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Vol.68, No.1 Abstracts

The Present Condition of the “AOKI CLEANER”in the Paper Manufacture Industry
— Blade Type Canvas Cleaner —

Narihiro Ohtaka
Aoki Machinery Co.,Ltd.

In recent years the operation troubles of paper machine and its quality problems occur more frequently due to foreign materials including sticky pitch coming from increasing recycled paper usage. The sticky materials and pitch on canvas causes paper break at dryer, faulty spot, frequent splicing at winder, which decrease productivity.

Screening, pitch control chemical, high pressure water has been used to improve these situations, but these measures cannot solve the problems completely.

We, AOKI Machinery, has been developed “AOKI CLEANER”, an epoch-making blade type canvas cleaner. Let us introduce its mechanism and some operation facts.

Simplified and Energy Saving of Screen System
— MaxFlow Screen Series —

Kazumi Fujita
Technical & Engineering Department, AIKAWA IRON WORKS CO.,LTD.

The screening which works as the impurities removal system from paperstock is the most important and common stage for today's all paper manufacturing process. And, everyone who works in paper industry desires strongly its performance improvement and reduction of power.

MaxFlow Screen and MaxSaver which were awarded a Japan TAPPI Sasaki prize 2013 are the AIKAWA's newest outward flow, vertical and pressurized type screens. They are armed with state-of-the-art casing structure, rotor and screen cylinder, and achieve both of impurities removal performance and power consumption reduction, at the highest level.

We appreciate for strong supports from MaxFlow Screen and MaxSaver users, and appreciate for having been able to get a very good chance to introduce them formally in this paper to paper manufacturing industry again.

Manufacturing and Application of Nanocellulose

Go Banzashi, Yasutomo Noishiki, Yuichi Noguchi, Takayuki Shimaoka, Katsuhito Suzuki
and Yoshiyuki Asayama
Advanced Technology Laboratories, Oji Holdings Co., Ltd.

Cellulose nano fiber (CNF) is nano size cellulose fiber with high aspect ratio, which is produced by fibrillation of pulp. In order to facilitate fibrillation of pulp efficiently, we investigated new chemical pretreatments (e.g. Oxidation, Esterification). Using these techniques, we can control its size (short or long, coarse or fine) and surface charge (anionic, cationic or neutral). Using this CNF, we have been successful in manufacturing continuous CNF sheets.

Economics of Ethanol Production in a Repurposed Kraft Pulp Mill

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Richard Phillips, Hasan Jameel and Hou-min Chang
North Carolina State University

Commercial production of cellulosic ethanol is difficult. One of the reasons is high capital expenditure relative to ethanol product value. A repurpose scenario has been proposed from North Carolina State University (NCSU). In this scenario, available capacity of a kraft pulp process is used as a pretreatment facility of the ethanol production process. In consideration of repurpose scenario, some potential advantages are identified: reduced capital expenditure, experienced employees skilled in pulp operations, etc.

For the repurpose scenario, pretreatment of wood chips with green liquor followed by oxygen delignification and refining has been developed. In the optimized condition the sugar yield after enzymatic hydrolysis (on chip) was about 56%. In addition, saccharification technology with multi-stage clarifiers has been examined to make enzymatic hydrolysis more efficient.

Framework for financial analysis is developed with WinGEMS※, a process simulator for pulp and paper mills. NREL reports are public useful databases of fermentation and capital investment for the analysis.

With those method and technology, economics of cellulosic ethanol production in the repurpose scenario was analyzed. The total cost was 125.5JPY/L. From a sensitivity analysis, variable costs of chips and enzyme was found to have a significant impact on the total cost. Capital expenditure of repurpose scenario was one fourth compared to that of greenfield scenario, which means the repurpose scenario is an attractive solution.

※Metso production

Thermal Spray Coating onto the Shell of Yankee Dryer and the Operating Experience of PMT4 Tissue Machine

Keiichi Furikado
Kasugai Mill, Oji Paper Co., Ltd.

PMT4 tissue machine in Kasugai mill has been in operation since 1993, and it is producing tissue paper. The shell of Yankee Dryer (YD) had worn thin, and the surface of YD had become coarse. We solved these problems by coating the shell with the method of thermal spraying. This paper reports the experience of thermal spray coating onto the shell of YD and the operating experience.

Practical Use of the Camera Type On-Line Formation Sensor for the Improvement of Sheet Formation

Junji Yamamoto
NPi Research Laboratory, Nippon Paper Industries Co., Ltd.

Well-controlled sheet formation is necessary to ensure optimal physical characteristics leading to product quality and waste reduction. To evaluate and control the sheet formation, a good on-line formation sensor is required that is able to give us enough information such as flock size distribution, trend and so on.

We installed the camera type on-line formation sensor, which is able to detect the transmission images of the running web and evaluate the sheet formation (formation index and flock shape) intermittently, on the newsprint paper machine. We analyzed the relationship between sheet formation measured by the sensor and the operating condition. We succeeded in improving the sheet formation with the optimization of the dewatering condition on the former of the paper machine and the furnish arrangement.

Numerical Analysis of Fountain Coating Applicator

Yousuke Ozeki and Masaru Yasuhara
MPM CAE Center Co.,Ltd.

We verified the behavior of coating liquid onto the running web the fountain applicator by the numerical analysis.
As a result, the condition of the dirt lip fountain was simulated by the Reynolds number.
Furthermore, the proper range of both coating speed and viscosity is also clarified by using the Reynolds number.
We found that, the numerical analysis is effective to find out optimum design of the phenomenon.

Reinforcement Constructions of Niigata Sheet Finishing Machines

Yuichi Hokari
Hokuetsu Kamiseisen Co., Ltd.

At Japan Tappi seminar, in May 2013, we made a presentation the title is “Operating experience of New Sheet Finishing Machines”. We reported the outlines of new sheet wrapping machines and new skid wrapping machines for the export sheet paper. At that time, new Pasaban-made cutter machines we adopted had just started up. In this paper, we report the characterization and running situations of new cutter machines. We run a lot of cutter machines because the ratio of sheet paper we produce is relatively high volume than web. On deciding the adoption of new cutter machines, the overseas results are also appealing points. There have been many operation results of Pasaban-made cutter machines all over the world. In Japan, there have been results for paperboard, but there is no experience for paper. The new cutter machines we adopted have been running with high efficiency rather than existing ones we have.

Renewal of Wastewater Treatment Facility and its Operating Experience

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Facilities Department Yashio Mill Rengo Co.,Ltd.

Rengo Co., Ltd. Yashio Mill has installed a new wastewater treatment facility for the use of recycling water due to the decreased performance and aging structure of the existing facility. Under the spatial constraint, a highly-efficient, energy-saving, compact system had to be designed in the renewal project. Eventually, Sumi-Sludge® System, a high-rate coagulation system, was selected after a comparative investigation of those including suspended carrier process, oxygen aeration process, multi-stage biological process, and membrane bioreactor. The new system is equipped with high-rate coagulation precipitators, Sumi-Thickner®, which concentrate the activated sludge to a high extent. With the aeration tanks also keeping the MLSS in high consistency, the system is designed to treat the wastewater efficiently with the BOD volume load of 2 to 3 kg-BOD/m3/day.

As the characteristics of the system, it keeps good conditions of the microbiological ecosystem and sedimentation property which enable a highly efficient treatment while the property and flow rate of the wastewater are kept stable. On the other hand, owing to the space-saving design, the surface level of the activated sludge tends to fluctuate widely once the sedimentation property worsens. Besides, high consumption of chemicals such as coagulant, and high sensitivity of the performance to the fluctuation of the wastewater property and flow rate are also observed.

Here we report the implemented measures against the above, including the control of MLSS, adjustment of effluent flow rate, reselection of chemicals, and additional installation and modification of auxiliary machines. These subjects need to be resolved continuously for the future by accumulating operational experiences and further improvements.

Plant Design and Operational Performance of RPF and Wood-Chip Co-Firing Boiler
— Concern for Environment and Reduction of Fossil-Fuel Consumption —

Masahito Sugimura
Mishima Mill, Tokushutokai Paper Co.,Ltd.

In order to reduce the consumption of fossil-fuel, RPF and wood-chip co-firing boiler was constructed at Mishima Mill, and it started the operation in 2012 after the shut-down of existing heavy oil fired boiler. Installation of the new boiler resulted in the reduction of both energy consumption and carbon-dioxide emission from energy usage.

Since the mill is located in residential area, the boiler was designed in a way that takes the surrounding environment into consideration. Fuel hopper and ash banker are placed indoor to prevent the spreading of dust. Dust collectors are installed in various places such as fuel hopper, fuel conveyor, ash banker, and sand banker.

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Web Gauging System at a Glance

Yuki Hashimoto
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Recently, in the paper industry, a population of experienced staff is decreasing year by year, and succession of operation technique poses a problem.

The industry was supported by craftsmanship of each of operator. Considering actual condition, QCS (Quality Control System) is really needs to help operation by insufficient experienced operators.

Our company is tying up with NDC infrared engineering (the following NDC is called) lineup the excellent system in this field, and wants to offer the system to the users of the paper industry. We focus to measurements of basis weight, moisture, thickness, then can offer excellent performance with reasonable prices.

Furthermore, it became possible to reduce sharply the failures by reducing the parts mark of system. We hope that if a system is introduced, user will get quality improvements, claim reduction and overall cost reduction.

Moreover, we provides to after-sale service including the correspondence in the engineering service such as arrangement of apparatus, improvement of equipment for conveying paper threading tail, erection work, test run adjustment, preventive maintenance and emergency call.

Belt for Extreme shoe press conditions
- BlackBelt E -

Tetsuro Endo
Valmet K.K.
Satu Hagfors
Pulp, Paper & Power, Metso

Centrifugal casting in a cylindrical mould is the newest method to manufacture shoe press belts. Belts are usually made of polyurethane elastomers reinforced with synthetic yarns, either as a woven base fabric or as straight yarns in two or three layers. Grooved belts are used to get nip dewatering. Groove shape and dimensions are selected based on the requirements of the machine and paper grade.

Belt wear may be affected by paper machine speed, load, filler content, washing agents used, elastomer material and the reinforcement of the belt. There is a relationship between the shoe press load and the belt stretching: Stretching will increase when the load is increased. This is due to the Poisson effect: when an incompressible material (like polyurethane) is compressed thinner, it will stretch to the other direction. Stretching in the nip causes speed difference in the shoe press and this will enhance belt wear. High modulus reinforcement decreases belt stretching in the nip.

Good results have been obtained with high modulus yarn reinforced belts fast board and paper machines with shoe presses where standard belts wear or crack.

Solution for Sheet Breaks and Paper Defects by Canvas Passivation Technology

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Chemicals Development Team, Maintech Paper Tech Co., Ltd.

In recent years, paper makers have focused on production efficiency and manufacturing cost, even though the paper-making condition has been deteriorated year by year, for example OCC grade down and increase of recycled magazine in the furnish, reuse of recycled fiber and so on. These conditions lead to serious deposit problems in dryer section which cause sheet breaks or defects in a finished paper. Not a few fabric cleaner are used in the machines but have not met paper makers requirement.

This report introduces a development of a passivation chemical nCleanKeepr®" which works efficiently with any kinds of dryer fabric cleaners. Examples applied in paper machines are also presented.

Simple and laboratory-Scale Coating Machine
-Introduction of "Coating Unit"-

Masaru Futaba
Nomura Shoji Co., Ltd.

Sumet in Germany released its latest model of the Laboratory-scale coating units. The standard coating unit is equipped with application roll, backing roll and a rod for removing excessive chemicals before coating. It can be used as size press and film press. Optionally, it can be used as a blade or metering rod for coating. Infrared dryers and hot air dryers are used for drying the test strips. The integrated touch screen is used to control the dryers, as well as speed and compression force. The sample is automatically pulled through the coating unit. The coating rolls and coating container can be removed quickly from the unit to ensure easy cleaning. Therefore this type of coating unit is suitable for coating many different kinds of chemicals with only a little amount of coating color. The same condition of coating as well as coating amount can be reproduced exactly as long as the parameters are kept same. These parameters include roll to roll and rod contact pressure, dryer intensity, speed and so on. In this article, the standard type for cut sheet coating and optional type for On-line for roll sample coating are introduced.

Introduction of Automatic Filter
-Applications and References of Non-Electric/Self-Cleaning Filters-

Daisuke Inoue
Ecological & Industrial Machinery Dep.,Itochu Machine-Technos Corporation

The development of water treatment technology has been contributed to the reduction in water consumption. Water use reduction and cost reduction can be achieved not only by membrane technology but also by appropriate methods of water treatment.

In this paper, "automatic filter" and its applications in paper and pulp industry are introduced. It is non-electric and self-cleaning filter that mainly uses water pressure for filtrating and cleaning. There is a wide range of applications including intake water and cooling tower filtration.

Technology Development in Tissue Making and Things Europe

Dairo Tomita
RIKENGREEN CO.,LTD.

Rikengreen offers the most advanced paper chemical technologies in Japan under exclusive license from the global leading company, Ashland Hercules Water Technologies.
We offer every chemical product and its application technique required from pulping operation through comprehensive paper making. We are confident in helping and assisting the mills optimal operations with our specialties; the best fit application techniques based on the knowledge of whole process of the paper making operations and the quick understanding of the specific feature of the individual machine and its environmental requirements.
In this report, we would like to present the state-of-the-art tissue technologies using the new, fully cross linked coating agent and the low AOX wet strength agent from European industry.

Total Solution of Papermaking Machine by New Type Wet-End Improver

Hiroyuki Oishi, Koichi Tadaki, Kazutaka Kasuga and Yukihiro Fujita
Technical Dept., SOMAR Corporation

In recent years, the effect or performance of various wet-end chemicals has been
weakened, because of the closed system of papermaking machines, recent poorer quality
of pulp materials and other factors mentioned later. Especially, the dosage of the wet-end chemicals such like retention aid, paper strong agent, and sizing agent has increased to show their further more effect, in response to the higher dosage of waste paper and fillers. That resulted in stain of papermaking equipment, and defects of paper surface.

"REALIZER A Series" which our company has developed, is an effective / practical

high-performance coagulant and special cationic polymer to applied to pretreatment process of pulp materials. On the other hand,"REALIZER R Series, FX Series"is a high molecular special polymer with various structure which enables to achieve excellent retention with small dosage.

We'd like to emphasize the New type Wet-end System, the unique usage system, that is, using together"REALIZER A Series","REALIZER R Series"and "FX Series". It would be noted that we named the unique system"AXISZ SYSTEM"and R & D has been still working for farther better runnability and productivity.

In this paper, we'd like to introduce the characteristics of the abovementioned and newly developed systems.

Adaptable Paper Strength Agents for Papermaking of High Electrical Conductivity

Takashi Minabe
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In recent years, paper making systems have been changing from the viewpoint of environmental protection and cost reduction. Recycling rate of used paper has been increasing, and fiber quality has become worse. For a reason of operation cost reduction, consumption of fresh water has also been restricted. Under such highly closed wet-end condition and high electrical conductivity, various wet-end additives or internal wet-end agents cannot show desirable performance.

We developed powerful internal paper strength agents which show higher retention rate than conventional chemicals under high electrical conductivity. A new internal paper strength agent (amphoteric PAM) can form a polyioncomplex under high electrical conductivity because of increasing ionic charge density in the polymer. In addition, we also developed a paper strength agent of spray type for papermaking of high electric conductivity. Combination use of internal additives and spray type paper strength agent, it is capable of exhibiting the higher paper strength effect than use of internal additives only.

Optical Bleach Plant
-Pulping Process Control by In-Line Optical Transmitter-

Keijiro Suzuki
BTG Japan, Spectric Co., Ltd.

In this paper I present the new concept "Optical Bleach Plant"which has great possibilities to measure the pulp characteristics and control the process in fiberline instead of the method in past year. The fiberline process is the "key"of papermaking process and has a big effect on the whole of papermaking pr if the fiberline process is stabilized or variating. In other words, in the fiberline there are big potentials which will affect on the quality of products and its profitability. It is my great pleasure if I can show the "thread of light"to improve your fiberline process with our new concept and technologies.

For Sound or Noise in Industrial World Part VI
- It Thinks about the Noise as Part of T.F.O from SKF -

"For sound or noise in industrial world" is the five in this time. This explanation is a noise by the contamination. The contamination accounts for 14% of the whole of the problem that the damage at the early stage of the bearing doesn't reach the calculation longevity. The contamination exists from small one to the big one, and from rigid to soft. And, there is the solid and liquid. I present the example of the soft solid one by this contamination, deprave the longevity of the bearing by it, and tell how the noise is generated.

Fully Split Seal for Agitators Services
-Type-37FS Fully Split Seal-

Takahiro Hayashi
EU Engineering Dept. John Crane Japan, Inc.

Retrofit shaft seal from gland packing to mechanical seal in pulp and paper mills is proceeded but it is only limited to the major machines such as pumps for cooking and chemical or refiners. Gland packing is still applied in raw material tanks or horizontal agitators for chest.

This is because the horizontal agitators often occur shaft runout and vibration. These factors are long deflecting shaft and changing tank liquid level, etc. So, it is thought that mechanical seals cannot be applied.

However, there is a mechanical seal that can absorb such shaft runout and vibration by using rubber bellows. Furthermore, fully split design can reduce cost and time of the maintenance.

We would like to introduce the fully split mechanical seal which can be applied accommodate the shaft runout and vibration for horizontal agitators with actual experiences.

A Report on ISWFPC 2013
-June 12-14, 2013 at Vancouver, Canada-

Shiho Takahashi
Forestry and Forest Products Research Institute

ISWFPC 2013 (The 17 th International Symposium on Wood, Fiber, and Pulping Chemistry) was held in Vancouver, Canada hosted by PAPTAC (Pulp and Paper Technical Association of Canada). Total participants were 183 people from 16 countries. There were 91 oral presentations on 11 sessions and 103 poster presentations. Summaries of several presentations regarding biorefinery, pulping and bleaching, and lignin chemistry were introduced in this report.

