

Industry 4.0: Fluff or Substance?

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Introduction

I recently attended the first annual Industry 4.0 Conference that took place May 10th, 2017 sponsored by Antec and SPE in Anaheim California and moderated by Robert Grace. The purpose of the seminar was to show multiple perspectives of how companies are now offering (or planning to offer) new features that will fall under the Industry 4.0 umbrella. The bulk of the presentations came from injection molders, with one from W&H for blown film, one from IBM showing how the entire supply chain can benefit and one from RRAMAC, a company that provides technology support to implement more secure remote support solutions. Even with the heavy weighting from the injection molder OEMs, the features and benefits they are envisioning will be similar for film and sheet extrusion. Some of the features are not really new (like remote support), but what is new is being able to bring all the features together to improve machine operation, (uptime, efficiency and performance) or improve supply chain efficiencies by having the machine communicate to ERP (Enterprise Resource Planning) or MES ([Manufacturing Execution Systems](#)). Having read this document you will hopefully have a better understanding of Industry 4.0 (hereafter referred to as I4.0).

Overview

The main emphasis of I4.0 activity is to bring together the next level of integration of equipment performing related tasks. In a blown film line, for instance, the IBC system is providing cooling and size control, but if it received data from the gravimetrics telling the IBC the production rate is, it could manage cooling more efficiently by increasing or decreasing with production rate (and alert someone if the cooling capacity will not support what they are attempting to do). There are other parts of the I4.0 that relate simply how the operator interacts with the machine. For instance, anyone operating a film line knows there are a symphony of steps that have to take place to get the line running. Using I4.0 ideas, the operator can be prompted to perform the proper steps in the proper sequence. A kind of augmented intelligence that helps the operator NOT replaces the operator. Finally another useful area is preventative maintenance and predictive failure analysis. This can tell the operator that a problem is coming and guide what the possible solutions could be to head it off before it takes the whole machine down. In some cases, you can even look at providing operator and technical manuals or even exploded parts drawings, of course, an easy to read HMI is require to make this useful, so for auxiliary suppliers this could be a challenge unless they incorporated those functions into a mobile app for their customers.

Motivations

It appears from what I have observed so far is that most of this effort comes from the OEMs who were having a bit of a challenge differentiating themselves from one other. For first providers of I4.0 functions there again are clear reasons why a customer might choose one supplier over another (besides only cost). There are issues with progress in this integration as Information Technology (IT) departments tend to be a bottle neck in what the Operational Technology (OT) departments want to do. OT is a fancy name for the production department. As an auxiliary supplier, we know from experience that a company's IT department can make or break the efforts of the production department to connect vendors to their machines via the Internet. There are legitimate concerns of these IT departments and so one segment of I4.0 is to smooth the relationship between IT and OT (more on this later).

On the surface however, the main emphasis seems to be making the machines work more efficiently as a group of peers. Certainly there is some great marketing potential that goes along with providing I4.0 technologies with any piece of equipment a company sells, particularly since it is a hot topic right now. I don't think this will be a fad, mainly because the costs of doing the work needed has been steadily dropping and the technology is quite stable. I would say I4.0 is simply an epiphany of what can be done with what has become readily available to generally trained engineers (as opposed to research scientists). Sensors have become cheaper and even hub processors that collect sensor data and pass it up to a main processor are available for less than forty dollars. A lot of technology cost decreases have come from the drone development community.

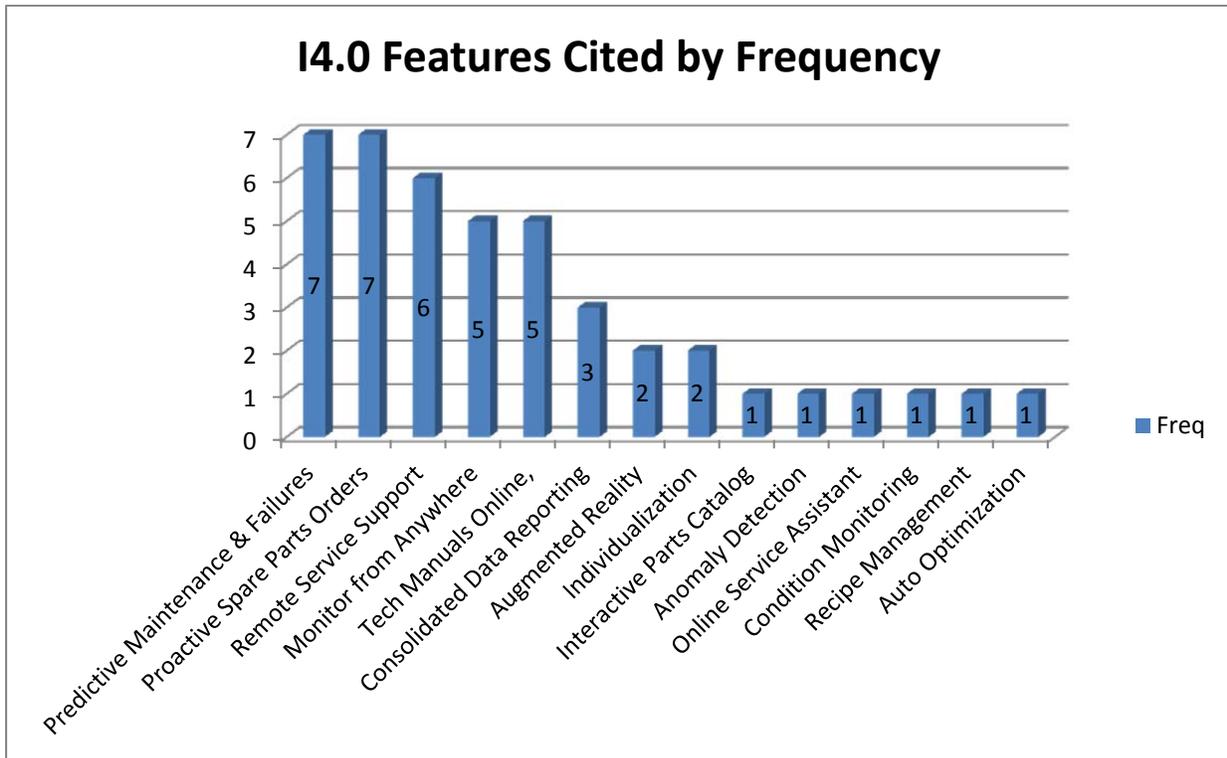
The benefits are positive, even though some think I4.0 will ultimately result in a [Skynet](#) type reality. My read is that serious designers do intend to ultimately provide [augmented reality](#) (AR) type solutions. There isn't much possibility of artificial intelligence handling the factory floor, although you will undoubtedly see some companies marketing I4.0 in that manner. Back to augmented reality; we were shown an example of a technician viewing a part of the machine with his tablet (through the camera in the tablet) and software superimposes a 3D exploded view of how the part should be disassembled for repair. This has huge benefits for companies looking for people able to work on specialized machines. No longer will companies need to hire someone with years of experience on a specific machine, but instead they can look for someone with a general knowledge of mechanical systems and the proper use of tools – something that can be trained in a short period of time. Of course, the knowledge for AR has to come from industry experts. Those experts are retiring at an alarming rate and there is a huge gulf that has to be bridged. AR is a possible answer to help the next generation pickup where the last generation sat down their tools and went home.

