Intelligent Motor Control

Tell me more about...

- Rockwell Automation
- Integrated Architecture
- Rockwell Automation Services
- What is Intelligent Motor Control?
- What is Premier Integration?

Motor Control Issues

Select from menu below:

1. Motor Protection – Overload Condition
2. Motor Protection – Underload Condition
3. Process Protection – Controlled Shutdown
4. Process Change – Simplified Changeover
5. Simplified Design – Premier Integration
6. Device Replacement – Auto Configuration
7. Maintenance Support – Remote Diagnostics
8. Predictive Vs Reactive Maintenance
9. Energy Efficiency – Energy Savings
10. Integrated Safety – Safe-off Operation
11. Conventional Panels Vs Decentralised Contr

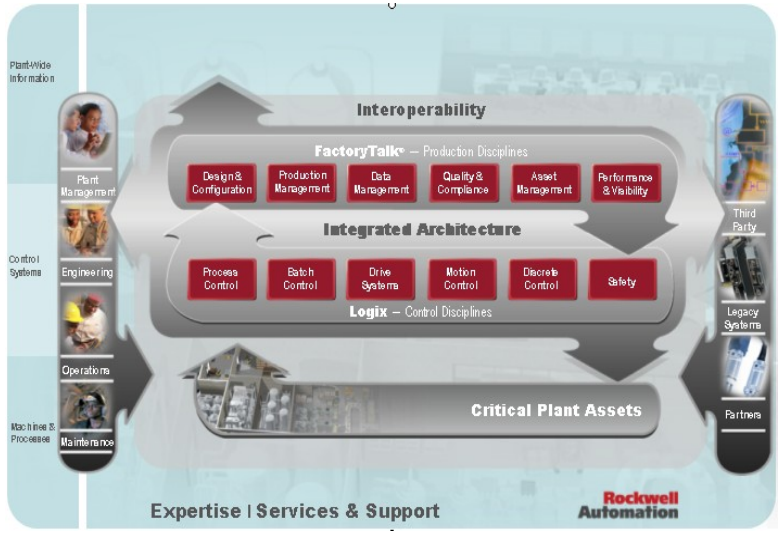
Motor Performance, Motor Protection & System Wide Communication

- **FIXED SPEED CONTROL**
  - Direct Online Starters
  - Soft Starters
- **VARIABLE SPEED CONTROL**
  - Low Voltage AC Drives
  - Medium Voltage AC Drives
  - Engineered Drive Solutions
- **MOTION CONTROL**
  - Servo Drives
  - Servo Motors

Integrated Architecture Overview

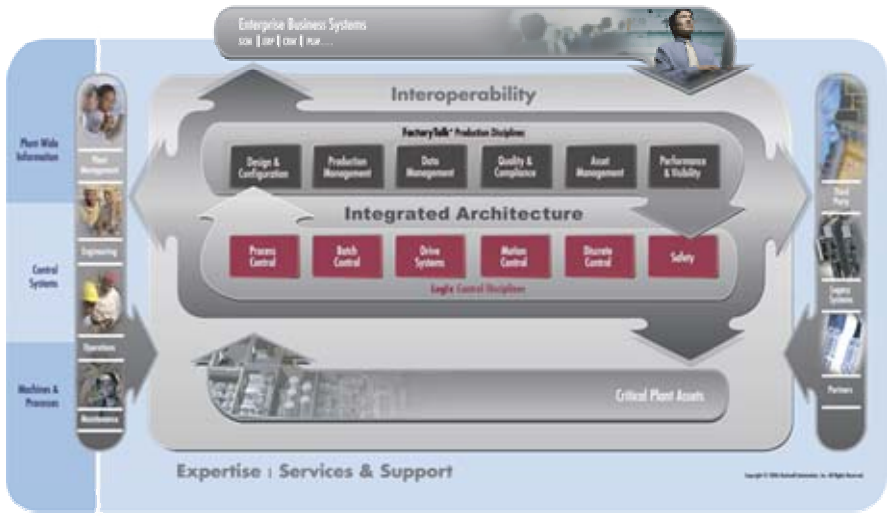
Integrated Architecture

- Single, coordinated, plant wide infrastructure for the entire range of control and production disciplines
  - Single platform
  - Multidisciplined
  - Scaleable
  - Information-Enabled
- Real-time, enterprise-wide information exchange for business decisions that
  - Improve responsiveness
  - Increase productivity
  - Reduce costs
  - Assure regulatory compliance
  - Keep control of employees safety
- Integrate anything from a single new machine to a full divisional system quickly, easily, seamlessly and cost-effectively



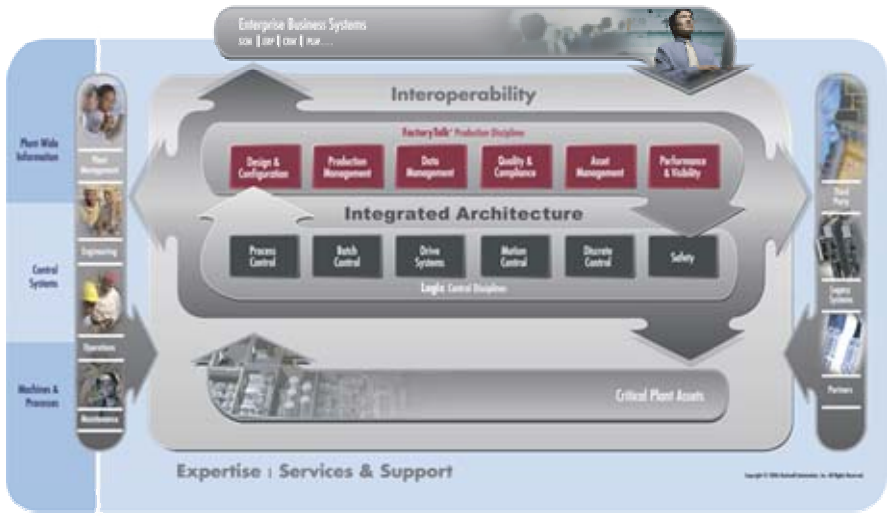
Integrated Architecture Logix Control Platform

- Logix Control Platform:
  - Delivers cost, productivity, flexibility and quality benefits throughout the entire life cycle
  - Is multidisciplined, providing fully integrated, scaleable solutions for the full range of automation disciplines
  - Is Information Enabled and can be easily integrated with a customer's information system
  - Fully integrated with the FactoryTalk integrated production management and performance suite
  - Simplifies data collection and integration with higher-level information
  - Is scalable and available in a wide range of control, network and visualisation functionalities and sizes
  - Has a single programming and configuration software package



Integrated Architecture FactoryTalk

- FactoryTalk Production Management and Performance Suite:
  - Is a common suite of modular, integrated production performance applications and related services
  - Provides a flexible application development framework, common user interface and industry-standard data models
  - Scaleable from machine, to line, to plant to enterprise
  - Is comprehensive, delivers rich functionality across six interrelated production disciplines to support multiple industries

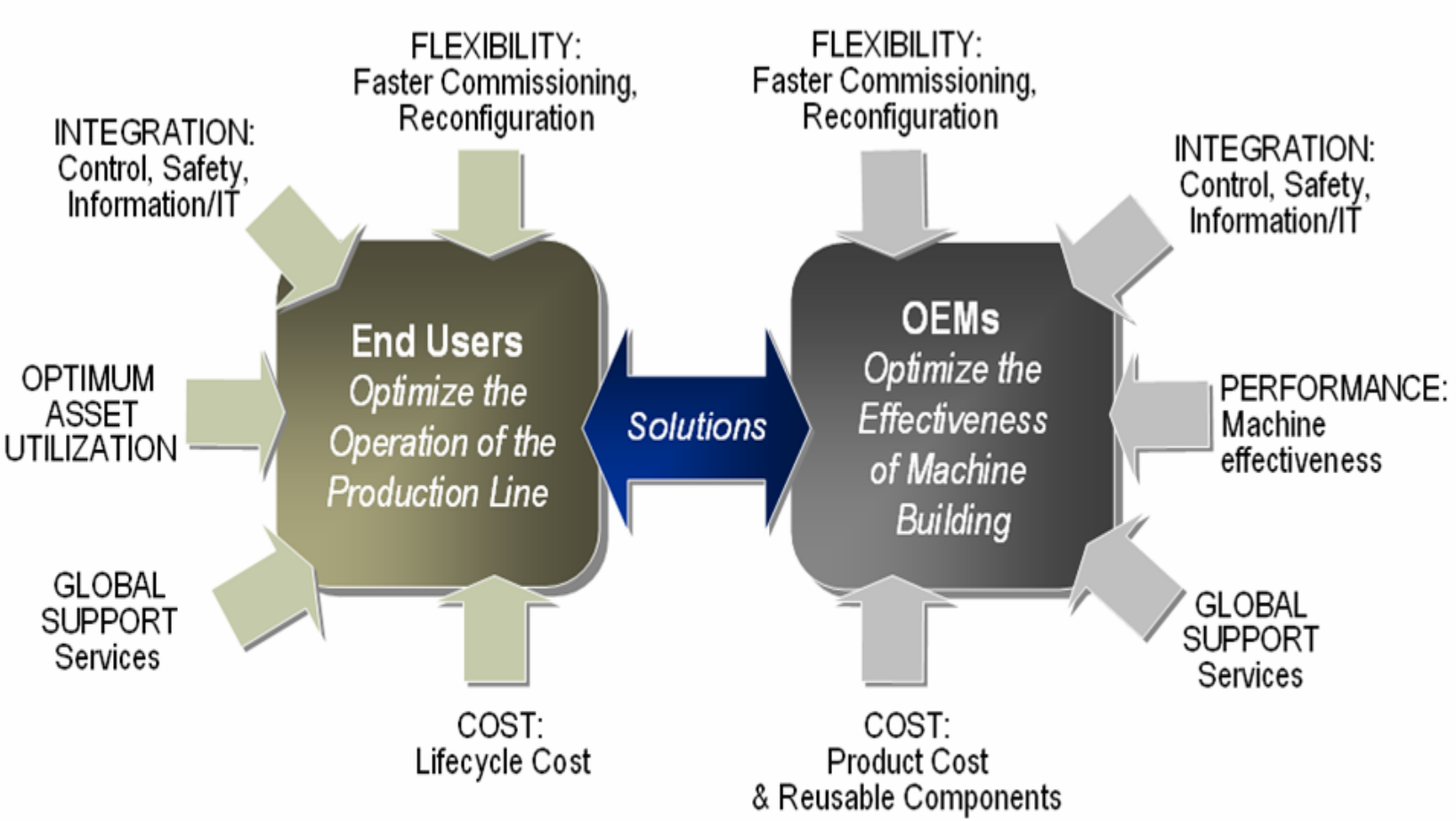


Integrated Architecture – Core Technologies

The Logix Control Platform and the FactoryTalk Integrated Production Management and Performance Suite are linked through a set of core technologies allowing seamless interaction and information flow:

- Logix: multidisciplined, information enabled and scaleable controller family
  - *reducing equipment, training and development costs.*
- NetLinx: common industrial protocol from plant floor device to IT, improving flexibility and productivity while reducing cost.
  - Control, Configure, and Collect information and data efficiently.
- View: a common, fully integrated, scaleable visualisation strategy across your whole manufacturing enterprise
  - Delivering the information you need for more effective decision-making
- FactoryTalk: flexible application development framework, common user interface and industry-standard data models
  - Premier integration and interoperability.

Manufacturing Drivers Today



Many Common Drivers for OEMs and End Users

Flexibility and Agility In Production

- Flexibility
  - Multiple Products per area or line
  - Short Production Runs
  - Meeting Delivery Requirements
- Agility
  - Rapid Product Introductions
  - Recipe Management

Production Challenge – Quality

Meet Quality Requirements in each Processing Step

- Manage Raw Material Variability
- Reduce Waste
- Consistency in Production
- Recipe Management

Production Challenge – Throughput

Increase Quantity of Product Produced from existing assets

- Production Yield
- Cycle Time
- Idle, Changeover, and Cleaning Time

Production Challenge – Operating Costs

Manufacture the products with lower fixed and variable costs

- Time to Market / Startup
- Scrap, Waste, and Rework
- Maintenance Costs
- Labor Utilization
- Utilities

Production Challenge – Regulatory Compliance

Implement systems and procedures to meet requirements of regulatory agencies

- Data Collection
- HACCP
- Tracking and Tracing

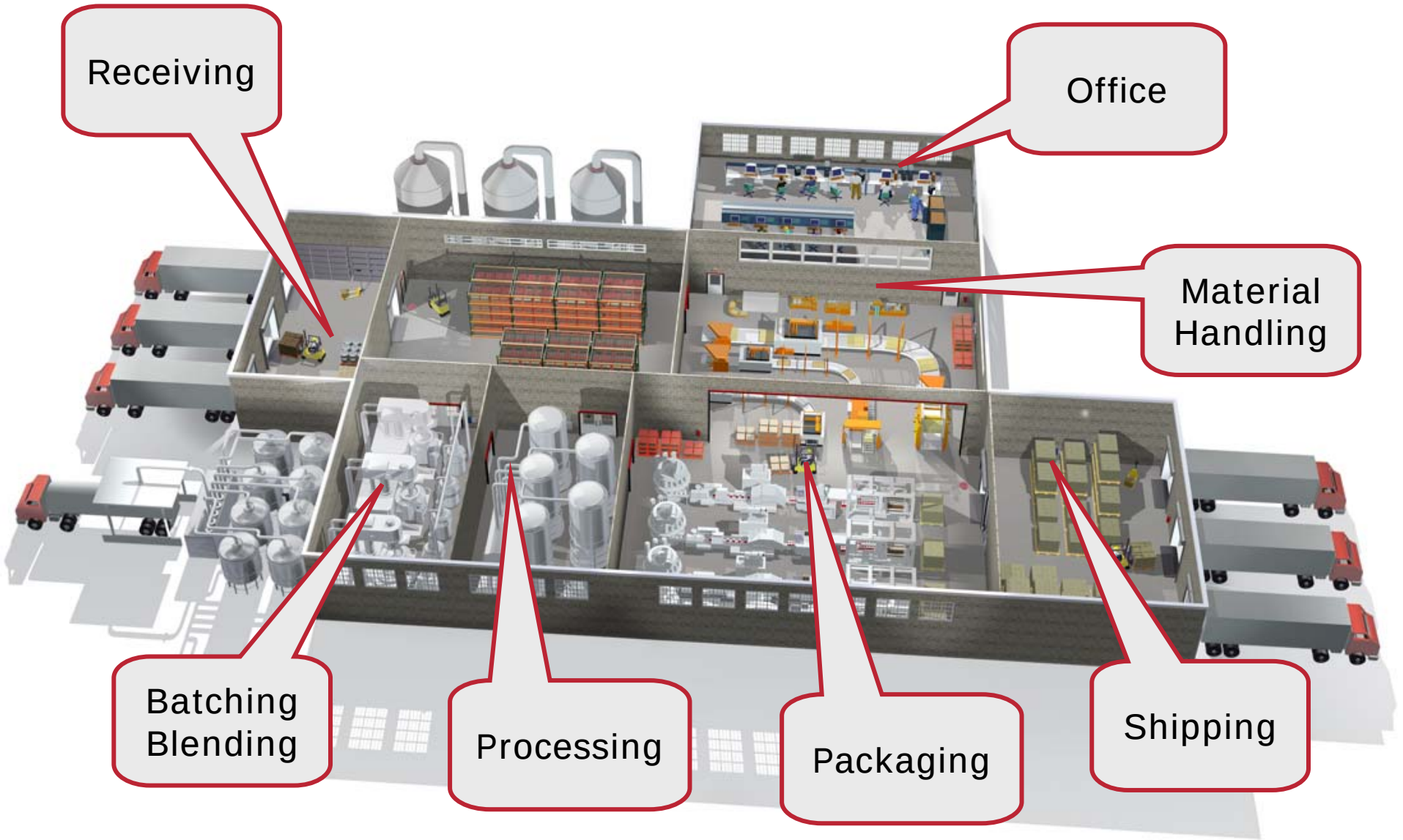
Meeting the Challenge

The underlying premise … must have's:

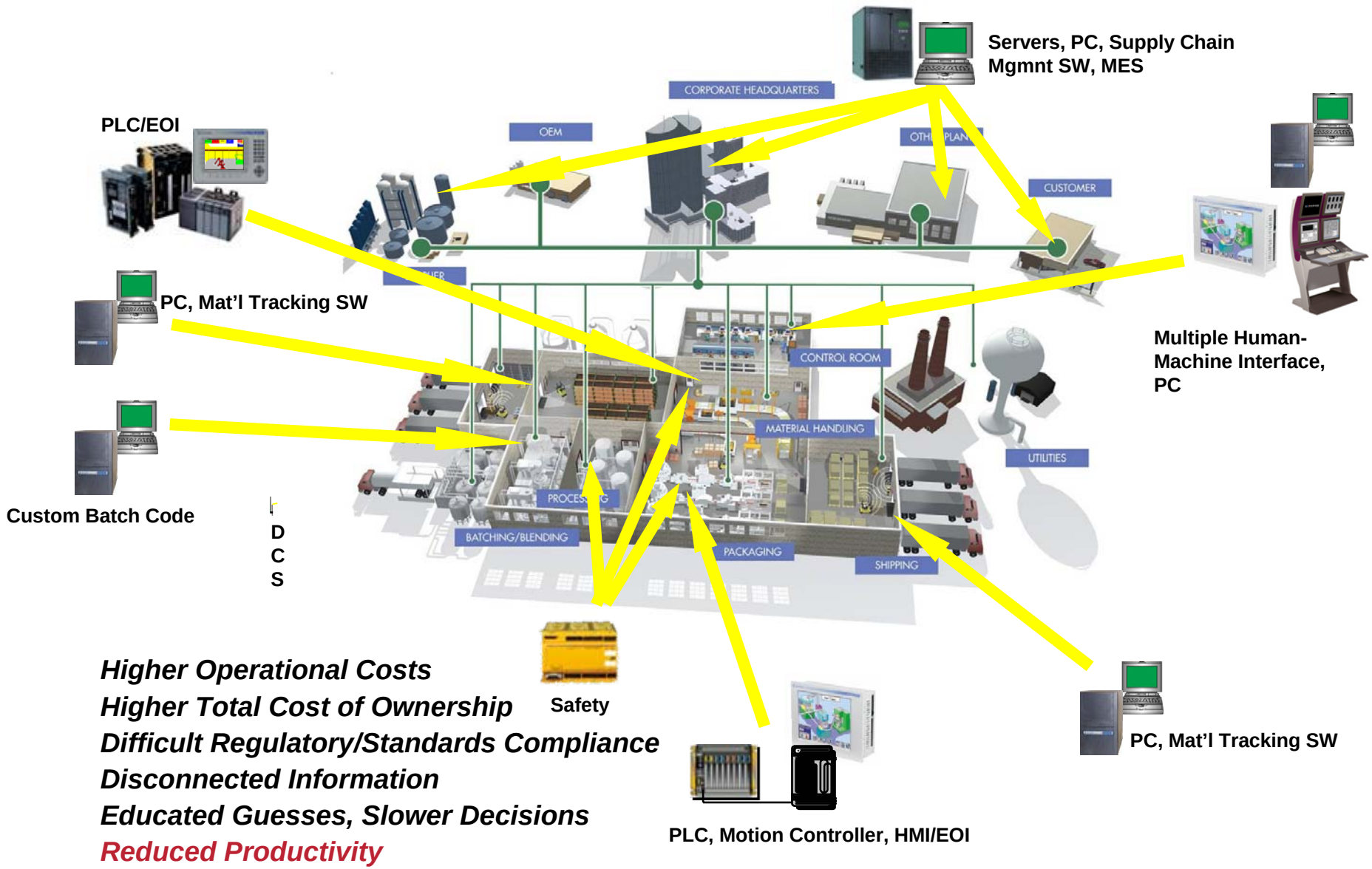
1. Agile & Efficient Plants
   - facilitate change ie; product, package size / shape, labels, etc
   - enable continuous brand innovation and renewal
   - focus on safety, quality, cost, "change"

2. "Information Management"
   - connectivity to Business systems
     - Inventory Management
     - Supply Chain Optimization
   - access all sources of info. w / in facilities, process & packaging

Typical Manufacturing Operation



Typical Plant Situation



Higher Operational Costs
Higher Total Cost of Ownership
Difficult Regulatory/Standards Compliance
Disconnected Information
Educated Guesses, Slower Decisions
Reduced Productivity

Strategy for Improving Operations

- Implement a single Automation and Information Solution that bridges the process and packaging operational areas
- Processing Area
  - Modular Batch Automation
  - Codification of the “Art”, utilising international standards
- Product Packaging
  - High Speed packaging solutions
  - Single Architecture with discrete control and motion
- Total Production Management
  - Recipe Management
  - Production Visibility
  - Process Analysis

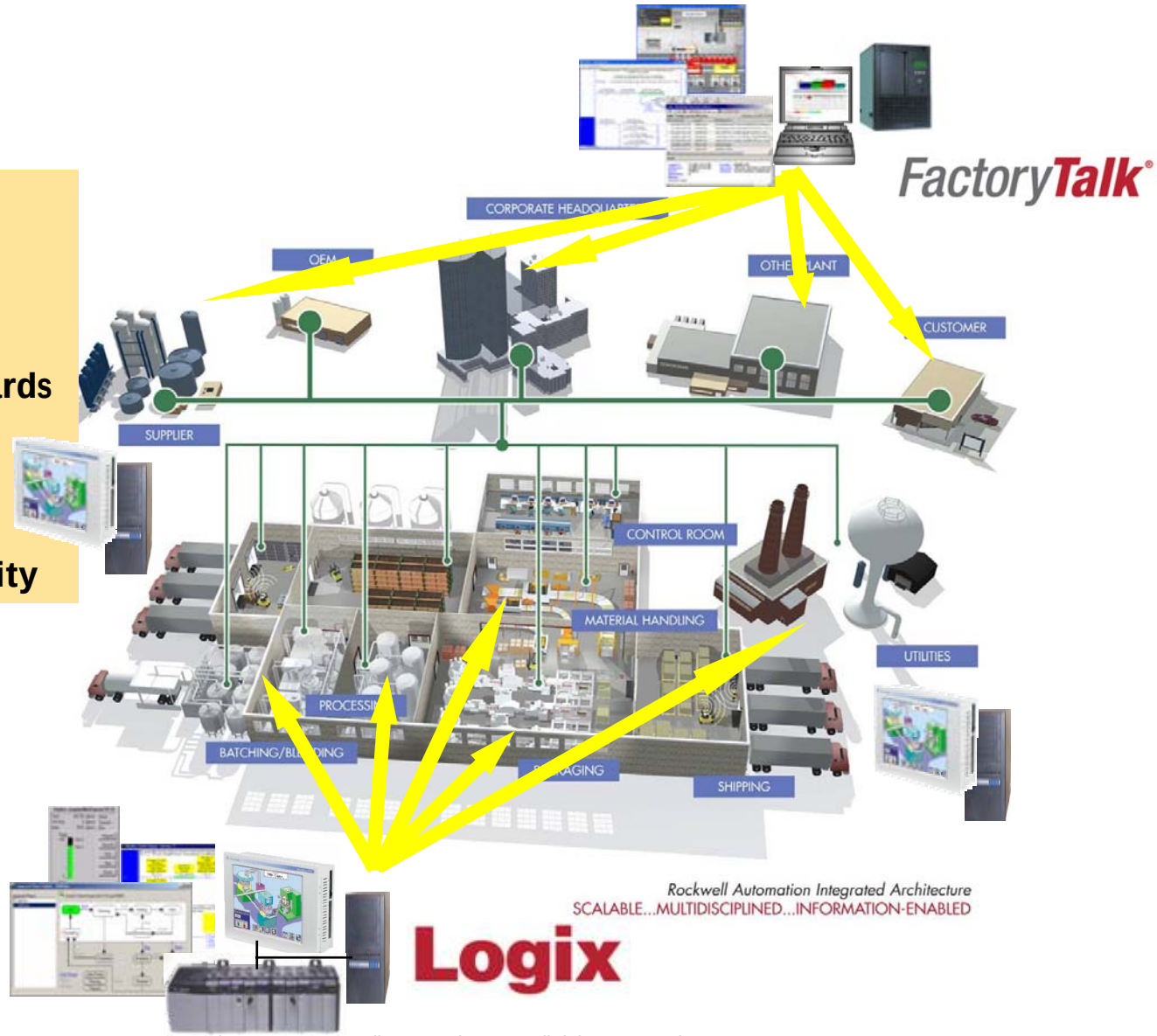
OMAC®
USERS GROUP

WBF
WORLD BATCH FORUM

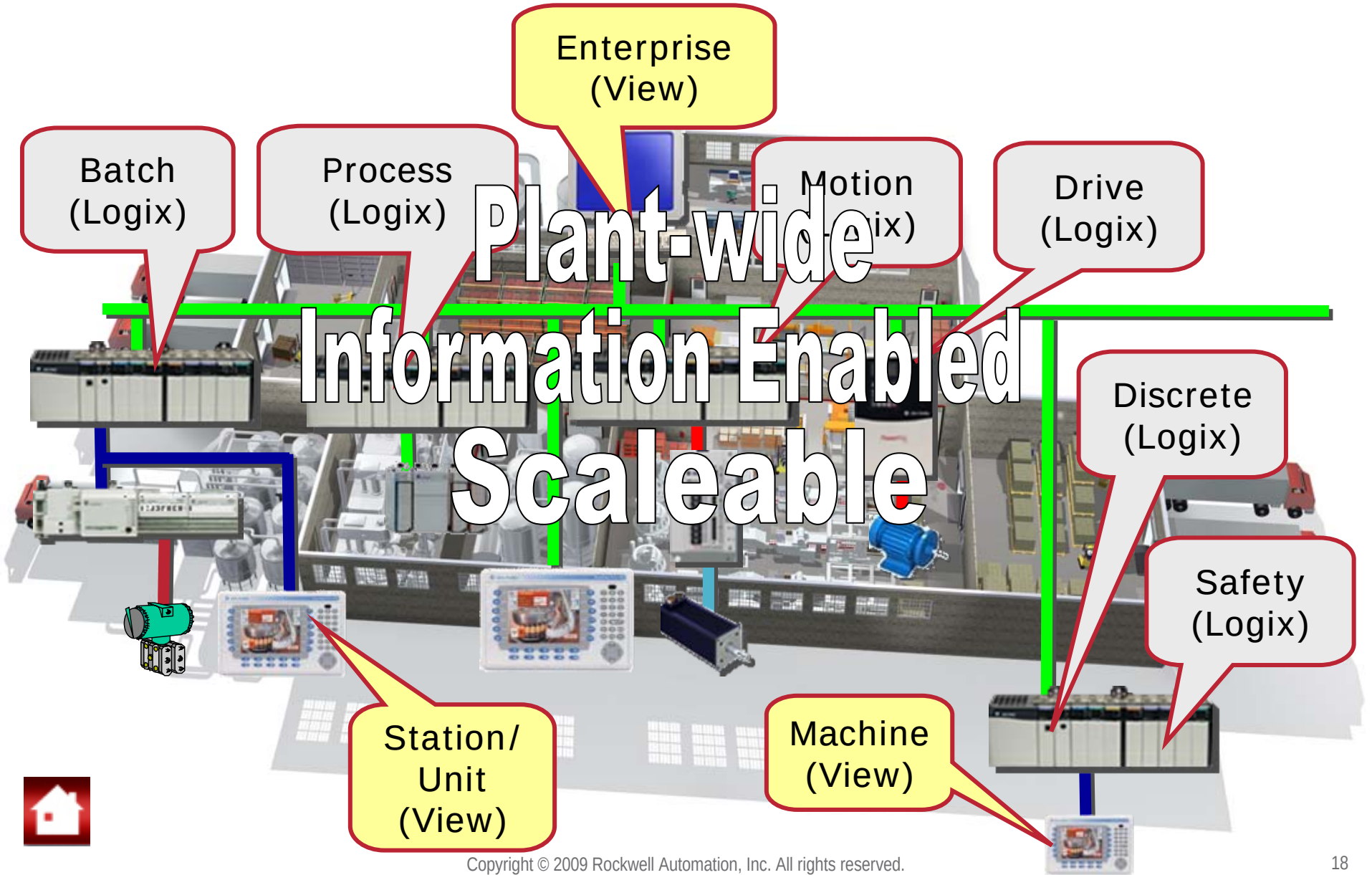
Integrated Architecture Vision

One Architecture for Plant Wide Control and Information

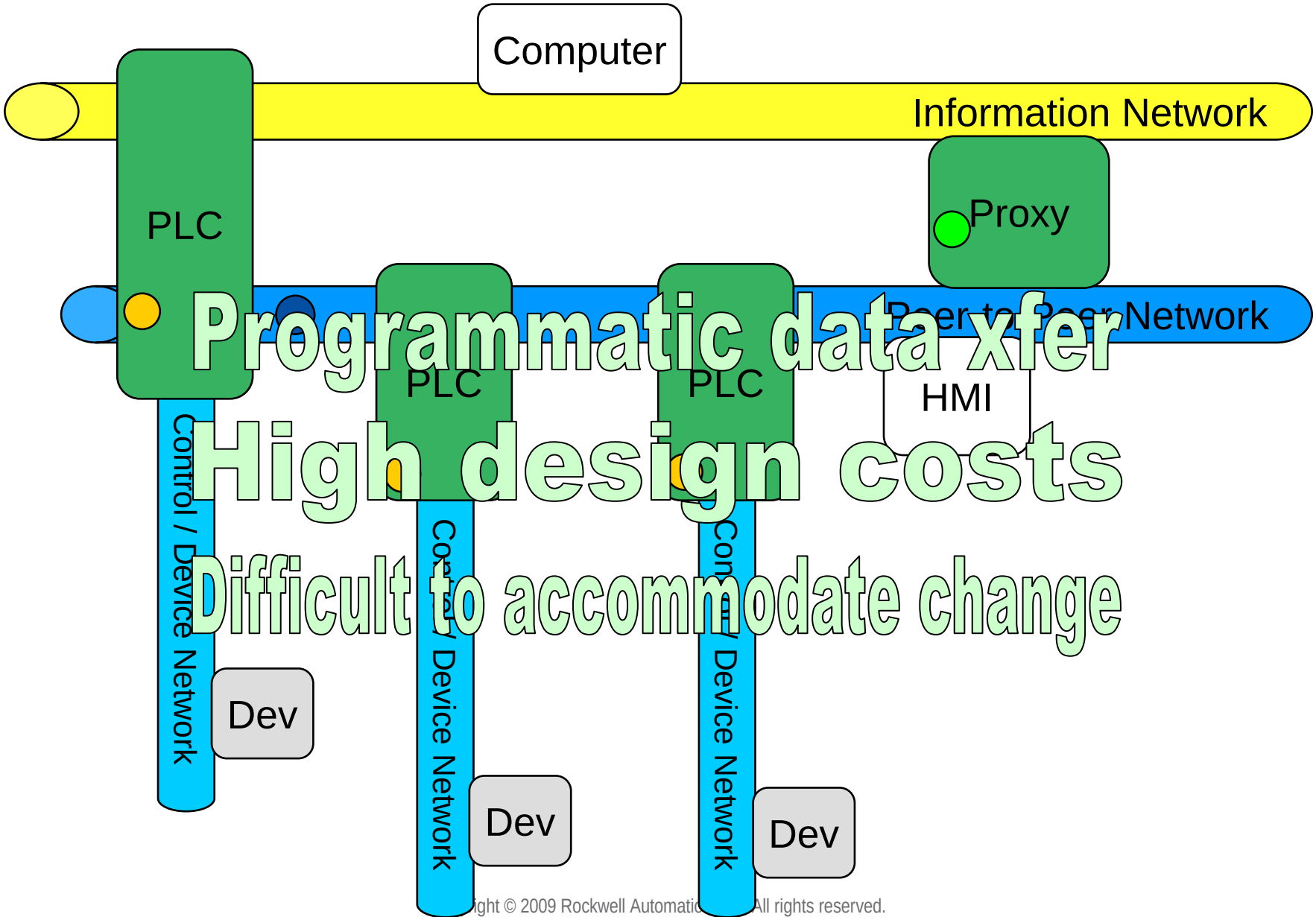
- ✓ Lower Operational Costs
- ✓ Lower Total Cost of Ownership
- ✓ Regulatory & Standards Compliance
- ✓ Better Information
- ✓ Faster Decisions
- ✓ Increased Productivity



