

CONTENTS

Jan-03

New Year's Speech	Soji Ban...(1)
The Special Issue of JAPAN TAPPI 2002 Annual Meeting at Shizuoka.Fuji	
General Review of JAPAN TAPPI 2002 Annual Meeting at Shizuoka.Fuji	Planning Subcommittee, JAPAN TAPPI...(4)
Keynote Address	Soji Ban...(15)
Lecture by Winner of 2001 JAPAN TAPPI Prize	...(24)
A Visit to Fuji Mill-Daishowa Paper Mfg. Co., Ltd.-	...(32)
Technical Report	
The Latest Improvement for High Consistency Pulper & Detrashing and Sticky Contamination Analyzing Equipment"SCAN"	Takeshi Kanazawa...(41)
The Practical Examples of Paper Machine Operation Using"MOAS"	Noboru Negishi and Youhei Shiokoshi...(48)
Carbon Think as a Measure against Global Warming	Naoto Haraguchi...(55)
Operate a Boiler System Designed to Combust Paper Sludge in Combination with Chip Rubbish	Yousuke Makita...(61)
-Contribute to the Community, Conversion Fossil Fuel and Reduce Energy Costs-	
Trial Plantation of Eucalyptus globulus Using Clonal Technology in Australia	Toshiaki Tanabe...(68)
Procedure for Obtaining CoC(Chain of Custody)Certificate of FSC	Hiroaki Niwata...(74)
Forest Certification System in Mitsubishi Paper Mills Limited Hachinohe Mill	
Exhaust Gas Treatment System for Ozone Bleaching Process	Junji Kitatani, Hiroshi Sanui and Kazuho Iwamoto...(79)
New Process Producing Highly Concentrated Polysulfide Liquor	Keigo Watanabe, Yasunori Nanri, Tatsuya Andoh and Yoshitsugu Shinomiya...(84)
Mechanism of the Fluting of Coated Paper in Web	
-Offset Printing - Approach from Design of Paper to Improve-	Tetsuya Hirabayashi, Yukiko Suzuki, Yukio Tani and Daisuke Watanabe...(92)
The Development of Functionality Sheets	Hajime Tsuda...(98)
-PBO(Poly(p-phenylene-2, 6-benzobisoxazole))Fiber Sheet-	
Barito Project, Operation Experience Pulp Manufacturing from Acacia Mangium	Kazuyoshi Noguchi and Satoshi Fujita...(103)
Operating Experience of9PM	Katsuhito Minami...(111)
Operating Experience of High Brightness DIP System	Keisuke Irikawa...(115)
Starting Up of Onsite PCC Plant and Experiences of Neutralized Paper Making	Munetaka Aoyama...(121)
Topics & Information	
About Reexamination of Fuel Classification	Japan Paper Association, Engineering & Environment Div....(126)
Committee report	...(03)
Coffee break	...(128)
Papyrus	...(131)
Industry News(Domestic and International)	...(134)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(144)
List of Patents issued and Laid-open Publication	...(146)
Price list of Domestic Logs and Wood Chips by District	...(157)
Wholesale Price list of Papers at Tokyo Trade Center	...(158)
Other Monthly Statistics	...(160)
News from the Association	...(162)

The Latest Improvement for High Consistency Pulper & Detrashing and Sticky Contamination Analyzing Equipment "SCAN"

Takeshi Kanazawa

Aikawa Iron Works Co., Ltd.

High consistency pulping providing a helical rotor and detrashing performance (This technology was first developed by Aikawa in the world about 25 years ago.) is now recognized as one of the best technologies for deinking system, and many stock preparation machinery suppliers are manufacturing similar equipment globally. Recently this technology has been dramatically improved, specially for energy saving and contaminant removal, and was awarded Sasaki Prize by Japan Tappi on 2002 as the best development of the year. This paper reports about the latest technology for the High Consistency Pulping and Detrashing System and also reports for interesting equipment to analyze sticky materials contained in the stock, which is called "Sticky Contamination Analyzing Equipment, SCAN".

The Practical Examples of Paper Machine Operation Using "MOAS"

Noboru Negishi

Sinko kagaku Co., Ltd.

Youhei Shiokoshi

Nippon Paper Unitec Co., Ltd.

The technique to take the real-time data of wet paper web moisture and the two parameters - "Heat Transfer Rate Coefficient" and "Pressing Coefficient" - which related to the moisture makes it possible paper machine to be controlled reliably and precisely, and improves the productivity.

Additionally, the accumulation of time-series files which contains simultaneously moisture data at different parts of paper machine, above-mentioned parameters and general operation data leads to systemize quantitatively the reason for moisture variations. This systemization standardizes the control action which traditionally based on experiences or subjective factors, and rationalizes significantly paper machine operation.

"Heat Transfer Rate Coefficient" and "Pressing Coefficient" are the specific factors in "MOAS"; "HTRC" is the specific characteristics of paper which resulted from furnish composition and wire retention, affecting hydrokinetically to dewatering performance at press section. "PC" reflects quantitatively the dewatering performance at each press section.

Carbon Think as a Measure against Global Warming

Naoto Haraguchi

Overseas Forestation Dep. Raw Materials & Purchasing Div. Oji Paper Co., Ltd

This article illustrates the possibility of contribution to the measure against global warming by Japanese Pulp and Paper industry and overseas forest plantation.

While the vast majority of pulp wood used in paper making originates from saw mill residues and thinning, the industry has made a commitment to expand overseas forest plantations in order to secure wood supplies and to contribute to the world's environment.

Japanese Pulp and Paper companies together plan to establish 550,000 ha of forest plantations, both inside and outside Japan by year 2010. As for Oji Paper Co., Ltd, it has a goal to establish 200,000 ha of overseas forest plantations by 2010. Overseas forest plantation projects not only create jobs, but help the area in environmental improvements such as reduced salinity and reduced wind erosions. In addition, cultural exchanges between Japanese expatriates and locals take place. Recently, carbon absorption by forests is drawing more attention toward forest plantations. While it is not clear how carbon absorption is accounted and valued, Oji plans to help other companies which plan to develop overseas forest plantation projects. Overall, forest plantations mean recycling of wood, reducing the use of fossil energy while lessening the pressure to clear natural forests.

Operate a Boiler System Designed to Combust Paper Sludge in Combination with Chip Rubbish- Contribute to the Community, Conversion Fossil Fuel and Reduce Energy Costs -

Yousuke Makita

Power Section Tokai Pulp & Paper Co., Ltd.

In recent years Tokai Pulp & Paper Co., Ltd. has made a concerted effort to improve the natural environment, such as minimized the effect of the solid waste that is released into the city. This means to increase wastepaper utilization rate, and maximize the uses of recycled paper.

During the process of minimizes its impacts on the environment, the increased of manufacture waste is also generated. With paper sludge/ chip rubbish steam plant in place (number 10 boiler), Tokai Pulp & Paper Co., Ltd. in now able to use the majority of its paper sludge by-produce, reducing both energy and disposal costs. By using the paper sludge and chip rubbish as a fuel, Tokai Pulp & Paper Co., Ltd. minimizes its impacts on the environment, reduces reliance on fossil fuel related greenhouse gas emissions, and stability of the power generation.

Trial Plantation of Eucalyptus globulus Using Clonal Technology in Australia

Toshiaki Tanabe

Forestry Resources Australia office, Pulp and Paper Research Laboratory,

Nippon Paper Industries

Nippon Paper Industries has been developing the clonal propagation technology of E. globulus by micropropagation to supply a high yield, quality, survival rate and uniformity for plantation purposes. In 2000, our research laboratory was established in Collie, Western Australia in order to try to produce clonal plantlets by micropropagation. A photoautotrophic culture in the rooting stage produced more than ten thousand vigorous rooted-plantlets and enabled us to work the culture under non-aseptic conditions. A low temperature plant tissue storage method propagated enough shoots to provide for rooting with a regular amount of work in the shoot propagating stage. These methods technically and economically improved micropropagation of E.globules for practical use. The micropropagated plantlets were planted in plantations in Victoria and Western Australia. They have shown healthy growth without any problems for the initial period.

Procedure for Obtaining CoC (Chain of Custody) Certificate of FSC Forest Certification System in Mitsubishi Paper

Mills Limited Hachinohe Mill

Hiroaki Niwata

Hachinohe mill, Mitsubishi Paper Mills Limited

Mitsubishi Paper Mills Limited (MPM) Hachinohe mill obtained Chain of Custody (CoC) certificate under the rules of the Forest Stewardship Council (FSC) by Scientific Certification Systems (SCS), organization approved to submit FSC certificate.

FSC Certification system is NGO based forest management certification system and CoC certificate qualifies the products coming from well-managed forests.

With obtaining CoC Certificate, Hachinohe mill are allowed to put FSC-Logo on it's certified products, such as coated paper and fine paper of which at least 30% of virgin fiber comes from well-managed forest.

The field inspection for Hachinohe mill was conducted on 14 July, 2001 by inspectors of AMITA Corporation, Japanese representative of SCS, after spending 2 months on designing control system and documentation according to the CoC standard. The CoC certificate based on the assessment report was issued to MPM Hachinohe mill on August 20, 2001.

This year, the CoC certificate for Hachinohe mill was expanded to include the sales division and logistics division. Now MPM can manufacture and sell FSC-certified coated paper and fine paper.

MPM is working to obtain FSC forest management certificate for MPM's own plantation in Chile and FSC certified wood chip will be shipped from the plantation by 2003.

Exhaust Gas Treatment System for Ozone Bleaching Process

Junji Kitatani

Kitakami Mill, Mitsubishi Paper Mills Limited

Hiroshi Sanui and Kazuho Iwamoto

Market Development, Nippon Sanso Corporation

Reuse of the oxygen in the exhaust gas from ozone bleaching process is an available technology for chemical saving. To use the residual oxygen effectively, it is necessary to destruct the residual ozone, and to refine oxygen. In this paper, we will introduce the newly developed exhaust gas treatment system for ozone bleaching process.

This system is composed of a packed type absorbing tower, pumps and fans. And for absorbing agent we use alkali in the kraft pulping process, which contains sodium sulfide for ozone destruction and caustic soda for carbon dioxide absorption. This system is very simple, and almost free from corrosion, and the maintenance is easy. And also as an ozone destructor, both equipment cost and running cost are cheaper compared with the heating type one. These points are also discussed in this paper.

New Process Producing Highly Concentrated Polysulfide Liquor (II)

Keigo Watanabe and Yasunori Nanri

Nippon Paper Industries Co., Ltd., Pulp and Paper Research Lab.

Tatsuya Andoh

Kawasaki Kasei Chemicals Ltd., Research and Development Center

Yoshitsugu Shinomiya

Chlorine Engineers Co., Ltd., Engineering dept.

A new electrolytic process to produce highly concentrated polysulfide (PS) liquor from the white liquor has been developed. This electrolytic process can provide two different compositions of cooking liquor, not only electrolytic oxidized liquor (EOL) but also caustic soda, from the white liquor (WL) in the process. By adding the EOL to the digester, a great improvement of pulp yields can be obtained and required active alkaline can be reduced. In addition, combination use of the electrolytic cell and modified cooking (MC) enhances both effects of EOL. But a mill scale has not been realized because of high capital investment and large electricity for electrolytic process.

To optimize the combinatorial use of EOL and MC economically, optimum balance of PS and sodium sulfide in PS cooking liquor were discussed in this paper. Consequently the amount of WL to be oxidized with electrolyzer was reduced. Also a new electrolyzer was tested in long term. Successful results of the operations with pilot-scale are shown in this paper. This new electrolyzer is expected simple enough even in practical mill scale.

Through the optimization of the way of cooking, it is found that whole WL does not have to be oxidized with electrolyzer. As a result of the development of new simple and compact electrolyzer with high efficiency, required electricity was economized and space for installation was reduced and acceptable capital investments will be achieved.

Mechanism of the Fluting of Coated Paper in Web-Offset Printing? Approach from Design of Paper to Improve ?

○Tetsuya Hirabayashi, Yukiko Suzuki, Yukio Tani and Daisuke Watanabe

Pulp & Paper Research Laboratory, Oji Paper Co., Ltd

In relation to the recent rapid development of web-offset printing, fluting in web-offset printing is becoming a serious quality issue requiring an urgent solution. Our study on this issue identified that fluting in web-offset printing is a phenomenon where an imaged area had been buckled by a compressive force caused by a combination of tension and contractile force during the printing operation. Also, the number of the fluting in web-offset printing is determined by the compressive force, the size of the imaged area and the stiffness of the paper

On Dec. 2001, we started to produce a new paper product which is free from the fluting in web-offset printing on. It's designed to have small contractile force which is occur by drying of web-offset printing process.

The Development of functionality sheets- PBO (Poly(p-phenylene-2, 6-benzobisoxazole)) fiber sheet -

Hajime Tsuda

Technical Research Laboratory, Tomoegawa Paper Co., Ltd.

We have developed several types of functionality sheets made with polymer fibers and metal fibers using the wet paper making technique. We have recently developed the Poly (p-phenylene-2, 6-benzobisoxazole) (PBO) fiber sheet for printed circuit boards.

This PBO fiber (ZYLON) is made by TOYOBO CO., LTD. and has excellent properties such as high tensile strength, high tensile modulus, low moisture content and high thermal resistance.

This report presents the way of making PBO fiber sheet, it's property and PBO pulp which is needed to make the PBO fiber sheet.

Barito Project, Operation Experience Pulp Manufacturing from Acacia Mangium

Kazuyoshi Noguchi

Production Manager PT TEL Musi Mill (Indonesia)

Satoshi Fujita

Mill Manager PT TEL Musi Mill (Indonesia)

The first large scale plantation of Acacia Mangium was begun 1991 at Province of South Sumatra, Indonesia for the first time, by a Joint Venture Company composed by PT. Barito Pacific Timber Corporation (BPT) and Forestry Ministry of Indonesia.

And a construction of a new Pulp Mill was started by a Joint Venture Company between Indonesian and Japanese consortium. Nippon Paper Industries Co., Ltd. participated in this project to provide technical and production assistance to this mill for the long term of contract.

The Mill construction was begun September 1997 and completed November 1999, and trial operation of the mill was consequently conducted May 2000, the commercial production begun after the commercial transfer of a key to the Mill Manager. It is our pleasure to have an opportunity to introduce the outline of the Mill and a story from our experience.

Operating Experience of 9 PM

Katsuhito Minami

Geibo Mill, Japan paperboard Industries Co., Ltd.

The 9PM for board paper has been started operation at Geibo mill in Apr. 2001. This was a substitute for the Osaka mill which was closed down in Dec. 2000 under the reorganization of the board paper industry.

The production capacity is 494 t/d. The wire's width is 5100mm and the operating speed is max 550m/min.

Also the machine has some characteristics. For example high temperature and high consistency disc dispersion system, shoe presses, JF sizer etc. So we are able to supply the best quality board paper for the user.

I'd like to report an outline of this machine and the operating experience since it was started up.

Operating Experience of High Brightness DIP System

Keisuke Irikawa

Daishowa Paper MFG. Co., Ltd., Honsha Mill Fuji Div.

In Daishowa Honsha Mill, Fuji Division, we have 3 lines of DIP process which amount of product is 630t/d. The current High-Brightness-DIP process, start running from September 2000, makes it possible to brighten 75% of DIP.

In here we have Sprit-Flotation System, which is first trial in Daishowa. This process is able to intensify ink rejecting by flotation cell, which set up in front and back of hydrogen peroxide bleaching. This system can discharge ink before it break up into minute particles, like less than 2 μ m. Therefore, it is effective for manufacturing high brightness DIP. Now, we use mixtured of old newsprint and old magazine, however, from the good result of our new process, we are able to make the best use of any waste papers.

In this report, we will introduce system, operation experience and quality of our New-DIP-Process of this two years.

Starting Up of Onsite PCC Plant and Experiences of Neutralized Paper Making

Munetaka Aoyama

Shiraoi Mill, Daishowa Paper Co., Ltd.

Daishowa Paper Shiraoi Mill completed onsite Precipitated Calcium Carbonate (PCC) manufacturing facility in June, 2000. We have planed to transfer from acid to neutralized paper making in all paper grades except for news print and liner board. PCC is used to make neutral paper and the decision was made to build an onsite plant. A PCC manufacturing and supply agreement was signed with PCC manufacturer, Specialty Minerals FMT K.K. (SMF), in the summer of 1999.

Specialty Minerals Inc. (SMI), a parent company of SMF, has an excellent reputation as a producer of high quality PCC and is the largest producer with 2.1million tons of PCC at their 55 plants located around the world.

In general, neutralized paper making can provide many advantages including less degradation over time, higher brightness and opacity, and better printability. On the contrary, some disadvantages include difficulty in keeping machines clean, ink feathering, and high costs. Because of these disadvantages, we have limited to apply neutralized paper making to PPC paper and special grade of fine paper. We, however, were able to overcome these technical problems and, with the exception of newsprint, we have decided to neutralize most paper grades.

At this time, we would like to present a general description of on site PCC plant, and PCC characteristics. Also, we would like to present our experiences in the transfer from acid to neutralized paper making.

CONTENTS

Feb-03

Finishing Technology II

- Sheet Cutter with Speedpiler Michio Takahashi ... (2)
Maruishi-Bielomatik Folio Sheeter. The Newest Technology Shuichi Matsunaga... (8)
Automation of the Sorting Work of Planographic Sheets
-Planography Automatic Sorting Machine with Suction Belt Feeding- Akira Baba... (17)
Operating Experience of Sheeter with Speedpile Seiichi Tsuno... (22)

Topics & Information

- The Introduction of Automatic Roll Preparation Device for Coater Unwinds Masato Takahashi... (27)
Operating Experience of Sirius reel, Fuji N-2 Paper Machine Noriyuki Mano... (34)
Measuring Equipment with No Contact of Unevenness of Roll Paper's end Face Shigeki Nakamura... (39)
-The Dishing Measuring Equipment-
Operating Experience of Lo-SolidsTM Cooking Yuji Miyata... (49)
The Outline of Katsuta Paperboard Machine Remodeling Osamu Mantani... (54)
New On-line Fiber Orientation Sensor System Based on Anisotropy of Dielectric Constant - Shinichi Nagata... (58)
Its Development and Proof Experiments-
TPM Implementation for Seven Best Kisao Taniguchi... (65)
A Progress Report of Pulp and Paper Test Standards Committee of Japan TAPPI Toshiharu Enomae... (74)
and an Update on JIS and ISO Standards

Introduction of Research Laboratories (33)

- Division of Forest Resources Utilization, Section of Forest Environment and Resources, ... (86)
Department of Bio-environment, Faculty of Agriculture, Yamagata University
Science of Bioenvironment, Graduate School of Agricultural Science (Master Course),
Yamagata University
Science of Bioresources, United Graduate School of Agricultural Sciences, Iwate University
(Three-year Doctoral Course)

Research Report

- Thermogravimetric Analysis of Pigments and Fillers for Papermaking Toshiharu Enomae... (89)
The Method and Characteristics of Synthesized Zeolite Prepared from Paper Sludge Ash
Takao Ando, Masato Saito, Shigeo Muramatsu, Kimio Hiyoshi, Junsuke Haruna, Naoto Matsue, Teruo Henmi and Toshio Fukuda... (94)

Pulp and Paper Mills in Japan (21)

- Harada Mill, Mishima Paper Co., Ltd.-Mishima Paper Co., Ltd. ... (105)

Committee report

- Committee report ... (03)
Essay on Intellectual Property ... (85)
Coffee break ... (88)
Papyrus ... (111)
Industry News (Domestic and International) ... (114)
List of Titles in Foreign Journals Received by JAPAN TAPPI ... (125)
List of Patents issued and Laid-open Publication ... (127)
Price list of Domestic Logs and Wood Chips by District ... (137)
Wholesale Price list of Papers at Tokyo Trade Center ... (138)
Other Monthly Statistics ... (140)
News from the Association ... (142)

February 2003 Abstracts

Sheet Cutter with Speedpiler
Michio Takahashi
Jagenberg Co., Ltd., Voith Paper Group

In order to increase productivity of sheeter with simple operation, Jagenberg developed continuous pile change system "Contimat", which is former version of "Speedpiler", together with European paper mill.

Further, Jagenberg improved "Contimat" and start to supply new version "Speedpiler". The principle of "Speedpiler" is same as "Contimat" but there are many improvements on "Speedpiler" system. The principle is that pile change is done without sheet loss and without speed down with keeping same function of two-layboy system.

Due to development of "Contimat" and "Speedpiler", we could eliminate 2nd layboy, which means total length of sheeter can be reduced remarkably and we can save the required space. Besides, by eliminating 2nd layboy, total operation of sheeter becomes simple and easy because no operation is required for 2nd layboy.

Further, new version "Speedpiler" is modular design, so the erection period is reduced, which means quick starting-up can be expected. For continuous pile change, one gripper system is adopted, therefore simple and quick pile change can be possible without markings.

As to unwind stand, "Speedwind" is designed. One of the important advantages of "Speedwind" is minimized downtime. There is "free space" at unwind. It is possible to feed new rolls either M/C side or paper flow direction.

Due to development of new version of "Speedpiler" and "Speedwind", it is expected that the productivity is improved remarkably.

Maruishi-Bielomatik Folio Sheeter. The Newest Technology
Shuichi Matsunaga
Engineering Dept., Maruishi Co., Ltd.

In the rapidly changing international market today, Maruishi-Bielomatik Folio Sheeter has distinguished itself by tailoring its innovations to meet the customer's specific needs.

Maruishi-Bielomatik Folio Sheeter has transformed the latest technology into new machine systems, such as non-reject system which has zero reject paper during stack change; analog less drive control with high-speed bus communication; unit control by IPC (Industrial Personal Computer). Especially, the control systems are infused with newest technology. Moreover, the special DD-type (direct drive) cutter has remarkably improved the speed curve, and Maruishi pallet robot system can securely carry damage-free paper products anywhere after piling.

With new technology and concept, Maruishi-Bielomatik Folio Sheeter can bolster super quality and high-efficiency production.

Next in this article, I'd like to introduce in details the new technology and high-tech features of Maruishi-Bielomatik Folio Sheeter and also its market prospective in the future.

Automation of the Sorting Work of Planographic Sheets (Planography Automatic Sorting Machine with Suction Belt Feeding)
Akira Baba
Tokyo Feeder Co., Ltd.

In relation to the automation of the final process handled at the finishing department of the paper mill, results are being produced as the automatic sorting of good and bad papers have been improved by the advancement of the camera and the development of the automatic sorting machine.

Our Company has studied to see if the development of a user-friendly and cost effective Planography Automatic Sorting Machine could be possible, and focused our attention on suction belt feeding. As the result, we have succeeded in simplifying the machine and reducing the costs, and thus have become able to offer the cost effective Planography Automatic Sorting Machine to the industry.

The simple construction of this sorting machine has made it possible for female workers to operate the machine without requiring any special skills.

It has been a while since printing was regarded as the barometer of culture, but with the increase in the new ways of using paper due to the advent of PCs, there have been further calls for improvement of quality and uniformity.

The inspection process is also making the transition from visual check to that by the automatic sorting machine, but as the check itself does directly result in production, it may not be possible to invest a lot of money into inspection, judging from the current state of the economy.

In order for this device to be used more widely in the industry, it is crucial to evolve the device to one that is more cost effective and sophisticated by trying to reduce its costs by continuing to come up with new ideas.

Our Company hopes to continue to contribute to the industry by accumulating efforts in technological development by incorporating new ideas as well as utilizing the expertise of machines that we have developed until today.

Operating Experience of Sheeter with Speedpiler

Seiichi Tsuno

Hokuetsu Kamiseisen Co., Ltd.

We reported our operating experience of sheeter with Speedpiler at 2001 JAPAN TAPPI Annual Meeting and on 2002 January JAPAN TAPPI JOURNAL. So we have 3 sheeters with Speedpiler. Speedpiler makes precisely counted pile changes possible without sheet loss at full operation speed. Because of single layboy, sheeter length is shorter in comparison with the previous arrangement with two layboy. And we started up additional one new sheeter with speedpiler in July 2002. This sheeter that named "THE NEW GENERATION" has a lot of equipments using new technologies.

We report our operating experience of this new generation sheeter with speedpiler.

The Introduction of Automatic Roll Preparation Device for Coater Unwinds

Masato Takahashi

Iwakuni Mill, Nippon Paper Industries Co., Ltd.

Must do the continuous patch of new roll and old roll with unwinds of coater. Therefore, the work of putting a tab tape and an adhesive double-coated tape on new roll is necessary. It has already been automated with the printing machine. But, it was one of the operator works, and it wasn't automated in the paper industrial world. Automatic roll preparation device was introduced in 4C/R to automate this work and to save labor.

