

Systems Integration

Electro Cam Corp. PLuS Programmable Limit Switches feature two methods of integration into wider control systems:

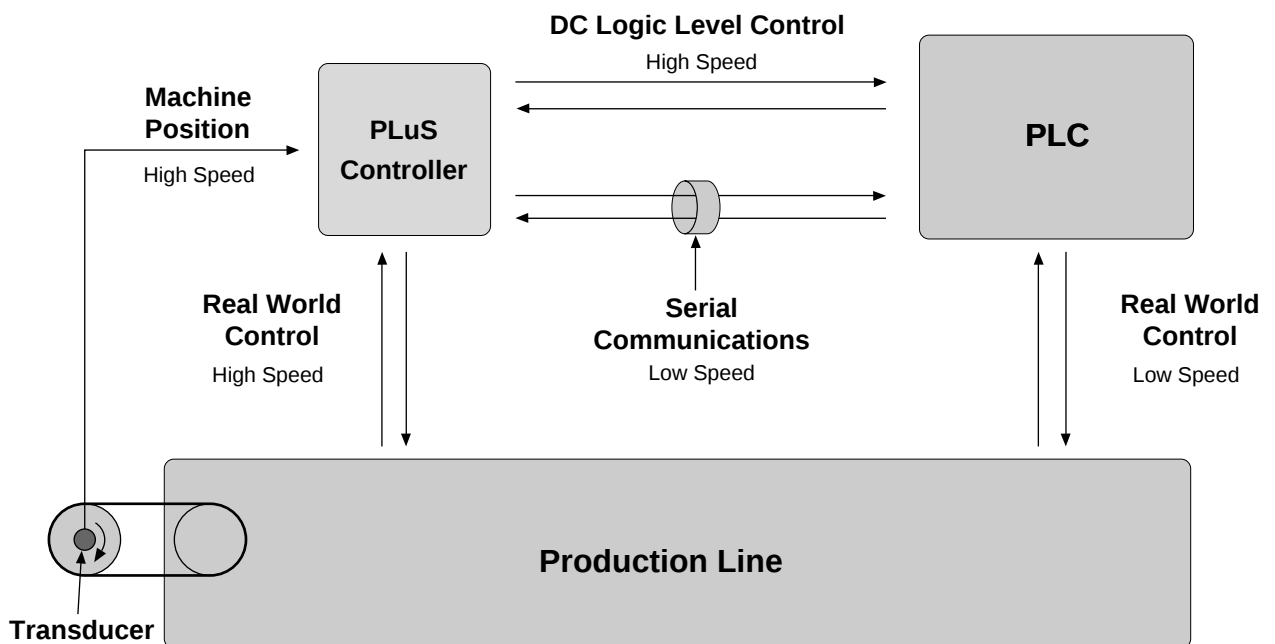
- DC logic level wiring using built-in DC inputs and outputs
- Serial communications using built-in ASCII commands

DC logic level wiring connects DC terminals on the PLuS controller directly to DC terminals on a PLC or other system host. Programming in each controller generates and responds to on / off signals between the terminals. The system response time depends on the scan times of the controllers at each end. Because the PLuS controller is dedicated to machine control, its scan times are much faster than an average PLC.

Whereas DC logic level wiring is limited to exchanging on / off switching signals, serial communications can transfer control commands and operating data between controllers. PLuS models capable of serial communications include:

- PLuS 6000 Series Controllers
- PLuS 5144 Controllers
- PLuS 5000 Series Controllers with Communications Option ("-C")

Typical System Integrating a PLuS with a PLC



Serial communications are initiated when the system host sends a command, or string of ASCII characters, to the PLS. The commands can interrogate the PLS controller for operating and control data, and they can also change programming values within the PLS. The PLS processes the command and replies to the host with an ASCII character string.

Each PLS model recognizes a set of approximately 100 commands providing control over nearly every function. For information on the complete command set for a specific PLS controller, contact Electro Cam Corp.

To incorporate serial communications into a system, the host controller must be programmed to generate and send the appropriate ASCII character strings to the PLS controller, and process the ASCII reply from the PLS controller.

Man-Machine Interfaces

One type of control system that integrates diverse controls into a wider network is the Man-Machine Interface, or “MMI.” Designed to simplify the operation of complex control systems, an MMI provides software tools for developing on-screen graphic representations of machinery and factory processes. An operator manipulates these graphic elements to start and stop machinery, change product sizes, or confirm operating characteristics such as speeds or production rates. As the operator uses the graphic interface, the MMI software translates the actions into commands which are transmitted to individual controllers throughout the system.

