PlantPAx
Process Automation System

Achieving Process Automation Excellence

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Rockwell Automation

Outline

1. PlantPAx – Responding to Industry Challenges
2. Key Areas of Functionality
   - System Core
   - Critical Control & Safety
   - Field Device Integration & Asset Management
   - Batch Management and Control
   - Process Information
3. System Tools & Utilities
4. Services and Training

2010 "Industry" Awards

RA Takes Industries from EMR, INV, and SIE

RA won 26 1ST Place Finishes in 2010 (vs. 23 in 2009)

	Chemicals Mfg	Electric Power Generation	Food & Beverage Mfg	Metals, Minerals & Mining	Oil & Gas Extraction	Petroleum Refining	Pharma & Life Sciences	Plastics & Rubber Mfg.	Pulp & Paper Mfg	Water & Wastewater Processing
Continuous Regulatory Control	Emerson Process Mgmt.	Emerson Process Mgmt.	**Rockwell Automation**	**Rockwell Automation**	Emerson Process Mgmt.	Honeywell	Emerson Process Mgmt.	Emerson Process Mgmt.	Emerson Process Mgmt.	**Rockwell Automation**
Batch Process Automation	Emerson Process Mgmt.	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	+1 **Rockwell Automation** (previously Emerson)	Honeywell (previously Emerson)	Emerson Process Mgmt.	-1 Emerson Process (previously Rockwell)	**Rockwell Automation**	+1 **Rockwell Automation** (previously Emerson)
Continuous Sheet/Web Monitoring & Control	Honeywell	No winner	No winner	**Rockwell Automation**	No winner	No winner	No winner	Honeywell	ABB	No winner
Safety / Emergency Shutdown	Invensys Process Systems	+1 **Rockwell Automation** (previously Invensys)	**Rockwell Automation**	+1 **Rockwell Automation** (previously Siemens)	Invensys Operations Management	Invensys Operations Management	**Rockwell Automation**	**Rockwell Automation**	Invensys Operations Management	**Rockwell Automation**
Sequential Logic Control	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**	**Rockwell Automation**

- RA is chosen as outright winner in 6 of 10 process industries & tied in 2 more!
- Gained four new industry categories in 2010 (net gain of 3)
- EMR received fewer industry 1st place finishes (net loss of 2)

Process Industry Challenges

Visibility of Plant Operations

> Importance of Distributed Visualization

Monitoring & diagnosis of asset health

> Importance of Field Device Diagnostics

Asset utilization and environmental protection

> Importance of High Availability & Integrated Safety

Production flexibility and regulatory compliance

> Importance of Batch Management & Control

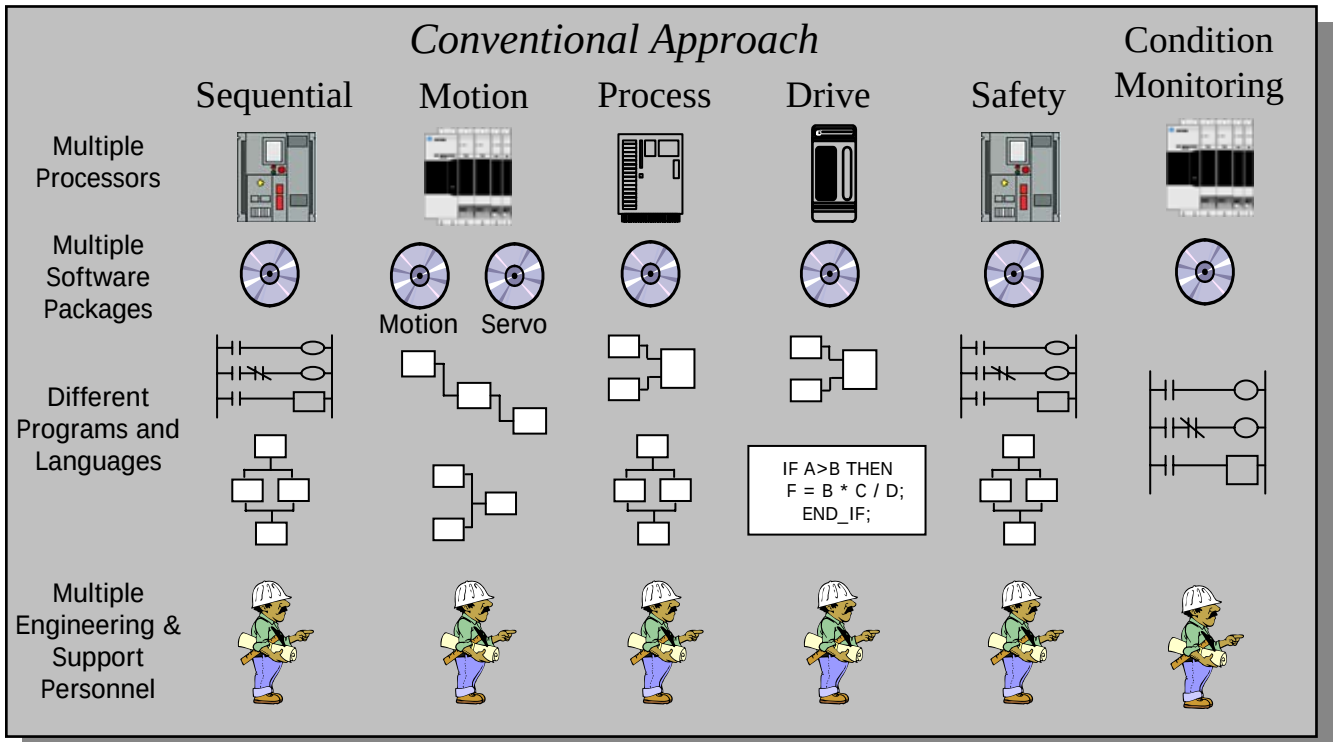
Energy usage and production optimization

> Importance of Real-time Process Optimization

What is the Value of Integrated Architecture?