It is report about the outline of automatic roll preparation device, the preparation conditions and the effect on introduction by this report.

Operating Experience of Sirius reel, Fuji N-2 Paper Machine

Noriyuki Mano

Fuji Mill, Oji Paper Co., Ltd.

N-2 machine of Fuji Mill started up in October 2001. The new plant produces white lined board in a basis weight range of 160-450 g/m². The wire width is 4.7 m and maximum design speed is 800 m/min. This machine is the fastest multi-fourdriner machine for white lined board in the world.

We adopted Sirius reel, permitting roll diameters up to 4,000 mm.

The design of this machine was to set new milestones, including outstanding winding characteristics. As a result of this development work, the latest Sirius generation covers all requirements. In this paper, our operating experience of Sirius reel is reported.

Measuring Equipment with No Contact of Unevenness of Roll Paper's end Face – The Dishing Measuring Equipment –

Shigeki Nakamura

Nippon Paper Unitec Co., Ltd.

This equipment is 'dishing' measurement equipment which roll paper of newsprint paper, telephone directory paper, and other use paper, was rolling up paper from Winder, and was installed in the position on a conveyance.

It is equipment which measures the displacement of the main axis of roll paper's end face before rolling up and by the side of the reverse side by the laser sensor, and calculates 'dishing' (unevenness) of rolling up using a sequencer.

It is also possible to also have equipped the external judging output and the printer actual result printing function, and to transmit 'dishing' (unevenness) data to a higher rank host.

Operating Experience of Lo-Solids™ Cooking

Yuji Miyata

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

The EMCC cooking was introduced to the digester at Chuetsu Pulp & Paper Co., Ltd., Sendai Mill in 1994. The brightness of brown stock pulp was increased and the bleaching chemical was saved as expected. However, since the digester was overloaded, the main extraction load became bigger and the digester operation was not in stable, especially in rainy season when the chip moisture was increased. As a result, it has caused big losses such as the reduction of the pulp production.

In September, 2001 the digester was modified to the Lo-Solids™ cooking. The digester- operation has become stable and the pulp quality has been improved since the Lo-Solids™ cookig was introduced. The Sendai mill made a Down-Flow trial in Lo-Solids™ cooking this year. It was confirmed that the digester operation became stable further by the Down-Flow operation.

The Outline of Katsuta Paperboard Machine Remodeling

Osamu mantani

Hokuetsu Paper Mills Ltd., Kanto Mill (Katsuta)

No.1 machine (K1) at Kanto Mill (Katsuta) has been in operation since April 1975, manufacturing high quality white paperboard from the used paper collected in Kanto and its surrounding areas. Starting up K1, Hokuetsu Paper Mills Ltd. has established its place as one of the leading paperboard manufacturer, including the coated ivory board at the Niigata Mill, and the coat white-lined board at Kanto Mill (Ichikawa). Since operation, K1 has repeated remodeling in order to improve the quality of products and the operating efficiency.

This article introduces the outline of machine remodeling and its operating experience.

New On-line Fiber Orientation Sensor System Based on Anisotropy of Dielectric Constant – Its Development and Proof Experiments –

Shinichi Nagata

Advanced Technology Research Laboratory, Oji Paper Co., Ltd.

A new method for measuring the fiber orientation is developed. Measuring the fiber orientation is very important from the viewpoint of the quality control of paper, non-woven fabrics and other plastic sheets. The dimensional stability of paper at various temperatures, for instance, is known to be strongly influenced by the fiber orientation.

This new method is based on the measurement of anisotropy of dielectric constant of paper that is caused by the anisotropy of electronic polarization of cellulose molecules. The microwave dielectric resonators have been employed as a measuring tool in this method, and the fiber orientation direction is determined as the one along with the direction of the maximum dielectric constant. The difference between the maximum value and the minimum value of the dielectric constants reflects the degree of orientation.

The fundamental performance of our system was proved by the static measurement of PET films, and the dynamic measurements were done at a speed of 1,000 m/min by using our high-speed test-coating machine.

TPM Implementation for Seven Best

Kisao Taniguchi

7B propulsion Dept., Osaka mill, Kishu Paper Co., Ltd.

Osaka mill is located in the south of Suita City Osaka Prefecture. The location is near Shin-Osaka station, Osaka Airport, Suita interchange of Meishin expressway. This is the important point of the transportation.

Our mill have complete quality control and plenty of challenging spirits to improve the evaluation of "Kishu Paper of Specialty paper". Because of that the same premises, R & D Dept. tie up with the mill. For that reason, we achieve the mission as the development mill.

Our mill began implementing TPM in 1998 and won the "Award for TPM Excellence-First Category" in 2001. We will report how to begin and how it goes and the progress and the result. Furthermore, how to tackle with it.

A Progress Report of Pulp and Paper Test Standards Committee of Japan TAPPI and an Update on JIS and ISO Standards

Toshiharu Enomae

Paper Science Laboratory, Bio-material Sciences, Graduate School of agriculture and Life Sciences, The University of Tokyo

Testing standards committee member of JAPAN TAPPI

Here reported are recent activities of Pulp and Paper Test Standards Committee of Japan TAPPI. The committee is responsible for developing test standards related to pulp and paper. Committee drafts of JIS for establishment and revision are developed, Japan TAPPI test methods are established and revised, and new ISO standard proposals and their systematic reviews are discussed and voted on by the committee. JIS has been conformed to ISO standards since 1998 so that Japanese domestic standards would not become a non-tariff barrier. Recent JIS revisions feature: (1) 20 ° C and 65 % r.h. as the standard atmosphere for conditioning and testing has already expired to validate only 23 ° C and 50 %, (2) in all of the optical measurements, the geometrical and optical characteristics – illuminant C diffuse illumination / normal observer – with an integrating sphere must be applied. All of the test methods using the Hunter reflectometer will be abolished as of March 31st, 2003, (3) in determination of folding endurance, ISO fold number has been newly defined and the conventional fold number will expire on March 31st, 2003, (4) in determination of ash, the ashing temperature 575 °C was replaced with 525 °C.

Since Japan became a P-member of ISO/TC6 (pulp and paper), we acquired a right to propose revision in systematic review and had more of a voice in Committee Draft voting. Moreover, we registered experts in some Working Groups to reflect our opinions directly in the Working Draft stage. Accordingly, the domestic WG3 "optical properties" was organized. At last, the next international meeting of ISO/TC6 is scheduled in November of 2003, for the first time, in Japan. Kind cooperation and participation by everyone interested would be appreciated.

Keywords : board, ISO, JIS, paper, pulp, test standard

Thermogravimetric Analysis of Pigments and Fillers for Papermaking

Toshiharu Enomae

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

Thermogravimetric analysis was applied to several kinds of pigments and fillers for papermaking to examine exact temperatures from which mass reduction commences. Clay and talc began to reduce mass from about 350 °C and 450 °C, respectively. Clay contained in coated paper began to reduce mass from about 350 °C. Therefore, "Other fillers and pigments (than calcium carbonate) such as clay and titanium dioxide are also unaffected by ashing at 525 °C." stated in ISO 1762:2001, "Paper, board and pulps - Determination of residue (ash) on ignition at 525 °C" was found to be apparently wrong. Calcium carbonate began to reduce mass from about 580 °C, suggesting no decomposition at 525 °C specified in JIS P 8251:2002. The result also suggests no decomposition even at the ashing temperature 575 °C specified in the previous edition of ISO 1762. However, the standard tolerates an accuracy of ± 25 °C due to technical difficulty in temperature control of muffle furnaces. So, it is appropriate that the ashing temperature was lowered from 575 to 525 °C in the revision. There was no mass reduction for titanium dioxide up to 1000 °C.

Keywords: ash, clay, calcium carbonate, talc, thermogravimetric analysis, titanium dioxide

The Method and Characteristics of Synthesized Zeolite Prepared from Paper Sludge Ash

Takao Ando, Masato Saito, Shigeo Muramatsu and Kimio Hiyoshi

Fuji industrial research institute of Shizuoka prefecture

Junsuke Haruna, Naoto Matsue and Teruo Henmi

Department of agriculture, Ehime Univ.

Toshio Fukuda

KAWARA MFG. CO., LTD

Paper sludge ash (PS ash) discharged from Fuji area, Shizuoka prefecture reach about 160,000 tons/year. Therefore, the development of a technique for utilizing of PS ash is essential for recycling waste materials.

PS ash collected in Fuji area has little of SiO₂ and much Al₂O₃, CaO, in comparison with the general material of the artificial zeolite (e.g. coal fly ash). PS mainly consists of calcite, talc and kaolinite, which are originally present in paper. These minerals are converted to gehlenite, meta-kaolinite, meta-talc and lime by incineration. For this reason, the PS ash has excess Ca and low Si content.

We synthesized an artificial zeolite from the PS ash by the "Si-added method" to exclude the effect of excess calcium present in the ash. Furthermore, we studied the reaction conditions such as temperature, time and the alkali used, and found optimal synthesis conditions. Chemical and mineralogical characteristics of the synthesized zeolite were then investigated. It was found that an NaP1-type zeolite was synthesized in an autoclave by processing at 120 ° C for 2 hours using a 3.5M meta sodium silicate (Na₂SiO₃) solution.

The characteristic of Si and Al dissolved in a diluted NaOH solution shows a characteristic property of zeolite. The PS ash, coal fly ash and Shirasu were classified to S type ($\text{Si}/\text{Al} < 0.5$), P1 type ($0.5 < \text{Si}/\text{Al} < 2$), and P2 type ($\text{Si}/\text{Al} > 2$), respectively, in terms of the characteristic solubility of Si and Al in diluted NaOH solutions. For zeolite synthesis, the PS ash was found to require more Si to meet the synthesis condition because the PS ash had a low Si and a high Ca content. As it was, Ca silicate (CSH) was generated and zeolite synthesis was prevented. Shirasu was chosen as a material providing complementary Si. Ca in the PS ash reacted successfully with the Si in the added Shirasu to generate zeolite.

Keywords: zeolite, paper sludge, calcite, talc, kaolinite

CONTENTS

Mar-03

Process Control and Automation General Review of 26th Pulp and Paper Process Control Symposium	
Process Control and Automation Committee, JAPAN TAPPI	...(2)
Latest News about Automation System from Foreign Country's References	Kiyoshi Dekula...(16)
New Trials Surrounding DCS	Takekazu Takayama...(28)
A New Information System for Paper Roll Handling	Takahiro Shigematsu...(36)
The Performance of Sheet-break Monitoring System	Takaharu Yokota...(43)
Integration of Control Rooms in the Power Plant and Kraft Pulp Plant by DCS	Akitosi Konno...(47)
The Newest Technology of Detecting Streak and Line Fault	Masahiro Nakata...(53)
-Algorithm of NASP-Multi500System-	
Advanced Technology for Streak Detection by Full-digital processing	Satoshi Suzuki...(60)
The Newly Developed Method Applied for Streak Defects Detection	Minoru Fujita...(64)
The Latest Technology of Detecting Streaky Flaws	Yoshinobu Sugino...(70)
Introduction of Defect Inspection Systems and Their Technology	Junichi Harada...(76)
Topics & Information	
Pressure Loss Calculation Software-2002	Shigeru Saito...(82)
Automatic Friction Coefficient Testing Machine	Hirofumi Sagawa...(89)
New Visual Inspection System of Paper & Film	Yoshiro Yamada...(91)
-Build"Ultra-high-resolution Visual-Inspection System"by TECHNOS Neuro-Vision5000K-	
Research Report	
HBS Pulping (5)-Chemical Structure and Properties of HBS Lignin-	Hideaki Nagaoka and Yoshihiro Sano...(97)
Manufacturing of Magnetic Papermaking Fibers and Paper(Part)	Katsuhisa Fujiwara and Masaaki Morikawa...(106)
-Preparation of Magnetite-Loaded Pulps at their Lumen by in situ Synthesis-	
Pulp and Paper Mills in Japan (22)	
-Mishima Mill, DAIO Paper Corporation-DAIO Paper Corporation	...(114)
Committee report	
	...(03)
Coffee break	...(96)
Papyrus	...(120)
Industry News(Domestic and International)	...(123)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(134)
List of Patents issued and Laid-open Publication	...(136)
Price list of Domestic Logs and Wood Chips by District	...(146)
Wholesale Price list of Papers at Tokyo Trade Center	...(147)
Other Monthly Statistics	...(149)
News from the Association	...(151)

March 2003 Abstracts

Latest news about automation system from foreign country's references

Kiyoshi Dekula

Metso Automation K.K., Paper Automation Div.

When we started to produce "Paper" with machine. It's control is basically manual control or hand made ones. But as everybody can see, control/automation system is totally different nowadays related with Paper Machine's histories.

As everybody knows that Automation System defined DCS, QCS and MCS have so long history since more than 40 years ago. In that period, there have been many progresses, evolution and development. Also Hardwares and Softwares are changing.

Based on those histories, I would like to report the latest Automation System defined by DCS, QCS and MCS based on actual references.

Before introducing those references, I would like to express my deep appreciation for the people who advised, informed and helped me to make this report.

New Trials Surrounding DCS

Takekazu Takayama

Oji Paper Co., Ltd., Fuji Mill

In October 2001, an innovative board machine named N-2 started up in our Oji Paper Fuji mill. The design of control system was discussed repeatedly so as to handle this machine very comprehensively.

During its 25 years history, DCS has grown up and well matured. Nowadays, it seems that there left only nominal differences between one vendor and another. On the other hand, many intelligent sensor systems and information systems have also been developed around DCS. From the viewpoint of plant operation, all the systems should be combined and unified to serve operators like a single "seamless system". We think that DCS is a nucleus in such system.

This paper introduces our basic idea of the control system of N-2. Whole the scope of instrumentation system as well as some application of IT is also discussed.

A New Information System for Paper Roll Handling

Takahiro Shigematsu

Kushiro Mill, Nippon Paper Industries Co., Ltd.

This paper describes the modifications incorporated in the information system for the existing paper roll handling process. In order to share production, marketing and inventory information between the headquarters and each domestic mill, the paper roll tracking system was replaced in Kushiro Mill. Since the previous system lacked memory, communication bandwidth and expansion capacity, new PC system was introduced. It has successfully consolidated various products information into single database. The next phase is to expand this service to each department by constructing company-wide LAN, and promotes the new system capability to the headquarters.

The Performance of Sheet-break Monitoring System

Takaharu Yokota

Niigata Mill, Hokuetsu Paper Industries Co., Ltd.

As a paper machines are larger and faster; even short-time sheet break causes an enormous loss. When a sheet break occurs, it repeats frequently for the same reason. Therefore, a prompt identification of break reasons in early stage and working out countermeasures are of great importance in improving production efficiency.

In this report, a subject is sheet-break monitoring system. A sheet-break monitoring system, which is an equipment identifying a breaking stage and reasons by observation camera, is expected to reduce the sheet break.

Hokuetsu Paper, Niigata mill adopts three types of the sheet-break monitoring systems. This report focuses on comparing functions and performances of each system.

Integration of Control Rooms in the Power Plant and Kraft Pulp Plant by DCS

Akitosi Konno

Daishowa Paper Mfg. Co., Ltd.

To improve the productivity and to reduce the cost, Daishowa Iwanuma Mill integrated control rooms in power plant and Kraft pulp plant to the central control room respectively by introducing DCS. The project was successfully completed in a short period the mill can spare.

This paper describes the control system configurations and the change of operations in both plants.

The Newest Technology of Detecting Streak and Line Fault-Algorithm of NASP-Multi 500 System-

Masayoshi Nakata

Technology Development, Vision System Business DIV, OMRON Corporation

The measure that detects the streak fault in our company becomes about ten years. As a trend of those days to the next of the Spot-fault inspection system, we developed technology and products, and we developed the Streak-fault inspection system that combined analog-processing technology and special detection algorithm. In the performance of detecting the streak fault, the improvement was continuously achieved up to now. The feature of the streak fault is long, slender, linear, and that the defective signal is a minute level. So, it is beginning of the measure that we adopted the camera and detection algorithm, which is different from these of detecting the spot fault.

At present, using image-processing technology, we develop the detection algorithm that suited the amount of the features of the streak fault, and have released the products whose detection performance improved. Furthermore, the detection algorithm has evolved by the needs of detecting the scratch fault, the line fault, and the wrinkles fault.

Thus, it is sure that sensor technology has contributed to the base somewhat to the demand or needs of the paper manufacture industry till present.

Advanced Technology for Streak Detection by Full-digital processing

Suzuki Satoshi

COGNEX K.K., Surface Inspection System Division

COGNEX developed a new web inspection system, "SmatView ICN". This system has the following advanced technologies for streak detection. (1) 12 bit digitalization (4096 gray levels) and full-digital processing, (2) Superior streak detection algorithm, (3) Reliable Defect Identification by over 40 defect features. It allows you to detect scratch (short streak) and moving streak.

The Newly Developed Method Applied for Streak Defects Detection

Minoru Fujita

Vision Systems Engineering, System Components Dept.

Toshiba IT-Solutions Corporation

The combination of several defect detection channels which sensitivity are optimized for different width and length of defects is verified. The proposed width-length defect model enables us to fully understand the characteristics of the capability of defect detection channels. The image analysis results show that the detection channels can enhance a streak defect.

Another important feature of defect detection is connectivity analysis, unification and defect classification.

The newly developed web inspection system, M9000 utilizing these methods provides various aspects of streak defect information to assist understanding of the manufacturing process.

The Latest Technology of Detecting Streaky Flaws

Yoshinobu Sugino

Research and Development Dept., Futec Inc.

As has been the case, many requirements are made to the inspection system.

Even more diversified requirements are seen because of its possible versatile applications. There are some industries in which, a short while back, it was thought to be hard to apply automatic inspection, but now because of more increased competition, some kind of automatic inspection would be a most effective means to be apart from the other competitors. The competition is not only among domestic but world-wide and is by all means intensifying.

As to the overall performance, there are two critical points in focus.

The first is how to most effectively utilize the flaw data for the improvement of product quality and production yield. The inspection system was once regarded as a simple sensor, but the times have changed now and is required to provide an opportunity to becoming more competitive position in the market. The collected data is thought to be even more valuable if it were shared among operators via network. It would be further processed, like SQC analysis, to bring in more benefit.

The second is, needless to say, the sensitivity itself. Market is going to require defects detected which were used to be not required before. The more sensitive means, more data is gathered.

It is crucial to make the system more efficient in handling vast flaw data along with improved sensitivity. On top, how to most effectively share that flaw data internally in order to achieve the better result.

Here I describe briefly about how we can achieve the afore-mentioned balanced performance.

Introduction of Defect Inspection Systems and Their Technology

Junichi Harada

Mitsubishi Rayon Co., Ltd.

Mitsubishi Rayon has been developing and offering the optical inspection systems using the line CCD cameras, about 10 years. These are being used for the manufacturing processes of the optical-film, the steel or non-steel. In these fields, there is a demand to detect the defects such as uneven surfaces and streaks, which can be finally confirmed with the human eyes. Therefore, we have developed the special image-processing technology to detect the defects accurately. We introduce our image processing technology for the paper manufacturing process.

Pressure Loss Calculation Software-2002

Shigeru Saito

KITZ Corporation, Sales Engineering Dept.

We would like to introduce you new pressure loss calculation software for piping system, which is the renewed and updated version from one of last year and easier to use. We would like to explain to you mainly additional features from the previous one here, not the same features. The previous software calculated fluid pressure loss based upon virtual installation of valves and elbows on a fixed piping system.

There had been some differences from the actual piping system with this way, which sometimes created difficulties in handling.

The new software was programmed to solve this problem. You can design plane and lateral drawings automatically by selecting piping materials from the menu and calculate pressure loss by setting fluid conditions at the piping system.

Thus, there is no restriction for number of piping system patterns. Users can specify as many piping system patterns as possible.

Also you can check pressure losses at the specific locations by clicking mouse at any points of the piping system. You can print out the whole piping system to verify it clearly. We hope that this new software will be of great help to you.

Automatic Friction Coefficient Testing Machine

Hirofumi Sagawa

Sagawa Seisakujo Co, Inc.

Automatic Friction Coefficient Testing Machine adapted to ISO 15359 is composed of a main body and a personal computer instrument apparatus.

Installation of samples is more convenient by utilizing weight with clamp mechanism. Automatic measurement will eliminate individual errors. It is highly reproducible.

New Visual Inspection System of Paper & Film-Build "Ultra-high-resolution Visual-Inspection System" by TECHNOS Neuro-Vision5000K-

Yoshiro Yamada

TECHNOS JAPAN CORP.

The Paper Industry is known of very fast work speed as well as the cold mill in the Steel Industry. The mass production of polarizing film and diffusion film which will be the materials of the display device is progressing by using the high speed production technology. TECHNOS holds a world patent of anew technology systems. And we again developed a visual automatic inspection system which has the best accuracy in the world. This new system is buildup a function called Mini-Movement of human eyes. Our new system is able to find the minutest defect to a low-contrast spot. 10000m every minute in the high speed line by only one camera. This new system has a accuracy of 1000 times of a former CCD line camera (equal of 4000 pixels). As we developed this marvelous system 5000K, we can deliver within 48 hours upon receipt of an order and are able to install within 3 hours.

HBS pulping (5) -Chemical Structure and Properties of HBS Lignin-

Hideaki Nagaoka

Nippon Paper Chemicals Co., Ltd.

Yoshihiro Sano

Laboratory of Wood Chemistry, Graduate School of Agriculture, Hokkaido University

Chips of fir (T) (A. Sachalinensis Mast.) as softwood and birch (B)(B. platyphylla var. japonica Hara) as hardwood were pulped by HBS pulping process with fresh HBS of 1,4-butanediol and its recovered solvents (RHBS-1 and 2) prepared from spent liquors. HBS lignins (HL), that is, BL-1-3 and TL-1-3 were isolated in yields of 90-150% based of chips from the spent liquors of birch and fir, respectively. Furthermore, HL was fractionated into ether insolubles (IS) and solubles (S) to analyze. Each the lignin was subjected to elemental, spectral spectrographic (UV and NMR), thermomechanical, gel permeation chromatographic analyses, determination of hydroxyl groups, and also nitrobenzene oxidation.

Keywords: Pulping with high boiling solvent, softwood, hardwood, lignin, chemical structure, softening point, average molecular weight

Manufacturing of Magnetic Papermaking Fibers and Paper (Part I)-Preparation of Magnetite-Loaded Pulps at their Lumen by in situ Synthesis-

Katsuhisa Fujiwara and Masaaki Morikawa

Paper Industrial Research Institute of Ehime Prefecture

Magnetic pulps loaded with magnetite (Fe₃O₄) in the pulp lumen were prepared by in situ synthesis. The synthetic conditions for forming magnetite includes the following three steps: a) dispersion of pulp in a ferrous salt solution, b) addition of an alkali to the ferrous salt, and c) air-bubbling. The main factors influencing the magnetite formation were the added amount of the alkali to the ferrous salt solution containing pulp, i.e. the pH value, and the successive reaction temperature to form magnetite. Magnetite was formed in the temperature range from 50 to 90° C, when the added amount of the alkali was nearly equivalent to that of the ferrous salt present in the pulp suspension. The alkaline addition level for magnetite formation was expanded in the range from 0.6 to 4.0 equivalent to that of the ferrous salt at the reaction temperature of more than 90° C. The magnetite formed in the pulp lumen was observed by means of a scanning electron microscope. X-ray diffraction analysis of the magnetite formed in the pulp lumen showed that it had a spinel-type crystal structure with cubic system, because its lattice planes [311], [440] and [220] were detected at diffraction angles 2θ of 35.4, 62.6 and 30.1°, respectively. The particle size of the magnetite was 0.3μm on average, and distributed in the range from 0.2 to 0.4μm. The magnetite contents in the pulp were 23-33% (based on dry weight of the loaded pulps). The magnetite-loaded pulp with 30.4% magnetite content had saturation magnetization and remanent magnetization values of 16.3 and 3.6 emu/g of magnetite-loaded pulp, respectively, and had a coercive force of 240 Oe.

