Picking the Right Control System for Your Industrial Facility

As the line between DCSs and PLCs continues to blur, it's more important than ever to know exactly what you need.

Control system technologies are continually evolving, providing designers and facility owners with an ever-increasing array of options. Programmable logic controllers (PLCs) and distributed control systems (DCSs) are the most well known microprocessor-based control systems. Each uses a slightly different combination of hardware and software to control many types of industrial processing and manufacturing systems. Choosing the best solution requires a basic understanding of the differences between these two systems and an awareness of the latest developments that will affect the future of industrial automation.

To those unfamiliar with control systems technology, PLCs and DCSs can look remarkably similar in a modern automated processing plant. Both platforms will likely include a control cabinet that contains an Intel-based processor, some communication cards, and several input/output (I/O) cards connected to various field devises. Both are likely to have a combination of PCs and servers that show one or more graphical images of the processing plant. And both are likely to display process variables and alarm information about certain conditions in the plant. But while these control systems may look similar and be used in similar ways, their operation differs in a few important ways.

Capabilities Evolve. In the beginning, DCS systems were best suited for large-scale process operations. They were easier to use, but less scalable and less open to third party devices. On the other hand, PLCs, in combination with a modern HMI package, were more scalable and easier to interface with, but more difficult and time consuming to configure.

Over time, advances in technology broadened both systems' capabilities well beyond their original boundaries, yet industry perception remained behind. Modern PLCs systems have much improved capabilities in handling analog process variables. Newer PLCs feature function block and structured text programming formerly only available with DCS. At the same time, DCSs have become much more economical to buy and maintain. Hardware costs have become more competitive, and the Windows-based programming interfaces have made development less costly.

Industry experts predict a slow and steady increase in PLC sales through 2008.

These developments diminish many control system distinctions, ultimately giving designers and owners an increasing number of options. And many of these new automation systems no longer fit neatly into the traditional categories of PLC or DCS.

Recently developed hybrid control systems attempt to combine many of the desirable characteristics of DCS and PLC/HMI systems, and promoters tout a "best of both worlds" approach. The increased functionality is achieved through the power of object-oriented programming that combines the openness and scalability of a PLC/HMI combination with tightly coupled configuration strategies and DCS-like design and programming tools.

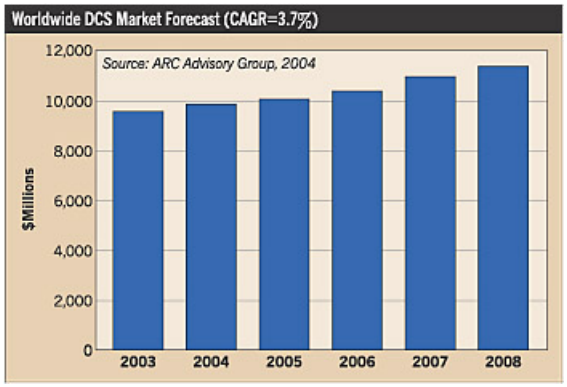
Selecting the best system. Ultimately, any decision regarding an automation platform should be based on functionality, affordability, and life cycle costs. Kevin Stively, senior process control engineer with Parker, Messana, & Associates, Inc., Federal Way, Wash., suggests that control system selection should begin with a thorough analysis of the process and its control needs, including required scan times and response times.

Stively also suggests that the number and types of I/O and communications interfaces can also point toward a certain platform. As a rule of thumb, traditional DCS may work best in situations with more than 2,000 I/O points and several hundred PID loops. Smaller processes can likely be controlled by a hybrid or PLC/HMI system for considerably less money.

Some owners may want to take their existing automation into account when specifying new systems at existing facilities. Industrial automation has a long life cycle, and it may be possible to match new automation hardware to what is currently in place. Trained personnel, spare parts, and other existing resources can make this

the best choice. If the current automation platform provides the process with all of the functionality required, it may be best to continue using it. However, newly developed systems often have significantly improved Windows-based design and development software that's easy to learn and use.

Stively concludes that the initial cost of the solution may also drive the decision. This includes hardware, software, and development time. Hardware and software costs are relatively easy to determine. The challenge comes in assessing the development time required to program and configure the solution. While industrial automation suppliers continue to improve their development software, in many cases the training and experience of the developer has a larger effect on development time. In the short-term, an experienced developer working on an obsolete system may outperform an inexperienced programmer using the latest development tools. However, it's also important to accurately assess the life cycle benefits of new and improved engineering tools, which can often provide more long-term benefits, especially if the programming will be modified frequently.



An equally steady increase is expected for DCS sales through 2008.

Certain automation challenges will continue to favor the more traditional approach of using "pure" PLC or DCS solutions, but as automation, hardware, and software suppliers continue to add functionality to their product lines, owners and designers can expect the lines that distinguish the two major platforms to become increasingly blurred. The end-user must evaluate the required desired capabilities, functionalities, and other features of the system and then work with integrators who understand the different platforms and the key differences between them. Only then can users determine which PLC, DCS, or hybrid system best meets their needs and budget.

Sidebar: The Automation Alphabet

Acronyms are commonplace in control system lingo, but that doesn't mean you should throw them around at your next staff meeting without knowing what they mean.

Programmable Logic Controller (PLC) - A control technology coveted for its ability to handle analog process variables.

Distributed Control System (DCS) - Earlier designs of this automation platform were less scalable, but newer models make up for it by being less expensive to maintain.

Human Machine Interface (HMI) - Often a personal computer, but more correctly, any electronic device through which a human communicates with a control system.

Supervisory Control and Data Acquisition (SCADA) - A high-end function of HMI software that allows operators to monitor and adjust process variables and log process data.

Process Automation Controller (PAC) - A new generic term proposed by some industry leaders to more appropriately describe a wide range of automation hardware.

Process Automation Systems (PAS) - A term used by ARC Advisory to describe all forms of DCS, mini-DCS, and hybrid controls.

For more information...

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This article was published in the May 1, 2005 issue of EC&M.