- Control sequential, motion, safety, process, drives, and condition monitoring within a single control platform (or single controller if desired).
- One Software Package for Structured Text, Function Block, Ladder, and SFC
- High Availability of Resources…Ocean of Talent
- Lowest Total Cost of Ownership

PlantPAx
Process Automation System



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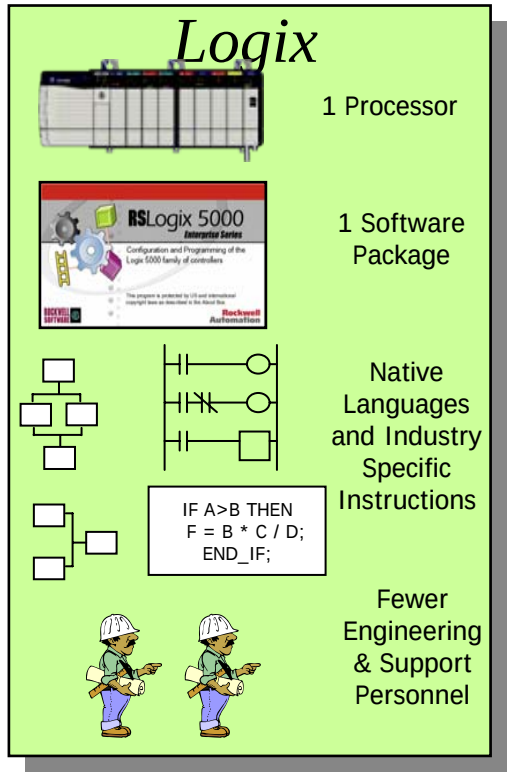


The Essentials

PlantPAx Process Automation System

PlantPAx represents:

1. A scalable portfolio unifying the Rockwell Automation investments that enhanced process technologies, solutions and services
2. A Process Control core based on the widely adopted Rockwell Automation Integrated Architecture technologies for plant-wide control
3. A core system with defined performance, i.e. a “characterized” system
4. Accompanying tools and utilities that accelerate the implementation of a process automation system
5. **And,** a healthy road map of planned new features, enhancements and expansion of system capacities

Automation for the Process Industry

Field Device Integration & Asset Management

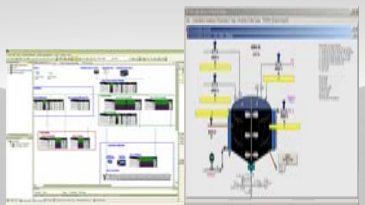
System Core

Process Information

PlantPAx
Process Automation System

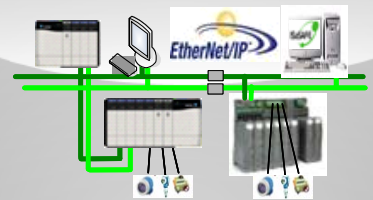
Batch Management & Control

System Tools & Utilities



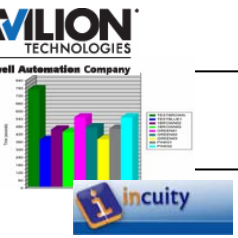
Strategic Partners

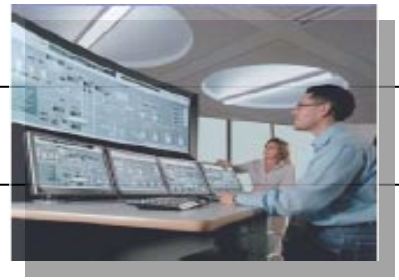
Critical Control & Safety



PlantPAx – Six Key Areas of System Development

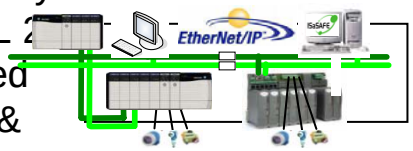
Operations Productivity
- Optimization
- Decision Support
- Historian
- Batch Mgmt.





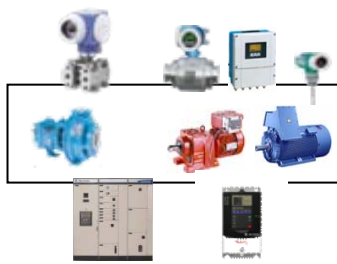
Core Process Control
- Distributed HMI
- Logix control
- System Bundle

High Availability
- Logix - SIL 2
- Integrated Control & Safety System



Design Productivity
- System View
- Process Library

Asset Management
- FT AssetCentre
- Process Device Mgmt
- FDT/DTM adoption



Field Device Integration
- E+H devices
- Metso valve
- Drives / MCC

Rich Visualization

- **Operator Effectiveness**
  - Right information, right time
  - Alarm management solutions
- **Pervasive Access to Information**
  - Displays, Alarms, Historical Trends, Batch Status, etc. via Thick, Thin, or Web-based Clients
- **Scalable, Extensible Architecture**
  - From stand-alone, single unit, industrially hardened
  - To large, distributed multi-server multi-client plant wide solutions

Coming Soon

Alarm Management

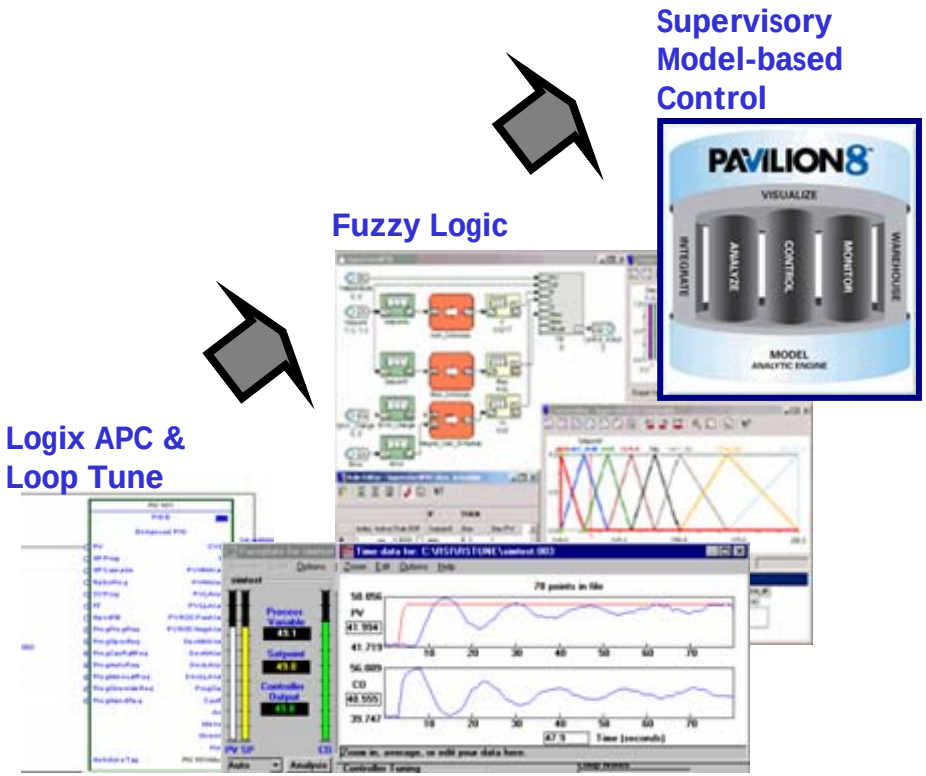
- Simple Alarm Reports
- Sub-system guidelines based on industry standards

