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Efforts to Conserve Energy in the Papermaking Process

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In recent years, raw material cost and fuel cost have risen sharply, and there is an urgent need to reduce variable cost by saving electricity and steam. In this paper, four cases of saving electricity and steam in each machine at the Kishu Mill are introduced.

In PM5, a heavy oil heater was used as the hot air source for the Yankee dryer hood. Replacing it with a steam heater, fuel cost and CO₂ emission were reduced by decreasing the amount of fossil fuel consumed. In PM7, hot air drying is performed using a PV roll, heater and fan in the dryer section. Switching medium pressure steam to low pressure steam for heat exchange with the PV heater, we eliminate an amount of medium pressure steam used then the energy was saved. We will also introduce an energy saving case of stopping one roots blower by combining with the vacuum source of a 1PB felt roots blower used for the 1PB uhle box and 3P vacuum pump used for the 3P felt uhle box. In PM8, we will report an energy-saving example in which the total amount of steam consumption was reduced by changing the differential pressure control of the dryer steam to recover more flash steam.

Proposal of Energy Saving motors - IE4 and IE6 Efficiency motors -

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Due to growing interest in environmental and energy issues, there is a demand for high efficient motors. The efficiency value of three phase motors is regulated to the IE3 efficiency class in many countries around the world. EU had raised regulations on induction motors from 75kW to 200kW to IE4 efficiency class from July 2023. Japan is considering raising regulations on motor efficiency class. TMEIC has developed IE4 efficiency class induction motors and IE6 efficiency class reluctance motors for variable speed.

UC-1: The "Construction-Free" New Generation Clamp-On Ultrasonic Flow Meter for Energy Management

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In recent years, various initiatives related to "decarbonization" and "energy efficiency" have been promoted both domestically and internationally to realize a "sustainable economic society," as symbolized by the SDGs. Without the detailed visualization of "when, where, and how much" electricity and various utility fluids are consumed, it is difficult to implement specific and effective energy-saving measures such as "eliminating waste" and "revising equipment operation." On the other hand, allocating significant costs, energy, and human effort for "visualization" poses a risk of counterproductive outcomes. Therefore, Tokyo Keiki Inc. and Oval Corporation have jointly developed the "Clamp-on Ultrasonic Flowmeter UC-1 (hereinafter referred to as UC-1)" optimal for visualizing utility fluid usage.

The UC-1 is a flowmeter featuring four characteristics: "no piping work required," "no power supply required," "no installation tools required," and "no cable laying required." Additionally, the "sensor slide type" design allows it to accommodate a wide range of diameters with a single model, covering 8 diameters (nominal diameter 25A to 100A). The UC-1 is an innovative flowmeter that can potentially bring a breakthrough in utility flow measurement, overturning conventional images, and is expected to become a widely utilized tool for building energy-saving foundations in the industrial sector in the future.

Global Warming Countermeasures Using Radiative Cooling Materials -Balancing Adaptation and Mitigation Strategies-

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Global warming is progressing at an unprecedented pace, posing serious challenges not only to the natural environment but also to our society, economy, and daily lives. The issues associated with global warming are diverse, including extreme weather events, rising sea levels, and increased energy demand due to elevated temperatures. To address these challenges, it is essential to complement the adoption of renewable energy with innovative energy-saving technologies. Among such technologies, one that has garnered significant attention in recent years is passive radiative cooling materials, which can lower temperatures below the ambient level under direct sunlight without requiring energy input. These materials utilize the radiative cooling phenomenon, where heat is converted into thermal radiation within the wavelength range of 8–13 μm (the atmospheric window) and emitted into outer space. This principle has been the subject of numerous studies and reports in recent years. Radiative cooling materials have significant potential applications in cooling buildings and outdoor electrical equipment, among other uses. This paper discusses the fundamental principles of radiative cooling materials and their potential applications while also presenting the latest research findings and the current state of their societal implementation.

Fuel Conversion and CO₂ Reduction Initiatives at Fuji Mill

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In recent years, large-scale natural disasters caused by abnormal weather have occurred all over the world, raising awareness of the issue of climate change. As reducing greenhouse gas (GHG) emissions is an urgent task in each country, the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change held in 2015 adopted the Paris Agreement, and Japan has set a target of reducing GHG emissions by 46% by 2030 compared to fiscal 2013. Nippon Paper Group has also set GHG reduction as a key issue in response to climate change issues in order to realize its corporate group philosophy, and is aiming to reduce GHG emissions by 54% compared to fiscal 2013 through energy conservation, fossil fuel reduction, and the use of biomass fuel and fuel conversion. Under such circumstances, Fuji Mill has also been working on GHG reduction by fuel conversion in the No.10 boiler, which accounts for approximately 60% of the mill's GHG emissions, in order to achieve its GHG reduction target.

