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Automation and Manufacturing in the Age of Trump

Donald Trump has been inaugurated as President of the United States. Manufacturing leaders and automation vendors need to cope with some serious issues going forward.

US President Donald J. Trump

Last month, the INSIDER highlighted some trends we believe will be seen in the near term, and later. These trends and management of them will be critical in the success of manufacturing companies and their automation vendors.

Destabilization of the USA and EU by their right wing political parties. This should aid China and India, and other, smaller companies. The destruction of institutions such as the EPA will have effects far greater than the simple unemployment of a group of bureaucrats. EPA regulations govern water, wastewater, air pollution, solid waste pollution, and superfund sites. There are hundreds of companies whose business is, all or in part, dedicated to providing municipalities and companies the tools and support necessary to comply with the EPA in many areas. If the EPA is destroyed, these companies will stand to lose anywhere up to 100% of their income. Automation companies that provide flow meters, disinfection systems, air pollution monitors, water pollution monitors all the way down to simple pH meters, and the control systems that are associated with them will see a substantial decrease in sales to the environmental markets. This would include companies such as Emerson, Yokogawa, ABB, Sick GmbH, Danaher Corporation, and hundreds of others.

This may cause loss of revenue over the 10 years following the collapse of EPA regulations of perhaps as much as 25% of the entire automation industry in the United States. The fact that other countries generally follow the US EPA may cause similar revenue reductions in other countries around the world.

Imposition of bans against persons of color entering the United States are legally problematic, but the INSIDER suggests that this kind of restriction could cause the Manufacturing sector and its automation vendors to have to reduce efforts for R&D, and other activities, because of the lack of qualified personnel. A cursory look at the senior staffs of many automation companies and a simple count of the immigrants from mostly-non-white countries is not only instructive, but should set the automation companies into action to forestall such bans.

Those are only two vectors with which the destabilization of the United States will impact manufacturing and automation. There are more. All of them will certainly be expensive for manufacturing and the automation vendors.

This does not consider the economic and political effects of President Trump's apparent ease in angering other countries, such as China, Australia, Mexico, Iran, and Japan.

Globalism is, if not effectively dead as a manufacturing philosophy, under serious

Automation and Manufacturing in the Age of Trump(continued)

pressure. For several years, companies in manufacturing have been looking at "make there, sell there" scenarios to cope with climate change, rising nationalism, and lack of shipping on a global basis. The automation vendors were incredibly negatively impacted a couple of years ago, by flooding in Thailand that destroyed chip making facilities. Some companies could not deliver for a couple of months. This is an issue, but may not be a real problem It may in fact be an opportunity, depending on how manufacturing companies and automation vendors deal with it.

Automation vendors who are capable of restructuring themselves as user performance enhancing companies will win; vendors who attempt to continue as usual, or just do lip service to the IoT and the new centers of manufacturing excellence in China and India, will lose. This may become increasingly important as the US Government reduces support for scholarships and research in the United States, and restrict the entrance of immigrants to the USA. The anemic response of the US Government to counter other countries' efforts such as Industrie 4.0 and China 2025 will also damage performance of manufacturing companies and automation vendors going forward. The Obama administration spent approximately $1 billion on supporting the future of manufacturing, while the Chinese Government is betting something like $55 billion on the same future.

John Bernaden, chairman of the Smart Manufacturing Initiative (www.smartmanufacturinginitiative.com) relates that he attended a recent meeting on Capitol Hill with manufacturing leaders and government officials. It appears that at least at the present time, the Trump Administration expects to continue the Obama policies toward manufacturing, along with additional tax incentives and other assistance. This, if it continues, will be a small step in the right direction, but if President Trump decides he is displeased with the loyalty of the manufacturing sector, such policies may well be abandoned.

The continuing push toward more fully realized automation will generate social and political pushback. Vendor companies and end user/asset owner companies need to be prepared for public stigma, as politicians blame them for unemployment and poor job situations. Trump successfully used this gambit to get displaced auto, steel, mining, other manufacturing workers to vote for him. If the Trump administration is not widely viewed to be successful in creating the promised good jobs and getting companies to move manufacturing plants back to the US, the rough coalition of angry voters may get even angrier. As INSIDER columnist, Joy Ward notes in her forthcoming book, *Why Trump Happened, a Path Forward*, "If we think displaced workers are mad now, wait four more years."

Some automation companies, such as Siemens and Emerson, have attempted to combine Cloud based services and the manufacture of sensors. This, quite honestly, is a last ditch effort to maintain the pricing on sensors—sensors are very often the highest gross margin product of an automation vendor.

And as tax bases reduce, the level of infrastructure spending, already at historically low levels, will decrease even further. This may not be a problem for manufacturing leaders and the top executives of many automation companies, who can simply slip away into their guarded and gated communities, but their workers will have targets painted on them.

The trend toward bifurcation of the industry into software companies and sensor companies will continue. Sensors will continue to face extreme downward pricing pressure. There will likely be destabilization from companies intruding into the sensor market from outside. We are already seeing this in the commercial and home Internet of Things market. People are marketing very simple, very inexpensive sensors specifically designed to work with already-existing software via the Cloud and the Internet. Companies like IBM and Microsoft, who provide cloud-based analytics and data storage are not interested in making sensors. IBM has, for nearly a century, continued to follow its founder's dictum that IBM personnel are executives, and they don't get dirty in the factory. Some automation companies, such as Siemens and Emerson, have attempted to combine Cloud based services and the manufacture of sensors. This, quite honestly, is a last ditch effort to maintain the pricing on sensors—sensors are very often the highest gross margin product of an automation vendor.

Remote operations management may become even more important if the political situation in some countries continues to degenerate. We have already begun to see younger workers expressing deep reluctance to be stationed somewhere in the jungle, or in the Arctic—where the raw materials are. As local conditions are exacerbated by climate change in places like Yemen, Syria, Iraq, India, Indonesia, Thailand and Southeast Asia, local economic and political conditions will continue to degrade, and western populations and corporations will be seen to be at least part of the problem, and not any part of the solution. Remote operations facilities, com-

Automation and Manufacturing in the Age of Trump(continued)

bined with private security forces (read mercenary armies) may be the only solution viable.

Fracking may not save the oil and gas industries, or the automation vendors who are counting on revenue from fracking companies. The populace is getting very concerned about the problems with water pollution and earthquakes, and unless fracking technologies can be developed to avoid those things, fracking may not be a long -term proposition. In the short term, with the Trump Administration heavily influenced by oil and gas interests (and himself invested in them) we should see a resurgence of drilling and fracking, as well as a resurgence of pipeline and refinery construction. If the Trump Administration loses political control, we could also see a quick and stiff backlash against environmentally-dangerous activities such as drilling and fracking.

The dismantling of the social safety net in the US and Britain may require companies to pick up the difference, and set up training schools and funding for health, safety, and retirement for their workers, or they might have trouble getting quality workers.

It is possible, as Congress dismantles the Affordable Care Act, that companies will have to go back to providing quality health care themselves. This will seriously negatively impact the SME companies that are still in existence. We believe that the number of small to medium size enterprises in the United States has declined by half since 2000, due primarily to the banking system crashes, and not to foreign competition. If Congress continues, as they have said they will, to dismantle Social Security and Medicare, it will be up to the manufacturing sector and the automation companies that serve it to provide the social safety net that the Government is abandoning.

The dismantling of the social safety net in the US and Britain may require companies to pick up the difference, and set up training schools and funding for health, safety, and retirement for their workers, or they might have trouble getting quality workers.

This is especially important because most of those SMEs and many large enterprises are having great difficulty expanding because they cannot get good, high quality, qualified employees *now*. After the Republicans in Congress and in the State Houses reduce significantly aid to colleges and universities, and also to elementary and secondary schools it will be even harder to get qualified workers. The historical response to this has been the H1B visa program, which the Trump Administration appears to be trying to eliminate.

