

(Graphic Courtesy: Endress+Hauser)

Automation in Food and Beverage Manufacturing - Factory of the Future

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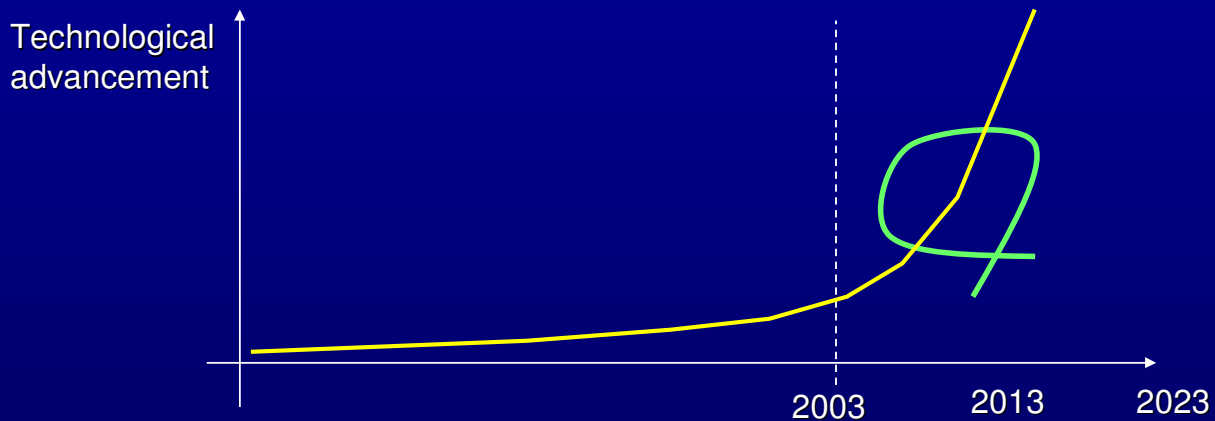
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Automation & The Factory Of the Future

Technological change is exponential.

Useful and realistic to think about the next 5 years.



Moore's Law: Transistor density doubles every 18 months

Origin of Opinions

- Distill, interpret and summarise

- > Personal industry application experience

- > ARC Advisory Group



- > ISA



- > Automation Vendors Siemens, Citect, Schneider, Rockwell etc

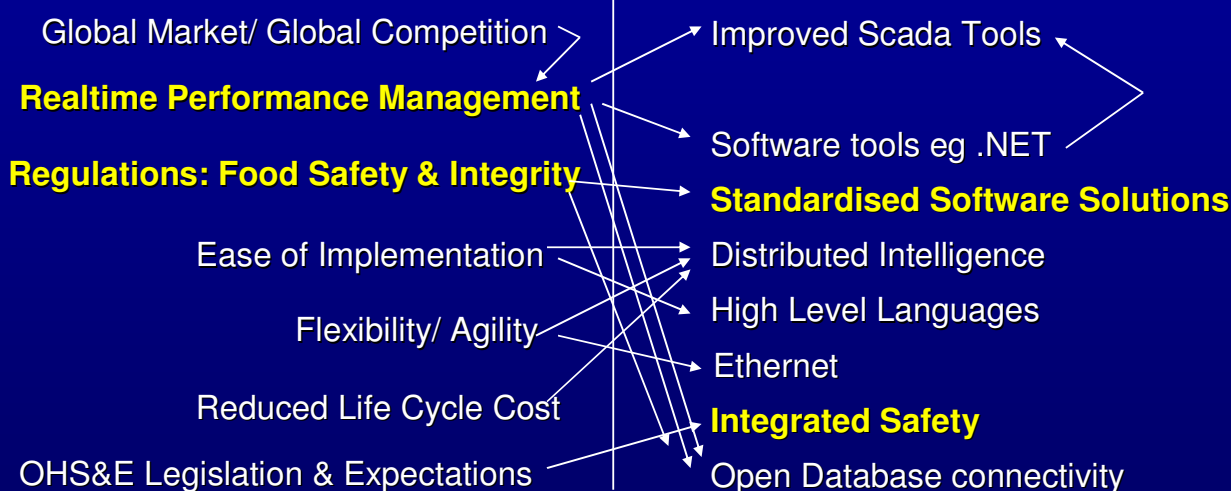
- > Industry Shows (Inc Hannover Fair, Germany)

- > Industry Publications

Automation & The Factory Of the Future

Trends & Drivers (Needs)

Enabling Technologies



Quality - signed, sealed, delivered
FDA-compliant data recording

Food Safety and Integrity

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FDA-compliant data recording

