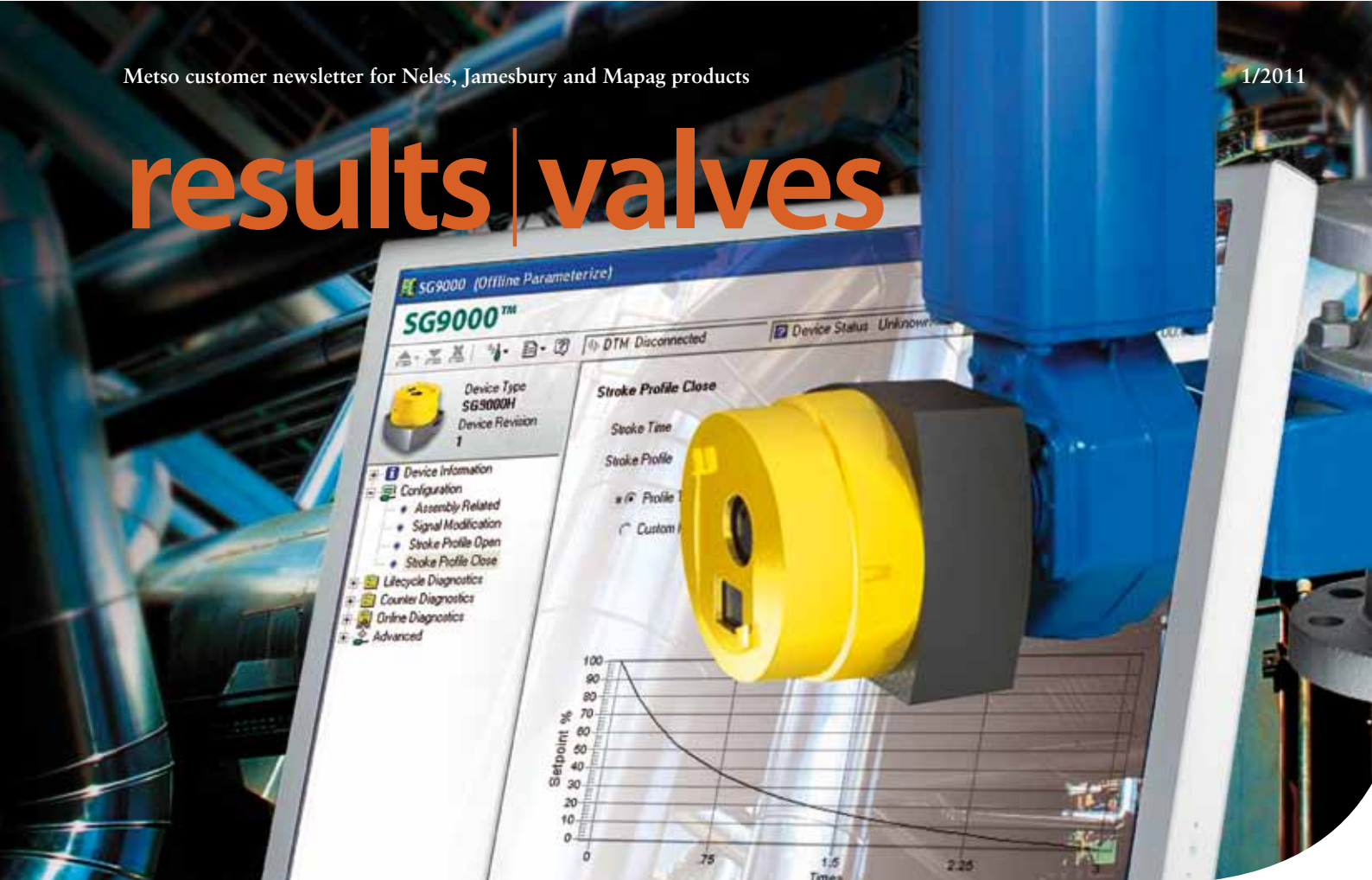


results | valves



Neles SwitchGuard, an intelligent on-off valve controller

Bringing intelligence to on-off valves and simplifying on-off valve instrumentation

Traditionally, on-off valves have been instrumented by at least a separate solenoid valve and limit switches. Quite often the desired functionality cannot be achieved by using only a solenoid valve and limit switches, which means that additional pneumatic accessories are needed. For example, if the process requires precise valve opening or closing stroke times, these cannot be guaranteed by using only a solenoid valve; but there is also a need for some extra accessories such as throttle valves.

