



Moore® to DeltaV™ Systems Connectivity Options

This paper describes the methods of implementation and the benefits of preparing an existing Moore legacy system to connect with a DeltaV system.

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Introduction

APACS and QUADLOG systems have done their job over the years. However, system upkeep is increasingly expensive and requires dedicating personnel to address tag server and engineering software concerns, locate parts through 3rd-party suppliers, and keep the system running. Vendor support has been declining over recent years, particularly for HMI and batch products. Their migration offering is complicated to configure and its learning curve seems daunting. How can you continue meeting market demands while operating these legacy systems?

Emerson offers flexible migration solutions that facilitate low-risk, low-maintenance system improvements that help you derive greater benefits from your existing Moore system and plan for a full transition to the DeltaV system and PlantWeb in steps that make sense for you. Emerson personnel understand the Moore systems and work with clients to determine the best options for your site, from total system replacements (in phased approaches) to standalone DeltaV systems for new plant areas. These standalone DeltaV systems can integrate with other plant systems more easily than can any other control systems. This paper describes how to connect the DeltaV system to Moore systems and outlines the benefits of each connectivity option.

Moore Systems Architecture

Moore controller racks (Modulracs) connect peer-to-peer using Modulbus or ModulNet, which also ties them to tag servers (typically redundant). To make process data available from controllers to the HMI, tag server and/or client node databases are required. Graphic screens are built using dynamic tag references to the *server* and not directly to the controller. Maintaining multiple databases can be a headache for the user. For example, tag naming conventions will be different in the server database from the controller database. Setting up network redundancy with these disparate nodes is not trivial, especially as systems are typically much more complicated than the simple architecture shown in Figure 1 (next page).

