Aiming for leadership position

Welcome to uptime with Metso’s control valves

PAGE 4

12 Technology in a reliable role in PDH process
16 Ensuring availability with installed base audits
24 Metso proves strong enough for Goliat

Technology and services for improved performance
“We have the know-how, but even more importantly, we know how to add value with our offering to the offshore business.”

Juha Yli-Petäys,
Head of Valve Controls
Metso is the world’s leading industrial company in the flow control business. Our knowledge, people and solutions help drive sustainable improvements in performance and profitability in our customers’ business.

» Making the big difference
04 AIMING FOR LEADERSHIP POSITION
Uptime with Metso’s control valves

» Theme | Intelligent innovation
08 INDUSTRIAL INTERNET OF THINGS
– The new Industrial Revolution is here
12 IN A RELIABLE ROLE
Technology in PDH process

» Metso experts at your service
16 ENSURING AVAILABILITY OF INSTALLED BASE
Installed base audits and analysis
18 EXPANDED SERVICE LEVELS
Services around the world

» Technological development
20 CONVERSION KIT FOR PUMPS
Optimized operations in Brazilian refinery
22 CURRENT
Latest product & solution news
24 METSO PROVES STRONG ENOUGH FOR GOLIAT
Intelligent valve controllers for Barents Sea
27 AT HOME IN THE ARCTIC
Intelligent valve controllers and actuators for extreme environments

» The world is our showroom
28 BURNER APPLICATIONS IN ROMANIA
Highest level of shut-off safety
29 CONTROL VALVES IN TURKMENISTAN
Serving the national oil and gas company
30 VALVES, ACCESSORIES AND SPARES IN INDIA
Delivery to world’s largest oil refinery
30 ON-OFF VALVES IN TURKEY
Flow control for geothermal power plant
31 VALVES AND CONTROLLERS IN CHINA AND FINLAND
Orders based on pulp and paper expertise

Metso’s flow control business serves a diversified mix of industries; oil and gas, refining, petrochemical, mining, pulp and paper and other process industries. We have strong industry knowledge, vast experience, and we are constantly developing our valve and pump solutions and products further. We want to make a big difference in serving our customers.

Our new customer magazine for flow control business highlights various topics how we can support our customers’ success and performance. Have a look!

PERTTU LOUHILUOTO
President, Flow Control
Welcome to uptime with Metso’s control valves

Aiming for leadership position

TEXT: Christian Borrmann, Valve World Magazine
PHOTOS: Vilhelm Sjöström & Shutterstock
ETSO AIMS to strengthen its market position by expanding its valve, pump and valve controls offering to oil and gas and mining customers. Today Metso enjoys a good position in oil and gas valves but we understand that the company’s ambitions are higher. In addition Metso continues to offer its valve solutions for the pulp & paper, power and other process industry customers.

“The new strategy has brought us more focus and a clear mission in the flow control business”, says Mika Nissinen, Vice President of Oil and Gas control valves. One of the selected growth areas is the control valve business in Oil and Gas related industries. “In my area of responsibility this is really good news and we are more than excited about the opportunities our new product portfolio brings to us”. Mr. Nissinen is referring to the latest Metso acquisition in the valve field: In 2012 Metso acquired a globe valve product line from South Korea which is now serving the global market. “For many years our customers have been asking for globe valves with the same quality and reliability as our rotary control, ball and butterfly valves. We are happy to say that Metso now has a globe valve solution to fulfill that need.”

METSO HAS BEEN FAMOUS for its rotary control valves over several decades. During this time Metso has reached a strong position in several industries and now the portfolio is completed with a linear valve technology product line. Neles globe valves offer an innovative and fundamentally simple construction with excellent operational and maintenance features to optimize and secure process performance at the lowest price level. Metso’s offering is truly massive. All the control valve technologies in linear and rotary configuration, all the actuator options, intelligent valve controllers, severe service trims and decision making software support are available from one location. In addition to the new globe valve series, Metso has brought new enhancements to its rotary control valve offering. The 30 year old Q-trim technology has been boosted with second generation trim technology Q2-trim which sets the bar at a new level, reducing the noise up to 30 decibels compared to typical control valve. A selection and sizing tool NelProf now includes all Metso’s control valves and a new revision was launched in May 2015. “This is a great tool to ensure that you are able to select the best-fit control, on/off or safety valves to the given process conditions. We are a one stop shop for our customers”, says Mr. Nissinen.

THE VALVES in a petrochemical or refinery process must withstand significantly demanding process conditions, such as high pressure and temperature, toxic and corrosive fluid, vibration and pressure shock under normal service conditions, and they must meet all safety requirements. “Our mission is to bring sustainable products to the

Metso’s Mika Nissinen, Jari Kirmanen, Vesa Lempinen and Sari Aronen (left to right).
CHEMICAL AND PETROCHEMICAL PRODUCERS face ever-increasing regulatory, environmental and performance demands. Now, more than ever, deep application knowledge and application specific technologies are required in order to select control valves that are just right for the application and helps keeping the engineering and operational costs at a reasonable level.

FURNACE FUEL GAS CONTROL is a good example where accurate, reliable control valves play a significant role in reducing operating costs. Proper combustion maximizes heat transfer, which minimizes fuel gas consumption and related costs. Variations in fuel gas composition and different operating conditions at start up, normal operation and shut down means that such valves must control various loads, which requires a wide rangeability from the valve. This is typically solved by using a split range configuration with globe valves. Another method is to use rotary control valves with a wide rangeability, such as V-port segment valves. In this way, the wide rangeability allows accurate control with both small flows and large valve openings with a single valve solution.

SARI ARONEN, APPLICATION MANAGER, explains that “there’s no right or wrong way to design your fuel gas control method from the options presented. The most important is to decide what works best for the plant in question and weigh up the pros and cons of engineering, piping costs, inventory management and daily operations. Partnering with a valve supplier that can provide a variety of reliable solutions to meet the specifications and, more importantly, can help to find the right solution for your plant and your case is the key to success.”

FURTHER INFORMATION
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market which maximize the plant uptime with competitive price level while fulfilling all safety or environmental requirements.”