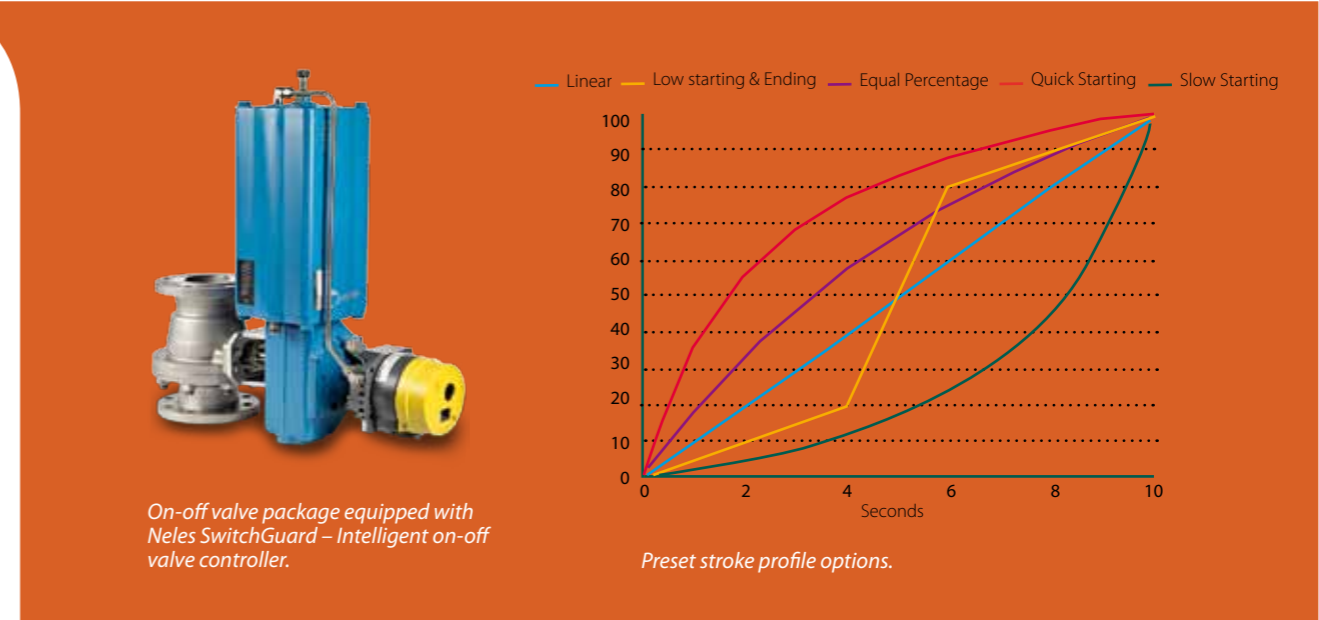
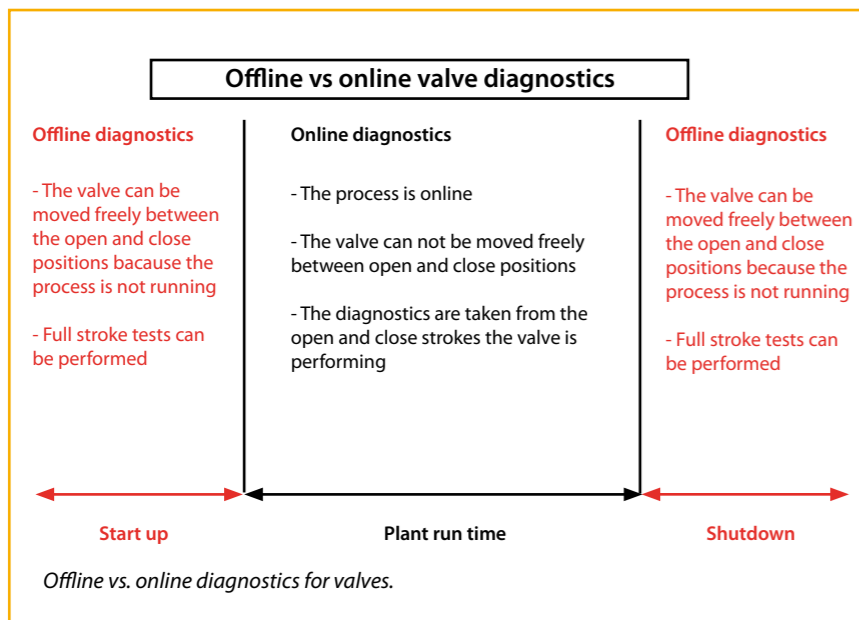
TEXT: Juha Kivelä

With control valves, it has already been possible for more than a decade to receive diagnostic information on control valve performance by using smart positioners, such as Metso's Neles ND9000. With on-off valves it was not formerly possible to obtain the same kind of diagnostics, since solenoids do not include any intelligence. Thus in some cases smart positioners have been used

to obtain a little diagnostic information about on-off valve performance. But, as can be easily understood, the targeted applications and application-based challenges for normal smart positioners are completely different from those of cycling on-off valve applications. Thus the diagnostic features embedded in intelligent smart positioners are not ideal for on-off applications.

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Smart valve technology

Nowadays many different types of ‘smart’ solutions are available from several vendors, but the main difference between them is the level of valve diagnostics that the solution can provide. Diagnostics can be divided into two different types: offline and online diagnostics. Offline diagnostics are basically gained from valve tests that can be conducted during the plant-commissioning phase or maintenance shutdowns. The more challenging type, online diagnostics, are gained from the valve under normal online process conditions.

After control valves, the terms ‘smart’ and ‘intelligent’ have also started to appear in the field of safety valves. Nowadays it is quite normal for a plant to use a smart device, for example, on top of their Emergency Shutdown Valves (ESD). An example of such a device is Metso’s Neles ValvGuard.

Traditional on-off valves

On-off valves can be divided into different groups in many different ways. The ESD valves mentioned in the previous section are only one group of on-off valves. Other on-off valves can be divided, for example, into high-cycling, process-critical and standard on-off valves. Traditionally all groups of on-off valves have been controlled by solenoid valves, and this remains the most common option; smart technology has not

yet advanced much in that field. One of the main reasons for this is that until recent years there have been no true smart control solutions available for on-off valves.

Even though on-off valves can in many cases be instrumented with only a solenoid valve and limit switches, there are several different situations in which additional accessories must be used together with this standard package. The picture above on the right illustrates a typical installation of this kind.

Another typical case where extra instrumentation might be needed is when the process requires fast stroking times with large valves. In these cases, the solenoid valve may have insufficient capacity to meet the stroking time requirements, so additional accessories - such as volume boosters, air operated valves or quick exhaust valves - may be needed for use together with the solenoid. The same applies to cases where smart control valve positioners are used in on-off valve installations to obtain diagnostics. The positioners presently available on the market have a fairly low pneumatics capacity, so it is often with large valves that extra accessories will need to be applied, if the decision is made to use a normal smart positioner.

