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January　2005　Abstracts

Dirt Check on Pulping Process
- Dirt Control by Measuring It with "Dirt Counter" -

Hiroshi Nagai
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Dirt in the material of paper has been measured by checking dirt in the sample sheet that is made only for checking dirt.
By this way, the feedback timing is very late and also, it is very troublesome to make sample sheet, out of process.
Dirt Counter solved these problems by checking dirt directly in the slurry on the process. It is quite effective and convenient equipment, not only for DIP, but also for general KP.

The Development of the Polymer Rolls for Calender Machines

Atsuo Watanabe and Kenjiro Nakayama
Yamauchi Corp.

We have been developing and selling polymer rolls for various calender machines (SC, SNC and On machine multi- nip calendar) from 1987.
We faced many problems from start such as “heat spots”, “crack propagations”, “abrasion”, “delaminations” and so on. For the counter-measure we improved both of cover materials and the adhesive strength, and decreased the inner stress of roll-covers fixed on steel cores.
On this paper we report the outline of the improvement and it’s results.

Operating Experience of Acid Treatment and Ozone ECF Bleaching

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Yatsushiro Mill, Nippon Paper Industries

Kraft pulp section of Yatsushiro mill consists of two fiber lines and both lines were converted to ECF bleaching sequence in 2003. Medium consistency ozone bleaching with an acid treatment (A stage) prior to ozone bleaching stage was introduced to the fiber line #2 for hardwood.
This A stage is the first commercial application in Japan to prevent diffuser washer from scaling.
This report shows the mill experience of A stage and Ozone ECF bleaching.

Operating Experience of KURE 5 Paper Machine

Shirou Hirano
KURE Mill, OJI Paper Co., Ltd.

No.5 Paper machine at KURE mill, OJI Paper, which has been started operation as a fine paper machine in 1989, also now products LWC paper in response to the market changes. This machine was designated as the “model machine” in our company and we set up a project team to go about increase of productivity. As a practical measure, for the purpose of reducing deposits and web breaks, several equipment were installed.

This article introduces the experience of operating these equipment.

Operating Experience of MJ Turn Bar

Keiichi Sato, Kunio Kazama and Shigeharu Yamahata

Hachinohe Mill, Mitsubishi Paper Mills Limited

Since NO.7 PM (Paper Machine) of Hachinohe Mill, Mitsubishi Paper Mills Ltd. began production in 1997, many kinds of paper products have been manufactured. Especially, woodfree light weight coated paper has such a good quality that the production of woodfree light weight coated paper is dramatically increasing. While we tried to speed up NO.7 PM in order to increase the production, we got a serious problem (release problem) which occurred at the release point of coated paper from the SymsizerR application roll. The release problem caused the unevenness of coated layer and prevented to increase the machine speed.

At last we decided to install “MJ Turn BarR” to NO.7 PM in order to improve the problem. Then it was already introduced on October 2003 and it's been working well. “MJ Turn BarR” could make web releasing stability at the release point from the application roll and enable us to increase the machine speed.

In this paper we report about our operating experience of “MJ Turn BarR” that enabled us not only to keep the quality of woodfree light weight coated paper but also to increase the productivity.

Influence of Molecular Orientation on the Curling Phenomenon in Laminated Films
- A Curl Control Method of "Communication Paper" -

Tadakazu Miyata
Advanced Technology Research Laboratory, Oji paper Co., Ltd.

Recently, plastic films have been widely applied to manufacture "communication paper", such as direct thermal films (or paper) and dye diffusion thermal transfer sheets. In these applications, the biaxially drawn films are used, and their molecular chain orientation causes "curl phenomena", particularly in laminated films.
We found that the curl-value (ΔK) of plastic films clearly related to the difference of the thermal expansion coefficients of each ply in laminated films, and the thermal expansion coefficient could be predicted by measuring the degree of molecular chain orientation (MOR-value) determined by the transmitted microwave intensity method.
Based on these findings, we propose that quantitative curl prediction is possible by employing an approximate formula derived from the lamination theory.

Development and Future of Waterproof Laminated Paper “Oper”

Senzo Yamaguchi
Komatushima mill, Nippon Paper Industries Co., Ltd.

“Oper”, which is a waterproof laminated paper, has been made by Nippon Paper Industries since 1988. “Oper” maintains the same characteristics as general papers, like “softness”, “printability”, “convertibility”. Now it is widely used in a commercial printing business and in a converted paper business.
At the early stage of development, “Oper” had some problems in quality, which were caused by the effect of roughness and moisture of base paper onto the surface morphology of laminate layers. We report here how we coped with these problems.
We also report the development of our new products, “The Poster”, and “Oper MDP”. “The Poster”, which is the product mainly used for posters, has improved ink drying property which was the strongly required property by a market. And “Oper MDP” was developed for full-color laser beam printer, which is one of the on-demand printing field which is remarkable growth field in recent years.

And we introduce our latest consideration to the environment.

Paper Pulp Raw Material Supply in the Future
- Research on Improvement of Production and Quality of Wood Biomass -

Takashi Hibino
Forestry Research Institute, Oji Paper Co., Ltd.

The supply of raw materials is a business base of the paper manufacture industry. It is necessary to aim at a production increase and a qualitative improvement of the wood biomass by the expansion of the afforestation area in the stable supply of the raw materials. Securing a suitable afforestation area will be expected to become difficult by the competition with the farmland acquisition that originates in the food problem. As a result, afforestation in a very bad environment with various environmental stresses is not avoided.

Oji Paper succeeded in the creation of an environmental stress resistant eucalyptus by using our original genetically modified technology. In addition, the genetic information database of the eucalyptus was as also constructed for the improving of the wood biomass. The wood formation mechanism of the eucalyptus is clarified, and it will aim at practical use for efficient production of the wood biomasses along with the stress tolerance in the future.
As a result, stable production of the wood biomasses becomes possible, and use as the recyclable resource for the wood biomass not to mention the paper pulp raw material to replace the fossil resource such as oil can be accelerated. In addition, it is expected that large-scale afforestation of the eucalyptus that has high carbon dioxide fixation ability becomes possible, and it contributes to the carbon dioxide absorption for the global warming prevention greatly.

Operational Experience of Power Boiler for PS Incineration

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Nippon Daishowa Paperboard Tohoku Co., LTD.

Since paper sludge (PS) generated in paper manufacturing has high water content and low calorific value, its utilization as heat source is not popular. On the other hand, waste tire is utilized partly only because reuse is restricted by particular application due to difficulty in treatment of wire contained in tire. Recently, treatment of waste tire becomes an issue of waste materials.
Incineration PS together with waste tire, but without auxiliary fuel (fossil fuel) support, has been satisfied. The incineration boiler can produce high temperature and high-pressure steam, and generate electric power of 14,000 kW in stable operation. Thus it contributes to resource and energy conservations, reduction of wastes and consequently utilization of wastes.
The incineration boiler was put in commercial operation since October 2003. Experience and establishment of the plant operation with regard to reduction of dioxin emission controlled by combustion temperature, turbine load control performed remarkably in the waste incineration boiler and maintaining the plant in stable and safe operation are described.

Operating Experiences of CL&K Removal System Using Ion-exchange Resin
- Chloride Ion & Potassium Ion Actual Operation Report of Removal System for Solution of Electrical Precipitator Ash at Recovery Boiler -

Youichi Kataoka
Niigata Mill, Hokuetsu Paper Mills, Ltd.

In the process of Kraft Chemical Recovery Cycle, Chloride (CL) and Potassium (K) entering with raw-material wood chip are gradually accumulated and concentrated during continuous operation. The plugging issue of carryover particles and dust in the Recovery Boiler is caused by decreasing melting temperature of dust along with increasing concentration of CL and K in the Black Liquor.
At the same time, fouling and corrosion at the super heater of Recovery Boiler is apprehended. To avoid above problem, proper portion of recovered Electrical Precipitator Ash was deserted from recovery cycle. In this manuscript, actual operation data from CL&K Removal System using Ion-exchange Resin developed and installed at Niigata Mill are introduced.

Operating Experience of RPF Boiler at Tomakomai Mill

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Tomakomai Mill, Oji Paper Co., Ltd.

Tomakomai mill, Oji Paper Co.,Ltd., has contributed to the cultural and economical development of Japan as the most important mill in Oji Paper since the establishment in 1910.
Today, Tomakomai mill is the largest newsprint mill in the world and continues to fulfill the obligation to provide stable supplies to the customers.
Oji Paper established the Environment Charter and is pledged to make further efforts to reduce its consumption of fossil fuel by promoting thermal recycling in which collected used paper and plastics which cannot be recycled are incinerated for energy.
In order to implement the plan, Oji Paper has installed a circulating fluidized bed boiler (CFB) at Tomakomai mill. It is the first high temperature and pressure boiler in the world, which uses RPF as the main fuel.
In this paper, the abstract of the RPF boiler is introduced and the operating experience is reported.

The Advanced Information System for Paper Roll Handling

Takahiro Shigematsu
Kushiro Mill, Nippon Paper Industries Co., Ltd.

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

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Newsprint in the Press

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Objectives of this paper are to discuss newsprint in the newspaper printing press through introducing the structure and function of the press, paper behavior in the press, and characteristics of newsprint.
It is possible to assume paper as elastic film with variation of elastic modulus upon water absorption through the printing process. Surface strength must be increased to reduce piling problem while brightness of paper must be similar among papers to be used in many sites to keep consistent print quality across the nation. It is also important to evaluate characteristics of paper under the condition corresponding to the actual operation.

Advanced Forming Fabric Technologies for Each Paper Grade

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According to our market research in Japan, while the forming fabric market has been shrinking annually, the number of forming fabric designs has been increasing every year. In this market situation, we would like to explain what kinds of forming fabric design are more popular for each paper grade, how they changed in comparison with 5 years ago, what the main factors to decide the direction of those changes are and what advanced forming fabric technologies for leading them are. Also, at the viewpoint of R&D, we would give some suppositions regarding the trends of new forming fabric technologies for future challenges and their solutions.

The Latest Development and Trend of Seamed Felt

Makoto Saito and Hiroshi Abe
Albany Nordiskafilt KK

During the seventies, papermakers expressed their need for a press felt with seam, to make the felt installation easier. The reason for this was that the development of felt with seam had moved forward and the base weaves now contained both MD/CD with single monofilaments. With the single monofilament base weaves, the felt construction became stiffer and by that harder to install.

More than 20 years ago, the dream became reality, and the first press with seam was installed at PM9-2P in Skarblacka, Sweden, producing a Kraftsack paper. The year was in 1982 and the trial was successful. The rumor was spread around and its future expectation became very positive for paper makers. The design of seamed felt was patented, but many of the licenses were sold to interested competitors to promote the development.

About The DOCTOR SYSTEM for Wire and Press Part

Shunich Hagita
DOCTOR MFG CO., LTD.

DOCTOR SYSTEMS in recent years has turned to DOUBLE DOCTOR SYSTEMS like DOCTOR FOR WIRE SUCTION COUCH, DOCTOR FOR CERAMICS and so on.

COUCHDOCTOR effective to the prevention of the occurrence of the mist and the hole obstruction and the improvement of the water profile.
DOCTOR FOR CERAMICS is doing DOCTORING enough, using a shower.
A big fault of all DOCTOR is Dregs stick to the reverse side of BLADE. However, it could remove by SELF developed afresh. If you use SELF CLEANING DOCTOR together with DOUBLE DOCTOR, a bigger effect can expect

Introduction of Trinippress into Paper Machine for Corrugating Medium

Toshihiko Ohara
Amagasaki Mill, Rengo Co., Ltd.

Amagasaki Mill No. 8 Paper Machine (PM No.8) of Rengo is manufacturing corrugating medium, basis weight from 115g to 200g.
The paper machine installed in 1979. The wire part was remodeled into Twinwire Duo Former F in 1987. As for the press part, we had not remodeled since the first. However, currently the press part became too old, and February 2002 which was renewed.
At selecting the new type of press section, we mainly took into account the improvement of runnability and energy saving by dehydrating at the end of press part. As a result, we decided to introduce the trinippress to the paper machine despite no performance of the introduction in the paperboard field.
In this report, I would like to report on the outline of the installation of trinippress and the current operating condition of PM No. 8.

Rebuild of Headbox & Ontop-Former at No.7PM

Hideya Takizawa
Iwakuni Mill, Nippon Paper Industries Co., Ltd.

No.7 paper machine at Iwakuni mill, Nippon Paper Industries, has been in operation since 1987.This machine has a 408-ton production capacity of coatbase paper per day, and has played the core role in our mill, the specialty being the high quality coated paper.
In January, 2004, the wet section was modified in order to enhance the sheet quality of coatbase.With this project, the Sym Flow-D headbox with advanced dilution control system and Sym Former-MB with a loadable blade module, being supplied by Metso-SHI Co., Ltd. allowed us to achieve a higher level of MD and CD quality and sheet formation.
This article introduces the latest operating experience, focusing on effects of this project.

Progress of OptiConcept Paper Making Machine

Hiroaki Tagashira
Metso SHI Co., Ltd.

Since 1st OptiConcept complete news print machine started in China, 10 complete OptiConcept machines have already started. One of the main targets of the OptiConcept was to combine all paper making processes into one paper making line.
The concept was realized by development of OptiSizer as for the coating unit and OptiLoad as for the on line multi nip calender. There are 4 complete LWC machines are running with this concept. In addition to the development of all online concepts, further development of section technology has been continued. Result of the latest development, such as new OptiFlo headbox, OptiDry vertical dryer and OptiSpray coating are introduced.

The Investigation of the Elution Tests of the Fluorescent Whitening Agents Contained in the Paper Packing Container for Foodstuffs

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Naoto Arai
Environmental Affairs Dep., Oji Paper Co., Ltd.

We requested some analytical organizations to carry out the fluorescent whitening agents examination of the papers, which have possibility to contact with foodstuffs directly. Although the examination was performed based on the official standard method, Kansyoku No.244, there was a considerable difference in the results obtained from the examinations carried out by various organizations. Kansyoku No.244 examination is performed as follows.
First, the specimen is extracted with weak alkali water. Then, the pH value of extract is adjusted between pH3 and pH5 with diluted HCl solution, and the gauze is dipped in the above extract. Finally, the gauze is observed under UV lamp to judge whether fluorescent whitening agents are extracted or not. In this investigation, it was found that the fluorescent whitening agents efficiently stained the gauze in strong acid water, but were little in weak acid and alkali water and the observer's abilities of recognizing the fluorescence was difference, respectively.
The different results of the examinations carried by the analytical organizations were caused by the difference in pH, at which the gauze was dipped in the extract, and the observer's ability of the recognition of the fluorescence.

The Development of MJ Former for Paperboard Grade

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

Hiroshi Iwata and Kazuhiko Masuda
Mitsubishi Heavy Industries, Ltd., Hiroshima R&D Center

Production increase and the trend toward to lighter weight have been prevailing rapidly in the packaging industries on high speed operation. On the other hand, to increase an efficiency of the production, the number of multi-ply layers is reduced by heavier base paper.
Mitsubishi Heavy Industries has developed a new Roll Blade former to respond these market requirements. This new former has high drainage capacity, operational flexibility and gives excellent paper quality.
The first installation will be start-up in April 2005 in Germany.

Development of Biopulping Process with Cellulolytic Activity Suppressed Coriolus hirsutus

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

Biopulping, defined as a treatment of lignocellulosic materials with lignin-degrading fungi prior to pulping, can reduce energy and chemicals during the pulp making process. Coriolus hirsutus, one of the lignin-degrading fungi, is a promising strain for biopulping, because it degrades lignin efficiently and grows at higher temperature. However, C. hirsutus can not be directly applied to biopulping, because the cellulolytic activity of this fungus brings about negative effects on both pulp yield and paper strength.
In the present work, we cloned several cellulolytic genes of C. hirsutus and constructed a tandemly arranged antisense gene to suppress cellulolytic activities by the genetic modification. The transformants carrying a tandemly arranged antisense gene have lower cellulolytic activity than the host strain. Application of this treatment to wood chips has successfully led to higher cooking yield in chemical pulping without any negative effects on paper strength.

