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2015 January JAPAN TAPPI JOURNAL

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Development of Inspection System for Appearance Quality of Flat Sheet

Takayuki Ikeda

Engineering Div., JFE Electrical & Control Systems Inc.

JFE Electrical & Control Systems Co., Ltd has developed an appearance inspection monitoring device with optical image sensors of the flat sheet for the finishing line of a paper mill. The inspection monitoring device detects defects on the surface of paper, such as sticking paper particle, paper folded and abnormal aligned. These are considered as one of the most important quality control index for the paper mill. Advanced technology for image processing has been applied to detect the defect with high accuracy.

Two monitors have been already installed and are in operation in the paper mill company for folio sheeting line; in addition another four monitoring devices with the same technology are being used for plain paper copier.

The Countermeasures for Reduction of the Fuel Consumption in Lime Kiln

Hideto Suzuki

Consulting Department, Taiheiyo Engineering Corporation

Over the past years, Taiheiyo Engineering Corporation (TEC), Tokyo has conducted numerous investigations in cement plants around the world for various clients who have process and operation problems or who are planning for innovations.

TEC have developed successful techniques to diagnose the existing cement plants and to overcome the existing process/operational problems and to reduce the fuel consumption and thus assuring stable kiln operation.

In the paper industry in Japan is implementing various measures to reduce the fuel consumption. Although a certain improvement has been obtained, but not to the extent of large reduction of fuel consumption is obtained, so far.

Hence based on energy-saving technology adopted in cement plants, TEC has conducted extensive study in Lime Kiln operation achieved following successful results towards reduction

of the fuel consumption.

1) Diagnosis of Lime Kiln : TEC have conducted a diagnosis study on existing Lime Kiln towards the existing process/operational problems and to found optimal countermeasures for reduction of the fuel consumption.

2) Replacement of existing Kiln Burner: By replacing the existing Kiln Burner with Taiheiyo' s TMP Burner (Taiheiyo Multi-purpose Burner), TEC achieved improved burnability efficiency and reduction in the amount of primary air.

3) Adjustment of Lime Cooler: For the improvement of heat recovery efficiency of existing Lime Kiln Cooler, Grate Speed Control and Airflow Control was adopted to Lime Kiln Cooler, for better cooling efficiency.

4) Adjustment of Kiln Operation: TEC has reduced the amount of water at the Lime Kiln Inlet Housing, thus optimizing the O₂ concentration control, and the of raw meal filling ratio in the Lime Kiln.

As a result of adopting above mentioned countermeasures, TEC achieved a 13% to 15% reduction of the fuel consumption.

Introductory Experience of Inspection System for Appearance Quality of Ream

Masami Uchida

Nichinan Mill, Oji Paper Co., Ltd.

At the process for making the ream by stacking cut paper, quality defects such as folding , jumping or the unevenness occurs sporadically by mechanical causes. So as not to send defective products to the next process, it is necessary to constantly monitor states of the ream. It was subjected to visual inspection by the operator before, in order to achieve automation of the test, where the end of 2006 and later, was installed an inspection system, it exerted a test stable accuracy.

Operating Experience of Fuel Conversion to Petroleum Coke on Lime Kiln

Mitsuru Takatsuji

Akita Mill, Nippon Paper Industries Co., Ltd.

After the startup of the coal boiler in 2008, the lime kiln became the equipment using heavy oil most in our mill. Due to the jump in the heavy oil price of these days, the equipment of petroleum coke was introduced to reduce heavy oil consumption of a rotary lime kiln. An initial

problem was solved at an early stage after operation, mixing ratio of petroleum coke is maintained as plan.

This paper reports the process for introduction of facility, and operation experience of fuel conversion to petroleum coke.

Revision of Japan Revitalization Strategy and Cellulose Nanofibers

Masayoshi Watanabe

Ministry of Economy, Trade and Industry

Revitalization Strategy of JAPAN was revised 24th June 2014. To put the Japanese economy on the path of sustainable growth, continued reforms in line with a constantly evolving Growth Strategy are essential. The aim of this revision of “Japan Revitalization Strategy” is to review the progress of already implemented policies and to provide basic guidance for remaining tasks. And it has been mentioned that Promotion of R&D Cellulose nanofibers in this Revision of Japan Revitalization Strategy. Taking this opportunity, the Ministry of Agriculture, Forestry and Fisheries (MAFF), and Ministry of Economy, Trade and Industry (METI) launched the inter-ministerial meeting to promote Cellulose nanofibers material in to the society, and nanocellulose forum composed of industry, academia and government, was also established.

Manufacturing of Cellulose Nanofiber and Sheet-making Technology

Hayato Fushimi

Incubation Section, New Business Innovation Center, Innovation Promotion Division,

Oji Holdings Corporation

Cellulose Nanofiber (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). We can also introduce reactive or hydrophobic substituent group on surface of CNF. We try to apply these unique CNFs to various applications. For example, using high transparency CNF, we have been successful in manufacturing continuous CNF transparent sheet. The CNF transparent sheet has high transmittance (>90%), low haze (<1%), high mechanical properties, tolerability to organic solvent and flexibility. This sheet will be useful as a material for organic

light emitting display, foldable solar cell and flexible TFT substrate. Through making CNF/resin emulsion sheet, CNF reinforced plastics have been fabricated. The resin emulsion disturbs CNF aggregation during dry process, and hence CNF is easily dispersed in the resin matrix. Addition of 20% CNF increases bending elastic modulus and bending strength of PE by 2.8 times and 2.2 times, respectively.

Efforts for the Practical Use of Cellulose Nanofibers

Masayuki Kawasaki

Nippon Paper Industries Co., Ltd.

Recently, research and development about the use of celluloses in wood biomass as energy sources and a wide variety of new materials have been vigorously carried out. As one of them, much attention about an investigation of cellulose nanofibers and their applications is being denoted.

The hydrogen bonds formed between cellulose microfibrils make it more difficult to disintegrate native cellulose into microfibrils with smaller width. Therefore, this technical problem has to be perfectly overcome to obtain cellulose nanofibers.

Native celluloses can be converted to individual microfibrils after oxidation mediated by TEMPO followed by gentle disintegration treatment.

A way of preparing TEMPO-oxidized cellulose single nanofibers, their characteristics and potential applications are introduced in this report.

Action for the Facilities Accident Reduction in the Pulp Manufacturing Process

Naonobu Motozawa

Kitakami HiTec Paper Corporation

Kitakami HiTec Paper Corp. was established by spinning off the “Kitakami Mill” from Mitsubishi Paper Mills Ltd. in 2015. From start of operations, our mill has been producing pulp from domestic hardwoods supplied mainly from Iwate Prefecture and sanitary paper and photographic base paper.

In recent years, due to the limited capital investment budget, we concentrate our effort to manufacturing cost reduction, reduction of fixed costs and the work efficiency improvement. However, we faced to the frequent shut downs of the pulp manufacturing process on our 40

years old pulp plant due to equipment accidents.

Therefore, we, together with Mitsubishi Paper Engineering Co., Ltd. which is responsible for the designing and maintenance work in the plant facilities, made a factor analysis of equipment accidents that have occurred in recent years. As a result, more than half of the total accidents were caused either by the bearing failures or leakages due to corrosion/deterioration of piping.

Through studying the causes of these accidents, various causes including the lack of aged pipe management, lack of maintenance skill inheritance, skipping or neglectance of maintenance items and lack of communication between operator and maintenance personnel were found.

From 2007, in order to eliminate the cause of the accidents, we made a schedule to reduce these accidents to visualize our activity. And then under this schedule, we surveyed the maintenance and monitoring details of each maintenance area and built up “To-Do List” to work with. “To-Do List” mainly consists of four activities.

Through these activities, in 2013, machine shut down of the pulp plant reduced to 4times, 20 hours from that of 16 times, 57 hours in 2006.(Reduction of about 70%)

In this paper, activities to reduce equipment accidents are reported along with some illustrative examples.

Operating Experience of Wire Shaking Equipment in Multilayer Linerboard Machine

Naoki Sumi

Kushiro Mill, Oji Materia Co., Ltd.

Recently, in order to compensate for paper strength reduction due to the waste paper ratio increases, it is very important added in the internal paper strength additive. However, paper strength improvement effects have become difficult at high addition area. It has to dividend increase of kraft and internal paper strength additive, which is a factor of rising costs.

This time, we introduced wire shaking equipment at a multilayer linerboard machine for the first time in the country. We obtained paper strength advancement by formation improvement. As a result, it was able to achieve the dividend reduction effect of fresh pulp and paper strength additive.

Formation improvement show a high tendency according to high basis weight, it have gained a 30% increase at the 280g / m². The highest frequency and stroke produced great improvement.

Also, advancement of bursting strength shows a high effect at high basis weight. It had gained 5% up at the 280g / m². This is the same result as the formation improvement. It was possible to clearly see the relationship of specific bursting strength advancement and formation

improvement.

The Highest Nip Load Shoe press in Japan-Energy Saving by Introduction of High Nip Load Shoe Press to the Container Board Machine

Akio Kato

Yashio Mill, Rengo Co., Ltd.

As companies are expected to take environmental actions, Rengo established “Eco Challenge 020” as the company’s environmental action plan and is strenuously working to reduce the carbon emissions by 32% in 2020 compared to 1990 levels. In addition, Saitama Prefecture, where Rengo Yashio mill is located, has set the reduction target of CO₂ emission by 13% in 2019 compared to the average level between 2002-2004 by enforcing the local regulation of global warming prevention since 2009. Moreover, energy saving is the urgent issue of Yashio Mill because of the raising fuel cost in recent years.

Against such a background, Yashio Mill PM1 (medium machine) introduced the high nip load shoe press with an aim of improving the productivity as well as reducing the steam consumption. The outline of the retrofit and an operating experience will be discussed in detail below.

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DeBottleneck Project of the Duplex Board Machine

Yasuyuki Yazaki

Kobayashi Engineering Works, Ltd.

The UP-GRADE Project for duplex board machine, Kobayashi Engineering Works, Ltd. received an order from SKIC (Siam Kraft Industry Co., Ltd. in Thailand) in 2012 was started. Former name of TUPI is a subsidiary company of SCG (Siam Cement Group) who is the biggest enterprise in Thailand. TUPI changed their name to SKIC in the anniversary of 100 years of the foundation in December 2013.

In 2005, we received an order from former TUPI of relocation project of a machine which was No.7 machine belonged to Oji Paper Co. Fuji mill in that time and the operation of this PM9 was started in 2007. This machine is High Speed Ultra Former consists of 7 layers and exclusively producing coated duplex board. The Contract of this project included the installation work, commissioning work and performance guarantee and we could fully and smoothly made our performance conforming to SKIC's needs.

According to this good achievement, we received another order of renovation work for production increase and quality improvement in 2009 and the modification work was made in November and December 2013 including the machine start with stock. This work was completed within shortest period because the machine was stopped during the production requirement.

In this paper, I make a report about PM9's start-up.

Our Approach to P&S Business / VOITH Group

Takanori Goto

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

For the past decades, the situation surrounding paper industry has been changing dramatically. To enhance the production efficiency is one of the most important concerns. Under this situation, VOITH Paper has set up a new business line of P&S, "Product & Service". This is a message for

our market needs and we'd like to support customers' various kinds of suffering with new value components other than big investments. That is to say, we'd like customer to support smaller investment, but make a maximum profit.

In this paper, we will introduce our new concept “P&S” business and latest technologies of related to some stock preparation equipment's components.

Innovative Chemical Approach to Lower Energy Cost by Dehydration Agent in Press Process

Hidekazu Tada

Research Dept, Nissin Kagaku Kenkyusho Co., Ltd.

In the paper-making process, the press part squeezes out moisture by pressure treatment from the wet paper web dried by wire part that is a last process, and assume the role conveyed to dryer part that is a next process.

Thermal dry cost in dryer part is higher than mechanical dry cost in press part. Therefore, it can reduce the paper-making cost that improving dehydration as much as possible in the press part.

“Newluster A-25” as a felt warm-up agent improve nip dehydration by applying to felt, and it has an effect shortening the period required for initial warm-up of the felt.

Continuous use “Newluster A-25” during operation, the moisture of wet paper web is reduced in the press outlet, and according to the effect, it is expectable reduction of the amount of dryer steam or improvement in paper machine speed.

In this report, we introduce the effect of the press dehydration agent “Newluster A-25” with the verification results by measurement of a paper machine operation data.

Scale Control Chemical Assuring Better Performance of Pulp Process

Rekha Bharati

Solenis-Asia Pacific, Singapore

Jae Hyung Kim

Moorim Pulp & Paper, Republic of South Korea

(Translator)

Masanobu Hatano

Rikengreen Co., Ltd.

Scale deposition is a phenomenon that occurs in all pulp & paper making process. The extent, type and chemistry of scaling depend on type of wood, water and process conditions. Scaling causes severe unit operations efficiency loss and profitability problems. Calcium carbonate deposition is a very frequent problem when forming on heat exchangers and digester screens. This paper reviews (i) major causes of calcium carbonate deposition; (ii) mechanism of scale formation; (iii) the process problems caused and (iv) discusses chemical solution that can be implemented to overcome the problem of scaling inside the digester. A case history of successful digester scale control in an integrated kraft pulping process in Asia Pacific, with crystal modifier type of product is discussed.

Greaseproof Properties of a Surface Coated with a Polyvinyl Alcohol

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

EXCEVAL™ is a novel copolymerized modification of polyvinyl alcohol (PVOH) by a special hydrophobic group enhancing its crystallinity and barrier performance at high humidity conditions. It has been registered as a Food Contact Substance in FDA and it has various potentials to be used in food packaging papers. In this paper, properties of coated paper with not only EXCEVAL™ but also combinations of EXCEVAL™ and other agents by size press are described. The combination of EXCEVAL™ and fatty acid emulsions or fluoro chemicals gives larger contact values for water and oleic acid and higher oil resistance at folding parts than EXCEVAL™.

Development of New Paper Surface Strength Agent for Paperboard

Taku Ainoya
Research and Development Department, Paper Chemicals Division, Arakawa Chemical Industries, Ltd.

Paperboard thickness has recent become thinner from environmental policy and carbon dioxide emissions reduction point of view. Thinner paperboard may show poor strength properties, therefore, starch treatment onto paperboard will commonly be employed in fortifying paper strength. Corrugated cardboard is made of large amount of recycled fiber which can

provide poor strength properties as compared with fresh pulp. Surface treatment with starch solution can be applied in order to cover poor paper strength; however it is not good enough to achieve desirable paper strength for packaging. It is also a problem that high viscosity starch solution may not be easy to coat the paper surface homogeneously and poor bonding corrugate cardboard might be produced.

On the other hand, Polyacrylamide (PAM) based surface paper strength agents are available to prevent such trouble and widely used in industry; however these are more expensive than traditional starch. In this report, newly developed two types of PAM based surface paper strength agents “New Paper Surface Strength Agent A” and “New Paper Surface Strength Agent B” have been introduced. The feature of “Agent A” is that it can penetrate deep into a Z-direction of paper easily and thus, “Agent A” can show better distribution in inducing compressive strength with small quantity. “Agent B” is a modified high molecular weight substance and even higher molecular weight polymer can penetrate into paperboard very well. These agents can make corrugate cardboard stronger without any trouble.

Compact and Laboratory-Scale Calendering Unit

—Introduction of “Lab Calender”—

Masaru Futaba

Nomura Shoji Co., Ltd.

Sumet in Germany released its latest model of the Laboratory-scale calendering units. The compact Laboratory calender is a table-top design. The heated bottom roll is constructed from polished steel. The exchangeable top roll is constructed from steel, high-glossed polished, coated polyurethane, HNBR or composite as desired. An acrylic glass acts as a safety guard from injury. An integrated touch screen is used to set parameters and monitor the unit during calendaring. The sample is pulled through the rolls at a regulated speed and rolls- pressure is controlled. The advantage of this machine is flexibility because of the easily changeable rolls only taking in a few minutes. Short heat up time of the rolls is due to the small diameter, and constant temperature profile at the rollers is due to the special heating technology. The integrated sensor in the roller enables the control of the temperature in roll surface in high accuracy. This calendaring unit provides highly correlated results with the production machine and ensures the saving of time and costs of the testing

New Type, Automatic Small Roll Wrapping Machine

Hiroyuki Kasai

Maruishi Co., Ltd.