A report on 15th Fundamental Research Symposium
"Advances in Pulp and Paper Research"
－September 9-13, 2013 at Cambridge, UK－

Minoru Kimura
The University of Tokyo

15th Fundamental Research Symposium "Advances in Pulp and Paper Research" was held at Cambridge, UK on September 9－13, 2013 hosted by The Pulp and Paper Fundamental Research Society. Total participants were 110 people, and 42 oral presentations including a keynote address and 3 reviews were conducted togather with 11 poster presentations. Summaries of several presentations and personal impression on this symposium will be reported.

Corporate Profile & Products Information (9)

KURITA WATER INDUSTRIES LTD.

KURITA WATER INDUSTRIES was established as a boiler chemical supplier in 1949. For more than 60 years since its establishment, Kurita has been contributing to the development of industry and society by providing solutions to customer's problems as a leader in the fields of water and the environment. Defining our corporate philosophy as "Study the properties of water, master them, and we will create an environment in which nature and man are in harmony." We are aware that the Kurita Group has a mission to create new solutions to different issues involving water and the environment.

Given that water resources are limited, it is essential to make effective use of water and to establish a continuous cycle of clean water to and from nature for repeated utilization. On the basis of its accumulated water technologies, Kurita will devote all its strength to helping to resolve various issues in the field of Pulp and Paper Industries.

In this article, we would like to introduce our corporate profile as well as the technical trend and the recent development of water treatment chemicals for pulp and paper making process.

Research Report(Original Paper)

Moist Heat Accelerated Ageing Test of Naturally Aged Paper: Predicted Initial Physical Properties and Degradation Rate Indicator at Room Temperature by the Result of Suspension Method

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Graduate School of Fine Arts, Tokyo University of the Arts

In order to take measures for preventing degradation of paper whose permanence is low, like acid paper, and saving them in a better state for a long time, it is preferable to estimate the natural ageing rate of various types of papers and to predict their life expectancy. Conventionally, the permanence of paper is evaluated by artificially ageing paper at a single temperature, but it has been reported that if paper deteriorates differently at different temperatures, the assumed permanence of paper at a single high temperature will differ from that at room temperature.

Thus, in this research, 11 naturally aged books from the Journal of the Chemical Society published in Britain that had deteriorated over time for 130 to 80 years were selected and further aged artificially under 4 temperature conditions between 60 and 90°C (65%r.h. constant). It was possible to obtain the degradation rates of tear index, burst index, degree of polymerization and discolouration at room temperature by Arrhenius plots with high correlation coefficient (more than 0.97). Initial physical properties were calculated by estimated degradation rates, current physical properties and time that elapsed from the publication of the sample books. The degradation rate indicator (degradation rate constant divided by tear or burst index) were calculated as in our previous research, since the higher the physical properties, the lower the degradation rate of
tear or burst index was. Better correlation was observed between the concentration of hydrogen ion before moist heat accelerated ageing and the degradation rate indicator of the physical properties of paper at room temperature than at higher temperature.

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Space Technology and Its Evolution
- Challenge to Space -

Yasufumi Wakabayashi
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In Japan we have been working for Space Development these 50 years. We join the International Spacestation (ISS) program, and contribute the H-2 transfer vehicle (HTV) every year. This paper describes outline of Japanese space development and its evolution.

Disaster Prevention Initiatives Tokyo Gas and Response to The Great East Japan Earthquake

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The Great East Japan Earthquake did not damage any important facilities used by Tokyo Gas for city gas production and supply operations, but some low pressure pipelines with low earthquake resistance were damaged, forcing the company to suspend supplies of gas to about 30,000 homes to preserve safety. This paper briefly describes initiatives taken by Tokyo Gas to provide prevention from earthquakes and its response to the Great East Japan Earthquake, which is centered on the super-dense real time monitoring earthquake system, SUPREME.

Next-Generation Mobile System

Tetsuya Ishizuka
Ashikaga Mill, Nippon Paper Industries Co.,Ltd.

At our Ashikaga mill, we have decided to utilize mobile DCS in order to update exist. Since mobile PC was still profound feeling, target was to be portable for operate. Hence, we try to implement tablet PC which has been spreading through the market.
The tablet is not only for DCS, but also can help operator for work procedure, manual operate. We could build different mobile system from previous one by installed function can manage local process record as well.
This report describes the outline of mobile system and operation.

Cyber-Security Controls for Industrial Control Systems

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Service Division, Yokogawa Solution Service Corporation

The introduction of Information Technology (IT) has improved performance, has reduced costs, and has added other important capabilities in industrial control systems. Since this technology has brought malicious attackers from the Internet world to industrial automation world, cyber-security risks such as computer virus infection have increased. Industrial control systems are generally utilized in mission critical infrastructure, so cyber-security is one of the most important concerns.
In this paper, we firstly investigate the root cause of cyber-security risks prior to establish security controls. When introducing security controls, industrial control system users are supposed to build security policies. We show the key points to be considered for the policies. We lastly explore the best cyber-security solution to protect industrial control systems from attacks based upon security policies.
Yokogawa have established Security Competence Laboratory in Singapore, India, America and Japan. The main mission of Security Competence Laboratory is to research cyber- security technologies and to apply them to industrial control systems with our rich experience in industrial automation. Yokogawa have sufficient capabilities to protect industrial control systems from sophisticated attacks.

Azbil Crisis Management Solutions for Manufacturing Industry

- BCM Solutions and Intelligent Earthquake Emergency Shutdown System -

Shouichi Osakabe
Business Headquarters Solution Department, Azbil Corporation

Social environment surrounding companies has been changing substantially, such as earthquakes occur frequently, cyber attacks on companies etc. Such changes introduce greater complexity and diversify into risks that seriously affect business continuity and increase these serious risk. Companies are facing a "time that is easily exposed to risk".

Azbil challenges to supporting the manufacturing industry customers for strengthen the risk management measures, improving response to suspend and restore manufacturing equipment operation quickly and safely to minimize a loss and maximize a safety. This paper introduces BCM (Business continuity management) solutions Azbil proposed, including the “Intelligent Earthquake Emergency Shutdown System” that become a high-profile solution in the country.

Integration of IT and Instrumentation Technology －The Case Study in Yatsushiro Mill－

Junji Hoshi
Yatsushiro Mill, Nippon Paper Industries Co.,Ltd.

Instrumentation technology is one of the key technologies of pulp and paper industries and other process industries. And it has contributed significantly to the improved productivity of the plant in the efficiency of production lines and labor saving represented by automation.

On the other hand, personal high-performance computer was released in the late 1980s. Since then, continued to grow super-accelerated rate, and synergistic with the network technology such as the Internet, it became the basis technology to penetrate deeply well as any industry, even our lives.

In recent years, instrumentation technology has evolved dramatically further by utilizing actively this IT technology, it has great potential depending on the idea.

In this paper, as one of the initiatives aimed at the integration of IT and instrumentation technology, we introduce the application that using it to build and process data warehouse with integrated measurement and control real-time data of the plant. And mention about the future prospects for enhancing the application of measurement and control technology to the future.

The First Introduction Example of New QCS with Non-Contacting Optical Caliper Sensor

Takeshi Hashida and Takashi Endo
Fuji Mill, KJ Specialty Paper Co., Ltd.

Recently, QCS (Quality Control System) is becoming one of most important component for Quality Management of papermaking. The result of developing various Quality Sensors and establishing Control strategies, Paper Industry tried to adopt an advanced stage of Production Management with QCS instead of the experimental rules.

However, our industry got big impact through the financial crisis such as the Lehman shock in 2008. So, we started to consider not only for Initial investment but also long term maintenance cost to make a plan to replace or apply new equipment to our mill facilities. Under this kind of our environments, we decided to apply NDC ProNet QCS with Optical Caliper Sensor as 1st trial of thickness measurement for paper machine at Aug 2012. We would like to describe our experiences and evaluation using Optimike as completely non-contacting optical caliper on this paper.

Introduction of Fiber Weight Meter at Kasugai Mill

Sumio Hayakawa
Kasugai Mill, Oji Paper Co.,Ltd.

Oji Kasugai mill has carried out replacements of QCS with the deterioration of electronic components. At the time of consideration of renewing QCS for 100% pulp tissue manufactur- ing process, sensor suppliers recommended the newly developed fiber basis weight sensor using infrared technology (“fiber basis weight sensor”). The characteristics of the fiber basis weight sensor are as follows.

① Both basis weight and moisture can be measured by one sensor, and that lead to a cost reduction.

② No official permission for containment of radioactive material, radiation protection supervisor or education and training for handling radioactive material are necessary.
③ Measurement data are influenced by the ash content in the web.

For tissue manufacturing processes which do not contain the loading material, installation of the fiber basis weight sensor is reasonable for many advantages. Oji Kasugai mill therefore has started the introduction of the fiber basis weight sensor into tissue machines since Jan. 2010. As it was the first case of introducing the fiber basis weight sensor to tissue machines in Japan, the formal basis weight sensor using radiation was also installed as a benchmark until the measurement data of the fiber basis weight sensor become reliable.

This paper describes three examples of the installation of the fiber basis weight sensor of two different manufacturers.

Case of Non-Contact Caliper Sensor Installation to Wrapping Paper

Tetsuo Funaba
Takaoka Mill, Chuetsu Pulp & Paper Co.,Ltd.

In the recent years, QCS quality control system has become vital component in the paper production.

6 QCS systems have been installed in Chuetsu Pulp & Paper Takaoka Mill.

As for existing QCS system of No.1 machine, which was installed over 18years ago, and some of the controller parts has passed its maintenance warranty period which makes it difficult for the supplier to supply the parts. Hence, update of the QCS system was brought forward.

Problems with the existing QCS system were that, the upper and lower contact surface of the contact caliper would clamp the paper and leave scratch marks on the paper which would cause the sheet break. This was seen significantly when measuring thin paper such as basis weight 20g/m2. Therefore, to resolve this problem a non-contact type caliper sensor has been selected for this QCS system update.

This document explains the measuring of the laser caliper sensor post installation.

Storage for Big Data/Cloud Era
-Tiering Storage Technology to Meet the Diverse Needs-

Hitoshi Tanigawa
Toshiba Corporation Cloud & Solutions Company

In “Big Data / Cloud era”, the storage is required for scalability that can accumulate large amounts of diverse data. At the same time, superior performance that can correspond to real-time processing is also required. By the tiering storage technology of ”Toshiba Total Storage Platform”, Toshiba realizes a high level of both performance and capacity characteristics, and supports big data and cloud era.

New Defect Detection Technology for Tissue Industry

Jason Zyglis and Wayne Killmer
COGNEX CORPORATION
Atsushi Kurosaki
COGNEX K.K.

Cognex will present a new level of sophistication for defect detection, specifically tailored for the challenging tissue environment. Using Cognex’s new detection technology, tissue producers can now reliably detect 5-10 mm spots and holes with 90% accuracy. Globally, tissue producers are adding vision technology to their production lines at an increasing rate. In addition to sheet break analysis and other process monitoring solutions, the leading producers now require holes and spots to be detected so immediate corrective action can be taken by operators.

Report on 2013 TAPPI International Conference on Nanotechnology for Renewable Materials

Riichi Muramatsu
Nippon Paper Industries Co., Ltd.

2013 TAPPI International Conference on Nanotechnology for Renewable Materials was held at KTH in Stockholm, Sweden from June 24th to 27th, 2013. Approximately 400 delegates gathered mainly from Europe, the US and Canada. The conference included 85 oral presentations and 33 poster presentations.

Summaries of the several presentations are reported.

Corporate Profile & Products Information (10)

Azbil Corporation

Ever since the founding of our company as Yamatake Shokai in 1906, and through subsequent name changes to Yamatake-Honeywell, Yamatake, and finally Azbil Corporation, we have consistently provided solutions through the pursuit of measurement and control technology.

On our 100th anniversary we set forth a corporate philosophy to guide our business development in the next century: “We strive to realize safety, comfort and fulfillment in people's lives, and to contribute to global environmental preservation, through human-centered automation.” At this time azbil, from the words “automation zone builder,” was selected as a reminder of this philosophy, reflecting our wish to realize places of safety, comfort, and fulfillment using automation technology. Six years later, to accelerate our business growth, we changed our company name from Yamatake Corporation to Azbil Corporation. At the same time, domestic azbil Group companies were renamed to include “azbil,” unifying our brand and our company names inside and outside of Japan.

The azbil Group, through each of its three major business areas, helps to preserve the earth's environment, and provides people with peace of mind, comfort, and a sense of accomplishment. Our major businesses are Advanced Automation, for factories and plants, Building Automation, focusing on commercial buildings, and Life Automation, providing essential services and health care.

As we implement our corporate philosophy, our policy is to be a long-term partner for customers and the community. In our solutions development, we have a threefold emphasis: next-generation solutions for production and working/living spaces, energy management solutions, and safety solutions. Our business model aims at domestic and global development by leveraging the azbil Group's unique products, technologies, and services.

－Peer Reviewed－

Review of AOX Measurement

Masayuki Watanabe, Hitoshi Takagi, Hiro Iwata, Miyuki Nakagawa, and Hitoshi Okada
Japan Pulp and Paper Research Institute, lnc.

AOX (Adsorbable Organic Halogen) is a useful index of total organic chlorine compounds, and is used internationally as an evaluation method for the paper industry’s effluent. In Japan, AOX discharges from bleached pulp mills had been reduced by changing bleaching processes to ECF (Elementary Chlorine Free) since the last half of 1990s. We confirmed that the Japanese mills have low AOX discharges when compared with other countries. However, the AOX measurement method of Japan was different from other countries. In Japan, AOX was measured by the domestic method based on EPA9020B. On the other hand, AOX was measured by the ISO method based on ISO9562, EPA1650 and SCAN9:89 in other countries.

Therefore, we investigated the influence of the method on the value. As a result, we found out that AOX measured by the ISO method was higher 1.3 times than the domestic method. It was considered that this result was caused by high hydrophile and low molecular chlorinated organic compounds in the effluent. AOX discharges from the Japanese mills are low, even if we use the ISO method.

We can get the correct value at the same level with the ISO method, using the improved method which changed the washing solution of the domestic method into acid from neutral. Considering the correct value and the convenience, we recommend the improved method.

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Operating Experience of Dissolving Kraft Pulp

Yoshifumi Horisaki
Kushiro Mill, Nippon Paper Industries Co., Ltd.
Current Affiliation : Maryvale Mill, Australian Paper Pty Ltd.

In recent years, the demand of rayon for clothing and woven is growing based on the background to the remarkable economic development at Asian region, especially China. The raw material of rayon is cotton linter or dissolving pulp. Dissolving pulp supply can be stable because dissolving pulp is industrially produced without climate affects which cotton linter always faces on. So the stable demand of dissolving pulp is expected in the future.

Dissolving pulp has been produced by the Sulfite Pulp method. However, manufacturing techniques to produce dissolving pulp by the Kraft Pulp method with continuous digester has been developed. Kushiro Mill, Nippon Paper Industries Co., LTD., started up the world first continuous cooking process for softwood Dissolving Kraft Pulp (DKP) in 2012, and started commercial production in March, 2013.

This report covers the installation of DKP process and experience of DKP operation.

Operating Experience of Canvas Cleaning Equipment

Kanichiro Kadoya
Kushiro Mill,Oji Materia Co.,Ltd.

Oji Materia Kushiro L-1 produces linerboard 1,370 ton per day. It is one of the largest linerboard machines in Japan. The paperboard comprises three layers; bottom layer is formed by Fourdrinier, middle and surface layers are done by Belbond-former.

We take a variety of measures against defects derived form sticky substances to improve production yield. Especially, sticky substances that were accumulated at the canvas of bottom part of the second dryer caused a lot of troubles. A blade type canvas cleaning device has been operated in conjunction with a high-pressure water type cleaning device since June 2012, and they have been very effective for reducing defects. We report the consideration of introduction and our operating experience.

Quality Control of Converting Paper for Food Container

Tadashi Matsuzaki and Yuichi Kaminuma
Oji F-Tex Co.,Ltd..

Oji Paper Group moving into a holdings structure in October 2012, Oji Specialty Paper Co., Ltd. changed its name to Oji F-Tex Co., Ltd. . We are determined to enlarge our “Diverse Products Lineup”, the distinctive specialty printing papers, specialty paperboards, functional papers, films and converted products.

Our high-grade paperboard and specialty paper are used in variety food containers and packaging. Such as paper for liquid packaging, cups for instant-noodle soup, ice creams, yogurts and greaseproof paper for hamburger wraps along with glassine based cooking papers and so on. BOPP (Biaxially Oriented Polypropylene) films are also available. We manufacture from specially selected pulp into consideration when designing products, so as to maintain food quality and safety. Our products are also very easy to fold so customers can design packages that assert their uniqueness.

We work to use environment-friendly materials, and ensure production safety based on Oji Group's “Product Safety Charter” as well, when we purchase materials. We also adopt the standard set by Japan Paper Association and Japan Food Sanitation Act.

Improvement of Frost Resistance of Concrete by Pulp Addition

Yuki Kamiya, Hiroyuki Tanaka and Soichi Takahashi
Chuetsu Pulp & Paper Co., Ltd.
Shinichi Yamada

Hokuriku Electric Power Company
Keita Shimonakamura
GEOSTR Corporation
Yoshitaka Koshimura
AVANT ASSOCIATES, INC.

Recently, the amount of generated coal ash has been also increased. Therefore, effective utilization technology of coal ash should be developed urgently. The coal fly ash is a fine particle fraction of coal ash, has been already utilized for the improvement of durability and fluidity of the cement concrete. However, it is known that there is a problem in durability and strength of concrete containing with high percentage of fly ash. Therefore, fly ash content of the cement concrete is usually 15% or around, and to be 30% at most.

