CONTROL

PROMOTING EXCELLENCE IN PROCESS AUTOMATION • CONTROLGLOBAL.COM

INDUSTRIAL COMPUTERS FIELD GUIDE & RESOURCES

Industrial computers, PCs and many of their counterpart devices can take almost any form these days, and serve in almost any setting thanks to miniaturization, diskless and fanless technologies, more capable software and other advances. This is good news for users and applications in harsh environments, but it can be hard to sort out all the available options. Here is a bounty of instructional materials, products and other resources that can help you do just that.

BEGIN

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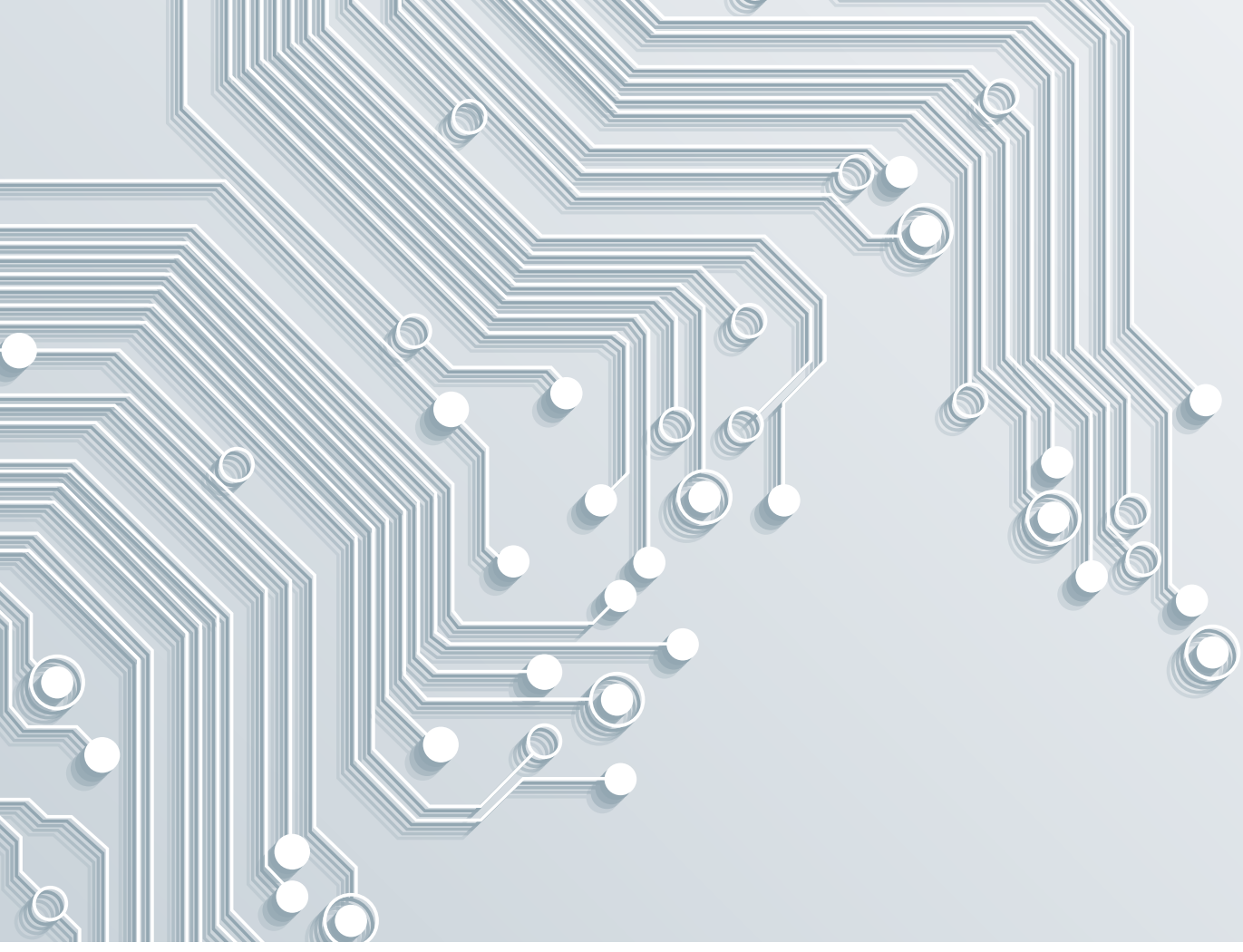

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Online resources: Industrial PCs and PLCs

BEFORE YOU BUY AN INDUSTRIAL PC

PCs performing real-time control have been "the next big thing" in process automation for decades, but many still doubt their reliability and maintainability. The solution is to use an industrial PC (IPC), which can perform just as well as a DCS or a PLC. This ControlGlobal.com article tells what you should you look for in an IPC. **Find it here. Control**

AN INTRODUCTION TO LADDER LOGIC

Need to know what ladder logic is and how it to use it? Join 200,000 viewers who have brought themselves up (or back up) to speed in less than 20 minutes with the video, "Introduction to PLC ladder logic programming." Created by Automation Technologies, the video shows how to get from a wiring diagram to ladder logic, and how ladder logic is implemented using a PLC, I/O and generic programming software. Other videos at www.automationnc.com and www.PLCMentor.com will take you as far up the ladder as you care to go. **The intro is here. plc Mentor**

LEARN ALL ABOUT COMPACT PCI

While custom solutions have their place and can be tailor-made for an application, IPCs represent a far more powerful and cost effective solution. The whitepaper, "Next Generation IPCs," states traditional IPCs may not offer all the peripherals needed for a particular application. To better meet industry's needs, IPC manufacturers are adding CompactPCI technology into IPC platforms. CompactPCI is a well-established industrial computer parallel bus interconnect standard that has been in existence for more than 10 years, and has progressively evolved while maintaining backwards/downward compatibility. Standardization is specified by the PCI Industrial Computer Manufacturers Group (PICMG), a consortium of more than 200 companies. **Find the whitepaper here. Advantech**