With the increased speed and width of paper machines, larger paper rolls are produced for even faster printing machines. Corresponding to these requests, each machinery manufacturer is trying to develop high-quality, full automatic and labor-saving winders for bigger paper rolls with good quality. Thus, for more stable and efficient production, the recent trend of the finishing line is one unified wrapping system optional with the diversity of wrapping forms for various paper rolls from several winders.

I would like to explain in details the newly developed “Automatic Small Roll Wrapping Machine” which is suitable for the variety of paper rolls in small lots as well as the limitation of the space required.

Energy Saving and Efficiency of Cleaner Equipment

—Cleaning Efficiency, Energy Saving, Pulp Fiber Recovery—

Junichi Yano

Sales. Dept., Kawano Zoki CO., LTD.

Cleaner system which can perform higher cleaning efficiency, or can be operated at equivalent to or higher cleaning efficiency compare to the conventional cleaner at lower energy consumption, and in the other case cleaner which can recover more pulp fiber is needed. Cleaner is indispensable equipment in the cleaning process, and must satisfy those requirements. When higher cleaning efficiency is required, it is often the case that removal of light weight debris, such as adhesive material, plastic or rubber, are insufficient. To increase speed of vortex, smaller diameter cleaner design is required. To reduce energy consumption in cleaner system, such a cleaner type which can perform high cleaning efficiency even in the operation of higher feed consistency can meet such a demand. To increase fiber recovery from cleaner final reject, cleaner system which can prevent pulp fiber flow into final reject can fulfil the necessity. We introduce cleaner technology which can meet such a demand of higher quality and energy saving.

Waste Water Treatment Performance Diagnosis Seen from Activated Sludge

Naoki Akiyama and Yuko Watanabe

NIPPON RENSUI CO.

The waste water treatment performance diagnosis seen from activated sludge which we provide is comprised of multiple evaluations on the biota by microscope observation that include the evaluation of protozoa as well as metazoa of the activated sludge, that of biological property of the sludge floc (aggregate of bacteria), identification of emerging species and their volume among filamentous bacteria and actinomycetes, and further include the evaluation of the conditions of our original index organisms in the sludge.

The evaluation of the biota is done by using literature information and pragmatical indices established by the analysis of biotas and waste water treatment data collected from more than 200 waste water treatment facilities.

Therefore, with our diagnosis described above, we can understand the conditions of waste water treatment, problem and its cause more accurately than the conventional waste water treatment managing method using protozoa and metazoa as indices.

In this report, we would like to introduce you the examples where we applied the diagnosis for and successfully solved the problem of the rising of sludge interface and the floating of scum in the sedimentation tank as well as the issue of rising COD of treated water.

Andritz Technology for Bio Energy and Possibility

—Effective Use of Renewable Energy—

Daisuke Nagamine, Hiromi Kida and Chiaki Kawakami

Andritz K.K.

In order to cope with the global greenhouse problems due to increasing carbon dioxide emission from using fossil fuel more over the 200 years, it is essential to develop technologies for renewable energy and to utilize biomass more to reduce usage of fossil fuel.

Andritz has been focusing efforts to develop such renewable energy technologies. Today, more than 50% of Andritz' business is related to sustainable energy and green biomass utilization.

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 2: Unique Modification in Japan that Resulted in Washi Culture

Kiyoaki Iida

Paper making process that was invented in China arrived at Japan in the fourth or fifth century, and was developed to a unique one there. Mulberry and paper bush, which were main fiber sources in Japan, gives good sheet strength by relatively slight beating, maintaining their fiber length. This characteristic of the fibers, the use of viscous liquid from a certain plant, neri, at sheet forming and the modified sheet forming method called Nagashisuki perfected the process of washi, Japanese paper, making. The paper was good for writing with brush, and also strong enough to be used as a material for various commodities in daily life in Edo Period. In the beginning of the Meiji era, it was exported abroad due to its thin and even sheet formation. The industry, however, remained a cottage one. As modern printing system was imported and became common, washi lost its share to machine-made paper, and declined.

Corporate Profile & Products Information (18)

Daiwabo Progress Co., Ltd.

We Daiwabo Progress Co., Ltd., it is the industrial business company of Daiwabo Holdings Co., Ltd.

Daiwabo Holdings is organized 3 group companies of “IT infrastructure distribution business” , Textile and related business” and “Industrial machinery business” .

Daiwabo Progress has 3 businesses, such as Dryer Canvas Dept., Industrial Materials Dept., and Rubber Products Dept.

Then, we canvas department sell the Dryer fabrics, Forming fabrics and Plastic Mesh Belt for Paper-making industry or any another industries.

We have 2 manufacturing plants in Japan and Indonesia.

We try to improve customer satisfaction and introduce new technology, and expand our business globally.

—Peer Reviewed—

Optimum Operation Method of Activated Sludge Process Using TS Analyzer

Takao Ogawa

Ogawa Environmental Research Institute, Inc.

Activated sludge treatment is widely used as the waste water treatment process. However, its performance is not enough clarified. IWA (International Water Association) proposes an activated sludge treatment model of ASM (ASM1、ASM2、ASM2d、ASM3) . ASM models are based only on the mass balance of O_2 using values of COD_{cr} , and they are not applicable to the actual industrial waste water which has large fluctuation of water quality.

In this paper, a new model ,which is applicable to the treatment process of actual industrial waste water as well as conventional activated sludge process, is proposed in addition to the measurement method using TS analyzer. The activity of activated sludge changes with the habitat condition in uptake, assimilation and dissimilation of organic matter in waste water with the consumption of dissolved oxygen. This proposed model considers the real activity of sludge calculated by the oxygen consumption rate measured with TS analyzer.

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Creative Design of Practical Robots

Shigeo Hirose

HiBot Corporation

Although the word “robot” was inspired by human workers, we do not need to imitate human figures when we design a practical robotic system for some specific applications. Instead, we should be free from all the preconceptions and we should select unconventional shapes in the design of the robots. In my career as a robot researcher in Tokyo Tech for more than 40 years, and CTO of Tokyo Tech start-up company HiBot corporation, I have been enjoying the design of more than 150 robots.

In this talk, I will show some of the examples of creative designs, such as the design of snake-like amphibious robots, the snake-like rescue robots, the snake-like multi-joint arm, which is already in use in the assembly line of automobile industry. The spider-like walking robots, such as a walking and roller skating hybrid robot, a walking and crawler hybrid robot will also introduced.

In the final part of the talk, I will summarize the tips to make creative design of robotics mechanisms and discuss the future direction of the development of robots and ideal relation between robots and human society.

Maintenance Work Efficiency Related to Field Instruments by Using Digital Communication

Hirokazu Kamei

Marketing Dept., Advanced Automation Company, Azbil Corporation

Recently the HART devices have been increasingly used in Japan. HART devices which are used more than 30 million units in the world have the overwhelming share compared to the other field protocols. However about 85% of the devices transmit the process variable of 4-20mA only and the diagnostic and other information are not utilized effectively. This paper describes how to make maintenance work efficiency of field instruments by using the full

potential of HART devices with case examples.

Introduction of Color Web-Inspection-System at Kishu Mill

Hideaki Sakai

Kishu Mill, Hokuetsu Kishu Paper Co., Ltd.

Various defects occur even if they put a papermaking process as demand quality of the paper diversifies by other kinds small lot apparition product and in front of the visitor needs correspondence. To the defect detector which is an important instrument preventing a defective article outflow to the in front of the visitor, superior ability for inspection and stability are found.

Four paper machines operated, and a defect tester of the examination with each F elt side was installed in the Kishu Mill, Hokuetsu Kishu Paper Co., Ltd. but the inspection ability that a light color defect where both sides inspection and a color line defect and the making paper of the light color included it was detectable became unavoidable because I hit it and added the defect detector of the No.6 machine to conventional fine paper, color fine paper in after 2009, and special paper was targeted for inspection in transfer papermaking from other factories. In addition, I carried out color defect detector introduction and winder support equipment update in 2011 because the defect check with the winder, the processing number of times increased by Tokushu Paper Mfg. papermaking, and machine slowdown came to produce an operation trouble with the winder support equipment of the threshold method in operation. I introduce introduction progress and operation experience this time.

Digital Hydraulics

Junji Masunaga

Paper Projects, Valmet K.K.

Valmet developed digital hydraulics for nip control based on new groundbreaking control technology in cooperation with universities. With digital hydraulics the energy saving is significant compared to conventional hydraulics. The key principle in digital hydraulics is to use parallel-connected two-way on/off valves to achieve digital flow control. With a sufficient number of valves and intelligent control algorithms, it is possible to achieve good controllability with simple and low-cost on/off valves.

This paper introduces the outline of basic principle and the example of calender nip operation result with digital hydraulics. And, the applications on sizer and winder are also described.

Efforts to Strengthen the Environmental Information Management System

Kuniaki Yamaji

Otake Mill, Nippon Paper Industries Co., Ltd.

Nippon Paper Industries Co., Ltd. was established the "Guidelines for compliance in smoke generation facility" in 2008 for strength of environmental information management system (EIMS). Then EIMS had been structure accordingly at each mill of Nippon paper industries Co., Ltd.

Otake Mill also needs to follow the guidelines because of merger with Nippon Paper Group in 2012.

This report will introduce the examples of EIMS as modified equipment corresponding to the guidelines.

The Optimal Security Design for a Production Control System

Shoichi Doi

Solution Service Business Headquarters, Yokogawa Electric Corporation

In recent years, sophisticated cyber-attacks that target factories and plants have increased even in production control systems. Due to such increases in threats and changes in the environment, the importance of security measures has become even more urgent. In fact, since 2010 damage caused by malware infection has increased significantly.

However, this does not mean that blindly introducing security technology will be sufficient. Unlike information systems in general, a stable, real-time operation on a 365 day/ 24 hour basis is essential considering the sophisticated environment of control systems.

YOKOGAWA group support has taken a holistic approach to security measures in which strategic defense-in-depth concepts are used to effectively evaluate potential risks, consider technical measures and continuously update the system's lifecycle. We believe improvements on a continuous basis are important during operation. Measures are necessary to assess and mitigate the risks identified within the control system and to be better prepared to recover the system in the case of an emergency.

In YOKOGAWA group, by investigating and researching conditions in which security measures are implemented in control systems and the practical use of the latest security technology, we are currently developing effective solutions and optimal measures for a variety of system configurations for different industries and applications. Over the lifecycle of the system, we are committed to providing the best possible solutions and services to ensure high reliability of systems and to provide customer-specific security measures so that stable operation can be maintained.

The Reduction Approach and Action to the Scratch Spot by the Contacting Caliper Sensor

Ryuta Abe

Mishima Mill, Daio Engineering Corporation

The Daio paper new Mishima mill has the large production of the newsprint in the main product. PM N5 is using the Honeywell QCS of MXOpen from 1997. This QCS was equipped the contacting caliper sensor, it is standard sensor of QCS. However, it has problem of the scratch spot on the sheet by the loading material and foreign material as it is known.

We were trying to the solution for the scratch spot on the sheet by the contacting caliper sensor of QCS with Honeywell Japan Inc. It realized the large reduction of the scratch spot by our suggestion to the Honeywell, and improvement to the caliper sensor by the Honeywell. The usage conditions of the improvement to contacting caliper sensor and the results of solution are also introduced.

Introduction of Compact Wireless Diagnostic System for Environment of Electronic Equipment TMe²SMART

Noriyuki Maehata

Systems Development Section, Automation Systems Development Department, Industrial Automation & Drive Systems Division, TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION

Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC) has released the wireless sensor system "TMe²SMART" that implements both data acquisition and data analysis functions. TMEIC has already furnished the equipment diagnosis using TMe²SMART in ten sites or more. As the result, the precious data such as observation of the noise exceeding the

maximum rating, and the detection of failure of power supplies, have been acquired. These results show that TMe²SMART is effective to fix problems unsolved. Moreover, it also shows that TMe²SMART can improve a latent incongruent factor.

Construction of Roll Finishing System by FA Controller

Tetsuya Nakamura

Gifu Mill, Oji Materia Co., Ltd.

The system constructed with YEWMAC and FA500 made by Yokogawa Electric Works, Ltd. is used in the conveyance process from the winder to the product warehouse at Ena mill. This system is a very important in the finish process at our mill, because it generalizes the transportation equipment, the weighing machine, and the automatic IJP (Ink Jet Printer) , etc.

This system has been using for 20 years after operating in 1994 up to the present, and a trouble occurs not only equipment but also the trouble in the software . We launched out into the update of the system, falling into the situation to stop the operation in the cause. I introduce the system that was updated this time.

The Control Room of the Future

Kenji Ishibashi

Energy & Chemical Markets, Honeywell Japan Inc.

“Innovation of Control Room solution”

With "Experion PKS System" the newest DCS of Honeywell, the perfect system integration of the form which included "TDC(S)3000LCN" is made possible, and it connects with QCS, Advanced Control, Information System, Operation Procedure Software and Safety System simply, and is performing the newest technology and collaboration according to a time.

With the technical innovation of the system, plant operation by DCS is also changing a lot, and further innovation is performed.

In this paper, we introduce following basic concept to the innovation in a control room solution of;

“Operation Environment”

- 1) Abnormal Situation Management Consortium (ASM Consortium)
- 2) Orion Consol

3) Collaboration Station

“Operation Awareness”

1) Make more important things stand out

2) Data computerization

“Control Efficiency”

1) C300 Universal I/O Module

Intelligent Web Monitoring System “SmartAdvisor 5.0”

Shuichi Shoda

COGNEX K.K.

Cognex will present a new Intelligent Web Monitoring System “SmartAdvisor 5.0” that has advanced defect detection and filtering function (SmartTrack™). One of the advantages is defect classification. The system has Classification tool with Self Organization Mapping (SOM), and defects can be classified automatically by defect image features. The system also allows to integrate Cognex Vision Library (CVL). CVL is widely used as vision tool for “Detection” , “Identification” and “Measurement” in semiconductor, electric parts and other industries, that will help for paper process improvement.

New SmartAdvisor hardware architecture is simple and scalable. 1 camera system consists of Gig-E camera, environmental small cabinet and PC. It is easily to be used as research tool and to be extended to multiple camera system.

A Report on 2014 International Conference on Nanotechnology for Renewable Materials

Haruo Konno

Nippon Paper Industries Co., Ltd.

2014 International Conference on Nanotechnology for Renewable materials was held at Vancouver, Canada from 23/6 to 26/6, 2014. I attended this conference to know the current situation of nanocellulose development in the world.

More than half of attendees in this conference come from North America. Number of attendees from Japan is 25, which is third largest in this conference. This conference comprised from 82 oral presentations and 34 poster presentations. Summary of some presentations are reported in this paper.

Corporate Profile & Products Information (19)

TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION

TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION (Brand name: TMEIC) was established in October 2003 through the integration of Toshiba Corporation's and Mitsubishi Electric Corporation's businesses in the industrial field. Our corporate statement "We drive industry" represents our commitment to "contribute to development by becoming a driving force of industry."

TMEIC has achieved sustainable growth through contributing to manufacturing and environmental management by leveraging our leading-edge technologies underpinned by rotating machinery, power electronics and world-class engineering. Having marked our 10th anniversary in 2013 and relocated our head office in March 2014, TMEIC has taken a new step forward toward the next decade.

The business environment surrounding TMEIC is rapidly changing due to various social issues including globalization, energy concerns and environmental issues. In addition to contributing to strengthening the competitiveness of customers by providing products, technologies and services that will respond to these changes along with the ongoing globalization of our conventional businesses, TMEIC also actively invests its management resources into green business with a focus on solutions for reducing environmental impact and energy.

With regard to markets overseas, including rapidly developing emerging countries, TMEIC globally responds to customer needs by developing bases for sales, engineering, manufacturing and services throughout the world. TMEIC has delivered products to 125 countries worldwide to date and the overseas sales ratio currently exceeds 45%. Going forward, TMEIC will continue to realize the further globalization of our business.

As the world's leading company in industrial system integration field, TMEIC will advance together with our customers, always seeking to deliver even greater satisfaction.