System-wide Focus

- Additional Supported Topologies
- Continued Integration Focus

Powerful Process Control

- **Production Optimization**
  - Portfolio of Process Optimization Capabilities
  - Open & Closed Loop Auto-tuning
  - Advanced Regulatory and Unbounded Fuzzy Logic Supervisory Control
  - Linear & Nonlinear Multivariable Model-Predictive Control, Real-time Economic Optimization
- **Broad Control Platform**
  - Choice of controller & I/O offerings – mix & match – choose the right solution
- **Multiple Control Disciplines**
  - Continuous, Batch, Discrete, Motion, Safety, Drive Control – One Platform
  - Function Block, Sequential Function Chart, Structured Text, Ladder Logic



Ongoing focus…

- Configuration Enhancements for improved modularity & reuse
- Additional platforms – put more in a single controller, or pick smaller controllers & distribute your system

Process Visualization Bundles

Current Focus

PlantPAx PASS
Process System Server

- *Visualization Server Software*
- Server Computer Hardware

PlantPAx OWS
Operator Station

- *Visualization Client Software*
- Workstation Computer Hardware

PlantPAx EWS
Engineering Workstation

- *Typically Required Engineering Software*
- Workstation Computer Hardware

Pre-package system software on PC hardware to reduce project risk

Automation for the Process Industry

Field Device Integration & Asset Management

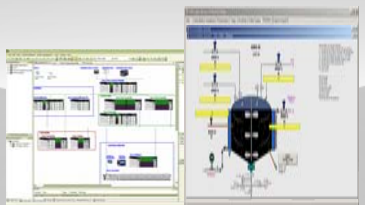
System Core

Process Information

PlantPAx
Process Automation System

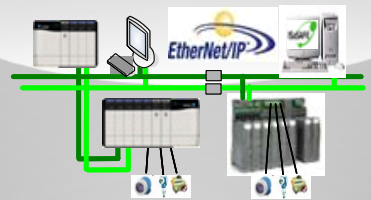
Batch Management & Control

System Tools & Utilities



Strategic Partners

Critical Control & Safety



Critical Control & Safety

Summary

- Maintain control of critical processes to prevent dangerous hazards
- Protect assets, production and equipment

Key System Areas

ControlLogix Redundancy:

Transparent, automatic, fast and bump-less

ControlLogix SIL 2:

Common components and tools for both process control and safety

ICS Triplex SIL 3:

Highest availability and fault tolerance with Trusted TMR and scalability with AADvance

- Logix Redundancy Extensions
- Enhancements to ControlLogix SIL 2
- Integration of ICS Triplex Technology

A Continuum of Fault Tolerance and SIL Options

ICS Triplex Critical Control & Safety

Trusted TMR SIS

- Highest available SIL 3 fault tolerance
- "Never have to stop"

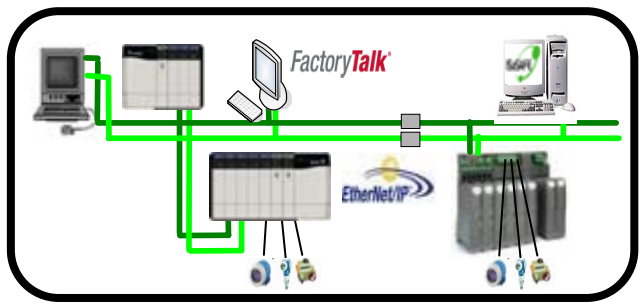
AADvance SIS

- Scalable modular safety system
- Configurable to meet a range of SIL and fault tolerance

1oo1 ,1oo2, 2oo3
SIL 1, 2 or 3

SIS Integration

- OPC connectivity to View SE
- EtherNet/IP communication to Logix
- BPCS and SIS integrated to reduce TCO



Next 12-18 Months

- Implement CIP Produce/Consume in AADvance architecture
- Additional I/O Offerings
- Transport of ICS Triplex technologies into Logix

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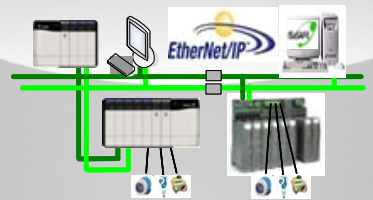
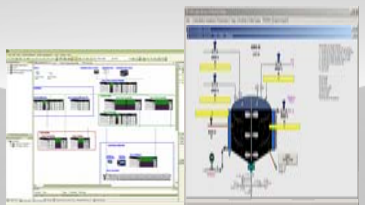


