JAPAN TAPPI JOURNAL 10
October 2024
Vol. 78, No. 10

CONTENTS

Papermaking Technology Ⅱ

Topics & Information

Introduction of Research Laboratories (159)

Pulp and Paper Mills in Japan (107)

2024 October JAPAN TAPPI JOURNAL
Vol.78, No.10 Abstracts

Recycling technology for future waste paper raw materials

Makoto Sakakibara
AIKAWA Iron Works Co.,Ltd.

The rate of paper recycling in Japan reached 66.8% in 2023, surpassing the goal set by the Ministry of Economy, Trade and Industry to increase the rate to 65% by 2025 in 2020, and has continued to maintain this level ever since. This can be said to be the result of efforts by local governments and recycling companies to cooperate with waste paper collection, and by the paper industry's efforts in waste paper recycling technology.However, on the other hand, the need to utilize difficult-to-recycle waste paper that had previously been discarded is increasing year by year.

In this paper, we will introduce the breakthrough paper recycling technology, the Continuous Detrashing System known as the “S-PAL System” aimed at enhancing the removal of foreign contaminants in the pulping process.

Optimize Operations with in-line Fiber Analyzer, BTG SPM
-Energy Savings On Your Tissue Machine With Minimal Capital Investment-

James Litchwark, Klaus Kunschert, Sanjay Aggarwal, Grant Downham and
Kenichi Ishihara
Voith Turbo Co., Ltd. BTG Japan, Process Solutions

With recent volatility in energy markets worldwide, energy efficiency initiatives are a priority for many tissue manufacturers. While new technology and modern machine designs do offer better efficiency than older technology, it is not always necessary to have major capital investment to achieve significant energy reductions in your tissue process. Starting with diagnostic audits focusing on papermaking fundamentals, and layering new technology on top of strong foundations, it is possible to design customized solutions to suit any budget that can deliver significant gains in energy efficiency and raw material costs. Depending on the specific process circumstances, these solutions can include anything from process instrumentation, to advanced process control software, to improved operating procedures, based on the findings of an in-depth audit.

This paper outlines a holistic approach to energy reduction and raw material cost savings, and presents some real-world examples of successes achieved using this approach. The examples demonstrate that it is often possible to achieve significant gains in energy and raw material costs, while simultaneously maintaining or even improving paper quality and machine productivity.

this paper three topics which I was concerned to the development were briefly described.

Introduction of inline color sensor on liner paper machines

Ryoji Nakamura
RENGO CO., LTD. Paperboard Business Unit Fukui Group KANAZU MILL

In October 2017, Rengo Co., Ltd.'s Kanazu Mill upgraded its No. 2 paper machine from a machine that only made corrugating medium to a production facility that can also make linerboard. In 2019, it was selected as an IoT promotion model factory in Rengo because it only has one machine and can easily analyze and evaluate new technologies and equipment. Since then, we have been actively working on DX promotion and IoT utilization with the aim of further improving quality and productivity.

This article provides an overview and operational status of a new control system that we have introduced as part of our activities, focusing on adjusting the surface color of the linerboard on the machine.

Basics of approach part from stock preparation theory and transition, latest trend including introduce of Bale&Broke Pulper, Conical Refiner, Machine Screen

Kouhei Oka
Paper technology, Valmet K.K

The approach system for feeding raw materials to the paper machine and the stock preparation process are very important processes that ultimately control the quality of the product. Approach system equipment has also changed over time, and this paper will explain each equipment(pulper,refiner,screen) used by Valmet. Valmet, the world leader in this field as well in the pulp and paper industry, has a full range of equipment and service to improve stock preparation and approach system.

Latest Screening and Cleaning Technology

Takashi Kanda
Service Business Group, Andritz K.K.

