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JAPAN TAPPI JOURNALVol. 58, No. Novuary 2004 Abstracts

Fall Washing System for Removing Ink and Clay from Waste Pulp

Nobuyuki Kamo
Sakae Kohki CO., LTD.

The "FALL WASHER" removes is ink and clay from waste paper pulp using a mesh drum.
The washer is composed of a drum with steel bars attached to the inside sufface (pat.) The drum rotates powerfully at high speeds. This motion forces the pulp to come into contact with the mesh surface of the drum many times, while performations remain unblocked and allow the contents to dehydrate. The "FALL WASHER System" prevents pulp from forming into lumps, efficiently removes ink and clay from waste paper pulp.

On Automation of Sheet Sorting-By Vacuum Belt Conveyance-

Yuji 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.

Measures Against Global Warming in The Paper Manufacturing Industry-Activities of Oji Paper Co., Ltd.-

Tomoki Tada
Environmental Affairs Dep., Oji Paper Co., Ltd.

The paper making industry has long contributed to society by making extensive use of biomass resources and recycled materials in its role as an exemplary recycling-oriented industry. This article presents reductions in CO2 emissions achieved through reforestation activities, forestry conservation management and fuel conversion as actively carried out from an early stage by Oji Paper Co., Ltd. Under the plans for CO2 reductions, a total annual reduction of 2.07 million tons/year in 2010 is expected, which includes a decrease of 1.15 million tons resulting from fuel conversion, 0.56 million tons from energy conservation, and 0.36 million tons from conservation management of company-owned forests within Japan. These figures correspond to an approximate reduction of 30% compared with 1990 CO2 emissions.

Development of Environmental-stress Tolerant Eucalyptus and Forest Plantations

Tetsu Kawazu
Forestry Research Institute, Oji Paper Co., Ltd.

Environmental problems in the earth scale have become serious by a variety of industries and economic activities of human race. And it is pointed out that the activity of paper industry is one of main factors in the decrease of forest. The wood raw material securing is a big problem especially in Japan where forest resource is scarce. As a solution of this problem, paper industry positively executes afforestation in various regions around the world for stable securing of the raw material. For the further improvement of productivity and pulp properties in eucalypts, Oji Paper Co. is doing forest tree breeding research. Improvement of their growth under stress environment would be most important targets of molecular breeding to increase productivity. We introduced the transcription factor DREB1A gene that induces expression of some stress tolerance genes, and a mitochondrial citrate synthase gene that was related to acquiring phosphate under aluminum-induced inorganic phosphate limited conditions. Our recent results suggest the possibility that we can give tolerance of drought and acid soil to hybrid eucalypts (Eucalyptus grandis×urophylla) by this approach.

Development of Transgenic Eucalyptus

Keiko Watanabe, Hiroyasu Ebinuma
Nippon Paper Industries Co., LTD., Forestry Science Laboratory

One purpose of NPI research work is developing a effective production system using a new biotechnology for improvement of biomass yield and wood character of woody plants. One of the target species of NPI is Eucalytpus, which is the most valuable for pulp and paper production.

Our strategy involves the following key components:
(1) Select germ plasm
(2) Isolate genes of interest
(3) Develop the gene transfer system
(4) Develop the mass propagation system
(5) Develop the evaluation system for traits and environmental impacts

For the commercialization of transgenic crops and trees, it will become more important to reduce their environmental impact than to increase their economic value. The MAT vector system, which can remove marker genes without sexual crossings and stack valuable genes in sterile clones, is a promising technology for obtaining both regulatory and public approval and to accelerate the commercialization of transgenic trees.

It is estimated 25 million hectares of agriculture land in the world suffer from excess salinization, and another two million hectares of salinated land are added each year. Salinity is a major abiotic stress limiting the productivity of crop plants around the world. Using MAT Vector System, the genetically modified trees tolerance to environmental stress presents a possible new solution for the global problem of soil deterioration with less environmental impact. Glycinebetaine is one of the compatible solutes that accumulate in the chloroplasts of certain halotolerant plants when these plants are exposed to osmotic stress. The choline oxidase (codA) from Arthrobacter globiformis converts choline into glycinebetain when this bacterium is exposed to the high salt condition. The choline oxidase (codA) is introduced into Eucalyptus camaludulensis with MAT Vector System. 5 transgenic lines were more tolerant to high salt stress than normal plants. The tolerant plants were able to produce roots in medium supplemented with 200 mM NaCl, that almost totally inhibited the rooting of normal plants.

Operating Experience of MOAS-Optimization of the Wire Part and the Press Part-

Hiroyuki Nakagawa
Yatsushiro Mill.Nippon Paper Industries Co., Ltd.

While improvement in the speed of a machine progresses, it is becoming important to grasp the moisture action of all machine processes and the structure of paper more than the former. These can be referred to as contributing to the improvement in productivity according to sheetbreak curtailment and speedup as well as quality stability if it can observe quantitatively greatly. MOAS is a tool that computes each dryer moisture and the rate coefficient of heat transfer used as the index of paper structure from BM meter, a dryer, drive data, etc. If combining with ECOFLOW, MOAS is acquirable even parameters, such as each press moisture and a press coefficient that evaluates water drainage of a press.

In Yatsushiro N1 and N2, very big success, such as sheetbreak curtailment and production increase by speedup, and a life rise of felt, is achieved from effective use of MOAS. In this paper, it introduces about the measure for optimization of the wire part and a press part who utilized the rate coefficient of heat transfer, a press coefficient, and press exit moisture.

Latest Technology of Foundation Fieldbus

Kazuhiko Matsumoto and Shinichi Daimon
Fushiki Mill, Nippon Paper Industries Co., Ltd.

Fushiki Mill adopted FOUNDATION Fieldbus (Fieldbus, after this) to N-DIP plant for the first time in Japanese pulp & paper industry in April, 2001. This was largest DCS system with Fieldbus I/Os in Japan. Existing panel system and existing pneumatic field devices to latest DCS system with Fieldbus technology and latest FF devices in F-DIP plant was modernized, and existing DCS system with Fieldbus technology and existing Fieldbus devices in N-DIP plant was also upgraded to latest hardware and software version as phase II implementation this time. Two systems were integrated on the same control network bus and latest Fieldbus technology system was achieved in the world.

This document shows how were expected items for the engineering, operation and maintenance improved through the result of installed system with latest Fieldbus technology and its products after about two years.

Concerning 3M/C Winder Automation

Toru Okumura
Futatsuka Mill, Chuetsu-Pulp Co., Ltd

Our company, Futatsuka Mill, 3 the machine is the newspaper machine of the A volumen 4 taking which was worked in 1988. In order this time to assure reduction of labor, the automated device of the volumen edge tape sticking, and core supply job was introduced. Below, it reports concerning the summary, and operation experience of consecutive automation equipment.

The Measure against a Bad Smell of the Paper Sludge Incinerator at a Regenerative Thermal Oxidizer

Hisao Umezu
Kanto Mill (Ichikawa), Hokuetsu Paper Mills Ltd.

The sludge incinerator that works at this factory is the structure where the smell of sludge soaks into an exhaust gas in a dryness process. Introduction of deodorization equipment has been considered to correspond to environmental change of a circumference area. By introducing regenerative thermal oxidizer, the bad smell generated from a Paper sludge incinerator is remarkably improvable. The progress that results in introduction of this equipment, and an operation situation and the effect of an environmental improvement are reported.

Experiences of the PS Incinerator in Kishu Mill

Yukimasa Takagi
Kishu Mill, Kishu Paper Co., Ltd.

Kishu Mill of Kishu Paper Co .,Ltd planned a replacement of the existing incinerator for the following reason. Overage equipmernt Apply of Waste Disposal and Public Cleaning Law (the Ministry of Environment) 3) The increase of paper sludge.

Still more, when the replacement of the PS (paper sludge) incinerator, we planned to build a waste heatboiler what makes good use of exhaust gas from this incinerator. In this sentence, we report the experience of the PS incinerator operation since May 2002. In spite of a little trouble occurred after the start, we have relatively been in good operation.

We would like to maintain good operation in view of, reduces reliance of fossil fuel, recycling of waste, minimizes its impacts on the environment.

Technologies and Development of Gas Permeation Control through Film

Takashi Kawamukai
Specialty Products Development Laboratory, Oji Paper Co., Ltd.

Technologies of gas permeation control through film such as oxygen barrier and water vapor barrier are very important in the field of packaging materials or food packages. The technologies have been developed by the replacement for polymer materials that contain chlorine with the increase of environmental consciousness, and applied to flexible display panels.

In this report the mechanisms of gas permeation through film and barrier technologies such as vapor deposition method or sol gel coating method are described. The incorporation of drying agents in a multi-layer film having an oxygen barrier layer of ethylene-vinyl alcohol copolymers results in high oxygen barrier property. Plate-like fillers also enhance barrier property of polymeric film.

Heat Storage Capsule and its Application-Application for Savingenergy and Amenity Life-

Mamoru Ishiguro
Mitsubishi Paper Mills Ltd., Corporate Research Center

Microcapsule is a few micron-sized container which can include liquid and solid therein. In paper manufacturing, coated paper with microcapsules which include oil and leuco dyes has grown remarkably as no carbon required paper. However, microcapsules have not been produced so much for other fields, medical and food industry.

Authors had developed new application of microcapsule including phase change material (PCM) for energy saving, comfortableness, and environment. Heat storage capsule (HS capsule) is a small particle including organic PCM. PCM releases or stores latent heat at its phase transfer temperature. Since PCM melts and solidifies in HS capsule, dispersion or solid of capsule can be treated as liquid or solid state at any temperature, respectively.

In this presentation, characteristics and application of HS capsule will be introduced.

Trend of Electronic Paper and Oji's Original Technology

Shigeo Hayashi and Shuichi Maeda
Advanced Technology Research Laboratory, Oji Paper Co., Ltd.

There has been increasing interest in electronic paper that has properties which are close to those of conventional paper in terms of thinness, lightweight and portability. In this paper, we will first discuss the reason why electronic paper is required from a social point of view.

The rapid spread of the Internet and digital information lead us to focus on the displays of personal computers and mobile phones. The conventional displays such as liquid crystals and CRTs are not suitable for reading for a long time. Therefore, intensive research and development are being carried out to achieve electronic paper which has the advantages of both paper and a conventional display for use, particularly, in newspaper and books.

Secondly, we disclose our original idea for making electronic paper, with particular emphasis on its principle, characteristics and preparations. The key technology here is to use electrical twisting microsticks made of a fiber whose surfaces are divided into two areas with different colors and electric charges in a transparent tube as the display elements.

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February 2004 Abstracts

Introduction of Advanced Metso Paper Technology into China

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Metso-SHI Co., Ltd.

Recently Chinese paper industries have been showing rapid development, in which Japanese papermakers have a serious interest. While the paper and board demands in advanced countries including Japan seem to have reached ceiling level, the paper and board demand in China still shows rapid increase. Total production of paper industries in China in 2002 was 37.8 million tons, which showed 8.4 % increase compared to that a year before. Although new machines were installed in China year by year, the domestic demand of paper and board is expected to keep increasing due to further economic growth and large population of potential consumers.

Metso Paper has a regional company in Beijing, Service Technology Center in Wuxi and Valmet-Xian as a joint-venture company in Xian, which enhance Metso Paper's business, production and customer service in China. Recent noteworthy point is that the world first OptiConcept machine was installed and started up in Nanping, China earlier than in European countries, and achieved satisfactory results.

In this paper, the future prospect in Chinese paper industries and representative paper machine technologies delivered by Metso Paper are described.

Treatment of Anionic Trash and Improved etention/Dewatering-Improved Productivity of Paper Making-

Keiji Suruga, Jiayi Chen and Takashi Saigusa
Kurita Water Industries Ltd.

Recently high usage of recycle fiber and coated broke, proceeding mill closure, causes the papermaking conditions to have been getting worse. It includes Anionic Trash that causes pitch trouble on paper machine. Anionic Trash reduces the performance of retention/ drainage aids. As a result production rate and runnability of paper machine is decreased.

This paper presents the new approach for improvements of productivity of paper making that the treatment of Anionic Trash is combined with OPTI system (which is dual polymer retention/ drainage system developed by Kurita).

Closed System of Papermaking Machine and Wet-end Condition

Shigeru Kurose, Koichi Tadaki and Munetoshi Yamaji
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Strong world-wide interest on environmental concern in pulp and paper industry, and acceleration for white water closed system for paper making process cause number of problems in paper making process.

Neutral conversion of papermaking, higher use of de-inked pulp from recycled paper and higher content of coat broke makes built up of micro-biological slime, and pitch and anionic trash build up in the system due to lower effectiveness of Alum. Retention and drainage of wet-end operation will be affected as well as physical properties of paper such as physical strength and sizing degree which may be reduced. All these are related to deposit in papermaking system. These troubles cause operational problem which result to production slow down. Variety of chemicals is used to control these problems, which will accelerate deposit built-up because of high dosage of chemicals for system closure. It creates vicious circle.

Somar's long experience in controlling microbiological deposit using slimecide "MICROCIDE", and capturing pitch and anionic trash using wet-end control agent "REALIZER", offers total control approach on machine deposit problem caused by white water closure. This paper describes several proposals on how to improve machine operation.

Wet End Chemistry and On-line Measurements

Hitoshi Nagao, Shigeru Motegi
Pulp and Paper Research Laboratory, Nippon Paper Industries Co., Ltd.

The importance of wet end chemistry is increasing, due to the trends of high speed paper making. The stability of wet end process can be achieved when agglomeration and adsorption, which are the most important phenomena, are controlled well. Therefore, all measurable parameters that explain the condition of the wet end system should be maintained at the appropriate levels. Most of these parameters used to be measured by the off-line systems, however, recently several on-line measurement systems have been developed and they make it possible to monitor the change of the wet end.

In this paper, we present details of the recent online measurement systems, which have strong relation to the wet end chemistry, such as retention meter, cationic demand analyzer, and zeta potential analyzer with fundamentals and the examples of the measurements. Additionally, MOAS, entrained air analyzer , and slime monitor will be simply introduced.

The Improvement of Production Efficiency by Stabilized Wet End

Tatsuya Sato, Masato Higashiyama and Keiichi Satou
Mitsubishi paper mills limited

The fundamental of stock preparation is consistent supply of homogeneous and adequate stuff to the paper machine. Recently the control of consistency and flow rate, grade changeability and production stability were remarkably progressed.

However, we are still facing the fluctuation of drainage and first pass retention (FPR) at the wire part.

In this paper, we present a summary of test results of On-line Charge Measurement at our 7PM for the stabilization of wet end.

From the trails, it was recognized that the charge of coated broke can be controlled by the addition of coagulant and it improved drainage and FPR. However, the coagulant dosage without monitoring the charges of the systems would result in the instability of the systems.

Consequently, to get the reliable improvement of operation by charge control, the On-line Charge Measurement can be used as an effective sensor.

Operating Experience of POM System

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Kasugai Mill, Oji Paper Co., Ltd.

The PM4 at Kasugai Mill, Oji Paper, has been introduced the POM system and in operation since March 2002, in order to improve the efficiency of small batch production. In this system, conventional white water silos and seal pits are replaced by POM pumps and their small supply tanks, which have centrifugal de-aeration function, consequently total volume of the wet end system could be notably reduced. As a result, we could expect reduction of time for grade change and inhibition of sliming in the wet end system.

At the PM4, the loss time for grade change including significant variation of color and ash content has been cut down by up to 47% compared with that of the conventional system. In addition, shut down for cleaning attributed to slime in the wet end system has been reduced. This report describes the outline, operating experience, and the benefit of the POM system.

Operating Experience of High Pulp Consistency Ozone ECF Bleaching

Shuuichiro Mochizuki
Nichinan Mill, Oji paper Co., Ltd.

High pulp consistency ozone ECF bleaching plant was started up at Nichinan mill in 2002. This bleaching system is the first one in Japan. The operation is now stable through the solution of a couple of troubles during starting stage.

Since we found that the pulp consistency and pH would be effect on the reaction efficiency on ozone stage, they have been carefully controlled as key factors.

The bleaching cost of ozone ECF has been slightly increased than before. This difference corresponds nearly to the electricity cost for oxygen and ozone generation.

There would be almost no difference on pulp quality between ozone ECF and chlorine bleaching. The paper quality and runnability of paper machine seems to be same in both cases.

The content of AOX and chloroform in effluent has been remarkably reduced, by >90% and >99%.

Automatic Sheet Creating Unit for Sticky Contamination Monitoring

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Yufutsu Mill, Nippon Paper Industries Co., Ltd.

Mitsuhiro Sugino
Technical & Engineering Div., Nippon Paper Industries Co., Ltd.

Nippon Paper Industries Yufutsu Mill reinforced new DIP process to increase the rate of recycled paper for newspaper production. The new DIP process can use old magazine for the main materials. By increasing the rate of DIP, and the rate of old magazine, sticky contamination trouble carried from these materials was worried. For this reason, Sticky Contamination Analyzer (SCAN- II) was introduced in order to grasp change of the sticky contamination in DIP stock.

SCAN- II automatically collects the sample from each process of DIP and creates the sheet which can be measured to count the sticky contamination. Using this unit, the measurement of the sticky contamination, and the flat screen treatment which man performed before, were simplified. Moreover, by catching quickly change of the sticky contamination, the quick action for the quality control in the news paper production is possible.

This report introduces the fundamental mechanical contents of SCAN- II and the operation experience at production plant.

Paper Counter Equipment

Takao Shimatsu
Nippon Paper Unitec Co., Ltd.

This is the equipment which measures the paper on a palette using CCD camera,and counts the number of sheets of 200-micrometer thick paper with high precision and high speed.

By using this equipment you can expect to cut down the number of workers in the finishing process and to stabilize the quality of the product.

The Fully Automatic System for the Measurement of Dirt Count Characteristics of Chemical Pulp

Nobuo Oikawa
Kitakami Mill, Mitsubishi Paper Mills Limited

For the purpose of the measurement of dirt count characteristics in pulp slurry, we developed the original system.