In this paper, we attempted to the prevention of decreasing of strength and durability in high fly ash-containing concrete (substitution ratio: 60%), by pulp addition. The mechanical strength change due to material age was measured, and freeze - thawing test was also carried out as an indicator of durability. As a result, by pulp addition to the concrete with high substitution of fly ash, the mechanical strength was reached to sufficient value for withstanding practical use, and also the frost resistance was dramatically increased. Although the mechanism is unknown, it was presumed that addition of pulp fiber has inhibited of separation of fly ash and cement particles due to the density difference. In addition, it was expected that the reduction of damage from freeze-thawing cycle by the hollowed structure of pulp fiber has resulted expression of high frost resistance.

Lime Kiln Capacity Upgrade and Optimizing Its Operation

Koji Nigorikawa
Iwakuni Mill, Nippon Paper Industries Co., Ltd.

Iwakuni Mill and Otake Mill in Nippon Paper Industries are located adjacent to each other. They needed to reorganize the production structure of pulp and paper for the purpose of recovering profitability.

As one of the measure of this, we tried to make Kraft Pulp more competitive by shutting down the production of pulp at Otake Mill permanently, consolidating their production into Iwakuni Mill.

For this reason, it has become more important to produce pulp stably. To achieve this, there was priority issue-'insufficient capacity of recausticizing process' to be solved. Especially capacity of hot lime production in kiln was bottleneck in our recausticizing process when we make up enough white liquor for two digesters in full swing. To increase hot lime production, we have modified the process and optimized operating condition and utilized add-on chemical. And then we have finally achieved to produce sufficient white liquor and debottleneck Kraft Pulp production.

Design of New Retention Aid Polymer

Goichi Hayashida, Naho Murata, Yoshimi Yoshioka and Yukiko Minegishi
Shonan Reserch Center, HYMO Corporation

Recently, paper-making environment has become more severe because of increasing fine fiber, ash and anionic trash. Therefore, the effects of conventional retention aids are not enough. Focusing on controlling the intertwinement of the polymer chain, we designed new retention aid polymer showing high performance even if the amount of fine fiber is high.

In general, increasing molecular weight of polymer causes intertwinement of polymer chain. It decreases charge interaction between polymers and fibers. However, the charge interaction is important for fine fiber particularly. For the purpose of developing new retention aids having both high agglomeration ability and high reactivity of charge interaction, we controlled the conformation to reduce the intertwinement of the polymer chain keeping high molecular weight.

We examined the new developed-polymer by measuring molecular weight, radius, viscosity and speed of charge interaction. These results supported that the new developed-polymer had less intertwinement and its charge interaction was faster than that of normal linear polymer. As expected, new developed-polymers showed higher retention rate than normal linear polymers in the case of high amount of fine fiber.

Water Based Barrier Agent for Food Packaging Paper,"EXCEVAL™"

Yosuke Kumaki, Masako Kawagoe and Shigeki Takada
Kurashiki Plant, Kuraray Co., Ltd.

EXCEVAL™ is a hydrophobically modified special polyvinyl alcohol (PVOH) which provides higher water resistance and higher gas barrier at high humidity condition. In this paper the properties of coated paper with EXCEVALTM by size press is characterized. The coated paper provides lower air permeability and it results in better barrier against oil & grease compared with fully hydrolyzed PVOH. This performance is enhanced by combination with platy minerals. EXCEVALTM has been registered as a Food Contact Substance in FDA and it has various potentials to be used in food packaging papers.

Optimization for Reject System of Stock Preparation by Combisorter™

Masamori Tanaka
Voith IHI Paper Technology Co., Ltd.

The reject system handling is getting more and more difficult recently because not only of worse quality of raw material but also of the change of flow concept. For the latest screening system, coarse and fine screening can be combined. This change has been available by technological development of pulping and screening. At the same time, coarse and fine rejects are mixed together and the reject contains contaminants with much kind of size and character. Usually several machines and not so small energy are necessary to treat this reject, but CombisorterT™ which is combined with screening, deflaking, and dewatering function within one machine should be the best solution for simple flow system. This article shows the introduction of Combisorter™ and its advantage for the optimization of reject system.

Biology and Management of Nuisance Midges (Diptera: Chironomidae) in Paper Mills

Goro Kimura
Technical Research Laboratory, IKARI Corporation
Masahiko Konishi
Sales Development Department, IKARI Corporation

Adult chironomids emerging from eutrophic lakes or polluted bodies of waters have become intolerable because their high densities are a severe nuisance and cause economic problems. Generally, these adults invade from the outdoor habitats, however, Limnophyes natalensis also emerged from the indoor drain pit. We investigated following three subjects: (1) seasonal abundance, (2) flight behavior, and (3) management of L. natalensis.

Profit Creation and the Process Stability Operation System Construction

Kazuo Yanagi
Japan Business Innovation Consulting

We contract with the famous process industry about consulting of "profit creation and the process stability operation system construction" recently. Much consulting themes are improvement of the manufacturing yield, and reduction of machine troubles.
Content of consulting is to improve "chronic defectiveness" having difficulty in carrying out measures.
The following points are necessary to carry out "chronic defectiveness" measures effectively.
1. Understanding in detail of "a phenomenon" and "a production principle" and "the facilities structure".
2. Adopting the way of thinking of a functional thing and understanding the actual situation that a poor phenomenon is taking place.
3. All the examination members can catch an object for an image by illustrating an object.
4. Organizing a team to constitute from the member of the ace to examine "a peculiar technique", and building the structure which raise the synergy with "the management technique giving by consultants
This lecture shows the main point about "the solution to improve chronic defectiveness"

Report on the Results of the Fiscal 2013 Follow-up Survey on JPA's Committed Action Plan and Efforts against Global Warming in the Japanese Pulp and Paper Industry

Kazuo Ikeda
Japan Paper Association

The Japan Paper Association (JPA) has been actively working to save energy since 1997 when it established its “Committed Action Plan on Environment”. JPA declares its policy of restraining CO2 emissions in the action plan, and has worked toward the following targets:

·On a five-year average basis from fiscal 2008 to fiscal 2012, reduce specific fossil energy consumption and fossil energy derived CO2 emission intensity by 20% and 16% from the level of fiscal 1990, respectively

·By fiscal 2012, expand forest plantation area owned or managed by the industry at home and abroad to 700 thousand hectares.

According to the fiscal 2013 survey, fossil specific energy consumption per ton of paper production and fossil energy derived CO2 emission intensity in fiscal 2012 reduced by 24.8% and 20.3%, respectively, compared with the level of fiscal 1990. This is mainly thanks to manufacturers’ continuous efforts such as energy saving and energy conversion from heavy oil to biomass and waste energy. On the other hand, forest plantation area at the end of the fiscal 2013 was 676 thousand hectares, falling short of the 700 thousand hectares target.

In addition to the results of the follow-up survey, this report introduces the energy situation in the Japanese pulp and paper industry, and information such as JPA’s Action Plan for low-carbon society and the impact of the raise in electricity prices on the industry after the Great East Japan Earthquake.

The History of Paper Machine Development: 100 Years from Robert's Invention
Part 1: The Invention of Paper Machines, Fourdrinier and Cylinder Mould

Kiyoaki Iida

Louis Robert, Frenchman, invented paper machine in 1798. His machine was 10 feet long, had only a wire part and made paper of 24 inch-width by hand wheel drive, With funding by Fourdrinier brothers and mechanical capability in England, a proto-type model of a machine which would be called Fourdrinier machine and be used for almost 200 years was perfected in just 10 years.

Cylinder mould machine which have been mostly used for paperboard production until now was also invented in England at the same period of time, The technology was imported into the U.S. and domestic machine suppliers improved the machine and their efforts helped them to become worldwide players in the 20th century.

Many factors contributed to the quick development of paper machine, some of which were well-trained mechanical engineering using iron and steel instead of wood, robust paper demand, and active information exchange supported by international patent system. One decisive factor is the presence of entrepreneurs energetically engaged in technological development like Fourdriniers, Donkin, Dickinson in England and Gilpin and Ames in America.

The Fourdrinier machine was further modified, adding up improvements in dryer, calender and cutter. In around 1900, it was 150 inches wide and ran at the speed of 600 feet/minute.

The development will be discussed in the part 2.

－Peer Reviewed－

Introduction of High Performance Activated Sludge

Masayuki Watanabe a) , Keiko Fujita, Miyuki Nakagawa and Hitoshi Okada
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We have studied activated sludge (AS) in order to improve the efficiency of wastewater treatment. We previously reported that the performance of each mill’s AS was different, and that the high performance AS enabled us to improve degradability of other mill’s wastewater on a bitch experiment.

At the next step, we used a continuous experimental apparatus, which have the condition similar to a mill’s plant. Using this apparatus, we conducted the experiment assumed that the high performance AS is introduced into the mill having the problem of wastewater treatment. As a result, we found out that blend of 20% of the high performance AS with the conventional AS made degradability of wastewater improved. Genetic analysis revealed that original bacteria of the high performance AS existed in the blend AS during treatment of wastewater. In addition, substrate utilization assay showed that carbon source utilization profile of the blend AS was more similar to that of the high performance AS than the conventional AS, suggesting that bacterial community in the blend AS became similar to that of the high performance AS after blend.

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Research Report(Original Paper)

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Estimation on the Economic Impact and the Environmental Conservation Impact Brought by SAQTM Cooking

Junji Tanaka
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The use of SAQ is more selective for carbohydrates stabilization and delignification. It is economically more attractive due to the increase of pulp production. In this report, the economic impact and the environmental conservation impact by using SAQ as a cooking additive was studied for a Japanese kraft pulp mill which LBKP production capacity is 1,000 tons/day.

At first, the cost-benefit as an economic impact by SAQ was estimated. When the merit by SAQ (reduction of active alkali and increase of pulp yield) and the demerit by SAQ (decrease of energy generation caused by the reduction of organic solid in black liquor) were calculated for this model pulp mill, it could obtain cost-benefit definitely by SAQ usage.

At second, the raw material wood chip saving was estimated as an environmental conservation impact by SAQ usage. As a result, it is estimated to be about 11,700 tons/Y in this model pulp mill. Furthermore, the reduction of carbon dioxide emissions in the procurement of wood chip saving was estimated to be about 3,900 tons/Y. Thus, kraft cooking using SAQ has economic and environmental advantages comparing to the original kraft cooking.

The Most Popular Canvas Cleaner in the World Presented by m-clean

Atsushi Nakayama
Paper Machinery Sales Department, Kobayashi Engineering Works, Ltd.

The patented Kadant m-clean“ MultiJet” cleaning system utilizes high-pressure water in combination with an effective evacuation and air knife system to cost-effectively remove contaminants from the fabric and restore permeability to the fabric. When combined with a rotating brush, the system is capable of on-line coater backing roll cleaning in addition to fabric cleaning. Since year 1995, almost 500 systems have been operated worldwide.

Impact of Sodium Silicate on Paper Machine Drainage and Deposits

Koichi Tanaka, R. Daniel Haynes, Derek Maddox, Joseph Shu and Ong Hui Lam
Pulp and Performance Chemicals Division, Akzo Nobel K.K.

Over the years antidotal and specific mill observations have been made of sodium silicate carry over from the recycle process impacting drainage and contributing to deposition issues. Sodium silicate has been shown to have benefits beyond being a bleaching aid in the flotation deinking process but the observations of issues at the paper machine has raised concerns. Lots of work and interest has been spend in developing a sodium silicate replacement for pulping chemistry and field testing to date looks good and promising. Benefits obtained from the sodium silicate replacement in pulping chemistry are as follows:

· Similar DIP quality
· Lower anionic trash carry-over from the pulp mill
· Lower process conductivity in both pulp mill and paper machine
· Improved yield by lower reject consistency
· Improved pulp mill performance and paper machine runnability
· Lower overall chemical cost

Recent work looking at replacing sodium silicate in the recycle plant has given opportunities to observe the difference in drainage time, turbidity and deposition behavior. This paper will first discuss the difference in drainage in a polymer only and polymer/nano-particle silica retention and drainage program when sodium silicate is not used in the deinking process. Then show how sodium silicate interacts with paper coatings to form deposits potentially harmful to paper machine performance using tackiness measurement in conjunction with colloidal stickies concentration.

Picth Troubleshooting of Paper Making by Comprehensive Chemical Approach

Hidekazu Tada and Yasutoshi Himei
Development Dept.1, Nissin Kagaku Kenkyusho Co., Ltd.

This report describes an important factor of pitch troubleshooting and introduces the newest pitch control technology.
In recent years, pitch troubles on the paper making process have been increasing by increase in the blending ratio of waste paper and closed water system. This problem is one of the most difficult subjects for the paper making engineers who explore the stable operation and the improved quality.
The pitch from waste paper has been able to remove to some extent in the pulping process, but the remaind pitch is carried into the paper making process. It may cause some troubles with a wire, a press, and a drier.
If removal of the pitch was insufficient in the pulping process, the pitch troubles will be caused frequently. The pitch troubles will cause the increase in chemicals and the reduction of productivity. Therefore, we consider that it is the best method to solve the pitch troubles by removing more pitches in the pulping process.

Biomass Boiler Management and Cost Saving by New Analyzer Metso MR Moisture
-Inovetive Moisture Analyzer for Pulp, Biomass Material-

Jarkko Ruonala and Lasse Kauppinen
Metso Automation Inc.
Takeshi Sato
Metso Automation K.K.

The moisture content of many of the materials used in the pulp and biofuel power industry today is increasingly important to optimizing the operation of the facilities. The technology to measure this moisture content quickly is now available with Metso's new magnetic resonance moisture analyzer "Metso MR Moisture". Industry standards of moisture measurement is oven drying method. The issue with the oven drying method is that it takes a lot of time to run the test properly. Metso MR Moisture can be done in the less than two minutes. This quick measurement will vastly improve facilities ability to purchase their raw material based on the true value of material more accurately and incredibly faster than before. Metso Automation performed local test of this new analyzer in domestic pulp mill. The test results for biomass chips improved excellent measurement accuracy, faster measurement time and easy operation of Metso MR Moisture. It shows great possibility for biomass boiler management and cost saving by new analyzer.

How to Make It Possible for WIS to Tell Metal Defects from Others

Jun Ikeuchi
Inspection Systems Business Div., Omron Corporation

Battery separator, which is one of the insulating sheets, is an indispensable material for its safety and functionality of an rechargeable battery that has been used for a hybrid car, an airplane, etc. In order to tell metal defects that might cause an electrode short circuit from other defects on the surface of battery separator, OMRON has developed an innovative technology of Web Inspection System. With the cameras for exclusive use and the near-infrared reflected lighting, we have got the experimental data that shows a metal defect such as Aluminum, Copper and Iron oxide, with a size of 100-micron order is told from other defects at the speed of 200 m/min.

Energy Saving in Paper Machine Vacuum System
-How to Utilize Modern Process and Variable Speed Drive Technology-

Shigeru Kikawada
Marubeni Plant Engineering Corporation
Jyrki Uimonen and Jussi Lahitnen
Runtech Systems Oy, Finland

Energy prices are soaring beyond all expectations. On the other hand, new technologies are emerging to tackle this challenge. But how much energy can be saved without putting paper production at risk? In the paper industry, we are use to - for a good reason - to be rather conservative in applying new inventions. Savings and cost factors tend to be marginal in relation to the overall cost and income. Any disturbance in production, however, will cost a lot in lost profits.

The rising price of energy is putting pressure on paper production costs. Besides the pulp production, the paper machine line consumes a significant amount of energy. When the production volumes are high, the process equipment is a heavy user of energy. From this process equipment, the big pumps and paper machine line drives are the heavy users of energy. New technologies in process design, pumping principles and variable speed electric drives can cut the pumping energy bill dramatically.

Vacuum pump choice and mode of operation also has a significant impact on energy consumption. High power consumption is needed to produce the paper machine vacuums, needed in drainage and web handling, i.e. for the suction boxes and the suction rolls. Further on, these vacuum elements often represent a big portion of the friction increasing machine drive loads. Dimensioning the system can be a tricky task, because so many variables are involved, and many of them (such as raw material, water, water temperatures) are often beyond the control - at least beyond economical control - of the machine personnel. By utilizing energy efficient pumping principles and controllable technology, this obstacle can be overcome.

Renovation of Underground Existing Various Pipeline
-The PALTEM HL Method/The PALTEM-SZ Method/The PALTEM Flow-Ring Method-

Tetsuo Yoshimitsu
Ashimori Engineering Co. Ltd.

A large number of pipes are used in various fields and places to improve the industrial efficiency. There are many kinds of pipes such as for gas, industrial water supply, drainage, and oil. Also these are now deteriorating by aging. The PALTEM HL method , The PALTEM-SZ method and The PALTEM Flow-Ring method is the crafting technique for the prolongation of lives of such aging existing pipes, prevention of leakages of pipes, reinforcement of pipes, and renovations of pipes to add quake resistance to it.

This report is about the background of the PALTEM HL method, The PALTEM-SZ method and The PALTEM Flow-Ring method as a crafting technique of renovation for the underground existing various pipelines.

Water Treatment Systems for Cooling Water Using New Polymer Technology

Kota Sekido
Yokkaichi laboratory, Hakuto Co.,Ltd.

In the recent cooling water treatment, it has been required the both of performance improvement and environmental measure of the chemicals. We developed new cooling water treatment chemicals (Neofilm HC series and EX series) to meet these requirements.

"Dual Polymer System (DPS)", consisting of combination with the film forming polymer and the dispersant polymer, has been applied in these new chemicals as core technique. By using the DPS, it is able to reduce the content of zinc and phosphorus and, in addition, to improve the performance of the chemicals.

The chemicals which are using the DPS indicated high performance compared with traditional chemicals and commercialized chemicals in the evaluation test used cooling water simulator.

