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Operating Experience of Combisorter

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In Oita mill, there are three paper machines, PM#1, PM#3 and PM#5. Paperboard is mainly produced in Oita mill. In addition to it, gypsum liner board, white paperboard, color board and core board paper are produced.

As the usage rate of used corrugated paperboard accounts for about 80%, the reduction of the rejected pulp in the corrugated paperboard process leads to the increase of the pulp yield rate. In this report, we will introduce the case that the pulp yield rate has been boosted by the installation of Combisorter, IHI Voith Paper Technology Co., Ltd., at the last screen of the pulp production process.

Operational Experience of the Latest Coarse Screen Reject Treatment System “MaxiTrasher & MaxiSeparator”

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Kanto Mill, Nippon Paper Industries Co., Ltd.

Nippon Paper Kanto Mill, Ashikaga is located at about 70km north from the Tokyo metropolitan area and about 50km south-west from Utsunomiya city, Tochigi prefecture. The mill owns the PM1 that produces core paper, pasting paper board and water-resistant paper board, and the PM3 producing conventional corrugated medium and heavy-duty water-resistant corrugated medium.

Our production is running on about 99% recycle papers, based on a global environmental friendly activity that efficiently applies the recycle papers. It is however now becoming more and more tough situation to maintain the quality and the yield, due to more contaminants and increasing defibration difficulties in the recycle papers. We have now put for the first launch in Japan the “MaxiTrasher & MaxiSeparator” a coarse reject screen system from Aikawa Iron Works in place on our recycle paper handling process for the corrugated medium line, and

improved the yield and the operational performance. This paper introduces the details of this successful implementation.

Operating Experience of the Biomass Power Plant Combusting Exclusively Unused Wood

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The biomass power plant installed in Yatsushiro Mill is Japan's first power plant specialized in combusting exclusively unused wood. Our aim is to contribute realization of low-carbon society and activation of forestry as an overall biomass enterprise.

Biomass power plant has started commercial operation from June 2015. During the test run period, the operation was not stable by the influence of the fly-ashy conveyance system trouble and the fluctuation of the water content in unused wood. These problems were solved before the start-up and achieved the power sales volume as planned.

This reports operating experience of the biomass power plant combusting exclusively unused wood.

Development of Inkjet Paper for Newspaper

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In the publishing and advertising industry, on-demand printing has expanded the market as a promotion tool that meets customers' needs. On-demand printing, which makes it possible to print such variable information as customers' addresses and names, local advertisement, and guidance of goods based on customers' preference, has steadily become popular in the market with the spread of the device. Credit card bill, cell phone invoice and direct mail *etc.* are very familiar to us, and we can imagine that on-demand printing related would increase in the daily life.

Inkjet printing which doesn't require plate making and is advantage of a small amount of printing, has begun to penetrate even in the newspaper business. Assuming that local newspaper, city edition of national daily paper *etc.*, which have a few print copies, are replaced with inkjet printing, the authors have developed the inkjet paper for newspaper by the use of recycled pulp, selection of optimum ink fixative, the setting of optimum range of ink fixative volume and size

press coat weight *etc.* in order to add the quality of each grade required for the inkjet paper for newspaper. This paper introduces the technical development of inkjet paper for newspaper which the authors have studied so far.

Next-generation Surface Sizing Agent

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In recent years, we are faced with new challenges, including; 1) a decrease in sizing efficiency of the anionic surface sizing agents and the internal rosin sizing agents due to the reduction of the use of aluminum sulfate associated with an increasing trend of making acid-free paper; 2) destabilization of a surface sizing agent due to an increased number of calcium ions in coating liquid. This increase was caused by calcium carbonate falling from paper surfaces into coating liquid which was associated with an increase of the amount of calcium carbonate in paper, *etc.*

In China, the world's largest containerboard producer, this is done in order to maintain the strength of the corrugated fiberboard in the high humidity climate, and much starch has been used for coating as a paper strengthening agent together with the surface sizing agents when manufacturing the corrugating medium. As a result, the coating liquid contains much anionic trash such as fine fibers which fell off the low-strength paper.

Thus, a high performance surface sizing agent, which can efficiently impart stable sizing performance to the paper and has superior performance related to operability such as mechanical stability, *etc.* even under these conditions.

We have developed a new surface sizing agent which is different from the traditional surface sizing agents and adapts to this environment by reviewing the molecular structure and synthesis method to solve the problems such as the improvement of the sizing effect of surface sizing agent; the reduction of influence by contaminants including calcium carbonate, calcium ion derived from the calcium carbonate and anionic trash; and the improvement of mechanical stability.

Application to TEMPO Oxidized Cellulose Nanofiber for the Paper Product

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Our company is engaged in developing Cellulose Nanofiber (CNF) obtained by defibration of chemically modified pulp. Our aim is to establish stable mass-production of CNF with high quality and low-cost. In this report the characteristics and possible application to papermaking of TEMPO oxidized CNF, which we focus on developing, are reported. CNF as a raw material for papermaking improves air resistance and stiffness of paper. These result suggested the use of CNF as a material to give barrier property or better strength to paper. Furthermore, because TEMPO oxidized CNF's surface is easily modified by ion exchange application to various functional paper is possible.

The Operation Results and the New Match of Papermaking Machine Winder Number 10

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

Our factory paper making machine number 10 starts the operation in 2002, and building materials paper, food paper, a stencil for foil, metal joined paper, a stencil release paper wind specialty paper of the low density off with production, a papermaking machine winder number 10.

When wind paper of the low density off with a winder, a difference of the apparent density by the difference in winding hardness and a machine loss of the spool bearing affect the tension control, and wrinkle and paper break occur; have a problem.

