About energy-saving efforts at the Takaoka Mill

Kimihiko Wata
Takaoka Mill, Chuetsu Pulp & Paper Co., ltd.

It is natural for companies to comply with each emission standards, in addition we set and operate according to the internal standards that are stricter than the legal levels. However, it is undeniable that there are facilities that use excessive energy to comply with the high reference standards. Although compliance with the legal standards is the top priority, we introduce the case of a bio film treatment device that was able to achieve a large effect by taking measures from a new point of view on energy conservation system in wastewater treatment facilities.

High-efficient Flat Belt Drive
-Introduction of HFD System(Hyper Flat Drive System)-

Takemasa Yoshimi
Power Transmission Belt Design Group Engineering Department Industrial Products Division, BANDO CHEMICAL INDUSTRIES, LTD.

Bando have been a pioneer in the non-tire rubber and plastics industries since our founding in 1906, responding to customer needs with new technology and product development. Over the centuries we have expanded upon our core business to meet the ever-changing needs of the times, and we now produce a wide range of products, starting from the first Japanese manufacturer of power transmission V belts, conveyor belts, systems to precision equipment components, and optoelectronic and electronic materials. At Bando, by utilizing the industry’s most advanced technology, we believe that any product, even the “workhorse” V-belt, can be built a better way to solve customer needs and also to the environmental initiatives.

As regards to new request and market needs, Bando “Hyper Flat Drive System (HFD system)” is one of the most efficient equipment and eco-friendly processes, for the next generation horsepower tasks to all power transmission application users.

Our HFD system, we recognized the excellent qualities of the flat belt and refined those qualities with further improved transmission capabilities for below points:
1. An operation with ideal tension and improved transmission efficiency leads to energy saving and CO2 reduction.
2. Maintenance free is possible due to the longer service life and tension control by the unique technology of auto-tensioner.
3. Flat belt construction leads, low flex distortion, and reduces noise problems.
4. Development of flat type belt, compact design layout is available, with no influence on the durability.

In addition, to sustain the most efficient power transmission system, Bando developed a unique technology of belt meandering device. This drive system will autonomously control the running belt to the right position and by combining this devise system with an auto-tensioner, Bando overcame the belt side tracking and tension problem. Thanks to continuous research and development today we cover the size line up for the application from 2.2kW~22kW and for the heavy duty users 30kW~75kW.

The Trial of novel wood biomass fuel co-firing in Kushiro N1

Hiroyuki Ogawa

This article will report the trial of novel wood biomass fuel co-firing trial, which was carried out at N1 power plant, Kushiro Mill, Nippon Paper Industries Co., Ltd.

N1 power plant is a coal fired power plant, which still holds a key position in generating electricity in Japan. However, tons of CO2 emission from coal combustion is a significant
environmental issue. Woods are considered to be carbon neutral, so that we can reduce CO2 emission by substituting wood-derived fuels for coals. Under the increasing social demand against global warming, we are researching novel wood biomass fuels usable for pulverized coal boilers as one of the efforts to reduce greenhouse gas emission which contributes to realise a low carbon society.

Since N1 boiler is a pulverized coal boiler, it needs to be crushable with coal mills to use wood biomass fuels. However, it is often difficult to crush the wood biomass because they are usually very rich in fibre and high in water content. It is common to employ stokers or fluidized-bed technologies to burn biomass fuels. Then, we carried out some wood biomass and coal co-firing trial to investigate the availability of so-called “black pellets”, the wood biomass fuels processed by steam explosion or torrefaction technology, for pulverized coal boilers.

In this study, we examined the mixing rate of wood biomass and coals up to 30wt%. The mixed fuels were supplied to the coal mills of N1 boiler. And we ran and adjusted the boiler, monitoring the operating status of the mills and the boiler.

As the result of this research, we found out that we could ran N1 boiler burning coals mixed with 30wt% black pellets without any modification to the current mills and boilers. However, we needed to adjust lots of their parameters due to the property difference between coals and biomass fuels.

Also, it is suggested that there is a potential to use the biomass fuels more than these results and it needs a further study.

Introduction of Subordinate Power Generation
-Saving Energy by Installing Small Hydroelectric Generators-

Takeshi Oe
Nakatsu Mill, Oji F-Tex Co., Ltd.