Screening and cleaning play an important role in removing impurities in the stock preparation process. Recently, due to poor quality of recycled paper and increase in energy costs, not only screening and cleaning efficiency but also longer lifetime of wear parts and energy saving are conditions required by paper companies. In the long history of screening and cleaning, ANDRITZ has developed many unique products in the screening and cleaning fields to respond to a variety of demands. In screening, ANDRITZ has developed the "UTwist" basket where the height of the wire may be changed as needed, by twisting the wire. The ability to adjust the profile height within the ANDRITZ UTwist basket is unique. The twisted wire allows for an optimum profile height at any position on the basket. UTwist Basket makes it possible to improve quality and to increase the capacity from a new perspective in comparison to existing screen baskets. In cleaning, ANDRITZ has developed the Multi Injection Vortex Control (MIVC), which effectively adds dilution water from the bottom, making it possible to improve operation and capacity with only a small amount of dilution water. MIVC addresses many of the common problems that jeopardize daily operations — runnability issues, yield issues, and energy consumption. These products can contribute to quality improvement and energy saving and have already been used both domestically and internationally, but we would like to introduce these technologies here, as they are expected to play a vital role in solving the problems of many mills in the future.

Worker safety management and flow line management system using automatic recognition technology.

Tsuyoshi Matsueda
Business promotion center, TOPPAN DIGITAL Co., Ltd.

The 2024 problem in the manufacturing industry is the aging of workers and a shortage of human resources. And The manufacturing industry faces many challenges, including the 2025 problem, which will be the aging of the baby boomer generation.

To solve the shortage of human resources, there is an urgent need to build a system that provides an environment in which current workers can work efficiently and easily. Many IT companies provide systems for building systems for DX in the manufacturing industry. However, even if only the system is converted to DX, efficiency will not be improved if it is not possible to collaborate with the workers who will use it. I will introduce the latest automatic recognition technology that makes it easier to link with systems by visualizing the status of worker line management and health management.

Introduction to 'Cooperative Process Optimization'
- Efforts to Reduce Loss and Save Labor through Improved Control -

Ken-ichiro Wada
P&W Solutions Div., Yokogawa Products HQ, Yokogawa Electric Corporation

The manufacturing process of pulp and paper involves multiple continuous processes, with numerous control loops. Optimizing such a plant requires understanding vast amounts of data to identify issues and their underlying causes, as well as considering process interferences. Our "Cooperative Process Optimization" service is designed to address these needs. This service offers significant benefits, including reduced loss time during grade changes leading to increased production and decreased use of raw materials and steam. It also suppresses process variability, enhancing product quality and reducing material usage and the rate of returns. Additionally, it extends the coverage and effectiveness of automated control, promoting labor and personnel reductions and standardizing operations.

In manufacturing environments, where current operations are often taken for granted, recognizing problems can be challenging. Even when problems are acknowledged, quantitatively evaluating the impact of improvements is difficult. This complicates the decision-making process for necessary investments. Our service addresses these challenges by first clarifying the existence of issues, demonstrating their potential for improvement, and then quantitatively estimating the effects of these improvements, all carried out comprehensively by our specialized control engineers. This article outlines the approach and details the examples, which include the introduction of Cooperative Grade Change Control between stock preparation and papermaking processes resulting in more than 20% reduction in the required time for grade changes, an expansion of the automation scope, and an improvement in operational individual differences. Another example is the improvement of fluctuations due to mutual interference between the stock preparation and papermaking processes, which achieved more than a 50% reduction in the convergence time of basis weight during grade changes.

Wastewater treatment operation optimization system using manufacturing process data

Chise Fukuda
Kurita Water Industries, Ltd.

In recent years, raw materials and operating conditions have changed significantly in the paper industry, and various efforts have been made to maintain stable product quality. These efforts have a significant impact on water quality for papermaking, and changes in the water quality can lead to unexpected problems.

Kurita has developed an operation optimization system for wastewater treatment by leveraging its extensive water knowledge, which is used in large quantities in paper mills, and its solutions for operations from the manufacturing process to the wastewater treatment process. The system predicts issues that arise in wastewater treatment and constantly optimizes operations to ensure that wastewater treatment is always stable, even under changing operating conditions.

In this report, we introduce three key technologies for building wastewater treatment optimization systems.

First, we will describe the S.sensing® system, which visualizes operational data. The S.sensing® system continuously monitors water quality data of the entire plant and visualizes the factors influencing key indicators.