Overall, I would not be overly cynical about the motivations of I4.0 and instead consider it the next phase of the industrial revolution – a revolution that successful companies will need to embrace. My main concern for the OEMs is that they should not do anything just for the marketing reasons. Whatever the plastic industry does should solve real problems for the customer, it can't be just glitz for the sake of having something glitzy.

Industry 4.0 Features

Below are I4.0 features that were brought up in the course of the seven presentations I listened to. As I mentioned earlier, not all of them are new (remote support). The others are really not part of what is available from most machine and auxiliary suppliers (of course, other than the ones that elected to present what they are currently offering). I think that features that do not rely extensively on the Internet/Cloud, would be best first choices. Certainly, first choices for implementation could be predictive maintenance and failures.

Here is a frequency graph of features mentioned at the conference:



As I mentioned previously, what we do in I4.0 must solve customer problems. I4.0 features must make the life of your customer easier, better, or both. We heard from one presenter that dollars for data typically does not work as a selling feature. For there to be a value, the data has to be converted into information for the customer. For instance, our company (DR Joseph, Inc.) has recently released an ftp hosted data collector that allows our software to assist the user in reviewing performance and finding unique events that correlate to quality problems. By having it on a HMI based FTP site, the customer has no requirements to manage the data. When they need it to solve a problem, they start a program point to the machine and the time stamped data is available for recreation. Recreation means we put it back together as if it were happening in real-time including the ability to view it at triple the normal speed.

The best implementations of I4.0 will be easy for the customer see the value of what they are getting. The easier they see the benefit, the easier it is for them to make a decision to delve into something new.

Even then, there can be hesitation due to the standard reasons; budget, training, development, etc. Companies that have established SOPs will be more reluctant to make widespread changes, so you have to be able to keep SOPs intact. For instance, when Windows 7 came out it supported a feature to maintain the look and feel of Windows XP. It's a small detail and it can require extra work to provide two interfaces, particularly when there are multilingual support issues, but the last thing you want is to alienate your customers. If you do, you are making it easier for them to consider your competition's offering.

Cloud Supports Remote Support

I am not a fan of cloud based computing at all, and those of you who know me are probably surprised that I would even mention this subject. I mention it because cloud support does not necessarily mean process data or parameters are stored on the cloud. The aspect of the cloud that interests me is that it can provide remote support through the cloud without forcing the customer's IT department jump through hoops to setup a VPN connection or other internet access method. Remember, I mentioned earlier that IT departments loath making holes in their firewall for production requirements – even if those requirements would save money. There are more details to the implementation than I have space to explain here (the folks at [RRAMAC](#) would be the best to contact for these details), but I will say that there is room in my world for a Cloud based remote service support. It's one that I can setup and the customer simply connects out to the Cloud to begin. This eliminates what IT guys really hate the most, someone unknown connecting into their network.

Conclusions

Regardless of what you think of it, I4.0 will be a component of manufacturing machines going forward. Right now, there is not a lot of real activity on the production floor using I4.0, but that will change over the next 5-10 years. Regardless of what we do as an industry, we need to make sure it is something that provides the customer tangible value. A cooling looking touch screen does not do that, but one that is easier for the next generation of operators might provide real value. Or one that allows them to see scores of how well they are running the machine. For instance, a trend of startup times showing how long it took to get into production. That trend could be used to identify materials that are causing issues or possibly operators that need help with their techniques. If you could take it to the next level and guide the operator based on more efficient techniques of other operators, certainly that would be of value.

The presentation from W&H had a slide that said something like , “ build on your expertise.” I think that's a wise place to begin in selecting I4.0 features that will provide more value for customers.