directly interface to the local or remote Series Six I/O – there is no need to remove any of the I/O wiring, modules, racks or panels.

• The program in the Series Six CPU can be converted to 90-70 language with identical functionality.

• A majority of the program conversion can be completed and tested off-site, minimizing system downtime to change out the CPU rack itself.

• The 90-70 CPU can support Series Six I/O, 90-70 I/O, and Genius I/O simultaneously.

• Existing Series Six I/O can be replaced with 90-70 I/O or Genius I/O at any time in the future, minimizing machine downtime and spreading out the retrofit costs.

There have been a number of successful conversions using these techniques. Below are three case studies of the Series Six to 90-70 CPU conversion, each outlining a different client advantage.

CASE STUDY 1 – EASE OF CPU CONVERSION

A steel mill was operating a number of Series Six systems in various applications. A plant-wide project required access to all PLCs via the Ethernet network on the factory floor for monitoring purposes. The first Series Six to be converted consisted of one CPU rack and seven I/O racks mounted in remote panels. Phase one of the project involved converting the Series Six program to 90-70 logic and testing the functionality to the system specifications. This first phase was completed off-site. In the second phase, the Series Six CPU rack was removed from the original panel and the 90-70 CPU rack with the Series Six interface card was installed in its place. Installation of the CPU rack and the field testing of the program with the Series Six I/O took less than half a

day on-site. The customer's initial requirements for data access over the Ethernet network were met. Added benefits included the ability to troubleshoot the process over the remote Ethernet network, and the ability to use standard laptops approved by the internal IT department.

CASE STUDY 2 – CPU CONVERSION WITH PHASED I/O CONVERSION

A paper mill that had standardized on the Series Six wanted to begin the migration of the older Model 6000 systems to the 90-70 system. The first system that needed to be converted consisted of one CPU rack and 12 I/O racks. The size of the system and the associated costs to change out all of the I/O points made a total retrofit uneconomical. Ideally, the customer wanted a solution whereby the I/O could be changed out over time.

The Model 6000 CPU was replaced with a 90-70 CPU and the Series Six I/O interface card, which controlled all of the existing Series Six I/O. During each of the regularly scheduled maintenance shutdowns over the next year, a few of the Series Six I/O racks were replaced with 90-70 I/O racks containing identical I/O counts. The new 90-70 I/O racks were controlled over the GE Fanuc Genius I/O bus; a Genius Bus Controller was installed in the CPU rack to control the 90-70 I/O. All I/O points were mapped into the appropriate locations to insure the integrity of the CPU program.

Once the migration to the 90-70 I/O was complete, the Series Six interface card was removed from the 90/70 CPU and the conversion process was started on another Series Six system.

The paper mill was able to convert the Series Six to 90-70 during scheduled maintenance, maximizing machine up time and allowing management to spread the cost of the conversion over several months.

CASE STUDY 3 – CPU CONSOLIDATION

While the Series Six system had significant programming and memory capacity in the 1980s, today's PLCs offer much greater processing power and capacity. A finishing and shipping line in a large manufacturing facility originally required four Series Six systems to handle all the processing. The amount of Series Six I/O was extensive. In addition, the four Series Six units were linked to obsolete MicroVAX units in order to upload production information to the plant management systems. In order to insure long-term stability of the systems, the user was required to look at upgrading both systems.

After studying the functionality of the individual systems, it was determined that all of the functions of the four Series Six CPUs could be consolidated into a single 90-70 CPU. The MicroVAX units were replaced by a pair of NT servers with ODBC-compliant applications. The existing Series Six I/O was linked to the new 90-70 CPU via the Series Six Interface card.

The greatest benefit to engineering was that only one CPU needed to be supported instead of four, which reduced spare parts. In addition, the system's data was more reliable and more readily accessible.

SUMMARY

While each of these scenarios was unique, the user was able to realize significant improvements to his control scheme. In all cases, the cost to change out just the Series Six CPU with a new 90-70 CPU proved much less expensive than a total system retrofit.

Engineers from Qualitrol International are available to speak with you about your unique applications using Series Six PLCs. You can reach the Qualitrol International engineers at 1-800-784-9385 or at conversions@qualitrol.com.

Qualitrol International
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