Our system is composed of a slit screen, a dewatering unit, a circulation tank, pumps, CCD-camera and software.

This system enables to measure a large amount of pulp by automatic operation, and has good reliability, quick response, and accuracy. These points are also discussed in this paper.

Development of On-line Fiber Orientation Meter Based on the Light Guide Effect

Yuji Abe and Hidenobu Todoroki
Pulp and Paper Research Laboratory, Nippon Paper Industries Co., Ltd.

A new technique, based on the optical property of fibers, has been developed for the online measurement of fiber orientation in whole layers of paper sheet. Due to the light guide effect, the focused circular light spot cast on one side, the elliptical light spot is observed on the opposite side of paper. The shape of the elliptical spot represents the fiber orientation of paper.

A prototype sensor was assembled and installed to the pilot coater. The sensor using YAG-laser, which has 7n second pulse width, can successfully measure the fiber orientation of paper running at 1000 m/min.

To downsize the sensor, we thought laser diode (LD) was the hopeful candidate as a light source, and assembled the prototype sensor using LD and optic fiber. Since the size of the light spot must be small for the reliable measurement, it is very important to optimize the diameter of the optic fiber. It was found that ϕ=60?m is small enough for the focusing, and the prototype using the optic fiber and LD can measure the fiber orientation of paper running at 1000 m/min as well as the one using YAG laser.

Keyword : Fiber Orientation, On-line, Light Guide Effect, Laser Diode

Progressing Report by LCA / Environmental Label Working Group

Motoi Matsui
LCA / Environmental Label Working Group of Japan Paper Association

In 1997, Japan Paper Association organized LCA working group (WG) within the technical and environmental section to investigate the LCA of pulp and paper manufacturing along with the establishment of LCA Society of Japan by the industry-university-nation complex. WG was called LCA / Environmental Label working group for type III environmental label system in 1998. The works of WG are summarized as follows.

(1) Report of LCI data for paper and board production.
(2) Draft of the industrial guideline on paper and board products for type III.
(3) Propose of the simple calculation procedure of LCI for the production stage.
(4) Translation and examination of GHG calculation tools developed by NCASI (USA)

Surface Chemistry of Deinking Process- Effects of Nonionic Deinking Agents and Fatty Acids on Foaming Properties in Flotation Deinking of Old Magazine -

Shisei Goto and Takanori Miyanishi
Pulp and Paper Research Laboratory, Nippon Paper Industries Co., Ltd.

Foaming properties of pulp suspensions of old magazine (OMG) were investigated with regard to dynamic surface tension of pulp suspensions containing deinking agents, and effects of fatty acid Na salt addition to nonionic deinking agents on foaming properties were elucidated. Dynamic surface tension of water containing deinking agents was measured by means of the maximum bubble pressure method. An interfacial rheometer was employed to measure surface viscoelasticity of supernatants of the pulp suspensions. The obtained results showed that OMG/ONP (old newsprint) mixtures generated more foam in flotation than ONP only, when the nonionic deinking agents were used. Compared with ONP suspensions, turbidity of the OMG/ONP suspensions was high due to the high amount of ash content. Moreover, cationic demand and static surface tension of the OMG/ONP suspensions were lower than ONP suspensions. These results suggest that the OMG suspensions are easy to generate and stabilize foam, and thus some deinking agents having relatively low foam generation and stability are required for flotation deinking of OMG. Surface tension measurements showed that nonionic deinking agents containing fatty acid Na salts gave higher initial dynamic surface tension of water, and generated smaller volumes of foam. In fact, the addition of FA (a mixture of stearic acid and palmitic acid Na salts) and OA (oleic acid Na salt) increased dynamic surface tension of the OMG/ONP suspensions, and decreased their foam volumes. Furthermore, the addition of FA to the nonionic deinking agents increased surface viscosity of the supernatants, and decreased their surface elasticity. On the other hand, the addition of OA to the nonionic deinking agents did not change surface viscoelasticity of supernatants of the pulp suspensions. These results implied that the mechanism of the decreased foam volume was different between FA and OA due to the difference of their solubility in water and/or solid-liquid interactions in pulp suspensions.

Keywords: deinking agent, dynamic surface tension, foam, OMG, surface viscoelasticity

The Evaluation of Paper Sludge (PS) for Zeolite Synthesis(Part 3)-Weekly Change of Chemical Composition of PS and the Aptitude for Zeolite Synthesis-

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Fuji industrial research institute of Shizuoka prefecture
Junsuke Haruna, Naoto Matsue and Teruo Henmi
Department of agriculture, Ehime Univ.
Osamu Shimada
Gakunan daiich cooperation of paper manufacturing association

In the case of zeolite synthesis from paper sludge, PS ash, it is necessary to investigate its chemical and mineralogical stability.

Our previous study showed that the suitability of PS ash for zeolite synthesis remarkably depended o nn the CaO content of PS ash.

The relationship between CaO content (x) and XRD intensity (y) assigned to zeolite, Z index, was found as y=-0.36Ln (x)+1.33. Less than 21.5% of CaO content was suitable for zeolite synthesis, on the contrary, more than 28.8% content was not suitable. When the content was in the range between 21.5% and 28.8%, hydroxyl sodalite was dominantly synthesized. The fairly well linier relation between the atomic ratio of Ca to Si, XCa/Si, and Ca to Al, XCa/Al, was found, that is, XCa/Si/XCa/Al＝0.86～0.97. The mineralogical ratios (talc, kaolinite and calcite) of representative PS ashes were determined by the normative method and ideal mineralogical composition ranges for zeolite synthesis were summarized in talc-kaolinite-calcite triangle figure. PS ashes were classified into 4 types of mineralogical composition ranges. The ranges (A) and (B) were suitable for the zeolite synthesis and ranges (C) and (D) were not suitable. The PS ashes in the ranges (A) and (B) never changed into the rage (C) and (D) for 5 days.

In this study, we investigated the weekly change of PS ashes mixture gathered from 16 paper mills, which compose a cooperative association for the PS disposal in Fuji city of Shizuoka prefecture, for 4 weeks. The PS ashes unsuitable for the zeolite synthesis contained less than 10% of the ash fraction and more than 30.6% of CaO. We compared the chemical composition of PS ashes mixture discharged from the association with the calculated chemical composition excluding the above unsuitable PS ashes. As a result, the following conclusions were obtained.

① Even if the unsuitable PS ashes for zeolite synthesis are excluded from PS ashes mixture, the chemical composition will scarcely changes.
② PS's discharged from the paper mills that are manufacturing the paper products including a lot of kaolinite are suited for zeolite synthesis.
③ To obtain zeolite more easily for industrial purpose, it is desirable only to use the PS involving much kaolinite.

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

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March 2004 Abstracts

The Present State of Wearable Computer and its Industrial Applications

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The term "Wearable computing" is now widespread in general thanks to the media presence.
In this paper, I define the term of "Wearable computer" and discuss its crucial components, which are displays, input interfaces and sensing devices and technologies. As one of sensing technologies, overview of a personal positioning method proposed by the authors is described. Lastly, the potential applications to industry are described.

Performance of Fold Inspection System

Akihiro Terada
Oji Paper Co., Ltd., Ebetsu Mill

In smaller-size cutter equipment, roll paper from Paper Machine is cut into the sheet sizes; A3, A4, B4, or B5, a packing machine puts up each size 250-1000 sheets into a package, and then the packages are put in a carton box.

At Oji Paper Ebetsu Mill, since Paper Inspection in the papermaking process is important, Spot Detectors are installed in all Paper Machines. However, in the packing process any dedicated inspection system was not installed, though the importance to inspect the packing state was realized.

In October 2001,the dedicated inspection system to auto-supervise the packing state was introduced in Ebetsu Mill. In this paper, we are reporting the experience of the Fold Inspection System performance to supervise the packing state.

Renewal of DCS in Takasago Mill

Yasuhiro Konishi
Ryoukou Ltd.

DCS, which are operated with CRT monitoring system, have been installed on paper machines and coating machines in Takasago Mill, and play an important role in the machines. However, these DCS are getting superannuated. We have planed maintenance and tried to prolong the life of DCS, but have troubles in the maintenance due to degradation of parts.

In this paper, we would like to report on the renewal of DCS in Takasago Mill.

Operating Experience and Potential for the Operation Assistant System

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In Oji Paperboard Co., Ltd. Oita mill we mainly produce the container board and box board. Recently we are required to increase the competitiveness of the mill. Then on last year we have planed and modified largely the process line to improve the quality of container board and the labor assignment.

On this project we needed to consider about the process of introduction of the DCS (Distributed Control System) to achieve our target in the short period. To solve the above difficulty we adopted the Operation assistant system "EXAPILOT" from Yokogawa Electric Corp. and achieved the good result.

Experience of Using Mobile DCS

Hiroki Kato and Yasuyuki Nagai

Fushiki Mill, Nippon Paper Industries Co., Ltd.

In recent years DCS has become indispensable to plant operation in the pulp & paper industry. Operators are generally in the Central Control Room to manage the plant, but the number of operators has been decreased by laborsaving thought, so the workshop area of each person activity is relatively expanding than before. Fushiki Mill adopted Mobile DCS into Water/Effluent Treatment Section for the first time in January 2002, and this section shifted to be managed by only one operator in April 2003.

This paper describes the results of using Mobile DCS for about 2 years.

The Actual Situation and the Examples of Mobile DCS-Information Technology (IT) Innovation of Manufacture Field-

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Yokogawa System Engineering Corporation Solution System
Dept Marketing Gr.

As twenty years or more have passed since DCS birth, a lot of products are developed, introduced and applied for the purpose of automatic operation and safe operation of industrial plant one after another. As the result, the fewer operator in the CCR has been required. Furthermore, a role of operator has been demanded to cover a field work or engineer work.

If its attention is paid to field work in the manufacture field, we still depend on manual work or human skill. Therefore, for the sake of pulling out the capability of human(that is field operator), new tool is required just now. Based on such present condition, we developed and released "e-Genba (Filed support software package)" as a tool that makes field work easier and more efficient.

We hereby introduce "e-Genba" as below.

Application of Mobile Computing Technologies to Plant Operation

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YAMATAKE Corporation

YAMATAKE Corporation has developed the "PlantWalker-HV" that is the mobile DCS terminal system by using mobile computing technologies. PlantWalker-HV is a product based on "Operation Anywhere" that is YAMATAKE's next generation plant operation concept.

PlantWalker-HV supports field operators in the several scenes as follows; Control loop check, CV bypass, Compressor starting up, Field patrol, and so on.

PlantWalker-HV runs with several DCSs (independent from DCS vender and DCS model), because it is in accordance with OPC DA (Data Access) and OPC A&E(Alarm and Event). PlantWalker-HV has already run with CENTUM-XL via Exaopc.

Mobile DCS - Present Condition and Use Case

Hiroshi Oota
TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS Corporation

The rapid progress of the information technology is changing the form of DCS for 1990 years in the latter half. It learned to share information by equipping the interface which the plant data of DCS were used for easily in the factory each section. It is introduced about the operating form by the connection of information and the use example of the terminal of mobile in the solution of operating. It explains further about mobile DCS.

Advanced Supervisory Control of Re-Reeler

Markku Jaaskelainen, Ph.D.
Cognex Corporation (U.S.A.)

The quality and process improvements associated with the SmartView(Paper web inspection system and Advanced Winder Advisor package are highlighted. These results are obtained through the advanced defect detection and identification capabilities of SmartView Paper web Inspection system. Through SmartView's ability to reliably detect all type of paper defects and differentiate different types of defects the line operators are able to confidently stop the re-reeler only on defects that need to be processed. The usage of SmartView(Advanced Winder Advisor further streamlines the re-reeling process. Extremely accurate stopping at desired defects and at the end of the reel plus immediate automatic resynchronization after splices provides results not seen before.

The Web Inspection System and its Possibilities-Sensing technology and Directivity of NASP System-

Masahiro Nakata
Technology Development Vision System Div. Omron Corporation

NASP-multi-500 platform which carried out the products release in the 2002 year evolved software. And carried out the products release as NASP-multi 530.

And the development of new personal computer system software called NASP-FX realized the downsizing platform. The addition of a detection performance and defective classification was realized by multi 530. In order to pursue the diversity of digital image-processing algorithm, the defective classification addition was carried out. Furthermore, in products called FX, it downsized by high defective information processing part, recording of a real-time operation demand, and a data-processing part. Advanced software technology and an advanced highly efficient personal computer realize. Although various products have been released, a base calls at multi-500 platform. They are the continuation product which can be upgraded.

Aiming for Open network between Each Process in Factory- Application of PROFInet, Control Bus -

Kenji Ohshima
System Application Group, Yaskawa Siemens Automation & Drives Corp.

It's a challenge to provide various information concerning production smoothly and quickly while pursuing factory automation and high productivity.

Ethernet (TCP/IP) has been used for the communication among administrative computers earlier. Field bus has penetrated rapidly in shop floors as low-end factory network these 10 years. It appears a certain measure of its standardization is accomplished though there are some kinds of Fieldbus.

Fieldbus, however, can't cover everything and so it' s necessary to consider superior layer as well in order to accomplish factory network.

Focusing on control bus, superior to Fieldbus, we would like to explain of PROFInet that enables the connection among different kinds of controllers and introduce an applied example of paper making system.

kajaani KSF-Automated Standard Freeness Tester

Naoto Takikawa and Esa Piirainen
Metso Automation, Kajaani

For the paper maker, freeness gives an estimate of what kind of fibers the pulp contains and what kind of paper can be made from it. Paper strength and different structural properties correlate to freeness testing values. Moreover, a change in target freeness value can be used to fix certain quality defects in the finished product.

kajaaniKSF is the first on-line true freeness testing instrument on the market, as well previous instruments measure something else than standard freeness.

Modern Technology for In-Line pH Measurement in P&P Industry-How to Get Reliable pH Value on the In-Line Measurement-

Yasuo Watanabe
Mettler Toledo K.K. Ingold Business Unit

Generally the in-line pH measurement in the Pulp and Paper Industry is one of the most difficult applications due to harsh condition in process. According to the report by P&P association, about 30% of all existing pH loops does not work well. We would like to show you the modern technology on the In-Line pH measurement and some kinds of solution against these troubles in the various processes.

The Role of Alkali-Hydrogen Peroxide during Pulp Treatment

Iori Tomoda, Yuji Matsumoto and Gyosuke Meshitsuka
Graduate School of Agricultural and Life Science, The University of Tokyo

Semi-quantitative method was developed for the determination of α-carbonyl structure in solid lignin. Deuteride reduction followed by nitrobenzene oxidation was applied to oxygen bleached softwood kraft pulp (NOKP) in order to evaluate the reactivity of hydrogen peroxide with α-carbonyl structures in lignin. We already showed that hydrogen peroxide attacked α-carbonyl structures in lignin very clearly during milled wood lignin treatment. However, when NOKP and hydrogen peroxide treated NOKP were analyzed by this method, the role of hydrogen peroxide was not clearly observed in terms of the content α-carbonyl structure. By the analysis of alkali treated NOKP without hydrogen peroxide, it was suggested that, at the hydrogen peroxide treatment, the effect of hydrogen peroxide on the α-carbonyl structure might be hidden by the generation of α-carbonyl structure and that actually hydrogen peroxide effectively degrades those newly produced structures. Hydrogen peroxide was found to play such a "hidden role" not only for newly produced α-carbonyl structures but also for the newly produced permanganate consuming substances during the treatment.

Keywords: kraft pulp, lignin, α-carbonyl structure, hydrogen peroxide, kappa number

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

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

An elastic analysis for a hole side plate (breadth 265mm and height 220mm) of the corrugated fiberboard case with the grip hole (breadth 50mm, height 2r=25mm and distance h0=25～75mm between the hole center and upper edge of the plate) under uniform stress in the upper hole center was performed by finite element method, and from this analysis, relations between stress components and h0 were considered.

Large absolute values of normal stresses Σx and σy in breadth and height directions and shear stress τxy are near the upper edge and sides of the hole. Maximum of |σx| is at the middle of the upper edge in the hole of h0<41.25mmm and at the middle in the upper plate edge of h0≧41.25mm, and maximum of |σy| is at hole sides of h0<75mm and at the middle of the upper edge in the hole of h0≧75mjm. And maximum (=|τxymin|) of |τxy| is at positions r/2 (r: curvature radius of the hole) in upper direction from hole side. The maximum of σy is increase with h0 increase, and other absolute values of maximum and minimum components decrease.

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

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April 2004 Abstracts

The Effect of Deinked Pulp Parameters on the Sizing Performance

Tomohiko Nakata, Ryuji Itose and Kazunari Sakai
Harima Chemicals, Inc.

Environmental issues have been taken seriously in all over the world. Although the papermaking industry is taking advantage of biomass resources, utilization of recovered pulp as recycle has been one of the most important trials in order to establish the ecological company. The recovered paper utilization rate target has been increasing year after year, and it has been set up to be 60% in fiscal year 2005. Deinked pulp (DIP) and virgin pulp have been used as raw materials for papermaking. The utilization of DIP has made paper chemicals less effective due to increase of fines, decrease of retention and increase of miscellaneous substances. Other factors such as deinking agent and washing process have also affected the properties of DIP. However, researches have primarily focused on either the impact of recycle on the DIP or surface tension of deinking agents rather than investigating the effect of the DIP parameters on the sizing performance.

Therefore, factors that can affect paper sizing in the DIP system were investigated in this research. Furthermore, design of a novel dispersed rosin size for this system is discussed.

Development of Environmentally Friendly Deinking Agent

Atsushi Yamasaki, Kousuke Yoshida, Akinori Kanetani and Toshio Kakui
Chemicals Research Laboratories, Lion Corporation

Waste paper recycling has been developed for the protection of the environment around the world. The deinking agent plays one of the most important roles in the deinking process for waste paper recycling. However, the environmental safety of the deinking agent has not been discussed until now, and the biodegradability of the currently used deinking agent is not good. Recently, the safety of the chemical ingredients has received worldwide attention based on environmental and human concerns. Using the raw material derived from plants, a new deinking agent that is environmentally acceptable was developed by engineering the molecular structure and molecular weight. The deinking agent showed an environmental safety equal to that of soap. The deinking performance was also much better than the conventional deinking agent; especially, it had an excellent pulp yield.

