Combustion control minimizes emissions at Ekokem energy-from-waste plant
metsoDNA automation for Neste Oil’s renewable diesel plants

- Metso will deliver comprehensive automation and safety solutions for two greenfield plants being built by Neste Oil Corporation in Singapore and in Rotterdam in the Netherlands.

The metsoDNA automation systems for both locations include control room stations and equipment, redundant process control stations, integrated HIMA safety systems as well as field equipment maintenance stations. Metso Automation will be working closely with Neste Oil and Technip Italy, the main contractor for both sites.

Construction has already started in Singapore and the plant is scheduled to be taken into operation by the end of 2010. The Rotterdam plant will be finalized during 2011. The production capacity of both plants will be 800,000 t/a of NExTBL Renewable Diesel.

Ten kajaaniTS transmitters to a Belgian wastewater plant

- IDEA municipal wastewater plant in Wasmuel, Belgium, has placed an order for 10 microwave-based kajaaniTS total solids transmitters for controlling solids in the sedimentation area. IDEA Wasmuel plant covers 285,000 people equivalents (PE).

kajaaniTS is applicable for low to high solids measurements including primary sludge, dewatering, and dewatered cake applications. Interface between the kajaaniTS transmitter and the plant control systems is ensured. kajaaniTS is available with mA+HART, Profinet PA or Foundation Fieldbus. DTM descriptions provide connectivity with FDT-based configuration and operation monitoring systems.

Automation system for new 920 MW power plant in Bandirma, Turkey

- Metso was awarded a contract for the delivery of a metsoDNA CR automation system to the new 920 MW combined cycle power plant (CCPP) in Bandirma, Turkey. The new CCPP is based mainly on two gas turbines and one steam turbine – each delivering more than 300 MW – and two heat recovery steam generators. Operational status is scheduled for summer 2010.

Automation systems and upgrades to Mondi Syktyvkar in Russia

- Metso will supply several control systems and upgrades to the existing automation of Mondi Syktyvkar pulp and paper mill in Russia as a part of an extensive modernization project.

The delivery includes control systems for both hardwood and softwood fiber line digesters and the new white liquor production area for causticizing, the condensate plant and lime kiln. Previously delivered Metso systems, for both fiber lines and the existing causticizing plant and lime kiln, will also be upgraded in addition to extending the control system. Metso will also deliver approximately 900 control and automated on/off valves as well as 2,400 manual valves to the project.

Metso expands its energy solutions offering with energy management system

- Metso will expand its existing portfolio of information management solutions as well as its overall energy and environment technology offering for the power industry. Metso Automation has signed an EU-wide sales and marketing agreement concerning an energy management system developed by Energy Opticon AB.

The new energy management system, which will be technically integrated into Metso’s existing automation system, is suitable for all kinds of energy generation and is especially well suited for combined heat and power plants. metsoDNA Energy Optima enables power plants to increase efficiency in their energy production and decrease fuel utilization.
Editorial

Energy and Environmental Technology – a new platform for growth


In the power sector, Metso is a forerunner in fluidized bed combustion technology for the pulp and paper industry and power producers, as it offers a wide range of power boilers for different needs, from small units to very large boilers. Fluidized bed boilers combine high-efficiency combustion of high caloric value fuels with low emissions even when burning various fuels at the same time.

For the recycling industry Metso offers the widest range of scrap recycling systems, such as fragmentation, size reduction, compaction and separation solutions. Approximately 45% of new steel is made of steel scrap, which – after collecting, sorting, cleaning and separating – is ready for being melted into steel again and used for new industry and consumer goods.

The Automation business line continues with its former operations supplying process automation systems and flow control solutions for the energy and oil and gas industries as well as for the pulp and paper industry. Our experience in automation and information management for power generation covers solutions for different plant types from conventional power to modern cogeneration plants. Our special applications have proven to be useful in all types of plants. They help to stabilize combustion during load changes, fuel feed disturbances or fuel quality changes. They also work with demanding fuels, such as biofuels.

The energy and environmental business offers us new growth opportunities by combining in a new way Metso’s current know-how and technologies. Our proven automation solutions will be maintained and further developed. But at the same time, we will work hard in finding better solutions for processes that are becoming more and more important and widespread. One example of these is the energy from waste process in which industrial, municipal and wood waste or sludge can be utilized.

Most environmental technology solutions are based on innovations or process improvements. In fact, process technology expertise is Metso’s core area of competence in the company’s development of environmental business. According to the OECD definition, over 60% of Metso’s net sales can be classified as environmental business.

Although the new operating structure will generate new opportunities for us, it doesn’t mean that we would downgrade our current customer industries. On the contrary. New opportunities will boost our current position in the pulp and paper and hydrocarbon industries. Metso’s comprehensive automation solutions offering also for these industries will be further developed to provide results for all of our customers.

Pasi Laine
President
Energy and Environmental Technology
The Ekokem energy-from-waste plant: Combustion control minimizes emissions
Burning waste and turning it into energy still make many people see horrifying pictures of emission clouds billowing into the air. Needless to say, with modern technology, it’s mostly water vapor that comes out of the chimneys. A good example is Ekokem Oy Ab’s new energy-from-waste plant located in Riihimäki, in southern Finland, whose user-friendly automation as well as combustion and emission control play significant roles in the process.

Behind a glass wall in a waste bunker, an enormous grab with its strong claws bites firmly into a pile of waste and feeds its ragged load into the grate’s flaming mouth. At a temperature of 1,000°C, about 85 percent of the energy content in the waste is recovered and turned into steam, which Ekokem uses in generating district heating and electricity as well as in running its own processes.

Built according to the EU requirements, this new 55 MW energy-from-waste plant is the first of its kind in Finland, although there are hundreds of similar plants operating elsewhere in the EU region. It started up in the autumn of 2007, and uses source-separated municipal waste as fuel in addition to various kinds of industrial and commercial waste. Earlier, this dry waste that is not suitable for recycling ended up in local landfills, which have now been closed down. At the same time, Ekokem has been able to replace non-domestic fossil fuels with waste and has thus been able to decrease greenhouse gas emissions from being released into the atmosphere.

The plant is able to incinerate 150,000 tons of waste per year, turning it into district heating for about 19,000 households in the towns of Riihimäki and Hyvinkää. The electricity generated exceeds the company’s own needs, and the rest is sold to the national grid.

Reliable automation stabilizes the combustion process
Ekokem’s energy-from-waste process differs significantly from that of power plant boilers running on ordinary, even-quality fuels. This naturally creates more challenges for controlling the process. The role of automation is especially emphasized in managing the combustion and handling the waste in the bunker.

“The with automated operations, we are able to stabilize waste compo-
Process Operator Pekka Paajanen appreciates the presentation of emissions in report trends as well as the system’s user friendliness.

There are three other combustion lines built earlier at Ekokem, all equipped with automation systems supplied by Metso. According to Kari Hyvönen, it was therefore only natural to choose a metsoDNA CR system for the new line, too, and thus reap the benefits of system uniformity in process control. Metso’s system delivery covered the boiler; feed water, condensate and steam system; process stations; IO cabinets; control room devices; Profibus connections to the district heating pump stations and burners; grate control to the hydraulics; the boiler protection system, as well as an information and reporting system.