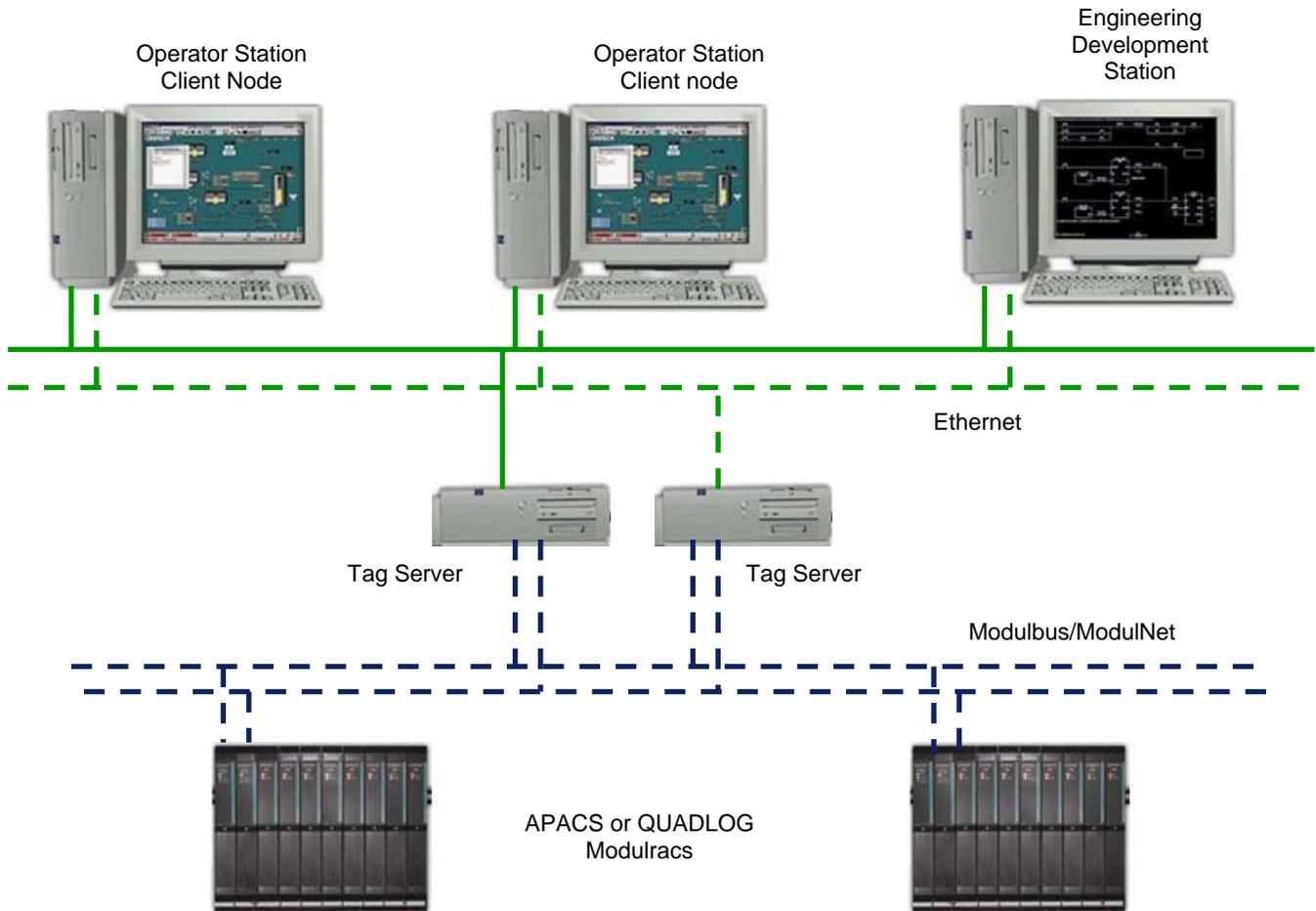


Figure 1. Moore® Systems Architecture

When the DeltaV Connect™ Solution for Moore® Systems is installed as a first step toward a complete system replacement, tag servers can be eliminated when all the legacy operator stations have been removed. Typically, legacy operator stations are decommissioned as operators gain confidence and become comfortable with the new DeltaV HMI. The tag server functionality is replaced with DeltaV Application Stations and legacy operator stations are replaced with DeltaV Operator Stations. The ProfessionalPLUS Station provides a modern set of configuration tools to easily manage the new HMI layer. The 4-mation software is still required to configure changes to the Moore controllers and I/O.

When it is time to replace the Moore controllers with DeltaV hardware the end result is a single common configuration database that is easy to use and maintain with industry leading engineering tools. Simplified database management allows engineers to take advantage of native DeltaV features such as embedded advanced controls, mining data history and easy connectivity to other systems.



Console Upgrade—First Step toward Digital Plant Architecture

The DeltaV Connect solution consists of software for the engineering environment: DeltaV ProfessionalPLUS Station and software for the real-time interface, DeltaV Application Station(s). Data exchange with APACS controllers uses the Siemens APACS OPC Device Server software, which installs on the same PC as the real-time interface software.

Architecture

The DeltaV Connect solution interface connects to the Moore Modulbus or ModulNet in the same manner that a Wonderware or MycroAdvantage HMI connects. The physical connection options are:

- 1) Ethernet to a Modulbus to Ethernet gateway, such as the Industrial Ethernet Module (IEM) from the DeltaV Application Station. The Modulbus to Ethernet gateway can be set up in a simplex or redundant configuration to complement the option for redundant DeltaV Application Stations, shown in Figure 2:

