

### **Saving energy by modifying waste paper treatment process**

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Kanto Mill, Nippon Paper Industries Co.,Ltd.

The Kanto mill Soka, Nippon Paper Industries Co., Ltd., has three paper machines and nine wastepaper processes and produces industrial paper board including cardboard.

This time, we had reviewed three wastepaper processes for PM2 and conducted two countermeasures in order to save energy. The first one is the primary coarse screen was stopped by reducing the pore diameter of pulper extraction plate. The second one is process modification which two secondary fine screens were installed in series. Energy saving case we implemented is reported below.

### **Activities for Energy Saving in Tokai Mill**

Takuya Kato

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Amid rising interests over renewable energy, Oji group has been positively progressing the utilization of biomass and hydroelectric power generation. Since paper manufacturing is an energy-intensive industry, the amount of purchasing energy such as LNG is still large. And the energy cost has a great influence on the profit, extraction and implementation of energy saving projects that produce the effect quickly are required. Since setting up an aim of reducing 1.5% of energy consumption from the previous year and progressing energy - saving activities in every Oji FTEX mills, and I wrestle for energy saving activity, but have a hard time for the excavation of the energy saving item newly.

Meanwhile, because I received the introduction of the energy saving apparatus which enabled the consumption electricity reduction of the induction motor called "SHIGA SAVER" in the Tokai mill and there were the introduction results a lot and got

an effect, I installed “SHIGA SAVER” in the facilities in the factory and inspected an electric power saving effect.

This paper presents “the energy saving with the SHIGA SAVER” as an example of the energy saving item.

## **Energy saving study process and examples using the Heat recovery solution**

### **『Water heat utilization system』**

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ORGANO CORPORATION

The heat of water contained in wastewater and cooling water is discharged at many factories. Water heat utilization system is a water heat recovery system that uses our total engineering and original review process. And it has high energy saving performance and high investment effect. We introduce the system outline and examples.

## **Activities for Energy Saving in PM8**

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Rengo Co., Ltd has set a target, which is called Eco Challenge 020, of a 32% reduction in CO2 emissions from the 1990 level by 2020. Amagasaki mill has formed a special team “ecocho!” to achieve this goal since 2014 and already met some success in it.

This report shows 3 examples of the reduction of steam consumption at the dryer part. Firstly, the prevention of paper temperature reduction at size press part by installing hood panel. Secondly, the improvement of sheet moisture profile and reduction of water consumption at moisture profiler by adjusting tabulator bar position in dryer cylinders. Finally, the effective utilization of the flash steam from the final drain tank at steam heaters.

## **Recent CO2 reduction technology by high biomass co-firing in coal-burning boilers**

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IHI Corporation

There is a CO<sub>2</sub> emission reduction method of burning woody biomass and coal, as a technical method to reduce the CO<sub>2</sub> emission of the coal fired power plant. So we have performed studies and examinations for providing the useful technical knowledge. Based on the result, we performed the verification test of 25cal% in a quality of woody pellet with coal fired power plant of 149MW of Kamaishi Works in Nippon Steel & Sumitomo Metal Corporation. The boiler had been performing the stable operation during that test. The text introduces the studies, examinations and verification test for high co-firing ratio of woody biomass.

### **Fundamental properties of surface modified pulp sheet**

#### **—TEMPO-oxidized pulp/aliphatic amine salts—**

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Two TEMPO-oxidized pulps which have different carboxy group content (0.42 and 0.86 mmol/pulp-g, respectively) were prepared from HBKP by TEMPO/NaBr/NaClO system. Then, primary, secondary and tertiary aliphatic amines with different carbon number of alkyl chain length (n-butyl, n-octyl, n-dodecyl, n-hexadecyl, n-octadecyl, di-n-octyl, di-n-dodecyl, tri-n-octyl, tri-n-dodecyl-amines) were introduced into carboxy groups present on TEMPO-oxidized pulps by neutralization. FT-IR analysis showed that almost all of the carboxy groups on the surface of TEMPO-oxidized pulp changed from acidic form to the carboxy/amine salt form in the case of primary amines, whereas formation of amine salt by secondary and tertiary amines were harder than primary amines, and the amount of amine salts was decreased in the order of secondary amines and tertiary amines. The introduction of abundant long-alkyl chains on TEMPO-oxidized pulp resulted in the lower density and tensile strength of TEMPO-oxidized pulp sheet, but such density was higher than original pulp and such tensile strength was equivalent to original pulp. Contact angle of sheet was dramatically increased because aliphatic amines made the surface of TEMPO-oxidized pulps hydrophobic. The higher contact angle and tensile strength sheet compared with original pulp was prepared from n-octyl amine salt of TEMPO-oxidized pulp with 0.86 mmol/pulp-g carboxy groups.