Waste incineration capacity:
- Normal 17.35 t/h (max. 21.79 t/h)
- Approx. 130,000–150,000 t/a
- Fuel efficiency: Approx. 55 MW (max. 58 MW)

Steam values
- Pressure 26 bar (a)
- Temperature 320°C

Steam production
- Normal 17.7 kg/s (max. 19.4 kg/s)
- Steam efficiency: 42.2 MW (max. 46.2 MW)
In May 2008, the Ekokem energy-from-waste plant received international recognition, as it won the national series of the World Energy Globe Award in Finland. Founded in 1999, the award is the most acknowledged in its field and can be applied for by projects around the world that develop and use renewable energy sources.

Emissions close to zero
Both the Waste Incineration Directive and the plant’s environmental permit set tight limits for the impurities to be let out into the air. For example, the latter defines average emission limit values for various substances per half an hour and 24 hours.

Located on the plant’s chimney are online measurements that measure, for example, dust, hydrocarbon, hydrochloric acid, hydrogen fluoride, sulfur dioxide, carbon monoxide and nitric oxide contents. The measurement results are saved into the database every ten seconds, and the concentrations to be compared with the limit values are calculated every minute. The average emission values are calculated and compared with the permit limits every half an hour; with carbon monoxide every ten minutes. This all means that the plant continuously knows where its emission level stands with regard to the permit conditions.

“Thanks to good combustion technology and flue gas purification, the emissions from the energy-from-waste plant are very low; close to zero in practise,” says Minna Kaila, Development Engineer in charge of Ekokem’s emission measurements.

“For example, keeping waste quality even is challenging with regard to combustion, emission control and flue gas purification. If the combustion and flue gas purification processes do not – or especially if automation does not – function in the desired way, occasional emission peaks and undesirable interruptions are possible in the process.”

To measure gaseous flue gas component contents, the plant uses an analyzer based on FTIR technology, whereas for measuring dust, there is an analyzer based on light scattering. Emission monitoring and reporting are carried out with an emission management application based on Metso Automation’s metsoDNA system. It produces the information needed in the plant’s real-time emission monitoring and ensures that emission calculation and reporting fulfill the requirements set by the law and the environmental permit. A similar application is running in about 70 other combustion processes.

Lots of information for users and authorities
There are two process operators and one bunker operator working in the power plant control room during the daytime. The operators are able to see at a glance all the necessary information related to emission control on the displays, such as the emission concentrations in comparison with the limit values, the exceeded limit values, as well as notifications on equipment malfunctions and the exceeded availability limits.

The emission concentrations in comparison with the limit values are presented in tables in a web-based, updating emission monitoring report. The application is integrated with the automation system, allowing, for example, Minna Kaila, who deals with the emission issues, to follow up the emission values at her own desk on the other side of the Ekokem plant. Every month a detailed report on the plant emissions and possible exceeded limit values is sent to the local environmental authorities.

“The emission management application has functioned well and in a reliable way. However, we’ve had to do a lot of fine-tuning after the start-up in order to meet all the requirements set by the permits and standards,” Minna Kaila continues.

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Irving Paper in Saint John, New Brunswick, Canada, finds that a new CD reel diameter control builds better reels and improves SC-A roll quality. Air entrapment problems, common in highly finished grades, are accommodated so that reel shape is built to target and problem streaks are eliminated. Printers see excellent roll quality regardless of the location in the parent reel.
O

line paper finishing, with multi-nip calenders as an integral part of the papermaking process, is about 10 years old now. Over those years, papermakers have found that building a good parent reel of online SC or LWC paper is a challenging task. High quality printing papers that are calendered online are thin, very dense and cannot be compressed much more. With these paper properties, it has been found that traditional methods of cross-direction reel build control using scanning caliper sensors have been difficult to optimize. To precisely build a good SC-A reel, many factors other than caliper must be considered.

When Irving Paper in Saint John, New Brunswick, Canada, decided to rebuild its PM1 to produce online SC-A grades, the new Metso Automation PaperIQ Plus quality control system selected for the project was initially configured with conventional CD caliper control for reel building. But Irving papermakers were not convinced that caliper control was the total answer. They talked to other SC producers who had similar concerns and experiences with reel building. The Irving mill had seen some of these issues on the PM2 SC-B machine in Saint John which had been rebuilt in 1999 with North America’s first online OptiLoad calender supplied by Metso Paper. This time, PM1 was being rebuilt with the world’s first online OptiLoad TwinLine multi-nip calender from Metso. The new SC-A papers are marketed under the trade name Radiance. After the PM1 startup in March 2006, the total SC capacity of the mill increased to 420,000 tons per year.

With the urging of Metso, Irving Paper decided to try a totally new technique to control reel build – using Metso Automation’s IQHardness measurement. Saying this measurement is new might seem odd, since its initial development dates back to the 1970s. But the original measurement, then used almost exclusively on newsprint machines, has been refined and the idea behind it has changed considerably since its early days. These developments were in response to more recent reel building problems encountered by producers of soft calendered value-added grades. IQHardness now measures micro-scale reel diameter, in addition to hardness, and that cross-direction reel diameter control has been the key to excellent reel and roll quality on Irving’s new PM1 line.

Open to new technology
“At Irving Paper, we have always been open to new technology, especially if it gives us a competitive advantage,” says Gilles Gagnon, Mill Manager. He cites Irving’s pioneering spirit with online soft calendering and multi-nip polymer roll calendering. So Irving Paper decided to team up with Metso to develop and perfect the reel building measurement and control application in order to build better parent reels and top quality rolls for its customers. The new measurement was not totally unknown. They had seen a first generation of the new IQHardness measurement at a Canadian mill producing soft calendered papers.

Gagnon says the new IQHardness measurement and CD reel diameter control gives them a valuable tool for grade development and meeting their customers’ needs for rolls which run well in the press room. And that need has been met conclusively. “Printers see excellent roll quality regardless of the location in the parent reel,” according to Gagnon.

New potential for control
The IQHardness measurement has gone through several stages of development since the 1970s. Originally known (and still known by some) as the Backtender’s Friend, it sensed cross-direction reel hardness with a rotating wheel, which housed an embedded piezo-electric crystal. The output signal was analyzed to indicate hardness. The measurement technique was improved by adding a second measurement button with another piezo-electric crystal, which measured the contact pressure applied by the measurement wheel against the building paper reel. The measurement of hardness could therefore be made independent of applied pressure as the reel was building. This was accomplished by using a mathematical formula which included reel diameter; hence a reel diameter measurement was required. As the reel builds, the angular position of the measurement wheel loading arm changes. The loading arm was therefore equipped with a rotation transducer, which indicated the angular position of the wheel and the diameter of the building wheel as the sensor traverses from edge to edge.

With reel diameter measurement, a new potential control variable became available. This measurement is very precise as well, with a resolution of 64 million bits per 360 degrees of revolution. That translates to a precision of...
The operating display shows the controlled diameter profile (top) and the nip loading profiles of the first OptiLoad calender.

less than 1 micron in reel diameter. Small ridges on the reel can be measured with high precision.

Of course the mechanical scanner and arm that load the wheel against the reel must be very robust to make sure this cross-direction measurement is correct. Reference scans are taken on the bare reel spools to provide a zero base.