“After the globe product line acquisition, we continued our investment in South Korea and a new globe valve technology center was commissioned at the end of 2014. It is ideally located in the growing Korean market amongst Korean EPC companies that play a key role in many projects worldwide”, Mr. Nissinen states. Metso has invested a lot in the last 5 years to its global footprint and today, as reported after our last visit to Helsinki in 2011, the company has a total of eight valve technology centers around the world. A valve operations network is geographically widespread and includes world-class valve production facilities located in Finland, Germany, China, South Korea, India, Brazil and two facilities in the United States. Over the last few years, Metso has resolutely expanded and developed its valve production facilities and now its extensive flow control services offering covers business solutions and services that optimize equipment use and cost of ownership. Today, Metso has more than 40 valve and field device service centers worldwide.

“Our operative model is very unique and enables good service levels to our customers. In 2015 we will open six new service centers globally”, adds Mr. Nissinen. “Our customers make our success. Products are only one part of the success story. You need to have skilled people, tradition, and a culture of serving the customers without compromise. It is our way, the Metso Way, which makes the difference to our customers”, Mr. Nissinen concludes.

CHUNGJU, SOUTH KOREA

New Globe Valve Technology Center

THE NEW CENTER is ideally located in the growing Korean market. It ensures high capacity and high-quality production and delivery of globe valves and supports efficient cooperation with customers. It features component manufacturing, engineering services and a flow testing laboratory with a state-of-the-art cryogenic test facility.
Knowledge, People and Solutions

Metso have all the required capabilities to help customers in both general and even the most demanding control valve applications, now even better than ever. Application based valve selection and knowledge combined with Metso’s extensive and field proven control valve products provide the most attractive solution from both an end user and an engineering company perspective.

The key to successful control valve selection starts from application and process information. The control valve type will be selected based on application requirements, keeping in mind also the economics and total cost of the valve ownership. During the early phases of valve selection process critical or severe applications requiring special care should be identified. Correct control valve selection leads also to lower maintenance costs and returns significant benefits from a process controllability point of view.

“One of Metso’s key values is demonstrating that, at Metso, we succeed through the success of our customers. We want to streamline our tools and processes up to the level where selecting and buying Metso control valves is as easy as possible. We want to be close to our customers to understand his/her challenges in order to find solutions, creating also values other than just supplying high quality and reliable products on time. These services may help him/her to optimize plant design or simply save his/her time during the project,” explains Jari Kirmanen, Global Business Manager, Oil & Gas Control Valves.

His colleague Vesa Lempinen adds: “In addition to expanding our product portfolio and delivery capability our new strategy puts more focus on strengthening our capabilities to serve our customers during all the engineering project phases. Providing services such as in-house engineering, we want to help our customers to meet his/her project KPIs.”

Metso’s Global Organization takes care of supporting the customer during the complete life cycle of the control valve. Dedicated project teams together with global sales and service capabilities ensure seamless operation and support from the early phase of the engineering project right through to start-up and beyond during the operational phase of the valves.

Process uptime, safety and productivity are what typically count when speaking about different industrial processes. Correctly selected process control valves greatly support uptime, safety and productivity targets but also help to minimize the maintenance costs and time.

Results flow control
The epitome of the current Industrial Revolution

Industrial Internet of Things

Industrial development is driven by new, innovative, and even radical ways of thinking. That is why the most notable phases of technological development in history are described as industrial revolutions. But what is so revolutionary about the Industrial Internet of Things, and what are its impacts and opportunities for a company like Metso? This article aims to uncover the answers.

The 1st Industrial Revolution was the invention of the steam engine, which gave rise to factories. The 2nd Industrial Revolution was the invention of the electric engine, which gave us the assembly line and the related, organized factory work. The 3rd Industrial Revolution was the invention of the transistor, which resulted in computers and organized management of work. Most people agree that we have now entered the 4th Industrial Revolution, which is mainly due to the invention of the Internet.

As the Internet is the main instigator of the current Industrial Revolution, the related phenomenon of connected devices, systems and services is called the Internet of Things (IoT) or the Industrial Internet of Things (IIoT), for industrial applications. It is said that the IIoT has an impact on two thirds of the world's economies. The IIoT revolution will change manufacturing, energy, agriculture, transportation and other industrial sectors dramatically. A study of the 20 biggest countries and their current IIoT policy and investment trends, products and technologies, reveals that the cumulative real GDP contributions are expected to reach USD 10.6 trillion by 2030.
FROM SENSORS TO SECURITY – THE BASICS | IIoT technology is based on sensors, computers, Internet, software and advanced analytics. Due to the advancements in mobile phone technology, the price and size of the sensors have decreased considerably. Between 2012 and 2014, the number of sensor shipments worldwide grew five-fold, from 4.2 billion in 2012 to 23.6 billion in 2014.

To transmit the collected data, sensors require control units and connectivity. Thanks to mobile networks and the Internet, connectivity is no longer a major issue. There are occasional limitations to accessing cost-effective high-volume connectivity, but connectivity costs will decrease in the coming years. All in all, there are no technical barriers to IIoT application any longer – all the necessary technologies already exist.

At the moment, more and more devices from small household equipment, like lamps, to cars and industrial machinery are connected to the Internet. Many studies predict a future where all things are connected to the Internet and have the capability to interact, connect and change their behavior based on context. Driverless cars and self-propelled lawn mowers and farming equipment will become more and more common.

To predict and adapt the behavior of a thing, the data sent by sensors and other sources must be analyzed and modeled. At the moment, companies are generating and collecting exponentially increasing amounts of data to be used in product, service and business development. However, according to a recent study many companies are lacking advanced analytics skills – the so-called big data skills – to use IIoT devices and solutions.

An IIoT device capable of autonomous operation contains a large amount of dedicated software. Software is the glue that holds everything together in the Industrial Internet of Things. In addition to the software inside the IIoT devices, there is also the software, which controls larger systems like plants, factories, traffic, houses and households.

The last fundamental aspect of IIoT is security. Solutions are increasingly dependent on software, which is connected to the Internet. If the systems and solutions are as insecure as most of the systems today, the systems cannot be used in production. Systems where security is extended to the edge of the networks and ecosystems of the IIoT are actively being developed.