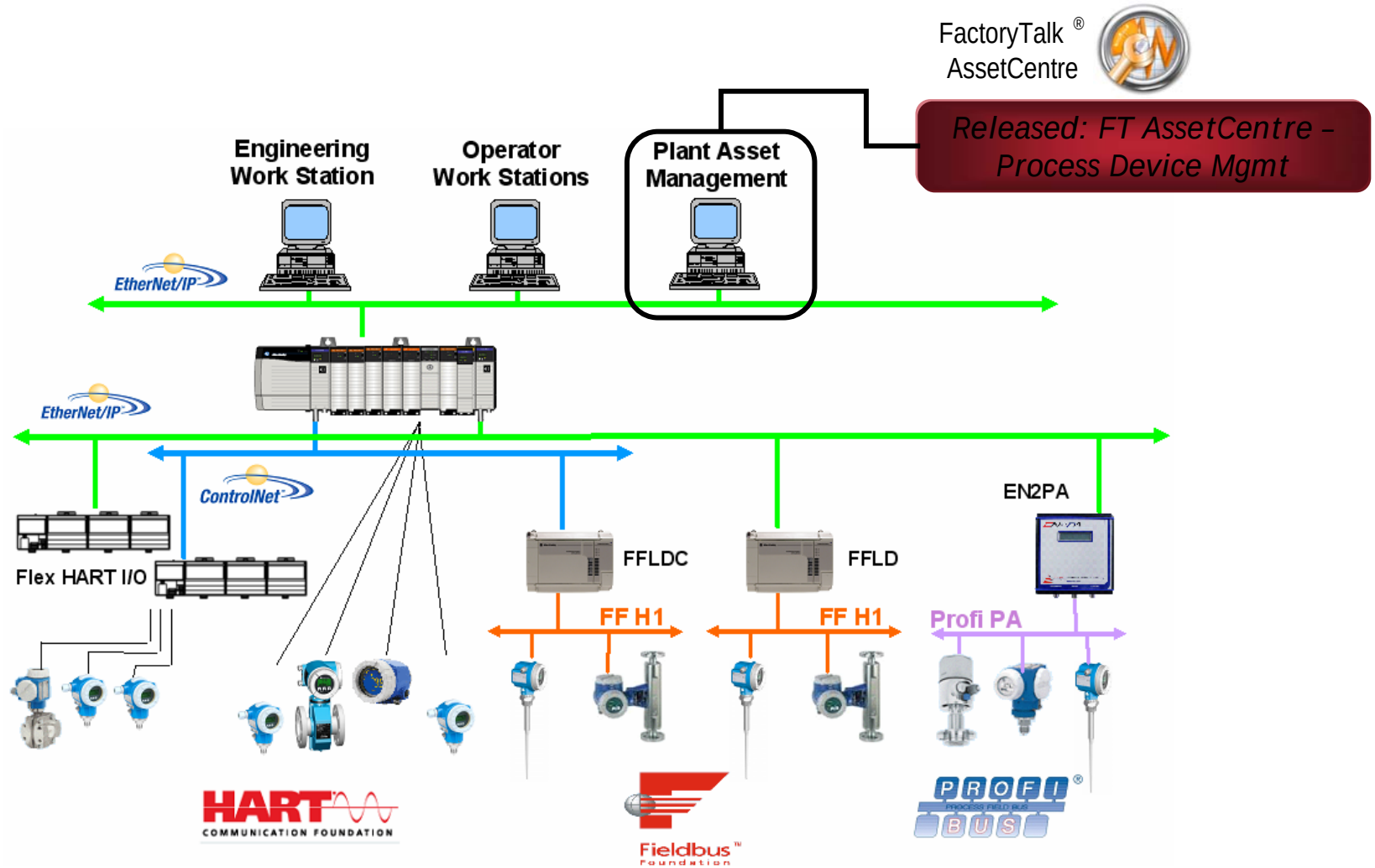
System Tools & Utilities



Strategic Partners

E+H
OSIsoft.
cisco
Matrikon
TiPS INCORPORATED

Field Device Integration



Preferred integration with E+H process instruments

Process Network Connectivity & Asset Management

Summary

- Intelligent process devices for greater process & diagnostic coverage
- Increased knowledge about production assets turned into action to improve plant financial, environmental & safety performance

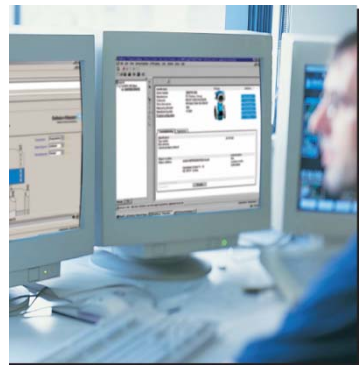
Key System Areas

Process Network Integration:

- Simple integration of information rich process devices using HART, Fieldbus Foundation and Profibus PA

Asset Management:

- Common components and tools for both process control and asset management
- Lower Total Cost of Ownership (TCO) of Process Automation assets such as process instrumentation and system configuration



Coming Soon

- Additional Logix HART I/O options
- Higher availability fieldbus solutions
- Increased scope of asset management

Standardized integration of Process Devices and Increased Plant Performance with Asset Management

Process Network Integration

Reduce installation and startup time with wide support of HART and process instrumentation fieldbus technologies

Best In Class

- **Application based process network selection**
  - **HART**
    - All the benefits of digital communication without loosing the simplicity of analog
    - Control with all 4 process variables without additional configuration
  - **Foundation Fieldbus and Profibus PA**
    - Linking Device architecture for maximum flexibility
    - Plant-wide connectivity via EtherNet/IP

HART COMMUNICATION PROTOCOL

PROFIBUS

FOUNDATION

⇨ *Meeting application specific demands*

Device Integration Tools

- **Collaboration with Endress+Hauser**
- **Step-by-step integration documentation, pre-engineered controller code, and pre-configured operator faceplates**

⇨ *Faster system engineering & reduced risk for projects of all sizes*

Next 12-18 Months

- **High Density ControlLogix HART I/O**
- **Redundant Foundation Fieldbus H1 Interface**

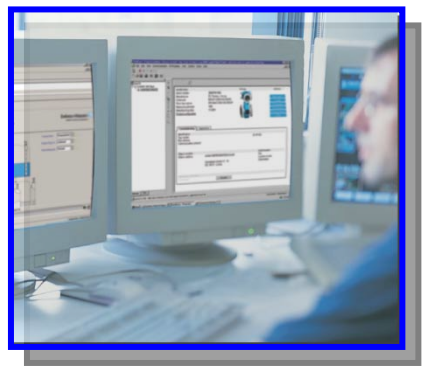
Asset Management

Increase plant availability using a single architecture for plant-wide process automation and asset management

Device Management

- **Management of intelligent process instrumentation throughout the lifecycle**
- **Process device calibration records management from handheld to archive**

⇨ *Increase operational efficiency to reduce costs and increase compliance*



Condition Monitoring

- **Predict or prevent impending failures of process instrumentation with centralized device information**

⇨ *Increased on-spec process uptime*

Change Management

- **Safe, secure, and versioned storage of configuration information**

⇨ *IP protection, traceability & disaster recovery*

Next 12-18 Months

- **Change Management for Smart Device Configuration**

Automation for the Process Industry

Field Device Integration & Asset Management

System Core

Process Information

PlantPAx
Process Automation System

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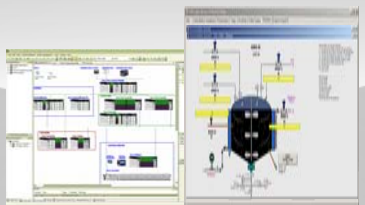