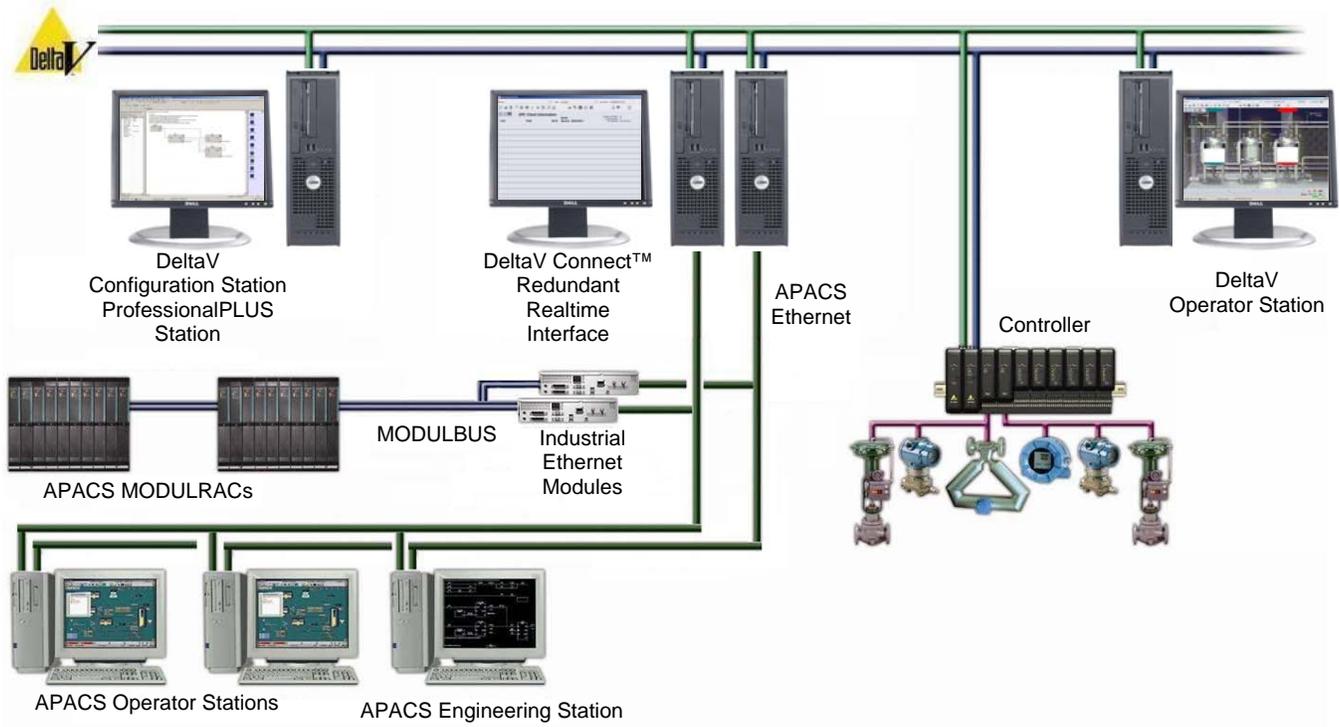


Figure 2. DeltaV Connect™ Solution for Moore® Systems, Redundant Architecture

APACS shown. This solution works effectively with QUADLOG, as well.

- 2) Direct Modbus connection with installation of a Modbus and ModuNet interface (MBI/MNI) card into the DeltaV Application Station (Figure 3):