IIoT IN PRACTICE AROUND THE WORLD | A common nominator for many IIoT solutions is energy and resource efficiency. Eco-friendliness is also often a factor. The following three examples introduce IIoT innovations from different industries and geographies.

One of the early IIoT adapters has been the aviation and airline industry. Due to their high security standards and intense competition, airlines have been forced to find ways to improve their fleet performance. For example, Accenture and GE Aviation
established a joint venture, which has developed a solution based on predictive analytics that uses telematics information collected from the airplanes to predict when the airplanes need servicing, where required spare parts should optimally be delivered, whether the planes are flown economically and how their performance stacks up against leading benchmarks. GE Aviation includes this data in services delivered to airlines.

Another good example is the European 365FarmNet service. The service brings together farm equipment makers Claas, Rauch, Horsch and Amazonen-Werke, financial service giant Allianz, chemical company Bayer, seed producer KWS Saat, agricultural software service provider LACOS, agricultural advisory service company Agravis, and the European Global Navigation Satellite Systems Agency. This ecosystem provides farmers with easy access to data and analysis on geo-location, diagnostics, crops, fertilizers, weather and other factors via smartphones or direct connections with farm equipment.

The Finnish company Enovo has developed a smart garbage system. Wireless sensors are placed into garbage containers to monitor how full they are. The information is used to schedule the emptying of bins so that the garbage trucks do not have to drive to bins that do not require emptying.

IIOT IMPACT ON WORK | IIoT solutions will enable more efficient use of systems and other larger entities by collecting and using the information that is collected directly from the source. The more comprehensive the data, the better business decisions can be made. IIoT devices and solutions are capable of receiving and processing information and changing their behavior accordingly. This capability means that new or corrective actions can be executed faster and closer to actual equipment. IIoT solutions are energy efficient, adaptive and increasingly autonomous. The level of automation and its new, innovative uses will revolutionize the way we work, hence the talk about the 4th Industrial Revolution. Following in the previous Industrial Revolutions’ footsteps, IIoT is also predicted to increase productivity and lead to growth in the global markets.

In companies embracing IIoT, the work that can be defined by rules, even complex ones, will be performed by autonomous systems. These systems will assist workers in decision-making by analyzing large volumes of data. Companies capable of creating ecosystems that connect autonomous systems with people will be the most likely winners. In addition, the interface of IIoT systems and people generates new jobs related to training and servicing robots and intelligent equipment, among others.

From industrial employees’ point of view, everyday routine work will be replaced with a more ad-hoc approach to problem-solving, more analytical or more people-oriented work. These changes will cause disruptions. On one hand, there will be less demand for certain types of jobs and, on the other hand, new jobs will be created elsewhere in the ecosystem. It will be worthwhile to concentrate on education and workplace training to improve people’s skills to use and apply new advanced IIoT solutions.

SEIZING THE IIOT | Opportunity IIoT brings along both opportunities and challenges. On a national level, some countries have strategic IIoT programs that help companies in those countries to develop IIoT solutions for the global markets. Good examples include the “Made in China” strategy and Germany’s “Industry 4.0”.

“Utilizing IIoT opportunities requires a deeper understanding of your customers’ needs.”

Companies that have already embraced IIoT have dedicated strategic programs in place. Some, like GE, have created a new service business and others are adopting IIoT solutions to improve their operational performance. Furthermore, utilities as well as oil & gas and transport companies are looking into IIoT solutions to improve their asset and equipment performance.

IIoT presents Industrial Equipment companies a constantly increasing number of opportunities to expand their business by offering their IIoT solutions based on intelligent devices to new customer groups. However, the new IIoT opportunities require a better, deeper and wider understanding of customers’ needs. Instead of simply delivering equipment, an IE company needs to understand how to deliver services and ensure the desired outcome for their customers.

Welcome to the 4th Industrial Revolution and the Industrial Internet of Things.

ARTICLE SOURCE
The data in the article is based on Accenture’s IIoT Report, published at the World Economic Forum 2015 in Davos, Switzerland.
The propane dehydrogenation process, known as PDH, is used to meet the needs of the constantly growing propylene market. Reliable and accurate control, on-off and emergency shutdown valve performance is vital during operation to ensure total process productivity and safety.

Customer challenge:
- Constant non-declining yield is important in PDH economics.
- Poorly performing valves, as well as the lack of operational control in the PDH process, have a direct impact on plant productivity, safety and maintenance costs.

Our solution:
- Metso has a wide range of highly reliable valves suitable for demanding PDH applications, which are designed to increase efficiency and productivity.
- Intelligent valve controllers offered by Metso have embedded valve diagnostics and online monitoring capabilities.
CONTINUOUS CATALYST REGENERATION | Over a period of time, due to the high operating temperature the catalyst becomes coated with coke, a natural byproduct of the process, and therefore requires regeneration. Catalyst activity is maintained by continuous catalyst regeneration (CCR) or by shutting down reactors one-by-one and regenerating the reactor using the regeneration air. The CCR is where the catalyst is continuously withdrawn from the reactor, then regenerated and fed back to the reactor bed. The CCR is not only used in the PDH process, but also commonly used in continuous catalytic reforming with the same function. A series of lock hoppers, typically four complete lock hopper arrangements, is used to move catalyst from the reactor to the regenerator and eventually back into the reactor. A constant non-declining yield is important in PDH economics. This is achieved by the CCR section, which ensures the reactors are continuously supplied with freshly regenerated catalyst and that product yields are maintained at fresh catalyst levels. Critical valves in catalyst handling lock hoppers, venting, catalyst withdrawal and addition play an important role in successful catalyst regenerating process performance. Poorly performing valves in the process must be serviced because they will have a direct impact on efficiency. Valves should be specifically designed to meet the process requirements, such as UOP specification 671. For these critical valves in the CCR section, care must be taken in material selection and seat construction in order to avoid any wear or particles entering the seat cavities and adhering to sealing surfaces.