Keywords: Magnetic paper making pulp, Magnetite-loaded pulp, Pulp lumen, in situ synthesis, Lumen-loading

CONTENTS

Apr-03

Welcoming New Graduates

Topics & Information

KAMYR Technology-Past, Present and Future	Jiro Nakamura...(1)
New Screens for Simplification and Power Saving of Screening Process	Kazumi Fujita...(8)
The Application of High Speed Paper Making Technology	Hidemasa Iijima...(15)
Analysis of Forms and Distributions of the Paper Chemicals on Paper -The Approach with Novel Equipments-	Atsushi Ikeda...(23)
Observation of the Configuration of Binder Latex in Coating Layer -Direct Observation Technology of Binder-	Kenji Arai, Yoko Saito, Hideki Touda and Jyunji Kasai...(29)
Method of Pest Control in Food and Medicine Factory	Goro Tajika...(35)
The Renewal of Electrical Equipments for Paper Industries and Saving Energy	Shigeru Sekine...(43)
SPM Shock Pulse Method for Diagnostic System of Rotating Roll Bearing	Masaru Futaba and Minoru Kamei...(52)
Trend in Mechanical Seal Technology in Pulp and Paper Plant -Mechanical Seal for Slurry Liquid Application-	Hidekazu Takahashi...(58)
BTF Dilution Headbox System -Application Report on BTF Dilution System-	Junichi Yano...(68)
Important Environment Challenges for the U.S. Paper Industry	Reid Miner...(74)

Introduction of Research Laboratories (34)

Marine Biopolymers Research Group, Institute for Marine Resources and Environment Research, National Institute of Advanced Industrial Science and Technology	...(80)
---	---------

Research Report

The Effect of Mill Closure on Properties of Mechanical Fines	Yasuyuki Kamijo and Takanori Miyanishi...(83)
Manufacturing of Magnetic Papermaking Fibers and Paper(Part II) -Preparation of Ferrite-Loaded Pulps at their Lumen by in situ Synthesis-	Katsuhisa Fujiwara...(90)

Pulp and Paper Mills in Japan(23)

-Nichinan Mill, Oji Paper Co., Ltd.-Oji Paper Co., Ltd.	...(96)
---	---------

Committee report

Committee report	...(03)
Essay on Intellectual Property	...(79)
Coffee break	...(82)
Papyrus	...(105)
Industry News(Domestic and International)	...(109)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(120)
List of Patents issued and Laid-open Publication	...(122)
Price list of Domestic Logs and Wood Chips by District	...(130)
Wholesale Price list of Papers at Tokyo Trade Center	...(131)
Other Monthly Statistics	...(133)
News from the Association	...(135)

April 2003 Abstracts

KAMYR Technology – Past, Present and Future

Jiro Nakamura

KVAERNER PULPING KK

Kvaerner Pulping is the successor of KAMYR, and the company has been the actual founder of modern pulping technology.

In this paper, some of the milestones of achievements of KAMYR are listed, however the focus is not on the history but on today and on the future, although I believe having a rich history in a very strong advantage in designing for the future.

I will give an overview of the big trends in the pulping industry and today's spearhead technology from Kvaerner Pulping.

Kvaerner Pulping considers the guiding stars of today in the further development of the supplier industry are "Simplification", "Software/Process solutions" and "Flexibility".

Kamyrr has the history? Kvaerner has the future and we will intensify and accelerate our efforts in the field of R&D.

New Screens for Simplification and Power Saving of Screening Process

Kazumi Fujita

Aikawa Iron Works Co., Ltd.

As an international environmental protection movement rising, power saving has been one of the major subjects to be concerned for the stock preparation field for paper board and de-inking in these several years. And today, there is another strong requirement of power saving according to the background of the international agreement for CO₂ reduction, and also for improvement of cost reduction in order to cope with global price competition and so on. For the waste paper treatment, as is known that the screening process occupies a large portion of energy consumption. It is estimated that the power consumption of screen process is 3 to 3.5KW/Ton for the stock preparation of the paper board, and 4 to 6KW/Ton for the de-inking plant. This paper reports about new screens, which are called as "Screen-One, Two and Three", "GFD GranFlow" and "CanisterScreen". With these screens, the screening system is simplified and dramatic power saving can be achieved.

The Application of High Speed Paper Making Technology

Hidemasa Iijima

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

A new Mitsubishi high-speed paper machine development project has started in 1999 and the new product is called MJ series to produce quality paper at 2000 m/min operation speed. The MJ series has been developed in the course of the elementary study, program simulation, model test, and final verification on our pilot paper machine in Mitsubishi R&D center of Mihara, Japan.

This paper presents the several challenges we were faced with when we tried high-speed operation on our pilot machine and also presents some useful products for stable operation.

Analysis of Forms and Distributions of the Paper Chemicals on Paper – The Approach with Novel Equipments –

Atsushi Ikeda

Research & Development Center, Arakawa Chemical Industries, Ltd.

The fixing of paper chemicals (sizing agent and/or strengthening agent) has been evaluated, in terms of "quantity", such as content % in paper, and the form of fixation has not intensely studied.

Also, the fundamental observations of detailed pulp structure and distribution of paper chemicals on the pulp were not simple tasks.

In recent years, the progress of analytical technologies has been enabling the detail evaluation of paper and/or pulp surface in simple process and the observation of paper chemicals on the micro-fibril has become possible.

The newest analysis results for forms and distributions of sizing agent and/or strengthening agent on the paper and/or pulp fiber by utilizing X-ray Photoelectron Spectroscopy (XPS) and Scanning Probe Microscopy (SPM) is reported in this presentation.

Observation of the Configuration of Binder Latex in Coating Layer-Direct Observation Technology of Binder-
Kenji Arai, Yoko Saito, Hideki Touda and Jyunji Kasai
R&D Center, ZEON CORPORATION

Printability of coated paper is influenced by the coating structure in which the binder plays an important role. It was therefore tried to observe closely the configuration of binder latex in coating layer. The inorganic pigments, which constitute a large portion of coating layer, were dissolved and removed by using hydrochloric acid and hydrogen fluoride acid. By taking this process, the configuration of binder latex in coating layer could be observed directly, without unnecessary effect of pigments. Electron Probe Micro Analysis showed that there was no residual pigment in coating layer (after the process above). Upon preparing samples for cross-section observation, Focused Ion Beam equipment and Cryo-ultramicrotome were used, to decrease the risk of damaging binder-latex's configuration. This observation demonstrated that binder latex form three-dimensional network structure, holding the pigments inside of the coating layer. Using Cryo-ultramicrotome, an ultra-thin film of the coating layer was also prepared from the cross-section, and observed through Transmission Electron Microscope(TEM). Furthermore, the application of this cross-sectional observation technique to commercial double-coated paper is presented in this paper.

Method of Pest Control in Food and Medicine Factory
Goro Tajika
Ikari Institute of Applied Biology, IKARI CORPORATION

In Food and Medicine Factory, There are four major factors of pest control. These factors are the following, reinforce the structure for pest control, maintenance the structure, monitoring pests, and extermination of pests. And more important thing is that those factors should be carried out in PDCA cycle.

The Renewal of Electrical Equipments for Paper Industries
and Saving Energy
Shigeru Sekine
Industrial Systems Engineering Department,
Toshiba GE Automation Systems Corporation

The first installation of the sectional drive system of a paper machine by Toshiba was in the year of 1951. And then the DC drive system of thyristor Leonard had been applied to the drive system of the paper machine. And the sectional drive system has been developed dramatically to the fully digital controlled AC drives systems today. The latest system has the great advantage to the conventional systems, but the renewal to the latest system from the existing system have not frequently occurred due to the restriction of the period of shutdown, the initial cost of renewal, and other factors. Actually the existing system automatically have been getting old and old, so the reliability of the equipments have been getting poor and poor.

In order to recover the reliability, the drive equipments should be renewed. If the equipments are not renewed, many problems would appear. The spare parts of the equipments may not be manufactured any more, and the number of technicians who can handle the equipments is getting smaller, and the down time of the paper machine may cause the reduction of the production of paper. The predictive maintenance and renewal of the equipments should be usually planed. It is not easy to renew the existing equipments at one time, so the gradual renewal should be considered with paying attention to the hybrid system.

This article explains the points to be considered at the renewal of the drive systems for paper industries and the saving energy by applying the medium voltage inverter to fans and pumps with the merit of the inverter.

SPM Shock Pulse Method for Diagnostic System of Rotating Roll Bearing
Masaru Futaba
Nomura Shoji Co., Ltd.
Minoru Kamei
JAITC LTD.

Roll bearings are commonly used in rotating machines, and vibration method is often employed for monitoring condition of roll bearings. Though vibration method needs high skill and long time to compare abnormal condition to normal one, diagnostic result is not enough to obtain real condition of roll bearings. Shock pulse method, SPM, was developed in 1969 in Sweden with further innovation till today, and is now world widely accepted philosophy for condition monitoring of roll bearings and machine maintenance.

SPM diagnostics reports not only condition of rotating roll bearings but also thickness of lubricating oil, that helps maintenance staff to know proper lubrication for getting longer life of roll bearings and for performing effective preventive maintenance in proper timing.

Trend in Mechanical Seal Technology in Pulp and Paper Plant – Mechanical Seal for Slurry Liquid Application –
Hidekazu Takahashi
EAGLE INDUSTRY Co., Ltd., Seal Engineering Dept.

In a pulp and paper plant, a large number of water pumps and various different pumps for pulp or chemicals are utilized in the production processes from economical point of view (energy saving, resource saving and maintenance saving) and environment preservation point of view. Mechanical Seals are also utilized for other rotating equipment including agitators, screens and refineries. This text describes Mechanical Seals which are utilized for a lot of slurry pumps and mills in a pulp and paper plant.

BTF Dilution Headbox System – Application Report on BTF Dilution System –
Junichi Yano
Design Section, Kawano Zoki Co., Ltd.

BTF system has been installed on more than 100 machines in Europe, the USA and Canada on grades from Kraft board to lightweight tissue and furnishes from ground wood to cotton liners, at machine speeds from 15m/min to 1200 m/min. Many of these installations are central distributor or dilution control retrofits to existing head boxes, while others are complete systems including a new head box. Retrofits have been made to existing head boxes from more than a dozen different suppliers, on roll head boxes as well as hydraulic head boxes. Central distributor systems and dilution control systems have also been installed on cylinder machines with open vats, and on multi-ply board formers.

The Effect of Mill Closure on Properties of Mechanical Fines
Yasuyuki Kamijo and Takanori Miyanishi
Pulp & Paper Research Laboratory, Nippon Paper Industries Co., Ltd.

The effect of dissolved and colloidal substances (DCS) in TMP (thermomechanical pulp) white water on the strength properties of handsheets and the flocculation capability of fines with retention aids were investigated.

For this experiment, two types of fines were prepared. One is water-washed TMP fines and the other is white-water TMP fines which were fractionated with TMP white water. Breaking length and surface strength of the handsheets containing water-washed TMP fines were higher than that of the handsheets containing white water TMP fines. It is suggested that DCS adsorbed on white water TMP fines had a detrimental influence on fiber bonding.

The extent of flocculation of fines in the white water of a newsprint machine was measured by Photometric Dispersion Analyzer (PDA). The results of flocculation experiments showed that fines extracted with acetone were more easily flocculated with cationic retention aids than fines in white water. The molecular weight of retention aids affected the flocculation of the fines in white water.

It is concluded that DCS has negative effects on sheet strength and on the flocculation of fines with retention aids.

Keywords: thermomechanical pulp, fines, dissolved and colloidal substances (DCS), sheet strength, flocculation

Manufacturing of Magnetic Papermaking Fibers and Paper (Part II) – Preparation of Ferrite-Loaded Pulps at their Lumen by in situ Synthesis*
–
Katsuhisa Fujiwara
Paper Industrial Research Institute of Ehime Prefecture

Magnetic pulps loaded with ferrite ($M_2O \cdot Fe_3O_4$) in the pulp lumen were prepared by in situ synthesis. First the basic conditions for preparation of manganese-ferrite, zinc-ferrite and manganese-zinc-ferrite by in situ synthesis were clarified; alkali was added to a pulp suspension containing ferrous salt and divalent metal ion, followed by oxidization of the pulp suspension through air-bubbling at temperature lower than $100^\circ C$. The amount of divalent metal ion added was stoichiometrically controlled for co-precipitation of the ferrite. New procedures to prepare ferrite-loaded pulps at their lumen were then developed on the basis of the obtained conditions.

Manganese-ferrite was formed at temperature of more than $50^\circ C$, $60^\circ C$ and $80^\circ C$, when the equivalent value of the alkali added was about 1.0, 1.5 and 2.0 times, respectively, as much as that of the ferrous salt present in the pulp suspension. Meanwhile, zinc-ferrite and manganese-zinc-ferrite were formed in a narrow range of the alkali addition level at temperature of more than $50^\circ C$, where the equivalent value of the alkali required was approximately 1.0-1.1 times as much as that of ferrous ion.

The contents of manganese-ferrite, zinc-ferrite and manganese-zinc-ferrite in the loaded pulps were 30.9 ± 2 wt%, 32.4 ± 2 wt% and 36.2 ± 2 wt%, respectively. These contents were close to or slightly higher than that of magnetite-loaded pulps reported in our previous paper. The lumen-loaded pulp with 30.9% manganese-ferrite content had saturation magnetization, remnant magnetization and coercive force values of 15.8 emu/g (based on the manganese-ferrite-loaded pulp), 3.2 emu/g and 107 Oe, respectively. On the other hand, the lumen-loaded pulp with 36.2% manganese-zinc-ferrite content had the corresponding values of 21.4 emu/g, 4.7 emu/g and 119 Oe, respectively.

Keywords: Magnetic paper making pulp, Ferrite lumen-loading, Pulp lumen, in situ synthesis, Ferrite, Manganese-ferrite, Zinc-ferrite, Manganese-zinc-ferrite

CONTENTS

May-03

Energy Saving

Results of the Fifth Follow-up to JPA's Voluntary Action Plan and Report of Energy Situation in Pulp and Paper Industry in Japan	Kunihiko Aida...(3)
RPF : Its Present State and Future	Katsushiro Seki...(15)
New Technology and Operation Records of Kawasaki ICFB-type Boiler for RDF combustion	Sadayuki Muto and Nobuo Suemitsu...(21)
Development and Operation Results of Recycle Fuel Fired Bubbling Fluidized Bed Boiler	Tatsuo Yokoshiki...(29)
Industrial Waste Combustion Boiler Installed at Paper Mill	Keisuke Tsukamoto and Norihisa Miyoshi...(41)
-Ebara Internally Circulating Fluidized Bed Boiler(ICFB) & Gasifier(ICFG)-	
Present Condition of New Energy Policy	Yasuji Hamada...(50)
Anaerobic Treatment System for Pulp Mill Waste Water	Shinji Hamada...(63)
Experience of Energy Reclamation from Biomass at Oji Nichinan Mill	Ryuma Iwata...(69)
- # 1Boiler : Water Tube Stoker Type Boiler-	
Utilizing In-process Wastes as Heat Source	Mituharu Hase...(75)
Energy Reclamation from Waste at Oji Tomakomai Mill(# 1SLB : # 1Sludge Boiler)	Taiki Fukuzawa...(80)
Refused Sludge Fuel System	Naomichi Tsuchida...(84)
Operate a Boiler System Designed to Combust Paper Sludge in Combination with Chip Rubbish	Hiroyuki Hirakawa...(90)
-Contribute to the Community, Conversion Fossil Fuel, and Reduce Energy Costs-	
Operating Experience and Reconstruction of Paper Sludge Incinerator	Yutaka Suzuki and Yoshiteru Kan...(99)
NEDO Activities to Promote the Introduction of New Energy	Kazuhiro Sugimoto and Nobuyuki Kawai...(104)

Topics & Information

2002Research Projects of Universities and Government Research Institutes	Wood Science Committee, JAPAN TAPPI...(137)
--	---

Research Report

Manufacturing of Magnetic Papermaking Fibers and Paper(Part I I I)	
-Techniques to Make Magnetic Paper from Lumen-Loaded Pulps, and Physical Properties of the Magnetic Paper-	Katsuhisa Fujiwara and Masaaki Morikawa...(112)
A Discrimination Method for Drawing Paper by Laser Displacement Sensor and Image Analysis	Hitomi Miyata, Masahiko Shimoyama and Makoto Shinozaki...(120)

Pulp and Paper Mills in Japan (24)

-Shiraoi Mill, Nippon Paper Industries. Co. Ltd.-Nippon Paper Industries. Co., Ltd.	...(128)
---	----------

Committee report

Committee report	...(03)
Coffee break	...(111)
Papyrus	...(144)
Industry News(Domestic and International)	...(146)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(156)
List of Patents issued and Laid-open Publication	...(158)
Price list of Domestic Logs and Wood Chips by District	...(167)
Wholesale Price list of Papers at Tokyo Trade Center	...(168)
Other Monthly Statistics	...(170)
News from the Association	...(172)

May 2003 Abstracts

Results of the Fifth Follow-up to JPA's Voluntary Action Plan and Report of Energy Situation in 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 the unit of fossil energy for paper products by 10% from that of 1990 level.

Since 1998, 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 every year. The following are the results for 2001 and the report of energy situation in pulp and paper industry in Japan:

Unit of fossil energy in 2001 was smoothly reduced by 7.3% from the level in 1990. However, the reduction in a unit of CO₂ emissions remained 4.0% because cost competitive coals have been largely used.

Paper and paperboard production increased by 8.1% in fiscal 2001 compared to that of 1990 level, whereas, increase in CO₂ emissions remained at 3.8% from the 1990 level. A breakdown of the 4.3% reduction from 8.1% to 3.8% shows that the pulp and paper industry decreased by 3.3% and electric companies contribute to reducing the remaining 1.0% (from effective generating and transmission electricity).

According to 27 companies that replied to our questionnaires, a total of 16.9 billion yen was invested in energy saving measures for fiscal 2001 and the crude oil equivalent of energy saved reached 193 thousand kiloliters per year. As far as the estimation from 23 companies, 101.9 billion yen will be invested and 523 thousand kiloliters per year will be saved from 2001 onwards.

RPF : Its Present State and Future

Katsushiro Seki

Seki Shoten Co., Ltd.

Japan ratified the Kyoto protocol, which aims to reduce the discharge of carbon dioxide into environment and to prevent the global warming. Now, The ministry of Economy, Trade and Industry is working to bring in a so-called coal tax, which will be expected to be as much as 700 yens per ton of coal. This tax will be a heavy burden to the pulp and paper industry.

RPF, refuse paper and plastic fuel, is one of prospective substitutes to coal. The author will introduce the development and future of that pioneering job.

New Technology and Operation Records of Kawasaki ICFB-type Boiler for RDF combustion

Nobuo Suemitsu

Kawasaki Heavy Industries, Ltd.

Power Plant Engineering Division, Thermal Power Plant Department

An Internal Circulation Fluidized Bed (ICFB)-type Boiler with double partition walls in fluidized bed has developed by Kawasaki.

This boiler is specially designed for Densified Refuse Derived Fuel (RDF) combustion. As it is capable of preventing from the major contact of corrosive HCl gas contained in exhaust combustion gas, the corrosion of the boiler tubes can be avoided effectively. We can not only to achieve 30 % and more power-generation efficiency, but also to substantially reduce the emission levels of pollutants like dioxins.

Development and Operation Results of Recycle Fuel Fired Bubbling Fluidized Bed Boiler

Tatsuo Yokoshiki

Boiler Engineering Section, Boiler Engineering Department, Power Systems Headquarters,

Mitsubishi Heavy Industries, Ltd.

Japan has been attained highly economic growth for the past decades. During the economic prosperity, on the other side, the amount of wastes has increased rapidly due to the mass production and mass consumption of various products. Nowadays, there is a tendency to utilize refuse as a fuel, to reduce the impact on environment such as global warming and to save the use of fossil fuel.

To meet the social needs, Mitsubishi Heavy Industries, Ltd., developed the M-STAR method under bubbling fluidized bed combustion. Combustion occurs at high temperature created by supplying multistage combustion air to the upper part of the bubbling fluidized bed in addition to primary air from the bottom. Due to such high-temperature combustion under a well-agitated mixed-gas atmosphere with a long residence time, we achieved combustion with low NO_x, CO and dioxin emission.

The M-STAR method has been put to practical use on a paper sludge (refuse) and coal cofired boiler and a wood chip (refuse) and coal cofired boiler, and confirmed a much lower NO_x, CO and dioxin level than the requests of purchaser.

Further, Mitsubishi Heavy Industries, Ltd., go on with development and design of worn-out tire firing fluidized bed boiler. The boiler is applied the M-STAR method and technology which discharge incombustibles.

Industrial Waste Combustion Boiler Installed at Paper Mill- Ebara Internally Circulating Fluidized Bed Boiler(ICFB) & Gasifier (ICFG) -
Keisuke Tsukamoto
EBARA Corporation Environmental Engineering Group
Norihisa Miyoshi
EBARA Corporation Environmental & Energy Technology Development Center

From the problem of global warming, the reduction of CO₂ emission is large proposition, and Paper manufactures have utilized positively biomass and industrial waste from a viewpoint of environmental protection. EBARA Internally Circulating Fluidized Bed Boiler (ICFB) co-combusts efficiently many kinds of fuel, is suitable for industrial waste and biomass combustion boiler. Internally Circulating Fluidized Bed Gasifier (ICFG) is new technology and featured making it possible for a recovery of clean gas without combustion gas.

Present Condition of New Energy Policy
Yasuji Hamada
New and Renewable Energy Division, Agency for Natural Resources and Energy,
Ministry of Economy, Trade and Energy

There is the big subject of Global Warming issues with the energy policy of our country in addition to securing of the energy stable supply being indispensable. To fulfill the commitment agreed upon in the Kyoto Protocol adopted in December 1997 to reduce greenhouse gas emissions by 6%, it is necessary to decrease energy derived carbon dioxide emissions by FY2010 to levels comparable with those posted in FY1990 in the case as our country. Therefore, in March 2002, the Global Warming Prevention Headquarters established the New Guideline of Measures to Prevent Global Warming, which incorporated energy conservation measures as well as measures on new energy. The latter includes specific introduction goals and additional measures. By carrying out these and other measures and programs, Japan intends to promote further introduction of new energy.

Concretely, "the use of biomass energy" and "the use of snow/ice energy" were added to the targets as new energy stipulated in the Law Concerning Promotion of the Use of New Energy in January 2002, and the national government began its support for application projects. Moreover, The Law Concerning the Use of New Energy by Electric Utilities was established in June 2002.

It is introduced about the present condition of these new energy policies by this report.

Anaerobic Treatment System for Pulp Mill Waste Water
Masahiro Hamane
Nippon Paper Chemicals Co., Ltd., Gotsu works

We installed the high performance anaerobic waste water treatment system instead of our conventional plant, and succeeded in cost saving, easy operation and the small amount of a surplus sludge.

This system converts the organic acid coming from foul condensate, white water and the fermented residue into the biogas. Now we report the operating experiences for three years.

Experience of Energy Reclamation from Biomass at Oji Nichinan Mill #1 Boiler : Water Tube Stoker Type Boiler
Ryuma Iwata
Nichinan Mill, Oji Paper Co., Ltd.

The heavy fuel oil and bark firing power boiler (#1Boiler) has been operated successfully since 1960 for adjusting steam demand variation of Oji Nichinan mill.

After the Oil Crisis, in order to reduce fuel oil consumption and promote biomass fuel utilization, Oji Nichinan mill has been conducting combustion adjustment tests and facility modifications.

The increase of bark consumption and the start of refused tire firing were conducted in 1981, and the combustion of waste paper was started in 1990.

From our experience, there are some difficulties to utilize biomass as a fuel sources; one is corrosion or erosion of pressure parts (furnace, superheater and boiler bank tubes) and the auxiliary equipment (air preheater, multi-cyclone). The other is formation of clinker on the stoker. As a countermeasure for corrosion and erosion, upgrade to the corrosion resistant materials and replacements at regular intervals were conducted. However, the clinker formation has not been solved.

This paper describes the process of fuel conversion to biomass and operating results of energy reclamation from biomass at #1 Boiler as an example of biomass utilization.

Utilizing In-process Wastes as Heat Source

Mituharu Hase

Kumagaya Mill, LINTEC Co., Ltd.

LINTEC is a company which produce and sell the speciality paper, fancy paper and converted paper. When producing these products we are very sorry to say that the whole materials which we through into do not become the final products and a part of the materials become in-process wastes. At the kumagaya mill we make the RPF from in-process wastes which was produced at the five mills including Kumagaya Mill in kantou area of LINTEC Co.,Ltd. We burn the RPF at the boiler and produce the steam which is used by drying the paper and so on. Producing steam by RPF instead of oil we can save the oil about 3,800kl/year.

Energy Reclamation from Waste at Oji Tomakomai Mill (#1SLB: #1Sludge Boiler)

Taiki Fukuzawa

Tomakomai mill, Oji Paper Co., Ltd.

Recently, interest in utilization of waste as a fuel source has increased. This is mainly due to the pressures associated with reduction of landfill availability and reduction of fossil fuel consumption. Until now, the waste has been treated as non-thermal material, which could only be disposed of by inland reclamation, incineration, or other costly and less efficient means.

