Christer Rameback
Vice President
Process Automation

Process Automation - History and Future
Facts about ABB

- A leading power and automation technology company with broad industry knowledge and geographic scope
- About 150,000 employees in more than 100 countries
- Leading position (1, 2 or 3) in each industry we serve and within our product areas
- Headquarters: Zurich, Switzerland
Process Automation Systems
Listening to the users

Continuous improvements are customer driven

Step changes are R&D driven
Step changes are R&D driven

The BIG steps come when R&D engineers understand the users
Agenda

- History of Industrial Automation
- Current situation
- Important aspects for the future
Maximizing Customer Satisfaction and Profit
Control systems market

Users

- Large
  - Automotive
  - Process Industry, Power Plants
- Medium
  - Discrete Manufact.
  - Hybrid Industries
- Small
  - Machine Control
  - Hybrid Industries

Products

- Large
  - PLC
- Medium
  - DCS
- Small
  - Hybrid systems

System size

Binary/Sequential  Analog  Advanced

Functionality

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PLC vs DCS

**PLC History**
- Early 1900 – electrification!
- Rolling mills, paper mills, car manufacturing
- Contactors - Relays – Electronic relays with sequences etc – Programmable devices – PLC’s
- Early 1970’s - Microprocessor based PLC’s
- Simple MMC’s (Man Machine Communications)
- Limited Information Management Capabilities

**DCS History**
- Early 1900 – oil flow, temperatures etc
- Oil industry, pulp mills, (power plants)
- Manual loops - Mechanical controllers - Pneumatic controls - Electronic controllers – Single Loop Controllers - DCS’s
- Early 1970’s - Microprocessor based DCS’s
- More advanced MMC’s
- Somewhat more advanced Information Management Capabilities

**Automation System**
Evolution of digital control systems

- Improved functionality over time
  - Graphics, Alarms, Control, Information Management, Batch, Communication
- PLC functions vs DCS functions
  - Binary, sequences, speed vs closed loops, alarms etc
- Integrated systems: PLC <-> DCS <-> IMS

Increased complexity
Industrial automation traditional architecture model

- Information Technology (IT)
  - Business Planning / ERP
  - Manufacturing Execution Systems
  - Other Plant(s)
  - Corporate

- Industrial Automation
  - Process Optimization
  - Process Automation
  - Instrumentation

- GAP

History
Industrial automation new architecture model

Today

Business Planning / ERP

Other Plant(s)

Corporate

Plant

Area

Unit

Loop

Field

Industrial Automation

Integrated Systems
Due to global competition combined with slow market growth, process industries forced to re-evaluate business models and implement continuous improvement initiatives.

- Cutting costs by consolidating, restructuring, and downsizing
Control systems market

System size

Small

Medium

Large

Functionality

Binary/Sequential

Analog

Advanced

Today

Automotive

Process Industry, Power Plants

Discrete Manufacture

Hybrid Industries

Machine Control
Control systems market trends

- Changes in the competitive structure
  - Consolidation
    - Too many suppliers and low profit levels
    - Mergers and acquisitions
    - Vertical integration
  - Merging market segments
    - PLC vendors enter the OCS market
      - Siemens, Rockwell
    - The hybrid systems market is common ground
      - ABB, Siemens, Rockwell, Fisher-Rosemount, Honeywell
  - Market exits due to increased development costs
    - Shake-out of smaller suppliers
    - Large end users with own control systems outsource
Control systems market trends

- Control systems become commodities
  - Commodity hardware
    - PC, network components, I/O, …
  - Decreasing differentiation at basic product level
    - Increasing competition on price
  - Competitive pressure on system components
    - “Unbundling”

- New product strategies
  - Broader scope of functionality
  - Unified systems: OCS + PLC + Safety + Scada
    - ABB, Siemens, Honeywell/Rockwell
  - Collaborative systems
    - Plant Automation, Asset Optimization, Business Systems
Simplified business model

- Customer orders
- Raw material
- Energy

Process Control

- Order Fulfillment
  - Time
  - Quality
  - Quantity

- Energy waste
- Environmental impact
- Capital utilization
- Safety
- Cost reduction

Maximizing Customer Satisfaction and Profit
Important factors

- Operators role
- Asset optimization
- Engineering efficiency
- Advanced control
- Environmental impact
- Information management
- Integrated safety
- System migration
- Scalable solutions
The operator’s extended role