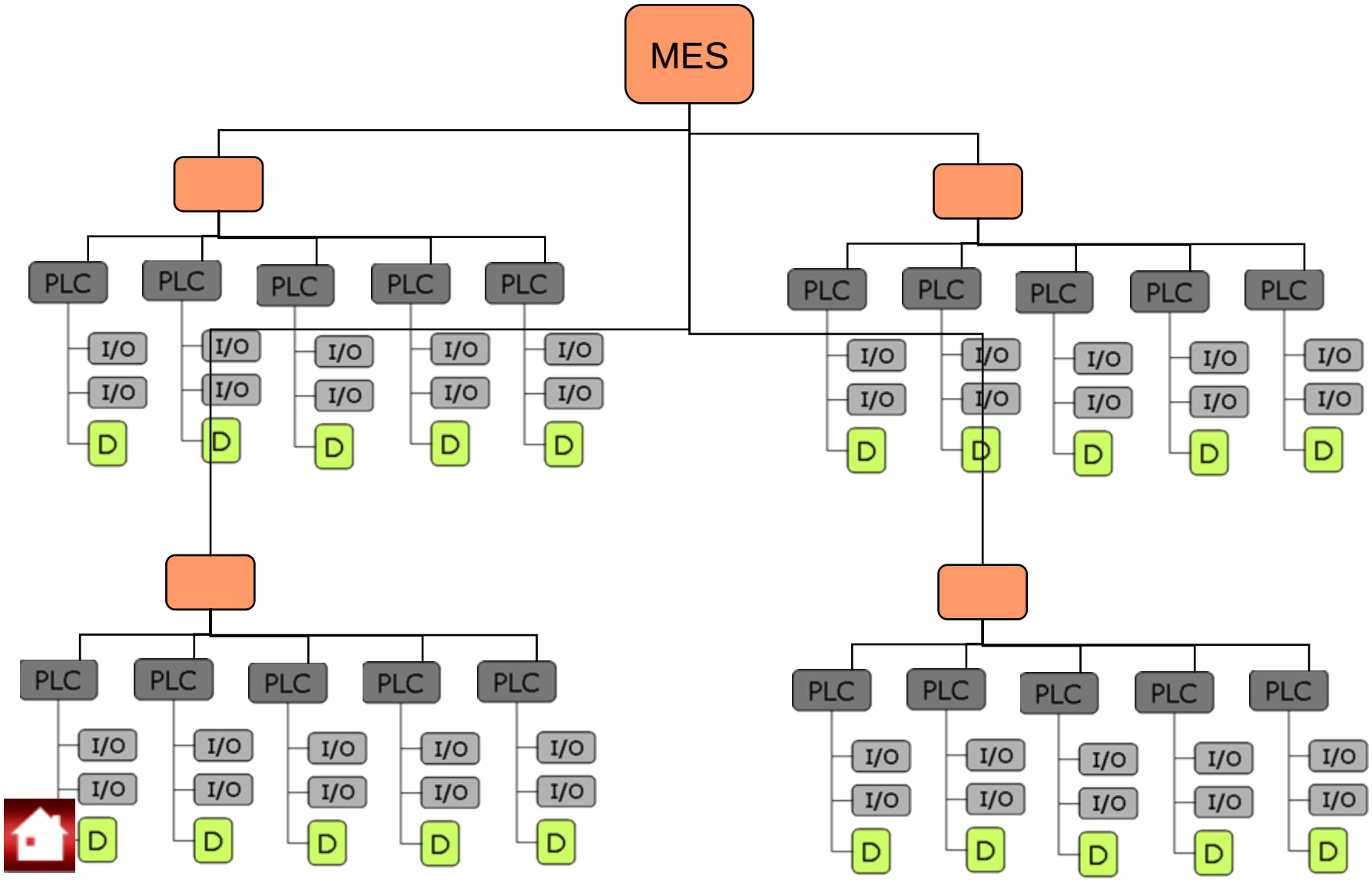
The Rockwell Integrated Architecture



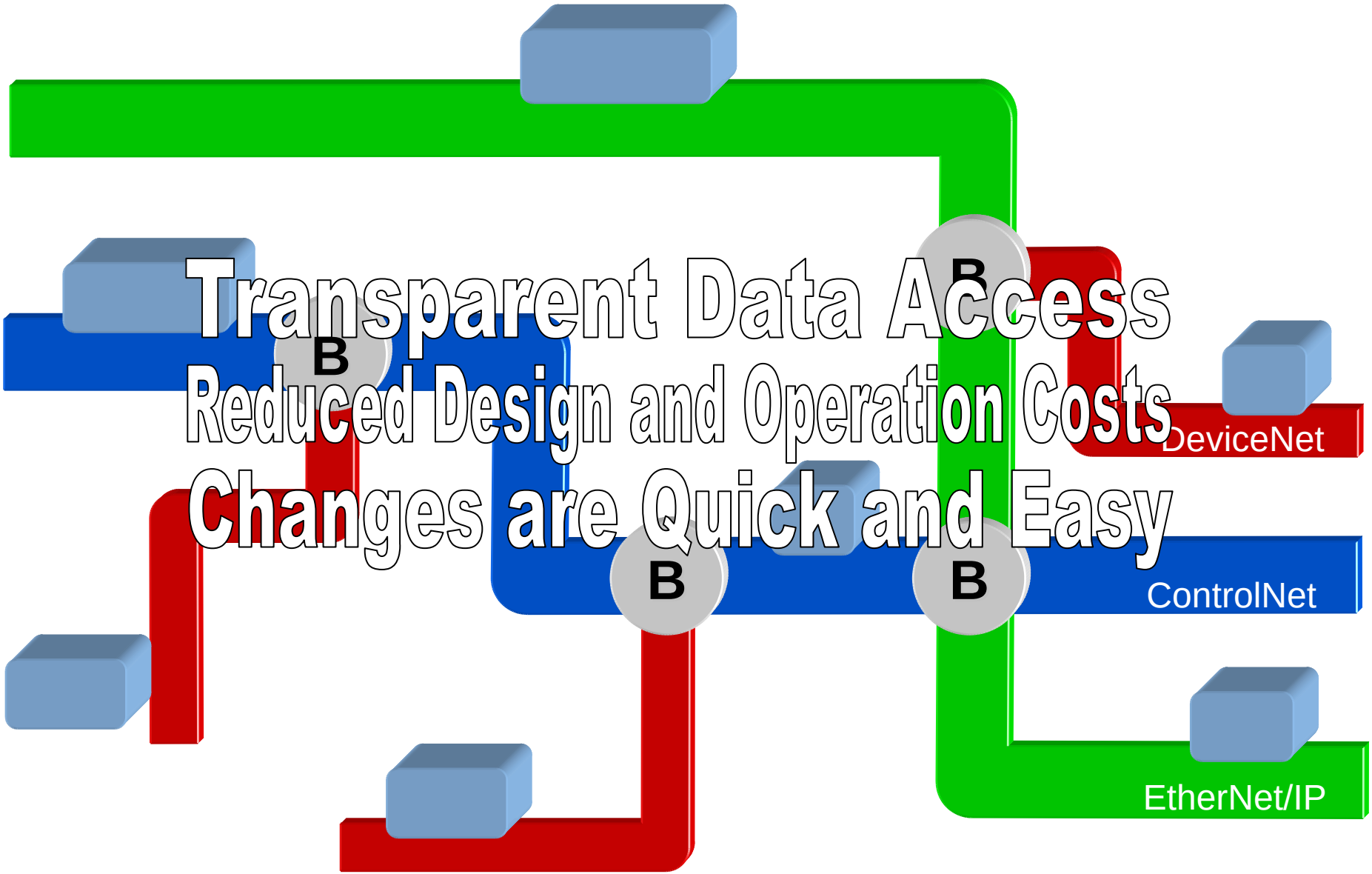
Traditional Communication Architectures



Even small operations become difficult to manage



Seamless NetLinx Communications



Transparent, Plant-wide Communications

First…
Messaging ***is easy with wizards & single MSG instructions***

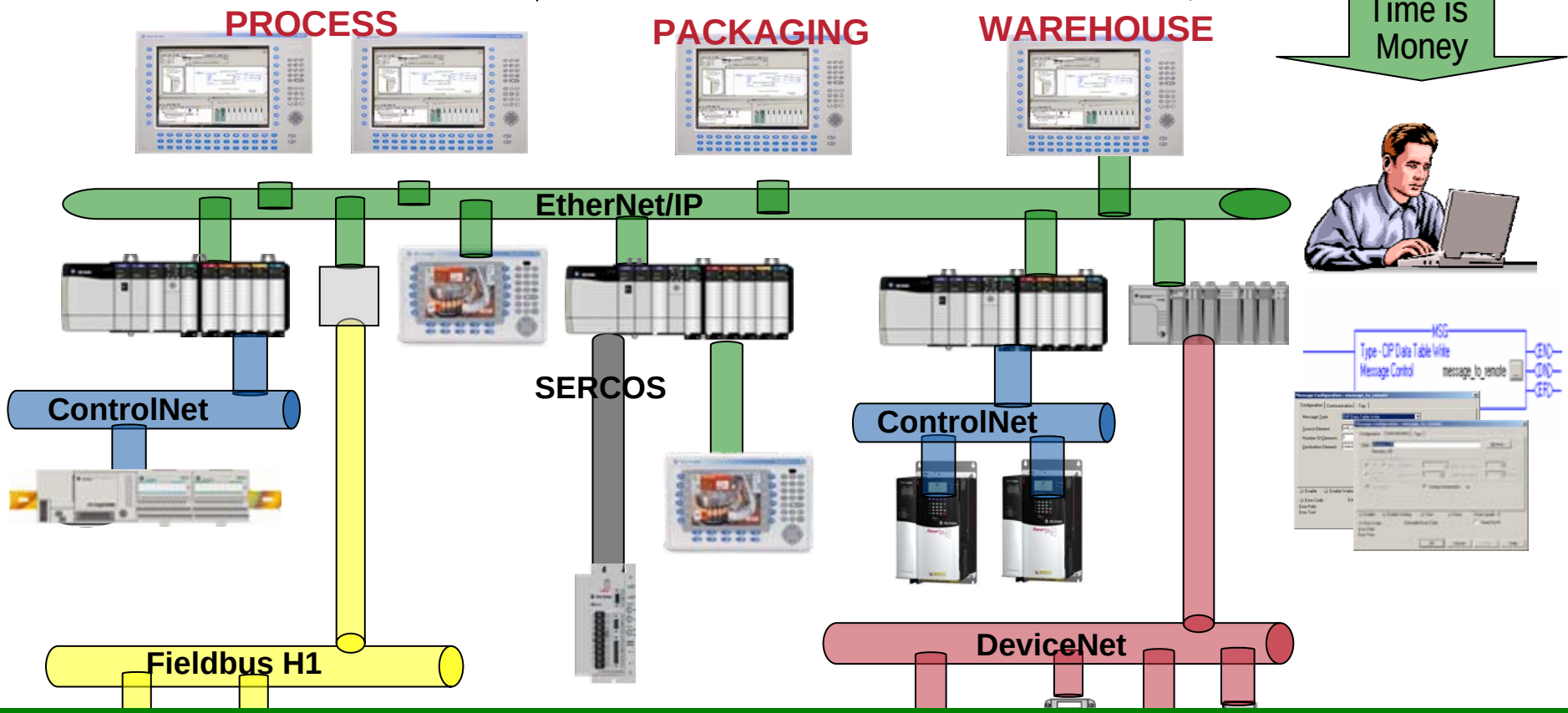
Save Time

Second…
Seamless MESSAGING over multiple networks

Save Time

Third…Access the entire control system from a single location

Time is Money

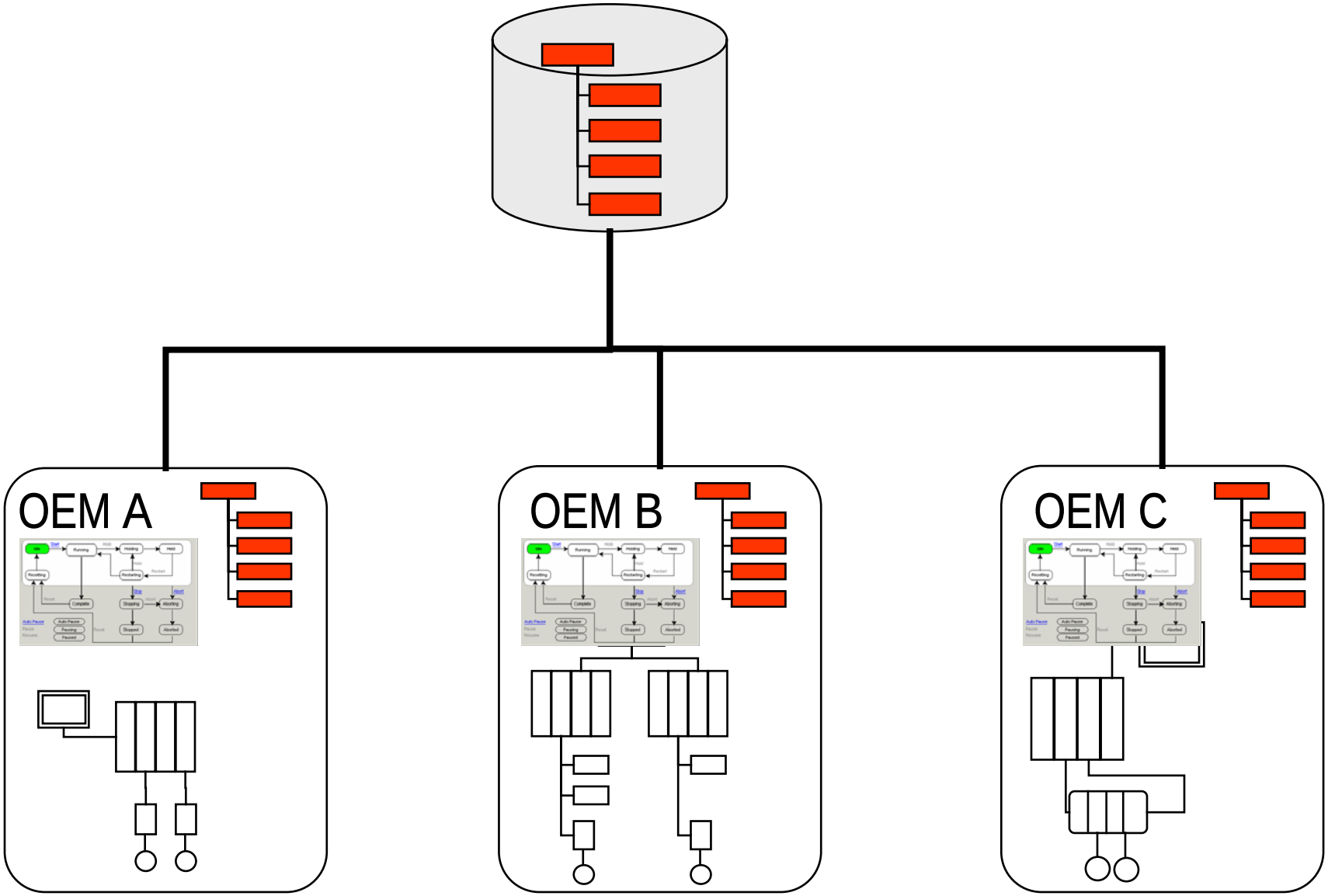


Benefit: NetLinx Communications allows Data to move seamlessly throughout a System… Saving Time & Money

Integration of OEM Machinery

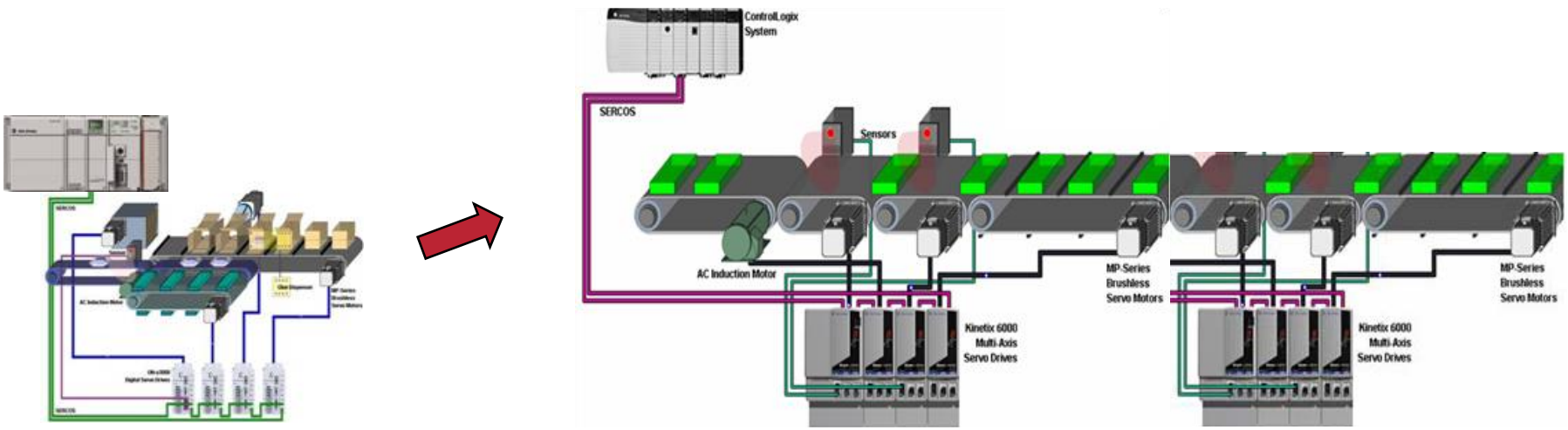
- The end user has to integrate data from multiple machines coming from disparate OEMs
- The tag-based memory structure in Logix, tightly integrated with the NetLinx network services allow to define End-User Data Structures that are easy to implement by OEMs
- It is possible to access every bit of information in every machine

Easy Integration of OEM Equipment

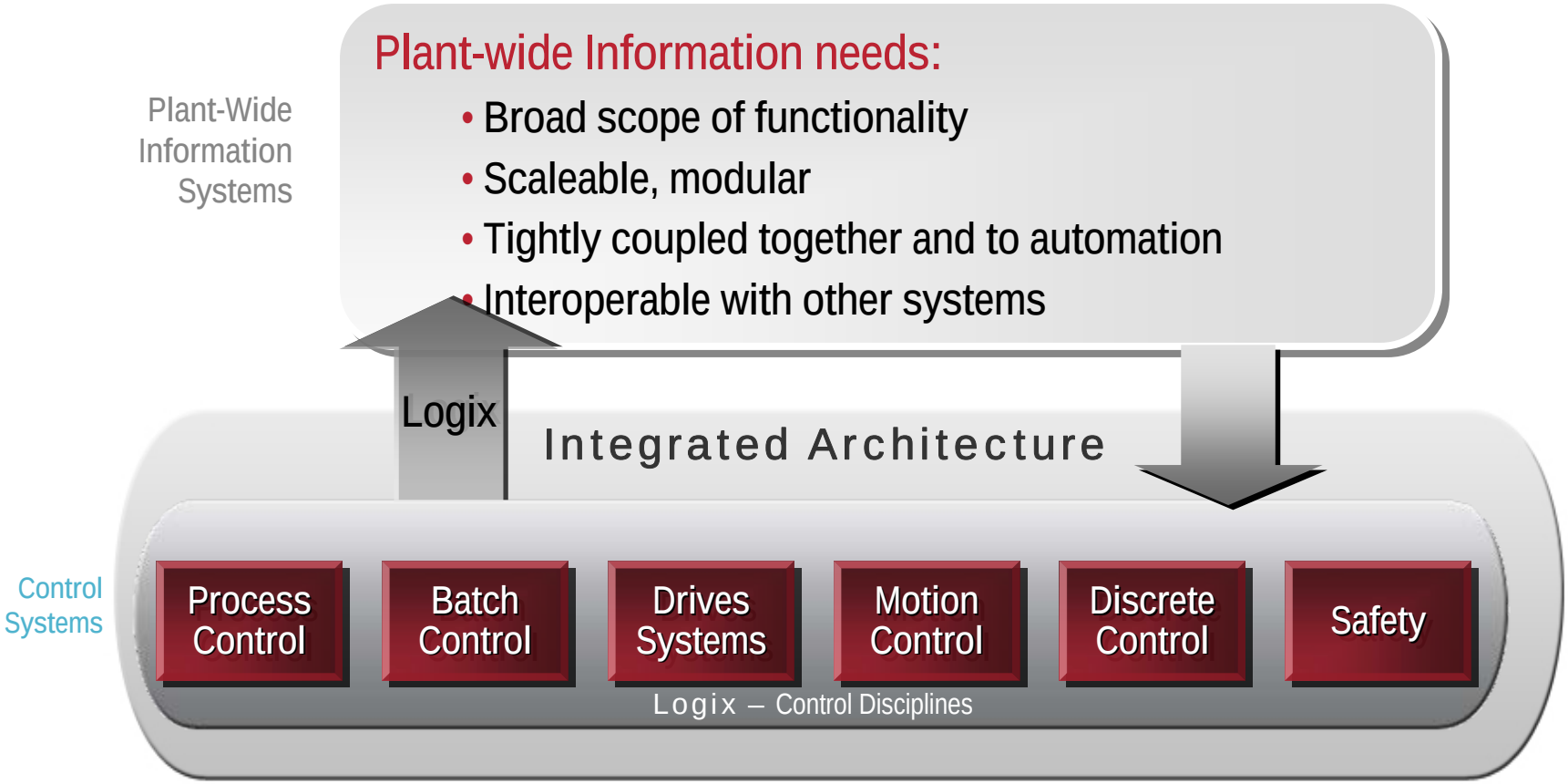


Maximum, True Scaleability

- All the key features are available for simple machines / small units using CompactLogix and for complex machines or large process cells using ControlLogix
  - Common RSLogix5000 development and maintenance tools
  - User defined, Tag-based memory model tightly integrated with NetLinx
  - Multi-discipline control engine

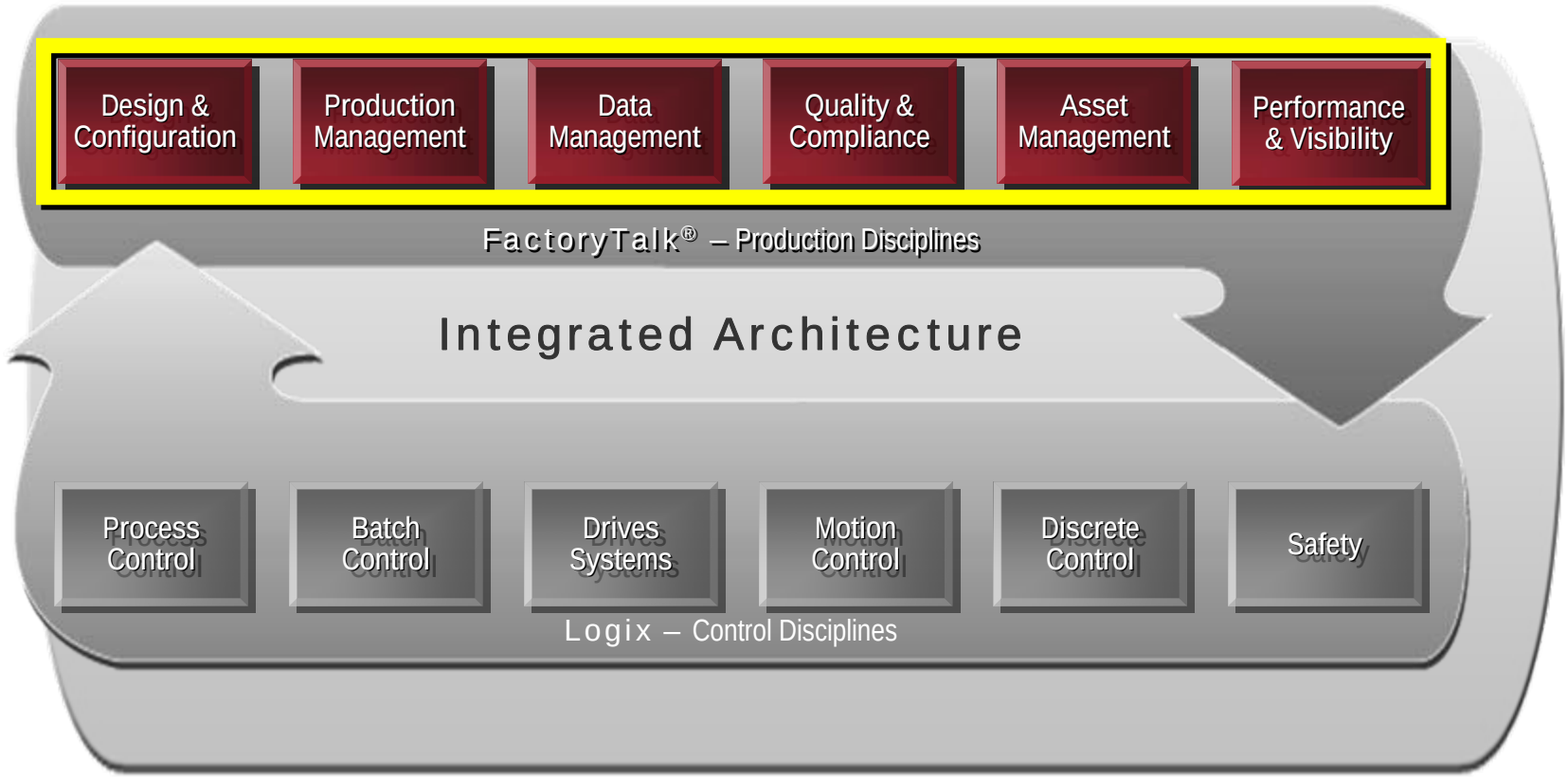


Expanding Integrated Architecture

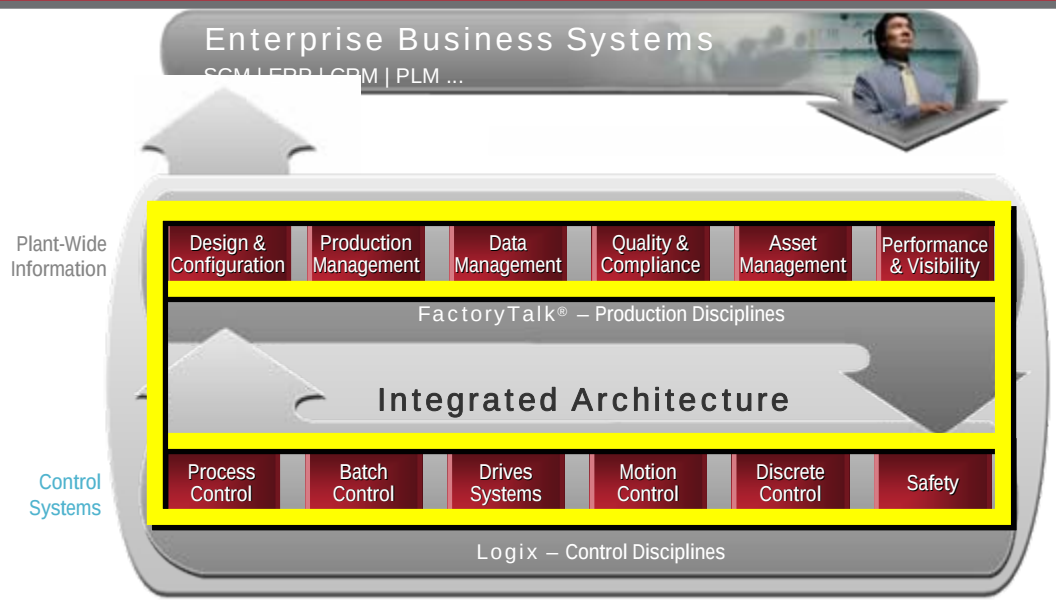


Integrated Production Management & Performance Suite

FactoryTalk®



Premier Integration



Faster Time to Market
Lower Integration Costs

Lowest Total Cost Of Ownership

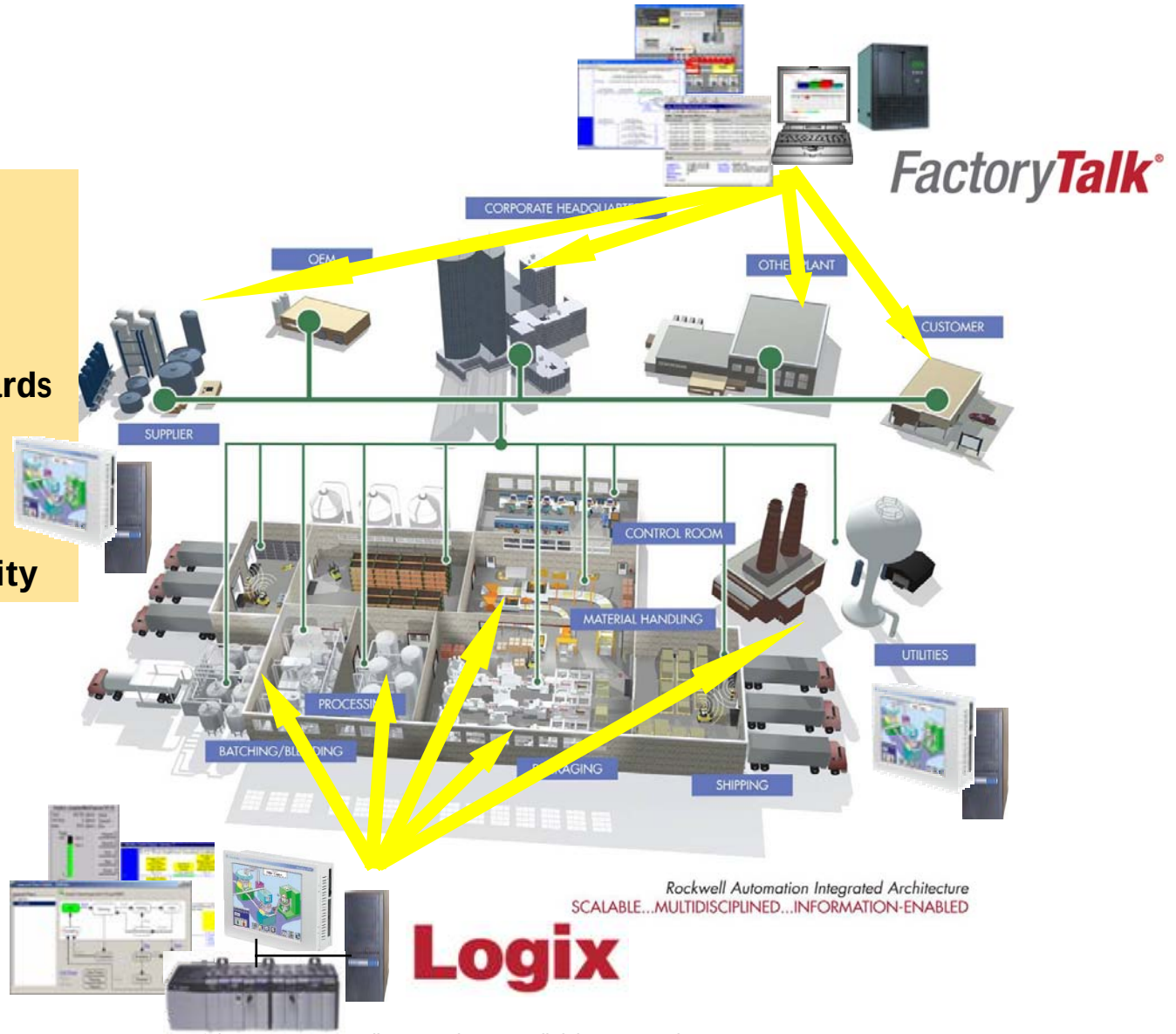
Performance Optimization
Regulatory Compliance

- **Integrated Architecture = Control & Information**
  - Broadest Scope of Supply
  - Scaleable/Modular Platform
  - Real-Time Information
- **Plant-Wide Information = FactoryTalk**
  - Multiple Production Disciplines
  - Scaleable/Modular Platform
  - Automation Empowered
- **Control = Logix**
  - Multiple Control Disciplines
  - Scaleable/Modular Platform
  - Information Enabled

Integrated Architecture Vision

One Architecture for Plant Wide Control and Information

- ✓ Lower Operational Costs
- ✓ Lower Total Cost of Ownership
- ✓ Regulatory & Standards Compliance
- ✓ Better Information
- ✓ Faster Decisions
- ✓ Increased Productivity



What is Intelligent Motor Control?

