



Industry 4.0: A Practical Implementation Model for Packaging

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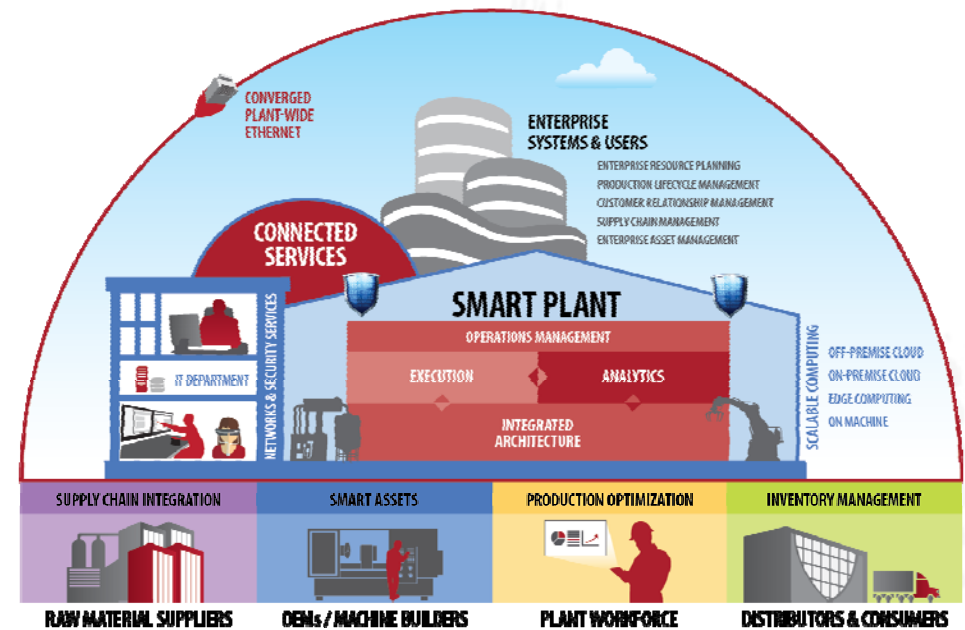
Industry 4.0 solutions

Rockwell Automation equipment builder/end user ecosystem strategy

To gain the needed benefits from Industry 4.0, there must be a **balanced approach** for both OEM and end user to maximize results

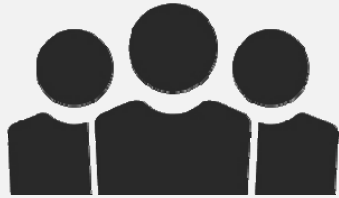
Investments within the ecosystem will focus on solutions that enable **enterprise implementations**... “one off” solutions are not desired by most end users

Success with Industry 4.0 requires a **comprehensive strategy** for data, infrastructure, cybersecurity, scalability, etc...



The digital journey for packaging

Enabling new opportunities for productivity and profitability



IMPROVED WORKFORCE ENABLEMENT

Leverage data from connected equipment for improved service, support and usability



OPTIMIZED BUSINESS OUTCOMES

Combine real-time data with existing systems to increase efficiency and reduce costs



MARKET DIFFERENTIATION

Increase pace of innovation for faster time to value

No single company can deliver all the Industry 4.0 solutions...it takes a community of IoT partners

The digital journey for packaging

The end user landscape

Current

ISA-95

**L4/
L5** Business Systems
(ERP, SCM, PLM)
Governance & planning

L3 Production Execution
(MES / MOM)

L2 Process Monitoring
(HMI-SCADA)

L1 Process Sensing,
Manipulating (PLC)

Challenges:

- Highly complex
- Multiple vendors
- Modern & legacy mix
- Rigid systems
- Poor interoperability

