An Alternative Solution to PLC Based Analog Control

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In recent years, it has become more routine to try and integrate analog control loops and, more specifically, PID control, in a programmable logic controller (PLC) system. This practice is technically feasible but often not as functional or as easy to support in the long-run. This practice is generally a more costly solution to using readily available "off-the-shelf" analog device technology.

Applications that require accurate single loop, or multi-loop, PID control and handling of discrete loops can utilize the best solution by using PID control modules supporting the PLC. The PLC is normally designed to work with digital I/O and sequence control. If a PID loop is added to the PLC application, the speed of both the logic functions and the PID loop is decreased. In this case, additional programming time, costly system memory, and I/O cards are necessary. Further, multiple channel I/O cards must be purchased even if only one loop has to be added.

The increased cost of a more powerful PLC processor and analog input cards is in direct conflict with the desire of total system cost reductions and the larger desire for single loop integrity. The reality is that more systems are now using, or trying to use, sub-panel mount devices that have the added benefit of saving panel space and will save on wiring time, and more importantly, save total system cost by using less costly PLC equipment and engineering man hours. Many products are available on the market that integrate to the PLC, but that do not address the desire for single loop integrity. These devices merely try to replace the PLC analog loops with their own analog PLC which is not much of a benefit at all.

The main advantage from this technology is that it is much easier for today's machine builder or system integrator to build and program systems with analog and PID loops, while offering true ease of integration, more robust single loop or multi loop PID control, and reduced engineering time and total system cost. No master control module is required- modules are independent and stand-alone. It is important to keep in mind that PID loops can be added without changing the PLC processor capability.

Successful systems, either OEM based or provided by system integrators, must consider the accuracy and repeatability of the analog inputs and loops, the individual component and total system costs, and desirability of each component. Analog control can be quite difficult as it needs to be performed at higher speeds, especially with auto tune, auto/manual transfer, and even such seemingly simple routines like alarm handling in the event of a sensor open circuit.

Ascon saw this PLC phenomenon and shortcoming several years ago, and as such, embarked on a development to manufacture DIN rail mounted analog control and acquisition modules with configurable/universal PID modules for heat only or heat/cool that integrate easily with virtually any PLC or PC system. Each module shares in internal 24VDC power and Modbus RTU communications bus so that external wiring is not necessary and no external back planes are required. This solution offers the desirable single loop integrity previously mentioned. Systems size can vary by the number of modules used, and can be centrally located or distributed in remote locations. Such modules offer fast sampling rates that are needed by analog inputs and PID loops, offer advanced auto-tune with overshoot control, come with input/output isolation, are also capable of "hot swap" without affecting other loops. Modules are configured via easy to use PC configuration software, allowing configurations to be saved, printed, or emailed to customers.

The system above offers several additional advanced features such as self-configuring touch screen operator panels in a variety of sizes and color screen options, and a DX module that stores each module configuration (up to 32) with operator parameters in the event a replacement module is to be inserted. An additional function for the DX module includes access to an open industrial slave bus (Profibus DP, DeviceNet, Modbus, and CANopen) and provides the technician a service port for field modifications without changing in use wire connections.