—Peer Reviewed—

Hemicellulose Recovery from Black Liquor Discharged during Soda–Anthraquinone Cooking of Bamboo

Kengo Magara, Tomoko Shimokawa, and Tsutomu Ikeda
Forestry and Forest Products Research Institute

We investigated the soda–anthraquinone cooking process of bamboo chips and the recovery of hemicellulose precipitated from the resulting black liquor to study how bamboo hemicellulose may be utilized. The cooking efficiency of bamboo chips improved after hot water extraction, probably because a part of the starch that consumes the active alkali during the cooking process was removed by the extraction. After cooking, hemicellulose with higher molar mass value was precipitated from the black liquor. Recovery yield of the precipitate by decantation was approximately 6.5 g from 300 g of dried bamboo chips, and it was increased by adjusting the pH of the black liquor to 11.5.

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Countermeasures for “Hydrangea-like Dirt Spot Defects” of Coated Paperboard

Takako Segawa and Mitsutaka Kondo

Innovation Promotion Division, Oji Holdings Corporation

Coated paperboards are used in packages, for facial tissue and commodities. They have sometimes quality problems caused by waste paper contained in their raw material.

One of the particularly important problems is “Hydrangea-like dirt spot defects”. It is caused by the sublimation transfer sheet contained in the paperboard. Sublimation ink of the waste paper contained in the paperboard migrates from inside to the surface of the paperboard gradually during a few months, then they will appear as spot defects like Hydrangea.

We investigated a method to detect the sublimation dye in the waste paper quickly. We focused on the volatility of the sublimation dye.

As a result, we succeeded in developing the detection system with the FAIMS sensor which can certainly detect the specific volatile components of the sublimation dye in the waste paper rapidly at room temperature.

In the future, we will try to develop an automated system for removing the sublimation transfer sheet from the waste paper in the actual production line.

Introduction and Operating Experience of the No.2 Gas Turbine Plant

Yasuo Kobayashi

Niigata Mill, HOKUETSU KISHU PAPER CO., LTD.

We run the mill emphasizing the environment, based on the company's corporate philosophy.

We have improved CO₂ emission intensities with continued activities of saving energy on power plant sections, introductions of large scale Soda Recovery Boiler and Biomass Boiler utilizing construction waste material, fuel source of existing boiler and turbine have been changed to natural gas. We have also experienced violent fluctuations of energy prices around the failure of Lehman Brothers and felt the necessity of diversification of energy source caused by the Great Japan East Earthquake. Against such a background, we planned to introduce the

40MW class Gas Turbine divertible of aircraft engine, as renewing the existing outdated Oil Boiler, 18MW-class Steam Turbine and 17MW-class Gas Turbine.

No.2 Gas Turbine plant has started business operation since March 2014. In this paper, we briefly describe the outline of the equipment and operating experience of No.2 Gas Turbine plant.

Example of Energy Savings in the Press Section of the Paper Machine

Junichi Kanayama

Kasugai Mill, Oji Paper Co., Ltd.

Pulp and paper industry is recently required to reduce energy costs because of sudden fuel cost rise and shutdown of nuclear power plant in Japan.

At Kasugai mill of Oji paper, we are working on energy saving activities with a target to reduce 2.5% of total mill energy consumption and we have focused on the press section as it is needs the most power consumption in the paper-making process. We have attempted energy saving measures by shutting off the felt suction boxes of roll press 1P positions near the start of the press section, and 3P shoe press positions and this has mostly never been attempted before on domestic Japanese paper machines.

This article introduces the measures and problems that occurred during these trials.

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 line.

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 pulp and paper 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.

Calculation of Greenhouse Gas Emissions Through the Supply Chain

Takeshi Yamashita

Environmental Affairs Section, Environmental Affair & Safety Hygienic Department, Rengo co., Ltd.

We have calculated a emission of GHG through the supply chain according to basic guidelines for the GHG emission calculation through the supply chain (Ministry of the Environment / Ministry of Economy, Trade and Industry). The total GHG emissions through our company's supply chain was 1,832,000 t-CO₂. The breakdown is as follow, the scope 1 emission was 663,000 t-CO₂, the scope 2 emission was 152,000 t-CO₂, and the scope 3 emission was 663,000 t-CO₂. It is revealed that the scope 3 emission was more than the company's total scope 1 and 2 emission. Furthermore, emissions of the GHG from a product, the service that we purchased occupied 35% of the emissions through the supply chain, and it became clear to be a main GHG emission source in the supply chain more.

Propagation of Japanese Black Pine (*Pinus thunbergii*) Seedlings for Restoration of Coastal Protection Forest

Naoki Negishi, Nobuaki Urata, Katsuhiko Nakahama and Akiyoshi Kawaoka
Agri-Biotechnology Research Laboratory, Nippon Paper Industries Co., Ltd.

Coastal protection forest functions as tsunami damper, prevention of sand erosion and salt damage caused by strong sea wind. Japanese black pine (*Pinus thunbergii*) is considered to be the best choice for these functions. In recent years, to cope with the risk of pine wilt caused by pine wood nematode (*Bursaphelenchus xylophilus*) variety of pine that are resistant against *Bursaphelenchus xylophilus* have been developed. However, pine tree seedlings are produced from seeds because pines are difficult to propagate by cuttings. Therefore nematode-resistant properties cannot always be inherited to progeny. Thereupon, in this research the efficient method to propagate pines by cuttings are investigated.

Needle leaves from 2 year old *Pinus thunbergii* specimen, grown in pots from seed in greenhouse were used as materials for rooting experiments. Cultivation under the environment of high CO₂ concentration (1000ppm) with glutathione, reportedly related to plants' photosynthesis, added to the culture media improved rooting rate to approx. 60%. However, it was unable to produce seedlings because rooted plants transplanted to pot did not sprout. Therefore, needle leaves were treated with N6-benzylaminopurine, known as artificial cytokinin to induce new sprout. Then cutting were conducted with treated leaves. Investigation of rooting rate and subsequent growth showed that even though rooting rate decreased slightly to 40%, new sprout grew afterwards and seedlings were obtained. Feasibility study will be implemented if the technique obtained through this research can be applied to the mass production of *Pinus thunbergii* seedlings for coastal protection forest.

Installing Combisorter™ into Paperboard Product Line and Its Operating Experience

Kenji Ota

Soka Mill, Nippon Paper Industries Co., Ltd.

The Soka Mill is located in the Soka-Yashio Industrial Park which had been developed in Saitama Prefecture for the first time. It is typical urban mill and this site is good place for us so it belongs to the metropolitan area where they consume paper and discharge wastepaper at the most. We have been moving forward recycle business to use wastepaper which is contained 99% in its stock. This helps us contribute to protect environment.

However, recently we are faced with recycled fiber quality issues because of the increase of contaminants and the development of printing technologies. Therefore, the pulp yield has been deteriorated.

We have installed “The Combisorter™ CSM” to solve pulp quality and yield loss problems. Here we report my operating experience.

Introduction Case of TrumpJet System to 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.

Effects of Next Generation Lighting on the Flight Behavior of Nuisance Insects

Goro Kimura

Technical Research Laboratory, IKARI Corporation

Masahiko Konishi

Sales Development Department, IKARI Corporation

We investigated the number and species composition of insects attracted to LED lamps in the field. The most abundant taxon was Chironomidae in each LED lamp. Except for yellow LED lamp, lack of the effect of UV in attractiveness to some nuisance insects, especially chironomids was suggested.

How to Proceed with 5S Education in Process Industry

— 5S Management for the Plant Manager —

Osamu Haneda

Japan Business Innovation Consulting

5S is a basic in plant operations. However, plant manager worry about the low level of 5S. Therefore, observing the plants 5S level is low, it was considered. As a result, management of the plant manager was important.

Further, it may lead to experts 5S. 5S activated by expert guidance. However, I will stagnate after training of experts. So, I was considered the cause of the stagnation. I introduce you that

we have devised a management of 5S fixation.

Report on the Results of the Fiscal 2014 Follow-up Survey on “JPA's Action Plan for Low-Carbon Society” and Related Information on Measures Against Global Warming in the Japanese Paper Industry

Kazuo Ikeda

Japan Paper Association

The Japan Paper Association (JPA) established its “Voluntary Action Plan on Environment” in 1997, in response to Nippon Keidanren's call to the Japanese business community to organize “Keidanren's Voluntary Action Plan on Environment. Since then, JPA has made a follow-up survey, and published the results every year.

As its Voluntary Action Plan finished in fiscal 2012, JPA started new plan called “JPA's Action Plan for Low-Carbon Society” and has been actively addressing global warming prevention, in order to achieve the following targets set in the plan:

- * Compared to BAU scenario, reduce fossil energy-derived CO₂ emissions by 1.39 million tons in fiscal 2020 from the level of fiscal 2005.

- * In view of securing forest resources and increasing forest carbon sink, expand forest plantation areas owned or managed by the paper industry at home and abroad to 800 thousand hectares by fiscal 2020.

According to the results of the fiscal 2014 follow-up survey (actual results for fiscal 2013), fossil-energy derived CO₂ emissions in fiscal 2013 was 18.58 million tons, compared to 24.91 million tons in fiscal 2005. Compared to the BAU emissions for fiscal 2013 (21.28 million tons), actual emissions in fiscal 2013 decreased by 2.7 million tons. This is attributed to each manufacturer's active efforts such as energy saving and energy conversion from fossil energy to non-fossil energy like biomass energy.

In addition to the results of the follow-up survey, this report introduces the current energy situation in the Japanese paper industry, and outline of the next phase of JPA's Action Plan for Low-Carbon Society spanning the ten-year period from fiscal 2021 through 2030, and the latest information on the industry's measures against global warming.

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 3: Paper Making in Islamic Lands and Its Transfer to Europe

Kiyoaki Iida

Paper making process invented in China travelled westward. It arrived at the Central Asia in the fifth century and Iraq in the ninth century. Then, it spread to Syria, to Egypt, through the North Africa, and to Spain at the eleventh century. Along the way, it competed with parchment that was durable but costly and papyrus that had a long history as a writing media. As culture there asked that sheet should be written with pen, not with brush, paper was modified to satisfy that need, and increased share. In the fifteenth century, paper supported the fully-matured Islamic culture of which center was Iran. Their paper consisted of well beaten linen rag, and was coated with chalk and starch, to make its surface good for scribing by pen. Then, imported paper from Europe which was cheap prevailed in the market, and the Islamic paper industry became extinct.

Corporate Profile & Products Information (20)

Hakuto Co., Ltd.

Hakuto is a company which trades electronics products and produces speciality chemicals.

For our electronics business, we are on the forefront of technologies and provide excellent technical service on electronic devices, components, and equipment.

For our chemical business, we treat various process chemicals for pulp and paper, petroleum, automobiles, and water treatment industries with our eco-friendly technologies.

Especially, concerning chemicals for pulp and paper, we have started to treat functional chemicals made by BASF. So, we can support the customer from many aspects.

Here, we will introduce the abstract of our company, our product line up for pulp and paper industry, and our new excellent technologies on this paper.

—Peer Reviewed—

Novel Analysis Method for Pulp Furnish Using Tube Flow Fractionator (Part 1)

Moe Fukuoka and Shisei Goto

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

Hiroki Ohtake

Hokkaido Mill, Nippon Paper Industries Co., Ltd.

The effects of various chemical agents on the agglomeration and fixation of filler particles in pulp furnish were investigated using a new apparatus, called fractionator, based on a tube flow fractionation. The apparatus separated component of pulp slurry gently by the hydraulic size against for a constant tube flow. The fibers and fines fractions were analyzed with a laser optical sensor and images from a CCD camera. The result from the addition of a cationic dry strength resin to deinked pulp (DIP) revealed that the elution curve of depolarization (D) and scattering (S) signals as indices of fiber and filler, respectively, from the sensor were overlapped while the S-signals of DIP without chemicals was delay from the D-signal. The patterns of those elution curves added various agents such as coagulant and flocculant were different among the agents. The images of those pulp fractions showed that the filler particles in the DIP without chemicals were dispersed. By addition of the chemicals, those particles formed agglomerates by themselves, and flocs with fibers and fines. The morphologies of filler agglomerates was different as well.

In conclusion, the method using fractionator was useful to examine the effect of the various chemical agents in paper making process. This method would contribute to select suitable chemicals and optimize wet end systems.

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Brightness Improvement Program in DIP Process

Takahito Ikeshita

Pulp and Paper Business, KATAYAMA NALCO INC.

Hiroshi Hasegawa

Technical Development, KATAYAMA CHEMICAL, INC.

Hydrogen peroxide bleaching is a principal method in deinked pulp (DIP) manufacturing. In recent years, it has become more difficult to keep up an operating standard of brightness as the amount of low-quality recycled has been increasing.

On the other side, monochloramine is widely used for the slime control purpose. We found that monochloramine can improve hydrogen peroxide bleaching efficiency in the DIP process. In this article, we will introduce the brightness improvement program using our oxidant techniques with a successful case. This technique helped the mill to achieve more efficient hydrogen peroxide bleaching and to reduce total cost of mill operation.

AEGO 3X PRESS I (Inverted Tri-EX Press)for Optimum WTL (White Top Liner)Production

Giancarlo Gianlorenzi

PMT Italia S.p.A.

Akihiro Ooba

Yonei & Co., Ltd.

The peculiarities of the physical structure of white top liner, together with the high quality demands of this increasingly important packaging grade, present a number of technical challenges to the machinery designer. The press section of the machine is one such challenge. PMT developed a press concept with the Hamburger group in Germany for its rebuild of the Rieger Trostberg PM2 in 2002. The concept - Inverted Tri-Ex was such a success that the group installed a second press of the same design in its new PM1 at Hamburger Spremberg mill in 2006. Subsequently, a couple of years later PMT has started up a third press unit at DS Smith on

PM2 Lucca mill in Italy.

This paper sets out to explain the underlying principles and the evolution of the Inverted Tri-Ex Press, commencing from the basics of the wet pressing process itself.

The fundamentals of water removal, maintaining white-layer purity and surface smoothness and z-direction strength are succinctly covered. A key factor in the design of the press is the closure of all transfers resulting in no open draws.

The Newest On Machine Equipment for the Efficiency Improvement — Case Studies of Deposit Removal Facilities on Paper Machine —

Chihiro Murayama

Technical Sales Department, AIKAWA IRON WORKS CO.,LTD.

By recycling papers usage percent increasing and its quality lowering, the difficulties of impurity removal at paper stock preparation stages are underscored year by year. As the result, the fine impurities reached to paper machine side are increasing, they have chances to deposit everywhere, and bring dirt troubles. Because cleaning up the deposit by hands requires long time and hard tasks with the paper productivity drastic reduction, its improvement would be one of the most important subjects for paper making. We introduce our newest profitable doctors and cleaners for paper machines to improve this big problem. Additionally we will introduce the most suitable suction roll sealing elements for paper machine energy saving which we became to supply from this year.

Andritz State-of-the-Art Sludge Dewatering Process — In Combination with Pre-Dewatering Gravity Table —

Tamio Fukuzawa , Toshio Okunishi and Yosuke Takeshita
Andritz K.K.

Andritz sludge dewatering systems treat all residues created in recycled paper mills. In addition to sludge, these include rejects from various process steps like pulping, cleaning or screening. Every recycled fiber line needs a proper water, sludge and reject treatment system in order to be able to operate economically and in an environmentally sound manner. The first and obvious goal is to minimize costs for resources (water, energy) and disposal. In this article, the combination of Andritz Gravity Table as pre-dewatering and Continuous Pressure Filter

(CPF) or Screw Press (SCS) is introduced mainly.

Fully Split Mechanical Seal for Shaft Wobbling

— **One Mechanical Seal can Change your Working Environment Completely !**

Provides Clean and Maintenance Free Plan —

Takashi Kamizono

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.

Web Inspection Camera System with Dust Filter for Tissue

— **Productivity Improvement by Integrated Camera System “TotalVision™” —**

Yasuhiro Takeyama

MATSUBO Corporation

It is “Challenging time” producers for household paper such as tissue, toilet roll and towel paper, because of high demands for quality control from consumers. Even in the severe competition against low cost imported tissue, Japanese tissue producers should take care of not only its quality but also cost management. However most of all tissue machines have no web inspection system (WIS) to detect defect such as holes or dirt, which is standard for paper/board machines. The only solution for web break trouble, such as web break at unreel in converting machine caused by pinhole from tissue machine, has been as a rule of thumb. Because conventional line scan camera inspection systems detect flying paper dust as defects. They cannot classify “true defects” on the tissue web.

“WebInspector™ “ the web inspection system by Papertech Inc. (Canada), which have delivered over 730 WIS and web monitoring system to paper/tissue producers, is introduced in this article. WebInspector™ has a powerful dust filter to detect “True defect” .