The Crisis of Continuing to Exist Professional Engineer, Japan (PE.Jp), Optional Subject- Forest Products
-Recommendation of Taking PE.Jp Examination -

Tatsuzo Nebashi
The Institution of Professional Engineers, Japan(PE.Jp)

Professional Engineer, Japan (PE.Jp) is the national qualification stipulated by the Professional Engineer Law. A Professional Engineer is defined as an engineer engaged in the professional practice of rendering services for science and technology in planning, research, design, analysis, testing, evaluation, and training in such work, which requires application of extensive scientific and technical expertise.

The Enforcement Regulation of the Professional Engineer Law specifies 21 technical disciplines, in each of which a Professional Engineers is qualified.

Forest which is one of 21 technical disciplines has 4 Optional Subject , that is Forestry ,Forest Civil Engineering, Forest Products, Forest Environment. Especially among of all, Forest Products is tightly related to Pulp and Paper Industry.

But the candidate for examination about Optional Subject- Forest Products is decreasing, so, now it is coming to the crisis of continuing to exist. I hope the membership of Japanese Technical Assoc. of the Pulp and Paper Industry try to exam Optional Subject- Forest Products in order to improve your technical skill and develop Pulp and Paper Industry.

Corporate Profile & Products Information (11)

SHIKISHIMA CANVAS CO.,LTD.

Shikishima Canvas was established as Omi Hanpu Co., Ltd at the place of Shiga prefecture in 1897.
Mass paper production in Japan has started in 1872 after introduction of imported western paper machine.
In those days, dryer fabric have been imported, but the demands of domestic dryer fabric has increased under the influence of paper industriy's development.
Omi Hanpu has imported 144 inch wide loom from England and started producing of dryer fabric in 1908 for the first time in Japan.
After several mergers and rename, Shikishima Canvas is now one of group companies of Shikibo Co., Ltd / Industrial Division.
Shikishima Canvas Co., Ltd makes sales activity and technical development of not only dryer fabric but also filter cloth, corrugating belt and conveyer belt.

-Peer Reviewed-
Enzymatic Hydrolysis of Bamboo and Larch Alkaline Sulfite Pulps for Glucose Production

Yi Zhang and Hiroshi Ohi
Graduate School of Life and Environmental Sciences, University of Tsukuba
Shiho Takahashi
Department of Biomass Chemistry, Forestry and Forest Products Research Institute
Guangfan Jin
School of Light Industry, Zhejiang University of Science and Technology
Keiichi Nakamata
Technical and Development Division, Hokuetsu Kishu Paper Co., Ltd.

Application of alkaline sulfite-anthraquinone (AS-AQ) cooking was investigated as a pretreatment for enzymatic saccharification and bioethanol production from Japanese larch (Larix leptolepis) and bamboo (Phyllostachys pubescens) culm. It was found that a 60/40 ratio of NaOH/Na2SO3 in the cooking liquor could produce high-yield pulp with the lowest lignin content. According to a method of filter paper cellulase activity, it was shown that the lignin of pulp inhibited enzymatic saccharification when both AS-AQ and soda-AQ pulps were treated by cellulase. Comparing the pulps at a given lignin content revealed that the enzymatic saccharification ratio of larch AS-AQ pulp was higher than that of soda-AQ pulp. Furthermore, it was found that the saccharification ratio of bamboo culm AS-AQ pulp was higher than that of larch AS-AQ pulp, and that the bamboo pulps with a lignin content of 6.8% were more easily hydrolyzed than filter paper. These results clearly show that the AS-AQ method is more effective than the soda-AQ method as a pretreatment, and that bamboo culm AS-AQ pulp is a promising raw material for bioethanol production.

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Energy Saving by Flue Gas / Water-Heat Exchanger on New Waste Fuel Boiler

Hiroaki Hamada
Hokkaido Mill-Shiraoi, Nippon Paper Industries Co., Ltd.

While there is an urgent need to act Global Warming Mitigation Measurements, Nippon Paper Group was formulated "Green Action Plan 2015". In this plan, we formulated two amount agendas:
a) Reduce CO2 emissions from fossil energy CO2 by 25% versus fiscal 1990.
b) Reduce the use of fossil energy by 30% versus fiscal 1990.
In Hokkaido Mill-Shiraoi, we've been taking various energy-saving measures. In May 2013, we installed flue gas / water-heat exchanger (GWH) on the gas exhaust line of #1 new waste fuel boiler . This GWH is sulfuric acid dew point resistance type, and produced by Air Fröhlich Engineering AG, Switzerland. This system reduced steam consumption in deaerator by improving exhaust heat recovery, and the installation made us achieve energy conservation. In this report, we will introduce the case of energy conservation by installing this GWH.

Energy Saving by Pinch Technology

Yosuke Kado
Chiyoda Corporation

Pinch Technology is an analytical methodology to utilize heat efficiently which enables to identify energy saving potential in plants based on their both heat demand and power demand. Many plants in heavy chemical industries such as refineries and petrochemicals have adopted this methodology to analyze and confirm their energy saving targets and successfully led to reduction in their energy consumption.
Pulp and paper industries consume a large amount of energy. Energy saving has been studied for long years and great deal of equipment has also been introduced to improve energy efficiency. However its study approach is not based on thermodynamics.
Since Pinch Technology is completely based on thermodynamic principles, it can be applied to not only heavy chemical industries but also pulp and paper industries to further improve their energy efficiency.

The Air Saving Measure of Paper Machine at Tomakomai-Mill

Satoshi Nakatani, Kazuo Musa, Yukio Urabe, Masaaki Akitaya, Jin Onodera, Takahito Suzuki, Jun Kabasawa and Hidenori Saito
Tomakomai-mill, Oji Paper Co., Ltd.

The cost reduction measure is one of the main daily business for those who are engaged in the manufacturing industry. The environment surrounds us is very severe because of the reduction of the domestic paper demand by progress of Information Communication Technology, and the increase of the imported paper. We have to do bolder cost reduction which ever we have done before.
Under these circumstances, we tackled the save of air consumption in paper making section at Tomakomai- mill, finally, we could stop one air compressor regularly.
This news reports these contents of a measure.

Low NOx Burner for Coal Fired Steam Generator

Iwamaro Amano and Shigeharu kokuryo
Boiler Engineering Department, Mitsubishi Hitachi Power Systems, LTD.
Keigo Matsumoto
Nagasaki R&D, Mitsubishi Heavy Industries, LTD.

We were analyzed by CFD the generation mechanism of NOx and unburned carbon in fly ash of conventional low NOx burner. We thought the four concepts of development of new burner from CFD analysis results. The four concepts of development are as below.

(1) A large, uniform ignition area is created over the entire surface of the burner nozzle to achieve better ignition performance than a conventional low NOx burner.
(2) According to the coal combustion characteristics, the optimum amount of secondary air is supplied at the optimized timing in order to optimize the oxygen concentration in outer flame.
(3) As result of (2), the high temperature and high oxygen level area in the outer flame, which causes the formation of NOx, is diminished.
(4) By maintaining the reducing atmosphere in the inner flame, NOx is effectively reduced by the existing reducing substances in the inner flame (volatile matter and char) and simultaneously, the combustion of unburned carbon is facilitated.

We developed new burner (M-PM burner) in accordance with above concepts with the combustion test in the test furnace. From the results of the combustion test in the test furnace, we are able to reduce significantly NOx emission and unburned carbon in fly ash using new burner compared with conventional low NOx burner. We also got the results that NOx emission or unburned carbon in fly ash is possible to reduce about from 25 to 30% respectively compared with the conventional low NOx burner in the field combustion test for industrial steam generator. In this paper we described the concepts of new low NOx burner, the test results in the test furnace, combustion test results of the industrial steam generator and applicable way to energy-saving operation of the steam generator.

Energy Saving by Modification of Medium Pressure Steam Lines at Power Plant

Hitoshi Nakamura
Soka Mill, Nippon Paper Industries Co., Ltd.

Nowadays, it is urgently necessary to improve profitability as fuel price increases and efforts of energy saving are regarded as important. Due to Japanese economic condition in the past few years, we were not able to invest and renew large-scale equipment. However, we found a new energy saving efficiency to build Medium Pressure Steam Lines that our plant has not owned. The following is the report of construction outline and operating experience.

Energy Saving Case by Facilities Improvement in the Takaoka Mill

Masatoshi Sekii
Takaoka Mill, Chuetsu Pulp & Paper Co., Ltd.

The Takaoka mill has home electricity generation facilities such as recovery boiler power plants, wood-fuel boiler, and fluidized bed boiler, accordingly total mill energy balance is constituted by these facilities. For the purpose of energy resource saving and cost reduction, we keep going to reduce fossil-fuel consumption and CO2 emission, then to use more biomass energy, waste paper, and wood resources, while trying to adopt next generation new technology. In this paper, I introduce the case of old power plant facility improvement for trying to recover its original capacity.

Energy Saving Effect by Steel Yankee Dryer
— Manufacturer: Hergen Paper Machinery —

Makoto Matsushita
KGK Engineering Corp.
Takefumi Ide
TAIZEN CO., LTD.

Aiming to develop an alternative to conventional cast iron Yankee dryers and based on the evident technical benefits such as reduction of investment and operational costs, Hergen Paper Machinery offers to the Tissue & Toilet Paper producers the most advanced line of Steel Yankee Dryers. We would like to introduce the detailed feature and the energy saving effect achieved by the Steel Yankee Dryer manufactured by Hergen, which has already been proven by the end users.

The History of Paper Machine Development: 100 Years from Robert's Invention
Part 2: The Development of Fourdrinier Machine

Kiyoaki Iida

Paper machine, which was invented by Donkin, became complete from head box to reel with further improvements in its design. Then, it grew bigger and ran faster, and in around 1900 it was 160 inches wide and was operated at the speed of 600 feet /min. The history of improvements and those who made them were reviewed in the part 2.

There existed a favorable spiral acceleration of technological development. Once infrastructure of technology was prepared, it stimulated new technologies, which in turn increased the level of the infrastructure.

For instance, a bigger and faster machine needed higher power drive, which was supplied by water wheel at that time. To satisfy the need, water turbine was invented. To invent water turbine, high level of metal work was necessary, and it was accomplished by development in machine tools in the precedent days.

As paper was manufactured with higher productivity and less cost by technological developments, it helped transferring information in society efficiently and contributed to prepare the higher level of technological infrastructure.

Corporate Profile & Products Information (12)

ICHIKAWA CO.,LTD.

Founded in 1918, Ichikawa Co., Ltd. has dedicated to develop cutting edge technology to optimize performance for paper production specialized at its press-part section. We acquired ISO9001 in 2003, striving for far better quality than ever. We are a global leading supplier of equipments used in paper manufacturing, press-felt, shoe press belt, and transfer belt, with best tailored solutions for every paper manufacturer around the globe. Forty two percent of our sales comes from overseas market. The products highly satisfy our clients in whatever country with its unrivalled performance as well as the inimitable quality.

In the following, we are happy to explain a lot more about us, our company profile, product features, production process, and so forth.

The head quarter is located in Bunkyo Ward, Tokyo, while two production mills are stationed in Kashiwa, Chiba, and Iwama, Ibaraki, both from 30 to 70km away in northeast of Tokyo. Our Research and Development Centre sits in Kasama, Ibaraki.

－Peer Reviewed－

Precise Determination of Lignin in Residue Obtained from Enzymatic Hydrolysis of Phyllostachys Pubescens Stem Alkaline Sulfite Pulp

Yi Zhang Akiko Nakagawa-izumi and Hiroshi Ohi
Graduate School of Life and Environmental Sciences, University of Tsukuba

Previous research has shown that bamboo stem alkaline sulfite pulp is enzymatically hydrolyzed with a much greater enzymatic saccharification ratio than larch pulp and cellulose filter paper. In order to investigate the residual lignin and saccharification behavior of pulp during enzymatic hydrolysis, it is necessary to precisely determine the lignin content of the pulp after enzymatic hydrolysis. To investigate the behavior during enzymatic hydrolysis and the residual lignin of these pulps, methods that can precisely determine the lignin content after enzymatic hydrolysis were considered. One of the widely used methods for determining lignin content is the acetyl bromide method, by which it was shown that the xylan in bamboo pulp affected the determination of the residual lignin due to the UV absorption by the reaction products. Furthermore, the amount of water in the reaction system also affected the UV absorbance. The application of the acetyl bromide method to bamboo alkaline pulp is difficult. On the< other hand, using a pyrolysis-gas chromatography/mass spectrometry method, the lignin content of the pulp after enzymatic hydrolysis can be precisely estimated.

It was shown that bamboo alkaline sulfite and soda pulps produced much more glucose than cellulose filter paper during enzymatic hydrolysis, and the residue ratios were found to be low. The determination of the lignin content of the residue after enzymatic hydrolysis showed that the lignin content decreased as the enzymatic hydrolysis of the pulp proceeded. Conversely, the lignin content of the soda pulp during enzymatic hydrolysis was almost constant. It was also suggested that lignin dissolved from bamboo pulp during the enzymatic hydrolysis enhanced the enzymatic saccharification ratio.

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2014 July JAPAN TAPPI JOURNAL

Shiori Uda
Mishima Plant, LINTEC Corporation

Recently the sign of economic recovery began to appear by Abenomics which consists of three policies included bold financial policy. However, after the Great East Japan Earthquake in 2011, the energy cost in our plant is increasing more caused by rising of electricity power unit due to the shut down of nuclear power plants and increasing of LNG unit price due to influence of the depreciation of the yen. Accordingly, energy-saving activity is becoming increasingly important for our factory from the point of energy cost reduction. So, in this report , we'd like to introduce our energy-saving activities and actual results of energy cost reduction implemented in the past few years.

Factory Diagnostics and Optimization

Norio Fukushima
Ayabe Factory, OMRON Corporetion

In October 2010, the Ayabe plant launched energy-saving efforts at its production site. The Ayabe plant aims to cut power usage in target areas for energy-saving to half the existing level by March 31, 2014. It was considered that it was difficult to press forward efforts due to concerns about a bad influence on quality and productivity.

This plant developed and utilized “Andon environmental information system”, by which we make “diagnoses” for electric power and environment. It expanded energy-saving efforts to “optimize” all things which plant place a high priority on, such as quality, productivity, environment, safety, and reassurance.

As a result, the plant realized a 50% reduction in power consumed by clean rooms, which require a large amount of electricity. At the same time, the amount of air-borne dust was reduced by two-thirds. These are just some examples of the 36 documented energy-saving and environmental improvements that the plant had achieved in December 2013 by cutting electricity usage while improving productivity and product quality. The plant proved that with the participation of everyone in the plant, energy-saving efforts at its production became the “optimization” Eco efforts which provide also to the improvement of quality and productivity.

Saving Energy of Water Pump with Fluiglide Coating

Tsuyoshi Mizuno
Foreign Product Department,　Tetsugen Jitsugyo Co.,　Ltd..

Firstly,　this paper describes the theory of the measurement at site on the water pump to understand the current performance of the pump such as head,　horse power and pump efficiency.　The multiple calculations based on the thermodynamics and the special loop calculation makes it possible to quantify the performance relevant value without inputting the actual flow.　Secondly,　the polyester based “Fluiglide” coating is introduced to optimize the performance of the existing pump in which the deterioration is obviously recognized.　The improvement of surface roughness,　lubrication property and water resistance with “Fluiglide” has realized the less frictional loss and the identical flow area during the operation.　Thirdly,　the technology of “CorroGlass” is also noted to sustain the durability of coating for a longer period since the damage of used pump requires the proper surface to apply “Fluiglide”.　The combination of the performance measurement and “Fluiglide” coating has achieved the recovery of pump efficiency and clarified the return of investment before all the coating work is implemented.

Statistical data which has been collected for a decade reveals the certain decrease of efficiency in used pump and indicates the possibility of recovery by applying the “Fluiglide” coating.　It is true that most of the pumps with 100-400kW electric motor at site have spent excessive running cost per year due to the inefficient flow.

Some of the case studies from UK and Japan have shown the decrease of the efficiency and the increase of the horse power in the used pump, comparing them with the ones measured during the manufacturing.　After applying the “Fluiglide” coating,　the user has recognized the noticeable decrease of horse power to achieve more efficient operation.

Return of investment was guaranteed in early stage and the technology of Fluiglide was admitted by the user.

Energy Saving by Installing Cold-Water Type LNG Vaporizer

Seiji Sasaki
Facilities Department Takefu Plant, Rengo Co., Ltd.

Rengo Takefu Plant manufactures cellophane, viscose processed paper, porous -cellulose beads, tinted film and other functional products.
In the past, the plant had been using a hot-water type LNG vaporizer, which sourced heat from steam to fuel the boiler with natural gas. On the other hand, the cold-water type LNG vaporizer we have recently installed utilizes heat from cool water used in the manufacturing process instead of steam.
After introducing the current vaporizer system, we have achieved an energy saving by reducing the steam consumption used to vaporize LNG.
In addition, due to evaporative heat removal by LNG, the vaporizer generates cold water which can be utilized in the manufacturing process of cellophane, and thus we have reduced the load of a refrigerating machine creating the cold water. The specific consumption of LNG and the power consumption of the refrigerating machine have reduced by 3.5% and 5.5% respectively.

Works on the Increase in Electricity Demand in the Mill

Yoshitaka Aoyagi
Kanto Mill (Katsuta), Hokuetsu Kishu Paper Co., Ltd.

All of steam and the electricity which are used in the mill are supplied from the No.2 biomass boiler (2B) and the No.2 steam turbine generator (2T/G) which started commercial operation in 2006. Since surplus electric power occurs even if it deducts the mill use about electricity, it supplies outside as electricity sales to utilities.
Establishment of large-sized equipment is scheduled for 2013, it was expected that electricity demand carries out the increase in 900 kW by this operation, and we were anxious about reduction in electricity sales to utilities. Since the work on this increase in electric demand became important, promotion of power saving by energy-saving project and the increase in a production of electricity of 2 T/G were tackled.
Moreover, photovoltaic generation equipment is due to work from March, 2014 as part of the renewable energy introduction which follows 2B in the mill.
In this news, the contents of activity and the example of energy-saving project and the increase in 2T/G production of electricity are introduced. In addition, the photovoltaic generation equipment under construction is introduced.