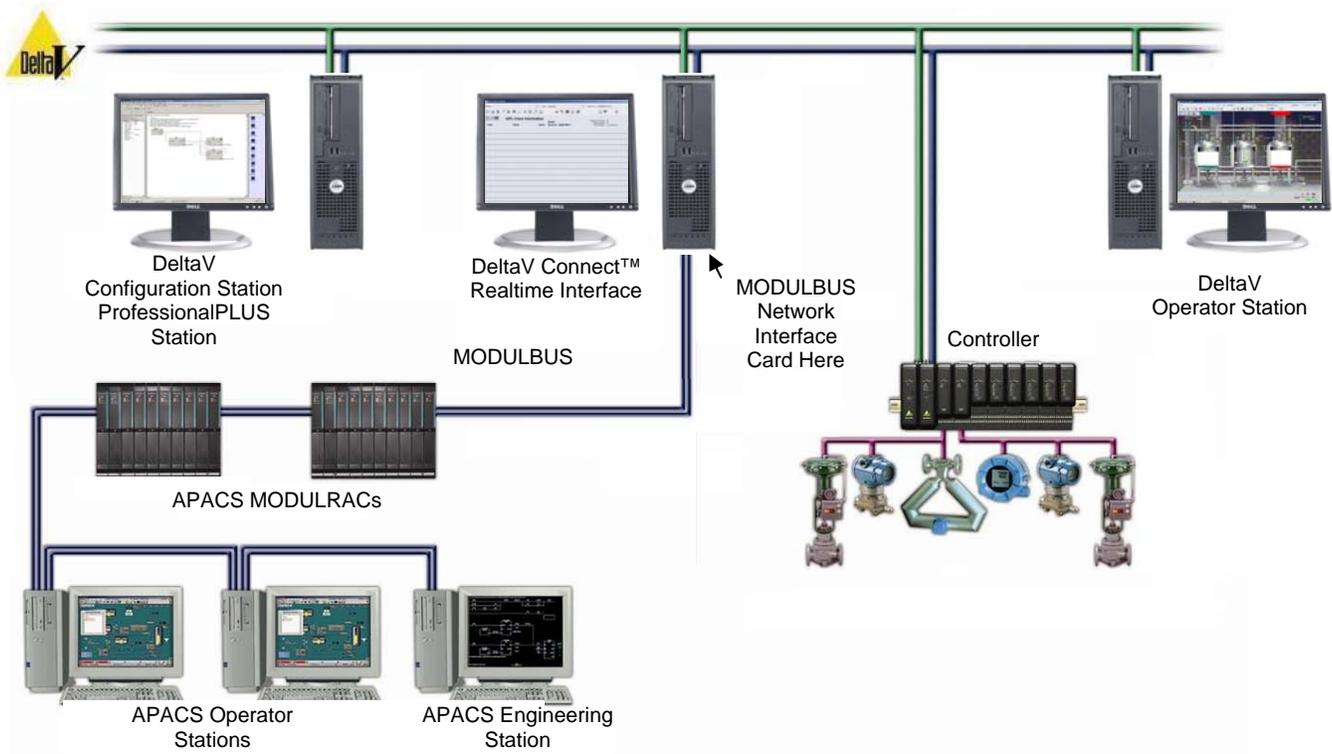


Figure 3. DeltaV Connect™ Solution MBI/MNI Schematic

Note: MBI/MNI 5 volt PCI cards are considered obsolete, with 3.3-volt PCI-X cards being the standard for today's server class PCs. Some Dell workstations still have one 5-volt PCI slot, but these may be phased out completely in the future. Therefore, objectively examine this connectivity option and its support constraints.



- 3) For small Moore systems, a single DeltaV station can be loaded with both the configuration and realtime interface software. The Modibus connection can be made through the Industrial Ethernet Module or an MBI card. (Figure 4 IEM connection shown):