Experiences of Carbonizing Furnace of Paper Waste Sludge

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

Sendai Mill has produced carbonized paper-waste sludge, burned directly in sludge kiln, and sell for soil improving material and insulation for steel production for long time. We replaced a new carbonizing facility instead of old kiln, due to a decrepit facility and response to waste disposal and public cleaning law.

On this line, dewatered paper sludge is pelletized in zouryuuki, dried to 10% water content, and distilled to dry carbonized materials by indirectly-heated carbonizing kiln. Exhaust gas produced in this distiller is burned in furnace for the purpose of the use of heat content of sludge. This facility is not regulated within dioxin relevant laws, because of a sludge-carbonization facility. But we placed this facility designed with the enough idea of dioxin rules on the structure.

We report about facility characteristics, operation after starting on Nov. 2002, and product properties.

Operating Experience of Finishing Plant, Fuji N-2 Paper Machine

Mikiya Suzuki
Fuji Mill, Oji Paper Co., Ltd.

In 2001, we reformed the production system of white lined board. In the papermaking plant, two former machines were stopped and N-2 machine, the fastest machine for white lined board was built.
On the other hand, in the finishing plant, in order to deal with planography products that is 80% of all products, four sheeters and three packagers were installed.

The new main point is the perfectly automated transport system in the finishing plant.From N-2 machine to sheeters, the transport is automated by conveyers and a crane, and from sheeters to packagers, by conveyers and transporters.
In this article, we will report the new automated device and our operating experience.

Reports of 16th PTS CHT Symposium

Jiayi Chen
Pulp & Paper Industry Department, Kurita Water Industries Ltd.

16th PTS CHT (The Chemical Technology of Papermaking) Symposium took place in Munich, Germany during 15 to 17, September in 2004. 37 of research and technical paper were presented. They covered the innovation in pulping, papermaking, environment, chemicals and mechanical engineering. In this report, retention aid, water management and scale control were reviewed.

Reports of 2004 TAPPI Fall Technical Conference

Takanori Miyanishi
Fushiki Mill, Nippon Paper Industries Co., Ltd.

The 2004 Fall Technical Conference was held during October 31 ? November 3, 2004 in Atlanta, Georgia, USA. It was the joint conference of Pulping and Engineering. The huge conference provided 97 presentations in 39 sessions in 4 separate rooms. Topics of my interest included

・Workplace transformation.
・Opportunities for cost reduction in pulp manufacture.
・Improving bleach plant operation.
・Optimizing pulp mill operations through process simulations.

SEC-MALS Study on the Molecular Conformation of Modified Starches for Papermaking

Hiroshi Ono

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Modified starches such as hydroxyethylated, acethylated, hydorhobic ester, and oxidized starches were widely used in papermaking industries as a surface strength agent or a binder of coating color pigment. However, the molecular conformation of these modified starches in aqueous phase was not fully understood. The purpose of this study is to investigate the molecular conformation of modified starches, which helps ideal chemical modification design for certain papermaking process.
Investigations based on size exclusion chromatography (SEC) and multi-angle laser light scattering (MALS) were conducted to assess the influence of chemical modification and degree of substitution (DS), molecular mass, and solubilization method on the macromolecular features in aqueous phase of modified starches for papermaking. SEC-MALS analysis revealed that increasing the DS value of hydrophilic group, decreasing the molecular mass by acid treatment or oxidation, and alkaline dissolution made the modified starch macromolecular more expanded conformation in water solution.

Keywords: modified starch, SEC-MALS, conformation, hydroxyethylated starch, surface strength

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The Latest Elevator Control Technologies

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An elevator group control system controls a multiple of elevator cars to improve the traffic efficiency in the building. In the recent group-control systems, AI (artificial intelligence) technologies, such as fuzzy theory and neural networks have been applied.

In this paper, we introduce to the history of elevator group control, and the latest group control system “Sigma AI-2200” as a product example.

The Basics, the Application and Great Possibilities of IC Tags

Hiroshi Ohtsuka
OMRON Corporation

IC Tag (RFID) has lately attracted considerable attention. IC tag is effective tool to solve the problems in the field of industries. But if we use it without understanding its essence, it would not give us any merits.
At first this paper describes the basics of IC tags (RFID), for example communication method between tag and antenna, variation of IC Tags and its characteristics. The 2nd issue is the introduction of some applications using IC tags (RFID).The last issue is the trends of standardization in the world and its possibilities in the future.

The Reduction Strategies of Construction Term and Cost in DCS Renewal

Yasuo Kobayashi
Niigata Mill, Hokuetsu Paper Industries Co., Ltd.

It has been over 20 years since the first DCS was installed for process control. Hokuetsu Paper Mills LTD. Niigata mill renewed two superannuated DCS. Although the model of the both DCS were the same, the used updating methods were different. This report deals with outline of reduction strategies in construction term and renewal cost at two examples of DCS renewal.

DCS Renewal at Kishu Mill

Yuji Yamanaka
Kishu Mill, Kishu Paper Co., Ltd.

Kishu Mill introduces DCS into pulp process, power process, and paper-making process, etc., and is performing operation by CRT operation. After the introduction of DCS into the Kishu Mill, about 20 years have passed. The system has been updated by the reconstruction of a plant, the problem on maintenance, etc. The updating example of DCS in pulp process is reported this time.

A New Enhanced System for Plant Maintenance Program

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

A new enhanced system for plant maintenance program has been developed in Yatsushiro　Mill in order to improve production efficiency and equipment condition. It should be expected the excellent tool using computers for carrying out the PDCA plant maintenance cycle and getting the best result within the limits of the budget. With this program, we can exactly reduce equipment breakdown and maintenance cost, and increase work efficiency. This paper outlines the feature and the process of developing the new plant maintenance system.

The Report on Process Control and Equipment Life

Process Control and Automation Committee, JAPAN TAPPI

Recently the replacing of process control system could not be proceeded. We collected the questionnaire data from the supplier of instrumentation and the user in pulp and paper industry about the life cycle of process control system. On this time we report the result of our investigation.

Optimizing the Pulping Process by Using a New On-Line Analyser and Experiences from Pulp Mills

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Research Engineer, Sodra Cell R&D
Hakan Karlsson
Product Manager, Lorentzen and Wettre AB

New technology admits new and more frequent measurements of pulp quality. Sodra Cell, the leading market pulp producer in Europe, has on-line measurements of fiber properties installed in all production lines in the four Scandinavian mills for production of bleached chemical pulp. The main purposes for the installations were to secure the quality delivered to the customers by more frequent tests of quality by measuring fiber properties. The system is used for quality optimization of wood supply and process as well as control of transitions in the pulp mill.

Totally Integrated Automation System for Paper Making Plant

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Yaskawa Siemens Automation & Drives Corp., System Design Group

The TIA shows that Totally Integrated Automation includes all the components of an automation system: Controllers, HMI systems, process control systems, distributed I/O, drives (the SIMOTION Motion Control System is a new addition here), sensors and actuators, integrated communication links, and software.
TIA thus enables the solution of all automation tasks in manufacturing and process control. The integration of the process control systems makes it possible to automate upstream, mainstream and downstream with components of the same system.
This results in savings from engineering to maintenance. Plant flexibility is increased by the high level of integration, and savings can be achieved in spare parts management.
MES applications of the SIMATIC IT Framework are used for process optimization and allow connection to the plant control level with procedures for order processing.

B/M System 7SP - Introduction of Lifecycle Solutions for B/M System -

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Minoru Yoshifusa
Lifecycle Solutions Service Center, Yokogawa Electric Corporation

Currently Yokogawa B/M system has 7 models and about 600 systems are in operation. Half of them have been operated for more than 10 years and the one third have been operated for even more than 15 years.
Under such circumstances, there are a couple of tasks for customers to be solved as follows:
(1) Deterioration of reliability due to aging system and increase of maintenance cost
(2) B/M system upgrading requirement compiling to quality and production improvement by using sophisticated production management system.
Yokogawa released “7SP (Lifecycle Solution Program)” for DCS (Distributed Control system) in April, 2004. A main focal point is to set optimum service solutions for system lifecycle divided into 3 stages for equipment of Introduction Support Phase, Operation Support Phase and Migration Support phase as “’7 Service Innovations”.
In this article, 2 problem-solving examples are introduced as lifecycle solutions only for B/M system.

New Developed Porosity Sensor to be Applied to the Coating Technology

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Porosity is an extremely important property for almost all paper types and grades. It plays a crucial role in the production of papers for sacks, filters and cigarette wrappers, where air permeability is an essential characteristic. In addition, correct porosity is a key factor in paper printability. Paper porosity has been measured for a long time, but until now, measuring porosity CD profiles in real-time has been impossible. The fixed position online porosity measurement system has been used for several years. In some cases paper mills have measured porosity profiles from samples with manual testing equipment or by means of automated paper testing systems.
Honeywell's new Porosity Sensor is the first online profiling measurement sensor that offers the capability to control the porosity MD and CD profiles. This means it is possible to have more uniform paper quality, and tools to better meet the quality expectations of customers.
Papermakers have knowledge and experience about factors affecting the air permeability profile. The same CD profiling units that affect other profiles also affect the air permeability profile: water removal elements, the press section nip pressure, the run model of the steam box, the condition of the paper machine fabrics, the drying shrinkage profile, and calendering are known to affect the porosity profile.
The scanning porosity measurement improves control over the grinding phase, the wet end chemical dosage, the wire section vacuum, and the calender. Optimal porosity also improves the coating result and reduces consumable coating agent volumes. Furthermore, improved paper machine control shortens grade change times, thus minimizing related downtimes and waste.

Hardness Measuring Instrument for Paper Roll “RPQ”
- Hardness Profile Appears Immediately with Continuous Measuring -

Mitsuhiko Matsuda
Nomura Shoji Co., Ltd.

Uniformity of hardness of paper roll is one of important quality control indexes in the paper production. So far there have been two popular methods of checking the paper role hardness; one is to hit the roll surface with a stick and to listen sound with ears -Hit and Listen Method-, and another is to measure hardness with Schmidt Hammer -SCHMIDT Hammer Method-.
The Hit and listen method relies completely on personnel skill and its numerical analysis is impossible. Even the Schmidt-hammer Method is also dependable on personnel skill and experience, because accurate measurement with Schmidt Hammer is not so easy and simple work. Measurement and analysis with Schmidt Hammer Method is rather time-consuming.
“Role Quality Profiler”, “PQP” for short, has been now launched from TAPIO Technologies OY in Finland for most effective measurement of the paper roll hardness.
The features of the RQP are continuous measurement, immediate profile display, and accurate results independent on personnel skill.

A Report on the 2nd International Symposium on Technologies of Pulping, Papermaking and Biotechnology on Fiber Plants

Gyosuke Meshitsuka
The University of Tokyo
Takuya Kitaoka
Kyushu University

The 2nd International Symposium on Technologies of Pulping, Papermaking and Biotechnology on Fiber Plants was held in Nanjing, China on October 13-14, 2004 under the co-organization of Nanjing Forestry University and Graduate School of Agricultural and Life Science, The University of Tokyo. Total participants was 156 including 38 from outside of China and 133 papers (44 oral and 89 poster) were presented.

Retention Control System in a Paper Machine Accompanied by the Decoupling Controller

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Pulp and Paper Research Laboratory, Oji Paper Co., Ltd.
Naoki Imai

Technology Division, Oji Paper Co., Ltd.
Yoshinobu Hara, Michiaki Niahimura and Shirou Hirano
Kure Mill, Oji Paper Co., Ltd.

We introduced a retention control system for the wet-end section of a paper machine using two intelligent pulp and filler(ash) low consistency sensors. When we tried to control the white water(WW) total consistency by the retention aid dosage using the “Proportional plus Integral (PI) feedback controller”, we experienced a strong interaction with the existing paper ash content control of the QCS(Quality Control System). To alleviate this interaction problem, we utilized a “decoupling controller” together with the “PI feedback controller”.

Keywords: paper machine, wet-end section, retention control, interaction, PI control (proportional plus integral control), decoupling control

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Development of the System which Allows the Commercial Scale Plantation Using the Plus Trees of Eucalyptus globulus

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Eucalyptus globulus, a kind of eucalyptus, is well known as a commercially valuable species for plantation with its excellent growth rate and its high density. But clone plant production through cuttings have not been applied in commercial scale due to the difficulty of rooting from the cuttings and also due to the lack of the selected plus trees.

Purpose of our study is to select the plus trees of Eucalyptus globulus and develop the system which allows the commercial scale plantation using the selected plus trees. In this paper we report our experience on the selection of the plus tree showing superiority in growth, density and others from the plantation area, propagation of clone plus trees having excellent growth rate and rooting capacity through cuttings, and plantation trial of the plus trees.

As a result, plus trees showing more than 50 % higher volume growth rate and more than 10 % higher density were selected through the study and established cloning system which allows the commercial scale plantation of thus selected plus trees.

Hardwood Kraft Cooking and Bleaching
— Emphasis on Raw Material Variability and Hexenuronic Acid Formation and Removal—

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Metso Paper Sundsvall AB, Sweden

Recent years have seen a lot more research focusing on hardwood pulping and bleaching processes. Although the understanding of these processes and the importance of raw material variability have increased, it has become obvious that there is still more to learn. Yet, technology has evolved.

It is possible to adapt cooking conditions for low Hexenuronic acid content of unbleached pulp, improving bleachability and decreasing brightness reversion. Today's modern light ECF bleach plants, utilising improved oxygen delignification technology and high consistency ozone bleaching, have made it possible to decrease effluent emissions in a cost efficient way, while maintaining pulp quality. Optionally, TCF bleaching is possible that would bring emissions to very low levels.

The Latest Screening Technology
- Newly Developed Ultra Energy Saving Screens & New Theory of Screen-Plate Designed by Hydrodynamics -

Takeshi Kanazawa
Aikawa iron Works Co., Ltd.

Screening performance has been dramatically improved by the development of bar type screen cylinder. Especially, this technology has contributed to improve sticky problems which is one of the most important subject for recycling fiber treatment and power saving in screening department. We, Aikawa, was awarded “Sasaki-Prize” by Japan Tappi for the “GranFlow-Screen” as the most superior development for the year of 2000. This paper reports the most recent technologies regarding to power saving of screening field that we have further developed since 2000.

High Density Pulp Bleaching with the Aikawa ConiDiscTM Disperser System

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Nippon Paper Industries Co., Ltd.
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The Nippon Paper Industries Iwanuma Mill has three newsprint paper machines. To increase the DIP rate of newsprint production, a new DIP process (DIP-3) was started up in July 2003. This process was given consideration to reduce sticky trouble at the paper machines. So we introduced the latest machines and new ideas.

The Aikawa ConiDisc Disperser System is one of the new machines, which was introduced to the new line at this time. The Conidisc consists of a conical-zone and a disc-zone. Because of that shape, it has two characteristics both high-speed disc-disperser and low-speed kneader. Since DIP-3 started, we have gotten good operations out of the ConiDisc in sevaral phases. This paper mainly reports the DIP bleaching with the Conidisc and other effects of this machine.

A New Fixing Agent for Rosin Emulsion

Yuko Okusa
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Anionic trashes or anionic interfering substances are released into the water phase from contaminated reused water, recycled fibre, or broke, and form deposits at papermaking process including the wet-end, press section, machine fabrics and rolls. The anionic trashes can cause loweing of productibity by defective products; sheet break, short shutdown duration. These kinds of troubles can be controlled by dosing cationic coagulant.

On the other hand, papermaking trouble is also deriving from the inadequated using of chemicals, such as poor fixing or over dosing of chemicals. These chemicals also behaviored as interfering substances when they enriched in the white water cycling loop.

This paper focoused on the unfixed rosin sizing agent, and discussed the chemical charactors and behaviors of the rosin fixing agents by lab and field trials.

Effects of Pigment Shape on Paper Properties

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Rajan R. Iyer
IMERYS Pigments for Paper Americas

It is well known that the flat shape of kaolin particle contribute to paper/print gloss and opacity in coated paper. A flatter (high aspect ratio) particle gives improved coverage and smoother surface properties for coated paper. Print gloss will also improve from a coating structure using higher aspect ratio pigments. However to measure a pigment's aspect ratio is a time consuming procedure, so there seems to be few detailed studies of the correlation between the aspect ratio of a pigment and coated paper properties.