Vendor companies need to create ecosystems, not customers. This is important in building customer loyalty, shoring up the "vendor annuity" of installed base, and even more important as the lack of trained and qualified employees continues to strike the manufacturing industries. Vendors who want to establish themselves as user performance enhancing enterprises must first have the trust of the asset owner, so that they will be entrusted with the intellectual property and performance requirements of the plant, or series of plants that they will be operating. This will require some retraining of sales and marketing and strategic analysts who have historically used sole source agreements and operating agreements as levers to increase profits over time while reducing provided services.

Younger workers will demand to be treated differently than Baby Boomers. This is obvious, but needs restating often. As we have already mentioned, younger workers are resisting being stationed in places where they can get dirty and where it might become dangerous. This will increase the pressure to provide remote operations and remote maintenance services. This will not only affect large automation vendors, it will also affect smaller companies who make sensors, or a specialized software package. Everybody will have to have the ability to service their products remotely, and probably set up, calibrate and operate them as well.

Younger workers will insist on using smart tools, smart phones, tablets, and other devices in the field. This means that many manufacturing companies will have to re-think hazardous area classification, or be prepared to buy their employees classified devices. This is also going to be reflected in education and training, until the younger workers are satisfied and happy employees.

Automation technologies are blurring the lines between industry, buildings, data centers, and the like. This will continue. Automation initiatives like the ExxonMobil Open Group initiative and the Smart Manufacturing Leadership Coalition's CESMII initiative will continue, and devices and software will be commoditized and made into Lego-like plug and play modules.

Companies who only focus on factory automation, or process automation, or on a single industry vertical such as pharmaceuticals or mining will find themselves at a disadvantage against companies who can do all types of automation.

The next few years will be challenging, to say the least. Manufacturing and automation will change drastically. We can hope it will be for the better.

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Schneider Embeds Expertune PlantTriage in Control Advisor

Schneider Electric has added a new enterprise-wide IIoT plant performance and control optimization software to its Foxboro Evo process automation and Foxboro I/A Series distributed control systems. Leveraging Expertune PlantTriage technology, EcoStruxure Control Advisor, a native smart decision-support tool, helps plant personnel prioritize and focus on loop performance opportunities that have the greatest impact on process performance and efficiency throughout the plant lifecycle. Using integrated, enterprise-wide Big Data and predictive analytics, Control Advisor monitors every control loop across multiple plants and global sites 24/7, empowering plant personnel to take actions that contribute directly to improved business performance.

Grant Le Sueur, Schneider Electric

"Strengthening the efficiency of the process in real time has a tremendous, positive impact on the entirety of the operation and business, and it puts customers on the path toward controlling other critical business variables, like safety, reliability and even profitability, in real time sooner," said Grant Le Sueur, senior director, control and safety software, Process Automation, Schneider Electric. "Control Advisor continuously monitors plant performance and identifies potential issues in real time, before they occur. The information it provides empowers the workforce to be more actively involved and responsible for the success of the business. In short, Control Advisor is a great example of how Schneider Electric can apply its IIoT expertise and technology at every level, especially when it comes to Big Data, predictive analytics and other emerging technology, to help our customers drive operational profitability improvements, safely."

Because it is more tightly integrated with the company's Foxboro Evo and I/A Series control systems, Control Advisor gives users better opportunities to improve business performance. An easy-to-use tool that works natively across a broad spectrum of industrial applications without substantial capital investments, it extracts more value from existing investments by bringing plant operations closer to set point, minimizing out-of-spec production and identifying predictive maintenance indicators. Improving the performance of each control loop not only restores stability to the operation, it can drive up to a 2 percent increase in energy savings and up to a 10 percent increase in production capacity. In addition to its ability to drive energy savings and production efficiencies, it is proven to enhance safety, optimize maintenance, lower operating costs, increase product quality and reduce emissions, among many other things.

"Because of the significant impact it can have on the efficiency and profitability of the industrial process, there has always been a need to simplify the complex task of optimizing control-loop performance," said Greg Shinskey, process control consultant and member of the Process Automation Hall of Fame. "Expertune and Schneider Electric, with its Foxboro brand, have set the industry benchmark when it comes to control-loop performance, and I am thrilled to see this work continue with the inclusion of Control Advisor technology. Its ability to identify performance metrics and relate those to real-world diagnostics customers can easily act on will indeed help process manufacturers improve the quality of their production, reduce energy consumption and avoid unplanned downtime. For example, an LNG facility that employs this technology has been able to save an estimated $1 million per year in operating costs. That's real money that goes straight to the bottom line. I congratulate Schneider Electric and Expertune for taking this step and I look forward to seeing how their customers will continue to benefit."

Greg Shinskey

Chris Lyden SVP Strategy Schneider Electric

"Control Advisor builds on Schneider Electric's long history of excellence when it comes to connected technology, closed-loop control and performance optimization across the entire manufacturing operation," said Chris Lyden, senior vice president of strategy, Schneider Electric's Process Automation business. "In a world of diminishing domain expertise, today's industrial workforce is expected to be more critically involved in the business. Control Advisor, with its easy-to-use analytics, helps them convert valuable raw data into actionable information so they can make better business decisions in real time. It is a powerful IIoT platform that empowers plant personnel to advance from controlling the efficiency of the process, which was their traditional role, to improving the overall performance of the business, including improvements to plant safety, reliability and, especially, profitability in real time. That is the true promise of IIoT, and the first step toward realizing the future of automation."

GE Oil and Gas Announcements from Annual Meeting

At its annual customer meeting held in Florence, Italy the end

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of January, GE Oil & Gas announced new innovative agreements including a technology cooperation agreement, contracts for subsea trees and wellheads, and a new Predix-enabled digital solution for equipment monitoring. The agreements are built from the continued partnership and collaboration between GE and its customers, according to the company.

In today's market environment, GE believes that increased partnership and collaboration in the industry is crucial. With collaboration at its core, GE Oil & Gas says it is leading a new era of partnerships and product/project co-creation by developing not only new technologies but also new business models and performance-based service agreements to meet the needs of its customers.

"Collaboration is crucial to accelerate technology advancement, streamline specifications and enhance solutions that meet the challenges of the current environment and position our customers to thrive in the future," said Lorenzo Simonelli, GE Oil & Gas President and Chief Executive Officer. "Through these new technology and advanced digital capabilities we are helping our customers improve equipment reliability, improve safety, reduce unplanned downtime and, ultimately, save costs."

Lorenzo Simonelli, GE Oil and Gas President and CEO

New technology offerings, deals and customer partnership agreements announced at GE Oil & Gas' Annual Meeting included Enterprise Impact, and Additive Manufacturing.

GE says that Enterprise Impact, the latest offering in GE's digital portfolio, is an innovative advancement in condition monitoring, providing condition prioritization and unifying monitoring insights across a complete enterprise.

Operation and Asset Managers in capital intensive process industries can now easily employ predictive and prescriptive analytics to quickly identify and prioritize machinery health issues across multiple monitoring technologies, improving operating efficiency, reducing maintenance costs, and increasing topline revenue.

Enterprise Impact increases accessibility and usability across the System 1 suite, improving asset returns by moving from an individual machine view to an enterprise level of insights and analysis.

It connects key data sources and systems like SmartSignal, Meridium and beyond, to enable broad deployment of Asset Performance Management (APM) on premise and in the Cloud. It adds robust prioritizations, detailed risk classifications, and rich failure analytics to enrich APM asset policies and strategies.

A Predix-enabled data connectivity solution, Enterprise Impact includes a web-based dashboard for a single, secure access point for monitoring equipment and instrument health. Unlike, disconnected point solutions and single mode monitoring, Enterprise Impact provides holistic and proactive health information for the entire enterprise.

