# Programmable Automation Controllers

## What Are Programmable Automation Controllers (PAC's)?

The programmable logic controller (PLC), was introduced in the 1960's, and has been proven as a reliable and rugged automation controller for harsh industrial environments. Surveys by the ARC and VDC show that more than 70% of PLC applications require less than 128 points of digital I/O. About 80% of applications can be finished by 20 ladder-logic instructions. These average requirements have resulted in the recent growth of low-cost, tiny PLC's with digital I/O that uses ladder logic.

Although 80% of applications can be satisfied by low-cost simple controllers, the other 20% are more complex, and traditional PLC's cannot fully satisfy them. These higher level applications usually require complex control capabilities, high speed analog measurements, multiple programs support with different cycle times, open communication functions and enterprise-level network integration.

Different domain applications, such as discrete control, process control and motion control, have traditionally adopted proprietary controllers, which require developers to spend a lot of effort on software development and maintenance. These requirements would be best suited with a controller that supports single development tools and has multiple domain functionality. The new controller architecture integrates multiple domain functionality on single controller which saves on system design costs, project implementation, maintenance, training efforts and spare part stock.

In order to satisfy the market demands for complex control, the concept of the Programmable Automation Controller (PAC) is emerging in the market. PAC's define the new generation of industrial controllers which feature the PC's openness, high performance CPU, rich memory and powerful software functionality as well as the PLC's reliability and robustness. The terminology Programmable Automation Controller (PAC) is defined by ARC Advisory Group.

### The Definition of a PAC is as Follows:

- Multi-domain functionality, including logic, motion, drives and process on a single platform
- Single multi-discipline development platform incorporating common tagging and a single database
- Software tools that allow design by process flow across several machines or process units
- Open, modular architectures that mirror industry applications from machine layouts in factories to unit operations in process plants
- Employs de-facto standards for network interfaces and languages, etc., allowing data exchange as part of networked multi-vendor systems



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## How Will PAC's Penetrate the PLC Market?

PAC's focus on complex control applications, rather than displace the traditional configurations of simple control applications, where PLC's currently work very well.

Complex control applications need a PAC's flexibility, so users can customize and optimize it to meet their particular requirements for controlling and automating both machines and plants. All parts of the PAC system are designed to maximize software and hardware integration. There should be one programming and engineering tool for a complete system. This capability includes transparent access for all parameters and functions within the entire system, combining PLC, remote I/O, motion control, drives, PID control, and data handling, along with a maximum integration level to the enterprise though the use of Ethernet TCP/IP, Internet, and IT standards.

Use of PAC's will continue to shift the emphasis toward open communication standards and software integration, with less focus on the hardware. Users will become more focused on the total system performance rather than the hardware selection. So PAC's will win more satisfactions from customers who are not satisfied by traditional PLC's especially when they need more than simple discrete I/O control function.

# Advantech PAC Solutions

### Open PAC System – ADAM-5550KW Series

ADAM-5550KW is a Programmable Automation Controller designed for control tasks which require Industrial PC computing performance with the PLC's robustness. ADAM-5550KW offers an AMD Geode GX533 CPU along with control specific features such as watchdog timer, battery backup RAM and deterministic I/O. ADAM-5550KW features 5 standard IEC61131-3 programming languages in CE 5.0, so PLC users can develop control strategies with their own familiar programming languages. The powerful Multiprog KW Software and stable ProConOS have allowed ADAM-5550KW to become the best choice for a Programmable Automation Controller on the market today. With the optional HMI Software and built-in VGA port, no longer will users be required to build up additional SCADA PC's in their applications. This open PAC system is ideal for a variety of applications ranging from machine automation to SCADA applications.

### Compact PAC System – UNO-2171KW

UNO-2171KW is a compact size Programmable Automation Controller designed for control tasks which require Industrial PC computing performance with the PLC's robustness. UNO-2171KW offers a high-performance Celeron M 1GHz CPU and supports PC/104 expansion. The selected PC-104 cards such as AMONet Motion Control, Analog I/O modules, Digital I/O modules and Serial communication module are available for the KW SoftLogic support. This compact PAC system is ideal for a variety of applications such as motion, vision and transportation applications.

### Distributed PAC System – AMAX-2050KW

AMAX-2050KW is a Pentium III grade platform with an onboard AMONet controller, which is designed for embedded machine automation applications. It provides special mechanism to protect machine builder's IP, also the self diagnostic function. From the peripheral point of view, with one AMONet, master port AMAX-2050KW can control up to 2048 I/O points and 64 axes. Also, AMAX-2050KW offers one LAN and dual USB interfaces to fulfill user's various communication needs. In addition, it also offers two RS-232 and one RS-422/485 communication port with automatic flow control functionality. Because of its openness, great expansion capabilities and reliable design (fanless and diskless), the AMAX-2050KW is an ideal distributed PAC system to implement custom applications for diversified applications.



# PAC Characteristics

### Multi-domain Functionality on a Single Platform

- PAC's will play a major role in different application domains by adhering to open industry standards and providing multidiscipline programming and functionality.

### Single Developing Tool for Various Form Factors

- A single programming tool provides transparent access for all parameters and functions within the entire system. A single platform can combine PLC, SoftLogic, remote input/output (I/O), motion control, PID control and data handling.

- Requires only a one-time design, and then can easily leverage the control know-how into different control platforms to meet versatile automation projects needs

### Supports IEC-61131-3 Programming Languages

- The standard includes Ladder Diagram, Function Block, Sequential Function Chart, Structure Text and Instruction List which covers almost all PLC programming languages.

- Cross language support for three graphical languages to simplify control programs

### Multiple Speeds with Deterministic I/O

- Some control systems require various speed applications, and PAC's provide multiple speeds with deterministic I/O.

### VGA Port

- Most of PAC system provides VGA port, no need additional Human Machine Interface, the system can connect directly to display and that save lot of cost.

### Seamless Integration between SoftLogic and HMI Software

- SoftLogic creates single tagging database and HMI Software shares the same tagging database

### Transfer Data and Information via Ethernet and IT Standard Technology

- Utilization of Ethernet, Internet and IT standards such as FTP, Web Server, Email Alarm, SQL, and OPC

### Standard Communication

- Multi-vendor data exchange by utilizing de-facto standard such as Modbus

### Open and Modular Architecture

- Flexible for upgrade and maintenance

- Easy to expand local and remote I/O modules

### Storage Function

- PAC Storage function can be set for your assigned time and conditions.

### Complex Control Functions

- Complex control algorithms need powerful floating point calculations and large memory capacity.

- The software development tool provides PID Function Block and allows users to develop custom function blocks with proprietary complex controls, such as Fuzzy Logic Control and Neural Network Control.

### Remote Maintenance

- Operators can access the supplier's Web site, allowing technicians to diagnose and troubleshoot problems directly from the plant floor by PAC's Web-based monitoring and maintenance function.