Fortunately, an establishment of combustion technique and manufacturing technique for

RPF (Refuse Paper & Plastic Fuel) has advanced through a modified combustion technique. This technique provides the possibility of waste conversion as the next generation of alternative energy source for fossil fuels.

Oji Tomakomai production facility generates a variety of waste materials: bark derived from pulp logs, paper sludge from papermaking operations, amongst numerous others. Subsequently, the opportunity for waste reduction by combustion at #1SLB of the Fluidized Bed Combustion form reduced consumption of fossil fuels, and energy savings through utilization of these materials, as an alternative fuel source is considerable.

In this report, circumstances and countermeasure to some difficulties for combustion of bark, paper sludge, and RPF at #1SLB started-up in Oji Tomakomai mill are described. The way of utilization of waste in Tomakomai mill is also detailed.

Refused Sludge Fuel System

Naomichi Tsuchida

Yufutsu Mill, Nippon Paper Industries Co., Ltd.

At Yufutsu Mill, we produce 300 thousand tons of newsprint, fine paper, coated paper and cup paper each year by pulp plants (KP, TMP and DIP) and 5 paper machines. Wastewater from each process is discharged after purified at clarifier. In 2000, wastewater sludge was 7,600BDt per year. We started Refused Derived Fuel (RDF) production plant up in October 2000 to reduce the waste and use wastewater sludge effectively. Wastewater sludge has not been used as fuel because of its low low-heating value. We succeeded to make RDF from wastewater sludge to mix with wood chip made from waste pallet and waste core. This RDF is used for coal circulating fluid bed boiler as fuel. Hence it made possible to produce electricity from waste and steeply reduced wastewater sludge disposed of at landfill sites.

This paper describes about an outline of our Refused Sludge Fuel System.

Operate a Boiler System Designed to Combust Paper Sludge in Combination with Chip Rubbish

– Contribute to the Community, Conversion Fossil Fuel, and Reduce Energy Costs –

Hiroyuki Hirakawa

Power Section Tokai Pulp & Paper Co., Ltd.

In recent years Tokai Pulp & Paper Co., Ltd. has made a concerted effort to improve the natural environment, such as minimized the effect of the solid waste that is released into the city. This means to increase wastepaper utilization rate, and maximize the uses of recycled paper.

During the process of minimizes its impacts on the environment, the increased of manufacture waste is also generated. With paper sludge/ chip rubbish steam plant in place (number 10 boiler), Tokai Pulp & Paper Co., Ltd. in now able to use the majority of its paper sludge by-produce, reducing both energy and disposal costs. By using the paper sludge and chip rubbish as a fuel, Tokai Pulp & Paper Co., Ltd. minimizes its impacts on the environment, reduces reliance on fossil fuel related greenhouse gas emissions, and stability of the power generation.

Operating Experience and Reconstruction of Paper Sludge Incinerator

Yutaka Suzuki

Iwanuma Mill, Daishowa Paper Co., Ltd

The incinerator of Daishowa Paper Iwanuma mill has burned and disposed paper sludge(PS) and rejects from waste paper deinking process(DIP) without using any auxiliary fuel.

This incinerator was required reconstruction in order to apply both new dioxin regulation in Dec. 1997, and the increase of PS due to the increase of DIP production.

The reconstruction was completed in May 2002.

Burning capacity increased 60t/d, namely from 190t/d to 250t/d. New addition of waste heat boiler, which recovers waste heat energy, and steam turbine generator has enabled maximum 3,100 kW generating power.

A couple of month's commercial running, normal operation has been attained in spite of the blockage of fuel feed system and the trouble of ash conveying system.

This paper reports on the outline of reconstruction and operating experience of paper sludge incinerator.

NEDO Activities to Promote the Introduction of New Energy

Kazuhiro Sugimoto and Nobuyuki Kawai

New Energy Promotion Department,

New Energy and Industrial Technology Development Organization

Under the Law Concerning the Promotion of the Use of New Energy, "New Energy" can be defined as important new energy which has not yet been widely used due to economic constraints, but which introduction is necessary in order to reduce Japan's dependence on oil.

NEDO conducts trial introduction of new energy and energy conservation systems with end users in order to verify the effectiveness of the systems and to establish the fundamentals of full-scale introduction, thus strengthening and expanding the introduction of new energy and energy conservation.

In addition to, NEDO subsidizes project operators who promote the introduction of new energy and energy conservation to accelerate promotion, in addition to providing information, guidance, and support for dissemination to obtain understanding and recognition for such energy policies.

Manufacturing of Magnetic Papermaking Fibers and Paper(Part III) Techniques to Make Magnetic Paper from Lumen-Loaded Pulps, and Physical Properties of the Magnetic Paper

Katsuhisa Fujiwara and Masaaki Morikawa

Paper Industrial Research Institute of Ehime Prefecture

(1) Magnetic papers were made from magnetite and ferrite lumen-loaded pulps. When the papers were made only from the magnetic pulps, its breaking strength and burst factor were 5.1 km and 313 kPa/g/m², respectively. The breaking strength and burst factor of the papers increased to 6.5 km and 461 kPa/g/m², respectively, by addition of 2-3% fibrous PVA binder. Thus, physical properties of the magnetic papers added with PVA were nearly equal or rather superior to those of papers from unbleached softwood kraft pulp (USKP). Saturation magnetization value of each paper prepared from manganese-ferrite and manganese-zinc-ferrite lumen-loaded pulps was 16.1, 15.7 and 21.2 emu/g, respectively, and each remanent magnetization value was 3.5, 3.1 and 4.5 emu/g, respectively.

(2) In the next experiment, magnetic papers were made by mixing a magnetic pulps and USKP by changing the mixture ratios of 0, 40, 70 and 100%. Breaking strength of these papers decreased with the increase in the added amount of USKP to the pulps. When the 2% PVA binder was added to the magnetic pulps (without addition of USKP), breaking strength of the papers was almost same as that of USKP. Magnetic properties of the papers prepared by mixture of manganese-zinc-ferrite lumen-loaded pulps and USKP decreased in both their saturation magnetization values and their remanent magnetization values with the decrease in the mixture ratio of the magnetic pulps.

(3) Furthermore, combination papers were made from a magnetic papers prepared from pulps lumen-loaded with magnetite and ferrite and a bleached softwood kraft papers (BSKP). When the 1-2% PVA binder was added to the papers, the interlayer stripping strength of the combination papers having two or three layers was improved to 1.7 N at the 50mm sample width, thus the composite papers having sufficient inter-layer strength were obtained.

(4) Security papers endowed higher security were made by sparsely binding of magnetite, manganese-ferrite or manganese-zinc-ferrite lumen-loaded pulps and BSKP

Keywords: Magnetic paper, Magnetic pulp mixed paper, Combination paper, Security paper, Lumen-loading, Magnetic fiber, Ferrite

A Discrimination Method for Drawing Paper by Laser Displacement Sensor and Image Analysis

Hitomi Miyata

Metropolitan Police Department, Criminal Investigation Laboratory

Masahiko Shimoyama

Hyogo Prefectural Police Headquarters, Forensic Science Laboratory,

Makoto Shinozaki

Oji Paper Co., Ltd., Materials Analysis

Surface topography of drawing paper was successfully captured by using a laser displacement sensor coupled with an XY coordinate table. The authors have proposed a method to identify paper by using an image analysis as follows;

At first, the light-transmission images of the paper to be Fourier transformed are prepared from a flatbed image scanner. The similarity between the power spectrum of the FFT of the sample and that of a reference is quantified using a cross-correlation matching method.

Drawing paper, however, is too thick to provide a light-transmission image. Surface topography, instead of light-transmission imaging, was found to be fruitful. 128 points each for horizontally and vertically with driving steps of 100 μ m, 200 μ m, 500 μ m were tested. Out of those three steps, with 500 μ m drew power spectrum most clearly and found to be most suited for actual use.

Consecutively, surface topography of 14 brand names of drawing paper were examined with 128 points each 2-dimensionally at 500 μ m step.

By carefully watching surface contours, PSs, and inverse FFTed images, some of 14 brand names were identified while others looked very similar and were difficult to be identified.

The reasons why can be considered as follows; at first there could be room to refine matching algorithm.

Second, only a few paper makers produce drawing paper in Japan and also the number of kinds of campus felts for the use of drawing paper is not so many as well.

CONTENTS

Jun-03

Topics & Information

Kraft Cooking with SAQ Suitable for ECF Bleaching	Junji Tanaka...(1)
ECF Bleaching of Softwood and Eucalyptus Pulps-a Comparative Study	Lennart Meuller, Jiri Basta, Lillemor Holtinger and Gerd Wane...(8)
New Refiner & Disperser Providing a Principle of Conical Refiner -DoubleConifiner & ConiDisc-	Kazuo Aoshima...(19)
Energy Saving RTS-TMP Puloing and its Pulp Quality	Masahiro Ohkubo, Tamio Fukuzawa, Chiaki Kawakami, Brad Cort and Marc Sabourin...(31)
Applying Automatic Chemical Control from Stock Prep to the Machine Roland Berger,	Lydia Christen Bley and Kenichi Ishihara...(38)
Introduction of a New Type Filter for White Water	Tomohiro Takahashi...(45)
Diagnosis of Microbial Problems on Paper Machines	Linda R. Robertson and Yasumasa Ishii...(50)
Increasing Productivity by Investing in New Technology	Hiroshi Fujiwara...(57)
-On-line Concepts for Different Paper Grades-	
Mitsubishi MCCR/MJ Calender	Setsuo Suzuki...(65)
A Study of Sheet Gloss	Eisuke Shiiyama...(70)
Improved Two-Drum Winder Technology	Peter Trilling...(77)
The Stable Flow Measurement for Stock Flow by Capacitance Magnetic Flowmeter	Takashi Okada, Jun Nishimura and Seiji Tanabe...(82)
Facility Diagnosis of Acoustic Signal -Acoustic Diagnosis Technology and Application Case-	Shinsuke Terashima...(90)
Introduction of Research Laboratories	
Laboratory of Bio-Macromolecular Chemistry,	...(98)
Division of Biological Sciences Graduate School of Science, Hokkaido University	
Research Report	
Preparation and Evaluation of Mordants for Neutral Rosin Size Emulsion from Lignin	Yasuyuki Matsushita and Seiichi Yasuda...(102)
Study on the Dispersion Stability of the Two Components Slurry, Composing from SAP and MFC(Part3) -Study on the Composite Structure of SAP and Microfibrillated Cellulose-	Migaku Suzuki and Gyosuke Meshitsuka...(113)
Pulp and Paper Mills in Japan(25)	
-Kushiro Mill, Nippon Paper Industries-Nippon Paper Industries	...(130)
Committee report	...(03)
Essay on Intellectual Property	...(100)
Coffee break	...(101)
Papyrus	...(138)
Industry News(Domestic and International)	...(142)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(153)
List of Patents issued and Laid-open Publication	...(156)
Price list of Domestic Logs and Wood Chips by District	...(165)
Wholesale Price list of Papers at Tokyo Trade Center	...(166)
Other Monthly Statistics	...(168)
News from the Association	...(170)

June 2003 Abstracts

Kraft Cooking with SAQ Suitable for ECF Bleaching

Junji Tanaka

Kawasaki Kasei Chemicals Ltd.

SAQR has been used as a cooking additive in many KP mills. This process is known as "Quinone Cooking". In this paper, some new applications of SAQR's functions are proposed when ECF bleaching process is introduced in pulp mills.

First, the effect of SAQR, which decreases bleaching load keeping pulp yield and strength by lowering Kappa number, is explained. Also, SAQR's advantage comparing with dispersed AQ is mentioned, especially when SAQR is used combining with Polysulfide cooking. Finally, KKC's study plan about SAQR's applications to recent modified cooking processes is described.

ECF Bleaching of Softwood and Eucalyptus Pulps – a Comparative Study

Lennart Meuller, Jiri Basta, Lillemor Holtinger and Gerd Wane

Eka Chemicals AB, S-445 80 Bohus, Sweden

This paper deals with a comparison in ECF bleaching and effluent characterisation of kraft pulps based on softwood and eucalyptus. The study is made for both conventional and oxygen delignified pulps.

There are similarities in the bleaching of softwood and eucalyptus looking at the bleaching parameters. In mill scale there are however normally differences in the number of bleaching stages for conventional and oxygen delignified pulps when bleaching to 90 %ISO brightness. Conventional pulps are mainly bleached in a five stages sequence with peroxide reinforcement in the alkaline stages, D (EOP) D (EP) D. Oxygen delignified pulps are mainly bleached in a four stages sequence, D (EOP) D D, especially softwood pulps. A three or four stages sequence, D (EOP) D D or D (EOP) D, is usually used when bleaching oxygen delignified eucalyptus pulps. For brightness levels of 88 %ISO a three stages sequence can be used for both oxygen delignified softwood and eucalyptus pulps.

In the ECF bleaching optimisation study we have used a five stages sequence for all pulps. The same bleaching sequence was used in the effluent characterisation study except for the oxygen delignified eucalyptus pulp where a three stages sequence was used.

Combined effluents from all bleaching stages were characterised and exposed to biological treatment. Characterisation studies were carried out both prior to and after the biological treatment.

The characterisation of the main COD components; lignin, carbohydrates, methanol, low molecular acids and extractives prior to and after external treatment, corresponded well with the calculation of the total organic composition. The results showed that the organic composition varies for effluents from different pulps.

The COD composition of softwood and eucalyptus effluents were significantly different, which explains why the effluents from the eucalyptus pulps were more biodegradable.

Keywords; Bleaching, ECF, softwood, eucalyptus, COD, AOX, Effluent characterization,

New Refiner & Disperser Providing a Principle of Conical Refiner-DoubleConifiner & ConiDisc-

Kazuo Aoshima

Aikawa Iron Works Co., Ltd

The DoubleConi-Finer is the latest designed refiner having both characteristics, double disc type refiner and conical type refiner, which is used for low consistency refining. The ConiDisc is one of the high speed disc type dispersers, which is used as a disperser for hot dispersion system and is also used as a high consistency refiner. It provides two kinds of fillings, one is conical type, and the other one is disc type which is fixed at outside of the conical type fillings. Those refiners having unique design improve dramatically paper characteristics and energy consumption. This paper reports the constructions and the benefits of those new refiners.

Energy Saving RTS-TMP Pulping and its Pulp Quality

Masahiro Ohkubo, Tamio Fukuzawa and Chiaki Kawakami

Andritz K.K.
Brad Cort and Marc Sabourin
Andritz Inc.

RTS is a new Low Retention, High Temperature and High Speed TMP pulping method developed by Andritz. While the pulp quality is kept the same as conventional TMP, the energy is 15-17% less than the conventional TMP.

Extensive studies were conducted to evaluate the development of pine pulp properties and energy requirements using two different thermomechanical refining processes at a southern U.S. paper mill. The processes included both a low intensity (TMP) and a high intensity (RTS?) refining configuration. The pulps produced with the RTS process had 15%-17% lower energy consumption compared to TMP pulps produced at similar freeness and handsheet physical properties. Despite similar average fiber length results between the two processes, the low intensity pulps had a higher percent by weight of fiber retained on the Bauer McNett 14/28 fractions, whereas the high intensity pulps had a higher percent by weight retained on the middle fractions. Calendered newsprint produced from the high intensity pulp had a lower roughness, which may be related to the lower fiber size distribution. Light was thrown on this finding by porometry measurements of the newsprint, which revealed a slightly lower pore size distribution from paper produced with the higher intensity pulp. Standard ink printing tests, however, provided similar results between newsprint paper produced from the TMP and RTS? processes.

Applying Automatic Chemical Control from Stock Prep to the Machine

Roland Berger and Lydia Christen Bley

Muetek Analytic GmbH

Kenichi Ishihara

Spectris Co., LTD. BTG division

For many years, retention-aid dosage has been controlled by the white water consistency in newsprint, fine paper and board applications. This control strategy is well known and has proven efficient and beneficial. However, combining retention-aid control and charge demand control with coagulant or fixative in the thick-stock area provides additional benefits. An on-line charge analyzer, measuring the incoming furnish charge level, allows controlled coagulant addition so that downstream additives are applied more efficiently and economically. This control strategy provides substantial cost savings to the mill. Costly functional additive consumption is reduced and other chemical control loops, such as retention-aid addition, are improved.

This paper explains the impact of white-water consistency on paper machine outcomes such as basis weight variation, steam consumption and wet-end stability. White-water consistency, dewatering and charge demand control approaches are discussed, and practical examples are used to describe how short circulation and chemical composition of the pulp affects final product quality. Mill experiences with the on-line units, and proposed gains and benefits of these measurements to papermakers will be demonstrated.

Introduction of a New Type Filter for White Water

Tomohiro Takahashi

Ebara Corporation, Environmental Engineering Group

For the recycling of white water from papermaking, several kinds of techniques have been developed and put into practical use, but mainly, sand filtration has been adopted up to present for the reason that it provides good water quality stably. However, with the conventional white water filters, problems occurred in the maintenance and management of operation, such as clogging of filter layers, slime troubles, etc. caused by mud ball formation. In order to solve these problems, EBARA has developed a new type filter provided with a surface washing agitator which allows, during backwashing, the sand particles in the filter layer to be cleaned by strong rubbing against each other. An outline of this machine is introduced below.

Diagnosis of Microbial Problems on Paper Machines

Linda R. Robertson

Principal Consultant Paper Microbiology ONDEO Nalco Co., Ltd.

Yasumasa Ishii

Senior Account Manager ONDEO Nalco Japan Co., Ltd.

Numerous microbes are capable of growth in paper machine systems. They form visible deposits that result in sheet defects, holes or even breaks in the web. Microbes are also responsible for performance loss and spoilage of pulp and expensive functional chemicals. This spoilage can lead to strength loss in fibers, formation of odors that result in rejected products, viscosity loss in starch and a variety of other problems. Diagnosis of microbial problems is complicated by the fact that simple aerobic plating techniques on tryptone glucose extract agar or Petrifilms™ with a 48-hour incubation period do not allow recovery of all of the microbes causing the problems. Nor do the numbers of planktonic (free-swimming) cells correlate to the severity of deposition on surfaces. This paper will discuss the limitations of generally accepted plating techniques and propose more accurate diagnostic methods for solving microbial problems.

Increasing Productivity by Investing in New Technology- On-line Concepts for Different Paper Grades -
Hiroshi Fujiwara
Sumitomo Heavy Industries Techno-Fort Co., Ltd.

Running references prove that on-line technology can improve productivity through lower costs and investments. Operating and technical demands are higher, but they can be handled with good cooperation and hard work. Every project is individual in terms of its demands and potential.

This means that on-line and off-line technology have to be considered case by case in accordance with project targets and local factors such as furnish. When applicable, on-line technology is one of the most promising options for productivity improvement.

Mitsubishi MCCR / MJ Calender
Setsuo Suzuki
Mitsubishi Heavy Industries, LTD., Hiroshima Research & Development Center

Mitsubishi Heavy Industries, LTD. (MHI) has developed a high performance controlled multishoe crown roll to control the caliper cross profile and MJ calender applied the technology from shoe press. Recently better surface for high quality printing and bulky paper for saving pulp consumption are required. MCC roll and MJ calender meets these requirement. This paper introduces outline of MCC roll and MJ calender and shows data from the pilot trial and field.

A Study of Sheet Gloss
Eisuke Shiiyama
Latex Research Center, Nippon A&L INC.

Recent years, requirement for sheet gloss of coated paper is steadily developing because it is one of influential factors deciding the final quality of coated paper.

In this paper, the relation between sheet gloss and the effective factors such as surface roughness or optical properties was studied. Coated paper samples were prepared with different latex binder types or different pigment systems, then several types of surface roughness or optical properties were measured in order to understand which property is more influential to sheet gloss.

The concluding remarks gave the following understandings.

Firstly in surface roughness measurement, although both the average roughness R_a and the average wave length of roughness frequency S_m gave good correlations with sheet gloss, the later was more influential. In addition, it could be understood that surface roughness was affected by a degree of kaolin orientation.

Secondly in optical property measurements, the ratio of incidental reflectance to the total reflectance including diffusion gave a liner correlation to sheet gloss, the higher ratio gave the better sheet gloss.

Improved Two-Drum Winder Technology
Peter Trilling
Voith Paper Jagenberg GmbH

Today many Paper Mills have to supply rolls at larger diameters to their customers. Very often the existing two drum winders cannot cope with the quality demands as larger roll diameters lead to increased roll weight and therefore higher nip pressure between roll and drums.

Excessive nip pressure results in various roll defects. So paper mills are forced to improve their winder technology. Ideally rebuilt packages for the existing winders should make the winder matching with their future demands.

Voith Paper Jagenberg GmbH can offer tailored solutions for many applications by supplying special roll covers which reduce the specific nip pressure.

The Stable Flow Measurement for Stock Flow by Capacitance Magnetic Flowmeter

Takashi Okada, Jun Nishimura and Seiji Tanabe

Yokogawa Electric Corporation

The stock feed flow from stuff box is very important factor to decide the quantity and the quality of paper. Usually magnetic flowmeters are used to measure the stock feed flow and the accuracy mainly depends on the uniform of the conductivity and gas fed with stock from stuff box at the start up action. We developed the capacitance type of magnetic flowmeter and tried this meter to the line in a series of the wet electrode type of magnetic flowmeter. The capacitance magnetic flowmeter measurements are very stable and the outputs of both flowmeters are quite different. This paper shows the state-of-the-art technology on the stock flow measurement and describes the advantage for the use of capacitance magnetic flowmeters.

Facility Diagnosis of Acoustic Signal—Acoustic Diagnosis Technology and Application Case—

Shinsuke Terashima

Automation Asset Management Department, Yamatake Industrial Systems Co., Ltd

IF-ASSET is abnormal signal segregation and detection technique that was developed based on inverse filtered acoustic/vibration signals, and was proven effective in monitoring rotary machines, compressors, piping and high pressures vessels. Now we intend to utilize IF-ASSET to monitor several kinds of industrial machines.

Preparation and Evaluation of Mordants for Neutral

Rosin Size Emulsion from Lignin

Yasuyuki Matsushita and Seiichi Yasuda

Graduate school of Bioagricultural Science, Nagoya University

Mordants for neutral rosin size emulsion from lignin were prepared and their abilities evaluated. To convert lignin into the mordant, an amino group was introduced to lignin by Mannich reaction and the reaction with glycidyltrimethylammonium chloride (GTA). In this study, Kraft lignin and phenolated sulfuric acid lignin (P-SAL) were used. In an experimental system composed of the handsheets made with LBKP, sizing agent and lignin derivatives, a Mannich reaction product prepared from Kraft lignin failed to exhibit any mordant characteristic, whereas Mannich reaction products (MP-SAL) prepared from P-SAL were highly effective as mordants. MP-SAL with ethylamino group especially showed higher performance. The MP-SAL with the higher pKa value of the introduced amino group also had higher performance. In the rosin emulsion-alum system, MP-SAL and GP-SAL, which latter are reaction products of P-SAL with GTA, enhanced the sizing effectiveness under acidic to neutral pH range. The handsheets prepared with MP-SAL or GP-SAL besides alum still showed the sizing effectiveness after chloroform extraction, although the sizing effectiveness of the handsheets prepared only with alum disappeared after chloroform extraction. Thus, these results suggest that the enhancement of sizing effectiveness contributed to greater association between the size and the fiber surfaces with the addition of MP-SAL or GP-SAL. A decrease in brightness was observed when MP-SAL or GP-SAL was used as a mordant. According to the Kubelka-Munk theory, the brightness of original pulp with 85% brightness was calculated to decrease 16.9% and 4.3% by adding 0.2% MP-SAL and 0.2% GP-SAL, respectively, but the brightness decrease of a pulp with 50% brightness by adding 0.2% MP-SAL and 0.2% GP-SAL was only 1.9% and 0.6%, respectively. This suggested that the lignin derivatives are as capable as a mordant in newspaper and mechanical papers, which do not require a high level of brightness.

Keywords: lignin, sulfuric acid lignin, rosin size emulsion, mordant, Mannich reaction, epoxy reagent

Study on the Dispersion Stability of the Two Components Slurry, Composing from SAP and MFC (Part III) Study on the Composite Structure of SAP and Microfibrillated Cellulose

Migaku Suzuki

Japan Absorbent Technology Institute

Gyosuke Meshitsuka

School of Agricultural and Life Sciences, The University of Tokyo

A dispersion liquid can be obtained exhibiting a high viscosity at a low concentration by uniformly dispersing microfibrillated cellulose (MFC) or bacterial cellulose (BC) in a mixed medium of water and hydrophilic organic solvent.