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In this study, we developed a biomass increase production technology and measurement technology to dramatically increase the amount of cellulose per unit area of afforested trees at the eucalyptus afforestation site owned by the Nippon Paper Group in the northern part of Brazil. Specifically, the following three items were implemented to realize this. (1) Development of large-area soil evaluation system using a soil sensing technology. (2) Development of DNA marker breeding technology. (3) Development of biomass estimation system using terrestrial laser scanner and UAV.

This achievement will be used for wood biomass production at overseas plantations, with an aim to develop and strengthen a wide range of manufacturing industries that use wood biomass as major materials, as well as forestry.

#### **Industrial Internet as Valmet Service**

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Valmet Automation Inc. Finland  
Masahiro Kanee  
Valmet K.K.

Our background lies in 1960's when our first automation solutions came to the market. In 1980's we launched first distributed controls and monitoring systems, and in 1990's we already were able to embed intelligence and advanced information into the production processes.

In early 2000, we started to provide our customers with 24/7 remote services for troubleshooting assistance and for preventive maintenance. Already since 2010 our customers have been able to utilize our information services and remote analysis to increase their productivity, end product quality and raw material efficiency.

Today, our customers can enjoy solutions that enable them to improve their performance by utilizing benchmark data and best practices regarding.

## **Introduction of on-line TOC Analyzer for waste water**

**—On-line TOC Analyzer especially suitable for sample with lots of salts or suspensions—**

Shuichi Akasaka

Mitsubishi Chemical Analytech Co.,Ltd

Online Total Organic Carbon (TOC) analyzers have become commonly used to monitor abnormal values of industry sewage in recent years. The combustion-type TOC analyzers are used in most cases, where we face many troubles by frequent maintenance and part replacements due to samples with higher salt concentration and suspended solids. One of the advantages is the two step destruction with ozone as the oxidant, which gives oxidation efficiency equivalent to the combustion-type analyzers. Another advantage is a wide sampling tube,  $\phi 2$  i.d. or larger, which prevents the tube being clogged with samples.

Further, the instrument is suitable for measuring industry sewage because the wet-type oxidation with ozone will not be affected by coexisting salts.

## **Big Data Management in Paper Manufacturing**

**-A Vision of the Future of Data-Driven Paper Making-**

Mark Korby, Ian Padley, Masashi Hasegawa, Yuji Nishino  
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The rise of big data, meaning the collection, analysis, and visualization of exponentially greater quantities of information, is having a disruptive impact on papermaking. Dramatically better methods for generating, storing, analyzing and understanding data are giving progressive paper manufacturers fresh opportunities to gain advantages. This can result in smoother operation with fewer process upsets, lower raw material consumption, improved efficiency, and better bottom-line profitability.

In this article, we will review the ways in which data has been used in paper making in the past, and what the current practices are today at many companies. We will then look at other advanced data management methods that are not as widely used today, but can offer competitive advantages. Finally, we will speculate on where big data management might be going in the future.

**Pulsar/Kawanoe Latest Converting Line Technology for Household Paper**  
**—New Trends in The Configuration and Management of Converting Line—**

Massimo Franzaroli

Pulsar Srl

Masaya Onishi

Kawanoe Zoki Co., Ltd.

Kawanoe Zoki has built partnership with Pulsar, Italy since July, 2017 and we are now pleased to introduce and offer the products and the latest technology of Pulsar for the domestic customers. Among a number of innovative products, we would say the following products are the most effective and attractive for the domestic markets. These are – 1. Product quality inspection equipment, 2. Conveyancing system for household products line, 3. Performance assessment analysis software for household products line.

