

ARC WHITE PAPER

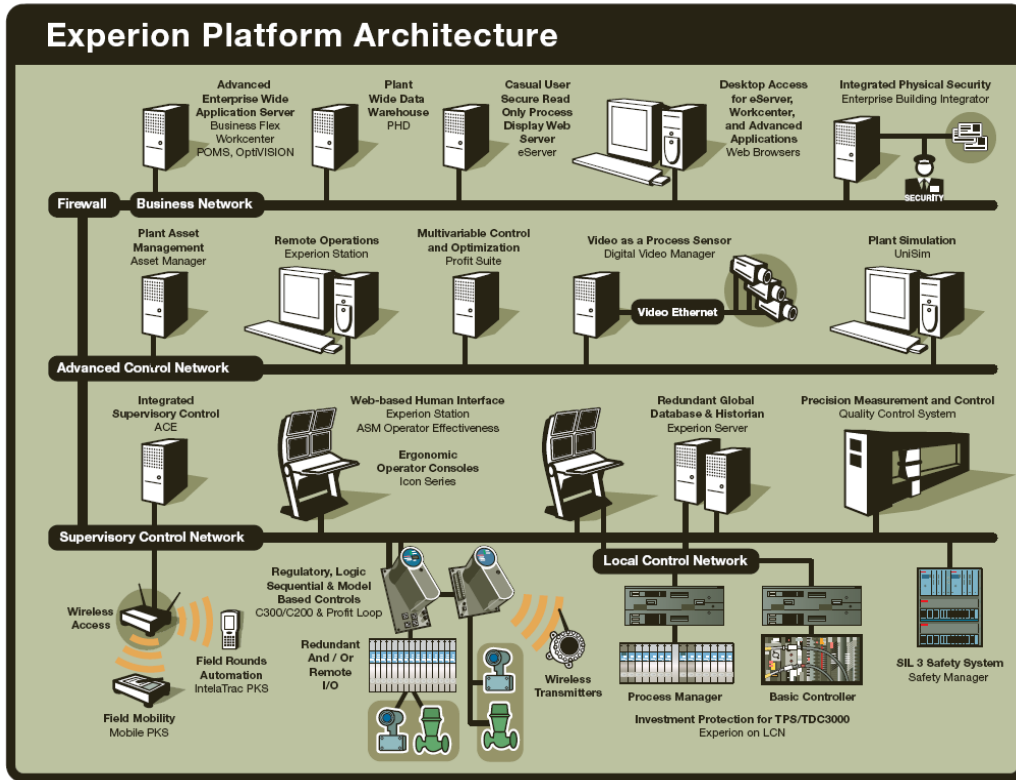
By ARC Advisory Group

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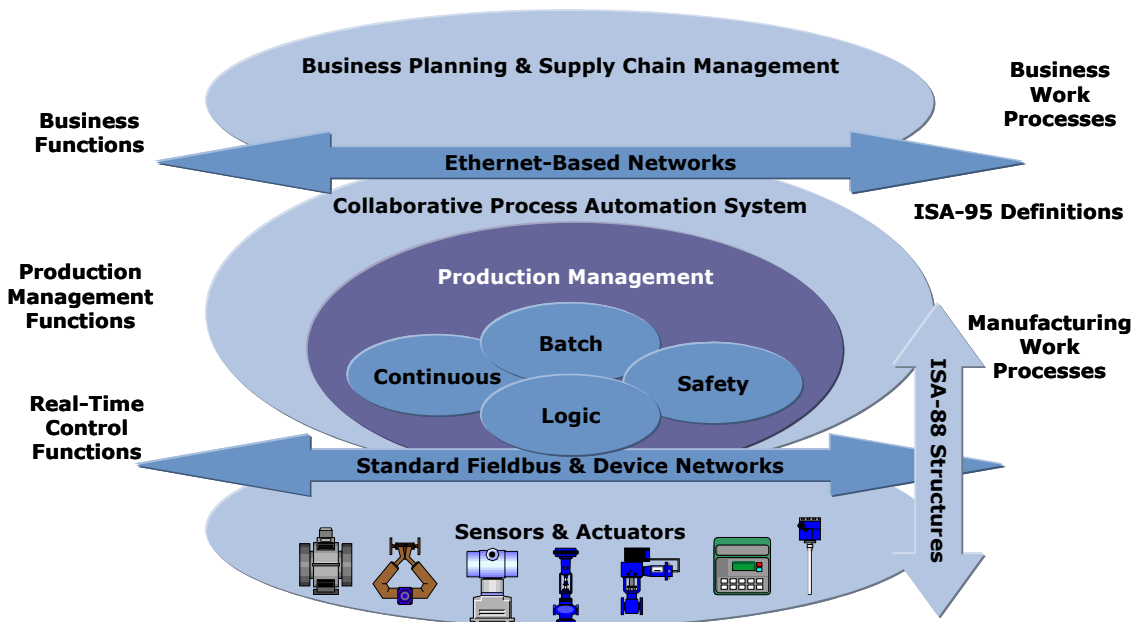
Honeywell Experion PKS R300