Reduction of Pitch Deposit Troubles by Coagulant Derived from Waste Corrugated Board

Masanori Kosuga, Tetsuo Morijiri, Motoharu Fujii and Masatomi Ogawa
Seiko PMC Corporation, R&D Division, Chiba Laboratory

In paper manufacturing process, the formation of colloidal pitch particle is an important matter that affects the runnability and finished product quality. Pitch deposit troubles caused by stickies in the recycled waste pulp have been increased with increasing the usage rate of recycled waste paper. Especially, pitches of polyacrylate esters derived from adhesives used for labels in the door-to-door delivery services have been drastically increased for the last several years. This type of pitches is frequently found on the drier rolls and canvases.

Four different types of our coagulants were evaluated in the liner mill which has pitch trouble derived from polyacrylate ester. These coagulants were effective in the reductions of the amount of pitch on the drier doctor, defects in the paper, and also turbidity and anionicity of white water, irrespective the kinds of coagulants.

Evaluations of the coagulants above were carried out in our laboratory in order to study mechanism of pitch formation and effects of the coagulants with the use of model pitch. Polyacrylate ester extracted from adhesive tape with THF was used as model pitch. The results showed the coagulants are effective in preventing pitch agglomeration of this model pitch. However, the action mechanism of the coagulants may be different, depending on their types, from the results of measurement of pitch particle size and its distribution by in-line particle monitoring system.

New Rebuild Concept for Paper Machine Sections-For Further Improvement of Paper Quality and Productivity-

Hidehiko Yamazaki
Metso-SHI Co., Ltd.

Several full line of OptiConcept machines with Metso Paper's advanced technologies integrated have been running and acquired favorable world-wide reputations in recent years. To achieve higher level of paper quality and higher productivity is targeted for these machines. An on-line LWC paper machine with 10 m wide and 2000 m/min of design speed is a good example.

On the other hand, the improvement of product quality, increase in production capacity and improvement of production line's performance not by installing a new production line but by rebuilding existing machines, are strongly requested. The technologies for such rebuilds consist of several individual section rebuilds, which together produce an effective line rebuild. Instead of approaching improvements by rebuilding the whole line at once, a step-by-step rebuild approach may be taken to start by improving areas with the greatest potential first.

In this presentation, we introduce several topics selected from wide range of Metso's rebuild technologies.

Hurth PM1-The World's Most Modern Newsprint Line Breaks New Records-

Takeshi Nonogaki
Voith IHI Paper Technology Co., Ltd.

This entire project and commissioning impressively shows what can be achieved through an optimal combination of meticulous planning, innovative technology, and competent personnel both on the side of the supplier and the customer. Bernhard Schmidt, Rhein Papier GmbH project manager, sums up the Hurth PM1 project execution and results as follows: "In the record time of only 12 months from construction start up to first paper on the Sirius reel, we completed an exceptional project together with Voith. Hurth PM1 is certainly one of the greatest successes in our entire company history".

JK-BC System As a Highly Advanced Wastewater Treatment System-Actual Case of Denitrification (Wastewater from Animal Husbandry)-

Akira Ikeuchi
Itochu Sanki Corporation

The JK-BC system is a wastewater treatment system developed as an evolution of activated sludge process and rotating biological contactor process. It uses bacilli (aerobic bacteria) preferentially cultured to a high concentration in combination with JK-BC system (three-dimensional rotating biological contactor) to bring about an evolution in the field of wastewater treatment. The JK-BC system has made it possible to treat high-concentration wastewater to remove nitrogen, phosphor, and odors which cannot be eliminated by the conventional bacteria.

Analysis of Distributions of the Paper Chemicals on Paper (II)-Approach to the Size Effect and the Appearance of Strengthening Mechanism by in-situ Observation-

Fumiaki Inokuchi
Research & Development Center, Arakawa Chemical Industries, Ltd.

The fixing of paper chemicals (sizing agent and 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 pulp surface in simple process and the observation of paper chemicals on the micro-fibril has become possible by utilizing Scanning Probe Microscope (SPM).

The newest analysis results for distributions of sizing agent and strengthening agent on the paper and pulp fiber by utilizing Environmental Scanning Electron Microscope (ESEM) is reported in this presentation.

Structural Analysis of Coating Layer Containing Plastic Pigments

Yoko Saito, Hideki Touda and Junji Kasai
ZEON Corporation
Hitomi Hamada, Toshiharu Enomae and Fumihiko Onabe
The University of Tokyo

Recently, the amount of plastic pigment used for coated paper has been increasing because the requirement of coated paper has been changed to have high sheet gloss, high brightness, and good opacity. The effect of plastic pigments existing in coating layer on the properties of coated paper was investigated by analyzing the structure of coating layer. According to the results of the measurement of porosity, SEM image of cross-section surface and analysis of its photographic image, it is found that the coated paper including plastic pigment shows the excellent smoothness and has a lot of pore in the coating layer and the orientation of inorganic pigment are disordered compared with that formulated by inorganic pigment only. This tendency is stronger in case of using hollow sphere. Following 2 reasons were considered, the existence of void due to the hollow sphere itself and disordered orientation of inorganic pigment by hollow sphere which has large particle size. Plastic pigment would play an important role in order to manufacture the coated paper of bulky and excellent optical properties. In this report we describe these examination results.

The Measurement of Flow load and Detecting Leak for Utility Air in Plant, as for Saving Energy

Taro Sento
Sec.2, Marketing Department, Advanced Automation Company, Yamatake Corporation

This paper explains the importance of selecting an air flowmeter in flow load measurement and the system of detecting very little air leak, and introduces an air flowmeter, AIRcube and an air leak detector, Leak DetectorII, which is needed for reducing a load of utility air of a pulp and paper plant, from the above perspective.

Recent Trends of Pulp and Paper Related Test Standards-The Situation of ISO Standards and Precise Response in JIS Establishment-

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Paper Science Laboratory, Bio-material Sciences, Graduate School of agriculture and Life Sciences, The University of Tokyo
Testing standards committee member of JAPAN TAPPI

Test standards play important rolls in management of pulp and paper products, data acquisition of fundamental research etc. for companies in papermaking industry. In comparison with past products of themselves or with products of other companies, test standards provide the means of evaluation beyond time and space. Pulp and Paper Test Standards Committee of Japan TAPPI, as major tasks, take a commission to establish JIS and deliberate ISO drafts for voting on them. Since 1998, JIS has been conformed to ISO standards so that Japanese domestic standards would not become a non-tariff barrier. However, nowadays, international standardization activities are obviously utilized as a national strategy by EU and United States. Japan stands in a crucial stage, but we should positively get involved with activities of Working Groups in ISO/TC6 - paper, board and pulps - to direct ISO standards never against Japanese papermaking industry. This article will summarize 10 recent standards of JIS published or to be published in 2000 or later as well as 19 ISO standards under draft processes to understand the world situation. At last, the next international meeting of ISO/TC6 is scheduled on November 3rd to 8th this autumn in Tokyo. Kind cooperation and participation by everyone interested would be appreciated.

A Report on 18th ISO/TC6 Meeting

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Yoriyuki Hattori**** and Tadashi Kano
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*Tokyo University of Agriculture and Technology
**Nippon Paper Industries Co., Ltd.
***Oji Container Co., Ltd.
****Mishima Paper Co., Ltd.

Japan TAPPI hosted the plenary meeting of ISO/TC6, which is responsible for the development of international standards for paper, board and pulps, on November 3-8, 2003 in Tokyo.

Meetings of two Sub Committees, SC2 and SC5 were held on November 6 and 7, respectively. Sixty-eight delegates representing 15 member countries presented in the series of meetings. This was Mr. George Weiss' last meeting as Chairman of ISO/TC6. Mr. Robert Wood has been appointed as the next chairman of ISO/TC6, for a three-year term since January 1, 2004.

A proposal to create standard testing methods for the determination of D65 brightness and the Determination of Colour (D65/10?) was approved (9 approved, 3 disapproved and 2 abstained). The revision of ISO 216 to include American writing paper dimensions was received favourably by 71% of the members voting, and therefore is qualified to proceed directly to the DIS stage.

Liquid Transfer Characteristics of Recycled Pulp Handsheets

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Tokyo University of Agriculture and Technology
Ken-Ichi Hashizume
Laboratory of Complex Functions of Materials, Faculty of Technology,
Tokyo University of Agriculture and Technology

Structural characteristics of chemical pulp fibers are irreversibly changed by recycling. The change of the surface behavior of a single pulp fiber during recycling was characterized by measuring the contact angle using appropriate test liquids. A remarkable increase in the contact angle of water was found after recycling. Recycling treatment did not substantially change the surface free energy of the fiber. However, the base parameter of the surface free energy decreased with recycling, particularly that based on free-drying at high temperature.

Two types of penetration measurements were designed to measure the rate of vertical (Z direction) and lateral (X-Y direction) liquid penetrations into paper. The rate of water penetration increased with recycling, and correlated with a porous structure in the recycled pulp handsheet. The tortuosity factor for the handsheet was calculated using the Lucas-Washburn equation. The recycled pulp gave smaller tortuosity factors of the handsheet compared with the virgin pulp.

Keywords : Recycling, Pulp fiber, Wetting, Liquid penetration, Acid-base interactions

The Evaluation of Paper Sludge (PS) for Zeolite synthesis(Part 4)-Monthly Change of Chemical Composition of PS and The Proposal of the Synthesis Technique to Industrial Output-

Takao Ando, Osamu Sugiyama, Masato Saito and Kimio Hiyoshi
Fuji industrial research institute of Shizuoka prefecture
Naoto Matsue and Teruo Henmi
Department of agriculture, Ehime Univ.
Osamu Shimada
Gakunan daiich cooperation of paper manufacturing association

We have been investigating the zeolite synthesis from paper sludge ashes (denoted as PS zeolite) by alkali hydrothermal treatment as a new effective utilizing technique of the paper sludge (PS). In this study, 102 samples of PS gathered from 16 paper mills in Fuji city for a half year were chemically and mineralogically examined and statistically evaluated in terms of fitness to the zeolite synthesis. The chemical composition of PS and the characteristics of PS zeolite led us to fallowing results. The relationship between CaO content (x) and the intensity of XRD peak assigned to zeolite (Z-index/10000 = y) was found as y = -0.37Ln (x)+1.48. Also, the fairly well linier relation between the atomic ratio of Ca to Si, XCa/Si, and Ca to Al, XCa/Al, was found as XCa/Si/XCa/Al=0.89. Based on these relationships, we classified the PS's into new chemical ranges of (A) to (D) in order to distribute almost the same number of samples in each range; that is, 21, 23, 22, 24, respectively. Here, Z-index/10000 at the boundary of the ranges (A) to (B) was 0.41, (B) to (C) 0.25 and (C) to (D) 0.20. This new classification was then converted to the mineralogical ranges (A) to (D) in a talc-kaolinite-calcite trigonal diagram through the calculation by normative method. It was found that the PS ashes in the ranges (A) in the diagram never changed into the rage (D) during a half year, and the reverse relationship was also correct. The mixture of PS's discharged from the 16 mills, as is in practice, contained 25.0% CaO, which was classified into the range of (B) and would formed hydroxysodalite. We proposed a new technique in order to obtain zeolite from the PS mixture for industrial output, in which 1.0M Si was added to the alkali solution with the PS mixture.

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

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May 2004 Abstracts

Results of the FY 2003 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 2002 and the report of energy situation in pulp and paper industry in Japan:

Unit of fossil energy in 2002 was smoothly reduced by 6.6% from the level in 1990. However, the reduction in a unit of CO2 emissions remained 2.3% because cost competitive coals have been largely used.

Paper and paperboard production increased by 9.8% in fiscal 2002 compared to that of 1990 level, whereas, increase in CO2 emissions remained at 7.3% from the 1990 level. A breakdown of the 2.5% reduction from 9.8% to 7.3% shows that the pulp and paper industry decreased by 2.2% and electric companies contribute to reducing the remaining 0.3% (from effective generating and transmission electricity).

According to 22 companies that replied to our questionnaires, a total of 14.8 billion yen was invested in energy saving measures for fiscal 2002 and the crude oil equivalent of energy saved reached 290 thousand kiloliters per year. As far as the estimation from 20 companies, 44.5 billion yen will be invested and 254 thousand kiloliters per year will be saved from 2002 onwards.

Energy-saving in Stock Preparation-Energy-saving by a Renewal to the Low No-load Horsepower Small Refiner-

Koji Nomura
Production Dept. Fuji Mill Nippon Paper Industries Co., Ltd.

Increasing the social demands to saving natural resources and the environmental protection, the production of the recycled paper has grown every year. The new plant of recycled pulp operated at Fuji Mill in 2000, and it has corresponded to the demand of recycled paper. While the production of products with a high use ratio of recycled pulp are increasing, the production of products with virgin pulp tend to decrease at 7,8M/C which manufacture colored paper, printing paper and base paper of coated paper. Therefore the quantity of bleached softwood, hardwood kraft pulp used for the paper machines is decreasing. The capacity of the refiner and the pump for bleached softwood kraft pulp in stock preparation becomes excessive for the manufacturing condition with a little amount of virgin pulp use. And it is in a situation that can't be efficient power use. According to the situation of the pulp flowing quantity and freeness target, we make a study of using the small type of refiner for saving the energy.

Steam Saving in Paper Making Process-Steam Saving by Raising The Temperature of Pulp Slurry Using Hot Water and Recycling White Water from Paper Making Process-

Susumu Chiba
Hachinohe Mill, Mitsubishi Paper Mills Ltd.

We have taken measures to reduce the energy consumption as one of the environmental improvement plan based on ISO 14001 standard in the Hachinohe mill of the Mitsubishi Paper Mills, Ltd. Company since 2001. And the target of the plan is to reduce the ratio of steam and electricity consumption to the paper production in the mill at the rate of 1 % every year.

Therefore we studied the actual conditions of processes in the mill and made a plan to save fresh water from the view point that cutting the heat loss by saving the warm waste water sewage could lead to the saving of steam consumption . Based on the plan, some measures have been carried out since 2002.

In this paper we describe the way to make the best use of hot water from a surface condenser in a black liquor evaporation plant and the way to reduce the size of a sand filter plant used for white water recovery from paper making process.

Energy Conservation of Screen

Tomomitsu Nihei
Kanto Mill (Ichikawa), Hokuetsu Paper Mills Ltd.

Kanto Mill(Ichikawa), Hokuetsu Paper Mills Ltd is the factory which produces recycled paper, such as white board paper, as a major product.

Taking advantage of conditions of location, and it is working considering the used paper the cargo oh is collected from a metropolitan area as main materials.

Although this used paper quality is becoming an aggravation tendency in recent years,the quality level of the paper called for is severe conversely.The equipment which is greatly related to this quality level is screen equipment before a materials tone part and a paper maker. I report the example of two affairs about an improvement of a quality side and change of power saving.

Efficiency Improvement of GAS IR System on #51 Paper Machine

Yasunori Arakawa and Yoshihiro Kudo
Nippon Daishowa Paperboard Yoshinaga Co., Ltd.

Energy-saving is a priority matter in paper and board manufacturing process, which consumes a lot of energy. Nippon Daishowa Paperboard Yoshinaga Co. Ltd.
aiming "Full Recycling mill" is focusing on it anytime and anywhere in the mill.

By replacement the burners of GAS IR system to the energy-saving type on #51 which produces on-machine coated board, we successfully achieved the saving of energy. After the burners replacement, the drying capacity increased by improving thermal transmission efficiency which can expect us the saving of gas consumption. However, it was not so easy to determine the optimum gas output under the actual machine operation. This paper shows how we obtained the actual energy saving.

Reduction of Turbine Bypass Blow off Steam by Lowering the Minimum Load of No. 4 Boiler

Junya Ota
Sobue Mill Oji Paperboard Co., Ltd.

No. 4 boiler (CFB; Circulating Fluidized Bed type) at our plant started operations in 1995 after our mill's fuel conversion program by taking the place of No. 3 boiler (heavy oil fired boiler).

The maximum steam generation of No. 4 boiler was 120t/h and it has been in operation with steam generation between 95 t/h to 120 t/h when all four paper machines were in operation. The operation of one large paper machine was reduced from 2002 and the operation of the machine stopped in January 2003 completely. The required steam generation now ranges between 75 t/h and 96 t/h.

Since the low-load operation of No.4 boiler causes a blockage in the combustion-air blowing nozzle at the bottom, the minimum operation load has been kept at 75 t/h. However, after the suspension of the large paper machine operation, power consumption at our mill when other machines are stopped for service and maintenance purposes has gone down. At a boiler load level of 75 t/h, power generation exceeds power consumption to result in a back feed to the power supply utility company. As a result, turbine bypass operation (blow off steam through turbine bypass valve) has become necessary.

In order to lower blow off steam by the turbine bypass operation, boiler operation needs to be further lowered and grid nozzle modification was seriously considered.

Grid nozzle type was changed from "pig tail" to "arrow head" to prevent bed material from entering the nozzle hole, so that nozzle blockage would not happen in low-load operation.

Thanks to the grid nozzle modification, the present minimum load is as low as 62 t/h and the rate of nozzle clogging by calculation stands at 23%, which means there is no problem. The boiler has been in operation without turbine bypass operation.

The reduction in blow off steam amount to the air as a result of low-load operation for the boiler currently amounts to about 600 t/month.

Boilers Energy Conservations

Teruhiko Tamai
Iwakuni Mill, Nippon Paper Co., Ltd.

Power plant at Nippon Paper Iwakuni mill has six boilers: one bark boiler, two oil boilers and three recovery boilers (two of them are standbys), and nine turbine-generators (three of them are standbys). All electricity required for the mill operation can be generated from the power plant. Iwakuni mill has been modifying the operation, promoting reuse of exhaust heats, replacing some old equipment with higher efficiency ones and constructing new high efficiency plants as well in order to increase energy efficiency at the power plant.Energy saving is one of the very important issues these days for mill operations, however at the same time effective solutions to achieve valid energy saving cannot be easily recognized. Therefore the mill now is challenging to reduce energy consumption with new activity, such as introducing responsibility share on each sections for the target.