Next, we will introduce the predictive analysis method that utilize the visualized data. The predictive analysis allowed automatic prediction of possible future changes in wastewater quality with a high degree of accuracy. In addition, our predictive analysis method can perform a pseudo-evaluation of important influencing factors on the predictive analysis results and select optimal operating conditions based on these results.

Finally, we will introduce our wide range of solutions and case studies as solutions to issues based on the results of predictive analysis.

Solves the problem of paper breaks and defects at the wet-end！
Locally chemical approach to improve productivity by preventing deposit and improving dehydration.

Hiroyuki Kokubun
Nissin Kagaku Kenkyusho Co., Ltd.

The deposits adhering to the wet-end cause operational troubles associated with paper breaks and defects, and often have a significant adverse effect on productivity and product quality in paper making process. There are many different factors that cause paper breaks and defects, so the best way to solve the deposit problem is also different depending on the situation. This is because the mechanisms that cause problems are complicated and the methods for solving them are not uniform. Therefore, for complex deposit problems, it is important to find the best solution by looking at them from various angles.

For more than 60 years, our company has been investigating the causes of deposit problems at many production sites, researching and developing problem-solving methods and proposing them, and striving every day to propose customized and optimal solutions. This paper introduces some examples of local countermeasures for various deposit problems in wire and press parts, from cause investigation to problem solving.

Competent for Turn Key System Project from Pulper to Wet-end and White Water Treatment

Nobuhiko Okumura
Engineering Division , Aikawa Iron Works Co., Ltd.

Three years have passed since the first Covid-19 infection in Japan, and we are now gradually returning to normal life, the pulp and paper industry is also suffering from the aftermath, such as changes in people's lifestyles and work styles due to the Covid-19 crisis, and inbound demand showing a recovery trend, boosted by the weakening of the Japanese yen. In a rapidly changing environment, we have had the opportunity to be involved in multiple new tissue machine installation projects. Through this opportunity, we have not only focused on stock preparation equipment, which is our main product, but have also provided an integrated service from system design to plant construction and commissioning by pouring our know-how in stock preparation treatment that we have cultivated over the years. This report introduces the compact layout and system design, including from pulper to wet end and fiber recovery from white water, and their turnkey service offerings.

Optimization of Wet-end Process by Slime Control Agent“CURECIDE” and Coagulant“REALIZER” PartII

Shuhei Otake,Saori Takesue and Koichi Tadaki
SOMAR Corporation

Due to the recent decline in the quality of pulp and recovered paper raw materials, there has been an increasing trend toward problems with paper machine tool contamination and paper making defects caused by adhesive foreign matters. In last year's report, we introduced the reduction of paper making defects by the combined addition of the oxidation type slime control agent“CURECIDE Series” and the multifunctional coagulant“REALIZER A Series” that introduces reactive polymer technology. In addition to defect reduction, this paper introduces the results of our study on reducing the addition of paper strength agents. The condition of the wet end tends to deteriorate year by year due to the decrease in the coagulation effect of sulfate bands caused by the neutralization of paper machines and the accumulation of dirt substances and increase in electrical conductivity caused by the closing of the machine. In addition, it is becoming increasingly difficult to maintain paper quality due to high ash content in the paper field and low basis weight in the paperboard field, and a new concept of agent is required to solve these problems. We have identified the problems with conventional oxidation type slime control agents and polymer type coagulants, and by applying the “CURECIDE Series” and the“REALIZER A Series”, which were designed based on a new concept, we have been able to improve the fixation of various internal additives such as paper strength agents while reducing paper making defects and adhesion to paper machine tools. The technologies to improve the fixation of various additives such as paper strength agents while reducing paper defects and adherence to paper machine tools are introduced.

Applications and Functions of the HYMO Wet End System
-Approach to Reducing Environmental Impact-

Natsuhiko Sato
Shonan Research Center, Performance Chemicals Development Group, HYMO Corporation

In recent years, it has become very important to consider SDGs and take actions of reducing environmental impact. Therefore, we are committed to the development and improvement of products that are useful for environmental conservation and energy saving.