COMPARE PLCS AND PACS

This whitepaper from National Instruments compares the two technologies, describing the benefits and differences between NI's line of programmable automation controllers (PACs) and more traditional programmable logic controllers (PLCs). The compact FieldPoint PAC hardware architecture is used for this comparison because it's the most similar to a PLC. This document will describe the factors and criteria you should take into consideration when deciding which platform is better suited, depending on your control and measurement needs. Issues covered include graphics, measurements, processing capabilities, platforms and communications. **The whitepaper is free and downloadable here. National Instruments**

VPAC COMPARISON CHART

This simple, one-page chart compares PCs, PLCs, RTUs, DCSs and PACs in terms of their features, functions and capabilities. The same page contains links to other PAC-related information, including, "Considerations for Choosing a PAC" and "Understanding Programmable Automation Controllers in Industrial Automation." **Learn more here. Opto 22**

NEXT-GENERATION MACHINE INTERFACE

This tutorial (one of a series) demonstrates how to configure the NA settings in Omron's Sysmac Studio integrated development environment. Sysmac Studio integrates logic, visualization, safety, motion, safety and data collection (via sequential query language, or SQL). A variety of how-to videos are available on YouTube. **Watch the video here. Omron**

EXPLORE THE STATE OF TECHNOLOGY

This State of Technology Report for PLCs and PACs explores in greater detail the trends that have shaped PLC/PAC machine control, the fundamentals of the technology, and real-life examples of implementation that have proven successful. Drawn from the most recent articles published in Control Design magazine, this special report includes articles on emerging developments, basic primers and machine-control examples illustrating the latest technology in action. **Control Design**

The latest in industrial computing and PLC technologies

VERSATILE AUTOMATION COMPUTERS

These four new computers are designed for the challenging requirements of the machine automation industries. UNO-3073 and UNO-3073GL have Intel Celeron 1.1- MHz and 1.0-MHz processors; UNO-3083G and UNO-3085G have Intel Core i7 2.2- MHz processors. They have up to five PCI/PCIe expansion slots and support high-speed PCIe x16, x8, x4 and x1 cards and legacy PCI cards.

Advantech Industrial Automation Group
800-205-7940
www.advantech.com/ea

GAME-CHANGING PACs

PACSystems RXi, a new control and computing platform, is designed for the needs of the industrial Internet. The core of the product family is a COM Express architecture with multi-core CPUs. Its configurations are unique in the industry, and able to run HMI, Historian and analytics applications right at the machine. The platform offers a full complement of high-speed interfaces with multiple gigabit **Ethernet and USB 3.0 ports.**

GE Intelligent Processes
www.ge.com

JUST A CLICK AWAY

The Click PLC line now has discrete and analog I/O modules. Available 24-VDC combination discrete modules are the eight-point DC input/eight-point DC sinking or sourcing output models, and a four-point DC input/four-point relay output model. In addition, the 24-VDC four-channel analog input modules with 13-bit resolution include the 0-20 mA current input and 0-10V voltage input versions.

Automation Direct
800-633-0405
www.automationdirect.com/click-plc

PACs IN A SNAP

The SNAP PAC S-series programmable automation controllers provide real-time control and flexible, multi-protocol Ethernet and serial communications for medium to large control, monitoring and data acquisition applications. S-series PACs are at the core of the SNAP PAC system of integrated hardware and software and are used with other SNAP modules to form a complete control system.

Opto22
800-321-6786
http://pacs.opto22.com

POWERFUL LITTLE PC

The new DIN rail-mounted CX9020 embedded PC is compact, robust and equipped with a powerful 1-GHz ARM Cortex A8 processor. It's suitable for a wide range of PLC and motion control applications in small- and medium-sized machines, systems or buildings. It can operate in a temperature range of -25 °C to +60 °C. It uses Windows Embedded Compact 7. I.

Beckhoff Automation
952-890-0000
www.beckhoffautomation.com

COMPUTER FOR HAZARDOUS DUTY

The 4123CF computer incorporates a carbon-fiber and aircraft-grade machine aluminum enclosure. It comes standard with Com Express Dual Core Atom processor (core i7 optional), SSD drive, network and USB ports, Wi-Fi, a 15-in., sunlight-readable display and multi-touch projected capacitive (PCAP) touch screen. It's classified NEMA 4X, Class I and II, Div. 2.

Daisy Data Displays
717-932-9999
www.d3inc.net

EXTREME ENVIRONMENT PANEL PC

Extreme Environment panel PC combines safety with the capacity to withstand more extreme temperatures than any other offering on the market. It's ideally suited to endure harsh extremes. Rated Atex Category 3 (for gas and dust) and UL-listed for Class I, Division 2 hazardous locations, it offers a 12.1-in., TFT, color display with resistive touch and readability in sunlight.

Rockwell Automation
www.ab.com/industrialcomputers

PLC MASTER

MasterLogic PLC brings power and robustness to very high-speed logic, interlock and sequencing applications. It can be deployed in standalone mode without a human-machine interface (HMI) and is easily integrated with Experion Process Knowledge System (PKS) architecture. It has an integrated PLC engineering environment with all-in-one, window-to-ladder programming.

Honeywell Process Solutions
www.honeywellprocess.com

DIRECT-MOUNT INDUSTRIAL PC

Designline is a configurable industrial PC that can be directly mounted on the machine. It has an IP65 rating and fanless design. Vesa mounting hardware mounts securely on the machine. It's currently available in two 15-in. touchscreen options. Users can choose either resistive single-touch or two-finger capacitive multi-touch for intuitive gesture operation.