In addition to the afore-mentioned cases, extra accessories or the use of a control valve positioner is always needed when there are special require-

ments for on-off valve performance. One such case is when either the opening or closing stroke needs to follow a certain stroke profile. A fairly common problem that on-off valves can cause, if the valve stroking speed is not controlled, is so-called ‘water hammer’. In this instance, if the valve is stroked at full speed, it can cause pressure shock in the pipeline. The stroke profiles mentioned above can then be used to prevent such pressure shocks.

The use of extra accessories with valves can present certain problems. When additional components are needed, the reliability of the installation is always reduced. The additional components also usually increase the purchase price of the installation and make it more complex to commission and adjust.

Intelligent on-off valve control solutions

Nowadays, a few vendors provide solutions, where the solenoid valve and limit switches are integrated into one package. This type of solution typically increases reliability when compared to the use of separately installed solenoids and switches, but it is not yet tackling all the challenges of traditional on-off valves. For example, this kind of solution does not remove the need for extra accessories nor does it provide any online diagnostics on the on-off valve performance.

State-of-the-art intelligent on-off valve controllers also provide the solution to the other challenges. Metso’s Neles SwitchGuard is the first intelligent valve control solution on the global market that is specifically designed to meet the requirements of on-off applications.

An intelligent on-off valve controller is like a smart positioner in many ways. As with smart positioners, it features automatic calibration and collects online diagnostics information on valve performance and stores it in the device memory. The diagnostics can then be accessed and analysed, for example, through any FDT/DTM technology compatible software, such as Metso FieldCare.

The diagnostics are the one thing that differentiates the intelligent on-off valve controller from a smart positioner. Whereas in smart positioners the diagnostics features are designed to detect typical control-valve-related problems, in intelligent on-off valve controllers the diagnostics are specifically designed to detect typical on-off valve related problems.

In addition to the diagnostics trends, the intelligent on-off valve controller also includes counters to monitor how many strokes the actuator and the valve have executed. This is a useful feature, especially with high-cycling on-off valves, since the device can give an automatic reminder when e.g. the rec-

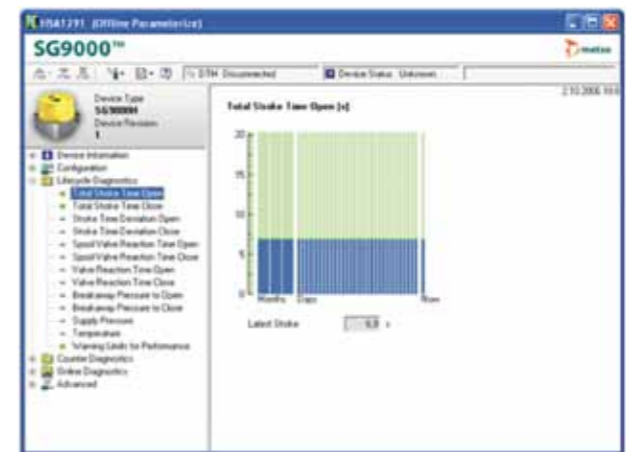
ommended maintenance limit of strokes has been carried out with the valve.

However, diagnostics are not the only benefit that an intelligent on-off valve controller brings when compared to either traditional on-off valve control solutions or to the use of smart positioners with on-off valves. In addition to the possibility of having limit switches inside the same integrated package, the intelligent on-off valve controller also has a high pneumatics capacity as a standard option. With the high pneumatics capacity, fast stroke times can be achieved also with large valves, without the need for additional accessories. This again helps to reduce the number of separate components required, thereby making the installation more reliable, cheaper and easier to commission and adjust.

With the intelligent on-off valve controller, precise valve opening and closing times can also be set without the need for extra accessories. In addition to stroking times, stroking profiles can also be chosen according to the needs of the application in question. As an assumption the stroking profile is linear, but the profile can also be chosen from a selection of preset profile options or be customized based on the process requirements.

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Shell's largest petrochemicals investment to date, the so-called Houdini project in Singapore, was managed with the strong intention to use the latest technology, intelligence and diagnostic potential on the pneumatically operated on-off valves. As the technology leader, Metso was awarded the umbrella contract for all pneumatically operated on-off valves in the new parts of the plant.

Metso's new intelligent valve technology for Shell Eastern Petrochemicals' Houdini project

Metso's contribution to the project includes some 1,350 valve assemblies with new technology. All pneumatically operated on-off valves in the project are equipped with Neles ValvGuard VG9F (for FOUNDATION Fieldbus) intelligent safety valve controllers, as mandatory, instead of conventional solenoid valves and limit switches. This new technology-based pneumatically operated on-off valve set-up was applied for the first time on such scale anywhere in the world.

Mr. Peter Beerepoot (Shell ECC Project, Manager Process Automation Group and Instrumentation) is very satisfied with the decision to use ValvGuard throughout the Houdini project. "Yes, there is always a risk in using a new product on such a scale, but we were convinced of the advantages the valve controller offered. Houdini was a complex project, but the end result speaks for itself. We started the plant up with no major hiccups in just 29 days, which was most satisfactory." Shell announced the Houdini project's successful completion in May 2010.

New technology on global scale

The new plant is set up for the FOUNDATION Fieldbus using the FDT/DTM technology. Metso's delivery scope includes Neles ball valves, high-performance triple eccentric disc valves, V-port segment valves, eccentric rotary-plug valves and pneumatic cylinder actuators, as well as Jamesbury ball valves, butterfly valves and pneumatic actuators. Metso also included some 3rd party valve products in order to provide a "Total Project Approach" from one vendor.

The total delivery comprises 528 on-off valves, 653 emergency shut-down (ESD) valves, 93 control valves, including low db and anti-cavitation Q-trim models, 33 high rate and low rate depressurizing valves and 51 manually operated valves. Sizes range from 0.5"-72". Pressure ratings range from ANSI Class 150, 300 and 600 to 1500. The temperature range is from high to cryogenic. The project fully follows Shell's specifications, including fugitive emission requirements.