Intelligent Motor Control

Fully Integrating Motor Control with the Control system

Motor Performance, Motor Protection & System Wide Communication

FIXED SPEED CONTROL

- Direct Online Starters
- Soft Starters

VARIABLE SPEED CONTROL

- Low Voltage AC Drives
- Medium Voltage AC Drives
- Engineered Drive Solutions

MOTION CONTROL

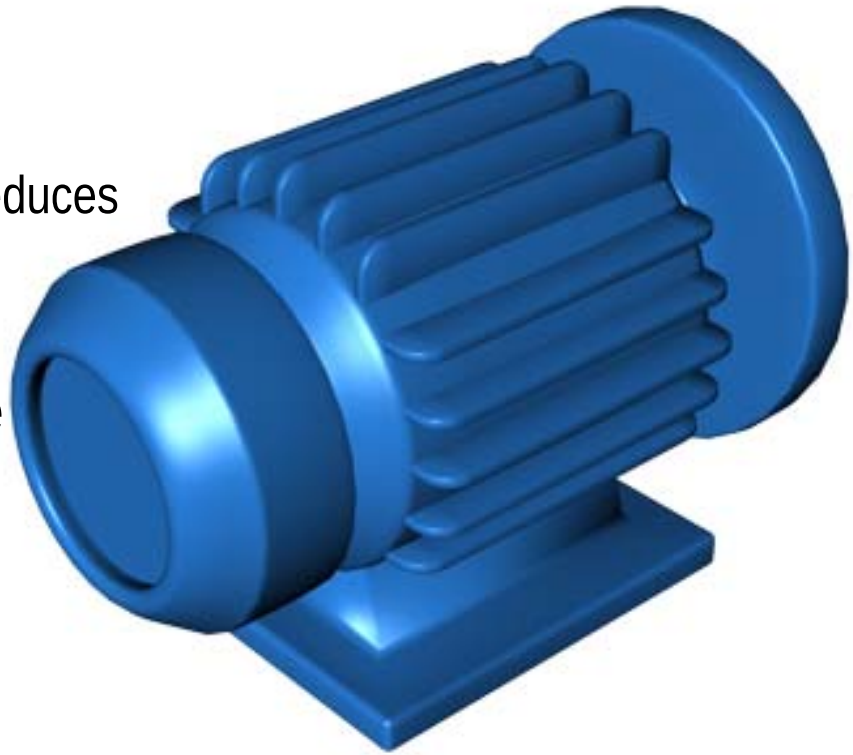
- Servo Drives
- Servo Motors

The benefits of Intelligent Motor Control

- What you can achieve with INTEGRATED ARCHITECTURE and INTELLIGENT MOTOR CONTROL solutions...
  - Optimise motor performance through intelligent equipment and networks
  - Reduce your energy consumption and increase efficiency
  - Reduce downtime in the event of device damage with automatic device replacement
  - Alerts you about motor problems before a failure occurs
  - Embed safety functionality to protect your process, personnel and equipment health
  - Achieve seamless communication and system visibility for increased system performance, simplified troubleshooting and reduced start-up times

Motors – The Workhorse of Industry

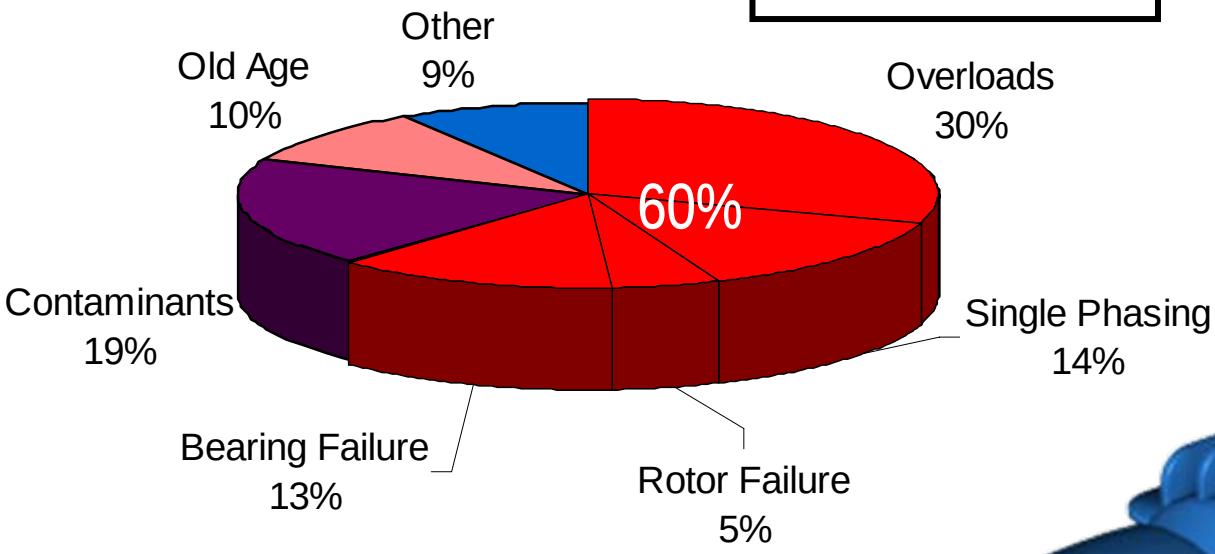
- Over 10 million motors sold per year within the European industry accounting for over 60% of electricity consumption
- The effect of a failed motor could result in the shutdown of a complete process or manufacturing line resulting in significant cost impact to your business
- In a 10 year life cycle a motor could accumulate energy costs 100 times its purchase value
- Energy usage by motors may be significantly reduces by use of an intelligent motor control solution
- It is estimated that in excess of $250 Billion is spent every year on excess maintenance activities mainly related to Motors

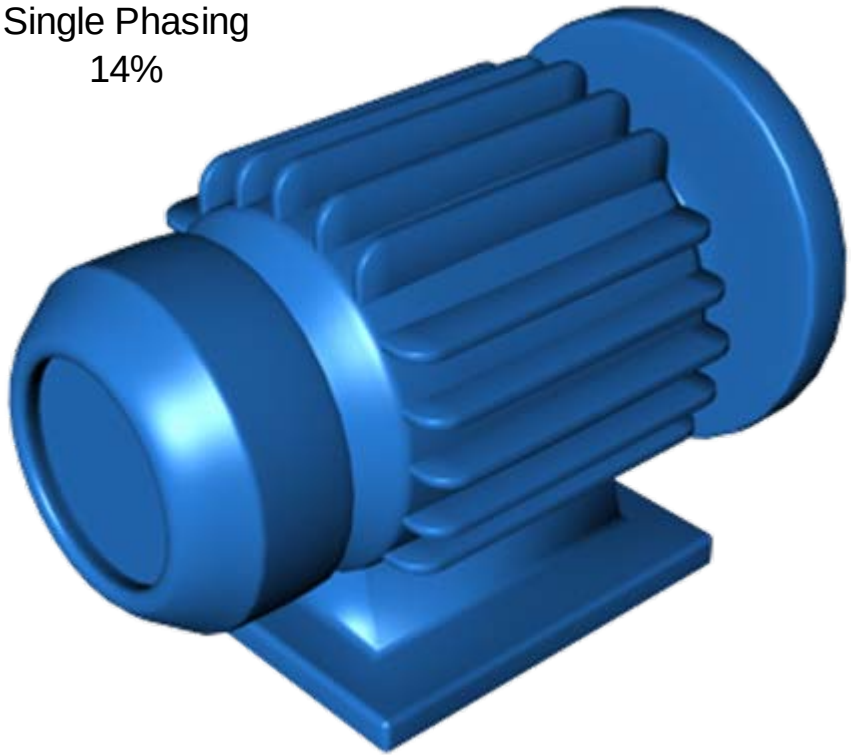


Motor Failures – Why Motors Fail

Causes of motor failure

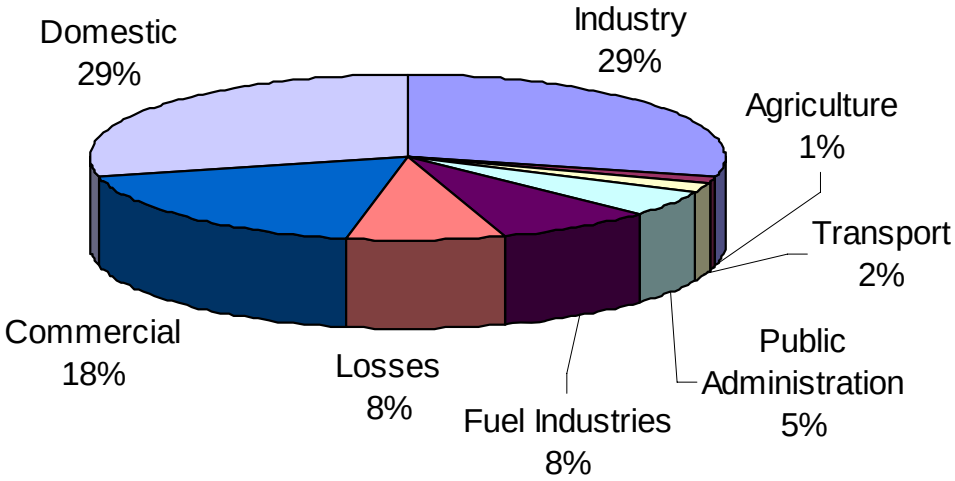
Preventable?



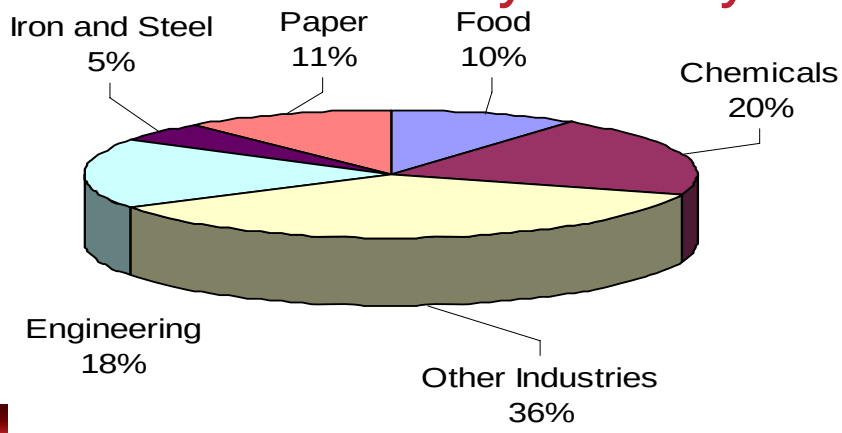


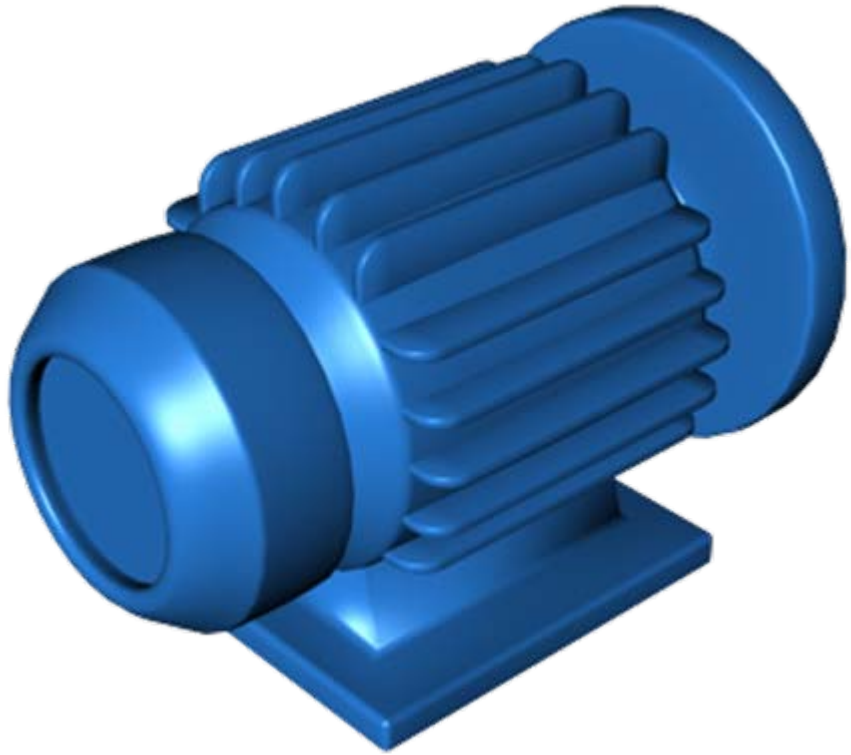
Motors – Where They are Used

Estimated demand by sector…



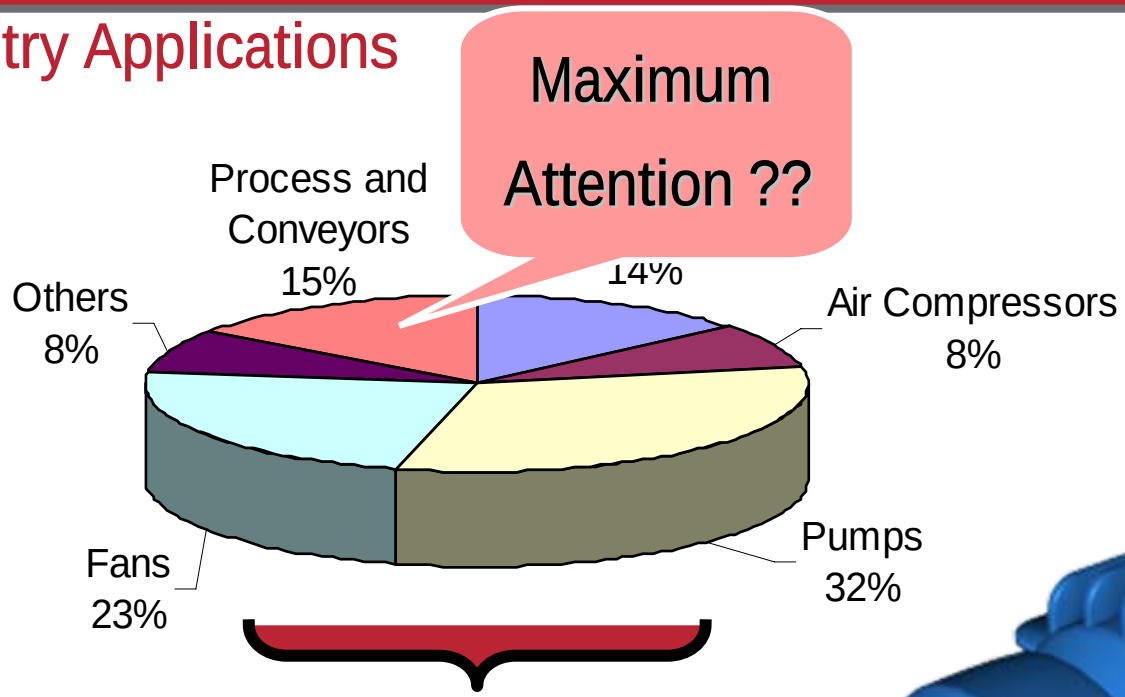
…and breakdown by industry

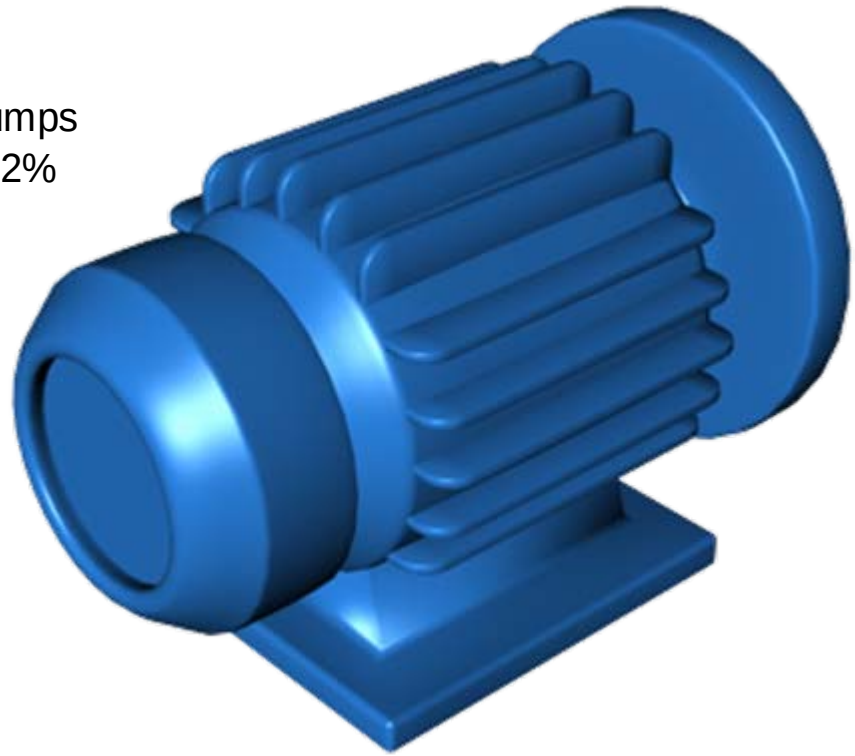




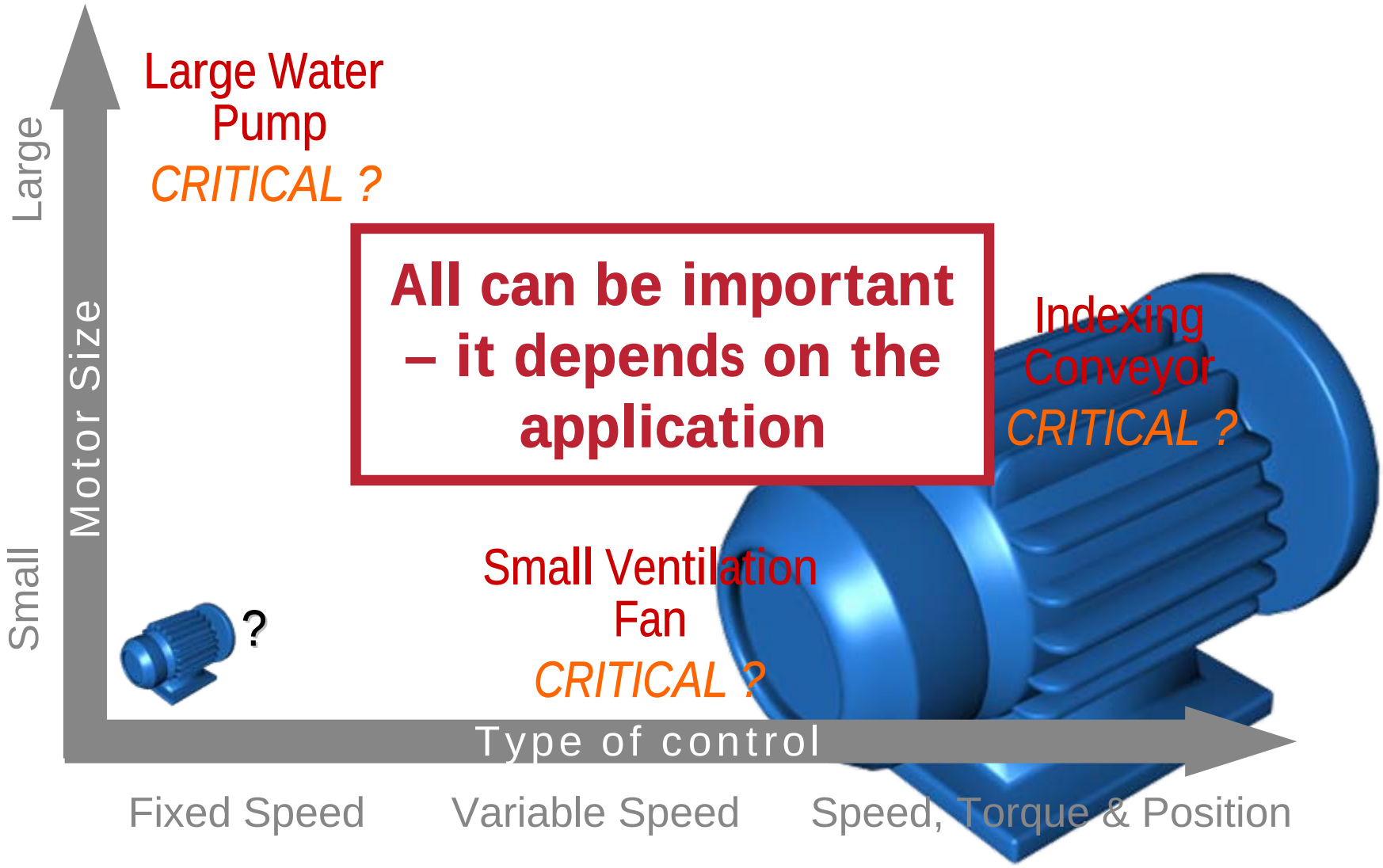
Motors – The Workhorse of Industry

Industry Applications





Motors – How Critical are they to Your Process?



Motor Control Design and Application requirements ?

Strategic Maintenance

CONSIDERATIONS

Predictive Maintenance ?
Preventative Maintenance ?
Reactive Maintenance ?
Remote Diagnostics ?
How to reduce costs ?
How to improve productivity ?
How to increase electrical and Mechanical life ?
Power Monitoring ?

Reduce overall Energy Costs

CONSIDERATIONS

How can I optimize efficiency ?
What are the best applications ?
What are the pay back times ?
What are the energy saving initiatives available today ?

Simplifying design and start up

CONSIDERATIONS

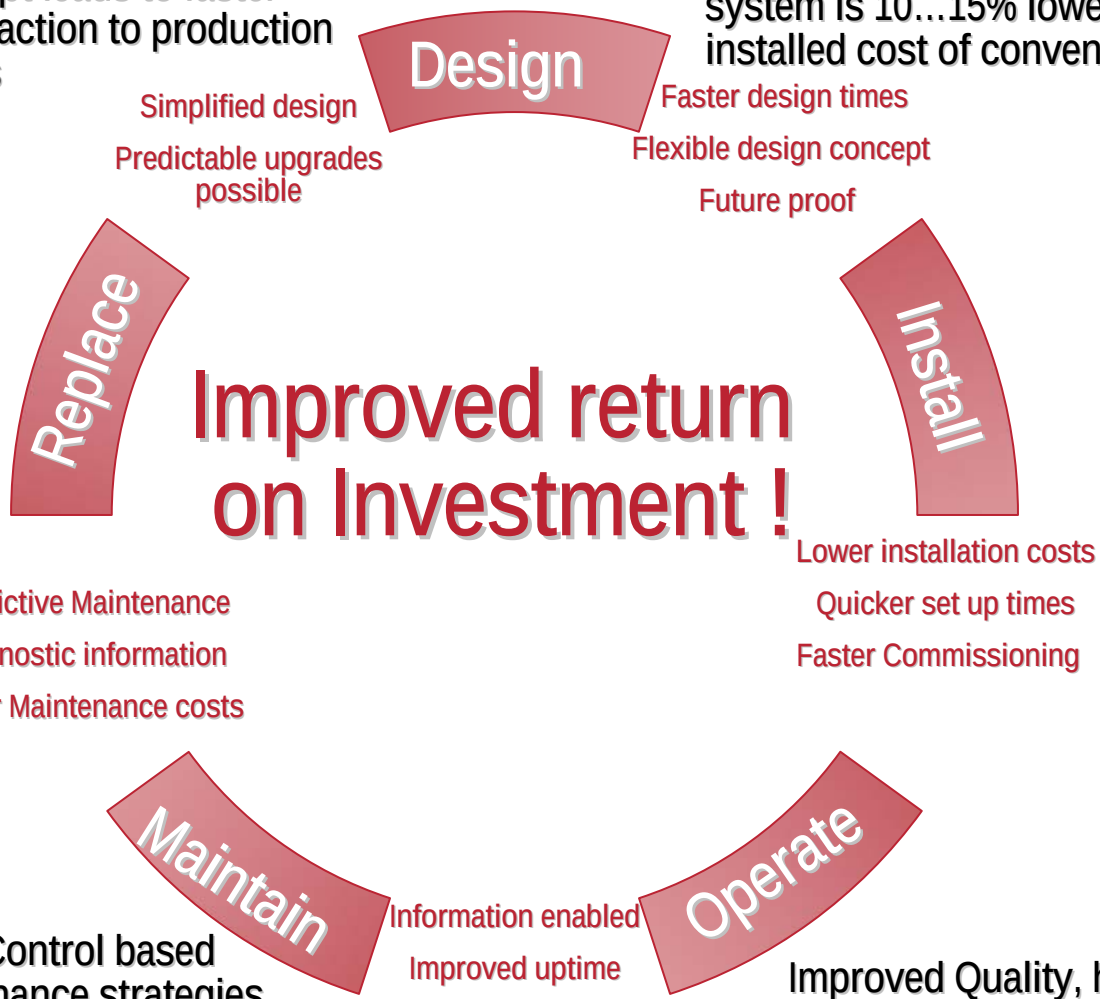
Reducing panel size ?
Reducing wiring ?
Faster troubleshooting ?
Future proofing my system ?
Embedding Safety?
Cost effective and Tailored to my needs ?
Common design where possible ?

Intelligent Motor Control from Rockwell Automation can help meet all of your design and application requirements

Intelligent Motor Control – Improving your Return on Investment ?

Future proof design concept leads to faster upgrades and improved reaction to production changes and requirements

A typical Intelligent Motor Control system is 10…15% lower than the installed cost of conventional system !



Intelligent Motor Control based Predictive maintenance strategies help reduce time based scheduled maintenance times and costs by up to 50%

Improved Quality, higher equipment availability, and throughput help Overall Equipment Effectiveness

Intelligent Motor Control - Summary

Tailored solution to meet all application requirements

-From simple to complex applications

-Fractional kW to High Power Applications

- Significantly Reduce downtime
- Alerts you about Motor problems before a failure occurs
- Embed safety to protect your process, personnel and equipment.
- Reduce your energy consumption and increase efficiency
- Simplify design and reduce build time and maintenance costs
- Future proof design capabilities
- Improve your Return on Investment.