Phoenix Contact
800-322-3225
www.phoenixcontact.com

MIGRATION HELP

ProSoft Technology's phased migration gateways allow users to replace old remote I/O drives or PanelViews with new PowerFlex drives and new PanelView Plus 6 terminals that use EtherNet/IP. Migration modules allow the PlantPAx system to interface and control the legacy DCS I/O system. They're also designed to minimize system downtime by offering a phased migration.

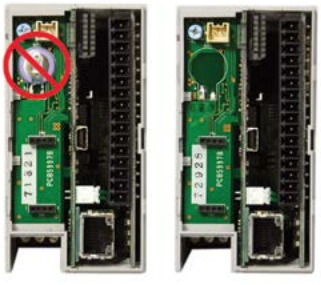
ProSoft
www.prosoft-technology.com/Products/Gateways

HMI WITH BUILT-IN PLC

The Pro-face LT4000M Series HMI plus control offers 3.5-in. and 5.7-in. LED backlit LCD Displays. Display and communication modules can be separated for quick mounting into a standard 22-mm hole without the need to create a larger panel cutout. The easy 22-mm modular mounting and separation cables also offer location options never before possible.

Pro-face
800-289-9266
www.profaceamerica.com

BATTERYLESS PLC



The new embedded Ethernet MicroSmart Pentra with MRAM is available in two CPU models with 12 I/O configurations and is compatible with current WindLDR software. All existing FC4A and FC5A expansion modules and accessories are compatible. Values can be stored permanently to eliminate the hassle and worry of losing dynamic and preloaded data.

IDEC
800-262-4332
http://pentra.IDEC.com

IPC FANLESS PROCESSOR

The new Fanless iPC-Series of industrial computers come with the Intel Dual Core ATOM N2800 processor. Available in 12-in. (iPC1200), 15-in. (iPC1500), 17-in. (iPC1700) and 19-in. (iPC1900) LED-backlit versions. The series can also be ordered as a non-display node computer (nPC300). All sizes and models have UL and cUL 508, Class I, Division 2, RoHS and European CE approvals.

Nematron
734-214-2000
www.nematron.com

ETHERNET-CONNECTED I/O SUPPORTS PoE

Easily connect digital and analog I/O to your network with Sealevel's eI/O 170E. Featuring eight 12 bit analog inputs, two optically isolated digital inputs, and two solid-state relay outputs, the compact 170E is the perfect solution for monitoring and control applications. All eI/O products are DIN rail-mount-compatible, and both PoE and DC input models are available.

Sealevel Systems
864-843-8078
www.sealevel.com

CPU WITH SQL

The Sysmac NJ Machine Automation Controller capabilities now include direct connectivity to SQL databases, integrating, logic, motion, vision and database connectivity into a single platform. Sysmac NJ SQL CPUs have the same functionality as standard NJ5 CPUs, but with added SQL database connectivity support using dedicated function blocks in Sysmac Studio software.

Omron Automation & Safety
www.Omron247.com

FLAT-PANEL MONITOR PCT TECHNOLOGY

The new 19-in. SIMATIC IFP1900 MT is the first industrial flat panel monitor with projected capacitive touch (PCT) technology for gesture and multi-touch operation. The 1366 x 768 pixel widescreen glass panel display responds to gestures and operator actions with up to five fingers, even with thin protective gloves. The front offers an IP65 protection and is scratchproof and chemical-resistant.

Siemens Industry
www.usa.siemens.com/industry

LOW-COST INTERFACE HIGHWAY TO DATA

Smart SoftPLC and Smart Gateway products now support up to two channels of Allen-Bradley Data Highway Plus (DH+) protocol. This interface provides low-cost, comprehensive connectivity to A-B DH+. Smart Gateways provide Ethernet, serial and fieldbus protocols for the HMI, driver or other device. A Smart SoftPLC functions as both a gateway and an A-B Remote I/O controller.

SoftPLC
800-SoftPLC
http://softplc.com

PLCs and industrial computers

PAC AND DAQ AT PLC PRICES

The Foxboro (PAC) System provides integrated hybrid control and data acquisition at the price of a PLC. It is built for installations with fewer than 3000 I/O points and marries high-density I/O modules with cost-effective redundancy options, energy efficiency, continuous analog, logic and sequential control, and secure data recording at point of measurement.

Invensys Operations Management
703/724-7300
iom.invensys.com

NEW INDUSTRIAL PC SERIES

The PS4000 Series offers extensive connectivity, high performance, energy-efficient processor options and quick and easy storage expansion. It features dependable disk-less operation, Windows XP Professional and Windows 7 Ultimate operating systems; quick and smooth high-speed processing with combinations such as Core Duo processors with Windows 7 and PCI Express expansion.

Pro-face
800-289-9266, www.profaceamerica.com

ALL-IN-ONE HMI AND PLC

Perspecto CP TV merges an HMI and a PLC into one package. The CP TV offers an all-in-one solution for logic and visualization. It features five sizes of TFT touchscreens and a selection of ports: Ethernet (Modbus/TCP), CANopen, USB, RS-232 and RS-485. The IEC 61131-compatible software is the all-in-one development tool for logic programming and graphic screen editing.

Wago
800/DIN-RAI, www.wago.us

HIGH-PERFORMANCE AUTOMATION CONTROLLERS

The UNO-2184G is for applications requiring lots of graphical processing power; UNO-2174G is for industries requiring faster performance, but no 3D capabilities. The 2184G comes with an Intel Core i7-2655LE processor, and the 2174G has an Intel Celeron 847E processor. They can support up to 16G DDR3 RAM, a dedicated Intel HD graphics processor, and are fanless.