This describes the result of the construction of Magna Drive, which started operation in Oct. 2003 and the plan for heat recovery of an oil boiler with S-CON, which is scheduled in 2004, as considerable solutions of energy saving.

The Energy Saving of the Power Plant

Tadayuki Kubo
Nomachi Mill, Chuetsu Pulp and Paper Co., Ltd.

While no one predicts the future of the Japanese economy, each company is striving for cost reduction in order to survive. On the other hand, pulp and paper companies are tackling to energy-saving as the most important theme from the viewpoint of cost reduction and global environmental problem. At Chuetsu-Nomachi Mill, we have been proceeding to energy-saving in each process, then both the amount of generating steam and using power have increased due to the operation of No.1 coater machine (April, 1998) and DIP facilities (October, 1999). After we tackled to energy-saving in order to lower the load of the mill, as a result, we were able to attain the heat recovery by passing the circulation water (about 70℃) of the Desox equipment of No.4 boiler through the pre-heater of 1st FDF and 2nd FDF, and also we were able to raise the temperature of the deionized water by change of the extraction of the raw water going into the deionized water equipment. The example of application is introduced, as follows.

Automation 1n the WET End ProcessTM

Hideomi Uchikawa
Voith Paper Automation Japan Ltd.

The literal German translation for approach flow system is Constant Part. It suggest that all process variations in this area directly upstream from the headbox have to be reduced a minimum in order to produce high quality paper.

Pressure, flow and consistency variations can be reduced or eliminated by applying state-of-art process technology. Much of this is well known, proven technology. However, recent developments with new measuring instruments now permit the control of chemical behavior of the stock suspension of in the approach flow system.

By combining retention with these new online measured parameters, and ensure both high quality and consistency of the finished paper.

Total retention, filler retention, charge or gas content should be controlled depending upon the furnish composition of the grades that are produced.

It will be shown in this paper how this can be integrated into the overall control architecture of Quality Control Management of the paper machine.

Various practical experiences outline the high potential of these new control strategies.

Deoxygenate Equipment for Boiler Water by Nitrogen Gas

Satoru Ura
Toyobo Engineering Co., Ltd., Environment Solution Division

Our Deoxygenate equipment for boiler water spends less Nitrogen Gas than other equipment. It may be about 1/3 quantity of old equipment. Our Deoxygenate equipment use special technology to make fine bubble. It is very effective for Deoxygenate from boiler water by Nitrogen Gas.

If you use chemicals for deoxygenate boiler water. Our Deoxygenate equipment for boiler water saves large money.

Although this equipment is a condensation filter, with the existing technology which adds a condensation agent in the water for processing, it is equipment condensed only by there being nothing, making into the shape of complications or a pellet substances, such as water magnesium oxide processed specially, and passing processing water to it.

This equipment is equipment which converts an established waste incinerator so that the dioxin regulating method may be suited.

Pulp Bale Breaker-Pre-shredding for Stabilized Operations and Reduce Costs-

Masaki Maeda
Industrial Machinery Department.NIPPON SHARYO, LTD.

Bale Breaker : SSI's slow-speed, high-torque shredders offer important solutions to meet your product reclamation and pre-processing needs. Shredding bales prior to pulping enables the hydropulper to be meter-feed a steady stream of consistently sized material. This improves and accelerates the blending process, resulting in increased capacity and efficiency (through lowered hydropulper energy and maintenance cost).Users have also reported reduced chemical usage and costs (because of accelerated material breakdown) as well as an improved end product.

Automatic Pallet fork transport system-Automatic Pallet-Robot-

Susumu Inaba
Maruishi iron works Co., Ltd.

Maruishi manufactures and sells Pallet Shrink- Packing Machine and Pallet Dust Remover and so on, which have been developed under a technical tie-up between ourselves and REKER in Germany since 1991.

We would like you to introduce the following Pallet-Robot. Pallet Robot is the full automatic fork style of skid transport system. The characteristic is as follows.

. Fully automatic working operation.
. No deforming sheets during pick-up and transport.
. Pick-up of a single skid out of a complete set.
. Transport of skids in any direction, also free turning of robot.(available for any kind of sheeter)
. One pallet robot can handle several sheeters, capacities up to 80 skids/hour.
(depending on layout)

We would produce results such as we delivered more than 5 Pallet-Robots to Europe and one Pallet Robot to Japan in 2001.

Study on the Effect of Testing Conditions on Compressive Strength and Bursting Strength of Board

Masataka Ito, Hideki Izumi＊＊ and Yoshio Yoshida
Material Analysis Center, R & D Div., Oji Paper Co., Ltd.

JIS P 3902 "Linerboards" specifies the compressive strength by ring crush tester and the bursting strength by Mullen high pressure bursting tester. The both strength tests have comparatively large variance on the test results among the testers. In this report, we studied the effect of testing conditions on the both strengths of board.

On the compressive strength test, the parallelism of the upper and lower platens, the position of test piece holder on the ring crush tester, the position of test piece seam in the test piece holder, the kinds of die cutters and the kinds of ring crush testers had effect on the results.

On the bursting strength test, the pressure at 10mm bulge height of diaphragm and the kinds of bursting testers had effect on the results.

Keywords: testing conditions, compressive strength, bursting strength, board, ring crush tester,high pressure bursting tester

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June　2004　　Abstracts

Heat Recovery from the Waste Water

Hiroyuki Watanabe
Kushiro mill, Oji Paper Co., Ltd., Oji Engineering Kushiro Dept.

Kushiro Mill produces 700 thousand tons p e r year of newsprint, coated paper, mechanical "paper and linerboard by four paper machines with pulp plants (KP, RGP, DIP and OCC). In compliance with social requirements on environmental protection, Kushiro mill works for the increase in the wastepaper (DIP) utilization rate, according to environmental of Oji paper. And the expansion of DIP plant was completed in 2003.

As known, large quantities of warm water is necessary with DIP production process for washing of the ink particles which deinked from the wastepaper. The location of our mill is the cold districts, so it is necessary to use many amounts of steam at the pulp and the paper machine process.

We had to make warm water by using a new source of heat, because the warm water from the condencing turbine and machine waste heat was already consumed in the mill. In this　report, I describe the Heat Recovery from the new source which is waste water, and the saving energy.

Improvement Example to Reduce Water Content of Paper Sludge

T. Hosaka, T. Kato and K. Kobayashi
Kushiro Mill, Nippon Paper Industries Co., Ltd.

We have worked the sludge boiler that utilizes the paper sludge (PS) as the main fuel in 1992.And we are advancing the application of the renewable energy that is substituted to fossil energy.

In recent years, with advancement of the waste paper utilization, the materials for the paper making of our mill changed the de-inked pulp from the mechanical pulp. Also the amount of PS increased with utilization of DIP, the ratio of PS in the sludge boiler reached the point of approximately 70%.

On the one hand, the ash of mill draining rises due to the utilization of the magazine waste paper, accordingly energy efficiency of the sludge boiler deteriorates.

This time, we assured equipment remodeling and PS-fluke stabilization in PS dehydration process. As a result, PS percentage of water content decreased, as for us, could improve PS combustion energy.

Energy Saving by Adopting the High Efficiency Steam Turbine

Kenji Okamoto and Toshiaki Hatakeyama
Saga Mill, Oji Paperboard Co., Ltd.

The Saga mill No.2 steam turbine of our company has operated for 34 years and totally 12.0% efficiency decline at maximum output operation have been recognized which consists of deterioration in the turbine, pressure loss at the reconstructed extraction point and etc.

By replacing the turbine rotor, diaphragm and nozzle to the high efficiency type which causes 14.85% efficiency improvement at maximum output operation and by shifting the operation mode from the condensing power generation and purchasing power to the extracting power generation, we have achieved both energy saving and cost cut.

Energy Saving with Atmospheric Steam Reduction

Shinnei　Furuse
Yatsushiro Mill, Nippon Paper Industries Co., Ltd.

At yatsushiro mill, coal fired power plant has been operated successfully since 1993and it contributes to the cost reduction of Yatsushiro mill.

In early 1998, installation of the world-class N2 newsprint machine was completed, adding, substantially to our international competitiveness as a paper mill.

N 2 newsprint machine produces a haif of total production of Yatsushiro mill. On that account, when N2 paper machine stopped, we would stabilize boiler load with the releasing of atmospheric steam to decrease a large amount of the boiler load.
Power plant operators in a small group activity made a study of the stop timing of a coal mill.

In this report, we describe the results of a small group activity successful to archive the reducing of the atmospheric steam by a large marginies.

Activities of Energy Subcommittee at Niigata Mill, Hokuetsu Paper Mills, LTD.

Tomoo Arano
Hokuetsu Paper Mills, LTD., Niigata Mill Technical Section

The annual consumption of Hokuetsu paper Mills, LTD. Niigata Mill is approximately 5,000kL per year, converted into heavy oil. The activity of main energy saving has been started up since 1980 and now operating division, engineering division, and administrating division cooperate in the energy saving by means of the Energy Save Meeting. The target of the energy saving is 1% reduction of the annual energy consumption for purchase. The energy saving result in last three years was 9,200kL, and attained to the target. According to the classification of the energy saving by pattern, 75% of the energy saving case are easily case that stop surplus instruments by improvement the operating standard or changing flow. The recent main energy saving case in Niigata Mill are changing impellers of medium consistency pumps and examinations applying temporarily inverter unit for the preset motors.

The Examples of Energy-Saving in Oji Kure

Shoji Hirooka
Oji Engineering Co., Ltd., Kure Mill

Oji Paper has set itself the target of reducing its purchases of energy in unit terms by 2010 by 10% compared with 1990, and promoting activity in the whole company. Since 2000 when Oji Kure mill obtained environment control international standard (ISO 14001)certification, we are performing energy-saving activities in the program of the environmental management system (EMS).

I introduce some examples characteristic as a pulp-paper mill, and the situation in the Kure mill from the latest energy-saving result.

The Improvement in an Energy Original Unit and the Energy-Saving Example in a Futatuka Factory-Transition and Consideration of Energy and CO2 Original Unit-

Masashi Masui
Futatuka factory, Chuetsu Pulp & Paper Co., Ltd.

Chuetsu Pulp Futatuka Mill is in Takaoka-City of Toyama-Pref., which is located in the middle of Kanto economic region and Kansai economic region, supplies the products to the customers in both Tokyo and local area. The mill produces 180,000t/y of newsprints mainly.

This time, the main theme of Energy-Savings Seminar is “Returning to the starting point : an example of energy saving of the mill”, and our theme is “Transition of energy consumption per unit and Example of energy-saving” concerning about the change of fossil fuel consumption per unit from 1990 to 2002.

According to the data book 2003 investigated by Japan Technical Association of Pulp and Paper Industry, both the purchase energy and CO2 consumption per unit of Futatuka mill has been descending from the peak of 1993. Of course it depends on the increase of production simply judging from the index of production level, although, it is considered that the implementation of energy saving and the improvement of efficiency has contributed mostly. I try to make the important factor clear with adding consideration, and also the following is a successful example of energy saving implemented.

The Recent Activity of Energy Conservation at the Kasugai Mill

Junichi Nakamura
Kasugai mill, Oji Paper Co., Ltd.

Ojipaper Co., Ltd.’s Kasugai mill started operating in 1952. Recently the mill demands an ever increasing amount of electricity and steam. This is caused by greater production of used paper products; use of ECF sequencing in bleaching wood pulp; and increased electricity demands if new high-technology machinery. In this paper the composition, usage and conservation of energy in the Kasugai mill are reported.

We classified the energy conservation activity, which was carried out from1998 to 2002 (fiscal years), into 10 main themes and 6 sub-themes. Each amount of energy conservation was converted to the crude-oil equivalent. It turns out that conservation of about 7000 KLs and22,900 CO2 tons has been attained by the end of 2002. The energy conservation effect is large and furthermore we're going to introduce seven examples whose technique could be applied to elsewhere.

Furthermore, in order to attain the independence action plan of the paper and pulp industry titled; "Cutting down a purchase energy field unit ratio per product for 10% compared to 1990, by 2010", we set up the numerical target which should be attained by the end of the 2008 fiscal year.

Energy Curtailment at Mishima Mill, Daio Paper

Masanori Watarikawa
Mishima Mill, Daio Paper Co., Ltd.

The power generating facility at Mishima Mill has a 531 MW standard output and consists of 18 power boilers and 14 turbines. It supplies all the electricity used here and the surplus electricity is sold to the market.

After the oil crises Daio Paper shifted fuel dependence from heavy oil toward coal. Since 1985 we have also attempted to be more efficient in the power plant by raising the pressure and the temperature in the boilers and installing new turbines, and increased production of recycled pulp which has a low energy consumption rate.

In 2002, we accomplished a 15% reduction in fossil fuel energy consumption/paper tonnage compared to 1990.

However, facing the reality where reduction in carbon dioxide emission is required to meet the demands of global warming prevention, we are making independent efforts in the area of energy curtailment and fuel, with the aim of more than a 10% reduction by 2010 compared with 1990 level.

Energy curtailment cases in Mishima Mill are discussed in the following section.

BTF Dilution Headbox System- Comparison Data between before and after BTF Retrofit -

Junichi Yano
Design Section, Kawanoe Zoki CO., Ltd.

We will give a presentation on how much product quality can be expected to improve by retrofitting the BTF system to an existing headbox, based on machine startup data in the USA and Canada.

Since many roll type headboxs are still in operation in Japan, we will also introduce data of two kinds of roll type headboxes this time.

The first system in Japan started up in July this year. We are sure we will be able to talk about an interesting result of installation in the near future.

Developments for High-Speed, High-Efficiency &Stable Paper Coating

Masahiro Sugihara
Mitsubishi Heavy Industries, LTD., Hiroshima R&D Center
Hiroshi Miura
Mitsubishi Heavy Industries, LTD., Paper & Printing Machinery Division

Mitsubishi Pilot Coater has been rebuilt to improve high-speed coating performance and to realize the simultaneous both side film coating. This rebuild enables our new developments for high- speed, high-efficiency and stable coating technology and customer's coating trials for verifying the performance of coater or coating color composition.

The efficiency of the state of the art "MJ-Sizer" for misting reduction and web stabilization, and the novel "Ejector & Steam substitution System" for high-speed free jet type applicator for prevention of air entrainment at the interface between coating color jet and base paper surface, have been verified by using this high-speed pilot coater. Several fundamental studies on film coating, blade coating and curtain coating are also being carried out to realize the high-speed, high-efficiency and stable coating operation.

In this report, we present our new high-speed pilot coater and some new technologies for high-speed coating.

Technical Trend of Mechanical Seals for Pulp & Paper Plants－Mechanical Seal Technology meeting Environmental Preservation－

Hidekazu Takahashi
Eagle Industry Co. Ltd., Seal Engineering Dept.

A mechanical seal prevents or reduces outboard leakage of toxic chemicals and saves energy and resources. Therefore, it can be deemed as one of the important environmental instruments that is directly and indirectly contributing environmental preservation. In a pulp & paper plant, many numbers of varieties of pumps are utilized such as water pumps, pulp pumps and chemical pumps all through the production processes from digesting to painting. In recent years, a mechanical seal has been selected as a standard sealing device for such pumps to pursue economical advantages by save energy, save resource and save maintenance points of view and is greatly contributing environmental preservation. I will make brief explanation of the mechanical seals first and then show you examples of environmental issues and contributions achieved by the mechanical seals.

Improvement of Hardwood Pulp Yield in Continuous Kraft Cooking and Estimation of Pulp Yields (Part I)－Optimal Conditions for Yield Increase and Estimation Using Carbohydrate Analysis－

Tomoya Yokoyama and Hiroshi Ohi
Institute of Agricultural and Forest Engineering, University of Tsukuba
Keiichi Nakamata
Technical and Development Division, Hokuetsu Paper Mills, Ltd.

The optimal conditions of isothermal cooking (ITC) for yield improvement of hardwood kraft pulp were established using Acacia mearnsii wood in a laboratory. The addition of both 1% sulfur and 0.04% soluble anthraquinone on wood gave an about 4.5-5% higher pulp yield at a kappa number of about 17. The highest yield was obtained when 70% of total active alkali and 100% of both PS and AQ were added at the beginning, and successively, black liquor was exchanged with fresh white liquor containing the remaining 30% of total active alkali just after the cooking temperature reached 135° C. A linear correlation was observed between pulp yields and ratios of xylose to glucose (X/G ratios), liberated from the pulps by an acid hydrolysis. This result means that a pulp yield can be estimated by knowing an X/G ratio of the pulp. However, it was indicated that the linear correlation for Acacia mearnsii can not be applied to cooking of different wood species.

Keywords: kraft cooking, isothermal cooking, polysulfide, anthraquinone, carbohydrate, pulp yield

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Effluent Minimization in European and North American Pulp and Paper Industries－Major Incentives for Mills to Reduce Water Consumption －

Hiroshi Araki
Japan Pulp and Paper Research Institute. Inc.

Environmental regulations and economics have increased interest in minimizing water use and effluent discharge in the world. The reduction of water use by pulp and paper industries is mainly driven by environmental regulation and cost saving. Although our water consumption has decreased considerably during the last decade, we are still large users of fresh water in comparison to other manufacturing industries. A good water management allows us to reduce the water consumption without any increase in toxicity and affection to the processes or the quality of the final products.

US pulp and paper industry discharged 53m3/adt of effluent in 1999. This represents a 40 percent reduction as compared to 1975. Continuous progress has been made by the Canadian industry in reducing water use. The average discharge is 66m3/adt presently. Current design levels for new mills in the newsprint and bleached kraft sectors are about 15m3/adt and 50m3/adt, respectively. The average discharge of EU pulp and paper industry is 35m3/adt presently and show the decrease of 19m3/admt (35%) during recent 5 years.

In Japan the national average of effluent discharge by the pulp and paper industry is about 90m3/adt in 2001. Although the effluent volume has been decreased 75m3/admt (45%) since 1980, there are still opportunities for further reduction on water use and effluent discharge.