This study aimed to research the effect of the pigment's aspect ratio on coated paper properties, especially in light weight coated paper in which the physical characteristics of pigments have a larger impact.

The Effect of Latex on Print Gloss

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NIPPON A & L INC.

In recent years, the quality demands to the higher grades of coated paper have been extremely diversified, emphasizing on sheet gloss, print gloss, whiteness, opacity or low density, then so many new grades of coated paper were released to the market during the last few years. The emphasized "print gloss" grade beyond LWC especially made a major trend because print gloss has been thought the most important quality in the final printed products.

It has been generally thought that "generation" and "leveling" of the split pattern of the printed ink is very influential to print gloss, and that the former ink behavior is mainly affected by printing pressure, speed and the amount of ink supplied to the coated surface, the latter ink behavior is greatly affected by the penetration speed of ink vehicle into coated layer. Moreover it has been experienced that the design of latex is very influential on print gloss.

In this paper, we tried to explain the print gloss by the two types of ink behaviors, the primary and the secondary ink penetrations, with varying design of latices used in coated layer as the main binder. The primary ink behavior is defined by wetting of ink toward coated paper surface and the secondary one is defined by ink penetration into the coated layer. It was concluded that the primary one play a influential role to the print gloss, although the secondary one has been the most influential factor on print gloss so far. The primary ink penetration would become a very important key to improve print gloss further in future.

Structural Analysis of Coating Layer Containing Plastic Pigments

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ZEON Corporation

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.

Use of Paper Sludge Ash as Paper Filler and Pigment

Kimio Hiyoshi,
Shigeo Muramastu and Masato Saito
Fuji Industrial Research Institute of Shizuoka Prefecture

Paper sludge (PS), which is exhausted in the conventional paper-recycling process, is mostly used as a raw material of cement at present. The application for the cement production is, however, not able to produce high additional value. Moreover, much amount of the other PS cannot be used for the above application due to the low quality, which results in the incineration to be buried under the ground.

For getting more effective utilization of PS, we carried out a study on the reuse of PS as raw materials of paper. In this study, proper conditions for making fillers and pigments from PS, such as incineration temperature, atmosphere, time and etc., were determined, and the recycled paper was tentatively manufactured using these fillers and pigments. It was confirmed that the cost to make paper using PS-derived raw materials was cheaper than the cost to dispose PS and make paper using new raw materials.

The PS recycled paper is now submitted to a feasibility examination to launch toward a commercial production by the collaboration with one enterprise.

Safety Standard of Machinery and Safety Components
- A New Direction of the Safety Standards -

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In Japan, occupational safety at work has been based on "education to avoid danger" until now. However, this culture is now becoming difficult in front of the foreseeable social change, for instance, aging of skillful experienced worker, increase of part-time workers and alien workers with different language and culture. In this circumstance, it will be indispensable to shift the culture to the occupational safety based on safety design. Because worker may make a mistake and machine may break at anytime.

For safety design of machine, it is practical to use safety components in accordance to international standards for safety such as ISO and IEC.

A Study of the Relationship between Coated Papers and Reverse-Image Ghosting

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Reverse-image ghosting is one of the ink transfer errors that occurs during web-fed offset printing. It happens when the imaging area on the face and the back are not balanced. This paper report what properties of coated paper influence reverse-image ghosting. Reverse-image ghosting was not influenced by water absorptiveness, stiffness or picking intensity. However, smoothness had a comparatively strong relationship with ghosting. In particular, dynamic (PPS) roughness under 20 kgf/cm2 of hard backing was strongly related to it. And in the case of the same PPS roughness, ink receptivity was related to ghosting. These results support the idea that reverse-image ghosting is caused by improper web release of paper, which leads to ink piling on the blanket cylinder and ultimately to reverse-image ghosting.

Keywords: offset printing, ghosting, coated paper, delamination, reverse-image ghosting

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Trend of the Top Runner Transformers and the Energy-Saving Nature of the Amorphous Core Transformers

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In order to promote saving resources and environmental protection, The Energy Conservation Law was enacted, and revision has been performed for the strengthening.

By revision in April, 2003, the distribution transformers were applied specification of the Top Runner Program. (Target Fiscal Year : 2006 for oil-immersed transformers, 2007 for molded transformers)

The manufacturer of this transformer has duty in which the set-up the standard point of energy consumption efficiency is kept, and in case of violation, the manufacturer will be apply penal regulations, such as recommendation.

The energy conservation effects by adopting the Top Runner Transformers is in the tendency of early introduction from about 30% of improvement being expected and the measure for spread, such as adoption to the "Law on Promoting Green Purchasing", is also taken.

In our company, manufacture of the transformer which adopted amorphous material with the excellent feature in no-load reduction as core is also performed, and the energy-saving nature is a product with which it satisfy of the standard point enough.

This time, we will show you the circumstances of the Top Runner Program adoption of the transformers, the feature, and the energy-saving effect of the Super Amorphous Transformers.

Top Runner Transformers Applied to the Energy Efficiency Standard for Equipment

Masashi Nanya
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Toshiba Industrial Products Manufacturing Corporation

Recently, to save the energy consumption (CO2 exhaust), several equipments had been set the criteria for loss consumption. The new criteria was chosen the distribution transformers efficiency. Top Runner Standard were determined that the energy efficiency standard for equipment were set higher level than the performance of the best-efficiency equipment among currently commercialized products for each category. The distribution transformers efficiency was standard that improvements of energy efficiency were achieved to high efficiency technology.

We have developed new transformers applied to Top Runner Standard. In this paper, we explained the newly to the developed Top Runner Transformers.

Micro Hydraulic Generation Using Water Supply for Industrial Use

Takuji Tojyo
Koyo Paper Co., Ltd.

Although energy saving had been tackled for years, development of a new energy source was tackled lately in accordance with the measure which reduces the conventional energies.

Already familiar new energy systems, such as solar system and wind power, are a certain things, In order to install as a company, it is almost the case which has an economic not enough effect.

The small Hydraulic generation　system using water supply　for industrial use installed this time is equipment which days of operation will be expected to be maximum output 9.6kwh through 300 days or more per year in day and night though small-scale, and Is realized enough also economically.

Especially this Hydraulic generation system had installation in the place which does not have an irrigation canal and a head chiefly taken into consideration, and are a fall and a regulating system which can respond to change of amount of water broadly.

Although it was very small energy, it installed as a long-term energy-saving measure.

Results of the FY 2004 follow-up to JPA's Voluntary Action Plan and Report of Energy Situation in the Pulp and Paper Industry in Japan

Kunihiko Aida Japan Paper Association

The Japan Paper Association (JPA) has been actively working to save energy since 1997 when it established its “Voluntary Action Plan on Environmental Issues”. JPA declared its policy of restraining CO2 emissions as one of the actions: By 2010, reduce fossil energy consumption per product unit for paper products by 10% from that of 1990 level.

Since FY1990, JPA has been following through on the actual results of the unit of energy in the year, and has been publishing its results compared with that in 1990. The following are the results for FY2003 and reports of energy situation in the pulp and paper industry in Japan.

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

Development and Operation Results of Tire Derived Fuel Fired Bubbling Fluidized Bed Boiler

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Each country promotes action to counter Global Warming and Climate Change by reducing the CO2 emission.
In the pulp and paper company industries, the energy conservation has promoted by the conversion of the conventional oil or coal to the recycling reused waste fuel.

About the tire derived fuel (TDF), the amount of domestic generating is about 1 million ton per year and the about 87% is recycled. In recent years, TDF is expected as the power generation utility because the amount of recycling tire for thermal utility is reducing with decrease in production of the cement maker who is a large user of TDF.

Under the promotion of environmental protections, MHI has developed the TDF fired bubbling fluidized bed boilers, and those are operating as a power generation boiler of the pulp and paper companies.

MHI’s TDF fired bubbling fluidized bed boiler has the technologies of continuous stable discharge of the steel wire which is included 10～20% in a TDF without the deposition on the furnace bottom, and of the low environmental load combustion by the M-STAR method (Multi-Stage Air Re-firing Method: patent of Mitsubishi).

Especially in this paper, we introduces about the outline of the development circumstances and an actual operation result.

Highly Efficient Cogeneration System for Pulp and Paper Industry

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It has become urgently necessitated to save energy and reduce environmental pollutants such as carbon dioxide and nitrogen oxides, as declared by the Third Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC-COP3/Kyoto) held in December 1997. Therefore, introduction of systems with high efficiency is desirable.

This paper describes a highly efficient Gas Turbine cogeneration system that combines energy savings with low pollution.

The Features of Our Large Sized Drum Less Water Tube Boiler “Ifrite” Series and It’s Example of Application to the Corrugated Paper Production Equipment

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Kawasaki Thermal Engineering Co., Ltd.

In recent years, multi-sets of a small type drum less water tube boiler were installed more often for the purpose of energy saving and laborsaving of a boiler facility, since it is convenient.　Moreover, in order to aim at improvement in synthetic thermal efficiency of the facility using the steam, the heat recovery from the drain of the used steam is performed briskly.

Since this drain has a heating value equivalent to about 40% of the latent heat of vapourization, whether this is reused effectively influences the thermal efficiency of the whole facility greatly.

The corrugated paper production equipment need s the steam of the pressure of about 1.27 MPa, and in order that it may perform the heat recovery from a high-pressure drain, the water tube boiler or the flue and smoke tube boiler has been used for some time.

Then, our large sized drum less water tube boiler has both the convenience of a small type drum less water tube boiler, and the good stability which the water tube boiler or the flue and smoke tube boiler has. We introduce the features of our large-sized drum less water tube boiler and the example of application to the corrugated paper production equipment.

Efficient Collection of Energy from Organic Wastewater

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Ishikawajima-Harima Heavy Industries Co., Ltd.

Methane fermentation process has been known as an effective treatment process for organic wastewater instead of the activated sludge system. Methane fermentation process uses some kinds of anaerobic microorganism and they resolve BOD which is organic compound in wastewater into methane and carbon dioxide. Oxygen consumption for BOD treatment is unnecessary for this process and surplus sludge amount is much smaller than the activated sludge system. And biogas recovered from methane fermentation has mainly methane gas and it is utilized as high quality fuel.

But because effective accumulation method of microorganism into anaerobic reactor has not known, methane fermentation process has been used for limited application.

In 1980's Up Flow Anaerobic Sludge Bed (UASB) process has developed and spread as effective wastewater treatment process. UASB process uses anaerobic granular sludge in which some kinds of anaerobic organism are naturally accumulated and the treatment capacity of UASB is ten to twenty times higher than the activated sludge system. In Japan, UASB process has applied to food processing including brewery and big UASB plant for treatment over 20ton-BOD/day has been built. In Europe and America many UASB plants are applied to treatment of pulp and paper mill's wastewater.

After 1995 UASB system has developed into some high rate types and they has applied to much wider field than UASB system. IHI has supplied a high rate anaerobic system which call Internal Circulation reactor (IC reactor) for some kinds of industrial wastewater like brewery, Shochu distillery, chemical, general food process and pulp and paper mill and proposed biogas recovery and utility system.

Some examples about biogas recovery and utility system introduce in this paper.

High Thermal Efficiency Gas Engine Fuelled by Bio or Waste Origin Gas

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Niigata Power Systems Co., Ltd.
Engineering & Technology Center, GE Development

It is necessary to develop the high efficiency gas engine, which uses bio or waste origin low calorie gas for effective use of energy resources. The composition of bio or waste origin low calorie gas is composed of CH4, CO2 or H2, CO, CO2, N2, and others. Every combustible gas has a possibility of fuel for internal combustion engines, if suitable combustion method is established.

The micro-pilot fuel oil ignition gas engine that uses a small amount of marine diesel oil corresponding to a few percent of the thermal input as the ignition source has a technically suitable combustion concept for utilization of such gases with unstable heat value. The great advantage of micro-pilot fuel oil ignition, adjustable and high ignition energy, led strong combustion stability, and a good thermal efficiency is achieved.

Energy Saving Example by Aeration Process Change of the Activated Sludge Process

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Engineering Department, Nichinan Mill, Oji paper Co., Ltd

Many paper mills have "the activated sludge process" which does microorganism treatment the effluent treatment process, and our Nichinan mill uses this system as well.

It is necessary to activate a microorganism in this activated sludge process by feeding oxygen(air) that consumes electric power.

There are three methods --- the surface aeration process, underwater aeration process and diffuser pipe process. This report introduces that energy saving is obtained by new modeldiffuser pipe using in the activated sludge process in Nichinan mill.

Solution for Paper Machine Deposit Oriented Spot Prevention

Tomohiko Nagatsuka
Sales Engineering Dev, Maintech Co., Ltd.

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 paper machine where the deposition could increase spots. The resulting surface passivation prevents depositions on wire, felt, press rolls , cylinder, fabric and calendar rolls and drastically reduces the number of spots on paper. Mills can take considerable advantage of this program. Elimination of deposits in the paper machine 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 M/C deposition. Case histories illustrating gained benefits in paper board grade M/C are presented.

Technical Trend of Mechanical Seals for Pulp & Paper Plants
—The Cartridge Mechanical Seals for Maintenance Saving and Resource Saving—

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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. The maintenance of mechanical seals is getting important. I will make brief explanation of the mechanical seals first and then describe the maintenance of mechanical seals and the cartridge mechanical seals for maintenance saving and resource saving.

Hybrane, a New Versatile Platform of Hyperbranched Polymers for Coating Applications

M.L.J. van Leeuwen
DSM Hybrane BV

DSM has invented a new platform of Hyperbranched polymers, trade name HybraneTM. Hybranes show remarkable properties and have found application as paper coating additive:

- Low viscosity in solution
- High functionality at low concentrations
- Hybranes can be tailore made to show desired functionality

A number of HybraneTM products are being commercialised as additive for paper coating formulation, to be used as:

- Runnability improvement agent for Metered Size press applications
- Printability improvement agent for coated fine papers

A Report on the PAPTAC (Canada) 91st Annual Meeting

Kunitaka Toyofuku
Japan Tappi

The 91st Annual Meeting of the Pulp and Paper Technical Association of Canada was held in Montreal, Canada on February 7-10, 2005. The meeting had more than 10000 entries and 400 or more exhibitors. It was one of the largest conferences worldwide in pulp and paper industry.

There were 146 presentations. Those were ranged from the pure academic fields to the new product introductions and included 93 from domestic, 53 from overseas such as 29 from U.S., 9 from Finland and 6 from Germany.

Elastic Deformation Strength for Square Tubular Case of Corrugated Fibber Board Box Shape under Uniform Compression (On Anisotropic Panel)

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

Formulations for elastic strains and deformation in the square tubular case (CFBS on anisotropic: width L and height h) of corrugated fibber board box shape under uniform compression were expressed from elastic stress formulation. Then from those formulations characteristic behaviors for elastic strains and deformation were discussed.

Maximum absolute values of normal strain ε xmax in width direction and total displacement uymax in height direction are constant for L increase. Maximum absolute values of normal strain ε ymax, in height direction, principal strain ε 1max and principal shear strain γ 1max increase and decrease slightly with L increase. And maximum absolute value γ xymax of shear stress increases and decreases and maximum abolute value uxmax of total displacement in width direction increases obviously with L increase. ε xmax, uymax and γ 1max are constant for Ex increase. ε ymax and ε 1max increase slightly and γ xymax increase obviously with Ex increase. And uxmax increase slightly with Ex increase. ε xmax, ε ymax, γ xymax, ε 1max, γ 1max , uxmax and uymax increase obviously with Ey increase. ε xmax, γ xymax, γ 1max and uxmax increase obviously, and ε ymax, ε 1max and uyma increase slightly with ν xy increase. Ratios ε ymax/ ε xmax, ε xymax/ ε xmax, ε 1max/ ε xmax, γ 1max/ ε xmax and uymax/uxmax are nearl 10, 1.5 10, 10, 1 and 12.

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Development of Large Scale Nickel-metal Hydride Battery

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Large scale nickel-metal hydride battery is developed for industrial use as a power source and a energy storage. Nickel-metal hydride battery can discharge at high rate and discharge most of energy stored in the battery with long life.