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Experion PKS Preserves Honeywell Customer Investment While Incorporating Honeywell's Application & Technology Expertise



Experion PKS Matches ARC's CPAS Vision in Key Areas

Experion PKS R300 Refines Honeywell System Vision

Honeywell has the largest contiguous installed base of any single process automation system, with the TDC2000, TDC3000, and TPS systems.

Honeywell has the largest contiguous installed base of any single process automation system, with the TDC2000, TDC3000, TPS, and Experion™ PKS systems. The system is contiguous because Honeywell has taken an evolutionary approach since the inception of the DCS in 1974, with incremental changes over time that have kept the system up to date with current technology trends.

Honeywell's latest evolution in its system platform is Experion PKS, which was first introduced in 2002. The goal of Experion is to provide Honeywell customers with single, scalable open system architecture while preserving their investment in their installed base of TDC, TPS, Alcont, PlantScape, and other Honeywell control systems. PKS is a significant evolutionary step for several reasons. From an application perspective, Experion leverages Honeywell's strengths in numerous areas such as collaborative production management (CPM), advanced control and optimization, and vertical industry solutions capabilities.

Experion PKS was the first system from Honeywell to embed domain expertise and related functionality from its advanced control and optimization business, then known as Hi-Spec, in a significant way. It also was the first platform from Honeywell to rely on an Ethernet-based network with Fault Tolerant Ethernet (FTE), and was the first to incorporate a unified approach to fieldbus and bundled Plant Asset Management (PAM) applications with the inclusion of Asset Manager. The system also took a unified approach to safety with Safety Manager 100 platform, which Honeywell claims is the first safety instrumented system (SIS) to earn certification from TUV Rhineland for Safety Integrity Level (SIL) 3 applications (IEC 61508 and 61511 standards). POMSnet 1.0 production management functionality for the pharmaceutical industries and Business FLEX production management applications for the process industries are also part of the system.

One of the most significant changes carried forward into the Experion PKS platform, however, was in the hardware layer with the C200 Series of controller and I/O modules, which were the result of a hardware manufacturing partnership with Rockwell. The C200 controller is also

available with the TPS-based HPM I/O modules, designed for the control requirements of critical applications in the traditional heavy process industries.

Experion PKS R300 Builds Innovation into Control Hardware

The newly announced R300 release of Experion takes the realm of control hardware one-step further into the future with the new Series C I/O and controller. For some time, ARC has been saying that it is becoming increasingly difficult for suppliers to add value to their control hardware. The

influx of Commercial Off The Shelf (COTS) components has drastically reduced the price of proprietary control hardware, which at the base level is usually little more than standard commercial components packaged in a configuration that is acceptable for hazardous industrial environments.

Honeywell, however, has taken a unique approach to the philosophy of control hardware with a new design that rethinks the role of hardware and its future in the plant. Series C incorporates a vertically designed cabinet architecture. Instead of racks of controllers and I/O mounted horizontally one immediately next to the other, each Series C module sits on its own modular and removable terminal, with modules mounted vertically on top of one another in an angled fashion, allowing for convection air currents between modules. The new design actually

allows for a smaller footprint, and better thermal management. The need for a common backplane is also eliminated, along with the corresponding single point of failure.

C300 Controller

The Series C C300 Controller is designed in the same packaging as the I/O. The controller also incorporates the control scheme that is currently found in the C200 Series controller, with the same control environment and tools.



