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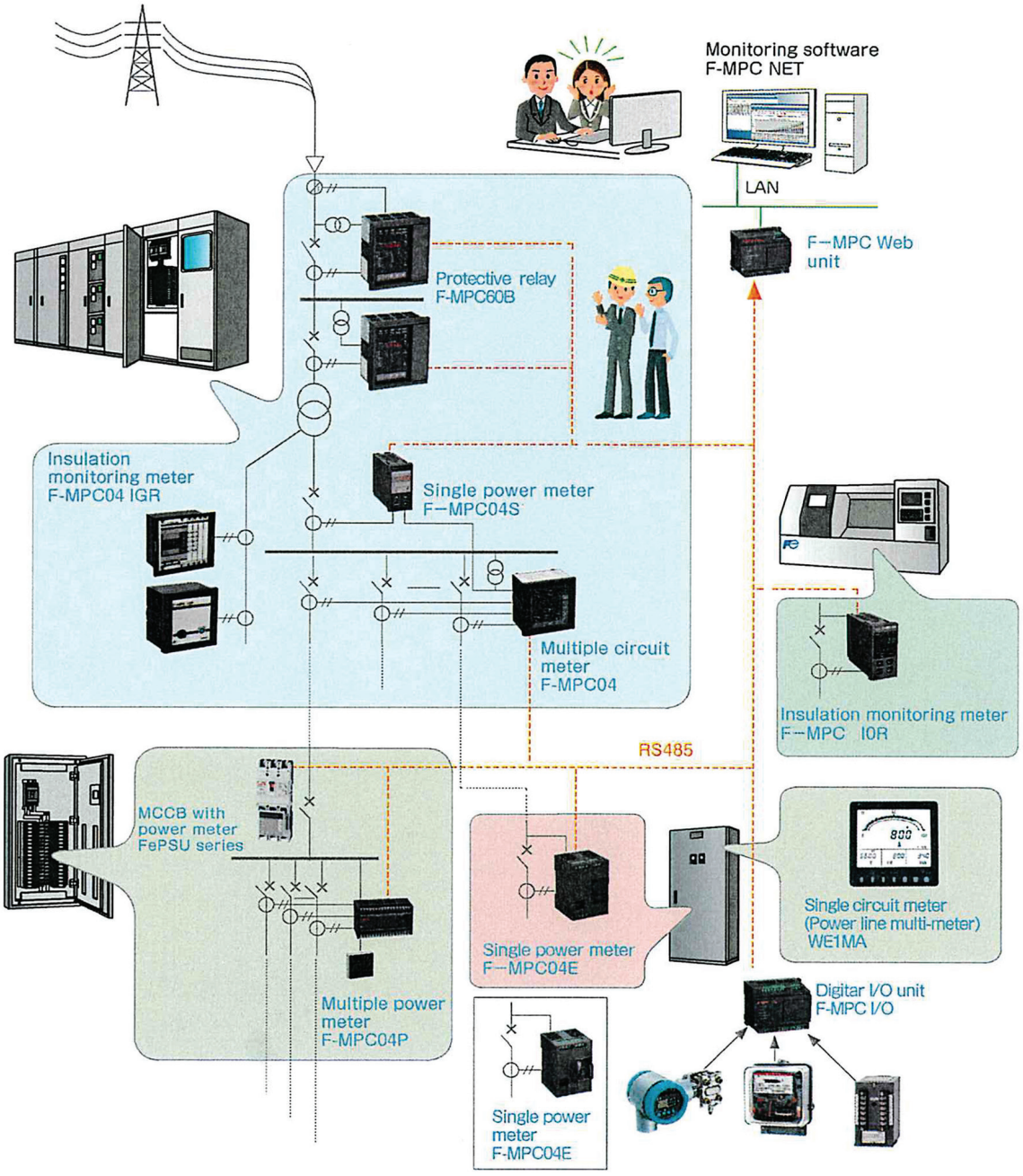

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EDITORIAL MESSAGE

Dear Readers, Happy New Year 2016!!

Greetings and warm welcome to the next edition of Automate Indonesia!

The AUTOMATE Magazine brand is renowned in Indonesia's automation industry but we are increasing our news coverage to both the automation and the manufacturing sectors to become Indonesia's ONLY MANUFACTURING & AUTOMATION magazine.

In this latest edition of Automate Indonesia, we provide you the latest breakthrough on food & beverage industry in Indonesia. The cover story of Automate Indonesia is covering news on "President Joko Widodo unveil Indonesia's 1st economic policy package". On the other hand, what happen if Indonesia will impose soda excise tax meet to resistance? Moreover, we also provide the previous news on growth Indonesia's food and beverage industry in 2015. The news on Food and Beverage industry is considered as our interesting story and it's coming from Omron Electrics Indonesia that creating 3D printing for biscuits for Indonesia's sweet tooth for biscuits.

Besides focusing on Food and Beverage industry, we are also covering the latest news on automation, electrics and energy industry in order to refer and support your business in 2016. We also have great chance to take an exclusive interview with Mr Chandran Nair (Vice-Presicent, Asia-Pacific Region) during National Instruments Day 2015 in Singapore

I would like to invite you to read our magazine regularly, share your feedback, and share interesting articles that you may have us for us to improve the magazine.
Automate Indonesia magazine is also available for download on our website www.automateindo.com for FREE.
Thank you for your support and we look forward to seeing you again in our next edition!

SUSAN TRICIA
Guest Editor,
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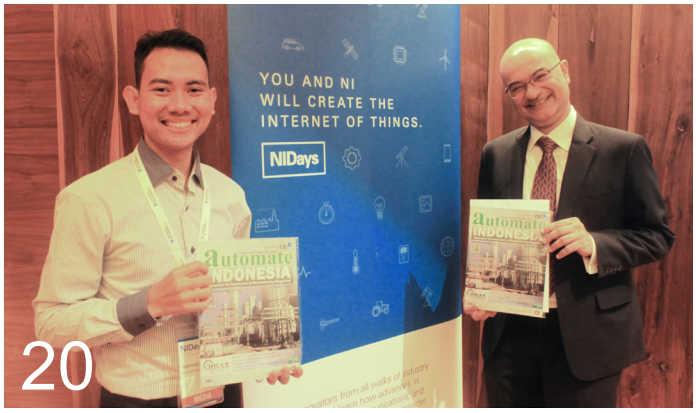

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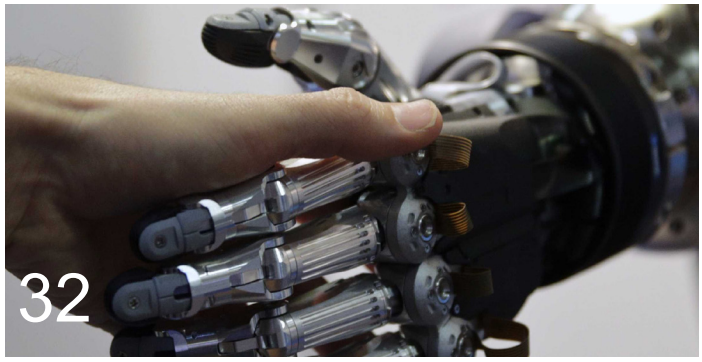

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PRESIDENT JOKO WIDODO UNVEILS INDONESIA'S 1ST ECONOMIC POLICY PACKAGE

On Wednesday afternoon, Indonesian President Joko Widodo unveiled some details of the new economic policy package, involving major deregulation measures, that had been announced last week by Chief Economics Minister Darmin Nasution. This package aims - on the medium to long term - to boost Indonesia's sluggish economy.

The package that was unveiled today and is to be implemented in October 2015, is the first of a total of three deregulation programs. This first package involves various matters. President Widodo said the government, in cooperation with other institutions (central bank and the Financial Services Authority), will increase efforts to safeguard the country's fiscal and monetary stability, which also includes controlled inflation (currently inflation in Indonesia is still high at 7.18 percent y/y in August).

President Widodo announced that 89 regulations are to be revised as they are considered to burden the country's business environment. In order to smoothen the ease of doing business in Indonesia the government will also simplify the process for companies to obtain business permits, cut red tape, curtail overlapping regulations, enhance the use of electronic-based services in an attempt to reduce (potential) misconduct by government officials, and enhance law enforcement as well as business certainty.

In order to protect the people from the weakening economy (weakening purchasing power) the government will empower the micro, small and mid-sized businesses through subsidized loans with low interest rates of 12 percent only (from 22-23 percent currently).

The government will also accelerate and increase the flow of central government funds to the local governments across the country. These funds are specifically for infrastructure development in the regions. Local government will become important powers to speed up realization of strategic projects of national interest. This includes the simplifying of the process for obtaining spatial planning permits, land acquisition and goods procurement, as well as providing stronger legal certainty.

Lastly, Widodo said investment in the property sector needs to be encouraged, including friendly policies for low-income communities. Indonesia is currently plagued by a backlog of 15 million property units.

Whether investors will appreciate this package is unknown as there are still many more details to be studied. Moreover, the government of Indonesia has a track record of failing to accomplish successful implementation of its ambitious programs. Therefore, investors may not yet be overly enthusiastic. For example, President Widodo pledged to boost (much-needed) infrastructure development in Indonesia, Southeast Asia's largest economy. For that purpose the government allocated IDR 290.3 trillion (approx. USD $21 billion) for infrastructure development, equivalent to 20 percent of the country's total revised 2015 State Budget (IDR 1.98 quadrillion). However, plagued by red tape, land acquisition troubles, political party struggles, procurement bottlenecks, poor planning, and weak cooperation between government institutions the government only managed to spend 11 percent of the total allocated funds (IDR 290.3 trillion) in the first seven months of 2015. A remarkable poor performance and leading to weak investor sentiment.

During the announcement at the State Palace in Jakarta Widodo was joined by Central Bank Governor Agus Martowardojo, Chairman of the Financial Services Authority (OJK) Muliaman D. Hadad, Chief Economics Minister Darmin Nasution, Finance Minister Bambang Brodjonegoro, Trade Minister Thomas Lembong, Energy Minister Sudirman Said, and Agriculture Minister Amran Sulaiman.

Source: Indonesia-Invesment

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Growth Indonesia's Food & Beverage Industry in 2015 Revised Down

Turnover in Indonesia's processed food and beverage industry is expected to grow 4 to 5 percent year-on-year (y/y) in the first quarter of 2015 from the same period last year. Adhi Lukman, General Chairman of the Indonesian Food and Beverage Association (GAPMMI), said that factors have been hampering this industry are the winding down of fuel subsidies, the country's sluggish export sector, the industry's dependence on imports of raw materials, people's weakening purchasing power amid low commodity prices, and a weak rupiah.

Due to this weaker context, Lukman expects that turnover growth in full-year 2015 will be limited at about 6 percent (y/y), down from an earlier growth forecast of 8 percent (y/y). In fact, he added that if the context deteriorates than this new growth forecast will need to be revised again. Last year, turnover in Indonesia's food and beverage industry was IDR 1.020 trillion (USD $82 billion), up from IDR 940 billion in 2013.

At the start of the year, Indonesian processed food and beverage producers raised prices by about 5 to 10 percent due to higher transportation costs as the government raised prices of subsidized fuels at the end of 2014 in a move to compile funds for economic and social development. Although transportation costs eased after the Indonesian government let fuel prices float in line with global oil prices (which had nearly halved since June 2014) at the start of 2015, the industry is still badly affected by the heavily depreciated rupiah exchange rate. As a relatively large chunk of raw materials (such as sugar, wheat, milk, fruit juices and soybeans) are imported operational costs have increased sharply due to the weakening rupiah (against the US dollar). However, as food and beverage manufacturers have already raised prices at the start of the year they are yet unwilling to raise prices again.

Lukman expects that the performance of Indonesia's food and beverage industry will improve in the second half of 2015 supported by Islamic celebrations such as the Ramadan and Idul Fitri when household consumption always jumps. It would also help if the global economy improves. The main export markets for Indonesia's processed food and beverage industry are Japan, China and Europe. However, these three regions are currently combating an economic slowdown and therefore demand from these key export markets remains sluggish. An improving US economy, on the other hand, provides opportunities for the industry. Although the weak rupiah (versus the US dollar) makes operational costs high, it also makes Indonesian food and beverage export products more competitive on the global market.

In 2015, Indonesia's processed food and beverage industry is expected to receive a total of IDR 60 trillion (USD $4.7 billion) of investment, particularly from Japan. At the start of this year two Japanese candy firms - UHA Mikakutou Co Ltd and Kanematsu Corp - have invested a combined IDR 300 billion (USD $23.3 million). Other established companies are eyeing further business expansion in Southeast Asia's largest economy. For instance, Coca Cola Amatil stated to invest USD $800 million the next three to four years to expand production capacity.

"Faiz Ahmad, Director of Beverage and Tobacco Industries at the Indonesian Industry Ministry, said that investment in the country's processed food and beverage manufacturing will be primarily aimed at bottled water and carbonated beverages".

Indonesia, a country with more than 250 million people, is a lucrative market for food and beverage producers, particularly as the country is experiencing steady economic growth hence giving rise to a rapidly expanding middle class segment that consumes more and more products.

RUPIAH INDONESIA VERSUS DOLLAR AS (JISDOR):

Source: Indonesia Investment

Fitch Ratings about Indonesia's Insurance, Automotive & Motorcycle Industries

New York-based Fitch Ratings, one of the three major global credit rating agencies, expects demand growth in Indonesia's life and non-life insurance sectors to occur over the medium term on the country's (currently still) low insurance penetration rate, improving risk awareness, and the expanding middle class segment within the rising population of Southeast Asia's largest economy. Meanwhile, the credit rating agency believes Indonesia's car and motorcycle sales will remain under pressure in 2016 due to weak consumer spending.

Indonesia's Life and Non-Life Insurance Sectors

In a report titled 'Indonesian Insurance Dashboard 2015', released this week, Fitch Ratings states that overall gross premiums written for the life and non-life segments in Indonesia grew by approximately 15 percent in 2014. Meanwhile, total industry premiums rose 7.8 percent (annualized) in the first half of 2015.

