Improving Operational Productivity with a Modern Approach to Distributed Control
Agenda

*PlantPAx®* and OEM Skids

- Modularity Inside the Controller
- Modularity Above the Skid
- Why Should I Do This?
- Examples
Smart Manufacturing is a *highly connected, knowledge-enabled* industrial enterprise where all business and operating actions are *optimized* to achieve substantially enhanced productivity, sustainability and economic performance.

- Rockwell Automation is a founding member of the Smart Manufacturing Leadership Coalition (partial list of members)

Smart Manufacturing is delivered through The Connected Enterprise.
Leverage intelligent skid equipment and PlantPAx to get the most out of your production processes.
Skid Integration can be complicated

Traditional DCSs are proprietary platforms.

- Communication Protocols and Data Mapping
- HMI Graphics and Security
- Safety Interlocks and Alarming
Integration Challenges

- Common Challenges
  - Alarming
  - Safety Interlocks
  - HMI Graphics and Security

Why Do These Challenges Exist?
- Few established standards for skid integration standardization.
- In absence of established standards, End Users, SIs, EPCs, OEMs create their own.
- Everyone’s “Standard” is different.
Skid Interface Checklist

- Common Network Protocol.
- Class-based Public Interface: DCS to/from Skid
  - Command, Status, Tag Naming Convention.
- Alarming
  - HOW, WHAT, and WHEN to alarm, also WHAT NOT to alarm.
- HMI Standardization
  - Visualization, Object Naming, Security.
- Documentation Standards.
PlantPAx™ Simplifies Skid Integration

- Common Network Protocol – EtherNet/IP
- Common Alarm Strategy
- Common HMI Security and Visualization
Skid Interface Checklist – PlantPAx

- Common Network Protocol – CIP over Ethernet (EtherNet/IP).
- Alarming – HOW is taken care of.
- Standardized HMI Security and Visualization.
  - Class-based Public Interface: DCS to/from Skid.
  - Alarming – WHAT, and WHEN to alarm, also WHAT NOT to alarm.
  - Standardized HMI Object Naming.
  - Documentation Standards.

PlantPAx Allows You to Focus on the Process!
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What Is “Modularity?”

Object-based Programming Philosophy – allows simplified management of process functions.

- Primary Concepts from ISA-88’s Physical Model.
  - State-based Object (Usually EM), Contains CMs.
- No Direct Communication Between Peers
  - Parent Layer Coordinates Child Objects.
- Single Interface Tag for Each Object
  - ALL Data Needed by Child and Parent.
- Portable Container – Program Folder in Logix
Quick Programming Summary…

- Control Modules / Process Object Libraries
- NO Controller Scoped Tag References
- Equipment Module Commands and Sequences
- Many Program Scoped Tags
- One, and only one, ALIAS to a Controller Scoped Tag

Key Point
Quick Programming Summary...

- Procedures/Operations issue commands to the EMs through their Interface Tags.
- Small number of tags in the controller scoped area.
- EMs have 1 ALIAS to one controller scoped tag – the Module Interface Tag.
- All command and status for each EM reside in its Module Interface Tag.
- The controller can also have a “Public Interface” for receiving commands and indicating status, just like any other piece of equipment.

But, modular programming need not end inside the controller…
Agenda

PlantPAx® and OEM Skids

Modularity Inside the Controller

Modularity Above the Skid

Why Should I Do This?

Examples
Example Architecture

Identical Public Interfaces for the same Equipment Class, even though the compressors are different styles.
PUBLIC Tag Structure

This Controller scoped tag should be defined based on skid Class.

Commands can be easily issued via an HMI, or a supervisory controller.

The “Cmd” substructure receives data from the Parent. Elements should match the skid Class’s requirements.

The “Sts” substructure sends status data back to the Parent. Elements should reflect the skid Class’s capabilities.
PUBLIC Interface

Interface Program in Child (Skid)

Read MSG to Get Commands
Write MSG to Send Status

Map PUBLIC Commands to Internal Logic
Map Internal Values and Data to PUBLIC Status
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Skid Integration on PlantPAx System

- Skids use same underlying Integrated Architecture as PlantPAx
  - ControlLogix® or CompactLogix™ Controllers
  - FactoryTalk® View SE or FactoryTalk® View ME for HMI

- Skid Controllers can be added to an existing PlantPAx system
  - Provide local Skid Control
  - Fully integrated into the PlantPAx system

- Rockwell Automation works with equipment builders to achieve consistent user experience including integrated alarming using the pre-built libraries
Benefits for Engineering

PUBLIC Interface Design = Easier Implementation.

