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2022 October JAPAN TAPPI JOURNAL
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Possibility of Digitalization technology in paper machine

Ryozo Shimizu
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For over five years, customers across the globe have been relying on the Papermaking 4.0 portfolio. Our digital solutions offer enormous potential to increase efficiency and availability of paper production lines. Thanks to individual packages customized for each customer worldwide, we offer the best possible solutions with fast amortization, in less than a year. With over 300 digital installations to date, Voith is the world's leading provider of digital solutions. Our customers benefit from this experience in ongoing projects.

Join us and help shape the future of paper production. Benefit from the huge potential offered by the digital transformation of the paper industry to boost efficiency, quality and productivity, and gain an important competitive advantage.

Let's make papermaking digital.

As a full-line supplier, Voith delivers holistic solutions tailored to the customer's needs. In concrete terms, this means that Voith takes responsibility for Operation and Information Technology implementation and long-term support, as well as maintenance and paper technology. As a result, we make improvements on a holistic level. This approach is also reflected in our modern business models, which ensure we work together with our customers to achieve the right goals. Full-line, full service, full benefit. Benefit from our holistic solutions from a single source for all aspects of Papermaking 4.0!

The latest thermal spraying technology to solve various problems in the paper machine dry part - Breakthrough non-stick thermal spraying and on-site grinding technology -

Kimiaki Iwane
Tocalo Co., Ltd Sales Division

The main problems in the paper machine dry part are paper defects and paper breaks due to dirt and wear on the surface of each roll. In particular, dryer cylinders and canvas rolls have a great influence on paper defects and paper breaks. In the case of the dryer cylinder, wet paper containing a large amount of water and paper coated with a size liquid stick to the high temperature surface, so that surface stains occur. Furthermore, wear and scratches occur due to the doctor blade used to remove dirt. In the case of the canvas roll, pitch stains on the outside roll are likely to occur, and in the case of the inside roll, rust is likely to occur due to the surrounding environment. Both are major problems that directly affect paper defects and paper breaks during operation.

This paper reports on breakthrough non-stick thermal spraying technology, on-site thermal spraying and grinding technology that solves various problems of these dryer cylinders and canvas rolls.

Calender and Reel part of basic theory and the latest trend

Keisuke Seita
Paper technology, Valmet K.K.

In this paper according to improvement of paper machine, machine operation at higher speed and higher quality is needed, also about energy saving is required. Both Calender and Reel part are continuously improved to meet that requirement.

The purpose of calendering is basically to improve paper surface roughness, impart gloss to paper, improve printability. Recently, to save bulk of paper after calender, as a new technology, Valmet have developed Aqua cooling technology.

The purpose of reeling is to make the paper web in a form which is easier to handle. Challenges of reel is coping with wider and higher speed paper reeling, also to keep quality of reeled paper under that situation. In order to meet that requirement, reel was developed from traditional surface reel, to with center driving, and to change reeling on rail. Also, technologies have been developed about spool turn-up. As an example, a water jet turn-up device will be introduced.

The transition and latest technology of dryer fabric

Susumu Takeuchi
Shikishima Canvas Co.,Ltd.

Dryer fabric plays an important role in the final process of the paper machine.
The basic function of dryer fabric is to promote wet paper drying with crimping steam-heated cylinders, while holding and transporting the squeezed paper after the press section process.
Dryer fabric influences not only to the final paper quality, but also impacts greatly energy efficiency. In other words, it leads to a decrease in production efficiency, an increase in energy consumption, and poor paper quality, if you cannot perform by selecting a suitable fabric for each part.

Today, we also introduce the history of dryer fabric starting from cotton fabric and in addition our latest technological trend like the
countermeasures against the DIP-derived contamination problem and recent development to enable to maintain air permeability by using CNF.

In the end, we would like to mention our future view and idea about what dryer fabric can contribute for the said Sustainability Support required socially in these days.

Aikawa Canvas Cleaner

Tsuyoshi Yoshino
AIKAWA Iron Works Co.Ltd.

The used paper utilization rate for the last 10 years has been around 64%, and the utilization rate of paperboard exceeds 93%, so further improvement is difficult. In order to achieve a used paper utilization rate of 65% by 2025, it is conceivable to improve the utilization rate of materials other than paperboard. Therefore, when using it for products that did not use recycled paper in the past, it is necessary to take higher quality measures than ever before, and it is necessary to strengthen the cleaning power of papermaking tools that are directly connected to the product. Here, we will focus on the canvas cleaning of the dryer part, especially for papermaking tools, introduce the types and features of our canvas cleaners, and propose models and cleaning methods according to the application.

The SmartPapyrus Realizes Work Style Reform in Paper Mills.

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Maintech has been providing paper machines with Dryer Section Passivation technology (chemical application combined with chemical product, equipment, and application methods) for over 30 years to prevent defect/sheet break due to dryer section depositions. As of July 2021, the number of applications being operated over the word has topped 800 units. In recent years, the number of problems caused by machine deposit 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 deposit 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 deposit using IoT, analyzing it using artificial intelligence, and using machine dirt deposit prevention technology. In SmartPapyrus Ver.1, we developed "SmartDepo.", which quantifies the contamination level by visualizing and quantifying the dirt deposit status of the fabric in realtime with a camera that can use high temperatures in the hood exceeding 100 degrees Celsius. We have also developed "SmartChemical", which is linked to "FabriKeeper", a fabric cleaning system, and controls chemicals according to the stain status of the fabric.

This time results of the application of SmartPapyrus Ver.1 will be reported.

Quantitative Approach to Identify the Problematic Positions Causing Defects with SmartPapyrus

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MAINTECH CO., LTD Fuji Technology Development Center

In recent years, the working population is expected to decrease in developed countries, including Japan.

Difficulty of acquiring young human resources because of the declining birthrate, and the aging of engineers means that if these trends continue, the experience and know-how developed over many years will be lost due to the inability to pass on technology, and stable manufacturing process may become difficult to achieve.

Japan's paper mills are no exception to this, and as it is difficult to acquire new human resources to work in the harsh conditions of high temperatures and humidity, and as experienced workers continue to retire, the reform of work style at production sites could become a major issue for future management.

As one of the solutions to these problems, we have developed “SmartPapyrus” to prevent defects and sheet breaks by visualizing machine dirt deposit using IoT, analyzing it using artificial intelligence, and using machine dirt deposit prevention technology.

In the process of developing this system, it was important to have information on what kind of defects occurred, “when”, “where”, and “how many” during the operation in order to conduct a predictive analysis of defects and sheet breaks. However, the current defect detectors (WIS:Web Inspection System) are only used to determine whether defective products haven’t been shipped, and do not output information about where defects have occurred on the paper machine.

In order to identify the location of defect occurrence, experienced workers on site have to make decisions based on their experience using the defect information output from the WIS.
In order to make it possible for anyone to make quantitative decisions about the process, we developed an AI that incorporates the hunches and tips of experienced workers through image classification using deep learning, and developed a defect image classification system that supports operations based on the AI inference results.

This time, we will report our past efforts and future prospects.