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The introduction of latest technology and process control for Stock Preparation

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Traditionally, timer control has been mainly used in the stock preparation process for processing reject and adjusting the amount of feed.

This is because, until now, it has been difficult to obtain information on fibers within the system and reject to be discharged as metadata, and it has not been possible to directly feed back information within the system to the control.

Recent improvements in sensing technology have already made it possible to treat this information as metadata.

The Voith paper focuses on traditional control methods for stock preparation and proposes the concept of 'Autonomous Stock Preparation', which automates as much as possible of these adjustments.

This paper introduces some component products to realize 'Autonomous Stock Preparation'.

Recent Technical Development of Internal Sizing Agent

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This paper focuses on the internal sizing agents such as rosin, alkyl ketene dimer (AKD), and alkenyl succinic anhydride (ASA), which are added for paper sizing, and outlines the basics, mechanisms, and effective usages. In the recent operation of environmentally friendly papermaking, it has become difficult to express the original function of the internal sizing agent. Therefore, we have developed and sold a new product, SPCA-956, with the aim of addressing issues such as performance degradation and machine staining caused by resin hydrolysis, as well as the risk of soaring prices of rosin. In the end, we believe that we were able to share information on the positioning of various sizing agents in various papermaking conditions and the best choice.

Functionality of HYMO Wet End System and Latest Technology

-Reducing the Environmental Impact of Paper Making by coagulants, retention and drainage aids-

Natsuhiko Sato

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In recent years, induced by the SDGs, reduced impact on the environment as well as cost reduction became more and more important. Therefore, paper mills are promoting the use of low-grade wastepaper, efficient chemicals, and a reduction in energy consumption for paper manufacturing. Among these, the use of low-grade wastepaper lead to an increase in short fibers and fillers and lead as well in increased amounts of pitch components. As a result, increasing amount of short fibers tend to decrease the retention rate on the wire and impede drainage. In addition, an increase in the amount of pitch components causes increase web breaking and other trouble in the papermaking process. In this situation, coagulants, retention and drainage aids are getting more and more important. The role of retention aids is to efficiently retain fines and fillers on the wire. Drainage aids shall improve drainage and to reduce steam consumption. Along with their roles, coagulants, retention and drainage aids provide various functions that contribute to the SDGs and result in a considerable reduction of the environmental impact. As for the specific functions of these chemicals, they shall enhance an effective use of fibers and fillers, as well as other paper chemicals, improvement of wastewater treatment, reduction of energy consumption, and improvement of the paper quality. Furthermore, we recently propose that it is important to optimize how to use the chemical products, such as the addition point, the addition method, and the combination of chemicals to maximize their effectivity by making use of the chemical characteristics of coagulants, retention and drainage aids. We call this system the HYMO Wet End System. For example, if we focus not only on the retention and drainage effect at the wire part, but also on the retention of other wet end chemicals, such as sizing agents, strengthening agents, and dyes, it is necessary to consider the addition point. In this case, the recommended addition points are mixing chests, machine chests, and stuff boxes located close to the addition points of sizing agents, strengthening agents, and dyes. In addition, we have recently developed a new drainage system, which system is a combination of high-molecular-weight anionic chemicals and special cationic chemicals added in that sequence. We are aiming at contributing to the SDGs and the reduction of environmental impact and cost by applying coagulants, retention and drainage aids and by making effective use of the functionality of the HYMO Wet End System.

Basic Technology and Latest Trends for Solution to Pitch Problems

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In recent years, the paper industry has been faced with the problems of increased pitch sticky problems due to an increase in the amount of pitch in recovered paper caused by a decline in the quality of it and an increase pitch in pulp.

One of the methods used to prevent pitch problems is the use of pitch sticky control agents. We are working to solve pitch problems throughout the entire process by using the appropriate agent for each process, and we call NISSIN Pitch Control Method (NISSIN-PCM).

Conventional pitch evaluation methods could measure the total amount of pitch or evaluate coarse pitch, but could not evaluate fine colloidal pitch. Because white water and pulp slurry contain many components other than pitch, flow cytometry has low measurement accuracy.

We visualized the pitch by image analysis using a fluorescence microscope, which enabled us to evaluate fine colloidal pitch. Using this method, when a pitch sticky control agent was added to the pulp slurry, a decrease in coarse pitch and an increase in fine pitch were observed in the filtrate. Thus, it was confirmed that the pitch control agent detached the fine colloidal pitch from the pulp and dispersed it in the liquid.

Combining these results with conventional pitch evaluation methods may lead to the development of new evaluation methods and pitch sticky control agents.

Solution for operation stabilization by analysis of wet end monitoring sensor and defect information

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The number of problems caused by machine deposits has been increasing due to the worsening of the raw material of pulp situation. In addition, it is becoming increasingly difficult to respond to machine dirt deposits in a timely and appropriate manner due to the decrease in the working population at production sites and the retirement of experienced employees. To address this issue, we are developing "SmartPapyrus®", a system to prevent defects and sheet breaks by visualizing machine dirt deposits using IoT, analyzing it using artificial intelligence, and using machine dirt deposit prevention technology.

In addition, we are currently installing sensors at multiple locations in the stock preparation line and conducting continuous online measurements to identify the causes of defects classified by SmartPapyrus® 1.0.