GE Oil & Gas and Total Refining & Chemicals entered a Technology Cooperation Agreement aimed at introducing innovative additive manufacturing techniques to the production of centrifugal pump impellers in GE's facility in Bari, Italy. The agreement represents a milestone in the process of adopting Additive Manufacturing as part of day-to-day operations in the production of equipment for oil and gas applications, including downstream.

GE and Total have already successfully implemented additive manufacturing techniques for turbo-machinery products. As part of the agreement, GE Oil & Gas will use advanced manufacturing methods such as 3D laser scanning and Direct Metal Laser Melting to 3D print impellers on a 1/1 scale, leading to a significant reduction in lead time – from months to an average of three weeks from 3D laser scanning availability – higher technology sophistication.

This advanced solution to optimize the supply chain, by moving from physical to digital stock, could be an effective contribution to Total's R&C units competitiveness. The first impeller will be in operation in a Total French Refinery within the second quarter of 2017.

GE Oil & Gas has been awarded a contract with Premier Oil Indonesia (Premier Oil Natuna Sea B.V.), for subsea trees and wellheads for the Bison, Iguana and Gajah Puteri (BIGP) fields, in the Natuna Sea.

The scope covers subsea trees and wellheads, rental tools and field service support during the installation and commissioning stage. For the initial phase, Premier Oil Indonesia will issue a call out for three sets of subsea trees and wellheads with deliveries anticipated by Q1 2018.

The subsea trees will be constructed at GE Oil & Gas' facility in Batam, Indonesia, which GE says is reflecting their commitment to increase local content and local capability for subsea projects in the region. The deal includes the GE Oil & Gas Tree on Mudline (TOM) series and the SG1 wellhead system,

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suitable for shallow water operations using jackup drilling rigs, and fully aligned to the needs of the operator.

GE Oil & Gas, PDI and EnerMech also launched eMERge, an innovative partnership supporting existing and new entrant North Sea E&P operators to maximize economic recovery of reserves. The strategic alliance will offer a range of integrated production and operational support services. It will help identify opportunities to increase productivity while reducing operating costs and downtime through unplanned outages, and offer services including project management, topside and subsea engineering, construction and commissioning, and field optimization solutions.

The alliance combines GE's technology, state-of-the-art digital solutions, products, services and financing capabilities, with PDI's project management and engineering expertise, and EnerMech's installation, commissioning and operational capabilities. The range and scope of service has been developed to ensure existing and new entrant operators can access integrated production, operations and maintenance optimization support services. eMERge aims to mirror the objectives of the UK Oil & Gas Authority's Maximising Economic Recovery (MER) initiative.

IHS Markit Releases Top Seven Manufacturing Technology Predictions for 2017

After a disappointing 2016 in automation sales, declining revenues for many equipment suppliers and investment uncertainties in numerous end markets, vendors in industrial automation are hoping for a brighter 2017. With changing market conditions filtering down from the macro level to technology adoption, what can the industry expect this year?

In a new **white paper** by Mark Watson, Senior Research Manager, Manufacturing Technology from IHS Markit, manufacturing technology analysts were asked to provide their informed predictions for the global manufacturing technology market in 2017.

The Top Seven Manufacturing Technology Predictions for 2017, as identified by IHS Markit analysts and listed in no particular order, are as follows:

Trend #1 – Global Market to Grow, Despite Headwinds

- The industrial automation equipment (IAE) market is expected to grow in 2017, reversing two consecutive years of contraction.

While growth prospects vary by sector, 2017 growth -- projected at 1.5 percent -- will take place despite headwinds, mainly in the form of low oil prices as well as a reduction in the sales of heavy machinery.

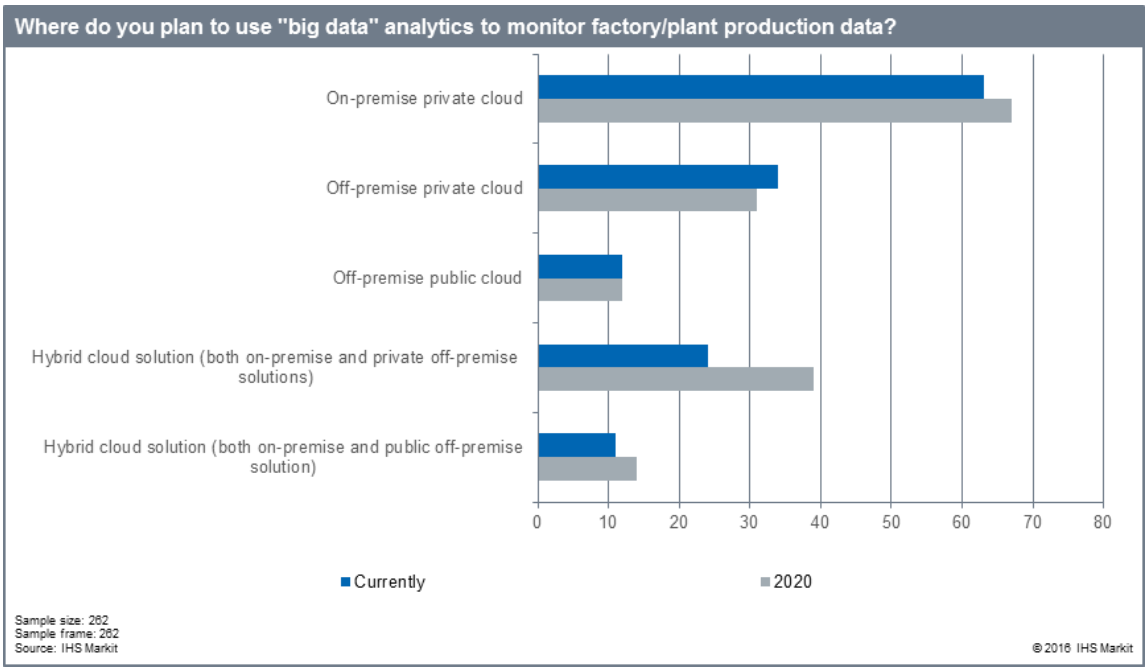
Trend #2 – Remote cloud-based analytics to shift to local and edge computing

- Throughout 2016, many cloud platforms were announced or released to support the Internet of Things (IoT) in manufacturing. While the remote cloud can offer significant advantages in terms of scalability and cost, concerns around cybersecurity caused hesitancy among end users.

As a result, in-house cloud solutions and "edge" analytics will gain scalability in 2017. However, the continued education of the market will also result in companies gaining increased confidence in the advantages and benefits that the remote cloud can provide.

Trend #3 – Industrial automation to become more influential in outsourced or relocated manufacturing

- Since 2014, changes in currency exchange rates, falling shipping costs, and the questionable longevity of proposed and existing trade agreements, have acted in concert to weaken once-solid justifications for offshoring factories, at least for the time being.



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Expect more vendors in 2017 to choose to invest in automation at US facilities in an effort to leverage tax incentives and a skilled workforce, rather than in offshoring production.

Trend #4 – Software-centric solutions to stay competitive

- While partnerships are one route that companies can undertake in bringing together IT and OT expertise, a handful of automation vendors last year engaged in the active acquisition of software vendors to meet this need.

Expect to see an acceleration in acquisitions and partnerships in 2017, as automation companies fight over and target software vendors able to expand their smart manufacturing portfolios.

Trend #5 – Capital equipment markets to consolidate

- 2017 will be a year of increased market consolidation across several capital equipment markets, such as those for motors, generators, turbines and generator sets.

For market leaders, maintaining—or even expanding—market share will remain a high priority, as market growth in 2017 is expected to remain subdued.