Shift in control strategy
But the need for the shift in CD control strategy from caliper (or hardness) to reel micro-diameter needs some explanation since the mechanisms of building a good SC (or LWC) reel are complicated and involve many variables in addition to caliper. Antti Heikkinen, Senior Paper Technology Manager at Metso Paper, explains why reel building has changed and become more challenging over the last ten years. He says that as paper sheets became less porous and machine widths and line speeds increased, air accumulation between layers in the building reel became a significant factor, resulting in abnormal reel building problems that could not be detected in the caliper profile.

“At speeds greater than 1500 m/min or with low porosity papers at lower speeds, excessive air entrapment can cause bad tension profiles and related winder runnability issues. Furthermore, with lower friction between paper layers, crepe wrinkle formation can be a problem,” he says.

“If paper is streaky, air removal becomes a very difficult task. Recently, soft drum covers have been introduced to help with streak tolerance,” states Heikkinen. Despite this development, the root cause of the dilemma must be addressed. He continues to describe the nature of the problem: “Air is removed from the reel more easily at the edges, thus most of the air entrapment takes place at the center of the reel. This tends to increase roll diameter at the center, giving the reel a characteristic cambered or crowned shape. Online diameter measurement is the only way of measuring this effect so that it can be controlled precisely across the web. Too high reel diameter at the center will be seen at the winder as very low tension at the center and high tension on the edges,” he states.

He also emphasizes the effects of boundary layer air on caliper measurements: “At higher web speeds, we need to push very hard on the paper with a caliper sensor in order to have good sheet contact, and this can lead to more sheet breaks. It is difficult to use a low pressure and still be able to measure caliper with enough accuracy,” he says.

When reeling 30,000 layers of dense, non-compressible SC paper into a parent roll, only extremely small caliper irregularities can be tolerated. With more compressible newsprint sheets, caliper is usually higher; there are fewer layers on the reel, and the higher compressibility of the paper allows for a larger margin of error.

Summing it up
In many previous cases, these uncertainties in measurement and control caused uneven parent reel building, winding instability and winder throughput problems. As any papermaker would appreciate, these problems were most acute on the reel edges.

In contrast, the reel diameter measurements provided by IQHardness “sums up” the effects of uneven air entrainment and many other factors that affect CD uniformity according to Heikkinen. “The effects of localized air accumulation, wound in tension, very small caliper changes and calender nip loads can be seen. Moisture profiles and felt condition are other factors which affect reel quality,” he says. The cumulative effects of CD caliper variations are taken into account in the diameter measurement and control.

He also underlines the importance of the measurement’s diagnostic capability. “With diameter measurement, you can define which streaks are really detrimental,” says Heikkinen. “Furthermore, it measures the effects of caliper, other paper profiles and roll nip profiles. It is more accurate and meaningful than any single sheet caliper measurement,” he adds.

Proper profile shape
Air entrainment was a known problem and a concern for the Irving papermakers. Terry Tomney, PM1 Superintendent, says, “No other online machine in the world makes SC-A with Bendsten porosity under 10 ml/min. And we knew that air entrainment can cause fine wrinkles after calendering.” He says the air entrainment problem can be lessened but not eliminated by good profile management and applying high torque in the reel to ensure a tight reeling process.

The mill staff decided this new reel diameter measurement and control strategy could be a valuable tool to overcome the uncertainties in reel building control and to build reels with the proper shape profile for good roll quality and runnability in the new WinBelt winder and the best pressroom performance. As a result, the IQHardness measurement was added to the PaperIQ Plus
The IQHardness measurement wheel scans the building reel from edge to edge. It senses hardness and micro-scale reel diameter. Small ridges can be measured with high precision.

The IQHardness provides a diagnostic capability for machine troubleshooting. If a profile problem cannot be resolved, the mill staff can look at various potential problems in the line. Tomney stresses that the condition of soft covered calender rolls is very important for good reel structure.

Gilles Gagnon sums up their experiences with reel diameter controls so far: “Printers see excellent roll quality regardless of the location in the reel. We have made big gains with end rolls, and they have not been an issue with printers. We feel that diameter control is the key to this success,” he claims. For the future, he says they will continue to use the control tool to develop their grades to meet customer needs.

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The cooperation of Yara Finland Siilinjärvi fertilizer plant and Metso Automation started in 1979. Since the millennium change, the cooperation has grown stronger. Shared visions regarding future development and needs provide a good base for cooperation that enables improved reliability and efficiency of the production processes.

**ENERGY AND PROCESS**

A wider view of process automation – a fruitful substratum for flourishing cooperation

Yara supplies plant nutrients in the form of mineral fertilizers required for sustainable food production.
In connection with the latest fertilizer automation solution delivery in 2007, Metso supplied a new grade change application, which together with other measures, significantly improves the efficiency of the fertilizer production and helps decrease the amount of off-spec. A brand-new diary application is actively used in improving communications between the production units. In addition to information exchange, it will also act as an excellent internal learning tool for the operators.

Cooperation with Metso Automation started in 1979, when the apatite concentrator was automated with Damatic Classic. The first delivery has been followed over the years by Damatic XD and metsoDNA systems, plus some upgrades, resulting in five rather impressive systems that cover practically all plants on these grounds. “In all, our systems here comprise a total of approximately 15,000 I/Os and 40 monitors controlled from four control rooms,” says Kari Karppinen, Sales Director of Metso Automation.

The automation system has developed and grown together with the plants’ production needs. That is why the systems are seen more as a single system for all operations. Since the first Metso automation solution – used at the Siilinjärv plant for 20 years – there have been numerous deliveries of varying scale. “Just before the new millennium, we made a wide study about the advantages of automation for our processes. As a result, we decided to continue with a wider concept in order to get the most out of our plants,” says Sakari Kivivuori, Automation Development Manager at the Yara Siilinjärvi plant.

Automation provides tools that help enhance cost efficiency. For instance, with accurate measurements and analysis, the mill can optimize both the process run and use of raw materials and thus prevent overuse of expensive materials. Automation also helps minimize losses from disturbances by aiding operators to correct unstable situations quickly. For example, some rapid changes in the situation, like electrical failures, cause disturbances, which a skillful operator can stabilize just a few minutes with the help of automation.

Metso proved to be a reliable partner, and the cooperation continued, but now in more depth. “We share the visions and views about future development trends and needs,” remarks Sakari Kivivuori. It is necessary for the automation solution supplier to be actively involved in a project during planning, installation, and start-up, but the task does not stop there. Since the automation solution will be used for the next 15-20 years, the supplier has to have the competency of planning maintenance strategies for the automation solution and the processes, and enable the customer to act according to changing situations and customer needs. “This is not an easy task, especially in our case. I think there are no similar processes at any manufacturing sites in Finland. Each project has to be studied and defined case by case from an automation point of view. The Metso specialists have had to clarify very tricky cases at times, but each time they have succeeded. The Metso service team has assisted us in getting more out of our processes than was expected at the projects’ starting phases,” Sakari Kivivuori adds.

Application for quick grade changes

In 2007, a new metsoDNA automation solution started up for the fertilizer production. “We wanted to change our grade change application to Metso technology. By doing this, we had the opportunity to come up with a compatible system in which every part works well together.” This application is very important in a plant with numerous different batches, the volume of which may vary from one to four or five thousand tons per grade. The material flow is continuous, and change from one grade to another has to be made without stopping or slowing down the process. Due to this, there is some off spec, which has to be recycled to the start of the process.

