

How to Set Off on the Smart Manufacturing Journey

By Brett Brune

Conrad Leiva, vice president for product strategy and alliance at iBASEt and chair of the smart manufacturing working group at MESA International, speaks with Smart Manufacturing Magazine Editor in Chief Brett Brune.

Conrad, please explain what solutions iBASEt is providing to companies adopting smart manufacturing technologies and techniques.

iBASEt is focused on bringing software solutions to market for complex discrete manufacturers. And these are manufacturers in industries like aerospace, defense, satellites, medical devices, advanced industrial equipment, products that have a longer cycle time, that have a lot of engineering put into them, that have deep bills of material, and where engineering changes have to be incorporated into work-in-process. These are unique industries that are also highly regulated and have a zero tolerance for defects.

As with any industrial revolution, there is hype and there are the real innovations that take place. Where do you think we are today on the scale, looking at that with smart manufacturing?

It's interesting that you said "industrial revolution." So I'll have to first address one of my pet peeves. Industrie 4.0 versus smart manufacturing. The Germans labeled their initiative for manufacturing of the future Industry 4.0, in anticipation of an industrial revolution. The idea is that all the technology is here and we can string it together to really create this next level of productivity, thanks to all the great connectivity we can achieve from equipment, people and processes.

In the US, the title more favored has been smart manufacturing. You can use them both the same but Industrie 4.0 is really putting the cart before the horse. So I favor smart manufacturing.

To answer your question more directly, I think there is a lot of real meat behind some of the hype. And I see smart manufacturing in two dimensions.

One, horizontally, from left to right, going along the product lifecycle where we are going from design into supply chain, production, and the service of a product.

Two, vertically, bottom up, from connecting machines to the Industrial Internet of Things. And going to data stream analytics, where we alert people of new trends and things happening there. And then we move to the operational layer of systems, where we impose business rules,

workflow and process control. And this is where that digital thread meets that smart factory vertical dimension—and keeps flowing up into intelligence for manufacturing, where we start looking at enterprise systems and the business metrics and how we're performing to the goals. And even looking for opportunities for continuous improvement. It's about how we connect all this technology to achieve these kind of systems and connectivity.

What's an example of a project that you would consider smart manufacturing?

We're working on several, and I encourage everybody to get started on these initiatives. One great example is we're working in the UK at the Manufacturing Technology Center on an assembly line for electronics, where each board going down the line can have a different configuration. So instead of setting up the line like we used to and going to each machine, loading the programs, and then running 100 or 1000 boards through the line, we actually configure the line for 20, 30, 40 products, and we identify the type of product on the board. And the equipment on the line recognizes the board and then loads the appropriate programs to component placement machines and inspection machines to the configuration of that board. A lot of that (solution) is a multi-vendor solution with vendors focused on RFID, different types of machines, and middleware between the machines and the MES system. So it's a very exciting proposition, where we can go from building to stock—where we would have overbuilt units that we didn't need and where we didn't have enough of what customers were really asking for—to where we're building on demand and we are able to dynamically change the line configuration. The line can adapt to the product going down the line.

Is this called "reconfigurable" manufacturing?

Yes. But a whole line, as opposed to just within one machine. So it's taking the next step, where we string all these machines together into a whole orchestration to produce a product. And there's more to it. We have to handle deviations and have a rework station on the side.

What do you suggest companies do today to get ready for a smart manufacturing future?

Where do they start?

I went straight to talking about the technology and the equipment. But really, companies need to start by evaluating their business models.

People are so excited about what's going on because they see an opportunity to disrupt markets and deliver more services along with their product, change that customer experience, and maybe even product as a service for some companies. And to do those effectively, we need the digital information to go along with the product. So start thinking about whether you want to be the one leading the market.

Evaluate your IT infrastructure. If you're still running the shop floor on paper, you're falling behind. So make sure everything is paperless and start reviewing your processes.

Next, evaluate your digital handoffs between systems and see how formal and standardized they are. It's not all about technology; it's about business models and it's also about culture.

To make all this connectedness work, we're coming from a culture of silos and moving to a culture of collaboration. So collaboration across departments internally and into the supply chain is key. It can no longer be a culture of cracking the whip on suppliers. We really have to see them as partners in these new manufacturing ecosystems.

How do companies with legacy equipment and systems move forward to adoption of these new technologies and methodologies? Do you feel it's best for them to create new greenfield plants from the ground up?

That's a touchy subject, and I get asked this a lot: "Do we just start new plants?" "What do we do with these old plants?" And "I just bought 20 machines! What am I supposed to do with those?"

I see smart manufacturing as a journey for the next 10, 20 years. Along that journey, we will have greenfield plants as our test beds. But we're also going to have in parallel: service providers that are focused on connecting the older machines and equipment into this ecosystem. They're already out there producing these solutions and creating solutions like leveraging service bus technologies and connecting different topologies from the shop floor into IT systems. I see a lot of third-party service providers that are going to focus on connecting older machines into the ecosystem. I don't think necessarily we're leaving them behind.

What about standards? We obviously need them to really have the connectivity goals of a digitally connected enterprise or a smart manufacturing ecosystem. How can standards keep up with the pace of innovation?

Yes, we love standards at iBASEt and encourage the use of standards. Proprietary solutions are a good first step for many on this journey. But we need standards to reach the next level of collaboration [and] multivendor solutions. Especially when we go outside of these big corporations and we want to go into their supply chain into lower tiers of suppliers and smaller companies, they cannot afford to create their own standards or adopt standards from so many vendors. And they cannot afford to standardize on one vendor for all their type of machines, for all their software.

It's not realistic to convert a whole supply chain to one vendor. So we need solutions that work across vendors. We're going to get there. There's many consortia working on this. We have all the standards groups evolving their standards: ISO, OPC, OAGI, Mimoso and MESA. We have consortia like the Industrial Internet Consortia (IIC). We have NIST here in the US working on standards that are creating reference models and providing guidelines for how we're going to leverage standards and connect this whole architecture.

Will vendors adopt the standards or still push for proprietary solutions in the next five years?

Manufacturers all need to, in their RFPs, request support for standards from vendors. That's where it starts. If we don't ask the vendors for standards, they don't think we need them. Some of the big vendors will react by saying they want to bring their own proprietary standard way of connecting things to own the market. But many also realize that that's not real, and it's not going to get us to the next level of manufacturing connectivity.

So I also see a lot of them collaborating into these little "clubs," like the IIC. But even if we end up with two or three ways of connecting things, it will be better than 20 or 40 ways of connecting things.