Furthermore, Papertech can also propose solutions for quality control and cost management. Their TotalVision™ system which is an integrated system of web monitoring and web inspection can specify roots of the troubles (defects, web breaks). It terminates “guess work” by operators and helps them to SEE defects or web breaks in the upstream process to find the root causes rapidly, and also give them appropriate solutions. Some cases which achieved cost reductions and productivity improvements are also introduced.

The Proven Effects of the Reel Optimization System (ROS)

Makoto Matsushita

KGK Engineering Corp.

In the paper manufacturing, the reel process is understood as the end and important process of the paper machine and easily related to the final product loss. The patented BLH Nobel Reel Optimization System (ROS) is a hydraulic force and position control system developed to measure and control the nip load directly during the full reeling process, to eliminate the wrinkles caused by air bubbles and the cracks during critical shifting phase, and to improve the roll density. Consequently ROS can decrease the paper loss dramatically and contributes to produce the optimum density rolls, but also can decrease the losses happened in the next re-winding process caused by the paper slipping in the roll. We would like to introduce the proven effects of the Reel Optimization System (ROS) with Reel Diagnostics System (RDS) which has been already operated in European and USA paper mills.

For Sound or Noise in Industrial World Part VII*1

— It Thinks about the Noise as Part of T.F.O from SKF —

Yasuhiko Yamasaki

RSS RS SKF Japan.

“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.

Newly-Developed Defoamer and Dosing Control

Yuuji Sonoda

Kurita Water Industries Ltd.

A fatty alcohol based emulsion type defoamer has widely been applied for paper making process, because of its excellent ability to deaerate white water and less negative impact on sizing. In this article, we introduce newly-developed emulsion type defoamer “KURILESS[®]800 series” and “S.sensing[®] FD II” that enables to quantify foam volume automatically, which has almost the same performance level with a visual measurement.

Notably, “KURILESS[®]800 series” has a beneficial effect both in high temperature system and in surfactant-containing system. These characters have already been proven in actual machine tests. “KURILESS[®]800 series” could be expected to be applied to paper and pulp making process water or wastewater where other types of defoamers have currently been used for, because it is highly effective to defoam the surfactant component system. As a result, we believe “KURILESS[®]800 series” expand the coverage of the emulsion defoamer.

“S.sensing[®] FD II” is an automatic monitoring system of foam volume, instead of visual judgment by a operator. The dosage of defoamer can be also adjusted automatically by utilizing the feeding control function of “S.sensing[®] FD II”, that adjusts defoamer feed according to the foaming volume information. We can quickly give a reaction to increase or decrease dosing at the time of the abnormal foaming. Thus, we expect that “S.sensing[®] FD II” contributes not only to cut the cost by the prevention of excessive dosing, but also to prevent foam obstacles caused by any fluctuation.

Construction Cost of KP Mill Construction for Bioethanol Production

Tokiya Yaguchi

Biomaterial in Tokyo Co., Ltd.

Makoto Iwasaki

MIP Consultant Office

Youichiro Isono

Second-generation bioethanol has been promoted as a viable form of renewable energy to sustain the global environment. In Japan, the technological development in commercializing cellulosic bioethanol production by 2020 has been pursued by the industry, government and academia, focusing on high-yielding herbaceous biomass and fast growing hardwood as the cellulosic feedstock, and the Kraft pulping (KP) process that can pre-treat the large volumes of biomass in preparation for bioethanol production. This report details the capital cost associated with constructing facilities for KP process with bioethanol production. The major findings were:

1. The construction costs of new KP mills and mills being planned or under construction around the world since 2000 were proportional to the scaling exponent 1.03 of their production capacities. The results were determined from a sample size of 85, with a contribution ratio of $r^2=0.82$.
2. The approximation formula can be used to calculate the construction cost of the KP (biomass pre-treatment) portion of bioethanol production facility. For example, a facility with an economically viable production capacity of 200,000 kL/year would need a Kraft pulp production capacity of 1,500 ADT/day, one of the largest in Japan. The fixed cost for constructing facilities including the KP process was calculated as US\$0.38/L of bioethanol.
3. The location of the KP mill is irrelevant for the approximation formula. The estimated equipment purchasing cost is proportional to the production capacity to the 0.6-0.7th power, which is in line with equipment installation costs reported by NREL to be 1.0 to 3.1 times the purchase cost. Further research and data is needed to confirm these findings.
4. The fixed cost of bioethanol production using Kraft pulp from new KP mills is extremely high, necessitating the need to consider establishing bioethanol plants that use Kraft pulp made from fully-depreciated KP mills to decrease this cost.

The Opinion Exchange Meeting with Patent Examiners

Takanori Miyanishi
JAPAN TAPPI

Recent developments of Japan patent policy was presented at a public meeting by the examiner of Japan Patent Office to intellectual property experts of paper companies. The policy sets several goals to deal with international disputes on intellectual property including trade secrets. It aims to establish the world's fastest and highest quality patent examination system in Japan and to support globalization of corporate activities and open innovation.

Corporate Profile & Products Information (21)

KUMAGAI RIKI KOGYO CO., LTD.

In January 1927, the previous owner Shichijiro Kumagai founded Kumagai Seisakusho in Kanda Sakuma-cho, Tokyo to start manufacture of test equipment for petroleum products. Since the foundation, we have dedicated ourselves to manufacture and sales of physical and chemical appliances with the goal of service and contribution to customers, development of social welfare and harmonization in society.

In 1949, we shifted our business focus from petroleum test equipment to paper pulp testers, and under the development in Japan of the paper pulp industry and the progress of paper making technology for more than a half century after World War II, have continued manufacturing of test equipment for the paper pulp industry. The products of Kumagai Riki Kogyo, Co., Ltd. are utilized extensively in Japan, first of all, and also in various areas in the world such as Asia, North America and Europe. Today, Kumagai Riki is expanding paper making technology into the study of new materials.

We have three categories of products in the area of expertise. The first is paper and board testers based upon the testing methods by ISO Standards, etc. In 1997, we developed a fully automated testing machine for paper physical properties which features high speed measurement, high precision and energy saving, called AutoScan. Today, it finds many users in various production factories. The second is for the fields of processability and printability: the former is devised into two genres: the coating machines including sizing and coating processes, and the glossing machine “Calendar”, and the latter of the processes of off-set and gravure. The third is the pulping tester including a cooking machine and a beating tester (refiner and PFI Mill). We also cover the product line of papermaking machines of various sizes, such as sheet former, press and dryer.

—Peer Reviewed—

Evaluation of Pulp Quality of Three Non-Wood Species as Alternative Raw Materials for Paper Production

Atanu Kumar Das , Akiko Nakagawa-izumi and Hiroshi Ohi

Graduate School of Life and Environmental Sciences, University of Tsukuba, Japan

Parts of three non-wood species, the stem of *Musa sapientum* (banana), the mid-rib of *Cocos nucifera* (coconut) leaves, and the stem and leaves of *Eichhornia crassipes* (water hyacinth), were kraft-cooked to assess their pulp properties as alternative raw materials for paper production. Regarding *M. sapientum* stems, the best result was found for pulp cooked at 150°C with the application of 9.2% effective alkali and 17% sulfidity. The highest tear index was 9.92 mN·m²/g with a 57.4 N·m/g of tensile index and 38.4% of screened pulp yield. The mid-rib of *C. nucifera* leaves displayed the best performance with the highest screened yield at 160°C with 21.3% effective alkali and 30% sulfidity. Moreover, the tear index, tensile index, and screened yield were 6.91 mN·m²/g, 67.8 N·m/g, and 44.4%, respectively. Considering all of the properties, the best treatment was 9.4% effective alkali, 13% sulfidity, and a cooking temperature of 150°C for *E. crassipes* stems and leaves, which provided pulp with a tear index, tensile index, and screened yield of 2.64 mN·m²/g, 63.9 N·m/g, and 33.9%, respectively.

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The Activity of Energy-Saving Produced Results in a Short Term

Ryosuke Kotani

Nakatsu Mill, Oji F-Tex Co., Ltd.

Amid rising interests over renewable energy, Oji group has been positively progressing the utilization of biomass and hydroelectric power generation. Since paper manufacturing is an energy-intensive industry, the amount of purchasing energy such as LNG is still large. As recent rise in energy prices influencing severely over the profits of the industry, searching and practicing energy-saving matters that can be realized in short term are desired. Since setting up an aim of reducing 1.5% of energy consumption from the previous year and progressing energy - saving activities in every Oji FTEx mills, Nakatsu mill has limitedly settled a small team and worked on energy-saving during the second half of 2013 in order to produce results in a short term. As a result, 19 actions have progressed in six months and succeeded in reducing 122 kL of energy per year measured in terms of crude oil. (corresponding to 0.45% reduction compared to the previous year)

This paper presents the activity of the “Energy-saving team” , two energy-saving acts (“Improvement of steam traps” and ”Halting single compressor”) and “System of visualizing energy consumption rate” which was a practical tool to progress energy-saving activity in manufacturing sites.

The Announcement by #1 Stock Preparation Energy Saving Screen Introduction

Teppei Tomokuni

Ashikaga Mill, Nippon Paper Industries Co., Ltd.

Ashikaga mill have changed the fuel to city gas in 2006. However, LNG prices have been increased by the recent depreciation of the yen. As a result, energy costs are increasing.

Revised Stock preparation #1 process in August 2014 to perform efficiency line that was operating in that integrated into one system in the conventional two systems were further introduced energy-saving screen.

As a result, was able to reduce the total amount of energy costs the entire approximately 23%.

Introduction of Energy Saving Application Case Study

Yoshiaki Akahori

Advanced Automation Company, Azbil Corporation

Minehiro Nishida

Building Automation System Company, Azbil Corporation

<Energy Saving application for Factory>

1) Utility air optimization

- Compressed air supply integrated optimization by ‘Compressor group control’
- Compressed air demand integrated optimization by ‘Demand air pressure control’

2) Boiler Turbine Generator Optimization

- The economic benefit that can be gained by applying online optimization system for steam turbine generator (STG) load allocation
- Not only BTG optimization but also claim the subsidy for energy saving promotions.

<Energy Saving application for Building>

- Not only energy-saving control in hospitals, equipment (Co-generation) also performed , including, to award-winning case study of the "Energy Conservation Center Chairman's Award" in the energy-saving award of Y2013.

Energy Saving in Mishima Mill Power Plant, Daio Paper Co., Ltd.

Koji Konya

Mishima Mill, Daio Paper Corporation

Daio Paper Mishima Mill is the nation's largest coastal Mill with 500 thousand square meters which is located in Shikokuchuo city. It is the Company's core factory, which celebrated its 70th anniversary last year. From the fact that is located a lot of equipment in extensive grounds, raw materials and water, steam, the system, such as power has become very complex. Furthermore, in the 70 year history, it has been repeated expansion and is a factor to be further complicated.

In this paper, I will describe energy saving of steam-power of the entire plant with a focus on power generation equipment.

With the goal of improving 2% of generation output, I tried by decompressing the steam

pressure that I sent to the factory. As a result, 2.4% of generation output improved. I used surface condenser of V/E and a turbine cooling tower coolant to raise temperature of the water. As a result, I was able to reduce steam consumption last year.

It is difficult to cooperate because a factory scale is big. However, I think that I was able to get big result by cooperating.

Energy Saving in The Steam & Condensate System

Hitoshi Terashima

Motoyama Shinkoh Co., Ltd.

Compared to the original operating conditions for a paper machine, almost all current operating conditions, such as paper weight and speed, have changed.

Saving energy may be possible by investigating and examining whether or not the drainage system has kept up with these changes.

By changing the drainage system to match the paper being made, there should be many cases that can expect improvements in quality and efficiency as well as realizing steam savings.

Here we report on what can be done from now on for the possibility of saving energy considering the drainage system, within recent significant improvements in drying efficiency through sealed hoods, air supply and exhaust, heat recovery system, etc.

Electric Power Saving for Acticontact Aeration Blower

Kenichiro Fukushima

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

Aeration Blower which is used for wastewater treatment equipment used to be adopted roots vacuum pump system, but now changed to turbo-pump system. Then we achieved noise reduction and electric power saving.

Technical Update of Advanced Energy Saving in the Stock Preparation Process

—Energy Saving Studies for Pulper, Screen, Refiner —

Jiro Urata

Technical & Engineering Department / AIKAWA IRON WORKS CO.,LTD..

In Japan, stopping of all nuclear power plants operation, and unstable situation of Middle East countries are imposing the continual electric power saving to all paper manufacturing mills. Aikawa Iron Works has been continuously working to develop the products that contribute to the energy savings, and would like to introduce our recent outcomes from our research and development in the following three themes.

1) The 3rd generation Helix Rotor (L.C Pulper Rotor) that reduces more than 20% energy comparing with traditional rotor. (It have been developed based on the advanced fluid analysis)

2) The “GHC2” Rotor that has possibility to surpasses more than 30% of specific power consumption from the existing GHC rotor.

3) Very narrow Finebar refining fillings and spline shaft modification on the refiners that saves energy consumptions.

Also we would like to introduce the solutions to remove fine metal impurities that is the cause of problems to detecting metals from food or medical goods packages.

Report of 2014 International Bioenergy & Bioproducts Conference

Michihiko Tamaki and Naoto Umeguchi
Daio Paper Corporation.

2014 International Bioenergy & Bioproducts Conference (IBBC) was held in Tacoma WA, USA on September 17-19 2014. There were 25 exhibitions and 30 oral presentations in the conference. The number of participants was 420, mainly from North America.

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 4: Paper Making in Europe and Its Adaptation to Printing Need

Kiyoaki Iida

Paper making process which landed in Spain spread in Europe. Linen rag was well pounded, from which wet sheet was formed on a mold. Sheets were stacked with a layer of felt between them, and pressed for dewatering. Then, they were dried in a room, being hung on a rope. They were further impregnated with gelatin and polished with stone. The process was improved in

cost with refined use of water wheel, flow operation in a mill and standardized product size, which were prerequisites for the coming industrial revolution.

Paper was sized in each land with its own method. In Europe, paper was impregnated with gelatin as an after-treatment. Its surface had to be strong against scribing by pen to be a substitute to parchment. As printing became common in the fifteenth century, less sizing was required. Then, paper machine was invented and became prevalent in the nineteenth century. Internal sizing was invented and rosin sizing was developed. Further technical developments like tub sizing and modifications in printing press made gelatin sizing dispensable.

Corporate Profile & Products Information (22)

Mushugen Industries Co.,Ltd.

Mushugen Industries Co.,Ltd. was established in 1960 as a manufacturer of microbial products and deodorants for wastewater-treatment. In various fields: sewage treatment, disposal of human waste, industrial wastewater-treatment, and other special wastewater-treatment in a ship, submarine, train and aircraft, we have cultivated the technology of these products and the maintenance management know-how, taking account of each situation and needs. In recent years, we have also made efforts to develop energy-saving technology in same fields, and have provided operating technique with original products.

Since eight years ago, we have promoted the application in the field of pulp and paper wastewater treatment. In this article, we would like to introduce an overview of our company and recent approach and products applied there.

—Peer Reviewed—

Pyrolysis of Wood Meals with Different Lignin Content Altered by Delignification or De-Carbohydrate Treatment

Kaoru Nishikiori, Kyoko Katsumata, Takuya Akiyama, Tomoya Yokoyama and Yuji Matsumoto

The University of Tokyo

In order to examine the effect of lignin and carbohydrates on the pyrolysis products of wood, wood meals (Douglas fir) with different lignin and carbohydrate contents were prepared. By

sodium chlorite delignification of Douglas fir wood meal (lignin content 26.5%), wood meals with lignin content 1.8 to 21.3% were prepared. By periodate oxidation of carbohydrates, wood meals with lignin content 45.1 to 67.6% were prepared. These wood meals were subjected to pyrolysis by the use of tube type kiln. With the decrease of lignin content from 67.6 to 1.8%, the yield of pyrolysis residue (char) decreased from 48.6 to 27.7%. Interestingly, not only lignin-basis yield but also sample-basis yield of eugenol, guaiacol and vanillin increased with the decrease of lignin content when wood meals delignified with sodium chlorite were subjected to pyrolysis. These products were most presumably derived from lignin. Contrarily, sample-basis yield of 4-methylguaiacol, 4-ethylguaiacol and isoeugenol decreased corresponding to the decrease of the lignin content of the sample. These results indicate that yields of lignin-derived pyrolysis products do not always depend on lignin content. Similarly, there was not clear relationship between carbohydrates-derived pyrolysis products and carbohydrate content.