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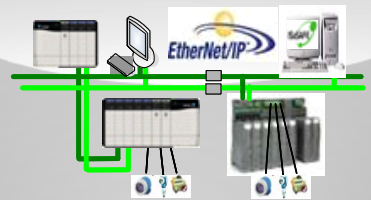
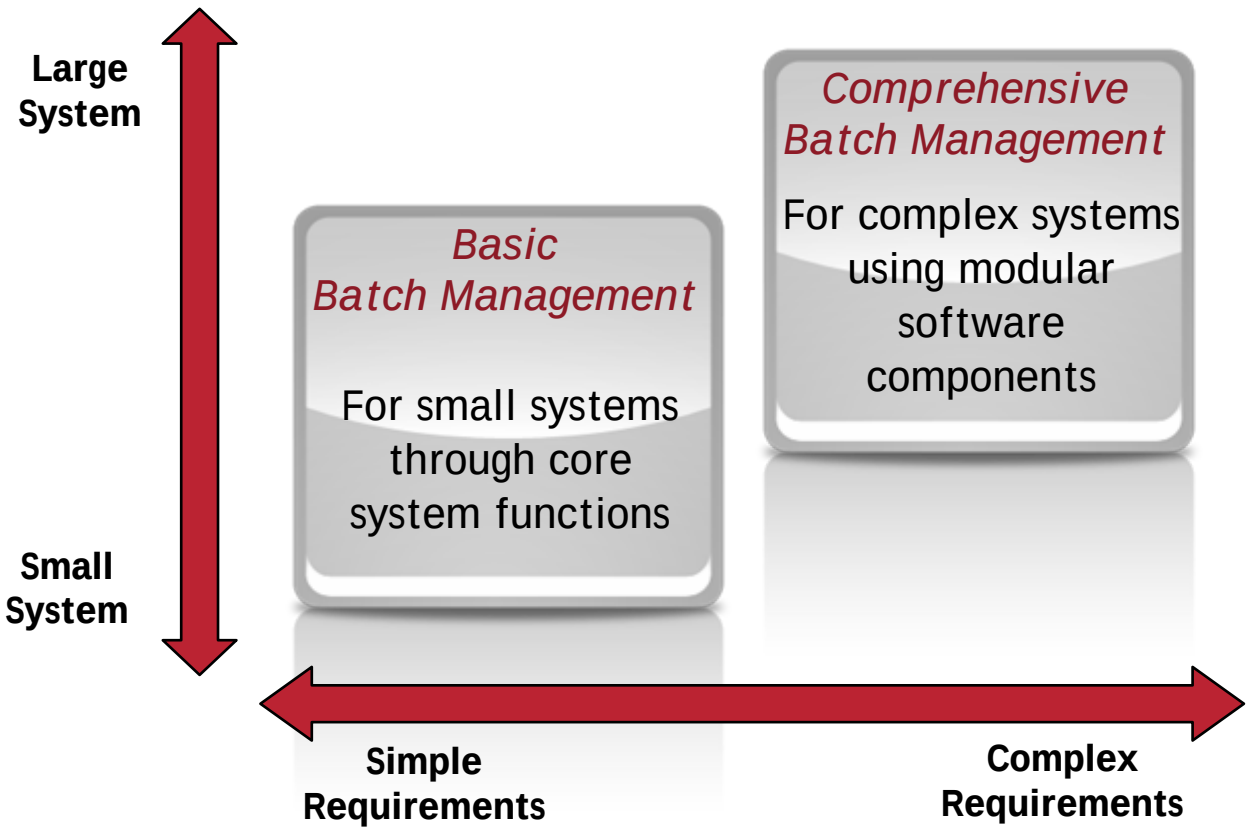
Critical Control & Safety

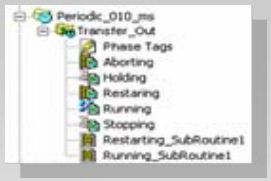


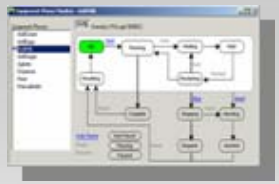
Batch Management & Control

- Scalable solutions to meet a wide range of batch requirements
- Improve yield, increase throughput, reduce costs, and improve quality



Basic Batch Management & Control





Logix-Based Sequencing → **Can Scale To** → **Logix-Based Batch**

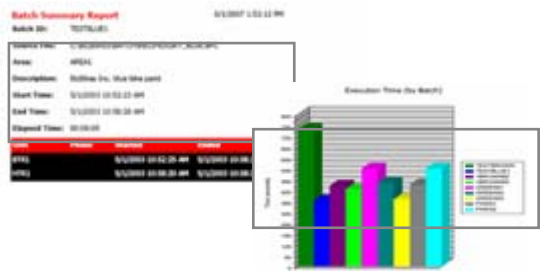
- Solve simple sequencing needs through standard controller functions
- Provide complete batch management local to controller

- Logix-based batch management & control application
- Small batch system characterization

Basic solutions allow you to start small and expand if needed

Comprehensive Batch Management & Control

- **Software-based Batch**
  - Batch Mgmt, Manual SOP's, Material Mgmt
  - Enable flexible mfg, product consistency, & regulatory compliance
- **Web-based Reporting**
  - Reduce engineering with open source templates
  - Provides batch queries, detail, T&T, material usage, and exception reports
- **Integrated Batch Visualization**
  - Reduce engineering with pre-built HMI graphics
  - Includes user manuals and code examples



- **Distributed batch management & control**
- **Historical batch analysis**

Comprehensive capabilities enable you to meet your demanding requirements

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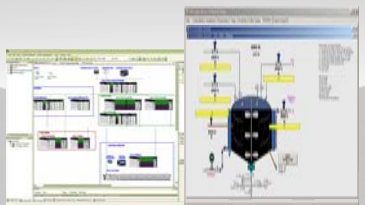

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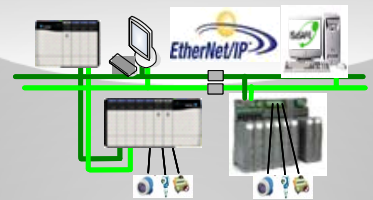


Process Information

• Decision-making tools and dashboards that help provide real-time access to & analysis of process information throughout the enterprise

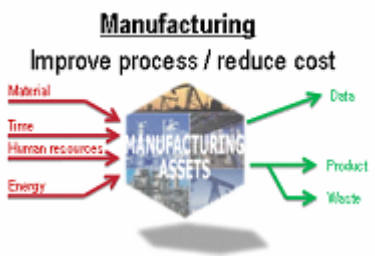
⇨ *Turn data into information with PlantPAx process information.*
Information for the right user at the right place at the right time.