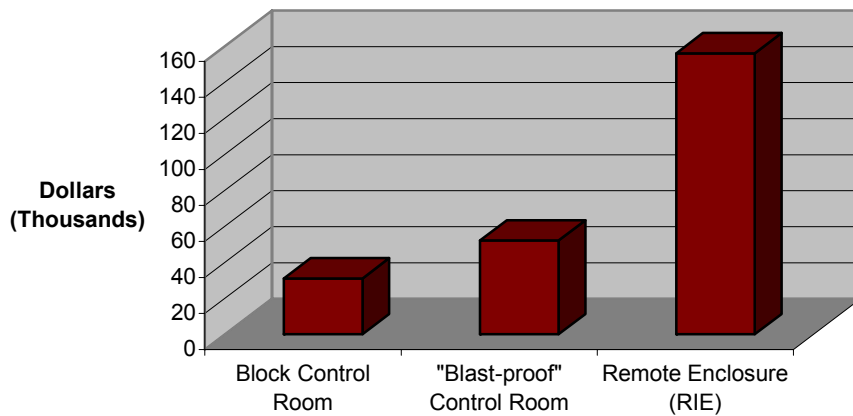
Series C I/O & Controllers Feature a Unique New Vertical Mounting Form Factor That Allows for Smaller Footprint and Improved Thermal Management

The control suite encompasses full function block continuous control, logic, and Sequential Function Charts (SFCs). Advanced functions, such as embedded model-based control and field network integration, are also included.

Real Cost Savings are Possible with Reduced Footprint

In existing plants, space is at an all-time premium in both existing plants and new installations, and the cost savings that can be attained by reducing footprint can be significant. Honeywell cites one example of a customer

proposal that went from 536 cabinets on a project to 356 cabinets with Series C – a reduction of 34 percent. The cost savings are particularly pronounced in applications requiring remote enclosures, with savings of up to \$150 thousand for an average size project. Even projects with blast-proof control rooms can experience average savings of up to \$50,000, while block control room installations can save over \$20,000.



Typical Cost Savings of up to \$150,000 can be Achieved with the Reduced Footprint of the New Series C Control & I/O

High Availability Control Remains a Priority

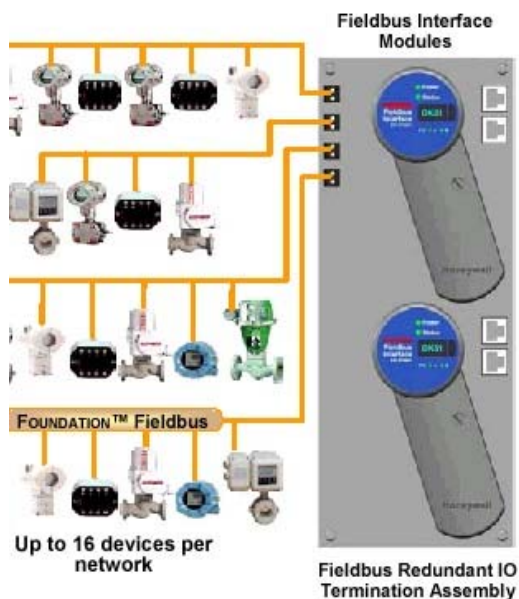
Honeywell has built a reputation on having “bullet proof” control, and C300 is no exception. The controller features full redundancy, and Honeywell claims that the new controller carries the highest processing capacity, thus minimizing the overall number of controllers required and the complexity of execution. Execution periods can also be set for each control module, allowing for optimized processing power. The Honeywell philosophy of “bullet-proof” control also extends down to the I/O. Series C I/O features a configurable safe state, where loss of functionality can be anticipated in the customer’s process design. The I/O also supports diagnostic readback checking, multi-channel fault annunciation, and bad value indication.

Fieldbus Functionality and Support

Honeywell has long been at the forefront of developments regarding process fieldbus. The company was a founding member of the Fieldbus Foundation and has several FOUNDATION™ Fieldbus installations up and running. Honeywell's fieldbus strategy has evolved from the field device level to include full functionality and integration at the control system, collaborative production management (CPM), and plant asset management (PAM) level.

Series C is also the new platform for Honeywell fieldbus support through the Series C Fieldbus Interface Module (FIM). The new Series C FIM features

twice the number of control connections as the previous version of the FIM, allowing for up to 16 devices per network. The FIM also does not require the implementation of the C300 Controller, and supports a direct path view from the FIM to the instrument or valve. The FIM also allows for implementation of field level control or "control on the wire" that is available with Foundation Fieldbus.