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Introduction and Operating Experience of the No.2 Gas Turbine Plant

Yosuke Nonaka

Niigata Mill, Hokuetsu Kishu Paper Co., Ltd.

We run the mill emphasizing the environment, based on the company's corporate philosophy.

We have improved CO₂ emission intensities with continued activities of saving energy on power plant sections, introductions of large scale Soda Recovery Boiler and Biomass Boiler utilizing fuel wood, fuel source of existing boiler and turbine have been changed to natural gas. We have also experienced violent fluctuations of energy prices around the failure of Lehman Brothers and felt the necessity of diversification of energy source caused by the Great Japan East Earthquake. Against such a background, we planned to introduce the 40 MW class Gas Turbine divertible of aircraft engine, as renewing the existing outdated Oil Boiler, 18 MW-class Steam Turbine and 17 MW-class Gas Turbine.

No.2 Gas Turbine plant has started business operation since March 2014. Thereafter, Fuel intensities converted into crude oil equivalent and CO₂ emission intensities have been improving. In this paper, we briefly describe the outline of the equipment and operating experience of No.2 Gas Turbine plant.

The Waste Heat Utilization by an Absorption Heat Transformer

Tomoyoshi Irie

EBARA REFRIGERATION EQUIPMENT & SYSTEMS CO., LTD.

The low temperature heat sources such as hot water less than 100 deg C are usually difficult to be utilized because the temperature is too low. An absorption heat transformer was developed to generate 180 deg C steam by utilizing these low temperature heat sources. A single lift absorption heat transformer generates 120 deg C steam in theoretical COP 0.5. A double lift and a triple lift absorption heat transformer generate 180 deg C steam in theoretical COP 0.33 and 0.25, respectively.

The Highest Nip Load Shoe Press in Japan - Energy Saving by Introduction of High Nip Load Shoe Press to the Container Board Machine

Ryuji Shinoda

Yashio Mill, Rengo Co., Ltd.

As companies are expected to take environmental actions, Rengo established “Eco Challenge 020” as the company's environmental action plan and is strenuously working to reduce the carbon emissions by 32% in 2020 compared to 1990 levels. In addition, Saitama Prefecture, where Rengo Yashio mill is located, has set the reduction target of CO₂ emission by 13% in 2019 compared to the average level between 2002-2004 by enforcing the local regulation of global warming prevention since 2009. Moreover, energy saving is the urgent issue of Yashio Mill because of the raising fuel cost in recent years.

Against such a background, Yashio Mill PM1 (medium machine) introduced the high nip load shoe press with an aim of improving the productivity as well as reducing the steam consumption. The outline of the retrofit and an operating experience will be discussed in detail below.

Suggestions towards Energy-Saving for Refining at Stock Preparation

Masaharu Menjo and Akifumi Hatta

Valmet K. K.

In this paper, two topics are to be described how to reduce energy consumption at stock preparation. In general, refining process requires lots of electricity. Therefore, it can be mentioned that there are still some big possibilities left for energy-savings.

One of these two topics is newly developed conical type refiner (OptiFiner Pro). With its unique refining mechanism, the refining efficiency is highly improved by comparison with previous generation of conical refiners (for example, OptiFiner RF). Due to the high refining efficiency, we have experienced some installation cases indicating that previous generation of two or three conical refiners can be replaced by only one OptiFiner Pro. In addition, there is also one installation case that successfully ended by the replacement from conventional type of three double disc refiners with only one OptiFiner Pro. Our customers are satisfied with not only energy savings but also reduction of maintenance cost for stopped refiners. By choosing suitable fillings (i.e. refiner segments), OptiFiner Pro is available for virgin pulp refining (i.e. hardwood and softwood) as well as recycled pulp nowadays.

The other topic is refiner segments with much narrower bars and grooves than ones from conventional refiner segments. We have finally succeeded to manufacture these refiner segments (MicroBar) by casting and MicroBar is now widely used for hardwood refining at stock preparation as a good tool for energy- savings. The refining intensity of MicroBar is so high that the motor load for double disc refiners can be lowered by using MicroBar.

There is also possibility that one double disc refiner can be stopped from where there are two double disc refiners installed in series. For softwood refining, we have found a very effective pattern throughout test runs with a customer in 2014. This new pattern for softwood refining is also to be briefly described in this paper.

Introduction and Operating Experience of the Energy-Saving Rotor for Inward Type Headbox Screen

Fumitaka Miyazaki

Fuji Mill, Oji Materia Co., Ltd.

It is accepted that, in the pulping process, we are able to achieve a reduction in power consumption by installing an energy-saving rotor at the screen and additionally by reducing the rotating speed of the rotor.

On this basis, we installed the same kind of rotor to the headbox screen in the paper making process in order to assess any possible energy savings. We have now carried out actual machine tests using the energy-saving rotor manufactured by Aikawa Iron Works Co., Ltd.

In this paper, I will explain our operating experience of the energy saving as a result of installing the energy-saving rotor for inward type headbox screens in the case of N - 2 M/C.

Case Study of Steam Saving at Dryer of No.4 Paper Machine

Naoyuki Sekine

MPM OPERATION Co., Ltd.

Our No.4 paper machine operated at Hachinohe mill of Mitsubishi Paper Mills LTD was not really outstanding at steam saving as compared with other paper machines.

A factor is difference of the steam consumption at the dryer part. And problems are lower efficiency of the steam equipment and differences of the operational condition, the mechanical drainage flow, and the drainage balance. We modified the drainage system as a solution of these

problems in December 2013 and achieved big steam saving.

This report is described about the past problems, the modifying of drainage system, and the result of steam saving.

Blade Type Canvas Cleaner — AOKI 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.

Looked from the Factory Diagnosis, Introduction of the Basic Unit Reduction

Takehiro Uwafuji

MIURA Co., Ltd.

In our company, conventional boiler energy conservation diagnosis carried out to present a tangible cost benefits amount of simulation of the steam pressure in the boiler updated, update, etc., diagnosed in effect hold-open, was committed to the spread of once-through boiler. However, energy conservation in boiler unit is marginal. In recent years, energy consumption rate study is sought by energy saving steam heat, water, and air, *etc.* which occurs in a factory. Energy conservation checks of the whole factory based on the diagnostic technic grown by a boiler are being put into effect. Measurement enabled difficult equipment to measure the energy in the past without installing an exclusive measuring instrument as flowmeters by utilizing analytical instrument of patent acquisition. By measurement technology, we can get visualization of effective energy, and quickly and precise grasp of the effects of when renewing.

In this paper, we would like to introduce points of energy consumption rate study, reduced through the use of the latest factory diagnostic tools developed in-house.

Corporate Profile & Products Information (23)

Maintech Co., Ltd

We, Maintech Co., Ltd., are the consulting partner for the Paper Mills, supplying with the Chemicals and Equipments, in order to achieve Improvement of quality and production efficiency by "Preventive Method" & "Creping Control for Tissue grade".

Our "Dryer Section Passivation" technology is applied for most of board grade machines in Japan, which uses higher rate of recycled pulp, and is also applied for Printing & Writing grade to reduce dusting and printing problems on the press rolls and Dryer Cylinder, which are deeply related to the printing problems.

In the field of Tissue grade, every manufacturer had tried to improve quality by use of fabric softener since year 2005, but they had found the fabric softener makes a bad influence on the paper making operation. Since then, "Creping Control" with our lubrication technology has been popular in the market, and Major Tissue Companies have started to adopt this technology.

—Peer Reviewed—

Bulky Paper from Chemically Crosslinked Hardwood Kraft Pulp Fibers

Antti Korpela and Atsushi Tanaka

VTT – Technical Research Centre of Finland Ltd

There is a general interest among paper and board makers to produce lighter and bulkier paper and board products. The aim of the present study was to characterize chemically crosslinked hardwood kraft fibers regarding their potential in making bulky paper and board. Crosslinking agents are molecules that contain two or more reactive ends that form inter-chain covalent bonds with cellulosic hydroxyl groups. The formed water resistant crosslinks prevent mutual movement and relocation of cellulosic chains and further, changes in fibers physical shape and dimensions, as the fibers are wetted, mechanically stressed and dried. In paper and board making chemically crosslinked fibers are less prone to swelling and deformation. Blocking of fibers surface hydroxyl groups by reactions with crosslinking agents reduce fibres ability to form inter-fibre hydrogen bonds. In the present study the crosslinking treatments were carried out in laboratory scale. The used pulp was never-dried, bleached hardwood (*Betula*

pendula) kraft pulp. Experiments were performed using various dosages of crosslinking agents followed by beating of the pulp and subsequent standard laboratory paper sheet making. The crosslinking treatments resulted in significantly increased paper sheet bulk. As expected, crosslinking decreased the dry strength of the sheets. However, after moderate refining, crosslinked pulps had much better tensile strength at constant bulk than never-dried or dried reference pulps. An additional advantage of crosslinking treatment is that it improves dewatering ability of the pulp significantly. Thus, use of chemically crosslinked pulp offers an attractive option for manufacture of bulky printing papers and paper boards.

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Vol.69, No.8 Abstracts

Current Situation of the World's Forests and Issues of Industrial Plantations

Hiroyuki Obuchi

Japan Overseas Plantation Promotion Center

Based on "Global Forest Resources Assessment 2010" that FAO performed in 2010, the current situation of the world's forests was introduced. The decrease in world's forests area diminished, but approximately 13 million hectares with annual average is still decreasing in the 2000s. In consideration of increase by afforestation, approximately 5 million hectares with annual average is net reduction in the 2000s.

Concerning increase in the population of the world and the demand for wood increase in the future, there are two important issues for industrial plantations. The first is to raise the productivity of planting area, and it is necessary to continue improving the forest tree breeding and the silviculture technology. The second is the selection of good trees which grows up with the inferior land and the development of new markets.

Trend of KP Continuous Digesters and the Related Basic Theory

Makoto Iwasaki

MIP Consultant Office

During 70's some injured fishes and marine animals were found in the Baltic Sea. The reason of phenomena seemed to be an effluent from pulp mill. KTH (University) and STFI (Research Institute) in Sweden started to research for decreasing kappa No. entering into bleaching stage in order to reduce chlorine dosage. It is difficult to archive both reduction of kappa No and maintain pulp yield at the same time, so they and machinery companies changed a conventional pulping process and developed some new cooking processes such as MCC, ITC, Lo-solids Compact Cooking. In this paper the trend of KP continuous digester and the related basic concept and theory behind of development on new processes are described.

Producing Polysulfide by Electrolysis of White Liquor, Development and Integration with Kraft Pulping Process

Kazuhiro Kurosu

Research Laboratory, Nippon Paper Industries Co., Ltd.

An electrolytic oxidation process to produce polysulfide (PS) from the kraft white liquor (WL) and integration of this process to the kraft pulping (KP) system is described. Electrolytic oxidation of WL through electrolytic cell provides highly concentrated PS liquor in the anode compartment with extremely high efficiency, and simultaneously, sodium hydroxide and hydrogen gas are available in the cathode compartment.

We have succeeded in the long-term stable operation of the electrolytic cell in practical scale for the first time in the world. And more, the merit derived from the integration of this technology with KP process have been actually verified in Nippon Paper Industries, Yatsushiro mill, such as follows.

1. Significantly high yield gain of pulp was available by combination of this electrolytic process and modified cooking process, and agreed with previous lab data.
2. The cathode liquor served as an excellent alkali source for oxygen delignification compared with existing oxidized WL.

Cooking Additives for Kraft Pulping

— The Reasons Why SAQ[®] Has Been Used for Years —

Junji Tanaka

Kawasaki Kasei Chemicals Ltd.

It is very important subject for pulp mills to increase pulp yield from a viewpoint of not only the improvement of profitability but also the effective use of fossil fuel and forest resources. In order to improve pulp yield, cooking additives have been applied. Polysulfide, anthraquinone compounds (SAQ or AQ) and surfactant are currently-used, in particular, SAQ has been used since 1976 in Japanese pulp mills. Because SAQ has some features; (i) superior impregnation into wood chips, (ii) many derivative effect for pulping process, and (iii) applicable to all wood species. Furthermore, we would like to add our continuous efforts to confirm effects on the actual operation.

Inorganic Scaling in Pulping Operations & Ways to Live with It

Rekha Bharati

Business Development & Application Manager, Pulp, Asia Pacific, Solenis

Inorganic scale deposition is a phenomenon that occurs in almost all pulp and paper making processes. The root cause of this scaling is the presence of trace metal ions and the very suitable process conditions for crystallization to initiate. In bleach plant scale formation is mainly due to trace metals or non-process elements (NPEs), while in evaporator, fouling also takes place due to process chemicals, the sodium salts. Strict waste water discharge using counter current filtrate management in bleaching and higher black liquor solids in evaporators and concentrators makes scaling even more problematic.

It is an unwanted occurrence that causes a number of operational problems, downtime and increased production cost.

This is a review paper dealing with (i) major scale deposition problems (ii) reasons for scaling and (iii) solutions that can be implemented to minimize the issue or live with it. The paper is focused around scaling in bleach plant and evaporator area.

The Review of Operating Experiences of Biorefinery Work

Suguru Nakamura

Yonago Mill, Oji Paper Co., Ltd.

As a part of biorefinery business of OJI group, we started commercial production of hardwood dissolving kraft pulp at Yonago mill since May 2014. At the same time, we also initiated verification tests for furfural production. In this report, the review of our biorefinery process and operating experiences are presented.

Biorefinery of Woody Biomass

Hidetaka Taneda

Nippon Paper Industries Co., Ltd.

A chemical article derived from biomass attracts attention for reasons of the reduction of carbon dioxide and substitute of oil resources. Large-scale research and development have been

started in Europe and America, but the process only to use edible biomass is in operation, and then utilization of food resources for another purpose becomes the problem. Woody biomass, which is the non-edible, has a great advantage because the infrastructure exists to handle, circulate, and use it. However it is not easy to refine woody biomass because of the hard structural nature. Therefore further research and development is necessary to overcome the difficult nature of lignin then will make competitive products from lignin. The pulp and paper industry has operated biorefinery process to produce cellulose as pulp, and utilize lignin as fuel. For the future, new technology will be developed to convert three components, cellulose, hemicellulose and lignin, into chemical materials with these natures. It could provide the industry with the chance to utilize it's forest resources and existed technologies.

DIP Technologies for Lower Grade Raw Material

— Keep Product Quality and Maximize System Efficiency & Yield —

Nobuhiko Okumura

Technical Department, Aikawa Iron Works Co., Ltd.

The trend on using more recycled paper in the domestic market has been desired for the fine paper category. It has been more and more difficult to obtain the high grade recycled paper due to a smaller distribution of the recycled paper caused by the decreasing paper consumptions, as well as the decreasing number of exporting the recycled paper to China.

With this background, there are more needs on using the low grade recycled paper based on the increase of using the recycled paper in the fine paper category, but the industry is facing some issues on the low yield rate by the prohibited materials, maintaining the product quality, and increasing the energy cost due to operating more facilities.

In this section we would like to introduce the technologies using the low grade recycled paper, which are [facilities for improving quality], [facilities for contributing to the system efficiency], and [facilities for contributing to the functional improve of the existing equipment], while giving you some examples based on our experiences.

China Opts for Modern Mechanical Pulping Andritz P-RC APMP

— What Can Europe & Japan Learn from This ? —

Tamio Fukuzawa

Andritz K.K.

Peter Brauer, Johann Grosalber and Heinrich Munster
Andritz AG

Over the past 5-6 years, China has doubled its paper production to almost 100 million t/a and is now the world's leading producer. In the same period, however, production of mechanical pulp has more than trebled, in spite of a chronic shortage of wood and energy prices at world market level. The main grades are chemi-mechanical high-yield pulps for printing and writing papers, board, and tissue, produced primarily using the P-RC APMP process with excellent energy efficiency. Here we present a range of state-of-the-art equipment and comprehensive consumption and operating data, including information on the latest waste water technology, such as integrated evaporation or anaerobic treatment.

Estimation of Merit by Installation of a Press in D₀ Bleaching Stage

Yan Ju
Pulp & Energy Projects, Valmet K.K.

