STANDARDIZED
AND
CONNECTED

Manufacturing Success
The standard is standardization: Our 20 roundtable executives want connectivity. To get there, they need standardization. This is how they are getting it right.

Connecting the dots: How do you create the connected enterprise, and make it work? Our experts discuss their top challenges and thinking for success.

Winning thinking: Three of the best ideas from our roundtables.

The Connected Enterprise Maturity Model.

Five lessons learned from *Standardized and Connected: Manufacturing Success*. 
Everything is connected...

The manufacturing plant is changing because it has to and – critically – because it finally can.

Why does it have to? Globally we’re adding 70 million to our middle classes, and they will be spending $8 trillion on goods. It’s one big, hugely competitive market. The winners will drive efficiencies in their manufacturing operations and differentiate on service.

Technology is enabling this change. The Industrial Internet of Things provides access to huge amounts of untapped data. Big Data provides the ability to store, consolidate and share it. Analytics provides new insights into it. And mobility provides actionable visibility for global decision makers.

Everything is connected. And it starts with your site and your infrastructure – because if that’s not securely united, the rest is moot.

What are the challenges and opportunities? How are other manufacturing leaders managing the people + process + technology sum? This eBook contains the highlights from a series of MeetTheBoss TV roundtables conducted in partnership with Rockwell Automation (who’ve been advocating this concept for 30 years). We have spoken in-depth with 20 senior leaders from 20 cutting edge companies about their work in this space.

How can you create manufacturing success? Read on...

Adam Burns
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The standard is standardization

When it comes to creating a connected industrial enterprise, says Nick Pryke, you can be sure of one thing: the technological relics of the past aren’t your friends. But that doesn’t mean the future can’t be rosy – provided you’re standardized everywhere.

Welcome to the world of manufacturing IT, where complexity reigns supreme. That will come as no surprise to those tasked with leading the industry into its ‘connected’ era. Currently disparate and legacy systems collide with emerging technologies on the shop floor – and the shop floor struggles to talk with its corporate parent systems.

Our 20 roundtable executives want connectivity. To get there, they need standardization. This is how they are getting it right.

Start with a secure infrastructure

James Gross is senior IT strategist and architect for global automotive systems supplier TRW Automotive. He agrees with Jim Beilstein’s onion analogy but made one vital point (echoed across all four roundtables): “If you think about how our technology has evolved, it’s really about supporting direct manufacturing and direct operations within that facility. When you start to talk about connecting those dots? That was never built into the model…”

Start with a secure infrastructure, because without it, the control system / MES / ERP standardization challenge is moot.

“You have to think of [standardization] as an onion...the first few layers are easy to work out, but it gets increasingly harder to peel back the complexity as you get further towards the center of the problem.”

By Jim Beilstein, director of IT, Owens Corning
Clearly, standardizing your MES is going to require a substantial technological investment – but don’t underestimate the power of your people, too; Legacy habit can be just as damaging. As Timothy Bartel, global director for business process optimization at Joy Global put it: “As we try to standardize and create actionable screens using one set of technology, you find a lot of the cultural challenges come in...what we’re doing now is bringing together plant manufacturers from our major divisions to show them what we’ve done and reach some common ground.”

Jake Smith, director of enterprise applications at CVR Energy, explained: “Now that staff understand the power of our data, they want to be in control of how that data is massaged and what story it’s telling.” The moral of the story? Keep your machines close, but your staff closer if you want standardization to achieve its full impact.

“I’ve got plants that are highly-technology integrated and I’ve got others that have disparate systems and are almost impossible to connect due to their legacy systems... there’s a whole interoperability challenge we’re facing here.”

By Jim Beilstein, director of IT, Owens Corning
Leverage your legacy

It’s hardly breaking news that legacy systems are causing more than their fair share of headaches for IT manufacturing heads when it comes to standardization – just take Owens Corning, director of IT, Jim Beilstein’s, current situation: “I’ve got plants that are highly technology integrated and I’ve got others that have disparate systems and are almost impossible to connect due to their legacy systems... there’s a whole interoperability challenge we’re facing here.”

He continues: “Through acquisition efforts, there’s been multiple and differing strategic focuses in picking up new assets, which have presented new challenges around legacy systems and attempting to integrate them into the Owens Corning standard.”

Your legacy systems won’t be disappearing overnight; as the old saying goes, if you can’t beat them, join them. Or at least work out the best possible integration points to hold fort while you work out the wider blueprint – both between shop floor systems and from the shop floor to the wider enterprise IT.
All for one and one for all

“Being able to understand your link... knowing what you want to pull out of your ERP system – ours are central, while our plants are distributed – so you’re not limiting your shop floor by ERP connectivity, is absolutely key,” offered Bill Haser, CIO at Tenneco. And he’s right. It’s not just about being able to standardize between shop floor systems - it’s about understanding to what degree you want to standardize between your MES and ERP systems to ensure the most effective integration.