Since there has not been any superior Product quality inspection equipment (for toilet roll as well as packing products) so far in the world market, major European tissue makers commencing with Italy has started to recognize Pulsar's prominent optics technology and adopt its products. In domestic market, one tissue maker has installed Product quality inspection equipment last year and inspection work has been shifted from manual labor to unattended.

In cooperation with Pulsar in combination with our household tissue converting machines, we believe that we would be able to offer more flexible and effective solutions to the customer than ever.

**How the paper industry in Japan has technologically responded to the paradigm shifts of the Japanese society**

**Part 1 The paper industry as one of industrial sectors of the Japanese economy**

Kiyoaki Iida

When you plot the annual consumption of paper and paperboard against the year, the axis of the consumption being a logarithmic scale, the gradient at a certain year represents the rate of change at that year. The paper and paperboard consumption in

Japan was plotted in that way since 1950, and two sharp drops in the rate of change per year were found, one around 1970-1975 from 13.2% to 3.8% and the other around 1995-2000 from 3.8% down to minus 0.9%. The Japanese DGP (nominal) behaved in the same way and its rate of change per year decreased from 14.5% to 8.6% in the first period and further went down to 0.0% in the second period. The fact suggests that the Japanese society experienced the paradigm shift at those two periods and the paper and paperboard production was also affected.

The Japanese paper industry maintained the share of about 3% in the total industrial output (based on money), though in a downward trend, since the World War II. It is quite unique, as other industries experienced large ups and downs. It is because the Japanese paper industry supplied the most of domestic demand, against pressures from foreign suppliers. In fact, its import and export volumes have been less than 10% of the total production.

The Japanese paper industry has technologically responded to those paradigm shifts, and has been substantial in the Japanese economy. Its technological efforts will be followed in the next issues.

### **Development of Alkaline Newsprint Grade with High Brightness and High Opacity for Color Printing**

Takanori Miyanishi

JAPAN TAPPI

Several mill trials on a twin wire gap former suggested that neutral PCC (Precipitated Calcium Carbonate) filled newsprint has high brightness and opacity, and is technically feasible. Sheet formation was good, physical properties were acceptable, and print quality such as ink transfer and print through was excellent. However, more linting propensity was observed. To solve this problem, Prüfbau printing tests and EPMA (Electron Probe Micro Analysis) were employed for the evaluation of linting tendency and paper sheet structure. PCC fillers retained by mechanical filtration were observed near the paper surface as agglomerates. Laboratory studies found that using a retention aid improved two-sidedness of paper and distribution of PCC fillers by colloidal forces, and reduced linting propensity. Based upon these results, the next mill trial was performed. For effective use of retention aid, zeta potential of the paper machine headbox was monitored

continuously by an on-line instrument and was controlled into the proper range. Stock inlet pH was stable at 7.5-8 due to the buffering effect of PCC, and no darkening of mechanical pulp was observed. No paper breaks or foaming troubles occurred. The first pass retention was increased and two-sidedness and linting of the newsprint were decreased to satisfactory levels. The neutral papermaking technology of newsprint was successfully applied to develop value added high brightness and high opacity wood containing printing grade and generated ample profit to paper mills.

### **Development of the dry paper recycling technology which realizes a new office papermaking system**

Masahide Nakamura

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We have developed a new “dry paper recycling technology” and commercialized a “dry office papermaking system” that creates new paper from used paper at offices under the users’ care. Although direct dissolving processing has become widespread as a means of recycling confidential documents generated from offices, confidential leakage due to accidents during transportation is a risk as cardboard boxes containing confidential documents are transported to a paper company during the processing. As a solution, the office papermaking machine made it possible to realize both confidential deletion and recycling at users’ site without bringing confidential documents to the outside.

The developed technologies consist three technologies; "defibration technology" for decomposing used paper into each one pulp fiber, "sheet forming technology" for forming fibers again into a uniform sheet, "pressing and binding technology" for increasing fiber density and bonding pulp fibers each other to create new papers. By doing these in dry processes, we realized a small sized and low power consumption papermaking machine to be able to create on-demand paper recycling system. This recycled paper can be used to print as a PPC (plain paper copier) paper. In addition, to further increase the utility value as a papermaking system, we incorporate technology to create cardboard various thickness and colored paper according to the user's setting freely.