Trend #6 – Connectivity standards to prevail

- With ongoing pressure from end users, and opportunities for increased connectivity through industrial-IoT-based solutions, new possibilities for standardized communication have come about.

The prevalence of OPC-UA—or Open Platform Communications Unified Architecture—together with the release of TSN—or Time-Sensitive Networking—standards at the end of the year will bring further connectivity standardization in 2017.

Trend #7 – Artificial Intelligence (AI) to ramp up on the factory floor

- This year, robots featuring improved connectivity and sensing capabilities will continue to lead in the advancement of smart manufacturing.

With the further development of AI, industrial robots will become more intelligent—able to perceive, learn and make decisions on their own in the factory.

Siemens and Bentley Systems advance strategic alliance including joint investment initiatives

- To realise new growth opportunities in industry and infrastructure through integration of complementary digital engineering models

Siemens and Bentley Systems announced recently that they have formalised a strategic alliance agreement to drive new business value by accelerating digitalization to advance infrastructure project delivery and asset performance in complementary business areas.

Siemens and Bentley Systems will initially invest at least Euro 50 million in developing joint solutions to enlarge their respective offerings for infrastructure and industry to the benefit of the end-customers. This work will uniquely leverage new cloud services for a connected data environment to converge respective digital engineering models from both companies. In addition to those elements of the agreement, approximately Euro 70 million of secondary shares of Bentley's common stock have been acquired by Siemens, under a company program that will continue until such time as Bentley Systems' stock is publicly traded.

Siemens and Bentley Systems have a track record of complementing their respective portfolios through the licensing of each other's technology to provide solutions in the Digital Factory and Process Industries & Drives divisions, where respective software offerings have already been integrated. For example, Bentley's reality modeling software has been integrated into Siemens Process Simulate to leverage laser-scanned point clouds in modeling the existing context of brownfield industrial environments. The automotive industry manufacturer Turnkey Manufacturing Systems (TMS) successfully employed the innovative point cloud capabilities to create a "digital twin" of their production line to significantly enhance their planning and validation processes, while saving time and costs.

The new investment initiatives will involve virtually all Siemens divisions. The major benefit will be accumulating intelligence from Siemens solutions throughout Bentley's complementary applications for design modeling, analytical modeling, construction modeling and asset performance modeling. As a result, the integrated and accessible digital engineering models, such as the "digital twin" viewed through an immersive 3D interface, will enable unprecedented operational performance, visibility and reliability. This work will uniquely converge digital engineering models: physical engineering models in their 3D physical reality context by way of Bentley's software solutions and the corresponding

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functional engineering 2D models within Siemens' solutions.

Siemens and Bentley Systems have identified opportunities to work together in Energy Management, Power Generation, Building Technology and Mobility where each company can leverage their respective technology and industry expertise to bring new business value to the market. For example, Bentley's applications for the 3D modeling and structural analysis of industrial and infrastructure assets, complement Siemens' solutions and unparalleled domain expertise in electrification and automation. Siemens and Bentley Systems will each provide software from the other to deliver complete solutions from either company to the benefit of their respective customers in order to improve their project and asset performance through simulation and virtual commissioning. Development work will benefit from and extend Siemens' and Bentley Systems' established commitments to openness and interoperability.

Klaus Helmrich, member of the Managing Board of Siemens AG said: "This move further extends our industry software ecosystem from 2D to 3D software solutions, taking the simulation portfolio in our Digital Enterprise offering to a new dimension. We're rigorously executing our 'digital twin' vision from virtual planning to the real product to the benefit of our customers who themselves are driving digitalization across their value chains. Bentley Systems' independence, track record in interoperability, and leadership in engineering- and design-software make them our ideal partner for this undertaking."

Klaus Helmrich

Bentley Systems CEO Greg Bentley said, "Only with Siemens could we so purposefully advance beyond merely linking the 'Industrial Internet of Things', to ultimately leverage digital engineering models for visual operations and connected infrastructure asset performance. Given our long history of sharing complementary technologies, we are very excited to now contribute so broadly to Siemens' industrial digitalization leadership."

Greg Bentley

Nick Denbow: How DCS Vendors see their IIOT future

Engineers around the world are looking at how to benefit from various IIOT offerings: the survey below covering the approaches being adopted by some of the major DCS vendors was first published in South Africa, in the Technews South African Instrumentation & Control Journal, February 2017. Next month a similar article will cover the approach of some of the specialist suppliers to the process industries.

The last year saw all the major DCS and process control systems suppliers re-assess their business positioning, in the face of the turndown in capital spending as a result of the continuing recession and fall in commodity prices, led by oil. Their problem is that their main business cycles between feast and famine, as it is dependent on investment project business. Harry Forbes of ARC Advisory Group notes that automation companies will do nearly anything to protect their installed user base, because that's where they believe future revenues will come, and come more easily than winning projects. So the way to survive the famine is to provide on-going services to these asset owners, to maintain the business relationship, and be better positioned when capital investment returns. Plus they stop competitive suppliers gaining a foothold via similar service contracts.
The current area of interest for most manufacturing plants is IIOT, and so the automation vendors have been focusing on this, plus Big Data and analytics, offered by remote 'cloud-based' services. The different suppliers come from different market positions, and so their approaches, while offering the same, are tailored in different ways.

Emerson Automation Solutions
Peter Zornio of Emerson expressed his very clear view of this market back in April at their Global User's Exchange in Brussels. Emerson is involved in the IIOT: this does not include the 'Smart Cities' that Siemens and ABB talk about, nor Industrie 4.0, which extends from production back up into design concepts – IIOT is just 'Manufacturing'. I believe Emerson also recognise that their process control systems cannot be a part of IIOT, they must be fenced off, with firewalls etc, to prevent cyber-security worries, and blocked from external inputs. But this does not stop them transmitting information outwards, and the whole Emerson approach of 'Pervasive Sensors' – their major new topic for 2015 – is now an important feed, into IIOT analytics.
The resulting offering is a cloud-based service developed in co-operation with MicroSoft, using their Azure IoT Suite of cloud services. Having worked with MicroSoft for over 20 years, their Windows 10 IoT technology will be incorporated into both the DeltaV and Ovation control systems and in data gateways to serve plant data to the Azure IoT Suite. Emerson will then provide the data analysis services that feed back information and recommendations to the relevant plant personnel, for example about plant performance or equipment maintenance. Zornio described this as a

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remote service similar to the 'Monitoring Centre' typical of the electricity generation industry, or the 'iOps centre' typically described in the oil and gas industry – which shows the areas of focus for the Emerson control system business.

Since then, Emerson restructured their widely separated divisions, Process Management and Industrial Automation, into one business, Emerson Automation Solutions, under newly appointed president Michael Train. This brings in some of the factory automation aspects covered by the old Industrial Automation Division, and extends the potential for the same IIOT monitoring into other areas of the manufacturing plant, such as power supplies, packaging and even discrete manufacturing. However, as part of their restructuring, Emerson has sold off significant parts of what was their Industrial Automation business, bringing in significant amounts of cash. In December the Network Power business, serving mainly data centre and telecommunications customers, was sold to Platinum Equity for $4Bn: the business will be rebranded 'Vertiv'. Then, just this month, the deal to sell the alternators, drives and motors businesses known as Leroy-Somer (France) and Control Techniques (UK) to the Nidec Corporation was finalised: their combined annual sales were $1.7Bn, but of more relevance now to Emerson, the resulting cash payment received from Nidec is $1.2Bn. So Emerson Automation Solutions has probably earmarked part at least of that $5.2Bn of cash for some interesting, relevant acquisitions, maybe in this IIOT services area.