**Unsolved
Problems**

Wrap and Extend

Scalable Software Platform

Engage

Orchestrate

Analyze

Contextualize

Source

PLANT & CORP.
MANAGEMENT

MAINTENANCE

QUALITY

OPERATORS

Recipe for success

Insights at end users

Keys to success

- A well-defined, end to end information strategy
- Collaboration and co-development with OEMs and other business partners
 - Some IoT value can only be delivered by third parties
- Implementation of standard, scalable software platforms to limit risk and drive efficiency

Lessons learned

- The end user does not need to be the expert in Industry 4.0...seek partners who can help guide and build a proper solution
- Selection of the software platform and use cases are critical for short-term and long-term success
- Success requires change management to enable new solutions that unlock productivity and profitability



Recipe for success

Insights at equipment builders

Keys to success

- A well defined, specific problem statement
- Clarity in value definition for OEM and/or end user
- Thoughtful implementation of cybersecurity to mitigate connectivity concerns at end users
- Establishment of OEM monetization model

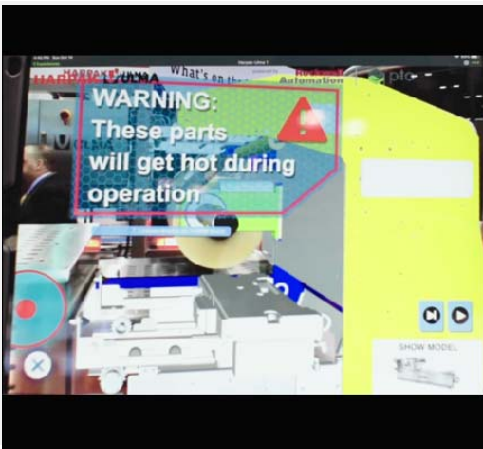
Lessons learned

- Achieve small but meaningful wins...don't attempt to do everything all at once
- Home grown systems represent high risk to the OEM
- Work with scalable IIoT solutions
- Success requires transformation and change management within the OEM



A practical application of Industry 4.0 for packaging

Workforce enablement: Vuforia augmented reality



Challenge: How can OEMs maintain productivity and quality of their production lines with a less skilled, higher turn over workforce?

Solution: Provide just-in-time, directed training for operators and maintenance teams through **augmented reality** experiences specific to the needed workflows

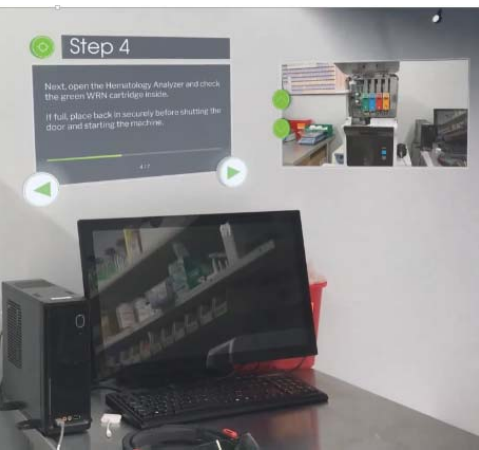
- Needed competencies at the end user are reduced through machine-specific content delivered by the OEM
- Better clarity for workflow actions will reduce MTTR and improve quality of work for a less skilled end user employee
- Faster changeover can be achieved using contextualized work instructions
- Validated AR business impacts:
 - Worker productivity improved 5%-8%
 - Reduction of new hire training time by 20%-30%
 - Reduced safety occurrences

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Enabled by OEM



A practical application of Industry 4.0 for packaging

Workforce enablement: Vuforia expert capture



Challenge: How can end users retain transfer “expert knowledge” to a high turnover workforce? Especially when experts are retiring...

