TP03-Scalable, Distributed, Fast and Reliable - Modern Batch Systems

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Agenda: Batch

- Batching and Sequencing opportunities
- Different types of Industrial Processes
- Complexities in Batch Processes
- ISA-88 standard
- Scalable Batch solution from Rockwell
- Advantages of our Batch Solution
Batch and Sequencing Opportunities
Distributed and Scalable Batch Solutions

- Batch manufacturing refers to a discontinuous process
  - Start with raw material, do something with it, send the resulting intermediate or product on its way, and start over again

- Prevalent industries using batch manufacturing include:
  - Food & Beverage
  - Household & Personal Care
  - Life Sciences
  - Chemical
Batch and Sequencing Opportunities
More than Just Batch
Batch Management is a specific solution used to optimize batch processes.

Key challenges Batch Management must address include:

- Production Performance
- Quality
- Regulatory Compliance
- Fast Product Changes and Turnovers
- Improved Yields
- Safety
- Traceability
- Efficiency

Industry standards exist to help:

- ISA-88: Addresses design of batch control systems
- ISA-95: Addresses integration of control systems with MES systems
Manufacturing Processes...

- Continuous
- Discrete
- Batch
The personality of Batch..  
Distributed and Scalable Batch Solutions
Complexities in Batch Control…
Distributed and Scalable Batch Solutions

- Single Reactor, Single product
- Multiple Reactor, Single product
- Single Reactor, Multiple Products
- Multiple Reactors, Multiple products with fixed equipment grouping and material routes
- Multiple Reactors, Multiple products with dynamic equipment grouping and material routes
The ISA 88 standard.. Distributed and Scalable Batch Solutions

- A batch facility has an inherent **STRUCTURE** which can be accounted for in the automation system.

- This inherent structure is divided into **TWO** main components:
  - The **EQUIPMENT** in the plant
  - The operating **PROCEDURES**
The ISA-88 Standard..
Distributed and Scalable Batch Solutions

- ISA-88 standard for batch processes gives us a standardized set of terminology and methods
- A common language for the design, operation and supervision of batching systems
- The terms:
  - Process Model: high-level flow sheet of process
  - Equipment (Physical) Model: the ‘pots and pans’
  - Procedural Model: the sequence of operations
  - Recipe: the quantity of ingredients (formulation) combined with the Procedure
- Separates the recipe from the equipment
  - Change sequences without changing controller programs
Modularizing the ‘Hardware’ of a plant
Distributed and Scalable Batch Solutions
Modularizing the ‘Software’ of the plant
Distributed and Scalable Batch Solutions

Recipe Procedure
Unit Procedures
Operations
Recipe Phases
Equipment Phases
Control Module logic

Recipe Procedure

Unit Procedures

Operations

Recipe Phases

Equipment Phases

Control Module logic

Manufacture Polymer - A

Polymerize

Prepare

Add A

Add A

XV 101

Recover

Add B

Add B

XV 102

Charge

Heat

Heat

PM 101

Dry

Soak

Soak

React
A combined view of both the models...

Distributed and Scalable Batch Solutions
‘Phases’.. The workhorses of Batch Process
Batch Reports

A combined view of both the models..
Different Process Sequences.. But the same set of building blocks

Three different batch sequences but with same set of Equipment modules & phases
Different methods for implementation of Flexible Batching..

- PC Batch Sequencer
- Controller Batch Sequencer
- Controller Sequencer
- Controller SFC Sequencer

Various different methods for implementation of Recipes

Control Module Basic control Logic

Equipment Phases
FT Batch based implementation of Batch
FT Batch based implementation of Batch
LBSM based ‘In Controller’ implementation of Batch

The various possible process building blocks are identified and mapped under the type of Reactor.
LBSM based ‘In Controller’ implementation of Batch
Sequencer instruction based ‘In Controller’ implementation of Batch
SFC based ‘In Controller’ implementation of Batch
Modern Batch Differentiation
Most Scalable and Comprehensive Offerings in the Market

**Batch Management**
- Scalable offerings and tools ranging from controller level to enterprise-wide systems.
- Based on ISA88.
- Automating sequences to reduce of time-to-market of product mixes.
- Create repeatable and controlled operations leveraging equipment capabilities.
- Focus on yield, throughput, and quality by managing recipes and procedures.
- Improve traceability, reporting, and approval controls by leveraging procedural models.

**Comprehensive Batch & Sequencing**
- Provide capability for systems through modular software components
- Solves complex needs around traceability and compliance
- Optimizes product changes and turnovers

**Basic Batch Management**
- Provide capability for systems through core system functions
- Ideal for small systems with simple requirements
- Localized visualization and control

**Packaged Skids & Pilot Facilities**

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FactoryTalk® Batch v13
SCALABLE | DISTRIBUTED | INTUITIVE | FAST & RELIABLE

- Improved EFFICIENCIES for operators and supervisors
- FAST navigations with INTUITIVE device-independent graphics
- SCALABLE architecture integrates into existing strategies
- COMPLETE coordination of S88 phases in the controller

Distributed Control + Intuitive Interfaces + Secured Information
Batch Reports

- New Reports!
- Batch Exception
- Sequence Events
- Event Summary
Questions?