Intelligent Motor Control – Case Studies

- Phoenix Cement Company
- Fluxys LNG
- Industeel
- Marley
- SIAAP waste treatment plant

LISTEN.
THINK.
SOLVE.®

Rockwell Automation Services

Rockwell Automation Services

Drive Systems

Customer Support & Maintenance Services

Site Services

Global Drive Systems

Allen-Bradley • Rockwell Software

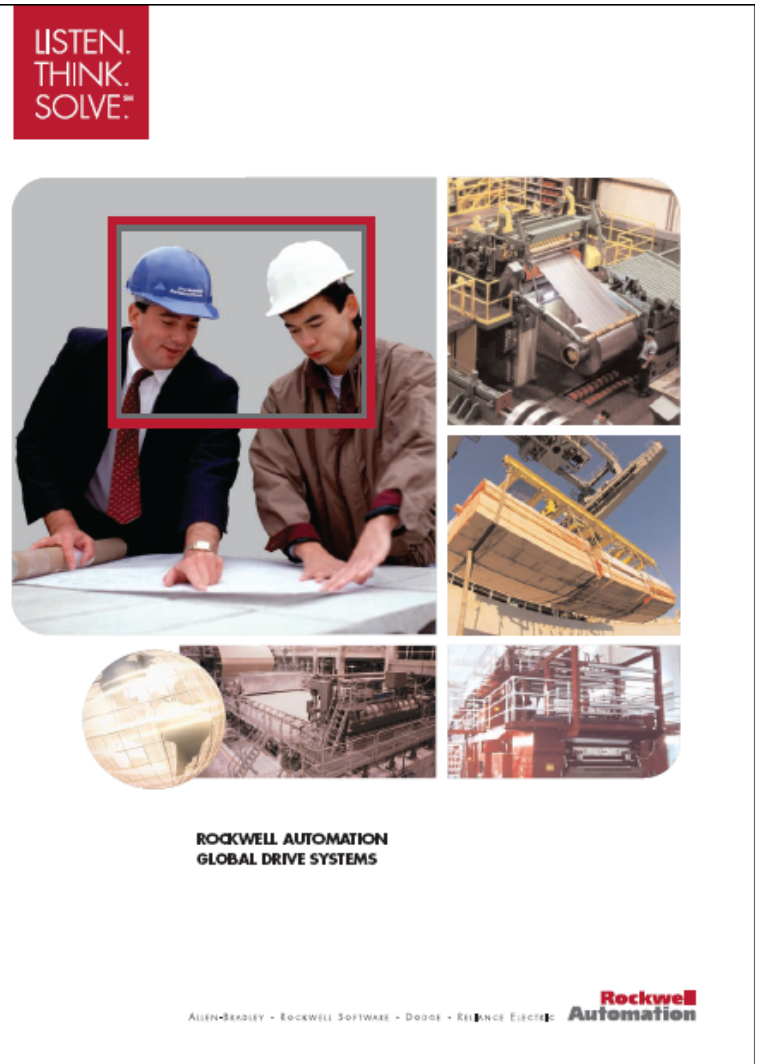
Rockwell Automation

Global Drive Systems

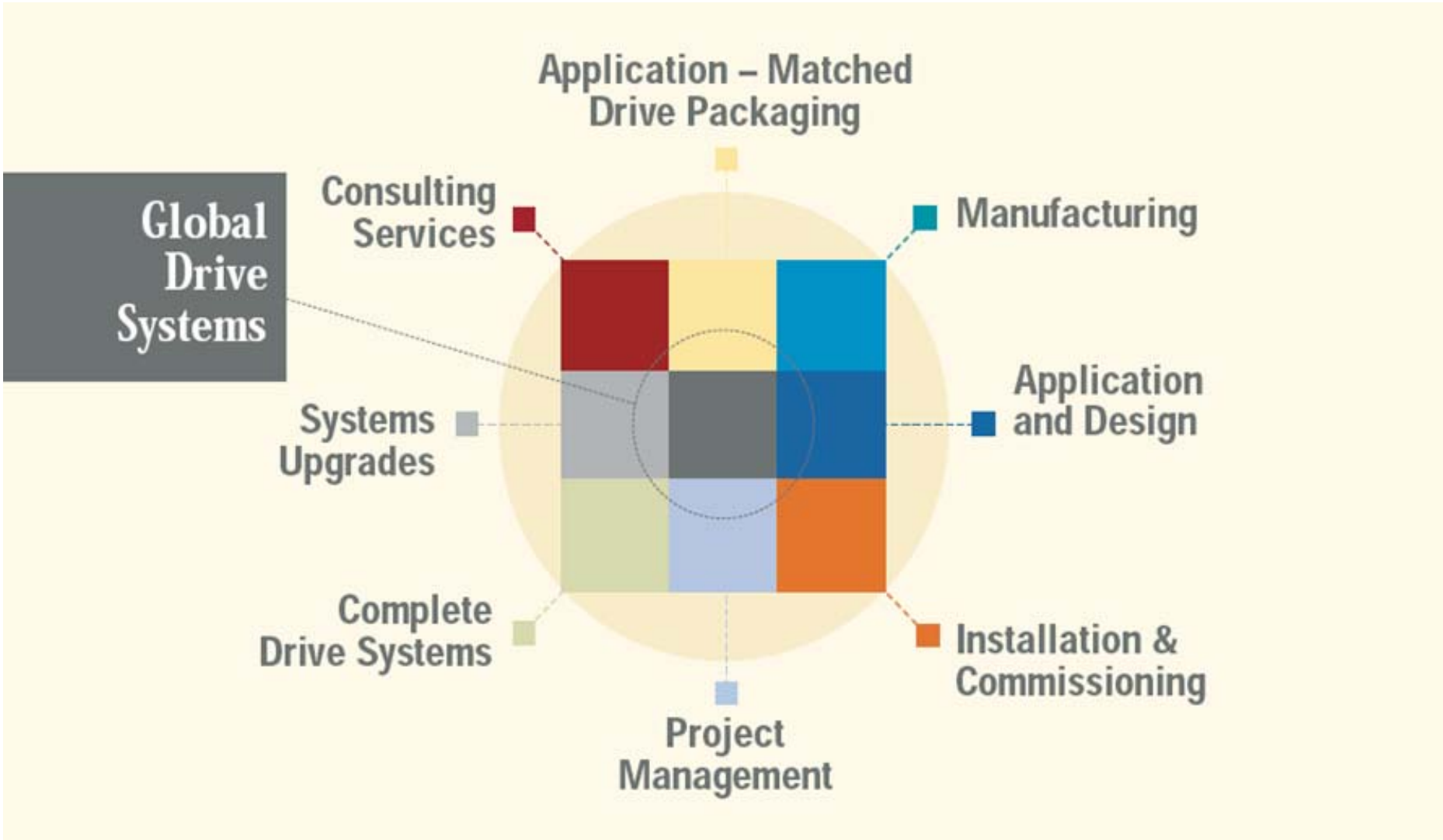
What Drive Systems provides…

- Technical consulting
- Hardware and software engineering
- Panel manufacturing
- Project Management
- Field and installation services

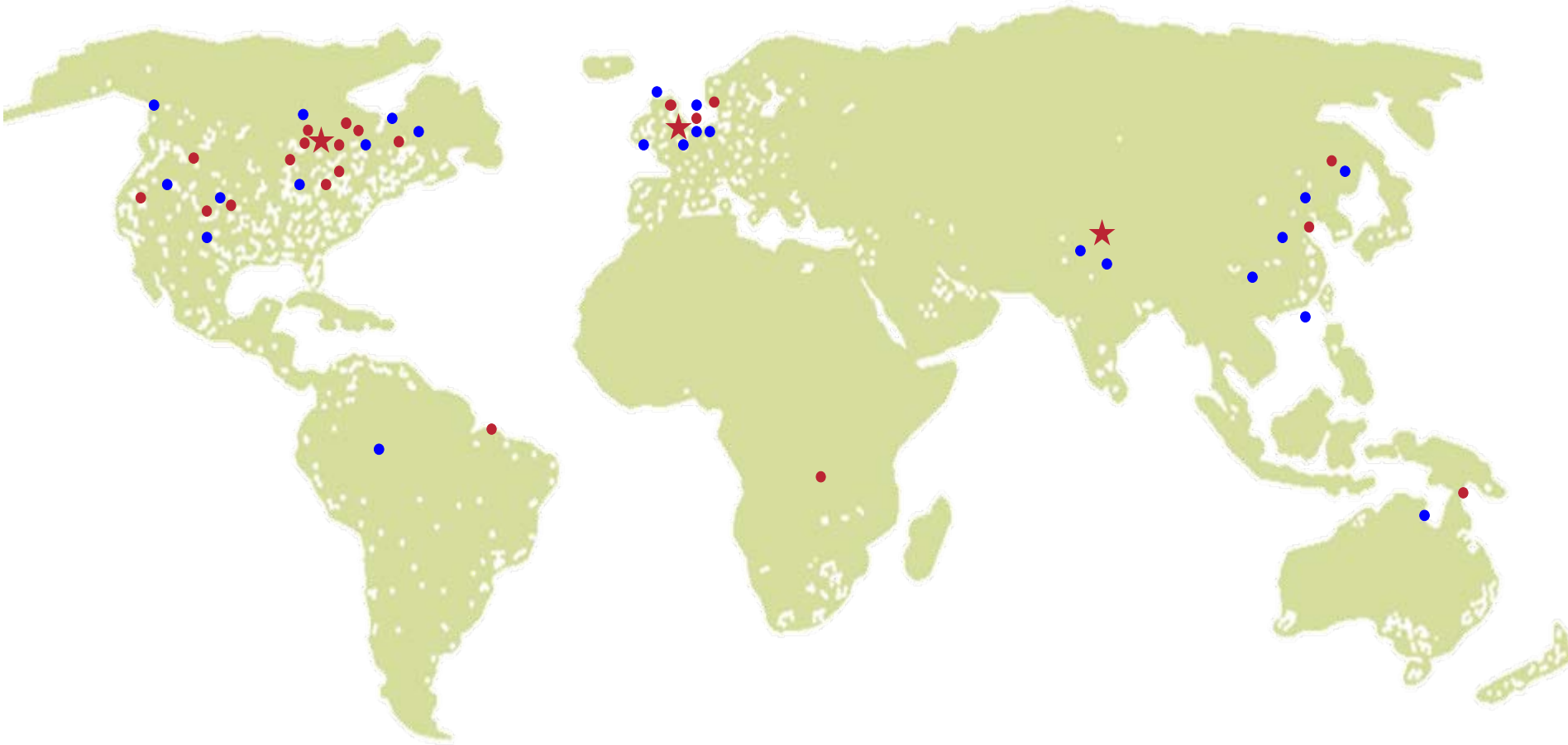
…for motor centric applications



Global Drive Systems



Global Drive System Locations



- Local Drive Solution Centers
- Local Drive Solution Super Center
- Application / Field Engineering Only

Drive Systems Solutions

Consulting Services

Consulting Engineering Studies:

- Maximizing machine performance through higher speed or better tension control
- Energy cost reductions
- Power dissipation
- Low harmonic solution
- Machine upgrades

Drive System Solutions

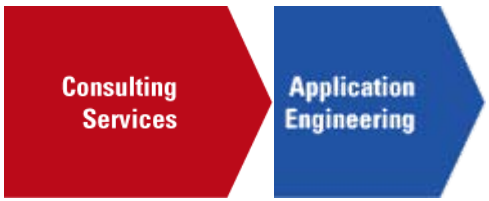
Application Engineering

- Industry Application Engineering Expertise
  - Converting
  - Cranes
  - Glass
  - Metals
  - Mining
  - Paper
  - Printing
  - Test Stands
  - Tire & Rubber
  - Plastics

- Engineering standards and tools
  - Re-usable software templates
  - EMC compliance
  - Autocad/Eplan drawings

- Hardware Engineering
  - Power loss calculation, sizing of air- or liquid- cooling, EMC optimized layout
  - Detailed electrical and dimensional drawings, bill of material, cabling list

- Software Engineering
  - Flowcharts, window designs, state-machines, data structogram
  - Programming and office test

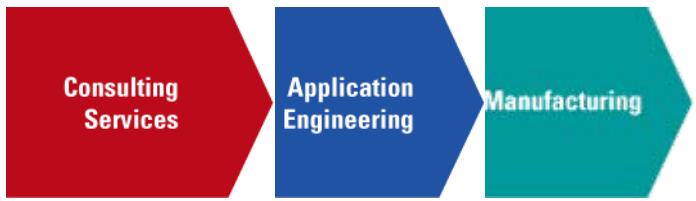


Drive System Solutions - Europe

Manufacturing

- Local Drive Solution Centers
  - Supports regional manufacturing requirements
  - Manufacture to local applications & global standards (IEC, UL, Nema)
  - 25 manufacturing locations including UK, Switzerland, Poland, Germany
  - Common global design and support approach

On Time Delivery Performance



Dierikon, Switzerland

Kempen, Germany

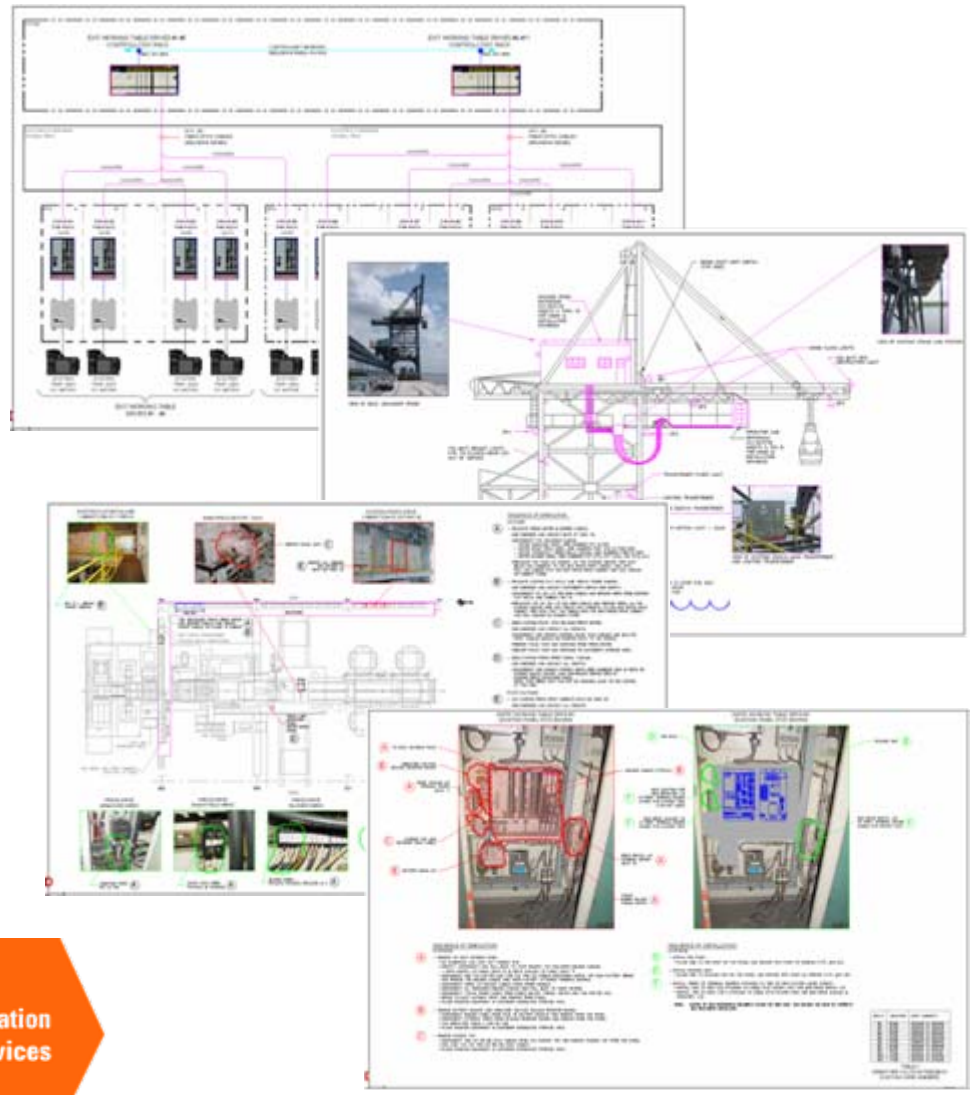
Bletchley, UK

Gdansk, Poland

Drive System Solutions

Installation Services

- Installation Engineering
  - Standard electrical drawings
- Installation Management
  - Contractor assistance
  - Installation planning and site assistance
  - Site supervision
  - Electrical “turnkey”



Drive System Solutions

Commissioning & Field services

- Centrally Managed – Locally Executed
  - Project monitoring
  - Installation support
  - Configuring and tuning of hardware
  - System integration
- On-site customer communication a priority
  - Regular communication with customer
  - Regular reports submitted
- Standardized tools and practices

Drive System Solutions

Project Management

- Ensures projects are completed on time and meets customer expectations
- Project Manager is single point of contact from order entry through field acceptance
- Kickoff meeting with customer
  - Identify project team
  - Review as-sold project scope
  - Responsible for correspondence and communication.
  - Set milestone dates
- Regular project review meetings
  - Review milestones set in project schedule
  - Identifies status of project definition, hardware & software design, manufacturing, system test and shipment
  - Forum to highlight issues and assess resources

Global Drive Systems

Configured Drives

Application engineers develop custom drive packaging solutions

Drive System Upgrades

Coordinated Drive Systems

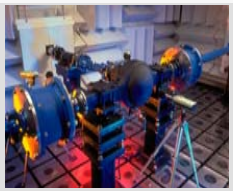
Coordinated drive control system plus HMI, Motors, Gear boxes and commissioning across many industries

Turnkey Project Services

- Project Management
- Consulting Services
- Installation Engr'g & Design
- Installation Services
- Commissioning

Applications

Test Stands
- Noise & Vibration Stand
- Engine Emulation
- Road Load Simulation



Paper, Converting Nonwoven
- Paper Industry Standards
- Sheeters/Metered Winding
- Nonwoven Application

Tire and Rubber
- EMEA OEM's
- Modernizations
- Mixing Applications

Electronic Line Shaft
- Newspaper
- Commercial
- Specialty Conversions
- Tower additions

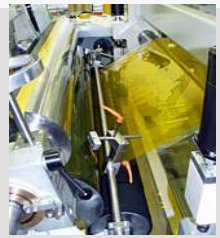
Liquid Cooled Drives
- Low Harmonic Apps
- Regenerative Apps
- Target High HP

Legacy System Upgrades
- Drive System retrofits
- Paper & metals process solutions
- Motion Upgrades

Crane
- Large Overhead Cranes
- Shipyard, Container Cranes
- Boom Gantries, Goliath Cranes
- Bulk Load/Unloader

Appl. Matched Packaging
- Configured Drives
- Custom Configured
- HiHP LV Drives

Plastics
- Sheeting
- Converting
- Coating



OEM Program
- Partnering with GDS
- Technology adoption
- GOTC and System Engage

Centrifuges/Compressors
- Sugar
- Separating
- Compressor/Compactor

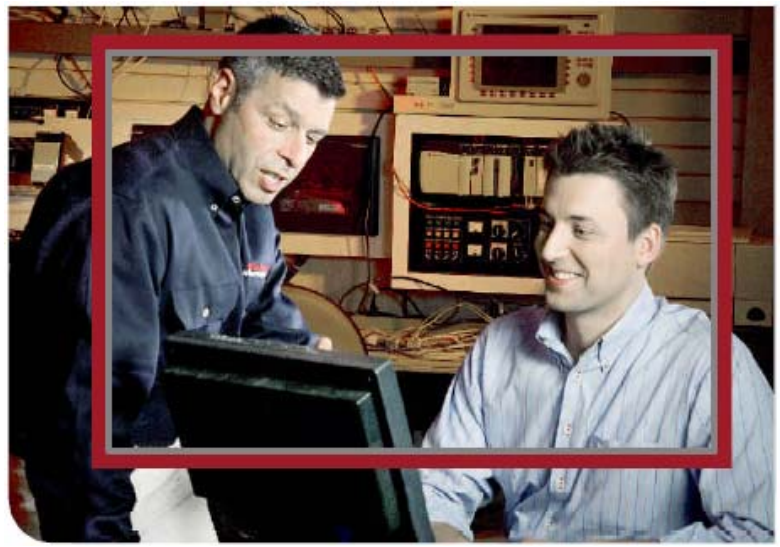
Shears
- Rotary
- Flying

Maintenance Issues

- Maintenance issues go beyond unplanned downtime
  - Time to fix equipment right vs. up-time demands
  - Pressure to reduce scheduled downtime
  - Keeping equipment within specified tolerances
  - Budget constraints
  - Maximizing equipment life
  - Availability of reliable spares
  - High inventory costs
  - Keeping up with technology
  - Maintaining competencies

How Have Manufacturers Responded to These Trends?

- Some support their maintenance in different ways:
  - Re-developing technical competencies within their operations (i.e. Performance Assessments, Training, Succession Planning,
  - Seeking collaborative partnerships to complement in-house capabilities
- Some manage to one of three ‘modes’ of maintenance:
  - Reactive
  - Preventive
  - Predictive



A Strategic Approach to Maintenance

- Using Maintenance as a Business Asset means correlating Financial and Productivity issues with Strategic Maintenance resolutions
- Rather than pick a single mode of maintenance, *strategic maintenance merges multiple modes in an optimal fashion*

Common Maintenance Modes

	CHARACTERISTICS	ADVANTAGES	DISADVANTAGES
Predictive	- Maintenance tasks are performed when a need is identified - Uses comparative data to assess probability of future events	- Predict catastrophic failures - Assists in identifying root causes - Lowers total cost of ownership	- Requires upfront investment and commitment - Requires additional skills and knowledge
Preventive	- Time based strategy - Attempts to anticipate and plan for downtime	- Improves resource planning - Improves and Maintains spare parts inventory	- Activities performed regardless of need - Takes time and commitment that is commonly missed
Reactive	- Run it till it breaks - No routine tasks to perform	- Don't spend money until you have to	- Most expensive approach - Downtime events are longer and unplanned

Manufacturers would like to spend 33% of their time on predictive maintenance, but only spend 15% (Maintenance Technology)

60% of preventive maintenance activities are considered unnecessary (ARC Advisory Group)

Manufacturers spend 40% of their time on reactive maintenance vs. their 12% ideal (Maintenance Technology)

Strategic Maintenance

Predict

Prevent

React

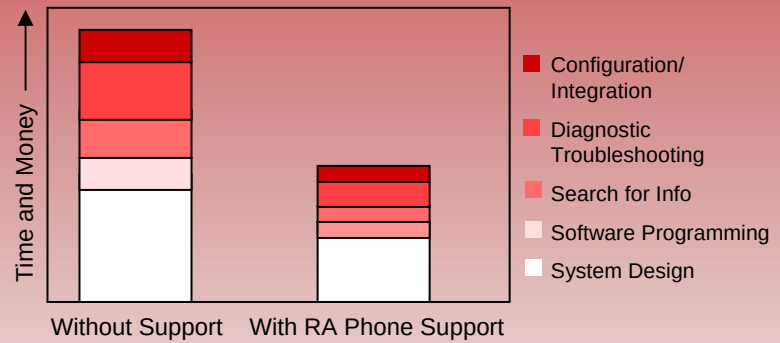
Phone Support

TechConnect, TeamSupport and Technical Application Services

TechConnect gives you direct access to world class support, technical information and software updates for Rockwell Automation products:

>> Global, real-time phone support in 14+ languages, 24 countries and 17 time zones from 6 call centers
>> Integrated support for controllers, drives, motion, networks, HMI and plant information software
>> Web-based support requests, technical resources, and case management tools
>> Support magazine
>> Bi-annual software updates
>> Technical Reference Library on DVD/CD
>> 24x7x365 phone support and dial-up diagnostics options

Typical Spend On Technical Issue Resolution



TeamSupport
- Priority, 24x7x365 response through dedicated phone line
- Designated Account Support Team and Manager
- Regular reviews of support issues and case summaries
- Two scheduled onsite visits prior to service startup

Technical Application Services
- Develop or debug small control system programs
- Migrate legacy or current Allen-Bradley programmable controller, HMI or EOI programs to the desired format

MAINTENANCE**MATTERS**

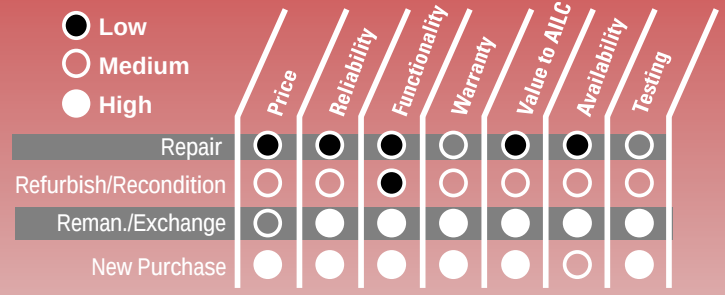
Great Lakes Brewing Company has saved over $2 million in retail product as a result of the support it has received through its TeamSupport program.

Repair Services

Remanufacturing, Repair, and Exchange Services and Renewal Parts

When production is down and every second counts, which part will YOU count on? The part repaired by company x or the part *REMANUFACTURED* by Rockwell Automation?

>> Services performed by original manufacturer
>> All applicable updates & enhancements installed
>> Failed and aged components have been replaced
>> Parametric testing has been performed
>> Unit has been cleaned, cosmetically restored, and returned in new shipping container
>> One year warranty included



Rockwell Repair, Remanufacturing & Exchange Network

- 17 global remanufacturing locations, all ISO 9000/14000 certified
- Dedicated 3rd party repair and obsolete parts manufacturing facilities
- 12,000+ catalog items available for exchange through 4 global hubs

RepairTrak Program **Future Service**

Commit to a specified volume of annual repairs through Rockwell Automation and receive:

- 3 year warranty on remanufactured and exchange parts
- Pareto analysis
- RepairTrak Web tool
- Proactive warranty tracking
- Probable cause reporting
- BoardRunner pick-up service (where available)

BoardRunner™ Rockwell Automation Repair Program

MAINTENANCE**MATTERS**

Rockwell Automation repair services resulted in 80% fewer reworks compared to 3rd party repair provider.

(Source: Rockwell Automation customer survey, July 2003)

Strategic Maintenance

Predict

Prevent

React

OnSite Support Services

Troubleshooting, Repair and Maintenance of Automation and Related Equipment

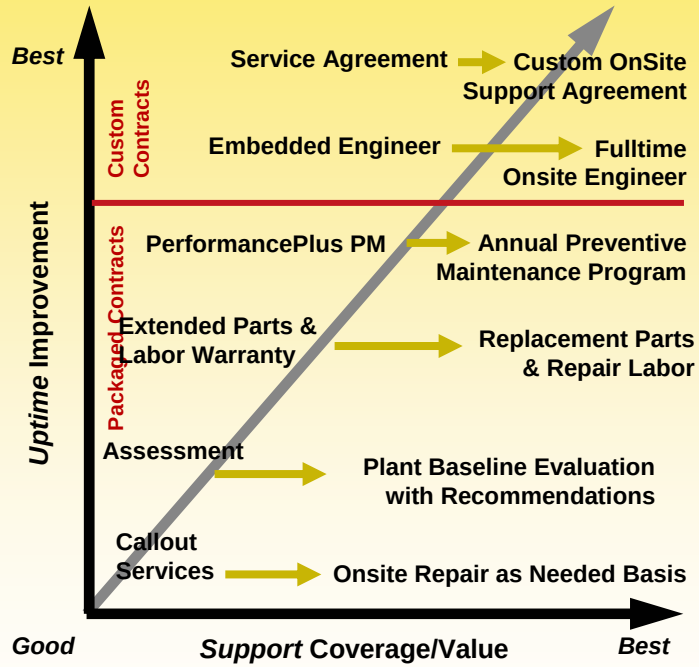
Our field support engineers work with you to provide the right combination of preventive and reactive support to meet your technical and financial needs and objectives.

>> Over 425 engineers dispatched from 100+ field offices in 50 countries

>> 13+ years average automation experience

>> On-going, factory-certified training program on automation technologies, project management, troubleshooting, and preventative maintenance techniques

Uptime Improvement vs. Support Coverage/Value



MAINTENANCE**MATTERS**

* Typical results. Actual results may vary.

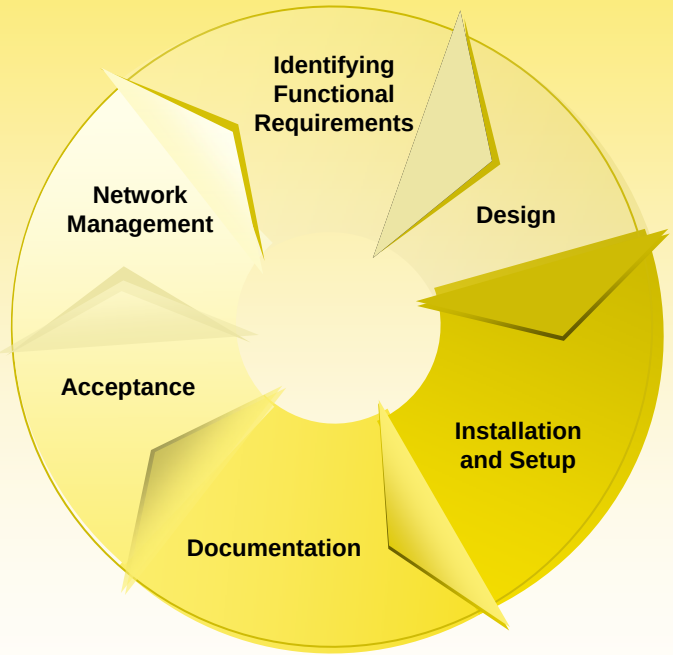
Industrial Network Services

Design, Validation, Evaluation and Maintenance of Control Networks

Industrial Network Services apply standard GAMP processes throughout your network project lifecycle – from initial design to installation and startup to system maintenance – to ensure your production data keeps moving, across your plant and throughout your enterprise.

>> Make informed business decisions
>> Improve productivity
>> Increase return on technology investments
>> Reduce project, start up and maintenance costs

Industrial Network Services provides support through every phase of project lifecycle



MAINTENANCE**MATTERS**

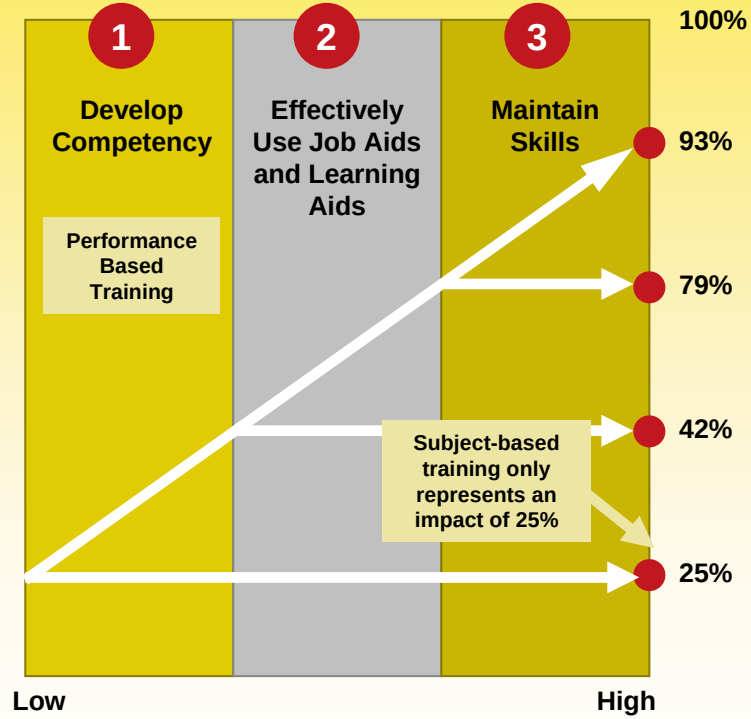
Industry studies have found that installation and media related problems cause 70-90% of unplanned downtime events in operating networks

Training

Improved productivity of plant floor staff through direct instructor interaction, computer based training, job aids and workstations.

Three core training offerings can significantly improve the productivity and efficiency of your plant floor staff.

- Classroom Training
  - RA, Technology, Safety, National Standards
- Web Based Training
- Computer Based Training
- Custom and Tailored Training
- Work Stations
- Job Aids



MAINTENANCE**MATTERS**

Human capital represents 78% of the nations manufacturing wealth…but only 6% of manufacturers attempt to measure the business impact of 'people related' investments.

Gary Becker, 2000 Nobel Laureate, Economics

Parts Management Agreements

Rockwell Automation Owned on-site Spare Parts Inventory

With a Parts Management Agreement, Rockwell Automation owns and manages your spare parts inventory for a fixed monthly or quarterly amount – and provides them when and where they're needed.

>> Reduces inventory costs

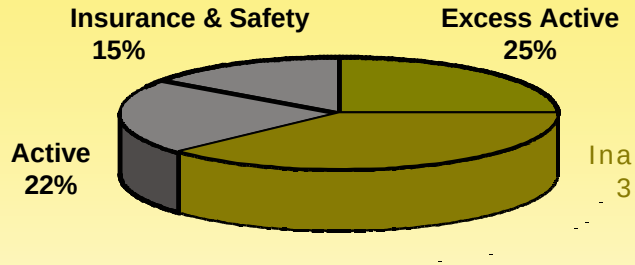
Carrying Costs Average 24% of the Price of Spares.

