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Your key to the latest industrial automation and process control information

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Schneider Meets: "FoxModiConex"

The combined Foxboro, Modicon, and Triconex user groups met in an event called Schneider Connect 2016 in New Orleans the last week in May. The meeting had all the typical components: there was a keynote by the president, Gary Freburger, who said, "The past one-and-a-half years have been pretty challenging." As senior vice president Chris Lyden noted, "Life at $40 a barrel looks quite different than at $115 a barrel." In a nutshell, that's been the external challenge for Schneider Electric as it integrated the Foxboro, Eurotherm, and Triconex product lines.

Gary Freberger

> "Life at $40 a barrel looks quite different than at $115 a barrel."

Attempting a difficult corporate integration is one thing. Doing so when the market for the products you make and the services you provide is tanking and looks like it will remain tanked for a few years more is quite another. This sometimes leads to interesting attempts like the failed partial acquisition of Aveva earlier this year. On the surface, at Connect 2016, all appeared to be well.

Chris Lyden

The announcements were spread around the three major product groups. Foxboro announced a new pH measurement system, and a new addition to the Foxboro and Triconex Intelligent Marshalling I/O products. Modicon announced a new version (v4.2) of PlantStruxure PES and a series of Modicon redundant controllers, the M580 ePAC, that Schneider said was "intended for the Internet of Things applications."

Foxboro Smart pH Transmitter

Intelligent Marshalling I/O

Modicon M580

In addition to the product line extension announcements, several speakers provided their outlooks on the future. Exxon's Sandy Vasser, who said he is soon to retire, talked about the philosophy of future proofing control and

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FoxModiConex (continued)

automation systems. Vasser has been talking for several years about future-proofing control systems, and various means to do that, including the prescription that Exxon has hired Lockheed-Martin to work over: creating a new control and automation platform that will be open, scalable, and interchangeable. This, Exxon believes, will be future proof.

Exxon's Sandy Vasser

Bridget Fitzpatrick

Wood Group Mustang Engineering's brilliant Bridget Fitzpatrick gave the best 30 minutes on alarm management and rationalization, and HMI design this reporter has ever heard. She talked about the ISA standards effort to produce alarm management standards that actually work and save lives in emergency situations, and discussed the ISA HMI standard and the evolution of visual standards over the past few years.

> "Cyber Security is everyone's responsibility. Be as AGGRESSIVE as the hackers..."

Gary Williams, senior director for cyber security at Schneider presented an acronym-based discussion that began, "Cyber security is everyone's responsibility." He urged listeners to be as "aggressive" as the hackers, by following the mnemonic, AGGRESSIVE. The mnemonic is:

Schneider's Gary Williams

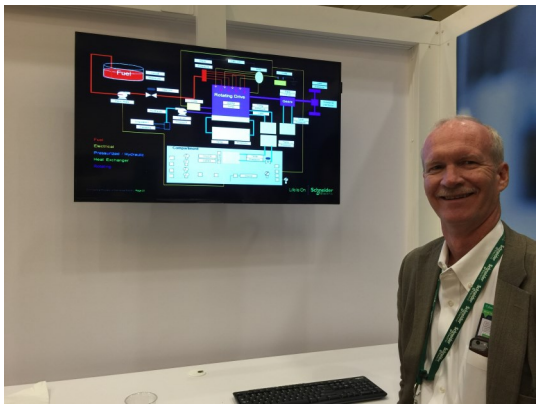
- **A**dopt a standard
- **G**ather controls
- **G**ap analysis
- **R**isk and threat assessment
- **E**xecute Mitigation
- **S**urvey the complete system
- **S**tore configuration files securely on/off site
- **I**nform all stockholders/stakeholders
- **V**erify on a regular basis
- **E**ducate everyone.

Schneider received the first annual exida Cybersecurity Award. According to exida, Schneider is actively trying to eliminate security vulnerabilities in their products, by design, and has incorporated cybersecurity throughout the development lifecycle, including planning, requirements, design, implementation, testing and release.

Schneider receives exida award

Exida noted that Schneider has become the first company in the world to have their process certified to IEC 62443-4-1 and ISCI Software Development Lifecycle Assurance (SDLA) and took note of the fact that Schneider has made significant contributions to ISA 99, and to ISA Security Institute (ISCI).

In the exhibit hall, there were interesting things to see, too. From Seeq and expertune, and other vendors, as well as Schneider's own products. Schneider's Steve Apple showed me an HMI version of a process unit. He asked me to tell him what it was. I didn't get it, but the answer is, it is a car. What we are doing, he said, is to make the



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FoxModiConex (continued)

operators use HMIs like these instead of dashboards. It's hard to drive a car without a dashboard display. Schneider is taking serious looks at what we've always done, and finding ways to do them differently and better.

The question, under the otherwise placid surface, is whether Schneider Electric Process Automation and its counterpart, Schneider Software, will find a brand for themselves.

Schneider, like Invensys before it, has not been good at branding itself. Schneider has nearly all the tools, people, and products it needs to establish a first class automation company, that is big enough to do plant automation, electric grid automation, and building automation, which most automation companies do not have. There is even the basis for a potentially competitive field device product line.