I remodel the density at the time of the line picking up speed and slowing down to plan stabilization of the tension control so that the motor output becomes most suitable to correct machine loss in the line constant speed automatically and introduce the contents to the stable operation because there was an effect.

New Type Turbo Blower Saves Energy

—Air Foil Bearing Variable Speed Single Stage Turbo Blower TurboMAX—

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In this paper, I would like to introduce the advantages and technologies of TurboMAX turbo blower. TurboMAX turbo blower consists of superior technologies like air-foil bearing, permanent magnet synchronous motor, high efficiency impeller, high speed control technique and so on. As for the overall structure, blower, motor, inverter, touch panel controller and blow off valve are installed in one enclosure. This is a new style turbo blower called “air foil bearing-variable speed-single stage turbo blower” . Compare to the conventional blowers, TurboMAX turbo blower has many advantages in “Saving energy” “Low noise and vibration” “Saving maintenance cost” “Space-saving and lightweight” . Especially, compare to the conventional root blowers, TurboMAX turbo blower can reduce power consumption by 20% on average.

As global warming is serious issue around the world now, reducing the power consumption is required to all industries regardless of its type and scale. Especially for paper industry which uses and disposes a large amount of water, reducing the cost for waste water treatment is a big challenge. In the process of waste water treatment, aeration blower's power consumption makes up the large proportion, and aeration blower usually runs for 24 hours every day. So, high efficiency aeration blower can contribute to the cost reduction of waste water treatment significantly.

In the latter half of this paper, I introduce an actual case of replacing 2 root blowers to 1 turbo blower (MAX100) at municipal sewage-treatment plant for the field trial. As the result, we could confirm 25% energy saving, 16dB noise reduction, 25 μ m vibration reduction, and 6°C blower room's temperature reduction.

ShinMaywa Industries, Ltd. launched TurboMAX turbo blower since 2012 in Japan, and some blowers have been delivered to paper factories. Though these blowers are used only as aeration blowers, I expect TurboMAX turbo blower can reduce the power consumption in many other uses too. One of applications is the air supply source for flotator which is used in the deinking process during manufacturing recycled paper from used paper. I hope TurboMAX turbo blower contributes to the energy saving in many fields and it leads to the reduction of environmental burden of the globe.

Report on the Results of the Fiscal 2016 Follow-up Survey on “JPA's Action Plan for Low-Carbon Society” and Related Information on Measures against Global Warming in the Japanese Paper Industry

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Japan Paper Association

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

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

- Compared to BAU scenario(based on specific CO₂ emission rate of 2005), reduce fossil energy-derived CO₂ emissions by 1.39 million tons by fiscal 2020 .

- In view of securing forest resources and increasing forest carbon sink, expand forest plantation areas owned or managed by the paper industry at home and abroad to 700 thousand hectares by fiscal 2020.

According to the results of the fiscal 2016 follow-up survey (actual results for fiscal 2015), fossil-energy derived CO₂ emissions in fiscal 2015 was 17.81 million tons, a 28.6% reduction compared to the fiscal 2005 (24.94 million tons).This is attributed to each manufacturer's active efforts including energy saving and energy conversion from fossil energy to non-fossil energy such as biomass energy.

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

The History of Technological Developments of the Paper Industry in Japan after World War II

Part 1 : The Start of the Paper Industry after World War II

Kiyoaki Iida

The Japanese paper industry lost its pulp and paper mills overseas which had covered almost a half of its production capacity after World War II. It restarted with the new strategy of vitalizing stagnated technological developments. By disintegrating old Oji Paper Co., free competition in the market as well as in technological developments was secured. The organization supporting open technical information exchange among the industry was established. Those were significant advices by R. Murdock of GHP, which have later worked quiet fine.

Though the industry lost its latest equipment overseas, the know-how was succeeded with

those who returned to home land, and helped the restart of the industry. Its style of engineering, doing everything by themselves, continued for a while until suppliers started to deliver equipment as a complete set, symbolically demonstrated in No. 6 machine of Kushiro Mill, Jujo Paper in 1960. Then, the interest of the industry's engineering turned to focus on operating mill efficiently, improving productivity and upgrading product reliability. The industry has made use of newly developed technologies, the solid state technology being one of them, for its interest and, by its efforts, the industry has been able to be competitive internationally.

—Peer Reviewed—

High Brightness Mechanical Pulp from Eucalyptus Planted Trees

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The mechanical pulp yield is about 85 to 95% of the original wood, compared with around 45 to 55% for chemical pulp. Hardwood mechanical pulp has the desirable properties of low cost, high opacity and good printing quality due to its high bulk, high smoothness, resiliency, and good ink absorption. Hardwood mechanical pulp tends to have shorter fibers, higher light-scattering coefficient and lower strength value. Eucalyptus plantation tree is a common tropical hardwood species and is used for the production of lower yield chemical pulps such as kraft pulps. It is believed however that Eucalyptus mechanical pulp is not suitable for the production of graphical paper grades because of its low initial brightness and limited bleachability. Alkaline peroxide mechanical pulping (APMP) and thermomechanical pulping (APTMP) use caustic soda, hydrogen peroxide, and stabilizers to soften and brighten wood chips prior to refining in a disc refiner. The chip pretreatment facility employs a screw feeder device to apply mechanical compression on wood chips and squeezes out the detrimental substances for bleaching. It also partially destroys wood structures allowing for easier fiber separation and reduces refining energy. In our study, APMP and APTMP were applied to Eucalyptus-globulus planted trees by pilot plant tests and significant benefits were obtained to improve bleachability. Brightness of Eucalyptus APMP reached 87% ISO brightness that surpassed 80% ISO brightness of aspen APMP.