This paper provides a summary of the effluent minimization implemented in European and North American pulp and paper industries during the 1990s.

Keywords : Effluent minimization, Environmental regulation, Water consumption, Effluent discharge, Bleached kraft pulp mill, Toxicity.

Operating Conditions of High Pulp Consistency Ozone ECF Bleaching

Shuuichiro Mochizuki
Nichinan Mill, Oji paper Co., Ltd.

High pulp consistency ozone ECF bleaching plant was started up at Nichinan mill in 2002. This bleaching system is the first one in Japan. The operation is now stable through the solution of a couple of troubles during starting stage.

Since we found that the pulp consistency and pH would be effect on the reaction efficiency on ozone stage, they have been carefully controlled as key factors.

There would be almost no difference on pulp quality between ozone ECF and chlorine bleaching. The paper quality and runnability of paper machine seems to be same in both cases.

The content of AOX and chloroform in effluent has been remarkably reduced, by >90% and >99%.

The Present Condition of Filtrating and a Future Plan of BKP Process

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

Nomachi mill has 2 continuous cooking lines for Softwood (N) Pulp or Hardwood (L) Pulp respectively, and each process has individual bleaching system as well. As far as N pulp is concerned we produce both high Kappa-No. pulp for Kraft paper and low Kappa-No. pulp for bleached pulp base paper.

This time, from the viewpoint of water-savings, I take up the washing flow of bleaching process as an example of BKP Filtrating.

We use Drum Filters as the washer of bleaching line for both N and L. As for bleaching sequence we adopt the conventional one, that is to say L is C/D-E/O-H-D and N is C-EP-H-D. And we appropriate the filtrate of the last stage (H & D) to the shower of the fist stage effectively.

I explain such a present condition of washing flow and the point of improvement after strengthening the H2O2 Bleaching line for N pulp, and also introduce the plan of ECF for N pulp that is to be changed from the conventional bleaching process this April.

Operating Experience of Bleaching Plant in #5KP－Improvement of Mill Water Consumption Rate by Increased Capacity－

Yasuhiko Nishiguchi
Iwakuni Mill, Nippon Paper Industries Co., Ltd.

A kraft pulp production line at Nippon Paper Iwakuni Mill, #5KP, was rebuilt in 1994 and has been operating well. The new line, originally designed as 1200 daily metric tons for bleached hardwood pulp, has three bleaching stages, C-E/H-D, each with a Diffuser Washer to intend energy saving. Since the start-up we have focused on improving the washing efficiency and reducing water consumption.

Although the water consumption rate had been improved with increasing the production, we had difficulty in the bleaching efficiency and productivity due to scale trouble on the Diffuser Washer screens. A chemical washing to those screens was effective in removing calcium scale. Furthermore we found a method to prevent the scale by dosing caustic soda to washings on the secondary stage of the Diffuser Washer. (Pat.) These approaches have led to improvement of bleaching efficiency and expansion of production; 1450 mtpd in 1999, 1550 mtpd in 2002. As the result of increase in productivity, the water consumption rate in bleaching process has been significantly improved.

Keywords：Water consumption rate, Diffuser Washer, scale trouble

The Instances of Water Saving in Niigata Mill

Takeshi Sato
Hokuetsu Paper Mills Ltd., Niigata Mill

Hokuetsu Niigata Mill started up the new coated paper machine (PM8) in July 1998. To reduce the purchase of market hardwood pulp for PM8 and other upgraded machines, the increase of pulp production capacity and the modernization of the pulp plant were planned and carried out before PM8 was started up.

This new pulp plant introduced ECF bleaching with D0-EP-DnD as a sequence. One of the most important thing was to reduce the use of water for this modernization.

This article describes some instances of water saving at the pulp plant in Niigata mill.

Operating Experience of Partial Closure in ECF Bleaching

Masami Furui
Hachinohe Mill, Mitsubishi Paper Mills Limited

New ECF bleaching sequence introducing pretreatment stage (QX), pretreatment with a mixture of chelating agent (Q) and xylanase (X), was developed to allow the recovery of bleached effluent from several bleaching stages in Hachinohe Mill of Mitsubishi Paper Mills. The sequence was (QX) P1HP2D. The filtrates from (QX) stage and P1 stage were recovered and introduced to the mill recovery cycle.

Before implementing the mill trials with new sequence, the balance of metals in the process was investigated. Most of the metals flowed in from the wood chips. The metals that flowed in the recovery cycle were discharged as the dregs. However, because the removed rate as the dregs was low about silicon and aluminum, their accumulate in the process concerned.

By the recovery of bleached effluent, the concentration of metals in the black liquor increased a little .

Keywords：ECF bleaching, Pretreatment stage, chelating agent, xylanase, filtrate, partial closure, recovery cycle

Introduction of Effective Utilization of Water in the Kraft Pulp Factories

Yuji Tsukamoto
Ebara Corporation, Environmental Engineering Group

Recently, the paper factories within the country have shown the trends of merger and abolition and the surviving factories have been in the direction toward increasing in production. Therefore, and due in part to the expanded demand for wastepaper, the water situation around the paper factories stands, in general, facing a severe condition. The precondition for increasing in production is that there is an allowance for water usage, and therefore, for each factory, it is becoming an important theme to reduce the specific water consumption per unit paper product. With the objective of investigating on water saving, EBARA implemented surveys of water balance in two kraft pulp factories within the country on a total factory basis. Based on the results obtained in the above surveys, this article reports the features of water use and the point of effective utilization of water in the kraft pulp factories.

DD Washer in Pulp Washing and Bleaching

Tamio Fukuzawa, Kannji Hagiwara and Masato Tsuchitana
Andritz K.K., Japan
Pekka Tervola and Olavi Pikka
Andritz Oy, Finland

The Drum DisplacerTM-washer (DD washer) has designed in response to the demand for improved washing efficiency, reduced operating, maintenance and capital costs. Today the DD washer is widely accepted by pulp mills all over the world and up till now, about 120 DD washers have been taken into operation.

The family of DD washers comprises machines that can be fed at low (from 3% to 6%, LCDD) or medium (from 8% to 11%, MCDD) consistency. The number of washing stages varies from one to four. Thanks to its unique segregated counter-current washing principle, a high washing efficiency can be reached. The design and the construction of the DD washer has been further developed, so that even higher displacement washing efficiency can be achieved and this excellent washing efficiency has been proven in the mill trial. The DD washer installation positions include brownstock washing, post-oxygen washing and bleach plant.

The unique PT Pressure Thickener innovated by Andritz can increase the low pulp consistency by about 2%, thereby improving process water management and washing efficiency of washing devices, for instance, after the screen room. The Andritz Modu screen F is capable of replacing the conventional centri-cleaners in the post-bleach position as has already been done in European pulp and paper mills. The Modu screen F gives high dirt removal efficiency and also provides the special feature of removing light-weighted particles like plastics from the pulp stock. Since the Modu F screen can operate at 3 times higher pulp consistency than the conventional cleaners, it improves water management resulting in energy saving.

System Closure for Kraft Pulp Mill and the Latest Fiberline Technologies

Yan Ju
Kvaerner Pulping KK

The pulp and paper industry is always under strong pressure from authorities, “green” organizations and consumers to reduce the environmental impact of the pulping processes. Since the dioxin debate, the pulp industry had improved its operation and to reduce the emissions and other substances to the receiving waters with new technologies same as recycling the filtrate or system closure.

In this paper it will be discussed that system closure for kraft pulp mill and the latest fiberline technologies. At the mention of system closure in kraft pulp manufacturing, it is the important developments include widespread adoption of new cooking techniques, oxygen delignification, closed screening, improved process control, new bleaching methods, and systems that minimize pulping liquor losses.

It was shown that Kvaerner Pulping new technologies such as the new cooking processes- COMPACT COOKINGTM and KOBUDOMARI cooking systems, a new oxygen delignification system-DUALOXTM, a hot chlorine dioxde bleaching system-DUALDTM, and a new washing equipment-COMPACT PRESSTM are playing an important role in system closure.

Keywords: system closure, Kraft pulp, filtrate, NPE, emission

Modern Bleach Plants- Closure and Bleaching Strategies -

Toru Kobayashi
Metso-SHI Co., Ltd.

A conventional ECF sequence is difficult to close without risk of process problems such as corrosion in the recovery system. With light ECF bleaching including a high consistency ozone stage followed by an alkaline stage without an intermediate washing stage, the water consumption and the COD discharge can be reduced considerably compared with a conventional ECF sequence. The use of ozone in the bleaching has also shown to be efficient to lower the brightness reversion of the bleached pulp. One cause of brightness reversion is hexenuronic acids, HexA, in pulp. Ozone reacts very selectively with HexA and therefore pulps with high HexA content are well suited for bleaching with ozone.

European Aspects of Kraft Pulp Effluents- Current Situation and Future Possibilities-

Christian Blom and Pia Jour
Eka Chemicals AB

Muneo Sakamoto
Nissan-Eka Chemicals Co., Ltd.

The development of Kraft pulp bleaching technology has led to better quality products and lower emission levels. The ECF bleaching technology has become the most common with 75% world market share for bleached chemical pulps (2001). By internal measures (partial closure, spill control, etc) and by external measures (biological effluent treatment) the COD and AOX emissions can be reduced to the level of 10 kg/ADT and 0.2 kg/ADT respectively. ECF bleaching technology is now part of the EU BAT, affecting the current emission limit directives. A massive R & D effort, Ecocyclic Pulp Mill ? KAM, suggests solutions to further reduce the emission levels. However, most of the technologies still await commercialization.

Keywords : Kraft pulp, Bleaching development, ECF bleaching, EU BAT, Emission limits, Partial Closure, Effluent treatment, Ecocyclic Pulp Mill

Adjustable Speed Drive Coupler MagnaDrive－Energy Saving with Non-contacting Permanent Magnetic Coupler－

Mitsuhiko Matsuda
Nomura Shoji Co., Ltd.

Energy saving initiative is very important in any field where energy is consumed. MagnaDrive ASD has been developed in U.S.A. as a variable speed coupler for an electric motor to control rotating speed of load for the purpose of saving electric power to the motor. The MagnaDrive is a magnetic coupler with rare earth magnet, which has most powerful permanent magnetism up to the date. MagnaDrive is to be installed just between axes of motor and load, and requiring neither anymore device nor wiring, and more over is operable under tough circumstances such as in high temperature or at outdoors. In this document, MagnaDrive is introduced with explanation of operating theory, benefits and application examples.

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The Latest ID-Screen & FiberNet with ID-Technologies— Intermediate Deflocculation & Dilution Device for Simplification and Power Saving of Screening Process —

Kazumi Fujita
Aikawa Iron Works Co., Ltd.

ID-Screen is the latest screen equipped with ID-Technologies (Intermediate Deflocculation & Dilution Device) which breaks the flock of fibers & small flakes and dilutes the reject stock consistency for recovering 100% passage efficiency of screen basket. With ID-device, the 2nd or the 3rd processing became possible in the one set of ID-Screen. FiberNet is the latest reject treating screen which also applied the ID-Device. ID-Screen & FiberNet realize dramatic simplification and power saving of screening process.

SiriusTM: High Performance Reeling Concept

Eiji Ando
Application Engineering Dept. Voith IHI Paper Technology Co., Ltd.

To fulfill the wide varieties and precise requirements of paper industries, future paper machine concept needs comprehensive and flexible solution considering the context process. Voith Paper offers “One platform concept” to cover the all customer requirements. This concept contains the special components for each section as well as total platform for the processing. For reeling component, SiriusTM covers needs of advanced reeling requirements for all paper and board grade. This characteristic issue is the one nip control via the Senso-reel drum. The nip load is continuously applied without changing the loading system. SiriusTM winding system allows maximum variability in the selection and application of all winding parameters. This description shows our new reeling concept for the most modern paper machine.

The Application of Novel High Cationic Charge Density Dispersion Polymers for Paper Chemicals

Yoshiya Yamaguchi
Paper Chemical Group, Shonan Research Center, HYMO Corporation

We have developed novel cationic dispersion polymers obtained by graft polymerization of acrylamide and (meth) acrylate onto polyalkylene polyamine. Specific properties of these polymers are not only high cationic charge density such as polyalkylene polyamine on the present market and also wider molecular weight distribution, higher polymer concentration, lower product viscosity and higher solubility.

The monomer components and polymerization processes have been carefully designed and optimized for various applications of wet-end. As a result, several line-up products have been prepared; Himoloc MT series as pitch control agents, Himoloc FR series as drainage aid and Himoloc SR series as retention aid respectively. These products are expected to help paper mills achieve stable paper making proceeding by controlling pitches and anion trashes, and increase paper making productivity by higher retention and draining rate in the wire section, by higher squeezing rate in the press section and by higher drying efficiency in the dryer section.

Improvement of Blade Former Performance with VentaShoeTM Technology— Upgrade Path to Next Generation Blade Former: MH-Former iFB —

Keiichi Fujiki
Mitsubishi Heavy Industries, LTD., Paper & Printing Machinery Division
Hiroshi Iwata and Kazuhiko Masuda
Mitsubishi Heavy Industries, LTD., Hiroshima R&D Division

Mitsubishi Heavy Industries, LTD. has developed a new technology that combines the best aspects of roll-blade and pure blade forming. This new technology consists of replacing the initial forming zone with a grooved smaller radius blade design. Rework to a former and headbox is minimal.

As in roll forming, the VentaShoeTM traps the jet more symmetrically with a positive angle to the wires that reduces the jet impingement sensitivity. Reduction in jet impingement sensitivity provides easy operation without any defects such as light spots. The blade drainage section provides the superior formation of a traditional blade former.

There are currently three papermachines utilizing this new technology. The first started up in North America in 2001 then the second and third started up in China and Japan respectively in 2002. All have been demonstrating many benefits in terms of paper qualities and papermachine operation.

A Study on Pigment Coated Paper Produced by High Speed Curtain Coating (2)

Kazuaki Ito, Hisashi Matsui and Atsushi Higuchi
Polymer Research Laboratories, JSR Corporation

Curtain coating is the non-contact coating method which liquid sheet falls freely onto the substrate to be coated. This coating system is very simple and has many advantages in easiness of operation, production efficiency and so on. In addition of these, recent works have been reported that curtain coating provides a very good coverage against coated surface expectively. In spite of the many advantages, curtain coating has not been used for the pigment coating because of the various problems occurred under the high speed condition.

In this paper, we report the influence of roughness character of the base paper surface and coating color properties on the above problems. We also report the character of high speed curtain coated paper surface and these printing properties compared with blade coated commercial A2 or A3 grades.

A Study of Sheet Gloss Part 2

Noriko Kitamura
Latex Research Center, Nippon A&L INC.

The tendency to improve the quality of coated paper becomes more and more marked in these years. In connection with this, the demand of increasing sheet gloss of coated paper is also rising. In our previous paper, we studied the relation between sheet gloss and surface roughness of coated paper and found that sheet gloss was highly affected by surface roughness. The higher the smoothness of coated surface, the higher the sheet gloss.

In this paper, we focus on the effect of volume change of coating color and constriction of base paper during drying process on surface roughness. To study the properties of coating color and the constrictions of base substance, coating colors are prepared changing in total solids, pigments and water retention agents and are coated on base paper and polyester film.

The result shows that sheet gloss of coated paper depends strongly on volume change of coating color during drying process ; the smaller the volume change of coating color during drying process, the higher the sheet gloss of coated paper. This tendency is same in case of coating on base paper and coating on polyester film. Namely, the coating color, the volume change of which is small during drying process, gives high sheet gloss to the coated paper and such influence is superior to that of the constrictions of base paper.

Application of SAQR to Modified Cooking Processes

Junji Tanaka
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SAQR has been used as a cooking additive in many KP mills. This process is known as "Quinone Cooking". This paper shows how SAQ is applied to recent modified cooking processes. In order to make conditions of laboratory test similar to the ones of a real digester, we developed a small scale digester in which addition and extraction of cooking liquors are possible.

Using this equipment, the following results became clear.

1) Addition of SAQ at the top of digester is most effective. The effect of SAQ is decreased if it is added after the start of cooking. Also divided addition of SAQ is not efficient.

2) When SAQ is added to the top of digester, the divided addition of white liquor doesn't influence the effect of SAQ.

3) The amount of extracted SAQ from a digester accompanying the extraction of black liquor is very small. Even if some of SAQ is extracted with black liquor from a digester, the effect of SAQ is scarcely influenced.

Fundamental Knowledge of Adhesion Phenomena and Application

Seiya Okamoto, Munetaka Mukasa and Isao Yoshimura
Tesatape k.k.

Adhesive tape products are common in consumer and industrial use. And they are used massively in Paper Manufacturing Industry. But we found the customers who don't know always the properties of adhesive products, then they encounter difficulties when choosing tape-products or solving their problems.

In this session I'll give explanations about the following features based on the view point of designing adhesive-tapes for Paper Manufacturing Industry.

1) Fundamental knowledge of adhesion phenomena.
2) Application knowledge for actual use.
3) Practical example of adhesive tapes for each paper manufacturing process.
4) Introduction of tesa new tape product "EasySplice Winderline".

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

Masa Taniguchi, Koichi Tadaki, Munetoshi Yamaji, Shigeru Kurose and Kenji Tsunekawa
Chemicals for Pulp & Paper Div., Technical Dept., Somar Corporation

Diversification of recycle fiber sources and concern on environmental issues in paper industry in recent years makes papermaking operation more troublesome. Common use of Alum in acid papermaking has been reduced due to the trend in neutral conversion and scale deposition. Further improvement in wet-end operation and cost reduction are the subject of total machine operation. In particular use and effectiveness of various wet-end chemicals are under consideration.

Deterioration of raw material quality influences both machine runnability and paper quality. It is difficult to achieve required objectives by a simple chemical application. It is common that one quality improvement may cause other properties to suffer. Due to complexity of the problem, the system using multiple chemicals rather than single chemical gives more realistic solution.