Operating Experiences of SE Rotor

Yasuyuki Yamada
Gifu Mill, Oji Materia Co.,Ltd.

We have pulper, screen, a process of manufacture, it is the facilities that pulper, screen and refainer use a lot of energy.
We simplified pulp process equipment, and have implemented various energy-saving measures, such as concentration of equipment.
This time we focused on the rotor in the pulp process that consume the most power at Nakatsugawa mill and Ena mill, introduced 90 Type SE rotor is made of six blades by Rotor-Kogyo Co., Ltd..

I will introduce the operating experience and energy saving about the Rotor in the case of Nakatsugawa mill, that was introduced in June 2011.

Advanced Operation in Activated Sludge Plant for the Stability Treatment and Reducing Energy by Using of KURISONIC, the Unique Monitoring Means for Sludge Settling Tank

Makoto Nomura
ENVIRONMENTAL RESOURCES MANAGEMENT SECTION2, INTEGRATED TECHNOLOGY GROUP
CHEMICALS DIVISION, KURITA WATER INDUSTRIES LTD.

KURISONICTM is the unique sensor, which provides the condition monitoring means in sludge settling tank (SST). This measuring method is ultrasonic, like sonar, the sludge condition can be detected by its echo.

The conventional operation in activated sludge plant is mainly based on DO and BOD load in aeration tank, however, the following two trials have been proceed by using of KURISONIC and obtained good results.

1) High Compaction Sludge Return Control in SST:

- Higher return sludge concentration causes to improve at dehydrator to reduce the cake water content, and to save cake waste cost.
- Smaller volume of return sludge causes to gain HRT in aeration tank, and to improve stability treatment.

2) Excess aeration and Denitrification control from monitoring SST:

- Lower SS effluent from SST causes to improve treated water quality, and to support the performance of plant.
- Suitable aeration causes to save energy, to save electric cost and concerning CO2 gas discharge to the earth

The operation with focusing to SST by using of KURISONIC is very effective in activated sludge plant.

High Efficient Fluoropolymer Heat Exchenger Enables Low Temperature Waste Heat Recovery of Boiler under 200℃

-Waste Heat Recovery at below Acid Dew Point is Available-

Masayumi Ishida
Kasama Operations Center, Clean technology component products
Products marketing, Junkosha Inc.

Energy saving and power saving are critical issues to be addressed among all factory. Conventionally, there is the demand to recover the energy from low temperature waste heat gas.

However, the waste heat gas recovering from the low temperature had been considered to be very difficult by acid dew point corrosion, scale adhesion of the heat transfer tube , and so on. Junkosha's Heat Exchanger resolves above problem by improvements of Junflon® PFA heat transfer tube and the structure of heat exchanger.

Four points are necessary to recover the waste heat from low temperature gas.

① Corrosion resistance for the acid dew point
② Reduction of the gas pressure loss
③ Reduction of the maintenance man-hour
④ Space saving and lightweighting

Junkosha's products have been installed in a Sheet Glass Company and used in maintenance-free for 14 years. Thus it has been already proved that four points of characteristics are superior.

In addition, we recently carried out a verification test with two papermaker's boiler(multi-fuel fired boiler：180 t/h, black liquor recovery boiler:170 t/h)

AS a results, no corrosion, scale adhesion, abrasion and deterioration of the heat transfer tube, were observed.

Junkosha's fluoropolymer heat exchanger,「FLUORO-X® GRID SERIES」, provides excellent corrosion resistance and the non-adhesiveness from low temperature gas. In addition, the overall heat transfer coefficient is very high(40～50 kcal/m2・℃・hr) In conclusion, FLUORO-X® GRID SERIES has the most advantages than the product made of other materials.

The Latest Proposals for Improving Productivity of Paper Machine

- On Machine Equipment, Approach System -

Yoichiro Iwatani
Technical & Sales Dept., AIKAWA IRON WORKS CO., LTD.

In the paper machine, productivity decline due to sticky contaminant or web break is a big problem. Therefore, to improve productivity of a paper machine, I will introduce the latest technology for the approach system and on machine equipment.

Technology for Reject Treatment and Recovery

-Fiber & Filler Recovery for Coated Paper and Board-

The cleaner reject consists of valuable raw materials that can be reused in the process after treating them with our reject treatment technology, ATREX. Especially the paper and board mills producing coated grades have a lot of coating flakes in their current reject streams. The heavier the coating is the more difficult in deflaking with existing machinery. Double coated grades or coated board are good examples. When the reject stream is studied more carefully, one can detect fractions from fillers, coating flakes, residues from furnish like fiber knots or shives and contaminants like sand. When this stream is processed with ATREX reject recovery system, the target is to reach the original particles size distribution of coating pigments and fillers. At the same time fiber knots are disintegrated and shives grinded. It has been shown that all the fibers and more than 95% of the total reject stream can be recovered back to process. The pigment works as filler and the use of native filler can be subsequently reduced.

Report of 2013 TAPPI PEERS and 10th RFR Conference

Takehiro Kojima and Kazuhiro Kurosu
Nippon Paper Industries Co., Ltd.

In 2013 TAPPI PEERS (Pulping, Engineering, Environmental, Recycling and Sustainability) and 10th RFR (Research Forum on Recycling) was held in Green Bay WI, USA on September 15-18. There were 82 oral presentations, 2 panel sessions and 5 workshops in these conferences. Total participants were 372 people, mainly from north America. This report introduced the summaries of these conference and several presentations.

Corporate Profile & Products Information (13)

YAMAUCHI CORP.

YAMAUCHI CORP. was established as a manufacturer of rubber-belt for cars in 1918. Since then, YAMAUCHI has been contributing to several industries by developing the highest qualities thanks to its unique compounding technologies and excellent production technique.

The representing products now are special rollers, belts and hysteresis torque limiters for multifunction equipment, precision molded resin and vibration isolation rubber for disc drives and single-cushion materials for PCB process.

As for paper making industry, Yamauchi has developed PU roll covers, ceramic covers and grooved belts for closed shoe presses first in the world and has been the major player in the world.

Yamauchi is operating factories, all of them are certified both ISO9001 and ISO14001, two in Japan, two in ASEAN, two in China and two in Europe so that Yamauchi is able to supply its high qualities to all over the world.

We hereby introduce the features of our latest products for papermaking industry.

-Peer Reviewed-
Analysis of Moisture Wrinkles in Containerboard Rolls

Hironobu Hirano and Takao Kobayashi
Pulp and Paper Innovation Center, Oji Holdings Co., Ltd.

Recently, containerboard basis weights have been decreasing in terms of resource or cost saving. Such a trend will cause some quality problems, one of which is moisture wrinkles observed in containerboard rolls.

In this study, containerboard rolls manufactured by six different mills were stored in the same place for a period of time to observe moisture wrinkles and to monitor the moisture content of rolls. Multiple regression analysis of the result suggested that moisture wrinkles correlated significantly with stiffness, hygroexpansion and formation.

Furthermore, numerical simulations using the finite element method were also performed to confirm the effect of these three factors on moisture wrinkles.

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Vol.68, No.8 Abstracts

Fundamental Properties of Nanocellulose

Tsuguyuki Saito, Yuri Kobayashi, Shuji Fujisawa, Chun-Nan Wu and Akira Isogai
The University of Tokyo

Cellulose is the most abundant polymer on earth, and is produced in plant cell walls as highly crystalline microfibrils consisting of fully extended and uniaxially aligned cellulose molecules. These microfibrils have very small widths (3 nm), high aspect ratios (>300), high elastic moduli (110-140 GPa), a low coefficient of thermal expansion (6 ppm K^{-1}), and large surface areas (900 m^2 g^{-1}). Owing to these characteristics, cellulose microfibrils have recently been attracting much interest as structural components in nanomaterials. These microfibrils have the potential to be applied as reinforcements in composite materials and high-capacity supports for catalyst, conducting, and magnetic materials. However, because individual cellulose microfibrils are strongly associated with each other in plant cell walls, it is essential to fibrillate cellulose before new materials consisting of cellulose microfibrils can be developed.

In this context, it has been found that cellulose can be fully dispersed in water as individual microfibrils via the application of a topological surface carboxylation reaction on cellulose microfibrils using 2,2,6,6-tetramethylpiperidinyl-1-oxyl (TEMPO) as a catalyst. The dispersed microfibrils spontaneously align in water. The integration controls of the self-aligned microfibrils, i.e., careful adjustment of the pH and evaporation of the solvent in the microfibril dispersions, produces a wide range of artificial bulk materials with outstanding properties. Examples include unprecedentedly stiff hydrogels that are free-standing with a water content of 99.9%, ultralow-density, tough aerogels with large surface-areas, and transparent films with exceptionally high oxygen-barrier properties. These materials are expected to further develop as robust frameworks of polymer nanocomposites or high-capacity supports of catalysts and the other functional materials.

Basic Items of KP Bleaching

Makoto Iwasaki
MIP Consultant Office

This article widely describes about change of equipments for KP bleaching, trend of the operation, bleaching chemicals and the chemistry, finally topics related to KP bleaching.

The Latest Ozone Generation Technology

Shinsuke Goto, Hajime Nakatani and Yoshiaki Odai
Department 1, Kobe Works Public-use Systems, Mitsubishi Electric Corporation

Ozone is made of three oxygen atoms which has strong oxidizing power. In the paper mill industry, ozone is used for pulp bleaching. However, since lots amount of ozone production is required for pulp bleaching, the increase in electric power cost and enlargement of an ozone generator were challenges to be achieved. Since improvement in efficiency of ozone generation and downsizing of the ozone generator were actualized, now our solution is introduced herein.

The improvement in efficiency of ozone generation was focused attention on discharge gap length. By “Narrow gap" which shortens discharge gap length, the energy distribution of the electron has been shifted to the higher distribution.

As the result, since the low-energy electrons which decompose ozone decrease and the high-energy electrons which generate ozone increase, the improvement in efficiency of ozone generation has been achieved. The specific power consumption of the ozone generator are reduced by about 27% at ozone concentration 12wt% from conventional type.

Downsizing of the ozone generator was focused attention on the increase in the discharging area and on the increase of the amount of ozone production per specific discharging area in the same ozone generator (it means the same diameter of the shell). By adoption of the small electrode whose diameter is smaller than the conventional one, the discharging area was increased by 4 times. Moreover, the amount of ozone generation per specific discharging area was increased twice by "Narrow gap".

As the result, in the case of the same ozone generator (the same diameter of the shell), the total amount of ozone production is risen by 8 times than the conventional type and on the one hand, compared with the same ozone production, the ozone generator (the diameter of the shell) becomes more compact to $1/\sqrt{8}$ ($\fallingdotseq 1/2.8$) of the conventional type.

Optimization of Operating in Lime Kiln

Yasuhiro Ogawa
Tomioka Mill, Oji Paper Co., Ltd.

At Tomioka mill, Oji Paper, in a lime kiln, although heavy oils, plastics, and biogases are

used as combustion fuel, the fuel cost of the kiln is in an aggravation tendency by the jump in a heavy oil price.

Then, Taiheiyo Engineering Corporation, which has implemented the energy conservation measures in cement kilns for years, was invited as operation consultant, and the technique was made to apply to the lime kiln.

Although three kinds of fuel were throw in with the individual burner, the burner which united the injection nozzle, TMP burner（Taiheiyo Multi-Purpose burner） was introduced in March, 2010. In this time, the lime kiln equipment was totally caught in addition to the burner, and the following measures were implemented.

1) Stabilization of the filling factor of sludge in the lime kiln
2) Adjustment of a flame
3) Optimization of the lime layer thickness in the lime cooler
4) Adjustment of the injection air content to the kiln
5) Optimization of the oxygen concentration at the kiln inlet housing

As a result of adopting above mentioned measures, we achieved 6% reduction of the fuel consumption.

The Measure against Operational Improvement of Green Liquor Clarifier of Causticizing Process

Hiroshi Fujita
Niigata Mill, Hokuetsu Kishu Paper Co., Ltd.

The production facility of Niigata Mill, Hokuetsu Kishu Paper Co., Ltd has digesters of two series, washing and bleaching equipments of three series, and causticizing equipments of three series. However, since it has only green liquor treatment equipments of two series, the load more than a design throughput has been hung. Since it is electrical overload operation, poor sedimentation in a green liquor clarifier tank takes place. Suspended solid in clear green liquor may go up by 4 times the standard value. If poor sedimentation in a green liquor clarifier tank takes place, a lime kiln-causticizing process will become out of condition by poor drying of a lime mud filter and change of the temperature profile in a lime kiln.

Then, cause investigation with poor sedimentation with a green liquor clarifier tank was conducted. And poor sedimentation of a green liquor clarifier tank has been improved by performing operation measures against an improvement, such as adjustment of green liquor concentration.

The Evaluation of the Hydrogen Peroxide Addition at EP Stage by Using Catalase

Yoshiaki Mase
Hachinohe Mill, Mitsubishi Paper Mills Limited

In Hachinohe mill, there are three bleaching lines of kraft pulp. No.3 BKP line whose capacity is 850ADt/d is the biggest line in this mill. Bleaching sequence is A-D0-EP-D1 equipped with diffusion washer.

At No.3 BKP line, we bleached pulp made from several kinds of hard wood chip having different bleaching property. In some cases, both addition of hydrogen peroxide at EP stage and of chlorine dioxide at D1 stage unusually increase. Chlorine dioxide may be consumed by the residue of hydrogen peroxide, so bleaching efficiency would be reduced.

In this paper, we introduce the method of evaluation by using the specificity and selectivity of catalase in order to optimize the residue of hydrogen peroxide at EP stage.

Operational Improvement by Retrofit of Kraft Pulp Fiber Line

Tetsuya Okamura
Kraft Pulp Div., Mishima mill, Daio Paper Corporation

Hardwood fiber line in Mishima mill had increased and extended step by step with expansion of paper machines. The total energy cost was pushed up because of the increased number of equipment and the pulp transportation distance.

On the other hand, the basic density of wood chip became lighter using of Eucalyptus nitens and Acacia, and we decided to retrofit our line to get much more production.

Our retrofit concept of Kraft pulp line was as follows;

1） Production increase
2） Cooking facilitation of a wood chip with a low basic density
3） Energy efficiency improvement by shortening the transportation distance, enlargement of equipment and decreasing the number of it
4） Quality improvement of pulp (reduction of dirt content, stability of pulp strength).

After retrofit, we achieved the production of 1,600 tons/day (100 tons/day of increase), more usage of the low basic density of wood chip, reduction of energy and bleaching cost and the improvement in pulp quality.

Optimization of Operating Condition for Dissolving Kraft Pulp

Takehiro Kojima
Kushiro Mill Production & Plant Engineering Dept., Nippon Paper Industries Co., Ltd.

Rayon attracts growing attention due to demand growth in south eastern Asia and in China recently. Rayon is made from cotton linter and dissolving pulp. While supply of cotton linter is greatly affected by climate, dissolving pulp process can provide stable supply. Demand of dissolving pulp is expected to be stable in the future. Dissolving pulp has been produced by Sulfite process. Since there was a limitation on wood species for Sulfite process, new technology was developed to produce dissolving pulp by continuous Kraft process.

Decision was made to produce the world first SW dissolving Kraft pulp utilizing continuous Kraft process. Construction was completed in October 2012 then commercial production commenced in March 2013.

This report shows optimization of operating condition for dissolving kraft pulp.

Operation Experience of MVR Pre-Eva

Hideaki Suzuki
Sendai Mill, Chuetsu Pulp & Paper Co., Ltd.

In Chuetsu Pulp, Sendai Mill produces HW pulp with continuous digester line and SW pulp with batch digester line.

The weak black liquor dry solids from the continuous digester to main evaporation plant is around 20 DS % with Pre-Evaporator (Pre-Eva) using the flash steam from the digester extraction as heat source.

On the other hand, around 13DS% SW black liquor directly goes to the main evaporator because of no Pre-Eva in the batch digester.

Sendai mill has been increased SW pulp production since 2009. Because of the pulp production increase, the main evaporation plant became overloaded.

Pre-Eva with flash steam from continuous digester has been introduced to Japanese mills. In food processing industry, electricity (compressor) has been used to evaporate the product because such steam would not be so available in the food processing mills.

Sendai mill has recently introduced vapor recompression pre-evaporation plant to the black liquor from SW batch digester to decrease steam consumption of the main evaporation plant as cost saving.

There are no references in Japanese paper pulp industry for vapor recompression evaporator with compressor which has been introduced to the food processing industry. Chuetsu Pulp decided to introduce Andritz Mechanical Vapor Recompression (MVR) Evaporator for Sendai

Mill because Andritz MVR has many references for black liquor pre-evaporation plant all over the world.

This paper explains the general description of MVR plant and the operation experience.

The Production Method of the Viscose Rayon Manufactured Using Dissolving Pulp

Ko Tokuda
Omikenshi Co., Ltd.

The reaction was invented viscose of the cellulose in the U.K. in 1982. It is produced approximately 4 million tons now in the world. It is as follows about the manufacturing method of the viscose rayon. Dissolving pulp is used for the cellulose materials of viscose. Pulp is immersed in sodium hydroxide solution and it is made alkali cellulose. Subsequently, carbon disulfide is made to react to alkali cellulose, and cellulose xanthate is produced. And a dilute alkali solution is added to cellulose xanthate, and it is made to dissolve in it. This solution is called viscose.

Viscose rayon is produced by carrying out solidification reproduction of this viscose.

Viscose rayon is used for clothing, industrial materials, and paper making. Moreover, functional rayon with a special function is produced by adding functional materials to viscose.