Rumors at the Connect 2016 event suggest that a shake up is underway at Schneider in the marketing function. Schneider has had good individuals in marketing, such as Dr. Peter Martin, for years, but for some reason, either under Invensys, or at least to the present under Schneider, these highly competent individuals have mostly produced ineffectual and dysfunctional efforts. We shall see what the next months provide.

Brazil's Crisis Worsens, Cloudy Future for Foreign Automation Companies, by David W. Spitzer PE

In November 2015, we wrote, "Most observers see four possibilities going forward. First, Dilma is impeached. Second, the Court forces new elections. Third, Dilma stays and finishes out her term. Fourth, the scandals continue and worsen and the economic crisis becomes considerably worse." In December 2015, we said, "For now, the democratic process appears to be playing itself out with no sign of the military intervening, although there is much talk about the impeachment being a "coup" against Dilma. The silver lining is that corruption is being exposed and prosecuted --- hopefully forming a more solid foundation for future development. Positive results will take a while."

First, Dilma was impeached and removed from office in May 2016 for cooking the government's books prior to her reelection. Dilma was temporarily replaced by Vice President Temer (now Interim President) but has 180 days to defend herself prior to another Congressional vote that will remove her from office permanently (or return her to the Presidency). The president of the lower house of the legislature has been removed from his position as was the Leader of the Government.

Dilma's impeachment proceedings followed constitutional guidelines but are still hailed as a "coup" (read overthrow) by Dilma and her supporters. Dilma may very well have been "railroaded" by those who did not support her but that she was not overthrown.

The second and third possibilities generally become moot points but the fourth possibility appears to be playing itself out. Interim President Temer almost immediately eliminated about 10 cabinet positions, appointed new cabinet ministers, and set about to determine the actual state of the country's finances. The finding of note was that government revenues were underestimated by approximately USD 50 billion which changed a small surplus in the government coffers into a large deficit. Along the way, it was revealed that one of Temer's newly-appointed cabinet ministers is being investigated for corruption so the minister resigned and returned to his position in Congress.

President Temer is quoted as saying that he will not seek reelection when his term runs out in approximately two and a half years (presuming Dilma does not return). Temer now is in the unenviable position of addressing multiple problems on multiple fronts --- most notably financial and social. So far, Temer appears to be "taking the bull by the horns" in an attempt to "right the ship" --- making substantive announcements about his findings and the actions that he is taking to remedy the situation. Many Brazilians believe that blanket immunity to corruption will no longer be the norm --- despite Temer, Temer's team, and much of Congress reportedly having "corruption problems".

On a side note, it appears that Temer will not hamper investigations associated with the various scandals so as to not create more high-profile conflict and chaos.

Removing Dilma from office was generally viewed favorably by the international community and has strengthened the Brazilian Real somewhat.

In general, Brazilian democracy is strong and the political processes are working as prescribed by the constitution. But that doesn't say all there is. The domestic business climate remains unchanged and political uncertainty remains --- albeit toned down a bit.

Economic activity (in general) and capital expenditures (in particular) have slowed due to the uncertainty associated with Brazilian politics. This does not bode well for instrumentation sales in the short term, and the newly discovered deficit does not bode well for large systems business in the future, regardless of the price of oil. We think that it will take a while for Brazil to work through its problems given the large projected budget deficit and uneasiness that will likely occur during the next few months as Dilma's trial nears.

David W. Spitzer, PE is a partner in the technology consulting firm of Spitzer and Boyes, LLC, which is the publisher of the Industrial Automation INSIDER. He is an ISA Life Fellow, and is an expert on field devices, variable speed drives, and technology transfer in the automation space. He can be reached at dspitzer@spitzerandboyes.com.

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The *INSIDER's* April 2016 Roundup

Eurotherm launches SaaS offering: Eurotherm Online Services

Schneider Electric has launched a new Software as a Service offer -- Eurotherm Online Services (EOS). An integrated online platform and management tool for overseeing calibration records and regulatory status, EOS offers an automated, digitized process for easy collection and retrieval of critical process data – from shop floor to top floor - when and where required.

Jean-Pascal Tricoire, Chairman & CEO of Schneider Electric said: "The extensive digitization of industries globally is demanding highly connected solutions that deliver new capabilities to control industrial operations enterprise-wide, from the edge to the core. Customers are also demanding a new breed of applications and software that deliver real-time intelligence to the right decision-makers at the right time.

"To meet this growing demand, Schneider Electric is launching a new wave of digitised and connected technologies designed to help reshape energy management and automation. EOS is one of our flagship field services solutions. This new cloud-based offer will enable process industries to reduce error-prone, paper driven processes by automating their instrument compliance procedures and planning – driving operations that are more safe, efficient, connected, reliable and sustainable."

Leveraging the online platform, EOS Advisor is a planning and scheduling tool that enables more efficient management of equipment and staff; meanwhile, the EOS eCAT™ tablet application improves calibration process efficiency with a secure, mobile-compatible tool that eliminates the drawbacks of paper-based records systems.