Rockwell Automation

Rockwell Automation has a totally different customer profile, perhaps the reverse of that described for Emerson, having great strength in factory automation, food processing and discrete process control in general. Their product portfolio is strong on motor control, actuators, energy management etc, using Ethernet based systems and controllers, which give simple interfaces to remote data systems. Steven Meyer of SAIC reported that the Rockwell South African MD Barry Elliot commented at the Electra Mining Show that the challenge is 'to do more with the assets the organisation already owns'. He added that "In most cases the data already exists: our challenge is to implement systems that enable us to turn this into actionable information to streamline productivity and efficiency". Just what the customer audience wanted to hear.

In November Rockwell launched their 'FactoryTalk Analytics for Machines' cloud application, based on – the MicroSoft Azure cloud enabled capability – yes, them again! OEMs using Rockwell/Allen Bradley controllers on their machinery can embed a FactoryTalk Cloud gateway device, to interface to this Rockwell remote analytical service. Back at corporate level, the new Rockwell CEO is Blake Moret, and his attention is also on developing the oil and gas process systems business that was actually doing well in Rockwell, but is smaller than that of rivals like Emerson: so he has acquired Maverick Technologies, one of their system integrator customers. First this give Rockwell access to the Maverick five years of experience in supplying remote operations support as a service. Second, Walt Boyes of the Industrial Automation Insider has pointed out that Maverick has craftily recruited many otherwise retiring process experts from such companies as Dow, DuPont, ExxonMobil and other first tier companies, amassing a couple of hundred very valuable grey heads with continuous process management expertise. These are very useful for remote service support and advice, supplied even from their retirement homes!

ABB and IoTSP

Maybe ABB will have an alternative approach? ABB has a concept described as the Internet of Things, Services and People (IoTSP). They last year joined the Steering Committee of the Industrial Internet Consortium, an organisation founded by AT&T, Cisco, General Electric, IBM, and Intel in 2014. Then in September they recruited Guido Jouret as their 'Chief Digital Officer' – he was at one time the General Manager of the Cisco 'Internet of Things' division. October, however, brought them back into line with Rockwell and Emerson, when their new ABB Ability offering was announced as standardised on MicroSoft Azure, "expanding the ABB leadership in energy and the fourth industrial revolution": ABB will take "full advantage of Azure services such as Azure IoT Suite and Cortana Intelligence Suite to capitalise on insights gathered at every level from device, to system, to enterprise, to cloud". Although ABB say they have had many years of successful collaboration with MicroSoft, from the website it appears Ability is a new venture – looking for applications in transport infra-structure, digital power substations, fleet management services, Smart buildings etc.

Yokogawa

Yokogawa started 2016 with two acquisitions, first 'Data-as-a-Service' provider Industrial Evolution Inc, who provide cloud-based plant data sharing services, followed by KBC Technologies, who specialise in offering oil and petrochemical production plants the advanced software needed for process optimisation and simulation. These two were combined to create their new Industrial Knowledge Division. Executive vp Satoru Kurosu commented that "Key strategic objectives of Yokogawa's Transformation 2017 plan are to expand the solution service business, focus on customers, and co-create new value with customers through innovative technologies and services".

They then followed up with a strategic investment in FogHorn Systems Inc, a Silicon Valley specialist in fog computing – said to be the solution to faster processing of IIOT data present in the cloud. At the year-end, Yokogawa made a further significant investment into IIOT technology, first with a $900k investment into Bayshore Networks, who specialise in cybersecurity, and have developed the Bayshore IT/OT Gateway for use in the cloud, separating IT Departments from OT (Operational Technology) infrastructure networks. More than that, Yokogawa announced the establishment of a new Architecture Development Division in California, to pursue the development of the core technologies needed to establish the robust and flexible architecture required to improve operational efficiency and productivity when using the IIoT.

The *INSIDER's* January 2017 Roundup (continued)

Their aim is to expand this US engineering centre to over 50 staff in the next five years.

In February 2017 Yokogawa published their own release describing how these businesses will work together, and introducing another co-operation with Telit IoT Platfoms LLC, who are said to offer "offers unmatched expertise, resources, and support to make IoT on-boarding easy – reducing risk, time to market, complexity, and costs for asset tracking, remote monitoring and control, telematics, industrial automation, and predictive maintenance across many industries and vertical markets worldwide". The most interesting aspect of their approach is that they seem to be moving towards "Plug-and-play" technology expanding to enable sensors to automatically join and adapt to plant networks, plus cloud reporting and condition monitoring, making the plant engineer's job a lot simpler! Obviously Yokogawa have major ambitions to develop and offer IIOT cloud data services with the best in technology and cybersecurity, all with a reduced customer detailed input.

Ed. Note: In last month's INSIDER, we inadvertently spelled Satoru Kurosu's name incorrectly. We have corrected it in this month's issue. We regret the error.

Satoru Kurosu

ABB Automation and Power World Changes Name

ABB has changed the name of their customer event from ABB Automation and Power World to ABB Customer World.

According to the APW website, "APW has always been an event focused on our customers, building connections between attendees and our engineers, providing hands-on training, and learning about their needs directly. It has also been a key networking event for peer-to-peer learning and to share insights from one industry to another.

As ABB and the APW event continue to evolve, we will further strengthen our customer-first approach and help meet your needs beyond power and automation. This is why, starting this year, APW will be renamed as ABB Customer World.

We will keep the same great networking and learning events but showcase more ways to navigate the increasingly interconnected world and use industrial digital technology to outperform.

Our fundamental drive is to help customers move forward and compete effectively in today's volatile business environment - our experience is that the best way to do this is by working closely together with our customers and partners. APW, under the new name ABB Customer World, will be a big part of making that happen."

ABB Customer World will still happen in Houston, March 13-16 at the George R. Brown Convention Center.

Schneider Electric Acquires MWPowerlab s.r.l.

Acquisition boosts Virtual Reality and Augmented Reality capabilities across simulation and asset management portfolios to improve workforce efficiency and operational excellence

Schneider Electric, the global specialist in energy management and automation, today announced the acquisition of MWPowerlab s.r.l., a software company with industry-leading 3D real-time technology. This acquisition adds advanced Virtual Reality (VR) and Augmented Reality (AR) technology to Schneider Electric's industrial software portfolio. According to Schneider Software, customers can benefit from strengthened Immersive Simulation and Training capabilities and advanced 3D visualization. This technology can further enhance the Schneider Electric Enterprise Asset Performance Management platform, the company suggests. Schneider Electric and MWPowerlab have a long history of delivering Immersive Operator Training and Simulation solutions that increase safety standards, improve labor effectiveness and increase asset performance on a global scale. This successful working relationship is expected to continue post-acquisition, with the MWPowerlab team bringing valuable domain expertise to Schneider Electric to drive continued innovation and digitization of the entire value chain.

"Virtual Reality and Augmented Reality are quickly becoming the industry norm to deliver operator training, simulation and asset management solutions. This acquisition ensures Schneider Electric customers have access to the most advanced technologies for a positive user experience, said Dr. Tobias Scheele, Senior Vice President Software, Global Solutions at Schneider Electric. "MWPowerlab brings best in class technology and highly skilled, motivated people that can significantly enhance the value of our Schneider Electric software portfolio."

"We are excited to become part of the Schneider Electric team. Our Virtual and Augmented Reality technology is now highly optimized for industrial applications, as a result of working with Schneider Electric over the past five years," said Maurizio Galardo, President of MWPowerlab s.r.l. "Together, we can unleash the power of 3D real-time technology across the Simulation, Asset Management and HMI Supervisory solutions that are part of the Schneider Electric industrial software portfolio."