Indonesia's non-life insurance industry posted a favorable loss ratio consistently below the 50 percent mark over the period 2010-2014. Fitch Ratings further states that "most domestic reinsurers' underwriting margin, as measured by their combined ratios, has remained steady over the past three years, driven by manageable losses from catastrophe events".

Despite Indonesia's economic growth having slowed to around 4.7 percent year-on-year (y/y) in all three quarter so far in 2015, Fitch Ratings expects GDP growth to accelerate to 5.3 percent (y/y) in 2016, and to 5.5 percent (y/y) in 2017.

Car and Motorcycle Sales in Indonesia

Fitch Ratings is less optimistic about car and motorcycle sales in Indonesia as weak consumer spending is expected to drag down car and motorcycle demand. In a report released on Wednesday (26/11) the credit rating agency says Indonesia's car and motorcycle sales volume is estimated to post modest growth of about 3 percent (y/y) next year. So far this year, sales of cars and motorcycles have fallen between 18 and 20 percent amid the economic slowdown, low commodity prices and subsequent weaker purchasing power and consumer confidence.

Fitch Ratings states that Indonesia's consumer confidence may stay low if there occur further delays in the execution of government spending, further rupiah depreciation (due to monetary tightening in the USA) and continued uncertainty over the global economy (specifically China's economic slowdown).

Fitch advises Indonesian car and motorcycles dealers to have a sound inventory management to discourage competition and price wars in order to combat slowing demand. In turn, the inventory management will also help manage dealerships' cash flows.

Source: Indonesia Investments

Ocean Data Systems, Red Lion collaborate on compliance reports for food and beverage industry

The industrial technology vendors team up to offer customers an interactive way to produce EPA, FDA, and other compliance reports required in pharmaceutical, water/wastewater, and food and beverage industries.

By Stephanie Neil , Senior Editor

Ocean Data Systems, a provider of automated reporting and corporate dashboards for the industrial markets, this week announced that Red Lion Controls has joined its Dream Report Proven Partner program.

Red Lion's portfolio includes process control products, HMIs and panel meters, Ethernet switches and cellular M2M devices, and communication converters. Many of these products are involved in applications that require compliance and performance reports and dashboards—which is where Ocean Data Systems' Dream Report can help.

Dream Report collects and archives real-time information gathered from open or proprietary archives and databases. With 70 different drivers, the technology is able to grab information form multiple sources, perform calculations, format and deliver it via a secure web portal. Users can access archived reports, generate new reports, or quickly build web-based interactive dynamic dashboards through an intuitive interface.

"Anybody who has a SCADA system or historian should now be layering Dream Report on top because of the value it can deliver," says Roy Kok, vice president of sales and marketing at Ocean Data Systems.

There are two types of important reports in manufacturing: Reports have to stay in business which are compliance reports for the Food and Drug Administration (FDA) or Environmental Protection Agency (EPA), for example; And, then there are the performance reports, which focus on improving productivity and quality. Typically, companies have turned to business applications from SAP or Microsoft or even use Excel to generate these reports. However, Dream Report has been designed from the ground up for industrial automation.

While Dream Report is applicable to any industry, company officials say it is very important for pharmaceutical and biotech companies that must comply with the FDA's 21 CFR part 11 requirements, as well as the food and beverage industry which must adhere to other strict FDA regulations. Water/wastewater and energy industries are also in need of a comprehensive system for generating reports to the EPA.

Over the past several years, Ocean Data Systems has built relationships with OEMs, including Schneider Electric, which sells Dream Report for Wonderware, and GE Intelligent Platforms' which has Dream Report for Proficy. In addition to its OEMs, the company has created its Proven Partner program for companies that are not reselling the Dream Report software, but have tested the application and will deliver joint services and long-term support to customers.

"Dream Report offers a wide variety of connectivity options including OPC standards and support for Modbus, which complements our broad range of industrial products," says Jeff Thornton, Red Lion's director of product management.

Red Lion is the latest addition to the partner program, which means the systems have been tested to work seamlessly together, therefore, if one of Red Lion's customers needs compliance or performance reporting, the company will recommend they use Dream Report.

Source: Automation World

Automation and "Factory of the Future"

Perspectives from the 2014 Pharmaceutical Automation Roundtable

By Bill Lydon

http://www.roboticsbusinessreview.com/

Pharmaceutical automation leaders from around the world gathered for the annual Pharmaceutical Automation Roundtable (PAR) at Bristol Myers Squibb in Devens, Massachusetts to discuss a number of automation challenges facing their companies. While the content was specific to the pharmaceutical and biotech industries, these challenges are certainly applicable to all industry segments.

This article reviews the highlights of a presentation made about Automation and "Factory of the Future", focusing on challenges in automating flexible biotech facilities.

What is "Factory of the Future?"

The presenter explored the notion of the "Factory of the Future." Automation professionals typically think about the future in terms of technology and integrating systems that include ISA88 and ISA95 standards, MES, DCS, BAS, LIMS, PLC, and business enterprise systems. The pharmaceutical industry is quickly moving away from large block buster medications towards more personalized medicines. This trend requires much more flexible manufacturing facilities.

The presenter used the example of one flexible manufacturing facility - the Biogen Idec Flexible Volume Manufacturing (FVM) Facility that was the 2013 ISPE Facility of the Year award winner in the category Facility Integration. The manufacturing methods employed at Biogen provide for a flexible, multi-product environment, with less initial capital investment, reduced utility demands, and increased speed through the product pipeline as compared to traditional biotech manufacturing methods. More information on this award: http://www.ispe.org/foya-winners-2013

.

"The pharmaceutical and biotechnology industry is experiencing rapid, significant, and revolutionary change. These products are becoming more diverse with treatments targeted at patients with specific disease subtypes. The technologies needed to manufacture these new therapies are becoming more complex, requiring significant investment at a time when there is already overcapacity and excessive cost."

There is a growing need in the biotechnology industry for many new products, serving smaller populations. These products are primarily based on sterile biotechnology processes and robust well-known unit operations, that will be high yielding and small batch volumes compared to past biotech products. The emerging "Factory of the Future" model is intended to address this environment.

Aspects of the factory of the future are envisioned as a "standardized" repeatable facility with a "Flexible Core."

Facility design, structural layout, and automation can be similar or identical in many facilities. This replication allows leveraging of standard designs, either from outsourced firms or across projects internally. The "Flexible Core" focuses on GMP (Good Manufacturing Practices) unit operations for late clinical or commercial launch. This flexible approach enables production of multiple products in small to medium batch volumes (2,000 liter and under) with modular, disposable, single use technologies. Mobile units can be moved in/out based on each product and production demands. This approach also enables rapid process development and startup of new processes.

Over the past 15 years, automation technology has changed and is moving towards enterprise level automation with DCS, process data collection, and historians. There has also been rapid growth of lower level automation including integrated HMI/PLC products, automation accessible to smaller scale operations, and OEM-supplied systems. Elements of both technology evolutions may be required to implement the Factory of the Future.

Change

The presenter posed a key question, "Are automation industry strategy and pharmaceutical manufacturing changes moving to strategic alignment or are they diverging?" He discussed how the automation industry has evolved to server-based systems with centralized data. However, now the pharmaceutical industry strategy is moving towards small scale, single use (disposable), plug and play, mobile, and modular production.

Automation and the industry have some alignment with repeatability, modularization, and rapid commercialization. Automation ensures process repeatability with execution the same way, every time. Modularization, with a well-designed S88 platform allows easy replication for additional modules or for duplicating facilities. If clinical development and production is performed on standard industrial platforms, rapid commercialization can be accomplished. Applied correctly, these elements are actually a strong fit with the "Factory of the Future," especially if the facility or manufacturing site is to be replicated.

Factory of the Future Impact on Automation Strategy

Manual Operations

Focus on disposables will introduce new failure modes, particularly with more operator set-ups required. Disposables require different instrumentation and control devices. The same levels of accuracy and reliability may not yet be available with disposable instrumentation.

OEM Management

The focus on small scale means lab systems will enter the GMP production environment often characterized by proprietary control platforms which limit customization. Vendors and R&D personnel are not leveraged in the engineering specification process.

Batch Records and Regulatory Strategy

We see more frequent "non-GMP" development operations yet systems still must meet applicable regulations depending on their intended use. Plug and play is essential to achieve scalability and portability goals.

Development & Manufacturing Alignment

Highly flexible manufacturing requires standardization and close alignment between product development and manufacturing groups.

Validation

Modular equipment and controls changes validation strategy. Functional tests (qualification) may be reduced but other areas of validation will emerge (such as leachable/extractable studies).

Discussion

These are comments from PAR group members during the Factory of the Future discussion.

The inherent limitation with the concept of modular flexible manufacturing is you cannot automate what is not yet defined.

Generally participants expressed that various levels of modularity is starting to be adopted at their companies for flexibility.

OEMs are migrating to modular controllers that are more cost effective than traditional DCS systems.

This is going to require automation engineers to potentially deal with multiple control and automation vendors.

Smart instruments are getting smarter with embedded intelligence and Ethernet communications.

Many existing highly flexible S88 implementations are often complex and difficult to use. They need to be easier to use.

About the PAR Meetings and this Article Series

Every year, I have the opportunity to attend the Pharmaceutical Automation Roundtable (PAR) meetings, as the only outside observer. The 2014 PAR meeting was hosted at Bristol-Myers Squibb Devons, MA location. Lead automation engineers from around the world attended this invitation-only, two-day event. This group of engineers has a wealth of practical knowledge and knowhow and is willing to share with other participants - truly learning from each other. The PAR meetings represent a very knowledgeable group of automation professionals gathered in one place at any one time to discuss automation issues. The participating companies included Amgen, Biogen, Idec, J&J, Eli Lilly, NNE, Novartis, Novo Nordisk, Pfizer, Sanofi-Aventis. The PAR meetings consist of various presentations given by PAR members on specific automation topics. Other members then provide comments about their experience, ideas, and challenges relating to the topics. This article series presents a summary of those conversations with each article highlighting one or more of the topics covered by the PAR meetings. Comments by specific PAR members are reported anonymously.

About PAR

PAR was founded about 16 years ago by Dave Adler and John Krenzke, both with Eli Lilly and Company. At the time, the purpose of the roundtable was to provide a means of benchmarking and sharing best practices for automation groups among peer pharmaceutical companies. The group specifically does not discuss confidential or proprietary information, cost or price of products, price or other terms of supply contracts, plans to do business or not do business with specific suppliers, contractors, or other companies.

Source: Automation

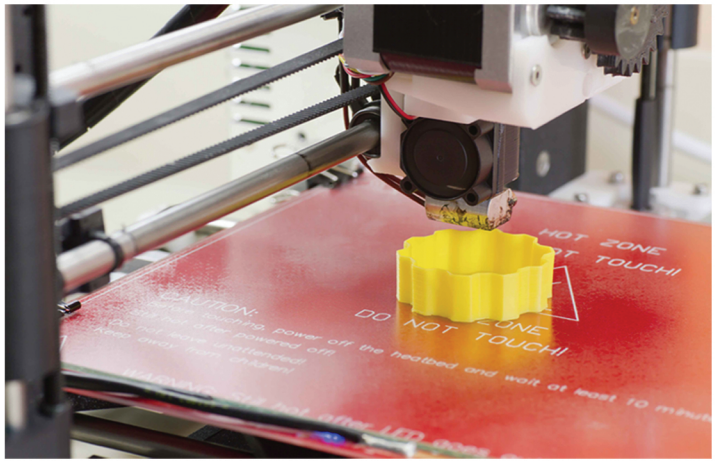
Indonesia's next top biscuit - made by you?

Indonesia's sweet tooth for biscuits

Biscuits are extremely popular in Indonesia, with Indonesians purchasing more than $1 billion worth of biscuits each year. However, the long-term outlook for Indonesian biscuits might not be so sweet. The biscuit industry is only expected to grow at around 4 percent per year until 2018, the same as back in 2008, which means biscuit-makers will find it harder and harder to stay profitable. Biscuit-making companies have a few options to stay in business: continue to compete on price, quality, or be innovative. The latter will involve creating new biscuits that capture the hearts and taste-buds of Indonesian consumers.

One biscuit brand designed specifically for Indonesia has almost 300,000 people who “Like” it on Facebook – that's a lot of love for a single biscuit! It shows that biscuits inspire a lot of brand loyalty in Indonesia, particularly around emotive issues like children's health.

What if they could do all three? This would be of huge benefit to not only manufacturers, but biscuit-buyers all around Indonesia. In fact, imagine if you could not only get high-quality sweet biscuits at a low price, but even customize them to your own tastes!



With 3D printing, biscuits take on a whole new level of personal creativity.

3D printing biscuits the way you like it

3D printing could make this possible. That's right, even biscuits can be printed with today's 3D printing technology. Oreo, a cookie made by Nabisco combined the use of 3D printing with personal experience by allowing customers to build customized cookies in a little over a minute. This offers a whole new experience for customers when consuming a cookie. Will customized biscuits be the solutions to biscuit manufacturers in Indonesia today? Right now, most of the 3D biscuits are made either by freehand or depend on the use of biscuit molds to get the same size, shape, weight, consistency, while maintaining their taste. Biscuits produced this way not only differ in color or shape, but can elicit a more positive reaction when it comes to consumer's opinion and brand loyalty. With 3D printing, biscuit-makers can produce a far greater range of biscuits but only in smaller batches and higher price. That's because 3D printing is very different from today's manufacturing processes that are automated.

3D printing has the potential to bring joy to millions of people both in Indonesia and around the world.

See biscuit, print biscuit, eat biscuit

This is where Omron's suite of advanced sensor technologies come in. The key to producing perfect biscuits lies in closely monitoring the biscuits produced. Precision sensors from Omron can ensure consistency in production by feeding data about the printed biscuits back to the production machine. For example, Omron's advanced thin-beam fiber sensor can detect even a 0.5mm increase in the size of the biscuits and send information to reduce the amount of dough used. In the same way, using Omron's innovative twin-output fiber-sensor, we can detect the color of the biscuits, making sure none of them are pale and underdone and adjusting the oven temperature to ensure each cookie is baked to perfection. Omron's keen sensor technology can even detect if the biscuit labels have been well printed!