All pneumatically operated on-off valves for the Shell Houdini project are

equipped with Neles ValvGuard VG9F intelligent safety valve controllers, which is mandatory, rather than using conventional solenoid valves and limit switches. This enables the plant to carry out full diagnostics on all on-off valves via the DCS asset management system. The Neles ValvGuard VG9F is connected to the safety system and the FOUNDATION Fieldbus DCS system for full diagnostics and configuration. VG9F intelligent safety valve controllers are also mounted on all pneumatically operated on-off valves outside the Metso range.

Project support all over the world

At the Shell Houdini project, Metso site teams of around 20 people are working at full speed to support the commissioning and start-up activities. For such projects, Metso provides global key-account management support and in-house engineering support for EPC contractors. Additionally, support for package-unit suppliers' projects is provided all over the world, as well as project execution support and site project management services. ▶

Houdini project

Shell Eastern Petrochemicals Complex (SEPC) project in Singapore is the company's largest petrochemicals investment to date and its second world-scale petrochemicals project within Asia in four years. The project was announced successfully completed in May 2010.

According to the Houdini project plan, each of the new chemical production units has started up. The world-scale ethylene cracker complex started up in March 2010, and one of the world's largest monoethylene glycol plants started production in November 2009. The project also includes modifications to the

Shell Pulau Bukom Refinery, enabling it to process a wider range of crudes to supply feedstock to the cracker. A new ethylene jetty and cryogenic terminal enable the import and export of ethylene.

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New Neles ValvGuard VG9000 increases safety cost-efficiently

Metso announce the launch of the HART version of its Neles ValvGuard VG9000 safety valve controller. Neles ValvGuard VG9000 is a 'new generation' safety-valve controller and automatic partial-stroke testing (PST) device for both emergency shutdown (ESD) and emergency venting valves (ESV). It combines new features and capabilities with all the benefits of the first-generation Neles ValvGuard VG800 taking automatic partial-stroke testing to a completely new level. TÜV Rheinland has certified VG9000 as compliant with IEC61508, up to SIL3.

Highly cost-efficient

Plant safety targets can be reached more economically with the Neles ValvGuard VG9000 than with traditional solutions. Its extensive safety-valve-testing capabilities include partial-stroke testing (PST), internal pneumatics testing and emergency trip testing. Safety-valve condition can be constantly monitored

using the diagnostics data gained from the tests the controller performs. In addition, the VG9000 is able to collect valve diagnostics during trip situations.

There is no need to mount extra instrumentation and parallel limit switches, because the VG9000 has market-leading pneumatics capacity and optional internal limit switches. The reduced number of safety-related components also increases plant safety while simultaneously creating cost savings. The VG9000, now available in both HART and FOUNDATION Fieldbus versions, can be used with both single- and double-acting actuators. The new HART version supports also both safety AO's and DO's.

Enables alarm management and predictive maintenance

The Neles ValvGuard VG9000 provides real-time alarm management at no extra cost. The availability of safety valves is maximized because emergency valve-



related on-line diagnostics are integrated into device functionality.

The diagnostics information collected by VG9000 is presented in an easily understandable form via a graphical FDT/DTM interface, such as Metso FieldCare. The usability of VG9000's interface is also taken to a new level when compared to first-generation partial-stroke testing devices. Because the diagnostics information enables predictive maintenance, potential valve failures can be detected and corrected before they can have any impact on the process or plant safety.

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Metso extend iESD offering with SIL 3 certified ball valves

Metso's offering of valves, actuators and intelligent valve controllers has been extended with the introduction of SIL certified ball valves. Trunnion and seat supported modular ball valve series X and M are classified and certified by Lloyd's in accordance with IEC 61508, Type A equipment. The SIL assessment study with field proven reliability analysis confirms that X and M series ball valves can be used in applications up to and including SIL 3 in single valve configurations in accordance with IEC 61508.

Intelligent safety valves from a single manufacturer

Metso's reliable iESD (intelligent emergency shutdown) valves and actuators with Neles ValvGuard intelligent valve controllers improve plant safety cost efficiently. Metso's iESDs combine the know-how of final elements and applications, safety standards and system operability together with intelligent partial-stroke test devices. All this technology has been combined in a single package and tested and configured as an integrated assembly with a clear function.

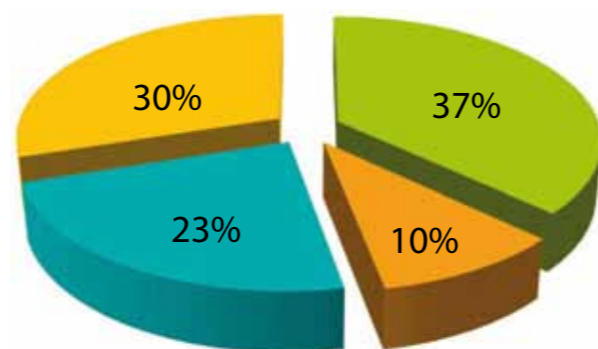


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Onshore condition monitoring of offshore valve assemblies

Especially in the offshore sector, there is strong emphasis on minimizing the number of staff working in hazardous offshore environments, without impacting on reliability. At the same time, it is expected that the availability of production and the life cycle costs of process equipment should be optimised. These requirements create the need to improve the capability to analyse control-valve data from offshore applications - to focus and plan service actions well in advance. In other words, to enhance the utilization of existing technologies and increase the use of specialist know-how in order to enable offshore personnel to carry out the required tasks effectively, safely and with minimal labour and disturbance to the process itself.

TEXT: Niklas Lindfors and Jarkko Rätty



Control valve condition during shutdown

- Adjustment needed
- Good condition
- Minor repair
- Full overhaul

Maintenance needs for control valves. Typically more than 1/3 of cases can be done with small adjustments without removing valves from pipelines.