Pulp and paper manufacturing is an energy-intensive industry and thus Oji Group has been actively promoting energy-savings and introducing renewable energy equipment. Under these circumstances, Oji F-Tex has set up the aim of saving energy: Nakatsu Mill has been working on energy-saving activities such as installing energy-efficient equipment and improving operating procedures. However, different perspectives are needed at all times to promote further energy-savings. Nakatsu Mill has focused on elevation differences in its water treatment facilities and considered installing small hydropower turbines which subordinates to the main hydropower plant. As a result, it has successfully generated power by installing turbines before a sedimentation device with a steady flow of water and also by effectively utilizing idle equipment.

This article introduces a consideration of installing small hydropower turbines utilizing the location of Nakatsu Mill and the results of its power generation.

Operational Experiences of MVR Evaporator in Gotsu Mill

Takuji Okamoto
Gotsu Mill, Nippon Paper Industries CO., LTD.

Gotsu Mill is the only domestic manufacturer of dissolving pulp which is produced by sulfite process. The evaporation capacity of our two evaporators have reduced due to their deterioration after 20 years since their construction. It was a major reason for the reduction of pulp production, therefore a new evaporator was planned for installation. Comparing MVR evaporator with multiple-effect vacuum evaporator based on the nature of sulfite liquor and the energy efficiency, MVR was installed. As a result, pulp production increased by 111% compared to before installation. Energy costs decreased by 13% compared to the installation of multiple-effect vacuum evaporators.

New Type Turbo Blower Saves Energy & Stable Operation With IoT
-Air foil bearing Variable speed Single stage Turbo blower TurboMAX-

Tsuyoshi Masuda
ShinMaywa Industries, Ltd.

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 with 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, 25μm vibration reduction, and 6℃ 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. As for paper factory, we have delivered blowers to 8 paper factories so far and 12 blowers are in operation now. Especially, one of these blowers are used for flotator which is used in the deinking process during manufacturing recycled paper from used paper, and we confirmed TurboMAX turbo blower can reduce power consumption in non-aeration use too. I expect TurboMAX turbo blower can reduce the power consumption in many other uses too. 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.

Operating Experience of Volume reduction solidification equipment

Makoto Hayakawa
Oji Materia Co., Ltd. Gifu Mill.

The Nakatsugawa Mill of Oji Materia, located in Gifu Prefecture center of Japan, produces Corrugated Medium Paper.

We acquire ISO14001, and have been actively working to reduction of waste, prevention of air and water pollution, noise and vibration. And the pollution prevention ordinance is concluded and observed between Nakatsugawa city.

Now, as increasing waste measures, we introduce environmental load reduction using volume reduction solidification device to convert landfill waste and incinerator with Low grade Waste Paper into solid fuel.

Uncompromising Design of The Heat Exchanger Which Contributes to Exhaust Heat Collection of Fossil Fuel Origin

-Energy Recovery Innovation by Air Frohlich Engineering-

Tetsushi Kadowaki
Industrial Machinery Dept. No.2, Itochu Machine-Technos Corporation

With the continuous increase in energy awareness and the urgently required protection of our environment, the interest in energy recovery with heat exchangers is growing. In this June 2019, the Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry published the 2019 Energy White Paper. The Chapter 2 gave a considerable space for the "Global Warming Countermeasures and Energy Policies Based on the Paris Agreement."

Factors noted in this vigorous discussion include the reduction of greenhouse gases (GHG) and the conversion of energy from fossil fuels to renewable energy. The technology that has been proposed by ITOCHU Machine-Technos Corp for these directions is a highly efficient energy recovery system using boiler exhaust gas as a heat source.

This paper introduces countermeasures against heat exchanger corrosion by sulfuric acid H2SO4, which is an obstacle to the utilization of fossil fuel-derived exhaust gas, and energy cost reduction effects by converting the recovered heat amount into CO2 reduction amount/fuel consumption amount, based on designs and application examples of feedwater preheaters (acid-resistant heat exchangers) that enable low-temperature exhaust heat recovery from boilers by Air Frohlich Engineering Corporation.
The Keenest Stock Preparation Technologies for Board Paper
- Countermeasures for Worse Waste Paper Quality -

Jiro Urata
AIKAWA Iron Works Co., Ltd.

The changes in China’s Waste Paper procurement policy and the trade friction between the US and China significantly change the amount and quality of used waste paper and affect the procurement of Waste Paper in Japan. In 2018, the Waste Paper procurement situation in Japan is new to memory that the surplus and shortage occurred in a short period due to the influence of external factors.