The task of the grade change application is to speed up the change from one grade to another, and to minimize the amount of off spec. The authority controls the contents of fertilizers strictly, so variations in the quality are not acceptable. “This application is very demanding, and cannot be done without a high degree of know-how and involvement from each party. As a result of the new application, combined with other development measures, the amount of off spec has reduced. The current situation is good, but more development steps have to be taken in the future. We chose Metso.
**Two-way information through DNAdiary**

“The most important advantage of the DNAdiary for us is its role as an efficient tool for two-way information flow,” says Pekka Sirén, Automation Manager at the industrial maintenance company Maintpartner. The company delivers maintenance services to the potassium sulphate and feed phosphate factories of Yara, the sulphuric acid factory of Kemira Oy and the calcium chloride factory of Tetra Technologies, Inc. in Kokkola, Finland.

The processes at each factory are controlled by means of Metso automation solutions. To support their operations, Maintpartner provides the information management system, also supplied by Metso Automation. Information needed in process maintenance is transmitted to this system through the Metso automation solutions of the factories.

The first version of the Metso Automation information management system started up in 2001. DNAdiary was added in the system the following year. At the time, all four factories were part of Kemira. When Kemira sold part of its operations, three of the Kokkola factories were sold to Yara and Tetra Technologies, and the maintenance departments became the ownership of Maintpartner. When the information management system was updated, Maintpartner purchased it, too. Today all four plants use Maintpartner’s information management system.

**Fluency and efficiency to daily operations**

The most important task of DNAdiary is to support information flow and storage. “In practice, this means that the most important transactions occurring during a work shift, such as disturbances, problems and process modifications, are stored in the diary. They are reviewed and commented on by process supervisors and specialists. Deviations that may cause a need for repair and maintenance are also registered, unless a work order is made directly to the maintenance system. Raw materials deliveries during work shifts are stored as well. When arriving at work, the supervisors check new entries and prepare work orders for Maintpartner if needed. The entries may also concern instructions or modifications regarding process operation. All this information can be searched in the history data later,” Pekka Sirén explains. “The processes of the four factories are connected. This is necessary, since a by-product of one process may be a raw material for another. The same DNAdiary front page opens up at each factory, and the employees can make searches in their own processes by various criteria.”

According to Pekka Sirén, the DNAdiary application is working well. It is easy to use, and it has been well received by the employees. So far, there has been only one improvement suggestion from the users. They have asked if the plant category could be automatically shown when making entries in the diary. “The application is utilized in communications between employees and supervisors, and machinery maintenance. And not just that. The communications also lead to concrete measures, which help control the process more efficiently. In addition, operation times, employees present at the work shifts, as well as repairs and arrivals of CaO loads can be retrieved in the diary. All this is information that the supervisors may need at a very short notice.”

**The more users, the more entries and analyses**

In connection with an update made in last April, Maintpartner and Yara started a project to activate the use of DNAdiary and enable more profound and detailed analyses through the increased number of entries. “Earlier the diary was in office use only. Now it can be opened at the operator interfaces as well. This change was done because we want to encourage the operators in using the application. The project has started up pretty well,” Pekka Sirén comments. “Once things are rolling at the Yara factories and experiences from using the diary accumulate, we can present the results to other plants and give them an opportunity to evaluate whether it would be a suitable model of operation for them, too.”

**Making things more diversified**

According to Pekka Sirén, other features of DNAdiary, such as reporting, have been used less so far. But there are ideas for further developing DNAdiary. “We have been talking about a department-specific quick-search function. It could ease things for those returning to work after a day off. By means of quick-search buttons, all plant-specific situations from the past week could be listed. We aim at developing the application in such a way that work orders would be sent to the maintenance system automatically from the diary entries. These ideas are worth evaluating from many sides: what is the benefit versus size of investment.”
also because the application can be further developed and adapted according to the new needs of the future.”

An entity fully controlled by Metso technology

metsoDNA is used at all production units, the apatite refinery, the power plant and the phosphoric acid plant. The organizational structure features advanced thinking. It is based on production units and their processes, with a maintenance function designed for each unit. “The new DNAdiary application supports the organizational structure, too,” says Kari Karppinen. “Operators at each production unit can open the same diary and make notes about production events in connection with process related information. If necessary, an impulse will be also sent to maintenance. One of the objectives is to clarify the events as well as add and share information. Information about measures taken at the different parts of the process can be retrieved and sorted according to different criteria. This helps develop production processes. It also helps operators and process specialists form a better view about the process,” Sakari Kivivuori adds. Even if human interaction cannot be totally replaced by a diary application, it certainly can be improved by means of it.

The DNAdiary has been in use for a year, except in the case of one production unit, which has user experiences from a period of six months. According to Sakari Kivivuori, the application is actively used. “The main users – operators, specialists and process controllers – make notes, and we go through them together in our meetings. Employees of different shifts can discuss process events, and specialists use it as a medium for instructing the operators. This is a very useful tool at a plant where different processes are scattered at different locations.” A total of approximately 200 notes are made in the diary in a week. “We are going to use the diary in learning, too. A sufficient number of process related notes will allow us to group and comment on the stored information and design an electronic learning tool. In this way, we can help our personnel learn through real cases.”

Close to the customer

Process reliability has to be secured at all times. The Metso service team has an important role in condition monitoring. They also perform application modifications according to changing process needs. A Metso service unit in Kuopio, only 20 kilometers from Siilinjärvi, enables the service team to be available at the site at short notice.

A worldwide fertilizer manufacturer

Yara supplies plant nutrients in the form of mineral fertilizers required for sustainable food production. In addition to fertilizers, Yara has gases and chemicals, mostly in the form of upgraded co-products from the fertilizer production plants. Mineral fertilizers are made from naturally-occurring raw materials containing nutrients that have normally been transformed into products that can be taken up by plants. In the nitro phosphate process, nitric acid is used for the digestion of phosphate rock. This benefits the extraction of calcium by crystallization as calcium nitrate, and the processing of high quality prilled or granular calcium nitrate products.

The Yara Siilinjarvi plant’s production is based on utilizing a local clean phosphor deposit. Since the acquisition of Kemira Grow How by Yara, the integration of functions has proceeded at a quick rate. Operations have been unified and standardized, and volumes have increased. Yara has invested considerably in the Siilinjarvi production site – a sign of its strong intention for development which is warmly welcomed.

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It’s often true that the most trustworthy and valuable measurements in a papermaking process are those that papermakers don’t think about too much. They just work reliably in the background. UPM’s Tervasaari mill in Finland has found that kajaaniRM3 headbox and white water analyzers installed on PM5 are just such “set and forget” measurements. With a little preventive maintenance, these analyzers are the solid foundation for continuous retention control. PM5 produces base sheet for silicone-coated label papers. With the stable controls, fines and stock sizing are retained at their optimum levels, retention aids are precisely metered, and uniform paper quality properties are maintained. As a bonus, the lifecycle service costs for the analyzers are kept at a lower level.