Migration Path for Legacy Controllers & I/O

Honeywell realizes that its installed base of customers has many assets, particularly at the controller and I/O level, which can last many years into the future. Honeywell's goal is to provide customers with single, scalable system architecture while preserving their investment in their installed base of TDC, TPS, PlantScape, and other Honeywell control systems.

While Series C and C300 are Honeywell's newest controller and I/O platform, the company still plans to support and move forward its existing lines of C200 and HPM hardware. Honeywell has already renewed its agreement with Rockwell Automation and will continue to provide C200 well into the next decade. According to Honeywell, support for the HPM hardware will continue for many years, with longer-term support possibly requiring specific service contracts.

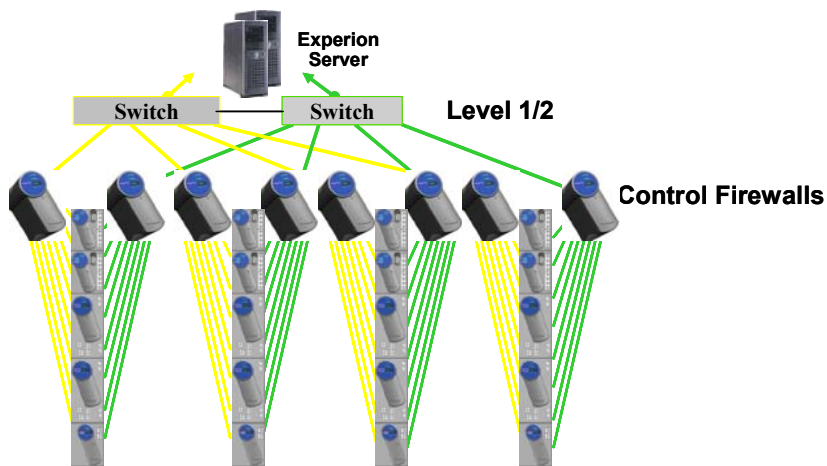
New Series C FIM Allows for More Devices per Network & Eliminates the Need for a Controller

Backup & Restore Prevents & Reduces Downtime

Another key enhancement to Experion PKS R300 is the Backup and Restore function. Designed to reduce unplanned downtime and protect against PC failures, Backup and Restore can backup systems while online and allow for faster recovery in the event of a failure. Backup and Restore allows users to backup a complete Experion or TPS system, including operating systems, applications, and all service packs and configurations while still online to a single PC or file server node. Rapid restoration from catastrophic failures can typically be achieved in less than an hour. If the user is restoring the node to an identical hardware configuration, no installation of configuration is required after the restore is complete.

Security & Procedural Operations Enhancements

The increasing influx of standard IT into automation systems also brings with it the need for increased security and countermeasures for system failure. The range of cyber security threats is numerous, from distributed denial of service attacks to password cracking. Manufacturers need to protect the confidentiality and integrity of their data and ensure availability of their systems.



Experion Control Firewall Provides an Added Layer of Security at the Controller Layer

The realm of the Ethernet-based control network is no exception. Honeywell's control network infrastructure moving forward is their patented Fault Tolerant Ethernet (FTE). The FTE network already incorporates Honeywell extensions for increased security and reliability. For example, FTE continually checks all possible routes on the network and rapidly re-routes communications in the event of failure of a network component.

Control Firewall Adds Layer of Security

Although FTE is just as reliable as proprietary control network architectures, devices deployed on Ethernet networks can still be subject to message flooding and denial of service attacks. To address this, R300 includes an embedded Control Firewall in Honeywell's existing High Security Network Architecture. Control Firewall resides with C300 Controllers and allows only the messages the Experion level 1 control devices need for control, rejecting messages that are never needed. Control Firewall also maximizes the flow of Ethernet management messages. Having this additional layer of firewall protection at the control layer is important in the event that there is an unprotected connection to the plant or IT/business network.

Procedural Operations Preserve Expert Knowledge

A key part of the initial vision of Experion PKS was to facilitate knowledge capture, promote knowledge sharing, optimize work processes, and remove personnel from routine process operations to focus on knowledge development. Operating procedures are a key area that can benefit from all of these elements. There is no doubt that improper execution of operating procedures can have an adverse effect on productivity and profitability. According to an Abnormal Situation Management® (ASM) Consortium study, for example, 14 percent of all incidents had improper execution of operating procedures as a contributing factor. One customer responding to the ASM survey cited a total of close to \$13 million in losses due to improper operating procedure execution over a five-year period.