Furthermore, China has announced that it will target zero solid waste imports at the end of 2020, and it is thought that the import of unsorted Waste Paper will be restricted. In the future, there will be a shortage of high quality Waste Paper and an excess of unsorted waste paper, and the frequency of using low grade waste paper will be increased. For that purpose, it is necessary to strengthen the raw material conditioning equipment to be compatible with low grade Waste Paper. In addition, there is also the possibility that raw material costs can be reduced by using inexpensive low-grade Waste Paper.

In this paper, we will close up on paperboard and introduce the latest Waste Paper processing technology that is effective as a countermeasure along with domestic and overseas achievements for each process.

Development of Quality- and Safety-considerate Paper Straws

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It was said that 2018 was the first year of the ocean disposal plastic issue movement. A lot of industries have started to disuse plastics and nations have prohibited to disposal plastics from 2018.

Nippon Paper Industries (NPI) set up new department “Paperising Promotion Office” in August 2018 in order to tackle the issue with paper. Paper straws are one of the paperising product. During the development of paper straws, it was found that conventional paper straws which were sold in Japan had some concerns about quality and feeling of use. The quality represented by water resistance and the feelings of use by using paper and adhesives are inferior to plastic straws. They stick to lips when we put them into mouth because of the moisture absorption. Smells and tastes of paper inhibit the flavor of beverages.

Paper straws of NPi are used very high density and smoothness basepaper for outside layer for mouth feel in order to solve the concerns of taste, smell and sticking to the lips. Water resistance and safety concerns are solved by using paper that is strictly controlled in terms of hygiene and an adhesive compatible with food-safety laws. Moreover, the adhesive is selected to have high water resistance and almost no elution in water. Paper straws of NPi designed as described above has performance and safety comparable to plastic straws.

NPI’s Paper straws have been available for sale in April, and are currently on sale at Askul’s mail-order site. In addition, they were adopted for the first time in the food and beverage industry in June, and are used in multiple restaurants.

An Essay on Methodology for Innovating “JAPAN TAPPI JOURNAL”
Part 4 : In Search for Converting the JAPAN TAPPI JOURNAL to Science/Humanities Fused-type Journal

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The Japan’s “Basic Program for Science and Technology” proclaimed in December 2019 focuses particular attentions to the human & social science as supporting academic environments to the progress of natural science & technology. In alignment with this program, the significance of fusion or integration of natural science with human & social science.

The fourth article of this series is intended to analyze the possibilities of conversion of the conventional Japan Tappi Journal to the fusion of natural science with human & social science.

The overall contents are described as below.

1. Introduction
2. Historical development of the grasping of human-oriented sciences in the Policies of Science & Technology
3. Controversial “Unnessesary human-oriented academic areas in national universities issues” and responses by the presidents of the universities
4. New directions of “Basic Program of Science & Technology” and significant concerns on human-oriented academic areas.
Analysis of Trace Elements by ICP-OES and XRF in Pulp and Paper Industry

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ICP-OES (Inductivity Coupled Plasma Optical Emission Spectrometer) is an analytical method characterized by the high sensitivity, wide dynamic range and multi-element analysis. ICP-OES is generally used to quantify trace metals in Pulp and Paper Industry samples. The pretreatment method for Fe, Ni, Cu, Zn, Cd and Pb in white liquor was studied by using a solid phase extraction column packed with polyamino-polycarboxylic acid type chelate resins. The recoveries of elements were affected by a pH. All trace metals were found to be extracted with similar efficiency at pH 5.5, indicating that the optimum condition for extraction is pH 5.5. Major matrix elements, Na, Mg, K and Ca, in white liquor were not extracted below pH 7. The optimum concentration of nitric acid for elution after cleaning the column was determined to be 3 mol/L. The assay values agreed well with the pre-set values without the interference of the major elements. Moreover, high recoveries of the elements (100±1%) were achieved for the white liquor sample. A Cs inhibitor for ionization interference was effective to suppress the ionization interference of alkaline metal (K) in ICP-OES analysis. Assay values by ICP-OES using the inhibitor correlated well with those using IC (Ion Chromatography). Also a simple analytical method with XRF (X-ray Fluorescence Analysis) using Ultra Carry Light filter provided the precise dilution factor easily. Furthermore, cross checking using XRF and ICP-OES improved the precision of the analysis.