When using this battery for several kind of electric power generator we can obtain high total generating efficiency, for example, wind power generator.

Large scale nickel-metal hydride battery has no dangerous substance, toxic metal and welding so recycling of battery is safe and easy.

The Latest Technologies for Energy Saving
—Reduction of Energy Consumption for Pulper, Screen and Refiner and Stock Preparation System to Contribute to Energy Reduction—

Takeshi Kanazawa
Aikawa Iron Works Co., Ltd.

In Japanese pulp and paper industry, various examinations have been performed for the purpose of 10% of further energy-saving achievement by 2010, which was scheduled based on the commitment at the Kyoto International Environmental Meeting at several years ago. This paper introduces new technologies for energy saving for pulping, refining and screening, which are key components to achieve further power reduction at stock preparation field, and also proposes some stock preparation systems to contribute further energy-saving.

The Design Concept of the Saving Energy for OCC Screening System

Toshio Dousaka and Iwashige Naoyuki
Voith IHI Paper Technology Co., Ltd.

VIPT can offer the most suitable engineering for customer's needs through the advanced technology which is integrated with VPT's. world-wide defacto standard technology and IIM's good experience and know-how created under the long term marketing.

This time, we wish to present a new OCC system which is focused on energy-saving with our integrated technology. We believe, we can present a new design concept of modern OCC system which can execute not only the low-energy-consumption but the high-quality too.

Energy-Saving by Introduction of High Efficiency Refiner for RGP
- Energy-Saving Examples by Low Speed Refiner -

Keisuke Irikawa
Iwanuma Mill, Nippon Paper Industries Co., Ltd.

With recent rise of market demand for environmental protection and saving resources, Nippon Paper Industries Iwanuma Mill has set up an environmental action plan concerning "the achievement of sustainable society."

This mill produces 55,000t of paper mainly newsprint per month based on this environmental action plan. Our newsprint contains kraft pulp, recycled pulp, and mechanical pulp as main materials resulting 75% or more of recycled pulp, 5-10% of kraft pulp (NBKP), and the remaining is mechanical pulp which is produced on site as RGP (Refining-GroundWood-Pulp).

Mechanical pulp, such as RGP, is pulp which needs an enormous amount of electric power as a feature of its production. However, power consumption was greatly reduced through repeated reconstructions, including stock flow change and introduction of new equipment.

This report describes a series of energy-saving examples achieved by reconstruction of RGP process.

Energy Saving with Cl & K Removal System Using Ion-Exchange Resin

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Niigata Mill, Hokuetsu Paper Mills, Ltd.

In the process of Kraft Chemical Recovery Cycle, Chlorine (Cl) and Potassium (K) entering with raw-material wood chip are gradually accumulated and concentrated during continuous operation. The plugging issue of carryover particles and dust in the Recovery Boiler is caused by decreasing melting temperature of dust along with increasing concentration of Cl and K in the Black Liquor. At the same time, fouling and corrosion at the super heater of Recovery Boiler is apprehended.

To avoid above problem, proper portion of recovered Electrical Precipitator Ash was deserted from recovery cycle. We have investigated conventional crystallizing method system, however, this system is required to operate large sized freezing machine and spend huge amount of electrical energy. Therefore, we have developed new method expected lower energy consumption.

In this manuscript, actual operation data from Cl & K Removal System using Ion-exchange Resin developed and installed at Niigata Mill are introduced. As the result of operation, plugging issue at the tube of the Super-heater was excellently decreased and large amount of steam reduction for the Sootblower have been confirmed.

Energy Saving by Introduction of the Gas Engine Generating System

Tadashi Arifuku
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Recently, increasing the demands on environmental conservation, Rengo has been working actively on resource and energy savings based on ‘Eco-Challenge009’ which is our environmental target. As part of our efforts, the Paperboard Manufacturing Department has set the target to reduce the ratio of CO2 emission at the rate of 1% every year.

Since Yashio Mill introduced gas engine generating system instead of conventional and low efficiency gas boiler and steam turbine generating system, we introduce the way and result of energy saving by taking this system as a case.

Steam Turbin for Driving Fan of Incinerator

Masaaki Koito
Fuji Mill Oji Paperboard Co., Ltd.

Our Fuji-Plant is located in Fuji-City, the central part of Japan, near Mt. Fuji on the north side, near Suruga Bay on the south side. Our Plant is also a main production factory which has two sets of NO.8・10 M/C and is a large-scale factory with the quantity of production representing Japan.

In addition, we have a fluidized-bed type garbage incineration plant for the waste generated at a materials process which capability is BD40 t/day (includes waste heat boiler with max flow rate 5.7t/h). Steam from the waste heat boiler had been controlled at constant pressure (1.75Mpa) by the valve in drum to be used for dry process of M/C line. This time we tried to improve to save energy by another method. There we observed the electricity to look into the fan motor which needs much energy in some facilities.

We present a new method as below of more effective use for steam that 2 steam turbines are installed and connected to the FDF(110kw-2P) motor and IDF (90kw-4P) motor to assist the power. It brought the good effects to save energy.

This system has very superior points in that we can use the rest of steam effectively and can save big energy under rated condition. In addition, it also has the characteristics of easy maintenance and easy start-up.

Now although the capability of 100% cannot be demonstrated from short of rated steam condition, we will be able to save the energy for the amount of electric power 130kw/h equal to 10,000,000 yen if the combustion of an incinerator would be stabilized, the amount of steam would be secured and could be run during a year.

We are willing to try more to save energy in the near future because the increase of the energy cost gives the large influence to the factory profit.

We would like to improve factory employee's consciousness　further in the future and to promote the energy-saving activities.

Energy Saving Project by Renovation of Stock Preparation System

Hidetsugu Ueda and Seiji Tomita
Nippon Daishowa Paperboard Kanto Co., Ltd.

Nippon Daishowa Paperboard Kanto (NDB Kanto) Co., Ltd., Soka Mill, has completed modification project of the existing OCC recycling system for the purpose of the power saving.

As result of reconstruction of the production map in NDB's four production companies, No.1 Paper Machine in Soka Mill has been changed to produce the corrugating medium only.

In this paper, two topics are presented in connection with the above modification;

1) Field test report of newly developed Low Power (LP) Screen of which trial was carried out jointly with the screen manufacturing company.

2) At the same time that LP Screen has been adopted in the existing OCC line, not only the current MF (Multi Function) Screen has been relocated but also the other fine screens have been modified to the bar basket type, and as the result, the extensive energy saving has been achieved.

Recent Paper Dryer Enclosed Hood
- High Dew Point Enclosed Hood and Machine Room Ventilation System -

Haruo Tanaka
SHIRATORI ENGINEERING CO., LTD.

Pulp and paper industries are the typical industry of plenty energy consumption type. Therefore, every paper mills have been endeavoring all efforts for the higher efficiencies in production, energy saving in all processes as well as high yields and waste paper recycles etc.

However, the more severe energy managements have been required owing to the high speed production under the broaden width of paper by giant paper machines.

Simultaneously, the long-life renovation of main machine and environmental improvement in machine room shall be considered according to the recent change of operation condition.

Siratori have been endeavoring to cultivate new technologies and know-how based on many delivery results regarding High Dew Point Enclosed Hood and Environment Improvement System by Machine Room Ventilation System.

Advanced Press Felt Management for Improved Quality and Paper Machine Performance

Hideomi Uchikawa
Voith Paper Automation Japan Ltd.
Raymond P. Shead
Voith Paper Automation GmbH & Co. KG

This paper describes a new press felt measurement system that is designed to assist the papermaker optimise the press section set-up and its routine operations.

The measurement provides both profile and trend information for water weight, permeability and temperature of the individual felts. By combining this information with moisture measurement directly following the press section, it can help improve product quality, felt performance and process efficiency while reducing the energy consumption of the pressing and drying operations.

Treatment Capacity of Rotary Press Filter
-Result of Operational Research on Actual Facilities-

Koji Matsumoto

Application Development Section Process Engineering Department Machinery & Equipment Division, TOMOE ENGINEERING CO., LTD.

Several years have passed since the Rotary Press Filter was first introduced to Japan and Tomoe Engineering started its production and sales, and its high dewaterability has been proved through test data of various materials. Further, the Rotary Press Filter has features superior to other dewatering machines such as simple structure, space saving, low power and less washing water requirement, besides dewaterability. Number of installation of the Rotary Press Filter is increasing year by year and we have installed 5 units for papermaking wastewater and 27 units for other kinds of applications in Japan. We expect its number will increase further.

In this report I will introduce a result of research made for about a month on the treatment capacity of the Rotary Press Filter in operation at papermaking company “A.” I will also introduce a result of research on changes of the feed sludge condition and cake moisture for two days during the one-month research period. This is the first time to release the dewatering data of papermaking wastewater sludge obtained at the actual facilities.

Application of SAQR to Modified Cooking Processes (PART II)

Junji Tanaka
Kawasaki Kasei Chemicals Ltd.

SAQR has been used as a cooking additive in many KP mills. This process is known as “Quinone Cooking”. In order to apply SAQ to recent modified cooking process, more effective condition for SAQ is investigated. The following results have become clear with the small digester developed by KKC in which addition and extraction of cooking liquors are possible.
1) SAQ’s effect in each combination of penetrating conditions (alkali concentration, temperature, and time) was observed as the same as in conventional one (non-separating liquors). Also SAQ will possibly be more effective than in conventional process under some combinations of the penetrating conditions.
2) SAQ penetrated enough into chip even at low temperature and short time. Most amount of SAQ remained in chip after black liquor was extracted from the digester. But dispersed anthraquinone was extracted more than SAQ into black liquor.

Production Methods of High Viscosity Kenaf Bast Pulp for Papermaking

Wiwin Suwinarti, Yu Wang and Kazuhiko Sameshima
Faculty of Agriculture, Kochi University
Zhou Cheng
School of Life Science and Technology, Tongji University (Shanghai)

Kenaf bast fiber was treated successively by ammonium oxalate, sodium hydroxide and sodium chlorite at different order and conditions in three methods, A, B and C (Table 1). The characteristics of pulp and paper were determined by various methods including TAPPI test methods. The Kenaf-B, derived from the method B, showed the longest fiber length as length weighted average which confirmed that this treatment is the best preparation method for fiber length measurement. However, the viscosity and the paper strength properties of Kenaf-A was the highest if compared to the other two methods. Comparison of the viscosity and the strength properties with other pulps (commercial kenaf bast and wood pulps) indicated that all the three methods have superior properties but the Kenaf-A is the best pulp so far.

Keywords: kenaf, bast fiber, viscosity, fiber length, paper strength

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Current　Situation on Recovery and Utilization of Recovered Paper in Japan

Haruo Takayanagi
Paper Recycling Promotion Center

The collection and the utilization of the recovered paper in Japan, has expanded rapidly for these several years owing to the supply and demand of recovered paper both industry's effort.

It was achieved the target in the fiscal year 2003, as to the target of the utilization rate of the recovered paper moving up 60% by the fiscal year 2005.

Especially, the amount of the recovered paper usage has been exceeded more than amount of the recovered paper collection as of 2000, and so the amount of recovered paper export to foreign countries has been increased.

On the other hand, we have many problems on the balance of recovered paper supply and demand in Japan, and on the instability of recovered paper prices according to expansion of recovered paper collection amount and increasing of recovered paper export. Additionally, there are problems like the recovered paper availability target after the fiscal year 2005 and the recovered paper quality control in the collection process.

It introduced the current state about these points, and described the way of the paper recycling improvement in the future with this report.

A Report on Investigation on Recyclability of the Troublesome Paper Materials in Paper Recycling Process

Atsushi Watanabe
Research Development Div., Pulp and Research Laboratory, Oji paper Co., Ltd.
Mitsuhiro Sugino
Production Dept. Technical and Engineering Div., Nippon Paper Industries, Co., Ltd.

The Japan Federation of Printing Industry (JFPI) has been starting the project to support the development of recyclable paper-based products since 2002. The main activity of the project is to investigate the recyclability of the paper materials which were thought to be difficult to recycle such as "gold, silver, pearl, UV ink printed paper, varnished paper, and plastic laminated." The lab experiment was completed in 2002 and the pilot plant trial was done in 2003. Base on the results, JFPI suggested the probability for the real usage of the materials in the industry.

This paper reported the results of the recyclability evaluation on ten paper-based materials. The samples were following; offset gold, silver, pearl ink printed, UV ink printed, gravure gold ink printed, gold-gilt paper, two types of hybrid UV ink printed, UV varnished, and PP laminated paper. Offset gold, silver, pearl printed and hybrid UV ink printed turned to be appropriate for recycling. On the other hand, rest of the paper materials was not suitable for recycling due to rough and large ink particle or fragmented film remained in the recycled pulp.

The next step is to propagate the recyclable materials. Then following step shall be needed; 1) reflecting the results to the standards of the industry, 2) preparing signs or indications for recyclable paper materials, 3) public support for the recycling facilities, 4) public education on recycling.

ModuScreen™ A - the Modular Screening Principle

Jukka Rinne
Andritz OY
Mirka Sireni
Andritz AG,
Yosuke Takeshita
Andritz KK

The new ModuScreen™ A presents a completely new screening family that has been developed for the pulp and paper industry. It is based on experience from more than 2000 plants supplied worldwide since 1950.

Many new ideas were used in developing the new Andritz ModuScreen™ A pressure screen series. Special attention was given to the hydraulic requirements of the housing in combination with the rotor to achieve optimum flow conditions for highest screening efficiency and reliability.

The ModuScreen™ A pressure screen series was designed to have exactly the right combination of screen cylinder (slot width and profile, cylinder diameter/height ratio) and rotor (foil or solid type) for each process, from DIP fine screening to kraft pulp screening. Since it is so flexible we are able to achieve cost-effective solutions combined with highest screening efficiency.

The Introduction of Latest Technologies for Contaminants Separation at Loop 1 Stage in Advanced Deinking System

Masakazu Eguchi
Application Engineering Dept.,
Voith IHI Paper Technology Co., Ltd.

Pulping, Screening at Loop 1 stage are very important technologies for removing contaminants in Deinking system. Effective and economical stock preparation system always require to develop new system, new equipment and innovative technology in order to get high cleanliness, minimal fiber losses and investment costs.

This presentation picks up some of the latest technologies of sticky contaminants removal for DIP processes, particularly Pulping and Screening at Loop 1 stage based on actual references in Japan, Europe and other countries.

How is the Latest Technologies for Sticky Removal of DIP

Takeshi Kanazawa
Aikawa Iron Works Co., Ltd.

One of the most important subjects for DIP is now how to handle the sticky problems. For optimum sticky removal, it is required to combine various “Separation Technologies” appropriately, such as Pulping, Screening, Cleaning, Dispersing, Floatation and Wet-End approaching.

This paper introduces the latest developed equipment, especially, new screening machine and dispersing equipment, relating to sticky removal.

Deinking Agent for Used Paper Printed with UV Curable Ink

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The paper manufacturing industry in Japan is trying hard to reach its goal to raise the percentage of waste paper recycling to 60% by 2005. To achieve this target, relatively low grade waste paper must be used, while at the same time, the quality of de-inked pulp must be improved. For significantly increasing the use of lower grade waste paper, maintaining regenerated pulp quality, removing foreign materials and selection of waste paper must be conducted.

In recent years, printed materials with UV curable ink are often included in waste paper. The ink in the paper printed with UV curable ink is difficult to remove in the deinking process. As the amount of the waste paper in the printed materials increases, the quality of the DIP decreases dramatically. However, there is no feasible method to measure the exact mixing amount of the UV curable ink printed materials. Therefore, we have developed a deinking agent with a new function. This new function has exceptional ability to remove UV curable ink.

This is to report a de-inking agent that can produce high quality deinked pulp.

De-inking Agent and Assist Agent for Recycling Paper

Takashi Tanaka
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Research & Department Division, NICCA CHEMICAL Co., Ltd.

We have been used recycling magazines with lack of wastepaper. Then less refining and developing flocculation pitch occurred from special coating component or paste resin. Until recently, high molecular form-nonionic activator was used for de-inking agent. However, a single element composition is not enough activator to penetrate and disperse. To make hybrid the action of the activator provides excellent de-inking performance that does not make above problems.