Reshaping compliance management for Process Industries

Clemens Blum, Schneider Electric Executive Vice President said: "Cloud based software services have revolutionised everything from taxi hire, to IT provision, Finance and HR. Industrial Automation is next and Schneider Electric is following a path of innovation to create a better connected, more flexible, safer and efficient use of industrial processes. EOS is a great example of this as it connects service providers and their end user customers, digitising the provision of compliance management from planning to audit; and from any connected smart phone, PC or tablet."

Go digital… Stop pen & paper

- Managing compliance and calibration can be expensive and time-consuming.
- Many process industries still rely on pen and paper to manage compliance, which can lead to mistakes and loss or damage of paper records that might not be discovered until an audit is in progress.

Eurotherm by Schneider-Electric have first hand experience where major non-conformance of calibration records nearly cost one of their customers the loss of two contracts worth multi-millions. The EOS service event scheduling tools ensure no compliance tests are missed, which helps optimise productivity and deliver trouble free audits.

Digital compliance for regulated industries

Digital compliance management is the future of all compliance management, EOS is applicable to any regulated industry that requires periodic testing to prove and maintain industry standards. There will be continuous development of EOS offerings to add further compliance tests and additional applications for use in regulated industries such as Heat Treatment for Aerospace and Automotive, Life Sciences, Healthcare, and Food & Beverage. In time EOS will be available on any device and operating system anywhere in the world.

- EOS applications leverage technology developed for the Industrial Internet of Things (IIoT) and Industry 4.0 applications.
- These technologies improve cost efficiencies, enable predictive maintenance and result in competitive advantage.
- Unlike many other technology solutions that require a 'rip and replace' mentality, the EOS solutions are a natural fit to an existing process setup and the technology easily wraps around current installations.

EOS for small, large & multisite enterprises

"The EOS tools are completely scalable and relevant to small manufacturing and large, multi-site businesses," says Christopher Ashworth, VP & Managing Director, Eurotherm by Schneider-Electric.

"They offer a secure, intelligent, and more efficient way of handling plant-wide process information, adding value to a process by enabling users to convert data quickly into the information required – and that is what the Industrial Internet of Things is all about."

New HIMA Regional Headquarters in Singapore

In response to soaring demand, HIMA now opens a new Regional Headquarters in Singapore.

"Singapore is the perfect location for coordinating activities in the region. From here we are well positioned to serve clients and develop new business in Korea, Japan, Australia, New Zealand and across Southeast Asia," says Jeyan Nadarajah, HIMA's Director Sales Asia Pacific.

The new name "HIMA Asia Pacific" reflects the safety specialist's strategy to unify its brand around the world and deliv-

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The *INSIDER's* April 2016 Roundup (continued)

er a consistent, high-quality customer experience. "Our goal is to build and maintain a strong global brand image that customers recognize and trust for leading-edge safety expertise, adds Steffen Philipp, Managing Partner of the HIMA Group.

Alexander Horch Named Head of Development at HIMA
Effective April 1st, Dr. Alexander Horch became new Head of Development at HIMA Paul Hildebrandt GmbH. In addition to aligning the development organization with customer and market requirements, Dr. Horch will help HIMA continue to consistently develop its safety automation leadership. This includes further developing and integrating functional safety expertise to reflect industry-wide issues such as Industrial Internet, cyber security and the role of human beings in the process industry.

Additionally, Dr. Horch is planning to optimize the development processes with regard to long-term product life cycles, and to tap new application areas that take advantage of HIMA's proven and efficient safety concepts and safety products.

Dr. Horch comes to HIMA from the energy and automation group ABB. From 2007 to 2016, he worked in various management roles in the areas of process control technology and automation of electrical networks, smart grids, and industrial and manufacturing plants, as well as Industrial Internet for ABB Germany and ABB Switzerland. From 2001 to 2007, he worked in the ABB Corporate Research Center Germany as a scientist and project manager specializing in plant optimization and plant asset management in the process industry.

"For us as a technology enterprise, development is a central function with a special priority," said Sankar Ramakrishnan, CEO of the HIMA Group. "Dr. Horch will help us make our enterprise sustainable with innovative product developments and solutions," he added.

Bit Stew Launches New Software Version for IIoT

Bit Stew Systems, developer of what they call the premier platform that solves the data integration challenge in the Industrial Internet of Things (IIoT), has announced the launch of version 10 of their MIx Core™ platform, a self-serve solution for intelligent data management for the IIoT ecosystem.

Enabling Intelligent Data Automation
Bit Stew's MIx Core is purpose-built to handle complex data integration, data analysis, and edge intelligence on data from billions of connected devices in the IIoT. Unlike conventional ETL and BI tools, MIx Core automates data integration by applying machine intelligence to the process, which reduces project costs by an average of 90% compared to traditional approaches.

The underlying technology of MIx Core provides an unmatched capability to integrate data in even the most dynamic and complex industrial environments. The platform applies its library of machine learning algorithms using the MIx Core Analytic Framework. The framework applies groups of algorithms in an ensemble, processing and analyzing data at the document level, and giving richer context to extracting semantics. Once the platform either creates or extends a semantic model, it can continue to enrich the model's entity relationships by marking and analyzing the data's byte sequences and patterns through assertion-based logic.