Advantech
800/205-7940
www.advantech.com/ea

HIGH-END PLC AT LOW-END PRICE

The Do-more H2 Series PLC offers features and performance of high-end PLCs for an economical price. Using DirectLogic DL205 hardware as a platform, it supports all base units, discrete and analog I/O modules available for the DL205 PLC, but with four times more program memory, nine times more data memory, and operates at speeds up to 20 times faster than current DL205 CPUs.

Automation Direct
800-633-0405
www.automationdirect.com

SEAMLESS PC/PAC INTEGRATION

The WinCPU seamlessly integrates with Mitsubishi's iQ Platform. It mounts directly to the back plane of the iQ-Series controller and is ideal for users who require synergy among high-level computing, multi-level processing and non-traditional control. It features a 1.66-GHz Atom processor and solid-state memory (SSD) and offers tight integration between control and computing technologies.

Mitsubishi Electric Automation
847/478-2100
www.MEAU.com

EMBEDDED PCS

Multi-core enabled CX2000 devices are equipped with Intel processors. CX2000's housing concept combines a metallic basic housing with front panels made of a special screening plastic, and can handle environments with temperatures ranging from -25 °C to +60 °C. The basic CPU module has one DVI port, four USB ports and two independent Ethernet ports.

Beckhoff Automation
952/890-0000
www.beckhoffautomation.com/cx2000/

HAZARDOUS-AREA PANEL-MOUNT HMIS

Pepperl+Fuchs has received UL Class I Division 2, ATEX Zone 2 and IEC-Ex Zone 2 certification on its 15-in. and 19-in. industrial panel products, including the PC8200 series Panel PCs, and KM8200 and RM8200 Series remote monitors. Its standalone operator workstations are rated for General Purpose, Class I Division 2, Class I Division 1, ATEX/IEC-Ex Zone 2 and ATEX/IEC-Ex Zone 1.

Pepperl+Fuchs
330/486-0002
www.pepperl-fuchs.us

LITTLE PC WITH BIG TEMPERATURE RANGE

Valueline industrial PCs now include the VL BPC Mini, a miniature embedded box PC. The first model available is a wide-temperature version that operates between -40 °C and +65 °C (-40 °F to 149 °F). It has a fanless design in a compact, DIN rail-mountable package. In addition, it has high shock and vibration ratings, which makes it suitable for rugged applications.

Phoenix Contact
800/322-3225
www.phoenixcontact.com

MULTI-TALENTED INDUSTRIAL COMPUTER

NPE–X1000 is an industrial computer that can be used as a telemetry module, modbus gateway/proxy/router or an SNMP agent. It's a complete, ready-to-use platform, including hardware, installed Linux operating system, freeware tools and programming libraries for C/C++. There are eight serial ports (6 RS-232, 2 RS-485) and CAN, audio, HDMI, USB and Ethernet interfaces.

Techbase
+48 58 345-39-22
www.a2s.pl

DOUBLE-SPEED PACS

Allen-Bradley ControlLogix 5570 series PACs have enhanced memory and process capabilities that help enable seamless integration with motion drives. They have a 1-GB secure digital card and USB port, an on-board display for enhanced controller diagnostics and run-time information, and a new energy storage module that eliminates the need for lithium batteries.

Rockwell Automation
414/382.2000
www.rockwellautomation.com

PLC MASTER

MasterLogic PLCs can be deployed in a standalone mode without any human-machine interface. They can also be used as an additional controller with Honeywell's Experion Process Knowledge System (PKS) architecture, and are compatible with Honeywell's portfolio of process control systems. With integration, they can control multiple processes with one common operator interface.

Honeywell Process Solutions
800/343-0228
www.honeywell.com/ps/hfs

Computers in a nutshell

Industrial PCs can take almost any form these days, but many users still need protected and enclosed hard drives, screens, keyboards and other interfaces in increasingly harsh and varied settings.

By Jim Montague, executive editor, *Control*

The industrial PC is dead, so long live the industrial PC! Many events unfold in mysterious ways, and the counterintuitive paths along which many technologies evolve offer some fine examples. For instance, computers were supposed to rid the world of paper, but users probably print more now than ever. Software was supposed to be the death of most hardware, but better data processing instead fueled a mini-renaissance in sensors and other field devices. Wireless was logically supposed to eliminate hardwiring, but all those transmitters, receivers and antennas usually need wiring at either end. You can see where this going.

Similarly, industrial PCs (IPCs) have morphed into an almost infinite variety of unconventional forms, many of which don't need the same protection as their screen-and-keyboard counterparts. Data processing can happen on DIN-rails, in cabinets, far-flung field devices or even in chips and connectors on networks. Likewise, flash memory doesn't need as much protection as hard drives, fans and other rotating media.

So I guess we don't need good old industrial PCs anymore, right? Uh, wrong. In the same way that computers unexpectedly spurred increased use of hardware, it appears that the growing diversity of data processing in its various forms may actually attract more users to try and adopt IPCs in new place.

In the same way that computers unexpectedly spurred increased use of hardware, it appears that the growing diversity of data processing in its various forms may actually attract more users to try and adopt IPCs in new place.

For instance, if you've got messages and reports coming in from some smart field devices, where are they going to go? More than likely, they'll go to an IPC, and if it needs to be on or near a plant floor, it will need some protection.

"Everybody has new signals coming in from wireless and other piggy-backed communication modes, so computing is going drawn into places it couldn't go before," says Thomas Morrisey, technical product manager for Wonderware's (global.wonderware.com) mobile solutions division. "For example, our IntelaTrac software template is being used more often on rugged, mobile handsets by field operators and plant-floor folks when they go out on their rounds to capture readings and trends. At the same time, these mobile, handheld IPCs have better sealing, better IP-rating compliance and are more rugged, so failure rates have dropped from 20% to 30% about 10 years ago to just 5% to 10% today."