Operators role

Simplified business model

Customer orders

Raw material

Energy

Process Control

Order Fulfillment

Time

Quality

Quantity

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Environmental impact

Capital utilization

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Cost reduction

Maximizing Customer Satisfaction and Profit

Internet order

Eng Spec

Live Video
Improved car worker efficiency

1. Assembly robot stops
2. Operator calls maintenance personnel
3. Wait 15 min
4. Maintenance person inspects control program
5. Maintenance person fixes the problem

Simplified business model

50% utilization level of manufacturing equipment

Assembly robot stops
Operator checks with local PCn
The system is guiding the operator to root cause
Operator fixes the problem

Maximizing Customer Satisfaction and Profit
Asset Lifecycle and Engineering

Simplified business model

Order Fulfillment
- Time
- Quality
- Quantity

Energy waste
- Environmental impact
- Capital utilization
- Safety
- Cost reduction

Maximizing Customer Satisfaction and Profit

Business Systems

Design

Asset Optimization

Plant Floor

Engineering efficiency

Asset optimization
Re-Use of solutions

Engineering Efficiency taken to the Next level:
- Re-use of solutions with ALL Aspects included
- Libraries of Typical Solutions with ALL Aspects
- Copy & Paste of complete process areas
- Inheritance -> Update type and all instances are updated!

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Engineering efficiency
Plant Modeling - Object Hierarchies

Valve

Heating System

Reactor

Engineering efficiency
Highly Scalable Solutions

Simplified business model

- Process Control
  - Customer orders
  - Raw material
  - Energy

Pay for what you need.

Use the same software for Engineering & Operations irrespective of solution size.

Maximizing Customer Satisfaction and Profit

System migration

Scalable solutions
“Over $20 Billion USD, or almost 5% of total North American production is lost each year due to unscheduled downtime.” – ARC Insights

Market Forces

Due to global competition, process industries forced to re-evaluate business models and implement continuous improvement initiatives.

Cutting costs by consolidating, restructuring, and downsizing.

Traditionally, companies view maintenance as necessary evil and not strategic opportunity.

Viewed as overhead, Maintenance is target of management’s cost cutting strategies.

Yet, unexpected failures and poor quality product can be devastating to profit goals.

“Over $20 Billion USD, or almost 5% of total North American production is lost each year due to unscheduled downtime.” – ARC Insights

Maximizing Customer Satisfaction and Profit

Viewed as overhead, Maintenance is target of management’s cost cutting strategies.

Yet, unexpected failures and poor quality product can be devastating to profit goals.

Asset optimization
Achieving Operational Excellence

Balancing act between high availability and low cost demands requires a proactive business strategy with clearly defined metrics.

- Continuous Improvement programs require real-time assessment of Key Performance Indicators (KPI).
- Measure asset performance and identify performance gaps and opportunities.

Unfortunately, traditional maintenance systems lack real-time information.

- Provide schedule-based functions.

“Plant Asset Management systems providing real-time asset performance information to operations and maintenance will increase Return on Assets (ROA) and lead to operational excellence.” – ARC Insights

Asset optimization
Traditional Operation and Maintenance

- In a typical day, maintenance will waste 40% of its time determining root causes of problems

Asset optimization
Real-Time Plant Asset Management (PAM)

Operating System (OCS)

Field Devices

Asset Condition Reporting System (CMMS)

Operations

Modern automation systems

Simplified business model

Process Control

Order Fulfillment

Time

Quality

Quantity

Energy waste

Environmental impact

Capital utilization

Safety

Cost reduction

Maximizing Customer Satisfaction and Profit

Advanced Process Performance Assessment

Asset Health Assessment
Can you supply 2 tons in 10 days for 945 dollars?

Answer in ten minutes.

Information management
Safety first!

- Safety is playing an increasingly important role both for Process Industries and Manufacturing Industries
- Avoiding Human AND Environmental impact
- Integrated in control systems
- Moving away from “hard wired” solutions
Environmental regulations

- Environment is not "free" anymore!
- Environmental fees are being charged to companies
- Tracking, reporting and REDUCING!
Summary

- Integrated systems
  - DCS – PLC – IMS – ERP
- Increased complexity
- Increased competition
  - Users
  - Suppliers
- Operator’s extended role
- Information Management
- Asset Management
- Scalable Solutions
Christer Rameback
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Process Automation

Process Automation -
History and Future

Thank You!