This ensures that the whole process of production, down to the taste of each biscuit, can be closely controlled and quality can be ensured.

"The implications of 3D printing are huge for any manufacturing industry, including those in food retail like biscuit producers,” said Budi Sutanto, Managing Director PT. Omron Electronics Indonesia.

“Manufacturing in Indonesia, whether of chocolate chips or computer chips, will quickly move towards greater efficiency and greater variety of more personalized product."

Omron's precision sensors can truly help innovative manufacturers in ensuring quality and consistency in delivery. This will be essential to keep production lines responsive enough to meet the quick changes in consumer tastes and personalization of their preferences.

Ultimately, 3D printing has the potential to bring joy to millions of people both in Indonesia and around the world, allowing even biscuits to be so personal that they spark an emotional connection. Every biscuit will be your favorite biscuit. The sweetness that 3D printing will bring to consumers is not just about the taste of food; it’s just another example of how automation, as a critical part of 3D printing, is a key ingredient in the happiness of everyday people.

OMRON

Manufacturing Industry Indonesia Expected to Grow 5.7% in 2016

Indonesia's Ministry of Industry is optimistic that the country's manufacturing industry will grow 5.7 percent (year-on-year) in 2016, up from the estimated 5.3 percent growth pace this year. Indonesian Minister Saleh Husin said this optimism is based on higher domestic direct investment. Domestic investment realization in Indonesia's industry sector rose 7.45 percent (y/y) to IDR 20.1 trillion (approx. USD $1.5 billion) in the third quarter of 2015 from IDR 18.7 trillion in the same quarter last year. Foreign direct investment (FDI) into Indonesia's industry sector stood at USD $3.15 billion in Q3-2015.

Minister Husin stated that the growth of the non-oil & gas manufacturing industry reached 5.21 percent (y/y) in the third quarter of 2015, up from the growth pace of 4.73 percent (y/y) recorded in the same quarter last year. In nominal terms, the export of manufactured (non-oil & gas) products in Indonesia's industry sector stood at USD $72.2 billion in the first eight months of 2015. Indonesia's main export markets for these products are the USA, Japan, China, Singapore and India. Husin said exports of industrial products accounted for about 70 percent of the nation's total exports in the January-August 2015 period.

Indonesia's (non-oil & gas) industrial sector accounts for 17.8 percent of the country's gross domestic product (GDP) up to the third quarter of 2015, up from 17.4 percent in the same period last year. The Industry Ministry targets this figure to rise to 18.5 percent by the end of 2015.

Husin emphasized the importance to boost competitiveness in Indonesia's industrial sector by improving the availability of electricity and gas at competitive rates, having more competitive interest rates at commercial banks, as well as reducing the country's currently high logistics costs.

The relatively high gas price in Indonesia is a particular concern to the petrochemical, ceramic, glass and fertilizer industries. Whereas industries in Malaysia and Vietnam pay USD $5 per british thermal unit (mmbtu), the gas price in Indonesia is currently still at USD $9 per mmbtu. In an effort to boost domestic industries, the Indonesian government decided to cut energy tariffs for labor-intensive industries in an economic stimulus package unveiled on 7 October 2015. For gas, it means that prices will be cut to USD $7 per mmbtu per January 2016. Although this will indeed cut operational costs, the price is still much higher than in aforementioned countries, making Indonesia's manufactured exports less competitive.

Source: Indonesia Investements

A New Way to Move Products

By Oliver Haya and Erik Myers, Motion Control, Rockwell Automation

Aquamechinery.com

Manufacturers and packaging contractors are constantly striving to locate a cost-effective and flexible way to increase productivity in their packaging operations, while also economizing their floor space. Traditional linear moving systems can often fulfill one or more of these criteria, but it is rare that all are ever met by one coherent system. The introduction of intelligent modular track systems is changing that, offering greater flexibility and energy efficiency, and lower operating and maintenance costs, for many industrial applications.

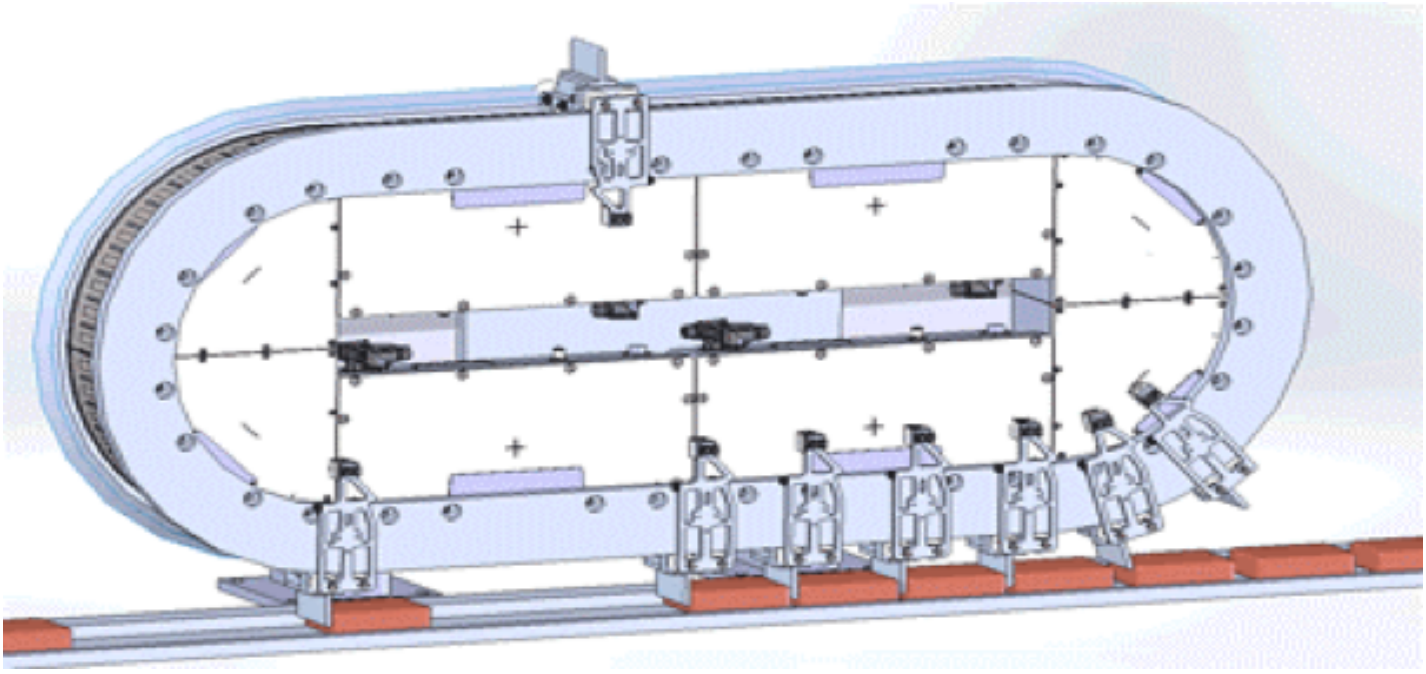
Traditional Solution:

In a traditional packaging application, chains and sprockets are often used for basic linear motion processes. For complex motion, more sophisticated mechanical arrangements may be required. For example, a product that needs to move at varying speeds along the same line, or changes from continuous to intermittent motion, typically requires several different chain and sprocket configurations, each connected to its own rotary motor and drive. Not only is this system complicated, but if a change occurs in the production run, any alterations in the configuration would be costly and time consuming. The complexity illustrated here typically increases the costs of operation and maintenance required to keep the machine properly running. Also, any change parts required for its operation tend to take up a large amount of valuable factory floor space.

Alternative Solution:

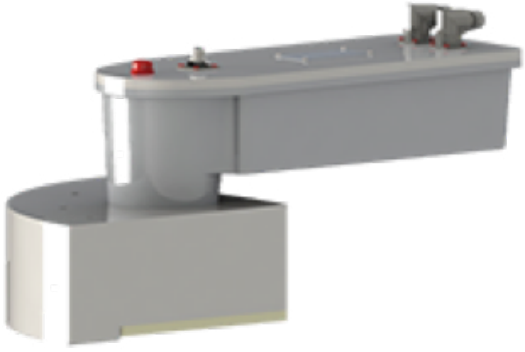
A modular, scalable and intelligent track system

In contrast to a traditional configuration, intelligent modular track systems allow for independent control of multiple movers for both linear and complex motion processes. Abandoning the use of rotary-driven chains, belts and gears, these systems simplify what otherwise is a much more complex, inflexible and unreliable process.



A modular, scalable and intelligent track system

Linear module



Curved module

How It Works

Intelligent modular track systems use innovative design elements, such as a linear magnetic-drive configuration that uses energized coils along the outside of the machine frame. The coils produce a field that interacts with a magnet mounted to the inside of a rugged mover, while a position magnet mounted to the top of the mover allows for absolute positioning of each mover in closed-loop servo-control applications. This design approach provides tool independence, making it possible to adjust the spacing between movers or products in real time. The availability of motor coils in either straight or curved modules with varying coil-length sizes, each size corresponding to a different amount of output force, offers greater scalability than traditional systems to meet each unique application's requirements.

An intelligent modular track system can achieve a wide range of forces and speeds for different packaging applications.

Benefits for manufacturers include a smaller factory-floor footprint, improved modularity and reduced downtime. End users that have adopted these systems typically have seen an increase in production rates of 50 percent or more due to high speeds and flexible programming that enable faster production and higher throughput.

This next-generation design is a perfect fit for those considering a change to a more forward thinking production line.

Source: Automation

Our Comprehensive Surge Protection Plan—For Your Facility

Why Should I Install Facility-Wide Surge Protection?

Damage Due to Transients and Surges

In today's world, almost every business depends on fragile micro-electronics to run everything from computer networks to manufacturing lines. **Power disturbances can disrupt or cripple equipment, causing loss of data, and an increase in downtime.** In fact, downtime and damage caused by power disturbances or transients cost companies billions of dollars each year.

The terms used to describe these power disturbances are varied — surges, transients, spikes, swells, or noise. What these terms describe are high-energy events that are microseconds in duration. The magnitude of these events can vary dramatically based on how they are generated and where they occur relative to the facility.

Transient impulses like those caused by lightning or utility grid switching can produce high-energy events that adversely affect your facility's incoming power. These disturbances will then propagate throughout your facility and ultimately place each panel and the panel's downstream equipment at risk. Numerous standards exist which address these concerns by recommending coordinated protection throughout your facility.

Develop a Plan

The benefits of installing surge protective devices (SPDs) throughout a facility are clear:

- **Reduction in downtime**
- **Improved system and data reliability**
- **Elimination of damaged equipment due to transients and surges**

Taking the extra steps to ensure the operation of your facility requires a coordinated surge protection plan that identifies susceptible "SURGE**HOT**Spots" within that facility.

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EMERSON Network Power

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320 SPD

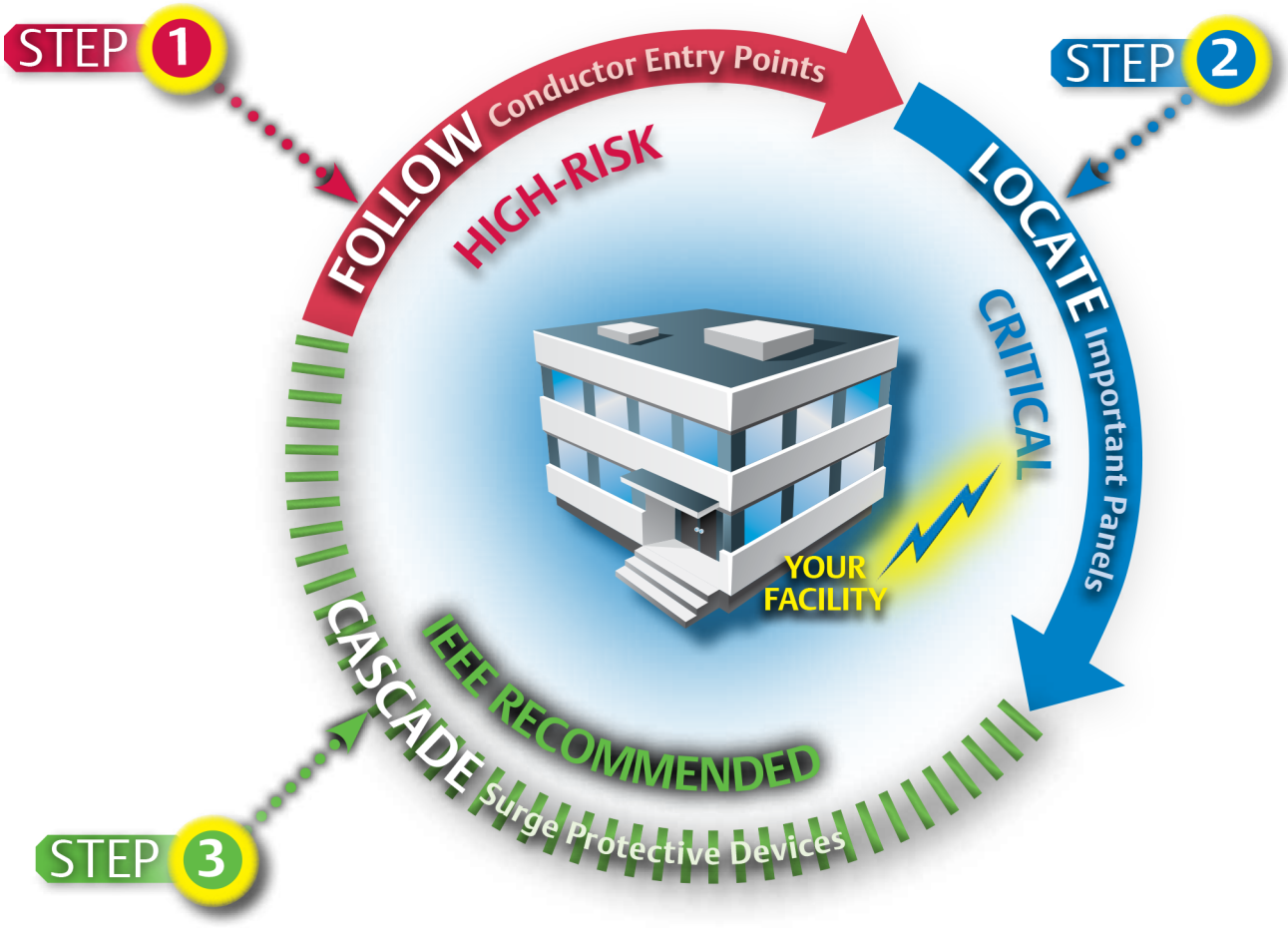
330 SPD

440 SPD

Emerson Network Power's 3-Step Approach to Facility-Wide Surge Protection

Lightning generated transients are diverse, varying in magnitude, duration, and frequency. Most lightning strikes are actually multi-stroke in nature, with a typical single flash containing four or more strokes. These transients can enter your electrical system at significant levels, working through your facility on any exposed conductor or path. They can directly enter your building via a flash or near a flash to your structure and indirectly through power lines or your building's wiring.