>> Increases spare parts availability

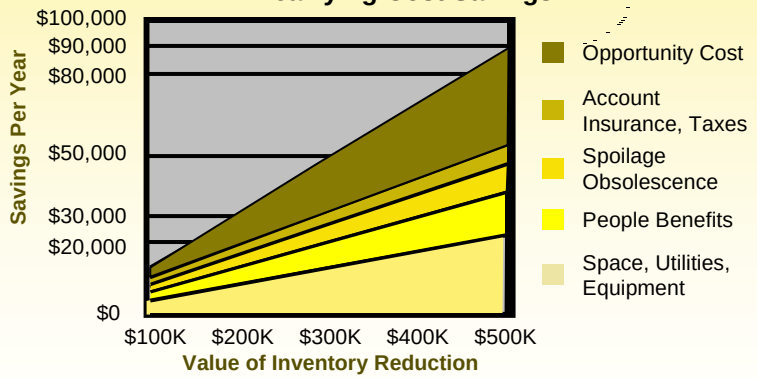
>> Provides in-service warranty

>> Allows for flexible parts list

Industry studies found 63% of MRO inventory is excess or inactive



PMA carrying Cost Savings



MAINTENANCE**MATTERS**

A major beverage Company is currently saving over $250k per year because of Asset Optimization though Rockwell's Part management Program.

Strategic Maintenance

Predict

Prevent

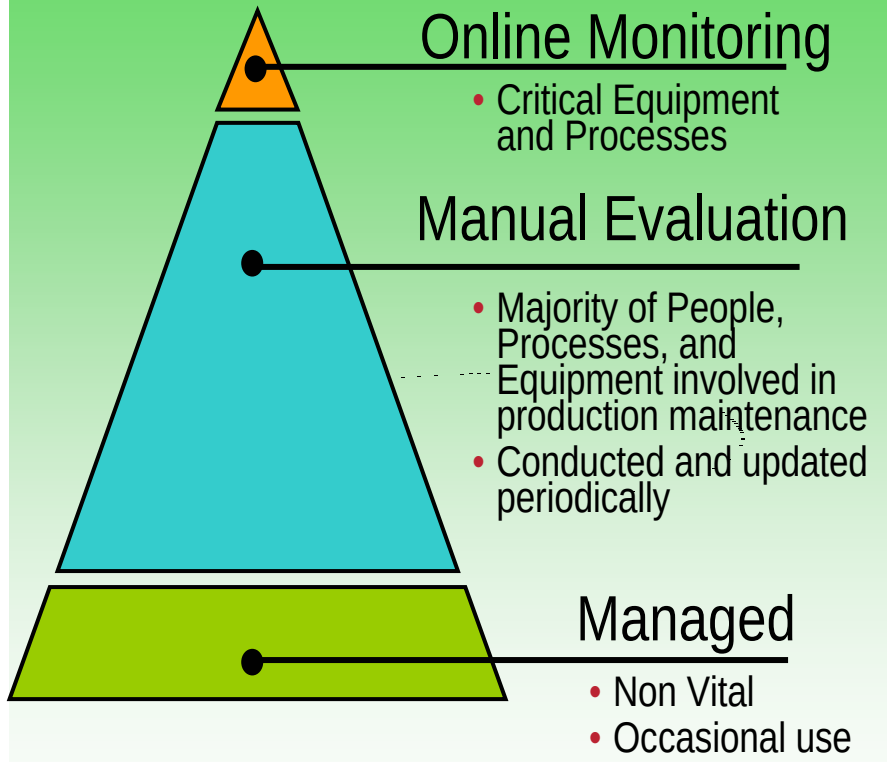
React

Service Assessments

Baseline Evaluations of Plant Floor Technical Skills, Procedures and Equipment

Identify human and equipment issues that hinder production performance and develop a maintenance strategy that leads to increased machine efficiency, availability, reliability and safety.

- **>> Integrated Performance Assessment**
  People and Procedures
- **>> Installed Base Evaluation**
  Control System Inventory (including spares)
- **>> Plant Baseline Evaluation**
  Control System Operation
- **>> Machine Condition Evaluation**
  Rotating Equipment Operation



MAINTENANCE**MATTERS**

Periodic assessments of maintenance personnel, processes and production equipment in comparison to industry norms and documented best practices ensures the effectiveness of any maintenance program.

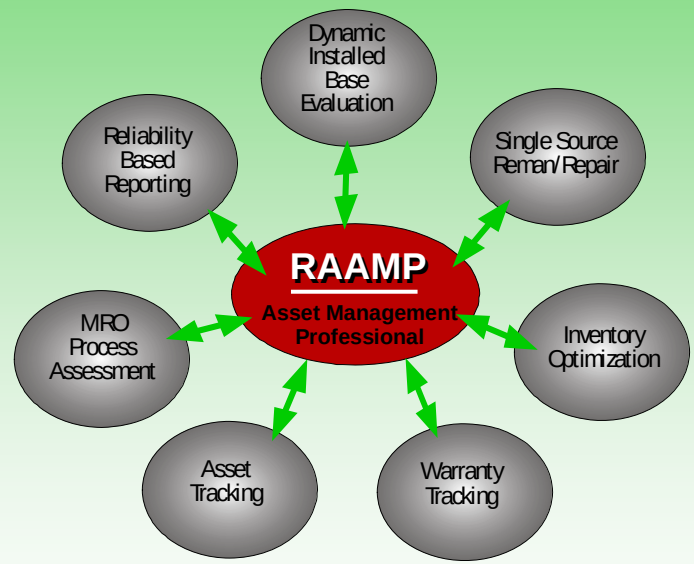
RAAMP

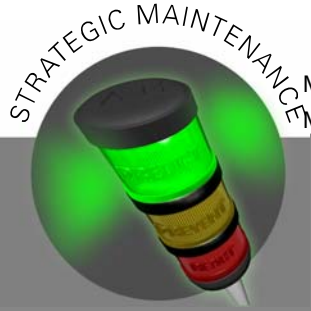
OnSite MRO Process Management

Information is Power

- >> Maximize uptime (MTBF)
- >> Minimize unplanned downtime (MTTR)
- >> Reduce repair costs
- >> Track warranty repairs
- >> Spares management
- >> Track warranty repairs
- >> Redeploy resources
- >> Reduce unnecessary inventory
- >> Identify opportunities for standardization
- >> Identify common mode failures
- >> Use reliability data to improve maintenance decisions

Rockwell Automation
Asset Management Portfolio (RAAMP)





MTBF - Mean Time Between Failure
MTTR - Mean Time to Repair

MAINTENANCE**MATTERS**

Continental Tire reduced repair costs by 30 percent and increased warranty utilization rates by 100 percent through RAAMP

Remote Monitoring Services

System Monitoring/Diagnostics by Offsite Automation Specialists

>> In.Site Continuous Support

Continuous, proactive monitoring and diagnostics of your control system at the Rockwell Automation In.Site Command Center via a high speed, broadband connection

>> Reliability Online

Collection of machine condition data and periodic analysis/ reporting by offsite Rockwell Automation engineers

>> Dial-up Diagnostics

Upon request monitoring and diagnostics of your control system by Rockwell Automation phone support specialists via a modem connection

Reduce, Prevent and Predict the Occurrence and Duration of Unplanned Downtime Events

Reduce Troubleshooting Time

Improve Product Quality

Enhance Productivity, Utilization and Capacity

MAINTENANCE**MATTERS**

Finch, Pruyn and Company, a paper manufacturer in up-state New York, saved over $1 million in the first year of its In.Site program ($300,000 - reduction in unplanned downtime; $800,000 - 1% improvement in efficiency)

Condition Monitoring

Predictive Maintenance Products & Services for Rotating Equipment

Proactively monitor the condition of your mechanical assets to identify potential failures and optimize scheduling of planned downtime, labor, and materials

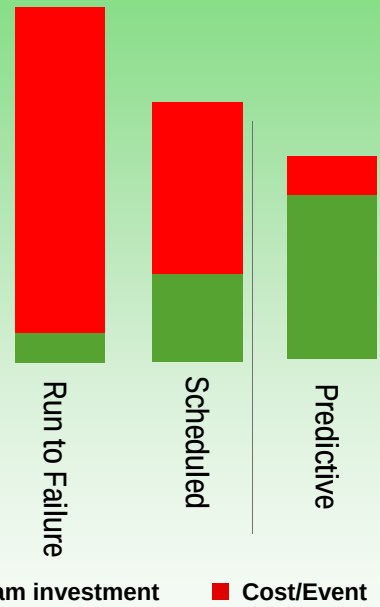
- **>>** Protection Systems
- **>>** Surveillance Systems
- **>>** Data Collectors and Meters
- **>>** Sensors
- **>>** Oil Analysis
- **>>** Services

Cost per Maintenance Event vs. Program Investment

Typical Cost of Unplanned Downtime Event by Industry*

Steel	$42,000
Paper	$36,000
Rubber	$25,000
Plastic	$12,000
Yours	?

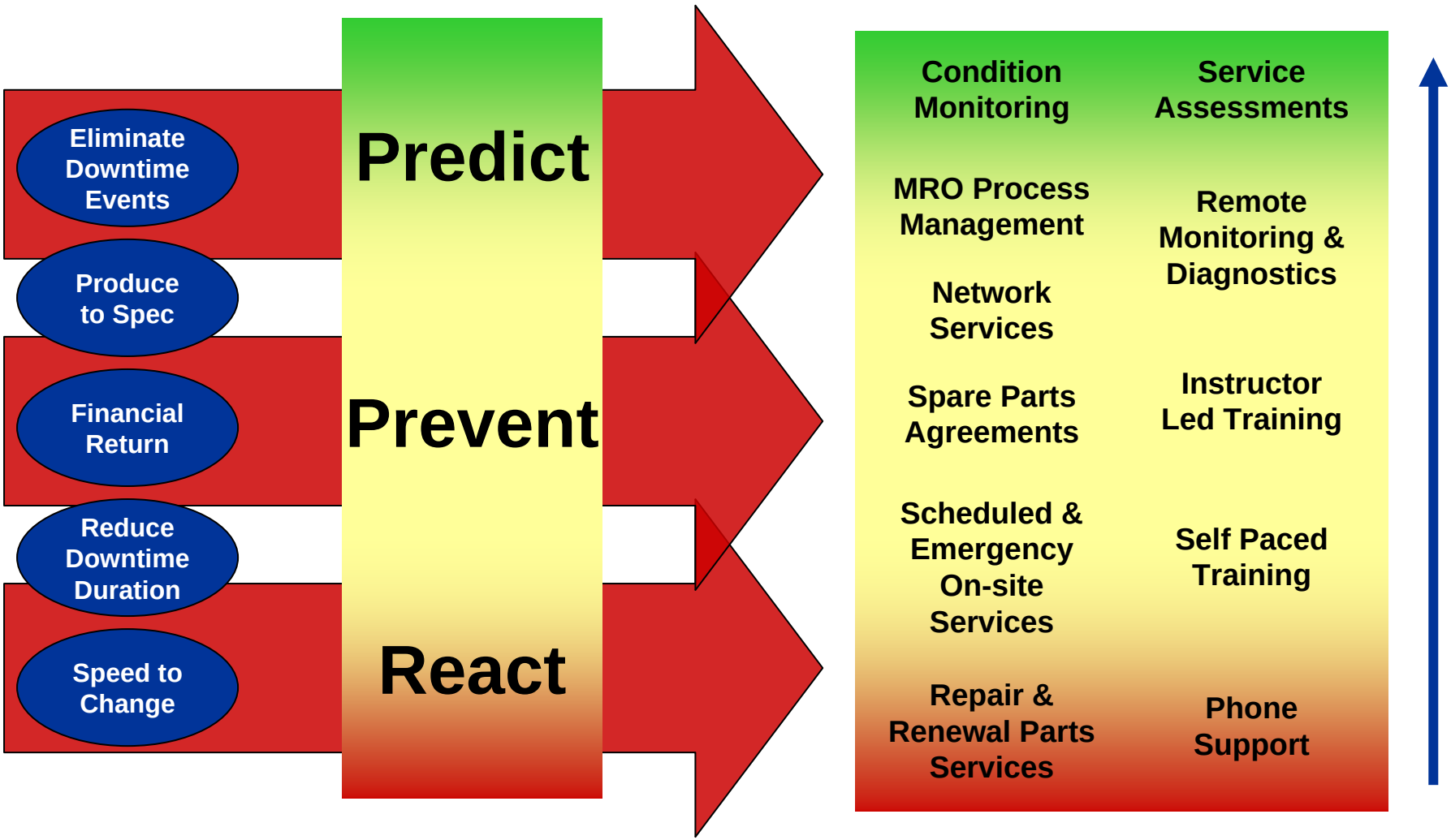
How much can you reduce your unplanned downtime costs by utilizing integrated condition monitoring?



MAINTENANCE**MATTERS**

Quantum Chemical reduced their spare parts inventory by $3M and overall maintenance costs by $10M the first 5 years after implementing a predictive maintenance strategy

Strategies to Match Maintenance Needs



Collaboration applies the right maintenance solutions to improve your Return on Net Assets.

Fixed Speed Control

Direct Online Starters

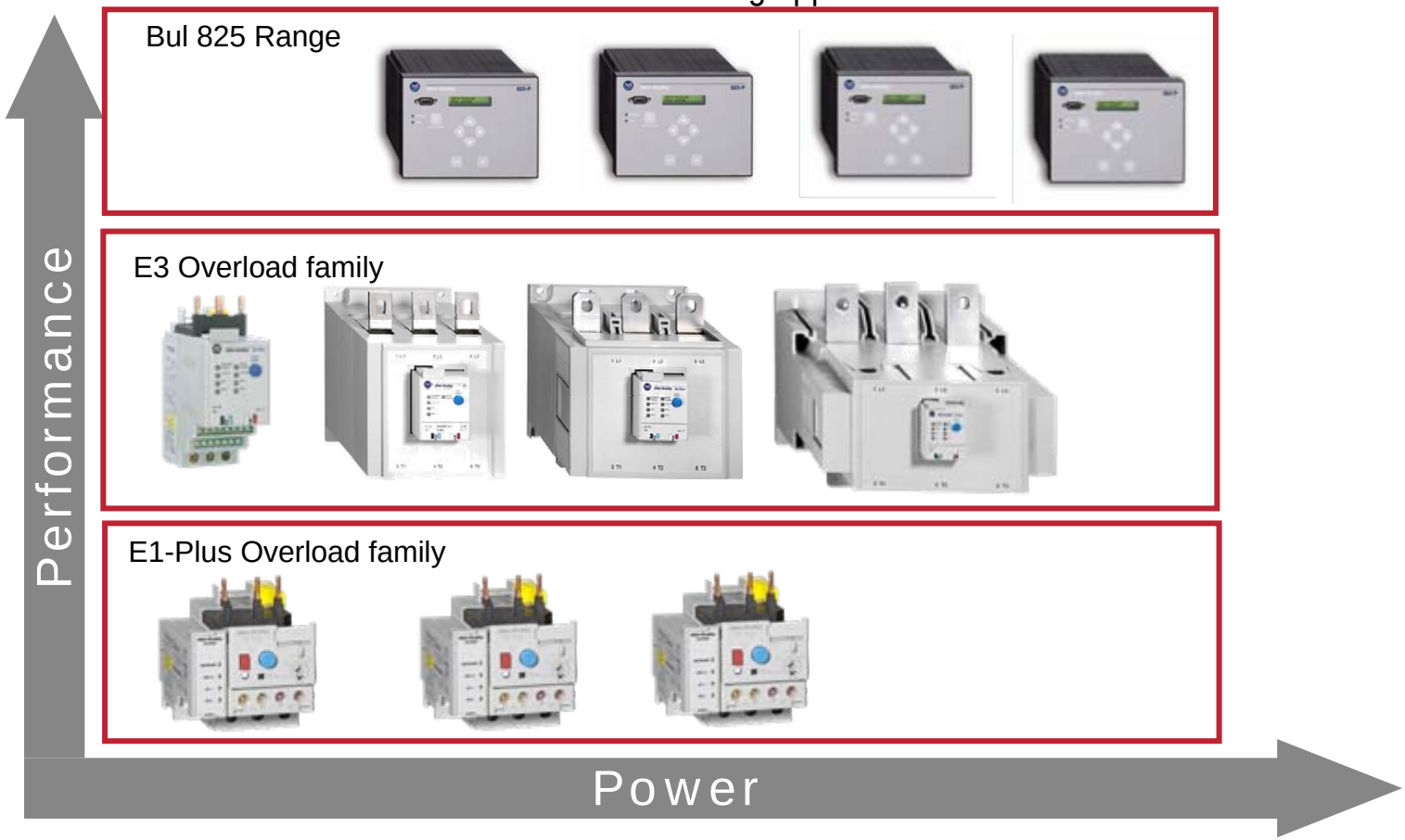
Soft Starters

Condition Monitoring

Electronic Motor Protection

The “Tailored” Electronic motor protection range is the starting point of any Intelligent Motor Control solution offering simple through to complex application solutions:

- E1-Plus range with add on Network modules for simple through to medium applications
- E3 Range for medium to advanced protection in demanding applications
- Bulletin 825 for Advanced and Harsh or demanding applications



3-Component Starters on Mounting System

The MCS Mounting System enables starters to be mounted directly onto a Busbar system:

- Standard Fixed speed starters
- SMC Softstarters
- PowerFlex Drives

Intelligent Fixed speed starters consist of 3 devices:
- magnetic only circuit breaker, contactor, motor protection relay

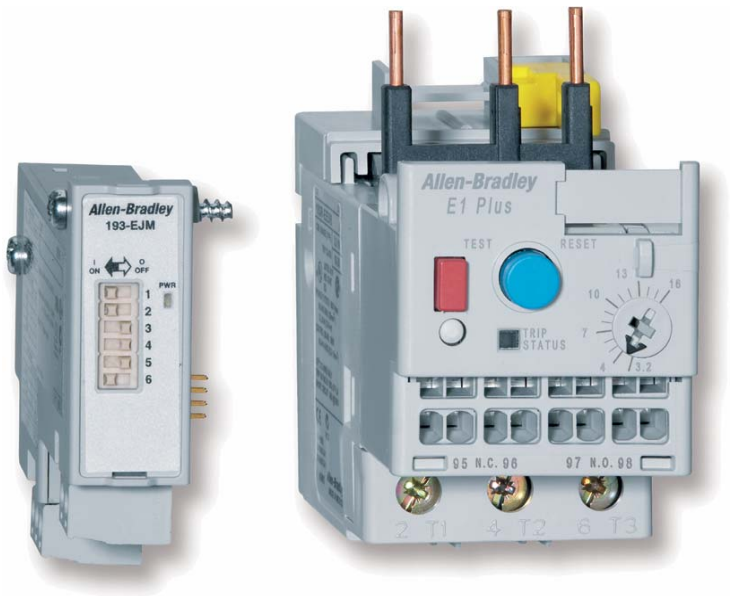
Choose motor protection relays to match the specific application needs such as :

-Simple or heavy duty starting

- Specific protection functions such as earth fault protection

- High-end protection relays with condition monitoring capabilities

E1 Plus Electronic Overload Relay



Setting a new standard for electronic motor protection. The solid-state design provides accurate, reliable and repeatable protection *For simple to medium level applications.*

Wide 5:1 adjustment rate

The patented modular design allows for easy expansion of capabilities through side mount accessory modules, such as:

- DeviceNet Communication Module
- Jam Protection Module incl. Remote Reset
- Remote Reset Module
- PTC Thermistor Module
- Ground Fault Module
- Current ranges from 0.1….800Amps

E3 and E3 Plus Electronic Overload Relay

Offering a broad range of features in one complete, compact package to effectively manage and monitor motor performance in order to prevent and minimise production downtime. *For medium to advanced protection requirements and demanding applications*

Features:

- Advanced protective functions
- Warning settings
- Control capabilities (DeviceLogix)
- Operational data and status information
- Integrated I/O
- DeviceNet communications (ODVA conformance tested)
- Current ranges from 0.4….860Amps (From 9….5000 Amps with CT's)

Bulletin 825 Electronic Overload Relay

Offering a broad range of features in one complete, compact package to effectively manage and monitor motor performance in order to prevent and minimise production downtime. *For advanced and demanding protection requirements and applications*

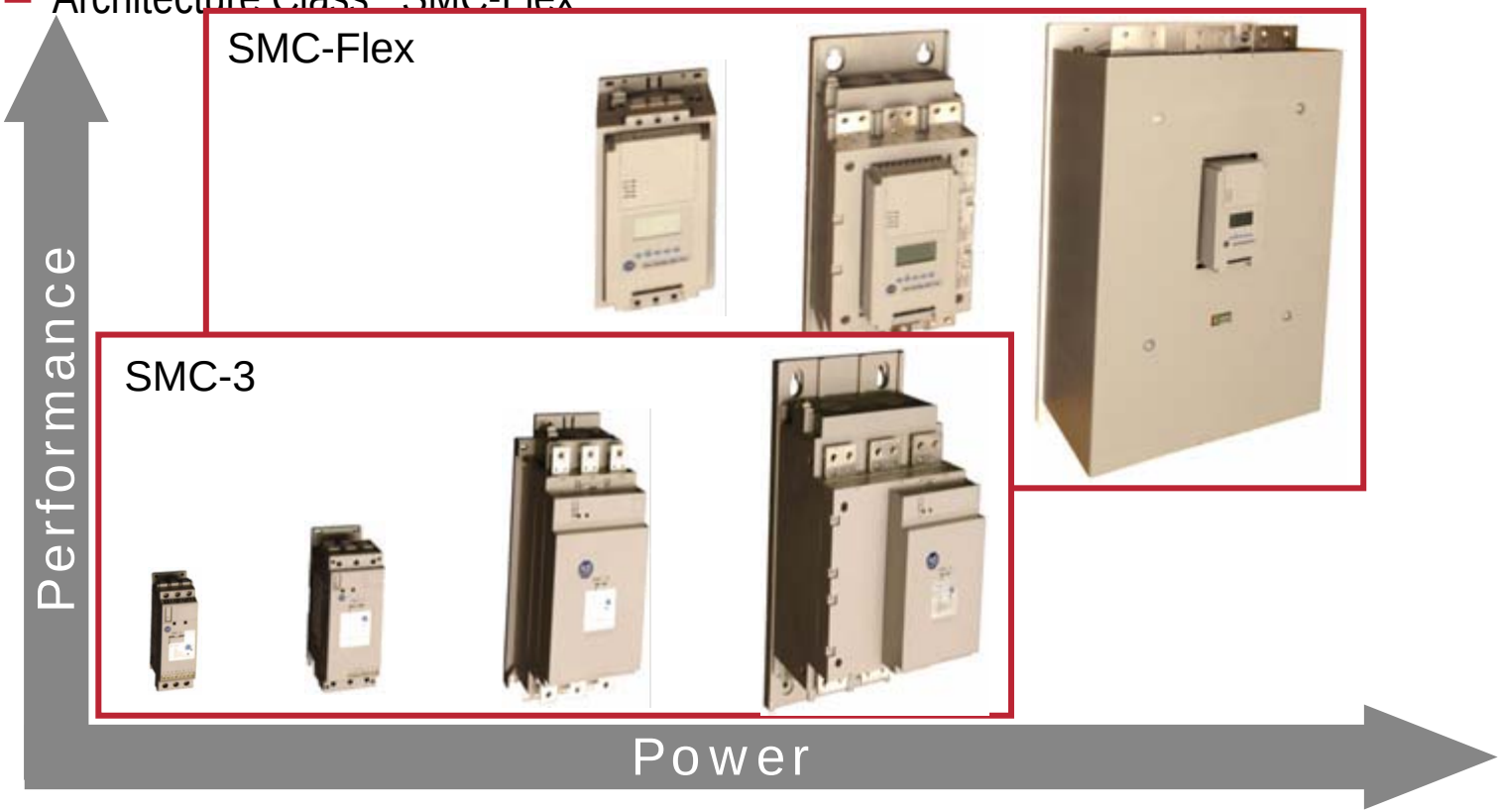
Features:

- Advanced protective functions
- Suitable for Low and Medium Voltage applications
- Warning settings
- Expansion I/O cards
- RTD Scanner module
- Integrated I/O
- Multiple Network communication options
- Current ranges from 0.5….5000Amps

Softstarter Family

Two classes of Softstarter:

- Component Class : SMC-3
- Architecture Class : SMC-Flex



Softstarter SMC-3 Compact Size

Component Class - SMC

- Dip Switch Settable with Diagnostics
- Din Rail Mountable through to 85 Amps
- Very compact design
- Integral Motor Overload Protection
- Built-in Bypass Contacts
- Full 3-phase control

	Frame 1	Frame 2	Frame 3	Frame 4	Frame 5
In line	43A	85A	135A	251A	480A
Inside Delta	74A	147A	234A	435A	831A

Softstarter SMC-Flex - Compact Size

Architecture Class SMC

- Parameter Settable Highly Featured Devices
- Complete Range with Built-in SCR Bypass
- Integral Electronic Overload Protection with Advanced Diagnostics
- Built-in Bypass contactor for minimal heat dissipation
- Provision for various communication networks
- Pump and Brake options available

	Frame 1/2	Frame 3	Frame 4	Frame 5	Frame 6	Frame 7
In line	85A	135A	251A	480A	780A	1250A
Inside Delta	147A	234A	435A	831A	900A	1600A

ArmorStart for Decentralized Applications

VFD

Variable Frequency AC Drive using PowerFlex Technology

SMC

Solid-State Motor Control

DOL / REV

Full Voltage and Reversing

0 2.2 kW 3.0 kW 5.5 kW 7.5 kW

ArmorStart - Overview

- Direct on Line, Soft Starter, and VFD Versions
- Robust Modular IP67 and IP69K design
- High level diagnostics
- Built in adjustable overload
  - Class selectable 10,15 or 20 selectable
  - Manual or Automatic overload reset
- DeviceNet with DeviceLogix and Zone interlocking Parameters
- Embedded I/O
- Supports ADR (auto device replacement) for rapid re-commissioning
- Local Control
  - Integrated HOA and Fwd/Rev
  - Visible LED's for controller status and I/O
- Various options

Variable Speed Control

For simple speed control to precise torque and position control, Rockwell Automation supports you with application knowledge, industry experience and a complete family of PowerFlex drives from 0.25kW to 25MW, helping you achieve the control you need.

Low Voltage AC Drives

Medium Voltage AC Drives

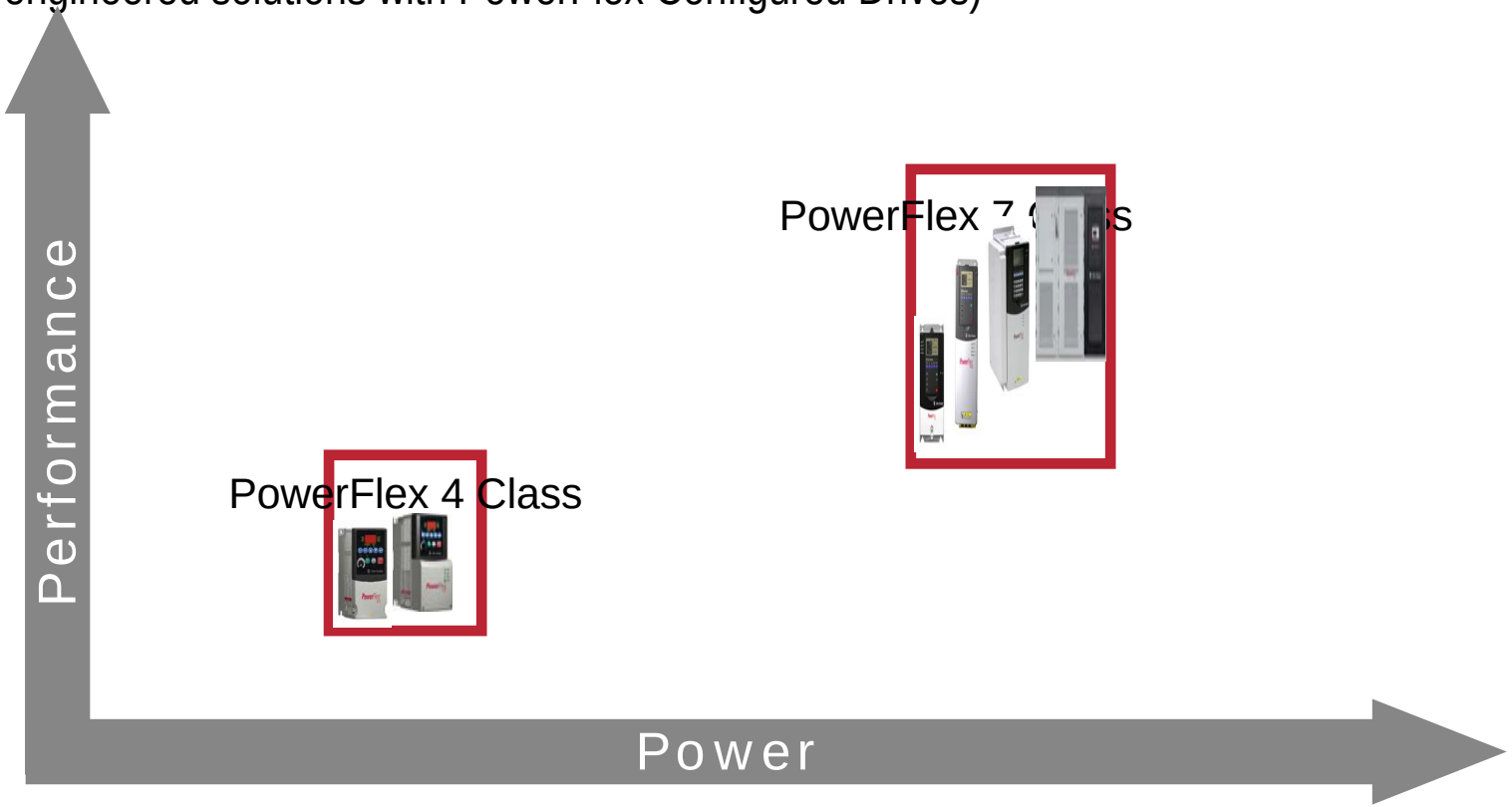
Engineered Drive Solutions

Condition Monitoring

Frequency Drives Family

Two classes of PowerFlex drives:

- Component Class (PowerFlex 4, 4M, 40, 40P and 400)
- Architecture Class (PowerFlex 70, 700, 700S, 700H, Medium Voltage PowerFlex 7000 and engineered solutions with PowerFlex Configured Drives)



Frequency Drives Family

PowerFlex family offering:

- Power ratings from 0.25kW single phase to 25MW at medium voltage
- Low cost, entry level motor control drives to fully featured high specification drives
- Configured drives offering base drive assembled with input protection devices and output devices, all housed in an enclosure. Also available with additional features.
- Standard control interface across PowerFlex family
  - Common setup and programming
  - Seamless integration into your control system

Frequency Drives Family

PowerFlex 4 and 4M

Component Class

- 115 to 480 V, 1/3ph input
- 0.2 to 11kW at 480 V
- Integral user interface
- Integral RS485 serial communication
- Integrated EMC solution for 220V 1ph drives
- Zero stacking for optimized panel space

- Additional features PowerFlex 4M
  - Integrated EMC solution for 400V 3ph Drives
  - Feed through wiring

PowerFlex 4

Up to 4kW at 400-480V

PowerFlex 4M

Up to 11kW at 400-480V

New

Frequency Drives Family

PowerFlex 40 and 40P

Component Class

- 115 to 480 VAC, 1/3ph input
- 0.2 to 11kW at 380-600V
- Integral user interface
- Integral RS485 serial communication
- Integrated EMC solution for 220V 1ph drives
- Zero stacking for optimized panel space
- Sensorless vector control (SVC)
- Highly configurable I/O, incl. PID
- Network and multi-drive connectivity