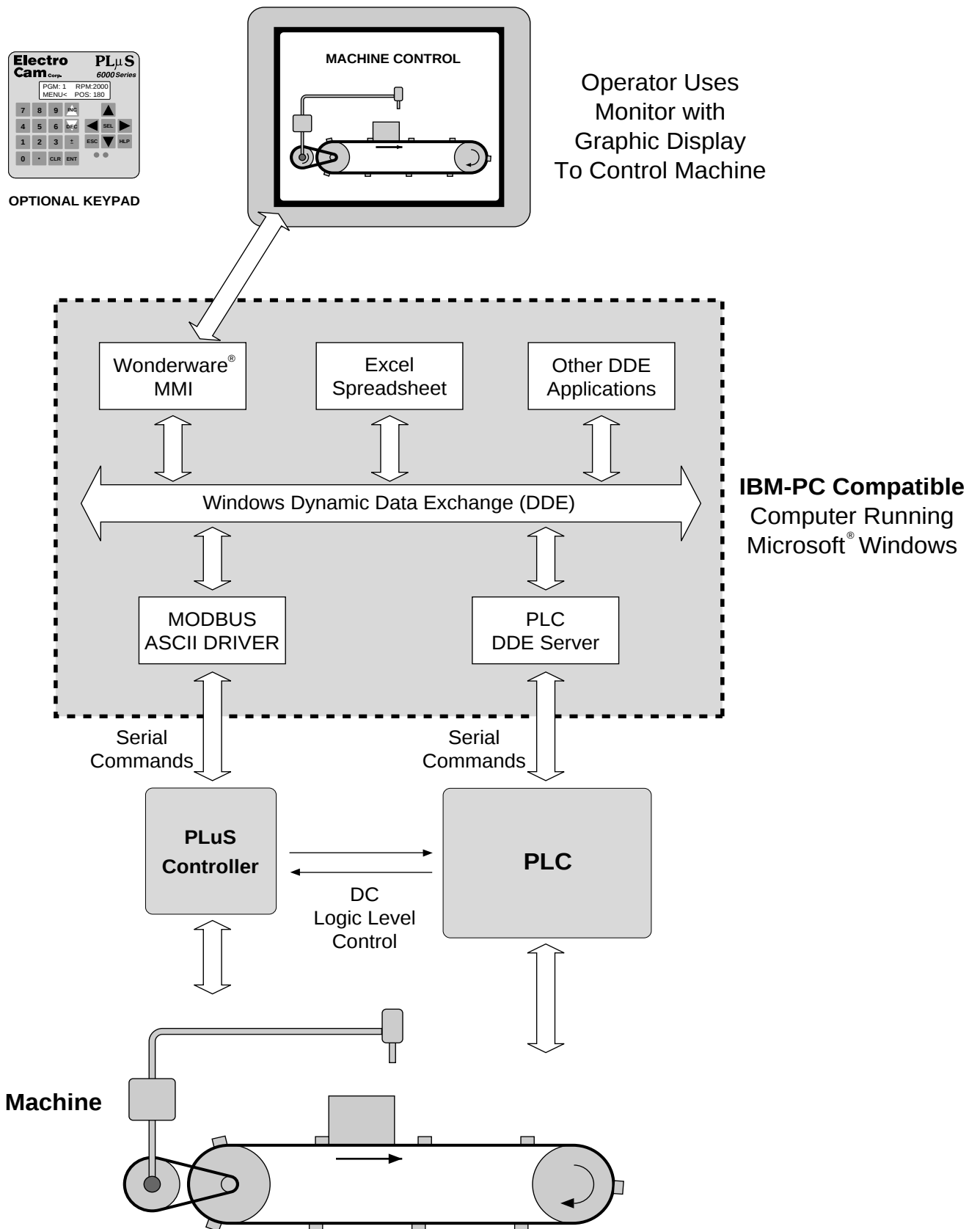
MMI software is available for a wide range of computer hardware and operating systems. One platform receiving strong attention is IBM-PC compatible computers running Microsoft Windows. Integral to the Windows operating system is DDE, or Dynamic Data Exchange, a facility for exchanging data between different software applications.

Page 3 illustrates a Windows-based MMI system incorporating a PLS 6144 MB controller as well as a PLC. Although the example includes Wonderware® as the MMI software, any other Windows-based software such as Intellution® or FactoryLink® with a MODBUS ASCII driver could be used.

In the system shown, the operator manipulates graphic elements which represent the machine. The MMI software translates these actions into DDE requests which are serviced through the Windows operating system. Requests directed toward the PLS 6144 MB controller are converted into MODBUS ASCII serial commands by the DDE server, then relayed to the controller.

Similarly, ASCII replies from the PLS controller are converted to DDE messages by the MODBUS ASCII driver, then sent through the MMI software to the graphic display.

Windows-Based Man-Machine Interface



Speed Considerations

Because of the layers of software translation involved, Windows-based MMI interfaces tend to be slow in passing control signals and parameters. For this reason, these systems are used for supervisory functions such as changing job programs or “recipes,” rather than high-speed control of critical machine functions.

In the system shown on page 3, the PLuS 6144 MB controller handles high speed machine functions through direct wiring of inputs and outputs to the machine. The serial commands select job recipes or interrogate the PLuS for operating data. The PLuS 6144 MB also exchanges DC logic level signals directly with the PLC, which is involved in controlling other system functions.

Benefits

Besides simplifying operation of the control system for operators who are not programmers, integrating a PLuS controller into an MMI system produces other benefits:

Excellent, Economical High Speed Machine Control

The PLuS controller economically performs high speed machine control using sophisticated functions such as speed compensation. This saves substantial programming time compared to writing code for these functions for a PLC or other computer.

Maximum Flexibility

Such systems allow a control engineer to mix and match a variety of control devices in nearly any configuration. In the same way that ladder logic in a PLC allows a programmer to change the control scheme for a machine without physically rewiring it, MMI software allows factory-wide flexibility in coordinating controllers and machinery into new configurations to accommodate new products or production methods.

Factory Information Systems

By including DDE compliant applications such as spreadsheets and databases in an MMI system, critical operating data can be collected through DDE and stored for documentation purposes. Spreadsheets and databases can also be used to store complex sets of operating parameters that can be sent through DDE to controlling devices to change product configurations throughout a factory.

For More Information

Electro Cam Corp. PLuS controllers are open to system integration. For details, please call our application engineers at the toll-free number listed on page 1.