Emerson Network Power has developed a series of products to specifically address these potential **SURGEHOTSpots**. With over 40 years of experience designing and manufacturing world-class surge protection products, we've established a **3-Step Approach** for you to follow to ensure a properly protected facility.



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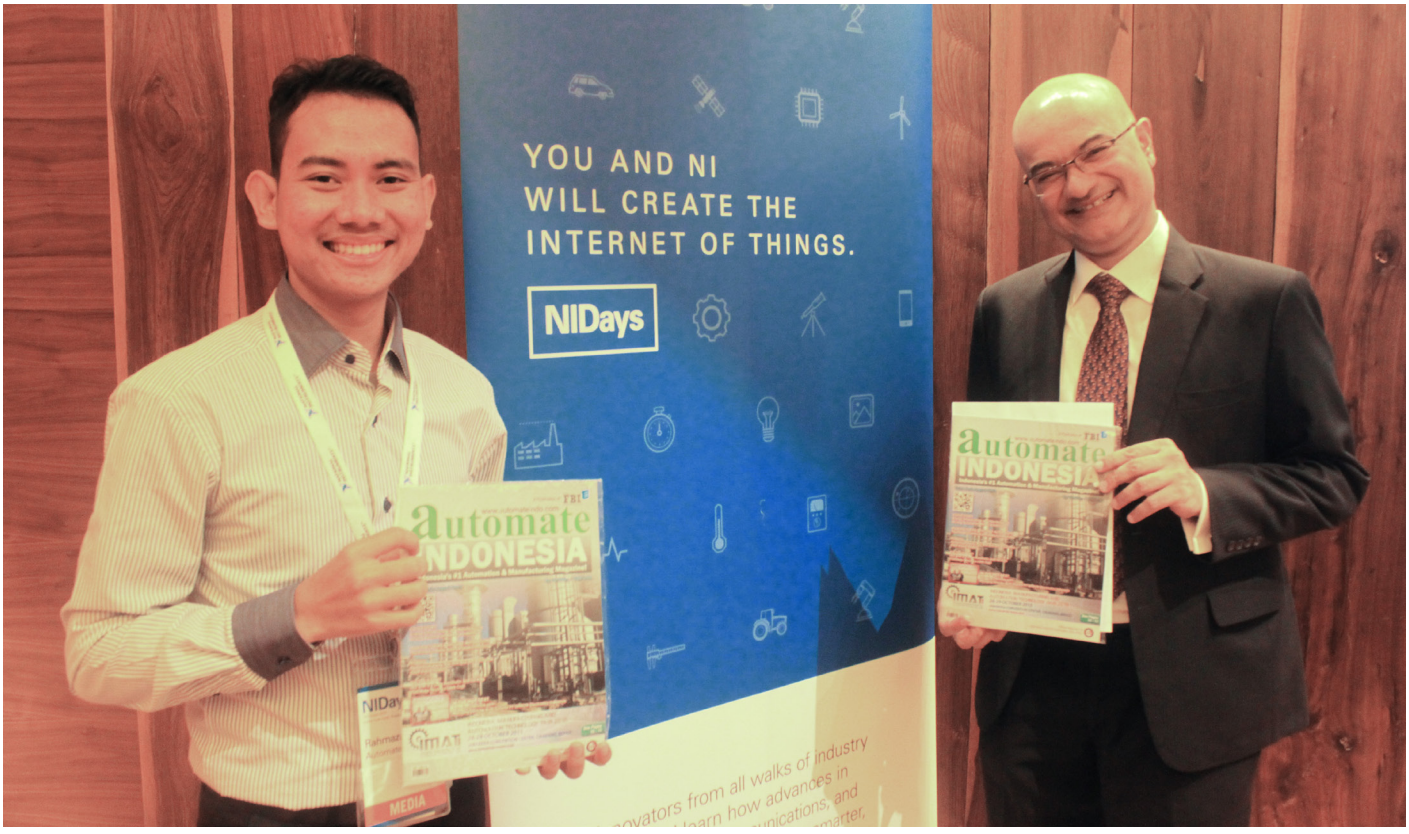
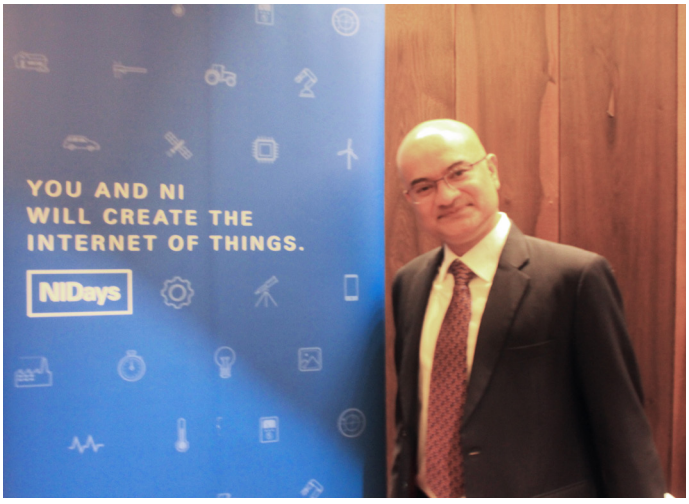
Exclusive Interview with Vice-President, Asia-Pacific Region National Instruments

Mr Chandran Nair





Mr Chandran Nair
Vice President for Asia Pacific
National Instruments

1. Share with us about yourself before you joined National Instruments?

I lived in many different countries before I joined National Instruments (NI). I was born in India and grew up in different cities including Mumbai, Dubai and Bangalore. I graduated in Physics, Mathematics and Chemistry from the Bangalore University. I moved to the United States to do my Masters in Mathematics at the Arizona State University. I started working in NI as an Applications Engineer after completing my Masters. While at NI in Austin, I was relocated to Milan, Italy, for a short stint. I then moved to Asia in 2003 and I have lived in Singapore ever since. I took on the role of Managing Director for Southeast Asia in Singapore in 2003. In this role, I was responsible for the growth strategy in the region.

2. Briefly describe about the history and company profile of National Instruments?

National Instruments, NI, was founded in 1976 by James Truchard, Bill Nowlin and Jeff Kodosky. They started the company by connecting instruments to computers using GPIB. Before long, NI was the major supplier of GPIB and as NI grew, they invested a large part of their profits in developing a Graphical Programming Language called LabVIEW.

LabVIEW is a development environment designed specifically to accelerate the productivity of engineers and scientists. It has a graphical programming syntax that makes it simple to visualize, create and code engineering systems. Over the years, NI continues to invent instrumentation models and control platforms like PXI and CompactRIO.

NI equips engineers and scientists with tools that accelerate productivity, innovations and discoveries. Since 1976, NI's integrated software and hardware platforms have revolutionized the approach of system development to help companies create smarter and more advanced technologies to address the world's most pressing challenge. With a long-term vision driven by a 100-year plan and a deep commitment in creating shared value, NI fosters the success of customers, employees, suppliers, and shareholders while making a positive impact on society.

3. What are the main goals of Nationals Instruments in the Southeast Asia region and what are the strategies in place for NI to achieve those goals?

The main goal of NI in Southeast Asia is to work with engineers and scientists, so that we can provide the latest tools that can help them deploy systems in their domain of work. We are working closely with universities around the region so that students learn to use industry standard tools. We want to create a pool of some of the best engineers, engage them to work together with us to provide services and consultations for our customers. This way, our customers can get a better understanding on what type of tools can help to solve problems based on domain expertise.

4. Could you please tell us more about the latest products that NI launched recently and which industries are your main targets for the products?

The latest products launched by NI include the high-performance CompactRIO Controller for integrators with rugged, industrial applications; Controller for FlexRIO for designers with high-performance embedded applications; Single-Board RIO Controller for designers who require more flexibility in their embedded applications, and the new 4- and 8-slot CompactDAQ controllers feature Intel Atom quad-core 1.91 GHz E3845 processors, programmable with new LabVIEW 2015 system design software, so engineers and scientists can customize their data acquisition systems to add functionality like processing, intelligence and control.

The main industries that we're focusing on in Indonesia include telecommunications, electronics, automotive, aerospace, oil and gas, and energy.

5. Could you share with us any expansion or development plans for NI in the next coming 5 years in the Southeast Asia region?

We have a big Research and Development (R&D) and manufacturing facility in Penang, Malaysia, which began operations in 2013. We continue to grow in China, both in sales and in application engineering. In Southeast Asia, we are looking at expanding Indonesia and Vietnam.

6. How does NI strive to stand out against their competitors and succeed in an increasingly competitive international market place?

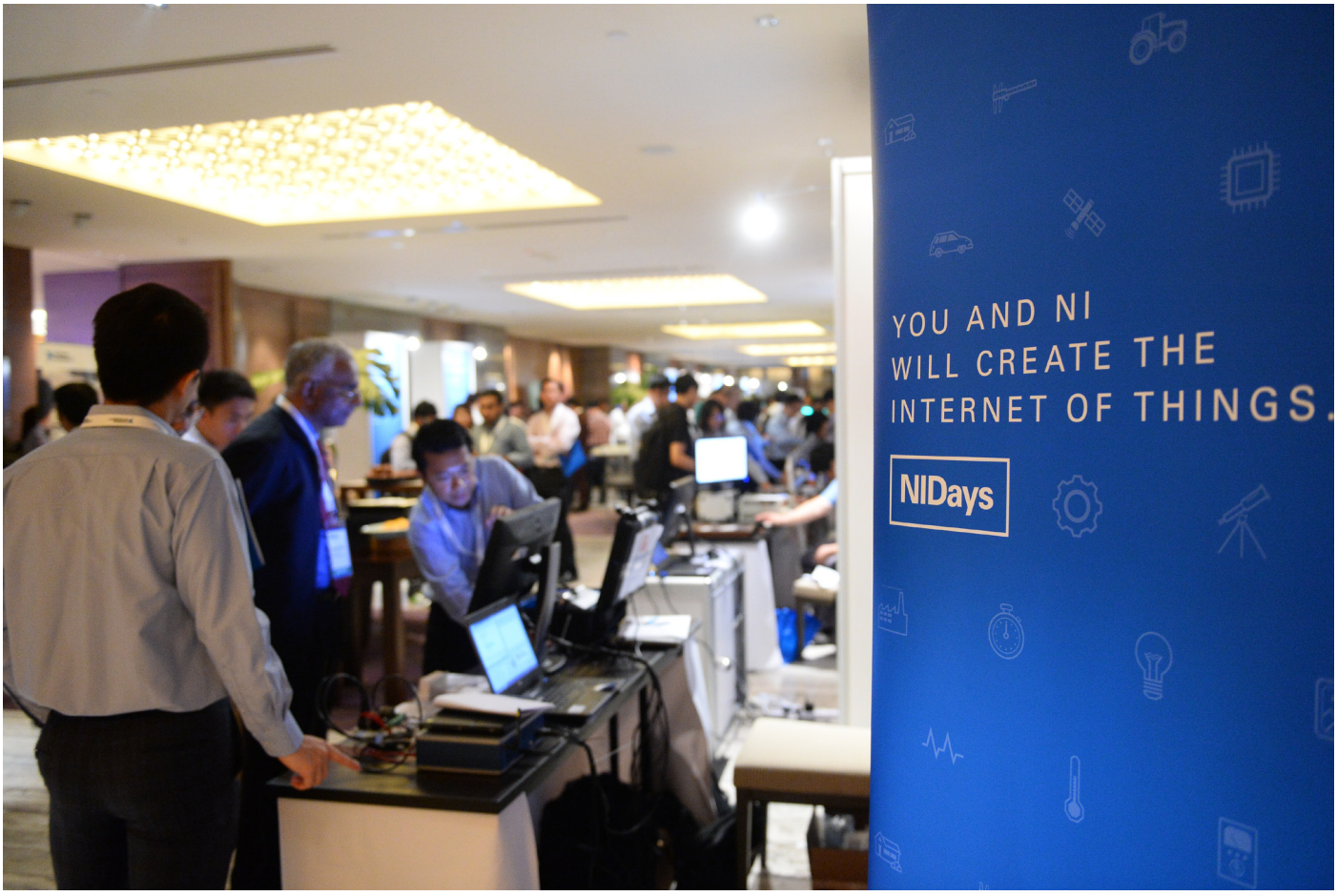
Our commitment to innovation remains unmatched. We invest over 16% of our revenue in R&D. We prioritize to ensure customer success by providing value to each and every single customer. We believe that we will be in good position to compete against our competitors.

7. What are your opinions about the development of the manufacturing industry in Southeast Asia recently?

The development of automated test and automation of factory floor is growing rapidly in Southeast Asia today. The Internet of Things (IoT) phenomenon is leading to the development of smart machines and smart factories. As the cost of labour and the demand for better quality increases, the manufacturing industry will progressively adopt technologies in test and automation that will decrease cost and increase reliability.