Also, using polycyclic oligomerform form-anionic activator shows effect of prevention of re-adhesion and depression of flocculation of pitch. These composition moderates having influence to function of activator, like families, permeability, and adsorption.

Generally, in the process of hydrogen peroxide bleaching, sodium silicate is used for peroxide stabilizer. However, it is piling which soils in the system and clogs the pipe. Using non-silicate-poly alpha hydroxycarboxylic acid alkali salt improves bleaching effect and makes recycling paper grater whiteness.

The Technology to Make a High Quality DIP

Yasushi Ikeda
Kao Corporation, Performance Chemicals Research Laboratories

Although the waste paper has been recycled for a long time, further recycling of the waste paper is recently expected in terms of environmental preservation and resource conservation. Old newspaper (ONP) has been mainly used as a furnish for various recycled papers, but it comes to the limit on amount of side. Therefore it is desired to utilize the lower grade waste paper (LWP) for recycled papers. Since LWP is cheaper than ONP, utilizing LWP is economical. Moreover, using LWP as a furnish contributes to the resource conservation greatly. However, there are some problems which should be solved when LWP is recycled. In this paper, the approach to solve these problems is reported as an example of old magazine waste paper (OMG) which is one of LWPs.

Needless to say, the deinking is important and additionally the sticky removal is also required for OMG's recycling. At first, the mechanism of the sticky generation is examined and the concept of sticky removal is proposed. Sticky is classified into the macro sticky and the micro one by its behavior. In the actual operation, it was found that the sticky troubles were often originated from the macro sticky which the micro sticky became by coagulation.

Therefore, it is very important to remove the micro sticky. The deinking process was thought to be more effective to remove sticky, compared to the papermaking process. Concretely, the flotation process which was one of the ink removal process in the deinking was selected. To attach effectively the sticky on air bubble surface was the key point of this technology. By changing the characteristics of the sticky surface based on the surface science, the sticky-sticky coagulation was promoted and the sticky-bubble affinity was increased. The possibility to remove the sticky was established.

Substances of the Environment-conscious Sheet-fed Ink and Standard for Offset Printing Services

Tadashi Nakano
Toyo Ink MFG. Co., Ltd., Printing & Information Business HQ, R&D Division

Over the last decade, environmental issues in Japanese printing industries have been changed strictly. Many companies are interested in "environment-conscious products" for their own printed matters. Three standards of offset printing are popular as follows,
1: The Japan Federation of Printing Industries" "Green Standard for Offset Printing Services"
2: Japan environment Association "The Eco Mark Program"
3: Green Purchasing Network "Purchasing Guides line for Offset Printing Services"
These Standards show main five rules,
A: not use substances harmful to human body
B: not use chloride resin
C: considers substances specified by PRTR law
D: controls VOC emissions
E: considers reducing factors that prevent recycling used papers

Ink manufacturers have been developing new environment-conscious products on condition that choosing substances according to these rules.

The Experiences of Dirt Removal from Deinked Pulp

Hiroshi Yamashita
Hachinohe Mill, Mitsubishi Paper Mills Limited

While the utilization rate of waste paper has been increasing in Japan, the amount of the product arranged the deinked pulp has also been increasing recently at Hachinohe Mill. This makes the deinked pulp more important to us. On the other hand, the techniques of dirt removal, especially sticky particle removal, from the pulp have become very important because increasing the amount of product of the deinked pulp sometimes not only caused the quality problem but also prevented making the deinked pulp.

It is very important to prevent stickies from being subdivided when we remove them from the pricess . We modified the conditions of the defibrating process in order to slow down or prevent stickies from being subdivided. After several trials, finally, stickies were effectively removed in the screen stage. Despite the improvement of sticky particle removal, some very tiny particles of sticky still remained in the end product of the deinked pulp.

We re-arranged the operating conditions of the disperser in order to make sticky particles even smaller so that they could be removed during the washing process. We finally arrived at the better technique of sticky particle removal from the pulping process and we were able to create a more stable quality of the deinked pulp.

Keywords: deinked pulp, dirt, sticky, removal, modify, subdivide, disperser

Dirt Control in DIP Process
－Recent Trend of Dirt and On-line Dirt Measurements－

Yukitsugu Kado
Ishinomaki Mill, Nippon Paper Industries

In DIP process, the troubles of dirt such as stickies and residual inks are currently increasing at rapidly pace because of downgrading of recycled paper and improvement of printing technique. Technical advance of screen and dispersion system is able to achieve more selective removal of dirt; however, it is hard to solve the issue of dirt completely. We need knowledge of dirt and instrument to control it so that we are annoyed with dirt troubles.

On-line dirt counter enables constant surveillance of dirt and prompt attention without lag lime by measuring it directly in the pulp slurry on the process. We are taking full advantage of dirt management since we had phased in it to three DIP processes.

In this paper we present recent trends of dirt and examples of dirt measurements by using on-line dirt counter.

Keywords: DIP, dirt, dirt counter, inks, stickies

The Improvement of Efficiency in the Screening in DIP Lines

Hideyuki Nomura
Kanto Mill, Hokuetsu Paper Mills, Ltd.

Since 1975, the Kanto Mill (Katsuta) has produced white board using largely DIP. DIP lines also have been operated since the beginning of the mill, and they were remodeled the facilities several times in order to improve the quality of products, enhance the treatment of various stocks and increase the output.

Now, two DIP lines are operated, changing sorts of recovered paper and treated volume, depending on the type of the products. These days, because of the deterioration of quality of recovered paper and customers' demands for low dirt, the main issue is to improve the efficiency of cleaning in the process, which we attempted to achieve in the regular operation. However, the capacity of screening for old magazine was so limited that the DIP lines were renewed the coarse screens in 2003 and replaced the pre-dewaterers and fine screens in 2004. As a result, we could achieve reduction in dirt in the products.

This report shows an overview of the facilities, the operation and quality improvement by remodeling.

Mill Experience of the Improvement of DIP Quality

Kenji Nagata
Chuetsu Pulp and Paper Co., Ltd., Futatsuka Mill

The use of recycled paper has been promoted in Japan, as the campaign of recycling rises and the measures of cost reduction is implemented in the background of prevention from Global Warming and conservation of the Natural Resources. Recently, the inclination to such motion has been affecting the supply-demand balance of waste paper, and then the contamination level has changed for the worse.

In Futatsuka Mill we also have raised the combination rate of DIP every year. But under the above-mentioned situation, the sticky trouble has caused the deterioration of the paper machine operating rate, and although this is a rarely case, pin-hole due to adhesive object was found at the rotary newspaper press of customer. In order to solve these problems, while reexamining the revaluation level of dirt spec, we have been tackling the measures of reduction of DIP dirt spec with strengthening coarse screen, fine screen and cleaning of light contaminations on the DIP manufacturing process.

Flotation for Printing and Writing Paper

Yasuto Tanaka
Technology Division, Oji Paper Co., Ltd.

The utilization rate of waste paper reached 60.2% in 2003. The expansion of utilization for paper instead of board will be necessary to promote above figure (60.2%). This will require an improvement of DIP quality close to virgin pulp without extra cost possible.

In this article, OK Flotator is introduced for high quality as an example of efficient rotary mixing system. This Flotator can be operated over a wide range of G/L and atomizer rotation speed to have stable de-inking effect on every ink sizes depending on material and operation.

Keywords：ONP, de-inking, flotation, Flotator

Analyses of Mucilaginous Compounds Used in Making Traditional Handmade Paper

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Tadashi Ishii
Forestry and Forest Products Research Institute

In the case of making Japanese and Korean traditional handmade paper, mucilaginous compounds extracted from roots of Abelmoschus manihot (Tororo-aoi), Hydrangae paniculata (Noriutsugi) and others with water are added to bast fiber suspensions to improve dispersity of the fibers. Although many studies in terms of chemical structures of mucilaginous compounds and their properties in aqueous solutions have been reported, there are still many unclear research subjects.

In this study, three mucilaginous compounds extracted from roots of Japanese and Korean Abelmoschus manihot (JAM and KAM, respectively) and Japanese Hydrangae paniculata (JHP) are subjected to several chemical analyses to distinguish these compounds. Neutral sugar and uronic acid composition analysis clearly gave different results among the three mucilage samples. The major metal elements were sodium and calcium for the JAM and JHP samples, while that was potassium for the KAM sample. The three mucilage samples were distinguishable by their pyrolysis-GC patterns obtained by the on-line methylation method. Size exclusion chromatographic analysis attached with a multi-angle laser light scattering detector (SEC-MALS) of the mucilage solutions in 0.1M NaCl revealed some differences in molecular mass values and conformations in the solutions among the polysaccharide components in the three mucilage samples. The JAM and KAM samples had similar weight average molecular mass values around 2300000-2500000, and the JAM and JHP samples had similar random-coil molecular conformations. However, it is unknown at this moment whether or not the obtained differences are applicable to all Japanese and Korean mucilaginous compounds extracted from plant roots of the same species.

Keywords: mucilage, tororo-aoi, SEC-MALS, FT-IR, sugar composition, pyrolysis-GC

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NipcoFlex Calender

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The product demands antithetic requirements: better surface quality and less loosing of its bulk. The shoe nip calendaring is one of convincing answer to the old question how a paper web can be calendered without loosing too much of its bulk. The NipcoFlex calendar, as the new shoe calendar called at Voith Paper, has been released and being carried out energetically to explore its capability. This calender mainly acts via the extended nip and associated longer dwell time.

This description shows very brief overview of the huge collection of the trials, experience of 1st commercial product, and to demonstrate the potential for the NipcoFlex calendar.

Newspaper Mill Optimization of Flotation Cell

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Spectris Co., Ltd., BTG Division

These presentations show what BTG can do in de-inking plants especially regarding “Optimization of flotation cell”.

A de-inking plant consists of a combination of different stage, which essentially serve to separate unwanted material from the recovered paper and to enhance the quality of the fiber suspension. The number and nature of the stages in the process are determined by the fiber suspension requirements. These requirements come from the paper grade that will be produced and this will also determine the raw material mix.

There is always a pulping stage designed to disintegrate the recovered paper. During this stage, with the help of the right chemicals, the printing ink can be detached from the fibers. After the pulper, various screening and cleaning stage follow. At these stage impurities such as bits of metal, glass, sand and adhesive impurities (“stickies”) are removed. The next step in the process is the flotation, where the actual de-inking is done. Finally we have the bleaching stages to boost the level of brightness and dispersion stages to further break down the printing inks in the fibers and to pulverize impurities that cannot be seen by the naked eye. There are also other sub-systems for treating rejects and sludge.

Operating Experience of Dirt Counter

Sadaharu Kunioka
Kushiro Mill, Oji Paper Co., Ltd.

In Kushiro mill we are using the 7 sets of dirt counter. These equipment are helpful to find the abnormal condition at the process and we could reduce the number of sample checking by operators. I will report that the process of the installation and operation for the first one at DIP plant, and the operating experience at DIP and BKP plant.

Trouble-Free Operation™

Yasuhiko Yamasaki
Condition Monitoring Marketing Service Division, SKF Japan

SKF offers a full range of products and services to assist customers in achieving maximum bearing and machinery service life, and is committed to providing optimum solutions for Trouble-Free Operation™ of plant machinery.

A Kvaerner Pulping Way to Improve the Environmental Operation of a Fiberline by Small Means

Martin Ragnar
R&D, Kvaerner Pulping AB

Tomoyuki Tezuka
Projects Department, Kvaerner Pulping KK

When the environmental operation of a pulp mill is assessed much of the attention is usually paid to the bleach plant. This is appropriate. The development of bleaching technology has been very rapid over the past 25 years and more is to come. In order to keep up with the frontrunners of environmentally friendly bleaching continuous investments in the mill are required.

The aim of this article is to give an overview of recent trends and to point out ways to improve the environmental operation of an old bleach plant having a limited budget.

Maintenance Management of a Drainage and Supply Pipe Way Institution
-Spiral Jet Washing of a Superannuated Drainage Pipe, a Hose Lining Method of Construction, etc.-

Toshiya Mochizuki and Satoru Ura
Toyobo Engineering Co., Ltd., Environment Solution Division

There are many superannuated drainage and supply pipes, especially things on which carbonic acid calcium and oxalic acid calcium deposited the drainage pipe way of a papermill firmly, and the washing is serious. Spiral (using the water amount of 180 l/min by super-high pressure, and moving a jet nozzle spirally/wash efficiently and) A jet method of construction is introduced.

Medicine washing of unnecessary neutralization processing is also united and proposed in the diameter of a small sum.

Reproduction of a pipeline introduces a hose lining method of construction applicable from the diameter of a small sum to the diameter of a large quantity. A hose lining method of construction is without excavating, and is a method of construction from a manhole which carries out reversal insertion the seal hose which has tough and waterproofness into a pipe by air pressure. The seal hose is made to harden 2 liquid reaction type hardenability resin uniformly applied in, and forms a new pipe in the inside of a pipe.

Introduction of Various Rolls for Sheet Conveyance

Hiromine Mochizuki
Oji Engineering Co., Ltd., Kanzaki Branch

The field which coats water or oil solvent onto a film and metal foil, etc., is required high precision coating in order to reduce the variation of coat weight in comparison with the field coat onto a paper.

The products with which especially the variation of coat weight appears as a result as it is, for example, a photosensitive film, a film for medical treatments and surface treatment of metal foil, need high precision coating.

The high precision coating needs the high performance coating head, the stability of a sheet thickness and the accurate cross tension, but these demands are not necessarily met.

The torque of an unwinder part and the drive system of a winder part ordinarily set up sheet tension in a coating machine. Also it is known widely that rotation resistance of the non-driving rolls that are installed in order to convey a sheet has a great influence upon a sheet tension.

The outline of several sorts of rolls that should cope with these problems is shown.

New Evolution of PAM Type Paper Strength Agents

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

In recent circumstances of paper making industry, conventional polyacrylamide (PAM) type paper strength agents are tend to difficult to exhibit their inherent characteristics because of the change in operating conditions.

This report shows our developed new PAM paper strength agents having sharp molecular weight distribution, which prepared by a new polymerization method, and their characteristics. This report further shows 2-liquid-combination system wherein two kinds of the new PAM agents having different flocculation characteristics are used.

The above combination system has an object to keep well balance of freeness and formation by unifying the size of pulp flock, thereby improving paper strength efficiency.

Each of the single liquid system and the 2-liquid-combination system shown in this report can be suitably selected in conformity with paper manufacturing purpose. Therefore, our proposed systems can provide superior results than those of conventional systems, in relation to flocking property, paper strength efficiency and formation.

The Latest Information of Polyvinylamine
- Fixing Agent Based on Polyvinylamine -

Anton Esser
BASF AG
Kazumasu Kobayashi
BASF Japan Ltd.
Satoshi Hiuga
SEIKO PMC CORP.

Hydrophobic substances like wood pitch, white pitch and stickys are introduced into the paper machine circuit by the raw materials used. To minimise runnability problems related to these substances, treatment with cationic fixing agents is common.

An entire class of new polymers, the polyvinylamines, has been developed. These new polymers have a large potential to improve the treatment of hydrophobic substances. The bonding strength between fibres and particles and therefore the fixing performance of polyvinyamines can be controlled by a wide choice of molecular weights, cationic charge densities and hydrophobic functional groups.

The effectiveness of polyvinylamine based fixing agents having different charge densities and different degrees of hydrophobicity, is demonstrated by the results generated in different lab studies and mill trials.

Ciba® TELIOFORM® SYSTEM
- A NEW MULTI COMPONENT ORGANIC/INORGANIC SYSTEM -

Joe Ledda, Philip A Ford, Ryuta Miyazaki and Masashi Hasegawa
Business Line Paper, Water and Paper Treatment Segment, Ciba Specialty Chemicals Co., Ltd.

Microparticle and micropolymer retention and drainage aid systems are powerful tools for paper and board making on a wide variety of machines. Deficiencies attributed to current systems can include apparent high cost, production and quality problems, and negative effect on formation, or in other words, the negative effective on printing qualities of the final sheet.