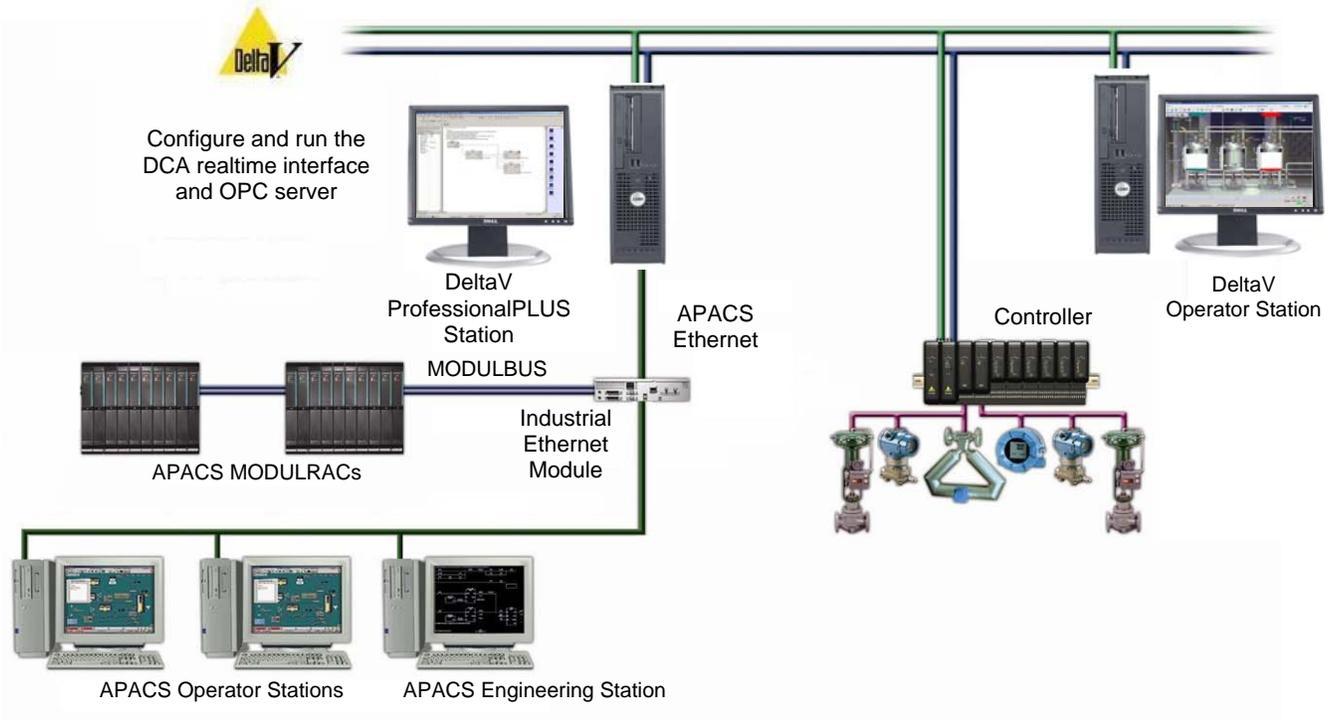


Figure 4. DeltaV Connect™ Solution Small System Schematic



Display Environment

The DeltaV Connect solution interface includes a virtual controller, which brings APACS data into DeltaV tags, also called connect blocks. These tags have DeltaV standard functionality for alarm, history, trend and display on process graphics.

For easier configuration, DeltaV Connect™ for Moore Systems includes faceplates that correspond to the connect blocks. These faceplates present the same data that you see on the APACS HMLs. Figure 5 shows DeltaV Connect™ for Moore Systems faceplates appearing on a DeltaV Operator Station:

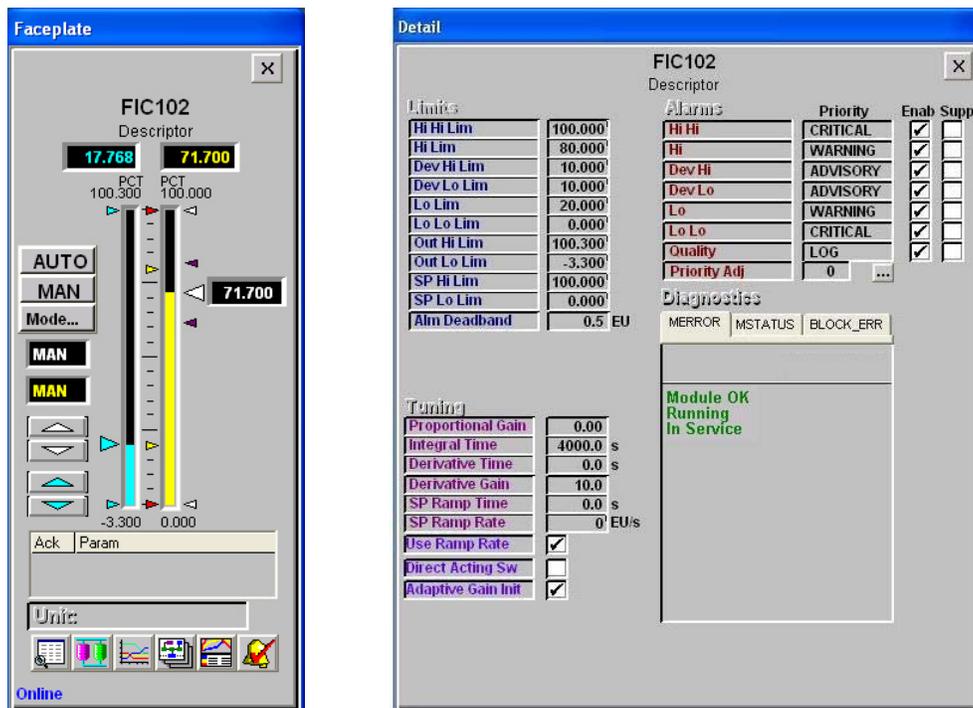


Figure 5. DeltaV Connect™ Solution for Moore® Systems Single Loop PID Faceplate and Detail Displays



APACS graphics and database conversion services are available for accurate and expedient display reproduction and database generation for the DeltaV Connect solution interface. An example of a converted display is shown in Figure 6.