The 4.3 meter wide PM5, first started-up in 1938, has been rebuilt many times. The most recent rebuild in 2001 converted the production to release base paper. Grammages range from 50 to 90 g/m². The design speed is 800 mpm.

Narrow operating window
For some time, the mill’s objective has been to continuously control retention to ensure even paper quality. The uniform retention of stock sizing agent and fine fiber particles is critical to paper properties such as porosity and absorption of water and oil. Mikko Rissanen, Production Manager, says, “We run very high retention levels – from 90 to 92% – and the operating window is quite narrow.” The mill uses a two-component retention aid system.

But the goal of continuous retention control had not been realized yet. Previous-generation analyzers were installed in 1996, before the change to high-retention grades. With the older analyzers, the precise and reliable measurement required for very low consistency white water measurement and control had not been demonstrated. So, in 2006, the mill decided to replace the old measurements with the new kajaaniRM3s. The improved measurement stability and reliability would satisfy two goals: maintain consistent retention levels and associated paper qualities by automatic control, and reduce lifecycle service costs.

Convincing justification
The justifications for uniformly high retention levels are convincing for several reasons. “For even quality, we need consistent fines and stock sizing levels in the sheet. Uniform retention plays a big role. Since sizing agent adheres to the fines particles, the retention of both go hand in hand,” says Rissanen.

With the high retention levels, the white water’s consistency is very low – from 0.4 to 0.6 g/l. But machine cleanliness and paper defect problems can occur if an upset occurs. So uniformly clean white water can avoid runnability and quality problems on the machine, and avoid spreading the contamination problems throughout the mill.

With automatic control, the flow of retention aids can be regulated precisely to achieve the desired – and measurable – results. Unretained fines and sizing agent are maintained at a stable low level. With this continuous level of control, chemical cost savings have also been possible.

Stable calibration, minimum maintenance
The kajaaniRM3 analyzers were installed in September 2006. The analyzers for headbox consistency and wire water consistency, are installed in a service-accessible location – on the machine operating floor level just behind the headbox. Samples are transferred to the units by process pressure. The installation work was simple, requiring only power, flushing water and interface connections to the

With the stable controls based on kajaaniRM3 measurement, fiber fines and stock sizing on the mill’s PM5 are retained at their optimum levels, retention aids are precisely metered, and uniform paper quality properties are maintained. Overdosing of retention aid is avoided. As a bonus, the lifecycle service costs for the analyzers are kept at a lower level.
Automation has been contracted to the Automation Supervisor. Metso Automation has been contracted to perform preventive maintenance twice per year, but no major problems have been noticed. Laapas reports the control has been very robust; no retuning has been necessary.

**More precise measurements, lower lifecycle costs**

kajaaniRM3 is the end result of almost twenty-five years of development of low-consistency paper furnish and white water measurement and control. The new analyzer incorporates Metso Automation’s field experience from over 900 installations of previous-generation products. The new design simplifies the construction of the unit so it is easier to commission and maintain. The optical module is made considerably simpler and more reliable by eliminating rotating discs and optical cables. New laser and LED light sources are rated for stable operation for a minimum of 5 years. Hard sapphire glass in the measurement cell improves durability and, since the glass structure is optically flawless, the measurement and calibration is highly precise. Six calibration signals are used to verify the measurement stability, and a calibration check using pure water ensures cell cleanliness, and optical and electronic steadiness.

The RM3 has been designed to offer low lifecycle costs for new installations and a considerable improvement in service costs when replacing older generation technology. Many of the improvements in the optics, electronics and fluid handling mechanics of the analyzer are aimed at durability and longevity.

The components and systems are rated for a six month maintenance interval, as determined by Metso Automation’s FMEA (Failure Mode and Effect Analysis) program. Metso Automation is the only supplier using FMEA to design its analyzers for long-term reliability and determine the lifecycle maintenance program. To define the lifecycle costs precisely, the expected preventive maintenance scheduling, spare parts requirements, component replacement scheduling, and consumable costs are laid out for the customer over a ten year period.

As of spring 2008, the kajaaniRM3 units have been installed for over 1.5 years and the mill staff reports stable, trouble-free operation with 100% availability. The measurements are trusted by the operators, and control of retention is used continuously. Now, retention aid chemicals are controlled precisely to achieve the consistency target value. A vicious cycle is cut

So, how does the customer view the success of the kajaaniRM3 commissioning? First of all, Rissanen says the new reliable analyzers have given them the stable measurement required for continuous control. That is just what they wanted. He emphasizes that the best results can be seen by running the control continuously. “By stabilizing white water consistency, we have met our main objective,” he says. The MD stability of sheet porosity, as measured by the mill’s offline profiler, has improved notably since the controls have been implemented.

He continues, “A big plus is that we are now able to control the overdosing of chemicals. Before, there was a tendency to add more and more without taking any out. It was a vicious cycle.” Since commissioning the measurements and controls, a decrease in stock sizing and retention aid consumption has been noticed.

The time between machine wash-ups has been extended from two to three weeks without any negative effects.

**No more babysitting**

Laapas reports the other major objective – lower service cost – has also been achieved. He says, “It is vital to find solutions to eliminate the babysitting of process measurements. Without the babysitting, the costs are lower. Reliability is also very important, so the operators can trust the measurement.”

Rissanen summarizes the feelings of many production managers concerning process measurements and controls. “A process measuring device should be in the background, and not be a problem. Making adjustments based on false information is not good. You should take it for granted that you have a reliable reading,” he says. It seems UPM Tervasaari mill has found that reliable solution in kajaaniRM3 for achieving stable retention control.

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With automatic control, the flow of retention aids can be regulated precisely to achieve the desired – and measurable – results. Pictured Mikko Rissanen (left) and Vesa Laapas.
The fourth production line of Neste Oil’s refinery in Porvoo started operating in the summer of 2007. The new diesel facility’s field devices are managed using Metso Automation’s Neles FieldCare software.

“To be perfectly honest, it means that for the first time our automation department can anticipate its maintenance needs throughout the entire production line. The system provides us with information that wasn’t available in traditional automation operations,” says automation engineer Misa Naumanen, who is in charge of the refinery’s automation maintenance.

Neles FieldCare is Naumanen’s pet project, as he likes to call his working tool. This is just as well, since a dedicated professional is exactly what is needed for the adoption of the new system. Not that the software is difficult to operate; it is more of a case of Naumanen having to sell the new way of working to his installers. Work routines that have evolved over the decades must be changed towards a more proactive approach to maintenance.

**One system for all devices**
The refining of crude oil into fuels is a complicated process. Over
5,000 field devices on Line Four in Porvoo have been connected to Neles FieldCare. There are more than ten different suppliers for the devices.

Neles FieldCare is based on open FDT technology in which 63 device manufacturers participate. The web-based software enables the management of devices by using either a manufacturer-specific or a generic DTM.

With Neles FieldCare, separate tools for each device are no longer needed. It enables the integration of tools in areas where this is most needed: maintenance, diagnostics, servicing and the management of process devices.

The nature of work is set to change
Neste’s personnel have made exemplary efforts for the adoption of Neles FieldCare. As the person in charge of the device and system development team at the automation department, Jari Manninen knows that the real benefits of the new system must be seen in the long term. Initially, the system may even increase the amount of work. If anything, the nature of the department’s work will change.

