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Innovative Changes and Future Technology for Quality Control System

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QCS was started by only 2 sensors, basis weight and moisture. QCS supplier was creating a lot of various sensors and MD/CD controls from 50 years ago. Currently QCS has so many sensors and MD/CD controls. The customers can have a selectable sensors and controls freely in produced by QCS suppliers. I describe the QCS history of approximately 50 years, and I want to predict the future of QCS from a new product of Honeywell. However basically, I think that QCS future will be depended on the customer require mentation.

Innovation and Future of Web Inspection System

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Since we developed our first Web inspection system in 1978, we have contributed to various industries by installing approx. 8700 sheet inspection systems; as of 2015 end, not only non-printing sectors such as paper, pulp, film, metal and non-woven materials but also printing industries of gravure, flexography and offset print.

As we look back the history of web inspection systems (WIS) , the frequency of line sensor cameras has been improved 100 times faster from 2.67MHz in the 1980s to 320MHz in the 2010s. Detected defects are realized to be classified by defect types simultaneously storing defect image data on a real time basis. In the early years, an aim of introducing inspection systems was avoiding flowing out defected products, but nowadays implication has an quality improvement tool of lines.

Furthermore, because of high image pixels and high-speed clocks with line sensor camera improvement, the number of cameras is reduced, and high-frequency fluorescent lamps have been replaced with high brightness LED of longevity light source. It resulted in being improved

efficiency of maintenance by lowering camera breakdown ratio and free from replacing lamps.

Using Color cameras, it realizes now real-time defect classification with detected color defect images, running in a great number of lines. Besides Integrated Quality Management System as IQM System, which manages the integrate data of multiple inspection systems in a network, has been supplied and monitor on-site condition remotely and analyze in real time.

In the years ahead, further advancement of high image pixels and high-speed clocks of line sensor cameras will be preceded and downsizing with high performance are to be expected. New technologies like learning with machines or deep neural learning are implemented, and inspection systems make a contribution to reducing the workload of operators and increasing productivity.

Change and the Future of the Plant Operation and Maintenance that Utilize Smart Field Devices

— Recommend Proactive Use of HART Devices —

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We now face a big data era where a variety of data such as manufacturing process in the factory, car, consumer electronics, and humans, gather in cyberspace.

In industry, communication with the field devices such as sensors and actuators have been rapidly changed from the signal transmission of a single one way by the conventional analog value to a two-way communication by a plurality of data.

In particular the spread of HART communication that is compatible with the conventional analog communication accelerated the movement of the intelligent network of field devices, and device management system to create a new value is becoming popular in industry.

In this writing, how you can change the plant operation and maintenance by proactive use of the smart field devices around the use case of the Azbil's device management system “InnovativeField Organizer™” .

Future Vision and Direction of Production Control Systems

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Change of technologies and market situation strongly affects the environment of the control systems. In recent 10-15 years particularly, various standardization and open technologies such as MS-Windows, field digital, and alarm management are introduced, and each control system vender has been applying those to its control system with avoiding the impact for the fundamental functionalities and roles of control systems. In coming decade, some larger changes are expected such as standardization of control system architecture, that of application schemes, integration between control systems and production management systems, CAPEX reduction with de-bottlenecking of project execution, and applying of cloud technology.

Control systems vendors are required to adopt such technologies efficiently in order to provide customers benefits without losing the current roles of the control systems in customers' plants. Control systems vendors are also required to consider the system continuity and compatibility to propose their customers the system migration plan from the existing control systems to the latest with minimum risk.

Innovation and Future of Analyzers and Measurements for Pulp and Paper Industry

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Analyzers and Measurements for Pulp and Paper have been developed for stabilizing and improving of quality paper product, for reducing production loss due to paper-break and deposite and new parameters for analyzing production process. These instruments have been improved its accuracy, availability and diagnostics for capable “Advance Process Control” and “Production analysis by big data from process sensors” . This article describes, based on the above background, to consider “Innovation and Future of Analyzers and Measurements for Pulp and Paper Industry” by 3 points of “Measurement technology” , “Maintenance” and “Operation” .

The Revolution and Future for Drive Systems

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TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION -TMEIC-

Since TMEIC supplied a sectional drive systems for the paper machine at a half century ago, a lot of customers have been applying the TMEIC sectional drive system to several kinds of the paper machine not only for Japanese domestic but also all over the world.

The pulp and paper manufacturers focus on the efficiency and stability of mill operation, such as energy savings, automation control for cost reduction, less maintenance and total coordination of the control system. So TMEIC is providing the state-of-arts products and technology for their mills. In the old days, the motor-generator system was one of the latest technology as the sectional drive system, however it had become obsolete for the operation and maintenance. At present, after a couple of decade since then the IGBT semiconductor technology is much improved and it has taken over the old system. From now on it is assumed the next technology is not only hardware, but also software like IoT technologies which improve a mill operation. This article describes the history of the drive system in the field of paper manufacturing facilities and introducing the latest drive system with innovative solutions for the future.

The Spot Color-Measurement by Upgraded Spectrophotometer with Paper Machine

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Daio Paper Co, has been producing one of the main products, coated and lightweight coated papers by N10M/C in Mishima mill. The N10M/C was the first On-Machine Coating system in Mishima mill in 2007 and also On-line Spectrophotometer by GretagMacbeth (now as xrite) was also composed in as the Close Loop Color Control system by spot color measurement. As always, even since then there have been rapid technological innovations and developments and the new Close Loop Color Control system became available and it made the prior system out of sales and thus out of service after several years after the out of sales. In March.2016, the system was finally upgraded to the most recent system and has been started to run as in the past functionality.

In this paper, they are shown and explained that the background, the features, the improvements and the operational performance of the new system.