Historical Data

- **Distributed data collection**
  - Effectively collect and verify contextual process data
- **Storage Management**
  - Provide reliable and efficient data storage with easy access

Decision Support

- **Comprehensive view of plant operations**
  - Provide easy access to KPI's that enable better business decisions
- **Presentation, analysis, and reporting**
  - Manage cost, quality, production, assets & resources more effectively



- **Enterprise manufacturing intelligence**
- **Distributed historian architecture**

Plant PAx System Characterization – Standardizes Capacity and Ensures Optimal Performance

Distributed System - Tested

- Process Areas: 4
- Clients: 32
- Control Loops: 6000
- Controllers: 50
- Points: 50,000
- ms: 80,000

Critical System Attributes

- Display Update: < 1 sec
- Steady State Alarms: > 20/sec
- Alarm Burst: < 3 sec/1000 alarms
- Alarm Resolution: 1 sec timestamp
- Keyboard Entry: < 1 sec to controller
- Control Loop Closure: <100msec

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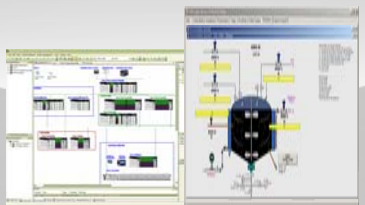

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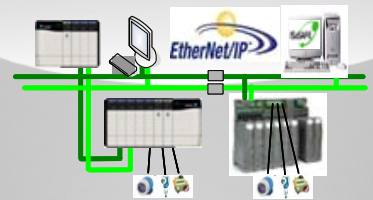
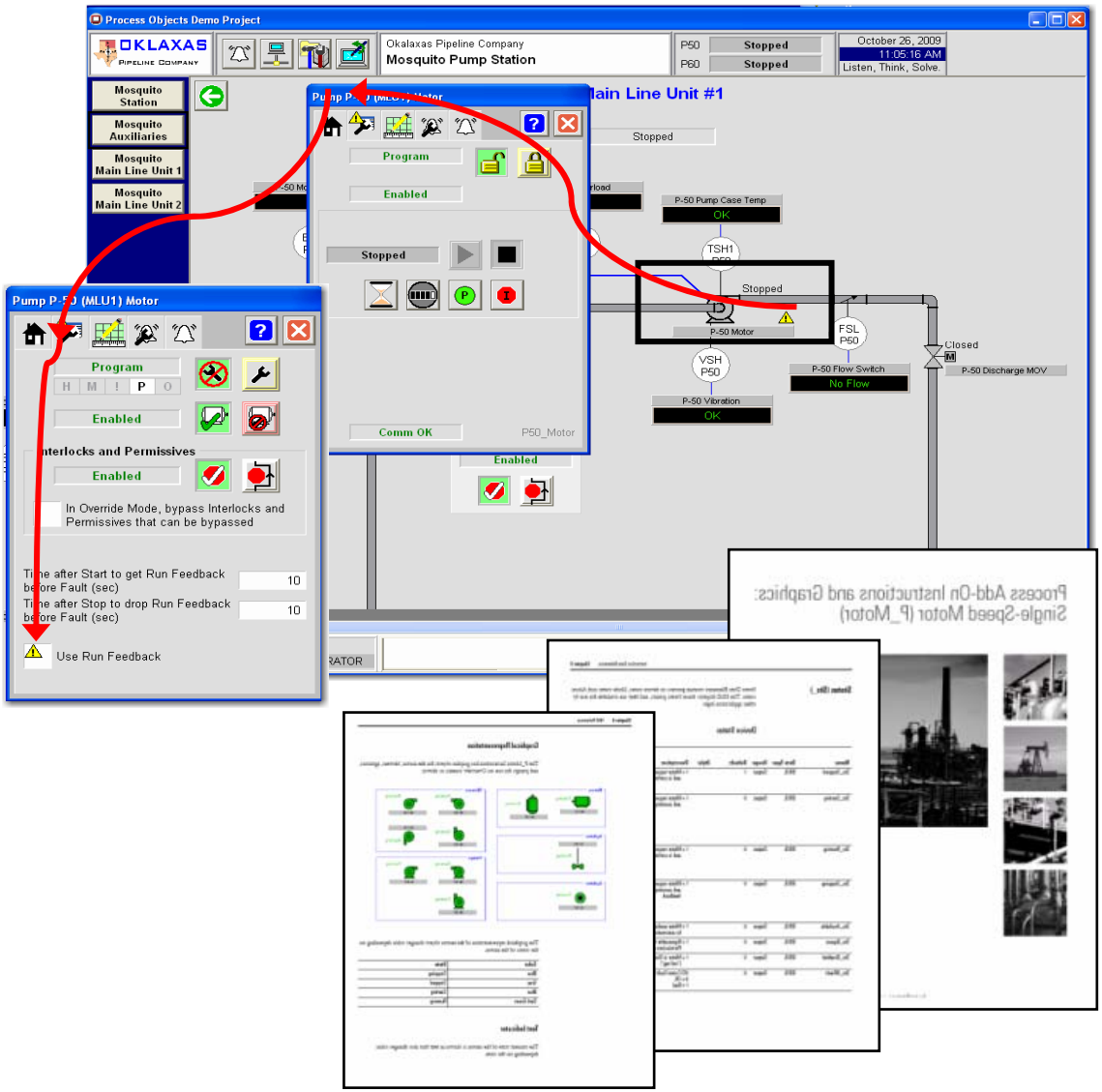


System Tools and Utilities

- In support of Design & Development the Rockwell Automation PlantPAx system comprises:
  - **A Process Device Library** of Logix Add-On Instructions and View faceplates for commonly used process devices
  - Logix Add-On Instructions, View faceplates and Documentation that simplify the integration of **Endress+Hauser HART** instrumentation with PlantPAx Process Automation System
  - And….a suite of utilities to help **convert** legacy **DCS platforms** to PlantPAx Process Automation System

Reusable Library for Design Productivity



PlantPAx Standard Library

- Suite of Control & HMI objects to accelerate project engineering
- Built-in troubleshooting features
- Value-added “bread crumbs” for operators