National Instruments launches NIDays 2015 in Singapore

Annual regional technology and innovation event features the latest technologies in test, measurement and embedded systems



Participants of NIDay 2015 Singapore, visited the booth to observe the latest technologies of Internet of Thing (IOT).

Explanation of the National instruments expert on Internet of Thing (IoT) by Mr. Charles Schroeder (Vice president of Products Marketing, RF and Wireless Communication) to NIDays participants

SINGAPORE – October 16, 2015 – National Instruments (Nasdaq: NATI), the provider of solutions that enable engineers and scientists to solve the world's greatest engineering challenges, hosts its annual NIDays Graphical System Design Conference in Singapore today. Attended by more than 300 leading engineers, educators and scientists, NIDays 2015 features over 15 hours of technical content across 18 sessions and 3 application-specific tracks focusing on Embedded Systems, Automated Test and RF, and Measurements.

"Our customers are faced with the demand to create increasingly complex and intelligent engineering systems in the Industrial Internet of Things (IIoT) realm. From connected machines that drive greater efficiencies at factory floors or smart grids that deliver sustainable energy, National Instruments continues to demonstrate our commitment to support engineers

Enthusiasm of Participants of NIDay 2015 in listening the opening ceremony that was held in Grand Hyatt, Singapore on 16 October 2015

(R-L) Mr. Matej Kranj (managing Director, ASEAN & ANZ), Mr. Chrandran Nair (Vice President of National Instrument, Asia-Pacific Region), Mr. Charles Schroeder (Vice President of product Marketing Rf and Wireless Communication) and their team during NIDays 16 October 2015 at Grand Hyatt, Singapore.

National Instruments Media Briefing session, concerning the role and prospect of Internet of thing (IOT) on application industry in the future. This session explained by top leader of National Instruments

and scientists in accelerating innovation and productivity with our platform-based approach," says Mr. Chandran Nair, Vice President for Asia Pacific, National Instruments.

"NIDays also provides an excellent opportunity to network and connect with peers and domain experts from both the industry and academic institutions. We are excited to kick off NIDays 2015 in Singapore, and look forward to working with engineers and scientists in the region to overcome escalating complexity and make the Internet of Things a reality," adds Mr. Matej Krajnc, Managing Director, ASEAN & ANZ, National Instruments.

At the morning keynote, speakers from NI's leadership team – Mr. Charles Schroeder, Vice President of Product Marketing for RF and Wireless Communications, Mr. Chandran Nair,

Vice President for Asia Pacific, and Mr. Matej Krajnc, Managing Director, ASEAN and ANZ
– shared how NI's latest suite of products is equipped to help speed up test, reach measurement decisions faster, and enable smarter machines in real-world IoT systems.
NIDays 2015 also serves as a platform to honour outstanding engineers and scientists in the region; who play a critical role in addressing technological challenges in areas such as energy, advanced manufacturing, wireless test and other high impact research and development initiatives with the 2015 Engineering Impact Awards.

The regional event series is set to continue its route in Kuala Lumpur, Malaysia (October 28); Bangkok, Thailand (November 13); and Manila, Philippines (November 27).
To find out more about NIDays, please visit: https://www.ni.com/nidays/

About National Instruments

Since 1976, NI (www.ni.com) has made it possible for engineers and scientists to solve the world's greatest engineering challenges with powerful, flexible technology solutions that accelerate productivity and drive rapid innovation. Customers from a wide variety of
industries—from healthcare to automotive and from consumer electronics to particle physics— use NI's integrated hardware and software platform to improve the world we live in.

Can Indonesia Cut Gasoline Imports and Stop Diesel Imports in 2016?

As Indonesia's oil production is expected to rise while a new oil refinery in Tuban (East Java) has started to come online, Indonesia's Ministry of Energy and Mineral Resources targets to stop imports of diesel fuel altogether and cut imports of gasoline fuel by 30 percent in 2016. The refinery in Tuban is owned by Trans Pacific Petrochemical Indotama, which was recently acquired by Indonesia's state-owned energy company Pertamina.

The new Tuban refinery has currently reached about 80 percent of its total designed production capacity of 100,000 barrels per day (bpd). The refinery now produces about 45,000 barrels of premium (research octane number of 88) per day and 15,000 barrels of pertamax (92-octane gasoline) per day.

Soon, possibly next week, the government will also see the start of operations of the residual fluid catalytic cracking unit in Cilacap (Central Java). With this refinery on steam, the government hopes that there will be no more diesel fuel imports needed starting from 2016. Currently, Pertamina imports about 600,000 barrels of diesel per month.

Most existing refineries in Indonesia are old (due to a lack of investment in this sector) and are not efficient in terms of production costs.

Furthermore, future imports of gasoline fuel can be cut further provided a planned refinery (a cooperation between Pertamina and Aramco) will be realized. Moreover, the government's fuel-to-gas conversion program - initiated by Presidential Regulation No. 64/2012 regarding the Supply, Distribution and Price Setting of compressed natural gas (CNG BBG) - is expected to curtail oil imports once the program develops further.

According to data from the Ministry of Energy and Mineral Resources, imports of premium in the first ten months of 2015 fell 37 percent to 236 million barrels per day (mbpd) from the same period last year. Meanwhile, imports of diesel fell 84 percent to 20 mbpd over the same period. The decline in imports is also related to reduced economic activity in Indonesia. In the second quarter of 2015 Indonesia's economic growth slowed to the six-year low of 4.67 percent (y/y), improving slightly in the following quarter. Moreover, due to sharp rupiah depreciation amid speculation about higher US interest rates, imports into Indonesia have become much more expensive.

Source: Indonesia-investments

Lampung FSRU Uncertain as PGN, PLN Disagree on Price

State-run gas distributor Perusahaan Gas Negara (PGN) is expecting to resume operations of the Lampung floating storage and regasification unit (FSRU), although discussions the with the main client, PLN are still in a deadlock.

PGN president director Hendi Prio Santoso said discussions with PLN were continuing in order to settle the disagreements. “We are in a process that runs in line with our expectations. We are also being facilitated by the Finance Ministry so that every concern can be resolved,” Hendi said.

The Lampung FSRU started operation last year. The development of the FSRU was part of an attempt to boost gas facilities in the country so that more gas could be consumed domestically. However, the FSRU operation was briefly interrupted earlier this year as PGN, which operates the facility, recorded zero demand from its buyers, partly because of the slowing economic growth. The Lampung FSRU should have received liquefied natural gas (LNG) cargo sent from the Tangguh plant in West Papua, regasified them and then delivered the gas to customers, including state-owned electricity firm PLN and a number of industries in Lampung and West Java.

Under this year government’s allocation plan, the facility will receive 14 shipments from the Tangguh plant. PGN has previously committed to taking five of them after securing commitments from its buyers. However, none of them are sealed-in contracts, leaving the shipments with uncommitted statuses. “We are monitoring closely the development of demand, which currently is getting better. This is a dry season in which the hydro resources needed to generate electricity are declining. We need to know the government’s plan on its economic packages that will support the economy and help jack up the demand,” PGN director Wahid Sutopo said.He added that PGN expected to resume the FSRU operation before the end of year.

Currently, a majority of power plants in the country are fired by coal, which is the least expensive fuel option following the drop in its global prices.

There are a number of power plants using fuel oil — the price of which is also under pressure because of a global supply glut — and renewable energy sources, such as hydro. On the other hand, power plants generated by gas are seen as slightly expensive given current pressures on the commodity’s prices. Distribution and transportation of the gas from resource-rich areas, particularly in the eastern part of the country, to demand-rich areas in the western part, has been seen as a major component in determining gas prices.

PLN director for procurement and primary energy Amin Subekti said his company was still waiting for an agreement on prices. “Since the beginning [of the FSRU operation], we haven’t reached any agreement on the price. There are several price components, namely the gas price itself, the re-gasification cost and toll fee. Those are business-to-business matters with PLN,” Amin said. He added that PLN remained committed to using gas to generate power.

Indonesia is known for holding significant gas resources. However, most of the commodity is sent abroad as LNG because of low demand in the domestic market. The government has been calling on industry players to increase gas utilization so that the country will be able to reduce its dependency on oil-based fuel.

Source: the Jakarta post

Wireless M2M to Grow 20% in Oil and Gas

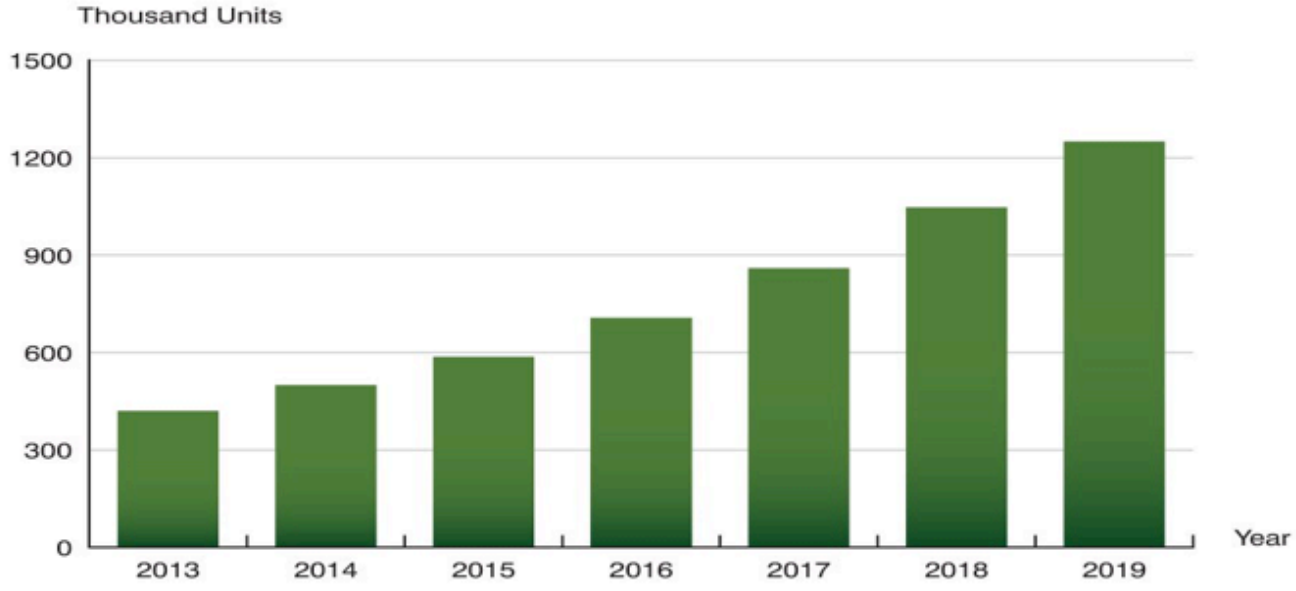
In an industry whose remote locations call for wireless communications, cellular- and satellite-connected devices are expected to grow to 1.25 million by 2019, Berg Insight says.

By Aaron Hand , Executive Editor

In an increasingly connected world, it's perhaps not a surprise that the oil and gas industry is growing its number of device connections as well. But the industry reaching into more remote and inaccessible locales is relying in particular on wireless connections to transfer its machine-to-machine (M2M) data.

The number of devices connected by cellular or satellite communications in oil and gas application is expected to grow from an installed base of 0.5 million at the end of last year to 1.25 million by 2019, according to new research from Berg Insight. That's a compound annual growth rate (CAGR) of 20.1 percent. By the end of the forecast period, cellular-connected devices are expected to reach 0.99 million, with satellite-connected devices at 0.27 million units.

Pipeline monitoring and tank monitoring are the top two M2M applications in the midstream and downstream segments, Berg Insight noted. Onshore well field equipment is the most common wireless application in the upstream segment. The growth of wireless M2M solutions in oil and gas has been driven primarily by safety and environmental concerns, regulatory compliance and demand for improved operational efficiency, analysts said.



Installed base of active wireless M2M units in the oil and gas industry (World 2013–2019)

Like many investments in oil and gas, however, wireless M2M has been hit by the drop in oil prices. "In 2014, M2M solutions in the oil and gas market experienced very healthy growth levels before slowing down at the end of the year when oil prices reached half of previous levels," said Johan Svanberg, senior analyst at Berg Insight.

This is particularly true in North America, which leads the world in wireless M2M solutions for oil and gas. But the drop in prices has also led to an increased focus on cost savings and efficiency, Svanberg said, noting that new technologies that demonstrate high return on investment (ROI) are prioritized, especially when combined with solution-as-a-service (SaaS) business models that minimize the initial investment. Automation, remote control and monitoring are particularly important to make it cost-effective to extract, transport and distribute unconventional resources such as shale gas and tight oil.

Detailing the type of M2M providers active in the oil and gas industry, Berg Insight notes that Sierra Wireless, Digi International, Orbcomm and Numerex are major players that deliver solutions to a wide range of industries, including oil and gas. FreeWave Technologies sells M2M private radio solutions to the North American upstream and midstream oil and gas markets.

Pason Systems and Zedi are Canadian companies that specialize in field instrumentation, equipment, services and M2M solutions for the upstream and midstream segments. CriticalControl, Elecsys, ZTR Control Systems, eLynx Technologies, Willowglen Systems, Oleumtech, AMCi Wireless, DataOnline and American Innovation provide specialized wireless M2M solutions for remote control, monitoring and automation in oil and gas. Tanklink, ISA, Sensile Technologies, Silentsoft, Powelectrics and Silicon Controls are major vendors of remote monitoring solutions for storage tanks in the downstream segment. Other important players are global technology and automation companies, including Emerson, Siemens, General Electric, Schneider Electric, Honeywell, ABB and Rockwell Automation.