- Additional features PowerFlex 40P
  - Encoder/Pulse Train Feedback
  - DriveGuard Safe-off

PowerFlex 40

Up to 11kW at 400-600V

PowerFlex 40P

Up to 11kW at 380-600V

Frequency Drives Family

PowerFlex 400

Component Class

- 5.5 to 37kW at 200-240V
- 5.5 to 250kW at 380-480V
- Integral user interface
- Integral RS485 serial communication
- Network connectivity

PowerFlex 400

Up to 250kW a

400-480V

Frequency Drives Family

PowerFlex 70 and 700

Architecture Class

- General features PowerFlex 70 and 700
  - 200 to 690 VAC, 3ph input
  - 0.37 to 132 kW at 380-690V
  - V/Hz, sensorless vector control or flux vector control
  - Torque regulation, w/ and w/o encoder
  - EMC compliance ‘out of the box’
- Additional features
  - PowerFlex 700 Application modules:
    - Profiling, Torque Prove, Float, Fast Stop…
  - PowerFlex 70 with IP66 enclosure
    - Rating up to 37kW @ 400 to 600V

PowerFlex 70

Up to 37kW at 400-600V

PowerFlex 700

Up to 132kW at 400-690V

Frequency Drives Family

PowerFlex 700H

Architecture Class

- 380 to 690 VAC, 3ph input
- 160 to 1‘100 kW at 400-690V
- V/Hz, sensorless vector control
- Rittal TS8 industrial standard enclosure

PowerFlex 700H

Up to 1’100kW at 400-690V

PowerFlex 700S

Architecture Class

- High-performance drive
- AC and servo motor control
- Embedded Logix™ controller
- Electronic line shaft capability
- Motion capabilities

PowerFlex 700S

Up to 1,100kW at 400-690V

Frequency Drives Family

PowerFlex 7000 Medium Voltage Drives

Architecture Class

- 2,200 to 6,600V up to 24,000kW
- Sensorless direct vector control
- Compatible with standard motors (no derating)
- Direct-to-Drive technology (no transformer)
- Current source inverter

PowerFlex 7000

Up to 24,000kW at

Frequency Drives Family

PowerFlex Configured Drives

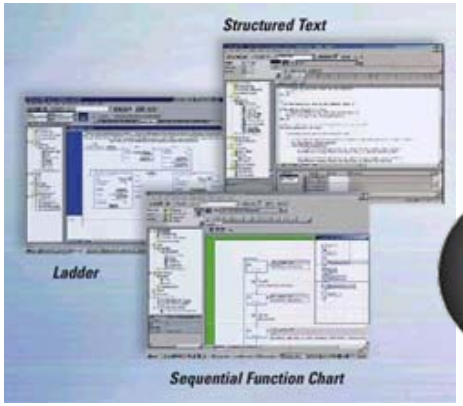
Architecture Class

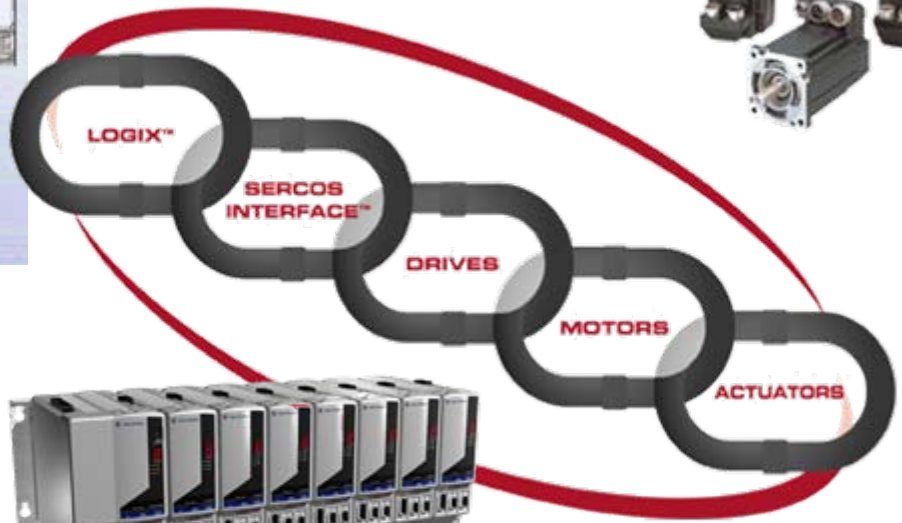
- 240 to 690 VAC, 3ph input
- 15 to 1100 kW
- V/Hz, sensorless vector control or flux vector control
- Torque regulation, w/ and w/o encoder
- Standard metric Rittal cabinet sizes

Frequency Drives Family

- PowerFlex connect to “all” common networks
  - 4 Class Products Core Networks:
    - EtherNet I/P, ControlNet, DeviceNet
  - 4 Class Products Other Networks
    - Profibus, LonWorks, BACnet
  - 7 Class products Core Networks:
    - EtherNet I/P, ControlNet, DeviceNet,
  - 7 Class products Other Networks
    - Remote I/O, Serial RS-485 DF1, Profibus, InterBus, CANopen, LonWorks, Modbus RTU, Johnson Controls, Metasys N2, Siemens Building Technologies P1, BACnet

Kinetix - Integrated From Control To Actuation





Servo Drives

Servo Motors

Kinetix Servo Drives – Full Power Range

Kinetix 7000
15 - 150kW

Kinetix 6000
1.8 - 22kW

Ultra 3000
50W - 22kW

Kinetix 2000
50 – 800W

50W 200W 500W 2kW 5kW 20kW 50kW 200kW

Kinetix Servo Drives - Ultra

- Ultra 3000
  - Ultimate scalability and flexibility for high & low power applications from 1 to many axes
  - Available in a number of different versions

Component Class

- IEC Analogue interface for use with third party controllers
- Built in ‘Indexer’ for stand alone, point-to-point, applications requiring servo performance

Architecture Class

- Built in DeviceNet network for point-to-point applications requiring flexible machine set up, menus etc.
- Built in SERCOS network for highly performance, tightly co-ordinated control with Logix

DeviceNet

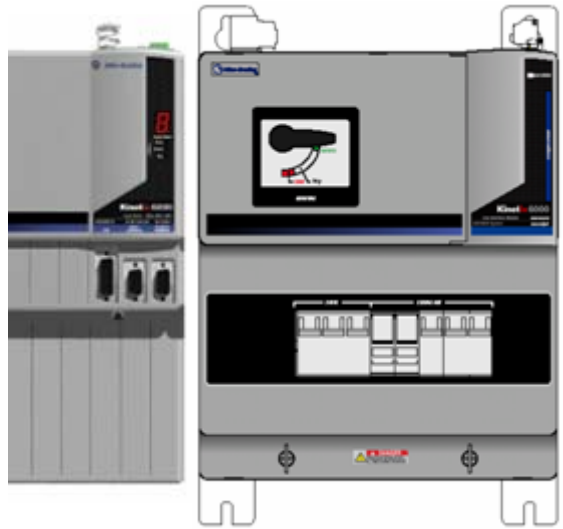
SERCOS interface

Kinetix 2000 Low Power Multi-axis SERCOS Drive

- Continuous output currents from 1 to 9.5Arms
- 3 Converter modules providing 3 kW output at 3 phase and 2 kW at single phase
- 230V 3phase and single phase input power
- SERCOS communications

Kinetix Servo Drives – Kinetix 6000

SERCOS interface



- Kinetix 6000
  - Best suited to 2-3 axis applications and above
  - 230V and 460V for direct connection to 3 phase
  - 10 Converter and 10 Inverter modules providing 3 to 45 kW output power
  - Offers a number of benefits
    - Full integration into IA
    - Space, mounting, wiring savings
    - Performance
  - Now with integrated safety (Cat 3, SIL3)

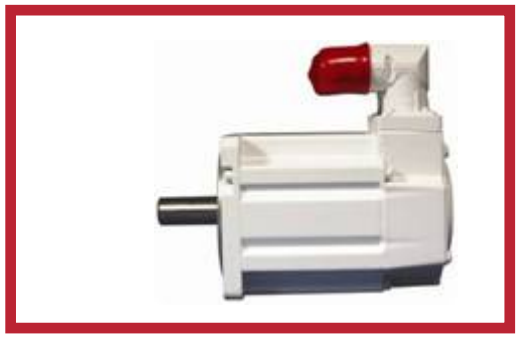
Kinetix Servo Drives - Kinetix 6000

- Just like a PLC, starts with a rack...
  - Mounting structure to secure modules
  - Reduces the number of mounting holes
  - Power distribution
  - Secure earthing and bonding
- Next simply clip on modules
  - Fast
  - Safe
  - Modular
    - supports 1-8 axes per rack
    - choose from wide range of servo drives with power to match the application

Kinetix Servo Drives – Kinetix 7000

- Integrated Motion
  - Takes full advantage of integrated motion supporting savings throughout the machine lifecycle from acquisition through design, installation, operations and maintenance
- Quality
  - Outstanding qualification performance
  - Built on two proven foundations – PowerFlex power structure and Kinetix control
- Power range and scalability
  - Any machine, complete coverage up to 150KW. You can take advantage of a single solution to meet your needs.
- Commonality
  - Same fault codes, same IO, same feedback cables, same safety connections as the Kinetix 6000. Common drive family up to 150Kw. Learn one and once.
- Safety
  - GuardMotion. More productivity for your machine.
- Motor flexibility
  - One drive solution for applications needing permanent magnet (synchronous) and induction (asynchronous) motors.

Kinetix Servo Motors - Overview



- MPL Series
  - Most popular servo motor with excellent performance, large power range, compact size, good IP rating
  - 1.5-163 Nm cont. (expanded to 0.3Nm May ’06)
  - Choice of feedback devices
  - Option of failsafe brake & shaft seal
- MPF Series
  - Special food grade version of MPL
  - Stainless shaft, food grade paint and special connectors
  - 1.5-19 Nm cont.
  - Choice of feedback devices
  - Brake option
- MPS Series
  - Most rugged of the MP Series family
  - Full-featured stainless steel product for harsh-duty, high pressure, hot caustic wash down applications
  - Suited to customers with key needs in raw food and pharmaceutical applications
  - Choice of feedback & brake options

Kinetix Integrated Actuation - Overview

- Integrated Actuation Benefits
  - Combines motor and actuation into a single housing
  - Reduces integration time – no compatibility sizing, parts selection, mounting hassles…
  - Size reduced up to 40% so machine can be smaller
  - Weight down by 25% for more machine payload
- Rotary Actuation
  - MPG-Series Integrated Motor Gearbox
  - Combines high torsional stiffness with low backlash
  - Ideal for indexing tables, robot arms, tool changers
- Linear Actuation (Available August ’07)
  - MPAS Series Integrated Motor Linear Stages
  - MP-Series™ Integrated Linear Stages allow the designer to select a linear actuator based on the desired performance and not worry about the internal drive mechanism

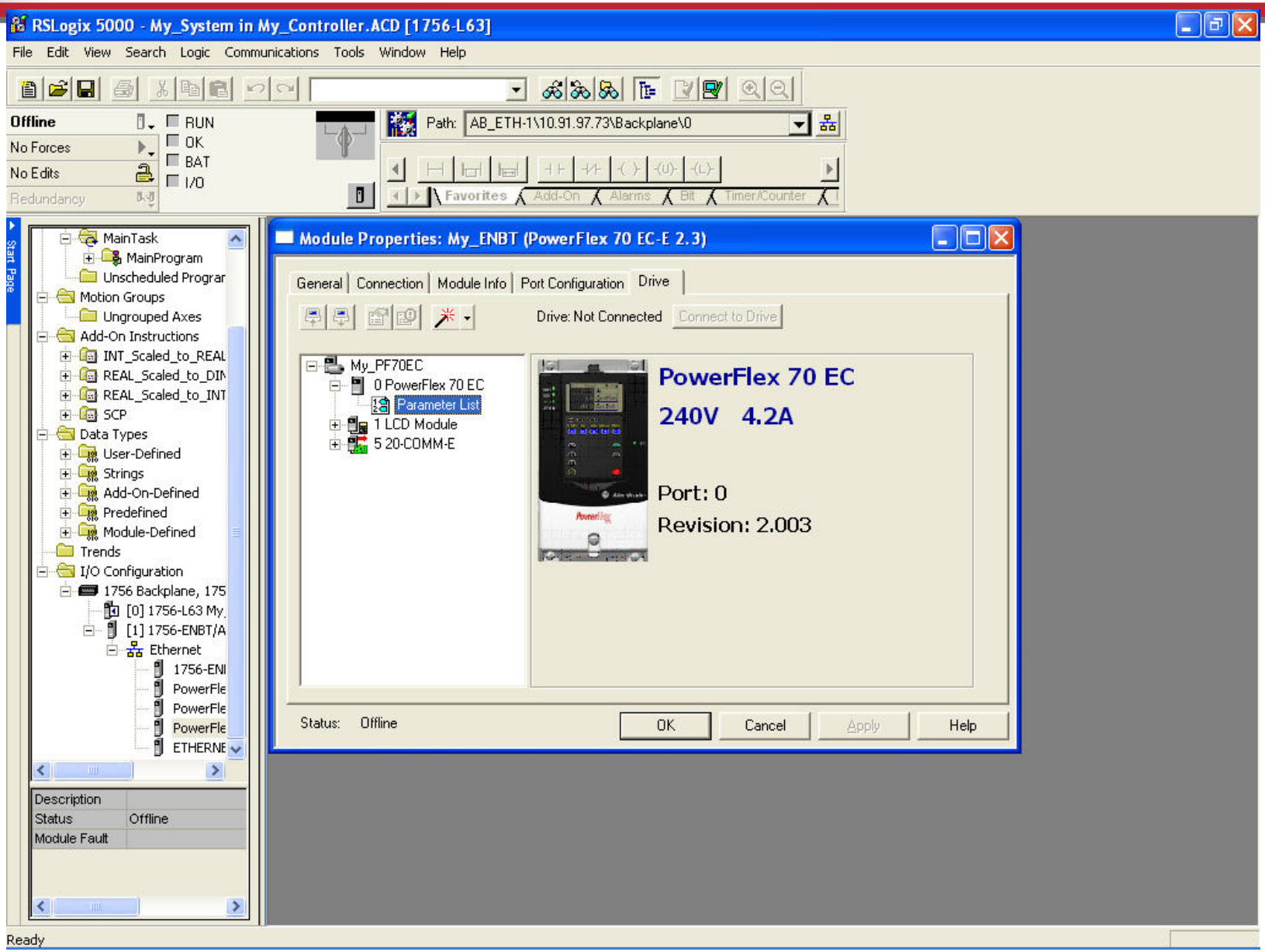
What is Premier Integration?

Premier Integration

Reduces development time by providing profiles, parameters and standardised tags that users can easily install using a pick-list and makes copy/paste programming makes configuring multiple drives effortless

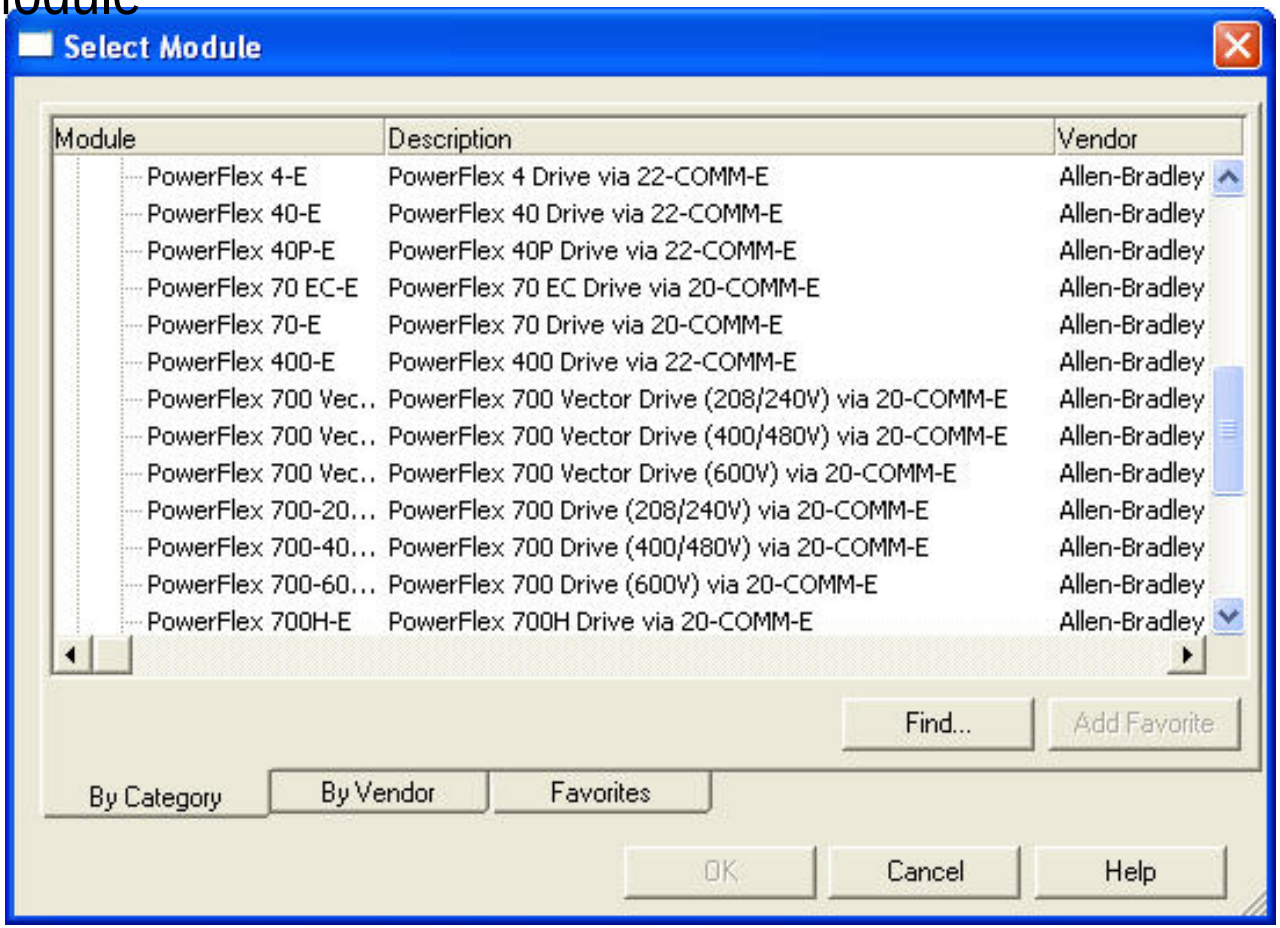
- Single programming environment for soft starters, variable speed drives and motion drives
- No programming manuals needed
- Dynamic selected drive parameters transmitted as network I/O
- Auto generation of descriptive tag names
- Drive parameter configuration via interactive wizards
- Elimination of programming errors due to duplication of tags
- Single repository of configuration data aids multiple drive programming or device replacement

RSLogix 5000 v16 - Integrated Drive Profiles



RSLogix 5000 v16 – Integrated Drive Profiles

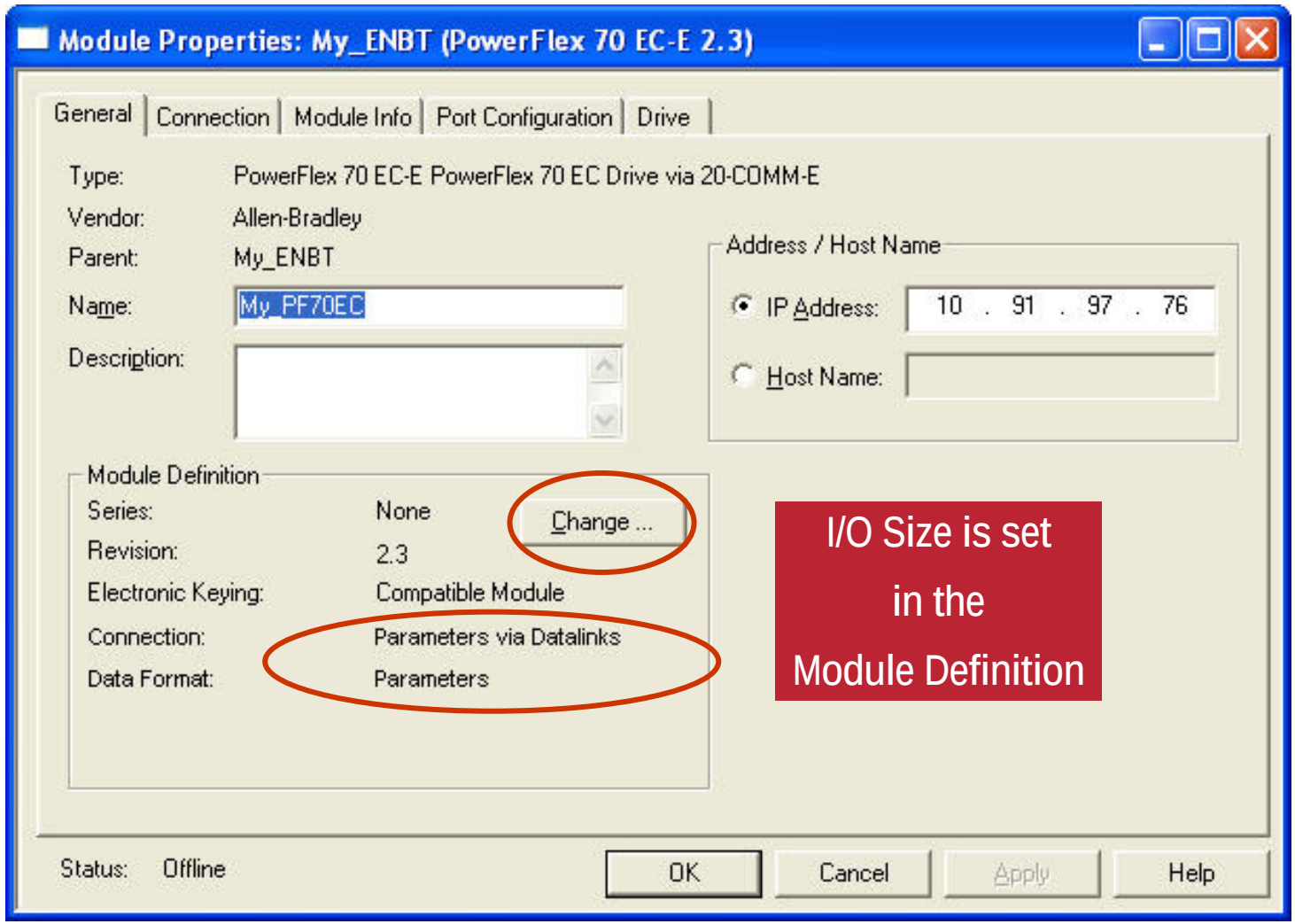
- Select Module



PowerFlex 7-Class and 4-Class drives, and most SCANport-enabled drives On ControlNet and EtherNet/IP networks

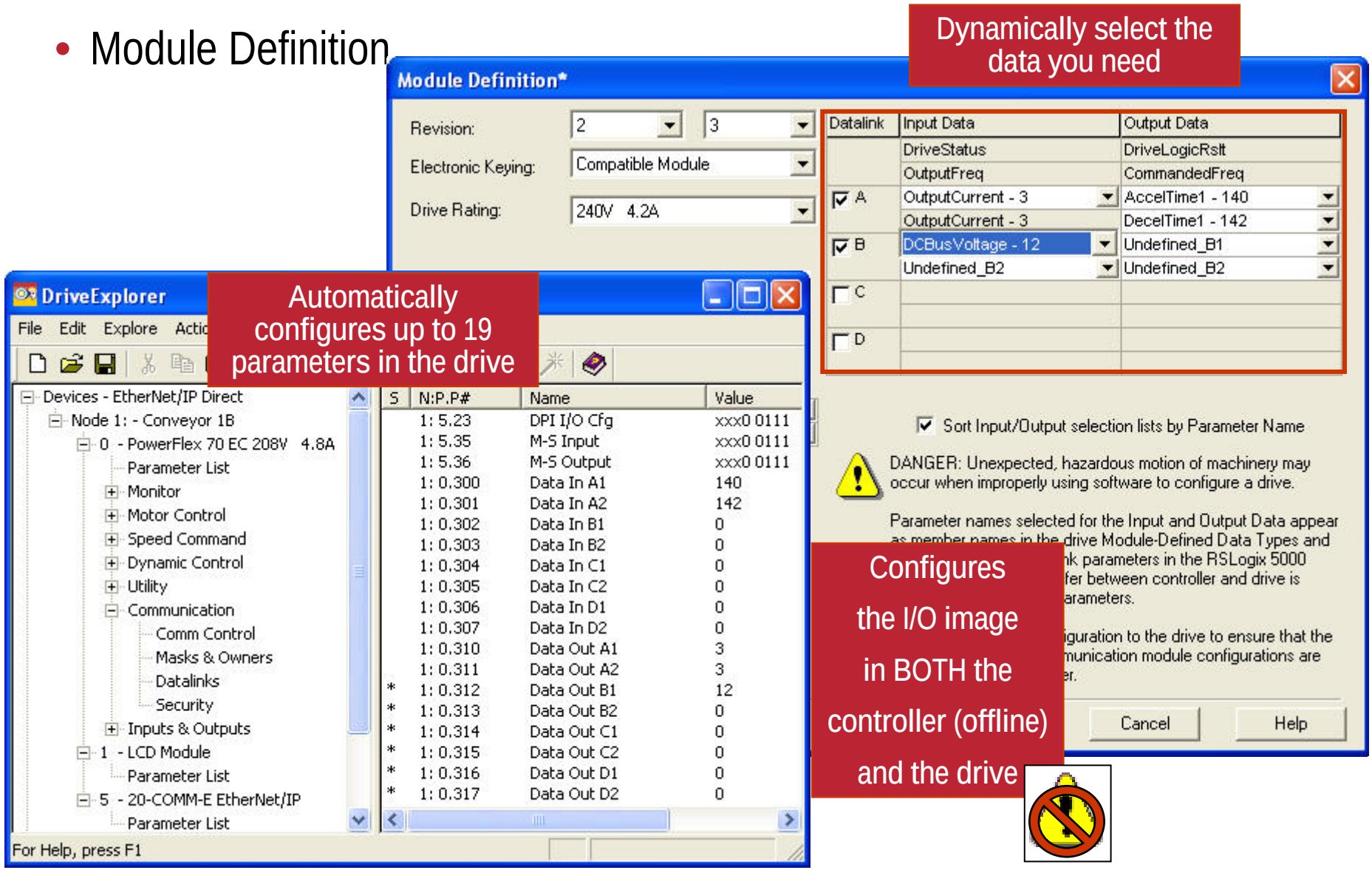
RSLogix 5000 v16 – Integrated Drive Profiles

- General Tab



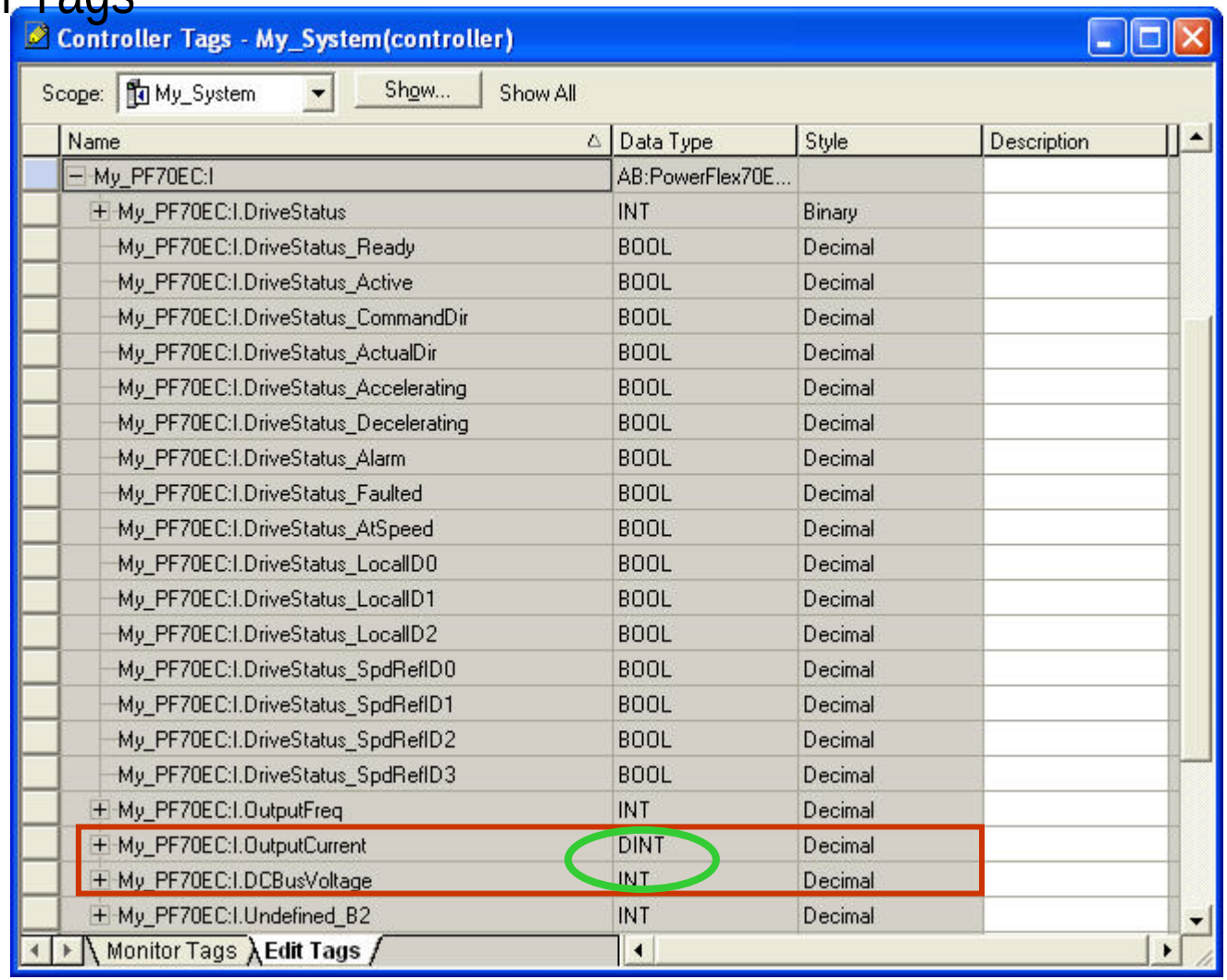
RSLogix 5000 v16 – Integrated Drive Profiles