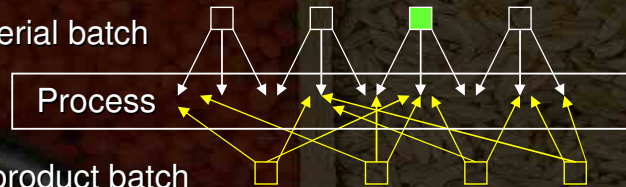
Food Safety and Integrity

- HACCP - growing regulatory requirement (Safety)
 - > Principles: Control, monitor, verify
 - > >>> data records
- Examples:
 - Australia: Pasteurisation and CIP in Dairy
 - US FDA: Seafood, juice, meat, poultry, milk.
 - US: Expanding to other domestic and imports
- Increasingly difficult to manage data manually

Traceability/ Genealogy

- Increasingly goal: “Farm to Fork Traceability”
- GE, BSE, pesticides, antibiotics, batch process history, storage, packaging, transport, warehousing
- Records to trace:

- Forward from raw material batch
- Backwards from final product batch
- > good records > minimum scope of recall



- Increasingly difficult to manage data manually

Thus expect transition: from Paper Records to Electronic Records

- Improved tools facilitate data collection.
- What issues with integrity of records?? Security??

US FDA 21 CFR Part 11

- FDA Guidelines for Security of Electronic Records
- Emerging world de-facto Standard (all industries)
- Application:
 - > Process (batch) data collection and storage
 - > HACCP process data records
 - > OHS&E data records
 - > Easier regulatory compliance (inc future reqts)
 - > Documentation according to Good Manufacturing Practice (GMP)
 - > Traceability
 - > Genealogy
 - > Gives data with recognised legal validity



Off The Shelf Software

- Off the Shelf Software Packages - Industry Standard functionality, multiple vendors:
 - > Tools for FDA 21CFR Part 11 compliance
 - > S88 Batch Implementation
- Practical solutions without reinventing the wheel!
- Knowledge and skills transferable from site to site

Data Acquisition

- eco-graph
- eco-graph a
- eco-graph c
- memo-graph
- memo-graph s
- mini-log b

Safety Data Manager Memo-Graph S

System compatible data manager with a unique safety concept for critical applications. Compliant to the high FDA requirements laid down in the 21 CFR Part 11.



Areas of application

The Memo-Graph S "Safety Data Manager" is the compact and powerful solution in safety relevant applications. It convinces merely by the fact that data is securely recorded. By using the "Audit trail" process sequences can be verified. It plots signals, monitors alarm limit points, analyses measurement points, stores the data internally and archives them on ATA flash memory cards in a coded format. The already standard ReadWin @ 2000 PC software package is used for set-up, visualisation and archiving the recorded data.

Data access is limited to authorised personnel only and is controlled by use of a unique ID and password system. Memo-Graph S can be applied wherever priority is given to safe recording:

- Pharmaceutical and food industry
- Biotechnology and fine chemicals
- Multi-product plants
- CIP cleaning systems
- Batch applications

Paperless!



(Courtesy: Siemens Ltd)

(Courtesy: Endress+Hauser)

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S88 Batch Software

- Take advantage of what others have achieved. Eg.:
 - > S88 Batch Control - (to industry standard)
(Batch records, version control of recipes, standardised interface)
 - > Examples:
 - Siemens PCS7 Batch
 - CitectSCADA Batch
 - Intellution iBatch
- Key Issues:
 - > Standardised features and operator interface
 - > Ease of regulatory compliance
 - > Future migration path

Intellution iBatch Client - [PROCEDURE AS SFC]

Mode: O-AUTO State: RUNNING Procedure: MIX_SNAKES_YOGO

473942

- UP_DHSM_LOAD_SKIM:1
- OP_DHSM_LOAD_SKIM:1
- XFER_OUT_SILO:1
- XFER_IN_FSILO:1
- RPT_SKIM_TO_DHS
- UP_NULL_DHSM:1
- OP_NULL_DHSM:1
- NULL:1
- UP_DMIX2_LD:1
- OP_DMIX2_LDCRM:1
- XFER_IN_FSILO:1
- XFER_OUT_SILO:1
- RPT_CREAM_TO_DI
- OP_DMIX2_LDCONC:1

Example of S88 Batch Software

Recipe Information | Prompts | Parameters | Reports | Binding

Select Parameter to Change Value:

Name	Low	Value	High	Eng. Uni
ADD_DCONC	0	138	600	LITRES
ADD_DCREAM	0	200	650	LITRES
ADD_DHSM_SKIM	0	1000	1000	LITRES
ADD_DSKIM_REM	0	284	2550	LITRES
ADD_WHEY_PROTIO	0	0	0	LITRES

Start | iFIX Startup | Intellution iBatch Clie... | ClientMonitor - | C:\WINNT\Profiles\scada... | untitled - Paint | 12:20 PM