Source: Automation World

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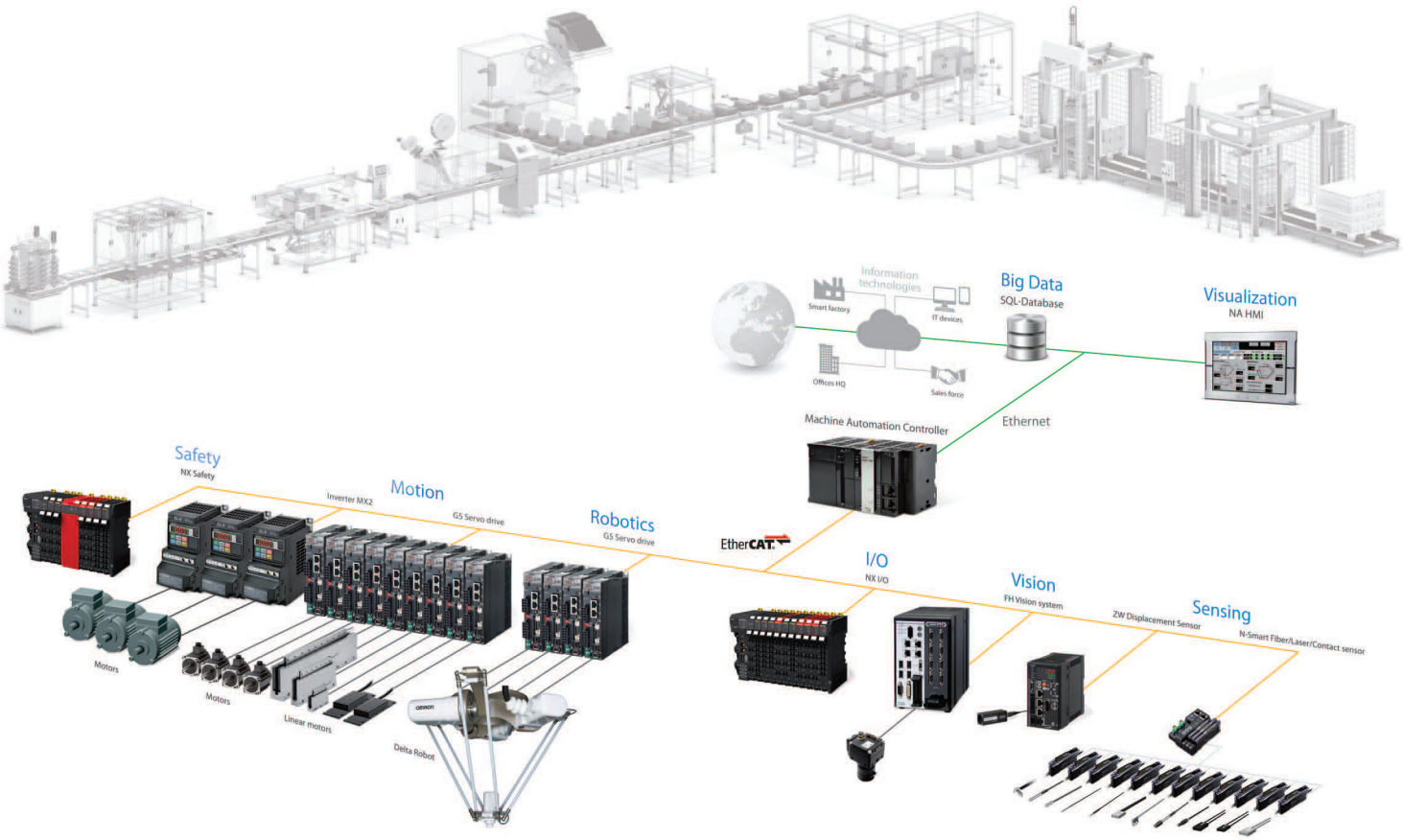

A complete range of products to build production lines

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The Foodjet 3D printer in action

> *We use a printing technology based on jet printing. A gelling agent supports the shaping of the pureed and strained food," says Pascal de Grood of Foodjet, Netherlands. "On the one hand the gelling agent needs to be compatible with the printing system, while on the other hand the printing system must support food matrices such as meat, carbohydrate and vegetables.*

A Fully 3D Printed Meal to Satisfy Every Elder's Appetite

BY TYLER KOSLOW

As we inevitably grow older and our bodies begin to descend with age, chewing and swallowing some of our favorite foods become one of the many difficulties we may have to face as people reach an elderly age. Harmful conditions such as strokes and dementia often lead to a loss in eating abilities, forcing older people to settle for unfavorable 'mash-type' meals, which are much less nutritious and appealing then they could be. But with methods of 3D printing food on the rise, the European-based PERFORMANCE (Personalized Food for the Nutrition of Elderly Consumers) concept is taking advantage of the technology to help recreate the elderly's favorite dishes not only in taste, but in texture and nutritional value as well. The initiative has already showcased 3D printed foods for nursing home elderly in the past, but their latest endeavor uses 3D printing to recreate the actual form and feeling of classic dishes.

The project involves may European countries, including Italy, Austria, Netherlands, and Denmark, and is heading by the German-based food innovation company Biozoon. By taking pureed ingredients and utilizing 3D printing technology in order to revive the natural texture and shape of the selected food or dish, the PERFORMANCE concept is giving the elderly access to classic foods such as gnocchi and peas. Not only are these foods completely redesigned back into their natural form or dish setting, they are also personalized to fit the necessary nutrients, portion size, and any other needs of each elderly patient.

Before the elderly customer's personalized food order is 3D printed, the PERFORMANCE concept uses an algorithm programmed by the German IT company Sanalogic, which monitors the nutritional value of each patient on a weekly basis, while other European-based enterprises helped with the packaging and set-up of the program. All in all, the PERFORMANCE concept is providing nursing home residents with eating troubles a chance to relive their favorite dishes from the past. With a uniquely developed 3D food printer, European's elderly folk can now once again experience the texture, nutrition, and excitement of their favorite foods even in the mash-type puree form.

Source: 3dprintingindustry

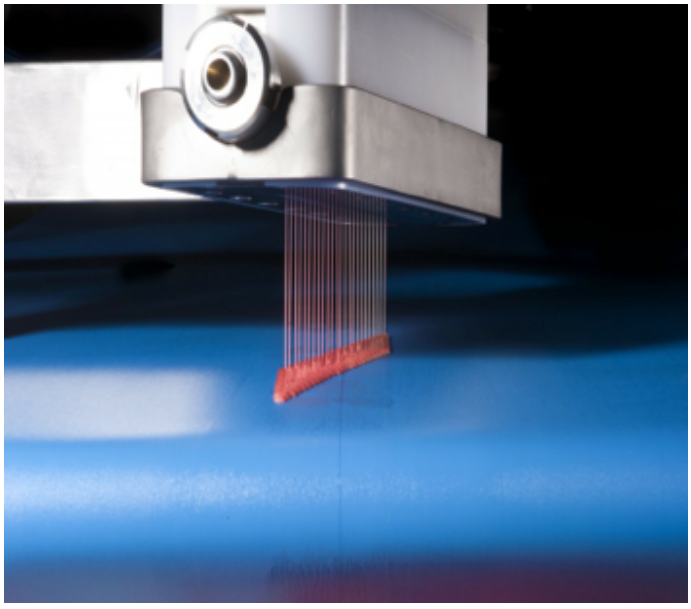
From Puree to 3D – The EU PERFORMANCE Project Presents Results

3D printing of food offers a great potential for the realization of personalized diets for older people suffering from chewing and swallowing difficulties. This may sound like a vision of the future, but the first production line for personalized meals for elderly was now presented as part of the 'PERFORMANCE conference' in Brussels. Participants from all over the world listened intently to what the speakers presented and watched with great interest the demonstration of the first production line for the manufacture of 3D printed food for people with chewing and swallowing problems.

Project Performance

The technology as well as other important developments emerged in the context of the European interdisciplinary research project PERFORMANCE (Development of Personalized food using Rapid Manufacturing for the Nutrition of elderly consumers), funded with € 3 million by the European Commission. The launch of the project fell within the scope of a first meeting of all project partners in November 2012 in Bremerhaven under the coordination of the SME biozoon Food Innovations GmbH in Bremerhaven, Germany. Some of the innovative developments – from the app-based detection of the nutritional situation of the persons and the 3D printing to a new packaging concept for the regeneration of personalized meals in the microwave, have now been presented in Brussels after 3 years of intensive research and development.

Gnocci with meat, copyright biozoon 2015



Copyright De Grood Innovations BV

The Smoothfood Concept

Based on the so-called smoothfood concept, the idea for the project came up in 2011/12 and has aroused a great interest among the public. Due to the consequences of e.g. dementia, cancer or stroke, people can be permanently dependent on mashed food that often implies loss of appetite or could even lead to malnutrition. However, those should get the possibility of visually appealing meals which are at the same time safe for consumption. Handmade smoothfood is already successfully freshly prepared in kitchens of many smaller care facilities. However, because of technical and logistical reasons or due to lack of knowledge with regard to an adequate nutrient supply, commercial kitchens and private persons often cannot benefit of this concept. Hence, the consortium of the project PERFORMANCE made it its task to

look for a solution for this target group by developing an entire value chain from order until delivery of personalized meals for people with chewing and swallowing difficulties. 'It is important that only fresh products are processed and the quality of these products does not differ from the manual produced ones' said Matthias Kück – Coordinator of the PERFORMANCE project and Managing Director of biozoon GmbH; only the shaping of the food items should be brought to an industrial level, which comes the first time along with personalization of the meals.

Meals can be enriched with the necessary nutrients and adapted depending on the health, nutritional deficiencies or choice of portion size, so that an appropriate and balanced supply is guaranteed. The enrichment and monitoring of actual food intake is controlled via software and an app developed within the project by the German IT company SANALOGIC. The developed application was now presented among others in Brussels on 16 October 2015, within the 'PERFORMANCE Conference'. The data on the personalized dishes is generated by the software and forwarded to the production.

The individual enriched components can be produced by means of 3D printing. Pascal de Grood, founder and Managing Director of Foodjet explained the individual steps of the printing process as well as the difficulties that have been overcome in the context of development with reference to the production line that was installed at the conference. Thus, the food material to be printed, the gelling system for stabilizing the shape which was developed by the German company Biozoon and the University of Applied Sciences Weihenstephan-Triesdorf, and the printing technology must match exactly to one another but still be flexible with respect to different recipes. The complex printing process is based on jet printing and requires defined viscosity properties to assure best printing results. While freshly produced and strained food material is transported into the print head, the necessary gelling system but also any required nutrient is brought into the material, controlled by the before mentioned software. The necessary mixing concept to assure proper and fast mixing of all components before printing was specially identified within the project under the lead of the Dutch technological research centre TNO. Finally, the custom-made dishes would be packed and transported frozen to the respective consumer.

All the developments are part of an integrated supply concept which was validated at the end of the project through consumer tastings in nursing homes. The positive feedback from the validation tests strengthens the project partners in their vision that the production of personalized meals for people with chewing and swallowing difficulties is a part of Industry 4.0. Matthias Kück closed the PERFORMANCE conference mentioning that although the overall concept PERFORMANCE cannot be introduced immediately in the market, it can be assumed that some of the developments will find their way as stand-alone solutions quickly into the market.

Source: 3d printing

Humans Can Empathize With Robots

Researchers have presented the first neurophysiological evidence of humans' ability to empathize with a robot in perceived pain. Event-related brain potentials in human observers, reflecting empathy with humanoid robots in perceived pain, were similar to those for other humans in pain, except at the beginning of the top-down process of empathy. This difference may be caused by humans' difficulty in taking a robot's perspective.

Photo credit: www.businessinsider.sg

Empathy is a basic human ability. We often feel empathy toward and console others in distress. Is it possible for us to emphasize with humanoid robots? Since robots are becoming increasingly popular and common in our daily lives, it is necessary to understand our interaction with robots in social situations. However, it is not clear how the human brain responds to robots in empathic situations.

Now, researchers at the Department of Information Science and Engineering, Toyohashi University of Technology in collaboration with researchers at the Department of Psychology, Kyoto University have found the first neurophysiological evidence of humans' ability to empathize with robots in perceived pain and highlighted the difference in human empathy toward other humans and robots.

They performed electroencephalography (EEG) in 15 healthy adults who were observing pictures of either a human or robotic hand in painful or non-painful situations, such as a finger being cut by a knife. Event-related brain potentials for empathy toward humanoid robots in perceived pain were similar to those for empathy toward humans in pain. However, the beginning of the top-down process of empathy was weaker in empathy toward robots than toward humans.

"The ascending phase of P3 (350-500 ms after the stimulus presentation) showed a positive shift in the observer for a human in pain in comparison with the no-pain condition, but not for a robot in perceived pain. Then, the difference between empathy toward humans and robots disappeared in the descending phase of P3 (500-650 ms)," explains Associate Professor Michiteru Kitazaki, "The positive shift of P3 is considered as reflecting the top-down process of empathy. Its beginning phase seems related to the process of perspective taking, as was shown in a previous study."

These results suggest that we empathize with humanoid robots in a similar fashion as we do with other humans. However, the beginning of the top-down process of empathy is weaker for empathy toward robots than toward humans. It may be caused by humans' inability in taking a robot's perspective.

It is reasonable that we cannot take the perspective of robots because their body and mind (if it exists) are very different from ours. The researchers are trying to manipulate humans' perspective taking of robots in a further study. This study will contribute to the development of human-friendly robots whom we feel sympathy for and comfortable with.

Source: science daily

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NATIONAL INSTRUMENTS

Technologies For Foiling Food Fraud

A new report forecasts growth in the anti-counterfeit food and beverage packaging market. Technologies of choice include holograms, RFID, and the emerging area of invisible, edible barcodes.

The recent ABC News 20/20 investigation into the sale of counterfeit drugs in the U.S has spread awareness among the masses that the pills in our medicine cabinet may not be real. In fact, they may be dangerous. Fake products also filter into cosmetics, toothpaste, even vehicle airbags.

Now that we know that, it may also be time to shine a spotlight on the items in your kitchen. Is the honey in your pantry, the salmon in the freezer, or the fruit juice in the refrigerator really authentic? Food fraud is on the rise, which means we should be questioning our cuisine.

More importantly, it means that food and beverage producers need to be more vigilant when it comes to protecting the authenticity of their products for the safety of their customers as well as their own economic viability. The Grocery Manufacturers Association estimates that fraud may cost the global food industry between $10 billion and $15 billion per year, affecting approximately 10 percent of all commercially sold food products, and a fraud incident that results in a public health scare could also tarnish the manufacturer's brand.