"Gone are the days of large integration teams and never ending data problems. Small teams can now solve big industrial problems with MIx Core," says Franco Castaldini, Bit Stew's Vice President, Marketing. "The introduction of version 10 and the new Data Management Workbench provides a self-service experience that enables IT and OT professionals to quickly model, map and ingest data from disparate sources."

Franco says, "The platform removes the time and cost associated with continuous data wrangling which empowers industrial enterprises to transform and optimize their business, realize cost reductions, optimize asset performance, and improve productivity."

Walt Boyes Elected Member of Futurists Association

The INSIDER is pleased to announce that editor Walt Boyes has been elected as a Full Member of the Association of Professional Futurists. The Association of Professional Futurists (www.apf.org).

The Association of Professional Futurists is a growing community of professional futurists dedicated to promoting professional excellence and demonstrating the value of futures thinking.

The APF was founded in 2002 by an informal network of professional futurists, including automation guru Jim Pinto. A community of like-minded people saw the need to create a network to help advance the field. The Association of Professional Futurists is now a worldwide group of foresight professionals with members from over thirty countries.

INSIDER's Walt Boyes

"I have always been interested in the future, and I am delighted to be recognized as a member of the Association of Professional Futurists. The future of our society, of automation and manufacturing is not only fascinating but is critical."

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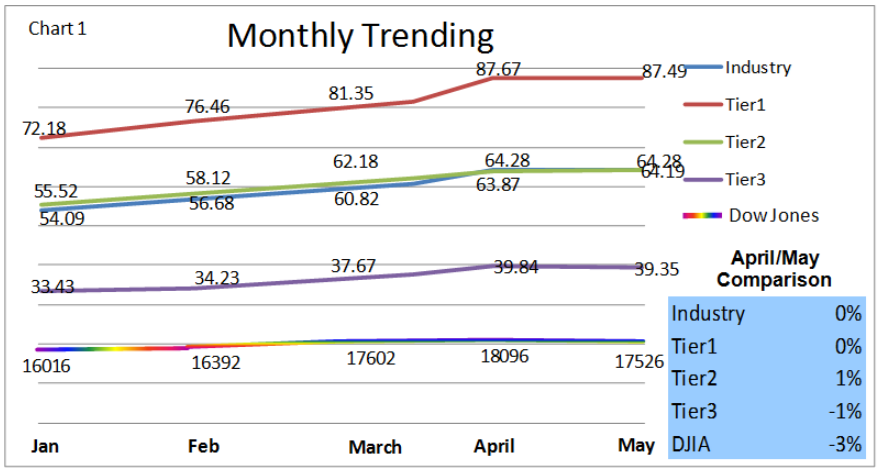
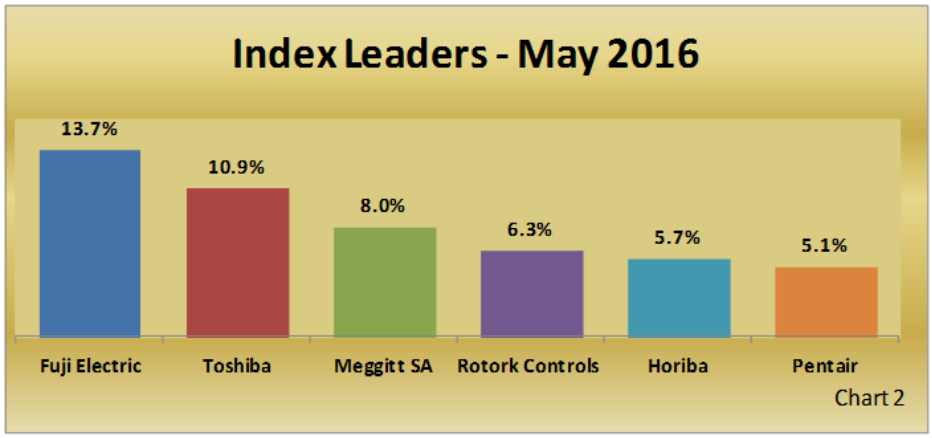


There was little to no movement in the Index over the past month, but it is important to remember that performance that does not include a loss is considerably better than what has occurred frequently over the past year or so. Tier 1 and the industry as a whole showed no change, Tier 2 increased 1% and Tier 3 decreased by 1%. The Dow was also fairly flat, underperforming the Index slightly, with a small drop of 3%.

While performance was somewhat stagnant overall, there were several individual players who did quite well over the past month. The top two are both Asian based companies (Fuji – Japan, Toshiba – China), and their presence comes as a bit of a surprise considering the currency and economic associated lag that companies in Japan and China have experienced in the recent past.

The Top of the Hill



Fuji Electric jumped almost 14% compared to last month, the largest increase seen in the Index this month. The jump is probably motivated by their recently released quarterly report, the highlights of which are shown in Table 1.