In this report, we will introduce on the analysis results using sensor data from the stock preparation line for the defects and sheet breaks that have been classified by SmartPapyrus® 1.0.

Washing effect of Power Combi Cleaner 2.0 -equipped with Air venturi self-washing system-

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ProJet Japan Corp, ProJet B.V.

ProJet B.V. is a leading company specialized in High pressure water fabric cleaning systems. Since its establishment in 1998, We have delivered over 1,000 units fabric cleaning systems to paper mills, nonwoven fabric factories, and food processing plants worldwide. In Japan, as of 2023, we have supplied over 80 units for wire part, press part, and dryer part for paper mill.

In particular, paper mills have a high re-utilization rate of the used paper, a canvas cleaning system that consistently achieves high cleaning effectiveness and stable operation is demanding in order to prevent product defects, paper break, and improve productivity. ProJet B.V. has been continuously innovating of cleaning technology since its founding. In 2021, we released the "Power Combi Cleaner 2.0", which a double air venturi-type cleaning head that maximizes cleaning effectiveness and mist collection performance to the utmost limit. Further we are equipped as standard patented technology "air venturi self- cleaning system" to prevent clogging of venturi tube, which is biggest weakness of air venturi type cleaner.

Here by, let we introduce the effects and features of the "Power Combi Cleaner 2.0" and "Air venturi self- cleaning system".

Operation Experience of ProJet's dryer fabric cleaner (PowerCombiCleaner 2.0)

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Saga Mill, Oji Materia Co., Ltd. has three paper machines, Machine 1, Machine 4 and Machine 5. It is a sustainable mill that produces linerboard, medium and special paperboard from almost 99% of waste paper.

Sticky from waste paper has been increased recently while customers are focusing more on paper defects. Sticky is one of the causes of sheet breaks and paper defects as it accumulates on machine fabrics. So actions such as sticky control chemical dosage and screen slot size decrease were taken, but they can't solve the issue completely. It is an urgent task to take effective action against sticky defects due to customers' tough view especially to linerboard.

This article shows a case about dryer fabric cleaner upgrade that led to sticky defects reduction and steam consumption improvement in Machine 5 that produces linerboard.

Aikawa technology contributes to safety measures and labor savings in the papermaking process matter removal technology in the papermaking process

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The manufacturing workforce in Japan has been around 10.5 million people since the 2010s. However, due to the aging population and low birth rates, there has been a declining trend in young workers, leading to a long-standing labor shortage. The paper industry is facing a similar situation and has been taking measures such as introducing equipment and automation to achieve labor savings. Furthermore, safety measures have been improving year by year to ensure the safety of workers, minimizing the risks of accidents and injuries. In such circumstances, our company designs, manufactures, and sells equipment that contributes to safety and labor savings. This article introduces safety measures and labor-saving technologies in the papermaking process.

Productivity Improvement and Skills Transfer Using SmartPapyrus® -The Latest Trends and Future Developments in Defect Image Classification Systems-

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In recent years, the number of problems caused by machine deposits has been increasing due to the worsening of the quality of waste paper. In addition, it is becoming increasingly difficult to cope with machine deposits in a timely and appropriate manner due to the labor shortage at production sites and the retirement of experienced employees. To address this issue, we are developing "SmartPapyrus®", a system to prevent defects and sheet breaks by visualizing machine deposits using IoT, analyzing it using numerical analysis, and using machine deposit prevention technology. For the next step, we developed SmartPapyrus® 1.0, a system that uses AI to automatically classify defects detected by Web Inspection System(WIS) based on their origin. SmartPapyrus® 1.0 makes it possible to determine in real-time when and where in the process so many defects have occurred.

To date, SmartPapyrus® 1.0 has been installed on many liner machines, and have shown amazing performance, including real-time evaluation of the effectiveness of operator's actions for defects countermeasures and their results, as well as investigation for specific defects to respond to complaints from the end user.

On the other hand, similar problems are occurring not only in liner machines but also in white board paper machines.

Since the quality requirements for white board paper are much higher than those for liner, the machines are operated with higher sensitivity of WIS so that even small defects of 1 to 2 mm or less can be detected.

However, WIS can detect over 2,000 defects per each jumbo roll, including not only small defects, but also noise.

We have up-graded SmartPapyrus® 1.0 system so that it can solve these problems.

In this report, we show how the system improved the productivity of white duplicate board manufacturing machines.

ABB Digital transformation solution
– Industry 4.0 Visibility approach for refining and Wet end control

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Currently, industry got strong pressure from the market because Japan government announced carbon neutral industry by 2050. In Japanese industry, especially material industry, there are several serious potential issues like lack of human resource due to less attractiveness for young people, retirement of baby boomer and the technical transfer. On the other hand, there are bright future in paper industry because paper is excellent material for plastic reduction and new functional material, Cellulose Nano Fiber.

ABB started following four approaches to cooperate with customer to solve facing issues.

- 1) Reliable and high-performance online measurement for Refiner, Wet end control
- 2) Cutting-edge fiber analyzer for new material development
- 3) Speedy, Safety and high precise paper testing machine
- 4) High speed, high precise and reliable automated paper testing machine

In the paper, overview of ABB digital transformation solution and some actual results are described. You can understand how ABB L&W online measurement is reliable and how to utilize the measurement data for process optimization.