Experion PKS R300 addresses the need for better management of procedural operations with best practices that are implemented directly into the

control system, on the C200, C300, or ACE control platforms, and can be accessed in the field through remote wireless workstations where they are needed. Essentially, the control system tells the operator what to do based on the best practices that are configured by engineering. The control system then checks the operator's



Startup/Shutdown

Seldom executed therefore subject to error or inconsistencies



Grade Change

Normal production change (grades, rates, equipment, etc.)



Abnormal Condition resulting in 'SafePark'

Bringing plant to safe holding point to be ready to resume Operations, or shutdown plant



Cyclic Planned Activities

Activities repeated based upon well defined criteria, normal operations (regeneration, pump changeover, decoking)

Most Plants Do Not Run in Constant Steady State and there is a Need for Better Management of Complex Procedures

work, and invokes an exception handler if there is an error.

Procedural Operations is a step toward the automation of state transitions in the plant, which is a core concept of ARC's Collaborative Process Automation System (CPAS) model. Most plants do not run at steady state and are almost constantly in some kind of transition, whether it is startup, shutdown, grade changes, abnormal conditions, or other planned or unplanned activities. Automation of specific, complex procedures has been co-developed by Honeywell with their end user customers to address the issue of specific metrics that can cause abnormal situations or incidents.

Experion PKS R300 Strengths & Challenges

Honeywell has taken some unique steps with the release of Experion PKS R300. With the influx of commercial off the shelf technology (COTS) in control hardware, it is increasingly difficult for process automation system suppliers to add value at the hardware layer of the system, particularly at

Honeywell must continue to build more security into Experion PKS to address the ever-growing list of threats not only in the realm of IT, but also in the realm of physical plant security.

the controller and I/O level. Honeywell's new vertical design is unique in the industry and provides the reduction in real estate and footprint that has increasingly become a concern for users.

Honeywell, however, has also had to bear the cost of developing and designing this new hardware platform, as well as bringing it forward in the future. In

Honeywell's view, however, this was a necessary step to keep its technology offerings as current as possible and provide the most value to the user.

Cyber security breaches and virus attacks continue to plague business and industry with no signs of slowing down. Honeywell's steps to address the issue of cyber security with embedded control firewalls and a more secure network architecture also addresses key user concerns regarding the vulnerability of automation systems. Honeywell must continue to build more security into Experion PKS to address the ever-growing list of threats not only in the realm of IT, but also in the realm of physical plant security. Honeywell can take advantage of its security systems business to drive this functionality.

Perhaps the most interesting aspect of this release from a functional perspective, however, is the enhanced procedural operations. ARC definitely sees a continued reduction in workforce knowledge that can only be accumulated with experience, and capture of this knowledge will be essential for the future success of any process manufacturer. More importantly, the Procedural Operations function conforms to a key aspect of ARC's CPAS vision, which is the automation of state transitions in the plant.

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Acronym Reference: For a complete list of industry acronyms, refer to our web page at www.arcweb.com/Community/terms/terms.htm

AI	Artificial Intelligence	ERP	Enterprise Resource Planning
API	Application Program Interface	HMI	Human Machine Interface
APS	Advanced Planning & Scheduling	IT	Information Technology
B2B	Business-to-Business	LAN	Local Area Network
BPM	Business Process Management	MIS	Management Information System
CAGR	Compound Annual Growth Rate	MRP	Materials Resource Planning
CAS	Collaborative Automation System	OpX	Operational Excellence
CMM	Collaborative Manufacturing Management	OLE	Object Linking & Embedding
CNC	Computer Numeric Control	OPC	OLE for Process Control
CPG	Consumer Packaged Goods	PAS	Process Automation System
CPAS	Collaborative Process Automation System	PLC	Programmable Logic Controller
CPM	Collaborative Production Management	PLM	Product Lifecycle Management
CRM	Customer Relationship Management	ROA	Return on Assets
EAI	Enterprise Application Integration	ROI	Return on Investment
EAM	Enterprise Asset Management	RPM	Real-time Performance Management
		SCE	Supply Chain Execution
		WAH	Web Application Hosting
		WMS	Warehouse Management System

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