Knowledge increases pain, as Manninen puts it. “Our task is to learn to utilize the growing amount of information. During the adoption stage, we had to parametrize field devices more accurately than before. In the long run, however, we will reap the rewards.”

“What we seek with FieldCare is good usability. If we can avoid even a single large ramp-down with the system, it will have brought us considerable cost savings,” says Manninen.

The highly fine-tuned process is operated at its limit capacity. Long intervals between outages are a typical feature of refineries. In Kilpilahti, the objective is to limit the standstills at the refinery to only once every five years.

“During major outages, the area has a lot of workers and a large number of devices and equipment that need maintenance. Our goal is to minimize this number. FieldCare serves as the central tool by which we can reach this goal.”

Strategic tool
Neles FieldCare forms part of Neste’s maintenance strategy. Even the location of the workstation has been carefully considered. “The terminal is next to the coffee machine. The objective is to have people use both of them equally on a daily basis,” says Misa Naumanen with a laugh.

Information technology has changed the face of an automation installer’s job. Naumanen and Manninen reiterate the fact that the benefits gained from the software are largely dependent on how well its use can be marketed within the work community.

“When you have people doing things according to a certain routine for 20 years, introducing change poses the greatest challenge,” says Manninen.

One thing, however, is certain: the first thing Naumanen does in the morning is to make a pot of coffee. After that he sits down in front of FieldCare. The system is used on a daily basis, as condition monitoring operations must be checked and the facility’s situation charted every morning. During the day, Naumanen will return to the application depending on his tasks. “The system is beginning to control our operations. In the past, according to Jari Manninen and Misa Naumanen (left to right), the past year has made condition monitoring software an essential tool for Neste. Naumanen finds it difficult to imagine a return to the days before Neles FieldCare.

Neste Oil is a refining and marketing company concentrating on low-emission, high-quality traffic fuels.
it used to be a case of something going wrong somewhere, and us having to go there and fix it. Now we are increasingly able to start work before problems arise,” Naumanen sums up the change brought by Neles FieldCare.

Easy to maintain
System Expert Tenho Eteläinen, who has been in charge of installing Neles FieldCare, brings the point of view of maintenance to the discussion. Now that the application is in active use, the maintenance personnel’s experiences of the necessary and easy-to-use tool are heart-warming.

Eteläinen describes Neles FieldCare as a tool that is easy to maintain and stresses the necessity for cooperation between the supplier and the client.

“During the adoption stage, support and advice were always within easy reach. As a system, FieldCare has proven itself as a good tool. Obviously, as we use the system more and more, there will be certain functions which we would like to expand or modify. These observations and needs have provided the basis for a good discussion with Metso personnel working on FieldCare.”

Interpretation of information
Tenho Eteläinen shares Manninen’s hope of avoiding ramp-downs. According to Naumanen, Neles FieldCare has helped avoid many threatening situations.

*The Kilpilahti industrial area is the largest uniform cluster of the chemical industry in the Nordic countries.*

Neste Oil’s Porvoo refinery
- The Kilpilahti industrial area is the largest uniform cluster of the chemical industry in the Nordic countries.
- About 2,000 oil refining professionals work at Neste Oil’s production facility in Porvoo.
- The facility’s refining capacity is approximately 11 million tonnes annually.
- The facility manufactures about 150 different products and product components.
- The main products are sulfur-free fuels for traffic and basic oils used as raw material for lubricants.
- The first unit manufacturing the renewable NExBTL diesel, located in connection with the refinery, was completed in 2007, with a capacity of 170,000 tonnes annually. A second similar unit will be completed in 2009.
- In addition to the oil refinery, the production facilities include a large container area, a harbor and a technology center.

“Our condition monitoring has detected deficient devices. In the case of valves, this means that the slightest shift in a process could have caused large problems. Now we have been able to notify the production team of faulty parts or equipment and advise that we would replace them,” he says, pointing out that in a demanding process, even the operator cannot be aware of each measurement result.

Neles FieldCare’s user interface displays, in real time, the statuses of field devices as small squares. A green square indicates that the device is functioning properly. Yellow serves as a warning, while red indicates an alarm. When the alarm limit has been set correctly, a device will send an alarm before it breaks down.
Manninen adds that it is not just a question of devices indicating that they are developing a fault. “There is always room for interpretation. You have to consider whether the device is really deficient, or whether we are running the process in a way that causes the fault.”

Neste’s automation department has always been very familiar with its own processes. Misa Naumanen expects the new way of working to pose increasing challenges to knowledge in this area. “In order to interpret alarms, we must be even more familiar with how the process functions and behaves. The majority of alarms originate from the process. If we can’t detect them here, we’ll waste a lot of time trying to find them in the field.”

**Neles FieldCare facilitates work**

From the facility’s point of view, anticipating problems helps cut costs. For the individual installer, the benefits of Neles FieldCare are much more concrete. Adopting new technologies is much easier when they reduce your own workload. FieldCare saves time and effort in the maintenance and configuration of devices.

“In the traditional method, we would hook up a laptop to a device. Simply finding the point where to connect to a field device in a cross-connect equipment room with an area of hundreds of square meters takes some time,” Naumanen points out.

The distance from the central control room to the connection room is over a kilometer and, on top of that, the installer has to find the device. Naumanen reminds us that, unlike other industrial sectors, production at a refinery takes place outside.

“In the worst case, we have to climb a ladder up to a 90-meter tower. In the winter cold, especially, it will be a great advantage to be able to locate the device from the control room.”

**Support for production**

The emergency shut-off valves controlled by the Neles ValvGuard safety system are a prime example of proactive condition monitoring. These valves are not in everyday use, but as they are located at critical points in the plant, they must operate perfectly in the rare case that they are needed.

Misa Naumanen explains the operating condition of the emergency shut-off valves at the old units could be ensured only with regular tests carried out during outages. But up-to-date self-diagnostics helps to keep the safety features functioning at a high level for a longer time.

The past year has made condition monitoring software an essential tool for Neste. Naumanen finds it difficult to imagine a return to the days before Neles FieldCare. “By keeping our adjustments and measurements in working order, we are able to give considerable support to production.”

According to Naumanen, the greatest benefit from the new tool is reaped in the monitoring of valves. However, he reminds us that the majority of the refinery’s field devices measure various temperatures. The longer the list of devices and device suppliers, the better Neles FieldCare, which is based on open technology, can showcase its advantages.

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**Neles FieldCare’s properties**

- Operation of devices manufactured by various suppliers using manufacturer-specific or generic DTMs
- Reporting of maintenance history
- Network configuration
- Device navigation in a network environment
- Management of device-specific DTMs
- Monitoring of users’ procedures
- Management of user rights
- Document management
- Condition monitoring during runs

Over 5,000 field devices on Line Four in Porvoo have been connected to Neles FieldCare.
Metso Automation’s DNAlime lime kiln optimization controls have stabilized the hard-to-manage process at Zellstoff Rosenthal’s Blankenstein, Germany, kraft pulp mill. Very significant energy savings have been recorded and the improved lime stability has had positive effects throughout the recovery and fiber lines. Ring formation problems have been alleviated by automated thermal shock techniques.
Commissioning best available process equipment and controls
to keep its bleached kraft pulp mill highly competitive in quality, cost, productivity and eco-friendliness is a major thrust for the investment strategy of Zellstoff Rosenthal. Adding high level controls to optimize process performance and lower costs is therefore a natural fit. So when the mill upgraded its control system to metsoDNA in 2006, one of the major objectives was to provide a capable platform for Metso Automation's Optimization Controls.