- Identical Interface for Similar Equipment
- “Canned” Logic and Graphic Objects
- Standardized Alarming Capabilities
- Can Add Skids to a Running System
- Substantial Reduction in Commissioning Time
Benefits for Engineering

- Ease of Implementation
  - Identical Interface for Similar Equipment
  - “Canned” Logic and Graphic Objects
  - Can Add Skids to a Running System
  - Substantial Reduction in Commissioning Time
Benefits for Engineering

- Ease of Management
  - Consistent Documentation
  - Consistent Building Block Approach
    - Code Module Objects
    - Graphic Objects and Faceplates
  - Portable
- Focus on Process Control – NOT Code
Benefits for Maintenance

- **Common Concept**
  - All Skids Use Same Interface Design
    - Consistent Programming Approach
    - Easier to Troubleshoot
  - Interface Can Support Expandability
    - Incorporate Spares to Allow Data Modifications
Benefits for Operations

- Consistent Interface
  - Skids Use Same Graphic Objects as Greater System
    - Consistent Programming Approach
    - Easier to Operate
  - Reduced Training Overhead
    - Training Material Similar for Different Skids
    - SOPs Easier to Update
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OEM and Equipment Integration

- OEMs are able to provide state-of-the-art equipment while adhering to a common set of standards.
- By using core libraries, the data does not require re-mapping, re-licensing, and maintains a common security and user experience.
- Allows equipment to be tested prior to shipment improving acceptance and consistency.
- Easier to support and troubleshoot multiple process skids from global suppliers.
- Enable unit level reporting to align with operational KPIs and validate performance of equipment.

Value Proposition

Skid Integration

Skid integration typically consumes ~50% to 70% of our project budget. We can reduce this by 25% (as well as a schedule savings of 2-3 weeks) if we specify PlantPAx templates and controls on the OEM bid packages. The incremental costs for International OEM compliance would be offset by the integration savings.

60%
30%

Of manufacturers lack the necessary equipment connectivity to capture the data
Have NO integration at all

60%
30%

Source: 2013 Industry Week Study

“With more than 11 machines required for our production process, we needed an integrated control architecture…”

Mike Williams, Director of Engineering, King’s Hawaiian

“The PlantPAx system allows standardized code development both by internal and external engineering resources, and allows integration of both processes and machine control systems within a common domain of software tools.”

Source: Engineering Manager, Global 500 Consumer Products Company

PUBLIC

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King’s Hawaiian New Facility

Common Network and Integrated Architecture Ease Integration and Data Sharing Between All Machines

- King’s Hawaiian desired a common infrastructure for OEM equipment coming into their Greenfield site
  - Scalable control platform - Logix
  - Common communications Network
  - FactoryTalk® software suite provides
    - Intuitive production HMI
    - Role-based production data
    - Remote access to real-time data
    - Dashboards that provide comprehensive picture of factors contributing to operational performance

- By standardizing on Rockwell Automation products King’s Hawaiian was able to accomplish the following:
  - Met implementation timeline resulting from common network architecture, continuity and familiarity with spare parts
  - Doubled Production / Increased Capacity by reducing lost production time during testing, increased accessibility of production data.

Standardized Technology Requirements for All OEMs
OEM Trends for Process equipment (skids, superskids, repeatable lines)

- **Modular Equipment**
  - Information enabled skids leveraging fast, high bandwidth network (E/IP)
  - Scalable capabilities with smallest footprint
  - Easily integrated into plant control system
  - Supports safety & sustainability

- **Design Flexibility & Productivity**
  - Standards conformity & modular programming
  - Reusable Libraries, Process & Device Objects

- **Remote Access & Support**
  - Real time operational data to mobile devices
  - Remote monitoring, VSE, diagnosis & remediation

- **Enhanced Equipment Automation**
  - Intelligent equipment supports process performance and integrity
  - Advanced / Model Predictive Control optimizes key process parameters
Thank You!