The presentation last year entitled "Optimization of Wet-end Operation by Realizer" demonstrated problem solving approach from the analysis of machine deposit resulting from biological, inorganic and organic materials. Somar's long history on biocide application, and wet-end improvement by effectively capturing pitch and anionic trash, and observing scale deposition and foam formation, allows new proposal ; total deposit control system.

Improved Process Control with STFI On-line Fiber— On-line and Laboratory Measurements of Fiber Quality Based on Image Analysis —

Hakan karlsson
Product Manager, Lorentzen and Wettre AB

L & W STFI Fibermaster is a platform for pulp quality measurements. Measured values are fibre length, width, shape, kink, fines, coarseness, bendability, vessels, shives and freeness. The latter are recent developed extensions with complementary technology developed to suit different applications. The base is fibre analysis with cameras and image analysis. The development of measurement technology was carried out originally at the Swedish Pulp and Paper Research Institute (STFI). Many R&D laboratories in Scandinavia use L&W STFI Fibermaster. Several on-line applications have now been implemented. The leading market pulp producer in Europe has on-line measurement of fibre properties installed on all of the Scandinavian mills.

Introduction of ITALIAN Waste Water Treatment into JAPAN

Akira Yamaguchi and Yasuyuki Murata
Industrial Machinery Div., HEIWA PAPER CO., LTD.

HEIWA PAPER CO., LTD. started the new business at April, 2002, such the introduction of the treatment of industrial and municipal waters, sludge and rejects, from Italian

O.M.C. Collareda Srl into Japan.

The main operating processes introduced at the present time, are three systems such as FLOATION, SETTLING-FLOATATION, FILTRATION. Each system has a special designedequipment, as follows,

1) FLOATATION system...DELTAFLOAT and TIGERFLOAT.
2) SETTLING- FLOATATION system...SEDIDELTAFLOAT.
3) FILTRATION system...GAMMAFILTER, OMEGAFILTER, DENSIDESC and SIGMA-FILTER.

are explained the structures and mechanics in detail in this paper.

The application sectors in this paper focus on the spcific and final treatments for paper board mill waste water.

The 2004 Pan Pacific Conference— April 19～10, 2004 at Canberra, Australia —

Gyousuke Meshisuka*1,Toshiharu Enomae*1,Kawamura Ayano*2, Kazuhiro Kurosu*3,
Keiko Fujita*3 and Kunitaka Toyofuku*4
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2004 Pan Pacific Conference incorporated the 2004 Appita (18-22 April) was held in Canberra, Australia. Mr. Meshitsuka, professor at Tokyo University and Mr. Toyofuku, executive director of Japan TAPPI attended the conference as the representatives of Japan TAPPI. At the conference 4 Japanese speakers noted
The representative from Paptac (Canada), Japan TAPPI, Korea TAPPI, TAPPI (Philippines), Taiwan TAPPI were in the attendance at the conference, but the representative from TAPPI (USA) was not.

Kraft Pulping Characteristics of Plantation-grown Acacia Mangium

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Takanori Miyanishi
Nippon Paper Industries CO., LTD., Fushiki Mill

The first large-scale afforestation of Acacia mangium was started in 1991 at Provinces of South Sumatra, Indonesia. Prior to the construction of a new pulp mill, kraft pulping characteristics of plantation-grown Acacia mangium was investigated in our laboratory. It was found that pulp yield was very high and was comparable to Eucalyptus globulus. Acacia mangium pulp had high brightness, low dirt and high viscosity. It was a short and thin-walled fiber, and was valuable for its ability to produce paper with low bulk, high opacity and good smoothness. In 1999 the Musi Mill in Indonesia was constructed and is currently producing full bleached kraft pulp at a rate of 450,000 tons per year. Major applications are woodfree printing paper, lightweight coated paper, tissue paper, and white board.

Keywords: Acacia mangium, kraft pulping, afforestation

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New Developed GelViewTM Sensor to Optimize the Coater Drying System

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Uniform coating is a complex and difficult issue, as the coating process is affected by a large number of interrelated variables, ranging from the recipe, theology and application solids, to base sheet porosity and the unique characteristics of the coater. One key element for end coating homogeneity is control of the coating consolidation process. The ability to control the rate of evaporation requires continuous control of both air dryers and infrared (IR) dryers, providing the papermaker with a valuable tool to significantly enhance their product quality.

This paper presents a new method with a new developed GelViewTW sensor for monitoring and controlling the rate of drying coatings. The method consists of a series of fixed-point measurements, distributed along the path of the coater dryer section, configured to produce outputs enabling monitoring and control of the drying rate along the length of the coater. The individual measurements are presented in a standard operator station and track the reflective changes of the surface of the coating. The GelView is a fiber optic based system, which, through its complex algorithm, is capable of combining the surface condition data with other quality control data to produce a robust analysis of the drying rate of the coating. This new ability enables the papermaker to optimize production while minimizing or eliminating quality problems, such as back-trap print mottle.

New Modified Starch for Surface Size Press

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We report new modified starch for improving surface strength of paper. Recently according to increase of waste paper, surface strength of paper tends to be lower, and at the same time printing press is operated more high-speed and has a function of multicolor printing for spread of offset printing, so that printing trouble is increasing such as picking, scuffing and break.

We have developed new amphoteric starch suitable for offset printing papers.

This amphoteric starch shows more stable viscosity than commercial oxidized starch and has high water resistance on treated paper.

Size pressed paper with this amphoteric starch improves surface strength of paper.

Treatment Capacity of Rotary Press Filter- Test Result of Continuous Operation -

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Machinery & Equipment Division, TOMOE ENGINEERING CO., LTD.

Rotary Press Filter, a rotational pressurized dewatering machine with a new dewatering mechanism, which was introduced from Fournier Industries Inc. in Canada and is currently manufactured and sold by Tomoe Engineering Co., Ltd. Because of its high dewatering capacity, simple mechanism, sealed structure without odor, compactness that can reduce energy cost, and superior maintenance, Rotary Press Filter is considered to be a dewatering machine suitable for the future. We have installed 23 units (including sewage) and 3 units (2 places) for paper waste sludge only in Japan. In addition, we are continuously carrying out dewatering tests of various materials with a test machine and have obtained good results. In this report, I will introduce the test result of the continuous operation conducted for about three months at paper company A including comparison with other dewatering machines.

Sulfuric Acid Inline Diluting System- Various Application of the Sulfuric Acid for Cost Reduction, and Its Safety Dilution -

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Sulfuric Acid, being used for additional ph adjustment of white water and adjusting ph in waster water application for a long time, is used for removing secondary products in proceeding Elementary Chlorine Free and Total Chlorine Free, and used as a part of substitute of Aluminum Sulfate for a cost saved assistant of sizing agent in Acid paper making and of reinforcing agent in neutral paper making. Aluminum Sulfate of having a purpose of ph adjustment is easy to handle and very popular chemical, therefore it had been added roughly to pulp making application but the cost is 2 or 3 times higher than 98% Sulfuric acid and it can be easily targeted for cost saving. Large cost saving will be made by substituting a part of Aluminum Sulfate.

Batch treatment is widely used for diluting Sulfuric acid but it should be changed to deeply considered safety method for human and environment as the application becomes wider. In meaning of safety method, we hereunder introduce our in-line diluting system.

Feature of in-line diluting system is high productivity because of easily and quickly manufacturing of whatever concentration and volumes in whenever needed. Moreover, storage tank is not required and space is saved, besides effect on human can be avoided.

Iwaki's Sulfuric dilution system has a unique design coming from various features being provided by pump maker. In-line mixing of using centrifugal pump was accomplished by using our own pump controller. Process time of the dilution becomes tremendously shorter and productivity becomes greatly improved. As the generated temperature varies by the concentration of dilution, we provide the best diluting method for each concentration for preventing the dilution from boiling and our using flexible tube absorbs heat expansion and contraction of piping. At the mixing point, siphon prevention function is employed and secondary safety function of checking valve failure is also employed. Besides, it also has a function of preventing convection caused by difference of specific gravity. For safety it has transparent plastic cover on piping units for accidental chemical spouting. Regarding system protection, our system has an alarm output in case of detecting flow rate variation (concentration change), upper temperature limit (for piping protection), upper and lower pressure limit (for piping protection) and abnormal works of motor driven valves (for piping protection). Also our system as a protection program of stopping whole equipment in case of detecting a tripping of the pump inverter, thermal relay operation, wrong operation in manual operation and failure of sequence itself.

Since we do whole system controls of not only pump but also control devices and mixing unit by our experience of various kinds of diluting, we are very proud of offering the one year warranty on whole equipment.

Operational Impact of DFLSTM Cooking at Alberta-Pacific Forest Industries

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Kanji Ogiwara
Andritz K.K., Japan

This paper details the operational and economical impacts of upgrading from Cross- flow Lo-SolidsR cooking process to DFLSTM cooking technology to produce more than 2000 ADMT/D of Kraft Hardwood pulp. Beginning in November of 2000, Alberta Pacific has conducted several short and long term trials to determine if DFLSTM could benefit the digester operation by reducing the top three root causes for lost production in the digester area.

In the past, Alberta-Pacific Forest Ind. has experienced unstable plug movement in the digester vessel. This instability has resulted in difficulties controlling digester level, blowline kappa excursions and blowline temperature fluctuations. The blowline temperature fluctuations result in by passing of the atmospheric diffuser, which is a critical washing stage.

The resultant benefits of DFLSTM mode of cooking throughout Brownstock, Bleach Plant and Chemical Recovery are also included in this paper.

The Latest Developments in Camera Event Capturing Technology

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Papertech inc.
Tsutomu Hoshino
Nippon U.S. Machinery Co., Ltd.

Paper breaks are an efficiency robbing reality on all types of paper machines and coaters. Reducing breaks has become more and more important with the increasing speed and operating complexities of today's paper and board machines.

Fully digital break recording technology, using the latest CCD cameras and digital image processing, is now offering papermakers new opportunities to find and solve the many reasons causing breaks. These systems continuously monitor, in real-time, all of the critical locations from the wet end to the dry end of the paper machine and coater. When a break occurs the system downloads the event into a permanent storage, making it possible to fully analyze what took place just before and after the break. This allows the papermaker to take the necessary corrective steps to prevent the break from occurring again.

Taking advantage of the latest technological advancements in digital image processing, these systems are now able to offer high image resolution, high reliability with minimal moving parts, and are able to provide automatic image analysis and alarming for holes, edge faults and sheet breaks.

These systems have now been proven on all types of paper machines, from the wet end to the dry end, ranging from slower board machines to the worlds fastest machines producing LWC, fine paper, newsprint, tissue etc.

This paper discusses the latest available techniques in camera break recording technology, their applications, and the results that have been achieved to date

Online Web Imaging Solution- MTS Concept and WIS (Web Imaging Solution) -

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This paper describes the features and merits given by Yokogawa WIS and WIS roles in the MTS (Machine Technology Solution). The system configuration of WIS is simple and keeps higher performance regardless of increase of cameras. WIS is good to maintain and reduces maintenance time and cost. Also WIS performs the automatic intensity control of light source and enables to extend a life span of light source. WIS has easy operator interface (defect map) for human feeling to accept. WIS provides various formation images such as displaying a reference beside of live formation, both sheet edge one. Regarding defects to be difficult to detect, WIS can detect water drops by transmission and lower contrast defects such as wrinkles, weak spots by SDI (Subtle Defect Image) technology. We introduce the overview of the advanced Auto Classifier which can classify automatically every kind of defect by applying neural network technology. Auto Classifier can create setting values and attributes to be needed to classify defects. WIS is easy to expand system and able to interface with our MTS elements such as ABS, MAS, QCS and so on.

Application of Composite Coating to The Rollers for Paper Manufacture
- Roller which is Compatible in Durability and Less-dirt -

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Nomura Plating Co., Ltd.

By improvement in the speed of a paper manufacture machine, the increase in the used paper content in materials, etc., the dirt on the roller for paper manufacture has also increased from the second half of the 1980s. The dirt on a roller caused increase of machine maintenance time, and the bad influence to paper quality, and the roller which cannot become dirty easily has been desired. Therefore, application of fluoro-resin coating roller started,and the appropriate effect was accepted. However, the low durability of the coating itself required the reproduction of the coating in the short period.

We started the development of the durable fluoro-resin coated roller to solve the problem, and development and released the composite surface treatment (Tiger roll and Jaguar roll) of the chromium plating and the fluoro-resin which will be mentioned later in 1990. After that we have been continuing the improvement of the resin itself and the design of composite surface with hard coating. And now in order for marked improvement to be accepted by these improvements in the performance.

Simulation of ink removal at a newsprint deinking facility

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Pacific Simulation, Inc.

This paper describes three new process modules developed to simulate the removal of ink from paper fibers and to predict brightness. These modules were used in the simulation of a newly constructed deink plant to predict brightness throughout the system. Model development and verification, as well as model application to the subject deink plant simulation, are detailed. The simulation was used to evaluate a disc thickener and a dynamic washer based on brightness gain and overall cost.

A Cost-Effective Talc Solution to Stickies Control in OCC Pulps

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Nihon Mistron Co., Ltd.
Gary R Williams
Luzenac Asia Pte Ltd.

Landfill space limitations and rising disposal fees are creating opportunities for papermakers to increase recycled fiber usage. However, the recycled fibers rich with contaminants cause manufacturing difficulties when stickies cause deposits on papermaking equipment, thus necessitating paper machine shutdowns for cleaning. Paperboard manufacturers that use OCC fibers spend a considerable amount of money on cleaning chemicals to control contaminants.

This paper presents multiple case studies showing the effectiveness of a newly developed talc product for stickies control involving paperboard furnishes. A comparison with a chemical treatment is also included. The results demonstrate that the newly developed talc product provided the most cost-effective solution to the depositable stickies from recycled OCC pulps.

Rod Metering State of the Art

Dirk Schepers
Horst Sprenger GmbH

Horst Sprenger is one of the well-experienced Rod manufacturers in the world and has highest market share in European paper mills. The design concept is longer life, less trouble and excellent finishing of surface of paper and board.

The Rods and Beds are mainly applied for the following equipments: Auto Blade Symsizer (MESSO), Speed Sizer.Roll Flex (VOITH), Filmpress.Vari-Bar.etc. (JAGENBERG).

Main applications: Sizing, Starch application, Pre-and top-coating for Board, Pigmenting, etc.

HS can supply both of plain surface rod and profile rod. Due to hydrodynamic pressure principle, coating can be achieved.

As to profile rods, coating weight can be varied by change of depth. All coating performances are of course depending on the following factors (Absorption, Colour solid content, Viscosity, Hardness of backing roll, Rod dia., Nip pressure).

HS can offer the range of Rod dia. between 10 and 38mm. Plain Rods have generally chrome plating and HS also can offer ceramic coating Rods for longer life.

The materials of Beds are mainly PE and PU. PU has more elasticity and PE is stronger abrasion property. The future tendency of Bed material will be PE. Further, due to extrusion system, manufacturing cost of PE Bed will be reduced.

As to surface sizing, plain Rod is common use. For starch liquid application, plain Rod is not suitable. The profile Rod should be used for this application.

As to pigmenting, plain Rod with longer dia. is applied. The range of dia. will be between 20 and 38mm.

In order to minimize running cost, HS starts to supply "COMBI-SYSTEM". The advantage of this system is to minimize cost of Rod Beds. The replace part is not complete Bed but only the part around Rod, which we call Rod Bed. We can expect to reduce the cost of Bed up to 50% or at least 30%.

The Development of Defoamer for Kraft Pulping Process

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Black liquor made in the kraft pulping process contains various surfactants derived from modified lignin. That means black liquor tends to make foam so easily that the process is troubled with foam at any time. If amount of foam was broken out, the efficiency of brown stock washer would decrease and the whiteness of pulp would be under the standard level. Furthermore, operation speed of brown stock washer would lower, which means the efficiency of pulp manufacturing would decrease. Though the foam trouble can also be prevented mechanically, chemical method using the defoamer is mainly adopted in the kraft pulping process. We present the characteristics of new silicone type defoamers, and their applications.

Maximum Elastic Stress for Squar Tubular Case of Corrugated Fibber board Box Shape under Uniform Compression (On Anisotropic Panel)

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

From elastic stress formulation obtained by previous paper, elastic stress analysis was performed for square Tubular case (CFBS: anisotropic panel) of corrugated fibber board box shape (width L, height h) under uniform compression py0. Then maximum values (σ xmax, σ ymax, τ xymax) for normal stresses σ x and σ y to width and height directions and shear stress τ xy were obtained by the formulation, and characteristic behaviour for σ xmax, σ ymax and τ xymax were discussed. And maximum principal stress σ 1 and shear stress τ 1 were obtained and their maximum σ 1max and τ 1max were discussed.

σ xmax is constant (ν xypy0) for changes of Poisson's ratio ν xy (effect to x direction deformation for y direction deformation), L, h and x and y direction elastic longitudinal elastic moduli Ex and Ey. σ ymax migrates from ranges of upper and lower edges to centers in upper and lower edges, and from their centers to panel plane centers with increases of L and h. τ xymax migrates in narrow ranges about corners with increases of L and h. σ 1max migrates from corner vicinity to positions of distance h/8 from upper and lower edge center, and from their positions to panel plane center vicinity. τ 1max migrates from corner to plane centers and next from plane centers to corners. σ ymax, σ 1max and τ 1max increase and decrease slightly with L and h, and increase slightly with Ex and ν xy increases and decrease slightly with Ey increase. τ xymax decreases and increases with L and h increases and increases with ν xy and Ex increases, and decreases with Ey increase.

Keywords: Elastic Stress, Sqar Tubular Case, Corrugated Fiber Board Box Shape, Uniform Compression, Anisotropic Panel

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October　2004　　Abstracts

The Proposal to Association Activity: Aim at Base Strengthening of an Association

JAPAN TAPPI

In 1994, a project team has submitted to the board of directors "The Guideline for the 21st Century: the report entitled "aiming at training of the engineer who bears the next generation, and higher technology". Then, it has worked according to the recognized report. The proposal was again looked over by leading the Junior Steering Committee in 1998. As a result "The Guideline for the 21st Century: aiming at the further development" was submitted anew. Henceforth, activity has been promoted that this proposal should be materialized. Since five years were passed after that, while the Junior Steering Committee takes the lead and summarizes activity in the meantime again, in order to strengthen the base of JATAN TAPPI, the report about a new action policy was submitted to the board of directors in June, 2004, and it was recognized.