And to do that, you have to know what question you’re trying to answer - just as Jon Parker, CIO for Lyons Magnus, did in explaining his horizon dilemma: “How do we pull that data the machines are generating back into our overall network and systems topology so we can start to measure real-time performance?”

Ultimately, to standardize between the shop and top floor is to appreciate step change.

Prioritize what’s important in the nearest of futures from an efficiency perspective between the two – and then standardize to a best fit. Just don’t underestimate the power of correctly aligning to wider business goals.

“The information on our ERP, over time, is getting better and better as we’ve extended more of that information into that plant screen and onto the shop floor. We’re just starting down that path and that starts with some serious organizational changes first.”

Timothy Bartel, global director, business process optimization, Joy Global
Connecting the dots

20 senior IT executives from 20 leading manufacturers of everything from glass containers to printers, cigarettes to mining equipment sat on four roundtables to discuss creating the connected enterprise... and making it work. Adam Burns reports on their top challenges and thinking for success.

Data, tagging, the Internet of Things: nobody knows the exact location of ‘your business success’, but the road signs along the way are pretty clear... first, start connectivity now or, at the very least, soon. The business wants to know everything about what it produces, how and when, because getting that right is the business.

When Jørgen Vig Knudstorp took over as CEO at Lego, the company was on the brink of bankruptcy because, says CMO Mads Nipper, it “had no idea how much it cost to manufacture the majority of their bricks”.

To find the best way forward, Knudstorp went back to basics. He made Lego a world-class manufacturer of plastic once again, he linked design to manufacturing costs, and he refocused on the core business of making construction sets.

Today, Lego is a connected enterprise - technically and culturally, from shop floor to enterprise IT - and very, very successful.
Our roundtable experts’ top three challenges are:

1. Connecting the dots... Technically

Companies grow through acquisitions, or under different department heads with different ideas using different technologies. Jim Nordmeyer, vice president of global business process with Fortune 500 manufacturing leader Owens Illinois best summarized the challenges this creates: “we have various manufacturing systems on our shop floors, and have just completed a global ERP implementation... We’re now asking to connect what is going on shop floor wise to our machine control systems - in addition to connecting that into our ERP.” And of course all of that data is in different formats, uses different models and represents things in different ways.

2. Connecting the dots... Culturally

To add further complexity, when it comes to bringing up the swapping of systems and plugging in new technology, Jim highlighted the delicate task of dealing with egos “…everyone is proud of what they’ve done in their own factory - and we have 82 of them.”

Daniel McCue, vice president of information management with Xerox, the multinational document management company, agrees. Although for him, it’s less ‘not invented here’ and more ‘not right now’. “It turns out often to be a timing issue; it’s difficult to time the deployment of systems with the organizational change that’s required to go with it...so we have to get our operational teams to ramp up on training and implementation in different factories, at the same time that we’re bringing the systems online in the IT world.”

3. Connecting the dots... Securely

Jake Smith, director of enterprise applications with CVR Energy, speaks for 80% of our roundtable attendees: “I can’t connect my control systems to my core IT systems. For regulatory compliance reasons, those networks have to be separated, so all the things I’d love to do to give my business users that great information, I have to figure out how to get that across a security divide.”
Lorillard Tobacco, makers of Newport, Maverick, Old Gold and more, has been a connected plant since 2005. Director of engineering, Larry Beckman, has these words of advice for people on the journey...

Words of advice #1
When Lorillard started to connect its plant in 2005, the technology wasn’t mature enough so it custom-built a lot of what it now uses. The problem: now it wants to use more off-the-shelf solutions. Make sure you balance build and buy. Do you really need bespoke? Really?
Words of advice #2
You're not just connecting IT; you're connecting people. “IT says ‘what’s the process and how do we want to do it?’ Whereas for manufacturing, it’s more guys just wanting to roll up their sleeves and dive in,” says Larry. To solve problems, Lorillard created a Manufacturing Execution Group.
Winning thinking

Two of the best ideas that came out of the roundtable discussion...

Connection drives continuity

**Jim Beilstein**, director of IT, Owens Corning & Tammy Gilbert, CIO, Trinity Industries

Jim discussed the upcoming talent shortage of senior operators on the shop floor: “It will be a huge drain on our operations. We see technology as a big opportunity to continue to drive productivity without losing the footprint of our performance today.” Tammy squared the circle – saying that a roadmap to your technology infrastructure development was vital to bringing a new generation of staff into the workplace.