Introduction of Chip Level Switch which Doesn't Require Radiation Controlled Area

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We used traditional gamma-ray transmission-type level switch for detecting the upper limit of the chip chute for producing kraft pulp at Ebetsu Mill.

However, this type of switches, containing radiation sources regulated by-law, needed to be at the radiation controlled areas.

When we planned to replace the existing transmission-type level switch, we went through a trial of new level switch with Earthnix Corp., Ltd., who manufactures the gamma-ray reflection-type level switch that will not need to be at the radiation controlled areas.

As a result, we were able to come to the conclusion to put the new level switch, and get rid of the radiation control areas at the chip chute for the first time in pulp and paper industry.

This report introduces the case.

Mill Experiences with Single Point Kappa Analysers

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Kappa value measurement is the most important & critical pulp quality parameter to determine the chemical addition rate in Pulp production process and can become the key to optimize the chemical cost.

Chuetsu Pulp & Paper Takaoka mill's old softwood kraft bleach plant due to the ageing was closed down and was replaced with a new bleach plant which started operations in December, 2015. The new bleach plant is expected to provide better chemicals and energy efficiency while producing pulp that meets quality targets.

In Japan, it has been a standard practice to install traditional Multi-Point Kappa (MPK) analyzer to measure Kappa online. Typically, MPK analyzer has many sampling positions due to the update time is long (30 min to 1 hour), which impacts response to process variability. In addition, poor accuracy, unexplainable measurement spikes and plugging of sample transport pipelines, makes this heavy investment unreliable. When we were dealing with the equipment selection of kappa analyzer for our new bleach plant, Single Point Kappa (SPK) analyzer was proposed by Spectris BTG. Understanding the measurement principle and the function of SPK and the expected benefits. Chuetsu team concluded that this novel technology for fiber kappa measurement does offer the possibility to overcome some of the unstable conditions and has a potential to reduce the chemical cost so a trial was performed in the existing plant.

This paper reports the outcome of SPK trial and the current situation until the installation from the trial.

Color Defect Classification by New Inspection System

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AMETEK SurfaceVision developed new inspection system “SmartView 7.2C” with color line camera. The system allows users to set color defect classes by additional more than 20 color defect features. Learning classification tool “SmartLearn” is useful for classification especially for color defects. Users can focus on making Defect Library of color defects without struggling with color defect parameters.

International Conference Report —Pan Pacific Conference 2016—

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On October 25th, 2016, the Pan Pacific Conference was held in Seoul in Korea. The researchers and engineers mainly from Pan Pacific countries attend the conference which was held once in every two years. In this conference 10 invited speech, 55 aural presentations and 59 poster presentations covered a wide range of topics such as pulping, papermaking, coating, biorefinary and nonocellulose. The summary of those presentations focused on nonocellulose, pulping and biorefinary are reported.

Basics of Ozone Bleaching

Part 4 : High Consistency Ozone Bleaching Plants

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The first commercial high consistency (HC) ozone bleaching started in 1992 at the Union

Camp mill in Franklin (Virginia, USA). According to the C-Free[®] process implemented there, the pulp was adjusted by pH, pressed to high consistency (40%), fluffed and transferred to the ozone paddle reactor operating at atmospheric pressure. The C-Free[®] was provided by Sunds Defibrator until the late 1990's in the USA, Sweden, South Africa and Germany. Modern HC ozone bleaching uses the ZeTrac[™] technology provided by Valmet which is a much-simplified version of the C-Free[®]. The experience gained for the first industrial installations has shown that ozone requires very short contacting time with the pulp for around one minute and that a 5-10 minutes extraction stage after the Z-stage without intermediate washing is in most cases sufficient. Experience has shown that a 5-10 minutes e-stage at 11-12 percent pulp consistency, following the ozone treatment at high consistency produces results similar to those of a 60-90 minutes conventional extraction stage. The pulp at 38-42 percent consistency is diluted directly with alkali, so the alkali reaches the heart of the fibers without the need of diffusion and quickly solubilizes the oxidized material. Then the press following the e-stage removes solubilized material from the fibers when pressing the pulp. These two aspects — the quick access to the fibers thanks to their high consistency, and the quick removal of the alkali with the press — eliminate the need for long diffusion times in an extraction tower (in the case of new bleach plants). These observations permitted to reduce the size of reactors and to lower the investment costs. The plug screw feeder, the refiner fluffer and the washing stage prior to the extraction stage could all be eliminated. These drastic simplifications led to a significant reduction of the capital expenditure, energy requirement, maintenance costs as well as effluent volume.

—Peer Reviewed—

Development of Multiple Evaluation Method of Wood Pulp in Paper by Near Infrared Spectroscopy

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Near infrared spectroscopy (NIRS) has been applied in some fields such as medicines, chemicals and agricultural products. In this report, NIRS was applied to paper sheets to analyze the contained pulp qualitatively and quantitatively. LBKP, NBKP, CTMP and others could be classified by principal component analysis (PCA) for NIR spectra. The blend ratio of LBKP, NBKP and CTMP in the both mixtures of LBKP and CTMP, and NBKP and CTMP could be

determined respectively by partial least squares regression (PLSR) for NIR spectra within the coefficient of determination (R^2 value) of 0.98. Furthermore, the ratio of mixture of KP and another pulp on the paper could be determined somewhat correctly even if we do not know what kinds of pulp were contained. NIRS could also be used to estimate the drainability of LBKP; that is, the predicted value was very close to the measured value. NIRS was also applied to evaluate the degree of degradation of pulp. PCA for NIR spectra of LBKP has revealed the linear relationships between recycled times and score.

The NIR technique is faster than staining techniques, and does not require special training. If we could have tested a wider variety of samples, if we had more time, and if we could have optimized the analysis condition, it would be possible to estimate more precisely.