Troubleshooting Activated Sludge Problems

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Hidesato ShimotoNovozymes Biologicals Japan Ltd.

Operating treatment systems for the pulp and paper industry can be quite challenging considering that treatment regulations are getting more stringent and mills are changing their operations. The mill operation changes have changed wastewater characteristics and the loadings to previously successful operating plants. The result is that some existing treatment plants cannot consistently meet their effluent discharge permit.

Success or failure in activated sludge systems depends on growing a biology that has good settling characteristics that will produce a quality final effluent from the secondary clarifier. There are many problems that can occur in activated sludge systems such as poor settling and foaming. This paper discusses these problems by listing possible symptoms for each problem, the potential causes and the methods available to correct or control the problem.

MC Series of Bacterium Products for Troubleshooting in Activated Sludge Processing

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The extraordinarily large amount of the industrial water is used in the pulp and paper industry among major domestic industries. It is discharged through the process in the secondary treatment such as bio-treatment process. Therefore, the wastewater treatment at the bio-treatment processing in the pulp and paper industry is an important theme. Although bio-treatment processing is a popular method, many factories are facing problems at wastewater treatment with several factors, such as increase of load and process fluctuations. Moreover, since it is assumed that the regulation for effluent standard becomes stricter due to consideration of environment issues, the demands for the improvement on capability and stable operation for bio-treatment processing are increasing year-by-year.

In these circumstances, we have been applying products by the name of “MC Series” for Bioaugmentation. The Bioaugmentation is the practice to add bacterial preparations which have high growth capability into the current bio-treatment process. The bacterial preparations in MC Series have specific catabolic abilities which can degrade certain components in the wastewater. Bioaugmentation can enhance the performance of an indigenous biomass to respond against process fluctuation.

In this article, it introduces the feature of MC Series, the results of field tests and “MC + Chlorination processing” which is a new method of filamentous bulking treatment. These results indicate that the MC Series lineup meets the various requirements for industrial wastewater treatment at pulp and paper industry. It is considered that it can contribute to the pulp and paper industry on the reduction for environmental impact.

Keywords: Bioaugmentation

Continuous measurement of Biochemical Oxygen Demand by microbial BODs biosensor

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BODs biosensor, BF-2000, with immobilized microorganisms was developed for measuring the biochemical oxygen demand in industrial wastewater. BF-2000 is able to use even microorganisms in active sludge other than Trichosporon sp.

Also BF-2000 is adopting antiseptic tubing to prevent blockage by microbial contamination. BF-2000 is able to equip wastewater sampling/dilution system and data transmission systems to improve the performance. The result that measured various kind of wastewater by using the BODs biosensor is shown.

Keywords: BOD, Biosensor, immobilization, microorganism, instrument, wastewater

Introduction of Mitsubishi Di-electric Droplet Scrubber for Sub-Micron ParticleRemoval

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Machinery & Environment Plant Department

For oil fired boiler plant, SO3 gas is cooled down forming very fine mists through wet type flue gas desulfurization system (wet-FGD). Therefore, removal of SO3 mists is very poor at FGD absorber, which causes a long visible smoke from the stack. To overcome this problem, installation of wet type electrostatic precipitator (wet-ESP) is the most suitable, however this system is not widely used due to the space limitation or expense.

An advanced gas cleaning system has been developed, which incorporates the function of wet-ESP into wet-FGD. This paper introduces the principle of the new technology, along with the operational experience at the commercial scale plant. This system is called Mitsubishi Di-electric Droplet Scrubber (MDDS).

Biological Transporting Bed of Waste Water Processing System (Ryu Ryu Bio System) for Paper Mill

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Waste water from paper mill is much quantity, but it is comparatively clean without SS. Requirement for environment management increases recently, and regulation about waste water becomes severe. On the other hand, the quality of waste water from paper mill have taken a turn for the worse due to request of paper recycle. And now paper mill become to have new waste water treatment in order to prevent water pollution. We have developed for 8 years a simple waste water processing, that have Transporting Bed I called(Ryu Ryu Bio System). I will show the history and feature of Ryu Ryu Bio System.

Paper Mill Wastewater Treatment by Moving Bed Biofilm Reactor Using Sponge Media

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The moving bed biofilm reactor using sponge media has characteristics such as that can be operated with high load BOD and easy maintenance. Pilot plant tests using this reactor were conducted for paper mill wastewater treatment. And so the performance of full scale moving bed biofilm reactor using sponge media was investigated, modifying an existing paper mill wastewater treatment plant.

In the pilot plant test, S-COD was removed over 65% at COD volumetric loadings below 4kg/(m3･d), and S-BOD was removed over 90% at BOD volumetric loadings below 3.5 kg/(m3･d). The moving bed biofilm reactor using sponge media showed high performance of organic removal. Furthermore this pilot plant effluent COD was removed about 80% by chemical precipitation test, conducted with the addition of 200mg/L as Al2(SO4)3･18H2O and 1mg/L as anion polymer at pH 6. These results show that soluble and particle organics is removed effectively by combined process of moving bed biofilm reactor and chemical precipitation.

In the full scale moving bed biofilm reactor, S-COD was removed over 70% at S-COD volumetric loadings below 2 kg/(m3･d), about 60% at S-COD volumetric loadings of around 3 kg/(m3･d),and S-BOD was removed over 90% at S-COD volumetric loadings below 2.5 kg/(m3･d). Performance of full scale plant was higher than designed value with 60% S-COD removal at S-COD volumetric loadings below 2.5 kg/(m3･d)

These results show that high organic load treatment is achieved with the moving bed biofilm reactor using sponge media for paper mill wastewater, and this reactor is effective for improvement of existing plant.

Keywords: Paper Mill Wastewater, Moving Bed Biofilm Reactor, Sponge Media, High Organic Load

New Wastewater Treatment System for Pulp and Paper Factory

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The wastewater treatment system applied to the pulp and paper factory is required to save space and to save cost of construction and operation. In this paper 3 systems which suits the requirement are introduced.
1) BiobedR EGSB system is a high load anaerobic wastewater treatment technology using the granular biomass. This technology has merits-high organic loading capacity, low power consumption, less sludge discharge, energy recovery from bio-gas.
2) Sumi-Sludge system is a space saving wastewater treatment system. Sumi-thickener - High rate coagulation and sedimentation system - is combined to activated sludge treatment process.
3) The membrane bio reactor (MBR) system applies submerged membrane units inside of the aeration tank of activated treatment process. The permeated water quality is very clear. This system is a high space saving wastewater treatment technology.

Keywords: wastewater treatment, anaerobic, EGSB, UASB, Coagulation and sedimentation, Membrane bio reactor, MBR, Submerged membrane

Application of Oxygen Activated Sludge Treatment(UNOX System) for Pulp and Paper Waste

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Showa Engineering Co., Ltd.

UNOX system has been used in various fields as its unique treatment process for years, and the number of installations reaches over 130 plants in sewage and industrial waste treatment in which 35 plants are for pulp and paper waste.

This process was developed in a leading chemical company in USA. In Japan, Showa Engineering, which took over Showa UNOX K.K, has been marketing since introduction of UNOX technology, and has continously advanced UNOX system with lots of experiences; especially for cost-reduction of both construction and operation as well as for optimum design conditions.

Since UNOX system uses high purity oxygen gas as aeration gas instead of air, there are many advantages compared to a conventional treatment process.

Thanks to customer's highly evaluation for UNOX system, the large size treatment plants in pulp and paper waste have been mostly UNOX system. Besides, the expansion is to the existing plant are similarly UNOX system. We are convinced that UNOX system is one of established wastewater treatment process on its treatment performance as well as economical process.

We, herein, have just made an evaluation of UNOX system based on the past achievements in pulp and paper wastewater.

Keywords: Usage of high purity oxygen, Energy-saving-plant

Solvent Exhaust Gas Treatment Technology

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With environmental problems attracting global attention, efforts are being made in industry to protect the environment by acquiring ISO14000 series certification and adopting industry-based control and improvement. Trends are growing in implementing Pollutant Release and Transfer Register (PRTR) laws to protect the atmosphere, in enforcing ordinances for preserving the environment through penal regulation (a first in Japan being implemented in Saitama Prefecture) and in including emission regulations for volatile organic compounds (VOC) thought to cause photochemical oxidants and suspended particulate matter in The Air Pollution Control Law in the Japanese Diet. This calls for further cooperation among enterprises.

Since preserving the global environment is a top social priority, enterprises are expected to bear the cost of measures regarding substances and low-concentration exhaust gas not yet included in emission regulations but expected to be monitored in future.

VOC (primarily high-concentration exhaust gas) are recovered or burned in attempts to save on equipment and run cost. In view of emission regulations and the work environment, however, low-concentration, high-capacity exhaust gas must also be treated. Enterprises must thus be thoroughly knowledgeable about how such exhaust gas occurs to select effective, appropriate treatment.

This paper outlines the selection of VOC treatment based on gas occurrence and the purpose of treatment. It introduces principle and features of exhaust gas treatment equipment. Representative equipment manufactured by Toyobo Co., Ltd. is given below.

K-filter solvent adsorption equipment involves fixed-floor adsorption recovery using activated carbon fiber that enables recovered solvent to be reused. Honey-rotor adsorption condensation equipment uses low-pressure-loss, high-performance adsorbent obtained by fabricating hydrophobic zeolite or activated carbon in a honeycomb configuration, condensing high-capacity, low-concentration exhaust gas into low-capacity, high-concentration gas and making after-treatment equipment compact and inexpensive. The treatment principle behind K-MATROLL is to adsorb and condense exhaust gas by rotating a belt of adsorbent activated carbon fiber before catalytically oxidizing condensed gas using compact exhaust gas treatment equipment, i.e., K-MATROLL. We recommend the above equipment for effectively treating exhaust gas case by case.

Keyword: volatile organic compounds, VOC, Air Pollution Control, K-filter
K-filter solvent adsorption equipment, hydrophobic zeolite,
Honey-rotor adsorption condensation equipment, K-MATROLL

Regenerative Thermal Oxidizer (RTO) For VOC Destruction

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The Regenerative Thermal Oxidizer (RTO) is one of the most efficient pollution control system available for the elimination of fumes, odors, solvents and other volatile organic compounds (VOCs) from process exhaust air of ovens, coaters, dryers, chemical systems, and similar processing equipment.

RTO is designed to burn VOCs at high temperature of 800°C to 1000°C while minimizing operation costs. To save fuel, RTO uses the regenerative principle in which equipped ceramic media (honeycomb type) are alternately heated and cooled.

Up to 99% of the polluting VOCs are converted to harmless substance such as water and carbon dioxide by thermal oxidization, while up to 98% of the waste energy is recovered and reused for the preheating process. This RTO system has come into wide use in Europe and America since 1980's to effective control VOCs, and recently has taken notice of the person in concern in Japan.

This paper explains briefly about the RTO technology for VOCs destruction.

Treatment and Utilization Technology of Coal Ash in Electric Power Industry

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Central Research Institute of Electric Power Industry

The amount of ash generating and its future prediction, and the actual condition of processing, disposal, and effective use technology on coal ash which are generated with an electric power industry are introduced. In the present condition, it is presumed that the amount of coal ashes generating increases steadily, and amounts to 9 million t at 2010 age. Since a limitation is in the reclamation disposal ground and an expensive waste processing expense is required when coal ashes are used for cement raw material, the valuable effective use technology should be developed immediately. Although each electric power company is developing extensive use technology in civil engineering works or a construction field energetically, an actual result in field is not gotten yet. Therefore it is necessary to develop a valuable effective use technology continuously from viewpoints, such as reliability, economical efficiency, and environmental protection.

Central Research Institute of Electric Power Industry considers “control of the amount of coal ashes generating”, “quality improvement of coal ashes”, and “the advancement of coal ashes use technology” as a technical subject which increases the valuable rate of effective use of coal ashes. The outline of research that we investigate for these subjects is introduced.

Keywords: coal ash, effective utilization technology, electric power industry, coal fired powerplant

Reports of 2004 TAPPI PAPER SUMMIT

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Pulp and Paper Research Laboratory of Nippon Paper Industries Co., Ltd.

2004 TAPPI PAPER SUMMIT took place in Atlanta, GA, USA during May 3-5 in 2004. Technical papers included 150 papers in the oral presentations and 8 papers in the poster presentations. They dealt with the topics of innovation in paper making, environment, recycling, product performance, people and infrastructure, manufacturing excellence, maintenance and reliability, and U.S. department of energy agenda 2020 R&D. In this report, innovation of filler, sizing, online sensor, and head box were reviewed.

Keywords: papermaking, innovation, recycling, environment

Improvement of Hardwood Pulp Yield in Continuous Kraft Cooking and Estimation of Pulp Yields (Part II)- A Mill Trial at A Continuous Digester -

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Graduate School of Life and Environmental Sciences, University of Tsukuba
Keiichi Nakamata
Hokuetsu Paper Mills, Ltd.
Guest scientist at the center for Tsukuba Advanced Research Alliance (TARA), University of Tsukuba
Ryuichi Suzumi and Takeshi Sato
Hokuetsu Paper Mills, Ltd.

The optimal conditions of isothermal cooking (ITC) for the improvement of pulp yields were applied to a mill trial using mixed hardwoods, polysulfide (PS), anthraquinone (AQ) and a continuous digester. PS cooking liquor containing 70% of total alkali and AQ (0.02% on wood) were charged into a chip-feeding circulation line, and then kraft cooking liquor containing 30% of total alkali was introduced into three circulation lines, i.e., top-cooking, bottom-cooking, and washing, where temperature reached about 130-145° C. Results from laboratory cooks of the mixed hardwoods showed that a linear correlation existed between pulp yields and ratios of xylose to glucose (X/G ratios), liberated from the pulps by an acid hydrolysis. Pulp yields at a mill trial could be estimated by knowing X/G ratios of the mill pulps. It was indicated that the PS-AQ ITC under the optimal conditions gave pulps with 0.235 X/G ratios at kappa number 18-19. It means that PS-AQ ITC shows about 7% higher pulp yields than laboratory kraft cooking and at least about 1.4% yield increases compared with the kraft ITC.

Keywords: kraft cooking, isothermal cooking, polysulfide, anthraquinone, carbohydrate, pulpyield

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Increasing Productivity by Investing New Technology Part II
－On Machine Calendering for on Machine Coater－

Takashi Akazawa
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There are references in operation for the production of film-coated LWC HSWO grades, but rotogravure print quality has so far been considered almost impossible to reach with the film technique due to the high smoothness requirements, especially at basis weights below 57 g/m2.

As opposed to conventional solutions, the focus is placed on improving base sheet uniformity further (i.e. low basis weight variation and evensidedness) by closing and smoothening the paper surfaces with reinforced precalendering prior to film coating, which is then followed by multinip calendering to produce the desired final surface properties.

The all-online surface treatment process consists of reinforced precalendering, a compact coating process, and multinip final calendering. To reach the quality requirements placed on both LWC rotogravure and HSWO printing paper produced with film coating.

Solution for Dryer-part Deposit Oriented Spot Prevention in P&W Grades

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Maintech Co., Ltd., Sales Engineering Dev.

Spot problems originate from deposition of pitch, stickies and latex in the dryer section is becoming a critical problem under high DIP furnish, closed system and alkalization conditions. These spots lead to production and quality problems such as an increase of broke and joint work. To date, only a few pitch control programs have been tried, high-pressure fabric (canvas) cleaning showers and double doctoring have been developed. However none of them have met with industry-wide acceptance.

Maintech has developed a spot prevention program, a total solution that passivates all surfaces in the dryer section where the deposition could increase spots. The program starts with M/C survey and interview to M/C tender to investigate the spot generation process, then present a proposal which installs equipment in the proper positions, uses the correct chemical where needed. The resulting surface passivation prevents depositions on cylinder, fabric and calendar rolls and drastically reduces the number ofspots on paper. Mills can take considerable advantage of this program. Elimination of deposits in the dryer section reduces not only the number of joints in the finished rolls but also reduced tonnage and down time for M/C cleaning. This paper reviews an investigative method of spot generation from dryer deposition. Case histories illustrating gained benefits in printing grade M/C are presented.

Resource Saving and Energy Saving of Paper Machine
- “Petax” for White Water Recycling Shower and “Robo Cleaner” for Canvas Cleaning -

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

Various approaches to resource saving and energy saving have been taken in papermaking industry. I will introduce hereunder the new equipments contributes to solve problems in paper industry, specially the issues in paper machine. One is “Petax” enables the recycling of white water and another is canvas cleaning unit, “Robo Cleaner”.

Petax is the filter capable of filtrating white water to the quality needed to high- pressure shower. Recently high-pressure paper machine cleaning shower uses large quantity of flesh water with speeding up of papermaking speed or enlargement of machine capacity, etc. But the water is limited resource and the recycling is an important issue.

For waste paper, further promotion of utilization is emphasizing. Along with the increase of quantity consumed of waste paper, the stock preparation unit is improved year by year to meet these requirements. On the other hand, in papermaking process, it is said that troubles caused by rise of utilization of wastepaper are increased. Contaminants such as paper powder and pitches attached in wire (former part), felt (press part) and canvas (drier part) are part of the reason for these troubles. The units used to remove these contaminants are ROBO Cleaner.

Yield Estimation for COMPACT COOKINGTM and KOBUDOMARI Pulps

Catrin Gustavsson R&D Kvaerner Pulping AB Ju Yan
Projects Department Kvaerner Pulping KK

A method for determining the mill-cooking yield has been developed. A laboratory cook performed at the same temperature, hydroxide ion and hydrogen sulphide ion concentration as in the mill is used to obtain the reference data needed for the calculation of the mill yield. The assumption made is that at constant kappa number the cellulose content in mill and laboratory pulp is same. Since the gravimetrical yield of laboratory cooked pulp can be determined with ease, the mill yield can be calculated.
This method has been a useful tool when evaluating the yield increase when implementing COMPACT COOKINGTM or KOBUDOMARI into the mill. It was observed that COMPACT COOKINGTM and KOBUDOMARI gave a yield increase of about 1% compared to conventional cooking when calculating the mill yield using this method.