Gaps closed vs. Emerson & Siemens process systems

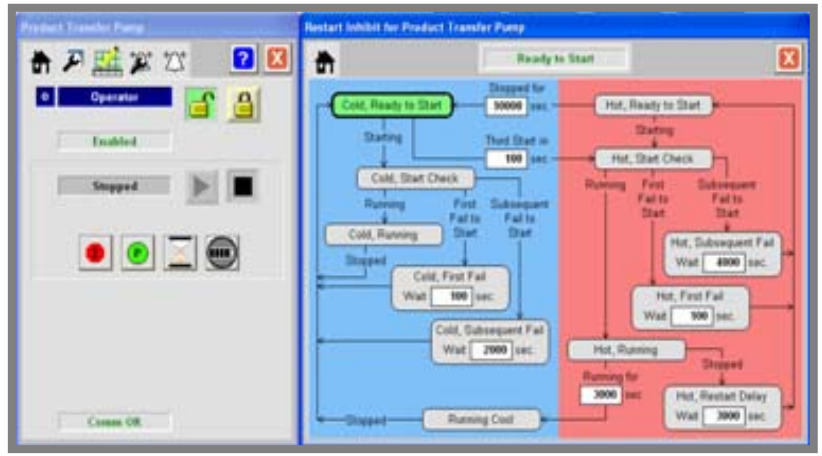
Base Process Library
A high-efficiency suite of Control Modules

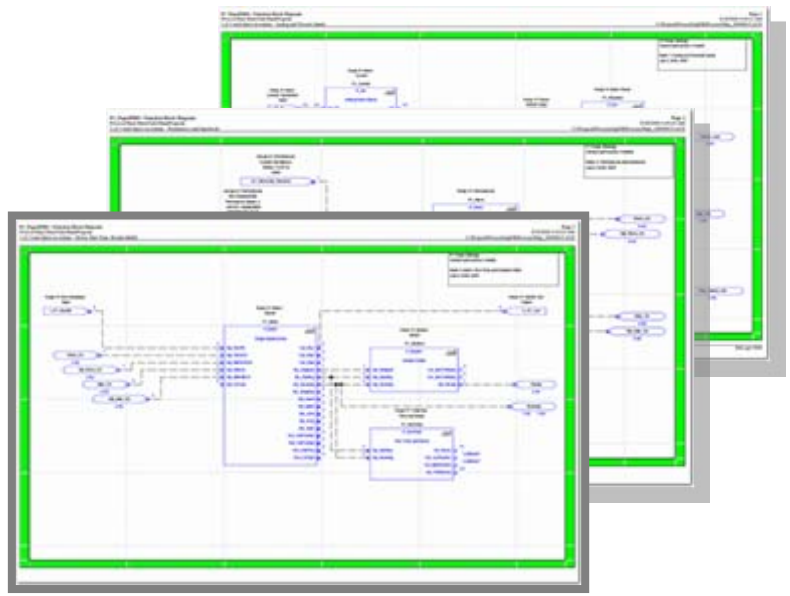
- Mode Selection
- Standard Alarm
- AI w/ Scaling & Alarms
- DI w/ Alarms
- Single-Speed Motor
- Permissives with Bypass
- Protectives with First-Out, Bypass
- Run Time and Start Accumulator
- Re-start Inhibit for Large Motor
- Date/Time Blocks

- Hand-Operated Valve Monitor
- Hand-Operated Motor Monitor
- Cascade and Ratio supported PID
- Advanced AI with High Rate of Change Alarm, Square Root Extraction, and Deviation Alarms

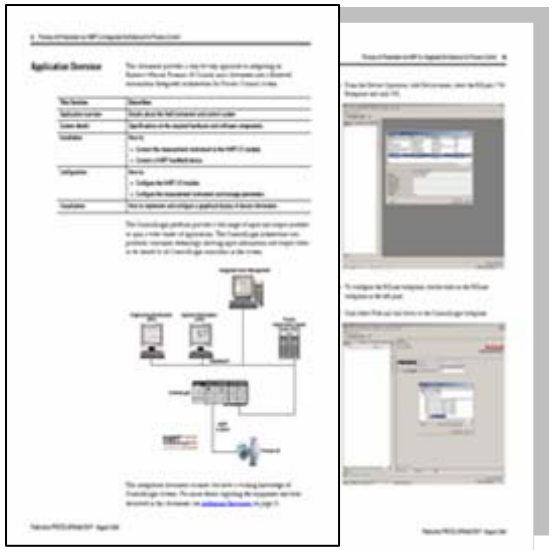
- 2-Speed Motor
- Reversing Motor (e.g., FVR)
- Pulse-Input flow meter dosing with pre-act and in-flight adjustment
- Analog-Input flow meter dosing as above
- Weigh-Scale dosing (Loss-In-Weight and Gain-In-Weight supported)
- Controller CPU Utilization

- Solenoid-Operated 2-state Valve
- Motor-Operated 2-state Valve
- PIDE-based PID with Standard Modes and Deviation Alarms
- Analog Output
- Variable-Speed Drive (e.g., PF70-style)



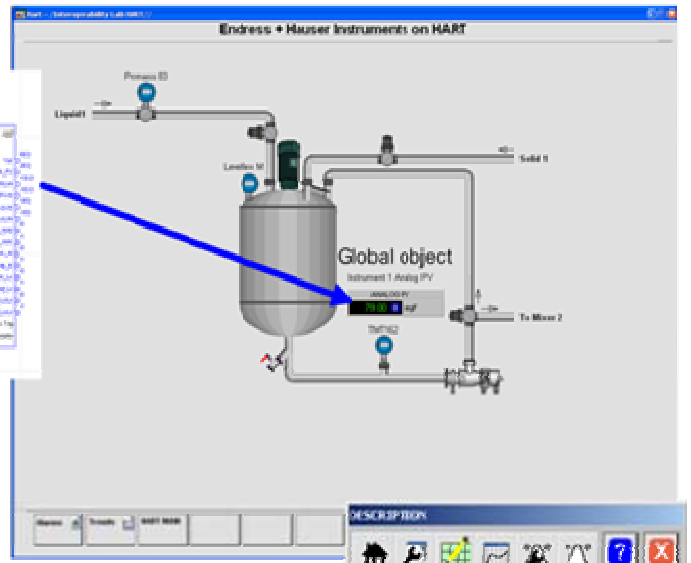


Rockwell Automation and Endress+Hauser
Preferred Integration of HART Instrumentation