- Module Definition



RSLogix 5000 v16 – Integrated Drive Profiles

- Auto-Generation of Tags



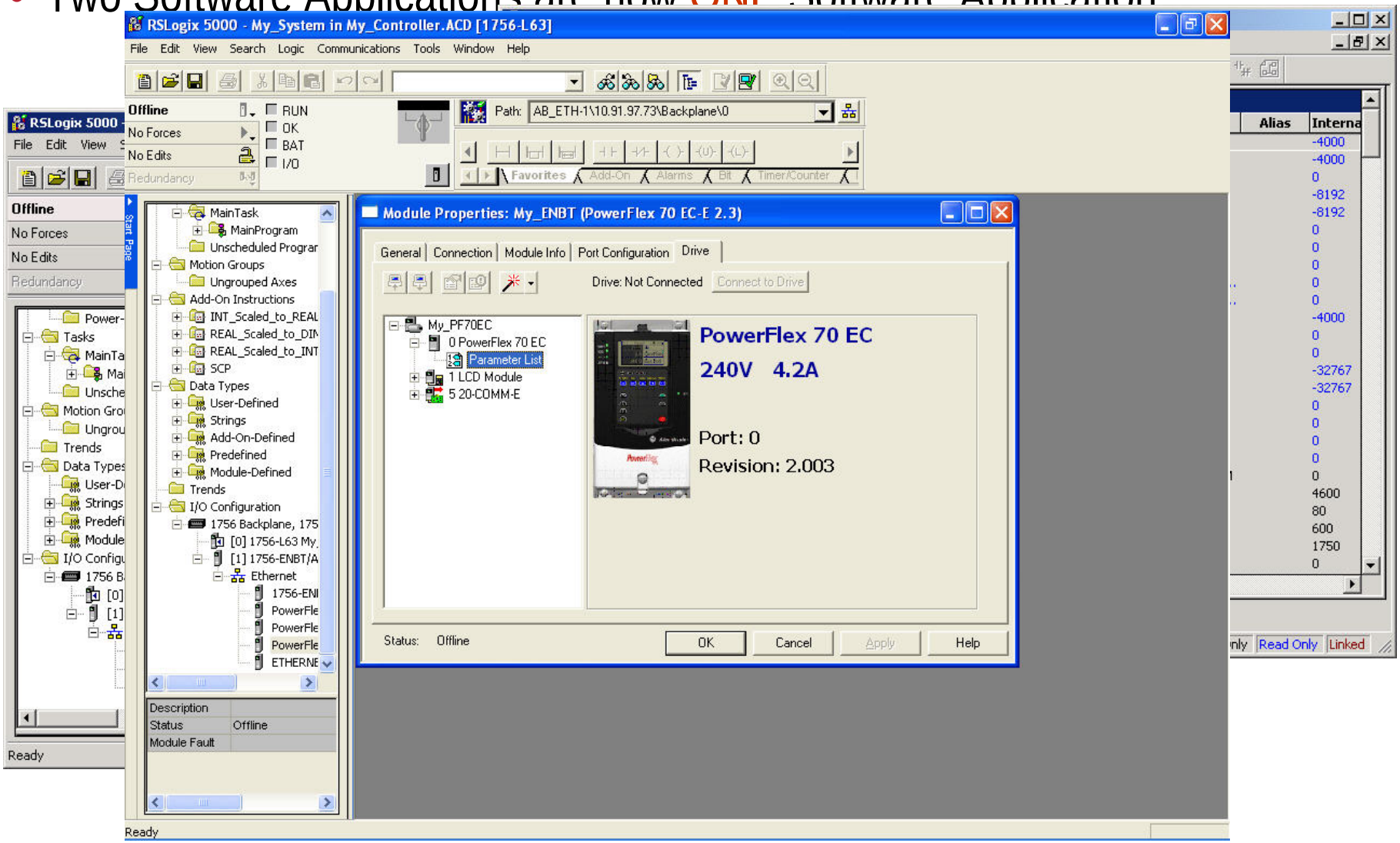
All tags are descriptive

(now Datalinks are too)

and use a data type respective of the parameter

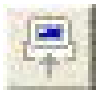
RSLogix 5000 v16 – Integrated Drive Profiles

- Two Software Applications are now ONE Software Application



RSLogix 5000 v16 – Integrated Drive Profiles

- Drive Tab

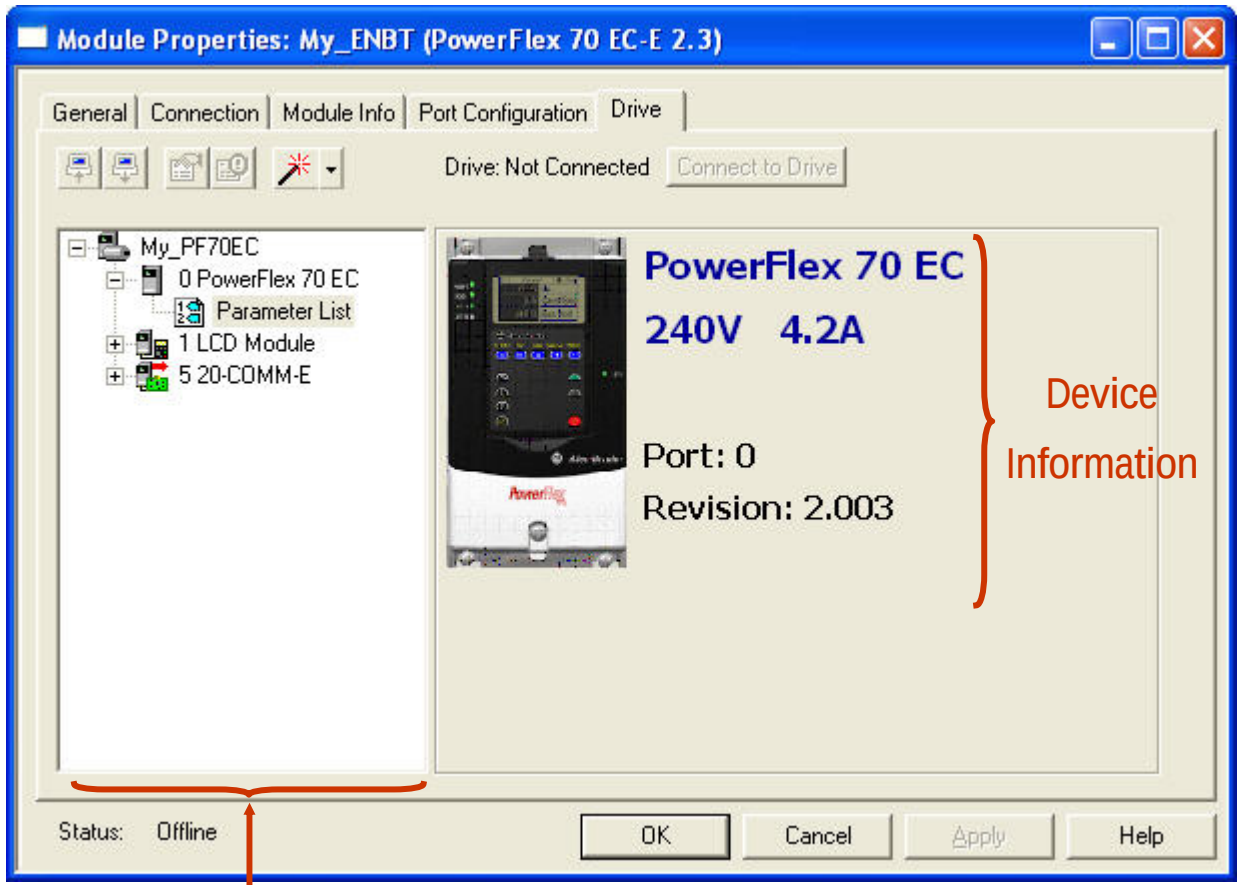

Upload


Download


Properties


Faults, Alarms, Events

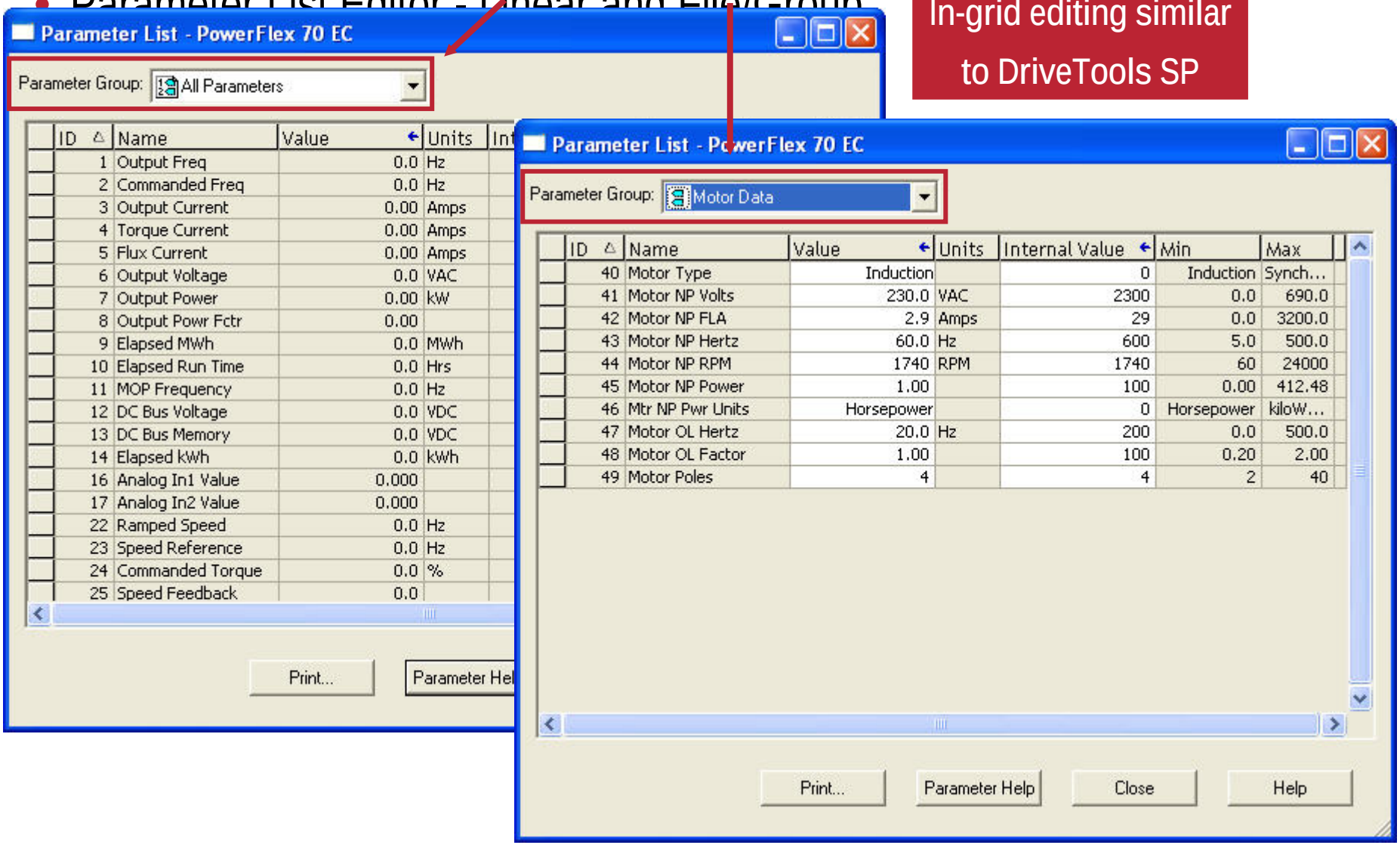

Wizards



Device Pane similar to DriveTools SP and DriveExplorer

RSLogix 5000 v16 – Integrated Drive Profiles

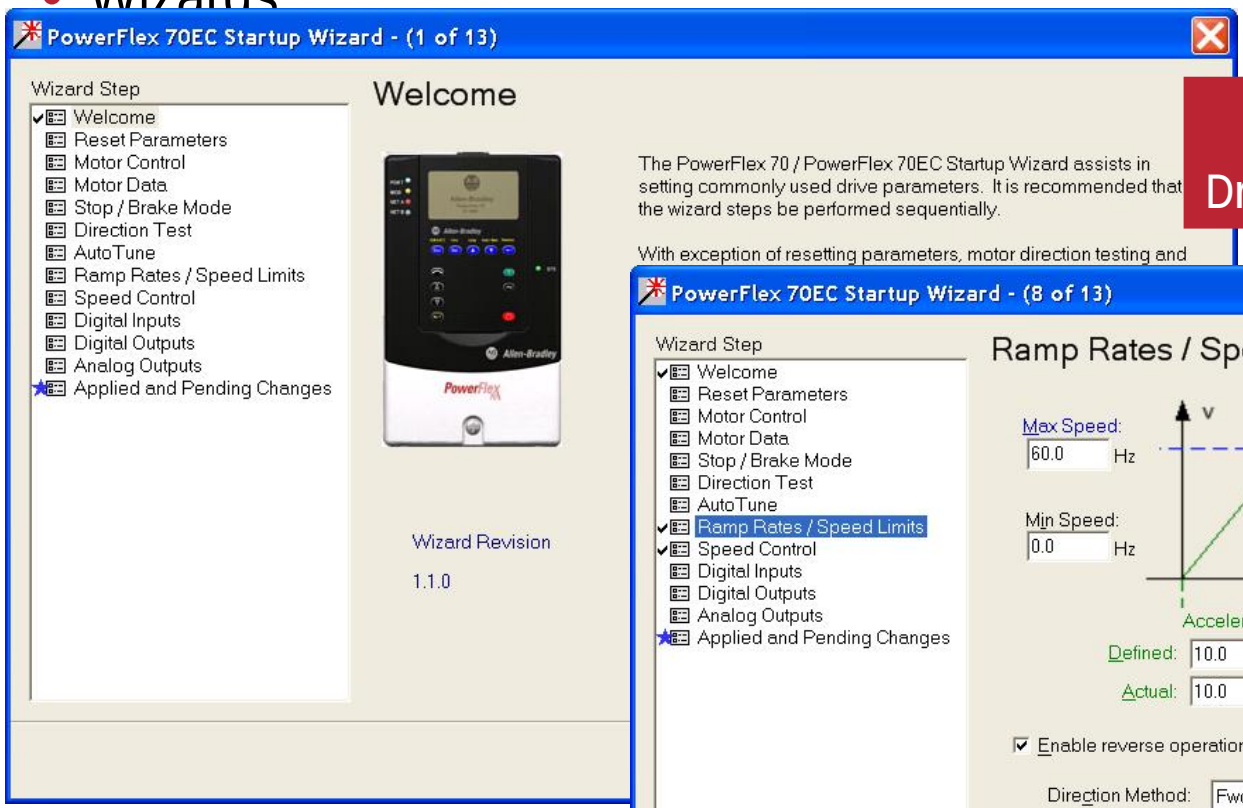
- Parameter List Editor - Linear and File/Group



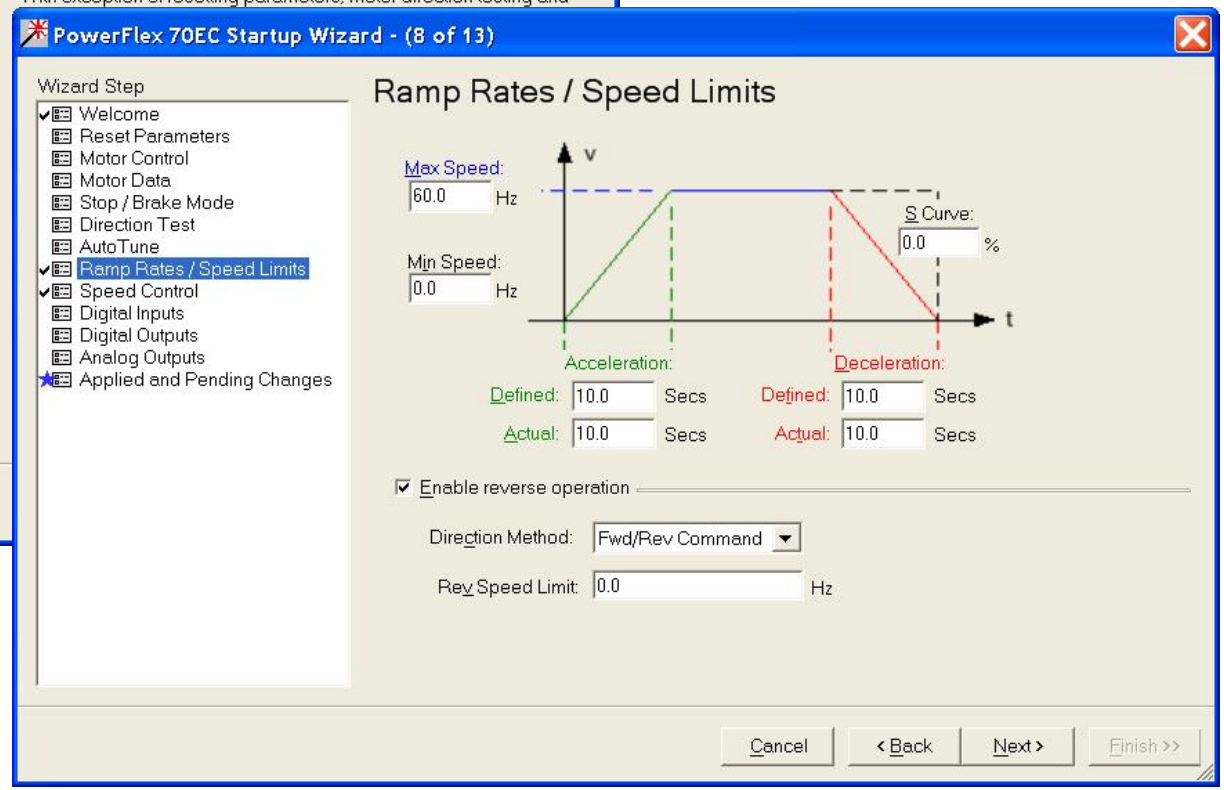
In-grid editing similar to DriveTools SP

RSLogix 5000 v16 – Integrated Drive Profiles

- Wizards

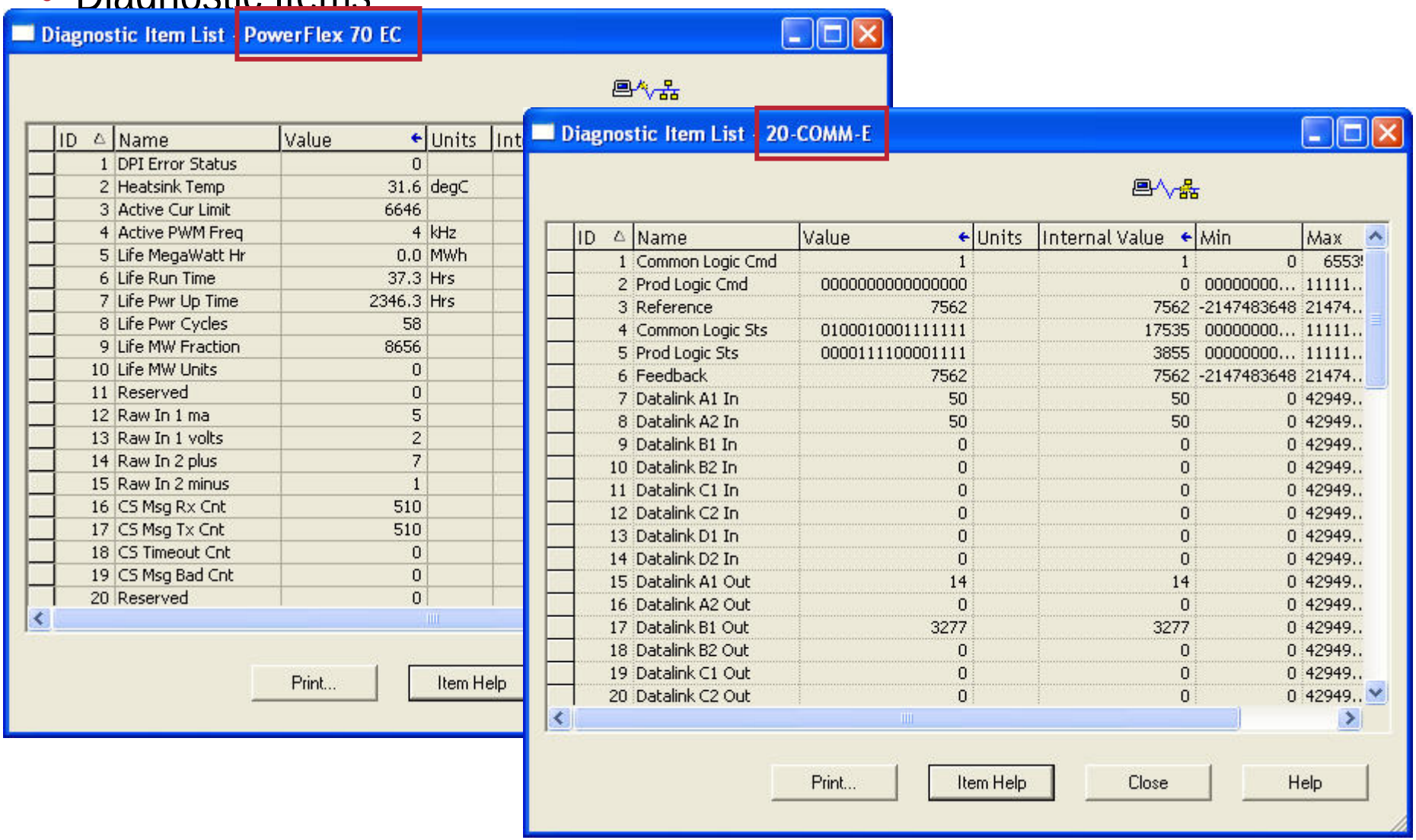


Same wizards used with DriveTools SP and DriveExplorer



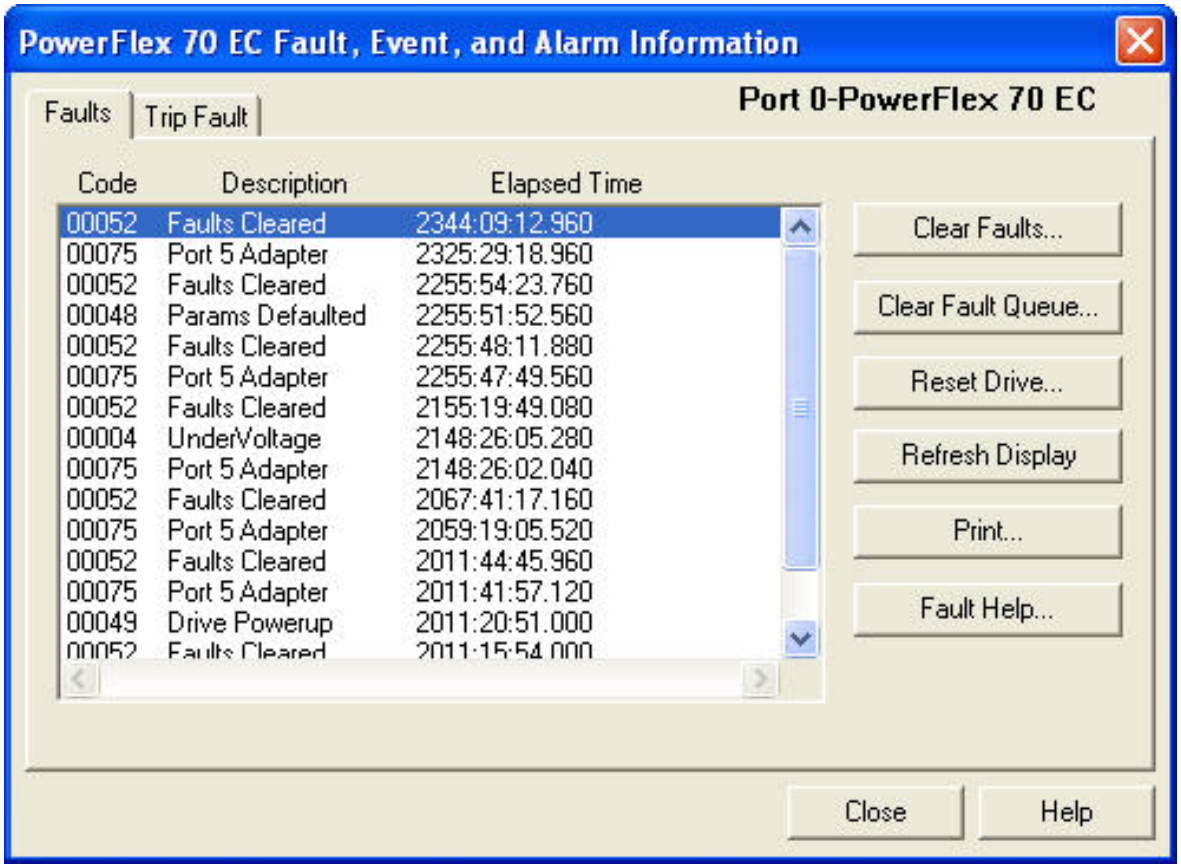
RSLogix 5000 v16 – Integrated Drive Profiles

- Diagnostic Items



RSLogix 5000 v16 – Integrated Drive Profiles

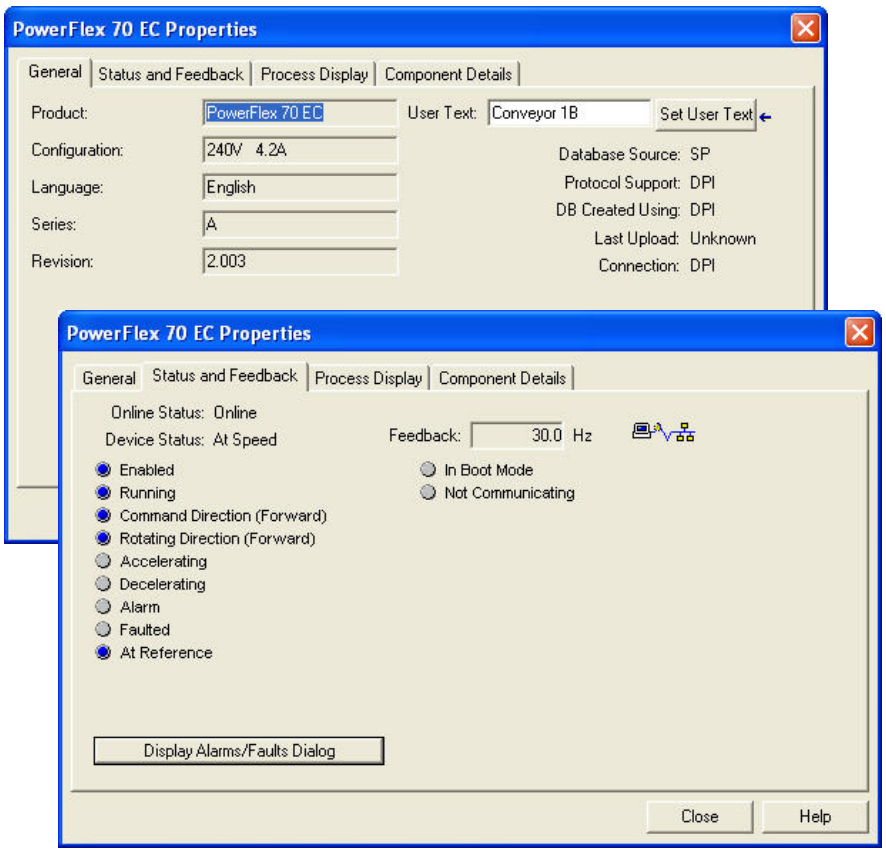
- Fault, Alarm and Event Information



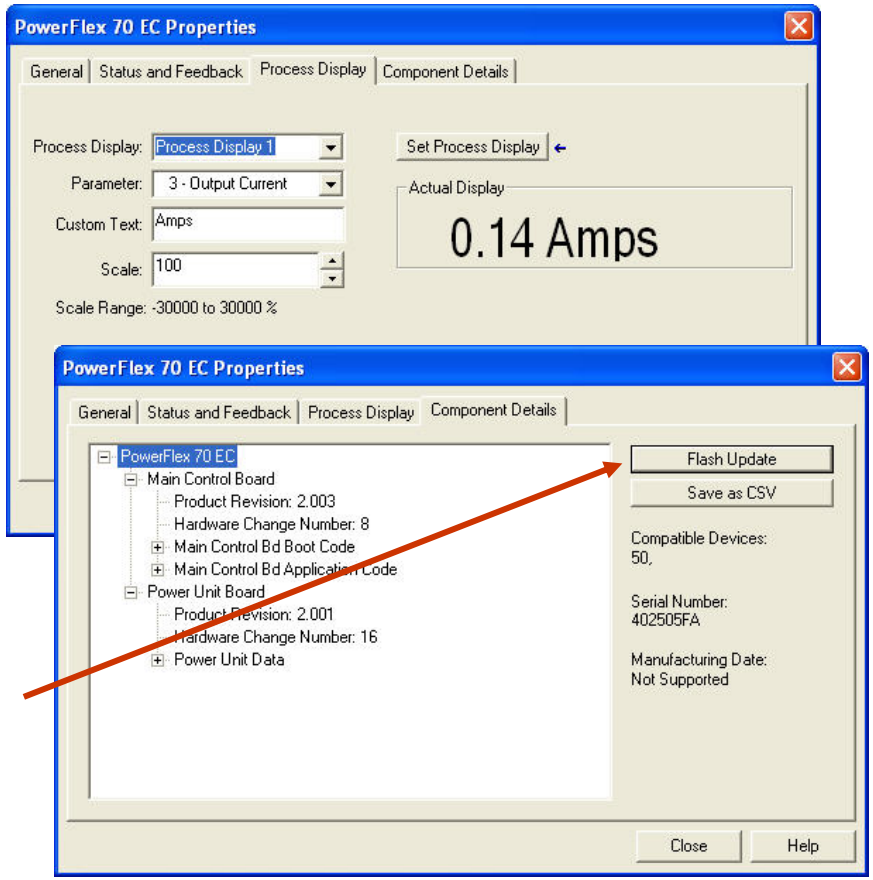
Same component used in DriveTools SP

RSLogix 5000 v16 – Integrated Drive Profiles

- Device Properties



Same component used in DriveTools SP



Flash drives and peripherals directly from RSLogix 5000

RSLogix 5000 v16 – Integrated Drive Profiles

- Drive configuration settings are saved in the ControlLogix processor since it is part of the .ACD file
  - **Single** repository of system configuration settings
    - User <u>manually</u> downloads the drive configuration settings

RSLogix 5000
*.ACD file

Configuration settings for each drive

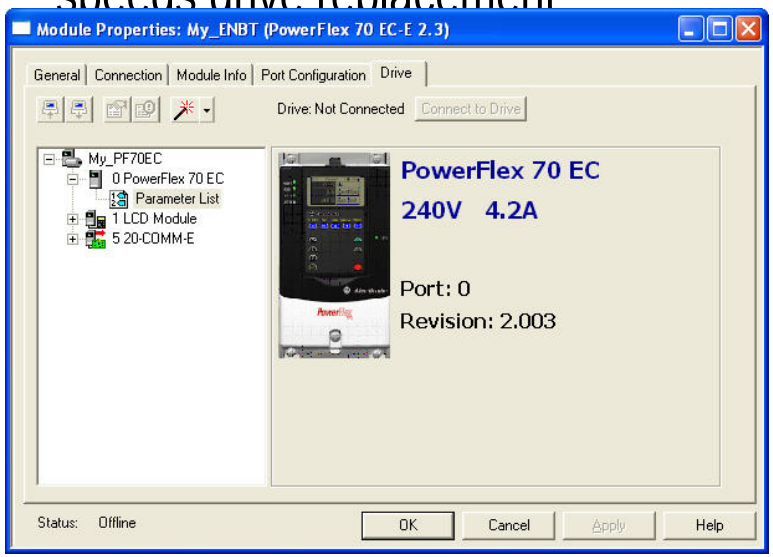
Integrated Drive Profiles - Benefits

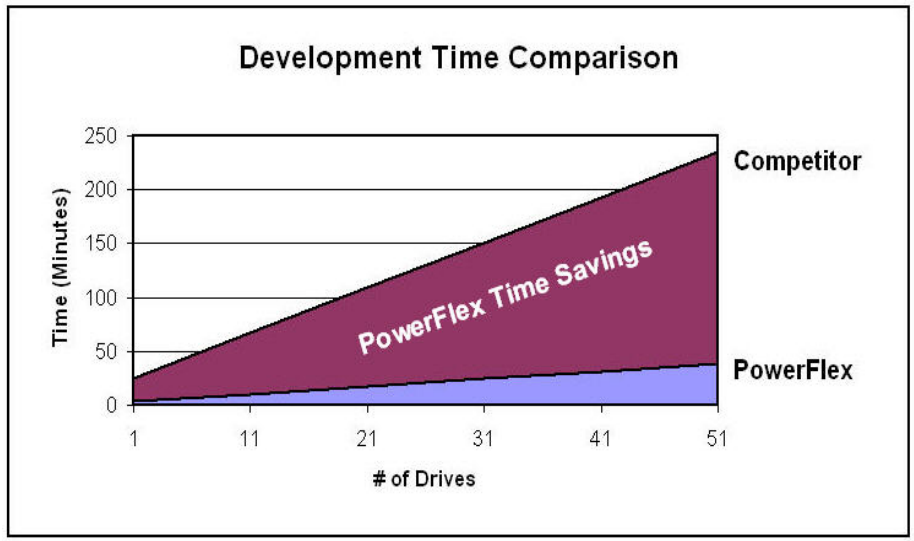
- Reduce drive system development time by as much as 70%*:
  - Use one software tool to configure the entire Logix / drive system
  - Controller and drive network connections are configured at the same time
    - eliminates I/O mismatch errors
  - Dynamically select drive parameters transmitted as network I/O
    - communicate only what is needed for the application
  - Auto-generation of descriptive tag names
    - eliminates the need to enter individual tag descriptions
  - Auto-generation of respective tag data types
    - eliminates the need to convert from one data type to another
  - All drive configurations are saved in the RSLogix project file and in the Logix controller
    - provides a single source of drive configuration data
  - Copy & Paste capability simplifies creating additional duplicate drives
    - duplicates the drive configuration settings so all the new drive needs is a different node address
  - Allows use of the same easy-to-use drive configuration Wizards used in DriveTools SP and DriveExplorer

* Figure obtained from timed side-by-side drive configuration comparison testing

Integrated Drive Profiles - Benefits

- Develop systems that are easier to maintain:
  - Drive diagnostic, fault, alarm and event information is integral to RSLogix 5000
  - Drive Tech Support Wizard can be run from RSLogix 5000 to collect all pertinent information about a drive, it's peripherals, various software components, and PC operating system
  - Drives can be flash updated from RSLogix 5000
  - Having a single repository of drive configuration data (in RSLogix project file) speeds drive replacement





Condition Monitoring

Integrated Condition Monitoring

Condition Based Maintenance is a strategy for scheduling maintenance activities based on the condition of the asset.