Health Watch

By Mary Samuelson

Table 1 — Fuji YOY Comparison

	3/31/2015	3/31/2016	YOY DIFF	% YOY
Revenues (mil)	2260.88	2409.36	148.48	7%
Earnings (mil)	140.99	194.78	53.79	38%
EPS	1.58	2.18	0.6	38%
Return on Equity (%)	23.25	32.4		
Return on Assets (%)	7.68	10.44		
Revenue Growth (%YOY)	-10.05	6.57		
Earnings Growth (%YOY)	-16.29	38.15		
Net Margin (%)	6.24	8.08		

Even with the increase, Fuji's stock is currently trading at over 20% below its December 2015 high, but the 13.7% increase made up a large part of the previous downhill tumble.

Toshiba's MOM increase of 10.9% is a bit harder to comprehend, and frankly leaves us scratching our heads.

Toshiba stock was holding steady at between 1,300¥ and 1,400¥ until May 11, 2016, at which point it began to climb. We did some searching to help us understand what might be driving the increase, and found the following article published May 12:

Toshiba posts $4.4 bn full-year loss on nuclear writedown

AFP

May 12, 2016 3:43 AM

Tokyo (AFP) - Toshiba said on Thursday that it suffered a $4.4 billion full-year net loss as the troubled conglomerate booked a massive write-down of its US nuclear unit, but said the worst was over as it forecast profits for the current business year.

Huh? An article like this will typically drive stock prices down, especially when the article contains so many negative references, which this one does. It references to the 2015 profit-padding scandal in which Toshiba management was involved, discusses a net loss for the previous nine months of 483.2 billion yen, and reports a sales decrease of 7.3% for the

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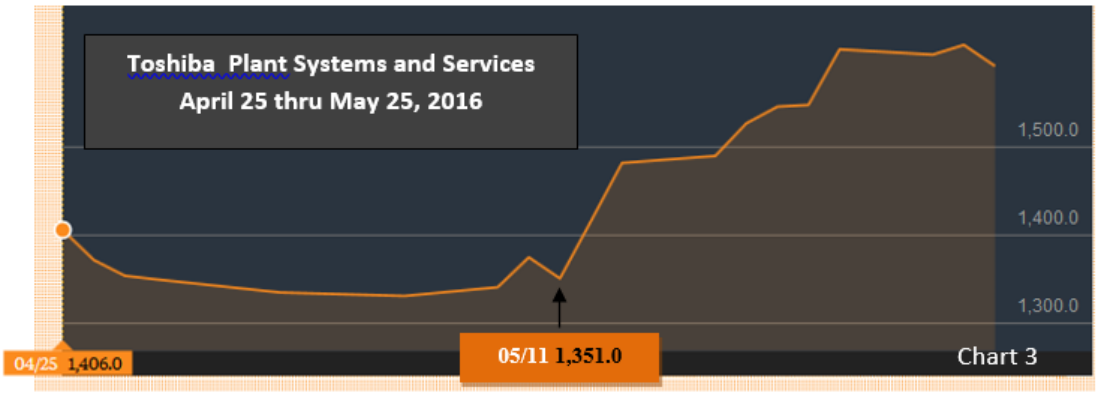
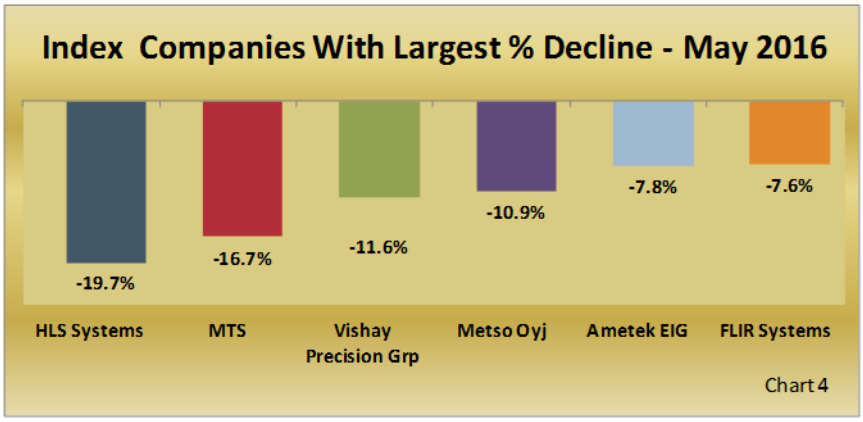
fiscal year.



And even more interesting is the discovery that this isn't the first time this 'backasswards' phenomenon has occurred for Toshiba. On July 21, 2015, on the heels of Toshiba's announcement of a $1.B accounting scandal which resulted in the resignation of Toshiba's CEO Hisao Tanaka, and Vice Chairman Norio Sasaki, Toshiba's stock surged 6%. Leslie Shaffer posted the following to ETCNBC.com:



> Toshiba's chief executive and vice-chairman have resigned in the wake of an independent report on the company's 152 billion yen ($1.2 billion) accounting scandal, which accused the management of padding profits. But, nonetheless the engineering giant's stock has surged more than 6 percent Tuesday. [Emphasis mine.]

Shaffer also quoted Amir Anvarzadeh, director of Japan equity sales at BGC Securities as saying, "We don't really see the attraction for Toshiba, but every stock has its price." It is some consolation to know that we aren't the only ones puzzled here. If we didn't know that Toshiba is based in China, we might think the company has the luck of the Irish.