Application Defines Protection

"Industrial PCs will continue to be used and will not go away, though new modifications will undoubtedly be

"Industrial PCs will continue to be used and will not go away, though new modifications will undoubtedly be made as new requirements continue to arise in both batch and continuous process applications and in discrete factory automation applications."

Francisco Tacoa, Pro-Face America's product marketing director

made as new requirements continue to arise in both batch and continuous process applications and in discrete factory automation applications," says Francisco Tacoa, Pro-Face America's product marketing director. "IPCs are no longer restricted by their outward appearance, and are defined only by their microprocessor, memory and I/O components, and then what protection they'll need in industrial settings."

For example, a poultry processing division of 2 Sisters Food Group, formerly John Rannoch Foods in Haughley Park, Suffolk, U.K., recently installed 35 PC-Guard terminals as part of its factory network. Each terminal is contained in a stainless steel enclosure that meets IP 67 specifications for hostile/wet environments, and includes a separate cabinet for a bar code label printer. These temperature-controlled terminals also include PC-Guard's integral bar code laser scanners, touch-button mouse controls and membrane-touch keyboards.

Locating these terminals close to the poultry processor's production control system was crucial because every move of material into, inside and leaving is recorded by scanning its bar code or by printing a new label. The bar codes also provide traceability for every product and ingredient shipped by the factory. Also, the system software schedules orders, sets priorities and procures raw materials. This previously meant lots of manual printing and distribution of computer schedules and completion of manual records for each batch process. Now, the terminal's screens present a production schedule at every workstation. Processing each order takes up to 48 hours and involves eight to 10 stages from killing the chickens through to cutting up, flavoring, cooking, packing and shipping.

"Instead of people manually recording what they used or made, they can scan the information from the bar code label or print a label, and attach it to the item to pass the information on through the system," says Paul Nix, 2 Sisters' plant information systems manager. He estimates that using the protected PC-Guard terminals saved about 2% on total labor per year, or £330K to £500K annually,

REQUIREMENTS FOR INDUSTRIAL PCS

So what makes an industrial PC more able to survive on plant floors, outdoors and in other harsh environments than regular PCs? It's their many levels of protection. Here are some of the most important requirements (and some applicable standards) that Pro-Face America reports a PC must meet to be considered truly industrial.

- High vibration and shock conditions (IEC 68-2-6)
- Extreme temperatures (down to -40 °F and up to +185 °F) (IEC 1000-4-3)
- Extreme humidity conditions (up to 100%)
- 24 VDC needed in most applications (not 3.3, 7.5, or 9 VDC)
- Often need DIN rail-mountable form factor
- High mean time between failure (MTBF) of at least 40 years
- Higher immunity to radio frequency interference (RFI), electromagnetic interference (EMI) and electrostatic discharge (ESD) (EN 5501)
- Radiated immunity of 80 MHz to 1GHz for electromagnetic fields (EMF)
- Higher power surge immunity and electrical fast-transient burst immunity (IEC 1000-4-6)
- Industrial-grade agency approvals (such as CSA's C22.2 for safety)
- Dielectric withstanding
- Flammability (UL 94, 746A and C, IEC 529)
- Sealing (NEMA 4 minimum)
- Connector material (30 micro-inches of gold over 50 micro-inches of nickel)
- Long, non-voidable warranty of at least three years

One of the best ways to protect an IPC is to update its memory storage technology so it doesn't need as much protection. Developers and suppliers are doing this today by moving from hard drives and fans to flash cards, USB drives and even solid-state hard drives.

and so the terminals paid for themselves in about nine months. "Since our products and many ingredients we use have a limited shelf life, we must have complete visibility of our production status to control stock and procurement of materials. The new system and terminals let us minimize waste, deploy our workforce more efficiently and fill customer orders more efficiently."

Going Fanless

One of the best ways to protect an IPC is to update its memory storage technology so it doesn't need as much protection. Developers and suppliers are doing this today by moving from hard drives and fans to flash cards, USB drives and even solid-state hard drives. Because these newer media don't move or get as hot, they don't need fans, which means less contamination, clogged filters and damage. "The most recent method is solid-state drives that don't have any mechanical parts and store on high-capacity chips," says Tacoa. "In fact, Pro-Face is launching a solid-state drive (SSD) too. Its main benefits are less shock and vibration, but it can also make IPCs smaller, more immune to EMF interference, operate in a wider temperature range, and need less protection and sealing. The prices on these had been higher, but they're coming down. So even though IPCs with SSDs might cost more, they will have better cost of ownership."

The benefits of non-rotating storage media become immediately obvious in settings like coal mines, where one of Advantech's users has incorporated its PCM-4381 single-board computer into its digging, scooping and conveying machines. Because the mining machine is too dangerous to have operators nearby when it's running, it's remotely operated by an administrator in a secure server room watching a monitor. PCM-4381 was integrated into the mining machine to help with monitoring and remote control. This makes it easier for operators to use a digital camera to display mining progress, as well as receive and monitor gas sensor information. Advantech reports that its single-board computer is able to survive in the mine because its fanless design increases system reliability, even in a heavy dust environment; its compact size simplifies system integration and maintenance; and its embedded OS and software application program interface (API) support speeds system design cycles.

"The path forward is already very clear. As PC processor manufacturers add more cores, IPC makers will follow with ruggedized versions."

Graham Harris, president of Beckhoff Automation.

The Future of IPCs

"The path forward is already very clear. As PC processor manufacturers add more cores, IPC makers will follow with ruggedized versions," says Graham Harris, president of Beckhoff Automation. "When processor cores hit 8-, 16-, 32-cores and on, one industrial PC will begin to make a PLC look like an old rotary telephone competing with a 3G iPhone. Besides automation, control and HMI, one IPC can take on more measurement, asset management and data acquisition functions, and begin to move into fuzzy logic, neural networks, artificial intelligence at near-human levels and more. As IPCs processing power continues to increase, the capacity to implement revolutionary functions for automation and far beyond grows right along with it.