(Courtesy: National Foods)



OH&S (Machine Safety)

- By its nature a continuously rising Bar!
- Industry awareness of elec reqts poor but improving
- Safeguarding affecting operability?
- Increasing complexity > poor maintainability?
- >>> Needs:
 - > Close integration of safety with std ops. for better functionality
 - > Good diagnostics for reduced repair time
 - > More affordable safety related controls

“Integrated Safety”

- Now: Software based systems on mainstream CPUs
 - > (Replace “Hardwired” systems)
- Now: Safety field busses
 - > mainstream busses with safety support
 - PROFIBus via PROFISafe
 - ASI via “Safety at Work”
 - DeviceNet, ControlNet, EtherNet/ IP (release 2004)

Siemens S7 315F Failsafe PLC



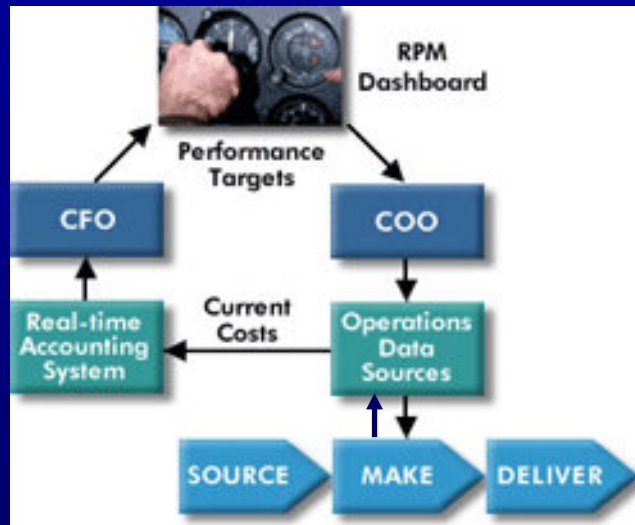
Little Benefit from Automation?

“ ... significant capital expenditures in automation ... over past 30 years. ... millions of \$ spent, **no discernible performance improvement.**”

“Manufacturing managers should be seeing real returns on all of their capital investments, and automation systems should be leading the pack.”

Peter G Martin “Bottom Line Automation” page 122 (ISA Press 2002)

Realtime Performance Management (RPM)



(Courtesy: ARC Advisory Group)

“The Next Frontier in Operational Excellence”

ARC Advisory Group
Thought Leaders for Manufacturing and Supply Chain

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Events > Forums > Real-time Performance Management Forum USA 2003

Real-time Performance Management Forum USA 2003

ARC's Eleventh Annual Forum
Real-time Performance Management: The Next Frontier in Operational Excellence
June 25-27, 2003 - Boston, Massachusetts

ARC Forum Highlights RPM as an Enabler to Optimized Business Performance
Executives from all over the world gathered to discuss Real-time Performance Management (RPM) at ARC's Eleventh Annual Forum in Boston. RPM drives enterprises toward an environment that supports innovation and creates new value, not just reduced costs, as dynamic performance measures encapsulate corporate strategy to ensure actions taken by employees optimize plant performance. Implementing RPM requires management commitment along with a culture change as this philosophy requires tearing down the silo mentality in order for all stakeholders to benefit. Above all, this new culture needs accurate information to instill confidence and promote proper application as everyone is now a decision maker.

FORUMS

- Operational Excellence Seminar in Consumer Packaged Goods
- Performance Driven Manufacturing Forum 2004 USA
- Upcoming and Recent Forums
- Sponsorship Opportunities

INFO ON THIS FORUM

- Event Highlights
- Topics
- Executive Speakers

Realtime Performance Management

■ Application:

- > RPM as tool to see how to optimise the manufacturing process and thus add value to the Enterprise
- > Enabling technology and standards coming of age
- > Monitor OEE Overall Equipment Effectiveness in real time

The engine of Discrete Manufacturing is moving from production machinery and equipment to information shared across the business enterprise.

(Courtesy: ARC Advisory Group)

The capability to manage a factory in real-time provides the foundation for a new level of productivity, quality, and customer satisfaction.

(Courtesy: ARC Advisory Group)

(Other related: CMM Collaborative Manufacturing Management and CDAS Collaborative Discrete Automation Systems)

Summary - Factory of the Future

- Broader application of Standardised Automation Tools to address challenges of the Global economy eg.
 - > Electronic Data Collection and Storage - 21CFR11 Compliant
 - > Standardised Batch Control - S88 compliant
- Increasing penetration of Integrated Safety to address machine safety
- Application of new technologies to achieve Realtime Performance Management and thus pursue "The Next Frontier in Operational Excellence"
- Flexible, easy. High value add from Automation
- Automation as a key element of competitiveness