Metal seated valves, such as our ball valves, have been widely used for critical catalyst handling applications. Hard coatings should be applied to raise the surface hardness of the ball to provide long component life in this highly abrasive service. Special seat construction is recommended in this critical application as catalyst fines behind the seat can cause the required torque to increase enough to exceed the maximum output capability of the actuator. This design has proved its long lasting tightness over years of frequent cycling and catalyst handling.

In the CCR section, the catalyst addition system is the point in the process where new catalyst is added to replace the quantity of catalyst that is withdrawn and discarded from the system after it can no longer be regenerated. The new catalyst flows by gravity into the system through a catalyst addition hopper at ambient temperature. Soft seated ball valves with catalyst friendly design are typically used as a solution in this case. A safety interlock system is a typical requirement to prevent both the valve above and below the lock hopper from opening at the same time.

REACTOR AND PRODUCT RECOVERY | In the reactor section of propane dehydrogenation, heaters are used to maintain the desired reaction temperature by continuously supplying heat, because the reaction is endothermic. Conventionally, heater pass control valves have been rising stem globe valve designs. However, during the heater cycle, some coke and sticky oil may start to accumulate in the rising stem gland packing. Leakage and sticking reduces the accuracy of throughput control, affecting heater performance and process efficiency while posing environmental and safety risks. Unscheduled maintenance can be costly and risky, and can financially impact plant productivity. The gland design of rotary control valves is inherently reliable and will not suffer the leakage problems typically associated with conventional globe designs. This is because a rotary stem does not move process media into gland packing in the same way as a rising stem.

Another important application in heaters is fuel gas control; accurate, reliable control valves play a significant role in reducing operating costs. Proper combustion maximises heat transfer, which minimises fuel gas consumption and related costs. Variations in fuel gas composition and different operating conditions at start up, normal operation and shut down mean that such valves must control various loads, which requires wide rangeability from the valve. This is typically solved by using a split range configuration with globe valves. Another method is to use rotary control valves with wide rangeability as high as 150:1, such as Neles V-port segment valves. This way, the wide
rangeability allows accurate control with both small flows and large valve openings with a single valve solution.

In the reactor section of propane dehydrogenation, dryers are used to remove trace amounts of water formed from the catalyst regeneration, and to remove hydrogen sulfide. A typical dryer consists of two or more columns packed with molecular sieves. As the wet stream is processed in one column, the other column is regenerating. The dryer switching valves play an important role in directing the inlet/outlet stream of gas between the dryer columns, hence switching the columns from an adsorption phase into the regeneration phase in a preset sequence. High temperature gas or hydrogen (approximately 250 °C) is used to regenerate the adsorption bed. The valves have to withstand these fluctuations in temperature together with high pressure, all while keeping the tightness in both flow directions over years of operation.

The molecular sieve dryer beds tend to release dust during the regeneration cycle. Care must be taken in material selection and seat construction in order to avoid any wear or particles entering the seat cavities and adhering to sealing surfaces. Different stroking profiles are often required for opening and closing to minimise the bed dust release and pressure shocks. Metal seated valves, such as Metso’s ball and butterfly valves, have been widely used for these kinds of demanding switching applications. For the most demanding applications, trunnion mounted ball valves are selected for their reliable operation and excellent response with high pressure differentials.

Trunnion mounted designs give lower friction and operating torque. Seat construction ensures durable tightness in both directions, even in extreme conditions. This design has proved its long lasting tightness over years of frequent switching with molecular sieve dust present and constant temperature changes. Special hard coatings, such as carbides, are commonly used in this type of application. For smaller sizes and lower pressure differentials, seat supported ball valves have been used for floating ball designs that ensure long lasting tightness with metal seats and low shut off pressures.

Triple eccentric disc valves provide an interesting option in large size applications for dryer valves, where pressures remain at a moderate level. The triple offset metal seat design is well suited to this frequent cycling at high temperature and to abrasive applications because it can withstand long periods of operation without losing bidirectional tightness. Long lasting tightness is ensured by mechanically induced disc and seat contact, which does not rely on differential pressure and a rugged one-piece seat design.

High performance triple eccentric disc valves with double seat design can manage medium with large temperature difference between two sides of the valve and to keep bidirectional tightness. This provides a single valve solution for dryer valves instead of double gate valves in a large size. Compared with double gate valves, high performance triple eccentric disc valves have many advantages, including less weight and cost saving. Similarly to a rising stem, the rotary stem does not tend to move process media into gland packing, and is able to tolerate the piping forces.

**PLANT SAFETY** | After careful selection and sizing of the valve, actuator and instrumentation, seeing how the valve is performing in critical applications, such as with lock hopper valves or dryer valves, is possible. This helps to predict and plan the maintenance activities. Digital control valve positioners provide digital communications, but intelligent valve controllers have embedded valve diagnostics and online monitoring capabilities to predict valve failures and maintenance needs. They also provide additional safety for staff and the process.

An intelligent valve condition monitoring system enables a systematic approach. Valves that need maintenance are identified and the provision of spare parts, appropriate tools and service work can be preplanned to reduce problems and risks in the process plant. Failures or malfunctions are detected before problems occur. The valve’s diagnostic history, current status, performance and future performance can all be seen. Intelligent digital controllers take the start up, operation and maintenance planning for propane dehydrogenation applications to a new level. Most importantly, it is possible to see, during the course of the process, what is going on at the process critical valves, such as the lock hopper valves in CCR section or switching valves in dryers.

**CONCLUSION** | Careful selection of valves for the propane dehydrogenation process will increase the efficiency, productivity and safety of the process. An intelligent valve controller provides the means for simple and reliable instrumentation with transparency to valves’ performance while the process is running. Intelligent and reliable valves will support the use and development of propylene production through propane dehydrogenation that provides the means for broader sources of feed.
What is the availability of your field devices?

For the efficient continuity of your process, it is vastly important to ensure the availability of spare parts and replacement devices whenever they are needed. Over time, it is not uncommon to realize that stocked spares may no-longer reflect the existing installed base and the data may not be in line with what you actually have sitting on the shelf in storage. This is when it’s time to call Metso Services to carry out an installed base audit and analysis.

