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Development of Inspection System for Appearance Quality of Flat Sheet

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JFE Electrical & Control Systems Co., Ltd has developed an appearance inspection monitoring device with optical image sensors of the flat sheet for the finishing line of a paper mill. The inspection monitoring device detects defects on the surface of paper, such as sticking paper particle, paper folded and abnormal aligned. These are considered as one of the most important quality control index for the paper mill. Advanced technology for image processing has been applied to detect the defect with high accuracy.

Two monitors have been already installed and are in operation in the paper mill company for folio sheeting line; in addition another four monitoring devices with the same technology are being used for plain paper copier.

The Countermeasures for Reduction of the Fuel Consumption in Lime Kiln

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Over the past years, Taiheiyo Engineering Corporation (TEC), Tokyo has conducted numerous investigations in cement plants around the world for various clients who have process and operation problems or who are planning for innovations.

TEC have developed successful techniques to diagnose the existing cement plants and to overcome the existing process/operational problems and to reduce the fuel consumption and thus assuring stable kiln operation.

In the paper industry in Japan is implementing various measures to reduce the fuel consumption. Although a certain improvement has been obtained, but not to the extent of large reduction of fuel consumption is obtained, so far.

Hence based on energy-saving technology adopted in cement plants, TEC has conducted extensive study in Lime Kiln operation achieved following successful results towards reduction

of the fuel consumption.

1) Diagnosis of Lime Kiln : TEC have conducted a diagnosis study on existing Lime Kiln towards the existing process/operational problems and to found optimal countermeasures for reduction of the fuel consumption.

2) Replacement of existing Kiln Burner: By replacing the existing Kiln Burner with Taiheiyo' s TMP Burner (Taiheiyo Multi-purpose Burner), TEC achieved improved burnability efficiency and reduction in the amount of primary air.

3) Adjustment of Lime Cooler: For the improvement of heat recovery efficiency of existing Lime Kiln Cooler, Grate Speed Control and Airflow Control was adopted to Lime Kiln Cooler, for better cooling efficiency.

4) Adjustment of Kiln Operation: TEC has reduced the amount of water at the Lime Kiln Inlet Housing, thus optimizing the O₂ concentration control, and the of raw meal filling ratio in the Lime Kiln.

As a result of adopting above mentioned countermeasures, TEC achieved a 13% to 15% reduction of the fuel consumption.

Introductory Experience of Inspection System for Appearance Quality of Ream

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At the process for making the ream by stacking cut paper, quality defects such as folding , jumping or the unevenness occurs sporadically by mechanical causes. So as not to send defective products to the next process, it is necessary to constantly monitor states of the ream. It was subjected to visual inspection by the operator before, in order to achieve automation of the test, where the end of 2006 and later, was installed an inspection system, it exerted a test stable accuracy.

Operating Experience of Fuel Conversion to Petroleum Coke on Lime Kiln

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After the startup of the coal boiler in 2008, the lime kiln became the equipment using heavy oil most in our mill. Due to the jump in the heavy oil price of these days, the equipment of petroleum coke was introduced to reduce heavy oil consumption of a rotary lime kiln. An initial

problem was solved at an early stage after operation, mixing ratio of petroleum coke is maintained as plan.

This paper reports the process for introduction of facility, and operation experience of fuel conversion to petroleum coke.

Revision of Japan Revitalization Strategy and Cellulose Nanofibers

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Revitalization Strategy of JAPAN was revised 24th June 2014. To put the Japanese economy on the path of sustainable growth, continued reforms in line with a constantly evolving Growth Strategy are essential. The aim of this revision of “Japan Revitalization Strategy” is to review the progress of already implemented policies and to provide basic guidance for remaining tasks. And it has been mentioned that Promotion of R&D Cellulose nanofibers in this Revision of Japan Revitalization Strategy. Taking this opportunity, the Ministry of Agriculture, Forestry and Fisheries (MAFF), and Ministry of Economy, Trade and Industry (METI) launched the inter-ministerial meeting to promote Cellulose nanofibers material in to the society, and nanocellulose forum composed of industry, academia and government, was also established.

Manufacturing of Cellulose Nanofiber and Sheet-making Technology

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Cellulose Nanofiber (CNF) is nano size cellulose fiber with high aspect ratio, which is produced by fibrillation of pulp. In order to facilitate fibrillation of pulp efficiently, we investigated new chemical pretreatments (e.g. Oxidation, Esterification). Using these techniques, we can control its size (short or long, coarse or fine) and surface charge (anionic, cationic or neutral). We can also introduce reactive or hydrophobic substituent group on surface of CNF. We try to apply these unique CNFs to various applications. For example, using high transparency CNF, we have been successful in manufacturing continuous CNF transparent sheet. The CNF transparent sheet has high transmittance (>90%), low haze (<1%), high mechanical properties, tolerability to organic solvent and flexibility. This sheet will be useful as a material for organic

light emitting display, foldable solar cell and flexible TFT substrate. Through making CNF/resin emulsion sheet, CNF reinforced plastics have been fabricated. The resin emulsion disturbs CNF aggregation during dry process, and hence CNF is easily dispersed in the resin matrix. Addition of 20% CNF increases bending elastic modulus and bending strength of PE by 2.8 times and 2.2 times, respectively.