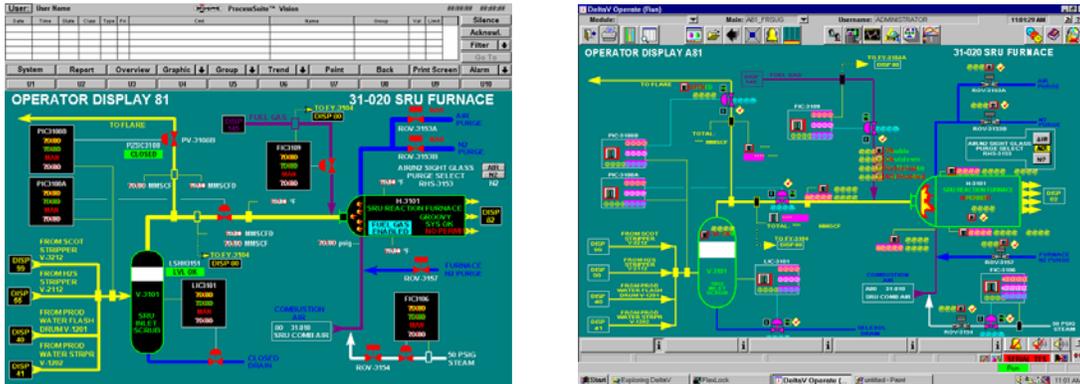


Figure 6. Displays: APACS® Original (left) and Converted DeltaV™ Operator Station (right)

Benefits

- Startup is low-risk with *no downtime*.
- Configuration is easy, fast and intuitive for APACS users.
- Consoles and workstations from both systems can operate side by side.
- Operators learn software quickly, with look-alike HMI displays.
- Expansions can include the latest bus and smart-device technologies.
- Field device maintenance is more effective, once operators and maintenance personnel have access to FOUNDATION fieldbus and/or HART device information from the control system consoles.
- Foundation is laid for a future switchover, when moving control from APACS to the DeltaV system.

To learn more about this product, see the DeltaV Connect™ for Moore Systems *product data sheet* at www.EasyDeltaV.com/Solutions/DCS.

Controller and I/O Upgrade and Expansion

When upgrading your Moore system control strategies to the DeltaV system, process downtime is a key concern. To afford maximum flexibility in I/O specification and implementation, Emerson offers FlexConnect® solutions. FlexConnect solutions *minimize process downtime* by enabling you to connect DeltaV controller I/O directly to Moore system I/O terminations.

Architecture

Figure 7 shows an example of DeltaV controller and I/O architecture, featuring a FlexConnect solution for Moore APACS:

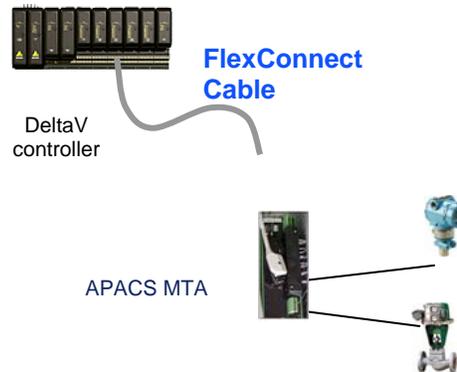


Figure 7. FlexConnect® solution brings APACS® Marshalled Termination Assembly

Benefits

The most compelling of FlexConnect solution benefits is the dramatic reduction in downtime, which can be 75% or more, versus rewiring. Another benefit is lower wiring costs: they drop by 50% when using FlexConnect solutions versus rewiring. Table 2a shows wiring costs for a conventional switchover, based on 860 I/O channels:

Table 2a. Cost impact of an 860-channel system switchover, conventional method

Activities	Impact
Disconnect old terminations	5 minutes/channel
Remove old terminations Install new terminal blocks Re-terminate wires	8 minutes/channel
Wire from new terminal blocks to DeltaV system	10 minutes/channel
Document	20 minutes/channel
Total time required per channel	43 minutes/channel
Total installation time for 860 channels	616 hours
Labor costs @\$50/hour	\$30,800
Downtime (not including documentation time)	>25 days



Table 2b shows wiring costs using FlexConnect solutions. Compare the downtime with that listed in Table 2a.