Particulate SAP as dispersed in this dispersion liquid, SAP particles can be stably dispersed with a high concentration in the dispersion liquid by virtue of the viscosity exhibited by MFC. In addition, possible coagulation and re-coagulation to be caused with SAP particles otherwise coming near to each other can be almost entirely prevented by the SAP particles being dispersed in the dispersion liquid by the action of the dispersion of MFC, so that a dispersion slurry of a long and stable pot life can now be prepared.

The respective behaviors of SAP and MFC in such mixed medium have been reported in Part I of "Study on the Composite Structure of SAP and Microfibrillated Cellulose", "Swelling & Coagulation Behaviors of Acrylic Acid Base SAP in Water & Water Miscible Organic Solvent Mixture" 1) and in Part II "Study on the Dispersion Stability of the MFC or the BC in a Solvent Mixture of Water and Organic Solvent" 2) in this Journal.

As reported previously, the authors believe that they have made clear the nearly whole picture of the conditions for stably dispersing each component, SAP and MFC, alone in a dispersion medium. When it comes to a two component slurry system of SAP and MFC in coexistence, various unexpected phenomenon come to take place caused by the concentrations and concentration ratio of SAP and MFC, their different mixing mechanisms, changes with time, coating conditions, etc. In this report, studies have been made on the process flow of SAP and MFC being added and mixed, their dispersion limits, stability with time of their mixed slurry, stability at their temperatures, etc. so that the following results have been obtained:

- 1) It is found that MFC has the following effects in the slurry of SAP and MFC in coexistence:
 - .MFC even if at low concentrations prevents coagulation and re-coagulation of SAP by virtue of its high viscosity;
 - .MFC being dispersed keeping a finely particulate shape prevents bonding in groups of SAP particles to each other;
 - .While SAP tends normally to swell to 1.5 to 2.2 times larger than its original form as it selectively absorbs water in a dispersion medium, it is prevented by MFC in coexistence from swelling with MFC retaining water out of the dispersion medium by virtue of its high hydrating property; and
 - .MFC prevents the selective water absorption of SAP so as to cause the dispersion medium not to undergo changes in composition for a long period of time.
- 2) The optimization of the preparation conditions of subject slurry contemplated in a commercial process:
 - .In a procedure of preparing a slurry, a dispersion liquid of MFC should be first prepared and then SAP is to be added;
 - .SAP has been found to be wide in its stable dispersion region if it is such as cross linked on the surface, of spherical shape, of small particle diameter and is obtained by being reversed phase suspension polymerization;
 - .The limit concentration of SAP in coexistence with MFC is 20 to 40 %;
 - .The limit concentration of MFC in coexistence with SAP is 0.4 to 1.0 %;
 - .Possible change with time of the slurry with MFC in coexistence can be prevented by properly selecting SAP and the water content of the dispersion medium and keeping the concentration of around 15°C.

- 3) It has been found that the conditions of stably forming sheets can be established by defining a range of conditions for stabilizing the slurry.

Keywords : SAP, MFC, SAP/MFC co-existence slurry, partial swelling of SAP, dispersion condition, sheet formation condition

CONTENTS

Jul-03

Pulp

- Oxidation of Carbohydrate and Lignin During ECF Bleaching Process Yuji Matsumoto...(3)
Ozone Bleaching and AHL-Stage Acid Treatment in a Modern Multichemical Bleach Plant
Tamio Fukuzawa, Pikka Olavi and Vehmaa Janne...(12)
A Theoretical Basis for the Hot Chlorine Dioxide Bleaching Process and Mill Results
Martin Ragnar...(21)
from the First Installation
Beneficial Improvement of Environmental Impacts by Elemental Chlorine-free Bleaching
-Model Experiments and Mill Experience- Hiroshi Ohi and Keiichi Nakamata...(31)
The Situation of the Technology for the Reduction of COD from the Bleach Plant
Lennart Meuller, Lillemor Holtinger and Muneo Sakamoto...(38)
Operating Experience of ECF Bleaching with Xylanase Treatment Takashi Oishi...(51)
Operating Condition of Ozone ECF Bleaching Takao Suzuki...(57)
Operating Experience of Improved ECF Bleaching Sequence Shinichi Hara...(64)
Scale Formation and Inhibition in ECF Bleaching Plant Kenji Kowata...(70)
Elemental Chlorine Free Bleaching Impact on Metal Management Joe Konopa...(81)
How to Control Scale Deposit Problems in ECF Bleach Plant Hirotaka Tanabe...(88)

Topics & Information

- IGT's New Testing Machine Toshimichi Hashimoto...(94)

Research Report

- The Evaluation of Paper Sludge(PS)for Zeolite synthesis(Part1)
-Optimal Mineral and Chemical Composition Range for Zeolite Synthesis-
Takao Ando, Masato Saito, Shigeo Muramatsu, Kimio Hiyoshi, Junsuke Haruna, Naoto Matsue and Teruo Henmi...(101)
Manufacturing of Magnetic Papermaking Pulp and Paper(Part4) Katsuhisa Fujiwara...(112)
-Micropore-Loading of Magnetite in the Cell Wall-

Pulp and Paper Mills in Japan

- Sendai Mill, Chuetsu Pulp & Paper Co., Ltd. -Chuetsu Pulp & Paper Co., Ltd. ...(118)

Committee report

- Coffee break ...(100)
Papyrus ...(126)
Industry News(Domestic and International) ...(129)
List of Titles in Foreign Journals Received by JAPAN TAPPI ...(140)
List of Patents issued and Laid-open Publication ...(143)
Price list of Domestic Logs and Wood Chips by District ...(153)
Wholesale Price list of Papers at Tokyo Trade Center ...(154)
Other Monthly Statistics ...(156)
News from the Association ...(158)

July 2003 Abstracts

Oxidation of Carbohydrate and Lignin During ECF Bleaching Process

Yuji Matsumoto

Wood Chemistry Laboratory, Department of Biomaterial Sciences,
Graduate School of Agricultural and Life Sciences, The University of Tokyo

The dependency of carbohydrate degradation on the oxidation of lignin during ECF bleaching is reviewed based on the results mainly obtained in Wood Chemistry Laboratory, The University of Tokyo.

The progress of lignin oxidation during oxygen bleaching can be separated into three clearly distinguished phases. Oxidation of the first phase is mainly due to the direct reaction of molecular oxygen with phenolic unit in lignin. During the second and third phases, oxidation of lignin occurred mainly due to the active oxygen species. Those active oxygen species are also present in the first phase but probably reduced by the reaction with phenolic groups in lignin. However, those active oxygen species could attack carbohydrates as well as lignin. Since the active oxygen species are produced by the reaction of oxygen with lignin, the oxidation of carbohydrates during oxygen bleaching process can be regarded as "co-oxidation" phenomena. The effect of metal ion on the formation of those active oxygen species and the reaction selectivity of active oxygen species to react with lignin and carbohydrates were studied by various model experiments. The formation of active oxygen species and the effect of metal ion, and, co-oxidation of carbohydrate and lignin during ozone bleaching are also briefly discussed.

Key Words : Oxygen, Hydrogen Peroxide, Ozone, Lignin, Carbohydrate, Oxidation

Ozone Bleaching and AHL-Stage Acid Treatment in a Modern Multichemical Bleach Plant

Fukuzawa Tamio

Andritz K.K., Japan

Pikka Olavi and Vehmaa Janne

Andritz Oy, Kotka, Finland

From a chemical point of view, there are many alternatives for pulp bleaching today. The ozone stage, Ahl-stage and combinations of these with the D-stage give plenty of possibilities for processes and set a new standard for low chemical consumption.

Part of the kappa number is generated by hexenuronic acid groups bound in xylan. When determining the kappa number, the hexenuronic acid (HexA) groups are also titrated. Included in the kappa number determination is hence the total amount of the lignin and HexA contained in the pulp ? not only the amount of lignin. Except for oxygen and peroxide, all present bleaching chemicals react with the hexenuronic acid group. This leads to an increase in the consumption of these bleaching chemicals. /1/.

Ozone is a strong bleaching chemical which has been closely connected with the production of TCF pulp. When the demand of TCF pulp decreased, ozone stages were also used in ECF sequences and the results of these ozone ECF sequences have made ozone an extremely attractive choice for modern ECF sequences.

A Theoretical Basis for the Hot Chlorine Dioxide Bleaching Process and Mill Results from the First Installation

Martin Ragnar

Kvaerner Pulping AB, Fiberline Division, R&D

Hot chlorine dioxide bleaching is rapidly evolving to become the standard choice for the first bleaching stage in an ECF sequence for HW kraft pulp. In this article data from experiments on a large number of different HW species are presented with respect to their bleachability in a D*ED (D* here denotes hot chlorine dioxide bleaching) sequence compared to in a DED sequence. Results from the operation of the first mill installation of hot chlorine dioxide bleaching are compared and found to agree well with the laboratory results. Finally hot chlorine dioxide bleaching is compared with hot acid treatment followed by chlorine dioxide bleaching, (AD)* technology. In addition a 2-stage bleaching sequence including hot chlorine dioxide bleaching, (DQ)*(PO) is included in the comparison of e.g. strength properties and bleaching chemical costs. It is concluded that the 2-stage sequence shows a lot of benefits compared to the other sequences and that this is even more true in a Japanese context.

Keywords : hardwood, Eucalyptus, ECF bleaching, chlorine dioxide, hydrogen peroxide, hot acid treatment, hot chlorine dioxide bleaching, hexenuronic acid, brightness reversion

Beneficial Improvement of Environmental Impacts by Elemental Chlorine-free Bleaching – Model Experiments and Mill Experience –
Hiroshi Ohi

Institute of Agricultural and Forest Engineering, University of Tsukuba

Keiichi Nakamata

Technical and Development Division, Hokuetsu Paper Mills, LTD.

Kraft pulp and sulfite pulp bleaching mills using chlorine, chlorine dioxide (D) and other chlorinated compounds are under surveillance of the dioxins regulation in Japan. One of questions is whether water qualities of process sewers in chlorine dioxide bleaching (Elemental Chlorine-free bleaching: ECF bleaching) mills are less than the environmental water quality (1pg-TEQ/L) or not. Objectives of this report are to review studies about the dioxins level of ECF mill sewers and model experiments from an aspect of the environmental water quality. Laboratory bleaching were carried out using a mill hardwood oxygen-bleached kraft pulp (LOKP), chlorine dioxide from a mill R8 generator in a laboratory high-share mixer. Active chlorine factors were in the range of 0.14-1.14. In all cases, 2,3,7,8-TeCDD and TeCDF were not detected for the pulps and spent liquors. Examination of process water from an ECF bleaching line in Niigata mill of Hokuetsu Paper Mills, LTD. shows that the concentrations of the dioxins in both sewers of the chlorine dioxide stage (D0) and the alkali stage (E/O) were below 1 pg-TEQ /L, and that the 2,3,7,8-tetrachlorodibenzofuran (TCDF) concentrations were 0.41 pg/L or less. In addition, a main source of 1,3,6,8- and 1,3,7,9-tetrachlorodibenzo-p-dioxins in the process water seemed to be an agrochemical in water supplied from a river.

In the meantime, Japan revised the Air Pollution Control Law in 1996. The main purpose of the law is to reduce discharge of toxic pollutants such as carcinogenic substances into the air. The Japan Papermaking Association estimated the nationwide chloroform discharge to air for the fiscal year 1996 at 1655 t on the basis of field studies, and initiated a reduction of the discharge. As a result, the estimated discharge was reduced to 1118 t, which was a reduction of 32%, for the fiscal year 1999. However, further reduction is required because there is still much discharge. We estimated chloroform formation and discharge in the mill having an ECF bleaching line and a chlorine bleaching line as well as an effluent treatment process. It was clarified that the chloroform formation in ECF bleaching was approximately one eightieth of that in chlorine bleaching.

Keywords : Dioxins, Chloroform, Pulp bleaching, Chlorine dioxide, Agrochemical

The Situation of the Technology for the Reduction of COD from the Bleach Plant

Lennart Meuller and Lillemor Holtinger

Eka Chemicals AB, S-445 80 Bohus, Sweden

Muneo Sakamoto

Nissan-Eka Chemicals Co.,

This presentation will deal about technologies for the reduction of COD from the bleach plant, mainly focused on the partial closure system, and also referred to the closed cycle of the bleach plant.

Based on laboratory evaluations of partial closure when applied to the ECF bleaching of conventional and oxygen delignified eucalyptus kraft pulps, the following conclusions can be made:

- . about 50% of the bleach plant COD, BOD and color will be returned to the recovery system.
- . less than 20% of Ba, Ca, Fe, Mg, and Mn and about 35% of the oxalate will be recirculated.
- . only about 5% of the total chloride will be returned.
- . the eucalyptus effluents are easy to treat with obtainable AOX and COD reductions of about 80% and 70% respectively.

Ultrafiltration and partial closure of alkaline filtrates in ECF bleaching can reduce final bleach plant effluent COD by as much as 60% and AOX by as much as 40%.

Ultrafiltration of ECF alkaline filtrates can be achieved with both high fluxes and little fouling using commercially available membranes.

Experience in full scale from a pulp mill shows that partial closure of the bleach plant is possible, while retaining the ECF concept.

Based on a reduction of the total emission from the mill a more effective biological treatment should be considered.

Results from pilot plant work shows that the ECM system is able to transform the bleach plant effluent to clean condensate, a methanol containing condensate, carbon dioxide exhaust gases and a mixed solution of sodium salt and heavy metals in a sludge.

Keywords; Bleaching, ECF, TCF, softwood, eucalyptus, COD, AOX, Effluent characterization, Partial closure system, Total closure system

Operating Experience of ECF bleaching with Xylanase Treatment

Takashi Oishi

Oji Paper Co. Ltd., Yonago Mill

Yonago mill of Oji Paper produces approximately 1,200 tons of hardwood pulps per day at 85-86% ISO brightness for coated paper products.

Xylanase treatment with on-site enzyme production was introduced into the hardwood kraft pulp bleaching process (C-E/O-dnD) in October 1998. A thermostable xylanase from a microorganism, *Bacillus* sp. S-2113, that we isolated through screening was selected for use in this process. The xylanase-containing culture was applied to the bleaching process without removing the bacterial cells from the culture medium. Therefore, xylanase treatment process could be operated economically. Introducing xylanase treatment was allowed to reduce bleaching chemicals, so chemical cost was lower than before.

In November 2000, the bleaching process was converted to ECF one (D0-E/O-dnD). As a result, effluent AOX and chloroform emissions have decreased significantly. It is recognized that introducing xylanase treatment is allowed to reduce bleaching chemicals in ECF bleaching process, too.

Operating Condition of Ozone ECF Bleaching

Takao Suzuki

Yufutsu Mill, Nippon Paper Industries Co., Ltd.

Medium consistency ozone bleaching plant was started up at Yufutsu mill in January 2001. This is the first plant that uses ozone gas as a bleaching sequence in Japan. By changing conventional C/D-E/op-D into ZD-E/op-D, we have entirely excluded the usage of elemental chlorine.

The bleached pulp with ozone is converted continuously to be paper products without any kinds of faults. The main cost of ozone generation is electricity expense, and then the important factor to introduce ozone bleaching is a possibility to supply inexpensive electricity by private-generation system. In this case, the total cost of the ozone ECF bleaching is as low as that of chlorine bleaching, and furthermore less than that of chlorine dioxide ECF bleaching.

Conclusively the introduction of this bleaching system has made satisfactory results as expected for bleaching effectiveness, chemical costs, and environmental impacts, in spite of the frequent initial troubles of the ozone generator and scaling on the facilities.

Operating Experience of Improved ECF Bleaching Sequence

Shinichi Hara

Hachinohe Mill, Mitsubishi Paper Mills Limited

ECF bleaching has superseded the conventional chlorine bleaching on NO.3 LBKP-production line in Hachinohe mill of Mitsubishi Paper Mills limited in 2000. The operational data of ECF bleaching for two years made it obvious that the brightness of oxygen-bleached pulp had larger influence on the bleaching efficiency of ECF bleaching than kappa number in contrast with the case of conventional chlorine bleaching. Furthermore, it was shown that the improved ECF bleaching sequence had enabled to reduce the chemical consumption and the scale trouble which were main problems in ECF bleaching.

Scale Formation and Inhibition in ECF Bleaching Plant

Kenji Kowata

Pulp & Paper Industry Department, Kurita Water Industries Ltd.

Scaling troubles of calcium oxalate are observed frequently in ECF (elemental chlorine free) bleaching process at a kraft pulp plant. Phenomena of the scale formation is very complicated which includes simultaneous nucleation, dissolution, growth and/or adhesion of crystals. The scale formation tendency can be predicted by a saturation index (SI) calculated by pH and concentration of scaling species.

Scale inhibitor shows effects such as nucleation prevention, crystal distortion and suspended solid dispersion. For scale inhibitor treatment, a critical saturation index (CSI) is defined as a maximum SI which shows no nucleation at some inhibitor concentration.

ECF bleaching process has a tendency to show higher SI compared with a conventional bleaching. At a washing filter of chlorine dioxide stage in ECF process, CSI optimized "Depoclean" treatment shows a stable operation without scaling trouble.

Elemental Chlorine Free Bleaching Impact on Metal Management

Joe Konopa

Pulping & Bleaching, Ondeo Nalco Corporation

With the implementation of the Cluster Rule in the United States, all bleached grade kraft pulpmills were required to meet stringent levels of absorbable organic halides in the effluent. The method most mills used to meet the absorbable organic halide levels was to convert to 100% substitution of chlorine dioxide in the predominately C or CD first stage. As mills substituted chlorine dioxide in the first stage of the bleachplant, thereby converting to elemental chlorine free (ECF) bleaching, several key parameters were impacted. Two of these were that delignification in ECF was less than partial substitution of chlorine dioxide in the chlorine stage and secondly the increase in pH in the first stage did not give the same level of metals solubility as compared to chlorine or CD bleaching. Metals management has become a significant issue in ECF bleaching as metals that previously had a minor influence in bleaching now create issues with inorganic deposition and efficiency reduction of peroxide bleaching. Several operating conditions have been identified that when optimized, reduced the issues associated with scale development in various stages of the bleachplant.

Keywords : elemental chlorine free, ECF, scale, metal management, Scale Rate Monitor

How to control scale deposit problems in ECF bleach plant

Hirota Tanabe

Yokkaichi laboratory, Hakuto Co., Ltd.

Because of environmental concerns about chlorinated organic compounds and chloroform in kraft mill effluent, new technologies of kraft pulp bleaching was studied and come into practical use.

New ways of bleaching are ECF and TCF bleaching. ECF bleaching does not use both elemental chlorine and hypochlorite, and TCF bleaching does not use chlorine compound at all. In Japan, converting to ECF bleaching is general.

Basically, scale deposit problems often occur in beaching plant. Along with the conversion to ECF bleaching, the tendency of scale deposit formation greatly changes.

In this report, we show characteristics and control methods of scale deposit in ECF bleaching.

IGT's New Testing Machine

Toshimichi Hashimoto

IGT testing Systems, Japan branch

IGT's new Testing machine, Global Standard Tester (GST) Series has been introduced in Japan.

One of the features of this machine is high reproducibility test result, simple operation and short testing time.

IGT has much knowledge and technology on printability test equipment, which was accumulated during more than 60 years, since its establishment in 1939 in Amsterdam.

Since 1939, many of our Testing Machines have kept the basic principle, this proves the high level of basic design of these machines.

We are convinced that our IGT Testers are quite mature since our R+D engineers, having large knowledge on printability testing, printability testers and machine engineering have worked a long time in development and modification for improvement of these machines to reach an optimised design and high performance.

The present technology is not the same as the one in 1939 any longer.

Our end users needs are also changing accordingly. It is time to carry out the test on our new testing machines to meet present demand of accuracy, speed and repeatability.

You can feel our 60 year long history and experience; accumulated knowledge and technology when using our newest testing machines of the Global Standard Tester series.

Manufacturing of Magnetic Papermaking Pulp and Paper(Part IV) – Micropore-Loading of Magnetite in the Cell Wall –

Fujiwara Katsuhisa

Paper Industrial Research Institute of Ehime Prefecture

Distribution of magnetite components present in magnetic pulps, which were prepared by in situ synthesis according to the previously reported method, was studied. Transmission electron microscopic (TEM) observations and electron diffraction analysis combined with TEM revealed that highly crystalline magnetite particles were present in the magnetic pulps. Mapping analysis of the magnetic pulp using iron of magnetite as a marker element was then carried out by means of an energy-dispersive X-ray analyzer attached with TEM. The obtained results showed that magnetite was formed in micropores in cell walls of the magnetic pulps. Also in the case of magnetic pulps prepared by in situ synthesis of manganese-ferrite, zinc-ferrite and manganese-zinc-ferrite, it was indicated that these ferrite components were present in micropores in cell walls.

Keywords: Micropore, Cell wall, in situ synthesis, Magnetite, Ferrite, Filler, Micropore-loading, Magnetic pulp, Never-dried fiber, Loading

The Evaluation of Paper Sludge (PS) for Zeolite synthesis(Part 1)

-Optimal Mineral and Chemical Composition Range for Zeolite Synthesis-

Takao Ando, Masato Saito, Shigeo Muramatsu and Kimio Hiyoshi

Fuji industrial research institute of Shizuoka prefecture

Junsuke Haruna, Naoto Matsue and Teruo Henmi

Department of agriculture, Ehime Univ.

Paper sludge (PS) discharged from the paper mills in Fuji city, Shizuoka prefecture reach about 1,018,000 tons/year. The development of the zeolite synthesis technique is essential from the viewpoint of recycling of wasting materials.

Generally, PS ash contains not only Si and Al, but also significant amount of Ca. From our previous study on the interaction between Ca in calcite and Si as well as Al in kaolinite during the zeolite synthesis¹⁰), the following results became clear. (1) The metakaolinite that was heated at 600°C is converted to zeolite by the alkaline (NaOH) hot water treatment at 100 °C for 4 hours. (2) Co-existing Ca is expected to inhibit the formation of zeolite, since the amorphous Ca-silicate hydrate will form preferentially and Si-O-Al bonds will not. (3) Chemical and mineralogical characterization of the zeolite synthesized by the mixture of Ca(OH)₂ and metakaolinite led us the supposition that the chemical formula of the amorphous Ca-silicate hydrate was Ca₃Al₂(SiO₄)₃X(OH)₄X. From these results, we cleared the conversion rate of LTA (Linde Type A)^{19),20} zeolite, and the ideal mineralogical composition range of PS for the zeolite synthesis was obtained.

In this study, the practical PS ashes were mineralogical and chemical characterized and their possibility as starting materials for the zeolite synthesis, was examined. The 20 PS ashes from paper mills in Fuji city were heated at 600°C for 12 hours and a X-ray fluorescence (XRF) measurements were tested.

The talc, kaolinite, calcite constitution ratios of them were determined by the normative method from a X-ray diffraction (XRD) profiles obtained, and were compared with the above ideal composition range. It was found that 50% of the PS ashes could be directly used for the zeolite synthesis and the others could be addition of Si compounds.