GO ONLINE to see the new animation outlining the entire audit and analysis process in more detail. SCAN THE CODE OR GO TO: http://youtu.be/2LBSRLinRpE
STEP 1: Visual Audit

**METSO CARRIES OUT** an on-site visual inspection based on a comprehensive checklist. The visual audit confirms the details of the installed products along with their life cycle status based on spare parts and replacement devices availability. Our experts also list of recommended long-term and immediate maintenance actions.

**STEP 2: Analysis**

**UTILIZING THE COLLECTED DATA,** Metso can now prepare a solution based on the actual installed base. Our comprehensive analysis describes the current situation from a storage value and coverage point of view, often revealing that storage value is high compared to coverage for actual installed base, due to changes over time.

More than 50% reduction in storage value

Considerable improvements are possible by following the recommendations outlined in the report provided by your Metso expert.

### Visual Audit Checklist:
- Metso delivery history
- Field device list
- Device maintenance records
- Specialist inspection tag by tag

### Benefits:
**Ease, efficiency and economics**

#### AVAILABILITY
- Accurate installed base information
- Harmonized field devices
- Wider spares coverage
- Reduced downtime

#### PERFORMANCE
- Product upgrades and modernizations
- Improved economical performance

#### RISK CONTROL
- Correct and up-to-date data
- Improved plant safety
WE ARE OPENING a new valve and field device service centers in numerous locations around the world. Our newest service centers offer the latest technology and know-how to carry out high-quality maintenance and repair work on Metso and third-party devices, such as valves, actuators and pumps. The service centers’ primary customer base consists of customers in the oil and gas, pulp and paper, and mining industries.

Of our more than 90 service centers globally, over 40 of them serve flow control customers. In 2014, 60% of our orders received came from services business. We continue to develop and build our local service presence in key markets across the globe. With four new centers opening and another four in the works, we are aiming to ensure that all of our customers, regardless of geographical location, get to enjoy the benefits of receiving Metso-certified expert services from our dedicated and experienced service staff.
Metso’s extensive flow control services offering covers business solutions and services that optimize equipment use and cost of ownership. Our valve technology centers and valve production facilities are currently located in Finland, the United States, Germany, China, South Korea, India and Brazil.

**NEW SERVICE CENTERS**

South Korea, Turkey, Thailand and Mexico

THE FOUR LATEST additions to our service center network deliver services to important growing markets in their respective regions. In addition to repairs, spare parts and refurbishments the service centers will offer specialist services in upgrades, staff training programs, field support and diagnostics.

**UPCOMING SERVICE CENTERS**

Abu Dhabi, Qatar, Poland and Sweden

IN ADDITION to the already commissioned service centers, four new centers are being planned to further strengthen service presence in the Gulf Region and Europe. The Gulf Region will receive a new service center in both Qatar and Abu Dhabi, while Sweden and Poland can also look forward to service centers in the near future.

Our presence today

- 400+ Service professionals
- 20+ Countries
- 40+ Service centers
Optimized operations in Brazilian refinery with Metso conversion kit

Metso’s pump conversion technology was recently selected by a major Brazilian mining company for use in its aluminum refinery. As a result of the upgrade, operations have improved while costs for power consumption, maintenance and spare parts have been significantly reduced.
AUXITE, A RAW MATERIAL used in metal production, is delivered in slurry form – a mixture of crushed ore and water – and needs to be filtered before processing. The ore moisture content must be 14 percent or lower and the continuity of operations must be maintained, since nearly 27 thousand tons of ore are moved daily.

Metso’s challenge was to improve pumping operations by ensuring the constant pressure necessary for the process. The upgrade was implemented on the wet end, with the conversion kit (as shown in the photo) installed in the filter lines to deliver slurry at a rate of 145 m³/hour, or 100 tons of bauxite per hour. The replacement of the existing wet-end parts has optimized pumping operations, with constant pressure at the filters (which also last 6 months longer), enabling the product to perform to specification.

THE SITUATION PRIOR TO REPLACEMENT | The inadequacies in previous filtering operations included an increase in the moisture content of the bauxite and level fluctuations in the filter pump feed tank. In addition, there was flow loss and the equipment was manually operated. Maintenance data were more critical, with high turnover of spare parts and frequent non-routine maintenance.

Combined with the increased power consumption, the process and maintenance history indicated that a change was needed.

FROM RECOMMENDATIONS TO RESULTS | Metso’s work focused on identifying opportunities for improvement. The pumps’ operating conditions could not be changed, including the required slurry flow rate of 145 m³/h and the head of 65 m. Also, the pump feed tank level of 80 percent and the size of the equipment (6/4 model) had to be maintained.

The recommended solution was to use Metso’s conversion kit, which would enable the client to meet all its requirements without needing to replace the equipment completely: it was necessary only to replace one wet end. The improvement has also reduced power consumption from 120HP to 106HP, with consequent savings in energy costs. The existing equipment had a rotor of diameter 365 mm, while Metso’s solution uses rotors of diameter 400 mm. This change has increased the internal working pressure from 5.8 bar to 6.1 bar. The discharge speed has increased too, from 5.65 m/s to 6.65 m/s. And pump efficiency has increased from 59.7 percent with the earlier equipment to 65 percent with Metso’s solution.

“Power consumption and maintenance and spare parts costs were also significantly reduced,” commented George Borgens, a senior technical sales representative at Metso. Regarding power consumption, Metso’s solution secured a 13.2 percent decrease. Maintenance costs have fallen too, with one annual stoppage instead of three previously. Spare parts costs fell by 67 percent.

The figures presented are the result of a new setup in the ore slurry pumping process to supply the set of filters. The slurry level in the pump feed tank, previously subject to major fluctuations, is now stable.

The bauxite moisture content is now maintained at the specified levels, ensuring the required production levels and eliminating unscheduled downtime. The equipment, previously operated manually, was automated, which helps achieve a constant flow rate. The internal pressure level of 6.1 bar is also maintained.

“With scheduled maintenance, there has been less replacement of pump wet end parts, maintenance costs overall have decreased, and the operation has reached the required consistent output levels,” Borges concludes.
LATEST PRODUCT & SOLUTION NEWS

Safety in high pressure applications

METSO’S NEW XH SERIES HIGH PRESSURE BALL VALVES BY NELES® have been designed to deliver customers safety and reliability for multiple high pressure applications. Modern safety and emission standards are setting new a demand level for valve products. The new XH series is ready to meet these requirements in higher pressure classes, ASME 900 / EN PN 160.