Development and Current Situation of Waste Treatment and Recycling Equipment

Yukio Tajiri TAJIRI Corporation

We suggest our customers with most appropriate recycling system from our wide variety of recycling systems available to prevent global warming and optimization in recycling process of natural resources.
We also are currently developing ecofriendly and energy saving recycling systems such as reconvastion of RPF/RDF, reutilization of wastes as chemical products.

Develop the Canvas Clean Roll - Canvas Cleaning Device -

Toshio Kameyama
Aoki Machinery Ltd.

Under the circumstances of environmental pollution problems to be being
strictly restricted in world widely, the demand of recycle paper has been increased drastically in its volume as for paper production materials.
As proportionally as its usage of recycled paper has been increased, there are new problems in topic caused by latex-glue (so called Pitch) from them. Problem is that they are easy to stick to the fabrics in the operation and finally reduce total operation ratio by causing a lot of troubles to keep clean paper production.
In order to protect these problems, several newly introduced methods have been applied, such as ①replace with finer screen to be more in effective in the process of preparation, ② newly application of chemical for releasing latex-glue for less sticking, ③newly installation of washing method for Canvas cleaning, ④spraying chemical onto surface of Canvas for protection its stein and ⑤mechanically make free some rolls from touching to the surface of fabrics for protection of pitch(latex-glue) accumulation.
Here with, please find the newly development “Washing Method” based on the same technology of “Shower Roll” already introduced into the market. This is the firstly innovated “Canvas Cleaning Roll” in the world as an extent of the technology of “Shower Roll” plus with additional patented design to be more effectively working as a Washing Method for Canvas in the paper machine.

Steam Turbine-Induction Motor, Dual Driven Air Compressor

Yasuo Fukushima Nishinihon Machinery Department Shinsho Corporation

Energy saving method by converting the difference of steam pressure to otive power with steam turbine instead of using pressure reducing valve promotes high efficiency, and introduction of such method has been increase in recent years.
Besides building a new plant from the beginning, it is a key to decide for what application the collected motive power at the existing plant is utilized.
How to use the steam turbine as auxiliary motive power to compressors, which has high energy consumption rate, in general plant are hereunder described.

Global Neutral/Alkaline Papermaking Overview -ASA sizes are highlighted-

Dominic S. Renda
Principal Consultant, Advanced Technologies, Paper Services Division, Ondeo Nalco Company

Yukio Kase
District Manager, ONDEO Nalco Japan Co., Ltd.

Neutral/alkaline papermaking continues to develop and dominate many paper and paperboard market in the Americas and Europe. These global experiences can provide the foundation for neutral/alkaline papermaking practices in the Asia-Pacific markets. Significant advances in functional and process aid chemicals and their application technologies have supported this trend. Commercial neutral/alkaline papermaking conversions using alkenyl succinic anhydride sizes (ASA) are highlighted.

A New Low Consistency Refiner Improved Fiber Properties While Reducing Idle Energy by up to 40% - Andritz Papillon Refiner -

Gabl Helmuth and Gorton-Hulgerth A.Andritz AG Yosuke Takeshita Andritz KK

Andritz AG has developed a new machine Papillon, which combines the advantage of the cylindrical refining zone of the Hollander beater with the modern design requirements of continuous operation in small machine. It provides significant in fiber technology and reduction in no load energy.

The Development of the New Insect Control Program

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

The various measures have been taken since before in a factory as the prevention of the breeding and extermination of the insect. However, there are few cases that developed the program of effective prevention of the breeding and extermination. The factory where has the program that be able to explain to the outside a company is few. The cause is various, the structure of a factory, insect of knowledge insufficient, maintenance, analysis, communication, engagement person, and it is those complex. There can be more than one cause.

The procedure of the insect control program development is similar as crisis management program development. Even the knowledge of the specialist of the academics is necessary to the plan of the measure. As for the enforcement of the improvement activity the plan is important. The plan of the plan including the role share of the engagement person is important and to implement certainly. The communication that included education was effective. The periodic validation of plan itself is necessary. Each of insect control measure has an effect and limit that originate from each characteristic. The combination of several measures is effective. The development of the insect control program, that has explain to the outside a company, is demanded.

Polyvinylalcohol Applied for The Ink Jet Silica Binder
- Application of Crosslinkable PVA “Gohsefimer Z” -

Shusaku Mandai and Yoshiaki Hirai
Central Research Laboratory, Gohsenol Laboratory,
Nippon Synthetic Chemical Industry Co., Ltd.

Application of Gohsefimer Z (acetoacetyl group modified PVA) as silica pigment binder for the porous-type absorption layer of IJ media was investigated. Applied with proper cross-linking agents, Gohsefimer Z exhibited excellent silica-binding strength, which can prevent silica dusting even when small amount of PVA was used.

For example, the coating layer of IJ media combined of Gohsefimer Z and Zirconium compound or Adipic dihydrazide (ADH) showed larger silica binding strength than that of other PVA. Moreover the viscosity of the coating mixture consisted of Gohsefimer Z and Zirconium compound or ADH did not show abrupt increase. These results suggests that Gohsefimer Z based systems are promising as the binder for the porous type IJ media.

The “Chlorine Dioxide Concept” - A New Way of Supplying ClO2 for Your Bleaching Demand -

Anders Dahl Eka Chemicals AB Muneo Sakamoto Nissan-Eka Chemicals Co., Ltd.

Eka Chemicals, the world’s largest maker of chlorate has introduced a new way of supplying chemicals and process know-how to its customers in the pulp industry, the “Chlorine Dioxide Concept”. This concept adds value to our customers and they can focus on their core business, making pulp. Highly efficient processes like SVP-LITETM, SVP-HPTM, and HP-ATM and remote monitoring guarantees stable, cost effective and safe supply of chlorine dioxide.

Reports of Pulpaper 2004 Conferences

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Makoto Iwasaki, Yosuke Uchida
Pulp & Paper Research Laboratory of OJI PAPER CO., LTD.

Pulpaper 2004 was held in Helsinki, Finland during June 1-3 in 2004. Pulpaper attracted about 20,000 visitors on a scale similar to SPCI in north Europe. The technical sessions presented 48 oral reports and 26 posters under the themes of energy and Carbon management, coating, and Efficiency.

The movement of the environment regulations and Green Procurement Survey Standardizing Efforts
- In Canon Inc. -

Kiyoto Furuta
Environment Management and Engineering Center, Global Environment Promotion Headquarters, Canon Inc.

Laws and regulations concerning environment are getting stricter and stricter these days all over the world. What the IT equipment manufacturers have to pay attention to, in particular, is the use of chemical substances contained in parts and materials in order to comply with related laws and regulations.

From 2001, Japanese electrical and electronic equipment manufacturers have been discussing standardization of green procurement survey in order to make own products more environmentally conscious ones. Electrical and electronic industries of U.S. and Europe also agreed on the concept of standardization and the three parties are now moving toward the global standards of green procurement survey. Green procurement surveys of parts and materials are essential for legal compliance of products and for selecting parts with low environmental burden. Sharing such information among manufacturers greatly improves efficiency for product development, and it is also advantageous for suppliers because it helps constructing database efficiently. This paper describes the activities toward the global standardization.

Correspondence to Waste Illegal Dumping (Insight into Wicked Dealers)
- Structual Factors and Counter Measures of Illegal Dumping and The Recycling Outlaw -

Masayoshi Ishiwata Chiba Prefecture, Environment and Life Division, Industrial Waste Dept.

The actual condition of the waste illegal dumping is explained from the viewpoint of the dual structure of industrial waste treatment, the illegal dumping syndicate, the formation of an illegal dumping center of savings storage, the overflow of a middle processing institution, the raising funds of the last disposal place and the industrial waste connection evolved type .

In addition to thous, the actual condition of the recycling is explained of the problem of container packing recycling, 6-fold price of plastics, the household- electric-appliances outlaw, and the automobile recycling law. And the correspondence to these is explained as “the illegal dumping zero program (3x3 methods)” of administration.

Furthermore, the evaluation of the potential risks on the industrial waste treatment, the risky industrial waste disposal contractor, the input-output analyzing method and the simple risk-assessment-method are explained.

Effect of Notches on Micro Failures During Tensile Straining of Paper

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Acoustic emission that occurred during the tensile straining of handsheets made from softwood or hardwood kraft pulp beaten to various degrees was measured and analysed to investigate the effect of notch application and notch geometry on micro failures occurred during the tensile deforming and fracturing. Notch application causes a higher proportion of failure of fairly strong fiber bonds and fiber failure throughout almost all of the tensile straining period irrespective of notch geometry. Furthermore, an increase in beating degree causes a higher proportion of failure of fairly strong fiber bonds and fiber failure for both specimen with and without notch. Notch geometry little affects on the micro failure occurrence mentioned above, while maximum tensile load per width and the period required for sheet breaking after maximum load are affected by notch geometry.

Keywords: Acoustic emission, bond failure, fiber failure, notch, handsheets, tensile testing, Infrared thermography

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Solutions for a Bright Future in Papermaking

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Metso Paper, Inc.

In many old line industries investments have slowed down due to slow payoffs. This trend is turning much of traditional manufacturing into a technological backwater. In a world where productivity and related investments are key, sluggish productivity improvements result in a vicious cycle with little prospects for big returns. Only proactive productivity development, product quality improvements or new business approaches will lead to long-term success in the paper industry.

In addition to the productivity challenge there is the anticipated threat of electronic media. But the worldwide per capita consumption of paper is still increasing. It is predicted that worldwide paper consumption will continue to grow at 2%-4% annually.

The growing consumption of paper is driven by a thirst for knowledge, and so long as the cost of paper is competitive relative to competing media, its versatility in terms of accessibility will secure it a strong market position long into the future.

Retrofittin Consistency Profiling Systems to Existing Headboxes
-Results from the First BTF Dilution Control System in Japan-

Junichi Yano

Mechanical Designer Paper Machinery, Kawanoe Zoki Co., Ltd.

In July 2003, a BTF Central Distributor, with automatic dilution control, was installed on the existing Escher Wyss headbox on paper machine No 3 at Marusumi Paper Co., Ltd. Kawanoe mill.

The goal of this project was to improve the CD basis weight profile, to reduce the grade change time and to improve the sheet edge quality for producing wider sheet.

All grades produced so far are running around 50% or better than the 2-sigmas that were previously (before BTF installation) achievable. The grade changes are much faster and are now done within five minutes. The basis weight profile is no longer an issue during grade changes.

And the sheet edge quality was improved so that 30mm wider sheet can be produced.

The Latest Headboxes for Board and Packaging Grades

Motoaki Sato

Voith IHI Paper Technology Co., Ltd.

The one of the most important parameter for product quality in board and packaging (B&P) grade is still its strength basically. But new trend in B&P grade is reduction of basis weight, and requirement in product is not only its strength but also the fineness of the surface quality, which influence printability. Due to these tendencies, better quality and higher performance must be required for the headboxes for B&P grade compared with those in the past. VOITH Paper had developed MasterJet headboxes, based on the well-known technology of the high-turbulence W-type headbox and ModuleJet dilution control, to meet the higher demands from the paper industry. On the other hand, VOITH Paper also considers economical solutions for the B&P grades.

SUCCESS FORMER and Its Application in Overseas

Masahito Mukai and Takashi Suzuki

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

The Pulp/Paper Industry is growing more intense in competition globally. Under the Present circumstances, “Success Former” is the very effective machine to achieve the Purpose of improving both productivity and quality of paperboard. In this thesis, we would like to introduce the structure and characteristic of it, also explain how it has been developed in such a high growth market like China.

“Success Former” is designed based on Kobayashi’s original ideas, to realize excellent formation and superior quality for Multi-layer paperboard. We have many achievements for producing various kinds of paperboard in domestic and abroad markets. The most remarkable point is “Success Former” has obtained a high evaluation in China of late. We have exported 2 complete units to China in recent 3 years. Both of them had smooth start-up, which truly satisfied our customers with the high advantage to their investment. Here, we will introduce an example.

Theory and Practice for Formation

Hidehiko Yamazaki

Metso-SHI Co., Ltd.

Michael Odell and Pekka Pakarinen

Mestp Paper, Inc., Jyvaskyla , Finland

This paper is an overview of the theory and practice of improving formation. The aim is to provide background information for mill personnel to understand the basic mechanism of formation improvement and how these mechanisms can be controlled in practice. The scope of the paper is mostly related to paper grades and concerns all headbox and forming section types. There is a lot of relevance in this discussion also for board grades although the emphasis is primarily on paper.

The principles of how formation is influenced by fibre concentration, shear, turbulence, flow elongation and drainage are explained. In the furnish and stock preparation area the influences of fibre properties, refining, wet end chemistry and formation improving additives are discussed. There is a section on formation measurement intended to brief the reader on what measuring methods are appropriate for different uses and how new measuring methods can characterize the appearance of formation. Formation improvement cannot be considered in isolation from other paper properties so while formation is the main theme of this paper the consequences of formation tuning activities on other paper properties are also described.

The emphasis on practical tuning in this paper is on how to optimize the headbox and former operation. There are sections in this paper concerned with formation fault finding, systematic tuning procedures and strategies for routine formation control. A new formation tuning technique based on measurement and control of Z direction formation profile is introduced in this paper.

Latest Technology of Forming Section
- Bel Baie Former Upgrade with VentaShoe Technology -

Keiichi Fujiki

Mitsubishi Heavy Industries, Ltd.　Paper & Printing Machinery Division

Mitsubishi Heavy Industries, LTD. has developed a new technology that combines the best aspects of roll-blade and pure blade forming. This new technology consists of replacing the initial forming zone with a grooved smaller radius blade design. Rework to a former and headbox is minimal.

As in roll forming, the VentaShoeTM traps the jet more symmetrically with a positive angle to the wires that reduces the jet impingement sensitivity. Reduction in jet impingement sensitivity provides easy operation without any defects such as spotting. The blade drainage section provides the superior formation of a traditional blade former.

There are currently eleven papermachines utilizing this new technology in the field. The first started up in North America in 2001. All have been demonstrating many benefits in terms of paper qualities and papermachine operation.

Shoe Press Technology for the Dewatering of All Paper Grades

Takeshi Nonogaki

Voith IHI Paper Technology Co., Ltd.

The important technological and economic advantages have expanded the use of shoe press technology to dewatering of all paper products from pulp and tissue. Whereas the development of NipcoFlex technology began in packaging paper machines 20 years ago, this technology can today be found in virtually all applications for the mechanical dewatering of the paper web in new and modernized production systems. The portfolio offers an economic solution for increasing productivity and efficiency for any requirement, whether a rebuild or a new machine. The advantages of shoe press technology are now also utilized in calendaring in the paper industry.

Remodeling Shoe Press of PM10

Kenji Kurimoto

Kasugai Mill, Oji Paper Co., Ltd.

The PM10 at Kasugai Mill, Oji Paper, was started up in February 1991, and it has been produced wood-free paper and coated paper. Chiefly, remodeling shoe press installed in the third nip was achieved continuous stability operation with design speed 1,300m/min in January 2002. In the past, there were problems of drier dryness ability shortage and production rate restriction due to insufficient pressed. The shoe press has brought a 4% to 8% increase in dryness compared to roll press. After remodeling, shoe press has been evaluated at high contribution degree to improve both paper quality and productivity and have been considered to be indispensable equipment for quality improvement and increased machine speed, and the production increase plan was achieved.

In this report, it reports around the outline of remodeling, the operation experience, and the effect of the introduction.

Quality Improvement by Remodeling the Headbox and the On-top Former in PM7

Tomoki Kitamura

Niigata Mill, Hokuetsu Paper Co., Ltd.

Niigata mill PM7, which started up in 1990, produces A2/A3 coated paper with on-line coating. PM7 had quality subjects that had to get over and the reached conclusion was that the improvement of the base paper profile and formation were indispensable. Therefore, the remodeling of the headbox and the on-top former were carried out in 2001. The “SymFlo-D” was adopted for the headbox that controls the BD profile by dilution. The wire section renewed to “Duo-D former” that achieves the remarkable formation improvement effect applying by the counter blades. This report shows the overview of the equipment, the operation and the quality improvement by the remodeling.

Improvement of Hardwood Pulp Yield in Continuous Kraft Cooking and Estimation of Pulp Yields (Part III)

-Pulp Yields of Isothermal Cooking with Kraft and Polysulfide Liquors as well as Anthraquinone-

Tomoya Yokoyama and Hiroshi Ohi

Graduate School of Life and Environment Sciences, University of Tsukuba

The pulp yield was improved by about 4.5-5% when polysulfide(PS) and anthraquinone (AQ) were added to the kraft cooking liquor (white liquor). The exchange of the black liquor with fresh white liquor further increased the yield. The highest pulp yield was obtained when the PS cooking liquor containing 70% of total active alkali (AA) and 100% of AQ was used from the beginning of the reaction and the black liquor was exchanged with fresh white liquor containing the residual 30% of AA just after temperature reached 135℃.

There was a good correlation between kraft pulp yields of a hardwood species and the ratios of the amount of xylose to glucose (X/G ratio), liberated by an acid hydrolysis of the pulps. However, the correlation was dependent on raw material wood species. Therefore, it is required in advance to establish a correlation between the yields and X/G ratios for raw material wood species of a target pulp in order to estimate pulp yield using X/G ratio. The X/G ratios of relatively high yield pulps showed higher values than those expected from the correlation.

In a mill trial, the superiority of the PS-AQ ITC process over the kraft ITC process was confirmed by examining X/G ratio of pulps obtained. The pulp yield in the PS-AQ ITC process was estimated at about 57.0%. This yield is very high, which indicates that reaction conditions of the PS-AQ ITC process are optimal.

Keywords: kraft isothermal cooking, polysulfide, anthraquinone, carbohydrate, pulp yield, mill trial