

Productronica 2015: Are we Industry 4.0 Ready?

Full disclosure: Our Productronica tickets were gifted to us by ASM Assembly Systems.

Now the dust has settled on Productronica 2015 and I have had time to research more into the manufacturing industry's current state I can start to form some conclusions on where we are with Industry 4.0.

Industry Reflection

Having a background in the open and community lead Software Engineering world means I have naturally been waiting for the Industry 4.0 movement to occur but when was more the question.

I worked in SMT through a period of time where large multinationals dictated their requirements to machine builders at the expense of internal innovation.

We don't want our machinery on networks due to the fear of Viruses, was a classic. We can't let you remote-in to fix that issue due to our company policy, was another. Then, I grant you I may have been living in a cave working on an unrelated project, but overnight in 2007 customers started asking for their manufacturing equipment to be networked.

In reflection, a level of technical education had been achieved at the board level of most companies thanks to the launch of the iPhone. CEO's started to 'bring their own' mobiles into the corporation, previously an act which would be quickly squashed by an IT department's policies, but as this was the CEO, then policies quickly changed and education flourished.

I will try to keep the history lesson brief, but other changes included the drive for Onshoring and how this reflected on the Total Cost of Ownership (TCO). Western hands are costly, so the only way to reduce this was the reduction of them by Automation. However, this goal was originally suppressed and delayed due to the cheaper hands of the Asia-Pacific region.

Finally, and I believe this to be the biggest change, is the natural introduction of Millennials into what can be considered a conservative industry. These are people who are highly educated with consumer technology and again, why technology such as the iPhone was such a game changer in waking up the world.

My first experience of the latter was a visit to Hella KGaA Hueck & Co where I met two Manufacturing Execution System (MES) Engineers and their intern. These were people a few years out of University tasked with deploying the iTAC MES platform into their factory. I knew from this meeting that this was the start where the machine

builder's software became the 'platform' and customers would start to take control of configuration.

Previously the whole delivery was in control of the machine builder resulting in inflexible solutions.

Productronica

At Productronica in Munich I swooped around the stands asking, primarily the machine builders, two simple but often confusing questions.

- What data can you supply me?
- How can I get hold of it?

While I have heard about the event for many years, from my previous view as an Engineer at the coalface, I always saw it as a grey suit Buyer-Seller trade show. This was mainly due to the people who would be sent by my former employer, Namely Marketers, Product Management and the Top Brass.

It was therefore a highlight to my trip that I was able to speak to many Software Engineers attached to machine builders and also key architects at MES and traceability companies.

An Engineer from FUJI even sat me down at one point and proceeded to draw out a complete diagram of their data architecture, which I was highly thankful for.

After firing my blunt, and therefore often confusing questions, followed by uttering the words 'Industry 4.0' I was often relayed from the Sales Guy to the Product Manager and then when they realised I was an engineer I was finally relayed to the nominated 'Software Guy'.

Industry 4.0 Ready?

At the heart of Industry 4.0 is interfacing, a concept that isn't new to the industrial world that has over the years slowly produced primitive interface standards.

While some industry veterans seek Industry 4.0 standards so systems can Plug and Play, it isn't in the spirit of the Internet of Things, which Industry 4.0 is based.

Instead of creating interface standards that take years to define and agree, everyone can create their own interface based on modern technologies, often web-based, which are documented via the interface itself.

For example a RESTful interface can produce machine readable XML, JSON or a custom format, but also HTML which developers can read to educate themselves via a web browser.

The majority of machine builders at Productronica have created their own interfaces mainly driven by their SMT line solutions. This is where customers use their

complete software ecosystem when multiple machines have been purchased from the same supplier.

Often machine builders want to facilitate the ease of connecting other manufacture's hardware onto their line solution.

Hubert Egger, Head of Products and Solution Marketing at ASM Assembly Systems explained to me their Operations Information Broker (OIB), an Web Service interface based on SOAP.

Signing a NDA, as we have, third party software vendors are given a Software Development Kit (SDK) full of example code and applications with complete documentation of the interface.

The OIB is a relatively mature interface in regards to when it was originally conceived but in later years it has grown as more software vendors have used it.

Like any good interface, emphasis has been placed onto version control, allowing improvements to be made but also maintaining older ones. A strategy that seems wise, but I do believe a breakage now and then helps to remind customers they shouldn't be using version 1 for 10 years.

Moving over to Florian Ritter, Manager of Business and Product Portfolio Development, of ASYS Group, he explained that they also have a similar interface based on raw sockets where a Publish-Subscribe mechanism exists.