At Metso, a framework as well as associated products have been developed to utilize onshore condition monitoring of offshore control-valve assemblies: The framework optimises collaboration not only between offshore field personnel and onshore analysts, but also with manufacturers' technical specialists. On the front-line of the framework is the intelligent valve controller ND9300, followed by FieldCare software for condition monitoring and a Device Performance Monitor for database analysis. Condition monitoring is performed onshore with support from technical specialists. In the planning of predictive maintenance, offshore field experience is combined with massive onshore database-analysis utilizing sophisticated algorithms in the determination of optimum maintenance actions. Metso has used this combination of framework and tools for several years in onshore applications.

Predictive maintenance and asset management

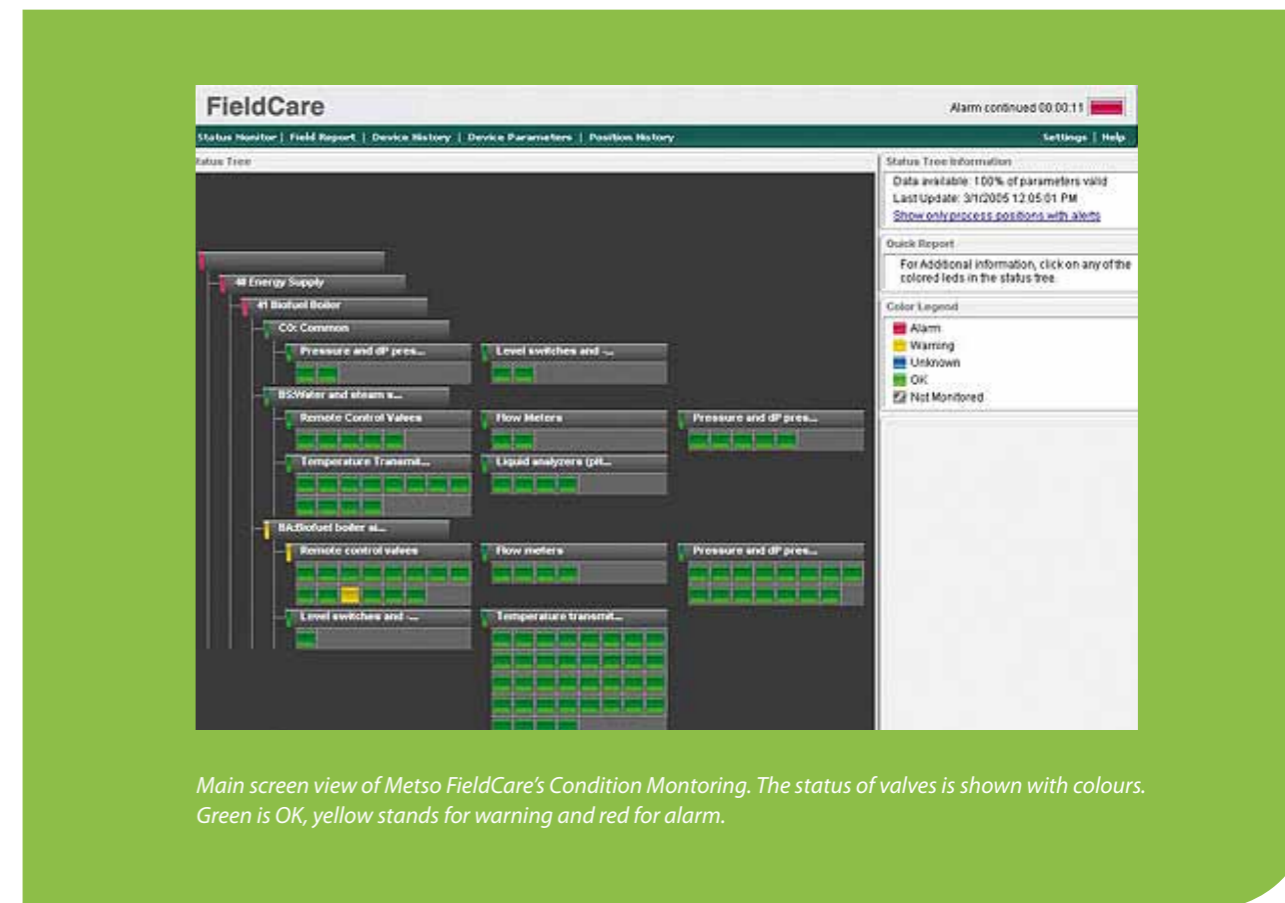
Running a plant at an optimised cost level is a challenging task involving numerous variables. To find the minimum combined cost of equipment purchase price, maintenance costs and possible down-time etc., numerous known figures have to be taken into account, as well as many "guesstimates" of likely future costs. The most costly possible event is, of course, an unexpected interruption in production – leading to a loss of the ability to make money.

Predictive maintenance is considered to provide real help in decreasing the likelihood of such incidents in a cost effective way. PdM helps to focus the actions on those targets where action is really necessary. When utilizing a predictive maintenance strategy with process critical control valves, undesirable process disturbances caused by disrupted

control-valve performance can be minimized without investing extra money in valves that do not require maintenance.

A prerequisite for implementing predictive maintenance is that the field devices are capable of supplying the relevant information, the software to gather and analyse this information and, of course, human resources capable of running the system.

The Neles ND9000 valve controllers are high-end products, especially when it comes to diagnostic properties. One of the unique capabilities of the Neles ND9000 is its ability to store information from the entire life of the valve in its memory. Advanced online diagnostics convey essential information on control-valve performance in a clear and easily understandable form. Valve performance and diagnostics data, read from the device memory, enable the user to make informed maintenance decisions.



