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PLC or DCS: Which Is Right for Your Operation?

Over the past decade, the functionality of different control systems has been merging. Programmable logic controllers (PLCs) now have capabilities once found only in distributed control systems (DCSs), while a DCS can handle many functions previously thought more appropriate for PLCs. So what's the difference between the two control approaches, where's the dividing line and are there still reasons to choose one over the other?

PLCs grew up as replacements for multiple relays and are used primarily for controlling discrete manufacturing processes and standalone equipment. If integration with other equipment is required, the user or his system integrator typically has to do it, connecting human-machine interfaces (HMIs) and other control devices as needed.

The DCS, on the other hand, was developed to replace PID controllers and is found most often in batch and continuous production processes, especially those that require advanced control measures. The vendor handles system integration, and HMIs are integral.

As users demanded more production information, PLCs gained processing power and networking became common.

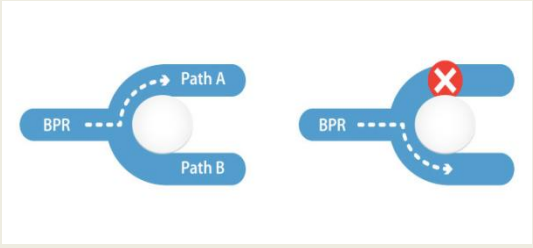
PLC-based control systems began to function like a miniDCS. At the same time, the DCS hybridized to incorporate PLCs and PCs to control certain functions and to provide reporting services. The DCS supervises the entire process, much like the conductor in an orchestra. Protocols, like OPC, have eased interactions between the two control systems.

Since PLCs are less expensive and can now perform much like a DCS, wouldn't it make sense to convert everything to PLCs? The answer, like most things in the world of automation, is that it depends on the needs of your application. Here are six key factors to consider:

1. Response time
PLCs are fast, no doubt about it. Response times of one-tenth of a second make the PLC an ideal controller for near real-time actions such as a safety shutdown or firing control. A DCS takes much longer to process data, so it's not the right solution when response times are critical. In fact, safety systems require a separate controller.

2. Scalability
A PLC can only handle a few thousand I/O points or less. It's just not as scalable as a DCS, which can handle many thousands of I/O points and more easily accommodate new equipment, process enhancements and data integration. If you require advanced process control, and have a large facility or a process that's spread out over a wide geographic area with thousands of I/O points, a DCS makes more sense.

3. Redundancy
Another problem with PLCs is redundancy. If you need power or fault tolerant I/O, don't try to force those requirements into a PLC-based control system. You'll just end up raising the costs to equal or exceed those of a DCS.



4. **Complexity**
The complex nature of many continuous production processes, such as oil and gas, water treatment and chemical processing, continue to require the advanced process control capabilities of the DCS. Others, such as pulp and paper, are trending toward PLC-based control.

5. **Frequent process changes**
PLCs are best applied to a dedicated process that doesn't change often. If your process is complex and requires frequent adjustments or must aggregate and analyze a large amount of data, a DCS is typically the better solution. Of course, the very flexibility of a DCS system also makes it much more vulnerable to "meddling" by operators that can cause spurious shutdowns.

6. **Vendor support**
DCS vendors typically require users to employ them to provide integration services and implement process changes. System integrators perform similar functions for PLC-based systems. It has also become common for PLC vendors to offer support services through their network of system integrator partners.

Process control has become increasing complex. It's difficult for any individual to know everything about these sophisticated systems, increasing the need for vendor support. Manufacturers also continue to reduce factory staff and a generation of experienced process control personnel has begun to retire. As a result, the quality of support has become a critical factor in vendor selection.