

Energy Saving for KP Plant by Steam Reduction

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The demand for paper has significantly dropped after the Lehman collapse in 2009. That was why Yufutsu Mill had to halt the operations of Paper Machine No.1. It decreased the amount of the KP production and increased the energy consumption rate in the KP process. The accumulation of small improvement projects was not effective enough to get it back to pre-shutdown level. In this study, notable reduction of the steam consumption rate in the KP bleaching process, which was considerably affected by the production curtailment, was observed without any large capital investments, as a result of three measures: optimization of hot water usage, efficiency improvement in hot water generation, and drastic changes in exhaust heat recovery. This report describes these three measures.

Energy saving using the variable speed fluid coupling

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In the manufacturing plant, we are seeking energy conservation for the purpose of efficient use of fossil fuel to prevent global warming and reduce environmental pollution. Efficient plant operation leads to reduction of energy cost and brings many benefits. In plants with large boilers electric motor driving a large fan or pump is consuming more power. Fan and pump variable speed drive introduction rather than a throttle or valve control will lead to big energy savings. In this paper, we consider the use of variable speed fluid coupling for realizing energy saving.

Activities for Energy Saving in Takaoka Mill

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Chuetsu Pulp Takaoka mill focused on energy savings as a major cost reduction measures from the past and the whole mill have achieved results. However, in recent years, we had dealt with the projects that can easily obtain energy saving benefits, so the achievement ratio to energy saving targets set each year became generally low. Even in such circumstances, the Energy Management Committee members take the lead in doing tenacious activities in energy saving conscious and discovering a new project for energy saving.

In this paper, we introduce the recent energy saving results into three categories, electric power saving, crude oil saving and water saving of our factory.

Energy Saving Measures by Low-Emissivity Thermal-Barrier Effect for Heat Treatment Facility Like Industrial Furnace

—Thermo-Resin SV Method—

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In recent years, the manufacturing industries, in cooperation with the public sectors, have been actively adopting energy saving measures from maintenance and management.

Meanwhile, one of the highest energy consumption facility in the industry is a heat treatment one including industrial furnace. There are around 40,000 heat treatment facilities in operation throughout Japan, which accounts for about 18% of energy expenditures in Japan and about 40% of that of all industrial sectors.

Therefore, we have developed an ultrathin low-emissivity thermal-barrier paint "Thermo-Resin SV" which can reduce radiant heat transfer up to 80% by simply cladding only 5 - 15 μm as a valid measure in both environment and economic aspects by reducing energy consumption rate and improving the workplace owing to

cutting heat loss. It archives cost-effectiveness in a very short period because its initial cost is very low as users only have to clad the coating paint and yet have big heat reduction effect.

Practices for specific energy reduction in TMP process

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In 1970's the strength on newsprint paper manufactured in Tomakomai mill, Oji Paper Co., Ltd depended mainly on mechanical pulp such as TMP (thermo-mechanical pulp) .

TMP contributed greatly to lighter grade of newsprint paper through established production system; however, the required pulp quality as well as production ratio has become less dependent on TMP after KP plant started and the production of DIP(deinked pulp) has been increasing with the rise in environmental awareness.

Once oil-saving production system was implemented in 2008 at Tomakomai due to higher fuel price, we needed to improve operating conditions such as refining system or new type of refiner plates to reduce energy cost in TMP accompanied with high energy consumption.

In a series of several practices, we have continued to optimize conditions and introduce new technology while carefully considering required pulp quality, and finally achieved 32% specific energy reduction in the refiner process of TMP production.

GL&V/Kawanoe EZ HYDROCYCLONE TECHNOLOGY

—Ultimate process performance and superior time economy—

Jose Santiago · Kozo Kishida

GL&V Sweden AB, Kawanoe Zoki Co., Ltd.

Current economic conditions put high priority to cost cutting and more effective shutdowns. Hydrocyclones are very important equipment that shall meet high standard requirements both at a process and quality level but also at maintenance. Effective shutdowns are critical to the operation of mills, whether they are planned

or unplanned, every mill aims to reduce overall downtime costs as much as its time length. Furthermore, cleaning efficiency and fiber saving demands have increased along the years and therefore existing cleaner systems can be operated at equivalent or higher cleaning efficiency at the same energy consumption while increasing fiber savings. By introducing changes in the internal surface of the hydrocyclones, separation efficiency and fiber savings are increased and run ability improved. We present the EZ technology that meets all these high demands, uniting concepts such as process performance and time economy in one single product.

Standardized and Automated On-Line Pulp Testing for Process Optimization and Control —L&W Pulp Tester – Case Studies—

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Optimization and control of the pulp and paper making processes for cost-effective production requires more frequent monitoring of the relevant pulp and stock preparation quality parameters. A new quality monitoring system for pulping and stock preparation is developed. The online L&W Pulp Tester is a complete wet laboratory with automatic sampling from different positions along the process chain. Repeatable tests are made automatically and frequently. True variations are monitored in real time and are used to secure product quality, save time, material and energy, and increase production. The online pulp tester consists of automatic standard and established tests for CSF, SR, brightness, color, fiber length, kink, coarseness etc. suitable for building up an automatic quality monitoring and optimization system in the mill.