Solution: Provide an **augmented reality** system focused on capturing expert behaviors and insights on specific applications so new employees can leverage the knowledge without the expert being present

- Expert knowledge is captured and stored in an easily retrievable and reusable format
- Equipment nuances and “tricks of the trade” can become archived to ensure knowledge is not lost through workforce turnover
- Time to productivity for new employees increases rapidly since best practices and proper procedures serve as the reference for all AR training
 - And since all can be contextualized to a specific machine or application, effectiveness of knowledge transfer also increases

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A practical application of Industry 4.0 for packaging

Optimized business outcomes: ThingWorx Operator Advisor, Vuforia Chalk



Challenge: How can end users obtain better support of their operations to improve uptime and reduce MTTR?

Solution: Enable a **remote monitoring and support** capability from trusted OEMs to leverage their knowledge and expertise to identify issues and quickly resolve problems

- Experts at the equipment builder are best suited to understand and interpret machine information and provide proactive solutions to mitigate risk
- Additional IoT enablement from tools like Vuforia Chalk can increase effectiveness and reduce MTTR
- With minimal investment by end user, a vast community of experts can be enabled to solve problems and identify areas of operational improvement
- These solutions will be augmented with analytics and artificial intelligence over time

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Optimized business outcomes: DataView analytic engines



Challenge: How can end users obtain better results for their enterprise operations for availability, productivity and quality?

Solution: Enable **analytic capabilities** within an enterprise IoT solution to track key metrics, understand cause and effect and uncover new correlations of events to improve overall performance

- OEE dashboards alone cannot improve productivity...they can only identify where problems are occurring
 - The promise of Industry 4.0 is to use system information to go beyond an OEE metric and identify root cause and initiate mitigation through a system response
- Comparative metrics are also critical to understanding enterprise opportunities for improvement
 - Common data definitions and common performance models are critical to properly benchmark performance
- Using a solution that can absorb multiple data sets (plant floor, QMS, ERP, etc...) will enable far more meaningful correlations when analytic engines are applied

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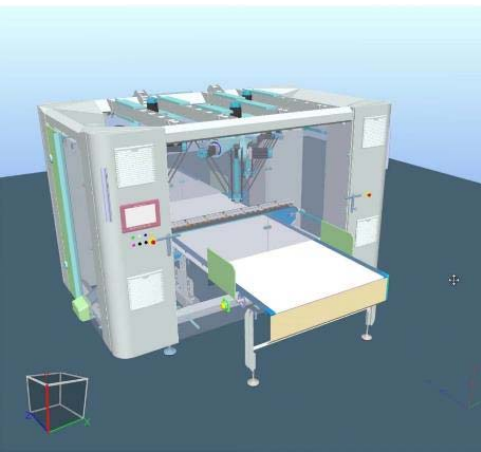
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Differentiation to drive results: Digital twin

Challenge: How can OEMs drive new design and commissioning efficiency to enable lower implementation costs and faster time to market for their end customers?

Solution: Use **simulation tools** to validate designs in a virtual environment before manufacturing takes place and commissioning begins

- OEMs who use dynamic virtual prototyping can gain efficiencies in both design and deployment of their assets to the market
- Simulation tools can enable both physical and logical testing of the design before anything hitting the manufacturing floor
 - Faster time from idea to offer
 - Thorough logic sequence and timing validation to help eliminate errors
 - No need for any physical prototypes to be developed saving time and cost
 - Reduced commissioning time since code and kinematics have already been modeled and tested



 **EMULATE3D**
by ROCKWELL AUTOMATION

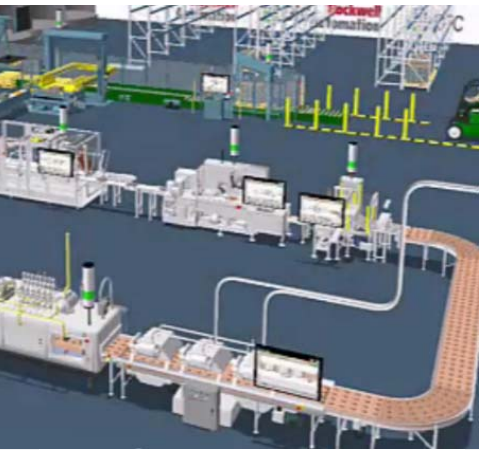
Enabled by OEM

Emulate 3D Booth S7406
Cama Booth S7313



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Differentiation to drive results: factory floor virtualization



 **EMULATE3D**
by ROCKWELL AUTOMATION

Enabled by end user

Challenge: How can end users optimize manufacturing lines without interrupting production or using costly “trail and error” methods?