Industrial computers and PLCs

PLC/PC HYBRID

The 758 Series IPCs pair CoDeSys V2 software, Linux OS, IEC programming languages and multiple onboard fieldbus protocols for real-time control applications. Independent Ethernet ports provide fieldbus connectivity and support Profibus and CANopen protocols. Direct connection to the 400+ modules in the Wago-I/O-System is possible.

Wago
800/DIN-RAIL
www.wago.us

CPU FOR HIGH-END CONTROL APPLICATIONS

The RX3i CPU315 is ideal for applications where large amounts of data and application optimization are needed. The 1-Ghz processor enables applications to reduce machine cycle times. It has 20 Mbytes of battery-backed user memory and 20 Mbytes of flash user memory, configurable data and program memory, programming in Ladder diagram, structured text, function block diagram and C.

GE Intelligent Platforms
800/433-2682
www.ge-ip.com

ePC LITE FANLESS PC

The ePC Lite is a low-cost, fanless version of the ePC-Series industrial computers. It has an Intel-based, fanless Atom N270 CPU board and solid-state drive. Its 1.6 GHz processor provides processing power to HMI and SCADA applications. Windows XP Pro, SATA 40-GB solid-state drive, 15-in. XGA LCD, 1-GB DRAM, analog resistive five-wire touchscreen, and a NEMA 4 front panel are standard.

Nematron
734/214-2000
www.nematron.com

SMART PAC

Smart SoftPLC includes a four-port managed Ethernet switch/router with PoE and fiber connection options, five serial ports and an option for an RS-485 or phone modem. It combines I/O control and logic, rich communications, an embedded firewall/VPN and an embedded web server in a small, value-priced package that can handle applications ranging from simple and small to large and challenging.

SoftPLC
512/264-8390
http://softplc.com

FANLESS EMBEDDED COMPUTER

The Uno-3084 fanless embedded automation computer with front-accessible I/O design features an Intel Core 2 Duo L7500 1.6 GHz processor, 2GB DDRII RAM (expandable to 4GB), dual DVI-I ports with support for up to three displays, two RS-232/422/485 ports with automatic flow control, and two 10/100/1000 Base-T RJ-45 ports and five USB 2.0 (one internal) ports.

Advantech Industrial Automation
800/205-7940
www.advantech.com/ea

PRODUCTIVITY IN PAC FORM

The Productivity3000 PAC combines features and capabilities of a PC-based control system with that of a typical PLC. It is a modular, rack-based system of up to 116,000 I/O points with local, expansion and remote I/O bases and a full lineup of discrete, analog and specialty I/O modules. The high-performance CPU has 50Mb memory, fast scan times and seven communication ports.

Automation Direct
800/633-0405
www.automationdirect.com

COMPACT, BATTERY-LESS PLCS

Simple, intuitive and exceptionally powerful, Modicon M340 PAC provides numerous cost and performance advantages over comparably priced PLCs. It requires no battery and is a compact 4 in. high and 3.7 in. deep with high-density, 64-point I/O cards, and is only 1.25 in. wide. It uses CANopen networks and USB cables. The PAC has 4 Mb of memory upgradeable to 16 Mb and a 70K instructions/ms execution speed.

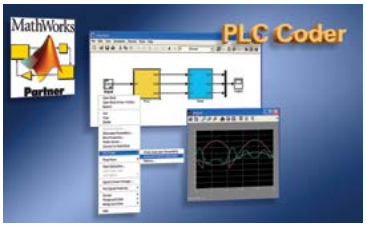
Schneider Electric
847/397-2600
www.us.schneider-electric.com/PLC

WIRELESS PAC

Snap-PAC-R1-W is a rack-mounted PAC with IEEE 802.11a/b/g Wi-Fi networking, two independent 10/100-Mbps wired interfaces for standard Ethernet networking, and one RS-232 serial port for PPP communication. It provides control, communication, I/O processing, remote monitoring and data acquisition, and is fully integrated with Opto 22's PAC Project software and all Snap-PAC brains and I/O modules.

Opto 22
951/695-3000
www.opto22.com

GENERATE IEC CODE AUTOMATICALLY



Simulink PLC Coder extends model-based design for the industrial automation segment by helping create source code in structured text (IEC 61131-3 ST) using Simulink models that can be easily integrated in B&R Automation Studio. It complements the Automation Studio Target for Simulink. Users can generate ANSI-C or structured text code alternatively, and automatically integrate it into the automation project.

B & R Automation
770/772-0400
www.br-automation.com

MICRO PLC WITH RS485 CAPABILITY

MicroSmart Pentra is now available with optional RS485 communications. It is the only micro PLC on the market that allows control systems to seamlessly communicate with up to seven serial devices via RS232C or RS485. Now, with the new RS485 communication module, it can talk multiple communication protocols on the same system. For fast transmission speed, this unit also supports communication baud rates up to 115Kbps.

IDEC
800/262-4332
www.IDEC.com/usa

PACS FOR EXTREME APPLICATIONS

NI cRIO-9023 and NI cRIO-9025 real-time controllers are ideal for high-performance measurement and control applications operating at extended temperatures. They operate in a range from -40 °C to 70 °C and are available with conformal coating for additional protection in harsh conditions. The 9023 has a 533 MHz PowerPC processor. The 9025 has an 800 MHz PowerPC processor and dual Ethernet ports.

National Instruments
800/258-7022
www.ni.com/compactrio

FLAT-PANEL MONITORS FOR DUSTY SPACES

VisuNet Series industrial flat-panel LCD monitors have Class II Division 2 certification for use in dusty environments. They're also available as general-purpose displays, as UL-listed Class I/Div 2 devices, and can be combined with a Bebco EPS purge system for Class I/Div. 1 hazardous environment mounting. Touchscreen options are available. They come in 10-, 12- 15-, 18-, 19- and 20-in. sizes, and are rated for use from -10 °C to 55 °C.