The next generation of multi-component organic/inorganic systems has demonstrated their ability to improve formation for the same retention level, or increased retention, with either no negative effect on formation, or in some instances, even improved formation! They offer the ability to dial in retention/drainage/formation with the same high return on investment of current microparticle systems.

Modern Technology for In-line Measurements in P & P Industry
- Conductivity, Dissolved Oxygen, Turbidity and Oxidation-Reduction Potential -

Yasuo Watanabe
Mettler Toledo K.K., Ingold Group

At the last Annual Meeting in Hiroshima, we introduced the modern technology for pH measurement in Pulp & Paper Industry. However, there are other important parameters, not only pH, but also Conductivity, Dissolved Oxygen, Turbidity and ORP. These parameters are available for in-line measurements in P&P Industry. So we would like to introduce some examples of application regarding these parameters.

Pest Control in Pulp and Paper Industry
- Pest Control Activities for Quality Assurance -

Yoshihiro Kuroda
Research and Development, Earth Environmental Service Co.

There are 5 important activities for inset pest control (prevention of insect contamination) in terms of quality assurance in pulp and paper factories as follows;

1) Analysis of claim from customers caused by contamination of insects as well as detection of contamination in the factory. It is important that they should identify the kinds of insects (=contaminants), date and time of contamination, and contaminated location of processing line. Results should also be recorded, collected and kept.

2) Investigation of successive data of each kind of contaminants captured by traps in the factory. It is important that they should summarize the profiles of each contaminants in the documented form i.e., insect pest library.

3) Establishment of integrated preventive procedures by correlation study of cause and process of contamination by insects. Information about ecology and behavior of each contaminants is convenient to decision of effective procedures.

4) Collecting environmental parameters indicating strength of light, direction and velocity of air flow, temperature, humidity for all monitoring points as well as the number of contaminants captured.

5) Periodical audit and validation of activities. It is important that they should refine and correct activities by periodical education and training of employees.

Repulpable Tape for Paper Mill
- Repulpablity of Tapes -

Yukitoshi Horikawa
SUMITOMO 3M Limited

Repulpable tapes are used for many applications at paper mills. The most important property of these tapes must be “repulpability”. Repulpability is unique requirement for these applications. It is not easy to give repulpability to pressure sensitive adhesives because many other requirements for these tapes (such as shear resistance, heat resistance and anti-bleeding) become trade-off to repulpability. So we have to harmonize repulpablity with other properties in developing repulpable tapes.

In this presentation, I will show requirements for repulpable tapes, the relations between “repulpability” and other properties and a test method of “repulpability”.

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Development and Performance of MJ Pulper

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The society switches over resources sustainable circulation system so as to recycle the all things come to an end in the view of environmental improvement. In recent year, the amount of functional papers has been increased rapidly by means of the progress of productivity, the revolution of transportation system and the investigation for convenience. And these functional papers have hard wet strength properties.

In the try to be re-pulped with functional papers for utilization into recycling papers, these materials were disposed to land reclamation or to burn it to ashes in view point of consideration for cost balances by reason of the conventional pulpers were required with much more electric energy and extra machinery and equipments. But the degree of reutilization for recycled fibers was increased gradually in worldwide. And then it becomes to make problems of the lack of stock-supply. S0 the needs of re-utilizing waste functional papers were took up sharply in the field.

In the background for the above, we developed with MJ pulper of the new concepts. The MJ pulper realized the energy saving and also one unit of MJ pulper has been operated favorably in the field. In the below, we will explain the construction and the effect of saving energy of MJ pulper.

Solutions for Papermaking Problems with New Spraying Chemical
— Presentation of “Spanol N-3250” —

Yoshihiro Ando
Paper Chemicals Lab., Nichiyu Solution Inc.

Deposit problems in papermaking tend to increase more and more in recent years. So we have developed a new nonionic chemical, “Spanol N-3250” which is sprayed directly to wire, felt, and roll parts in wet-end sections of papermaking. Functional mechanisms of “Spanol N-3250” are “Detackification” of deposits and “Passivation” of wire, felt, roll, etc. “Spanol N-3250” has excellent effects not only on deposit control but also on drainage improvements in wet-end sections, whether deposit problems are found or not. We propose new solutions with “Spanol N-3250” to provide improved performance in papermaking.

Result from the BTF Introduction
－Promising Items by Improvement in Quality with BTF System－

Junichi Yano
Mechanical Designer Paper Machinery, Kawanoe Zoki., Ltd.

We have issued the result of the BTF retrofit to the existing headbox, improvement in not only CD-dry weight profile but also fiber orientation, at every occasion.
This paper will discuss the actual improvement and benefit result from the quality improvement with BTF dilution profiling.

The main concept of the BTF retrofit dilution system is to replace the Tapered Header feed to the existing headbox and install a BTF Central Distributor with Automatic Dilution Profiling. Because stock distribution by conventional Tapered Header is the principal source of problems related to the control of basis weight, for all modern headboxes. And the solution to this problem is the BTF central distributor.

Regardless of the flow conditions through distributor, with its symmetrical design, creates a uniform pressure loss from one edge of the headbox to the other, and the stock passed through flexible hoses, each of identical length, and is delivered to the headbox tube bank.

Proactive Maintenance - Downtime Reduction

Joachim Nittke
FAG Kugelfischer AG

Unpredicted bearing damages often result in paper machine standstills and production losses, which cause huge cost loss in paper industry. Recently Online monitoring systems are focussed as a countermeasure to reduce the unexpected standstills due to the bearing damages. But this will not be the permanent solution for the bearing damage. To reduce the bearing damages it is much more important to focus on the application and to adopt appropriate solutions for the particular application.

Development of Ultrasonic Testing System of Rubber Roll for the Paper Manufacture

Shigeki Watanabe
Nikko Inspection Service Co., Ltd.
Mitsunao Ariji
Kokusakukikou Co., Ltd.
Kazuo Kobayashi
Nippon Paper Unitech Co., Ltd.

The rubber-covered roll used for paper machine becomes multilayer structure where the polyurethane rubber or FRP etc. is used. The peel might be caused between layers of this roll by long-term use. The thickness of paper becomes not uniform by the occurrence of the peel, and it is serious problem in this production process.

The conventional inspection method to detect the peel was only hammering test, tactile impression or visual inspection. The peel of an initial stage is difficult to detect because only a distinctive peel can be detected by these inspection methods. Therefore, the ultrasonic examination technique to detect the peel of initial stage in quantitatively was developed.

In this development, it paid attention to the phenomenon of the ultrasonic reflection wave on the boundary layer of the rubber. The reversal phenomenon of the phase by the peel was observed, and a device to extract its phase was developed. Now, this developed system is used to inspect actual rubber-covered roll, and quantitative evaluation is obtained.

This paper reports the principle of inspection, a content of system development, and an actual inspection result.

A Study of SB-latex Concentration near the Surface of Coated Paper by Integration Ball Type Ultraviolet Spectrophotometer

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Ryuki Hashitani
Material Characterization and Analysis Laboratory, JSR Corporation
Yoshiaki Zama
JSR AMERICA INC.

Since the quantitative analysis method using chromatoscanner (Shimazu Chromatoscanner CS-930) was proposed by Fujiwara et al., it has been widely used to obtain the information on styrene-butadiene latex (SB-latex) concentration near the surface of coated paper. chromatoscanner is a reflection-absorption spectrophotometer and it can provide ultraviolet absorbance of the styrene units in SB-latex. The absorbance has been used as a measure of SB-latex concentration.

However, chromatoscanner couldn't measure the whole of the reflection, so that there may be a few ambiguities in the interpretation of the experimental results. In this report, we studied on the technique for evaluating the SB-latex concentration near the surface of coated paper with using the integration ball type UV spectrophotometer that was able to measure the absolute value of reflectivity.

Then the relation between the average density of the latex that existed in the area of depth of which everything given from the surface of the coating layer and the absolute value of reflectivity was examined by solving the Kubelka-Munk equation, which described the light-absorption in optically inhomogeneous systems. As a result, we found that it was derived to be able to decide the average density of the latex that existed in the area from the surface of the coating layer to depth about 1-1.5 μ m level.

Retention System Using the Anionic Micro Particle Polymer

Kenji Sakai and Kazuyuki Hirata
Shonan Research Center, HYMO Corporation

The Improved Dual Polymer System (HYMO Twins system) of retention aid for the high speed paper machines consists of addition of the water soluble cationic polymer and anionic polymer those obtained by the micro precipitation polymerization in the salt containing aqueous media.

The anionic aqueous polymer dispersion (FA230) for the system shows excellent performance for the ash retention and the homogeneous web formation because of it's micro particle behavior of the polymer.

We discovered the improvement of the micro particle characteristic of the anionic polymer result in small and strong floc suitable for web formation at high shear conditions.

The floc formation behavior, the ash retention and the drainage performance of the extended FA-series polymer were analyzed by the Flocky-tester, the Britt Dynamic Jar Tester (DDJ) and the Dynamic Drainage Analyzer (DDA).

Compozil System Application for Liner Machine

Yoshikazu Sonehara and Nobuaki Imaizumi
Nissan-Eka Chemicals Co., Ltd.

Compozil system is a multifunctional wet-end chemical system developed by Eka Chemicals AB in Sweden, and this system has been well accepted for all of the paper including liner and board.

In this paper, the application of Compozil system into a Japanese liner machine is discussed.

The liner machine has the problems of lower retention and drainage, higher dosage of the chemicals, and spot on the product due to the neutralized pH caused by more waste paper as the feedstock. To dissolve these problems the introduction of Compozil system was studied. During the test run and the usual operation after the introduction of Compozil system since March 2003, following improvements have been proved.

1) Better retention and drainage, less dosage of the chemicals, and the reduction of the spot were accomplished
2) The increase of 2-3% average machine speed was realized
3) Around 1% increase of the finishing yield under stable operation
4) Around 6% increase of averaged production rate per day
5) Significant saving of electric power consumption
6) Around 2.3% up of relative machine operation efficiency
7) Less frequency of the paper break (no paper break operation for 7 months was scored)

Keywords: Compozil system, retention, dewatering, liner, neutral papermaking, spot, machine speed, productivity, paper break, colloidal silica, cationic polymer,

Paper Caliper Increaser "PT Product Line"

Naruhiko Sone, Teruyuki Matsushima and Masaaki Kawamura
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Recently, low-density or light-weight paper has been required, especially for book paper and printing and writing paper grades. Books with the use of the light-weight paper with low paper density have been published and have made the best-seller lists. Various grades of light-weight paper with low density have been recently on the market in Japan. Thus, demand of light-weight paper with low density will be increased from various aspects including environmental issues such as resource saving.

Addition of paper chemicals to pulp slurries at the wet end is one of the methods to increase paper caliper. We have developed this type of paper chemicals called "paper caliper increaser, PT series," which increase paper caliper, sizing degree, and moreover allow less foaming.

We summarize here the characteristics of paper caliper increasers available in Japan and make a working hypothesis for the mechanism of increase in paper caliper from the results for evaluation of various caliper increaser samples with different properties. Some examples of application are also given.

New cross Direction Control Technology in QCS

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Yokogawa Electric Corporation

In this paper, we introduce two newly developed cross direction control technologies in QCS. One is finite response CLP CD control that uses finite settling response method in sampled-data control theory. In a machine where it was applied, the convergence time after sheet pass was decreased by 50 % compared with the conventional sampled PI control. The other is CD adaptive control.

In consistency control for basis weight profile, the actuator intervals become narrower than those in slice bolt control and that makes the allowance of accuracy of position correspondence more severe. And wide width machines have more possibility of variation of position correspondence. So the automatic identification of position correspondence during CD control has been strongly demanded.

We have succeeded to develop this challenging technology named as CD adaptive control and applied it to an actual machine. It can substitute the conventional identification method by step response test and the continuous running of this CD adaptive control makes the 2 sigma of basis weight profile smaller than operation when this control is not running.

Introduction of RCS Roll Wrapping and Handling System

Masashi Shibaki
Itochu Sanki Corporation

RCS has been dedicated to develop their know-how, initiatives, idea, and sprit for innovations for decades. The demands for roll wrapping and handling are becoming hard and diversified, not only for the protection against humidity, tear up, grease, but for low cost optical attractiveness, ecological benefit. This paper introduces the latest technologies of RCS to meet the all expectations.RCS has been dedicated to develop their know-how, initiatives, idea, and sprit for innovations for decades. The demands for roll wrapping and handling are becoming hard and diversified, not only for the protection against humidity, tear up, grease, but for low cost optical attractiveness, ecological benefit. This paper introduces the latest technologies of RCS to meet the all expectations.

Layer Separation of Kenaf Bast Fiber and the Influence of Each Layer to the Kenaf Bast Paper Strength

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Zhou Cheng
School of Life Science and Technology, Tongji University, Shanghai

Kenaf bast fiber is composed of primary(P) and secondary(S) phloem fibers. The primary phloem is single layer but the secondary phloem comprised of multiple layers which decreased the number according to the height of the stem section. The higher the section, the lower the number of secondary phloem layers.

Layer separation was made at the middle part of a stem and the fiber length, the weight, the viscosity(copper ethylene diamine, CED) were measured. The average fiber length as length weighted fiber length was 2.65－3.00mm (P) and 2.25-2.60mm(S). The primary phloem fiber is obviously longer than the secondary phloem fiber. The weight ratio (P/S) was 0.073. CED viscosity was 76-96cp (P) and 121-142cp (S). The primary phloem had lower viscosity.

The five sample paper sheets[A) only secondary phloem, B)no separation, C)and D)increased P/S ratio, and E) only primary phloem] pulps were prepared from the lower part of a stem and subjected to paper strength tests. It was shown that with the increase of the primary phloem pulp ratio give inferior strength properties than the only secondary phloem pulp. It might mainly be explained by the lower CED viscosity of primary phloem. The production possibility of higher quality kenaf bast paper by using the higher stem part which has more primary phloem than the lower stem part should be examined more in detail.

Keywords: kenaf, bast fiber, viscosity, fiber length, paper strength, phloem

Simulation for Compressive Behavior of Cartons

Hironobu Hirano, Takao Kobayashi and Isao Kodaka
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In order to optimize structural design of cartons such as corrugated boxes, it is necessary to understand their behavior when they are subjected to compressive loads. Since cartons have a complicated structure that is composed of multiple panels combined with each other, and the compression of cartons gives rise to a phenomenon involving plastic material behavior and buckling, it is difficult to analyze the behavior from the theoretical point of view. Therefore, numerical simulations using the nonlinear finite element method were performed to predict the compressive behavior of cartons.

Cartons were modeled as simplified configurations, tubes, which consist of four side panels. The material was assumed to be elastic-plastic with the properties of the paperboard. The carton model was divided equally into 3-D quadrilateral shell elements. The bottom edge was fully constrained as the boundary condition, and the compressive displacements in the vertical direction were applied for all nodes on the top edge as the loading condition. Considering material and geometrical nonlinearities, finite element analysis was carried out by the Newton-Raphson iterative method. All computations were performed using the commercial finite element program NISA (ver.11.0).

Compressive behavior of a carton was able to be simulated as follows. As the carton was compressed, the load applied on the top edge increased, and four side panels of the carton buckled into some sinusoidal waves. However, the load never fell because the vertical edges remained straight in spite of the buckling of the side panels. Eventually, buckling of a vertical edge induced the collapse of the carton, when the load reached its maximum point, and then decreased rapidly. The load value of this point corresponds to the compressive strength. This computation was able to be performed until four side panels folded up regularly towards inside of the carton. Simulation results showed that load-displacement relationships and deformation behavior were influenced significantly by material properties and structural geometry.

Keywords: Carton, Compression, Plasticity, Buckling, Finite element method

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Advanced Screening Concepts

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Screening is a decisive process stage for removing contaminants from fiber pulp. Different tools are necessary for different kind of tasks. It starts with the question “what should be screened" -primary or secondary fibers (brown or white) and “what contaminants" like coarse, fine disturbing components or shives or stickies. For each screening task, different kinds of screens are necessary. But what are the big influences on quality and what kind of impact do they have on a screen? It is common to discuss hole sizes and slot width. But beyond that discussion, several other points have to be taken into account.