This paper introduces an example of the mill's new initiative to co-combust cut tires in the No.10 boiler in order to reduce GHG emissions.

The Potential and Application of Biomass Fibre Strengthening Enhancement

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FIMATEC LTD. PAPER MINERALS GROUP

Currently, Cationic Starch and PAM are widely used to improve the strengths of paper. The demand of paper strength agents is increasing in the future because it becomes more difficult to collect waste paper and its quality tends to decline as raw materials.

The biomass Fibre Strengthening Enhancement in this article is a product called the Surflock Series, which uses starch as a raw material and has different characteristics from Cationic Starch. The Surflock series is a product developed by EcoSynthetix, which specializes in starch-based products. Patented process is used to manufacturing the Surflock series. It is less effective in improving wet strength but is effective in improving dry strength because it is starch-based product.

In Europe, the Surflock series is commercially used in the toilet paper sector. Moreover, Mill Trials are running in the fields of household paper and liner board. One of its features is that it can keep the softness of the products, which is particularly valued in toilet paper sector.

The benefits of the Surflock series are improving tensile and burst strengths and increasing the retention of raw materials. By utilizing the improved strengths, it is possible to reducing basis weight, optimising the ratio of pulp, optimising wet-end chemicals, and reducing energy consumption by lowering the refining.

Since it is 99% bio-based, it can contribute to the environment and more sustainable products manufacturing.

Automatic backwash filter that removes impurities from fluids such as industrial water, intake water, white water, wastewater, cooling water and oil.

Kenta Gumi Kazuki Tanaka, Tomoaki Nago and Koji Kimura

Bollfilter Japan

In pulp and paper manufacturing, a significant quantity of fluids, particularly water, is utilized, playing a crucial role in the production process. The quality of water directly affects product quality and production efficiency. In order to make water clean, strainers are commonly used to remove sludges and substances from water, but they require manual cleaning, which is labor-intensive and costly. The Bollfilter's automatic backwash filter enhances efficiency by automating the cleaning process. In this paper, I'd like to introduce case studies and real opinions from users who have implemented Bollfilter.

Predictive Digital Advisory Services for Chemistry Management, Control and Optimization in Pulp and Paper Industry

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Kemira Oyj, Finland, Kemira Chemicals Ltd, Singapore
Kozo Ibara
Kemira Japan Co., Ltd.

Today the pulp and paper industry is under pressure to improve process performance and cost efficiency in a highly competitive market. Improvements in processes are also needed to achieve tightening environmental regulations. At the same time, the digitalization of processes generates more and more data 24/7. This data can be used to enhance the processes in these challenging conditions. However thorough analysis of all the available data using traditional methods is not practical as there's just too much information to process in real time.

The Kemira Digital Advisory Services aim to optimize customer processes through chemistry and process recommendations. These recommendations are generated through advanced online chemistry monitoring, data analytics utilizing machine learning and Kemira's broad knowledge and experience in chemistry and chemical applications. The contents of the Digital Advisory Services are modular and they are selected and designed based on the main observations of data analysis and application expertise.

In this presentation we briefly introduce case histories of Kemira Digital Advisory Services in optimization of ClO_2 -production, extractives control in pulp production, deposit control in board making, runnability improvements in papermaking, and improved control in waste water treatment.

Moving Bed Biofilm Reactor for pulp and paper wastewater —On-site test and implementation example—

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Biological treatment is essential for removing organic matter from wastewater in paper pulp factories. Many fixed-bed biofilm treatment methods have been introduced for biological treatment. All of them were installed several decades ago and have been in operation until now. In the fixed-bed method, materials for bacteria to be attached on are installed in the biological treatment tank, but as the years of use pass, wear and tear occur; so we examined the possibility of using a Moving Bed Biofilm type of biological treatment method as an alternative. For this purpose, we conducted treatment performance checks on KP wastewater and recycled paper wastewater from pulp & paper facilities. The treatment results of an on-site test and an actual equipment modification are reported below.