Pepperl+Fuchs
330/486-0002
www.pepperl-fuchs.us

MASTERLOGIC PLC

MasterLogic PLCs bring power and robustness to high-speed logic, interlock and sequencing applications. They can be deployed in a standalone mode or used with the Experion Process Knowledge System architecture, and are compatible with Honeywell's portfolio of process control systems, including the recently released Experion LS. MasterLogic CPUs, power supplies, rack sizes and I/O selection are suited to many applications.

Honeywell
800/343-0228
www.honeywell.com/ps/hfs

INDUSTRIAL-STRENGTH MONITOR

NX Series enclosed industrial display system is a NEMA-sealed, commercial-grade, large monitor built in a rugged-steel 14-gauge enclosure. It can operate as a standalone monitor, or it can be integrated with a Modpak modular computer system, which allows easy serviceability, service removal and upgrading. It has a Lexan protective lens window and sealed connectors for power, Ethernet and USB ports.

Dynix
734/677-6100
www.dynics.com

EXTREME-ENVIRONMENT PANEL PC

The Allen-Bradley Extreme Environment Panel PC combines intrinsic safety with the capacity to withstand extreme temperatures. With U.S. NEC Class 1, Division 2 hazardous location certification, it can be used in areas where explosive materials are present. It is rated to withstand temperatures from -20 °C to 70 °C inside the computer cabinet, and display side temperatures of -20 °C to 55 °C.

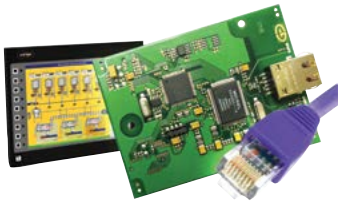
Rockwell Automation
www.ab.com/industrialcomputers/

UPGRADED CONTROLLER BASE STATION

The upgraded base station for the Nanoline controller, nLC-055, is designed for small to mid-sized machines with limited I/O points. It can add, subtract, multiply and divide, as well as perform modulo (percentage) operations. Other new features include two analog inputs with 12-bit resolution, eight digital inputs, two high-speed counters, a built-in real-time clock and four relay outputs.

Phoenix Contact
800/322-3225, www.phoenixcontact.com/usa_home.htm

TWO-NETWORK HMI



G3 Series HMI is available with the new Ethernet expansion card, G3Enet. Now users can add a second Ethernet port to increase bandwidth and separate networks. G3 Series HMIs with the G3Enet card provide communication with devices on two distinct Ethernet networks simultaneously—without an industrial router. The expansion card can be easily fitted to any G3 series HMI.

Red Lion Controls
717/767-6511, www.redlion.net

ENERGY-SAVING EMBEDDED PC

The new CX5000 has Intel Atom technology and up to 1.6 GHz of processing power. It has a magnesium housing, making it lightweight, and improves its mechanical stability and resistance to EMC. The DIN rail-mountable PAC has a fanless design with a maximum power loss of 12.5 Watts. Just 3.9 x 3.9 x 3.6 in. (100 x 100 x 91mm), CX5000 also is exceptionally compact.

Beckhoff Automation
952/890-0000, www.beckhoffautomation.com

INDUSTRIAL PCS WITH HIGH-SPEED PROCESSOR

Siemens introduces four industrial PCs built with the Intel Core i7 (i series) processor. The Simatic IPC627C box PC and the HMI IPC677C panel PC are suitable for high-speed measurement, open- and closed-loop control tasks, and their HMI functions directly at machine level. The 19-in. IPC847C rack and compact IPC647C rack PCs are designed for continuous, 24-hour service.

Siemens Industry, Inc.
www.sea.siemens.com

SENSOR DATA VIA THE INTERNET

RST-5001 network and web-enabled 4-20 mA input controller is compatible with any 4-20 mA device, and sends email and text message alerts when user-defined limits are reached. It can be powered via either a standard 24 VDC supply or PoE. Conversion options include volume, level, distance, weight or user-defined units. No special programming software is required.

Automation Products Group
888-525-7300, www.apgsensors.com

New guises, protections for industrial PCs

Computers are taking on new forms to perform new assignments on the plant floor

By Jim Montague, executive editor, *Control*

To paraphrase Mr. Twain, reports of the demise of the industrial computer have been greatly exaggerated. Sure, recent technical advances are making the desktop PC-in-a-box and many of its traditional capabilities unrecognizable. However, there remain many applications in which operators need screen-based HMIs on or close to machines, production lines or other systems. So rather than eliminating the need for industrial PCs (IPCs) and enclosures, diversifying computing capabilities are fueling an increasing variety of new industrial computing form factors.

HOW TO DECIDE WHAT IPC YOU NEED

To find and implement the most appropriate industrial PC for their applications, Mike Berryman, market development director in Advantech Corp.'s industrial automation group, says users need to consider the following questions:

- What kind and level of computing horsepower does your application need? Unless it's a high-end vision system or image capture application, then a regular, embedded industrial PC can handle it.
- How much maintenance are you doing on your PLCs now?
- Can you put your old, big PC's software on a new, smaller PC? Is it easy to install and check out?
- Can you use embedded Windows XP software? Can it run on Flash? Does it have protected media, such as an enhanced write filter? And can all your existing software be loaded and run on it?

Evolution and Diversification

"There's a lot of confusion in the market these days about what constitutes an industrial computer. Everyone even uses the word 'ruggedized' in different ways. So, we try to define an industrial PC by how well it matches its application." says Ed Boutilier, president and CEO of Stealth Computer Corp.