In Europe new advanced screening concepts have been developed recently. The new concepts are using “Tandem Systems" with Feed Forward. Beyond that Intermediate Screening are used instead of Middle Consistency Screening Systems. Therefore a high variety of pre/ and fine screening arrangements are in operation in DIP Systems. They always compromises between maximum cleanliness efficiency, minimal fiber losses and investment costs. This presentation pick up some of the most advanced combinations and investigates the investment costs and performances. Due to the development of the new LP Screen new concepts for the OCC Line are also introduced.

Forerunner for Next Generation Canvas Cleaner

Akiyoshi Shibata
Canvas cleaner-project KGK Engineering Group

With ever increasing use of recycled papers, the maintenance of a stable quality of papers is the hot issue the paper industry is facing right now. Several issues are related in this regard. However, keeping dryer canvases clean is one of the on going hot issues.
The methods of dryer canvas cleaning is very diversified, such as from shower cleaning methods with lots of clean water consumption, to traversing cleaning head systems between FS and BS to get the benefit of all-over cleaning. However, none of them has ever reached the level of total completion.

We enjoy a very experienced history over handling canvas cleaner systems as the very first company ever introduced the canvas cleaner system into the PPI industry in Japan. The machine speed has achieved a surprise increase from 800m/min level of 1970 to 2000m/min level of the present. This has made possible with the paper machine development from fourdrinier former, to on-top former and further to gap formers(with better effect of no-draw). Together with it, the machine width has increased remarkably.

With this ever increasing machine speed and widening machine width, the hiking usage of recycled paper has ever spot lighted the issue of dirty dryer canvases which works very bad to deteriorate the paper quality.

Mono-screw Pump which is Advantage in View of Maintenance
- Mono-screw Pump which is Long Interval Time between Maintenance and Easy Disassembling and Reassembling -

Yoshiro Tsuruga
ENGINEERING DIV., IWAKI CO., LTD.

Mono-screw pump is well known. The most important feature of the mono-screw pump introduced here is double shaft construction of five year guaranteed flexishaft and pump shaft. This construction enables long interval between maintenance and easy disassembling and reassembling at the time of maintenance and inspection.

In addition to above mentioned feature, another feature is the long life for whole pump because the user can select suitable coating of rotor according to pumped liquid and because reliable mechanical seal is employed in cooperation with mechanical seal manufacturer. Most of users of this pump do not do the maintenance works except replacement of rotor and stator.

Generally used pin joint or gear joint needs periodical maintenance works, above all, qualified worker is needed to disassemble and reassemble the gear joint.
Mono pump does not need qualified person to be disassembled and reassembled, and inside company person can do the maintenance works for small size to large size pump. Furthermore, interval time between maintenance for whole pump can be shortened by selecting suitable parts, which saves the cost for maintenance such as spare parts cost and personnel expenses.

Study of Less-dirt Parts for Paper Machines

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Yong-Bo Chong
Research Institute for Applied Science

In recent years, rolls contaminated easily during the machine operation causes serious defects on paper.

It was found out that an excellent plating with the hydrophobicity and durability .It was superior to fluoroethylen resin that is hard to be contaminated, as a result.

It was found to improve the coating paper quality by appling a metering rod for a coater machine on paper machine's equipment. On the other hand, it will be applied the cover of various rolls for easy relies contaminant.

Papermakers Experience with Improved Talcs for Pitch and Stickies Control in Europe and North America

Shingo Hayakawa
Nihon Mistron Co., Ltd.
J. Yordan, V. Lasmarias, P. Biza and G. Williams
Luzenac Group

Modern papermaking requires modern additives, especially with the growing importance of environmental protection, the need to improve cost efficiency and safe product handling. Talc is the natural product for the paper industry with three main properties, hydrophobic/organophilic surface, softness and platy structure. Most talc applications are based on the improved quality or reduced cost talc offers to the end users. The fact that talc is chemically inert makes it safe for handling and application as well as an environmental friendly product.

In this paper the experience with novel surface-treated talcs in six European, North and South America paper mills is presented. More specifically, there experiences describe the successful control of pitch and stickies obtained with two types of surface-treated talcs at four newsprint mills, a fine paper mill and mechanical (TMP and groundwood) and recycled pulps or combinations thereof.

Development of New Pigment which Gives High Opacity

Motoshi Tamura, Noriaki Matsuda and Kazuyuki Hosoi
SHIRAISHI KOGYO KAISHA, LTD.

In the paper manufacture industry, precipitated calcium carbonate (PCC) and titanium dioxide (TiO2) have been widely used as a filler in order to improve whiteness and opacity of paper for many years. TiO2 is an expensive product and has a problem, which is low one-pass retention in paper making process compared with PCC.

Recently, the composite of TiO2 and PCC has been researched by various methods in order to improve retention and optical properties such as opacity and brightness.

"Valkofil" is our new Pigment combined with TiO2 and PCC using our unique process. Valkofil is able to give higher opacity and Light Scattering coefficient (L.S.C) to paper than conventional PCC.

Stabilized Bromine - A New Technology for Alkaline Microbiological Control

Gray W Johnson
Nalco Pacific Pte Ltd., Singapore

The global movement to neutral-alkaline papermaking has increased pressure on microbiological control in the wet end. Over the past decade, in an effort to improve program effectiveness and to reduce costs, the widespread utilization of halogenated oxidizing biocides has brought with it additional operational problems such as increased corrosion, chemical attack of other wet end additives and paper machine clothing, and increasing environmental concerns about the discharge of AOX. A new stabilized bromine based biocide that releases halogen slowly has demonstrated; both rapid kill and persistency; compatibility with other additives, reduced corrosion, and has the potential to reduce the dosage of other more harmful biocides.

Advanced Winder Adviser Controlling to a Winder Operation

Atsushi Kurosaki
Cognex K. K.

The results of Advanced Winder Advisor (AWA) system are highlighted. AWA can control to a winder accurately, using inspection data and synchronization by SmartView Paper web Inspection system. The results are (1) Stopping at desired defects within ±10 cm, (2) Reduce winder operation time.

SmartView and Advanced Winder Advisor package allow users to have best performance of inspection and winder operation.

“Visualization of Operations” and “Integration of Operation Environment”
-OperationAnywhere-

Manabu Doji and Yutaka Makino
Advanced Automation Company・Yamatake Corporation

Since introduction of Distributed Control System (DCS), plant and process controls are automated and operations became central controls. However there are a lot of field operations as ever for various reasons. In the situation operators of baby-boom generation who play a key role in the field are ageing. It is certain that generational shift from experienced operators to younger proceeds. It is a critical issue that next generation takes over the know-how of experienced operators in order to maintain safety and stable plant operations.

Because of the central control architecture of traditional DCS, the functions were not sufficient to assist in field operations. Then Yamatake offers “OperationAnywhere” as a new generation concept that realizes Operations freely without restrictions of space. “The visualization of operations” means to catch the field conditions from office or remote place and the producing status of whole plant include other process. “The Integration of operating environments” means to operate of separate systems at the same time through the single Windows terminal and to minimize costs for the investment as compared with before.

We introduce the detail of concept “OperationAnywhere” and that product family.

Experience with Modern RCF Line Producing Stock for Industrial Grades

Kimmo Nurminen
Andritz Oy
Yousuke Takeshita
Andritz K.K.

The environmental and economic benefits of using recycled raw materials are becoming increasingly self-evident to many different industries. For this reason a growing number of paper and board manufacturers globally are now favoring recovered fibers as raw materials. And as the recovery rate increases, the use of recovered paper and board is also seeing an upward trend. There are already signs that there is a shortage of good quality recovered raw materials in certain parts of the world.

Increasing raw material use and price, transport costs, and deteriorating raw material quality will all affect a mill’s productivity. Ultimately, design of the RCF line and its ability to handle a higher content of impurities will determine the future cost-effectiveness of the entire mill. Technological developments enable the use of lower grade furnishes, while producing final products with improved quality.

Many mills all over the world have been investing recently and some are currently planning to invest in new industrial-grade lines. Many decisions are based on the current situation where, for example, it is possible to use 100% good quality OCC as raw material.

The situation will change, however, in the future and this in turn influences mills in many ways. Lines must start using very high percentages of mixed waste. Some will even go up to 100% low quality mixed waste. The equipment chosen today dictates how well a new OCC/MW line will be able to cope with this wide range of raw materials in the future.

In this paper, a very simple but also very effective solution is presented for a modern industrial-grade RCF line.
Results are also provided from several mill installations and pilot plant trials.

The main target is early removal of contaminant and a minimum of equipment to reach the required quality. The pulping stage is the first and most important stage of the line. Pulping will dictate the pulp properties, impurities content following pulping, and operation of the entire line.

Report of the 13 International Symposium on Wood, Fiber and Pulping Chemistry (13 ISWFPC)

Gyosuke Meshitsuka
The University of Tokyo

13 International Symposium on Wood, Fiber and Pulping Chemistry (13 ISWFPC) was held at Sky City Convention Centre in Auckland, New Zealand as the joint symposium of 59th APPITA Annual Meeting. Main topics of this symposium are pulping and bleaching chemistry. About 200 papers including 99 oral papers were presented at 11 sessions of pulping and bleaching chemistry, cellulose chemistry, surface chemistry, biosynthesis and chemical structure and so on. Forty nine papers including 22 poster papers were in the field of pulping and bleaching chemistry, which were largest number among all sessions.

Optimum Design of Flute Structure for Edgewise Compression of Corrugated Fiberboard

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Corrugated containers are widely used for packaging various products. The compressive strength of corrugated fiberboard determines the compressive strength of the corrugated container, which is one of the most important required properties. To obtain higher compressive strength, various measures can be taken, such as raising the basis weight, adding more kraft pulp or using more fluting medium. However these measures generally increase the cost.

Here we report the results of our study on flute structure with a view to improving the edgewise compression strength of corrugated fiberboard without increasing costs. Our method is to simulate the deformation behavior of an edgewise crush test (ECT) using finite element method (FEM). In our study, the compressive strength of corrugated fiberboard was estimated through the following procedure.

Firstly, the compressive strengths (Sc) of the liner and the fluting medium were ascertained by carrying out short-span compression tests (SCTs). Next, these SCTs were simulated, then the maximum equivalent stress at the point at which the model reached Sc was regarded as the failure criterion. The compressive strength of the corrugated fiberboard was assumed to be equal to the reaction force at the point at which the liner or the fluting medium reached the failure criterion in the ECT simulation. In the FEM simulation, nonlinear structural analysis was carried out under the assumption that both the liner and the fluting medium behave as orthotropic elastic-plastic materials. The model of corrugated fiberboard was constructed of shell elements.

On the other hand, a series of experimental corrugated fiberboards with various flute shapes (U-shape, V-shape, UV-shape and so on) were prepared, then their edgewise compression strengths were compared.

As a result, the V-shape with the larger glue width was found to have the most advantageous flute structure in terms of strength and cost.

Keywords: Corrugated fiberboard, Finite element method, Flute structure, Edgewise compression strength, Edgewise crush test, Short-span compression test

Characteristic Mechanical Properties of Washi Papers

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Comparing with commercial papers from wood pulp, Japanese traditional papers, washi from kozo fibers show the following features; Washi generally gives thin paper sheet relating to its low basis weight. Sheet density and elastic modulus of washi are low, showing poor fiber-fiber bonding. However in-plane mechanical properties of washi are superior to those of wood pulp papers, especially tear strength and folding endurance are enormously excellent。 On the other hand out-of-plane mechanical property such as peeling strength at paper failure is poor for washi.

Keywords: Density, Fiber-fiber bonding, Kozo fiber, Mechanical properties, Washi

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Innovative Technology Reduces Both COD and Through Deoxidization

Norifumi Yoshida
Aience Co., Ltd.

Biological processes, in particular activated sludge are commonly used as secondary treatment methods in paper-industry sewage systems. What is less widely known, however is that the use of an aeration system (aeration efficiency) can greatly improve treatment performance. It would be no exaggeration to say that because most drainage treatment plans operate independently of production facilities, an unnecessarily high degree of carelessness is common in the industry. A little more attention in this area could substantially cut losses in a company's net profits. As the term biological process suggests, by activating microorganisms, it is possible to reduce the amount of BOD and COD in wastewater.

But when use incorrectly this basic technique can be counterproductive, making it difficult to reduce the load and at the same time, producing a large quantity of sewerage. What causes this to occur? The answer lies in the subtle relationship between oxygen and microorganisms, which when not properly dealt with can create needless problems. Microorganisms, with the exception of large amounts of artificially created chemical substances, thrive in direct relation to their immediate environment. And like human beings, some microorganisms metabolize energy with oxygen. In other cases, they metabolize with nitric-acid or sulfuric-acid ions. However, by using aerobic drainage treatment methods such as activated sludge that cause non-oxygen metabolization, not only does a decrease in treatment speed occur, but odor and bulking (filamentous bacterium) frequently result. To prevent these unwanted consequences, it is necessary to efficiently diffuse the oxygen in the BOD load in an existing diffusion tube becomes, the more difficult the process becomes.

To solve this problem, by raising the water and sludge from the bottom of tank, Aience's revolutionary water treatment system makes use of a technique that greatly circulation of the water and improves performance in a way that has been impossible until now.

The Latest Environmental Load Reduction Technology in Wastewater Treatment

Katsura Kitatsuji
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Three systems were introduced as the latest environmental load reduction technologies. 1) The supercritical water oxidization system uses supercritical water to rapidly decompose organic compounds into water and CO2. It can carry out complete decomposition of the high strength organic matter, organic sludge and persistant organic pollutants. 2) ANAMMOX Bacteria have completely different new nitrogen metabolism from other bacteria, and generate nitrogen gas from nitrous acid and ammonia under anaerobic condition. By combining nitrous acid oxidization and ANAMMOX reaction, significant reduction of treatment cost and CO2 can be achieved compared to the conventional nitrogen removal system. 3) The activated sludge system utilizing protozoa generates 70% or fewer excess sludge compared with a standard activated sludge process without additional energy requirement.

The following three systems were introduced as environmental load reduction technologies in the paper and pulp industries. 1) Moving bed biofilm reactor is the latest biofilm process. Backwashing is not required in MBBR and the maintenance is very easy. Because of the high treatment efficiency, low concentration wastewater can be processed within shorter time. It is also more suitable for wastewater treatment process of paper and pulp industries. 2) The super-high loding anaerobic reactor was developed by improving UASB. Applicability to KP drainage, DIP wastewater, and neutral paper-making wastewater have been already confirmed. 3) The chemical addition control system based on optical dispersion sensor is applied to flocculation process and dewatering process of excess sludge. The sensor detects the optimal flocculation condition using laser light dispersion and optimises the chemical dosage. Compared with in manual operation, about 30 percent reduction of the chemical dosage is possible. Moreover, combined use of ogranic coagulants in this system enhances further reduction of inorganic coagulants.

Status and Trend of Environmental Laws and Regulations

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Since the 1990s, many environment-related laws and regulations have been enacted and put in force, one feature of which is the reinforcement of waste and chemical substance management for environmental conservation. The other is the establishment of a framework for a sustainable society, ranging from effective utilization of resources and eco-friendly goods to environmental report and education. Ministry of the Environment has played the central role in these environmental policies after the reorganization in January 2001.

As for waste management, twelve laws have been promulgated between 1995 and 2000, 6 of which are recycling-related ones. And "Waste Management and Public Cleansing Law" has been frequently revised for the past few years including the revision in May 2005, though it was said that the revision in 2000 was final. This law must be paid attention by not only person in charge but also business people because the industrial waste is generated in wide range of businesses irrespective of its size and has to be treated under many requirements.

In regards to chemical substance management, effective laws and regulations have been implemented to reduce pollutants such as Dioxins. On the other hand, the voluntary action practiced by industry sectors has been also efficient to decrease hazardous chemicals, in accordance with the principles of “PRTR law”, “Air Pollution Control Law” and so on, which is very different from traditional approach through national emission standards.