Efforts for the Practical Use of Cellulose Nanofibers

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Recently, research and development about the use of celluloses in wood biomass as energy sources and a wide variety of new materials have been vigorously carried out. As one of them, much attention about an investigation of cellulose nanofibers and their applications is being denoted.

The hydrogen bonds formed between cellulose microfibrils make it more difficult to disintegrate native cellulose into microfibrils with smaller width. Therefore, this technical problem has to be perfectly overcome to obtain cellulose nanofibers.

Native celluloses can be converted to individual microfibrils after oxidation mediated by TEMPO followed by gentle disintegration treatment.

A way of preparing TEMPO-oxidized cellulose single nanofibers, their characteristics and potential applications are introduced in this report.

Action for the Facilities Accident Reduction in the Pulp Manufacturing Process

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Kitakami HiTec Paper Corp. was established by spinning off the “Kitakami Mill” from Mitsubishi Paper Mills Ltd. in 2015. From start of operations, our mill has been producing pulp from domestic hardwoods supplied mainly from Iwate Prefecture and sanitary paper and photographic base paper.

In recent years, due to the limited capital investment budget, we concentrate our effort to manufacturing cost reduction, reduction of fixed costs and the work efficiency improvement. However, we faced to the frequent shut downs of the pulp manufacturing process on our 40

years old pulp plant due to equipment accidents.

Therefore, we, together with Mitsubishi Paper Engineering Co., Ltd. which is responsible for the designing and maintenance work in the plant facilities, made a factor analysis of equipment accidents that have occurred in recent years. As a result, more than half of the total accidents were caused either by the bearing failures or leakages due to corrosion/deterioration of piping.

Through studying the causes of these accidents, various causes including the lack of aged pipe management, lack of maintenance skill inheritance, skipping or neglectance of maintenance items and lack of communication between operator and maintenance personnel were found.

From 2007, in order to eliminate the cause of the accidents, we made a schedule to reduce these accidents to visualize our activity. And then under this schedule, we surveyed the maintenance and monitoring details of each maintenance area and built up "To-Do List" to work with. "To-Do List" mainly consists of four activities.

Through these activities, in 2013, machine shut down of the pulp plant reduced to 4times, 20 hours from that of 16 times, 57 hours in 2006.(Reduction of about 70%)

In this paper, activities to reduce equipment accidents are reported along with some illustrative examples.

Operating Experience of Wire Shaking Equipment in Multilayer Linerboard Machine

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Kushiro Mill, Oji Materia Co., Ltd.

Recently, in order to compensate for paper strength reduction due to the waste paper ratio increases, it is very important added in the internal paper strength additive. However, paper strength improvement effects have become difficult at high addition area. It has to dividend increase of kraft and internal paper strength additive, which is a factor of rising costs.

This time, we introduced wire shaking equipment at a multilayer linerboard machine for the first time in the country. We obtained paper strength advancement by formation improvement. As a result, it was able to achieve the dividend reduction effect of fresh pulp and paper strength additive.

Formation improvement show a high tendency according to high basis weight, it have gained a 30% increase at the 280g / m². The highest frequency and stroke produced great improvement.

Also, advancement of bursting strength shows a high effect at high basis weight. It had gained 5% up at the 280g / m². This is the same result as the formation improvement. It was possible to clearly see the relationship of specific bursting strength advancement and formation

improvement.

The Highest Nip Load Shoepress in Japan-Energy Saving by Introduction of High Nip Load Shoe Press to the Container Board Machine

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Yashio Mill, Rengo Co., Ltd.

As companies are expected to take environmental actions, Rengo established “Eco Challenge 020” as the company’s environmental action plan and is strenuously working to reduce the carbon emissions by 32% in 2020 compared to 1990 levels. In addition, Saitama Prefecture, where Rengo Yashio mill is located, has set the reduction target of CO₂ emission by 13% in 2019 compared to the average level between 2002-2004 by enforcing the local regulation of global warming prevention since 2009. Moreover, energy saving is the urgent issue of Yashio Mill because of the raising fuel cost in recent years.

Against such a background, Yashio Mill PM1 (medium machine) introduced the high nip load shoe press with an aim of improving the productivity as well as reducing the steam consumption. The outline of the retrofit and an operating experience will be discussed in detail below.