Table 2b. Cost impact of A 860-channel system switchover using the FlexConnect® solution

Activities	Impact
Install FlexConnect panels	2 minutes/channel
Install inter-connect cables	4 minutes/channel
Document	4 minutes/channel
Time required per channel	21 minutes/channel
Total installation time for 860 channels	301hours
Labor costs (\$50/hour)	\$15,500
Downtime (not including documentation time)	12 days

For more information about this product, see the FlexConnect Solutions for Siemens-Moore APACS *product data sheet* at www.easydeltav.com/solutions/dcs.

DeltaV Advanced Controls

Two powerful DeltaV advanced control applications are supported “standalone,” meaning that no DeltaV controller hardware is required, with non-Emerson systems. These are DeltaV Neural, an inferential sensing package, and DeltaV Predict or PredictPro, a model predictive control package that can help manage interactive loops for improved process performance.

Architecture

Two architectures support the use of DeltaV advanced controls with your APACS system:

- (1) DeltaV Neural or Predict can run in a DeltaV Application Station.
- (2) DeltaV Neural or Predict can run in a DeltaV hardware controller.

For either implementation, connecting to the APACS MODULBUS network requires DeltaV Connect™ for Moore Systems or an OPC interface. Another option is to wire directly from the field devices to DeltaV hardware controller I/O.

Benefits

By implementing DeltaV Advanced Control applications, you can improve process performance and product quality without major rework to your existing APACS controls.

More DeltaV advanced control applications, such as Inspect, Fuzzy Logic and Tune are embedded in DeltaV controllers. To learn more about embedded DeltaV Advanced Controls, see www.EasyDeltaV.com/KeyTechnologies/AdvancedControls.



Managing Risk

With a new DeltaV system, you have several options that can help ease the adjustment and minimize errors in the early learning phases. One of the first considerations is the type of people who will manage and execute the transition. Emerson offers a suite of services to help make all control system transitions successful. Emerson engineers and project managers are experienced with Moore-to-DeltaV system upgrades. They have implemented successful hot cutovers, as well as performed site checkout and system startups during tight turnaround periods. For details about how customers have benefited from Emerson expertise when upgrading from their Moore systems, visit <http://www.emersonprocess.com/solutions/>.

Other considerations are training your personnel and providing tools that facilitate quick adoption of the new technologies. As your project progresses, with DeltaV database configuration and graphics complete, you will have the tools needed for training operators on the new system. DeltaV Simulate Pro can provide realistic field responses to operators without connecting to real I/O. In a safe and virtually risk-free environment, operators can practice running the familiar process from the new DeltaV system. For all system sizes, Operator Training solutions are available to suit the specific needs of your site and personnel. Emerson also offers custom courses either at your site or in their training centers. For more information about these powerful training systems, please see http://www.easydeltav.com/pd/PDS_DeltaV_OTs.pdf.

Reference sites are available for all of the solutions described in this white paper.

Conclusion

Successfully implementing APACS-to-DeltaV systems connectivity enables you to:

- Establish a path toward digital plant architecture now
- Pace the transition from older to newer technologies
- Replicate familiar operations displays on the newer consoles
- Save engineering configuration time through the use of conversion tools
- Train operators and verify configuration in a risk-free, offline environment
- Minimize process downtime during a switch of process control IO between systems
- Save existing wiring and avoid costly re-wiring

DeltaV connectivity brings great new possibilities to the APACS user. With smart implementation, the DeltaV system maximizes process potential while minimizing the costs of the transition.