Instrument Function Block

Instrument Display & Faceplates



- Documentation for setup and operation
- AOIs for 2-way exchange of data between View and ControlLogix
- View faceplates for instruments connected to ControlLogix HART I/O

Click on global object

Integration of E+H fieldbus instruments in progress…

Example DCS Platforms

DCS Platform	Dominant Industries	Typical Age of System	Key RA Value
Bailey	• Power • W/WWT • Mining	• 25 – 30 years	• **In-chassis (1756) dedicated interface cATM-BLY90**
PROVOX	• Spec Chem • Life Science • Metals	• 20 – 25 years	• **In-chassis (1756) I/O Scanner for S10/S20 I/O**
Honeywell TDC 2000, 3000, IPC, PIScape	• Metals & Mining • Pulp & Paper • Oil & Gas	• 25 – 30 years	• **In-chassis (1756) I/O Scanner for IPC620 Serial I/O**
FOXBORO Foxboro IA	• Power • Pulp & Paper • Oil & Gas	• 20 – 25 years	• Nosecone Adapter Cabling Solution for FBM100 Series I/O

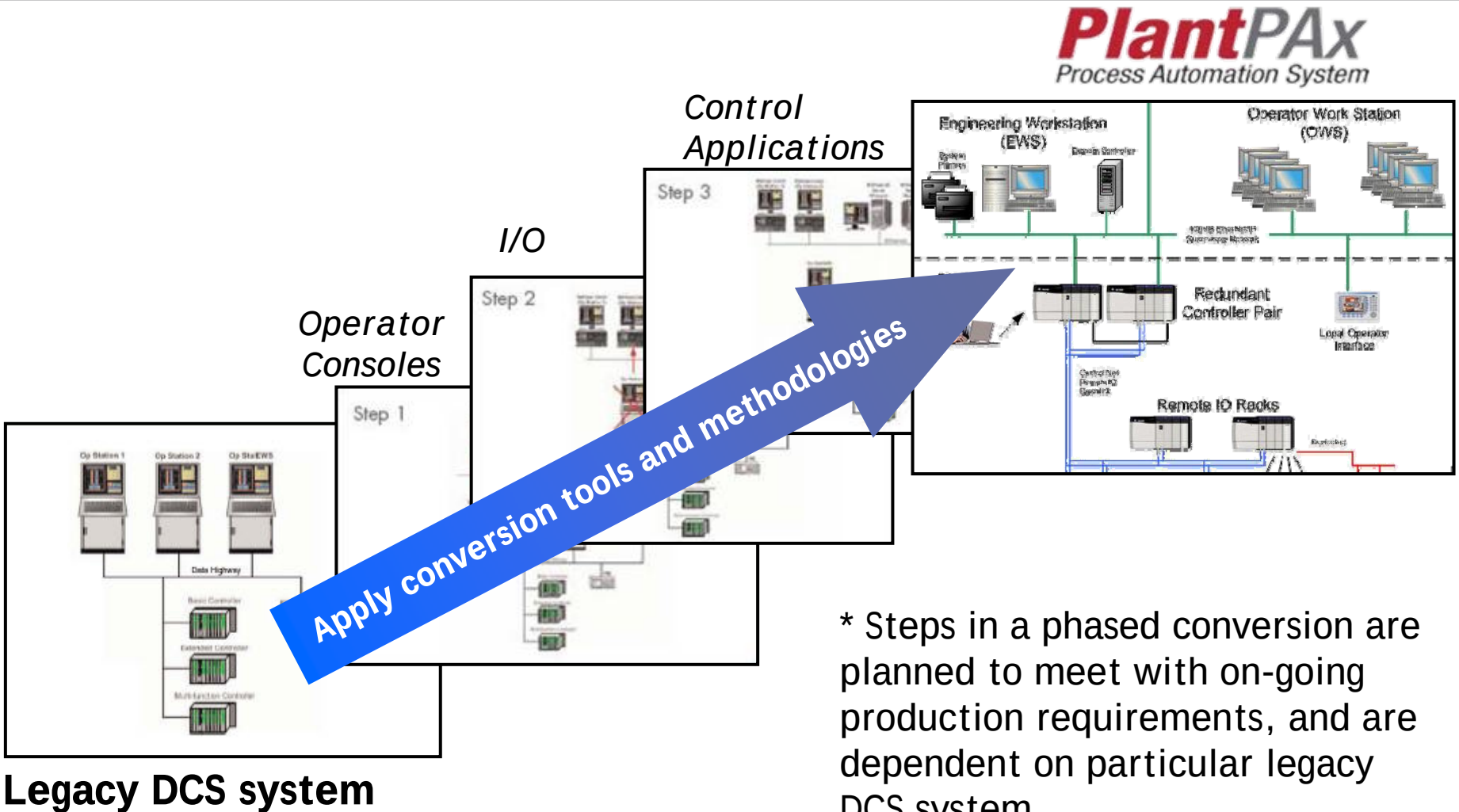
Why Migrate?

- “Our control system is obsolete and needs to be replaced.”
- “Any interruption in production is an interruption in revenue. We cannot afford a shutdown… unplanned or extended scheduled”
- “We cannot simply rip and replace. We need a migration plan that will minimize downtime and meet our budget constraints.”

20 Year Total Cost of Ownership Analysis

- Service Support Contracts
- Extended Warranty
- Spare Parts or Parts Management Agreements
- Client Maintenance and Support Personnel Costs
- 3rd Party Engineering/Configuration/PM Costs (Hourly Rates)

Example of Phased Conversion Project



* Steps in a phased conversion are planned to meet with on-going production requirements, and are dependent on particular legacy DCS system

Phased conversions minimize production interruptions

Outline

1. PlantPAx – Responding to Industry Challenges
2. Key Areas of Functionality
   - System Core
   - Critical Control & Safety
   - Field Device Integration & Asset Management
   - Batch Management and Control
   - Process Information
3. System Tools & Utilities
4. Services and Training

A Full Suite of Support Services

Providing services throughout the production process that are focused on maximizing productivity, improving financial performance, and optimizing assets.

Breakdown

- Replacement Parts
- Remanufacture/Exchange
- Callout
- Phone/Internet Supp

Consulting

- Maintenance
- Network/Security
- Energy
- Safety

Filling the Skills Gap

- Preventative Maintenance
- Training
- Network Design
- Embedded Engineer

Management and Monitoring

- 24x7 Remote Monitoring
- MRO Process Management
- Storeroom Management
- Condition Monitoring

PlantPAx System Architecture