The causticizing plant was the first target for Optimization Control. That very successful project, which alleviated a recovery line bottleneck (see sidebar), was commissioned in 2005 in a metsoACN process control node. It was the first step to the complete system upgrade. Then, the complete metsoDNA upgrade gave Rosenthal the extra processing capacity needed for controlling the new brownstock washing line brought online in 2006. The mill staff also had their eyes on the potential returns from future Optimization Controls.

The next step in Rosenthal’s process control upgrade program was to install Metso Automation’s DNAlime lime kiln optimization control in 2007. That project was spurred by the need to stabilize the difficult-to-control process and drive it to a stable operating window where extra lime production capacity and lower natural gas energy bills were possible. The lime kiln is the biggest consumer of natural gas in the Rosenthal mill and, as is common everywhere, energy costs have been skyrocketing.

Differing dynamics, challenging controls
But the lime kiln process presented a particular challenge because of the unique and complicated process dynamics involved and operators' frustrations when trying to maintain a stable process from shift to shift. Hans-Joachim Milz, Recovery Line Manager, describes the issue: “We run a five shift operation, so you can have five different opinions about how to run the kiln. Sometimes we have had unclear ideas about how to handle a problem.”

This control dilemma is created by the different dynamics of the combustion and chemical reaction processes in the kiln. Some control parameters, like flue gas temperature, respond within a few minutes to changes in gas flow. Others, like the kiln temperature profile, the lime reaction process and residual carbonate level, take 10 to 15 hours to change. The actual lime flow through the kiln takes 4 to 5 hours. Altogether, it takes a long time to achieve a stable lime process, and there are often many instances of over-control or under-control. This is somewhat like the frustrating task of trying to drive a car with severe under-steer or over-steer and sluggish brakes. The mill was therefore looking for a better way of precisely steering the process for lower variability and a higher return on investment.

Profound effects
The effects of lime kiln instability on the entire recover line can be profound. Hans-Joachim Milz says that instabilities in lime quality have a cascading effect on causticizing efficiency, white liquor production and, eventually the digester production. It’s a bottleneck effect that the Rosenthal mill wanted to solve. Thomas Ludwig, Process Control Engineer, describes the objectives of stable control in the lime kiln. “If we get high quality carbonate levels with low variation, this leads to improved causticizing throughput, even white liquor production and even digester production. Lime kiln optimization and causticizing optimization go hand in hand,” he states.

So the mill enlisted the help of Metso Automation engineers to determine the key variables to control in their process and implement them in the DNAlime lime kiln optimization program. Metso Automation has installed a number of DNAlime optimization control systems in kraft pulp mills. These high level supervisory systems oversee the operation of the lime mud washing, fuel combustion, lime burning and kiln operation controls to stabilize the process and to provide even lime quality for a more stable causticizing process. Since the lime mud washing process in the Rosenthal mill is very stable with low residual alkali levels, this control was not implemented.

Temperature profile most important
In the kiln, the temperature profile from the inlet to the outlet is

“We keep the mill up to date with the best available technology to stay in the mainstream,” says Managing Director Leonhard Nossol.
When the Zellstoff Rosenthal mill upgraded its control system to metsoDNA, one of the major objectives was to provide a capable platform for Metso Automation’s Optimization Controls.

By stabilizing the combustion conditions in the kiln, over 6% energy savings have been realized. It’s a typical case of taking advantage of lower variations by shifting operating targets. According to Hans-Joachim Milz, this has been possible by keeping the temperature profile constant with respect to the kiln load. Thomas Ludwig says with the lower variation in the combustion level, the fuel flow can be managed to keep flue gas temperatures as low as possible. During the trial run, the energy consumption was reduced from 6.66 Giga Joules/tonne to 6.25 Giga Joules/tonne – a 6.16% savings. These savings have been maintained after the trial during normal running conditions. “The savings are huge, about 6%. For 350 days of running time, the payback time is less than one year,” claims Thomas Ludwig.

Alleviating a bottleneck

With the improved stability, the Rosenthal mill has seen that they can run the kiln at a higher lime production rate – a demand driven by increasing fiber line production. Thomas Ludwig reports that current kiln capacity has been bumped up to 285 tpd of CaO compared to 260 to 265 tpd during the previous year. “The higher load on the kiln was demonstrated by the optimization controls,” he says.

Thomas Ludwig continues to describe the stabilizing effects on the complete line. “White liquor production has been constant for the whole year, and we use the causticizing plant at full capacity more days per year. We forecast a record 315,000 tpy pulp production for 2007 and it would not have been possible without

The flue gas temperature profile is managed by:

- The fuel feed, which regulates the temperature level.
- The primary air flow, which affects the flame shape and provides effective heat transfer.
- The flue gas fan rpm, which affects the kiln temperature profile.
- Oxygen and carbon monoxide measurements modify the draft flow control to maintain a proper level of excess oxygen in the flue gas and low carbon monoxide emissions.
- The kiln rpm, which affects the lime mud depth (degree of filling).
Kiln burning and temperature profile controls. The primary objective in lime kiln optimization is to control the temperature profile from the inlet to the outlet.

The kiln optimization control,” he said in late 2007. That forecast was actually exceeded, as the mill produced more than 320,000 tonnes. Thomas Ludwig says the lime kiln optimization was not the only reason, but it definitely supported this record.

Rings are shocked
Keeping a constant temperature profile will lessen the tendency to build rings in the kiln. Thomas Ludwig says ring formation may be impossible to eliminate completely, but if the ring is relatively small (1 meter or less), it can collapse under its own weight or it can be loosened by thermal shock. Once loosened, gravity takes over and eliminates the pieces.

To loosen small rings Metso has implemented a special thermal shock sequence that is initiated by the operators from the metsoDNA system. During a 10 hour period, the kiln speed is increased, the fuel flow is increased to give a higher feed end temperature and oxygen flue gas levels are increased in response to the higher combustion rates. This thermal shock technique has been used several times before maintenance shutdowns. In 2007, there were no production halts for removing rings and that has continued into early 2008. There is some ring buildup, but nothing requiring a production halt.

Learning and improving
The knowledge of the Metso engineers was an important ingredient in the success of the lime kiln project and its continuing development. Metso continues to provide consulting and control tuning services in a yearly contact.

“Metso people visit different mills with a lot of different experiences. They are in a good position to provide their knowledge. During the implementation of the controls, we learned a lot about the process and how it responds,” says Thomas Ludwig.

The commissioning of additional new controls will continue. D-stage optimization controls will be implemented in the bleach plant. One metsoACN process control node is reserved for future implementations of Optimization Controls.

Results continue:
Even causticizing stabilizes the whole mill
Causticizing optimization with DNAcaust was implemented at the Rosenthal mill in 2005. By managing the green liquor TTA, the degree of causticizing and slaker reaction optimization, the control has more than met ZPR’s expectations. It took only two weeks from switching for the results to seal the acceptance of the system.