Main screen view of Metso FieldCare's Condition Monitoring. The status of valves is shown with colours. Green is OK, yellow stands for warning and red for alarm.

For demanding corrosive applications, an explosion-proof, fully 316 SS stainless steel model ND9300 is also available.

Metso FieldCare or any DCS-system-integrated asset-management software provides easy access to diagnostics data collected by any intelligent field device. When diagnostics information from control valves is continuously monitored, the condition of the control valve is known at all times. In other words, the user knows not only how the control valve has been performing and how it is currently operating, but can also predict how the control valve will perform in the near future.

Information processing of the valve assembly

An intelligent control-valve positioner, such as the Neles ND9000, gathers information on the control-valve package's performance throughout its lifecycle.

The ND9000 stores all this data in the device's own memory. This data can be accessed not only on site, but also remotely. Basically, there is no difference between processing the diagnostics data on-site or from thousands of kilometers away from the site. While remote condition monitoring does not fully replace inspection "footwork" done on-site, it can focus and improve it. Depending on the application, valve assemblies should be inspected visually for leaks, accumulating dirt, corrosion etc. These visual observations can be stored in the same system together with the valve controller's diagnostics data.

Metso has several years of experience in condition monitoring and predictive maintenance with onshore customers in different branches of industry. This experience has proven that the amount of information from a site with hundreds of valves equipped with smart position-

ers can be huge. Processing this information is greatly improved, both in terms of quality and cost-effectiveness, with the help of state-of-the-art condition-monitoring algorithms developed at Metso. By utilizing knowledge about control valve behaviour, diagnostics gathered by the intelligent valve controllers and advanced mathematics, the Device Performance Monitor (DPM) indicates those control valves whose performance has changed and suggests the most probable reasons for impaired operation.

Organizing predictive maintenance and technical support

Condition Monitoring (CM) of offshore valves can be developed in small steps. The following models can be used in organizing condition monitoring and predictive maintenance.

In the first phase, intelligent valve controllers and suitable asset manage-

Vesa Lempinen, Finland.
 Our specialists receive questions related to valves and flow control every day and we want to share some of them with you. Our expert this time is Vesa Lempinen, Product manager, Neles control valves.



Ask the Valve Expert

Finetrol's plug shape is different from that of other eccentric rotary plug valves on the market. What is the practical value of this design difference?

Finetrol belongs to the eccentric plug valve category (IEC 60534-1 Sect 3.1.2.5), but it has design differences, which distinguish it from other eccentric plug valves on the market. One of these is Finetrol's balanced plug that delivers benefits in practical control duty.

The patented Finetrol plug design (Figure 1) is contoured with a plug tail-element that balances the flow forces and provides a wider opening range from 0 up to 90 degree. The plug balances the flow forces by bringing the total flow force close to the stem's centreline, which means that the effect of dynamic forces on valve operation and control stability is minimized.

This is not the case with a conventional eccentric plug design, where the flexible arm connection between the plug and valve stem acts like a torque arm to allow the flow forces to generate additional torque against the valve stem. Depending on the available actuator output torque, this can create challenges to the valve's controllability and stability, especially at low valve-opening angles.

Another practical benefit of the Finetrol plug shape is its full 90-degree opening range. The tail-element of the Finetrol plug extends the maximum opening angle of traditional eccentric rotary plug valves from 50 or 60 degrees up to 90 degrees (Figure 2).

This means that with Finetrol the equivalent flow capacity is presented to a wider opening range. As a result, smaller flow changes can be controlled using the same degree of opening change, giving more accurate control of smaller flow-rate changes with the Finetrol control valve.



Figure 1: Finetrol plug

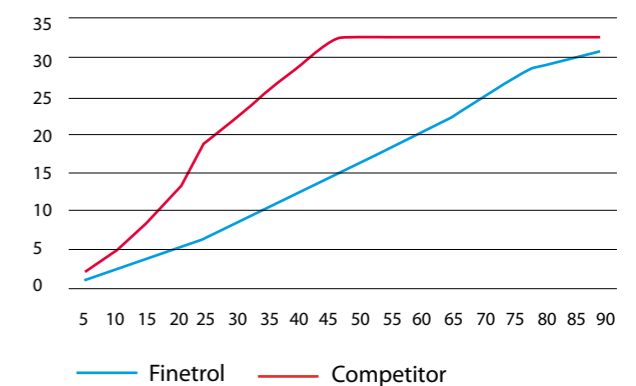
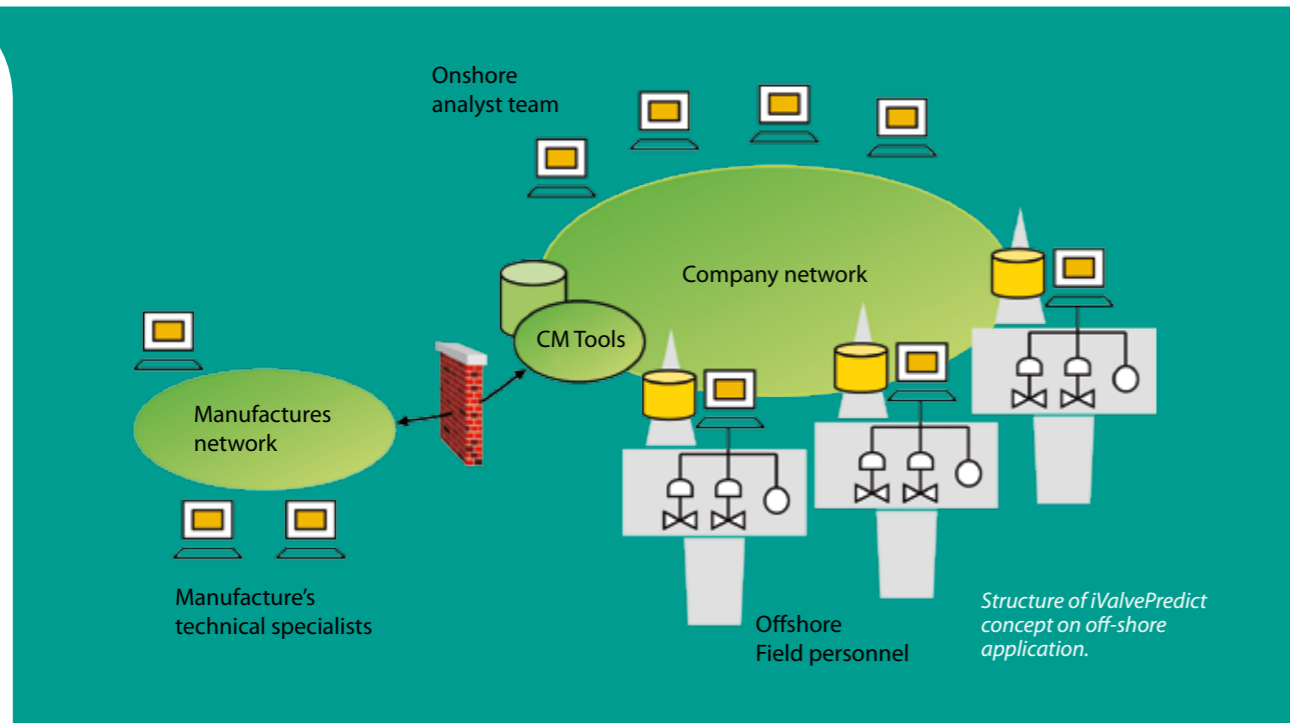