The driving factors behind Toshiba's increase may be a bit difficult to fathom, but the reasons behind the decrease seen for Hollysys and MTS, the two companies who showed the biggest drop in stock price compared to last month, are very understandable.

The Bottom of the Pile

Hollysys stock decreased in value almost 20% since last month's reporting. Looking at their latest financial report released May 16, it is easy to understand why. Total revenues for the last nine months were up only 1.9% compared to last year, with lower margins, comparatively. The quarterly comparison, however, is what in all probability, drove the drop.

Compared to the prior year period, non-GAAP net income for Hollysys decreased 21.7%. Gross non-GAAP margin was at 31.7% compared to 46% for the same period last year, and non-

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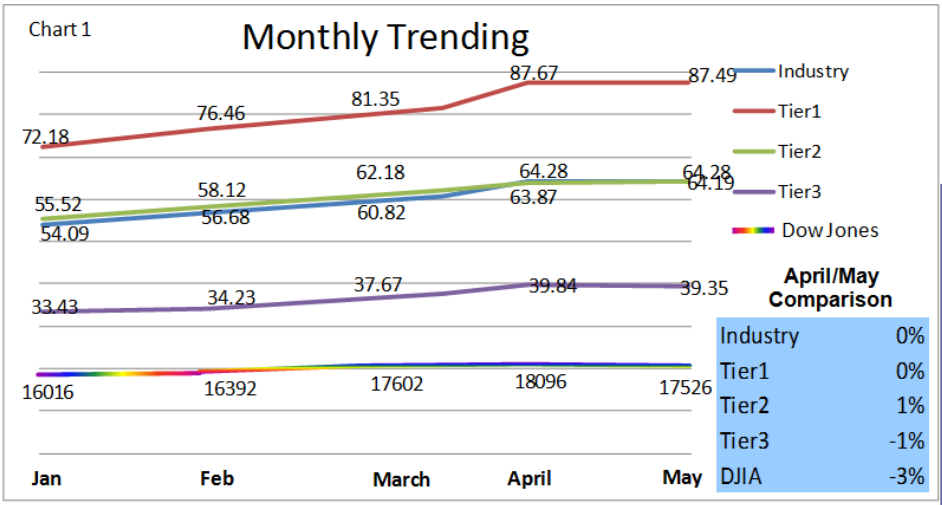

GAAP diluted EPS (earnings per share) dropped 24%.

Hollysys is straining to pull away from its weaker performing industrial automation areas like petro-chemical, but the company continues to expand its sales force in factory automation while allocating resources to attempt to raise and promote their customized turnkey solutions. The company acknowledges in its financial report that industrial automation revenue is declining, but states that "we will always try our best to minimize the impact, including adjusting internally to better cope with external environment and keep sustainable long-term healthy development."

MTS' financial report to some degree mirrors that of Hollysys, i.e., it ain't good. Revenue is down 5% YOY, GP is down 20%, EPS dropped from $0.77 to $.020, and orders performance is down 6%.

To help reduce costs, MTS plans to eliminate 55 to 65 positions, "adopting a leaner Corporate overhead structure" that will free up funding for technology, engineering, and operations roles that "are essential to our growth and operational efficiencies moving forward." It is expected that the cost reduction generated by the restructuring will produce approximately $9 million in annualized savings.

In the third position is Vishay, with a decline of 11.6%. Last month, Vishay led the pack with an increase of 15%, but it appears that to some degree investors lost confidence, due in part to quarterly reporting the company released May 10 via Business Wire.

(Click on the logo to see the full report.)

In the report, Ziv Shoshani, VPG's chief executive officer comments on overall company performance as well as that of the various segments. In summary:

Net revenues for the first quarter of 2016 were $56.6 million, flat compared with $56.6 million of net revenues for the prior year period. Comparing sequential results, net revenues for the first quarter of 2016 decreased by $2.3 million, or 3.9%,

Health Watch

By Mary Samuelson

The *INSIDER* Health Watch(tm) is written by Mary Samuelson, Senior Editor, and Quantitative Research Practice Lead at Spitzer and Boyes, LLC.

Ms. Samuelson was director of research at Maritz Research, and vice president at Rockhopper Research, and a Senior Project Manager with The Right Brain People.

"The Health Watch shows what we are capable of, in quantitative research, at Spitzer and Boyes, LLC.," she said. "If you are looking for research that is different from the kind you get from the usual suspects, give us a call."

Spitzer and Boyes, LLC has a complete qualitative and quantitative research capability, focused on the automation industries. For more information, contact Walt Boyes at waltboyes@spitzerandboyes.com.

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Mary Samuelson is available for speaking engagements about the Health Watch™ and other quantitative marketing issues. Contact Walt Boyes for details at waltboyes@spitzerandboyes.com.

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from $58.9 million in the fourth quarter of 2015.

Net earnings attributable to VPG stockholders for the first quarter of 2016 were $0.5 million, or $0.04 per diluted share, compared to net earnings attributable to VPG stockholders for the first quarter of 2015 of $0.9 million, or $0.06 per diluted share.