There are some laws and regulations needed to be monitored cautiously in pulp and paper industry, which is the introduction of VOC regulation in “Air Pollution Control Law”, the revision of total pollutant load control in “Water Pollution Control Law” and the spreading of odor regulation based on humane olfactory perception. Recently PCB waste treatment has begun and early registration discount system by Japan Safety Corporation (JESCO) is currently in progress. It is desirable to cope with this type of movement in a planned manner.

What is Multi-chemical Sensitivity?

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Are there any ones who intend to induce sick-house syndromes or multi-chemical sensitivity problems? Who is responsible for these indoor environmental problems? Any stakeholders of the indoor environment, such as building designers, constructors, and industries of construction materials and consumer products do not intentionally draw the serious problems. They are generated as side effects of mitigation measures of some environmental problems.

To prevent climate change and resources depletion issues, various new technologies have been developed. Airtight houses can contribute to conserve energy for cooling and heating by reducing air exchange rates. However, the airtight house tends to be more polluted by volatile organic compounds because their concentration is reciprocally proportional to the air exchange rate. Energy conservation by contracting airtight houses conflicts with indoor air pollution. These kinds of dilemma or multi-lemma issues are real causes of sick house syndromes and multi-chemical sensitivity problems.

Keywords: sick house syndrome, multi-chemical sensitivity, dilemma, climate change, resource depletion

Waste Utilization Technologies in Japanese Cement Industry

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The cement production process has the special characteristic of being able to use large volumes of waste and by-products as raw materials and fuel. The Japanese cement industry produced 73.5 million tons of cement in 2003 and used 27.6 million tons of waste and by-products as alternative raw materials and fuel. The cement industry can be seen as the nucleus of an industrial cluster in the field of the waste utilization.

In recent years, though the production output of cement is on a declining trend, the expectations and requests from the society for more utilization of waste are increasing, so the structure of the industrial cluster has been changing. The Japanese cement industry has developed the new technologies for waste management, and worked toward increasing the treatment quantity and the utilization of more difficult items to dispose.

In this report, the present situation of the waste utilization in Japanese cement industry and the new waste utilization technologies are reviewed.

Keywords: waste utilization, cement industry, incinerated ash of municipal waste, sewage sludge, municipal solid waste, chlorofluorocarbon, Ecocement

Eco-Action 21

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The recent social and economic system of mass production, mass consumption and mass disposal has offered us convenient and comfortable life. But, it has put huge burden on natural environment, and the balance between the socio-economic system and our natural environment has been severely damaged. Now, the existence of human being is threatening.

We have to convert this socio-economic system of the 20th century to one which is sustainable and recyclable and is characterized as “suitable production, suitable consumption and minimal disposal”.

To establish this sustainable recycling society, everyone including business people, consumers and government persons should voluntarily and aggressively take part in the movement. Especially, business enterprises which play a major role in the socio-economic activity are expected to work actively, whether they are large or small or whatever business they are in.

Large corporations are willingly working for sustainable environment by taking ISO 14001. But, it is also a fact that not a few small business enterprises are pro production and are not affordable in expense for environment conservation. Recently the good behavior for environment conservation is becoming one of requisites for business deal and those who neglect it will surely lose their business opportunities.

Eco-action 21 targets to urge those small enterprises which are significant in the socio-economic activity to become environmentally friendly. Its characteristics and procedure are discussed.

Simple system setup for ISO 14001

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Many enterprises are working to get the certificate of ISO 14001 in Japan. ISO 14001 intends to be helpful to solve global environmental problems like the global warming by individual and voluntary efforts of improving environmental management system in every enterprise. Therefore, it is welcomed that ISO 14001 is more commonly obtained everywhere.

As recent environmental problems are diversified in many kinds like dioxins, environmental hormones, land pollution and waste disposal, it is more important for enterprises to have their own environment management system which is capable of proper risk management, not one just asking to obey laws. The meaning of getting the certificate exists in this capability.

Large corporations are getting ISO 14001 and the trend is now prevailing in smaller organizations as well. The incentive of getting the certificate is : better environment conservation work, one of corporation policies, an improved corporation image, an international trend, evaluation by a third party, a requirement by customers, improving corporate management system and eliminating environmental risks. It is important to clarify the intention of introducing ISO 14001 and to get substantial return. Otherwise, it would be for the sake of written forms or be too exaggerated. The author will explain how to set up an efficient system which he calls “simple system setup” through his experience as an inspector.

Compactness for Agility and Stability of Wet-end Process with the POM System Improves the Paper Machine Production Efficiency

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Aikawa Iron Works Co., Ltd.

The first concept of the POM Compact Wet-End System was the minimizing of the thick stock and the short circuit volume to get fast and precise response for small lot & many grade changes paper production machine. The POMix is a thick stock mixer with small volume and high efficiency to avoid huge volume mixing and machine chests. The POM header is developed for the process that is handled in a closed hydraulic system without tanks and vessels. The back water must be degassed by the POMp before feeding it into the closed system. The POM lock is the very compact system to avoid the seal pit. Contrary to people's fear, it was proved that the POM Compact Wet-End System yielded improved stability and operability. And additionally, it was proved that the POM system is cleaner, smaller energy consumption, better paper strength than traditional system.

Today, it is recognized that POM Compact Wet-End System improves the productivity not only for the small lot & many grade changes paper production machine, but also for the writing printing paper, the news printing paper, liner paper, board paper, and tissue paper machine.

JK-BC System as A Highly Advanced Waste Water Treatment System
－Waste Water Treatment Test With Bacilli at Paper Mills －

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Tooru Shimomura
MITSUBISHI PAPER MILLS LIMITED, HACHINOHE MILL, Power Sec. Pulp Production Dept.

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.

Is Your Slitting System Cutting into Your Profits?

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Knowing the details of your slitting operation, can lead to higher quality and reduced costs in some unexpected ways. Many converters and paper manufacturers could have a slow steady profit loss they may not even know about. Perhaps they have got used to frequent knife changes and time consuming set ups of a poorly designed slitter, even though it is costing them money.

As companies tighten up their operations, many are discovering that they can cut costs, reduce product waste, minimise downtime by taking a look at their slitting systems. Understanding the fundamentals of slitting is important, and knowing how to evaluate a system for a specific application can build up the bottom line.

Something as simple as changing the process can make a big difference.

Analysis of Behavior of Rosin Glycerin Ester in Rosin Ester Emulsion Size by Visualization Using ToF-SIMS

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Recently, in order to prevent water penetration, the rosin size emulsion that contains abietic acid, maleic rosin and rosin glycerin ester has been applied at many mills in neutral papermaking conditions. It is said that the role of the rosin glycerin ester is to prevent the dissolving of abietic acid and maleic rosin into water. To make clear this, the behavior of the rosin glycerin ester in rosin sizes in different papermaking conditions was investigated by ToF-SIMS (time of flight type secondary ion mass spectrometry). To assure certain detection of the rosin glycerin ester, we used a deuterium-labeled rosin glycerin ester synthesized using deuterium-labeled glycerin and analyzed by searching the deuterium ion peak. This labeling method was very useful for our purpose. ToF-SIMS images and the measurement of sizing effectiveness of handsheets prepared in different pH showed that rosin sizes containing rosin glycerin ester exhibited sufficient sizing effectiveness, and rosin glycerin ester still remained on pulp fiber surface in alkaline as well as in neutral papermaking conditions. However, rosin sizes without rosin glycerin ester did not show the size effectiveness in a neutral condition and that suggested abietic acid and maleic rosin were dissolved. This result supported the past research that rosin glycerin ester prevents the dissolving of abietic acid and maleic rosin into water in a neutral condition.

Key words: ToF-SIMS, rosin sizes, rosin glycerin ester, deuterium-labeling

Ink Penetration Mechanisms for Modified Calcium Carbonate-coated Ink-jet Paper

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Nowadays, ink jet printing systems are widely used not only for personal use, but for advanced commercial printing capable of outputting variable information continuously, prepress of offset printing, non-contact printing on curved surfaces of packages and many other applications in industry. Manufacturing technology of ink-jet paper, one of the ink-jet media, is rapidly developing, but not keeping pace with improvements in printing speed and size reduction of ink droplets developed by novel ink-jet head technology. Commercial ink-jet papers are made from silica or alumina as a coating pigment, both of which give high image quality, but are expensive. The present work aims at efficient use of calcium carbonate as an alternative of silica for ink receptive coating layers. Commercial calcium carbonate was ground mechanically or dissolved partially with hydrochloric acid to reduce and equalize the aggregates size. Trial ink-jet papers were prepared and some of them were plasma-etched to give a hydrophilic property. The trial ink-jet papers were evaluated in terms of dynamic behavior of ink droplets ejected from a test ink-jet head by a microscopic high-speed video camera system and of ink penetration depth determined by confocal laser scanning microscope (CLSM). Particle size reduction of calcium carbonate pigment by mechanical grinding and hydrochloric acid dissolution decreased ink dot area and dot roughness on the papers. This result suggests that particle size reduction improves image quality. Based on the criterion standard that smaller the dot area, the better the image quality, the efficient processes were mechanical grinding, hydrochloric acid dissolution and plasma-etching in the decreasing order. It is concluded that particle size reduction decreases pore size of the coating structures and consequently ink droplets tend to penetrate deep in coatings rather than spread laterally along surfaces.

Keywords: coating layer, confocal laser scanning microscope, ink-jet printing, grinding, plasma-etching

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Paper quality at Dryer section

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Dryer section has been composed of multi cylinder dryers and steam heat has been used for drying from old time. On the point of view from paper quality, the moisture profiles at thickness direction and cross machine direction especially influence the quality in dryer section.
In this paper, the development of dryer section, the trend of paper market, the required paper quality from the printing machine, the paper quality improvement by dryer section are introduced.

Latest Technology of Dryer Section
- Introduction of Voith HiDryer -

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During the last few years the paper machines around the world set one speed record after another. Today the speed limit of paper machine is defined by the strength of the wet sheet in the beginning area of the dryer section. Even in the single-tier dryer with modern stabilizer “ProRelease”, the considerable web tension is required for the better operation. So the solution for further paper machine speed-up is simply the dryness increasing before the conventional dryer section once more.
The perfect solution comes with the development of Voith HiDryer with impingement drying system. Here we introduce this sophisticated new drying equipment for successful future.

The Latest Technology of Dryer Hood and Machine Room Ventilation

Kouji Saito
Metso SHI Co., Ltd., Application Engineering

Dryer section hood and ventilation system has been developed together with the development of paper machine production. Flow volume of exhaust air from the latest dryer hood and ventilation system has been minimized by adopting high humidity in the exhaust, which has minimized the energy loss from the exhaust air by increasing the heat recovery efficiency as warm water and pre-heating of hood supply air. However, minimized exhaust air volume does not prevent evaporation from the paper by supplying sufficient amount of heated dry air to the pocket; in addition it improves web runnability by newly developed blow boxes. Modern air system consists of hood and ventilation mentioned above, air dryer system in the coater dryer, mist ventilation in the wet end and machine hall ventilation.
The latest system of dryer hood with it’s history, heat recovery, mist ventilation and machine hall ventilation are introduced in this paper.

The Improvement of PM9 Production Efficiency by Retrofitting the Dryer Section at Shiraoi Mill

Yuji Hoshino
Shiraoi Mill, Nippon Paper Industries Co., Ltd.

No.9 paper machine at Shiraoi mill, Nippon Paper Industries, has been in operation as fine paper machine since 1975.
In 1995, it was remodeled for coatbase paper machine. We had difficulty problems result of increasing the machine speeds, and the modification of paper grades.
One problem was the sheet breaks caused by sheet flutters, and other was the sheet spots caused by dewdrops. In November 2004, we improved these problems with replacement of pocket ventilation systems.
In this report, I introduce this replacement and the operating experience.

Basis Concept of Drainage Equipment

Yoshiyuki Gohoh
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Dryness of Wet paper is an action that evaporates the moisture by heat, and is movement of heat and a substance. As for the basic concept of Drainage equipment, for these what ten years is not changing. In Drainage equipment, in connection with the M/C speed rise of a Paper machine, condensate water discharge apparatus evolved into high speed stationery siphon + blow through steam from bucket + steam trap.

A regulation meter and control apparatus have also changed from panel board of an air formula to an electronic formula regulation meter or DCS. By this sentence, Drainage Maker plans to introduce the actual condition of the Drainage equipment design business centering on the heat calculation to some extent.

Technical Trends in Dryer Fabrics

Hideyuki Onishi
Shikishima Canvas Co., Ltd.

Dryer fabrics, which are used on many parts of dryer sections of paper making machines, have longer longevity than other paper making clothing like forming fabircs and press fabircs. For this reason, they are necessarily required to be maintained good and stable condition for fairly long periods.

To enable dryer fabrics to be used for longer periods on the paper making machines in Japan, which have been controlled by the highest standards of management and control system achieved by the Japanese paper making manufacturers, it will be very important and indispensable for dryer fabric manufacturers to continuously make every efforts in improving and developing the quality of dryer fabrics.

In this discourse, the new technology incorporated in improving and developing dryer fabrics will be reported with specific examples based on following themes:

The improvement on durability of dryer fabrics

The countermeasures for anti-contamination of dryer fabrics

The dryer fabrics for high speed paper making machines

Besides above, “The understanding on the present state of dryer sections” will be also reported, which we learned through our various measurments on site.

High Pressure Waterjet Canvas Cleaning Technology

Makoto Matsushita
KGK Engineering Corp., NUSM Division

We started selling the High Pressure Water Jet Canvas Continuous Cleaning System presented by ProJet B.V., Meerssen, Holland, April 2004, and delivered the first system in September the same year. Ever since over less than one year, we sold total 15 systems and are enjoying ever ceasing sales and new inquiries. Over our sales activities as above, we have heard many cases in the past over the competitors’ systems that they did not bring about satisfactory cleaning results as was expected of.

What secrets there are in the ProJet system that have resulted in such a remarkable surge in the sales over less than one year period? What are differences between ProJet system and others? Where we are planning to go to improve ProJet system further?

We are going to talk and introduce about those topics in this workshop.

Solutions for Deposit on 1st Drying Part of PM 1 at Oita Mill

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Oita Mill, Oji Paperboard Co., Ltd.

In Oita Mill , we started up the PM1 in May 1970 , which at the time had Inverform machine.　Originally the machine had four inlets which had a wire width of 4200mm , and produced 300T/D linerboard. Since then, the PM1 was rebuilt for the purpose of improving product quality and increasing machine speed.

Presently we produce 600T/D of kraft pulp liner on average, with a maximum operation speed of 900m/min. But we had some trouble for deposit on drying part all the time. In October 2004 we remodeled the canvas cleaner on 1st drying part. Combi Cleaner, the name of the canvas cleaner, carries professional high pressure water jet.

The following report describes the operational experience of the Combi Cleaner from initial start up to the present time.

A Report on the 19th ISO/TC6 Meeting

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ISO/TC6 meeting was held on June 6-10, 2005 in Stockholm, Sweden. The number of registered delegates representing seventeen countries was eighty three.

Three delegates representing Japan attended WG meetings, plenary meetings of SC2 and SC5, and TC6 plenary meeting.

Physical Structure Characterization of High Viscosity Kenaf Bast Pulps

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Wiwin Suwinarti and Kazuhiko Sameshima
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The high viscosity kenaf bast pulps were prepared by using three different methods (A, B and C) and their viscosity values were 109, 63 and 102 cP, respectively. The physical structures of these samples were characterized by FT-IR spectroscopy, X-ray diffractmetry and CP/MAS 13C NMR spectroscopy. Although the FT-IR spectra of all pulp samples revealed the similar chain conformation, the magnitude order of mean hydrogen bonding, relative ether linkage and crystallinity index were in the same trend with the order of viscosity values. X ray diffractograms and CP/MAS 13C NMR spectra indicated the presence of residual lignin between the (1 10) plane of the pulp that subjected to the method B. However, FT-IR, X-ray and CP/MAS 13C NMR analyses showed the method A gives the highest crystallinity pulp.

Furthermore, the relationships between the viscosity and the crystallinity index values in these three methods were in a high correlation (R>0.9), that indicates the viscosity is parallel to the crsytallinity.

Keywords: CP/MAS 13C NMR spectroscopy, crsytallinity index, FT-IR spectroscopy,
kenaf bast fiber, viscosity, X-ray diffractmetry.