Figure 2: Cv-value vs opening angle of Finetrol and Competitor's product (size 1 1/2")



ment software are established at each platform. The actual condition monitoring of valves is the responsibility of the offshore field personnel. Distributed condition motoring requires the presence of skilled personnel on each platform or a group of specialists who travel from platform to platform.

The next step in improving condition monitoring is to centralize it, using one asset management system, with supervision by a dedicated onshore team of analysts. This team is able to monitor and co-ordinate maintenance actions at several platforms. Carrying out predictive maintenance efficiently needs seamless co-operation between onshore analysts and offshore field personnel. In the case of a large centralized condition-monitoring network, a maintenance support agreement for the asset management program is needed.

With such an agreement the software vendor is responsible for system availability and upgrading, which means that the analysts can focus on condition monitoring. Remote connection ensures fast response times and is the most cost efficient way of maintaining support.

Further improvement in condition monitoring can be achieved by combining the knowledge of the offshore field personnel, the team of analysts and the valve manufacturer's technical specialists. Metso has developed a concept that utilizes special tools for the condition monitoring of large field device networks. One functionality of the concept is the Device Performance Manager (DPM), which works as a "filter" to point out the devices that have shown some changes in their performance, flow situations or surrounding conditions. These particular devices are subjected to closer

analysis, rather than manually analyzing the whole of a large installed base. The Metso concept also includes a common database platform where all parties (field personnel, analysts and manufacturer's specialists) can work and communicate with each other. Such co-operation produces a continuously updated turnaround list with recommended actions, which makes maintenance planning accurate and more cost efficient. Smaller checks and adjustments can usually be done without removing the valves from the pipelines, improving valve performance and producing savings in maintenance costs. This kind of agreement has been used in onshore industries since 2006. Experience with this model is very encouraging. ▢

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Toni Lahtinen (Metso), Petteri Otranan (Neste Oil), Tuomo Waljus (Metso), Sami Virkkula (Neste Oil) and Antti Orell (Metso).

Finland's biggest maintenance turnaround -Neste Oil Kilpilahti

Finland's biggest maintenance turnaround shut Neste Oil's Kilpilahti refinery for four weeks. Metso's Turnaround Management Solution assured valve maintenance within the agreed schedule.

TEXT: Tapani Leppänen

After Easter, Neste Oil maintenance engineer **Petteri Otranan** and other workers at the Porvoo refinery were preparing for a big task, as were about 2,500 outside contractors, including Metso's Helsinki based valve maintenance crew. The major turnaround means 12-hour shifts and seven-day week. "Daddy will be back from work. After four weeks," Otranan jokes. With only brief visits home, family life is put hold, "Sure, it is a burden, everyday family activities are at odds with my other responsibilities," he says, but he enjoys his work, "For me, it's enough if I

can take care of essential chores." At least one week needs to be added to the four-week session for shutdown preparations and another for start-up. For many, the focus on valve related tasks can be more than six weeks, but fortunately, turnarounds do not come as a surprise, allowing for some preparation at home too.

Planning is turnaround management
Regular maintenance turnarounds every four to six years play an important part in keeping operations at Neste Oil's refineries safe and running at peak efficiency.

The new plan is launched soon after the previous shut, with maintenance preparations starting to appear in daily schedules about a year before D-Day. Under Otranan's supervision, work then starts to determine which of the valves need maintenance. "During the turnaround we focus on the challenging and difficult items. Those valves for which maintenance is not possible when the plant is running," he says. In four weeks, the refinery will accomplish one million working-hours. There is no space or resources for anything extra.

Metso's Turnaround Management Solution is tailored to the needs of the client, which ensures the successful implementation of the project. The service scope is negotiated on a case-by-case basis. Both Petteri Otranan and Metso's service manager **Toni Lahtinen** consider it important that the equipment supplier is involved from the beginning. Metso takes care of spare parts based on Neste Oil's installed base. The customer receives a comprehensive listing of parts with delivery times for each valve com-

ination where maintenance is needed. Otranan praises Metso's activities, according to him, valve maintenance needs have never before been prepared so well. Lahtinen says, that in addition to the spare part orders the work resource requirements were well timed. Well-planned work can free service resources for the odd surprise maintenance task!