Replacing an existing D₀ washer such as diffuser or drum washer by a wash press in an existing D₀-E_{OP}-D₁ bleaching plant, it is possible to operate a high dilution factor (D.F.) for D₀ wash press even if D.F. for D₁ washer is operated at a low number, and a large amount of the remaining D₁ filtrate can be used as the dilution liquor before D₀ reactor. In case study 2, by sending the remaining D₁ filtrate to D₀ filtrate tank as the traditional way, it can expect to reduce COD into D₀ reactor about 3.1 kg/ADt by which it estimates to reduce the consumption of chlorine dioxide approximately 0.5 a. Cl kg/ADt. In case study 3, by using the remaining D₁ filtrate for both the dilution liquor before D₀ reactor and the dilution liquor before D₀ washer, it can expect to reduce COD into D₀ reactor about 7.3 kg/ADt by which it estimates to reduce the consumption of chlorine dioxide approximately 1.8 a. Cl kg/ADt.

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 5: Paper, Economy and Culture in the History of Human Society**

Kiyoaki Iida

The fact that paper has been used for two thousand years means that people have appreciated

its value for so long time. At the same time, paper itself has been technologically developed to satisfy needs which followed the economic and cultural progress of society.

Historically, the amount of paper consumed has a positive relationship with the affluence of society that is represented by GDP as one of parameters. When society was stable and prosperous, new technology was invented to meet increasing demand of paper. The paper was invented by Ts'ai Lun in the age of Eastern Han when the dynasty was prospering. The bamboo pulp was developed in the age of Tang and Northern Song when the culture was at its best in the Chinese history. Italians impregnated paper with gelatin for book bonding when its society was flourishing at the Renaissance. Dutch invented Hollander beater and revolutionized beating operation in the 17th century when they were richest in Europe. England which was leading the industrial revolution invented paper machine in the 19th century.

These technological developments reduced price of paper which in turn stimulated printing technology, and printed matters became common in daily life. In Japan, Japanese paper (Washi) and wood block printing combined made it possible to publish various printed matters in Edo period. Paper was used as one of basic materials in everyday life as well.

Paper was also a useful tool for ruling in empires covering large territories like Chinese dynasties and the Mongolian Empire. Europe, on the other hand, developed typography. With paper produced with efficient productivity and letterpress printing which allowed low cost operation, printed matters became far more common and popular in Europe than anywhere else. This availability induced successive social revolutions like the Renaissance, the Reformation, the Enlightenment age, and the Industrial Revolution.

As Kremer wrote 100 years ago, blossom of mental activity made possible by paper started a new era of civilization.

Corporate Profile & Products Information (24)

Valmet K. K.

Valmet is the leading global developer and supplier of technologies, automation and services for the pulp, paper and energy industries. Our 12,000 professionals around the world work close to our customers and are committed to moving our customers' performance forward – every day. Valmet's vision is to become the global champion in serving its customers.

The company has over 200 years of industrial history and was reborn through the demerger of the pulp, paper and power businesses from Metso Group in December 2013. Valmet's net sales in 2014 were approximately EUR 2.5 billion. Valmet's head office is in Espoo, Finland and its shares are listed on the NASDAQ OMX Helsinki Ltd.

Valmet K. K. (former Metso Paper Japan) is established together with the birth of Valmet

Corporation in 2014. We are providing our technologies, equipment, spare parts and services to Japanese customers.

—Peer Reviewed—

Estimating of the Carbon Footprint (CFP) of Sanitary Paper

—A Case Study of Sanitary Paper Mill on Fuji City, Shizuoka Prefecture —

Takao Ando

Faculty of Risk and Crisis Management, Chiba Institute of Science

Masato Saito

Fuji industrial research institute of Shizuoka prefecture

Motoyuki Suzuki

Marukin paper company Co., Ltd.

Displaying carbon footprint (CFP) of manufactured articles for daily use is very important to “visualize” the environmental burden, especially life cycle CO₂ emission, from daily life. The goal of this study is to evoke people’s awareness to the environmental burden in daily life through the calculation of CFP from the sanitary paper, in particular sanitary paper, produced in Fuji city, Shizuoka prefecture.

Functional unit is applied to the CFP per 1 package consist of 6 sanitary papers with LDPE package. The life cycle stages in this study are classified into 5 stages, and CFP is calculated as the total amount of GHG emission from each processes.

The calculation result of CFP of 1 package of sanitary papers was 2,406.90 g-CO₂/package references to unacceptable product category rule (PCR) of “paper and paper board (PCR-025)”. The component ratio of each life cycle stages are: raw materials procurement stage 5.8%, production stage 75.8%, distribution and selling stage 13.7%, operation and maintenance stage 0%, disposal and recycling stage 4.7%. The most CO₂ is emitted from energy usage of the production stage, which accounts for 72.1% of the total CO₂ emission. Therefore, it is very important to choose the energy sources with the least environmental burden, e.c. renewable energy.

All sanitary paper mills discharged great deal of paper sludge (PS) from daily process. The CFP of sanitary paper is varies from the calculation conditions based on waste water treatment methods and PS treatment methods. Therefore, it is necessary to review the PCR for clarify the rules of wet end process, especially waste water and PS treating methods.

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History and State-of-the-Art Technology of Paper Machine Wet Section

Yukinori Takano

Paper Machine Eng. Dept., VOITH IHI Paper Technology Co., Ltd.

Many modern paper making machines for are based on the principle of the Fourdrinier Machine, which uses a specially woven plastic fabric mesh conveyor belt in the forming section. This Fourdrinier was invented by Louis Robert in 1799. This Fourdrinier Machine was one of the earliest of the industrial revolution era continuous manufacturing process. Previously paper had been made by hand, in individual sheets. The method of continuous production demonstrated by the paper machine influenced the development of continuous rolling iron and later steel and other continuous production process.

This paper describes the history, systematic classification, and state-of-the-art technology of Paper Machine Wet section, especially for graphic paper. There were some great innovations in the end of 20th century, such as ModuleJet dilution control system in headbox, NipcoFlex Shoe press technology in press section, for example. These made Paper Machines quite wider and faster, with higher paper quality. But, on the other hand, technology made by those who have gone before us in 200 years ago, were still useful in today' s paper making. This is quite interesting and we should still learn from our forerunners.

Development of Cover Materials for Press Roll and Shoe Press Belts

Hiroya Shimazaki and Takahisa Hikida

Products For Paper Industry & Laminate Div., YAMAUCHI CORP.

The press section of paper making machines are composed of roll presses and shoe presses.

We developed PU press roll cover quality "High-Top Roll" in 1963, first in the world, and have licensed this technologies to one of the biggest roll cover manufactures in overseas. Since then and up to now, we have been developing various types of cover qualities and have been keeping the top share in the markets by supplying those products to the customers mostly in Japan and Asia. With regard to the shoe press belt, we developed shoe press belt "YNB" in

1983, and now have grown up to have almost half of market share in Japan and have been increasing market share rapidly in Europe, Americas, Asia and other area all over the world.

The suction roll covers are required to have optimum surface design to improve its de-watering capability and stable bonding strength for longer life-time. Here, we would like to introduce the latest cover surface design and the new under layer to solve the above issues. Furthermore, we would like to introduce “High-Top” L-Series which has adapted totally new concept of bonding system.

For the shoe press belt, utilizing the polyurethane quality and processing technologies cultivated by “High-Top” roll cover, Super 95 series which we developed in 2009 has been well accepted by customers and has contributed to extend the belt life even under higher speed and linear pressure.

Here, we would like to introduce Super 93H series which is upgraded even from Super 95 series.

Operation Experience of the Amagasaki Mill Success Former Introduction

Hiroshi Okuda

Amagasaki Mill, Rengo Co., Ltd.

No.6 Paper machine (PM#6) in Amagasaki mill is producing liner board from 120 to 210 gsm with 2 layers. It was installed in 1969 as a corrugating medium machine and modified liner board machine, On Top Former, in 1979. In recent years, PM#6 has faced operation difficulty due to aging equipment such as adjustment of HB slice lip and it led to productivity and quality issue.

In order to solve those problems, PM#6 was modified new former, Success Former, and start its operation in Jan 2015. As a result, paper properties, sheet formation and strength, is improved by decreasing HB consistency from 1.1% to 0.7%. This report shows installation process and our operating experiences for PM#6 modification.

Introduction of New Technology from Allimand

— Allimand Hydraulic Head Box with Dilution Control S-IV Version —

Yosuke Suzuki

Itochu Machine Technos Corporation

Following the company rules of continuous improvement of Paper Making equipment, ALLIMAND has released the S- IV VERSION of the hydraulic head box with dilution control.

The S-IV VERSION, being more compact with simplified configuration, is leading to a cost effective design for the benefit of our customer.

The S-IV VERSION achieves the same hydraulic performances leading to excellent:

- 1) Formation
- 2) Basis Weight CD Profile
- 3) Individual monitoring of Fiber orientation and Basis Weight CD profile with even easier operation and access for cleaning.

It is suited to high speed machines and high quality requirements in all grades such as Printing & Writing, coated grades, packaging and container board grades, & specialty grades.

History and the Latest Trend of Forming Fabric

Akira Tajima and Hideyuki Yanai

Technical Development Dept. Nippon Filcon Co., Ltd.

Forming fabrics are used at the wet end of paper machines. The fabric has three distinct functions; ①to allow water of the pulp slurry to pass through its structure ②to promote the formation of uniform fiber mat ③to act as a conveyor belt transporting the sheet to the next phase (press section). Formation of the sheet is the most critical phase of paper making. Therefore, performance of the forming fabric has high importance. Recently, requirements for paper quality and productivity have increased in the papermaking industry. Such requirements have resulted in the larger and higher-speed paper machines. Responding to these recent paper industry demands, forming fabrics have evolved as well.

The first generation triple-layer fabrics had the hope of being an ideal design, yet they did not expand into the market rapidly. A flaw of these first generation triple layers was that their structural design properties allowed for easy internal wear. Second and the third generation triple-layer fabrics exhibited improvements, and have become a current mainstream design used on paper machines. Nippon Filcon has focused on developing its third generation, triple-layer fabrics called the SAKURA and FUJI series. These series, incorporating a unique design called WSB, have possibly the best resistance to internal wear on the market. Customers have observed stable operation while minimizing internal wear. Other value-added designs will be noted.

In this manuscript, we explain the history of forming fabric weave structures, from single layer to 3.5 layer fabrics, and their evolution alongside the advancement of paper machines. Finally, we shall give an overview of the FUJI series, our latest triple-layer design.

New Opportunity with Grade Conversion

— Achievement of Grade Conversion in Accordance with Market Demand —

Hidefumi Inoshita

Valmet K.K.

It is a well-known fact that the paper industry and paper markets are changing rapidly as the digital world changes everything around us. Papermakers are requested to produce proper paper grade to meet market demand.

New machine installation for quality improvement of some grades require time and costs. Grade conversion is recognized as the common way to solve, by modification of existing paper machine with new key components.

For grade conversion, papermakers need to study suitable type of papermaking line, necessary capacity to meet the market demand, improved properties, possibility to produce additional grade with existing machine and/or necessity to produce completely new grade.

Grade conversion has some cases like Paper to Board, Paper to Special, Paper to Paper. Especially the conversion in package grade is on rise.

Global market trend requires economical production of boards with higher efficiency and good qualities, resulting in lower basis weight grades, usage of economical raw materials, higher content of recycled furnish, higher machine speed operation and still the same requirement on board strength properties.

Valmet has developed advanced technologies for multi-Fourdrinier, hybrid and gap formers to manufacture various types of board grades.

The author introduces some of representative technologies in Valmet's advanced wet parts of board machines.

Case Study of Solving Issues by Optimized Spray Nozzles

Shoichi Shimose

Everloy Syhoji Co., Ltd.

Everloy is well known as a quality spray nozzle manufacturer in the world, especially, in the fields of industry like steel manufacturer, pulp & paper manufacturer, and waste incineration plant, and LCD manufacturer, and so on.

In the pulp & paper industry, various types of Everloy spray nozzles have been installed in

paper machines for years.

The functions of these spray nozzles are, for instance, washing, cooling, edge trimming, humidification, spraying of chemicals and water.

Recently, in the point of ecology, reduction of water consumption, water pressure, and electricity are quite important. Also, in the point of production quality, uniform spray of coating and cooling is necessary.

We, Everloy, are able to propose the best and the most appropriate solutions for the customer requests. Please contact Everloy.

Problems and Measures to Offensive Odor of Wastewater Treatment Facilities and Paper Making Processes

Hidenori Kojima

Kurita Water Industries Ltd.

In a papermill, a bad odor occurs in a wastewater treatment system and a papermaking process. Although the odor control chemicals are used for the measure against a bad odor, a more effective application is demanded. Moreover, some odor substances which occur in a papermill have serious influence for the trouble free operation and productivity of a factory. From such a viewpoint, optimize of the measure against a bad odor and the measure from which merits are obtained for a factory which is not a mere prevention of bad odor are introduced.

At a papermaking process, hydrogen sulfide generated in paper material slurry and diffuses at a storage tank or a machine, as this measure, application of odor control chemical which do not have bad influence in paper making process is effective, and this injection volume can optimize by ORP. Moreover, microbe control of paper material slurry by an inorganic biocide can prevent generating of bad odor, and it can improve the productivity of a factory, such as the amount-used cutbacks of papermaking agents. On the other hand, at a wastewater-treatment process, application of anaerobic inhibitor can remove the hydrogen sulfide in an activated sludge, and, it contributes to improvement of wastewater-treatment capability. Furthermore, the purifying equipment which improves corrosive environment can remove low concentration hydrogen sulfide which exists in a control room, and trouble of control units is prevented.

Corporate Profile & Products Information (25)

NISSIN KAGAKU KENKYUSYO CO., LTD..

Ever since the establishment in 1931, we Nissin Kagaku Kenkyusho Co., Ltd., have produced and supplied various kinds of chemicals. We tried hard to be a part as chemical assistants solving troubles at production sites.

It is our honor, as a forerunner in this field of research, to answer all kind demands of users. At the same time, we will create a novel value with users day by day.

We will try harder to open new aspects for producing chemicals.

—Peer Reviewed—

Novel Analysis Method for Pulp Furnish Using Tube Flow Fractionator (Part 2)

Moe Fukuoka, Hiroyoshi Suzuki, Toru Nakatani and Shisei Goto
NPi Research Laboratory, Nippon Paper Industries Co., Ltd.

The agglomeration and/or fixation behavior of hydrophobic colloidal substances (HCS) in deinked pulp (DIP) furnish was investigated by using a method combined with confocal laser scanning microscopy (CLSM) and a tube flow fractionator (TFF) in order to clarify the influence of wet-end chemicals. A solvatochromic fluoresce dye (SFD) was employed as a hydrophobic probe to visualize the HCS. The effect of wet-end chemicals addition into DIP furnish was evaluated. The furnish was classified into several fractions, as long fibers, short fibers, fines and colloidal materials by using the TFF, and the fluorescence of SFD attached onto HCS in each fraction was observed by CLSM. In the case of DIP without chemicals, the fluorescence was hardly observed in the fractions of long and short fibers, and a lot of fluorescence patches were confirmed in the fraction of colloidal materials. On the other hand, after the coagulant addition to DIP, the patches of fluorescence were observed on the surface of fibers and the amount of patches in colloidal fraction decreased significantly. It was thought that the addition of coagulant induced the attachment of HCS onto fiber surfaces without excess agglomeration of them. Consequently, this method combined with CLSM and TFF, visualized the distribution and behavior of HCS in pulp furnish. It can contribute to get more efficient and effective approach to select proper wet-end chemicals.

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Latest Technological Trend of Shoe Press Belt and Transfer Belt

Kazuyuki Shimizu

Technical Department, Ichikawa Co., Ltd.

From the time of the inception of our predecessor company, Tokyo Mofu Co., Ltd. in 1918 and throughout the early days of Ichikawa Woolen Textile Company, we have been accumulating unique technologies in the development of paper machine clothing that would help the press section of paper making process run more efficiently. Paper machine clothing used in the press section includes Press Felt, Shoe Press Belt and Transfer Belt. In Japan, we are the only manufacturer that is capable of developing, manufacturing and supplying all three product groups enabling us, as a press section specialist, to offer comprehensive solutions to optimize the operation of paper machine press sections.

In this issue, we present the latest technical trends in Shoe Press Belts of which we supplied our first product to the US market in 1982 as well as Transfer Belts with our first product installed in China in 2002.