What is Condition Monitoring?

- Collection and trending of a parameter which changes when machine condition begins to degrade. Example: Vibration Level Increasing With Time
- The goal is to identify changes in the condition of a machine that will indicate some potential failure

What Does the "Integrated" Mean in Integrated Condition Monitoring (ICM)?

- Integration of Multiple Condition Monitoring Technologies Through "Open" Software : Vibration Analysis, Thermography, Pressure, temperature, etc
- Integration Between Rockwell Emonitor Software and ERP Systems and CMMS (i.e. Plant Asset Management) : MAXIMO, SAP.
- Hardware Integration Through Industry-Standard Communication Protocols to PLCs, HMIs, Drives, DCS, etc

The goal of a Condition Based maintenance program is to perform maintenance only when it it needed.

Benefits of Condition Monitoring

- *Condition Monitoring* increases overall knowledge of the condition of manufacturing assets and allows decision makers to optimize scheduling of downtime, labour, and materials.
  - Increases availability, capacity, & throughput
  - Improves OEE, RONA, or other plant metrics
  - Reduces unplanned downtime
  - Reduces planned downtime
  - Reduces inventory costs
  - Reduces the time for repairs
  - Defers scheduled maintenance
  - Improves Safety and Quality

Condition Monitoring provides the inputs to a Condition Based Maintenance Strategy (Predictive Maintenance Strategy)

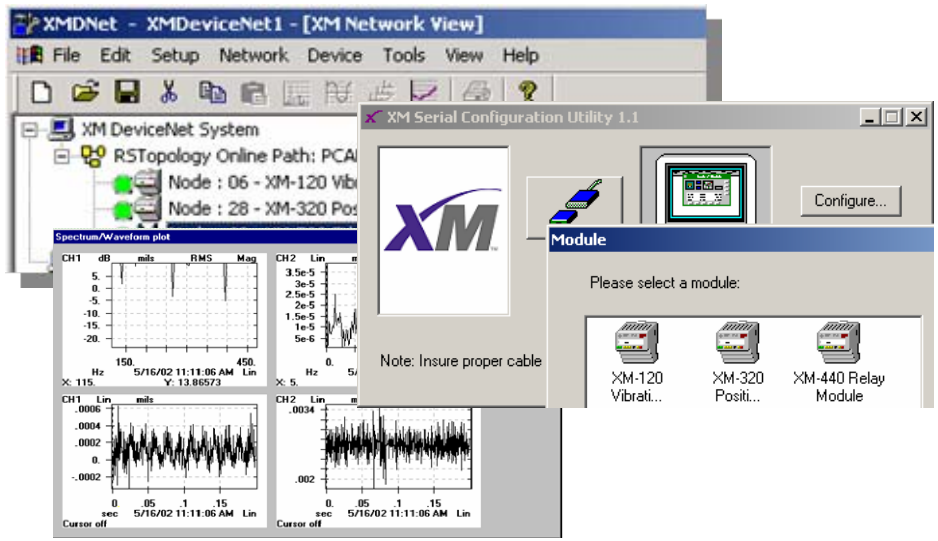
60% of preventive maintenance activities are considered unnecessary (ARC Advisory Group)

The XM Family Includes…

- **Two Channel Dynamic**
  - XM-120 Standard
    - XM-120E Eccentricity
  - XM-121 Low Frequency
  - XM-122 gSE Vibration
  - XM-123 Aeroderivative

- **Two Channel Speed & Position**
  - XM-220 Dual Speed
  - XM-320 Position
- **Six Channel Process & Temperature**
  - XM-360 Process
  - XM-361 Universal Temperature
  - XM-362 Isolated TC Temperature
- **Six Channel Overall Vibration**
  - XM-160 Process
  - XM-161 Universal Temperature
  - XM-162 Isolated TC Temperature

- **Four DPDT Relays**
  - XM-440 Master Relay
  - XM-441 Expansion Relay
- **Gateways**
  - XM-500 Ethernet to DeviceNet Gateway
  - PLC Gateway
  - 3rd Party



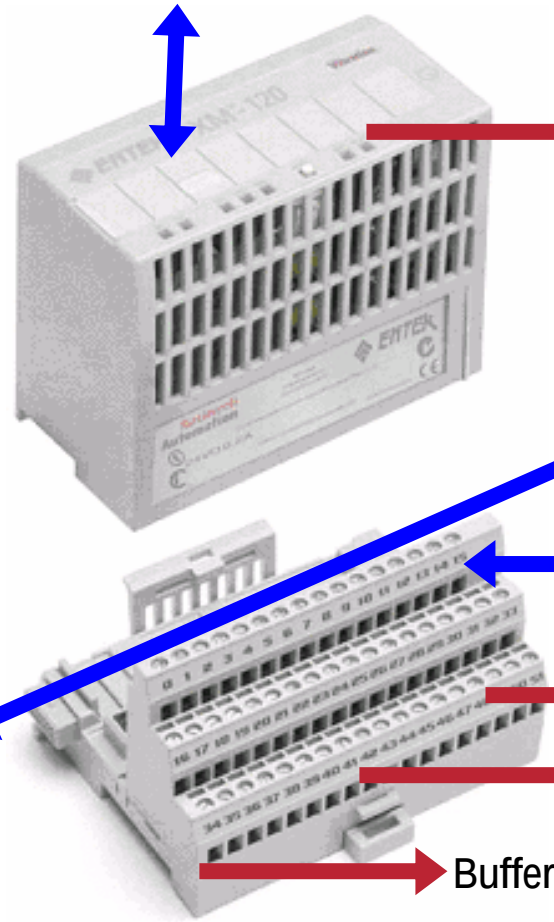
Common XM Module Features

Every  measurement module…

- Incorporates a **single onboard relay** (2 channel modules only)
- Captures **trended parameters** upon event (relay actuation) or remote command (host PC, controller or XM-440)
  - Dynamic Modules (XM-12x) also capture startup/coastdown data
- Supports
  - **Expansion relay** module
  - **Redundant power** supplies
  - Automatic Device Replacement (**ADR**)
- Are **hot swappable**
- Allow **firmware updates** via the network or local access
- Support both **local** and **remote configuration**
- **Devicenet communication**

A Wealth of Communications Solutions…

Serial communications to the XM Serial Configuration Utility



Module status indications via LED color (off, red, yellow) and state (solid, flashing)

DeviceNet communications to any DeviceNet compliant system or application

Proportional level value via 4-20mA output

Condition (alarm) status via relay position

Buffered outputs to secondary measurement systems

…That allows XM to…

Operate Stand Alone

- Serial Configuration Utility
- Integral Relays
- 4-20mA Outputs

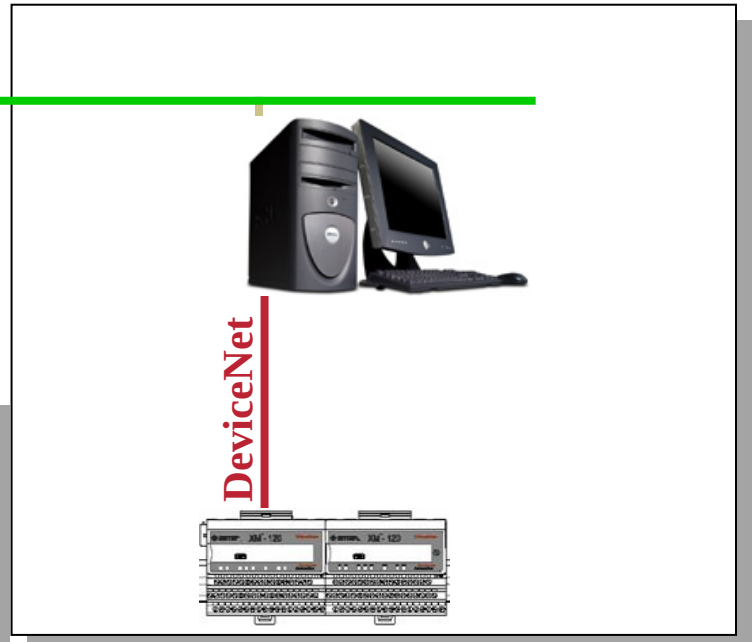
As a system by itself

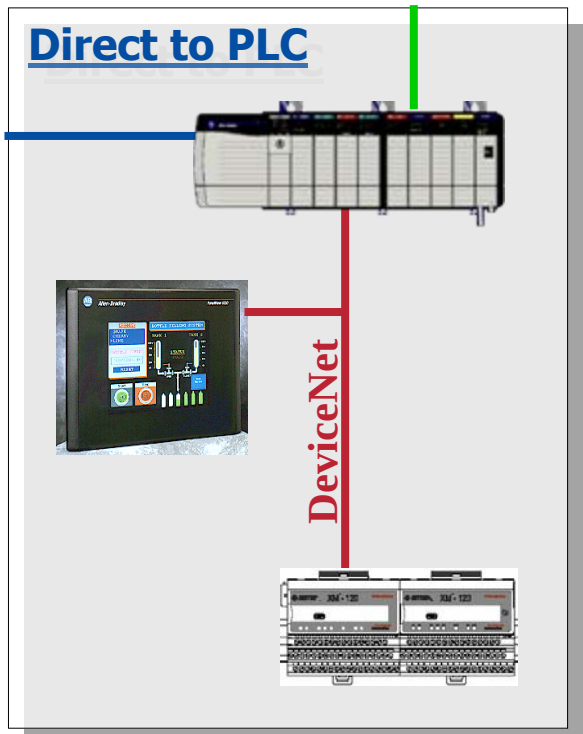
- Ethernet gateway
- Remote (Master) Relays
- Instant fault response
- Hazardous area certified
- Intelligent alarm and relay management

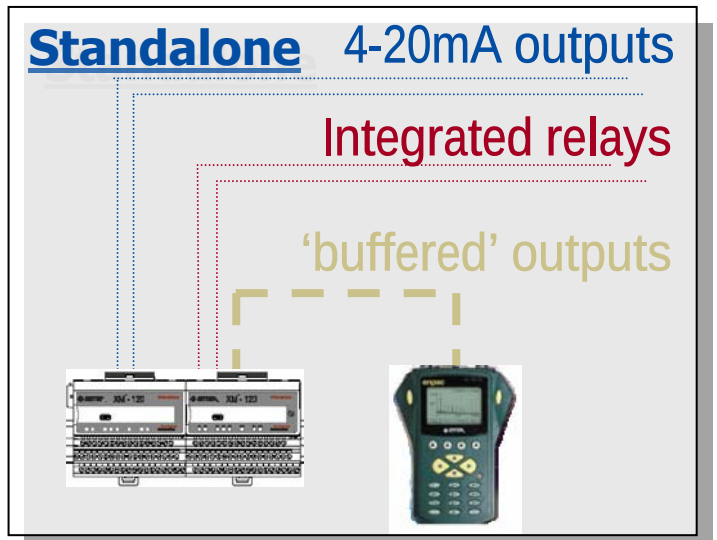
Or as a member of a broader system

- ODVA Certified DeviceNet communications
- Common power and installation requirements

The Industry's Most Flexible H/W Architecture







Rockwell Automation Capabilities

Exceeding your expectations.
Achieving results.

Exceeding Your Expectations

Building results-based solutions to meet your business objectives

- Lower total cost of ownership
- Faster time to market
- Better asset optimization
- Broader risk management

Rockwell Automation At A Glance

Leading global provider of industrial automation control and information solutions

- Annual Sales: About $5 billion
- World Headquarters:
  Milwaukee, Wisconsin, USA
- Trading Symbol: ROK
- Employees: About 19,000
- Serving customers in
  80+ countries

Serving You Around the World

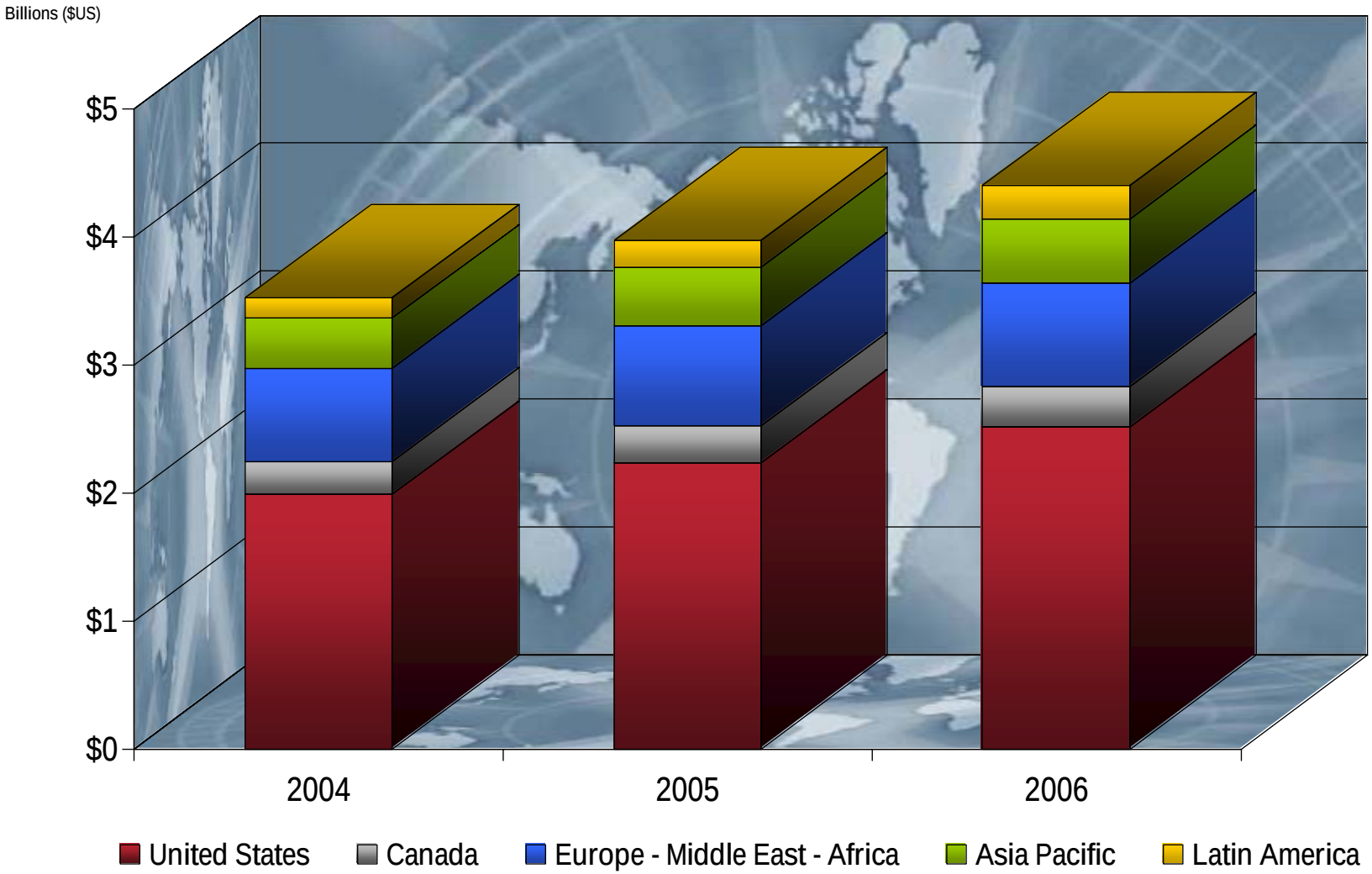
North America:
300 sales & support locations
14,000+ employees

Latin America:
30 sales & support locations
800+ employees

Europe, Middle East & Africa:
90+ sales & support locations
50+ countries
3,000+ employees

Asia Pacific:
50+ sales & support locations
20+ countries
1,700+ employees

Sales by Region



Expanding Our Global Presence

Expertise Focused on Your Industry

- Consumer-Driven Industries
  - Manage demand variability, rapid system reconfiguration & compliance
- Heavy, Resource-Driven Industries
  - Improve efficiency & keep critical assets up & running
- Machine/Equipment Builders (OEMs)
  - Make equipment easier to design, build, integrate & maintain

Consumer-Driven Industries Include…

Automotive

Increase flexibility & responsiveness while reducing costs & improving quality.

- Bridgestone
- DaimlerChrysler
- GM
- Goodyear
- Hyundai
- JCI
- Lear
- Magna
- Michelin
- Toyota

Food & Beverage

Satisfy consumer demand, while reducing costs, minimizing waste & improving asset performance.

- Anheuser-Busch
- Coca-Cola
- Kellogg
- Kraft/Nabisco
- M&M Mars
- Nestlé
- PepsiCo/Frito-Lay
- SABMiller

Household & Personal Care

Meet regulatory challenges & improve quality, consistency, flexibility & time-to-market.

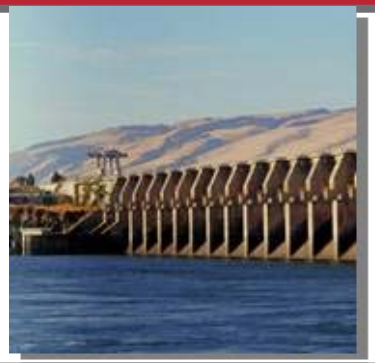
- 3M
- Beiersdorf
- Colgate-Palmolive
- DuPont
- Henkel
- Kimberly-Clark
- L'Oréal
- Procter & Gamble
- Unilever

Life Sciences

Reduce costs while meeting the demands of ever-changing regulations.

- Abbott Laboratories
- Eli Lilly
- Johnson & Johnson
- Merck
- Pfizer
- Sanofi
- Wyeth-Ayerst

Heavy, Resource-Driven Industries Include…



Water / Wastewater

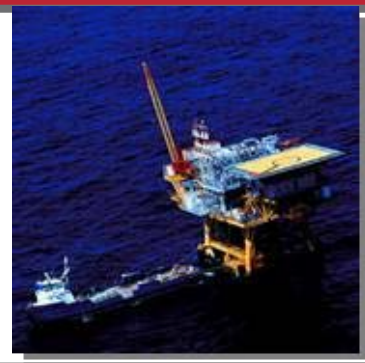
Achieve low long-term cost & on-demand engineering expertise with scalable solutions.

- A & E Firms
- Consultants
- Design Engineer Firms
- Design Institutes (Asia)
- Global Municipalities
- Privatizers (Europe)
- Pump OEMs
- System Integrators

Mining / Metals / Cement

Execute real-time control & maintain critical process parameters to respond to customer demands.

- Alcoa
- BHP Billiton
- CEMEX
- Holcim
- Lafarge
- Rio Tinto
- US Gypsum
- Vulcan



Oil & Gas

React to changing production conditions while maintaining operations at peak efficiency.

- BP
- Chevron
- ConocoPhillips
- ExxonMobil
- Shell

Semiconductor / Electronics

Increase yields while reducing risk & total cost of ownership by using a single automation control & information infrastructure.

- Agilent
- Applied Materials
- ATS Automation
- Axcelis
- IDC / CH2M
- KLA-Tencor
- Novellus
- Praxair
- Seagate

Machine & Equipment Builders (OEMs)

Expertise to help you innovate, build better machines & lower your total cost to design, develop & deliver

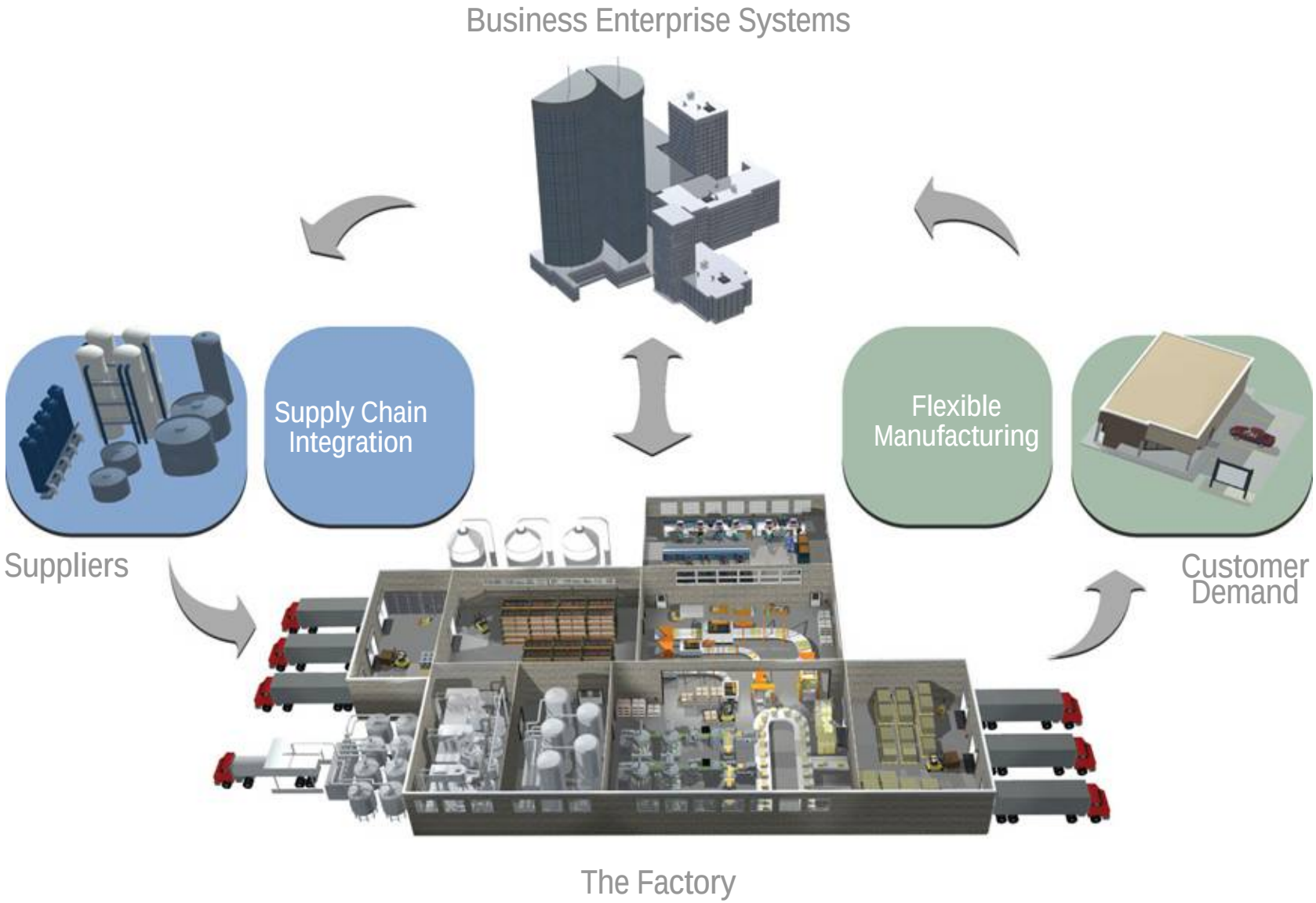
- Preferred by leading OEMs in our focused segments including:
  - **Packaging:** ADCO, Columbia Machine, Hartness, MaSipack, RA Jones, Schneider Packaging
  - **Converting/Print/Web:** Black Clawson, Catbridge, Cerutti, CG Bretting, Curt G. Joa, Jennerjahn, Mark Andy, Nordson, PCMC
  - **Material Handling:** FKI Logistex, HK Systems, Jervis B. Webb, Lantech
  - **Process:** ABEC, A&B Process, AZO, GEA, Getinge, Glasstech, New Brunswick, Paul Mueller, Steris
  - **Assembly:** ATS, ITCM, Mikron
- Specified by leading end users in consumer and heavy, resource-driven industries around the world

Optimize Your Operation

Our capabilities improve processes throughout your manufacturing cycle

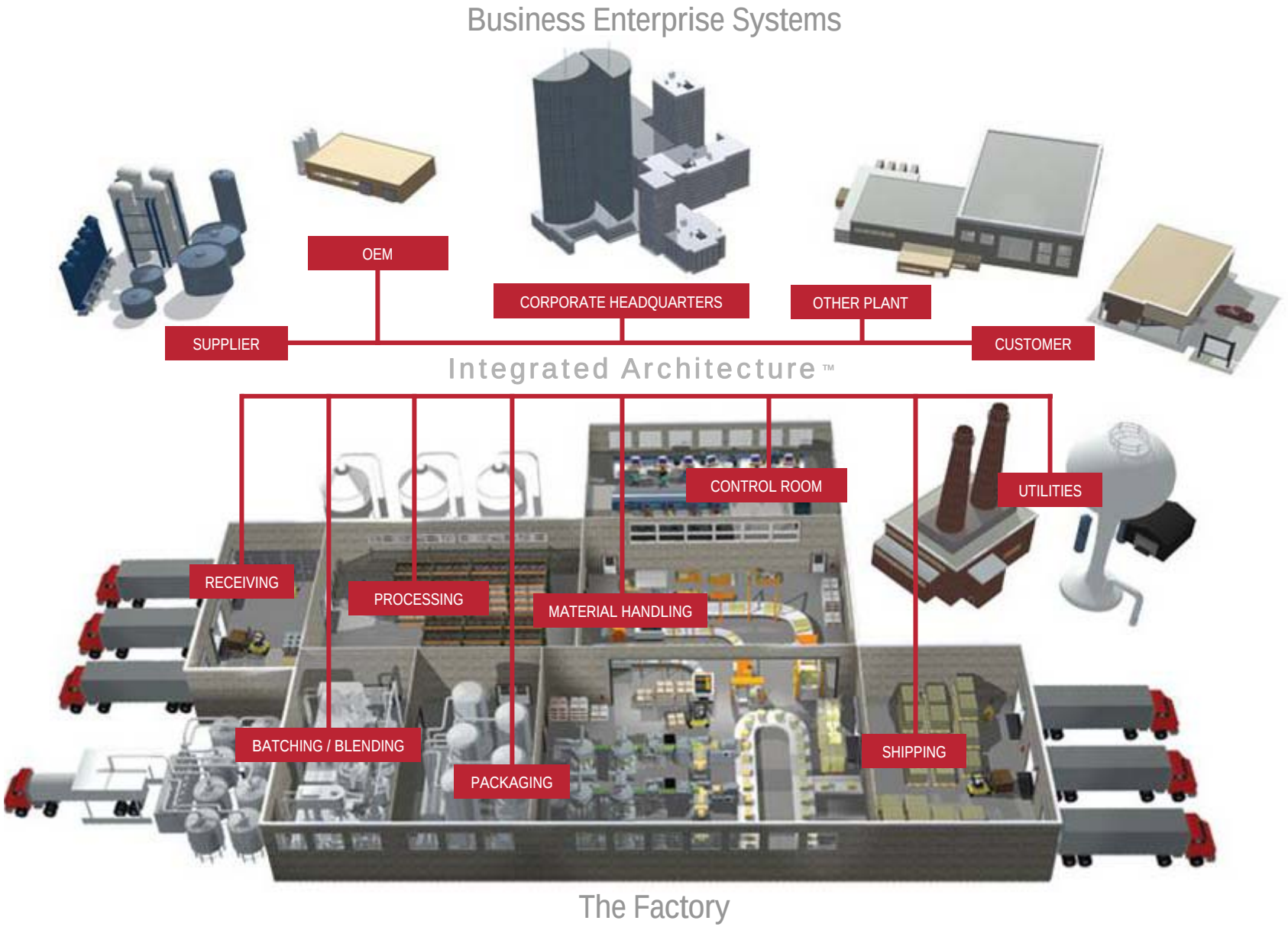
- Integrated Architecture™ System
- Intelligent Motor Control
- Essential Components
- Services & Support

Driving Integration in Manufacturing Today



Lower Total Cost of Ownership | Faster Time to Market | Better Asset Optimization | Broader Risk Management

Bridging Control & Information Across Your Enterprise



Exceeding Your Expectations. Achieving Results.

LISTEN.
THINK.
SOLVE.

- Lower total cost of ownership
- Faster time to market
- Better asset optimization
- Broader risk management