Among the wet-end chemicals, chemicals for papermaking processes such as coagulants, retention aids, and drainage aids have various functions that contribute to environmental impact and SDGs along with their roles. As for the specific functions of these chemicals, wastewater treatment improvement, reduction of energy consumption, fixation of other paper chemicals, effective use of the materials, and improvement of the paper quality are mentioned. Thus, we 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 functions by utilizing the chemical characteristics of coagulants, retention aids, and drainage aids. We call them 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 chemicals such as sizing agents, strengthening agents, and dyes, it is necessary to consider the addition place of each chemical. In this case, the recommended addition points are mixing chests, machine chests, and stuff boxes located near the addition points of sizing, strengthening agents, dyes, or other chemicals. Meanwhile, we have developed a new drainage system. This system is the combination of high-molecular-weight anion chemicals and special cation chemicals added in that order. Although it depends on the paper stock condition, high drainage performance and effect of moisture content reduction of the sheet after pressing is obtained by using this system compared to the case where anion chemicals are added after cationic chemicals added. In addition, by using chemicals in consideration of their chemical characteristics, various benefit for reducing environmental impact, such as improved wastewater treatment, can be obtained in actual machine trials.

We are aiming to contribute to the reduction of environmental impact and energy consumption by making effective use of applications and functions of the HYMO Wet End System.

ANDRITZ's Processing System for Low-grade, Mixed Recovered Paper

Tomohiro Hanada
Andritz K.K. Capital Systems Sales

Japan has one of the highest collection and utilization rates of recovered paper in the world. This is due to cooperation of consumers, the government, the development of paper collection systems by paper collectors, and the development of paper utilization technology of pulp and paper manufacturers. However, in order to further realize the sustainable society that the paper industry is expected to contribute to, pulp and paper manufacturers are now shifting the recovered paper they use to lower grades, with the aim of widening the range of recovered paper utilized. From a paper recycling perspective, this shift is making a significant contribution to the effective use of resources, in the form of waste reduction. On the other hand, companies are also urgently faced with the task of reducing production costs in order to secure profits, which are expected of them, and are investing in equipment that can meet the requirements of both this shift and profitability.
ANDRITZ, which celebrated its 170th anniversary last year, has continued to manufacture and develop stock preparation systems for production of paper as one of its missions. In this report, the following three systems will be introduced: first, the "ultra-low-grade mixed recovered paper processing equipment using a large-size recovered paper processing line", which has been adopted overseas, second, the "low-grade mixed recovered paper processing equipment using a small-size recovered paper processing line" , a good fit for the Japanese market, where it is difficult to secure installation space for large equipment, and lastly, the "FibreSolve Pulper," which was awarded the 50th Sasaki Prize by the Japan TAPPI last year, in 2022, for its ability to take recycled broke from paper manufacturing and finishing companies and to recycle them into raw materials, with approximately 20% less energy consumption compared to conventional methods.

Improvement approach of stock preparation system against raw material quality change

Takanori Goto
Voith IHI Paper Technology Co., Ltd.

The quality of the raw material (waste paper) is getting worse and worse. Until now, we have choices that we don't use poor quality raw material depending on requiring quality of final products. But the circumstances surrounding paper industry has been changing drastically nowadays and we come to the situation that we cannot help but use poor quality raw material for keeping stable production.

So, contaminants removal is one of the most important things in stock preparation line. For effective removal, contaminants should be removed in early stage as much as possible before contaminants turn into small pieces.

In this article, we will introduce some latest system for removing various kinds of contaminants such as plastic, sticky, metal pieces. TwinPulp system consists of IntensaPulper, IntensaMaxx and IntensaScreenDrum and enables to remove contaminants which are bigger size than perforation diameter of screen plate with frequent reject removal by enhanced detrashing system. Protector system including 2 stages HC cleaner with continuous reject as 1st stage and batch reject as 2nd stage enables higher cleaning efficiency. Combisorter is effective for removing plastic contaminants in the stage of corse tail reject. Tandem screen system of fine slot screen enable to get high quality stock for paper machine even if the raw material including many sticky contaminants.