The Foil Technology Products segment revenues were $26.3 million in the first quarter of 2016, up 5.0% from $25.1 million in the first quarter last year, and up 0.3% from $26.2 million in the fourth quarter of 2015.

The Force Sensors segment revenues of $14.8 million in the first quarter of 2016 were down 2.6% compared to $15.2 million in the first quarter last year, and were down 4.8% from $15.6 million in the fourth quarter of 2015.

The Weighing and Control Systems segment revenues were $15.5 million in the first quarter of 2016, down 5.1% from $16.3 million in the first quarter last year, and down 9.4% from $17.1 million in the fourth quarter of 2015.

In Conclusion

Flat performance certainly beats the consistent drops the industry has experienced for the past year plus, so while some companies in our industry are doing better than others', overall, we are holding our own. We believe that the industry is finally making concrete progress on its way back to health, based in large part to the quick action of industry leaders who are actively seeking new revenue streams that will replace those lost by the oil and gas slump.

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THE WAY I SEE IT
Editorial

The Real Issue of IIoT

We have all been talking about the Industrial Internet of Things as if it were a done deal—that perhaps by talking about it, it will become real. This doesn't seem to be working. As we said last month, there's a lot more heat than light here, both for the original Internet of Things, and for its spinoff in manufacturing, the Industrial Internet of Things.

Sure, IBM and Cisco, and hundreds of other firms have signed on to promoting their ability to make the IIoT work, but, like Bit Stew Systems (www.bitstew.com), they seem to be more interested in touting themselves, rather than actually producing use cases that work. Bit Stew Systems released a news item a few days ago that said that because they standardized on Intel processsors, they were at the core of the Internet of Things. As near as I can tell, they have no idea how manufacturing works, or how sensor based data acquisition systems work, either. Some of the floof spouted by other, larger companies sounds pretty awful too.

It's those pesky use cases, see. If you can't make use cases that show significant return on investment, you aren't going to get any investment at all. There are some basic issues with the theory of the IIoT, and until those issues get cleaned up, that business of more heat than light appears to be hanging on tight.

As Rajabahadur Arcot notes in his article in this month's INSIDER, on the following pages, the IIoT must have cyber security that is intrinsic to the design and operation of the sensors and the networks that the sensors connect to. Raja is right, and everybody knows it. And few companies are far along in transitioning their devices to the kind of devices needed.

There are a couple of good reasons for this, and here is where the IIoT stumbles.

There are hundreds of companies making industrial sensors and transmitters today, all over the world. One of the things they share in common is that they are making high margin, low volume, high priced products. Remember that high margin thing. For the past couple of years, companies like Emerson, Honeywell, Siemens, ABB, and many others have been talking about the Internet of Things and the vast quantities of sensors they will sell to make it come true— at current prices and margins.

Well, no. We have known for years that applying more sensors to processes can provide more information and better control. But we have also known that the amount of improvement was far less than the cost of doing it. That's a non-starter.

What people at companies that derive lots of their revenue and lots of their profit margin from field devices don't want to think about is that the price of sensors and the much simpler transmitters of the IIoT needs to be somewhere between 80-90% less than current pricing is. "Lalalalalala! I don't hear you!"

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We know what IIoT sensors need to look like in design and operation, and right now, nobody is making any. And quite likely, the first breakthrough products will not come from the automation giants, but from small companies moving into the field, This is going to be true of sensors, and of software. We have known for a generation that we need high value visualization software, but it took a company based on Microsoft, Seeq, to do it.

How will the IIoT compete with reality?

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Rajabahadur V. Arcot: Proponents of IIoT must address security concerns upfront

The saga of cyber-attacks on industrial control systems began in 2010 when *Stuxnet* crippled the functioning of an Iranian nuclear enrichment facility.

Then followed attacks such as Flame, Havex RAT, and others. Havex RAT targeted the industrial control systems in energy grid systems, electricity generating companies, petroleum pipeline operators and such others. It executed malicious files without the knowledge of the users or suppliers of industrial control systems (ICS).

> Stuxnet manipulated the PLC that was controlling the enrichment facility and altered the set point of the centrifuges *while keeping the plant operators in the dark about the set point change*.

A recently reported cyber-attack was on Ukraine's regional distribution power companies that resulted in the blackout of the Ivano-Frankivsk region of the country into darkness for several hours in December 2015. According to available reports, attackers used BlackEnergy, a Trojan, to disrupt the electricity infrastructure.

Stuxnet manipulated the PLC that was controlling the enrichment facility and altered the set point of the centrifuges while keeping the plant operators in the dark about the set point change. Until then only a few would have thought of using industrial control systems to disrupt a plant's operation.

Now cyber-attacks have become a reality and the incidences are on the increase, numerically and in sophistication. The report *NCCIC/ICS-CERT Year in Review FY 2015* highlights this trend. According to the report, during the review period, ICS-CERT received and responded to 295 incidents.

The Critical Manufacturing Sector accounted for 97 of these incidents, while the Energy Sector had 46 and the Water and Wastewater Systems Sector had 25. In my opinion, many cyber incidents go unreported in several countries and India is one among them.