Food fraud is defined by the Food and Drug Administration (FDA) as the "intentional substitution or addition of a substance in a product for the purpose of increasing the apparent value of the product or reducing the cost of its production, i.e., for economic gain." Bottom line is, what's on the packaging label is not what's in the product.

In an effort to get a grip on the severity of the situation there are now resources, like theU.S. Pharmacopeial Convention (USP) food fraud database, a searchable online repository for food ingredient fraud reports and emerging risks and trends related to counterfeiting. But a tool like this is more of a knowledge repository. Manufacturers, however, need to take action to protect against future problems. More and more, these companies are turning to technology to fight food fraud. Here's the proof:

A new report by Allied Market Research, titled, "Global Anti-counterfeit Food & Beverage Packaging Market-Industry Analysis, Size, Growth, Trends, Opportunities, and Forecast,2014-2020," forecasts the market to grow at a

compound annual growth rate (CAGR) of 16.1 percent from 2015-to-2020. The global anti-counterfeit packaging (for food and beverages) market generated a revenue of $26.4 billion in 2014 and is forecast to reach $62.5 billion by 2020, the report says.

" What really caught my attention were the companies in the edible barcode business "

The research identifies the anti-counterfeit technology market as being authentication technologies, such as ink and dyes, holograms, watermarks, taggants; and track and trace technologies in the form of barcodes and RFID. According to Allied Market Research, the top 10 companies providing anti-counterfeiting technology for the food and beverage market include: Zebra Technologies, Inksure Technologies, Alien Technology Corp., Alpvision, Avery Dennison, Sicpa, Authentix Inc, Flint Group, Applied DNA Science, and TruTag Technologies. What really caught my attention were companies like Applied DNA Science and TruTag, as well as another company not on this list, DNATrek. These companies are in the edible barcode business.

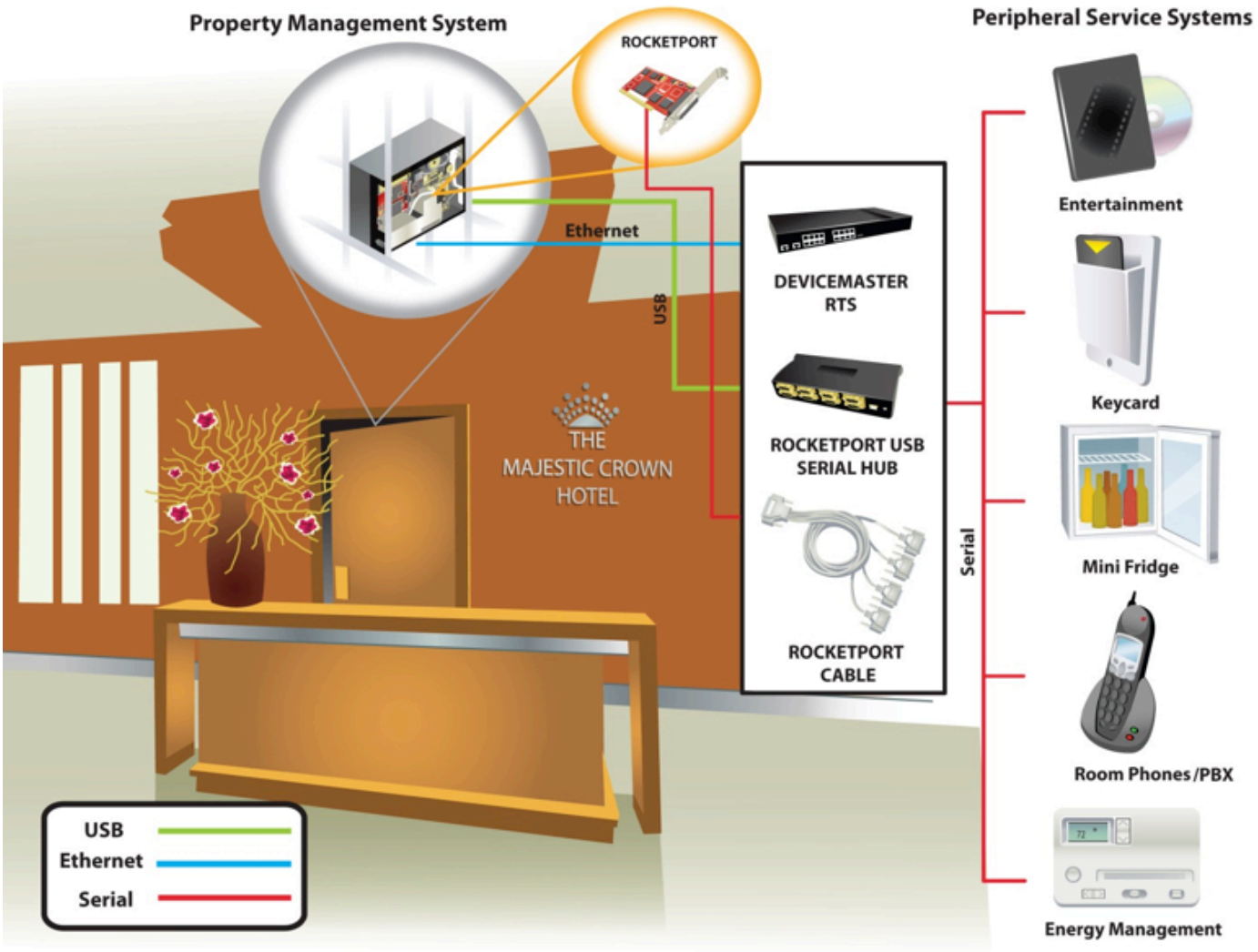
DNATrek's DNATrax, for example, is a sugar-based invisible barcode that uses technology invented at Lawrence Livermore National Laboratory. It is an FDA-approved produce coating that is sprayed directly on to fresh produce and other food products, or can be mixed with liquids or dry goods. With a simple swab of what the company says is "an inexpensive off-the-shelf instrument," DNATrax can identify the code and reveal the origin of the product-- right down to which tree a particular pear came from—in a matter of minutes. This is great for tracking contaminated food back to its source, but can also identify fraudulent foods, including how many ingredients have been added, how much, and where they came from.

It will be really interesting to see how technology like DNATrax will play into supply chain serialization. Given the Food Safety Modernization Act as well as new government initiatives-- such as the Obama administration's March 2015 announcement that it will implement a system to track the origins of every wild fish shipped into the U.S.-- my guess is that these new invisible, edible barcodes are going to be the next big thing in foiling food fraud.

Source: Automation World

Systems integration for Industry 4.0

By Nick Boughton, Boulting Group



Believe it or not, our world is getting smaller every day. Never before have remote locations been more accessible thanks to communications technology, smartphones and the internet. Connected devices have infiltrated every aspect of our lives, including the most traditional industry sectors. Here are the challenges connectivity poses for industry, particularly with regard to systems integration and the water industry.

One question industry has been unsuccessful in answering refers to the number of connected devices that exist in the world at the moment. Although we don't have a definitive number, all the estimates are mind-blowing. Gartner says that by 2020, the Internet of Things will have grown to more than 26 billion units. According to Cisco, there will be 10 billion mobile-ready devices by 2018, including machine to machine – thus exceeding the world population.

The Industrial Internet of Things

It's important to mention that these devices won't all be smartphones, PCs and tablets, but will include wearable technology, web

enabled TV, white goods, cars and so on – all connected in a gigantic web of communications. In industry, the phenomenon has several names: the Industrial Internet of Things, Industry 4.0 and Connected Enterprise. Beyond futuristic tags, all these concepts reflect the same reality: the need to optimise production through connectivity and an increased flow of data.

Only fifteen years ago, an industrial plant operated on three separate levels. You had the plant processes or operational technology (OT), the IT layer and in between stood the grey area of middleware - connecting management systems to the shop floor. The problem in most enterprises was that the commercial and production systems were entirely separate, often as a deliberate policy. Trying to connect them was difficult not only because of the divergence in the technology, but also the limited collaboration between different parts of the organisation. For these reasons successful implementation of middleware was rare.

Fast forward to today's smart factory floor that uses the almost ubiquitous Ethernet to make communications as smooth as possible. Supporting the new generation of networking technologies is an increased flow of data, collected and analysed in real-time. However, data is only useful when you can decipher and display it. The next step to industry nirvana is using relevant data for better decisions and predictive analysis, in which the system itself can detect issues and recommend solutions.

Smart manufacturing is based on a common, secure network infrastructure that allows a dialogue – or even better, convergence - between operational and information technology. Interestingly enough, the trend goes beyond the factory floor and expands to big processes like national utilities, water treatment and distribution, energy and smart grids, everything in an effort to drive better decision making, improve asset utilisation and increase process performance and productivity.

In fact, some water and energy companies are using the same approach to perform self-analysis on energy efficiency, potential weak points and the integration of legacy systems with new technologies. In a highly regulated and driven sector like utilities, maximising assets and being able to make predictions are worth a king's ransom.

The Connected Enterprise

You'd be forgiven for thinking the whole vision sounds like a utopia. If you work in industry, you know the transition to convergent network architecture can be a little bit more painful than Industry 4.0 makes it sound. One of the main challenges is integrating layer upon layer of systems and technologies from different manufacturers, some dating back several decades. Luckily, this challenge is now being addressed by the likes of Rockwell Automation, who has teamed up with Cisco to help companies that are keen to take advantage of the new technology and move into the next era of industry.

Rockwell Automation's Connected Enterprise leverages technology to gather and analyse data and transform it into insightful information that helps make better business decisions. The benefits are clear for anyone with eyes to see. Faster time to market, lower maintenance and efficiency costs, resulting in lower cost of ownership, improved asset usage and enterprise risk management are just some of the advantages that come to mind when discussing the potential of the Connected Enterprise. The real hurdle comes when you transpose the concept into practice. Luckily, Rockwell Automation has identified five easy stages of the Connected Enterprise model. The first stage requires an overall assessment that looks at existing IT and OT infrastructure, as well as processes that currently don't take advantage of the convergence of these two layers.

The next step is securing and upgrading existing IT and OT infrastructure – putting the systems in place that allow two-way communication between operations and business enterprise.

The next two stages focus on data – a central element of the Connected Enterprise. Stage three refers to working data capital. It involves defining and organising production data to deliver insights that allow real-time decision-making. Once the data exists, stage four addresses data analytics – and this is where it really gets interesting.

The aim of collecting more data, storing it and analysing it is to turn it into useful information that helps you change processes or equipment, so you increase productivity, lower costs, boost energy efficiency and improve customer satisfaction. Finally, the last stage is optimising and collaborating. The Connected Enterprise is not a one-off; it's a change in company culture that places continuous improvement at the heart of the organisation.

System integration challenges

System integration in this connected industry landscape comes with its challenges, so companies need to keep up to speed and get creative with technology. Keeping existing systems up to date and working properly is one of the main challenges of industry and big processes alike.

Another fundamental challenge is getting access to latent data, either by using existing technologies or upgrading systems. This doesn't just mean collecting data, but also storing it, analysing it and displaying it. Only then does data actually start becoming useful – when it turns into knowledge.

Finally, ensuring your system is secure from cyber

threats and attacks is a new challenge fit for Industry 4.0. Connecting a system or equipment to a network is all fine and dandy, but it also brings vulnerabilities that weren't there before. The great thing about systems integrators is that they relish a challenge and they're very good at adapting to new technologies. For this reason, some systems integrators have started working closely with industrial automation, IT and security experts to help overcome the challenges posed by Industry 4.0.

Regardless of whether we're talking about companies in utilities, manufacturing or transportation, the signs are showing that companies want to get more from their existing assets and are retrofitting systems more than ever.

Of course, retrofitting isn't always easy. In many cases, upgrading a system without shutting it down is like trying to change the brakes on a speeding bus – impossible. However, unlike the bus scenario, there is usually a solution. All you have to do is find it.

Flexibility is essential for good systems integrators. Being familiar with a wide range of systems and working with different manufacturers is the best way to maximise industry knowledge and expertise, while also keeping up to date with the latest technologies. At Boulting Technology, we partner up with market leaders like Rockwell Automation, Siemens, Mitsubishi, Schneider, ABB and others, to design and supply tailor-made systems integration solutions for a diverse range of industries, processes and platforms.

The world might be getting smaller and we might be more connected than ever before, but some things never change. Relevant experience, partnerships and the desire to innovate are as valuable as they have ever been in this connected new world of Industry 4.0.

About Boulting Technology:
Boulting Technology is a leading supplier of systems integration, LV motor control centres, switchgear, control panels, telemetry and pumping system optimisation services. It provides exceptional levels of technical expertise and customer satisfaction, making it the supplier of choice for the products and services it deliver

Sources: Automation

Indonesia Has Significant Potential to Increasing Geothermal Electricity Production

Indonesia ranked third in the world in both geothermal electricity production and geothermal generating capacity in 2014, behind only the United States and the Philippines. The country is located at the convergence of several tectonic plates in Southeast Asia, giving it significant geothermal potential, although most of its potential reserves remain unexplored.

Indonesia's Ministry of Energy and Mineral Resources estimates that the country holds a potential 29 gigawatts (GW) of geothermal capacity reserves, only 5% of which is currently being used. Indonesia's current geothermal capacity of 1.3 GW consists of plants clustered around Java, Bali, North Sumatra, and North Sulawesi. Geothermal currently makes up less than 3% of Indonesia's total electricity generation capacity, but Indonesia plans to increase geothermal capacity by 2025 as part of a plan to increase electrification in the country.

Despite a doubling of its total electricity generating capacity in the past decade, Indonesia still has a low electrification rate compared to countries with similar income levels. In 2014, about 84% of Indonesia's population had access to electricity compared to less than 68% in 2010, according to state electric utility Perusahaan Listrik Negara. Indonesia's latest energy policy aims to achieve nearly complete electrification of the country by 2020. In recent years, electricity capacity additions have not kept pace with electricity demand growth, leading to power shortages in grid-connected areas. Inadequate infrastructure as a result of insufficient investment and regulatory hurdles contributes to lower electrification rates, primarily in eastern Indonesia.

