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2023 September JAPAN TAPPI JOURNAL
Vol.77, No.9 Abstracts

History of Coating Technology and Latest Trends

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In this paper, three main topics are described as technology and history of coating and air dryer. The first is the technical development of size press. Pond size, roll metering, application head size press, spray sizer and the latest Hard nip sizer are described. The technical development of some important coater heads is described secondly. Roll application, short dwell application, jet application blade coater and curtain coater are explained. The third is an update of an air nozzle of air dryer. This greatly contributes to improvement of drying capacity and energy saving. The screen and the deaerator which are the important device of sizing and coating supply system are introduced at the end.

Transition and Latest Trend of Tape Turn-Up System -RCS / IBS Reel Changing System-

Atsushi Kudoh
IBS Japan Ltd.

IBS Paper Performance Group introduced the first Tape Turn-up system (hereinafter – "RCS") to paper market in 1986 and has delivered over 1,700 units in world-wide. In Japanese market, the first RCS1000 was introduced in 1999, and since then 82 units have been delivered and been operating. From the first-generation RCS1000, the second-generation RCS2000 to the third-generation RCS5000 and RCS3001-T, we supply consistent in-house productions except for some Automation products. We also provide in-house developed and manufactured paper tapes used for Turn-up. In addition, we provide our own regular maintenance service in view point of stable operation. This is because the turn-up system is in an important position to complete the papermaking process and is required to operate stably and accurately 24 hours a day.

The Synthetic Rubber Cover for Applicator Roll

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In recent years, the chemicals used for coating have become more diversified, and the rod metering size press, which supports faster machine speeds and space-saving, has become widespread. The environment in which applicator rolls are used is becoming more severe.

Polyurethane, which has high strength and excellent abrasion resistance, is often used for the coating material of the applicator roll. It is necessary to replace the roll every several tens of days, which is complicated in terms of management.

For the purpose of preventing swelling and peeling due to blistering of the applicator roll, we have developed synthetic rubber materials "Super Tempex SP" and "RPD-164" with excellent water and chemical resistance. In contrast to urethane rubber, which is highly hydrophilic and easily absorbs water, synthetic rubber can be made more water resistant by optimizing the grade of raw rubber and compounding agents.

A temperature difference was applied between the inside and outside of the roll, and an accelerated blister peeling test was carried out. While the urethane rubber peeled off in 4 days, the synthetic rubber could withstand 160 days.

Basic and latest technologies for calender and reel

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In the papermaking process, the surface of the paper after leaving the dryer part is rough and the structure is soft. Calendering applies pressure to the paper to densify the structure and smooth the surface to a specified thickness. Calendered paper is wound onto a roll shape by a reel for processing in the next process. In this process, the paper is required not only to have the required thickness, but also to have the required gloss and smoothness, and must be rolled up delicately so as not to spoil the gloss and smoothness. On the other hand, the demands of the times, such as increased productivity and differentiation from competing products, as well as technological advances, have led to the fusion and further subdivision of processes. As with other paper making process equipment, calenders and reels have also developed unique technologies to meet the specific requirements of each product type. This seminar reports the technological evolution of calenders and reels up to the present day, as well as the latest technologies.

In recent years, we have been focusing on machine inspection. Maintaining good condition maintains quality, which in turn leads to cost reductions. We will also discuss our efforts and actual cases.

Operating Experience of Fibre Solve FSV(U)C pulper for wet strength paper machine broke handling

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Fuji Mill has two paper machines, one is N-1 and the other is N-2: N-1 produces all grades of corrugating medium from the general grade to water-resistant corrugating medium and N-2 is one of the largest paper machine in Japan and produces the white paperboard with excellent conversion suitability and printing effects, while the intermediate warehouse located in the back-end process area enables a quick delivery to the customers. The company installed a biomass boiler in 2015 and is working to reduce its environmental impact through the effective use of renewable energy and further use of recycled resources and also made a committment to resource conservation and environmental protection. This paper introduces a case in which a machine pulper delivered by ANDRITZ was introduced to establish a stable operation of the broke treatment process during the new production of hard-to-pulping paper on the N-2.

Foreign matter removal technology in the papermaking process using low-grade recycled paper

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In recent years, the used paper utilization rate has been around 64%, and while the SDGs are being called for, the goal of achieving a used paper utilization rate of 65% by 2025 has been set. We believe that the use of used paper will continue to increase. However, while the amount of used paper generated is decreasing due to the COVID-19 pandemic and the quality of used paper is also decreasing, the number of sticky foreign substances such as pitches increases and adheres to fabrics, causing poor water extraction, paper break and reduces productivity. Is increasing. At the same time, improvement of product quality is also required, and the situation where difficult problems must be tackled is increasing. In order to improve productivity and quality even under such circumstances, we will introduce measures to remove foreign substances in the papermaking process while using low-grade recycled paper.

The Smart Papyrus realizes work style reform in paper mills. (Part 1)
-SmartPapyrus® 1.0 system that classifies defects by origin-

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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 2022, the number of applications being operated over the world has topped 800 units. In recent years, 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. For this reason, we developed SmartPapyrus® 1.0, a system that uses AI to automatically classify images of defects. SmartPapyrus® 1.0 makes it possible to determine in real-time when and how many defects have occurred.

As a result, the necessity and effectiveness of countermeasures can be quantitatively confirmed. In this report, we will introduce SmartPapyrus® 1.0 and discuss some examples of its use.

The SmartPapyrus Realizes Work Style Reform in Paper Mills. (Part 2)
-Smart Papyrus® 2.0 that analyzes and predicts the occurrence of defects-

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In recent years, problems caused by machine deposit have been increasing in Japan due to the deterioration of recycled paper utilization rates and raw material conditions. Furthermore, quality requirements from corrugated board mills have become more stringent and reducing the defect rate has become a major issue.
In addition, with a shrinking workforce and the retirement of skilled workers, it is becoming increasingly difficult to respond to machine soiling in a timely. and accurate handling. In response, we are developing "SmartPapyrus®," a system that visualizes machine deposits with IoT, performs predictive analysis of defects and paper breaks using AI, and prevents defects and paper breaks with machine deposit prevention technology. The goal of SmartPapyrus® is to eliminate defects and breaks in the papermaking process. The elimination of defects and breaks will reduce the amount of work required, and by eliminating wasteful work, not only will the machines be more productive, but also the workers will be able to focus on more productive work. Furthermore, by reducing the number of defective products due to defects and paper breaks, energy consumption can be reduced. This will contribute to decarbonization.

Therefore, we have started to develop a defect occurrence prediction analysis as SmartPapyrus® 2,0. SmartPapyrus® 2.0 receives machine condition data from DCS and QCS, in addition to SmartPapyrus® Ver.1 fabric deposit data and SmartPapyrus® 1.0 defect information and analyzes it using AI to detect signs of defects before they occur and to propose countermeasures to reduce defects. The system then analyzes the data to detect signs of defects before they occur and proposes countermeasures to reduce defects. In this report, we introduce an overview of the analysis of signs of defect occurrence and present a preliminary report on the Proof Of Concept (PoC) experiment.