Keywords: zeolite, paper sludge, calcite, talc, kaolinite

CONTENTS

Aug-03

Topics & Information

- Total Automation System for Paper Making Plant Kenji Ohshima...(1)
Operating Results of New TWINDRUMTM Pulping Concept at SP Newsprint Co., Newberg, Oregon
Bernhard Muller, Masakazu, Eguchi and Junichi Miura...(6)
Application of OptiDwell Shoe Nip Calender Matti Lares, Stefan Kuni, Martti Tuomist and Hidehiko Yamazaki...(14)
A New Pulping Method for Non-wood Fiber Resources for the Purpose of Lightening the Loading to Environment
Kyoji Suzuki, Kayoko Hoshino, Tetsuo Ide, Takefumi Ide, Kiyoshi Yoda, Tsutomu Hiyoshi and Kojiro Nakata...(22)
High Density & Continuous Pulping "KNEADINGPULPER" Nobuo Isobe...(26)
Charge Management through Process Analyzers Jukka Nokelainen and Takeshi Sato...(33)
Advantages of Commercial Rutile Titanium Dioxide Slurry for Paper Applications T. Wayne Logan and Shuichi Iyoda...(41)
Function Enhancement of the Paper by Surface Sizing Agents and the Mechanism Takanori Kurihara...(49)
A Study on Blistering Resistance with Acceleration of Air Permeability(II)
Nobuhiro Matsuda, Shigeo Yamanaka, Masaaki Yada and Yoshiaki Zama...(57)
Development Both Higher Opacity and Sheet Gloss GCC Masayuki Oishi...(65)
-Introduction of the FMT-OP Series-
Exact Sheet Counting and New Laser Ream Marking System Mitsuaki Katsumata...(70)
Pest Control Activities for Quality Assurance Shinya Yokoo...(75)
Web Inspection System "SmartView ICN" Satoshi Suzuki...(80)

Introduction of Research Laboratories (36)

- Laboratory of Forest Chemistry, Research Group of Forest Resource Science, Division of Environment Resources, Graduate School of Agriculture, Hokkaido University ... (86)

Research Report

- Acoustic Emission during the Tensile Straining of Paper from Hardwood Pulp Tatsuo Yamauchi and Takateru Hatanaka...(89)
-Effects of Beating and Addition of Dry Strength Resin-
Life Cycle Impact Assessment of Woodfree Papers Containing Nonwood Pulp or Deinked Pulp
Katsuhito Nakazawa, Tomonori Honda, Toru Katsura, Keiichi Katayama, Ryoichi Yamamoto and Itaru Yasui...(96)

Pulp and Paper Mills in Japan(27)

- Nagaoka Mill, Hokuetsu Paper Mills, Ltd.-Hokuetsu Paper Mills, Ltd. ... (106)

Committee report

- Committee report ... (03)
Essay on Intellectual Property ... (85)
Coffee break ... (88)
Papyrus ... (111)
Industry News(Domestic and International) ... (116)
List of Titles in Foreign Journals Received by JAPAN TAPPI ... (127)
List of Patents issued and Laid-open Publication ... (130)
Price list of Domestic Logs and Wood Chips by District ... (140)
Wholesale Price list of Papers at Tokyo Trade Center ... (141)
Other Monthly Statistics ... (143)
News from the Association ... (145)

August 2003 Abstracts

Total Automation System for Paper Making Plant

Kenji Ohshima

Yaskawa Siemens Automation & Drives Corp. System design group

"Open Networks", "Multimedia", "IT", all these are keywords to describe the recent trends in the automation of production facilities, which have provided for a more centralized management of complete plants. In the paper industry, Distributed Control Systems (DCS), Quality Control Systems (QCS), Drive Systems, and Maintenance Management Systems, are widely used, each of these being delivered by specialized vendors.

This multitude of systems with different hardware, software and diverse engineering tools constrict the efficient use of resources in running a paper plant.

Siemens demonstrated a way to solve these issues by providing a complete automation system based on a unified hardware base and only one kind of HMI. Yaskawa Siemens has developed technologies to support maintenance and diagnosis of equipment in the paper industry by remote monitoring systems via telephone or ADSL-connection.

Operating Results of New TWINDRUM™ Pulping Concept at SP Newsprint Co., Newberg, Oregon

Bernhard Muller

Engineering & Development Division, Voith IHI Paper technology Co., Ltd.

In 2000, an order was placed by SP Newsprint to replace their wash deinking process with a state of the art deinking line. VOITH PAPER supplied the entire scope of equipment needed for the rebuild. The plant is designed to produce 550 BDMTPD of finished pulp. The raw material is made up of 80% old newsprint and 20% old magazine. The system was successfully started up in September 2001.

A key role within the recycled fiber plant is attributed to the pulping stage. The pulping stage initiates the recycling process. Goals are to disintegrate the paper, without damaging the fiber and to release the printing ink and coating from the fiber surfaces. Another important requirement is that paper impurities remain as large as possible in size to facilitate an effective and early removal. The pulping module installed at SP Newsprint meets all those requirements by utilizing the new TwinDrum™ drum pulper concept.

Application of OptiDwell Shoe Nip Calender

Matti Lares, Stefan Kuni and Martti Tuomist

Metso Paper Inc.

Hidehiko Yamazaki

Metso Paper KK

Metso Paper has developed OptiDwell shoe nip calender which enables achievement of long dwell time, reduction of compression pressure and contour calendering with extremely soft belt. This technology is based on Valmet shoe press and soft calender technologies. The first OptiDwell was started up to produce coated liquid packaging boards and coated white top liner boards at Korsnas PM5 in Sweden in 1994. Bulk saving and improvement of surface qualities of boards were easily achieved with OptiDwell. The second OptiDwell was started up at Korsnas PM4 in 2000. Two other OptiDwell were also delivered to other customers and started up.

Metso paper has studied various kinds of applications of OptiDwell. OptiDwell is applicable not only for a final calender but also for a precalender. Pilot test results proved the effectiveness of new application of OptiDwell as a precalender for high-quality coated boards.

A New Pulping Method for Non-wood Resources for the Purpose of Lightening the Loading to Environment

Kyoji Suzuki and Kayoko Hoshino

Shizuoka University

Tetsuo Ide, Takefumi Ide, Kiyoshi Yoda and Tsutomu Hiyoshi

Taizen Co., Ltd

Kojiro Nakata

Fuji Technosupport

The soft pressure type kneading machine(New Taizen) which has been used as useful deinking machine was attempted to use as a new instrument for the pulping of non-wood resources. This new pulping method is expected to lighten the loading to environment in comparison with traditional alkaline chemical pulping. We applied it to the straws.

It was revealed that this new pulping method is hopeful for the straws, especially for a rice straw. Although some shives (fiber bundles) were found in the treated pulp, they may be separated into individual fibers by subsequent refining and bleaching or by higher alkali addition.

High Density & Continuous Pulping "KNEADINGPULPER"

Nobuo Isobe

Industrial Machinery Dept, Nippon Sharyo Co., Ltd.

The quality deterioration of raw materials caused by a rise of used paper recycling rate brings about new problems that its processing plant becomes complicated and its energy consumption increases. "How should an environmentally friendly pulper be?" we approached the essence of pulping and have developed the high density and continuous pulping "KNEADINGPULPER" which assures an excellent recycling performance of used paper. The equipment consists of a long cylindrical tab and a multistage rotor provided in it. Raw materials supplied from its top are pulped with a high density while they are descending. They are kneaded to disperse printing ink at the lower part and continuously discharged through a screw feeder. The equipment could have following advantages, because of "Lower kneading speed" and "No vertical circulation of raw materials", which are not in the past.

Charge Management through Process Analyzers

Jukka Nokelainen and Takeshi Sato

Metoso Automation, Field Systems Division

Modern automation solutions for papermaking wet end is a nice example how to utilize process analyzer as part of the machine controls. By wet end management we aim to have stable total and ash consistencies, drainage properties of the headbox suspension, and basic chemistry in paper machine short circulation. Stability is very important, because it's directly connected to paper machine runnability as well as to quality of produced paper. The level and variation of charge have a considerable effect on process status and operation. On-line charge measurement provides valuable information about the wet end chemistry of the paper machine. It is possible to perform charge control based on measurement by charge analyzer kajaaniCATi. The control provides many benefits for the papermaker. The benefits are process information, stability of process, runnability of papermachine and economical and effective use of chemicals.

Advantages of Commercial Rutile Titanium Dioxide Slurry for Paper Applications

Wayne Logan

DuPont Titanium Technologies

Shuichi Iyoda

DuPont Kabushiki Kaisha

Paper mills have used titanium dioxide to generate opacity in high quality paper and paperboard for many years. Dry anatase pigments were used at first since this was the only technology available. Invention of the chloride rutile process created opportunities for new levels of performance in the paper industry. Commercial rutile slurry was introduced over 25 years ago to the North American market and has been continually improved. Over 95% of the titanium dioxide used in this market is commercial slurry. More recently the use of stable paper slurries has been growing in both Europe and Japan.

Commercial rutile slurry offers performance advantages over slurry produced by the paper mill. High shear dispersion equipment allows optimization of the particle size and increased light scattering. Opacity gains of 10-12% have been demonstrated in the lab. Mill trials have confirmed even higher performance gains.

Anatase pigments have a lower refractive index and generally larger particle size. Both attributes will contribute to lower scattering performance than a rutile pigment. Mill trials have demonstrated over 20% reduction in pigment use when switching from an anatase pigment to rutile.

Handling and storage of slurry products is not difficult. Proper design of the equipment will insure trouble free operation and high product quality. Correct addition to the paper process will maintain the high performance of the pigment.

Function Enhancement of the Paper by Surface Sizing Agents and the Mechanism

Takanori Kurihara

Harima Chemicals, Inc.

Surface treatment technology is one of the important roles to control the quality of paper in papermaking process. Particularly, surface sizing agents have performances not only to improve printability and water resistance but also to enhance surface strength of paper. In addition, it is possible to reduce cost of total paper chemical additives by using surface sizing agent. Since ink jet printability, for example, feathering, print through and others, on DIP-contained PPC has been increasingly required in the recent, it is expected to develop more effective surface sizing agents. On the other hand, stability and solubility of surface sizing agent in coating solution and low foaming in the papermaking process are required to use surface sizing agent with starch or others at high temperature.

We have studied regarding printability on PPC and peel test on newsprint, and measured the dynamic properties by dynamic liquid penetration measurement and dynamic absorption tester on the sized papers with internal and surface sizing agents. Thus, this paper describes the consequences of the relationship among them.

A Study on Blistering Resistance with Acceleration of Air Permeability (II)

Nobuhiro Matsuda, Shigeo Yamanaka, Masaaki Yada and Yoshiaki Zama

Polymer Research Laboratories, JSR Corporation

The blister of coated paper that is caused by rising water vapor pressure is a problem in web-offset printing. However accurate experimental determination of the blistering resistance is very difficult. Many commonly used laboratory methods do not correlate to real press experience, and it is very expensive to use commercial press trials for testing purposes. Therefore, predicting the blistering tendency of coated paper is very important.

In the previous report, we reported that we developed our original air permeability tester with which we could measure the acceleration of the air permeability (AAP) of coated paper under high temperatures and high pressures during a short time. And we found that AAP was strongly related to the blistering tendency of coated paper.

In this paper, we used various commercial A2 web-offset coated papers made in Japan, and studied on the blistering resistance. Then we found that the internal bond of base paper and AAP that had a direction from base paper layer to coating layer, were strongly related to the blistering tendency.

Keywords : Acceleration of air permeability, Air permeability, Internal bond, Blistering, Coated paper

Development Both Higher Opacity and Sheet Gloss GCC- Introduction of the FMT-OP Series -

Masayuki Oishi

FIMATEC LTD.

Recent trends have shown that the demands for Ground Calcium Carbonates (GCC) for paper coating are steadily increasing. Among the diverse property demands of GCC, increased Opacity and Sheet Gloss demands come to the forefront. FIMATEC, a GCC manufacturer, has previously developed SC-95 (a particle size distribution controlled GCC). SC-95 has shown excellent properties in both gloss and picking resistance. However, SC-95 is designed for medium-fine to medium particle size and therefore cannot further improve sheet gloss properties.

Using SC-95 technology as a base, FIMATEC now introduces the newest development in particle size distribution manipulation in the new OP-Series. The OP-Series is specifically designed for medium to fine particle sizes which improves sheet gloss. Other beneficial qualities include: improved Wet Void Volume %.

Comparison properties of OP and SC series products are shown in the following report. All in all, OP-Series Test results show improved Sheet Gloss and Opacity characteristics .

Exact Sheet Counting and New Laser Ream Marking System

Mitsuaki Katsumata

Maruishi Co., Ltd., Engineering Dept.

Newly developed sheet counting device and ream laser marking system are developed by Function Control Research B.V. These devices are very suitable to count the number of paper and board sheet which are piled on a pallet coming from sheeter. Conventional tape inserter for every ream in the skid can be eliminated.

Exact sheet counting system can give many advantage for the industry. This sheet counting system with ream laser marking system has been working over 1.5 years in commercial operation, and it is a first experience in the world.

Pest Control Activities for Quality Assurance

Shinya Yokoo

Earth Environmental Service Co., Research & Development

Contamination control-not only insect contaminant is one of the important activities for quality assurance (QA) of the product and it should be based on the preventive approach. In order to realize the effective prevention of insect contamination in the factories, we must establish the comprehensive system including hardware, software, and human-ware, which can solve the basic cause of contamination.

We have been introduced the tailor-made comprehensive system against contamination to the wide variety of customer factories, which we call THC (Total Health Care) system. The framework of our THC system is as follows. After the annual program, we grasp an inadequacy by periodical on-site surveillance including visual inspection, sampling, monitoring, etc. Then we analyze the results of surveillance using statistical methods to decide the optimal action plan solving problems both existing and potential. The short-term action plan, which basically consists of hardware, software, and human-ware, is examined by the group discussion among factory member and us. Once the plan is accepted, we make it clear that whose responsibility, when/by when and where to execute, how to proceed, and why in order to make sure the plan into execution. After verification of execution, we validate the effectiveness of the plan by the close examination using statistical method. If the plan is ineffective, we refine the plan or adopt the alternative one. At least twice a year, we review and validate the annual program by the general statistical analysis because we must make the annual program more effective for the successive year. Continuous improvement of the comprehensive system can make the contamination control more and more effective year by year and our THC system enables it. In this paper we will explain the concept and procedure of our system in detail.

Web Inspection System "SmartView ICN"

Satoshi Suzuki

COGNEX K. K., Surface Inspection System Division

COGNEX developed a new web inspection system, "SmatView ICN". This system has following 3 advanced technologies. (1) Superior Defect Detection using digital cameras and parallel processing, (2) Reliable Defect Identification by over 40 defect features, (3) Unequaled Visualization. It has also snapshot function for web formation analysis.

Acoustic Emission during the Tensile Straining of Paper from Hardwood Pulp-Effects of Beating and Addition of Dry Strength Resin-

Tatsuo Yamauchi and Takateru Hatanaka*

Graduate school of Agriculture, Kyoto University

Acoustic emission (AE) that occurred during tensile straining of paper from hardwood pulp with and without dry strength resin was measured and analysed to investigate the process and mechanism of tensile deformation up to maximum load. Maximum amplitude distribution of the AEs that occurred during the straining manifested some changes of micro failures with increases in beating degree and addition level of dry strength resin. The increase in bonding area by beating and increase in specific bonding strength by addition of the resin cause an increase in failure of strong fiber bonds. Although almost all of micro failures that occurred during the straining up to maximum load are attributed to those of weak fiber bonds, some strong fiber bonds and/or fibers themselves fail just before maximum load for the handsheets from beaten pulp. With addition of the resin, strong fiber bonds and fibers themselves begin to fail even in mid of the plastic deformation.

Keywords: Acoustic emission, Beating, Dry strength agents, Hardwood pulp, Tensile strength

Life Cycle Impact Assessment of Woodfree Papers Containing

Nonwood Pulp or Deinked Pulp

Katsuhito Nakazawa

Japan Science and Technology Corporation

Tomonori Honda

Graduate School of Engineering, University of Tokyo

Toru Katsura

Mitsubishi Paper Mills, Ltd.

Keiichi Katayama
Graduate School of Engineering, Tokai University
Ryoichi Yamamoto
Center for Collaborative Research, University of Tokyo
Itaru Yasui
Institute of Industrial Science, University of Tokyo

Life cycle impact assessment for woodfree papers containing nonwood pulp (bagasse pulp and kenaf pulp) or deinked pulp (DIP) was investigated by eight kinds of environmental impact methods such as EPS1992, EPS2000, Eco-Point1993, Eco-Point1997, Eco-Indicator95, Eco-Indicator99, Panel method and Distance to Target method, based on the results of LCI (Life Cycle Inventory) analysis.

Considering the environmental impact caused by CO₂ emission from biomass, the environmental impact of woodfree paper containing DIP was smaller than that of other kinds of woodfree paper. Not considering the environmental impact caused by CO₂ emission from biomass, the environmental impact of woodfree paper made from 100% wood pulp was smaller than that of woodfree paper containing DIP except Eco-Indicator99. It was evaluated by eight kinds of environmental impact methods that the environmental impact of woodfree paper containing kenaf pulp was the largest in four kinds of woodfree paper. In the comparison of the environmental impacts calculated by eight kinds of environmental impact methods for four kinds of woodfree paper, the ratio of total environmental impact of the kenaf pulp and DIP was less than 1.8 in seven kinds of environmental impact methods except Eco-Indicator99. It was confirmed that the environmental impact caused by CO₂ emission was evaluated larger than that caused by other substances in eight kinds of environmental impact methods, especially accounting for about 70% in six environmental impact methods except Eco-Point1993 and Eco-Indicator99.

Keywords : Life cycle impact assessment, Woodfree paper, Bagasse pulp, Kenaf pulp, Deinked pulp

CONTENTS

Sep-03

Topics & Information

Improving Runnability of Papermaking Machine through Optimization of Wet-end Operation	Koichi Tadaki, Munetoshi Yamaji, Tomoko Asada and Kenji Tsunekawa...(1)
Continuous Analysis of Suspended Materials Gives Better Control of Pulp and Paper Processes	Chiaki Benitani...(11)
Anionic Trash in Papermaking : Mechanism and Approach	Jiayi Chen...(17)
ProRelease Stabilizer -Gentle Web Run-	Yukinori Takano...(27)
Introduction of Ronningen DCF Filter	Hisashi Kitano...(32)
Mechanism of Sizing Behavior of ASA	Kunihiko Matsushima, Manabu Takaoka, Hirofumi Zako, Yuki Sakamoto and Yoshio Adati...(36)
Development of Longlife Suction Box Lip	Ryo Shimizu and Norio Fujita...(44)
The Development of Stainless Steel Weld Overlaying for Continuous Digesters	Masaaki Ito...(51)
New Agents for Kraft Process	Keigo Yoshiuchi...(55)
Next Generation Color Control -Its Strategy and Results-	Kazumasa Hasumi...(62)
VERIS Power & Environment Monitoring System Real Time Monitoring & Analyzing System by PC	Hiroyasu Hattori...(73)

Research Report

Reduction of Chloroform Emission from Hypochlorite-bleaching Process	Kengo Magara, Olov Karlsson and Shuji Hosoya...(76)
Stress Analysis for Gripe Hole of Corrugated Fiberboard Case -Relation between Hole Breadth and Stress Components-	Satoru Matsushima and Shigeo Matsushima...(84)

Pulp and Paper Mills in Japan (28)

-Iwabuchi Mill, Oji Paper Co., Ltd.-Oji Paper Co., Ltd.	...(91)
---	---------

56th JAPAN TAPPI General Meeting ... (97)

Committee report	...(03)
Coffee break	...(75)
Papyrus	...(124)
Industry News(Domestic and International)	...(127)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(139)
List of Patents issued and Laid-open Publication	...(141)
Price list of Domestic Logs and Wood Chips by District	...(146)
Wholesale Price list of Papers at Tokyo Trade Center	...(147)
Other Monthly Statistics	...(149)
News from the Association	...(151)

September 2003 Abstracts

Improving Runnability of Papermaking Machine through Optimization of Wet-end Operation

Koichi Tadaki, Munetoshi Yamaji, Tomoko Asada and Kenji Tsunekawa
FC Process Department, Somar Corporation

Under world-wide increasing concerns for environmental issues and as an influence of the trend toward neutrality of papermaking conditions, difficulties are being added to the paper stock situations year after year. Increased mix of deinked pulp or coated broke not only deteriorates the wet-end properties such as fiber retention and drainage and paper quality such as paper strength, sizing, etc., but also is responsible for stain troubles in papermaking equipment. Countermeasures against stain on a papermaking machine are currently one of the major problems for improving productivity and runnability. In a papermaking machine system, slime troubles due to microorganisms and foreign matters such as pitches, anion trashes, etc. are sources of stain in correlation each to the other. It is believed therefore that a possibility would be accomplished for improvements of productivity and runnability by totally addressing these matters together and by undertaking rapid and adequate action therefor.

By utilizing the know-how accumulated over years for handling microorganisms with a slime controlling agent as the center item and the experience relative to "Realizer" as a wet-end improver which addresses foreign matters such as pitches and anion trashes, we are making various proposals for countermeasures against stain troubles in a papermaking machine addressed totally and analyzed as a comprehensive matter.

Continuous Analysis of Suspended Materials Gives Better Control of Pulp and Paper Processes

Chiaki Benitani
Spectris Co., Ltd., BTG division

This paper deals with an optical method for continuous analysis of suspended materials. It will find its main use in the pulp and paper industry e.g., for the analysis of pulp, white water and effluents from a mill. The instrument is based on the transmit measuring method. One of the unique features of the instrument is the possibility to simultaneously obtain separate values for the large particle (fibers) and fine particle content (fillers/fine) of the suspension. Changes in particle size will therefore have practically no influence on the total consistency measurement. This is normally a large problem for optical consistency meters, especially instrument for the measurement of turbidity.

The sensor is based on fiber optics and its design guarantees high reliability with a minimum of maintenance. Clogging of the measuring gap is practically impossible. Furthermore, the sensor is equipped with a device for automatic cleaning. This means that the measurement neither will be affected by variation in light intensity nor by contamination of the optical surface.

These analyzers have been installed, in different positions in the pulp and paper industry, with good experience. After presenting the great advantages of the measuring method, this paper will then explain different applications and mill installations.

Anionic Trash in Papermaking: Mechanism and Approach

Jiayi Chen
Kurita Water Industries Ltd.

Anionic trashes (AT) are released into the water phase from contaminated reused water, recycled fibre, or broke, and form deposits at papermaking process including the wet-end, press section, machine fabrics and rolls. The AT can cause lowering of productivity by defective products; sheet breaks; short shutdown duration.

The lab and field trials showed that troubles from AT can be controlled by dosing cationic fixing chemicals. This paper examines: the mechanism of troubles from AT, variable wet-end factors, selection of the most compatible additive; and monitoring machine performance.

ProRelease Stabilizer- Gentle web run -

Yukinori Takano
Voith IHI Paper Technology Co., Ltd.

Since its introduction, single-tier dryer section - equipped with DuoStabilizers and ropeless tail threading technology - has proven extremely successful. The complete single-tier TopDuoRun is now the preferred dryer section configuration, especially for high-speed paper machines and lightweight paper grade. Furthermore, in combination with double-tier dryer groups - the CombiDuoRun - for heavy grades and at somewhat lower speeds, it permits high runnability through stable web run and reliable, fast tail transfer.

The newly developed and already successfully installed ProRelease Stabilizer now offers further optimization potential in the particularly sensitive area of the first dryer groups by reducing the required tension of the still wet weak paper web during detachment from the dryer.

Introduction of Ronningen DCF Filter

Hisashi Kitano

ITOCHU Sanki Corporation

We started our relationship with RPA Process Technologies which are producing well known RONNINGEN-PETTER filters in United States in year 1998. As you may know, RONNINGEN filter is one of the best filter in the world in liquid filtration from the Wet End to the Coater. The filter which we are introducing here is built with the most recent technologies that the filter does not need to be back washed when operating as well as the traditional concept of the RONNINGEN filter.

Mechanism of Sizing Behavior of ASA

Kunihiko Matsushima, Manabu Takaoka, Hirofumi Zako, Yuki Sakamoto and Yoshio Adati

Chiba Laboratory Research and Development, Seiko PMC Co., Ltd.

Alkenyl succinic anhydride (ASA) is well known as one of the synthetic sizing agents widely used in neutral papermaking and its role at higher pH range sizing has become important because of environmental issues, the lifting ratio of recycling pulp, anion trash increase in papermaking system and so on.

Although many literatures on ASA have been published, we studied the mechanism of ASA sizing by using both ASA and ASAcid (hydrolyzed ASA) in order to obtain further comprehension. In this experiment, sizing treatment was carried out under ideal conditions where the filter paper was immersed in ASA emulsion or in the toluene solution of ASA, so as to retain the same quantity of sizing material in filter paper. The same procedure was adopted in the case of ASAcid. Contrary to our expectations, the most notable fact from the results obtained is that the sizing effect of the filter paper treated with ASA emulsion is superior to that of ASA toluene solution.

These results suggest that the most essential factor to develop sizing is morphology of sizing material distribution on fibers. We speculate that the entirely uniform distribution of sizing material, like a uniform thin film, is not necessary for sizing development but the scattered distribution, like dots, is required.

Development of Longlife Suction Box Lip

Ryo Shimizu and Norio Fujita

Nomura Plating Co., LTD.

A felt suction box is installed in the press section on a paper machine. It is useful for removing white water and shower water for felt cleaning by effect of vacuum. Our company developed of sprayed suction box lip that is a round type at 1997. We started the development of longlife sprayed suction box lip that is a flat face type for longlife, lower price and lighter. Suction box lip combined a resin body and spraying material on stainless steel. Result of fundamental experiment, we chose special phenolic resin and FRP from resin and epoxy adhesive from adhesive. We examined WC-NiCr spraying, Cr₂O₃ spraying, Al₂O₃-TiO₂ spraying, ZrO₂ spraying, Ni-P plating dispersing SiC, Ni-W plating, Cr plating and sintered Al₂O₃ by referring the result of taber abrasion test. After the wear resistance examination, we understood the followings by evaluate the lesswear, damage of felt, scratch on lip surface. Regarding for wear, WC-NiCr spraying and Al₂O₃-TiO₂ spraying are superior than other samples. Al₂O₃-TiO₂ spraying is the most suitable about wear resistance and spraying thickness. On the other hand Cr₂O₃ spraying is the most suitable about effect of less felt damage.