Fossil fuels power most of the electricity generation in Indonesia (88%), while renewables, primarily in the form of hydropower and geothermal resources, account for the remainder. Indonesia intends to use domestic fuel sources and diversify its fuel portfolio to include more renewable power. Plans to increase renewable energy use to at least 23% of the energy portfolio by 2025 depend heavily on further developing the country's geothermal and hydropower resources.

Indonesia has included several geothermal power plants in its fast-track program, which is meant to accelerate the development of more than 27 GW of total power capacity in the next several years. Indonesia has focused on geothermal in particular, signing an agreement with New Zealand in 2012 for joint development of geothermal energy projects.

About 5 GW of new geothermal capacity is slated to come online in Indonesia by 2022, including the 330-megawatt Sarulla power plant, potentially the world's largest geothermal power plant. Successful completion of these geothermal projects could result in Indonesia becoming the world leader in both geothermal electric capacity and generation.

One impediment to unlocking the country's vast geothermal resources has been the definition of geothermal development as a mining activity, which restricted new projects in conservation areas. Indonesia passed a law in 2014 that eliminated this limitation on geothermal development while streamlining the permitting process and alleviating land acquisition issues. The law also attempted to raise private sector investment in geothermal projects by making the price more closely match development costs.

Source: Business Spectator

PLN, General Electric to Power Up Eastern Indonesia

Jakarta. A subsidiary of state-owned utilities firm PLN is teaming up with US-based conglomerate General Electric to provide electricity to remote pockets of Indonesia.

"We are in the process of drawing up a memorandum of understanding [for the project]," PLN president director Sofyan Basir said in Jakarta on Tuesday.

The two companies are set to form a consortium to build gas turbine power plants with the capacity of 1,000 megawatts and featuring the latest technology from GE throughout Eastern Indonesia, where access to electricity remains scarce.

"Our subsidiary will build the power plant while GE will fund the project," Sofyan said.

President Joko Widodo met with Energy and Mineral Resources Minister Sudirman Said and GE officials at the State Palace on Tuesday morning to discuss the most suitable form of technology for the ambitious task.

"A large portion of Eastern Indonesia is not connected to the national power grid, it has therefore been decided that [the consortium] will use gas turbines for the project," Sudirman said. The project is scheduled to finish in nine months with an investment of $400 million.

Source: jakartaglobe.beritasatu

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Marubeni says to build 1 GW coal power plant in Indonesia

Japanese trading firm Marubeni Corp said on Friday it and its four partners will build a $2 billion one gigawatt coal-fired power plant in Cirebon, Indonesia, to meet growing electricity demand.

Marubeni, Indonesia's PT Indika Energy Tbk, South Korea's Samtan Co and Korea Midland Power Co, and Japanese utility Chubu Electric Power, have signed a 25-year contract with Indonesia's state utility PT Perusahaan Listrik Negara (PLN) to sell electricity from the plant.The new power plant which aims to start operation in 2020 is the latest in a series of overseas power generation projects by Japanese trading houses. Marubeni, which has been operating a 660 megawatt coal-fired power station in Cirebon since 2012, plans to construct the new plant next to the existing one. The land for the new station has been secured, a company spokesman said. The new plant will use ultra super-critical technologies, which typically get the most energy from coal through the most advanced technology available for commercial use.

Turbines will be supplied by Japan's Toshiba, while boilers will be procured by Mitsubishi Hitachi Power Systems, joint venture of Mitsubishi Heavy Industries Ltd and Hitachi Ltd, he said. The Tokyo-based trading house aims to secure financing in 2016 through project finance by international commercial banks, export credit agencies such as Japan Bank for International Cooperation, Nippon Export and Investment Insurance and Export-Import Bank of Korea. The project is 30 percent owned by Marubeni, 25 percent by Indika, 20 percent by Samtan, 10 percent each by Korea Midland Power and Chubu Electric.

Source: Reuters

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LM76: Rail & Roller Block Systems

These low profile linear and curved rail systems feature low noise, smooth travel, high speed, low weight, high accuracy, sealed radial low friction bearings, low cost, and easy installation into new and existing applications.

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Source: Automation World

CONEC introduces: M12 Connector for Food and Beverage

M12 Connector for food and beverage applications with sealing up to IP69K. Compliant with the highest levels of protection required by IEC specifications, the Industrial Circular M12 connectors feature a stainless steel housing that is entirely dustproof and waterproof. The resilient connectors retain their integrity even under the harsh conditions found in the food processing industry.

The Industrial Circular M12 Series connectors enable designers to incorporate these new water- and dust-tight interconnections that are also resistant to shock, vibration and other common disturbances into equipment specified for use in food and beverage processing applications.

Source: Automation

ABB Launches: Loop Tuning Accelerator Service

Loop Tuning Accelerator Service, powered by ServicePort, to reduce the time between diagnosing control loop issues and tuning the loops to improve performance. The Loop Tuning Accelerator Service uses data already gathered, analyzed and stored to quickly identify issues, so corrective tuning can take place without time-consuming and disruptive process “bump” tests. This ensures full utilization of the control system, reduces off-specification production and increases plant productivity for customers in cement, chemicals, metals, mining, oil & gas, pulp & paper and other process industries.

Source: Automation World

Complete Inspection Systems introduces invisible packaging labels

Complete Inspection Systems created an advanced track, trace and anti-counterfeiting system using Digital Watermarking, which doesn’t require costly additions to packaging, redesign of graphics or an ugly new barcode marring the appearance of the product.

Using digital watermarking technology, virtually undetectable codes can be embedded directly into existing package graphics. A mobile phone, computer or other specialized detection device can read the watermark and the code represented by it. Complete Inspection Systems licenses these encrypted codes to its customers and maintains a database of all the codes in existence.

Source: Automation

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Controller for FlexRIO

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The quaint, cobblestoned city of Amsterdam is about to get a modern addition: a 3D-printed footbridge.

How Robots Are Building a 3D Printed Metal Bridge in Amsterdam?

The canal-spanning bridge, which is on track to be completed by 2017, is the brainchild of MX3D, a tech startup based in the Dutch capital. The bridge will be constructed entirely by robots that can "print" complex steel objects in midair. The autonomous bots are like mechanical, torch-wielding welders that melt together layer upon layer of steel to form a solid object, said Tim Geurtjens, MX3D's co-founder and chief technology officer.

It's the first time that Geurtjens and his colleagues are designing and building a bridge using this printing technology. Until now, the company was mainly using its robots to build free-form sculptures and giant pieces of furniture. But the bridge project —a collaboration between the startup, several larger companies and the Amsterdam City Council — is a chance for MX3D to show that its version of 3D printing is extraordinarily useful for making all kinds of things in the real world. [The 10 Weirdest Things Created by 3D Printing]

"With a lot of techniques you're building something inside a printing volume [or container], and then when the object is done you take it out and place it somewhere," Geurtjens told Live Science. Companies like MakerBot and Formlabs, which make desktop 3D printers, have popularized such techniques in recent years.

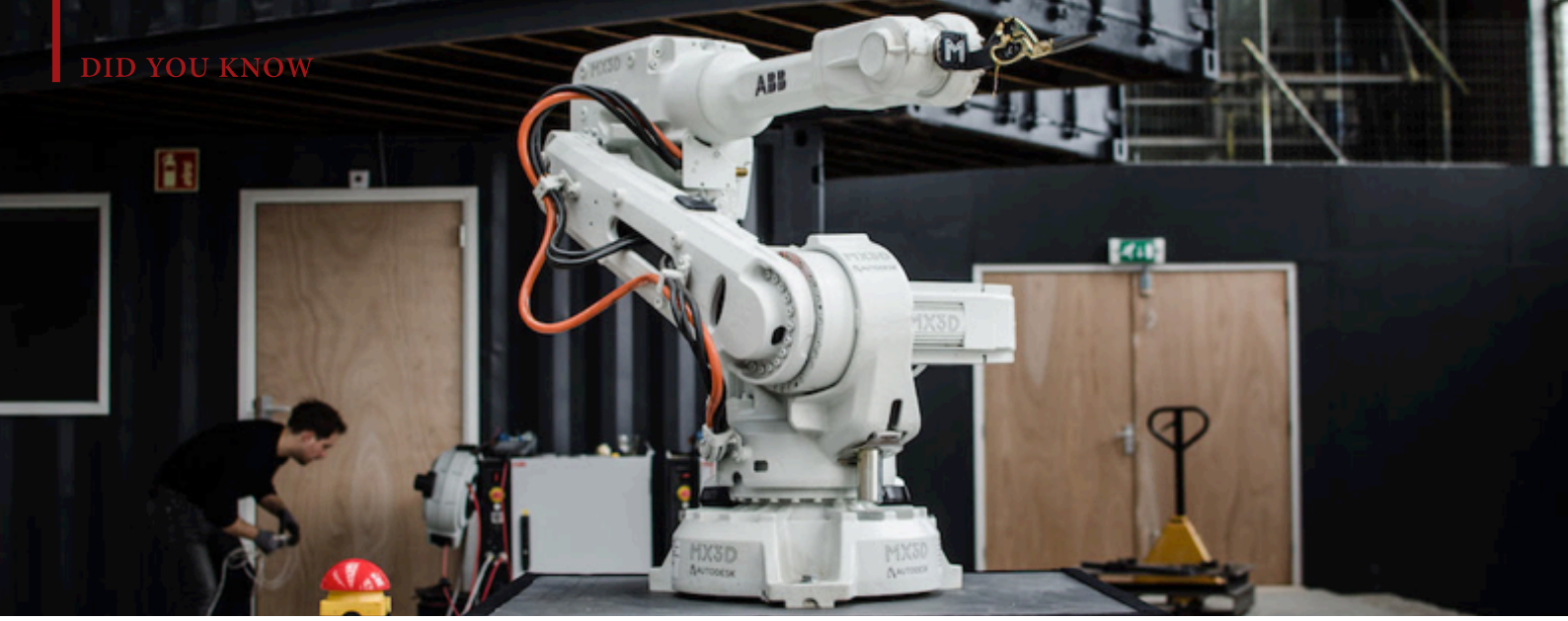
The Real World

But MX3D's robots aren't anything like desktop 3D printers. The bots look like giant mechanical arms that end in a torchlike apparatus. Instead of printing objects inside a box, the bots build things out in the open. Their welding torches melt a layer of steel and then cover that layer with more molten steel, which comes from a piece of wire that is melted as it's extruded by the robot.

Unlike most 3D printers that can only extrude materials in three different directions (forward and backward, left to right, up and down), the MX3D robots can print in all directions. The bots turn their torches sideways to print an object that juts out from the middle of a wall, for example. This ability to print in any direction, and at such a large scale, is part of what makes MX3D's technology revolutionary, Maurice Conti, director of strategic innovation at Autodesk, told Live Science.

Autodesk is the California-based software company behind AutoCAD, a computer-aided design software that helps architects and engineers model real-world objects in the digital sphere. The company has been working closely with MX3D to develop software that allows human operators to communicate with the 3D-printing robots more successfully. Autodesk is also allowing MX3D to test out software that optimizes computer designs so that they can easily be created in the real world.

"One of the reasons that I'm so excited about this project is that it's going to be a great demonstration of moving 3D printing into the real physical world and [away from] prototyping and tchotchkes," said Conti, who noted that MX3D's process is



Credit: Joris Laarman Lab/Adriaan de Groot/MX3D

breaking down three of the biggest barriers that have kept 3D printing from becoming widespread as a full-scale manufacturing method — size, speed and cost.

Bigger is better

The huge printing robots can't build enormous structures (they can only print as far as their arms can extend), but they can create objects that are significantly bigger than those created using other 3D printing methods for metals, like selective laser melting, or SLM. SLM is a 3D printing process first developed in the 1990s. It involves using a laser to melt tiny particles of metal (such as aluminum or titanium) onto a metal base.

The SLM process, which is often used to make parts for airplanes or medical implants, takes place inside a small printing volume, and the parts created are small enough to fit inside a shoebox, Conti said. By contrast, MX3D's bots can build things at the "human scale" or bigger, he added. [7 Cool Uses of 3D Printing in Medicine]

To build the bridge across Amsterdam's Oudezijds Achterburgwal canal, the bots will move along a specially designed track, printing a section of the bridge and then rolling along the track over that new section to print the next section. Because the streets of Amsterdam are so narrow and crowded with pedestrians, the actual printing of the bridge won't take place in the city's red-light district (the structure's future home). Instead, MX3D is building the bridge inside a giant warehouse in the northern part of the city, Geurtjens said.

Geurtjens didn't say how much the bridge would cost, but he did note that MX3D's printing method is a cheaper alternative to SLM.

"If you need really high-quality, very accurate parts, then SLM is the go-to technique. But if you want something really big and affordable, then [SLM] is not really an option," he said.

Traditional welding (the kind in which actual humans use handheld torches to fasten together pieces of steel) is another affordable option for bridge-building, but it's also a much slower process than the one carried out by MX3D's bots. The robots will get the job done anywhere between 10 and 1,000 times faster than traditional metal welders, according to Conti.

That's not to say that iron-working robots are going to "take over the industry," said Geurtjens, who added that MX3D's new technology is no "holy grail" for manufacturing. However, the robots can do the dangerous and dirty parts of a job — the things humans can't (or at least shouldn't) be doing. And that's what makes the company's technology "a big deal," Conti said.

"This is more foundational than a niche technology for a niche problem. I think that's why this is such a big deal. It can be applied a very broad set of needs," he added.

In the future, you might even see torch-carrying robot arms building bridges for cars or trains. The bots could also be useful at sea, to fix offshore oil rigs, or in space, to repair broken satellites. But for now, Amsterdam is the only place you can see the mechanical welders in action. You can keep tab on MX3D's progress at the company's visitors center (located at the Neveritaweg 15 in Amsterdam), which is open to the public every Friday between noon and 4 p.m. local time.

Source: live science

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