Close cooperation

Neste Oil's turnaround saw a total of 530 valves serviced, of which about 350 were Metso's products. Metso's Helsinki workshop handled 107 valves, with the remainder serviced in Kilpilahti.

The turnaround doubled both Neste Oil's and Metso's on-site valve maintenance workforce. Metso's Helsinki Service Center manager **Antti Orell** said that the workshop was taken over by Metso's own people and other familiar sub-contractors from neighboring countries. "We had more maintenance personnel at work than ever before. However, I believe that more important than the number of personnel is the advance planning and communication during the turnaround," said Orell. Petteri Otranan agrees. During the outage, he was in daily contact with Orell and product expert **Jouni Kareinen**. "I could say that this valve is in a hurry and this second one can wait. This way the work was prioritized and a steady stream of freight moved. We avoided long queues and never had a situation that the valve would have been missing," Otranan says.

Finely tuned maintenance process

The pace was swift, as only three of the four-weeks in the turnaround are reserved for valve repair. Everything needed to be already in place by the fourth week when the plant made operational tests. The tight schedule went as planned. When a valve arrived at Metso's service, it was photographed, tag information, product number and type data was entered into the system and a pallet label was printed, which then ran with the valve. The maintenance work number is stamped on the flange and actuator. These numbers and photographs make sure that the correct valve and actuator are re-installed the right way round. During repair, the valve is always disassembled and the actuator is serviced. A valve pressure test is carried out and maintained if necessary.

Petteri Otranan points out that the service does not always mean that all parts of the valve are replaced. Many critical items such as emergency shut off and fuel gas valves are simply checked to ensure that their performance can be guaranteed for the next operating period. "We serviced two hundred valves ourselves and ordered a large amount of spare parts. For us it was a huge help when needed parts are listed according to position. When the valve comes for service, the right parts are immediately to hand."

Also on site were Metso Service Technicians, who as well as doing pre-agreed work, took care of urgent tasks. "When

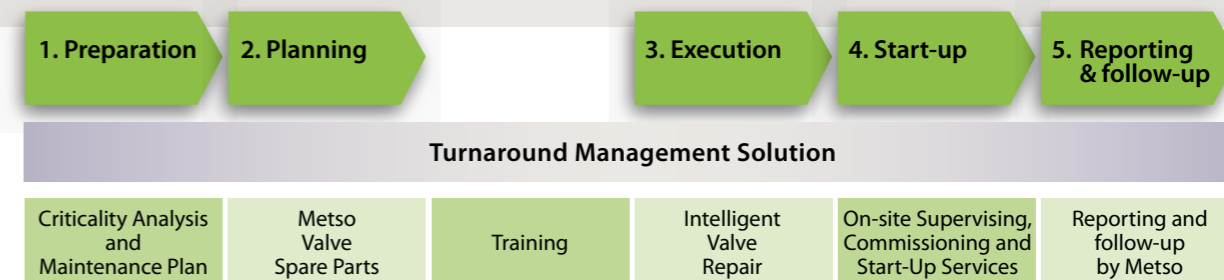
my resources were not sufficient, I could pass on the bigger and more challenging work to Metso. They were a very important resource, not only knowing their equipment, but also our policies and regulations," says Otranan.

Reporting is the next turnaround planning

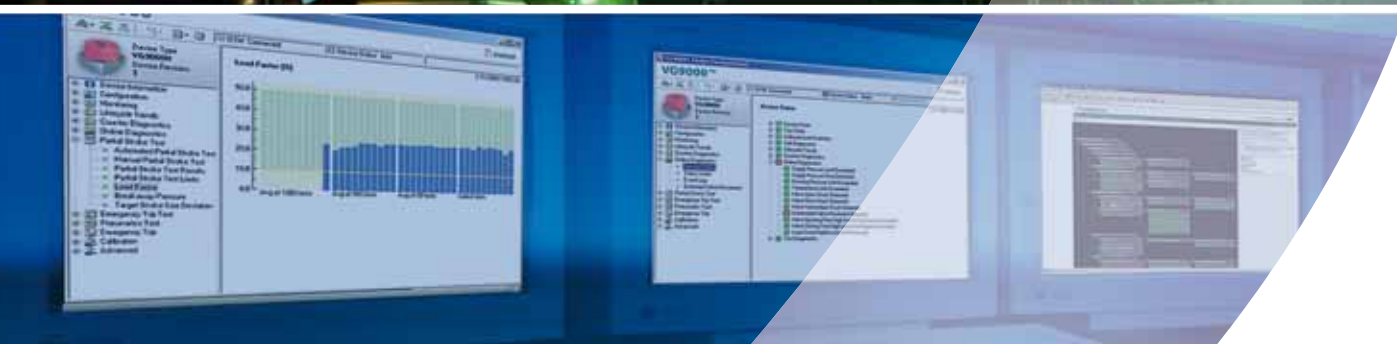
According to Petteri Otranan, Neste Oil's turnaround met the objectives. He sees value in the equipment supplier having a ready service model. In addition to defining the spare parts and the actual maintenance work, Otranan stresses the importance of reporting. "A good service report shows that an individual device has been faulty, what has been done and what parts have been replaced. This data is recorded in the device history in our maintenance system." Based on this information we get to know the equipment life cycle and make different estimates. Some of the equipment may be in the condition that replacement is needed at the next turnaround. Similarly, we can decide that some other equipment will operate reliably for more than the five-year operating period. "The same data can show if the valve had to be machined. If the same defects occur again, we can determine whether the valve selection made originally was correct or whether another solution would be better," adds Otranan and notes that a well prepared report is part of the next turnaround planning. ▢

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Metso's Turnaround Management Solution



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Metso's iESD – intelligent safety valves from a single manufacturer

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