The XH, designed to meet low emissions (ISO 15848), functional safety (IEC 61508-2:2010, SIL 3) and fire safety (API 607) standards still provides all the traditional benefits that Neles® ball valves are famous for. These are low cost of ownership due to less need for servicing, high production yield due to long lasting high tightness and general trouble free operation in both shut-off and throttling applications.

The benefits are delivered through Metso’s extensive experience in ball valve technologies including application based seat selection, material and coating technologies, and robust bearing construction.

The product is available for pressure ratings ASME class 900 / EN PN 160. Reliable operations are ensured in temperatures ranging from -50 to +600°C. Material options range from forged carbon steel body to fully Ni-based high grade alloys used in oxygen service.

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Competitiveness in rotary control valves

METSO’S NEW and improved RE flanged segment valves have been developed to handle higher temperatures. It will deliver considerable benefits in a number of refining applications for our oil and gas customers. In the first phase we are releasing sizes 2-10” in ANSI 150-300 pressure classes. The RE-series also will be available with a chrome carbide coating for more demanding mediums.

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METSO WILL BE INTRODUCING a new field reversible model of the VD series globe valve actuator during the summer of 2015. The model will feature two new features with major customer benefits. The first is its field reversibility, allowing for the actuator spring action to be changed in the field without the need for additional parts. The second new feature is an optional side-mounted handwheel, making it a compact overall package.

Technological developments and new product innovations are the current that carry performance to new levels. A steady stream of upgrades, updates and new product launches keep us at the forefront of the flow control industry.

Pumping efficiency with maximized service life

METSO’S NEW MILL DISCHARGE SLURRY PUMPS combine experience and knowledge to meet the market needs and demands for better wear life, service and significant cost benefits. The Mill Discharge Metal and the Mill Discharge Rubber lined slurry pumps are specifically designed for mill circuit applications and ensure sustained efficiency and maximum time between mill shutdowns.

The extremely robust pumps feature high performance materials that are resistant to abrasion, corrosion and erosion. Heavy sectioned castings and liners help maximize maintenance cycles. The advanced impeller design minimizes entrance losses and the double adjustment feature ensures that front and back impeller clearance is maintained.

The consistent hydraulic design limits the inlet velocity at the best efficiency point at a specified head. This decreases the impact damage from coarse and heavy solids and causes even hydraulic wear, which means maintenance is kept to a minimum and production is kept to a maximum.

The Metso Mill Discharge Slurry Pump series currently offers the MDM 300, 350, 400, 500 and 550 as well as the MDR 300, 350, 400, 500 and 550. Each fitted with a Metso EnviroSet sealing solution for reduced water consumption and better packing and service life.

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MINIMIZED NEED FOR MAINTENANCE

LEADING technologies

METSO is the world’s leading industrial company in the mining and aggregates industries and in the flow control business. Our knowledge, people and solutions help drive sustainable improvements in performance and profitability in our customers’ businesses.

Metso has an uncompromising attitude towards safety. Our products range from mining and construction equipment and systems to industrial valves and controls. Our solutions are delivered and supported by decades of process knowledge and a broad scope of services backed by a global footprint of over 90 service centers, thousands of service employees, and an extensive logistics network.
AMENDED FOR ITS SHEER SIZE AND POWER, Goliat is due to be fully installed and operational by the end of 2015 approximately 100 km northwest of Hammerfest, Norway in the Barents Sea. The colossal FPSO plant, owned 65% by Eni Norge and 35% by Statoil, will produce both oil and gas. It boasts a diameter of 107 meters and is equipped with the world’s latest technical solutions that enable it to operate reliably in the extreme Nordic cold climate and darkness during the harsh winters.

Goliat is one of the largest industrial projects ever and the first oil field to be developed in the Barents Sea. It is also the first FPSO plant to have chosen to equip all of its automated pneumatic valves with stainless steel valve controllers in order to enhance safety and minimize the operational and maintenance costs associated with its large number of valves.

MAINTAINING MAXIMUM CONTROL OF THE GIANT | Our special portfolio of stainless steel smart controllers was selected for the close to 900 pneumatic actuated control, on-off and emergency shutdown (ESD) valves in the Goliat plant. Now all the automated valves on the offshore platform will be under continuous online condition monitoring, enabling Eni Norge and Statoil as well as their maintenance partners to better monitor and report valve performance for the asset management purposes of the owners.

According to Oddvar Ims*, who is responsible for electronics, instrumentation, control and telecommunications for the Goliat project, the platform is well equipped with electronic nerve fibers in all of its production equipment and auxiliary systems. Approximately 200 devices, such as compressors and heat exchangers, feature model-based performance monitoring. Alerts with appropriate action proposals will be given whenever real performance deviates from the model’s expected performance. This gives Goliat the sheer power to beat all other offshore platforms when it comes to maintaining maximum control over the entire plant.

A SMART MOVE WITH SPEED AND AGILITY | To guarantee that everything works seamlessly, Eni Norge chose...
GO ONLINE to follow our smart controllers’ journey on board the Goliat in real-time, from Korea to the Barents Sea.
ABB to be the main supplier for the automation, instrumentation complete with all the valves, telecommunications and electronics. ABB, in turn, chose Metso to supply the smart valve controllers. For us this project represents our largest offshore delivery to date.

What made this project special is that ABB and Metso partnered closely from the very early phases onwards. We listened very carefully to the highly technical requirements needed and reacted quickly with a solution that could deliver to the demanding specifications. Our agility was greatly appreciated by ABB as well as Eni Norge and Statoil.

“It was important for us that we truly understood the requirements. This allowed us to make the necessary modifications to our products so that they perfectly fit the ABB system,” says Juha Yli-Petäys, Head of Metso’s Valve Controls business line. “For example, we made a new version of our ValvGuard VG9000 firmware for the ESD valves as well as designed a stainless steel version of SwitchGuard for the on-off valves. We made joint tests with ABB to prove to Eni Norge and Statoil that we had all the capabilities that they required. Throughout this process, we were able to demonstrate our speed and outstanding agile response to them.”