Solution: Use **simulation tools** to model manufacturing lines in a virtual space to research, test and validate the best possible solutions before making physical changes to plant layout and workflow

- Plant layouts can be virtualized to help analyze system throughput, identify bottlenecks and dimension layouts accurately, and test different operational modes to increase understanding of how a system responds to changes
- Simulation models move decision making from “hopeful expectations” to “data driven confidence” when projects are being justified
- An unlimited amount of testing can take place in the virtual environment, helping eliminate costly work and disruption to the plant floor as new ideas are tested
- Line sequencing code can also be tested and validated before making real world changes to the automation system

Industry 4.0 is changing our world

Those who prepare for this change will be the winners

What does this change look like?

- **New competencies** will be required at equipment builders and end users
- A secure and **trusted connection** will become the norm for end users and their OEM partners
- More devices and more machines will become **information enabled** as standard practice
- Service contracts and Machines as a Service (MaaS) will become **new offerings** from equipment builders who leverage IoT information
- The **digital thread** will extend from automation supplier, to machine builder, to end user and from raw materials, to plant execution to consumer fulfillment

40%

of top 100 discrete manufacturers plan to provide **Product as a Service** platforms

- IDC

51%

of research respondents say IoT is critical to their **organization's future success**

- VDC Research

84%

of products (or more) from best-in-class manufacturers hit their revenue, cost, launch date and quality targets using model-based engineering

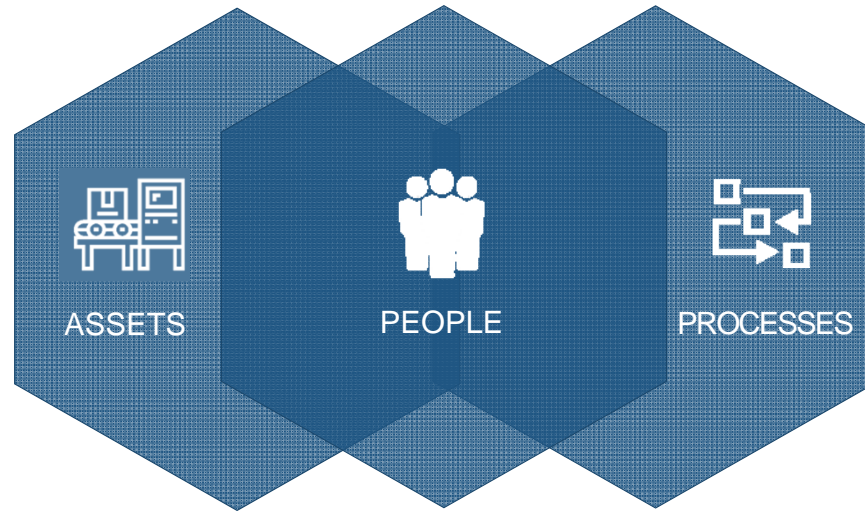
- Aberdeen

What about today?

Where to start

Smart Connected Assets

Drive step-change improvements in utilization & reliability



Smart Connected Processes

Enable breakthroughs in operational effectiveness

Smart Connected People
Make workforce productivity and safety soar

End User
Trusted advisors
software platforms

No single company can deliver all the Industry 4.0 solutions...it takes a community of IoT partners



**Rockwell
Automation**

we make

decision making faster and easier, by harnessing real-time data and insights to transform your operations

**EXPLORE WHAT'S POSSIBLE
AT BOOTH C-146**