According to *ICS-CERT Monitor for the period September 2014 – February 2015*, many of the threat actors are unknown due to a lack of attributional data. The prospect of such malwares residing undetected in ICS deployed in critical infrastructure industries is far more worrisome; it is a distinct possibility, because many of the critical infrastructure companies are complacent about the cyber threat potential.

Now that we know that industrial control systems have cyber vulnerabilities that can be exploited, it becomes incumbent, to include cyber security as a fundamental design criterion, on the part of all those strongly positioning Industrial Internet of things along with cloud computing and such others. The promise of the Industrial Internet can only be realized if, by design and architecture, it effectively addresses the security threats.

The unmet need: Seamless flow of information

The role of ICS in manufacturing industries is ever expanding. They are no longer mere shop floor enablers that are applied from consideration of health, safety, and environment. As production operations became more complex and tightly coupled with supply chain, demand fulfillment, and such others, the need arose for integrating production floor automation systems with enterprise solutions, such as enterprise resource planning supply chain management, plant asset management, manufacturing execution, and similar others.

While most automation and enterprise applications were built on proprietary platforms and conceived initially to operate on standalone mode, the need for seamlessly integrating

Rajabahadur V. Arcot: Proponents of IIoT must address security concerns upfront (continued...)

them evolved much later. Shop floor to top floor integration presents challenges and calls for significant efforts. While OPC Foundation has developed standards for open connectivity of industrial automation devices and systems that facilitate interoperability, achieving interoperability and ability to quickly adopt technological developments are still a challenge for industrial enterprises. While the basic technology to effectively address the manufacturing industries need for interoperable systems and solutions already exists, the challenge lies in ensuring cyber security.

It is absolutely essential to recognize that cyber security is manufacturing industries' fundamental requirement.

The promise of IIoT

Initiatives such as Industry 4.0 and Smart Manufacturing Leadership Coalition (SMLC) look at leveraging the technology so that all operations along the value chain of the future manufacturing enterprises are tightly coupled while ensuring that processes are flexible, responsive, agile and environmentally sustainable. Sensors and actuators with embedded intelligence acting as IIoT underpin these smart factory initiatives. Technology companies are positioning IIoT along with cloud computing, big-data analytics, artificial intelligence and robotics to play a major role in enhancing manufacturing efficiencies to meet the challenges of the new manufacturing era.

Initially it was companies such as Cisco, Google, GE, and others that took the lead in creating the euphoria and now others are beginning to stake their claim to emerge leaders in this emerging market. Recently automation supplier companies, such as Honeywell Process Solutions and Hitachi have announced the formation of new groups for driving the company's IoT business and strategy. *Hitachi Insight Group*, the new global group will be responsible for driving Hitachi's global unified IoT business and strategy in key market segments including Smart Industrial. HPS has established *Digital Transformation Unit* to help manufacturers harness the Industrial Internet of Things and more rapidly deploy technologies that will allow them to better manage and analyze data, making their operations safer, more reliable and more efficient.

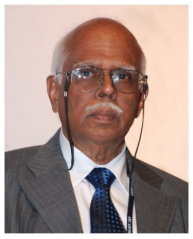
Inherent security risks

The promise of IIoT is that it will connect smart devices for seamless exchange of information. Digital connections also bring inherent security risks; seamlessly connected enterprises can become easy targets for cyber criminals. This challenge must be addressed upfront and must not be left out to be addressed subsequently as an after-thought as is the case with regard to existing ICS. Suppliers must deal with cyber threat issues upfront while developing OT solutions that will exploit the benefits of IIoT. Ensuring security will have to be a core focus area for companies that are architecting and promoting OT solutions based on IIoT, cloud, artificial intelligence, data analytics, and such others. It is absolutely essential to recognize that cyber security is manufacturing industries' fundamental requirement. Without adequate inbuilt cyber security protection, cloud, artificial intelligence, robotics and such others will become easy targets for malicious cyber activists.

IIoT solutions must have inbuilt security features

I believe that technology companies have the responsibility to offer OT solutions that have strong security features that are inbuilt to ensure protection from cyber-attacks. They should design systems that are inherently cyber secure and resilient and collaborate in developing the necessary and appropriate standards. *NIST SP800-82 R2, Guide to Industrial Control Systems Security18* highlights that "While security solutions have been designed to deal with these security issues in typical IT systems, special precautions must be taken when introducing these same solutions to ICS environments. In some cases, new security solutions are needed that are tailored to the ICS environment." Significant efforts have gone into formulating the emerging standards such as ICS: ISA-99 & IEC 62443 and ISO/IEC 27001 and these should be re-examined while developing cyber-secure OT solutions for the new manufacturing era. Ensuring the security of various subsets such as cloud computing of the emerging OT solutions is not only important for protecting industrial companies' data, assets and reputation, but also is fundamental for making a successful transition to the new manufacturing era. Manufacturing enterprises, on their part, must have a deep comprehension of both the promise and pitfalls of IIoT so that they can navigate the new territory with knowledge.

Rajabahadur V. 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. Until recently, he was responsible for ARC Advisory Group's business operations in India. Contact him at rajabahadurav@gmail.com**



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