PREDICTIVE DIAGNOSTICS HELP CUT COSTS | Our ability to bring intelligence to any valve made us the ideal choice for the demanding offshore environment. The unrivalled third generation diagnostics and plug-and-play functionality of the stainless steel smart valve controllers convinced Eni Norge and Statoil that Metso could meet their targets.

“Our superior third generation diagnostics is one of the biggest assets of our product portfolio. For operators, the easy-to-use graphic interface quickly shows them how a valve is functioning,” Juha states. “This enables our customers to better optimize their processes and effectively manage the maintenance work. Especially in an offshore environment, the costs of unscheduled maintenance can be incredibly high.”

AIMING FOR GROWTH OFFSHORE | Moving strongly into the oil & gas, refining and petrochemicals market has been a strategic long-term objective. To support goals of growth, we have been focusing on developing our product portfolio to bring exactly the right characteristics of our intelligent valve controller offering to the growing marine and offshore markets. Goliat is a perfect example of how the Metso stainless steel product range supports customer processes in rough operating conditions.

“Global oil and gas production is growing at a brisk pace, and customers are operating in more severe conditions, which place more demands on the components. Few competitors are able to provide such rugged and reliable components,” says Sami Nousiainen, Director, Neles Smart Products. “We already have good coverage with our product portfolio for this market.”

“Due to our leading position in advanced valve technology, services are an important part of our offering,” Juha says. “We have experts close to the final location of Goliat who are specialized in oil and gas projects that can respond to any need that may arise.”

GOLIAT-SIZED SUCCESS | Goliat will be able to effectively use the diagnostic information provided by the smart controllers and integrate this with its asset management and enterprise resource planning (ERP) system to optimally manage maintenance scheduling and the number of staff needed onboard. This results in significantly fewer working hours and less risk for the operators’ health and safety. Moreover, the system considerably lowers any negative impact on the surrounding marine environment.

With intelligent predictive diagnostics and maintenance capabilities, offshore as well as onshore project owners can decrease operational costs by reducing the number of valves needed overall. Maintenance costs are cut too as service visits can be better scheduled in advance and occur only as needed, which reduces servicing time and associated expenses.

Safety of the operations and the personnel is also paramount. Therefore, truly knowing the condition of the valves at any given time enables the operators and management to have a full picture of how to best mitigate risks. This is exactly what the stainless steel smart valve controllers from Metso bring to the Goliat plant.

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*) REFERENCE Tar siste stikk på diagnostikk’ (‘Takes the last trick in diagnostic’) in AUTOMATISERING | 07 2012 magazine
S O I L  A N D  G A S  P R O D U C T I O N moves to even more challenging geographic areas, the standard -40°C to +85°C environment tolerance is no longer sufficient. In particular, more stringent regulations originating from North America, Russia and China have made it necessary for valve controllers to be certified for even more extreme temperatures.

To meet these evolving needs, we have launched an Arctic option that expands the Neles ND9000 intelligent valve controller family and enables the controller to withstand temperatures from -53°C to +85°C.

"Metso intelligent valve controllers offers advanced control valve diagnostics remotely for process optimization and maintenance planning. Users no longer need to go out into extreme conditions next to the valves to carry out control valve diagnostics tasks. Instead, all access to user-friendly diagnostics reports that show control valve condition can be viewed from inside the comfort of an office," explains Sami Nousiainen, Director, Limit switches and positioners.

To complement our offering, the Neles B series pneumatic piston actuator is now also available as a reliable and high-performance version for temperatures ranging down to -55°C. The product is SIL3 certified, providing assured performance for safety critical applications. The same construction is used in control, on-off and ESD applications.

“Users no longer need to go out into extreme conditions next to the valves to carry out control valve diagnostics tasks.”

The unique diagnostics and performance features of the Neles ND9000 intelligent valve controller make it the leader in the industry. Its reliable and robust design is easy to commission and operate in all conditions.

FURTHER INFORMATION
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OMV PETROM is the largest integrated oil and gas group in South-Eastern Europe, with an annual oil and gas production of approximately 66 mn boe in 2014 and proven oil and gas reserves of approximately 690 mn boe in Romania and Kazakhstan.

BURNER APPLICATION

In burner management systems, extraordinary reliability is expected from the on-off and safety valves, as unnecessary shutdowns of a heater would cost hundreds of thousands of dollars on a daily basis. The safety shut-off valves must close under all circumstances. In addition to shut-off safety, the on-off valves in front of the burners are responsible for managing the correct heat temperature.

The chosen valves are expected to perform like new over a long period of time. As shutdowns for inspection and maintenance are costly, regular shutdowns are normally scheduled only once every four years, and they need to be performed as quickly as possible to minimize downtime.

EXCEEDING EXPECTATIONS | OMV Petrom S.A. chose Jamesbury® Series valves for its fuel gas safety shutdown and burner on-off applications. These soft-seated 7000 and 9000 ball valves are made for highly demanding uses such as fuel line emergency shut-off and switching applications.

The valves’ seating design and material provide superior long-term bubble tightness that withstands a high number of thermal cycles and valve strokes, even exceeding the 250,000 strokes required by EN 161. Additionally, the cavity relief feature enables safe operation, even in the event of sudden temperature increases. This allows any fuel gas overpressure that might build up in the ball valves’ cavities to be released automatically on the upstream side.

CERTIFIED PERFORMANCE | To fulfill European directives, the refinery followed EN 746-1, which requires that only EN 161-certified valves can be used in burner management systems. Thanks to all the relevant certifications the on-site approval process was accelerated. High process stability and safe operation in the refinery have been achieved through the unique design of these valves created specifically for burner applications.

WATCH THE BURNER SAFETY VIDEO http://goo.gl/rbTHws or scan the QR code

IN BRIEF

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ROMANIA  BURNER APPLICATION

Highest level shut-off safety for burner applications

OR OMV PETROM S.A., PETROBRAZI REFINERY in Romania, safety, efficiency and compliance with European regulations are major criteria in critical applications such as burner management systems. For this reason, the refinery decided to invest in new fuel gas lines and safety systems for its heaters and furnaces to make the units safer and more efficient.