The Development of Stainless Steel Weld Overlaying for Continuous Digesters

Masaaki Ito

Daio Maintenance Co., Ltd.

We have developed an overlay method for continuous digesters that substitutes the lining of stainless steel plates. We carried out the overlay (110m²) at the NKP Continuous Digester in Daio Paper Co., Ltd. in March this year.

The superior points of our overlay method are the high welding quality achieved by using new automatic welding machines, the short term of the work and the high safety level for assembly, inspection and dismantling that employed an automatic scaffolding system.

Our method of overlay is capable of preventing corrosion of the welded parts that stainless steel lining plates have and corrosion of the cladding of continuous digesters.

New Agents for Kraft Process

Keigo Yoshiuchi

Research & Development Dept., SAN NOPCO LIMITED

The Kraft process consists of the cooking process and the bleaching process mainly. In Kraft process, the weakest point is the low of the yield of pulp in the cooking process. The kinds of quinone derivatives or polysulfide derivatives are widely used as cooking assistant agents to improve it. "Cooking Accelerator" is the agent to accelerate the function that these agents have and to raise the yield of pulp furthermore.

In the bleaching process, chlorine is used as one of the bleaching agents. But it may cause the occurrence of dioxin, so it is better to decrease the amount of chlorine consumption from the environmental point of view. "Oxygen Bleaching Accelerator" can raise the ratio of delignification yield and decrease the amount of not only chlorine but also sodium hydroxide and chlorine dioxide.

Both agents are useful in the Kraft process, and can be expected in the future.

Next Generation Color Control- Its Strategy and Results -

Kazumasa Hasumi

Sales Department, Honeywell K. K.

Paper manufacturers and end-users have become more critical about shade variation and product appearance. These requirements span the entire grade structure from tissue to multilayer board, including the whites through to deeply dyed grades. While invisible quality variables, such as basis weight, moisture and caliper may be undetected although well outside specifications, small differences in shade can be easily detected by a relatively untrained eye, potentially resulting in substantial product rejection. The requirement for minimum color variation in paper products has forced papermakers either to maintain a group of operators whose time is nearly 100% dedicated to controlling product color manually, or to implement closed-loop color control. Over the past twenty years, the popularity of supervisory closed-loop color control has increased significantly and has produced excellent results.

In a push for greater efficiency, the industry has been seeking ways to reduce color change times and resultant broke losses. Typically, manually controlled color changes can require up to one hour, depending on the complexity of the change. Today's trends toward reduced inventories and faster delivery to paper customers denies papermakers the luxury of scheduling a well-established progression of shades and forces shorter production runs of each shade, resulting in frequent, more difficult shade changes.

As the new solutions for above requests, the Honeywell new color controls provide robust models which are both responsive and capable of maintaining the color coordinates closer to target than ever before.

VERIS Power & Environment Monitoring System Real Time Monitoring & Analyzing System by PC

Hiroyasu Hattori

Nittou Shoukai Ltd.

Veris Industries has the sensors and systems for building, factory control and automation: patented current sensor with integral relay, microprocessor controlled and analog current sensors for variable frequency drives, power meters, energy management meters, Modbus data acquisition products, humidity (RH) sensors, temperature sensors, carbon monoxide (CO) detectors, carbon dioxide sensors for monitoring indoor air quality, pressure sensors, electropneumatic pressure controllers, combination sensors for humidity/temperature/carbon dioxide measurement, power supplies and accessories. VERIS has developed Power and Environment Monitoring, Energy Saving systems using these sensors. We introduce VERIS real time Power and Environment Monitoring, Analyzing Systems using PC.

Reduction of Chloroform Emission from Hypochlorite-bleaching Process

Kengo Magara, Olov Karlsson* and Shuji Hosoya

Department of Chemical Utilization, Forestry and Forest Products Research Institute

Chloroform was readily converted to formic acid through the nucleophilic attack of hydroxyl anion under the certain reaction conditions (pH > 12, temp. > 70 °C). When guaiacol was reacted with hypochlorite at such reaction conditions, the generation of chloroform was almost completely reduced. Successful reduction of the chloroform generation was also observed in alkaline hypochlorite bleaching of kraft pulps and DIP without any loss in pulp quality.

Even when the hypochlorite bleaching was carried out under the open system (no sealing of the reaction vessel), nearly 90% of the generated chloroform was converted to formic acid.

Key words: chloroform, alkaline hypochlorite, bleaching, dehalogenation.

Stress Analysis for Gripe Hole of Corrugated Fiberboard Case- Relation between Hole Breadth and Stress Components -

Satoru Matsushima

Guest Professor, Research Center of District Corporation, Ehime University

Shigeo Matsushima

Professor Emeritus, Ehime University

An elastic analysis for side plates of the corrugated fiberboard case (breadth $L=240\sim 302.5$ mm, height 207.5mm and length 440mm) with grip holes (length $\Delta L_0=0.0\sim 62.5$ mm of parallel line, hole side radius $r=12.5$ mm of semicircle arc) applied uniform applied stress p in ΔL_0 range was performed by finite element method, and from this analysis, stress components of their plates were considered.

Large absolute values of normal stresses σ_x and σ_y in breadth and height directions and shear stress τ_{xy} concentrate near upper edges and sides of holes. Maximum of $|\sigma_x|$ is at centers of hole upper edges in $\Delta L_0 < 1.6r$ and at centers of plate upper edges in $\Delta L_0 > 1.6r$, and maximum of $|\sigma_y|$ is at centers of hole upper edges in $\Delta L_0 < 1.6r$ and at hole sides in $\Delta L_0 > 1.6r$. And τ_{xy} is negative value and maximum of $|\tau_{xy}|$ is at centers of hole upper edges in $\Delta L_0 < 1.6r$ and at positions $r/2$ along upper direction from hole sides in $\Delta L_0 > 1.6r$. Maximum values for σ_x and σ_y increase and maximum absolute values for minimum σ_y decreases with the ΔL_0 increase, and maximum absolute value for minimum σ_x and τ_{xy} decrease initially and increase with the ΔL_0 increase.

Keyword: Computational Mechanics, Structure Analysis, Elastic Bending, Strength of Corrugated Fiberboard, Elastic Stress Analysis, Structure Strength, Numerical Analysis, Stress Concentration

CONTENTS

Oct-03

ENVIRONMENT

- Taking Action Against Climate Change-Away from the Extraordinary Society of the
Second Half of the 20th Century Yutaka Tonooka...(2)
- Global Warming Issues with Pulp and Paper Industry in Japan Takuro Ueda...(14)
- How to Evaluate Carbon Sequestration by Forests Takao Fujimori...(33)
- Strategies for Compliance with the Kyoto Protocol from Private Companies' Point of View Kuniyuki Nishimura...(40)
- Future Development in Comprehensive Risk Management of Chemical Substances Masaru Masuda, Ph. D....(43)
- Self-Management and Human Resource Enrichment-
- Necessity of Scientifically and Technically Sound Management of PRTR Designated Chemicals Yoshitaka Hoshikawa...(50)
- Soil Contamination Countermeasures Law Seiji Aoki...(57)
- The Present Status of Legislation in Japan and Contamination Risk Management-
- Recent Study on Water Quality Standards for the Conservation of Aquatic Life Keiko Segawa...(76)

Topics & Information

- The Latest Web Inspection System and its Possibilities -Technology and Directivity of NASP Masahiro Nakata...(80)
- Multi500System-
- Development of Tesa EasySplice FastLine Seiya Okamoto, Yuki Kashiwabara and Munetaka Mukasa...(86)
- A Report of 2003(70th) Pulp and Paper Research Conference Wood Science Committee, JAPAN TAPPI...(90)

Introduction of Research Laboratories (37)

- Lab. of Wood Chemistry, Department of Forest Resources Science, Faculty of Agriculture, Shizuoka University....(110)

Research Report

- Determination of the Surface Layer of Kraft Pulp Fibers by Field Emission Scanning
Electron Microscopy(FE-SEM) Tetsuaki Okamoto and Gyosuke Meshitsuka...(114)
- Life Cycle Assessment of Papers Used for Environmental Reports
Katsuhito Nakazawa, Kohei Yamada, Toru Katsura, Hiroaki Niwata, Keiichi Katayama and Itaru Yasui...(119)

Pulp and Paper Mills in Japan (29)

- Asahiwaka Mill, Nippon Paper Industries-Nippon Paper Industries ...(132)

Committee report

- Committee report ...(03)
- Essay on Intellectual Property ...(112)
- Coffee break ...(113)
- Papyrus ...(140)
- Industry News(Domestic and International) ...(145)
- List of Titles in Foreign Journals Received by JAPAN TAPPI ...(156)
- List of Patents issued and Laid-open Publication ...(159)
- Price list of Domestic Logs and Wood Chips by District ...(166)
- Wholesale Price list of Papers at Tokyo Trade Center ...(167)
- Other Monthly Statistics ...(169)
- News from the Association ...(171)

October 2003 Abstracts

Taking Action Against Climate Change - Away from the Extraordinary Society of the Second Half of the 20th Century

Yutaka Tonooka

Prof. Faculty of Economics Saitama University

The second half of the 20th Century was an extraordinary age of global scale mass consumption resulting in depletion of resources and simultaneous environmental pollution caused by big business competition of global capitalism. It was an unprecedented experience not only within human history but also that of the Earth, injuring the Earth's system itself, for example, ozone layer depletion, climate change, pollution due to chemical products and so on. Many argue for a shift towards "Sustainable development" but it is extremely difficult to move to a sustainable society directly from the 20th century which is ideologically almost the complete opposite. It may be impossible to find the path to a sustainable society leading from the preceding part of the 20th Century, without a drastic revolution in our way of business society. In this short note the extremes of the second half of the 20th Century are discussed and suggestions made for the starting point for a sustainable society for the next millennium. Taking action against climate change might be just one of significant departures away from the prior development patterns of the 20th Century.

Global Warming Issues with Pulp and Paper Industry in Japan

Takuro Ueda

Paper Industry, Consumer and Recreational Goods Division, Manufacturing Industries Bureau, Ministry of Economy, Trade and Industry

To fulfill the commitment of the Kyoto Protocol adopted in December 1997, the promotion of measures on the global warming is a critical issue in the field of pulp and paper industry, which is one of the major energy users. However, investments on environment field such as energy conservation have not been so active, because of the recent situation of overall economy and individual corporate profit. Thus, for pulp and paper industry, it is essential not only to deal with environmental issues, but also to strengthen its competitive advantages. In order to realize these, we have to fully understand situations and problems that the industry is facing. From this viewpoint, government's policy measures, current situation and issues of the industry, and the strategy for strengthening its competitiveness are discussed.

How to Evaluate Carbon Sequestration by Forests

Takao Fujimori

Japan Forest Technology Association

Enhancing carbon sequestration by forests is important for mitigation of global carbon dioxide. However, it is always necessary to consider the relationship between carbon sequestration and carbon stock. Enhancing carbon sequestration and maximizing carbon stock are both important for the strategies for mitigation of carbon dioxide.

Carbon sequestration rate and amount of carbon accumulation vary according to forest stand development stage, and the peak of sequestration rate and the highest level of carbon stock cannot be realized at the same time. The peak of carbon sequestration rate is found in young stage, while highest carbon stock is found in old-growth stage. So the target stand structure for enhancing carbon sequestration should be aimed from young stage to mature stage, while that for maintaining high carbon stock should be aimed in old-growth-stage.

Enhancing carbon sequestration can be realized by forest management for timber production and maintaining high carbon stock can be realized by preservation of forest ecosystems. Energy for processing materials can be reduced by using timber for materials and the consumption of fossil fuels can be reduced by using wood for energy. Using wood is important for establishing recycling-based society.

Strategies for Compliance with the Kyoto Protocol from Private Companies' Point of View

Kuniyuki Nishimura

Mitsubishi Research Institute Inc.

The Kyoto protocol is expected to enter into force in 2005 and if so Japan will be required to reduce greenhouse gas emission by 6% from the 1990 level in the first commitment period (from 2008 through 2012). The unit cost of CO₂ reduction is high in Japan because of advanced energy saving measures already put in place and reduction, if attempted to achieve only with domestic measures, would impose great burdens on industries.

This paper discusses the importance of studying strategies and their possible direction, giving consideration to future enterprises' strategies to cope with the Kyoto protocol.

Future Development in Comprehensive Risk Management of Chemical Substance – Self-management and Human Resource Enrichment –
Masaru Masuda, Ph. D.
Faculty of Engineering, Tokyo University of Agriculture Engineering

Discussions on risk management of chemical substances have been repeated among international organizations such as OECD from 1970's, and have resulted in establishing various concepts, principles and systems. Based on such trends, I have proposed a concept of "Comprehensive Risk Management of Chemical Substances" making full use of scientific knowledge and logical thinking. Self-management, mainstay of the concept of "Comprehensive Risk Management of Chemical Substances," has achieved great result.

Future trend can be predicted by observing the activities of the international organizations, and through logical thinking based on scientific knowledge. First come will seize the opportunity and contribute to positive growth in management.

Construction of new science on "Comprehensive Risk Management of Chemical Substances" that discuss such matters from a bird's-eye point of view has been attempted, and human resource enrichment based on this new science is unfolding.

Necessity of Scientifically and Technically Sound Management of PRTR Designated Chemicals
Yoshitaka Hoshikawa
Chemical Risk Consultants

First Data Sets of Japanese Pollutants Release and Transfer Registry (PRTR) System under the Law concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (Law for PRTR and Promotion of Chemical Management) has been published on March 20th, 2003 and there are some intentional activities urging industries on the reduction of their environmental releases.

Considering these circumstances, we talk here about scientifically and technically sound management of PRTR designated chemicals, from points of compliance with the guidance provided by the law, voluntary setting of targets for environmental releases, and risk communication.

Soil Contamination Countermeasures Law-The Present Status of Legislation in Japan and Contamination Risk Management-
Seiji Aoki
Geo-Environment Department, Environmental Control Center co., Ltd.

Soil contamination has been one of seven typical environmental problems and the existing law was targeting only land for agricultural use. The new law, Soil Contamination Countermeasures Law, which covers land of any kinds of use, is now effective. The law specifies minimum requirements for preventing health hazards and its objects are very narrowed. If you make a survey on the land strictly with the minimum requirements specified by the law, there are chances of missing some existing contamination. It will be very risky, when you want to do business with the land. It will be advisable that you would make an enough extra survey, taking into account its historical uses.

Recent Study on Water Quality Standards for the Conservation of Aquatic Life
Keiko Segawa
Deputy Director, Water Management Division, Ministry of the Environment

The Expert Committee on the Water Quality Standards for the Conservation of Aquatic Life recently launched its report on the technical matters and framework. The report presents basic ideas on methods to set target figures to protect aquatic life from pollution by heavy metals and chemical substances in rivers and other water areas. Especially, this report points out the necessity of setting Water Quality Standard on Zn, and Precautionary Monitoring Targets for formaldehyde, phenol and chloroform. The contents of this report should be discussed in the Water Management board in the Central Environment Council in this summer.

The Latest Web Inspection System and its Possibilities-Technology and Directivity of NASP-Multi 500 System-
Masahiro Nakata
OMRON Corporation, Technology Development, Vision System Business DIV.

The web inspection system of OMRON renewed the technology of a detection part, and accomplished change further as next generation system, NASP-Multi500.

The basic thought used as the base of the detection part is Platform-thought. That is, by mounting logical & software in basic digital hardware as a firmware, variable of the logic becomes possible and it can reply to the daily demand in the paper manufacture industry. As for detection algorithm, digital image processing of our company original development is incorporated. It is mainly the fault from which a light fault, a streak fault, and etc. serves as the object.

Thus, the web inspection system is developed in our company every day, catching a demand of the paper manufacture industry exactly.

Development of Tesa EasySplice FastLine
Seiya Okamoto, Kashiwabara Yuki and Mukasa Munetaka
Tesa k.k.

We introduced EasySplice FastLine for paper splicing at the last JTAPPI conference in Yonago.

Fortunately we've got many users of the tape in the Paper Industry. We are very happy that we could serve to the Industry through new technology.

In this session I inform of the world wide achievements of technical and business results.

Then I'll explain the pasting mechanism of EasySplice and introduce some technical problems we had and solutions we gave for them.

At the end of lecture I'd like to speak about the development of EasySplice technology. We are going to launch a new product for auto-preparation robot of paper splicing. It has new concept best suitable for mechanical process though conventional EasySplice is the most suitable for manual preparation.

Determination of the Surface Layer of Kraft Pulp Fibers by Field Emission Scanning Electron Microscopy (FE-SEM)
Tetsuaki Okamoto and Gyosuke Meshitsuka
Graduate School of Agricultural and Life Sciences, The University of Tokyo

The surfaces of commercial softwood kraft pulp fibers were observed by FE-SEM to determine the surface layers of the fibers. Unbleached pulp fibers were covered by fibrils running in random fashion, and the fibrils sometimes extended to a pit area, which were characteristics of the primary wall. The existence of primary wall on the surfaces of unbleached kraft pulp fibers would cause the higher lignin content of the surfaces of the fibers than that of the whole fibers. Large parts of the primary wall were removed during bleaching process, and the fibrils running densely perpendicular to the fiber axis were observed on full bleached pulp fibers, which was a characteristic of the outer layer of secondary wall. The degree of the primary wall removal was different between the pulp samples. In one pulp sample, large amount of the primary wall was removed during oxygen delignification stage, although, in another pulp sample, some removal took place during oxygen delignification stage.

Key words: kraft pulp, fiber surface, primary wall, secondary wall, fibril, FE-SEM

Life Cycle Assessment of Papers Used for Environmental Reports
Katsuhito Nakazawa and Kohei Yamada
Japan Science and Technology Corporation
Toru Katsura and Hiroaki Niwata
Mitsubishi Paper Mills, Ltd.
Keiichi Katayama
Graduate School of Engineering, Tokai University
Itaru Yasui
Institute of Industrial Science, University of Tokyo

The number of companies that published their environmental reports have increased in recent years, and the recycled paper containing a larger amount of DIP (Deinked pulp) with lower degree of brightness is used to print them for environmental concerns. In this study, several different kinds of paper used for environmental reports of many companies were investigated, and their environmental loads and environmental impacts were evaluated by LCA (Life Cycle Assessment) method.

As for the characteristics of paper of eight environmental reports, paper containing 100% DIP was used for seven reports, and coated paper was used for three reports. Compared with non-coated paper and coated paper, total CO₂ emission caused by coated paper through its life cycle was estimated larger because of the large CO₂ emission from the manufacturing of related chemicals such as latex. As a result of LCI (Life Cycle Inventory) analysis of five kinds of paper used in environmental reports, it was observed that the total energy consumption of paper containing 100% DIP was smaller than those of paper containing wood and non-wood pulp. The evaluation with respect to CO₂ emissions from fossil fuel consumption showed that the CO₂ emissions caused by paper containing wood and non-wood pulp were smaller than that caused by paper containing 100% DIP. Regarding LCIA (Life Cycle Impact Assessment), with use of EPS 2000 and Panel method relatively little difference was seen among the environmental impacts of five different kinds, while it was shown by Eco-indicator 99 that the environmental impacts of paper with wood and non-wood pulp were larger than those of the others.

For more detailed study, it is desirable to conduct LCA by considering land use in relation to sustainable forest management, and biomass energy as renewable energy source.

Key words : Environmental report, Coated paper, Life cycle assessment, Life cycle inventory analysis, Life cycle impact assessment

CONTENTS

Nov-03

Topics & Information

Advanced Ex-Press Sheet Management for Improved Quality and Paper Machine Performance	Hideomi Uchikawa and Raymond P. Shead...(1)
Release Agent for Press Rolls	Hiraku Sawada...(7)
Lubricating Control & Save Labor of Paper Machin	Kazuhiko Tanaka...(12)
Increasing Profitability Through Filtration, Separation and Purification Technology	Kazuyasu Izawa...(15)
-Pall Total Cleanliness Approach to Pulp and Paper Production Process-	
The Least Whole Life Costs of Progressive Cavity Pumps in the Coating	Kitchen Jeremy Jones...(20)
PAM-type Ply Bond Strength agent"Himoloc MJ-450"	Tomonori Nakamura...(28)
Compact Wet End Systems are Proven State of the Art	Paul Olof Meinander...(32)
-Experience of Sixteen Installations-	
Dewatering Machine for Paper and Pulp -Rotary Press Filter-	Kouji Matsumoto...(40)
"Covercarb"(Hydrocarb CC) -A New Coating GCC for Enhanced Optical Properties-	Guillermo Bluvol...(46)
The Development of Environmental Consciousness with Regard to the Use of Dyes and Pharmaceuticals in the Paper Pulp Industry	Kunio Sugaya...(51)
2001Statistics on Industrial Residuals and their Utilization by Pulp & Paper Mills in Japan	
	Environmental Technology Committee, JAPAN TAPPI, Industrial Wastes Committee, Japan Paper Association, Environmental Protection Committee, Japan Paper Association ...(56)

Research Report

Mechanical Pulping of Cedar(<i>Cryptomeria japonica</i>)	Isao Onodera, Yasuyuki Kamijo and Takanori Miyanishi...(65)
The Evaluation of Paper Sludge(PS)for Zeolite Synthesis(Part2)	
-Daily Change of Chemical Composition of PS and the Aptitude for Zeolite Synthesis-	
	Takao Ando, Masato Saito, Shigeo Muramatsu, Kimio Hiyoshi, Junsuke Haruna, Naoto Matsue and Teruo Henmi...(72)

Pulp and Paper Mills in Japan(30)

-Kure Mill, Oji Paper Co., Ltd-Oji Paper Co., Ltd.	...(82)
--	---------

Committee report	...(03)
Coffee break	...(64)
Papyrus	...(90)
Industry News(Domestic and International)	...(93)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(105)
List of Patents issued and Laid-open Publication	...(107)
Price list of Domestic Logs and Wood Chips by District	...(118)
Wholesale Price list of Papers at Tokyo Trade Center	...(119)
Other Monthly Statistics	...(121)
News from the Association	...(123)

November 2003 Abstracts

Advanced Ex-Press Sheet Management for Improved Quality and Paper Machine Performance

Hideomi Uchikawa
Voith Paper Automation Japan Ltd.
Raymond P. Shead
Voith Paper Automation

The paper machine can be considered as a series of manufacturing units, each performing a discrete function as the sheet passes through it. The principal units are the head box, forming section, press section, dryers and calender stack. Despite the contribution that each of these units makes to production and quality, very little is either measured or controlled between the forming section and ex-press, especially when one considers that the majority of the sheet's characteristics are born in this part of the process. For example, nearly half the water within the sheet is mechanically removed between these two points, with virtually no process visibility available to optimize this part of manufacture. In addition there are no measurements to help describe the condition of the forming fabrics, press felts and transport belts involved in the de-watering process. Yet most modern paper machines will change the press felts every fifteen to thirty days as their age and efficiency reduces productivity and quality. There is a clear requirement and justification to do two things; first to examine the sheet at the ex press position and secondly to use the information to improve quality of the sheet and run-ability of the machine through its pressing operations.

Release Agent for Press Rolls

Hiraku Sawada
Maintech Co., Ltd., Sales Engineering Dev.

Deposition of pitch or fine fiber on the press rolls causes defects in the sheet, sheet breaks and fiber rising. Especially for high speed PMs (more than 1,200 mpm),

sheet release from the rolls is not only limiting their speed but also giving strong impact to paper quality.

Cationic polymer has been generally used to keep the roll surface clean, however, those program are not able to reduce draw and fiber rising effectively.

Our technology, a continuous application of chemical additives (Wax based emulsion, On Press™) directly onto press rolls treats surface and establishes a protective coating that prevents deposit buildup.

In addition to preventing deposition and linting on the press rolls, this new technology enables mills to increase PM speed and/or improve paper quality.

In this report, basic mechanism of the roll release is explained and case histories to various grades paper M/C are presented.

Keyword: press roll, web release, open draw, tension, pitch, stickies, deposit, fiber rising, linting in press room

Lubricating Control & Save Labor of Paper Machin

Kazuhiko Tanaka
Kowa Corporation, Tokyo Branch Oil Equipment Department Sales Group

There are bearings requiring to be lubricated in many points of the Paper-Making Machine system and various way of lubricating has been thought out and come to as present since Sairin built the model of current paper machine in Later Han dynasty.

As main ways of lubricating, there are manually-filling lubrication, dropping lubrication, soaking lubrication, ring lubrication, gravitation lubricating, splashing lubrication, jet lubrication, circulating lubrication, and grease lubrication, etc using lubricant such as mineral lubricating oil, fat lubricating oil, mixed lubricating oil, and grease, etc.