Start small, prove and move

**Rick Malone**, senior director business process technology, Graphic Packaging International

Technology is everywhere, and people may be a lot more used to it than you think. But the old rules of start small, prove, build consensus, and move on, still apply. Rick explained that, whilst today’s machinery is all IT savvy, which has increased the digital literacy of shop floor staff across the board, “we do have a lot of conflicts because corporate IT for us has never really been a part of the process control... no one on the operations side wanted us to report into corporate IT.” He started small, getting his process control folks to indirectly report into corporate IT to allow them to be helped in rolling out and standardizing some of the technologies at play. “Things are changing, and they are coming back to us after seeing work we’ve done together as a partnership.”
Manufacturing is changing. Radically.

By John Nesi

The vision of a connected enterprise is rapidly accelerating thanks to the industrial Internet of Things (IoT), and the swift convergence of Operational Technology (OT) and IT. The result is the transformation of data into insightful information that gives decision-makers across the enterprise new visibility into operations, new opportunities to respond to market and business challenges, and new opportunities to drive inefficiencies out of their operations. These operational benefits are huge, but so are the related fear and uncertainty.

To help minimize that discomfort, Rockwell Automation has developed its five-stage Connected Enterprise Maturity Model, which outlines the measures and best practices necessary to ensure effective change in both technologies and organizational cultures.
Every manufacturer will enter and progress through the stages of the Connected Enterprise Maturity Model that is most appropriate and at a pace determined by its own needs and readiness. The fear and uncertainty will long be forgotten as manufacturers and industrial operations begin to reap the plentiful benefits a connected enterprise can bring.

**Stage 1**
Assessment: Evaluation of an organization’s existing OT/IT infrastructure, including controls, networks, information solutions and security is critical. A thorough assessment helps create the “blueprint” for the new collaborative operation, laying the foundation for advanced technologies such as business intelligence software or cloud-computing capabilities.

**Stage 2**
Secure & upgraded networks and controls: A challenge for many organizations is the sheer volume and variety of outdated controls and networks in place. In this stage, the organization builds an OT/IT backbone that can deliver secure, adaptable connectivity from plant floor operations to enterprise business systems.

**Stage 3**
Defined and organized working data capital (WDC): The team now starts to define and organize all the available data needed for improving business processes. An effective OT/IT operation incorporates data from IoT devices across the enterprise to deliver performance-critical information that can be used for real-time, critical decision-making.

**Stage 4**
Analytics: The focus shifts to continuous improvement and how best to leverage the newfound OT/IT capabilities. Analytics utilizing the WDC identified help pinpoint the greatest needs for real-time information. In this stage the ‘data’ turns into ‘information’ that is insightful and actionable.

**Stage 5**
Collaboration: Create an environment that anticipates activities throughout the enterprise and through the supply and demand chain, enabling responsiveness to external events, supplier and customer activities, business trends, and changing market conditions. Manufacturers are also able to leverage centrally located domain experts across their operations, sharing best practices and enlisting the knowledge base of an entire supply chain.

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What we learned

1. **If your plant isn’t connected, you will lose out**
   70 million people are joining the middle classes, spending $8 trillion on goods. It’s a hugely competitive market and the winners will have efficient manufacturing operations that add valuable, agility-enabling data to the business. Everything is connected. And it starts with your plant and your infrastructure - because if that’s not securely synced, the rest is moot.

2. **The Internet of Opportunity**
   The vision of a Connected Enterprise is made reality by the Internet of Things and the transformation of data into insightful information that gives decision-makers across the enterprise new visibility into operations, new opportunities to respond to market and business challenges, and new opportunities to drive out inefficiency.

3. **Forget fear, uncertainty, and doubt**
   If the opportunities are huge, so are the related fear, uncertainty and doubt. The Connected Enterprise Maturity Model - followed at your own pace - means FUD is forgotten as manufacturers and industrial operators begin to reap the plentiful benefits a connected enterprise can bring.

4. **Standardization is table stakes**
   The 20 executives we spoke with, from a wide range of manufacturing operations, want connectivity. To get there, they need standardization. Start with a secure infrastructure, manage your culture, leverage your legacy, and make sure you understand what questions the business wants answered - for example: “how do we pull that data the machines are generating back into our overall network and systems topology so we can start to measure real-time performance?”

5. **You’re not just connecting IT; you’re connecting people**
   “IT says ‘what’s the process and how do we want to do it?’ Whereas for manufacturing, it’s more guys just wanting to roll up their sleeves and dive in.” Create your own steering committee or manufacturing execution group, with representatives from all parties, to provide a forum for problem resolution.

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