Presenting the 21st Annual ARC Industry Forum
Industry in Transition: Realizing the Digital Enterprise

February 6-9, 2017 - Orlando, Florida

Industrial companies are starting to employ 'digitalized' business processes and exploit the increasing convergence between operational technology (OT), information technology (IT), and engineering technology (ET) on the plant floor. How will disruptive technologies change existing products and plants? How will open source solutions impact traditional software and automation domains? Is cybersecurity a threat to digitalization? How 'smart' are smart machines? How do Big Data and predictive and prescriptive analytics enable operational change? Join us to learn how the digital enterprise benefits from smarter products, new service and operating models, new production techniques, and new approaches to design and sourcing.

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ARC Advisory Group

Founded in 1986, ARC Advisory Group is the leading research and advisory firm for industry and infrastructure. For the complex business issues facing organizations today, our analysts have the industry knowledge and first-hand experience to help our clients find the best answers.

Keynote Speakers:

Marty Edwards
Assistant Deputy Director, National Cybersecurity and Communications Integration Center
Director, Industrial Control Systems Cyber Emergency Response Team
U.S. Department of Homeland Security

Don Bartusiak
Chief Engineer, Process Control
ExxonMobil Research & Engineering

Who Should Attend

ARC's Industry Forum is a must-attend event for:

- CEOs, COOs, and Presidents
- CFOs, VPs, and Directors of Finance
- CIOs and CTOs
- VPs and Directors of IT
- VPs, Directors, and Managers of Operations
- VPs, Directors, and Managers of Engineering
- VPs, Directors, and Managers of New Projects
- VPs, Directors, and Managers of Procurement
- VPs, Directors, and Managers of Supply Chain and Logistics
- Directors, Managers and Architects of Automation and Enterprise Integration
- Plant Managers and Supervisors

Production Managers and Supervisors

In past Forums, over 50% of the attendees have titles like Chairman, CXO, President, Vice President, Director, or Partner.

The Health Watch
January Starts Off Well

INSIDER
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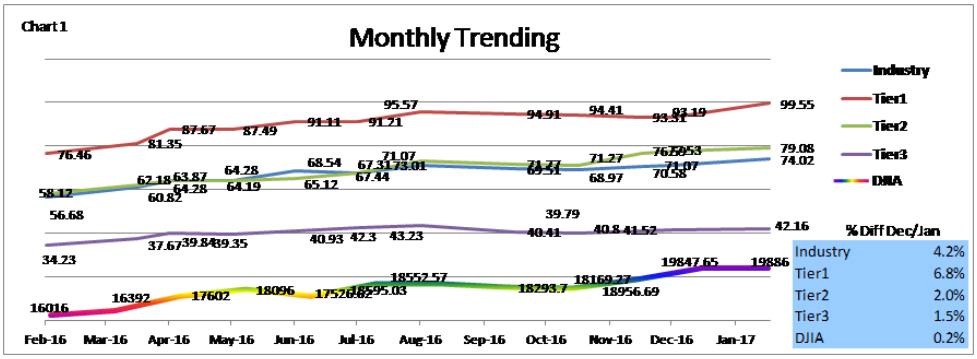
Health



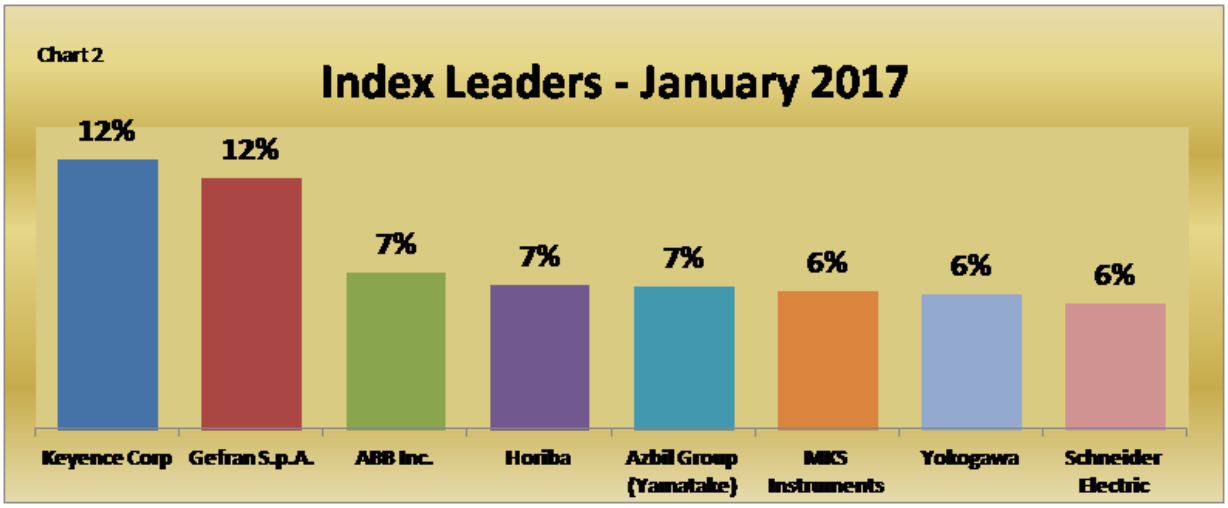
Another good month for our Industry!

Overall, the Industry Index increased by 4.2% since last reporting, outperforming the Dow by 4%! The largest companies in our report were the stars for January, showing an average increase of almost 7%, while Tiers 2 and 3 showed smaller increases but still outperformed the Dow.

This performance is further proof that we are finally putting the slump that has plagued us for the past year plus, is finally ended.

The Winners

Some individual performers stood out this month. Keyence Corp is tied with Gefran as the January winner, both with an Index increase of 12%. This jump more than makes up for the 4.5% decrease reported for Keyence last month.



Yokogawa, which also showed a small decrease of 1.7% last month, moved beyond as well.

Keyence Corp

One of the things we noticed about Keyence Corp when we went looking for the reasons behind the Index increase this month, is that company assets increased from $758M to $859M between March and June of last year, yet the company lists no short term or long term debt, a position that many would envy.

Not much is being reported publically about Keyence right now; with the only recent evaluation on the stock being provided by Capital Cube on January 19th, which reports that the stock is overvalued, but also comments on the company's lack of debt.

Gefran

Gefran's Index score also increased 12% since last reporting, and like Keyence, little information is available in the public domain to explain the jump.

We did see that in late December Gefran released information on a new series of power controllers, Gefran's Xtra series of Power Controllers which offer

The Health Watch
January Starts Off Well

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Health Watch

"exclusive, patented solutions for electric heating systems that minimize or even eliminate machine downtimes due to transient overcurrents or short circuits, thereby safeguarding the system's thermal energy, preventing costs and downtimes, and ensuring product integrity."

The new controllers are said to "sustain infinite short circuit cycles without damage, perform system sensing to check whether or not the problem persists, and automatically reset to resume the programmed thermal cycle."

In addition, the Xtra series can operate without operator intervention if a problem is transient (for example, electric arcs).

ABB

There is some indication of the motivation for ABB's 6% increase. It was driven, at least in part, by the active involvement of Swedish activist hedge fund Cevian Capital.

On January 20th, The Motley Fool reported that, "According to SEC filings, Swedish activist hedge fund Cevian Capital held more than 132 million shares of ABB Ltd. in September, worth around $3 billion at today's pricing. That's 6.2% of the utility, industrial and transportation -focused company's shares, and it signals Cevian's determination to unlock value from ABB's portfolio of companies."

Overall, 84% of Index members showed increases in stock price since last month's reporting. This is even better than the 75% who saw increases last month. In addition, 20% of the Index posted small losses last month, compared to only 15% this month.

Horiba

Again there is no information available in the public domain that would indicate why this stock increased as it did.

It is our believe that the increases we are observing are simply typical stock market movement in an industry that is coming out of a slump and moving forward toward long awaited stability.