In this article, I would like to mention the problems and solution concerning the circulating lubrication control using the mineral lubricating oil, which is often used in the Paper-Making Machine. And I hope it will be of any help to release you from the bothering matters on daily lubricating control.

Increasing Profitability Through Filtration, Separation and Purification Technology

- Pall Total Cleanliness Approach to Pulp and Paper Production Process -

Kazuyasu Izawa

Nihon Pall Ltd.

Contamination has been long recognized as the main source of failure to systems including pulp and paper making machines. Many researches has been conducted and concluded that the contamination control is the most effective means of preventing system malfunction. Unfortunately, the potential benefits are not being fully realized as often a 'fix' is implemented without considering other factors in the process.

This paper explains the practice of Total Cleanliness Control (TCC) which involves a systematic and complete approach to the subject of fluid system cleanliness. The implementation of this practice by component producers, system builders and operators alike will enable them to realize the benefits and the subsequent contribution to the profitability of the company.

The Least Whole Life Costs of Progressive Cavity Pumps in the Coating Kitchen

Jeremy Jones

Business Manager, North East Asia, Mono Pumps, Ltd.

Manchester, U.K.

The principles of designing a progressive cavity pump that will give the lowest total cost of ownership, the "Least Whole Life Cost", are described and discussed. A balance between initial capital cost and subsequent operating costs will result in the most economical solution. The factors influencing the maintenance and operating costs over the typically 20-year life of the pump include power consumption and component wear. The mechanisms of wear and the conclusions drawn from 10 years of a scientific research program are summarised. The Mono Pump that offers the lowest Least Whole Life Cost is described, and actual site experience is quoted to illustrate the successful application of the theory.

PAM-type ply bond strength agent "Himoloc MJ-450"

Tomonori Nakamura

Paper Chemical Group, Shonan Research Center, HYMO Co., Ltd.

High ply bond strength is required in combination board. Some kinds of starches are used as ply bond strength agents in spraying their suspension to the combined plies. Starch suspension, without cooking, is sprayed, and the particles of starch are gelatinized in the drying process, large ply bond is occurred. But there are some problems such as putrefaction in using starches. Recently, synthesized ply bond strength agents have been used, for example poly acrylic amide type (PAM). Our company developed cationic dispersion PAM as retention aids and drainage aids for the first time in the world. Furthermore, we have developed anionic dispersion PAM, "Himoloc MJ-450", as ply bond strength agent. "MJ-450" has great performance in small dosage because of its large particle size. The particle size of "MJ-450" is much the same as it of starches, and larger than it of the existing PAM. In this issue, we discuss the differences in the fixing mechanism of particles onto the ply between starches, existing PAM, and "MJ-450".

Compact Wet End Systems are Proven State of the Art – Experience of Sixteen Installations –

Paul Olof Meinander

POM Technology Oy Ab

Ten years ago most papermakers were convinced that a system needs to be voluminous and heavy for controllability and stability. In order to improve grade changing dynamics, the author of this paper began developing a compact papermachine wet end. The results have proven that compactness is beneficial even more broadly. Quoting Voith 1 "the trend is now the opposite - the systematic collecting and direct feeding of the individual water flows back into the system". In its gas-less form this is actually covered by a POM Technology patent.²

Dewatering Machine for Paper and Pulp- Rotary Press Filter -

Kouji Matsumoto

Process Engineering Development Section Machinery & Equipment Division

Rotary Press Filter is a rotational pressurized dewatering machine that has a unique dewatering mechanism. It was developed by CRIQ, the industrial research center in Quebec, Canada and manufactured and distributed by Fournier Industries Inc. Tomoe Engineering Co., Ltd. started its production under their license this year (2002).

Feature of Rotary Press are :1) High-dewaterability 2) A simple structure 3) A tight-sealed structure that prevent odor emission 4) A small foot print 5) Less enegy cost 6) Easy and minimal maintenance works It meets needs of today and future.

We have already installed 14 units (including sewerage application) in Japan and installed 3 units in 2 paper making plants for their wastewater sludge treatment. Further, we are conducting dewatering tests on respective applications with our test machine and have been obtaining good results. We will introduce the Rotary Press Filter for pulp & paper industry.

" Covercarb" (Hydrocarb CC)-A New Coating GCC for Enhanced Optical Properties-
Guillermo Bluvo

Dipl. Ing. Chem, Regional Technical Service Manager, Paper Coating Division

Almost unknown 25 years ago, ground calcium carbonate is today the most used coating pigment world-wide in several applications. Significant technical and economical benefits like high brightness, lower binder demand, excellent coater runnability and improved off-set printability are well known to the Industry.

In a number of applications however, conventional GCC pigments have the limitation of lower hiding power and reduced opacity. Therefore it is common practice to add opacifying pigments to the coating color for reaching the required opacity.

The theories of light scattering on small particle can be used to explain this phenomenon. Pigments with the high brightness, broad particle size distribution and fine particle size of the GCC's presently used are not optimal for opacity.

We have focused on particle size and particle size distribution to design a GCC pigment for improved opacity. We realised that a narrow particle size distribution (steep curve) would optimise opacity but at the same time many of the advantages of the present pigments would be reduced. There would be significant negative influence on coater runnability, binder demand and solids content of the coatings using the "ideal opacifying GCC".

Therefore a compromise was decided upon by which, as much as possible, the present advantages of GCC would be retained in the new pigment, while particle size distribution and average particle size would be shifted towards that of the ideal opacifying pigment.

The manufacture of this pigment is possible by use of a modified grinding technology.

The presentation describes the new coating pigment and gives a number of examples where conventional GCC pigments were substituted by the new type.

The Development of Environmental Consciousness with Regard to the Use of Dyes and Pharmaceuticals in the Paper Pulp Industry
Kunio Sugaya

Nippon Kayaku Colours. SC Marketing Development Group

Although environmental problems have been a major concern for a number of years, it is only comparatively recently that many companies have deemed it a matter of course to make an appropriate response to environmental problems.

Since its foundation in 1916, Nippon Kayaku has enthusiastically promoted such causes throughout its 80-year history, using as its basic philosophy the following dual concepts. The company believes in creating products that will benefit mankind and contribute to an improvement in global living standards, paying particular attention to the effect on health. Secondly, the company promises to respect the environment and to guarantee the quality as well as the safety of its products.

The paper industry was particularly prompt in dealing with environmental issues. There has been a considerable expansion in the use of fluorescent whiteners as well as colorful dyestuffs in general. Nippon Kayaku has been able to supply such dyestuffs to meet the expectations of the paper industry and has introduced a new recyclable series of dyestuffs with excellent decoloration properties. Additionally, a new series of liquid fluorescent whiteners requiring only water as their solvent has been put on the market. It is also necessary to speak of the positive effect that removing the luminosity from bleached paper by means of fluorescence-removing agents has on the environment.

2001 Statistics on Industrial Residuals and their Utilization by Pulp & Paper Mills in Japan
Environmental Technology Committee, JAPAN TAPPI
Industrial Wastes Committee, Japan Paper Association
Environmental Protection Committee, Japan Paper Association

With co-operation 111 paper mills, the 2001 Statistics on Industrial Residuals Generation and their Utilization was summarized as follows: comparing to 2000,1) the total amount was $2,620 \times 10^3$ BDT and decrease by 5.3% as much more waste paper was recycled but paper production decreased.

The total quantity utilized residuals was $1,314 \times 10^3$ BDT, about 86% of which was composed of the three predominant ones: paper & pulp sludge (575×10^3 BDT), boiler ashes (330×10^3 BDT) and fly-ashes(223×10^3 BDT). The large parts of these were reused as raw materials in the domestic cement industry.

Mechanical Pulping of Cedar (*Cryptmeria japonica*)

Isao Onodera, Yasuyuki Kamijo and Takanori Miyanishi

Pulp & Paper Research Laboratory, Nippon Paper Industries Co., Ltd.

Cedar (*Cryptmeria japonica*) is the most abundant softwood species in Japan and has been used for construction materials, furniture, barrels, shoes and so forth. However it was regarded unsuitable for mechanical pulping as it contains relatively large amount of lignin and extractives compared with other softwood species such as spruce, hemlock and radiata pine. We tried several thermomechanical processes by the laboratory refiner, changing chemical pretreatment and refining temperature. It was found that Cedar CTMP (chemithermomechanical pulp) had the high light scattering coefficient and brightness, and was suitable to produce printing grade papers.

Keyword: Cedar, *Cryptmeria japonica*, Mechanical pulp, Thermomechanical pulp, Chemithermomechanical pulp, Light scattering coefficient, Brightness

The Evaluation of Paper Sludge (PS) for Zeolite synthesis(Part 2) – Daily Change of Chemical Composition of PS and the Aptitude for Zeolite Synthesis –

Takao Ando, Masato Saito, Shigeo Muramatsu and Kimio Hiyoshi

Fuji industrial research institute of Shizuoka prefecture

Junsuke Haruna, Naoto Matsue and Teruo Henmi

Department of agriculture, Ehime Univ.

We have been investigating zeolite synthesis from paper sludge (PS) ashes. This technique is essential from the viewpoint of recycling of wasting materials.

In our previous study, the PS ashes from 20 paper mills in Fuji area of Shizuoka Pref. were examined on suitability for starting materials in the zeolite synthesis, and they were classified into 4 types of compositional ranges in terms of talc-kaolinite-calcite composition; that is, ranges (A) and (B) were suitable for the zeolite synthesis and ranges (C) and (D) were not suitable.

In this study, we selected representative 4 mills that had discharged PS corresponding to the above 4 types of compositional ranges, and the chemical and mineralogical compositions of PS from these 4 mills were analyzed for 5 days. As a result, the following conclusions were obtained.

The PS samples from the mills that had initially discharged PS belonged in the ranges (A) and (B) did not change into the ranges (C) and (D) for the period of 5 days. The samples belonged in (A) and (B) showed again being suitable for the zeolite synthesis.

PS discharged from a paper mill that makes products including a lot of kaolinite is suitable for the zeolite synthesis. However, PS containing too much calcite is not suitable.

Keywords: zeolite, paper sludge, calcite, talc, kaolinite

CONTENTS

Dec-03

Papermaking Technology I

Current State and the Future of Recovered Paper in Japan	Haruo Takayanagi...(2)
The Latest Refining Technology	Kazuo Aoshima...(20)
-Low and High Consistency Refiner Coordinated with Stock Refining Characteristics-	
A New Screening Concept and the Latest Mill Application in Thick Stock Screening	R. Rakohnen, Yosuke Takeshita and Hiroyuki Nagasawa...(31)
The Highest Potentiality and Efficiency of Algas Microfilter	Yasuo Harikae...(38)
-The Reference Report from Japanese Market-	
Technical Trends for Stock Preparation Equipments	Toshikazu Miura...(46)
POM System -Centrifugal Degassing and a Closed Hydraulic Wet End System Give	P. O. Meinander and Joji Taketomi...(55)
Expected and Less Expected Benefits	
Advanced Stock Preparation and Wet End Process	Junichi Miura...(65)
OptiFeed-New Stock Preparation and Approach System	Akifumi Hatta and Jussi Ahola...(75)
Optimized Deaeration Leads to Substantial Process and Quality Improvements in	Rainer Rauch and Kenichi Ishihara...(85)
Paper Manufacturing	
Features from Complete Plant	Reference Andreas Sauer...(93)

Introduction of Research Laboratories(38)

Laboratory of Energy Ecosystems, Department of Socio-Environmental Energy science, Graduate School of Energy Science, Kyoto University	...(100)
---	----------

Research Report

The Structural Characteristics of High Molecular Weight Chlorolignin	
Produced by Chlorine Bleaching of Kraft Pulps	Hiroyuki Shintani, Yuji Matsumoto and Gyosuke Meshitsuka...(104)
The Synthesis of Zeolite from Paper Sludge(PS) Associated with Its Carbonization	
Takao Ando, Masato Saito, Shigeo Muramatsu, Kimio Hiyoshi, Junsuke Haruna, Naoto Matsue and Teruo Henmi...(111)	

Pulp and Paper Mills in Japan(31)

-Rengo Co., Ltd. Amagasaki Mill-Rengo Co., Ltd.	...(120)
---	----------

Committee report

Committee report	...(03)
Essay on Intellectual Property	...(102)
Coffee break	...(103)
Papyrus	...(125)
Industry News(Domestic and International)	...(129)
List of Titles in Foreign Journals Received by JAPAN TAPPI	...(141)
List of Patents issued and Laid-open Publication	...(143)
Price list of Domestic Logs and Wood Chips by District	...(154)
Wholesale Price list of Papers at Tokyo Trade Center	...(155)
Other Monthly Statistics	...(157)
News from the Association	...(159)

December 2003 Abstracts

Current state and the Future of Recovered Paper in Japan

Haruo Takayanagi
Paper Recycling Promotion Center

The Japanese paper industry has accomplished development until today owing to the effective use of the recovered paper as the paper manufacture raw material and the technological development on paper recycling in Japan where resource is scarce.

The recovered paper utilization rate is 59.6% in 2002 now. It is about twice of the utilization rate 30% in the paper manufacture raw materials 40 years ago.

We come to the one more push to reach the target of the reutilization rate 60% in fiscal year 2005.

In several years especially, the recovery rate and the utilization rate is rising remarkably in Japan. It is in the background that the improvement of national consideration has been advanced because of promotion of the decrease in weight of garbage and the introduction of the green purchase, etc. aiming to construct the recycle base society. Moreover, the advancement of the recovered paper use technology cannot be missed.

On the other hand, China and Asian nations increase rapidly the import of the recovered paper from Japan along with the increase of the production of paper and the paperboard in the countries. Now, recovered paper is an international global trade raw material.

I had groped for the view in the future of the recovered paper use in Japan based on such a current state including the energy in the future and environmental problems such as the CO2 reductions.

The Latest Refining Technology - Low and High Consistency Refiner Coordinated with Stock Refining Characteristics -

Kazuo Aoshima
Technical & Engineering Dept., Aikawa Iron Works Co., Ltd.

Recently the environment around papermaking industry becomes increasingly severe. Strict conditions are placed especially on CO2 reduction, stock cost saving, energy cost saving, etc. Therefore also in stock preparation department we are forced to address these problems recently. What we should consider initially is energy saving of machinery consumes big energy. In that respect low consistency refiner especially needs to be considered most of all. However the energy saving also can be the factor affects quality and we cannot change it easily. So, I will introduce the new refiners as well as the result of consideration for low consistency refiners have been practiced lately this time.

In the case of waste paper handling, it will greatly contributes to cost saving to consider how to produce higher quality by handling the cheapest possible waste paper. On the same time, considering the measures against reduced paper intensity due to the increase of recycling, high consistency refining draws attention as refining produces paper intensity using cheap stock. So, I will also introduce the latest machinery for high consistency refining and the result.

A New Screening Concept and the Latest Mill Application in Thick Stock Screening

R. Rakohnen
Andolitz OY
Yosuke Takeshita and Hiroyuki Nagasawa
Andolitz K. K.

The main demands for paper and board production are the cleanliness of the end product and run ability of the machine. Therefore the stock fed into the machine is cleaned in several position before it enters the headbox. The expectations for the stock cleanliness are putting the equipment manufacturers to face a very demanding and challenging task. A new method to increase the cleanliness of the stock is the so called thick stock screening, where the stock is screened with narrow slots before it enters the short circulation.

The Highest Potentiality and Efficiency of Algas Microfilter-The Reference Report from Japanese Market-

Yasuo Harikae
Itochu Sanki Corporation

In compliance with social requirements on environmental protection, pollution control for water at a pulp and paper mill is becoming more and more important. Also, water consumption need to be decreased in light of material resource saving as well as production cost saving.

Under the circumstance, not less than 500 Algas Micro-Filters (AMF) are running all over the world and we have installed 18 AMF in Japan since 1998. AMF can contribute to re-use fibers, clear water and additives from white water, effluent water etc. and to reduce cost of water treatment as well as water discharge.

This report is to explain the basic construction and features of AMF and the successful references of AMF installation in Japan.

Technical Trends for Stock Preparation Equipments

Toshikazu Miura

Paper machine designing section, Mitsubishi Heavy Industries, Ltd.

In the view point of the stock preparation equipment which gives the gentleness for global environment, the first principle is less energy consumption on the basis of KW.D/T. And the society switches over resources sustainable circulation system so as to recycle the all things come to an end. On these situation, up to this time, the hard-repulping papers were disposed to land reclamation and/or to burn it to ashes by mean of the cost balances with spending much more money for recycling works.

But at now it becomes a required subject to recycle the hard-repulping papers and change to new resources. Fortunately we have ever supplied "BR PULPER" (old name is BARRACUDA PULPER) as to treat efficiently the hard-repulping paper.

The required repulping energy for treatment of the hard-repulping papers spends five to ten times as compare with the normal pulp and papers.

Then we developed new pulper for the purpose of treating the hard-repulping papers with less energy.

We call this new pulper "MJ PULPER".

On the other hand, on going with recycling old papers, the screening equipment is the most important device to reject foreign materials except fibers from old paper stock. Then we conducted research and development new screen having the capacity two times higher compare with existing one.

We call this new screen "MJ SCREEN".

In the below, we will introduce the outline of MJ PULPER and MJ SCREEN.

POM System- Centrifugal Degassing and a Closed Hydraulic Wet End System Give Expected and Less Expected Benefits -

P. O. Meinander

POM Technology

Joji Taketomi

Matsubo Corporation

The compact POM System was originally developed In order to obtain a more responsive system, allowing easy grade changes. With the experience of twenty references we have learnt that it also gives many other benefits, among these some quite unexpected ones. The most unexpected is improved process stability compared to that of a traditional system. Others are superior system and product cleanliness, easy handling, reduced energy consumption, better formation, and sheet bonding, less web breaks, less additive consumption, less fiber losses and finally a system simplification yielding a cheaper system and requiring less space.

Advanced Stock Preparation and Wet End Process

Junichi Miura

Stock Preparation Group, Application Engineering Dept.,

Voith IHI Paper Technology Co., Ltd.

In recent years, the situation surrounds the paper mills have increased significantly. Zero emission - such as water saving and industrial waste reduction ? become the universal factor.

Beyond that, the stability of the paper machine and the CD and MD profile of the paper have to be simultaneously improved.

We have to think about one common process. This means that stock preparation, white water circuit, effluent treatment, reject handling, chemistry and last but not least the wet end process have to match perfectly together.

This paper introduces the latest DIP and wet end process for graphic paper in Europe.

OptiFeed ? New Stock Preparation and Approach System

Akifumi Hatta

Metso-SHI Co., Ltd.

Jussi Ahola

Metso Paper Valkeakoski Oy

Increased stock quality and efficiency of the stock preparation process are the main focuses of the OptiFeed concept. A conventional stock preparation system, including approach system, has some major problems, such as uncontrollability of consistency of each furnish and large dead volume in tanks. Immediate problems with such systems are stability, such as consistency swing, and the extended time required for grade changes.

Through applying the new process solutions, equipment and automation within the OptiFeed concept, uniform stock parameters such as consistency and pressure of furnish fed to the paper machine can be achieved. At the same time, faster grade change time can be obtained which also results in better efficiency. In addition, less space and energy is required, which reduces investment and operation costs.

In addition to several partial OptiFeed system is operation, the first full-scope references have been successfully started up. Those OptiFeed systems are discussed in this paper, including the first mill results and experiences.

Optimized Deaeration Leads to Substantial Process and Quality Improvements in Paper Manufacturing

Rainer Rauch

BTG Muetek GmbH

Kenichi Ishihara

Spectris Co., LTD. BTG division

High air or gas contents in pulp suspensions constitute a serious problem area in papermaking. They are responsible for higher pump energy demand, deposits, pinholes, foaming and several other problems. An underestimated source of these problems is dissolved gases. High contents of dissolved gases mainly originate from a decomposition of calcium carbonate where carbon dioxide is formed. In comparison to air and its components, carbon dioxide is far more easily dissolved in water. The immense pressure drop at the wire and at the foils leads to dissolved gases being released. The measurement results achieved in various mills show that determining the levels of entrained and dissolved gases online enables the optimization of prevention measures as well as mechanical and chemical deaeration. The results also show that online control of deaerator chemicals based on the measurement values leads to substantial cost reductions, process improvements and quality enhancements in paper manufacturing.

Features from Complete Plant Reference

Andreas Sauer

Voith IHI Paper Technology Co., Ltd.

Voith Paper's proven technology and experience has made it today a future-oriented company providing the complete spectrum of technology. Since 1841, we have proven our competence to over 4000 customers worldwide. In the last six years alone, our engineers have planned 31 stock preparation plants, 24 paper machines and 13 complete plants. The constant exchange of experience between the worldwide Voith Paper Group companies ensures multiple synergy advantage.

The experiences with the TwinDrum Pulper showed that for Graphic Papers the chemical consumption is much lower than with high consistency pulpers. For Board and Packaging one customer does not even have to use his disperger for some grades. The flake content after the Drum is as low as in other applications it is reached after hole screening. Ecomizer Cleaners with their new technology can now be placed before the flotation and save therefore money for wear parts. New ideas about screening have proven their reliability and helped to increase the runability of the Papermachine. The latest virgin fiber pulper and refiners have helped our customer to get the maximum out of their furnish.

In China, Voith will start this year five new Papermachines (Huatai, Shandong Bohui, Jinfeng, Hengfeng, Mingfeng). All off them have chosen Voith as their main supplier for the total plant. Our service centres in Kunshan and Dongying, our technology managers and of course our staff at Voith Paper China RO in Shanghai are helping them for the entire life cycle of their plant.

The Structural Characteristics of High Molecular Weight Chlorolignin Produced by Chlorine Bleaching of Kraft Pulps

Hiroyuki Shintani, Yuji Matsumoto and Gyosuke Meshitsuka

Laboratory of Wood Chemistry, Department of Biomaterial Sciences, Graduate School of Agricultural and Life Sciences, The University of Tokyo

Three types of kraft pulps (unbleached softwood, unbleached hardwood and oxygen prebleached hardwood kraft pulps) were chlorinated at various levels of chlorine ratio (0.1-0.3), and residual chloroorganics in pulps were extracted in high yields by aqueous dioxane. Neutral sugar contents of these extracts were in the range of 1 to 5%. Extracted chloroorganics were treated by aqueous alkali in a similar condition as the E1-stage of bleaching. Structural features of extracted chloroorganics and their alkali-treated products were analyzed by ¹H-NMR spectroscopy, FT-IR spectroscopy and others. These results revealed that the structures of chloroorganics were quite different from that of native lignin. Only few aromatic protons are observed in ¹H-NMR spectra. Instead of this, chloroorganics are very rich in methyl, methylene and methine structures and carboxylic acids. Model experiments using milled wood lignin (MWL) revealed that these structural features can be reasonably explained by the structural modification, especially by an oxidative ring opening, of residual lignins in unbleached kraft pulps during chlorine treatment.

Keywords: kraft pulp, chlorine bleaching, lignin, chloroorganics, ¹H-NMR, FT-IR

The Synthesis of Zeolite from Paper Sludge (PS) Associated with Its Carbonization

Takao Ando, Masato Saito, Shigeo Muramatsu and Kimio Hiyoshi

Fuji industrial research institute of Shizuoka prefecture

Junsuke Haruna, Naoto Matsue and Teruo Henmi

Department of agriculture, Ehime Univ.

Paper sludge (PS) discharged from the paper recycling process is one of the wastes requiring active development of novel technology for their complete recycling. The PS is mainly consists of organic (cellulose) and inorganic (calcite, talc, kaolinite) matters which are originally present in paper. The present study has been concerned with reaction conditions such as reaction time, solid/liquid ratio and NaOH concentration for the synthesis of zeolite from the inorganic matters by successive alkali treatment following carbonization of the organic matters, intending to develop a new use of PS. Chemical and mineralogical characteristics of the synthesized zeolite were investigated, and the results are as follows:

(1) It is ascribable to decomposition of calcite scarcely occurred in the processing carbonization due to a high partial pressure of CO₂.

Therefore, carbonization process is found to be effective for the synthesis of zeolite from the PS.

(2) Carbonized matter in PS was activated in the alkaline treatment. The metakaolinite in carbonized PS was converted to zeolite faster than pure metakaolinite alone by the alkaline treatment. The zeolite formed in carbonized PS, showed fine grain in crystal morphology. We found that careful control of solid/liquid ratio, NaOH concentration and reaction time in the alkali treatment process for carbonized PS could give a new composite material of active carbon and zeolite.

Keywords: paper sludge, kaolinite, zeolite A, coal, active carbon