Changes and Latest Rebuild Case of Forming Section for Paperboard Machine

Jun Kobayashi and Hideki Sano

Paper Machinery Engineering Dept., Kobayashi Engineering Works, Ltd.

The forming section of paperboard machine was developed and progressed from vat machine and fourdrinier machine. The typical formers progressed from vat machine are Ultra Former series and Success Former, Kobayashi's original brands. There are different 7 types of our models those are applicable for all kinds of paperboard production. We developed and supplied new types one after another in response to the market needs during the days and those models are contributing to the paper industry's improvement.

On the other hand, the twin wire type formers such as hybrid former and gap former were developed from fourdrinier machine. Twin wire former is the type sandwiches the headbox jet by 2 wires and dewaters, and this former accelerated the high speed operation and paper's high

quality.

This report introduces the history of vat and fourdrinier machine, besides recent rebuild experience of a board machine start-up this March.

New Approach for Wet End Operation and Optimization

Hiroshi Iwata, Akihito Nagano and Harry Ritter
IBS Japan Ltd. and IBS Paper Performance Group

The global paper market put new challenges into today's paper making. Low cost imports and high quality manufactures are competing with each other. Competitive manufacturing cost as well as high quality is essential to keep the paper machine profitable to stay in business.

IBS "iTABLE™" is the perfect solution with modern drainage technology on a paper machine to produce consideration in formation and paper strength improvement as well as remarkable results in energy consumption and chemical cost saving leading to an extremely short payback period of less than one year. The over forty "iTABLE™" are operating in the worldwide on single fourdrinier, ON-TOP former and multi-layer high quality paper machines. This paper describe the performance results on field operation of "iTABLE™"

"Fiber to Print" , Optimizing Paper Process

— Allimand Hydraulic Head Box with Dilution Control S-IV Version —

Jukka Nokelainen
Valmet Automation Inc.
Takeshi Sato
Valmet 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 a study case for estimation of final paper strength by using fibrlization measurement results from On-line Fiber Analyzer Valmet MAP.

The Latest Trend of Press Felt in 2015

—Correspondence to Trend of Papermaking Technology—

Norihiro Niibe

Research & Development Department, Nippon Felt Co., Ltd.

In recent years, the efficiency improvement of paper machine operation has been getting more important in paper industry than before. The improvement has been done, for example, by the increasing number of energy-saving operation, higher pressure loadings at press position, and a higher machine operation speed. As a paper machine clothing supplier, it is very important to respond quickly to these trends. Therefore, we continue to modernize our production facilities and to work on the development of press felts based on the theory of water removal at press section.

This report introduces you some of our new type felts, such as “Aquathlete” for newsprint and printing & writing paper grades, providing very good water removal at press nip, “Multipath concept” for paperboard grade, retaining thickness and water permeability very well, and “W-speeder” for tissue paper grade, sustaining very good dewatering capability throughout its service life.

Deposit Control Technology of Papermaking Process

Masanobu Hatano

Technical Department, Specialty Chemical Division,
RIKENGREEN CO., LTD.

Deposit is a difficult issue to deal with in the paper making process. One of the solutions for deposit is chemical treatment which has two different addition methods, surface treatment and internal treatment. Surface treatment is to spray the chemical in only contaminated place, e.g. wire or felt, to deal with the problem at there. Disperser or sticky control is one of the chemicals of internal treatment which can control any deposit throughout the process. Overall deposit control can be achieved by combination of above treatments.

I explain sticky pitch issues mainly in this article.

Practical Use of the Two Dimensional 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. The two dimensional on-line formation sensor enables to detect the transmission images of the running web and evaluate the sheet formation (formation index and flock shape) intermittently.

The on-line formation sensor was installed on the two newsprint paper machines which have worse sheet formation than others. The relationship between the information from the on-line formation sensor and the operating condition was analyzed. The sheet formation of one of two paper machines was improved by the optimization of dewatering condition on the former from the results of the analysis and achieved the target value within one week. Although the target value wasn't achieved only by the optimization of the dewatering condition about one other paper machine, we succeeded in achievement of the target value by the optimization of the furnish condition as well as the dewatering condition.

Voith QCS Tissue Solutions

—The Most Economical and Ecological QCS for the Tissue Industry—

Ryozo Shimizu

Control System Engineering Department, Voith IHI Paper Technology Co., Ltd.

For safety and cost reasons, a major objective of the paper industry has been to measure moisture and fiber weight without using radioactive beams. Using the Voith LSC TecoSens sensor this is now possible for tissue production.

Currently, online basis weight in tissue manufacturing is usually measured with radiometric basis weight sensors. Using radioactive beta rays, the basis weight of the tissue web is determined in units of g/m^2 . Although this technology has long been proven, paper manufacturers were nevertheless seeking a reliable alternative without radiometry.

With the Voith LSC TecoSens, an infrared optical sensor is now available for tissue manufacture that uses one unit to measure both the moisture and fiber weight. It measures these two physical measuring variables of the tissue web simultaneously using a modular sensor unit integrated into the quality control system. The measuring process used is based on infrared spectroscopic methods and is particularly suited to tissue manufacture which uses only fibers and no fillers. This method is superior to conventional radiometric measurement in both

ecological and economical terms.

“TecoSens” means Tissue Ecological and Economical Sensor.

iRoll, Intelligence Solves Many Problems

—Technology for Better Runnability and Nip Profiles —

Yoshiki Kabutoya

Valmet K.K.

Production efficiency, good paper profiles, reduced energy consumption and cost savings are common targets for all paper makers. Besides these, also providing the best possible customer satisfaction for end product users is crucial on today's demanding markets. iRoll product family aims at these goals and provides a solution for improving sheet quality, optimizing nip profiles and for assuring highest possible end product runnability. The intelligent iRoll product family is a complete set of tools for controlling paper tension and nip profiles. iRolls are can be utilized for all main processes and positions of paper machines. iRoll technology enables to improve production efficiency and product quality by assuring optimal runnability in all process phases. iRoll offers cost savings by improved nip profiles, parent roll hardness profiles and tension profiles as well as best possible product for printing and converting houses. This paper introduces the applications or intelligent roll technology in paper, board and tissue making and illustrates the benefits through example cases.

The History of Technological Developments of the Paper Industry in Japan

Part 1: Social Restoration that Demanded New Type of Paper

Kiyoaki Iida

After The Meiji Restoration, Japanese started to introduce social culture and system of western countries. One was letterpress printing which was less costly than traditional woodblock printing. Another was carton and paper container that efficiently distributed goods. At the beginning, western paper was imported for those uses as traditional washi paper was unsuitable. So, some pioneers tried to produce those papers by themselves. It took thirty years since a first paper machine was installed for the domestic paper industry to take off. Then, it increased its production at the rate of 10% per year. The growth was supported by demand by

printing industry which grew as much as or more than the paper industry. Carton industry, one more customer, also expanded along with the paper industry, though its size was 20% of the paper industry. Imported paper, on the other hand, remained almost at the same volume, and its share went down to 10% in 1930.

Thus, the paper industry monopolized the domestic market by competitively inventing a Japanese model of production, and became one of major industries in Japan. This report follows the history of technological developments of the industry. The part 2 will review the dawn of the industry.

Corporate Profile & Products Information (26)

IKARI SHODOKU CO., Ltd.

In late years many paper mills introduce a monitoring system and an investigation as a part of pest control management, but the performance itself often becomes the purpose. Even though a large amount of cost is spent on the investigation every year, a hygiene level and environmental improvement do not often advance as expected.

IKARI SHODOKU CO., Ltd. recommends "the environmental diagnosis investigation" as well as highly advanced monitoring investigation system so that pest measures and sanitary supervision can be carried out more effectively. The exclusive apparatus which conducts an environmental investigation is used to find out the weak point of the facilities structure in order to make it possible to increase the efficiency of sanitation improvement activities.

Since IKARI gives priority to the environmental protection, we advanced non-chemical pest control measures and developed a lot of original products such as "Clean Eco line GX". The realization of the effective and effective pest measures in the paper mill is enabled by combining an environmental improvement design with basics of monitoring data.

—Peer Reviewed—

Fiber Morphologies and Sheet Properties of Hardwood Thermomechanical Pulp

Yasuyuki Kamijo and Mitsuhiro Sugino

Nippon Paper Industries Co., Ltd.

Takanori Miyanishi

JAPAN TAPPI

Thermomechanical pulps were produced in a laboratory from various softwood and hardwood species by applying different chemical pretreatments to study fiber morphology and sheet properties. High-density hardwood chips produced mechanical pulp fibers with thick walls, which were hard to be collapsed in the sheet forming and resulted in bulky sheets. The Runkel ratio was a good parameter to characterize the cross sectional dimension of fibers and to predict the sheet bulkiness. The fibrillated fines increased fiber bonding of sheets while the flake-type fines improved the light- scattering coefficient. Wood species and chemical pretreatment conditions primarily determined the type of fines, which was characterized by the sedimentation velocity test.

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The Development of Cellulose Fiber Based Nonwoven Type Separator

Hiroo Kaji, Henji Hyodo, Makoto Kato, Toshihiro Shigematsu and Noriko Kasai
Tsukuba R&D Laboratory, Mitsubishi Paper Mills Limited

Lithium-ion batteries have been regarded as promising high energy storage devices for many electronic devices. At the same time, more improvement of Lithium-ion batteries is desired in safety and battery performance. We developed the nonwoven separator for lithium-ion batteries made from the mixture of cellulose fiber and PET fiber in order to satisfy the safety and high battery performance.

In the first study, we investigated how the fiber material of nonwoven separator affected on lithium-ion battery performance. There was a good relationship between the porosity of the separator and the battery performance. The nonwoven with a high porosity was a preferable separator for lithium-ion batteries. Cellulose fiber and PET fiber were available for making such a good separator.

In the next study, we found that the nonwoven separator with cellulose fiber had a superior performance to film type separator in heat resistance and the mixture of cellulose fiber and PET fiber made it possible to provide the excellent nonwoven separator with higher wet strength and lower moisture affinity.

Development of Modified Cellulose Nanofiber Reinforced Resin Material

Daisuke Kuroki and Takafumi Sekiguchi
New Business Development Division, Seiko PMC Corporation

It is well known that the so-called shish-kebab structure could be observed when polyethylene (PE) is crystalized under shear flow. This characteristic is applied to the manufacturing process of high strength PE fiber. In this presentation, we discuss the relationship between mechanical properties, the crystal orientation and the injection-molding conditions of the modified cellulose nanofiber (CNF) reinforced PE.

The modified CNF reinforced PE was injection-molded in various conditions, then, its

mechanical properties and crystal orientations were measured. Filling speed and cylinder temperature strongly influenced the mechanical properties and the crystal orientations of the composites.

Development of PVOH for Paper Application

Keisuke Morikawa, Ayumu Yamamoto and Shigeki Takada
Kuraray CO., LTD.

Poly (vinyl alcohol) (PVOH) is widely used as a paper strengthening agent, stabilizer and binder in the paper industry. PVOH also improves air permeability and grease resistance of paper because a good film forming property of PVOH decreases the paper porosity. This report will refer to the properties of the coated paper with an outstanding hydrophobic modified PVOH. The coated paper has better air resistance and higher water resistance compared to conventional PVOHs. Furthermore the reason for the good air resistance was investigated from the perspective of affinity between PVOHs and paper, surface tension of PVOH aqueous solution, and PVOH crystallinities. As a result, the PVOHs having the lower crystallinities provided the higher air resistance. The lower crystallinity should ease the shrinking degree on the drying process of PVOH aqueous solution and lead to a void-less film on the paper.

Impacts and Solutions of Starch on Activated Sludge Treatment

Takuji Yamamoto
Paper Chemical Business Division, Seiko PMC Co., Ltd.

Starch is considered one of the main factors in recent increase of drainage load.

In the stock preparation, the paper-making system, and the effluent treatment process, the metabolic activity of the microbes which utilize starch have great influence on the productivity of paper mills.

Starch is degraded by enzymatic activity of amylase, and metabolically converted to reserve substances or extracellular polysaccharides of activated sludge.

Accumulation of reserve substances bring about aggravation of the treated water quality due to the decrease in substrate removal speed of activated sludge, and superfluous generation of extracellular polysaccharides cause foaming and deteriorated sedimentation property.

In this report, we demonstrated that continuous use of starch in paper-making system, especially raw starch, greatly influence on activated sludge process.

So, we introduce the optimization of the paper making chemicals of a paper-making system

which raises the yield of starch and reduces drainage load, and the microbial preparation “MC series” which improves activated sludge ability.

It should be essential for paper manufacture industry, which aims at saving resources and cost, to take measure against starch load of the effluent treatment.

In this paper, analysis detailed about a paper-forming process is conducted, and the influence which increase of the drainage load by starch has to activated sludge processing, and its measure are introduced focusing on the example of a mill trial of microbial product MC-003.

Papermaking Process Cost Optimization Concepts & Mechanisms with XELOREX™

Christian Jehn-Rendu

BASF South East Asia Pte Ltd.

Minoru Yoshida

Hakuto Co., Ltd.

The paper and board industries have always focused on reducing total costs of operation by improving the paper machine runnability and paper formulation sustainability. Some of the key driving actions in this context involve the optimization of the wet end formulation and improving the production output of today’s paper and board machines. In our paper, we will present an overview of the BASF chemicals and application approaches to achieve these objectives. We will provide case studies on mill scale, to support and validate our concepts and mechanisms.

Plant Optimization with Control Loop Performance Monitoring

—Metso PlantTriage—

Tomoshi Kono

Metso Automation K.K.

In recent years the plant operation with the small number of people is enabled mainly by the advancement of DCS, and the staff is reduced as a part of rationalization and the labor saving. In addition, the succession of the operation know-how of the plant becomes difficult for a similar reason. On the other hand, with complicated advancement of the plant control, the workload on operators and maintenance people are increasing. In such situation, it will be difficult to pay more attention to facilities improvement / the optimization of the plant.

In this paper, I would like to introduce “Metso PlantTriage”, the software which monitors performance of plant controls 24-7-365 and discovers the root cause of process problems with the case example at the bleaching plant where we successfully reduced the chemical consumption.

The word “Triage” used in the product name is the process of determining the priority of patients' treatments based on the severity of their condition in disaster medical care. This rations patient treatment efficiently when resources are insufficient for all to be treated immediately. In “PlantTriage”, we apply technique of the “Triage” to prioritize the problems which were found by 24-7-365 monitoring to optimize the plant in few resources effectively.

Cyber Security for Industrial Control System

Shoichi Doi

Solution Service Business Headquarters, Yokogawa Electric Corporation

In recent years, sophisticated cyber-attacks that target factories and plants have increased even in production control systems. Due to such increases in threats and changes in the environment, the importance of security measures has become even more urgent. In fact, since 2010 damage caused by malware infection has increased significantly.

However, this does not mean that blindly introducing security technology will be sufficient. Unlike information systems in general, a stable, real-time operation on a 365 day/ 24 hour basis is essential considering the sophisticated environment of control systems.

YOKOGAWA group support has taken a holistic approach to security measures in which strategic defense-in-depth concepts are used to effectively evaluate potential risks, consider technical measures and continuously update the system's lifecycle. We believe improvements on a continuous basis are important during operation. Measures are necessary to assess and mitigate the risks identified within the control system and to be better prepared to recover the system in the case of an emergency.

In YOKOGAWA group, by investigating and researching conditions in which security measures are implemented in control systems and the practical use of the latest security technology, we are currently developing effective solutions and optimal measures for a variety of system configurations for different industries and applications. Over the lifecycle of the system, we are committed to providing the best possible solutions and services to ensure high reliability of systems and to provide customer-specific security measures so that stable operation can be maintained.

Maruishi-Bielomatik High Speed Sheeter CFS for 1 Web Cut

Masayuki Sakakibara
Maruishi Co., Ltd.

Maruishi has been signed a license agreement for Folio sheeters with bielomatik in Germany since 1989.

After that, bielomatik bought the section of sheeters from Jagenberg and established the new company bielomatik-Jagenberg GmbH. Maruishi newly signed a license agreement with bielomatik-Jagenberg GmbH in May of 2005, and has already delivered 4 machines in Japan.

In such a situation, on receipt of request for compact design sheeters, bielomatik-Jagenberg released CutMaster CFS105/CFS145 and Maruishi started selling the machine. The compact machine corresponds to minimal space requirements as compared with conventional machine without sacrificing a cutting speed.