"What makes an IPC worthwhile is an application's downtime expense, and this is based on how much it will cost a user to replace the PC itself and how long it will take to transfer its data over to the new PC."

Mike Berryman, market development director in Advantech Corp.'s industrial automation group, explains, "The transformation of industrial PCs from desktops to all the variants we're seeing now is caused by open computing technologies—such as Ethernet and Intel's processors—being driven from commercial settings and into the industrial space. This is why things are moving so fast now. PCs can now use Flash memory to run at 2 GHz without a fan or other moving parts, which improves reliability, lets PCs be located on DIN rails and even lets them look like PLCs. In the past five years, Intel's low-power, low-heat Centrino processors have allowed builders to put a heat sink on their PCs and run at 60 °C to 70 °C without a fan."

Figure 1. A user performing real-time flood monitoring and alert services is using UNO-2053E and ADAM-4017 to remotely check water-level sensors in Malaysia's rivers, and broadcast warnings when high water levels occur.

In addition, while the emergence of Flash memory might seems to bad news for those traditionally devoted to protecting rotating media, Boutilier explains it's actually good news because it makes IPCs more affordable than ever, enabling users to take computing into new applications, most of which will need some level of protection. For instance, Stealth's Little PCs are small, fanless units that can be machine-mounted directly.

Monitoring Wind Power, Metallurgy, Envionments

End users are employing Advantech Corp.'s UNO industrial computers to migrate from larger computers to smaller PCs in a variety of applications. The firm reported on them at its recent 2007 World Partner Conference in Shanghai, China. For example, a 5,600-megawatt wind power generation facility in Germany recently used Advantech's UNO-2160 embedded automation PC to monitor the status of its generator and communications with its field-based PLCs and fieldbus equipment. This fanless PC checks and controls the generator's turbines and stores data in a small database.

A Malaysia-based user performing real-time flood monitoring and alert services is using UNO-2053E and ADAM-4017 to remotely check water-level sensors in local rivers and broadcast pre-recorded warnings when high water levels are reached (see Figure 1). Finally, one of the largest rolled-aluminum producers in the U.S. updated its HMI software using UNO-2053 to deploy Microsoft's Terminal Server technology. This allowed it replace its former PCs with thin-client terminals running ThinManager software, and communicating via a 100 Mbps fiber network.

Preserving Protection

To give users the access they want, but maintain the seals and protection they need, Nathan Espinosa, Hoffman's product manager, reports his company's enclosures are adding USB ports, an access door right to the CD drive, touchscreens instead of keyboards and pushbuttons, and more displays on pedestals and pendant arms, so workstations won't have to sit on the floor. "As PCs get smaller and thinner, as they're mounted in more different ways and locations, and as they gain more entry points, all of these create the need for more different types of protections," says Espinosa. "For example, we just got a new Amada press in for our own metal stampings, and it still has its stand-up

floor cabinet, but the PC sent to run it is in an HMI frame installed in the top of the cabinet."

Scott Kortier, marketing, sales and communications manager at Pro-face America, adds, "We laugh when we hear that Dell is supposedly the most used industrial PC because some users may not be looking at their true costs of ownership and getting their PCs back up to speed. They can install a $400-$500 PC in an enclosure rated

"Boards are being extended further out to the edge of some PCs, which mean less wiring, but more solder. So even if there are fewer PCs on the plant floor in the future, there will be more computing and data processing going on there."

Mike Berryman, Market Development Director, Advantech Corp.

to only 30 °C to 35 °C. However, when it fails on the plant floor and it takes eight hours to get it and the application going again, then that downtime may cost a lot more than some users might think. If users don't know the actual cost of their downtime, then they can't make an informed decision about what kind of PC and protection they need."

Self-Monitoring and the Future

Just as industrial PCs help monitor industrial processes, some innovative users are turning them around to periodically check the PCs own health. For example, Pro-face recently launched its Reliability, Availability, Serviceability (RAS) program to monitor the health of its industrial PCs locally or remotely. RAS will check a variety of operating parameters, including internal temperature, hard drive, fan speed and flat-panel backlight, and then output alerts or alarms from the PC to a stack light, pop-up message on another screen in a central control or elsewhere via the Internet.

UNDER POWER, IN THE MILL, UP IN THE AIR

Just as the hat makes the man, the appropriate housing may define the industrial PC. For example, National Instruments reports users are employing its PXI PC-based platform and LabView software in several unusual locations.

Testing and certification organization, KEMA Netherlands B.V., synchronized PXI-6133 boards and PXI-5122 digitizers to develop a faster-acquiring transient recording system that measures three-phase AC currents and voltages when testing for faults up to 1,060 kV peak at 63 kA.

Pitel Engineering developed a PAC-based gauge-monitoring system using PXI, Compact PXI and LabView software to check and control metal strip thicknesses in cold-rolling steel mills in Thane, Maharashtra, India. This new system provides micron-level deviation from setpoints as an analog input to the PXI hardware, which enables higher-precision monitoring, faster response times than PLCs and allows 24/7 operations.

Boeing reports using PXI controllers and chassis, FPGA dynamic signal analyzers, and LabView to build a process data acquisition system (DAQ)—including 600 ground-based microphones—to test the effectiveness of designs for reducing commercial jetliner noise during takeoff, landing and sustained flight. Boeing's new DAQ solution is distributed across multiple PXI chasses, synchronizes all channels, provides high channel count with full, simultaneous bandwidth and reduces required cable.

IPCs aren't likely to disappear in the future, but their forms and functions will be driven by users' needs and whichever software and hardware solves these problems best. Some developers are finding ways, such as using USB ports, to reduce internal hardware and remove much of the bus wiring. "Boards are being extended further out to the edge of some PCs, which mean less wiring, but more solder," explains Berryman. "So even if there are fewer PCs on the plant floor in the future, there will be more computing and data processing going on there.