Australian Paper Maryvale Mill started automatic on-line freeness measurement at a pulp mill and a machine chest by L&W Pulp Tester, and closed loop controls of refiners. As a result, Maryvale mill accomplished reduction of electrical power and steam consumption and of broke generation, and their accumulated savings on key export grade was EUR 248,000/year. This calculation was based only on their export grades which is 30 % of their total production amount. If calculation on the total production is done, the saving becomes more.

In this paper, we introduce our L&W Pulp Tester showing from pulps themselves to their properties to be measured, and then, share the case study at Australian Paper Maryvale Mill.

Papermaking 4.0 new concept of VOITH Paper

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Industrie 4.0 is a project in the high-tech strategy of the German government and is the title given to the next fourth Industrial Revolution. As part of Industrie 4.0 Voith Paper has already started to introduce and promote the Papermaking 4.0 concept globally. It based on the next generation of cyber-physical systems, encompassing the full life-cycle knowledge and intelligence necessary for the autonomous decentralized control of manufacturing plants. This coupled with big data analytics providing better insight and predictive capabilities allows for the next leap in productivity and cost reduction. Papermaking 4.0 is the sum of three main talents in a system of systems:

OnEfficiency SmartControls delivers sustainable performance. Papermaking 4.0 encompasses decentralized self-autonomous yet modular and integrated control solutions, distributed along the entire paper & board production process, enabling producers to easily drive their plant on the key parameters to continuously achieve business objectives.

OnCare SmartMaintenance delivers intelligent reliability. The smart self-diagnostic capabilities and seamless connectivity of Papermaking 4.0 ready products facilitate the highest attainable plant availability at the lowest overall cost of maintenance through a high degree of predictive foresight, automated service and material management.

SmartService delivers immediate assistance. Around the clock capabilities and assistance deployed through remote, on-site and on-call arrangements, supporting our customers with data analytics, diagnostics and real-time process optimization, ensuring highest plant performance and availability.

The most important differentiating factors from tradition automation solutions are in the high degree of modularity, step by step approach and unison between both production & maintenance faculties. The value delivered by our solutions substantially exceeds the sum of value from the individual components, generated through our USP, our know-how embedded into these solutions.

Fully Split Seal for Accurate Rotation

—Application to the vertical rotating equipment—

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Adoption of the mechanical seal has been progressing for sealing system of rotating equipment in the pulp and paper industry. However, the applications of the mechanical seal are limited to the black liquor or coating collar of pumps or screens.

For the most cases, end users are using gland packing for horizontal and vertical agitators with axial runout and vibration that are troublesome to the maintenance persons.

In order to reduce energy conservation and maintenance costs and to provide safety and stability for the daily operation, we have over the past two years introduced the fully split mechanical seal that is based on our own design with rubber bellows for horizontal agitator with vibration problems.

Today, we would like to introduce our extensive experience of application for vertical pulper that is running under the severer conditions. For that, we propose an optimal solution using our fully split mechanical seal for the equipment with axial runout and vibration.

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

Part4 Chips Import and Integrated Mills of the Japanese Model (1)

Kiyoaki Iida

From the 1960s to the 1980s, the paper consumption in Japan increased by almost 3 times in ten years and how to supply wood was one of the critical concerns. At that time, pulp production overseas was interested and several projects were going on. Then, softwood chips were imported from the USA (1964), and the efficient process of importing wood chips was established, which was followed by hardwood chips import. Based on imported chips, the industry developed a unique mill design model. Chips from abroad were carried to their existing coastal mills where they newly installed big kraft pulp plants and resulting pulp were integrally sheeted in the mills. Most of big mills in Japan took this model.

Statistics in the 1990s are as follows. The number of chip carriers was 70-80. The imported softwood chips, which came mostly from the USA, Australia and New Zealand, shared 50% of the total softwood chips consumption, and they were used for RGP and TMP for newsprint. Regarding hardwood, the amount of the import, mostly from Australia, the USA, Chili, and South Africa, increased quickly in the 1980s and reached about 80% of the total consumption. They were used for fine paper and coated paper production.

The economy of the model will be discussed in the next issue.

PCFD technology for coating and paper making process

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Coating is a significant basic technology in the field of chemical engineering and in Japan, VOF(Volume Of Fluid) method has been frequently applied to the coating industry to analyze free surface of the coating bead. This analysis method can reproduce various coating defects such as air entrainment, ribbing, rivulet, chatter, non-uniformity of layer thickness near the coating edge, and so on. Furthermore, the operability window of coating, quantitative correlation between coating conditions and state of coating defects, shows well similar phenomena to the actual coating. Thus the coating analysis method can provide the investigation of the cause of coating defects and the estimation of coating defects under coating conditions without experience, and recently is available to design the optimum coating condition mainly in the electronic materials industry. Now this method is applied to the monolayer coating with slot coating system in general and we expect to be applied to the multilayer simultaneous coating in the near future.

On the other hand, in the field of paper making industry, the fluid structure interaction analysis method is applied to the analysis of blade coating and can reproduce the behavior of the coating layer formed under nip pressure with elastic materials e.g. blade and rubber roll, while the penetration of coating material to base paper does not be taken into account. However, on the analysis for printing process, penetration model has already reproduced the behavior when liquid penetrates to porous paper, and the next target is application of this model to the blade coating. In addition, we may expect the following themes: 1) the investigation of the behavior of solid fine particles in coating color with the application of fluid

discrete element method interaction analysis and 2) moreover, the investigation of the behavior of fiber in paper making process with the analysis of fine fiber that consists of bonded particles aggregated softly.