The Latest Trouble and the Solution at Pulping Process
—Improvement of Productivity and Quality When Using Acacia Tree—

Masayuki Murano
PULP&PAPER INDUSTRIES DEPARTMENT, INTEGRATED TECHNOLOGY GROUP,
CHEMICAL DIVISION, KURITA WATER INDUSTRIES LTD.

Concerning the environment of the Earth, more and more acacia is used as pulping raw material. Acacia tree has high content of lignin and fatty acid, which will cause various operation trouble much frequently then the other hard wood tree. The troubles include scaling by calcium oxalate, pitch by fatty acid, and poorly-washing efficiency by foaming, and cause both productivity decline and quality drop.

The chemicals such as scale inhibitor, pitch controller and anti-foaming agent are applied to solve these troubles. The scale inhibitor, which works in low pH range is applied for calcium oxalate. The pitch controller can dissolve and disperse metal salt of fatty acid. The cause of poorly-washed pulp is air bubble in pulp slurry, and a proper defoamer can increase dehydration. An improved dewatering can decrease the residue of lignin and fatty acid carry over to latter

process, which will improve the oxygen delignification, reduce bleaching agent, and preventing from scaling or pitch troubles.

Introduction of the Latest DIP Technology

Takanori Goto
Research & Development Dept., Voith IHI Paper Technology Co., Ltd.

A DIP production process is a treasure of cost down - raw material, energy, and chemical costs are variable by the technology of each component. In this paper, we will introduce latest DIP technologies related to each component and system.

Chemical-Mechanical Pulps From Eucalyptus and Their Comparison with Eucalyptus Chemical Pulps

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Andritz K.K.
Eric C. Xu
Andritz Pilot Plant/R&D laboratory
Gary Harris
Andritz Ltd.
Paulo E. Galatti
Andritz Brazil Ltda.
Dieter Teubner
Andritz AG

This paper present recent developments in chemical-mechanical pulping and examines the latest pulping technology, P-RC APMP (Preconditioning followed by Refiner-Chemical treatment - Alkaline Peroxide Mechanical Pulping). The P-RC APMP process is based on peroxide bleaching chemistry, lignocellulose chemistry and refining mechanism. To ensure chemical and mechanical efficiency, the P-RC APMP uses two step chemical addition, first a mild alkaline-peroxide preconditioning of the chips, and second the addition of peroxide bleaching chemicals in refining, so that bleaching occurs both during refining and in a high consistency retention step following primary refining.

The application of the P-RC APMP process to various South American eucalyptus wood species was investigated. Pulps produced were compared with other pulps currently available in the market for various applications. The result showed that eucalyptus P-RC APMP pulps have

papermaking properties comparable to, or better than HWD market BCTMP pulps from North American wood species. When compared with Eucalyptus chemical pulp, the P-RC APMP pulps had higher bulk and higher light scattering at the same tensile index. The higher bulk renders this new process and attractive alternative for the utilization of eucalyptus for many paper and board applications.

Valmet Biorefinery Technology

Hiroshi Yamashita
Sales Group, Pulp & Energy, Valmet K.K.

The promotion of biomass is considered a way of creating a sustainable society for the future. We have been recently facing several challenges such as climate change, increase need for energy, energy security and so on. Then it is expected that the biorefining could be one of the promising solutions. On the other hand, the key factors to expand biorefining are cost efficiency and energy efficiency. Valmet has been developed several refining technologies about biomass. We believe that Valmet biorefinery technologies enable mills to install biofefining and creates new valuable products for mills.

－Peer Reviewed－

Photocatalytic Mechanism of Artificial Zeolite Containing Titanium Dioxide

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Ehime Institute of Industrial Technology
Teruo Henmi and Naoto Matsue
Faculty of Agriculture, Ehime University

We have already reported the synthesis of an artificial zeolite containing TiO_2 particles (AZT) from paper sludge ash that has a high concentration of TiO_2 (PS ash). This AZT has been able to reduce acetaldehyde gas under UV irradiation. In this study, we investigated the mechanism of the acetaldehyde reduction by X-ray fluorescence, X-ray diffraction, scanning electron microscopy (SEM), BET specific surface area measurements and acetaldehyde decomposition experiments. Acetaldehyde decomposition experiments showed that the AZT had photocatalytic activity, whereas PS ash showed no activity, although TiO_2 particles were present in both. SEM analysis of AZT showed that the TiO_2 particles were closely bound to the zeolite crystal. A zeolite containing TiO_2 (ZT) was prepared through synthesis of zeolite in the presence of TiO_2, and SEM observation revealed a composite structure with TiO_2 particles embedded into large

zeolite crystals. The ZT had higher photocatalytic activity toward acetaldehyde than did the physical mixture of zeolite and TiO_2. The close association of zeolite and TiO_2 that occurs during the synthesis of the zeolite in the presence of TiO_2 might support the transfer of acetaldehyde molecules from zeolite to TiO_2. We conclude that AZT showed photocatalytic activity because of binding of zeolite to the TiO_2 particles. We show that the binding of TiO_2 and zeolite is an important process contributing to the photocatalytic activity of these materials.

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Univ. Tsukuba- Biomaterials Green-processing Research and Paper Research Liaison with ASEAN Countries

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Faculty of Life and Environmental Sciences, University of Tsukuba

Biomaterials Green-processing Research Group in University of Tsukuba was established in 2013. Green-processing means an environmental-friendly technology for processing biomass (green material) to build a sustainable society (green society). The research topics conducted there include (1) the development of paper-based medical and environmental check-up sensors fabricated by printing hydrophobic barriers using an ink jet printer with a poly (styrene acrylate) resin ink to build a microfluidic channel on filter paper, (2) utilization of fundamental papermaking technology to improve the speed of delivering aqueous liquid analytes in a micro-channel for high performance of the sensors, (3) bacterial culture system, instead of Petri dishes, using paper and ink jet printing so that paper substrates can have many small hydrophilic areas to accommodate agar media in filter paper entirely hydrophobized beforehand, (4) Device for converting paper vibration caused by sound or noise to electricity using a power generator where the distance between an electrode and electret changes repeatedly and induce alternative current, (5) the saltwater immersion method for paper cultural heritage that is damaged by tsunami and flood to inhibit mold growth as a first-aid treatment, and (6) scientific reexamination of effects created by the air-exposure practices to customarily manage books stored in library for removal of pests and moisture. The research group keeps on making efforts to bring forward international and industry-academia liaisons for further development.

Paper Stock Preparation Equipment
— System, History & State-of-the-Art Technologies —

Kazumi Fujita
AIKAWA Iron Works Co., Ltd.

In the history of paper industry, the refiner has been changed its style from “Beater” to conical type, cylindrical type, and disk type in accordance with the paper market growing in a

rapid pace. These transitions of refiner are intimately-connected to upgrading of paper machine, to variation of paper stock character, and to development of general industrial technologies. Thus knowing of the refiner's history would be very useful for deeply understanding of existing refiners and for studying their future.

Now, we face two big tasks which might force reconsideration of today's main double disc type refiners. The first one is the continual energy saving of refiner for electric power cost reduction and greenhouse gas mitigation. The second one is to getting maximum paper strength by using low intensity refining technology from plantation hardwood pulp which has shorter fiber length and lower freeness. On their principled grounds, some suppliers gave a revival chance to the cylindrical and the conical refiners by using the newest industrial technologies, as the new generation refiners, and another supplier created multi disk refiner,

Also, "Finebar" refining fillings would be one of very effective way to the today's 2 tasks without so much investment. We would like to introduce the good results of "Finebar" trials and actual performances.

History of Paper Machine Approach System and State-of Art Short Flow Concept

Yosuke Takeshita
Andritz K.K.

The approach system that will send the raw material to the paper machine in the final stage is a very important process to control the end product quality. It has been changes with respect to technological innovation associated with mass production and speed of the paper machine approach systems in a corresponding manner. In the first half of this paper, we will describe briefly the historical transitions of the approach system for the last half a century. And the second half of this paper, we will describe the Andritz state-of-art system "short-flow concept" that Andritz proposes currently.

Operating Experience of Combisorter

Yoshihito Utsunomiya
Oita Mill, Oji Materia Co., Ltd.

In Oita mill, there are three paper machines, PM#1,PM#3 and PM#5.Paperboard is mainly produced in Oita mill. In addition to it, gypsum liner board, white paperboard, color board and core board paper are produced.

As the usage rate of used corrugated paperboard accounts for about 80%, the reduction of the

rejected pulp in the corrugated paperboard process leads to the increase of the pulp yield rate. In this report, we will introduce the case that the pulp yield rate has been boosted by the installation of Combisorter, IHI Voith Paper Technology Co., Ltd., at the last screen of the pulp production process.

Trend of the Paper Manufacture Use Precipitated Calcium Carbonate Filler

Toru Kawazu
OKUTAMA KOGYO Co., Ltd.

Filler grade precipitated calcium carbonate (hereafter called PCC) is used in papermaking to improve the physical properties, optical properties, and printing characteristics of paper, and has a large share of the filler material market in Japan. (It is estimated that in 2013 the quantity used exceeded 70% of the total quantity of filler.)

PCC is manufactured by chemical reaction after calcined limestone, and by appropriately adjusting the reaction conditions the particle shape and size can be controlled as desired, so the particles can be designed in accordance with the required quality of the paper.

This article introduces the effectiveness of control of PCC particles for control of paper opacity and bulk, and for reducing bleed through of ink.

Transition and Latest Technologies in Wet End Chemistry of Paper Board（Internal Paper Strengthening Agents）

Tetsu　Mizuko
Paper Chemicals Division, Arakawa Chemical Industries, LTD.

Paper making system have been changing from the viewpoint of environmental protection and cost reduction. Recycling rate of used paper has been increasing, fiber quality has become worse. For a reason of operation cost reduction, consumption of fresh water has also been restricted. Under such highly closed wet-end condition and high electrical conductivity, various wet-end additives or internal wet-end agents cannot show desirable performance. We have already been developing various type of internal paper strengthening agents optimized in such a worse condition, by controlling physical properties of amphoteric Polyacrylamide(PAM) such as molecular weight distribution, molecular weight, branching degree and distribution of ionic charge density.

In this paper, we outline the transition and latest technologies in wet-end chemistry of paper board. In addition, we also introduce our new internal paper strengthening agents, which shows

higher performance in high strength paperboard.

Operating Experience of Shaking System at PM6 in Iwakuni Mill

Kazuna Kondo
Iwakuni Mill, Nippon Paper Industries Co., Ltd.

PM6 at Iwakuni mill has been operating since 1974.and until 2009 was producing coated base paper. However, since a rearrangement of the corporation's paper production operations, PM6 now produces a large variety of paper grades and quality. This includes regular coated base paper, cast coating base paper and wood free paper. Compared to the original coated base paper, for wood free paper and cast coating base paper quality demands differ according to the customer, and we were asked to meet more stringent quality requirements.

In order to meet these quality requirements, as well as to improve competitiveness with our competitor's products, we were able to improve paper formation and lower the MD/CD ratio by installing a wire shaking system in December 2010. In this presentation I will report on the outline of the equipment, our operating experiences and changes in paper quality.

Introduction of First Smart Sizer

Kosuke Fukushima
Kobayashi Engineering Works, Ltd.

"Smart Sizer" is a sophisticated development of rod metering type size press.

There are many factors that go into designing and operating a successful high-speed rod metering size press, and Paperchine created a quite new and unique technology as "Smart Sizer".

The purpose of this paper is to highlight and evaluate the key areas for the equipment design and the process conditions. The development concept of "Smart Sizer" is based on "3C", that is, "Compact design, Clean operation, and Cheap equipment".

"Smart Sizer" is being used throughout the world to produce a variety of grades ranging from linerboard grades applying starch to high quality woodfree coated paper with high solids coating.

PVAm (Polyvinylamine) Technology; Improvement in Folding Endurance and Optimization of Chemical Use

Michael O'Byrne
Ashland Water Technologies
Kazuki Kato
Riken Green Co., Ltd.

Fiber type and source are perhaps the most limiting factors to achieving sheet quality and machine performance targets. As the use of recycled fiber in the global papermaking industry grows, maintaining furnish quality becomes increasingly challenging. Recovered paper fibers now account for over 70% of the industry' s raw material needs. Old corrugated containers (OCC) make up more than half of all recovered fiber tonnage, and are used to make most of the corrugated and folding cartons found on store shelves today. As these fibers repeatedly cycle through the processes of papermaking, converting, end use, and re-pulping, papermakers typically have to add more recycled furnish to the sheet to meet strength targets at nominal basis weight. This is not an attractive economic option due to the volatile recycle furnish market.

The paper machine wet end is one of the most complex and influential areas in the papermaking process. In a well-balanced wet end, additives impart sheet functional properties, improve machine performance, and increase operational flexibility. A chemically unbalanced wet end, often typified by overuse of additives, competing ions, and performance variability, can severely limit sheet quality and productivity.

Improving and optimizing the wet end additive scheme can reduce total input costs, boost machine performance, expand operational flexibility, and improve sheet quality, , Based on these concurrent needs, Ashland Water Technologies has introduced a unique single-chemical additive called Hercobond? 6000 paper performance technology that is designed to provide step changes in the areas of strength, drainage, and retention; thereby increasing operational flexibility.

New HYBRID™ Polymer and Application to Papermaking Processes

Yong Quan Dong, Qing Qing Yuan and Jin Hai Xiao
Nalco Company
Shintaro Sato
Katayama Nalco Inc.

HYBRID polymers are more effective in hydrophobic contaminant control and RDF (Retention, Drainage and Formation) applications because of its unique characteristics.

In recent raw material situation of paper industry, Nalco reviewed design of HYBRID

polymers and found optimum specification of polymer in each RDF and contaminant control application. Regarding RDF case, performance of developed polymer was confirmed in duplex board and gypsum liner machines. Various benefits were observed such as retention improvement, and more efficient dewatering from the wet web, reduction of steam consumption comparing with old type of HYBRID polymer.

In this paper, authors are trying to explain polymer development and commercial trial of new HYBRID polymer.

Characteristics and Potential Applications of Cellulose Acetate

Shu Shimamoto, Shizuka Okada and Toshikazu Nakamura
Cellulose Company, Daicel Corporation

The acetylation of cellulose followed by the partial deacetylation leads to the solvent-soluble cellulose acetates, which have been widely used in various industrial fields including, *inter alia*, membrane separation, photo film, liquid crystal display, and, textile and other fibers. In this article, we focus on the remarkable surface properties of cellulose acetates. In this context, the recent development of cellulose acetate-based hollow fiber membrane for drinking water treatment is reviewed; owing to its outstanding negative ζ otential, the cellulose acetate membrane is more resistant than other-polymer-based membranes to the fouling problem by the suspended solids in surface water which are negatively charged in general.

In light of the theory for interfacial forces in macroscopic systems developed by van Oss et al., characteristics of cellulose acetates are also discussed in this article; cellulose acetates are characterized by their high electron acceptability, which could be an origin for affinity towards electron donors such as metals and carbons, suggesting that the cellulose acetates are inherently suitable for the binder for the production of electrodes of rechargeable lithium ion battery and other electrical storage devices.

In an effort to verify the affinity between cellulose acetates and carbon materials, composite films of cellulose acetate and multi-walled carbon nanotube (MWNT) were prepared. The composite films from cellulose acetates exhibit high electrical conductivity than other polymer based composite films, revealing that MWNT is highly dispersed in cellulose acetate matrix presumably because of the electron acceptor – donor interaction (Lewis acid — base interaction). We are ready to offer samples of non-conventional water-soluble grades of cellulose acetate as well as conventional solvent-soluble grades for potential applications as such.

Corporate Profile & Products Information (14)

Aikawa Iron Works Co., Ltd.

Aikawa Iron Works Co., Ltd. was founded in 1924, and it has been contributing to the development of the Japanese Pulp & Paper industry as a dedicated manufacturer for the Pulp & Paper related equipment since its Japan's first innovation of the continuous stock preparation equipment "Super Refiner". And Aikawa started a technological collaboration with Lodding (U.S.A) in 1965 and Lamort (France) in 1970. Aikawa has been establishing a sturdy foothold by responding to the recent global market trend of saving resources and energy.

Aikawa opened the Okabe Mill in Fujieda city, Shizuoka prefecture in 2003 to integrate the machining dept. and assemble dept., and opened a foundry shop in Mariko, Shizuoka city for better production efficiency in the foundry process. We then moved the headquarters operations to the central Shizuoka at 24-2 Tenma-cho, Shizuoka city for more efficient management functions.

We have further established a foothold to the global market by an acquisition of POM and AFT that were based in Finland and North America (fundamental areas for the Pulp & Paper industry) for the operations and manufacturing and having the worldwide distribution channels, in order to gain the strength against the global competition. Our target is to be a leading supplier that provides with cutting edge technologies, products and services for the stock preparation equipment, paper machine equipment, approach flow technology, refining plates, screen cylinders, Pulper rotors, doctor blades and other major consumables.

We appreciate for giving us an opportunity for introducing our company, products and technical information.

－Peer Reviewed－

Role of Deinking Agent and Its Challenge
― Deinkability of Inkjet Printings ―

Hiromichi Takahashi
R&D – Development Research, Performance Chemicals Research, Kao Corporation

The basic deinking process for old newspapers, the role of the deinking agent, the science and the condition for good deinking are reviewed based on the results in our laboratory first. Then, by using this typical deinking process, the deinkability of the pigment-based inkjet printings was examined.

In commercial printings, the transition to on-demand printings is in progress, because the

on-demand printings enable to print many various lots and even small lots. Among them, the ink-jet printing has attracted attention in terms of printing speed. Therefore, it is thought that the waste papers printed by ink-jet printers will be used as raw materials in pulp manufacturing in near future.

In deinking of pigment-based inkjet printings, there were no problems in the ink-releasing process. But, inks released from the waste papers were too small to be rejected out in the flotation process. For increasing the efficiency of the flotation, it was found that the weakened shear in the ink-releasing process and the combined use of the aggregating agents such as fatty acids in the flotation process were effective. However, by this method, it is considered that ink-releasing will be not enough in the deinking of old newspapers and electrophotography printings.

It is necessary to establish the deinking method of mixed waste of ink-jet printings, electrophotography printings and old newspapers by adopting the suitable deinking systems and deinking agents and/or improving the ink-jet inks.

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Technological Transition of Papermaking Chemicals Focused on Functional Chemicals and Their Application in Wet End

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This paper presents a review of technological transition and recent developments of papermaking chemicals, such as sizing agent and dry-strength resin. In recent years, papermaking conditions have changed by greater use of recycled pulp, high amount of coated broke in furnish, higher loading of filler, increases in speed of paper machine and closed water system in paper mill. These trends result in the rising of pH values and electric conductivity of furnish and the increasing of dissolved and colloidal substances in papermaking systems, that disturb the absorption of papermaking additives to fiber and fine. Under these circumstances, the performance of sizing agent and dry-strength resin has been declined. To improve of paper properties and papermaking efficiency, it is necessary to understand of wet end conditions and utilize new polymer technology in papermaking chemicals.

Optimization of Wet-end Operation by "AXISZ System"

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Technical Dept., SOMAR Corporation

Please be notified that since marketing in 2001, "AXISZ System" has been adopted by a good number of paper making machines and has contributed to the improvement of the conventional retention system.

"REALIZER R Series", a version of "AXISZ System", has been keeping to be used by various types of paper making machines, regardless paper making machine or paperboard machine.

This paper refers to the developing history of "REALIZER R Series, FX Series" and "REALIZER A Series" and introduces the successful cases of the improvements of productivity, runnability and qualities attained by the abovementioned "Series".

Unfavorable tendency has clearly come into existence, that is, the dosage-increasing of

various kinds of wet-end chemicals provoked by the necessity to deal with deterioration of pulp materials and etc. This fact has brought big change in wet-end chemical condition of paper making machines and has become one of the big causes in poor performance of various wet-end chemicals.Simultaneously, people have already noted the tendency of increase of the deterioration of paper qualities, like defective paper surface and stain of papermaking equipment caused by pitch.

Knowing those unfavorable surroundings, Somar has developed wet-end improvement system named "AXISZ System" which enables various types of wet-end chemicals to demonstrate the original and intrinsic performances to the maximum. "REALIZER A Series" is high-performance coagulant which is effective for sticky pitch and defect paper surface and is also, special cationic polymer which is good to be applied to stuff box. High-performance retention aid, "REALIZER R Series, FX Series" is high molecular polymer with special structure and can achieve higher retention even with small dosage. Optimum Wet-end system can be obtained by combination of those chemicals. Also, it's should be noted it is unique that each chemical alone can demonstrate its own capability.

Transition and Latest Technology of Slime Control

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Pulp & Paper Industries Department, Kurita Water Industries Ltd.

While paper-making technology has been made progress, slime treatment issue also has been getting more important. Neutralization of pH, reduction of fresh water and increase of using recycled furnish cause in continuously serious slime problem and require more effective slime control technique. From the view of slime control history from 1970, the technology has been developed roughly through three generations.

First generation is "organic biocide": try to prevent slime deposit by combination of organic biocides.

Second generation is "inorganic biocide & cleanliness treatment": Development Fuzzicide® technology mostly solved any slime problems. Furthermore, cleanliness treatment in whole the process achieved completely slime defects prevention. Third generation is "water quality stabilization": We found microbial activity changes water qualities and influences on paper-making operation. Thus we have been developing S. sensing® system, that has three functions of monitoring, feeding control and analysis and then try to achieve operation stabilization and cost saving simultaneously by stabilizing water quality.

Case Study by Installing Trumpjet System to a Paper Machine

Akira Nozaki
MPM OPERATION Co., Ltd.

Hachinohe Mill, Mitsubishi Paper has the capacity of approximately 700,000 ton of papers per year. We have seven paper machines in Hachinohe Mill, and installed Trumpjet System in No.2(2PM) and No.4(4PM) and No.5(5PM) and No.6(6PM) and No.7(7PM) paper machines with the aim of chemical saving.

This report is described about the effect and trouble of Trumpjet System at 5PM.

Improvement in the Operation by Optimizing the Approach System of the Coated Paper Machine in HOKUETSU KISHU Niigata Mill

Katsuhisa Otaki
No.6 Production Department, Niigata Mill, Hokuetsu kishu Paper Co., Ltd.

This report shows our work on stable operation and saving energy with regard to the coated paper machines, N7, N8 and N9, in HOKUETSU KISHU Niigata Mill, especially the work concerning these machines' approach systems.

Firstly, about N7- in this machine, the quantity of outflow pulp and the number of streaks and sheet breaks has been reduced by reusing the unused cleaner to treat the reject of the final cleaner.

The next is about N8. In this machine, slime deposits have been reduced by changing the method of cleaning the machine pulper and preventing the coated broke in the tank from rotting.

The last is about N9. In this machine, letting the accept of the second cleaner combine with the accept of the first cleaner and sending those to the deaeration tank enabled the number of cleaners to be reduced, as a result, we could achieve high levels of energy saving.

In this report, we would like to explain the details of our work, its effect and result.

The Latest LC and HC Pulping Technology

Masamori Tanaka
Voith IHI Paper Technology Co., Ltd.

The Pulping technology is related not only with deflaking, but also with screening and detrashing. This is the result of technological progress of pulping. For each process of stock preparation system, the pulping system should be optimized for the type of raw material.

Especially pulping for waste paper should consist with detrashing system because the amount of contaminants in raw material is getting bigger.

In this article, the latest pulping technology mainly for LC and HC operation is introduced.

The Process Optimization of Paper Making by Stabilization of Wet-end Process, from a Part of "Metso Fiber to Print Concept"

Jarkko Ruonala and Jukka Nokelainen
Metso Automation Inc.
Masaru Nakasone
Metso Automation K.K.

When quality control is concerned, the focus is often on the paper machine. However, the quality potential for a paper machine is always set before it in the pulp mill and stock preparation area. Correcting stock preparation upsets at paper machine is already too late. To put it simple, the paper machine merely forms the sheet and removes the water, whereas everything else is done at furnish preparation. This paper will present the measurement and optimization possibilities in holistic quality management at paper machine and present an example case for end product quality management by means of optimizing stock preparation area.

Introduction of Non-Destructive Inspection Technique to Paper Mill Equipments

Tatsuyuki Nagai
Non-destructive Inspection Co., Ltd.

In this paper various kinds of non-destructive Inspection technique in a paper mill is introduced. In a paper mill measurement of internal deposit thickness for boiler waterwall tube in thermal power plant, Corrosion of equipment/piping, and delamination of lining materials serves as subjects of inspection.

Latest DIENES Slitting Systems

Isamu Tobari
Engineering Depar. Mack 3 Enterprises, Inc.

Since 1913, Dienes Werke has meant outstanding quality, expertise and breakthrough innovations in the field of industrial slitting technology. Dienes is the worldwide leading

supplier of circular and straight knives, knife holders and slitting systems as well as competent partner for all related services. Standard knife holders often do not meet varying customer requirements nor very special applications. The Dienes slitting laboratory will test cut materials with a variety of different holders and knife desings in order to determine the best solution for long term performance, functionality, and user friendness.

Online Measurement and Control of Fiber Orientation Angle

Motonori Tahara and Hiroyuki Miyamoto
Paper and Web Solutions Dept., Yokogawa Electric Corporation

Fiber orientation sensor for YOKOGAWA “B/M9000VP” system has been contributing to improving the paper quality represented by twist-curl by measuring the fiber orientation on both felt and wire sides of the paper. However, after the fiber orientation control is automated, it is appeared that paper pass-angle fluctuation in the sensor head gap and dust accumulating on the measurement window affect the fiber orientation measurement. In this paper the technical key points and the benefits of the improvement made against these issues are presented.

Corporate Profile & Products Information (15)

Yokogawa Electric Corporation
Yokogawa Solutions Services Corporation

Tamisuke Yokogawa founded YOKOGAWA Electric Corporation in 1915, and we will celebrate its 100th anniversary next year,the factory was Transferred in current place,Musashino-city in 1930 and until now we centered on the measurement, control, and information, and provides industry leading products, we have contributed to the development of society.

We develop the affiliated company of 34 countries, 15 in Japan, 70 in foreign countries now. And we read needs to change by the times sensitively and continue growing up while accomplishing a change by oneself and am counted today in one company of the world leading company in the field of control.

In this article, we would like to introduce our corporate profile and product introduction of Yokogawa Solutions Services Corporation and Yokogawa Electric Corporation.

－Peer Reviewed－

A Multivariable Pulp Brightness Control of ECF Bleaching Process by Model Predictive Control

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Core Technology Laboratory, Oji Holdings Corporation[1]
Masahiro Watanabe
Advanced Process Control Section, Vigilant Plant Services Center, Yokogawa Electric Corporation
Takahiro Yamamoto
Technical Solution Dept.4, Technical Solution & Engineering Division, Yokogawa Solution Service Corporation

In the pulp and paper processes, to improve more cost reduction and more quality stability have been required at any time. But the pulp process response has long delay time and many mutual interference elements that affect each other between control variables' responses; therefore it is well known that Kraft pulp bleaching process is one of the most difficult processes to control automatically.

In the meanwhile, "Model Predictive Control (MPC)" has been developed as a new control function to operate complex multivariable processes systematically in good conditions from days of 1980s, and is called and known as "Advanced Process Control (APC)", too. And, this new control system is reported a lot, it brought fruitful economical outcome by optimizing its process conditions and by controlling multiple points reasonably as observing whole process conditions.

In this paper, we show an example to apply the MPC system to the hardwood pulp (LBKP) brightness control for ECF(Elementary Chlorine Free) bleaching process of Kraft pulp and, at the same time, new "K-value control" utilized for to prevent serious "discoloration trouble" of paper sheet which has been recognized recently. The trouble is, to break out strong "yellowing trouble" when paper rolls are exposed in the heat and high moisture environment during long period for example in warehouses etc. after paper making.

Furthermore, in addition to use many special sensors in this control system, they are "hard sensors", such as pulp brightness sensor, residual chlorine consistency sensor and pulp Kappa number sensor etc., "Soft sensor" functions are also used together with MPC at the same time.

In this system, eight "soft sensors" which utilized multiple linear regression equation models for pulp brightness and residual chlorine consistency etc. are installed in the points where sensors are not equipped or where measurement is done by hand analysis, at fixed intervals, for the reasons of the requirement of more high-precision measurement values and so on.

And these soft sensor' values are linked with the MPC system and monitoring system, and it

had been able to make use of well, in actual plant operation.

Finally, applying the MPC system, we could control the pulp brightness, K-value, residual chlorine consistency and pH etc. of the ECF pulp bleaching process in good conditions. Furthermore we refer to the detailed analysis results obtained from long run operations, the control stability for the pulp brightness quality, the plant operability and the reduction effect of the bleaching chemical cost.

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Pulp and Paper Research Conference

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Technical Report (Original Paper)

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Mechanisms of Improved Viscosity of Coating Color with Application of Core-Shell (Polyvinyl Chloride-Cationic Styrene Methacrylic Ester Copolymer) Emulsion

Yui Takagi, Kazuhiro Kumeda and Shiro Umeuchi
Paper Chemical Business Division, Seiko PMC, Co., Ltd.

In recent years, as demands of high definition full color printing on demand have been increased, there is an increased need for inkjet recording paper in commercial use. Conventional inkjet recording paper on which is coated a coating color mainly containing porous silica, inkjet ink fixing agent and polyvinyl alcohol (PVA), enables to high definition full color printing. But because inkjet recording paper is expensive and has poor layer strength, currently, it isn't popular in commercial use, while popular in home use. In order to resolve these situations, we had started developing the new high-performance binder for inkjet recording paper, to achieve lower viscosity and better layer strength of coating color.

In a present study, we found that "core-shell (polyvinyl chloride-cationic styrene methacrylic ester copolymer) emulsion" has two useful effects for coated inkjet recording paper. One is the reducing viscosity of coating color and the other is the enhancing layer strength on coated inkjet recording paper. Reduction in coating color viscosity leads to lower production costs of inkjet coating paper as a result of the reducing drying load.

In this presentation, we show the above new binder's effects and mechanisms of improved viscosity of coating color with inkjet printability to paper.

Automatic Correction Method of Soft-Sensor Function that Employs Linear Multiple Regression Model for Pulp Bleaching Process
— Ordinary Method and Kalman Filter Algorithm —

Mori Yoshitatsu
Pulp and Paper innovation Center, Oji Holdings Corporation

When we adopt "Soft Sensors" to pulp plants, "Linear multiple regression equation model" is used well. And at that time, the coefficient values of the regression model are determined by using statistical analysis in general.

However, in many cases, the once decided coefficient values are drift with age, because of the gradual deterioration from actual processes. To prevent this problem, the method to correct and adjust automatically by the “constant parameter value” of the regression model using the ordinaly "smoothing method" is known well.

In this case, the “constant parameter” value is modified based on the actual measurement results which were obtained by periodic “hand analysis datas”. Furthermore, this paper describes about the advanced method applying "Kalman filter algorithm” that correct all coefficients’ values of the multiple regression model by using iteration procedure. Here, those predicted results’ performance were compared with using ECF pulp bleaching process data.

The System for Assessing the Flush Ability of Disposable Products (Tosa Method)
—Clearance Test of Disposable Products in Toilet and Drainage Lines—

Jun Morisawa
Kochi Prefectural Paper Technology Center

“The System for Assessing The Flush ability of Disposable Products (Tosa Method)” is composed of two tests, “Clearance Test of Disposable Products in Toilet and Drainage Lines” and “Disintegration Test of Disposable Products in water”

In “Clearance Test”, the probability that Disposable Products clog the pipe or drained by wash water is obtained, by using a large-sized apparatus that combines the drain pipe and toilet. And as the DC value (%), we were calculated ratio of “Drained or Clogged” of Disposable Products per unit weight.

DC value (%) indicates the probability that Disposable Products of a certain weight clog in the drainage Lines. And DC50 value (g) indicates the dry weight (g) expected that Disposable Products clog with the establishment of 50%.

By using the DC value of each product, we can compare the clearance of various Disposable Products.

Novel Chemical Solution for Increasing Ash in Paper

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Recently, the domestic demand for paper and paperboard has remained almost the same. Although the society is shifting to paperless, printing and communication paper still plays an important role as information media. Usually, inorganic particles called fillers such as talc,

calcium carbonate, and etc. are added to printing and communication paper to improve printability and optical properties. Especially, calcium carbonate is widely used, and its dosage to paper gradually increases due to its excellent performance and cost effectiveness in papermaking industry.

A lot of paper mills take great advantages of using calcium carbonate. However, the problem of strength loss would become serious as the dosage of calcium carbonate increases. To provide solutions for such problem, we have developed “surface-treatment agent for calcium carbonate”. It is a novel wet-end chemical that was created by combining new materials with our polymerization technology. It is applied to the slurry of calcium carbonate, and can improve the strength loss of paper caused by calcium carbonate.

When calcium carbonate was used with our “surface-treatment agent for calcium carbonate”, the strength loss was reduced compared to untreated calcium carbonate. Moreover, it was found that it can enhance the performance of wet-end chemicals such as dry strength agents. It is expected that it enables paper mills to increase calcium carbonate further.

We introduce our “surface-treatment agent for calcium carbonate” and how to use it along with the trial results.

A New Pitch Control Agent “Spanplus500 series”
—Paper Quality and Operational Improvement—

Satoshi Wada, Yoshihiro Ozawa and Chigusa Taguchi
Kurita Water Industries Ltd.

The domestic paper manufacture industry uses wastepaper as raw materials from the perspective of resource utilization, energy saving and environmental conservation. The rate of utilization of wastepaper is numerical value approximately near the limit. With increase of the rate of utilization of wastepaper, pitch included in the wastepaper increases in paper process of manufacture. The pitch causes quality drop and operation efficiency aggravation such as defect and paper break. Therefore the further improvement of the pitch control technology is expected to use wastepaper.

We developed the pitch control agent "Spanplus500 series" based on a concept "to fix on fiber and to make non-adhesion".

This paper introduce feature “Spanplus500 series" and case of paper quality and operation improvement by using it for machine having pitch trouble cause wastepaper.

The Latest Trends of Chemicals for Household Paper Products

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Paper Chemical Business Division, SEIKO PMC Corporation

In this report, we introduce novel cationic emulsion type softener. Comparing with conventional softeners, features of new softener are as bellow.

1) Better softness with keeping better dry strength, 2) high-bulk (high specific volume), and 3) less foaming.

Additionally, we also introduce new creping adhesive. Comparing with conventional adhesives, the new creping adhesive provides soft coating on Yankee dryer with good adhesion and good water resistance. The new creping adhesive is suitable for Yankee dryer with thermally-sprayed coatings.

Advances in Biolatex® Binding Systems

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EcoSynthetix Inc., Burlington, ON, Canada.
Masato Katayama
FIMATEC, LTD.

EcoSynthetix introduced Ecosphere® biobased latex binder to the paper industry in 2006. These binders demonstrated not only their performance with excellent binding strength but also their unique rheological & coating performance, enhanced coating structure, and optical properties to both wet and dry paper coatings. A mechanism for their unique behavior was proposed based on the understanding that these biolatex binders consist of deformable, water-swollen and internally crosslinked biopolymer nanoparticles.

The biobased nanoparticle latex is a technically competitive alternative binder system to petrochemical-based binders, such as XSB and SA latex binders. The characteristics of the biolatex binders and their successful application in paper and paperboard have been extensively discussed. When added to the paper coating color formulation, these products typically replace 25% to 50% of XSB and SA latex binders used in coating processes on a one-for-one parts-per-hundred basis.

This article will provide an overview of the EcoSynthetix product development capabilities and by way of example, review a case study of a new product innovation that involves a biolatex binder composition with novel functionality and improved performance. This new approach opens up the opportunity to go to higher petro-latex substitution rates in base and top coat formulations, especially in off-set applications. Performance and cost savings are to be expected in addition to a higher bio-content.

EVERLOY Spray Nozzles for Paper Mills

Shunsuke Makino
Everloy Shoji Co., Ltd.

Kyoritsu Gokin Co., Ltd. which is one of the leading manufactures of spray nozzles was founded in 1938 in Japan. The company brand : Everloy is well known especially in Japan. The more paper machines are large and speed is fast, the more demands for spray nozzle is increase. With such continuous demands, spray nozzles became indispensable high precision parts nowadays. EVERLOY will introduce Straight Jet and Flat Fan pattern nozzles for paper mills.

Wetting and Dispersing of Pigments with Regard to Curtain Coating Application

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Special Project Paper Coatings, BYK GmbH
Takashi Miyazawa
BYK Japan KK

Wetting and Dispersing Additives are important for all pigmented coating colors. With a right Wetting and Dispersing Additive you can achieve higher pigment load and lower viscosity of the coating color and at the same time you can get better substrate wetting. Especially when using Wetting and Dispersing Additive the stability and the elasticity of the curtain will be also improved.

Installation of "Defect Positional Information System" for Off-machine Coaters and Slitters

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Nakoso Mill, Nippon Paper Industries Co., Ltd.

It is highly important for quality assurance to accurately take care of splicing on poor paper quality resulting from coating defects. The accuracy of defects positional information was low so that we had to check over a wide area. When defects were not found, the roll was unfortunately treated as a reject roll. These issues caused productivity and yield decrease on the finishing process. Then we introduced "Defect Positional Information System" to solve these issues.

Various Safety Devices for Machinery Safety Applications

Keiji Otake and Yuji Yamada
Azbil Trading Co., Ltd.

The amendments of laws and guidelines have promoted the safety awareness of users and makers recently. However, due to the complicated standards and regulations as well as various safety devices available now as a result of technology advancement, we scarcely observe appropriate safety protections supported by correct understanding of standards requirements, the real danger at site and the most suitable protection measures with the economical point of view. Especially in the Paper and Pulp market, operators often need to approach to machines while roller parts are moving, and they try to manage avoiding machine stoppage as much as possible, for it is laborious to restart the machine. Therefore, machine designers and safety persons at site are facing dilemma over to what extent they should enforce safety measures to their machines.

In this paper, we are going to explain the concept of 'isolation and stop' and 'safety confirming systems', which constitute the bedrock of machinery safety, using actual application examples, including tips on how to choose safety devices.

Corporate Profile & Products Information (16)

Earth Environmental Service Co., Ltd. (ESCO)

Our company is established in 1978 as a pest control company and has grown up to be a company providing a total hygiene managing service for many kinds of clients such as food factory, pharmaceutical factory, packaging factory, *etc*. Service includes environmental monitoring and validation, inspection and examination, microbial control, education and consulting related to hygiene management, support service for certification, besides pest control operation. In this paper, we introduced our original current technology contributing to total hygiene management.

－Peer Reviewed－

Characteristics of Peroxymonosulfuric Acid Bleaching and the Mill Application

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Peroxymonosulfuric acid has been examined as bleaching agent which has ability of delignification, not as degradation agent of hexenuronic acid.

We revealed, in this study first the reaction mechanism of peroxymonosulfuric acid which has some characteristics during pulp bleaching. It was found that lignin degradation proceeded at almost the same rate in the range of pH 1.5 to 5.0. The most effective pH for degradation of hexenuronic acid (HexA) was 3.0. The peroxymonosulfuric acid treatment at low pH resulted in the decrease of fiber qualities. A treatment for more than 60 minutes was required for the sufficient degradation of lignin and HexA. It became apparent that the condition of peroxymonosulfuric acid (Px) stage was similar to another bleaching stage.

We confirmed that the effect of converting a common bleaching stage into Px stage in a laboratory test ln a trial an acid-washing stage was converted into Px stage in Z-ECF, and in the second trial acidic peroxide stage, which was introduced as the first stage in D-ECF, was converted into Px stage. It was confirmed that the beneficial effects of conversion were mainly decrements of hexenuronic acid and of chlorine dioxide consumption in both cases. These effects also confirmed in mill scale, and therefore we installed peroxymonosulfuric acid bleaching stage in June 2007 at Tomioka mill and January 2012 at Kasugai mill.

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Misunderstandings of Noise Control
— Listen, Feel and Understand Its Fact —

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When we visit a factory or plant to discuss about noise control, the customer often tells us that the previous countermeasure has not been sufficient in terms of its effect. However, during the discussion with us, sometimes the customer notices that they are misunderstanding the concept of the noise countermeasure.

In this session, some examples of the noise countermeasures that are tend to be misunderstood will be presented. Moreover, some examples that the noise measurement helps to understand the situation and concept will be presented as well. Also, typical noise control countermeasures and their effect will be demonstrated through some examples.

Odor Measures, Deodorization and Anti-Odor Protection in the Factory

Masaaki Katayama
Karumoa Co., Ltd.

Odor measures in the factory have changed significantly in the last few years. In the first,odor measures should be carried out that is the understanding of the current state. Odor is an invisible chemical substance. Understanding and visualization of the odor is the shortest way of odor measures. In this section, we introduce the deodorization and anti-odor protection.

iMethod, Choice of the Waste Industry

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iMethod is an analysis method of public information released from industry waste treatment companies. It is intended to extract four basic parameters of companies, including process

capabilities, process outputs, sales and the number of employees. By calculating these parameters, fundamental information to characterize the company are obtained such as operating efficiency, average unit price, overflow ratio and productivity. iMethod allows evaluation of a contractor, quantitative comparison of several contractors, financial analysis of consolidated group companies and trend analysis of the whole industry. Following characteristics of the industry are achieved by this method. The standard treatment price of waste materials is 30,000 yen/ton. Annual labor productivity is 667 ton/year. Sales are 20 million yen/person while the minimum is 15 million yen/person. Price and productivity are incompatible. The ratio of gross asset and sales is 1 to 1. In some companies, productivity and profit tend to increase proportionally when the standard productivity exceeds 1/2.

Development of Fly Ash-based Geopolymer Sleeper

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In recent years, global warming has been recognized as a social issue. In light of this, the manufacturing Portland cement, which releases a significant amount of CO_2, raises concerns. A widely used material in general civil engineering and construction work, Portland cement is manufactured by burning limestone ($CaCO_3$) at a high temperature, and this releases a large amount of CO_2: $CaCO_3 \rightarrow CaO + CO_2 \uparrow$. Additional CO_2 release also occurs during this process because fossil fuels are used for the high-temperature burning. Therefore, recently, geopolymer-hardened pastes have attracted significant interest as a substitute for Portland cement, in order to reduce CO_2 emissions. A geopolymer-hardened material is one that is stiffened by the reaction of amorphous silicon and aluminum materials, such as fly ash, with an alkaline silicate solution. Because this material does not contain Portland cement, significantly lower amount of CO_2 is released during its preparation, and it has the added benefit that industrial by-products, including coal ash, are used in its preparation.

The author utilized a geopolymer-hardened paste, and produced a general sleeper from prestressed concrete (PC) and a short sleeper from conventional reinforced concrete. The prestressed concrete sleeper that was produced conformed to the JIS3 sleeper as per JIS1202E "post-tension sleeper," and it was confirmed that it showed the required performance as prescribed by JIS.

A test was performed in which the amount of steel reinforcement in the short sleeper was reduced by reinforcing it with steel or polymer fibers instead. Even in this case where the geopolymer short sleeper was not reinforced with rebar, the performance was as required. However, the load capacity was smaller than that in the case of a commercial short sleeper

without rebar but with vinylon fiber as reinforcement. Therefore, practical use is possible in the case where fiber reinforcement is such that the load capacity of the short sleeper with less rebar reinforcement is equal to or greater than that of the commercially available short sleeper. In this paper, the potential use of geopolymer concrete in the future was discussed, and examples of the development of geopolymer sleepers were provided. Specifically, various properties of modern concrete can be controlled by the use chemical admixtures, and a future challenge is to achieve the same kind of control for geopolymer concrete. As a solution to the difficult problem that geopolymer concrete cannot be unmolded by using the mold lubricant that is normally used for general concrete, a high-melting-point wax-system mold lubricant was developed.

Analytical Methods for Mercury in Exhaust Gases and the Characteristic Features

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Environmental Control Center Co., Ltd.

Mercury has been emitted from various sources and transported globally. It is pointed that the emitted mercury accumulates on organisms and has harmful impacts on human health and wildlife. Even mercury use and emissions have been reducing in developed countries, mercury is continued to be used and emitted in developing countries. The global effort for adequate management of mercury and emissions reduction is an important issue.

Under the circumstances, Minamata Convention on Mercury was adopted at the international conference held in Kumamoto city and Minamata city in October, 2013. This treaty calls for an action to reduce mercury emissions to the environment through the whole life cycle process, including production, use, and disposal. It is also required to regulate the emissions of mercury and mercury compounds into the atmosphere, and to reduce the emissions where possible. Japan reaches the environmental quality standards regarding mercury, such as water quality, and effluent standards have been stated. On the other hand, emission standards for atmosphere have not been stated despite anthropogenic emissions promote the atmospheric mercury level and deposition rate on the soil. This paper introduces several analytical methods for mercury in exhaust gases, including Japanese and international methods, in conjunction with environmental quality standards and emission standards in Japan.

Mercury Emission to the Air
— Minamata Convention on Mercury —

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University

Mercury is a chemical of global concern owing to its long-range atmospheric transport, its persistence in the environment once anthropogenically introduced, its ability to bioaccumulate in ecosystems and its significant negative effects on human health and the environment. The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury. The major highlights include a ban on new mercury mines, the phase-out of existing ones, control measures on air emissions, and the international regulation of the informal sector for artisanal and small-scale gold mining. Article 8 of the convention calls for the Conference of the Parties (COP) to adopt four pieces of guidance. At its first meeting, the COP shall adopt guidance on best available techniques and on best environmental practices, taking into account any difference between new and existing sources and the need to minimize cross-media effects, and shall also adopt guidance on support for Parties in implementing the measures set out in paragraph 5, in particular in determining goals and in setting emission limit values. The Expert Group has been given the responsibility of developing these guidance documents, which will be submitted to the Intergovernmental Negotiating Committee for their consideration and to be forwarded to the COP.

Approaches to Biodiversity Conservation of Nippon Paper Group
—A New Partnership with Coca-Cola(Japan)Company, Limited—

Manabu Ishikawa
Nippon Paper Industries Co., Ltd.

Last October, Nippon Paper Industries Co., Ltd. concluded a basic agreement with Coca-Cola (Japan) Co., Limited on a joint medium- to long-term initiative for the conservation of forests.

Both companies, through their respective business activities, have been engaged in a variety of activities aiming for a sustainable society. In environmental terms, Nippon Paper Industries have successfully conserved forest resources, and Coca-Cola (Japan) is credited with its efforts to protect water resources. In order to develop the efforts, we agreed to work together to protect and preserve forest and water resources, effectively utilizing our experiences and assets into actions that enhance the multifaceted functions of forests, including biodiversity and water source conservation.

As the first step in our collaboration, the two companies decided to jointly conduct next-generation environmental education and a regionally integrated campaign under the concept of “conserving rich forests and water.” The activities will be carried out in Katashina, Gunma prefecture, where there is a forest that Nippon Paper conserves in the Sugenuma district

and a source of water used by the plant of Coca-Cola East Japan Products Co., Ltd. in Saitama Prefecture. Nippon Paper owns 400 forests areas throughout Japan, while the Coca-Cola system produces a variety of beverages at its 24 bottling facilities nationwide. Looking to the future, the two companies can take advantage of broad range of their assets and businesses in Japan to expand their collaboration nationwide.

Recent Trend in Emission of Offensive Odor from Pulp and Paper Wastewater Treatment Process, and Control Methods with Deodorants and Microbial Products

Kenji Hayashi
Mushugen Industries Co., Ltd.

Through various countermeasures, such as black liquor recovery, steam or air stripping, enhancement facility of wastewater treatment, or installation of closed system, the strength of odor emitted from pulp and paper mills is decreasing year by year. While the quality of living or work environment required inside or outside mills is concurrently being higher, and therefore it is nessessary for facility managers to continue to take further measures even now.

Mushugen Industries Co., Ltd. is a manufacturer of microbial products and deodorants for waste water treatment. In the field of sewage treatment and disposal of human waste, we have cultivated the technology of these products and the maintenance management know-how by using them for long time, and we have promoted the application in the field of pulp and paper wastewater treatment since eight years ago.

In this paper, we describe the knowledge acquired by experience in it about recent trend in emission of offensive odor from pulp and paper wastewater treatment process, operating technique, and control methods with deodorants and microbial products.

The Problems of Odor Are Deep-Rooted!
— Problems and Measures to Odor in Paper Mills from Paper Making Process to Wastewater Treatment —

Hidenori Kojima
Kurita Water Industries Ltd.

Some bad smell substances like hydrogen sulfide or lower fatty acid adversely affects to the paper making process and wastewater treatment. These bad smell substances are generated by metabolism of microorganism in pulp slurry or wastewater. As measures, microbial growth inhibition by disinfectants is effective in paper making process. Also, metabolic control of

anaerobic bacteria is effective in wastewater treatment system. By implementing these measures, it is possible to obtain benefits, not only the bad smell control but also such as productivity improvement and stable operation of the plant.

Technological Front of Forest Monitoring
— Domestic Forest and REDD+ —

Yasuteru Imai
Kokusai Kogyo Co., Ltd.

The problems which surround a forest are serious every year. The forest is neglected by decline of forestry in Japan and deforestation is progressing in the world. In order to cope with these problems, planned and sustainable forest management is important. For that purpose, it is important to monitor a forest periodically.

In this paper, it divides into two themes, a domestic forest and REDD+, and introduces the advanced forest monitoring technology.

The History of Technological Developments in Pulp and Paper Industry
: From Ts'ai Lun's Invention to the Birth of Modern Pulp and Paper Industry
Part 1: Survey on Historically Utilized Plants and Developments in China

Kiyoaki Iida

Paper and its making process were invented in China and were introduced eastward to Japan. Westward, they moved to Samarkand, then to Damascus, and through North Africa to Europe. One other route was through Greece to Europe. In Europe, the old technology was revolutionized to modern one, taking in it innovations developed in the Industrial Revolution. Then, the modern technology prevailed in the world.

Historically, fiber unit which plant ubiquitously has as its basic structure has been used as pulp for forming paper. Before the industrial Revolution, chemicals available were wood ash (potassium carbonate) and lime, and the highest temperature was 100 degrees C. Refining power for fibrillating fiber was human hands and wooden water wheel at best. Wood could not be pulped in those days, and only bast plant like hemp, flax and mulberry, and bamboo in the later age were candidates which were converted to paper after a lot of hard labor for so many days. In the course of time, every district searched plant natively available and modified its product (paper) for satisfying customers need.

China started to use paper in replacement to Mokkan (wooden strip) in about the third century.

As the society got developed and affluent, paper became not only a media for writing but also commodity of daily life. As the demand of paper increased, new fiber source was searched and finally bamboo was able to be pulped in about tenth century. Bamboo paper was mass-produced probably at a reduced cost in south east China where bamboo was plentiful. Sufficient paper supply supported civilization of dynasties from Tang to Ming, which was the highest level in the world.

Chinese paper making technology was transferred to Islamic lands where Islamic paper, different from Chinese one, was developed.

Corporate Profile & Products Information (17)

RIKENGREEN CO., LTD.

Rikengreen Co., Ltd. (RG) was established in 1957 as a subsidiary of Kumiai Chemical Industry Co., Ltd. (KUMIAI). KUMIAI's business was limited in agriculture field, therefore Specialty Chemical Department of RG was established in 1985 to expand the business of their new biocides in industrial field. Since then, we have been distributing biocides to paper mills throughout Japan together with K-I Chemical Industry Co., Ltd.

To extend our portfolio from biocides, we created a partnership with Houghton Co., in 1987 and release agent and creping adhesive were introduced to us. Those products were well accepted in tissue-towel market and we achieved big success in the business. We have been retained the leading position in the segment since then.

Our partner was changed from Houghton Co. to Hercules Inc. in 1996, and to Ashland Co., Ltd. in 2008, and to Solenis LLC. in 2014 due to company's merger and strategic decision. However, our position has been remained the same as an exclusive distributor of our partner for Japanese paper mill.

Not only biocide, release agent and creping adhesive for tissue-towel market, we are introducing wide range of products to the market now and some of those, such as deposit control agent, retention aid, release agent and creping adhesive, and dry strength additive are explained briefly in this article.

－Peer Reviewed－

Analysis of Chlorine Content in RPF by the X-Ray Fluorescence Spectrometry

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Oji group has been expanding the usage of RPF as a heat source to reduce the fossil energy consumed in mills. RPF is made of paper, plastic, wood and tire waste that is not recyclable as a material source any more. The expanded usage of RPF has sometimes caused serious problems due to corrosion of the thermal boilers by chlorine elements in RPF. Mills that take advantage of RPF have been conducting the chlorine analysis by the X-ray fluorescence spectrometry（compendium method） every day to ensure that the accepted RPF contains less than 0.3% chlorine element to avoid the corrosion problems. It was found that there have been unacceptable deviations in the measured chlorine values and these values sometimes do not match well with those obtained by the JIS method. Introduction of both new pretreatment of RPF samples and a new standard plate to draw a calibration curve has effectively diminished these deviations, and greatly improved the correlation between the locally measured values and those obtained by the JIS method.