Based on online measurements from kajaaniALKALI, the optimization control provided remarkable improvements in both green and white liquor quality. White liquor effective alkali (EA) improved from 114.1 to 116.4 g/l with a 50% reduction in variability. The increase in EA of 2.3 g/l gave an equivalent 1.9% increase in white liquor production. This extra white liquor production avoided previous bottleneck issues when pulp production rates were high.

As of late 2007, the results have continued and the white liquor EA is even higher. Thomas Ludwig says the DNAcaust controls are still working well without any retuning. “There is very little variability and that effect is seen throughout the whole mill,” he states. EA is now around 119 to 120 g/l and the causticizing efficiency, at around 80%, is close to the maximum predicted by Goodwin’s curves which are built into the control software.

During the control evaluation trial run, the energy consumption was reduced from 6.66 Giga Joules/tonne to 6.25 Giga Joules/tonne CaO – a 6.16% savings. These savings have been maintained after the trial, during normal running conditions.
Metso Automation introduced a noteworthy vantage point at the Tissue Making conference by giving tissue makers some good ideas for meeting targets both in high quality and energy efficiency.

The Tissue Making 2008 conference – held in September in Karlstad, Sweden – drew close to 200 attendees from various parts of the world to hear about the latest developments in tissue making. Tissue makers were invited with the theme “Quality and Energy Efficiency in Tissue Making” to explore the next generation technology, which can help them meet simultaneous goals of producing high quality tissue products while using lower amounts of energy in the process. The main sponsors of the event were Metso Paper, Metso Automation and Turbomach Industrial Energy Systems. Metso Automation’s contribution was comprised of presentations, workshop sessions and a mini exhibition. In addition, the worldwide launch of Metso Paper’s new Advantage NTT process for making high-bulk, textured tissue with much lower energy requirements also featured Metso Automation’s new IR fiber and moisture scanner as well as the advanced IQSteamPro steam box on the pilot line.

Cost-efficient tissue quality management
Key points and improvements for tissue makers are the completely new approach to managing control of the scanning function and a new IR based scanning head that does away with the need for a nuclear sensor. Jukka Sorsa of Metso Automation presented the new PaperIQ Select system and emphasized cost savings that can be achieved by reaching quality targets more quickly after a start-up or a web break. The new technology, first launched at the recent SPCI 2008 fair in Stockholm, has much more extensive online quality and process analysis functions combined with highly advanced paper machine disturbance control capabilities.

“The new PaperIQSelect system is revolutionary,” said Sorsa, “since it is based on a unique adaptive and situation-based scanning method. Instead of using one fixed scanning speed traveling on a fixed path, the new technology adapts both speed and position to the real time requirements of the paper web. It changes essentially scan speed, scan width and scan position in response to the real-time situation. In this manner, it is possible to quickly concentrate on the areas that most need attention. The new technology speeds up getting back to steady-state operation after upsets, such as grade changes, startups or web breaks.”

These selective paper web measuring technologies automatically adjust to the very different dynamic measurement and control requirements of steady-state production versus machine upset conditions. In addition, they allow precision paper edge analysis, which is extremely important for getting the best cost-efficiency out of a paper machine. All of this is possible with the new-generation intelligent scanners, ultra fast measurements and advanced data collection.

IR sensor for both weight and moisture in tissue
Sorsa also focused on the new IR (infrared) sensor that gives fast and accurate measurement of both oven dry (OD) fiber weight as well as moisture in the sheet. The dual-purpose configuration in a single sensor offers numerous cost advantages, as well as faster response time, better signal-to-noise ratio, and removes the special training and handling needed for nuclear sensors.

IQSteamPro is Metso’s new generation steambox profiler for tissue machines. Based on a new
According Fabrizio Lapucci, automation is seen by Sofidel as one of the key factors for improving both machine performance and environmental impact.

The Tissue Making 2008 conference in Karlstad, Sweden, drew close to 200 attendees from various parts of the world to hear about the latest developments in tissue making.

design, the system delivers the highest heat transfer rates to the tissue sheet. The profiling function allows the triple advantages of better moisture profiles, improved water removal in the press section and reduced energy consumption.

Both the new IR sensor and the IQSteamPro steambox were in use at the tissue pilot plant where the conference delegates were allowed to see Metso’s new Advantage NTT textured tissue making process being shown publicly for the first time ever.

Unique optimization cooperation at Sofidel

Fabrizio Lapucci of the Italian Sofidel and Luigi Tasso of Metso Automation discussed about optimizing the overall performance of Sofidel’s production lines. Sofidel is Europe’s fourth largest tissue producer, with operations at 13 mill sites in Italy, Germany, France, the UK, Spain, Poland and Turkey.

Metso and Sofidel have a very long history of working closely together, which led in 2007 to a cooperation for optimizing the overall performance of Sofidel’s production lines. The guiding thought was that the total optimization of all the company’s production lines could result in a profitability increase equal to a new production line. “If this could be achieved,” said Tasso, “it meant clearly a much lower cost alternative.”

Optimization is defined by Sofidel as improving existing performance and should not be confused with maintenance or refurbishment. According to Tasso, optimization should be achieved at a relatively small cost and should preferably result quickly in savings that are several times more than the amount spent on the optimization.

The project started with an optimization study of TM3 at Soffass in Lucca, Italy. Based on good results, the agreement was widened in May 2008 to a corporate cooperation for optimization of all suitable Sofidel machines. Data from the baseline study was benchmarked against similar machines by comparing key performance indicators to see where improvements might give the biggest payback.

While Sofidel is understandably hesitant to reveal too much about what they have found, the speakers did say that one example of optimization concerns decreasing the gap between the Yankee dryer and the Yankee hood, which can result in gas saving of 7% or allow a 5.5% production increase. Another example concerned the upgrading of a machine’s basis weight control, which led to tighter oven dry weight targets and a possible set-point reduction of at least 0.1 gsm for both fiber and energy savings.

Automation is the key tool

According Lapucci, automation is seen by Sofidel as one of the key factors for improving both machine performance and environmental impact. “The automation system is the key tool in carrying out these studies and in evaluating improvement proposals. Without reliable automation, optimization and verification would be difficult, if not impossible,” he stated.

Wet end management at tissue machines

In the Kajaani session (Active Wet End Management – Key to Production Efficiency in Tissue), the focus was on the wet end management of tissue machines. There were also running demos on view of Kajaani consistency transmitters, kajaaniWEM and kajaaniCORMEC5 products.

The number of customers attending the wet end session indicates the rising importance of wet end measurements and controls to improve machine productivity. The same level of interest was shown also in the demo area, where customers had a possibility to see applied measurements and discuss specific applications in more detail.

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Plan’s programme aims at ensuring optimal physical and mental development of children through improved early childhood care and development, basic education and health services for mothers and children. This will be achieved e.g. by strengthening the capacity of health professionals, increasing the knowledge of mothers and other care givers regarding preventable diseases as well as the importance of proper nutrition and clean water for children’s development and by training teachers and improving the learning environment. The project countries include, for example, Ethiopia, Ecuador, Bolivia, India and Lao PDR.

In the spirit of the coming holiday season, we have donated our seasonal gift funds to support the work of an international development cooperation organization Plan. The funds donated by Metso will be used in a programme for the children’s right to survival, growth and development.