As well as Pulp & Paper industry, it is possible to meet the needs of a wide range of customers.

We would like to introduce the advantages of this compact machine “CutMaster CFS105/CFS145” .

Development of Cladding Process of Water-Cooled Boiler Panel and Example of Some Characteristics in Actual Machine

Youichi Shiraishi and Yuuki Shimizu
Welding Alloys Japan Ltd.

In this paper, new maintenance method for cladding of water-cooled boiler panel is explained from viewpoints of safety and cost-effectiveness. This method comes from our basic maintenance philosophy which we call “Smart WeldingTM” for rebuilding. “Smart Welding” is registered trademark for rebuilding and means that every elemental technique concerned should be automated for speediness, safety and reliability.

Surface grinding and thickness measurement were herein automated with cladding process as new technological trial. It can be safely said that this maintenance method will be promising for cladding of worn-out surface of water-cooled boiler panel with some improvements. The cladding surface by this method is also shown in the actual machine (boiler) to be cost-effective in its characteristics, that is to say, corrosion resistance, erosion resistance and lifetime. From

this result, it can be proposed that this maintenance method will be applied to worn-out surface of such boilers as ultra-super-critical pressure boiler, bio-mass boiler, waste-burning boiler, recovery boiler *etc.*

The History of Technological Developments of the Paper Industry in Japan

Part 2: The Dawn of the Japanese Paper Industry

Kiyoaki Iida

In the latter half of the 19th century when the Meiji Restoration began, the paper industry in Europe and America had already put paper machine into practical use, and was developing a new technology of producing pulp from wood. Those technologies conjointly became a model of modern paper industry in the 20th century. When Japanese looked at paper mills in America dynamically manufacturing paper, they made up their minds to do it in Japan. But, things did not go well. After setbacks, they imported paper machines of medium size and manufactured paper with rags cooked in alkali under coaching of highly paid foreigners. The first one began operation in 1872. In a short period of time, Japanese learned know-how, dismissed them and amazingly made a copy of cylinder paper machine by themselves. The high ability of learning new things and a fairly good level of mechanical engineering in those days were a base for successive rapid progress.

Those who were credited at the dawn of the Japanese paper industry were young men who studied in foreign paper mills, such as Masanori Onodera and Ichiro Murata, and Joichiro Majima and Heizaburo Ohokawa who followed the formers. They were responsive to new technologies and introduced them positively to the industry, and their manner of diligence lasted throughout the pre-war period.

The next part will review the growth of the Japanese paper industry.

A Report on TAPPI PaperCon 2015

—April 19-22, 2015 at Atlanta, USA—

Yu Matsunaga

Ishinomaki Mill, Nippon Paper Industries Co., Ltd.

Shisei Goto

NPI Research Laboratory, Nippon Paper Industries Co., Ltd.

PaperCon 2015 was held in Atlanta, USA on April 19-22, 2015 hosted by TAPPI (Technical Association of Pulp and Paper Industry). This time was anniversary event of the foundation of TAPPI, so more than 2,500 people had registered. I report on summary and some topics.

Corporate Profile & Products Information (27)

MATSUBO Corporation

In 1949 our company was born as part of the commercial division of the Matsuzakaya Department Store, with a corporate philosophy of “contributing to society through the development of the Japanese industry sector by introducing excellent machinery, equipment, and new technologies from the West and other countries around the world”.

Our paper & pulp machinery business has been dedicated to supporting Japanese paper & pulp industry by providing advanced technologies from overseas since the foundation of the company. In addition to our import business, we recently launched a business to export Japanese excellent machinery to the overseas paper & pulp industry. We will continuously try to contribute to development of the Japanese and overseas paper & pulp industry by serving as a bridge for technology through the introduction of advanced technology to and from Japan.

—Peer Reviewed—

Analysis of Quartz Content in Paper Using X-ray Diffraction and X-ray Microanalyzer

Toshitatsu Takei, Kazuyuki Tachibana, Toru Yaeda and Fumihiko Shimizu

Material Analysis Center, Oji Holdings Co., Ltd.

A new method of analyzing printing plate wear, which combines X-ray diffraction and X-ray microanalyzer (XMA), was examined. When plate wear happened, the parallel incident X-ray beam method, which is one of the techniques of X-ray diffraction, was used to analyze small particles adhered to the blanket. As a result of the analysis, a small amount of talc ($3\text{MgO} \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$) was detected. However, it seemed that only X-ray diffraction was not enough to presume that talc was a causative material because the talc concomitantly contained small amounts of magnesite (MgCO_3), dolomite ($\text{CaMg}(\text{CO}_3)_2$), quartz (SiO_2) and chlorite ($(\text{Mg}, \text{Al})_6(\text{Si}, \text{Al})_4\text{O}_{10}(\text{OH})_8$). This analytical method was further improved by combining it with elemental mapping observation of Scanning electron microscope (SEM). Using this method, the

small amount of quartz in talc was found to be a factor in plate wear. Furthermore, the relationship between quartz content and plate wear in the experiment results matched previously known plate wear evaluation data. This new analytical method, which is a combination of X-ray diffraction and XMA, is a fast screening method that can detect up to 0.1 wt% quartz in samples.

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Key Points of ISO/ FDIS 14001:2015

— New Requirements and Smooth Shift to Revised Standard —

Tadao Iguchi

Japan Environmental Management Association for Industry

It is announced that ISO14001:2015 will be published on 16th, September, 2015.

In this paper I will explain the difference between ISO14001:2015 and ISO14001:2004.

Key points are "How to determine environmental aspects regarding organization's business risks and the needs and expectations of interested parties and "How to perform top management's readership. As existing Environmental Management System manual will be able to use at revised version (ISO14001:2015), the transfer to new Environmental Management System will be done with small burden than expected before.

The Wastewater Treatment Systems and Chemicals for the Reduction of the COD/BOD of the Papermaking Wastewater

—The“Bio-Attach”,“COD Cutter”that Degrades and Treats COD BOD —

Kenta Furusho

NIPPON STEEL & SUMIKIN Eco-Tech Corporation

The normal activated sludge method is widely used a wastewater treatment technology capable of advanced treatment at a low cost. However, the activated sludge method, by influent overload, water temperature fluctuations, and an insufficient air supply,would be lead to such problems as a sludge bulking and the water quality deteriorations. The amount of wastewater of the paper mills is quite large and the content of SS is also high. The "Bio-attack" system will solve problems mentioned above, because this system is a compact and a high-efficiency BOD processing system.

The “COD Cutter” is a bioactivating substance that was developed in order to improve the balance of microorganism groups in the aeration tank and prepare a proper environment for the mutual symbiosis of the complex microbial communities. Its effect is enhanced by maintaining

the diversity of complex microbial communities by supplying microorganism-activating substances.

This paper introduces a brief the “Bio-Attach”/“COD Cutter”, its usage, and usage examples.

Overview of Deodorizing Equipment and Deodorizer Technology

—Odor Control Will Be Settled in the Best Mix of Various Techniques—

Ken Nakatsuyama

Odor prevention Advisor, Japan Association on Odor Environment

Odor control technology is a very difficult technique unlike a prevention of various operation and air pollution technology in the chemical industry. This is because it must process a very low-concentrated blend shown by laws of Weber- Fefuner to a sense of smell level (the sense of smell threshold). These techniques were developed based on an existing technique about prevention of chemical industry and air pollution basically.

Offensive Odor Control Law constructed in 1972 (S47) became The driving force that a many Odor control technology was developed. However, all had good and bad points, and the performance that I expected was not often provided. Solution to bad smell pollution includes various approach, but it is the next pivot to be important.

- 1) Technique to control the radiation of the bad smell in the process (implant).
- 2) Investigation into ingredient causing the bad smell.
- 3) The choice and the binational of appropriate deodorization and deodorization device.
- 4) Investigation of construction maintenance cost and the environmental load.

The good Odor control technology will be provided from these technical Best mix.

Ozone Deodorization

— Fight Against Odour, Wastewater —

Mitsuharu Nakajima

Nagano Bio Co., Ltd.

Odour issues often are present and prevail within Old and New Establishment, despite most of them installed with various Waste Water Odour management products and equipment ... However, Ozone Technology from Nagano Bio has been proven to be most effective against Odour control which there are over 600 successful installations to date.

Applications where Ozone had been successful include Mushroom, Fish & Pig Farms, where Growth Rate along with Yield increased by 30% and Bacteria/Viruses eliminated. Key consideration for system adoption is Low Implementation Cost with Minimum Maintenance required.

Type of Ozone applications include:

Dry method with Ozone Gas - which is able to eliminate all airborne and surface bounded Bacteria/Viruses and able to reach all areas of the closed room or space applied. Wet method with Ozone Mist or Water - which is able to eliminate most of the common Bacteria-Viruses within 5 secs of contact.

Couple of key features and benefits of Ozone Solutions include:

- 1) It is available and generated on demand, therefore there is no need to keep any stocks and no worries about product expiry compared to Chemicals type options.
- 2) There is no secondary pollution generated and therefore no need of subsequent cleaning or removal of Ozone Air or Water, as it will revert back to Normal Air & Water after its main function.
- 3) It eliminates Bacteria and Virus with its strong Oxidation to break down the Cell Walls of the Bacteria and Viruses.

Included in the details are 2 installation references for Nagano Bio's 30 years of experience which includes

- The proper process to first understand the issue,
- The scientific way to measure and show results,
- Setting the expectation,
- Post installations follow-up & Maintenance

Ozone has been proven to be the most effective reducing levels of BOD, COD, VOC, SS, normal hexane, sludge and resulting in decolorized waste water.

Promotion of Energy Conservation Activities in a Paperboard Mill

Yuri Itou

Yashio Mill, Rengo Co., Ltd.

Following Rengo's environmental key word "Keihaku Tanshou", Rengo is engaged in manufacturing packaging products with more lighter, thinner and low CO2 emission qualities. While it starts with developing new containerboard products, making way to energy saving in manufacturing process and shipping, Rengo Yashio Mill has also been contributing to energy conservation by promoting development of new paperboard products, facility investment and grass root small group activities. The mill was awarded "Ministry of Economy Trade and

Industry Prize” by introducing its energy saving activities, which the details are described below.

Energy Saving Proposal on WW Process Utilizing Ultrasonic Monitoring & Coagulation Sensor

— Energy Saving & Environmental Load Reduction Using Devices —

Hisao Ooshimizu

Wastewater Treatment Section, Chemicals Division, Kurita Water Industries Ltd.

Energy saving on WW process draws increasing attention more and more along with stable operation.

In this writing, I would like to introduce some energy saving cases with our original products, Ultrasonic monitoring & Coagulation sensor.

And I'd introduce our cartridge type H₂S gas removal device which can make a contribution to stable operation and life extension of electrical equipment.

About Act on Rational Use and Proper Management of Fluorocarbons

— Thing that You Must Do as a Manager of the Apparatuses—

Tsutomu Osawa

Japan Association of Refrigeration and Air-Conditioning Contractors

The refrigeration and air conditioning equipment is used now in every place and becomes indispensableness supporting a comfortable living.

Whereas, Fluorocarbon has been used as a refrigerant of the refrigeration and air conditioning equipment, fluorocarbon was pointed out influence on ozone depletion.

Therefore we pushed forward reduction along Montreal Protocol in all the countries of the world, and planned the switch to HCFC alternatives.

However, as for the HCFC alternatives, movement of the regulation reinforcement of the HCFC alternatives begins because there is influence to give global warming more than several thousand times from several hundred times of carbon dioxide (CO₂).

In Japan, full-scale Fluorocarbons measures began because of the Fluorocarbons Recovery and Destruction Law was promulgated in June, 2001, and the law was revised in June 2006.

Because this law proved that there are many leaks of Fluorocarbon during the use of the

apparatus, large revision is performed in June, 2014 and changes the name the Act on Rational Use and Proper Management of Fluorocarbons is enforced from April, 2015.

This seminar's contents explain about "a standard of Re-filling" specified as an observance matter of the managers (owner) of the apparatuses by the process of conventional Fluorocarbon measures, and this time's newly amended point mainly on so-called "thing that you must do as a manager of the apparatuses".

Practice Point of Risk Communication

Shiro Kobayashi
Chemical Advisor

Under PRTR Law(Law concerning Pollutant Release and Transfer Register), targeted business operators are required to confirm the released/transferred amount of designated chemical substances, and report them to the government every year. Report data can be viewed by stakeholders such as local residents. Between the operators and stakeholders, the process of information exchange and mutual understanding of the published data is referred to as "Risk communication". In this presentation, a description will be given of the practice point to a smooth risk communication in the pulp and paper manufacturing industry.

The History of Technological Developments of the Paper Industry in Japan **Part 3: The Growth of the Japanese Paper Industry**

Kiyoaki Iida

In thirty years from the Meiji Restoration, the paper industry in Japan entered into its progressive era, benefiting from the efforts by pioneers and supported with a fair cultural level of mill workers. Paper machines of large size equipped with newest technologies were imported, instead of medium size ones at the beginning, in about ten year-delay from abroad. The new technologies were implanted on old paper machines. Several domestic machine builders also started their business, copying the imported ones at first. In 1916, they made more paper machines in number than the imported, though mostly cylinder machines, and the sum of their wire widths was larger than that of the imported. Ohshima Steel Works, among them, even supplied a newsprint machine of the largest size at that time. The active capacity expansion was to supply the demand increasing in printing and carton making. In other words, Japan itself was

rapidly expanding the economy.

Engineers most of whom were alumni of Tokyo Higher Technical School (a predecessor of Tokyo Institute of Technology) contributed to the expansion. They had chances to visit mills abroad while young and played important roles in introducing new technologies and also in mill operations.

Nishi, at his thirties, toured mills in the U.S. and Europe for 8 months in 1925, saw decline of France, stagnation in the U.K., recovery of Germany, growth in Sweden, wood shortage in the U.S. and newsprint production in Canada that was exported to the U.S.

He even said that it would be possible for Japan to compete to the U.S. and Canada economically by improving facility and technology.

Corporate Profile & Products Information (28)

HYMO CORPORATION

HYMO CORPORATION was established in 1961 and started as the production and sales company of the chemicals for waste water treatment. We developed the first Japanese synthetic polymer flocculent "HIMOLOC". Regarding the pulp and paper industry, the business started in 1966 by production and sales of the liquid type retention agent.

We have met various demands from customers in the field of waste water treatment, the sludge dewatering and the paper manufacturing with our functional polymer technology since the establishment of a business.

Particularly, our technology is appreciated worldwide regarding the original liquid type "Dispersion polymer". We provide our customers with the superior usage and know-how of our retention, drainage and fixing agents for the purpose of the improvement of the paper quality in the paper making process.

On the other hand, there are many relations with foreign companies. Recently, we entered into the non-exclusive distribution agreement of the paper chemicals with BASF and aim at new applications and the expansion of the market by the synergy effect with both chemicals.

In this article, we will introduce our corporate profile, our products, the technical trend and the recent development of paper chemicals.

—Peer Reviewed—

Properties of Fibers Prepared from Oil Palm Empty Fruit Bunch for Use as Corrugating

Medium and Fiberboard

Harsono, Lilik Tri Mulyantara, Andri Taufick Rizaluddin, Akiko Nakagawa-izumi and Hiroshi Ohi

Graduate School of Life and Environmental Sciences, University of Tsukuba

Keiichi Nakamata

Technical and Development Division, Hokuetsu Kishu Paper Co., Ltd.

This research was aimed at improving the utilization of waste generated by the palm oil industry by identifying the conditions needed to make fibers suitable for products such as paperboard and fiberboard from the empty fruit bunch (EFB) of oil palm (*Elaeis guineensis*). For this, the chemical pretreatment conditions needed to mechanically produce a pulp for paperboard were studied, as well as the effects of varying these conditions on the fiber properties. The optimum conditions to achieve the highest paper strength were found to be a NaOH dosage of 2 %, pretreatment time of 2 h at 121 °C and refiner disk-clearance of 0.10 mm. This EFB pulp exhibited similar tensile and tear indices to a pulp prepared from an old corrugated fiberboard box, and on the basis of this, it was considered acceptable for use in corrugating medium. Subsequent fabrication of fiberboard and clarification of its resistance to fungal attack found that the mechanical properties of EFB fiberboard made from unrefined fibers are lower than Japanese Industrial Standards; however, its resistance to brown-rot and white-rot fungus is better than that of board made from sugi (*Cryptomeria japonica*).