DEMANDING REQUIREMENTS IN A DANGEROUS ENVIRONMENT | In burner management systems, extraordinary reliability is expected from the on-off and safety valves, as unnecessary shutdowns of a heater would cost hundreds of thousands of dollars on a daily basis. The safety shut-off valves must close under all circumstances. In addition to shut-off safety, the on-off valves in front of the burners are responsible for managing the correct heat temperature.

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FURTHER INFORMATION
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Serving Turkmenistan’s national oil and gas company

Metso has received a large control valve order for a petrochemical plant project carried out by Turkmengas, Turkmenistan’s national oil and gas company. The order was placed by Hyundai Engineering Co. Ltd., a leading Korean engineering, procurement and construction company that provides engineering and construction solutions for plant projects.

Turkmengas’s petrochemical plant project will primarily produce high-density polyethylene and polypropylene by using natural gas. Our delivery will include standard and severe service globe valves and butterfly valves ranging in size from 1/2” to 20” from the Neles® and Jamesbury® product portfolios. We are also providing Neles® ND9000 intelligent valve controllers, which allow advanced performance follow-up. Delivery will take place in August of 2015.

Metso is a value-adding partner for all key stakeholders in the project, including operators, engineering, procurement and construction contractors and original equipment manufacturers.

“We are glad that Hyundai Engineering relies on our expertise. We have delivered valve solutions to more than 100 projects led by Korean EPC companies. Metso’s valves are widely used in petrochemical processes. Today, about 40% of the world’s polyolefin flows through our valves,” says Markus Hauhia, Director, Globe Valves, Metso.

CRITICAL COMPONENTS IN PETRO-CHEMICAL PROCESSES

Our Neles globe valves offer an innovative and fundamentally simple construction with excellent operational and maintenance features to optimize and secure process performance at the lowest possible cost. The valves in a petrochemical or refinery process must withstand significantly demanding process conditions, such as high pressure and temperature, toxic and corrosive fluid, vibration and pressure shock under normal service conditions, and they must meet all safety requirements. In a typical petrochemical or refinery project, our product range covers up to 90% of the needed valves.

IN BRIEF

TURKMENAS, Turkmenistan’s national oil and gas company, is implementing a USD 3 billion petrochemical plant project, which is expected to be commissioned in 2018. The groundbreaking ceremony for the project was held in April 2014. The engineering, procurement, construction and commissioning (EPCC) contractor for the project is the consortium of Hyundai Engineering, Hyundai Engineering & Construction (HEC), LG International (LGI) and Toyo Engineering Corporation.
WITH METSO’S VALVES geothermal power plants can produce renewable energy efficiently and safely at a low cost and with a low impact on the environment. We have received a total of 12 small or mid-sized orders from geothermal power providers in Turkey, including from Zorlu Energy Companies Group, which is building a new 45-MW geothermal power plant in Manisa-Alasehir. Our deliveries include control and on-off valves, consisting of butterfly, globe, segment and ball valves from the Neles® and Jamesbury® product portfolios.

"Our proven valve solutions are an ideal fit for the geothermal industry where process conditions with variable pressures and temperatures can be very demanding on valve performance," points out Cansu Gürbüz, Key Account Manager, Geothermals, Turkey, Flow Control, Metso.

In 2013, Metso also won its 10th repeat order from the Norwegian company Green Energy Group AS to deliver valves for their geothermal power plant installation in Kenya. Metso’s valves are also installed in geothermal plants in Iceland and Indonesia.

TURKEY is the seventh richest country in the world in geothermal energy potential. In recent years, the installed capacity of geothermal power plants grew faster in Turkey than anywhere else in the world. The country is well on its way towards meeting the government’s deployment targets of 1GW by 2023.

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Trusted in pulp and paper

**METSO WILL SUPPLY** altogether about one thousand valves for Stora Enso’s consumer board machine project in Guangxi, China. To guarantee effective services for the new mill, we will also strengthen our service presence in the Guangxi area. The consumer board machine is part of Stora Enso’s integrated mill project being implemented in two phases in China. At the same time hundreds of valves have been ordered for the Varkaus Mill rebuild in Finland.

Both valve deliveries contain Neles® ball valves, V-port segment valves and triple eccentric Neldisc® butterfly valves for on-off and control applications. The control valves are equipped with Neles® ND9000 series intelligent valve controllers, which have the capability for advanced performance follow-up. They also enable predictive maintenance planning activities.

“We are pleased that Stora Enso continues to count on our expertise and that our valve offering met their needs for the new mill. Our strengths are in understanding the mill processes and providing the best valve solutions. Reliable valves are crucial in maximizing pulp and paper process availability and increasing efficiency. Our strong valve services expertise will allow us to provide the needed predictive and preventative maintenance activities that our customers need and deserve,” states **Hangpheng Tan**, Vice President, Sales and Service, Flow Control, China.

**Marko Lindeman**, the Sales Director for the pulp and paper industry in Finland attributes the Varkaus deal to the strong existing relationship and Metso’s ability to deliver solutions that help bring down costs and optimize process efficiency.

Metso and Stora Enso have a long-term relationship. Our valve solutions are contributing to Stora Enso’s process efficiency at several plants globally. In China, we have a remarkable installed base of valve technology in the pulp and paper industry, and we serve all major pulp and paper companies in the country.

Stora Enso placed major valve orders based on our pulp and paper experience. They turned to Metso for thousands of valve products for mills in both Guangxi, China and Varkaus, Finland.

**STORA ENSO** is a leading global provider of renewable solutions in packaging, biomaterials, wood and paper. They aim to replace non-renewable materials by innovating and developing new products and services based on wood and other renewable materials. The company employs some 27,000 people in more than 35 countries, and their sales in 2014 were EUR 10.2 billion.
The rumours are true

We can offer you the most comprehensive selection of control valves. Want to learn more?

Check out the all-new www.metso.com website – more video, more product information, more real-life evidence. Now also easily accessible on mobile devices 24/7.

Your direct route to Metso valves: