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The Backing Roll Auto-Sanding Device

Atsuo Murata

Robot and Environment Div., SERVOARM Co., Ltd.

Servoarm Co., Ltd. is an enterprising company that makes the best use of its long cultivated hydraulic and electronic control technology to develop truly useful and problem solving devices to meet the particular needs of the customers.

Among our many special purpose devices, The Backing Roll Auto-Sanding Device was nominated and won the most honorable award in the paper making industry, the "Sasaki Award".

This highly versatile device, not only cleans the contaminants off the backing roll during operation without stopping the line, it also polishes and grinds off scratches from the backing roll to keep its surface always clean.

Although there were many problems when cleaning the backing roll, by introducing The Backing Roll Auto-Sanding Device, the following effects and merits have been achieved:

Operators are protected from the dangers of cleaning the roll during operation.

Quality of paper is maintained due to the clean roll.

Productivity is improved by lessening downtime of the operation line.

Life span of the backing roll and the coating machine related parts and apparatus are increased.

Close collaboration with our customers is the key to new developments, and we at Servoarm continuously strive to develop new and useful devices to actively serve the paper making industry.

High performance Flotator for smaller ink particles removal, " MT - Flotator"

Naouki Iwasige

Voith IHI Paper Technology Co., Ltd.

Flotation is the most important process for increasing brightness, removing hydrophobic contaminants in Deinking system. Particularly, smaller ink particles have a big influence on brightness than bigger ones.

Since 1985, many new Technologies were applied for NDIP (News to News) to detach ink particles from fibers and therefore improve appearance of the paper. As an example there is the High consistency pulping, Serial Kneading/Dispersing, high consistency soaking and new type of Soap with strong penetration.

The result was that ink particles were made smaller and smaller during the detachment of the deinking process. Because of that deinking system requires the removal of smaller particles by innovative flotators.

In 1990, the MT-Flotator has been developed by Ishikawajima Heavy Industries (IHI), Ishikawajima Industrial Machinery (IIM) and was awarded the Sasaki's prize by Japan Tappi on 2005. Since 2001, Voith-IHI Paper Technology Co., Ltd. is the developing centre of MT-Flotator technology. This presentation picks up some of the advanced technologies of the MT-Flotator. Additional to that the new generation of MT II - Flotator is also introduced.

Improvement to Reduce the Industrial Waste Using New Ecological Packaging System "Rock'n Pop System" for PPC Paper Products

Hideo Akikawa and Koki Takeda

Nichinan Mill, Oji Paper Co., Ltd.

The stretched film are wrapped on the box of PPC to keep optimum stacking shape these boxes on a palette.

We developed new system "Rock'n Pop System" to reduce the Wrapping film using water-solved glue during each PPC box.

Therefore, we achieved to reduce the half of industrial waste.

Development of High-Quality Newsprint for Next Generation

Fuminari Nonomura

Nippon Paper Industries Co., Ltd.

High quality newsprint features high opacity in multi color printing and also serves not only to increase the satisfaction of newspaper readers but also to enhance the value of paper as an advertising media. As a part of its initiative to develop high quality newsprint Nippon Paper Industries has been taking several steps to employ neutralized paper manufacturing process in its mills since 1997. This led to the first manufacture of high quality newsprint at the Ishinomaki mill in 2003.

It is expected that by June 2006, all eight mills inside and outside of Japan will be able to supply high quality newsprint.

High quality newsprint apart from being manufactured under neutral conditions uses calcium carbonate as filler for enhanced opacity. Some of the advantages high quality newsprint offers in terms quality and eco friendliness are listed below:

- High opacity (Less show through)
- Lower emission of carbon dioxide
- Effective use of calcium carbonate originating from

The Experience of ECF Bleaching Plant Operation

Norimasa Miyake
Kishu Mill, Kishu Paper Co., Ltd.

Kishu mill, Kishu Paper fiber line was converted to ECF bleaching sequence in August 2004. This plant was introduced to the hot chlorine dioxide process (DUAL-D), and this bleaching sequence has D*-EP-D.

Also D*stage tower was adopted the gravity feed system (Difeed system) with the first installation in the world.

Bleached pulp qualities has mostly expectation, especially brightness reversion is very low level.

D* : hot chlorine dioxide stage

Development of Salt Tolerant Eucalyptus Globulus by Selection

Akira Murakami
Forestry Science Laboratory, Nippon Paper Co., Ltd.

Selection of Eucalyptus globulus trees, which were excellent in growth and tolerance to aridity, was performed in the Western Australia plantations of Nippon Paper Company. In order to confirm the inheritance of the selected trees in an early stage, the salt resistance and drought resistance of those were estimated by laboratory testing of the cultured tissue and the clonal plantlets. It revealed that some individuals could survive for a short term when the salt content reached the level of the seawater and the individuals had high drought resistance after watering was stopped. Trial plantations of the clones were started in Western Australia.

Present Situation and Future Prospects for the Establishment of JIS Pulp and Paper Test Standards

Takayuki Okayama
Tokyo University of Agriculture and Technology
Japan Tappi Pulp and Paper Testing Committee

Recent activities of Japan Pulp and Paper Testing Committee are described in this paper. Four or five JIS drafts have been newly established and revised each year. Most of JIS drafts have been conformed to ISO standards step by step since 1998, so that JIS would not be become a non-tariff barrier.

Recent JIS revisions are as follows. (1) Estimation of contraries, stickies and plastics of recycled pulps would be newly established in JIS pulp and paper test standards. (2) The diffuse reflectance method with the CIE illuminant C has been accepted in all optical determinations of JIS pulp and paper test standards. (3) The print-surf surface roughness has been standardized in 2004. Also the St?ckigt sizing method has been revised in 2004, although it is not established in ISO standards. (4) Some measurements with new technologies, such as determination of total chlorine and organically bound chlorine and fiber length measurement with automated optical analysis, would be prepared as JIS pulp and paper test standards.

This paper summarizes 17 recent standards of JIS published or to be published after 2004.

Development of On-line Fiber Orientation Sensor System (Dielectric Type)

— Approach to the Practical Use —

Hidetada Sawamoto and Shinichi Nagata
Advanced Technology Research Laboratory, Oji Paper Co., Ltd.
Noriaki Kurogi
Nichinan Mill, Oji Paper Co., Ltd.
Junichi Kanayama
Yonago Mill, Oji Paper Co., Ltd.
Yoshiteru Setoguchi
Oji Engineering Co., Ltd.

A newly developed on-line fiber orientation sensor was installed in a paper machine at Nichinan Mill, and its performance has been examined at a speed of 580-630 m/min. The accuracy of the measurement of the fiber orientation angle and orientation strength was quite satisfactory, when the data was compared to that obtained by conventional off-line SST and MOA measurements. An important factor that leads to stable and reliable data measurements is ensuring the uniform contact of the sensor-head with the surface of running paper. This was made possible by introducing a special air-driven mechanism to the sensor-head.

This sensor system was found to be capable of measuring basis weight and moisture content of the paper while operating as a fiber orientation sensor. The results of these extra measurements are also reported.

Microstructural analysis of pigment on IJ media surfaces

Yukino Yasuta
Research Center, Mitsubishi Paper Mills Limited

The pigmented colorants were observed by following methods.

1) Quantity of colorants on the surface: To evaluate quantity of colorants on the surface of coated layer, media were milled by FIB and ultra microtome. In comparison with ultra microtome, FIB remained colorants layer and micro porous structure in original state.

2) Surface roughness: Print gloss is related to surface roughness. Surface roughness of printed paper was observed by three different microscopic approaches (confocal microscope, 3D-SEM, AFM). Atomic force microscope is suitable method to measure the surface roughness.

Operational Experience of Paper Sludge Carbonizing Plant

Kazuaki Shimizu
Hokuetsu Paper Mills, Ltd.

The Nagaoka Mill of Hokuetsu Paper Mills, Ltd has been registered to ISO14001 since 1996, making the most of its location in a nature-rich area to be a modern factory that can contribute to the society and environment. Since then we have aimed at environmentally friendly paper-making. In that attempt we found the problem; the disposal of PS (paper sludge) which has high load-environment. As the countermeasure we installed the PS carbonizing plant in August, 2003, and it started to be in commercial operation in March, 2004 after a long period of the test operation.

This report shows the process of how we managed the problems that occurred during one year and three months of the commercial operation from its beginning to this June.

Operating Experience of Paper Sludge Incinerator

Minoru Fukuda, Hidenori Mochizuki and Hitoshi Kondo
Nippon Daishowa Paperboard Yoshinaga Co., Ltd.

Nippon Daishowa Paperboard Yoshinaga Co., Ltd. has been trying to establish to be urban natural resources recycle mill which make good use of good geographical conditions located near the Tokyo metropolitan area.

In Yoshinaga mill, New No.5 incinerator has been operated from December 2002 for the purpose of incinerating P.S. (paper sludge) and generating power for mills facilities. This incinerator has the maximum capacity of incinerating P.S. at 330 B.D. ton/d. The boiler generates 60t/h steam and the condensing turbine generator generates 10,300kW power.

This report describes the outline and operating experiences of the incinerator and power generating plant.

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Solutions for Deposit on Pre-Drying Part Producing Fine Paper at Kure Mill

Yoshihiko Hirata

Kure Mill, Oji Paper Co., Ltd.

No.5 Paper machine at Kure Mill, which has started operation as a fine paper machine in 1989,also now produces LWC paper in response to the market demands. Major trouble on Producing Fine paper comes from Spots. Spots originate from DIP for LWC.

This introduces Solutions for the Dirt from Pre-Drying Part

Recent Trend of Paper Chemicals for Surface Treatment

- Surface Sizing Agent Polymarone-E100 Series -

Tsuyoshi Haraguchi

Paper Chemicals Division, Arakawa Chemical Industries, Ltd.

Recently, the paper manufacturing companies in Japan have been increasing waste paper stock usage as a result of taking the environment and resources-preservation issues into consideration. Besides, the operation of paper machines and coaters at higher speed in order to reduce the production cost leads to the harder situation for the paper chemicals to show their efficiency. In fact, the retention of internal sizing agents and the effectiveness of surface sizing agents tend to decrease.

Under the circumstances, it is strongly noticed to make paper with higher qualities and wider versatilities using surface agents that can improve the surface quality of paper. At this time, we shall present our surface sizing agents, POLYMARON E-100 series, together with the latest technical tendency of the agents.

POLYMARON E-100 series show higher sizing effect compared with conventional surface sizing agents. Particularly when coated on neutralized papers, they show excellent sizing effect, writing quality and ink-jet printability. Moreover, they have excellent mechanical stability and less foaming property which is good for operation.

Trend of Shoe Calender

- Application for Bulky Sheet -

Setsuo Suzuki

Hiroshima R&D Center, Mitsubishi Heavy Industries, Ltd.

Recently better surface for high quality printing and bulky paper for saving pulp consumption are required in our market. Shoe Calender is applied for paper and paperboard to make bulky sheet. Long nip dwell time and low nip pressure are key factors to make bulky sheet. Uniform smoothness, high stiffness and better printability are further benefits of shoe calender.

MJ calender is applied the technology from shoe press, and meets above requirement. This paper introduces outline of MJ calender and shows data from the pilot trial and field.

Non Contacting Caliper Measurements (Laser Caliper Sensor)

Nakano, Reijiro

Sales Development Dept., Honeywell K.K.

Direct thickness measurements (also called "caliper" sensors) provide an actual thickness measurement of paper web. There are two methods used to provide this. The first is to measure the distance between two product contacting sensing "elements". The other is to assume the distance between two sensor heads is fixed and to measure the distance to each head from a product to their support. Of the two methods the first will typically provide the highest degree of accuracy and repeatability but needs to either physically touch the material to keep the sensing element at a fixed standoff distance. The contacting sensor sometimes causes the marking, damage and dirt spike problems to products especially for lightweight papers on high-speed machines and supercalender applications. Also the contacting head of Caliper sensor itself has abrasion and dirt build-up problems as a maintenance issue.

So the second method has been developed for a long time, but non contacting methods typically have accuracy problems as a scanning on-line sensor because of the assumed fixed head separation. Honeywell has solved this issue by physically compensating the separation in the two sensing heads and introduced the Non Contacting Laser Caliper. The method for looking at the distance of each sensing head to the sheet and assuming a fixed distance between the two sensing heads is using laser triangulation and Z sensors. This paper presents the new developed Honeywell NC Laser Caliper.

Optimization with Updating PM4 Paper Quality Measurement and Control System at Sendai Mill

Yoshiyuki Shimosu

Paper Making Department, Chuetsu Pulp & Paper Co., Ltd.

The paper manufactures in Japan have recently faced on necessity of manufacturing of a wide variety of products in small quantities, along with competition with the import paper and diverse needs of customer. Therefore, grade change on PM has been being on the rise and more controllability on PQS (Paper Quality and Control System) has been required for smaller loss on grade change.

In this article, the operational experience of latest PQS which was replaced on Sendai PM4 in 2004 is introduced.

Latest Tail Threading Technology

Hiroaki Tagashira

Metso-SHI Co., Ltd.

Paper machine production speed is getting faster, 1900 m/min for LWC, 1600 m/min for fine paper and 1500 m/min for board, and production per year is reached to several hundred thousand tons. In high speed machine, to reduce the loss caused by web break and grade change, and to urge the automation instead of experts, are very important things to improve the production efficient.

Metso Paper developed improved tail threading device with advanced vacuum conveyor technology, PressForce for press section, SingleForce and DoubleForce1 for dryer section and FoilForce1 for calendar section. These new tail threading devices shorten tail threading time compared to conventional systems, enhance both human and mechanical safety by eliminating rope accidents, increase production line efficiency and reduce unexpected production downtime.

COMPACT BLEACHING™

- Reduces Capital Intensity in the Bleach Plant -

Martin Ragnar

Kvaerner Pulping AB, Sweden

Kenji Umemura

Kvaerner Pulping KK, Project Department

The technology relating to the bleaching of pulp relates not only to the chemicals used in the bleaching sequence but also to the washers and how the bleaching system as a whole is designed. In this paper, a novel bleach plant system called Compact Bleaching™ is presented. This system represents a paradigm shift in the design of a bleach plant, as it addresses a number of hot topics. With a Compact Bleaching™ bleach plant it is possible to reduce the electrical energy consumption by some 25 %, to handle the pulp fibers more gently and to reduce the building volume by as much as 25-50 %.

The Corrosion Resistant Materials for the Paper Industry

Hideaki Kawamura and Michio Nishi,

KITZ Corp.

For the extension of the valve durability, KITZ has developed and manufactured high corrosion resistance valves such as super-duplex stainless castings and pure nickel castings and so on. On this paper we report on the effect on the corrosion resistance of the alloy elements and on the corrosion examination test results in the corrosion medium such as sulfuric acid, chlorine dioxide and ozone of used by the paper manufacture industry.

A Novel Insolubilizing System for Polyvinyl Alcohol (PVA)

Hiroaki Yokoi, Hideo Baraki and Kenji Nasu
SEIKO PMC CORPORATION, R&D Division

Recently, demands for efficient insolubilizing systems for polyvinyl alcohol (PVA) have been increased with market expansion of communications paper such as thermal paper. Various kinds of insolubilizing systems have been developed, but there are still problems to be solved, for example, insufficient performance, corrosion of thermal head in printer due to chloride ions. Thus, we have developed a novel insolubilizing system composed of carboxylated anionic PVA (A-PVA), polyamide-epichlorohydrin (PAE) and polyethyleneimine (PEI). Our novel system with insolubilizing agents called "PVA insolubilizer, CP series" has advantages of performance and reduction in chloride ion contents over A-PVA/PAE combination system.

First, performances of various systems with or without PAE/PEI were studied for different types of PVAs, using cast film from their solution. The results showed that A-PVA/PAE/PEI combination system has an excellent insolubility. Application to over-coated layer in thermal paper is also exemplified. Then, mechanism of insolubilization by the combination system is briefly discussed.

Development of New Agent for Ink Jet Paper

Kentaro Ono, Hideki Touda and Junji Kasai
ZEON CORPORATION, R&D Center, Elastomer & C5 Chemicals

Recently, the growth of Ink jet Paper industry is remarkable. That is because the quality of Ink Jet printing method has improved especially at personal use.

The coating layer of Ink Jet paper include a large amount of cationic resins compared with offset printing paper system. Because the cationic resins work as a receptor of anionic Ink jet reagent. The common SBR latexes have been used at Offset printing paper as a binder of coating layer. On the other hand, Polyvinyl alcohol (PVA) is the main binder polymer of Ink jet printing because normal SBR Latexes are modified by anionic surfactant, so it caused coagulation between anionic latex and cationic resin.

In this case PVA-g-Latexes are developed as using just PVA as protective colloid having stability against cationic chemicals. In this report the characteristics of PVA-g-Latex and application as a binder of Ink Jet coating layer are introduced.

Anaerobic Treatment of KP Evaporate Condensate

Hidetaka Taneda, Osamu Asada, Masahiro Murata, Yuko Iijima, Takahide Monma, Yutaka Nuruki and Isao Onodera
Nippon Paper Industries Co., Ltd.

Yufutsu mill of Nippon Paper Industries has started a long term trial on anaerobic treatment of the operational condensation from KP black liquor. In this trial, the effect of the condensation variation on the removal rate at this plant was observed. After several arrangements, this system will help the mill to decrease COD discharge and supply new energy resources without any cost increase.

On-line Hardness Measuring System for Paper Roll "On-line RQP"

Mitsuhiko Matsuda
Nomura Shoji Co., Ltd.

Uniformity in hardness of paper rolls is well known as one of important properties to avoid paper break and registering error during printing process where paper speed is increasing year by year. Therefore, to get accurate hardness profile on every paper roll is essential to establish a reliable quality management system.

In 2003, Tapio Technologies Oy, a laboratory equipment manufacturer in Finland launched a handheld Roll Quality Profiler, RQP, with which anybody can easily and quickly measure paper roll hardness profile on paper rolls.

Based on the advantage in design and experience in the handheld RQP, Tapio Technologies Oy has developed a new On-line Roll Quality Profiler, "On-line RQP", and Nomura Shoji Co., Ltd. has started sales of On-line RQP here in Japan.

A Report on 2005 TAPPI Engineering, Pulping and Environmental Conference

Akihiro Kakehi*1, Takuya Yamamoto*2 and Tadashi Kano*3

*1 Oji Paper Co., Ltd.

*2 Nippon Paper Industries Co., Ltd.

*3 Japan Technical Association of the Pulp and Paper Industry

2005 TAPPI Engineering, Pulping and Environmental Conference was held on August 28-31, 2005 in Philadelphia, PA. The number of registered participants was 457. Japanese participants were three people mentioned above. Seventy sessions were held during three days of August 29-31, six to nine of which were took place simultaneously. The number of presentations was about 180.

The Effects of Cationic Polymer Addition on Size Retention and Paper Sizing Performance in Rosin Emulsion Sizing

Yuko Okusa

Pulp & Paper Industry Section, Kurita Water Industries Ltd.

Various cationic polyacrylamides (C-PAM) were added to pulp slurries for fixing rosin emulsion size, and the polymer properties influencing size retention ratio and paper sizing performance were studied. C-PAM with a high cationic density improved the retention ratio of rosin size, although paper sizing performance was low compared with C-PAM having a low charge density. These results show that sizing performance is influenced by not only rosin size content in handsheets but also the properties of C-PAM co-added to pulp slurries.

When calcium carbonate filler and C-PAM with a high charge density were used, rosin emulsion size tended to adsorb on not only pulp fibers but also the filler. Both size retention and paper sizing performance were improved, when C-PAM was added after the rosin emulsion size addition to pulp slurries rather than the inverse addition sequence. Furthermore, the longer the duration time between rosin emulsion size and C-PAM additions was, the lower the size retention as well as the sizing degree of the rosin-sized paper were. These results suggest that C-PAM should be applied to pulp slurries after the addition of rosin emulsion size for achieving more efficient paper sizing performance.

Keywords:C-PAM, rosin emulsion, fixing agent, sizing degree, retention

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[プリント用ページ]
One Duty Support System
- We Find You Safely How -

Hiroshi Nakano
Toshiba Mitsubishi-electric industrial systems Co., Ltd.

The labor saving and making work a few operators are promoted in a recent process industry system for making to the conserve cost. Doing the work done by two or more operators alone increases so far, and how worker's safety is secured becomes a problem.

We Built One duty support system equipped with the life sensor jointly developed with AJINOMOTO Co., Inc. as the solution. We introduce one duty support system while appropriating the focus to the development of the life sensor.

Applying Today's PLC to Process Automation Systems

Jun Ueda
Mitsubishi Electric Corporation, Industrial Products Marketing Division,
Industrial Products Engineering Department

PLCs as a whole are widely used in the process automation industry. The process control industry has experienced a constant change, such as downsizing, reduced costs, and standardization, as the forefront for process control.

This article addresses the issues of how today's PLCs in its form are applied to process automation systems.

Application of PLC for PA and Future Evolution of PLC-based Process Controller

Masaki Namie
OMRON Corporation Analog Controller Division

Some users have utilized the PLC for PA since the first half of the 1980s; however, it started to be used broadly in late 1990's.

At the beginning, the PLC-based process controller was used for only small-scale batch plants. As the introduction records increases, the application of PLC-based process controller has expanded. The duplex controller system accelerated the application expansion and the PLC-based process controller is introduced for continuous operation plants, these days.

In this writing, I will introduce some concrete application cases of PLC-based process controller for PA, the evolution concept of Omron's PLC "Smart Platform", and the concept of PLC-based process controller "SMARTPROCESS".

The Most Suitable Management and Cost Reduction Measures of Air for Instruments

Susumu Murayama
Oji Paper Co., Ltd., KUSHIRO Mill

Enlargement of instrumentation machinery of 2000 loops was expected by large-scale construction from 1999. I accomplished consumption up of air for instrumentation with this without building more compressors.

We had promotion of further cost reduction measure after 2003 and I started a new action toward reduction of compressors. As a result, I realized reduction of annual electricity 2 million kWh, quantity of coolant 77 thousand metric ton and got a big energy saving effect.

This paper shows overviews of this action. At the same time, I introduce valve-positioner developed with SP DEVELOPMENT LABORATORY CO., LTD. toward vibration-proof structure and stability control, which played a big role of reducing air consumption.

About a Maintenance Effect of Instrumentation Equipment by Air Leak Check

Satoshi Muramatsu
Tech Tokai Co., Ltd.

Pulp & paper mill selected DCS instead of old controller system now, instrumentation equipment also became electronics type.

However, many pneumatic device still exist, such as a control valve, a field type controller, and an automatic guide.

This time, we will make a report on "Air leak check of pneumatic instruments" which was performed by Tech Tokai as a part of energy conservation activities for two years since April, 2003, from the view point of effects on preventive maintenance of pneumatic instrumentation apparatus.

Operational Record of Paper Sludge Carbonizing Plant with the Compact PLC Control System

Kinya Kanda

Hokuetsu Paper Mills, Ltd.

The PLC control system has replaced the DCS or the personal computer DCS in recent years. In this situation the Nagaoka Mill of Hokuetsu Paper Mills, Ltd applied the compact PLC control system to the paper sludge carbonizing plant that had started the test operation since July, 2003.

This plant was the first one for the maker. We applied the PLC control system to this plant, because we could change the sequence and the control easily.

It was the first time for us to install the PLC control system. This report shows the process of installation and the engineering. Especially we designed the part of the engineering by our selves from the first time. Therefore we had a lot of trouble with the interface between the ladder sequence and the control loop, the interface between PLC and HMI in comparison with the DCS. This report also shows the above trouble.

Foundation Fieldbus System Construction by a PC Method

Hiroyuki Nonomura

Yufutsu Mill, Nippon Paper Industries Co., Ltd.

It aimed at "Establishment of the Fieldbus that everyone was able to treat at a low price" last year in July, and it set it up in the new establishment plant of draining the anaerobic equipment by the composition "General-purpose personal computer + Ethernet + Linking Device + Field equipment " without the adoption case at all at that time. It reports on the development in the obtained finding and the future, because it was possible to be in normal operation.

It is Quickly for Investigate the Cause the Trouble by PLC's Monitor

Kouetu Narita

Nippon Daishowa Paperboard Tohoku Co., Ltd.

In 1992, NDBTohoku introduced the Voith shoe press due to raise dehydration up at press part for the first time in Japan. This press was remodel from import facility, and the control logic had not established. Therefore we constructed the control logic with manufacturer (IHI).

But, we complained about analyze the factor of sequence delay, because of complicate systems and less operation experience.

For speed up of the failure factor analysis, we observed this shoe press control logic in 2003, using by PLC observation monitor.

Supervisory Improvement by DCS-PLC Integration

Hidekazu Morimoto

Mishima Mill, Daio Paper Corporation

We have renewed the DCS and PLCs for our LKP bleaching & washing plant which has been running since 1984.

Latest models of DCS have the ability to communicate with PLCs of various vendors in high speed owing to protocols adopted.

We have integrated the DCS with the PLCs aiming not only operational improvement, but plant diagnoses through PLCs internal data access availability.

Introduction of PLC Instrumentation and Application Example

Hiroshi Omura
Ohnest Co., Ltd.

In the field of process instrumentation and control field, EI integrated functionality and excelled cost per performance furnished "PLC instrumentation system" has been expanding the application field where mid to small DCS traditionally has been serving.

It is expected that PLC instrumentation system could be deployed rapidly for environmental satellite control such as utility/waste water control and monitoring particularly in pulp and paper factories.

We have developed the pH control system to overcome non linear process characteristics by adding fuzzy control function as an advanced control to PLC instrumentation system and applying continuous flow pump for the actuator.

We expect that these technologies could be utilized as key for the environment monitoring/waste water processing system, which are expected to be replaced actively hereafter.

Toward Optimization/High Promotion of Efficiency of Control Valve Maintenance

- Control Valve Maintenance Support System "Valstaff" -

Minoru Fukuda
Marketing Department, Advanced Automation Company, Yamatake Corporation

Since the operation of control valve has direct influence on a process, control valve maintenance has the very important role same with turn apparatuses such as a pump, a turbine, a compressor. The control valve maintenance is dependent on experience of an expert. Since the expert's age is high, if technical succession is not carried out to the next generation, a possibility that a plant will become unusual will become high. Therefore, the following is needed, additional data for determining the optimal maintenance cycle of control valve, the tool for performing a prompt action when a plant becomes unusual, and the diagnosis system which can detect failure of control valve before the abnormalities of a plant occur.

In this report, Control Valve Maintenance Support System "Valstaff" developed in our company for optimization and high promotion of efficiency of control valve maintenance is proposed.

Performance Improvement of Consistency Profile Control by the Latest CD Adaptive Control

Hironobu Maruno and Takashi Sasaki
P&W Solution Dept., Industrial Automation Systems Business Division,
Yokogawa Electric Corporation

In this paper, we introduce the concept of consistency profile control in B/M9000CS. It is composed of mainly the following four parts. 1) Virtual actuator corresponding optimizing control. 2) Model predictive control. 3) Auto tuning tool. 4) CD adaptive control. Especially, CD adaptive control has succeeded to realize world first fully automated identification of mapping. CD adaptive control constantly and automatically executes analysis and adjustment of mapping during profile control.

Water Vapor Transmission Behavior through Porous and Dense Enthalpy Exchange Sheets Treated with CaCl₂, LiCl and Colloidal Silica

Bong-Yeol Yeom and Byoung-Ryul Min
Department of chemical engineering, Yonsei University, Seoul, Korea

This report is concerning the sheet to be utilized to the air-to-air heat exchanger. Observation on the characters of the moisture permeation for two types of the enthalpy sheet (porous and dense enthalpy sheets) has been conducted. To improve the efficiency of the moisture permeation through the enthalpy sheet, the moisture absorbents CaCl₂, LiCl and colloidal silica have been used. Throughout the wet cup test according to the ASTM standards, the tests of the moisture permeation according to the changes of the air gap have been conducted. For both of the porous and dense enthalpy sheets, it showed 2 to 2.5 times of increase for the permeability of water vapor when the air gap reduced from 13 mm to 6 mm. Also, according to the treatment of the moisture absorbent, the permeability of water vapor increased, but after the certain amount of the processing no further increase of the permeability was shown. For the dense enthalpy sheet compared with the porous enthalpy sheet, it showed more increase of permeability of water vapor due to the moisture absorbent and also it was seen that the dense enthalpy sheet has the similar permeability of water vapor to the porous enthalpy sheet's when processing the moisture absorbent.

Keywords: air-to-air heat exchanger, enthalpy sheet, wet cup test, air gap, permeability, moisture absorbent

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Clonal Plantation of Eucalyptus globulus

- Selection of Plus Trees and Trial Plantation -

Kazuya Ito

Forestry Research Institute, Research & Development Division, Oji Paper Co., Ltd.

Oji Paper has established over 135,000ha of hardwood plantation overseas to secure its own resources in accordance with environmental conservation. Forestry Research Institute has established its branches in July 2002 in Australia where there are four plantation projects, to improve their productivity of hardwood plantation sites mainly by pursuing clonal forestation with plus trees. Firstly, candidates of the plus tree were selected by growth characteristics (height, diameter, stem form and so on) from several plantation sites where there are much difference in rain fall and edaphic condition. It is very important to improve not only growth but also wood quality from the view point of increasing pulp quantity produced from a unit area of plantation. Therefore, analysis of wood quality has been carried out to get plus trees with superior wood quality as well as growth. It was clearly shown that there were great differences of basic density among selected trees with better performance of growth. Trial plantation has been established at two sites in August 2004 using plus trees with better performance of growth and wood quality to study environmental variation.

The Latest Energy Saving Process for Secondly Fiber Treatment

- The Energy Saving Possibility with Newly Developed Technology -

Kazumi Fujita

Aikawa Iron Works Co., Ltd.

The Pulping, the Screening, and the Refining section. These three sections need especially big energy consumption in a secondly-fiber treating process. Aikawa Iron Works developed new facilities in these three sections which would be keys for global energy-saving needs. In this paper, we would like to explain these new facilities & system and introduce the energy-saving possibility.

New Modified Starch for Surface Size Press

Tetsuya Murayama

Research and Development Laboratory, Oji Cornstarch Co., Ltd.

The characterizations of new modified starches for surface size press were indicated in this report. The starches named GRS series were decrease of retrogradation, and sizing degree of paper coated with GRS series was become higher than with oxidized starch.

As a result, size pressed paper with GRS series improved surface strength of paper.

Removing Paper Machine Bottlenecks with Targeted Rebuilds

- Recent Topics for Rebuilds of Headbox, Former and Press Sections -

Hidehiko Yamazaki

Metso SHI Co., Ltd.

Rebuilding an existing paper machine is often a very profitable way for papermakers to increase the cash flow created by an older paper machine. Metso Paper has placed particular emphasis in recent years on developing concepts and products specifically for rebuild needs. The outcome of this work can now be seen as a wide selection of products offering quite possibly the best coverage of all time of specific improvement targets. Different needs can be addressed through truly different solutions. Selecting the best-fit alternatives will offer great upgrade options for all paper machines and paper grades.

Metso Paper's long experience with high-speed paper machines has been put to good use to create more cost-effective small and mid-sized solutions with the reliability and quality of bigger and faster paper machines.

In this paper, some of the most interesting and latest configurations available today for rebuilds of wet part area, especially headbox, former and press sections are discussed.

The Advanced Effluent Treatment System in Paper Mill

- Introduce of WSR Subsystem -

Takayuki Suzuki and Junichi Miura

Voith IHI Paper Technology Co., Ltd.

To achieve an optimal process performance 3 key elements are vital: First, the proper arrangement of water loops, Second, the removal of ash and colloidal contaminants (e.g. micro stickies). Third, an up-to-date reject handling system for effective preparation of rejects and residuals for incineration (for landfill) in order to meet the standard environmental interface for a modern plant. We can provide you with specifically engineered integrated subsystem for Water, Sludge and Reject-handling from a single source, customized to meet your needs as an upgrade or for a new paper mill.

In this time, we introduce Water, Sludge, and Reject system and unique machines.

System of Wet-end Chemicals for Neutral Papermaking

Noriyuki Okada

Sales/Paper Chemicals, BASF Japan Ltd.

Neutral papermaking tends to increase. Increase of pH involves adverse affects such as drop of size degree, increment of foam in white-water or increase of pitch problem. Therefore, existing chemicals for acid papermaking must be reviewed to redesign optimized system of wet-end chemicals for neutral papermaking.

Innovative wet-end sizing agent "PMD", originative retention / drainage system and effective fixation system are introduced for neutral papermaking in this report.

Design of Internal and Surface Sizing Agent Corresponding to Various Papermaking Conditions

Hiroshi Nakagawa

Paper Chemicals Division, Arakawa Chemical Industries, Ltd.

In the paper industry recent years, it advances toward the direction where use of recycled paper increases from the resource conservation and the rise of the concern to the environment.

Recently, it is thought that a decrease in the quality of recycled paper used for domestic consumption is advanced from the thing that the recycled paper export ratio to foreign countries has risen.

On the other hand, the amount of water used for papermaking is also advanced to go more closed from the environmental burden and the cost side. As a result, the development of the chemicals that demonstrates an excellent effect for such a change is demanded from the thing that is the environment that the chemicals for the extraction paper of the rise of white water electric conductivity and an increase of the number of anion impurities, etc. doesn't demonstrate the effect easily.

Surface sizing agent performance is controlled by the effect of sizing of so on the internal sizing agent is understood, moreover, it is pointed out to cause the problem (It bubbles, and dirt) in operation etc. in the surface sizing though the effect corresponded to the defect by increasing the amount of use.

In this lecture, the influence of the effect on internal and surface sizing agent and the design for sizing agent correspond to these changes are described.

Development of Cationic Colloidal Silica Treated with Amino-functional Silane for Ink Jet Paper

Mitsuru Ishii, Toshio Kakui, Masao Ishiguro and Sayaka Sato

Chemicals Research Laboratories, Lion Corporation

Colloidal silica is well known as nano-particle, which is used for the photo like paper for ink jet printing. Cationic colloidal silica having positive ζ -potential was obtained by treating the anionic colloidal silica with the amino-functional silane. By using three types of colloidal silicas, anionic colloidal silica and cationic colloidal silicas with the amino-functional silane and aluminium oxide, the performance of them for ink jet paper was investigated. In particular, the pigment inks did not run on the paper coated with the cationic colloidal silica having the amino-functional silane. It seems that the pigment ink having negative ζ -potential strongly adsorbs on the cationic colloidal silica by electrostatic interaction.

A Study on Print Gloss of Double Coating

Yoshihiko Hattori, Hiroshi Nakamori and Noriko Kitamura
Latex Research Center NIPPON A&L

In our previous paper we found out the porosity of under coating affected the formation of top coating and consequently had some influence on the print quality of double coated paper. This time further investigation was done to clarify the mechanism of print gloss development and ink setting property of double coated paper.

The behavior of ink vehicle was studied and it was found that vehicle of the ink printed on double coated paper penetrated into under coating through top coating, i.e. the ink holdout of under coating directly affected the ink setting property of double coated paper. On the other hand the print gloss of double coated paper increased with the smoothness of coating surface.

Based on these results, optimal coating design of double coated paper, which provides high print gloss and good ink setting property, was discussed.

A Summary and Operation Experience of Biomass-boiler in Nakoso Mill

Katsuya Furukawa
Nippon Paper Industries Co., Ltd.

The energy supply facilities of this factory were a heavy oil boiler and diesel generation facilities conventionally. They depended on fossil energy. From the viewpoint of reduction of an energy cost and discharge hold-down of CO₂, We planned switch to biomass energy. We started driving of a biomass boiler in September, 2004.

For this factory, there was not the operation experience of a boiler turbine set. Furthermore, we were inexperienced for a main boiler of the factory which assumed a small piece of wood fuel. However, we were able to operate facilities by cooperation of an operator and a plant maker on schedule.

Fuel of this biomass boiler is a small piece of wood and coal, but now uses only a small piece of wood. In addition, an original purpose is achieved by operation of a biomass boiler and now operates it without a problem.

Reports on the 6th Pira International Sizing Conference and the Chemical Engineering Laboratory of Complutense University of Madrid

Tomohisa Gondo
Oji Paper Co., Ltd.
Akira Isogai
The University of Tokyo

The 6th Pira International Sizing Conference was held on December 12-14, 2005, in Madrid, Spain. The conference had nineteen papers concerning internal and surface sizing and about 100 participants. Five presentations were from Universities, one was from partly governmental institute, and others were from chemical and paper industries. After the conference, the authors had a chance to visit laboratories of Professors Blanco and Negro, Chemical Engineering, Complutense University of Madrid. The outline of the Pira Conference and the professors' laboratories are then introduced in this paper.

Report of the International Chemical Congress of Pacific Basin Societies (PACIFICHEM 2005)

Gyosuke Meshitsuka

The University of Tokyo

Pacificchem 2005 was held in Hawaii, USA from December 15 to 21, 2005 and more than 11000 scientists including 5600 from Japan participated from Pan-pacific countries. Among 223 sessions organized during the conference, at least 5 sessions were related to the chemistry of biomass resources and plant organic polymers. At the Session of "Materials, Chemicals and Energy from Forest Biomass", 62 papers including 19 poster papers were presented.

Effect of Harvesting Time and Stem Height Position on Kenaf Bast Pulp Yield, Viscosity and Fiber Length

Wiwin Suwinarti and Kazuhiko Sameshima
Kochi University, Faculty of Agriculture

Kenaf variety Tainung-2 and Everglades-41 were planted in May 2003 and harvested at 80, 116 and 153 days after seeding. Kenaf bast fiber was treated by sequence treatments of ammonium oxalate, sodium hydroxide and acidic sodium chlorite (A) and acidic sodium chlorite, ammonium oxalate and sodium hydroxide (B). The agronomic characteristics, pulp yield, viscosity and fiber length were measured. The result showed pulp yield, viscosity and fiber length was affected by harvesting time. The pulp of 153 days after seeding gave much higher pulp yield and viscosity but shorter fiber length than those of 80 and 116 days after seeding. The higher stem position has lower pulp yield and viscosity but longer fiber length. This study also confirmed that the method A is the best method for high viscosity bast pulp production while the method B is the best method for fiber length preservation and higher pulp yield.

Keywords: Kenaf bast fiber, harvesting time, stem height position, pulp yield, viscosity, fiber length.

Elastic Stress Analysis for Case (Square Tubular Panel) of Corrugated Fiber Board Box Shape under Uniform Compression at Center in Upper and Lower Edges

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Guest Professor, Research Center of District Corporation, Ehime University
Shigeo Matsushima
Professor Emeritus, Ehime University

An elastic stress formulation was expressed for the square tubular case (CFBS: anisotropic panel) of the corrugated fiber board box shape (width L , height h) under uniform compression p_0 at centers in upper and lower edges. Then from this formulation the stress analysis is performed, and maximum values (x_{max} , y_{max} , $x_{y_{max}}$, 1_{min} and 1_{max}) for normal stresses x and y to width and height directions and shear stress xy , principal stress 1 and principal shear stress 1 were obtained and characteristic behaviors for x_{max} , y_{max} , $x_{y_{max}}$, 1_{min} and 1_{max} were discussed.

Rates of values x and y for the anisotropic case to the isotropic are about $x y E_x / E_y$ and $y_{min} / (y_{min} - x_{min})$ respectively. E_x and E_y are elongational elastic module in width and height directions and xy is Poisson's ratio (strain effect for height direction normal strain to width direction normal strain). Positions of y_{min} and 1_{min} are in the loading range of upper and lower edges and are independent of the case shape change, and $x_{y_{max}}$ and 1_{max} change as be at positions of distance $L/2 \pm \Delta x$ from corners in upper and lower edges with increases of L and the loading range.

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An Inside Power-plant for the Purpose of Saving Energy and CO2 Reduction

Shigeaki Obayashi

The First Energy Service Company, Limited

The Kyoto Protocol, an international and legally binding agreement on gases emissions has entered into force on 16 February 2005. To meet this protocol, Japan has to step up in a new phase for CO2 reduction. On the other hand, the law of saving energy, which was established by METI (Ministry of Economy, Trade and Industry), has been revised several times in order to tighten up the original. So the private sector has been requested more efforts for saving energy.

Recently, crude-oil price has risen more than twice as compared with that of two years ago, and also has set the record of 70 US dollars per barrel last summer. Under these circumstances, it is seriously required an introduction of more effective plant system or less fuel consumption plant.

In this paper, we explain the recent engine for the power generation in the use of an inside power plant, and aim to give some suggestions for saving energy, reducing CO2 and also saving cost. Also we briefly explain the ESCO (Energy Service Company) which is recently adopted in many companies as a way of introducing plant system for saving energy.

Energy Saving by Introduction of the Gas Turbine Cogeneration System

Hiroshi Nagata

Kanzaki Mill, Oji Paper Co., Ltd.

Located in the city of Amagasaki, Hyogo Prefecture, where the Kanzaki river a tributary stream of the Yodo river, the source of which is Lake Biwa-flows into the Osaka bay, the Kanzaki mill is an urban-style mill in the Kei-han-shin metropolitan area. The mill has 25 million population in its background. The mill started the production of coated paper in 1922. The coating technology has been handed down to us through the mill's long history. Since then, it has undergone various changes, the mill is well known as a mill manufacturing various processed paper by the communication paper.

Here, in Amagasaki, as same as in other industrial arrears in Japan, we must positively make efforts to solve the problems in order to meet more severe environmental standards on air and water pollution, legislated by Amagasaki city and Hyogo prefecture.

Since the mill introduced gas turbine cogeneration system instead of conventional and gas boiler and steam turbine generating system in September 2003, we introduce the way and result of energy saving by taking this system as a case.

Energy Saving in the Bleaching Plant

- Steam Saving Examples by Raising the Temperature of Hot Water -

Tomomi Inaba

Nippon Daishowa Paperboard Yoshinaga Co., Ltd.

Nippon Daishowa Paperboard Yoshinaga Co., Ltd. has been trying to expand the use of recycled paper with taking advantage of a good location near the Tokyo metropolitan area.

New No.5 incinerator has been operated from December 2002 for the purpose of incinerating paper sludge and generating power for mills facilities. But a consumption of fuel oil has been continued at a high level, then we have lost significant earnings as a result of a sharp oil price increase in recent years, we have felt a strong need for energy saving.

No.1 bleaching plant is located apart from the cooking plant and the chemical recovery plant, so it can not use the heat from black liquor. For the reason, it consumes the large amounts of steam.

This report describes steam saving examples by raising the temperature of hot water with using the heat of absorbent in No.5 incinerator desulfurization equipment.

Energy Saving with ID-Screen

Hirotsada Tsukakoshi

Nayoro Mill, Oji Paperboard Co., Ltd.

We have pulper, screen, a process of refiner in raw materials process producing wastepulp from wastepaper as facilities using particularly big energy.

In paper manufacture industry of energy many consumption model, it is a point to be connected directly with cost reduction to promote energy saving positively.

I introduce ID technology of Aikawa Iron Works Co., Ltd. into existing screen this time and I remodel it into dilution white water injection model screen (ID screen) and introduce the example that wrestled to power-saving

CO2 Reduction by Remodeling the Existing Boiler to the Gas Firing

Takao Koide

Power Plant Service Center, Mitsubishi Heavy Industries Limited

KYOTO protocol has taken effect since February 2005 and Japanese government requests industries to reduce 8.6% of CO2 emission in 2010 compare to 1990 as the aim. Addition to that, fuel oil price is getting higher recently, because of high crude oil price.

As a result, the company which has oil firing boiler has to study the reduction of CO2 emission and fuel oil cost for boilers.

Therefore, MHI suggests the remodeling the oil firing boiler to the gas firing for the reduction of CO2 emission and fuel oil cost simultaneously.

In this thesis, general and example of gas firing modification are introduced. And also, finance lease of safe light base for gas supply instead of gas pipe line, which MHI will provide, is introduced.

Energy Saving by Installation of Boiler Exhaust Gas Heat Recovery System

Satoshi Takai

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

In late year, as the issues concerning Environment and Energy are taken close-up globally, the measures to meet them became the urgent business. Then so-called Kyoto Protocol was taken effect as an anti-global warming measure in February, 2005. Reduction of the carbon dioxide discharge was fixed against Japan based on it. Japan Paper Association fixed the following target as a voluntary action plan.

- 1) Reduce the fossil energy consumption per ton of paper by 13% until 2010 compare with the 1990 level
- 2) Reduce the carbon dioxide discharge per ton of paper by 10% until 2010 compare with the 1990 level

On the basis of such a world trend, we in Nomachi Mill are wrestling with deducing the environmental load, with promoting the energy saving and the effective use of waste paper and wood resources. In Nomachi Mill, as a part of long term energy saving, we installed Boiler Exhaust Gas Heat Recovery System in the effluent gas chimney flue of the No.3 Recovery Boiler in July 2005 and decided to utilize the waste heat for warming the feed water of the above mentioned boiler. I want to introduce the example as follows.

A Reduction Approach to CO2 Emissions by Introducing a Large-scale Recovery Boiler

Shigeru Wakamoto

Niigata Mill, Hokuetsu Paper Mills, Ltd.

The approach of measures for controlling global warming and energy conservation has become important more and more by coming into effect the Kyoto Protocol in February, 2005. Additionally, conserving energy has been getting important as a measures of recent sudden rise of crude petroleum. Hokuetsu Paper, Niigata Mill introduced a large-scale recovery boiler in April, 2005 to replace the superannuated boiler, decrease the air pollutant, etc. Therefore, the plan of both air pollutant reduction and energy conservation were started by considering the best operating combinations of the new boiler and the existing boiler. In this report, the approaches of energy conservation and the CO2 reduction are described after introducing outline of the large-scale recovery boiler.

Water Jet Turning-Up System

Makoto Matsushita
KGK Engineering Corp., NUSM Division

Paper mills have been long after the turn-up efficiency improvement and subsequent paper loss reduction. Our full automatic "ReelJet" turn-up system (Paprima Industries Inc., Montreal, Canada) uses 2 units of ultra high pressure water-jet cutting head (1300-1500bars/20cc per turn-up) which run fast (2m/sec) to their waiting position each side of the line to get the sheet expanded to its full width keeping a completely uniformed wrapping both ways from the center, immediately after the tail has got caught by a new spool with the help of an air-coanda effect of a specially designed gooseneck. Thus, "Reel Jet" makes it possible to execute turn-ups failure free in such a shorter time span as 2 seconds since the issue of turn-up command via DCS until the two heads come back to their park-positions. Also, its beautifully balanced and even wrapping on a spool can release the reel part from vibration and noise related problems.

Its sales has been expanding among big scale world famous paper machines in Europe and North America, and they are quite satisfied with its overwhelmingly nice performance to cut paper loss and subsequently to improve productivity remarkably. Hereunder, we are going to explain about its structure and performance.

Solutions for High Quality Tissue Creping

Yoshinori Sekiyama
Sales Engineering Dev., Maintech Co., Ltd.

The Yankee dryer is a critical part of the tissue making process and its surface plays an important roll in achieving good sheet quality. Therefore, it is imperative that the Yankee surface is well protected. Maintech has developed "Ultra Lubrication Creping" an innovative and unique method in which Yankee dryer is protected by a lubrication coating layer composed of resin and disulfide molybdenum. The resulting surface reduces the friction between the dryer and doctor blade and extends the life of doctor blade dramatically.

Also, felt filling due to pitch and/or stickies can lead to any number of problems, including unstable coating layer, poor sheet quality, lost production, unscheduled shutdowns, and increased operating costs. Maintech has developed a series of deposit control products "MainteClean" whose amphoteric polymer prevents the pitch and/or stickies from accumulating on the felt and felt rolls. The treated felt gives positive impacts not only on the felt condition but also on the dryer coating.

This paper reviews the innovative methods of Yankee coating and felt conditioning comparing with conventional methods. Case histories illustrating gained benefits in tissue grade M/C are presented.

Low Consistency Refining Technology
LemaxX Spiral - Nature Applied

Kenichi Ito
Andritz k.k., Japan
Peter Antensteiner
Durametal Corporation

Andritz is a leading supplier of refining technology in the world. Also Andritz supply wear materials for refining process. Durametal Corporation, a subsidiary of Andritz, produces the refiner plates. This company has over 8,000 patterns of refiner plates and several new patterns developing in a week. Also Durametal plans to develop a simulation program "MAGNUS", it is simulate the "Nature of Refining" theory. Using this program Durametal Corporation developed The Logarithmic Spiral Design refiner plate LemaxX Spiral.

This report introduces the performance of LemaxX Spiral technology.

Wastewater Treatment in Japanese Pulp and Paper Mills Today

Environmental Technical - Committee of Japan Tappi
Environmental Protection Committee, Japan Paper Association

This survey of wastewater treatment in the Japanese pulp and paper industry is based on operations of 102 mills in 2002. Data covered 98% of pulp production (except recycled pulp including deinked pulp, DIP) and 89% of the production of paper and board products, and was compared with the last survey's in 1991.

As the Japanese economy had been sluggish in this 11 years, pulp production in 2002 decreased by 9% and paper and board production was confined to 10% increase. One third of the mills each produced annually over 0.3million tonnes of market products. 72% of the mills produced both pulp and paper products. 31% of the mills had kraft pulping process. Half of the mills discharged effluents into rivers and 41% into seas. Enclosed coastal seas (Tokyo Bay, Ise Bay and Seto Inland Sea) received effluents from 30% of the mills.

Enhanced awareness of the environmental preservation in Japan has further strengthened the effluent limitations. Discharge limits of suspended solids (SS) and biological oxygen demand (BOD₅) were lowered by an average of 20% and chemical oxygen demand (COD_{Mn}) by 10%.

As the results of sustained effort of the Japanese pulp and paper industry, the average specific discharge of SS in 2002 has decreased to 2.6 kg per ton of market products, BOD to 2.8 kg/t, COD to 7.4 kg/t, and the average specific consumption of water has been lowered to 88 m³/t, which corresponded to a reduction of 29% on SS, 42% on BOD, 30% on COD and 16% on water consumption.

Though coagulation-sedimentation was still the mainstream of wastewater treatment, the multistage processing including some biological treatments has spread progressively. Many activated sludge plants have shifted their aeration gas from air to oxygen, and then more than 50% of BOD and COD loads in wastewater have been removed by the activated sludge process.

The average operational staff of wastewater treatment was 4.7, decreased to one third from 1991.

International Conference Report

— The 5th Biennial Johan Gullichsen Colloquium, Finland —

Toshiharu Enomae

Graduate School of Agricultural and Life Sciences, The University of Tokyo

On November 17th, 2005, the 5th Biennial Johan Gullichsen Colloquium was held in Helsinki, Finland. This colloquium was initiated by Professor (currently emeritus) Johan Gullichsen of Helsinki University of Technology in order to encourage especially young engineers and scientists. The 5th colloquium featured “Raw materials and processes — viewpoint of product” and covered a wide range of topics including 5 categories and 8 aural presentations from all over the world. The summary of those presentations are reported.

Report of Studying at University of Maine

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Research and Development Dept., Product Development Research Lab.

Nippon Paper Industries Co., Ltd.

The author had an opportunity to study at University of Maine for one academic year of 2004. The author has belonged to Paper Surface Science Program (PSSP) in chemical engineering department of University of Maine as a visiting scientist. In this report, mission and current research activities of PSSP, the impression of the studying and the life at University of Maine are reviewed.

Keywords: University of Maine, Paper Surface Science Program, PSSP, Visiting scientist

Reduction of AOX by Prolonged ClO₂ Bleaching under High Temperature and Acidic pH Conditions

Kengo Magara, Tsutomu Ikeda, Tomoko Sugimoto and Shuji Hosoya

Department of Chemical Utilization, Forestry and Forest Products Research Institute

Decreases in AOX during chlorine dioxide bleaching at high temperatures and under acidic conditions were investigated. When the temperature in the chlorine dioxide bleaching stage was raised from 70°C to 95°C, a certain decrease in AOX was detected. AOX is formed by a chlorine substitution reaction with mainly lignin and chlorine that was generated from a reduction of chlorine dioxide. For the chlorination of lignin, it appears that raising the temperature facilitated an oxidation reaction rather than a substitution reaction, so that the rapid consumption of chlorine in the oxidation reaction suppressed the substitution reaction.

Extension of the bleaching period from 15 min to 90 min also decreased AOX discharge. In the first chlorine dioxide stage in bleaching, high temperature and acidic pH were employed to hydrolyze hexeneuronic acid as well as remove lignin. In this bleaching condition, some of the lignin was also subjected to hydrolysis. However, the cause of a dehalogenation reaction that was required to decrease AOX is difficult to understand. To determine the cause of dehalogenation, some chlorinated compounds such as a chlorinated aromatic compound and a chlorinated organic acid were heated at 95°C for 90 -120 min under acidic conditions. However, no explanation could be found to account for the decrease in AOX. Therefore, further investigation should be conducted to determine why the AOX reduction was induced by prolonging the bleaching period.

Keywords: chlorine dioxide bleaching, AOX, high temperature, acidic pH, bleaching period

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[プリント用ページ]

Results of the FY 2005 follow-up to JPA's Voluntary Action Plan and Report of Energy Situation in the Pulp and Paper Industry in Japan

Kunihiko Aida

Japan Paper Association

The Japan Paper Association (JPA) has been actively working to save energy since 1997 when it established its "Voluntary Action Plan on Environmental Issues". JPA declared its policy of restraining CO2 emissions as one of the actions: By 2010, reduce fossil energy consumption per product unit for paper products by 13% from that of 1990 level.

Since FY1990, JPA has been following through on the actual results of the unit of energy in the year, and has been publishing its results compared with that in 1990. The following are the results for FY2004 and reports of energy situation in the pulp and paper industry in Japan.

The survey also reported on energy consumption, CO2 emissions and the position of the pulp and paper industry in Japan as related information.

Reducing Distribution Loss by Control of Reactive Power

Tomoyuki Hosaka

Electric and Instrument Department, Yufutsu Mill, Nippon Paper Industries Co., Ltd.

Useless energy has been consumed by the inefficiency operation of the departure supply of power distribution equipment in the Yufutsu Mill. The chance to aim the inefficiency operation was to have discovered that receipt point was LEAD10%. Afterwards, No.1 Generator was operating by the Power-Factor limitation control since the departure supply of power distribution flow was investigated, and it turned out that the outflow invalidity Reactive-Power in the receipt point was a surplus. The operation of 100% or more comes to cause the losses such as the generators and transformers though operating it with Power-Factor 100% in the belt because of the Power-Factor discount system in daytime is an ideal in Power-Factor of the receipt point.

Therefore, the problem that the departure supply of power distribution equipment holds from an electric viewpoint is dug up, and it introduces "Reducing distribution loss by control of Reactive Power" executed in November, 2005 in this announcement.

HITACHI High-Voltage Motor Drive Energy Conservation Service-New Business Model 「HDRIVE」

Takashi Yabutani

Information & Control Systems Div. Hitachi, Ltd.

The industrial world in Japan including the pulp and paper has worked on conservation of energy for a long term after the oil crisis. As a result, it almost comes to the region in the limit about energy conservation by past methods.

As for the user, the energy conservation was not enforceable because there was an economical restriction though the necessity was recognized. In such a circumstance. We inspired a new business model based on the user's needs.

As the mechanism of concrete service, the user is do not need an initial cost to introduce the inverter, and, as a result, pays the service fee from a part of the achieved advantage. It is a scheme to which our company bears a part of risk of the amount of conservation of energy that the user owes. We named this scheme "HDRIVE(R)"

After it had applied for the patent, the number of the total service exceeded 50. This time, we would like to introduces the detail of HDRIVE.

Operational Experience of the Recycle Boiler

Sadayuki Kawamura

Hachinohe Mill, Mitsubishi Paper Mills Limited

The promotion of countermeasures for global environmental issues is one of the most important management strategies of Mitsubishi Paper Mills, Ltd. The Mitsubishi Paper Mills Environmental Charter lists "Reducing overall CO2 emissions" as the first item of it's action plan. Before the end of fiscal 2005, our target is to reduce CO2 emissions by 20% of 1999 levels.

To meet this target we installed a waste boiler at the Hachinohe mill in July 2004. Instead of burning fossil fuel, we used waste tires, waste wood and paper sludge. The operation of this waste boiler significantly reduced CO2 emissions and energy consumption.

Energy Saving on Cold-water Equipment of Chlorine Dioxide Generation System (R8)

Hirobumi Hamamoto
Ebetsu Mill, Oji Specialty Paper Co., Ltd.

As the environmental issues on dioxin have drawn bigger attention recently in pulp & paper industry, we have been required to adopt the new bleaching method (ECF, TCF etc) which don't use chlorine.

At Ebetsu mill of OJI SPECIALTY PAPER, we converted the bleaching method into ECF in 2003. Simultaneously, chlorine dioxide generation system was also renewed, altering main bleaching chemical from chlorine to chlorine dioxide.

In the process of generating chlorine dioxide, gas is generated first, then transformed into liquid by being absorbed in cold water.

As the conventional steam ejector cooling system requires much energy to cool down the water, we have changed to "CHILLER and Thermo-siphon system", the cold-medium and compressor system, making energy consumption less than before.

Energy Saving at the Power Plant

Yoshiyuki Nagao
Mishima Mill, Daio Paper Corporation

The power plant at Mishima Mill consists of 18 boilers and 14 turbines with a total rated output of 531 MW. It supplies all electricity used at the mill and the surplus is sold to the market.

After the 1970s oil crisis, Daio Paper converted from heavy oil to coal. Since 1985 we have also made the power plant more efficient by installing more boilers and turbines that create higher steam temperatures and operate at higher pressures. In addition, we have increased utilization of recycled pulp, which has a low energy consumption rate. As a result, we accomplished a 12% reduction in fossil fuel energy consumption, as measured tonnage of paper produced, in 2004 compared with that of 1990.

In a situation where we are striving to help prevent global warming, we set a voluntary target of a 20% reduction in carbon dioxide emission per tonnage by 2010 compared with that of 1990. We are making further efforts in the area of energy saving and conversion of fuel to achieve that target and reduce our energy costs.

Details of energy saving procedures at Mishima Mill are discussed in the following section.

Technical Trend of Mechanical Seals for Pulp & Paper Plants - The Cartridge Outside Mounted Mechanical Seal -

Hidekazu Takahashi
EAGLE INDUSTRY Co., Ltd., Customer Service Dept.

A mechanical seal prevents or reduces outboard leakage of toxic chemicals and saves energy and resources. Therefore, it can be deemed as one of the important environmental instruments that is directly and indirectly contributing environmental preservation. In a pulp & paper plant, many numbers of varieties of pumps are utilized such as water pumps, pulp pumps and chemical pumps all through the production processes from digesting to painting. In recent years, a mechanical seal has been selected as a standard sealing device for such pumps. Accordingly, ease of maintenance and foolproof design are getting of the essence. Another interest is interchangeability that cuts down spare needs. A new outside mounted cartridge seal having such features is presented.

Efficient Mixing of Papermaking Chemicals with TrumpJet™ System - Without Any Fresh Water -

Jouni Matula
Wetend Technologies Ltd.
Akira Ejima
Matsubo Corporation

A new innovation, developed TrumpJet™ Technology is used to inject papermaking chemicals efficiently into headbox stock. The mixing is greatly improved and consumption of chemical is reduced. The injection liquid is circulated headbox stock or white water instead of fresh water. Several installations operate with good results and improved quality of production.

Energy Saving for Refiner

— The Latest Refining Technology for Saving Energy —

Kazuo Aoshima

Aikawa Iron Works Co., Ltd.

The saving energy is a worldwide request and one of the most important subjects in Pulp & Paper industry. This paper reports how to improve energy saving for the existing refiner and the latest development for refiner, which is called as "ADC" Aikawa Double ConiFiner.

Operational Results of Neutral Deinking for Old Newsprint and Potential Application in Asia-Pacific Recycle Mills

Jim Merza, R. Daniel Haynes

Eka Chemicals Inc., USA

Johan Allen and Christine Chezick

Bowater Canadian Forest Products Inc.

Jamie McMullen

Tembec Paper Group, Pine Falls Operations

Myra Fong

Tembec - Spruce Falls Operations

Kozo Ibara and Yoshikazu Sonehara

Eka Chemicals K.K.

Earlier work has shown the success of a 10 day sulphite based neutral deinking trial. The neutral deinking process has now been successfully introduced into several recycle mills. Evaluation of free ink content and Lab scale studies showing the potential of this technology for the Asia-Pacific Region.

The objective of this paper is to document similarity and changes in plant operations by a survey of the recycle plant process and comparison of mill data before and after conversion. The mill survey includes information on pH, brightness, ink impairing brightness measured by ERIC, ink removal efficiency, water brightness of grey water, ash content, and solids loss at flotation. In addition, a review of each mill's operational changes in ERIC and ISO Brightness values is made after about 1 year of neutral deinking.

The results found all three mills able to match or to have a similar ERIC value after flotation despite a higher ink fragmentation going into flotation. Two of the three mills were able to reach or exceed their target brightness based on average mill data. The third mill averaged within one point of the target brightness and had a lower final ERIC value. Based on these three mills it can be concluded that sulphite based neutral pulper chemistry is able to operate continuously under the varied mill operating conditions typically experienced in the industry.

New Concept, High Efficiency Turbo Blower

Hiroyuki Hosoya and Naoki Tani

ITOCHU SANKI CORPORATION

Korean company, Kturbo Inc, has developed high efficiency Turbo Blower (TB) series. TB series are the perfect turbo blowers with semi-permanent foil air bearings, high speed motor. They can save more than 30% of energy consumption compared with roots blowers. TB series are oil-free and noise-free turbo blowers which are directly driven by permanent magnet high speed motors supported by hydrodynamic air foil bearings. Direct drive of the rotating shaft without mechanical contact reduces the noise level up to 85dB@1m, and total product weight and volume by 1/3 and eliminates the construction of basement for vibration isolation.

Kturbo blowers can be used for waste water treatment, conveying system of cement factory, process air supply for paper and fiber factories, etc. In particular, they are the best solution for food/beverage and cement factories which need perfectly clean air.

Treatment of Waste Water from a Paper Manufactory by Magnetic Separation
-Production of Reused Water-

Koushi Fukunishi, Hiroshi Ida and Yoshiyuki Kakihara
MS Engineerings (Futaba Shouji Co., Ohsaka Chemical Izuo Labo.)

Purification of waste water from a paper factory was attempted by super-conductive high gradient magnetic separation (HGMS) in a pilot-plant scale of 2000 ton a day. The plant of 2000 ton/day drainage consists of three main tanks, i.e., a reaction tank, a separation tank (thickener), and a magnetic-separation tank. In the reaction tank suspended and resolved substances in waste water were magnetized with magnetite particles and aluminum sulfate as coagulant (magnetic seeding). The resulting heavy magnetic flock precipitated smoothly in the separation tank and the remained magnetic flocks were captured by magnetic filters in the magnetic-separation tank.

The original COD (Mn) values (chemical oxygen demand) of waste water from a paper mill were in the range of 60~200 mg/L. The COD values reduced to 30~60mg/L by the sedimentation process and by the following magnetic-separation process. Their transparency was also raised prominently (turbidity=5~10 NTU).

In the magnetic-separation part, a super-conductive magnet of 3 Tesla was set, and a filter container with 400mm-bore in diameter was filled with magnetic filters. Floating magnetic flocks were trapped at the magnetic filters in high efficiency of more than 98%. An exchange and a washing system of the mud filters were developed by building up a continuous push out system. A production test of 2000 ton a day gave reasonable results with a continuous automatic operation.

A Report on International Symposium on Wood Science and Technologies 2005

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Tokyo University of Agriculture and Technology
Shigenori Kuga
The University of Tokyo

International Symposium on Wood Science and Technologies (IAWPS2005) was held in Yokohama on November 27-30, 2005 under co-organization of The Japan Wood Research Society (JWRS) and The International Association of Wood Products Societies (IAWPS). Total participants were more than 500 including 149 from outside of Japan. 395 papers including 4 plenary lectures, 163 oral presentations and 228 poster presentations were presented at 10 sessions. 33 papers including 12 oral presentations dealt with pulp and paper science and technology.

Study on the Water Retention of Coating Color by Sandas Method (Pressurized Filtration) Suggests that Using a Filter of 0.4m Pore Size is More Reliable to Predict Performance of Color in Coating Operation and Resultant Product Quality

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Corporate Research Center, Mitsubishi Paper Mills Limited

AA-GWR water retention meter is a very popular and useful test method for water reduction of pigment slurries. It is based on pressure filtration of coating colors under an air pressure and suitable for estimating a penetration phenomenon of a water phase from a coating color into a base paper under a practical coating process. In this study various plastic filters with specific pore sizes (5.0 to 0.05 m) were used for filtration of colors on AA-GWR. The dewatering amount of the colors was compared to the runnability of the color on a pilot blade coater. Some factors such as finer pigments and nonionic materials made an amount of filtrated materials increase much. And the reasonable correlativity between the runnability of coater and the dewatering amount was spoiled. The unreasonable water retention values on 5.0 m pore size filter were found on the evaluation of specific coating colors which contained nonionic water soluble binders such as Polyvinylalcohol (PVA) and Hydroxyethyl starch (HES) and finer pigments of TiO₂ and CaCO₃. These materials were not trapped by the filter and reached the test paper. However it was found that the 0.4m pore size filter was possible to be used to measure reasonable penetration of water phase of such colors and to estimate the runnability on a coater. Additionally water retention values measured by 5.0 and 0.4 m for common coating colors were almost the same.

Keywords: AA-GWR, water retention, coating color, blade coater, filtration

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World Market Pulp Supply/Demand & Chinese Recovered Paper

Minoru Arai and Takayuki Noma
Pulp Dept., Marubeni Corporation
Nobuyuki Ihara
Marubeni Paper Recycle Co., Ltd.

Recently the circumstances surrounding pulp suppliers have been dramatically changing in terms of energy cost, exchange rate, wood chip and so on. Looking at the supply side, we would see rapid expansion of hardwood pulp mainly in South America. World hardwood supply will turn out to be more than softwood supply. As for the demand side, China is considered to remain the big market for market pulp. Considering about production cost for pulp suppliers, they have been suffering from sharp rise of raw materials and fuel, currency appreciation against US dollar, which reduce their profits obviously. It is reported that lots of Canadian pulp suppliers had to shut down their mills this year.

The demand of recovered paper from Chinese paper mills has been increasing dramatically, and it has given big influence on Japanese market as China is major export market for Japan. China has further expansion plans for paper and paperboard and will consume more recovered paper. In order to secure the materials, China need to collect more recovered paper from the domestic market.

Recycling Potentials of Kraft Pulps Prepared from Planted Eucalypt and Acacia Woods

Takayuki Okayama
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When a kraft pulp is repeatedly wetted in water and dried for several times, the strength properties of handsheets are considerably deteriorated. The repeated wetting and drying of a recycling process affects the microstructure of the pulp fibers. The shrinkage of internal pore structure under recycling was not easily reversed.

Thirty-three 9-year-old fast-growing individual trees of *Eucalyptus globulus* planted in Australia were examined to investigate variations in pulp fiber and handsheet properties during recycling. Large between-tree variations in the thirty-three individual tree pulps were observed in tensile strength of handsheet during recycling. The fiber wall thickness and the Runkel ratio well reflected the shrinkage configuration of the pulp fibers during recycling.

Tensile indices at expected recycling were calculated by nonlinear regression analysis for each pulp. Expected tensile index of handsheet at extended recycling were closely related to the sheet density after five recycles, the fiber swelling of original pulp and fiber morphological characteristics.

Three species of 11-year-old fast growing *Acacia* woods, namely *Acacia mangium*, *Acacia auriculiformis* and *Acacia mangium* x *Acacia auriculiformis* (hybrid), planted in Malaysia were also examined to investigate variations in handsheet properties during recycling.

Variations in tensile strength of handsheet of the hybrid during recycling were similar to those of *Acacia mangium*. On the other hand, handsheet from *Acacia auriculiformis* had lower tensile strengths during recycling than other two species. The hybrid showed higher expected tensile indices, compared with other two species.

Keyword: recycling, *Eucalyptus globulus*, *Acacia mangium*, hybrid, fiber characteristics, paper strength, nonlinear regression

Operating Experience of Kraft Pulp Mill
"Plantation-grown *Eucalyptus*"

Toshiharu Yatomi
Technical and Industrial Department, CENIBRA
Alexandre Lanna
Production, CENIBRA

Cenibra (Celulose Nipo-Brasileira S.A.) is one of the largest producers of short-fiber bleached *Eucalyptus* pulp. The company was founded on September 1973. In July 2001, Japanese company, "JBP" became the only shareholder of Cenibra.

Cenibra's total area is 234,827ha, split in cultivated lands 123,398 ha with E. Grandis, E. Urograndis (hybrids E. Urophylla and E. grandis) and preservation and legal reserve 92,087 ha. The existing production capacity is 940,000 ADt with an expansion project for 200,000 ADt up-grade schedule to be start-up in early 2007.

The increase of production and quality stability needs as a continuous target, create a demand for wood segregation. Many parameters and alternative methods has been tried to improve process control.

In this paper, the outline of Cenibra is introduced and mil operating experience of pulp processes is reported.

Latest Recycling and Upgrading Technology of Low Grade of Raw Material in Stock Preparation

Masakazu Eguchi

Stock Preparation Dept. of Engineering and Development Div.

Voith IHI Paper Technology Co., Ltd.

Characteristics of raw materials in waste paper recycling system for paper making are changing to lower quality in the world according to recent higher recycling rate of waste paper, progress of printing technology, more usage of Eucalyptus and acacia pulp and shifting to planted wood from natural resources for pulping material.

Therefore, more innovated and appropriated stock preparation technologies are requested to treat such low grade of raw materials and to improve property of the paper and also runnability of the paper machine.

We, Voith IHI Paper Technology (VIPT), will state and introduce the current raw material condition in the world and VIPT's latest stock preparation technology for solution of your existing system and planning of your new project.

Required Technologies for Expansion of Use of Low Grade Furnish

Takeshi Kanazawa

Aikawa Iron Works Co., Ltd.

The use of the low grade furnish has been needed with the rise of the waste paper availability in the world. However, the low grade furnish contains a lot of various foreign materials and various printed matters with hard-to-remove-ink. This paper reports the technical questions and measures regarding the expansion of the use of such low grade furnish as the stock of paper and paper-board.

Stickies Control Agent for Recycling Paper by OPTIMYZE

Motoaki Kimura

Buckman Laboratories K.K.

As the demand for recovered fiber rises, the quality inevitably deteriorates. Recycled paper systems contain deposits called stickies that are composed of adhesives and other organic contaminants. These stickies can produce an off-quality product, an interruption of paper production, and increased landfill costs and buildup of waste materials. We have found a way to save our customers these production and end-product headaches and we can do it with chemistries that are environmentally neutral as well as safer for workers.

The Optimize Stickies Control family of products are based in part upon newly engineered, patented enzymes. The Optimize products are specially formulated, using patented stabilization technology, for use in furnishes composed of mixed office waste, old newspapers, and old corrugated containerboard. Their specific chemistry has been developed to break up and detackify stickies particles and thus decrease the amount of contaminants that can be deposited in recycle furnishes.

Optimize is a unique enzyme technology that replaces more hazardous chemistries and facilitates the use of recycled papers, which received Presidential Green Chemistry Challenge Award from United States Environmental Protection Agency's (EPA) in 2004.

Recent Large Aker Kvaerner Pulp Mill Projects

Sevn-Erik Olsson

Kvaerner Pulping AB

Tomoyuki Tezuka

Kvaerner Pulping KK

There is a clear trend in today's pulping industry. New facilities are mainly built in Asia and South America, where access to fast growing raw material and other production factors give favorable level of costs. Operations in the rest of the world mainly focus on modernizations of existing equipment and mills. This development also reflects Aker Kvaerner's operations over the recent years.

In this paper, the "giant fiberlines" especially for Asia and South America will be focused on.

The Latest Andritz Chemical Fiberlines, Mechanical Pulping Systems and Recycled Fiber Processes Delivered in China and South America

Kanji Hagiwara, Yosuke Takeshita and Tamio Fukuzawa
Andritz K.K., Japan

Andritz has delivered quite a number of pulping systems in South America since 2000 and also has delivered many Mechanical pulping systems and Recycled Fiber (DIP) Processes in China over the last 10 years. The latest Andritz technology for the chemical fiberline consists of the DFSL Lo-Solids™ Cooking technology and the Fractional washing DD Washers throughout the brown stock washing and ECF bleaching provided with Ahlstage™ acid treatment process. The latest Andritz mechanical pulping technology encompasses the PRC-APMPTM Process and RTSTM-TMP refining of energy saving. These processes have been successfully operated since the start-ups and the customer mills have been satisfied with the performances.

This paper introduces briefly the advantages and performances of the processes that Andritz has delivered in China and South America.

Keywords: DFSL (Down Flow Lo-Solids™) Cooking, TurboFeed™ System, Fractional washing
DD Washers, PRC-APMPTM, RTSTM-TMP, Ahlstage™

Utilization of Used Paper Cores and Tubes on Manufacturing Corrugating Medium

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Rising demands for environmental protection and resource conservation in the recent years have accelerated the creation of a recycling-oriented society, steadily increasing the Japanese waste paper utilization rate to 60% in 2003. Meanwhile, demands of variety functional papers with enhanced moisture resistance have grown as they offer greater convenience to consumers. These functional papers containing used paper cores and tubes raise serious issues to the paper industries as ordinary equipments at mills can not utilize them as regular waste paper. Also, functional papers consume a large amount of electricity at pulping process and most of them are disposed of as industrial waste. The use of such hard-to-recycle waste paper, however, is an issue that must be solved as society expects increased waste paper utilization rate in the future.

Rengo Kanazu mill started its operation in 1961 and currently has two corrugating medium machines. In order to promote waste paper utilization, the mill has been using 100% wastepaper since 1993 for manufacturing of corrugating medium. In order to meet current requirement to utilize hard-to-recycle waste paper, the mill installed a new processing facility for used paper cores and tubes in 2004.

The new facility does not require additional chemicals or heat. Used paper cores and tubes are put into the new facility in 'as is' condition and the output is sent to the regular pulper, and is treated in the same process as regular waste paper.

The final products manufactured in the stated conditions were examined and they showed no negative effects on both table test and real machine test. It is concluded that the facility can be operated without any problems.

Influences to the Operation of Bleached Hardwood Kraft Pulp by the Increase of Plantation Wood Chips

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Recently, in order to reduce the green house gas the plantation is getting increased in all over the world. And also there is growing tendency toward to conservation of natural forest and wildlife. Therefore the percentage of plantation wood chip supply is getting increased at typical Japanese kraft pulp mills. The tendency like this will be accelerated in the nearly future. To correspond to the change of wood chip property is one of important missions for the pulp & paper industry. Therefore the industry is needed to operate with various ideas.

Ishinomaki LBKP plant produces Bleached Hardwood Kraft Pulp. The digester runs on the conventional cooking and the bleaching sequence is D-Eop-D. The process flow is quite typical form. On the experience of Ishinomaki LBKP plant, it is found out that the plantation wood chips bring on the lower cooking & bleaching cost but the worse plugging in a 2ndary knoter and worse vacuum on bleach filters than the natural wood chips. The plant installed the optimized procedure of wood chip mixing and some operational ideas as the measures. Including them, this report introduces some influences by the increase of plantation wood chips and some measures for them at Ishinomaki LBKP plant.

Keywords: Plantation chips, Vacuum filter drainage issue, Scaling issue

The Operating Experiences Using Low Bulk Wood Chips

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Hokuetsu Paper Niigata Mill produces ECF bleaching kraft pulp via two fiber manufacturing lines that started up in 1989, and the another in 1998. The 95% of total purchased woodchips are cultivated and the remains are from domestic natural forest. The higher forested chip ratio takes great advantages of pulp yields, black liquor yields and chemical consumption. On the other hand, an unstable digesting operation may come out that is caused by the low bulk planted woodchips.

In this paper, the key points of the continuous digesting operation under using low bulk woodchips are reported.

The Influence for Operational Factors by the Diversification of the Wood Species

Tamotsu Morikoshi

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

The change in operational factors due to the increase in ratio of imported wood chips and diversification of wood species by afforestation, has recently become a problem. It is thought that in the future as diversification of wood species advances, there is a possibility of it becoming difficult to continue to stabilize operation.

The decline of the bulk specific gravity of the hardwood chip and changed bleach-ability of the chip combination aggravates productivity at Sendai Mill. In addition to the pitch trouble often experienced due to chip combination the pitch trouble with the NBKP/LBKP switch operation has especially become a serious problem. This report shows the influence of the change in chip combination of hardwood or softwood on the operation, and operational experience in the production of bamboo pulp, which recently has been tackled.

The Relationship between the Character of Plantation Wood Chips and Pulp Properties

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The relationship between the character (morphology, chemical composition) of plantation wood chips (*E. globulus*, *E. nitens*, *E. grandis*, *E. camaldensis*, *E. exerta*, *A. mangium*, *A. auriculiformis*, *A. hybrid* (*A. mangium* × *A. auriculiformis*)) and pulp properties was investigated. The results showed that fiber morphology in wood chips has a great influence on sheet properties, and that the lower lignin content in wood chips gives less energy for pulping and higher pulp yield. However, there were some exceptions to relationship between pulping efficiency and lignin content. In order to evaluate pulp properties of new wood chips, it is necessary to make pulping tests and measure the fiber morphology.

Reports of 92nd PAPTEC Annual Meeting

Takanori Miyanishi

Longview Office of Nippon Paper Industries and North Pacific Paper Corporation

Canada is the largest forest products exporting nation in the world. All this resulted in 92nd PAPTEC Annual Meeting in Montreal during February 6th-9th, 2006 that brought together hundreds of people working to support the industry and to revitalize it as it emerges from the challenges that have recently beset it. The Standing Committees sponsored 42 sessions featuring 249 technical presentations on a wide range of subjects. The comprehensive program attracted the largest audience in the past three years with a total of 947 delegates. Several papers in the fields of mechanical pulping, bleaching, paper chemistry and papermaking are introduced in this article.

Evaluation of Water Based Gravure Ink Penetration into Coated Papers by ESCA

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Research Institute, National Printing Bureau

Ink absorption on coated paper was investigated using ESCA. The relative intensities ($\text{Cu}2\text{p}/\text{C}1\text{s}$) and ($\text{Si}2\text{p}/\text{C}1\text{s}$) were measured by ESCA. The relative intensities ($\text{Si}2\text{p}/\text{C}1\text{s}$) were shown as the rate at which coated paper was covered with ink while the relative intensities ($\text{Cu}2\text{p}/\text{C}1\text{s}$) were shown as the exposure ratio of ink pigments. The relative intensity ($\text{Si}2\text{p}/\text{C}1\text{s}$) decreased with the increase of ink transferred area and leveled out at the lowest value. The region of leveling off indicated that ink almost covered the coated paper. The relative intensities ($\text{Cu}2\text{p}/\text{C}1\text{s}$) in this region were approximately regarded as the exposure ratio of ink pigments to ink vehicle.

The intensity ($\text{Cu}2\text{p}/\text{C}1\text{s}$) of the printed samples on coated layers with high micro-pore volume was high. The exposure ratio of ink pigments on gravure prints of the coated paper was correlated with liquid absorption into the same paper by Bristow method. The penetration of water based gravure ink on coated papers could be estimated from the relative intensity ($\text{Cu}2\text{p}/\text{C}1\text{s}$) by ESCA. This technique was directly adapted to the gravure prints.

Keyword: gravure ink, ESCA, liquid absorption, Bristow method

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Successful Press Section Management by Means of EnviroScan™ and FeltView™ Measurement

Hideomi Uchikawa

Voith Paper Automation Japan Ltd.

Reinhard Mullar

Voith Paper Automation GmbH & Co. KG

Some years ago a one-nip press concept appeared to be a vision that was out of reach. As a press concept like this provides obvious benefits to papermakers. Both woodfree and woodcontaining papers have their own individual dewatering behavior during pressing. Finally, it turned out that woodfree paper grades reach a sufficient dryness level after one nip only.

This paper describes the press configuration, the successful press section management by means of EnviroScan™ and FeltView™, and the layout data of the commercial reference machine. EnviroScan™ is a single beam compact scanner with moisture and sheet temperature measurements embedded inside the scanner frame as special designed. The scanner and the embedded both moisture and sheet temperature measurement are fully protected from the severe environment. FeltView™ is a press felt optimization system provides scanning measurement of water weight, permeability and surface temperature for up to four press felts. Both EnviroScan™ and FeltView™ should be standard for all Single NipcoFlex Press.

The Field Performance of MJ Former for Packaging Grade

Akihito Nagano and Kazuhiko Masuda

Mitsubishi Heavy Industries, LTD.

The features and performance of "MJ Former", high speed roll former for packaging grade has been presented at 2004 Japan Tappi. The first installation has successfully started up in Germany one week ahead of schedule. This paper machine has already reached design speed on brown grade. Paper qualities are excellent and achieved the target.

This paper presents the project outline and performance of paper machine high lighting "MJ Former".

Operating Experience of Headbox with Dilution Control System

Satoru Nakazato

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In 1985, a 5-layer Highspeed Ultra Former was introduced to PM5 in Saga Mill of Oji Paperboard Co., Ltd. Along with the speed-up of the machine, the flow rate through the headboxes increased and exceeded the design rate, resulting in bad BD profiles and exposure of the ridge problems (oil drum-like wrinkles). To solve them, the headboxes have been replaced systematically since 1997 and a micro-rod BD profiling system was brought in 2002. Then, we installed a Dilution Control System as a final stage.

The installation of the Dilution Control System has provided the improvement of the BD and caliper profile by up to 48% and 25%, respectively. In addition, the down-time for grade change and start-up has been cut by 2.4 minute and 3.8 minute on an average, respectively.

The outline, the operating experience, and the advantage of the headboxes with the Dilution Control System introduced to the PM5 are summarized in this report.

Development and Operational Suitability Test-Result of High Efficiency Washer 「Zekoo」

Saeko Akiyama, Takefumi Ide and Kiyoshi Yoda

TAIZEN Co., LTD.

In the Paper Industry, the need for Waste Papers has been increasing more and more. In the process technology for Waste Papers, the pulping process by the kneading method, which is our specialty, has been main current and so the quality of Waste-Pulps is very improved now.

Then we have aimed at a High concentration Washer to gain the more high quality of Waste Pulps. After many times of the trial and error, we have finally developed our vertical washer with separator, which is "Zekoo"

This "Zekoo" is capable of high – grade washing for Waste Pulps by our original mechanisms, which are the centrifugal dehydration, the kneading action , the turbulence and the efficient replacement of washing water by fresh water. And the vertical structure of Zekoo enables it to save the installation place and fresh water usages. And this "Zekoo" is designed to be applicable to wide concentrations of pulps and to be simple in the operations and the maintenances.

In the actual running of Zekoo, some potentials like as high grade rejection capacity of carbons and ashes and recovery capacity of fibers are demonstrated.

Now we present this epoch-making washer "Zekoo" to the Paper Industry, in which the need for the Waste Papers is increasing more and more in the future.

Equipment and Methods for Reliability-based Maintenance Strategies in the Paper Industry

Oliver Massa

F'IS Paper & Steel, FAG Industrial Service GmbH

Aimed availability of more than 95% in the paper industry does not allow any unscheduled shutdowns. This necessitates the employment of suitable inspections, measurements and monitoring in order to be able to reliably assess the condition of the equipment and detect damage to machinery early on. With online, a minimal damage or condition changes can be detected at a very early stage in comparison to offline.

Online condition monitoring allows a fast reaction time to plan the maintenance activities and guarantee highest reliability, but only with a consequent root cause analysis and counter measure, downtime can be reduced substantially.

Total Wet-end System with Reduced Alum Dosage for Linerboard

Takao Sezaki and Yasuhide Yoshimoto

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In papermaking industry, operating conditions are changing rapidly in order to cope with a rise in worldwide environmental awareness and unavoidable rationalization aiming to improve the profitability. In linerboard, the amount of calcium carbonate that contaminates the wet-end process tends to increase due to an increase in the recycling ratio of magazine. Consequently, such contamination could lead to the problem of frequent trouble by heavy gypsum scale and reduction in performance of wet-end additives because of the raised conductivity.

Under these situations, reduction of alum is expected to bring a lot of merits in linerboard production. On the other hand, some demerits would also arise from it. The application of "Total Wet-end System" is able to not only get rid of these demerits but also improve the quality of linerboard. We introduce the "Total Wet-end System" with reduced alum dosage, which can offer a solution to the difficulties including the contribution to the environmental protection, quality improvement, and increase of the productivity in linerboard.

Reduction in Effluent Load by Proper Wet-end Chemistry

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Chemicals for Pulp & Paper Technical Dept., Somar Corporation

In recent paper industry, global environmental protection is a big concern beside productivity, run ability and quality improvement. Increased recycled fiber usage promoted by global resource protection and environmental concern brings more foreign materials such as pitch and anionic trash in papermaking system.

At Somar we have been working on wet-end improvement agent "REALIZER A Series" as functional coagulant which maximizes the effect of variety of wet-end chemicals. Latest polymer technology help us to develop another functional retention aids as "REALIZER R Series" and "REXER FX Series" which are effective in fine and ash retention. Synergistic effect of the combination of these chemicals to improve wet-end performance is referred as "AXISZ SYSTEM". In addition to these chemical developments, long experience in slime control technology in papermaking process at Somar helps us to develop most effective biocide system "CURECIDE SYSTEM". The optimum wet-end control system could be built through the use of our chemical system which gives maximum effect with minimum chemical dosage. Possible reduction in many wet-end chemicals contributes lowering effluent load as well.

This paper describes the effect of reduction in effluent load by optimizing wet-end operation using "AXISZ SYSTEM" and "CURECIDE SYSTEM".

Density Decreaser for Paper

- MUSCUT Series -

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Research & Development Division, NICCA CHEMICAL CO., LTD.

Recently, "kasadaka-shi", that is high-bulky paper or low-density paper, has been widely used for book paper and paperboard. Low-density paper is combined with chemicals, fillers or large amount of pulp that makes bulkiness of paper. NICCA CHEMICAL has led and developed a cationic type density decreaser with sizing effect and entered the market with MUSCUT K-300. MUSCUT K-300 imparts not only bulkiness and sizing effect but also opacity, whiteness and softness for paper. Also, it shows less pitch trouble and less foaming on actual operation because of its self-fixing ability. We have striven for cationic density decreaser system and have continued to study and develop. Emulsion type products had been the mainstream in cationic type density decreasers. But we have developed a new solid cationic type named MUSCUT KF-2000. We would like to introduce its characteristics and applications.

Data Management of "SmartView®" Inspection System

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The Cognex SmartView® Inspection System provide historical and real-time inspection data to PC workstations on the mill-wide network, and to equipments (PLC, DCS, Plant Information System etc.) via OPC/ODBC. The SmartView® OPC Data Access software provides increased flexibility in roll summary data collection, real-time defect data collection, and system status and event monitoring. The SmartView® Data Archive with ODBC enables customers to access historical inspection results using customer-developed data analysis tools or Production Quality Advisor (PQA). PQA is a powerful suite of data analysis and display tools for viewing both current and historical production quality data from Data Archive Servers.

Effects of Pigments Shape on Paper Properties - II

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IMERYS Pigments for Paper Americas

It is well known that the flat shape of kaolin particles contribute to paper/print gloss and opacity in coated paper. Flatter particles give improved coverage and smoother surface properties for coated paper. This leads to improved coating structure and results in better print gloss. On the other hand, blocky ultrafine particles generally show advantage on sheet gloss.

Thus, the combination of flatter and finer particle is assumed to achieve both characteristics. However to measure a pigment's aspect ratio is a time consuming procedure, so there seems to be few detailed studies of the correlation between the aspect ratio and particle size and the affect on coated paper properties.

This study aimed to research the effect of the pigment's aspect ratio and particle size on coated paper properties in heavy coated paper in particular, in order to understand the interactive mechanism of such unique characteristics.

Influence of Diffused Light on Visual Perception of Print Gloss in Coated Paper

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Recently, coated paper is required characteristics of visual perception components like print gloss, sheet gloss and brightness and so on. It is a trend in the differentiation of the coated paper quality to give the product these components. "Print Gloss" is especially an important final quality of coated paper.

However, for the print gloss, as for "the specular gloss" measured with standard gloss meter and "the visual perception of print gloss" that man feels in sense, all might be not the same, and be different.

In this study, we considered that the visual perception of print gloss was influenced by permeation, absorption and diffusion of light in the ink layer (resins and ink pigments) and the coating layer (pigments and binders), in addition to ruggedness on printed surface, and investigated clarification of the key factor and the quantification of the visual perception of print gloss with using goniophotometer and scanning white-light interferometer.

As a result, it was found that the roughness on the printed surface of 10 μ m or less influenced to the visual perception of print gloss, furthermore the internal diffuse reflection light in the ink layer and the coating layer greatly influenced. And then the quantification of the visual perception of print gloss was also able to be established, it reported with this paper.

Keywords: coated paper, visual perception of print gloss, goniophotometer, internal diffuse reflection light

Express Moisture CD and MD

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Most CD moisture profiling devices are controlled from profiles obtained at the reel or, in the case of fine paper machines, possibly from the pre-size press scanner. In recent years, there is a continuing trend toward obtaining a flat moisture profile from the press section, and as a result, some mills have installed moisture scanners following the press section to control the sheet moisture profile. The reasons for this include the desire are to operate the press section in an even loading mode, to separate problems originating in the dryer section from those originating in the press section and to produce a uniform CD sheet bulk out of the press section.

In terms of MD Moisture, water removal in the press section is relatively inexpensive compared to moisture removal using steam heated dryers. Removal of an additional 1% of moisture in the press section can decrease the steam requirements in the dryer section by 4%, making it more economical to remove moisture mechanically than by evaporation. Methods for improving pressing moisture removal efficiency to reduce the moisture removal load on the dryer section are continually sought. So the actual moisture measurements in press would contribute to optimize the press section.

The Fiber Optics Moisture Sensor provides both CD and MD accurate and reliable measurements in wet press and dryer section over a broad range of paper grades, from tissue to heavy board, and of moisture levels, from bone dry sheets at the size press to high levels at the wet press. New generation of moisture sensor consists of a light source, an optical fiber for delivering the radiation to the web, a monitoring optical fiber and two detectors. The light source and all electric devices are located to outside of the machine, designed for maximum reliability, long operating life, and minimized maintenance requirements. This paper presents the Honeywell new developed Moisture sensor and applications.

For Achievement of Environmental Standard in Gulf of Toyama

- Reduction of Nitrogen / Phosphorus in Drainage -

Hirokazu Kondo

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The achievement of environmental standard situation of COD in Gulf of Toyama changed in the low situation of 32-60% after 1997. It was concluded that a rise of COD was Inside Production of photo plankton which assumed mineral nutrition salts (nitrogen / phosphorus) from land level nourishment source in investigation of Toyama prefecture in 2001, and an action of premeditated reduction of nitrogen / phosphorus in Manufacturing and The sewerage treatment was judged with need. This paper introduce an action in Nomachi Mill for corresponding to a plan of Toyama prefecture.

Effect of External Fibrillation on the Retention of Filler

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The purpose of this study was to examine the effect of external fibrillation of chemical pulp fibers on the retention of filler during sheet forming in a high-vacuum dewatering device. An ultra-fine friction grinder was used to prepare fibers with different degrees of external fibrillation, while keeping their internal fibrillation constant.

The entrapment of filler particles was found to increase with increased internal fibrillation of fibers in the presence of chemical aid, and it can be further increased by promoting mostly external fibrillation of fibers. Increasing the degree of external fibrillation alone, without changing the internal fibrillation, can be used as means to control the retention of filler.

Keywords: External fibrillation, Internal fibrillation, Ultra-fine friction grinder, Filler, Retention

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A Characteristic and Application of the Hydrophobicity
(Non-pollution) Functional Plating for Paper Industry

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Nomura Plating Co., Ltd.

Yong-Bo Chong

Research Institute for Applied Science

Last time, at this society, we succeeded in development of a hydrophobicity functional plating, announced that rough feature, and examined a possibility that this plating could be used in the paper industry. In this announcement, in order to examine a possibility that this plating in the paper industry can be used, the environment which can release and use the detailed data of this plating further was reached, and possibility was examined.

LEIPA Schwedt PM 4

- LWC Production Line of the New Generation -

Osamu Fujimura

Voith IHI Paper Technology Co., Ltd.

Andreas Koehler and Falk Albrecht

Voith Paper GmbH & Co. KG

On July 30, 2004 the first LWC paper was wound on the Sirius reel of PM4 at LEIPA Georg Leinfelder GmbH in Schwedt an der Ober, Germany. PM4 produces 300,000 tons of high-quality LWC paper per year on a wire width of 8.90 meters. Production can be based on up to 100% recovered paper. To produce the highest product quality, Voith bases the entire production process on the One Platform Concept.

The Feature of MJ-Sizer at Actual Coating Operation

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Hiroshima R&D Center, Mitsubishi Heavy Industries, Ltd.

Hiroshi Miura and Toshiaki Miyakura

Paper & Printing Machinery Division, Mitsubishi Heavy Industries, Ltd.

Film coater, such as gate roll and rod metering, is well accepted as sizing and on-machine coating device by its compactness, runnability and performance for production quality. Its low mechanical friction stress, acts on base paper in the applicator roll nip, reduces sheet breaks and then improves production efficiency. In addition to above, either low fluid dynamic pressure acts on base sheet in applicator roll nip region, and less penetration of coating into base sheet at the film metering process realizes better surface coverage of base sheet. Those features make the film coater as a suitable device for light weight and ultra light weight coated products.

MJ-Sizer, our state-of-the-art rod metering type film press, has several advantages for stable operation, efficient production and easy maintenance. In this paper, we present the features and advantages of MJ-Sizer those realize high efficiency in light weight coated paper production.

Model-Based Predictive Adaptive Control of Pulp and Paper Mill Processes

Jyunji Mizuki and Tamio Fukuzawa

Andritz K.K., Japan

Duncan Meade, Bill Gough and Sava Kovac

Ideas Simulation Inc., Andritz Group

This paper describes the application of a model based predictive adaptive process controller (Brain Wave?) to a number of pulp and paper mill control loops. These loops were maintained in either open loop (manual) or PID control prior to the application of the continuous controller due to their typically slow and varying process dynamics, since these processes are very difficult to control. All the Before application of the advanced controller, these loops required used different traditional control strategies, such as cascade schemes, varying model parameters or feedforward compensation.

Keywords: Model-Based Predictive Adaptive Control, Brain Wave, Reel Brightness, Recausticizer
Conductivity, Slaker Temperature, pH Control, Pulp and Paper Process Control

Application of SAQ® to Modified Cooking Processes (PartIII)

Junji Tanaka
Kawasaki Kasei Chemicals Ltd.

SAQ® has been used as a cooking additive in many KP mills. This process is known as "Quinone Cooking". In order to apply SAQ and polysulfide (PS) to the recent modified cooking process, more effective condition for SAQ has been investigated. The following results have become clear with the small digester developed by KKC in which addition and extraction of cooking liquors are possible during cooking.

- 1) In this experiment, the synergistic effect of SAQ and PS in the divided addition of liquors was almost the same as in the whole addition (non-separating) of liquors.
- 2) The result was improved by changing from PS liquor to white liquor, which was added in the middle of cooking (at the time of cooking temperature being 130°C) .
- 3) As to the condition with SAQ and the model PS liquor in this experiment, the PS concentration for acquiring the greatest effects was estimated at approximately 6g/L.

Precise Fixed Quantity Injection System for Dyestuff

Keiichirou Oono
IWAKI Co., Ltd.

When injecting dyestuffs into a pulp, dyestuffs are blended with pulp after the dyestuffs is taken from a dyestuff tank, which is the mixture of dilution water and dyestuffs. However, this method requires the management of the liquid volume and space for the tank. Moreover, the saving of labor and space requires the in-line system that allows dyestuffs to be injected directly to pulp-line.

But in case of using the feedback control by continuous flow pump in the in-line type, which is shown in view 1, a large scale system that equips the flow meters, control valves and controllers is required. Therefore, there are some obstacle to obtain the great labor and space saving. The pump must always transfer liquid quantitative and precisely against pressure change in pipe-line.

To solve the problems above, it reports on the function and the feature of the in-line injection system with the Hicera pump.

The Characteristics and Functional Mechanism of Retention Aid "Nano Cluster Dispersion (ND) Polymer"

Yoshiya Yamaguchi and Takumi Ohara
Shonan Research Center, HYMO Corporation

The novel retention aid cationic polymer; Himoloc Nano Cluster Dispersion (ND) polymer have been developed by water in salt-water dispersion polymerization technology.

The aqueous solution of the polymer shows particle behaviors because of its partial crystal or cluster structure in the molecule created during the precipitation polymerization reaction.

The particle behaviors of the polymer result in swift dispersion into the pulp slurries, small and strong flock with small stress-deviation and homogeneous formation of the web.

The polymer will be applied especially for the neutral papermaking and newsprint furnishes at the high-speed machines, where the pulp slurries contain high ratio of fine recycle-fiber or calcium carbonate filler.

The retention and performance and adaptability for the papermaking process were discussed based on the unique behaviors of the polymer solution.

Solutions for Papermaking Problems with New Spraying Chemicals Part II

—A Study of Deposit Control Agents for Shower Application by Measuring Zeta-Potential on Flat Plates—

Yoshihiro Ando

Paper Chemicals Lab., Nichiyu Solution Inc.

Roles of deposit control agents are becoming more important for quality improvements of paper and paperboard in recent years. The advantage of deposit control agents for surface treatment is to solve deposit problems efficiently by controlling deposits on surfaces of pulp sheets with chemicals transferred from wire, felt, and roll parts in wet-end sections of papermaking. The main functional mechanism of "Spanol N-3250" is "Passivation" of wire and felt, etc. Therefore, "Spanol N-3250" has excellent effects not only on deposit control but also on drainage improvements in wet-end sections.

This paper describes "Passivation" of deposit control agents for shower application such as "Spanol N-3250" by measuring zeta-potential on flat plates. As a result, we found that "Spanol N-3250" quickly adsorbs onto hydrophobic plastic surfaces of the same materials as machine clothing and forms the hydrophilic layer.

We also propose new solutions with "Spanol N-3253" to provide improved performance in papermaking. "Spanol N-3253" combines the above-mentioned benefits of "Spanol N-3250" and excellent effects on dispersing calcium carbonate that is one of the main components in complex deposit. This means that "Spanol N-3253" is especially effective as felt conditioner.

Material Retention - A New Concept for CMC

Teuvo Piilola

CP Kelco Oy

It is a well documented fact that poor water retention will not only increase the solids content of the coating color, but will also change other factors such as the particle size distribution of pigments in the coating layer, the impact of which will become evident. Carboxy Methyl Cellulose (CMC) due to its multi function capability (water retention, rheology modification and the carrying of optical brightening agents) has traditionally been one of the most important coating components for the provision of good runnability.

In this paper we will more correctly discuss the concept of material retention and its implications rather than confine it to the generic term water retention. It is not only water which goes to the base sheet during the coating process, all of the mobile material will be affected as well, such as small pigment particles, latex, optical brighteners and stearate. This is why we are discussing material retention, which will have a huge impact on runnability and the quality of coated paper produced. The need for more targeted material retention systems will be summarized.

A New Raser Peak Consistency Transmitter

Bertil Olsson

Spectris Co., Ltd. BTG Division

This paper examines the importance of accurate and reliable consistency measurement and control. It presents a completely new type of consistency analyzer that opens possibilities for utilizing the knowledge of process control technology for practical implementation, which to date has been restricted by the imperfections of traditional consistency analyzers.

Practical applications with improved calculations for screening and stock preparation are presented and discussed.

Sumitomo Stripping System for Deodorization : Sumitomo/SFLOW®

- High Efficiency Type for 「Reduction of Steam Consumption」 & 「Reduction of COD」 -

Koji Masuda

Sumiju Plant Engineering Co., Ltd.

We have been applying stripping technology to odorous wastewater treatment, especially for condensate of digester and the drain of evaporator at kraft pulping process. And Sumitomo have been delivering both air stripping and steam stripping plants for long times.

Now we have the know-how of the separation process (distillation, absorption, stripping etc.) with high performance structured packing, Sumitomo/SFLOW®.

On this paper, we introduce Sumitomo stripping system for deodorization with latest delivery reference.

Development of Technology for Reproducing of Marine Environment from Dredged Sediments by Using Paper Sludge Ash and Its Beneficial Applications for Cleaning Ago Bay

Daizo Imai, Tadayo Kato and Ahmed Dabwan
Mie Industry and Enterprise Support Center,
Collaboration of Regional Entities for the Advancement Technological Excellence
Isamu Harada
Nippon Paper Industries Co., Ltd., Environmental Dept.

Paper sludge (PS), which is mainly made from paper factories waste can be utilized for useful applications. We developed the solidified material by incinerating PS, and applied this technology for restoration of the marine environment ecosystem.

The applicable areas can be summarized as follows;

- 1) Development of materials to be used as coagulant and hardeners.
- 2) Making micro-habitat pellets and marine blocks in order to treat contaminated seawater and polluted sediments.
- 3) Creating stable surface area for culturing seaweeds and seagrasses (Amamo etc.).
- 4) Making artificial tidal flats. We believe these tidal flats will contribute to enhance the stability of the ground in areas where the conditions are poor. It can provide also a vital habitat for different benthic species.

Automatic Folio Size Ream Feeding System

- Full Automatic -

Toshio Aoki
Maruishi Co., Ltd.

Maruishi introduces a revolution in paper industry, namely "Automatic Ream Feed Robot". This system was developed by Schneider Engineering in Switzerland and today, Maruishi manufactures the system under the license agreement with Schneider Engineering. The characteristic is as follows.

- Fully automatic working operation for ream feeding and size change
- Sheet is counted by optical special camera and correct number of sheet per ream is automatically fed into wrapping machine.
- No more tape inserter or ink mark for ream feeding and no more maintenance for the both devices
- Constant ream feeding ensures the higher productivity per day comparing with man power feeding

A Report on the 2006 Japan-China Pulp and Paper Technical Exchange Symposium

Mitsuaki Otsuki*1, Soichi Saji*1, Toshihiko Koshino*2 and Kunitaka Toyofuku*3

*1Oji paper Co., Ltd.

*2Hokuetsu Paper Co., Ltd.

*3JAPAN TAPPI

The first Japan-China technical exchange, "2006 Japan-China Pulp and Paper Technical Exchange Symposium", sponsored and arranged by Japan TAPPI and China TAPI, was held on May 23-24, 2006 in Beijing, China. The number of participants of both countries was almost 200. After the symposium, Japanese participants visited two mills.

Elastic Stress Analysis on Corrugated Fiberboard Container of a Box Shape under Uniform Compressive Loading in Upper and Lower Edges
(On Isotropic Side Plates)

Satoru Matsushima
Guest Professor, Center for Corporative Research and Development,
Ehime University
Shigeo Matsushima
Professor Emeritus, Ehime University

An elastic formulation of bending deformation for side plates of the case (width 350mm, height 300mm and thickness 5.44mm, longitudinal coefficients 291N/mm² and Poison's ratio 0.10) of the corrugated fiberboard box shape made by applied uniform compression loading of width direction strain zero in upper and lower edges was expressed by the application to reasonable stress function combination. And from this formulation, bending stresses were calculated and these characteristic behaviors were discussed.

Absolute maximum value of bending normal stress ($b_{x\max}=-0.0652\text{N/mm}^2$) in width direction is at plate centers and maximum values of bending normal stress ($b_{y\max}=0.262\text{N/mm}^2$) in height direction, principal stress ($=0.262\text{N/mm}^2$) and deflection ($=3.36\text{mm}$) are at centers of side edges. And absolute maximum value of bending shear stress ($b_{xy\max}=\pm 0.163\text{N/mm}^2$) and principal shear stress ($=\pm 0.163\text{N/mm}^2$) are at plate corners. Ratios of bending stresses and plane stresses (x_{\max} , y_{\max} , $x_{y\max}$) are $b_{x\max}/x_{\max}=6.6$, $b_{y\max}/y_{\max}=2.6$, $b_{xy\max}/x_{y\max}=33.5$ and those large ratio values are made of bending deformation easiness for the shape of wide and thin side planes.

Keywords: Computational Mechanics, Structure Analysis, Elastic Bending, Case of Corrugated Fiberboard, Elastic Stress Analysis, Structure Strength, Numerical Analysis

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2006年10月 紙パテ協誌

[プリント用ページ]

A New Felt Conditioner

- PRESS SHOT Series -

Satoshi Wada and Kenji Kowata

Kurita Water Industries Ltd.

In recently years, various new types of contaminations are occurred in the papermaking process, they decrease the productivity of papermaking. Felt conditioner are applied for resolving these problems.

There are very few technical reports describe on the relation between papermaking conditions and the variation of contamination, and their treatments. Here, felt conditioners named "PRESS SHOT" series were developed based on a new concept, and their applications were introduced in this paper.

PRESS SHOT series were designed and developed for dealing various kinds of the contamination in papermaking. They are especially effective for decreasing the contamination by calcium carbonate, and increasing the papermaking productivity.

It is believed that PRESS SHOT will match the increasing trend of higher filler content using calcium carbonate.

BTF Headbox and BTF Dilution Control System

- Application Report on BTF Dilution System -

Junichi Yano

Design Section, Kawano Zoki Co., Ltd.

Now two BTF automatic dilution system are running smoothly in Japan.

First installation is at Marusumi Paper PM3 in 2004, and second one is at Ehime Paper PM2 in 2005. Those two installations have achieved much better level of 2 sigma than the target value we had expected. And we are starting up the third BTF dilution system at M Paper PM4 in this August. Those three installations are BTF dilution system retrofit to the existing headbox. BTF dilution system retrofit is in some means to enhance the performance of the existing headbox by replacing the tapered header with the BTF Central Distributor and BTF dilution system.

The BTF retrofit mentioned above gives your headbox a new breath.

A complete new hydraulic headbox with BTF dilution system is in our scope of supply. 60 BTF headboxes have already been installed in Europe and 20 in North America.

Substantial improvements in CD profile, fiber orientation, and formation have been achieved. And in Japan we are starting up a new complete BTF headbox with automatic dilution system at M Paper in the next January. We will soon be able to show the best result of both third BTF retrofit to an existing headbox and a first complete new BTF headbox.

kajaaniPulpExpert, On-line Automatic Pulp Laboratory with Revolutionary New Fiber and Shive Measurement

Takeshi Sato and Masanori Shimozaki

Metso Automation, Field Systems Division

After 15 years experiences and close co-operation with the customers, there has been launched new generation automatic pulp testing laboratory - kajaaniPulpExpert. Compared to old PulpExpert systems, the measurement modules are improved to fulfill the demanding needs of today's pulp and paper quality management: high measurement precision and low maintenance need.

kajaaniPulpExpert has a new technology for measuring shives and fibers. New revolutionary, outstanding performance, measurement module for measuring fibers and shives has been developed. New measurement algorithm is not just for kajaaniPulpExpert, but also for other Metso fiber analyzers; FiberLab and FS300.

Measurement speed, analyzed fiber amount and repeatability are 5-10 times better than any fiber measurement in the past. Module is suitable for all type of paper pulps. Module will be possible to install as update for existing PulpExpert systems.

Development of Healthy/Functional Crops

Koichi Sugita

Forestry Science Laboratory, Nippon Paper Industries Co., Ltd.

We have developed the original technology to generate genetically modified woody plants for pulp materials. For example, we produced an anti-salt damage genetically modified eucalyptus into which the gene of anti-salt bacteria was introduced. Although a lot of genetically modified plants have been developed in all over the world, the eucalyptus is one of the most difficult plant species. We developed the original technology to generate a genetically modified eucalyptus. This technology could be applied to produce healthy/functional crops which healthy/functional materials, peptide or protein, were accumulated into an edible part of plant. We mainly introduce here genetically modified rice seeds for the prevention of human cedar pollen allergy and type-II diabetes. These rice seeds demonstrated the potential to induce biological effects in cultured mouse cell systems. We will commercialize the rice seeds in near future, following verification of efficacy and safety in animals and human.

For Sound or Noise in Industrial World

- As Part of T.F.O. from SKF -

Yasuhiko Yamasaki

Condition Monitoring Service Division, SKF Japan

The noise and the vibration that maintenance person says are the one while the machine is operating it. Where does the noise come? The mystery is investigated.

It thinks about the efficiency improvement of the industrial world once by considering the generation mechanism of the sound or noise now.

Introduction of Latest Development of Dienes Cutting Technology Both in Soft and Hard

- Is Your Slitting System Still Profitable -

Heinz Herkenrath and Moritake Onuki

Dienes Japan

Concerning with Dienes "Full Automatic Slitting ", we have to admit that there are lots of newly developed features beyond our expectation. One of them is a "Cutting point" to be kept mechanically with its system. Mechanically referred is a specially designed and manufactured "Ball-bearing knife holders axles (zero gap in between)" combined heat treated mechanical components. PLC control system can guarantee "Automatic depth adjustment" to be within $\pm 0/05\text{mm}$ and its CSL to be continuously maintained.

Automatic positioning system is guaranteed to be free from vibration and keep its accuracy $\pm 0.1\text{mm}$ with its speed 1,500mm/min (5 to 6 units combination of Top and Bottom knife can be positioned within approximately 30 second).

Based on these developments, a lot of cutting loss can be reduced together with increasing number of layers (multi layer of non coated paper, 850g/m² can be cut smoothly) and contribute its manufacturing efficiency.

Not only Automatic positioning system, Dienes as a long experienced German knife manufacture have been developing its original knife quality to be fit for clean cut with long life running.

Effective Pest Control Activities

Shinya Yokoo

Research & Development Division, Earth Environmental Service Co., Ltd.

ESCO (Earth Environmental Service Co., Ltd.) have made annual base contact with up 7,000 food-related facilities, including food contact packaging manufacturing factories, for prevention of foreign mater from finish products. Any contamination derived from environment such as a contents product, a bottle and/or a package material, facilities, manufacture machines, an air environment, pests, use water, wastes and a consciousness of all of the members (contained outside workers).

However, these activities don't work well or not effect. For example one of the person does activities, another persons don't know activities. And they dose not distinguish phenomena from causes.

Today, we explain about effective pest control activities in the quality assurance.

The Development of a Functional Heating Sheets Using a Papermaking Technique

Yoshiaki Kumamoto, Masataka Ishikawa, Tooru Ugajin, Hidetoshi Ooga and Hironobu Kawajiri
Processing Development Research Laboratories, Kao Corporation

We have focused on adoption of pulp that is a recyclable material, instead of plastic that is an exhaustible resource, and developed "a paper bottle" in 2000 for the first time in the world as an attempt to the recycling society in the future^{1~2}). In this development, we found out that the pulp is a material with a great diversity and can immobilize a functional powder at a high ratio³).

We have developed a ultra-thin and flexible heating sheet element with abundant steam generation by immobilizing the iron powder and the activated carbon on the pulp in a high density, applied paper-making technique^{4~6}).

In this paper, we report this heating sheet element that is quite different from a common heating element such as the body warmer.

IQInsight

Junichi Mori
Metso-SHI Co., Ltd.

A new, instantaneous full-sheet moisture profile measurement has been after the press section. This new measurement system, called IQInsight, takes instantaneous profiles of the moving paper using an array of infrared detector modules across the web. This measurement array and associated fiber optic cabling are embedded in a pressurized protective enclosure that is located early in the first dryer section.

With this measurement, short-term machine direction and cross direction disturbances that cannot otherwise be seen clearly with traditional dry end scanning measurement are isolated and quantified. Specific examples of MD and CD stability problems that have been identified and corrected are presented.

New Techniques for Paint and Coating Applications

Keisuke Miyamoto
Nihon SiberHegner K.K.

In practical applications the following information is important concerning the rheological behavior of coatings:

- Time depending behaviors directly after a sudden change of shear conditions. Practical use:
Application behavior (thixotropy), leveling, sagging, layer thickness.
- Rheology plays an important role in dewatering processes. It is therefore interesting to analyze the dewatering process and the rheological behavior of a suspension simultaneously.

This paper informs newer rheological measurement about the behavior paints and coatings. Presented is a new test method for the investigation of the thixotropic behavior.

New Folio Size Sheeter Technology - FS-PRO Mark-Free Sheeting Technology -

Robert Deutschle
E.C.H.WILL GmbH Germany
Kimio Shigeta
Paper Converting Machinery Sect., 2nd Machinery Dept., K.K. IRISU

Today's folio sheeting industry is facing a challenging situation. The printing industry requires high quality paper and board material to achieve high-quality printing results to satisfy their customers' needs.

At the same time, paper mills and converters face high price and cost pressure due to smaller order sizes and shorter time to delivery. In this situation, marks and scratches on high-quality paper and board mean insufficient product quality, less output, more waste, lower efficiency and productivity of equipment and can result in customer claims, loss of image and, at the worst, loss of future orders.

E.C.H. Will has found the solution to avoid marking on the surface of top quality paper and board, even at speeds of up to 350m/min.

- June 6-9, 2006 at Seoul, Korea -

Takayuki Okayama*1, Toshiharu Enomae*2, Hiroshi Ohi*3, Toshihiro Ona*4, Makoto Iwasaki*5, Yosuke Uchida*5, Shunichiro Uno*6 and Kunitaka Toyofuku*7

*1 Tokyo University of Agriculture and Technology

*2 The University of Tokyo

*3 University of Tsukuba

*4 Kyushu University

*5 Oji Paper Co., Ltd.

*6 Nippon Paper Industries Co., Ltd.

*7 JAPAN TAPPI

2006 Pan Pacific Conference was held (6-9 June) under the auspices Korea TAPPI in Seoul, Korea. Mr. Okayama, professor of Tokyo University of Agriculture and Technology and Mr. Toyofuku, executive director of JAPAN TAPPI attended the conference as the representatives of JAPAN TAPPI. Pan Pacific Conference is held every two years in the rotation of 8 countries of Pacific Rim. The conference was held in Canberra, Australia in 2004. At the 2006 conference 8 Japanese speakers attended. A summary of Japanese presentations and other interested ones are described.

Report of 2006 TAPPI Coating and Graphic Arts Conference

Jun Makihara

Research and Development Dept., Product Development Research Lab.

Nippon Paper Industries Co., Ltd.

2006 TAPPI Coating and Graphic Arts Conference was held in Atlanta, GA, USA from April 24 to 27. This technical conference included 69 presentations in 21 sessions. The author had an opportunity to attend it, and review some of presentations in this report.

International Conference on Nanotechnology for the Forest Products Industry, which was organized by TAPPI for the first time concerning about nanotechnology, was also held at the same place from April 26 to 28. This report introduces a few of presentations as well.

Report of Studying at Royal Institute of Technology

Koki Kisara

R&D, Pulp and Paper Research Laboratory, OJI Paper Co., Ltd.

The author had an opportunity to study at Royal Institute of Technology (KTH) in Stockholm, Sweden for one year in 2005. The author joined "Wood and Pulping Chemistry Research Network (WPCRN)" project in department of Fibre and Polymer Technology of KTH as a guest researcher. In this report, the review of WPCRN, the impression of the studying, and the life in Sweden are presented.

Synthesis of Artificial Zeolites Containing Titanium Dioxide and Their Abilities for Removing Bad Smell Substances

Satoru Fukugaichi, Akira Uramoto, Hideaki Ichiura and Masaaki Morikawa

Paper Industrial Research Institute of Ehime Prefecture

Shouichi Kyougoku and Kousaku Nagashima

LINTEC Corporation

Toru Yamamoto, Naoto Matsue and Teruo Henmi

Faculty of Agriculture, Ehime University

Paper sludge (PS) has been discharged from paper-mill as an industrial waste of paper manufacturing processes. Most of them has been burned in an incinerator and thrown into the discard as solid waste for reclaiming a land. It is urgent matter to establish an effective technique for a recycling of PS, in consideration of current environment-oriented trend. In recent years, the formation of zeolites using PS ash has been reported. Acetaldehyde (CH_3CHO) is a kind of toxic gas with strong fruity smell, and is contained such as in motor exhaust and tobacco smoke. It is strongly required to develop agents for removing toxic gases, in relation to current health-oriented trend. In this study, we tried to synthesize three types of zeolites, NaP1 (P- TiO_2), Zeolite A (A- TiO_2) and Faujasite (F- TiO_2), from PS ash containing titanium dioxide, discharged from paper mills in Shikokuchuo-shi. These zeolites were produced by hydrothermal reaction with sodium hydroxide. The capacity of these formed zeolites containing titanium dioxide was evaluated by removing acetaldehyde experiment. All formed zeolites containing titanium dioxide had abilities for removing acetaldehyde gas. In particularly, F- TiO_2 showed the highest activity. It was suggested that the zeolites synthesized using from PS ash would have enough ability for the removal of toxic gas in atmospheric environment.

Key words: paper sludge, zeolite, titanium dioxide

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Meguri Aoyama
Asia Group, Nippon Keidanren

China is facing an increasingly polluted environment severe shortages of potable water and declining availability of arable land. As a consequence, Chinese government is now taking a series of measures to protect the environment. These measures, called green policy, are formulated and executed by two governmental ministries. One is the National Development and Reform Commission, who is responsible for controlling the material flow. The other is the State Environmental Protection Administration, who is promoting participation from the civil society for protecting the environment.

Recent Development of Water Environment Policy : Area-wide Total Water Pollutant Load Control Scheme for Enclosed Coastal Seas in Japan

Yasuo Takahashi
Office of Environmental Management of Enclosed Coastal Seas,
Environmental Management Bureau, Ministry of the Environment

The Area-wide total water pollutant load control system has been implemented under national legislation including the Water Pollution Control Law for the Tokyo Bay, the Ise Bay and the Seto Inland Sea, where the population and industrial activities are highly concentrated along extensive enclosed coastal sea areas. As a result, pollutant load has been steadily decreased in these areas.

As for the current status of the water environment in these sea areas, achievement ratios of the Environment Quality Standards are not sufficient, although the water quality has been clearly improved in the Tokyo Bay.

In the Tokyo Bay, Ise Bay and the Osaka Bay, actual adverse effects are occurring, such as large-scale oxygen-deficient water mass. As for the Seto Inland Sea (excluding the Osaka Bay), the occurrence of the oxygen-deficient water mass is limited, and the water quality is better than other sea areas.

Based on these situations, the Central Environment Council submitted a report to the Minister of the Environment on May 18, 2005, entitled "Basic Direction of the 6th Total Water Pollutant Load Control Scheme". In this report, the council recommended that it is necessary to further reduce the pollutant load in the Tokyo Bay, Ise Bay and Osaka Bay, while continuing existing measures for the Ise Inland Sea (excluding Osaka Bay) to maintain the present water quality.

The council report also suggested issues to be further addressed, including the consideration of targets for the water quality and methods of evaluation of these targets. The Ministry of the Environment is in the way to consider these issues under "extensive review of the framework of the water environment".

Current Situation Surrounding Industrial Waste Disposal in Chiba Prefecture

Hiroo Kitada
Chiba Prefecture, Environment and Life Division, Industrial Waste Dept.

In Chiba Prefecture, about 40% of the amount of illegal disposal in the whole country concentrated in the 1999 fiscal year, and it became a dishonorable result in which nationwide worst one for three years after that.

The wastes by which illegal abandonment was carried out are the sulfuric acid pitch, the tree waste generated with demolition of a building, construction sludge, construction surplus soil, etc.

For this reason, in Chiba Prefecture, measures, such as strengthening of the surveillance by a green action team etc., installation of the environmental criminal division in the Chiba Prefectural Police, and original regulations establishment of Chiba Prefecture, were taken as illegal abandonment preventive measures, and illegal abandonment has been tackled.

In the 2004 fiscal year, the amount of illegal abandonment decreased to 1/20 of the year of a peak as a result of this measure. However, the amount of survival of the waste with which illegal abandonment of the end of the 2004 fiscal year was carried out amounts also to about 3,900,000t.

Therefore, in Chiba Prefecture, motion of removal measure command to a contractor and promotion of the removal and processing by administrative subrogation are tackled.

Rules of a Risk Communications in Solution of Soil Contamination Problem

Toichiro Maekawa

Environmental Solution Headquarters, KOKUSAI KOGYO CO., Ltd.

After the enforcement of the Soil Contamination Measures Law, a soil investigation usually has been conducted all around the country in an occasion of a land trading, and the number of contaminated sites which is recognized has been increased rapidly. However the awareness of soil contamination is arisen in the society, only the negative information about soil contamination such as damage to the human health or decreasing land price is spread and the enlightenment of appropriate information is not given enough. As a result, many cases that a contamination is recognized fall in to trouble because the anxiety of people who face to a contamination is large and the understandings of a contamination between the stakeholders such as polluter, land buyer and neighborhood are different. Therefore in this problem, the importance of making the base for a solution by getting common understandings about contaminations between the stakeholders known as risk communication has risen.

This report introduces the roles of a risk communication that took part in the solution to the soil contamination problem and explains some notices for proceeding risk communication based on the experience of soil and groundwater contamination cases which the writer faced.

The Regulatory Framework for Pulp and Paper Mill Effluent in North America and Europe

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In the United States, the National Pollutant Discharge Elimination System (NPDES) of the Clean Water Act is the permitting system to control water pollution. This system consists of both chemical and biological method for the assessment and the reduction of toxic discharges. The Effluent Limitations Guidelines and Standards (1998) set discharge limits for dioxins, chlorinated phenolics, chloroform, TSS, BOD and AOX. EPA is developing options to encourage effluent trading for NPDES permittees.

In Canada, the Pulp and Paper Effluent Regulations (1992) under the Fisheries Act set discharge limits for TSS and BOD, and prohibit the discharge of effluents that are acutely lethal to rainbow trout. As well, mills are required to conduct Environmental Effect Monitoring (EEM) studies.

The Integrated Pollution Prevention and Control Directive of 1996 is a set of common rules on permitting for industrial installations in the EU countries. The permits must be based on best available techniques (BAT). The Reference Document on BAT in the pulp and paper industry set emission levels of TSS, COD, BOD, AOX, total nitrogen and total phosphorus to water. The waste water tax scheme has been widely adopted in EU member countries to improve water quality.

Status and Trend of Environmental Laws and Regulations

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Although many environmental laws and regulations have been enacted and put in force mainly to tighten the control since the 1990s, this trend could continue for the duration.

The focus of attention to come in environmental laws and regulations could be placed on (a) energy saving and global warming curbing countermeasures, (b) waste and recycling affairs and (c) the chemical substance management. Especially, it is expected to introduce a drastic reform for "Waste Disposal and Public Cleansing Law" because there are some situations taking place, which interfere with adequate recycling.

In this environmental seminar, the environmental laws and regulations are presented, which have been revised for the past several years and have to be watched closely.

It can be said that for ensuring compliance to environmental laws and regulations, it is necessary to understand the purpose and outline of the laws and regulations, and raise the level of efforts.

Technology for Total Chlorine-free Bleaching of Kraft Pulp

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Acid treatment was developed for non-chlorine bleaching of an oxygen-delignified hardwood kraft pulp. About 70% hexenuronic acid in the kraft pulp was removed after the acid treatment at pH3 for 1 hour at 105°C. After full bleaching with the acid treatment (A) followed by the ozone (Z) and the hydrogen peroxide (P), the final brightness of the pulp reached approximately 85 %ISO, keeping the viscosity over 15.0 cP. Little hexenuronic acid existed in the kraft pulp after this bleaching (A-Z-E-P). Furthermore, the brightness stability of this pulp was much better than that of chlorine dioxide bleached pulps.

Keywords: Kraft pulp, Non-chlorine bleaching, Total chlorine-free bleaching, Brightness, Hexenuronic acid

The Latest Environment Monitoring Technology for Drainage Water and Emission Gas Utilized in Industrial Plant Factory

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HORIBA, Ltd.

The environmental pollution issue being recognized as social problem in 1960s was local social issue, and the casualty was relatively limited extent. However, the global environmental issue is currently going through ecological crisis, and we have to consider how to reduce the effects on the environment the world over. The challenges accompanying in a business activity in environmental priority days is to consider environmental issue.

Next year is the 40th anniversary of the enactment for fundamental law of pollution in Japan. We outline in terms of steps in the progress of monitoring technology related to environmental problem and the latest environmental monitoring technology.

Analyzers for Effluent Gas and Waste Water

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Environmental pollution surely escaped from the worst state. But, is not complete. Movement of environmental purification must be continued. What primarily you must do will be grasp of the situation. It will be necessary more and more in future to grasp the environmental situation broadly more precisely. I introduce a trend about environmental measurement and a way of thinking of an analyzer along it as follows.

Sound and Vibration - Measuring Instrumentation

Tomoharu Wakabayashi
RION Co., Ltd.

The environmental pollution issue of noise and vibration has relations very much in our daily life. There are a lot of complaints concerning the noise and the vibration in the complaint concerning pollution. In this report, it introduces instruments to measure noise and vibration.

Introductions of the Environmental Measurement Devices of Shimadzu with a Focus on Electronic nose "FF-2A"

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Shimadzu Corporation, Analytical & Measuring Instruments Division

The present situations of the odor measurements are explained. The principle of the electronic nose is presented. Some improvements of the electronic nose toward the practical applications are shown. One of the improvements is using the trap tube in order to avoid humidity interferences and another is to use new analytical method of sensor signals. Using new signal processing drives the absolute values of odor intensity and odor characters. The odor continuous monitoring of the black liquor's combustion furnace is explained by using improved electronic nose.

Keywords: Electronic nose, trap tube, multivariate analysis, odor characteristic measurement, Continuous measurement of odor

Operational Experience of the Recycle Boiler

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From the point of view of the global warming and the cost performance of the fuel, the fuel conversion, from the fossil fuel to the biomass, has recently been prompted among the pulp and paper industry in Japan.

Because the fuel conversion had been one of the most important problems in Hachinohe mill for years, we decided to install the waste boiler that used waste tires, waste wood and paper sludge as fuel. At last we started the commercial operation of the waste boiler in July 2004. Since then, the boiler has been working well.

As a result of the operation of this waste boiler, we were able to reduce not only the energy cost but also the amount of the CO₂ discharge.

Sludge Dewatering Machine, Rotary Press Filter

-Dewatering of Paper Mill Sludge-

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TOMOE ENGINEERING CO., LTD.

Dewatering process is an important process to reduce and solidify sludge, and people are asking for an effective machine. Further, because of increased interests in the global warming due to CO₂ emission, a machine with not only with good dewaterability but also with low power consumption is desired. Rotary Press Filter is a sludge dewatering machine with new structure that has been introduced by Fournier Industries Inc. in Canada and is now being manufactured and sold by Tomoe Engineering. In addition to its features such as low power, simple structure, space saving, and less wash water, this dewatering machine is suitable for the new times in respect of maintenance and control. Since its introduction, number of units installed has been increasing year by year. In Japan we have installed 44 units for dewatering of sewage sludge, plant wastewater sludge, etc. Among them, 11 units have been installed for dewatering of papermaking wastewater sludge. In this report, I will introduce Rotary Press Filter's performance and effect of introduction.

Biological Effects and Biomonitoring of Pulp and Paper Mill Effluents

- Research Topics up to Vitoria 2006 -

Hiroshi Araki, Reiji Kaneko and Akiko Nakamura

Japan Pulp and Paper Research Institute, Inc.

The 6th International Symposium on Environmental Fate and Effects of Pulp and Paper Mill Effluents (Fate & Effects Symposium) was held as "Vitoria 2006" on April 9-13 in Vitoria, Brazil. Since 1991, the Fate & Effects Symposium has played an important role as a place of discussion for researchers on aquatic organism's response and toxicity associated with pulp and paper mill effluents. Topics of the symposiums for 15 years, including health assessment, toxicity identification, bioaccumulation and hormonal activity, are reviewed and the current of biological regulations (biomonitoring) in EU and North America are discussed.

Keywords: Environmental Fate and Effects, Pulp and Paper Mill Effluents, Aquatic Organism, Environmental Impact, Toxicity, Bioaccumulation, Endocrine Disruption, Biomonitoring

Development of Manufacturing Process for High Quality Calcium Carbonate by Causticizing Process in a Kraft Pulp Mill (Part1)

-Fundamental Study on the Controlling Method of Calcium Carbonate Morphology-

Yasunori Nanri, Haruo Konno and Hideyuki Goto

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Kazuto Takahashi

Gotsu Mill, Nippon Paper Chemicals Co., Ltd.

Causticizing step is a process to convert green liquor into white liquor in kraft pulping mill, and this process also produces a precipitated calcium carbonate as a by-product. If this causticizing calcium carbonate (CCC) could be extracted from this step as paper making material, the lime-kiln operation would be shortened or stopped; thus the consumption of fuel oil and the discharge of CO₂ gas can be reduced. However, the conventional CCC has serious problem of lower brightness, higher wire abrasion and poor opacifying ability as paper filler. Then, we challenged controlling the morphology of CCC like commercial precipitated calcium carbonate (PCC). In this paper, slaking and causticizing reactions were separated and precisely controlled, and then various shapes of CCC with high opacifying ability and little wire abrasion could be successfully obtained.

Keywords: Causticizing Reaction, Precipitated Calcium Carbonate, Filler

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Review of Paper Coating Technologies

Koji Okomori

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Production of coated paper has been increased since it was invented, and efficient production has been also pursued by means of increasing speed, widening wire of paper making machines and etc. From the point of view of economy and saving natural resources, coat weight and basis weight are required to be decreased without lowering coated paper quality. Paper coating technologies including coating methods and materials have been evolved to meet these demands.

Recent Trends on Coating Color and Its Latex

Hisashi Matsui

Polymer Research Laboratories, JSR Corporation

Recent trends and information on coating color and its latex are described. They are investigated into cost reduction, quality improvement and productivity improvement. On cost reduction, increasing content of calcium carbonate and reducing the binder content are proceeding by using improved latex. On quality improvement, brightness, paper gloss and printing gloss is improved. For the improvement, contents of fine kaolin, fine calcium carbonate and fluorescent dye are increased and plastic pigment or latex giving hard ink set-off is used. On productivity improvement, coating speed and coating solids content are increased. Increasing content of calcium carbonate and reducing content of starch are advanced. And it is required for latex to be non-adhesive and have good fluidity.

Under these trends, following two kinds of latex are wanted. One is latex which gives stronger pick resistance and better runnability. Another is latex which gives better printing gloss. The improvement of the former has been advanced by small particle size and control of particle morphology, molecular weight and cross-linking of polymer. The latter has been improved by polymerization method of acrylonitrile and control of particle morphology.

Recent Coating Color Preparation System

Hidehiko Yamazaki

Metso-SHI Co., Ltd.

Metso's equipments for coating color preparation covers the material receiving equipments to the surroundings of coater heads. Especially, in this paper, modern coating color preparation processes, which enable cost effective and environment-friendly production as well as the production with excellent quality, are introduced.

For color preparation, batch type methods are usually well-known and widely used. Here, newly developed continuous method (GradeMatic), pressure screen (OptiScreen) in color supply system, deaeration equipment (OptiAir), on-line color measurement system (ColorMat), etc., are described. In addition, coating color recovery system (OptiCycle) is described.

The Latest Technology and Trends in Coating Pigments

Chris Nutbeem

Pigments for Paper, Imerys Minerals Ltd.

Paper and paperboard coatings have become increasingly more sophisticated in order to meet the advertising world's need for better visual image. This together with machinery advances has driven significant pigment developments over the past 20-30 years. For the most part development has proceeded at an evolutionary rather than revolutionary rate, but in the past 10 years we have seen marked increase in the rate of new pigment developments and a dramatic reduction in the shelf-life of existing pigments.

However, there are now signs that the paper industry is changing in response to ever increasing cost pressures and at best flat paper pricing. Although going forward we are still projecting significant growth in printing and writing paper grades and a consequential increase in pigment demand especially carbonates, it is likely that the way in which pigments, especially high value pigments, are developed and used will change.

The focus now is very much on how pigments can be used as part of an application concept to offer value to the paper maker. New pigments are increasingly being developed to work concurrently with other pigments in multi-pigment application concepts. Understanding how pigments influence coating structure in multi-pigment systems is essential if performance and value are to be maximized and it is clear that there are synergies there to be exploited. Most notably it is apparent that the combination of platey kaolins with engineered carbonates is a powerful tool for the paper maker to either adjust quality or generate value through reduction of basis weight or replacement of expensive opacifiers or glossing additives.

Operating Experience : No.1 Coating Machine at Ishinomaki Mill

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No.1 coater machine in Ishinomaki mill has started producing coated paper since 1981 as an off-machine coater. Currently it produces 330 ton per day off-set printing paper and gravure paper.

No.1 coater machine runs with very high efficiency and has achieved 97.3%, the top rating efficiency among the all off-machine coaters in Nippon paper.

This paper reports the No.1 coater machine operating experience, including the rebuild recently conducted.

GelView Sensor to Optimize the Coater Drying System

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Honeywell developed the new sensor technologies of the measurement and control, which will be applied for the area from wet part to dry end. These technologies have been launched from the last year in Japan. The GelView is the one of these new technologies and focusing on the coater part. The GelView provides the solution for measuring the coating consolidation throughout the drying process and can offer monitoring the coating consolidation progress and profiles that could not be expressed by any sensors before.

The solution of the binder migration etc. that is the problem of coated paper and the improvement and the stabilization of the quality can be attempted by this technology. Moreover, it comes to lead to an appropriate reduction in dry energy by the control or the production increase of the product.

The contribution to a new paper manufacture technology by this technology can be expected.

Operating Experience : No.5 Coating Machine at Hachinohe Mill

Masato Shiraishi
Hachinohe Mill, Mitsubishi Paper Mills Limited

Hachinohe mill established since 1966 has five coaters and two of them are on-machine coaters. No.5 blade coater has been operated since 1988 and the fastest actual operating is 1,575 m/min. It produces about 650 ton of coated paper per day.

In this report we refer to three operative and technical problems and solutions to archive faster operation of No.5 coater.

- 1)Technology of splicing wide rolls on high speed operating
 - 2)Material and dimensional optimization of blade
 - 3)Renewal of quality monitoring and controlling system
- Furthermore two new technical topics are introduced.
- 4)Development of process technology for 2,000 m/min operation
 - 5)Application of CFD (Computational Fluid Dynamics) to coating process

Influence by Coating Blade on Coating Machine Operation

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BTG Div. Spectris Co., Ltd.

Due to machine speed-up, coating with blade became the most popular coating operation in the last decade. Position of the blade tip in contact with paper & coating color determine the final coated paper surface quality and also machine runnability. The determination of the right settings, blade tip material and blade design is the key of success. The advantages of using High Performance blade are a slow wear of the blade tip, that allows keeping blade tip shape constant and then to stabilize coater conditions, to enhance coated surface quality in using material that perfectly fit coating color peculiarity. Determination of the right mode of running (bent or stiff), the proper blade tip material and blade characteristic, and the optimized blade holder settings provide stability in both quality and productivity.

Operating Experience: PM8 On-machine Coating at Niigata Mill

Kazuhiro Takasumi
Niigata Mill, Hokuetsu Paper Mills, Ltd.

PM8 in Niigata mill has been in operation since 1998, and this machine has the biggest productivity of coated paper in all our mills. In December 2001, the third-press was remodeled into shoe-press. As a result, the productivity was improved significantly. In this report, I would like to introduce the outline of the on-line coater part and the latest experience of the operation.

A report on International Paper and Coating Chemistry Symposium 2006

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National Printing Bureau

International Paper and Coating Chemistry Symposium (PCCS) 2006 was held in Stockholm during June 7th to 9th, 2006 under co-organization of KTH, STFI and YKI. PCCS dealt with fundamental and practical researches on wet-end and coating chemistry. The number of participants was around 220 including 22 delegates from Japan. The programs had 10 sessions featuring 90 oral presentations including 19 invited lectures and 17 poster presentations. Trends of presentations were summarized and notable researches were cited in this report.

The Development of New Extensible Paper for Heavy Duty Sack that Helps Material Saving

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Multi wall kraft paper sacks used to have more than two layers to prevent from break. Recently the layers of the paper sacks and the basis weight of the kraft paper have been reduced to minimize the cost and the material. However, the strength of the paper sacks has come to the lower limit because of the reduction. For the further material saving, the stronger and tougher sack paper with the same amount of material is needed. Nippon Seitai and Nippon Paper Industries have developed the new extensible paper suitable for multi wall paper sacks. The elongation of the extensible paper is much higher than that of the normal kraft paper and the ordinary extensible paper 'Clupak'. It is found out that the new extensible paper is much tougher to break because it absorbs the impact of dropping or thrusting by stretching. Also as the new extensible paper is made of 100% soft wood kraft pulp and the wood is mostly from the periodic thinning, it is recyclable and environmental friendly. In this paper, we would like to show the significant characteristics of the newly developed extensible paper, and the material saving example of multi wall kraft paper sacks by using the extensible paper.

Keywords: Extensible paper, Material saving, Multi wall kraft paper sack, Elongation, Recyclable,

Periodic thinning