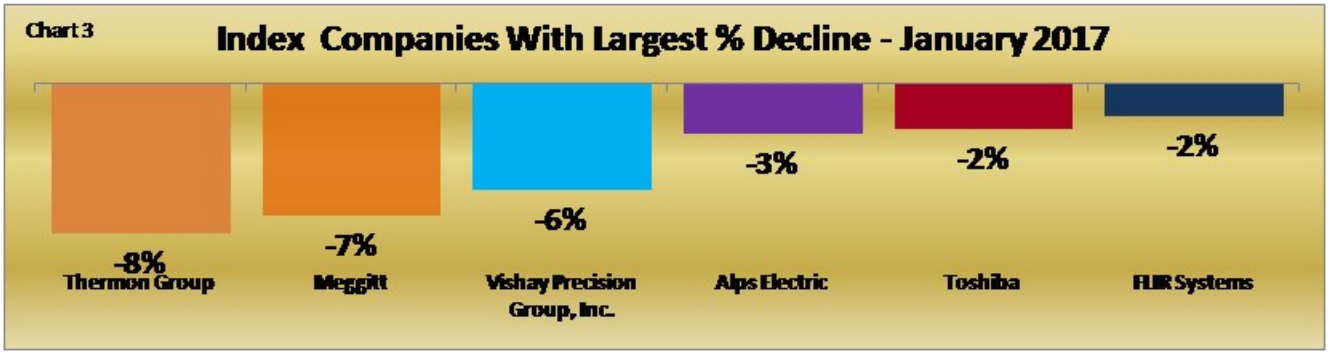
Overall, 84% of Index members showed increases in stock price since last month's reporting. This is even better than the 75% who saw increases last month. In addition, 20% of the Index posted small losses last month, compared to only 15% this month. The control automation industry continues to gain strength and stability, even during a time when the market is less so.

The Losers

Very few companies' Index scores decreased compared to last month, and the decreases, where seen, were small. Chart 3 shows decreases greater than 1%.

Thermon Group

In an overview dated January 26th, *Capital Cube* reported that Thermon Group Holdings, Inc.'s stock price "is about median in its peer group. The market expects faster earnings growth from THRUS than from its peers and also a turna-



The Health Watch
January Starts Off Well

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Health Watch

round in its current ROE."

The Cube also points out that THR-US has relatively low profit margins and median asset efficiency, and annual revenue changes are better than earnings changes compared to peers, which suggests that the company is focused on revenues.

Although THR-US has not performed as well as many of its peers over the past year, in a January 24th report, *The Street* mentioned that Thermon Group Holdings has now met/exceeded its average suggested target stock price, and that it is now time to assess whether the stock has reached its limit or if the target price should be increased.

Investors holding this stock, according to The Street, "have been given a good signal to spend fresh time assessing the company and deciding for themselves: is $19.67 just one stop on the way to an even *higher* target, or has the valuation gotten stretched to the point where it is time to think about taking some chips off the table?"

Thermon Holdings will be releasing its quarterly earnings report on February 8, and the results of that report should shed a clearer light on which path it would be more prudent to take.

Meggitt

A search for news involving Meggitt turned up very little, and nothing of note concerning P&L. There was one press release put out in late December that we believe might have some bearing on the drop seen in Meggitt's Index score. It involves the sale of Meggitt's Target Systems to QinetiQ Group for a cash price of €57.5M.

The article mentions the fact that Meggitt will pay €10.2M of the sale into the Meggitt Pension Plan to help reduce the deficit.

That statement is followed quickly by the statement that the sale "is consistent with Meggitt's strategy to focus on businesses of scale in attractive markets where our leading positions offer greater potential for growth and operational efficiencies," but not quite quickly enough to make one wonder why the pension plan has a deficit of over €10.2M to begin with.

And So…

For the past month, the World has been focused on political shenanigans and tom foolery, which could explain why there is so little finance related industry news to report.

If the subject of this article were political intrigue, poor political choices, or the latest Trump Twitter Tittle Tattle, there would be much more to discuss.

The nicest finding for this reporting period is that while the world in general has focused on the latest "As the Stomach Churns" political soap opera, and the Dow limped along with an increase of less than 1%, our industry moved forward by over 4% with 85% of the Index companies posting a positive increase in stock price since last reporting.

Congratulations to us!

THE WAY I SEE IT
Editorial

Techno-Trauma and the Rise of Donald Trump

For a while now, I have been a sometime guest lecturer at Webster University here in Saint Louis. I am lecturing as a professional futurist, which I am (it says so right here on my Association of Professional Futurists membership card). The students are valiantly trying to keep up with the technological advances that are sweeping away modern culture and replacing it on a nearly daily basis.

I asked the 25 twenty-somethings in the class who felt they were on top of the wave of change. Only a handful raised their hands. Most of them said that they were barely hanging on.

This is the generation that is supposed to be "digital natives." Apparently even the digital natives are having trouble with the rapid rate of change of technology and society.

Interviews with Trump voters since the election have found that many of them voted for him because he said he would bring back the good old days. He would bring back the good jobs for high school graduates, and the society of "Leave it to Beaver," and "Father Knows Best."

Comments? Talk to me!
waltboyes@spitzerandboyes.com

Read my Original Soundoff!! Blog:
http://waltboyes.livejournal.com

One respondent I remember vividly said, "I can't keep up with all the changes. I just want it to stop!"

In her soon-to-be-released book, ***Why Trump Happened: A Path Forward***, **INSIDER** columnist Joy Ward coins a phrase to describe this issue:

"I can't keep up with all the changes. I just want it to stop!"

Techno-Trauma. Techno-Trauma is when you simply can't keep up, and stop trying. It's when you start entering a fugue state, looking for a time in your past when things were simpler and more understandable.

This makes voters vulnerable to the person (like Trump) that promises to take away their worries. The problem with this is that Mr. Trump has to deliver, or if we think we have seen angry voters, we have not seen anything yet.

What does this have to do with automation? Quite a bit. If you think about what one of the biggest societal change engines automation has become, it is certain that automation is in for a lot of the blame by people surplussed and out of work. If you have nothing to do, and no prospects for future employment because the auto plant you used to work for closed, and then re-opened fully automated and there are only 300 jobs where there used to be 3000, you can imagine what the future looks like for many people.

We need to look at the entire picture, as we increase productivity by automating plants. Yes, if we want to be globally competitive we have to automate our plants even more than we have in the past. But we need to look at what the social costs of doing that are, and decide if our society can afford those costs.

Some of those costs clearly include increasing anger and rage, increased expressions of hatred and racism, Narcissism, too, is a common reaction, as are fugue and magical thinking. Not the best things for workers in our plants, that's true.

So what do we do? Many people are doing what IEEE president Karen Bartleson has done: take a stand. "IEEE is committed to the realization and maintenance of an environment in which scientists and engineers, regardless of ethnicity, religion, gender, or nationality, have the right to pursue their careers without discrimination. Science, engineering — and humanity — prosper where there is freedom of movement, association , and communication. " We all need to take a stand.

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Rajabahadur V. Arcot: Skills to Succeed in the Fourth Industrial Revolution Era

A lot is being written about the skill gap / skill shortage faced by the manufacturing industry including the industrial automation industry. The issue however is not new; the report *"America's Choice: High Skills or Low Wages,"* published about 25 years ago, alerted employers of the need to anticipate skills shortage due to technological advancements and the evolving service economy. The problem that affects both the employers and employees persists!

These reports highlight that employers often find aspirants lacking the necessary skills to be competent in their jobs despite their academic qualifications.

According numerous recent surveys and reports, the industry and some of the governments are concerned, on one hand, about the skill levels of even the qualified, and on the other about the lack of interest among students in pursuing science, technology, engineering, & mathematics subjects. Often many of these reports, which in a way reflect the reality on the ground, look at the issues from the industry's perspectives and ignore the plight of the workforce. Frequently the education system is blamed for the situation.

The challenge is daunting

A report based on the survey, conducted among 300 employers and 24 of the UK's leading academics teaching science, technology, engineering, and mathematics subjects, says "a majority of respondents agreed that a gap exists between the expectations of employers and the knowledge and skills of new graduates.

Of those surveyed, 59 percent of businesses and 79 percent of academics, believe that there aren't enough skilled graduates to address the needs of the society." The report *"The Skills Gap in U.S. Manufacturing 2015 and Beyond"* highlights the magnitude of the problem by projecting that "over the next decade, nearly three and a half million manufacturing jobs will likely need to be filled, and the skills gap is expected to result in 2 million of those jobs going unfilled."

With specific reference to the skill gap in the automation domain, an article in Control Engineering quoting U.S. Bureau of Labor Statistics says that talent needed for process-focused automation in the manufacturing industry is expected to grow at 6 percent from 2010 to 2020. These reports highlight that employers often find aspirants lacking the necessary skills to be competent in their jobs despite their academic qualifications.

Evolving skill needs mandate new approaches

Traditionally, employers inducted into the workforce professionals with academic qualifications in science, mathematics and basic engineering knowledge about measurement, control, and plant safety.

While recruiting, they also took into consideration good traits such as commitment, reliability, ethical & social behavior, and others.

When life-time employment was the norm, most employers were willing to invest in training their workforce so that they become skilled, competent in their jobs, and stayed on to serve them.

Professionals on their part, through work experience, acquired the required functional competencies in design and engineering, maintenance, and sales & marketing, and such others.

As they climbed the organizational ladder, automation professionals further honed their soft skills, such as interpersonal and communication skills, and acquired managerial compe-

Rajabahadur V. Arcot: Skills to Succeed in the Fourth Industrial Revolution Era

(continued...)

tencies. It was continuous learning and a mutually rewarding relationship for both employers and employees. With rapid changes taking place in the industry model, expectations of the employees, lifestyles, and socio-economic factors, both aspirants and employers have to get more proactively involved in skill development.

While employees have to acquire the skill set that will help them to get entry level jobs, employers have to focus on reskilling their existing workforce continually. Both will have to be masters of their destinies, but they must also remember that their destinies are intertwined.

The skill gap issue is inherent to the transformational changes taking place in the industry and the evolving occupational opportunities and expectations.

Broadly, reports attribute the reasons for the skill shortage to the educational system and overlook the fact that the skill needs of the industry keep evolving and are not static. Skill needs of the industry have changed over the years and will keep changing in future too.

The World Economic Forum's '*The Future of Jobs'* Report highlights that the *fourth industrial revolution*, interacting with other socio-economic and demographic factors, has created a perfect storm for business model changes that will have "significant impact on jobs, ranging from significant job creation to job displacement and from heightened labor productivity to widening skills gaps."

The skill gap issue is inherent to the transformational changes taking place in the industry and the evolving occupational opportunities and expectations.

Therefore, it is necessary both for the industry and job seekers to have a glimpse of the technologies that will dominate the world and the jobs of the future, so as to understand the skills that will be in demand in the future.

While how to address the skill shortage is industry's challenge, for the existing workforce and new aspirants acquiring the skills that will ensure their future wellbeing is vitally important and crucial.

Future technologies, jobs, and skills

Rapidly emerging technologies that are ushering the fourth industrial revolution include Internet of Things, Data Analytics, Augmented Reality and Virtual Reality, Artificial Intelligence, Machine Learning, and Robotics. These technologies are also expected have tremendous influence on industrial automation.

Companies will be requiring product designers to develop new products and applications around emerging technologies.

The product teams will require software and application developers, system architects and system engineers, and data analysts.

These technologies although extremely powerful are highly susceptible to cyber threats and therefore companies will require security specialists to work not only during product design and system architecting stage but also during the entire lifecycle of the products and systems.

In order to manage the organizational and workforce transition, companies will need organizational development and human resource specialists and senior managers.

As regards the skills that will be in demand in the future, the article *"The 10 skills you need to thrive in the Fourth Industrial Revolution"* released at the World Economic Forum 2016, identifies the top10 skills that include:

- complex problem solving,
- critical thinking,
- creativity,
- people management,
- coordination with others,
- emotional intelligence,
- judgement and decision making,
- service orientation,
- Negotiation,
- cognitive flexibility.

The article rightly highlights that some jobs will disappear while others grow; jobs that do not even exist today will become commonplace.

It is important to note that "the future workforce will need to align its skill set to keep pace." The changes would not wait, is the ultimate message of the article!

These are essentially soft skills and not technology related. Hence it is important for engineering professionals to look beyond acquiring technology skills.

Rajabahadur V. Arcot: Skills to Succeed in the Fourth Industrial Revolution Era

As regards employers, first and foremost, they have to start thinking of finding solutions that will address their problems instead of pointing out the existence of the problem.

They must initiate in-house skill development programs for their existing workforce programs and provide more opportunities for part-time degree apprenticeships and internships.

The Industry associations should work closely with the government and together develop career-advice for educational and training institutions.

I believe that employers, many of them with financial resources at their command, can be far more proactive in addressing the skill shortage challenge; and they will, if they have no alternate options.

Be alive to impending challenges

Both the automation industry and automation professionals have to take note of the impending challenges and opportunities.

At the industry level, automation industry is moving from traditional sensors, computers, controllers, and networks to Industrial Internet of Things, data analytics, cloud computing, artificial intelligence, machine learning, and similar others that are the main drivers of Industry 4.0.

New vendors are seriously staking their claim to become automation vendors!

Numerous reports say that automation is likely to make many jobs redundant but both automation industry and automation professionals will fall victims if they fail to become future-ready respectively with new business models and the appropriate skills.

The future looks bright and promising. It is not for the timid but for those who are brave, adaptable, and believe in continuous learning.

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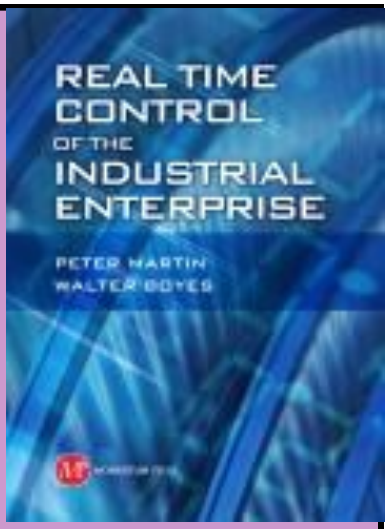

Over the last fifty years, almost none of the productivity gains in manufacturing have come from better chemistry or better design, or even better management and financial controls. Rather, those gains have come from better automation and control of the processes: continuous, batch, hybrid , and discrete. The secret to making manufacturing sustainable is better control. So, why aren't the theories that have led to enormous gains in productivity being used above the plant level? This book explains both why not and how better controls can be applied to the supply chain, and to enterprise financial management. This book provides engineering and technology managers the insight and tools for achieving a fully integrated automated manufacturing enterprise, from the technical and engineering side to the business management side. It is particularly helpful to readers seeking to bring the non-technical parts of a manufacturing operation - customer service, cost and financial management - in line with the already-automated production, inventory management, and plant management. The reader will learn: how to use the principles of real-time process control to manage and measure your manufacturing business more effectively; how to achieve much greater speed of information transfer for improved control over supply chain and distribution; and how totally integrated inventory control, automated manufacturing, automated customer service, and smart pricing control - and ultimately lead to higher profits.

Rajabahadur Arcot is an Independent Industry Analyst and Business Consultant, and Director Asia Operations for Spitzer and Boyes LLC**with 40 years of senior management experience. He was responsible for ARC Advisory Group in India. Contact him at rajabahadurav@gmail.com**