ASYS Group has had a considerable head start over ASM Assembly Systems in creating a line solution due to the lack of ASM manufacturing its own screen printer. ASM completed an acquisition of DEK Printing Machines in July of 2014 scrapping its own prototype screen printer. This finally gave it its own line solution along with a Solder Paste Inspection (SPI) machine. Two years on Hubert stated that both the Printer and SPI are still not fully OIB-Ready.

What did strike me about the ASYS Group booth is how in synergy everything was. From the corporate identity of the company itself, to the user interfaces of all the machines, to the designs of the machine covers, everything was to a standard.

I asked Florian how the company achieved this and in reflexion the answer was obvious. Design, User Experience and Marketing all sat under one department's control creating a uniformed output.

This may not sound related to interfacing but I often believe attention to detail and giving the correct teams of people ownership of engineering-unrelated but human-related parts of a business's output is key.

This can often be achieved by creating companies within companies or partnering with third party suppliers. Remembering that the full definition of a company is a 'Company of People'.

Focusing on interfaces, its clearly going to be a culture shock for machine builders to task teams to focus on creating software that doesn't initially have financial value.

The temptation will be to ask these teams to be multidisciplinary and work between different parts of their software solution.

The culture difference between developing something for today and developing something for the future clearly requires a different train of thought but it explains some of the repetitive messages I took away from my conversations on the day.

Current Hurdles of Industry 4.0

The two main messages I took away speaking to the industry leaders were:

- You need to talk to us
- To talk to us you need a customer

I have developed for many platforms in my time, Microsoft, Linux, Apple, Android etc etc but I have never required to seek a customer to start a development or needed to talk to the platform maker prior to start.

Too be fair to ASM Assembly Systems, their NDA was a simple process to complete, and to develop for Apple a developer licence of £90 per year is required before you can publish an App.

If a machine builder can make the process of understanding and using their interface a breeze without any human interaction then that would be the first barrier-to-entry resolved.

The second hurdle of Industry 4.0 is more of a global issue both within the line solution ecosystem and outside from a software vendor's viewpoint. Once a killer solution has been developed using one of the machine builder's interfaces a level of testing is required with either physical hardware or what is known as a Test Harness.

Using physical hardware normally involves talking to someone, wasting time, travel, maybe flights and then confirming a schedule to use it, often in the middle of a production run. So in the spirit of Internet of Things lets rule that one out quickly.

A Test Harness is the preferred option. That is an interface endpoint where dummy data can be sent and received via either a manual trigger or a simulator. Internally, test harnesses are always created by Engineers for their own use but normally only to a standard for internal use. A change in mindset in this area and direction from management solves the following problem.

When I asked the machine builders if they could supply me with a Test Harness they often repeated the two messages I have already defined above; when you have a customer we will support your development.

I completely understand their current attitude as from personal experience I know that even within these companies getting support from other software system suppliers can be time consuming.

Creating a Test Harness that can be bundled with a SDK is clearly the solution but there will be reluctance to do this straight away while there is no business case.

We therefore should use this current Industry 4.0 hurdle to learn for the future and the solution is simple to implement.

At INDUSTRY4.UK we encourage ourselves to "Eat our own dog food", this is a Microsoft term that is to say; use the product you make.

In this situation the product is the interface test harness and value to the machine builder would be achieved from the use of it by internal engineers. Once the test harness has been used by their engineers it can then be exposed to third party developers via the SDK at no additional cost to the machine builder.

The real main change in this situation is the direction from management by informing engineers to make their internal tools products.

Conclusion

The main two messages I took away from Productronica weren't a big surprise; it is a reflection that machine builders aren't totally there to facilitate Industry 4.0 yet.

It was more interesting to me the different strategies the machine builders were taking in either creating solutions in-house or partnering with software vendors.

Mitch DeCaire, Channel Sales Manager at Cogiscan, gave me the lowdown of networking manufacturing equipment over the last 15 years. Cogiscan provides Juki Automation and Speedline Technologies with traceability and automation systems.

It certainly sounded a painful game, with often machine builders creating interfaces, but also crazily only allowing their use after considerable payment. His stories reeked of machine builders not "Eating their own dog food" and therefore only justifying the interfaces when someone paid for them. Cogiscan has been able to guide Juki and Speedline's strategies and bring to the table fresh ideas.

With his stories as a reference I can conclude great progress has been made and I don't feel we will go through the same pain. But I feel without the Industry 4.0 buzzword what would be on offer would be the same today.

It's important for machine builders to remember the lessons learnt from mobile app development. The next killer software solution may not come from them or large software houses. It may come from a man in his shed, or a teenager in their bedroom, but this will only occur if the interfaces are open.

We must also talk about the progress being made and share our ideas and solutions, this again maybe an issue in an Intellectual Property protected industry.

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