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History and State-of-the-Art Technology of Paper Machine Wet Section

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Many modern paper making machines for are based on the principle of the Fourdrinier Machine, which uses a specially woven plastic fabric mesh conveyor belt in the forming section. This Fourdrinier was invented by Louis Robert in 1799. This Fourdrinier Machine was one of the earliest of the industrial revolution era continuous manufacturing process. Previously paper had been made by hand, in individual sheets. The method of continuous production demonstrated by the paper machine influenced the development of continuous rolling iron and later steel and other continuous production process.

This paper describes the history, systematic classification, and state-of-the-art technology of Paper Machine Wet section, especially for graphic paper. There were some great innovations in the end of 20th century, such as ModuleJet dilution control system in headbox, NipcoFlex Shoe press technology in press section, for example. These made Paper Machines quite wider and faster, with higher paper quality. But, on the other hand, technology made by those who have gone before us in 200 years ago, were still useful in today' s paper making. This is quite interesting and we should still learn from our forerunners.

Development of Cover Materials for Press Roll and Shoe Press Belts

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Products For Paper Industry & Laminate Div., YAMAUCHI CORP.

The press section of paper making machines are composed of roll presses and shoe presses.

We developed PU press roll cover quality “High-Top Roll” in 1963, first in the world, and have licensed this technologies to one of the biggest roll cover manufactures in overseas. Since then and up to now, we have been developing various types of cover qualities and have been keeping the top share in the markets by supplying those products to the customers mostly in Japan and Asia. With regard to the shoe press belt, we developed shoe press belt “YNB” in

1983, and now have grown up to have almost half of market share in Japan and have been increasing market share rapidly in Europe, Americas, Asia and other area all over the world.

The suction roll covers are required to have optimum surface design to improve its de-watering capability and stable bonding strength for longer life-time. Here, we would like to introduce the latest cover surface design and the new under layer to solve the above issues. Furthermore, we would like to introduce “High-Top” L-Series which has adapted totally new concept of bonding system.

For the shoe press belt, utilizing the polyurethane quality and processing technologies cultivated by “High-Top” roll cover, Super 95 series which we developed in 2009 has been well accepted by customers and has contributed to extend the belt life even under higher speed and linear pressure.

Here, we would like to introduce Super 93H series which is upgraded even from Super 95 series.

Operation Experience of the Amagasaki Mill Success Former Introduction

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Amagasaki Mill, Rengo Co., Ltd.

No.6 Paper machine (PM#6) in Amagasaki mill is producing liner board from 120 to 210 gsm with 2 layers. It was installed in 1969 as a corrugating medium machine and modified liner board machine, On Top Former, in 1979. In recent years, PM#6 has faced operation difficulty due to aging equipment such as adjustment of HB slice lip and it led to productivity and quality issue.

In order to solve those problems, PM#6 was modified new former, Success Former, and start its operation in Jan 2015. As a result, paper properties, sheet formation and strength, is improved by decreasing HB consistency from 1.1% to 0.7%. This report shows installation process and our operating experiences for PM#6 modification.

Introduction of New Technology from Allimand

— Allimand Hydraulic Head Box with Dilution Control S-IV Version —

Yosuke Suzuki

Itochu Machine Technos Corporation

Following the company rules of continuous improvement of Paper Making equipment, ALLIMAND has released the S-IV VERSION of the hydraulic head box with dilution control.

The S-IV VERSION, being more compact with simplified configuration, is leading to a cost effective design for the benefit of our customer.

The S-IV VERSION achieves the same hydraulic performances leading to excellent:

- 1) Formation
- 2) Basis Weight CD Profile
- 3) Individual monitoring of Fiber orientation and Basis Weight CD profile with even easier operation and access for cleaning.

It is suited to high speed machines and high quality requirements in all grades such as Printing & Writing, coated grades, packaging and container board grades, & specialty grades.

History and the Latest Trend of Forming Fabric

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Forming fabrics are used at the wet end of paper machines. The fabric has three distinct functions; ①to allow water of the pulp slurry to pass through its structure ②to promote the formation of uniform fiber mat ③to act as a conveyor belt transporting the sheet to the next phase (press section). Formation of the sheet is the most critical phase of paper making. Therefore, performance of the forming fabric has high importance. Recently, requirements for paper quality and productivity have increased in the papermaking industry. Such requirements have resulted in the larger and higher-speed paper machines. Responding to these recent paper industry demands, forming fabrics have evolved as well.

The first generation triple-layer fabrics had the hope of being an ideal design, yet they did not expand into the market rapidly. A flaw of these first generation triple layers was that their structural design properties allowed for easy internal wear. Second and the third generation triple-layer fabrics exhibited improvements, and have become a current mainstream design used on paper machines. Nippon Filcon has focused on developing its third generation, triple-layer fabrics called the SAKURA and FUJI series. These series, incorporating a unique design called WSB, have possibly the best resistance to internal wear on the market. Customers have observed stable operation while minimizing internal wear. Other value-added designs will be noted.

In this manuscript, we explain the history of forming fabric weave structures, from single layer to 3.5 layer fabrics, and their evolution alongside the advancement of paper machines. Finally, we shall give an overview of the FUJI series, our latest triple-layer design.

New Opportunity with Grade Conversion

— Achievement of Grade Conversion in Accordance with Market Demand —

Hidefumi Inoshita

Valmet K.K.

It is a well-known fact that the paper industry and paper markets are changing rapidly as the digital world changes everything around us. Papermakers are requested to produce proper paper grade to meet market demand.

New machine installation for quality improvement of some grades require time and costs. Grade conversion is recognized as the common way to solve, by modification of existing paper machine with new key components.

For grade conversion, papermakers need to study suitable type of papermaking line, necessary capacity to meet the market demand, improved properties, possibility to produce additional grade with existing machine and/or necessity to produce completely new grade.

Grade conversion has some cases like Paper to Board, Paper to Special, Paper to Paper. Especially the conversion in package grade is on rise.

Global market trend requires economical production of boards with higher efficiency and good qualities, resulting in lower basis weight grades, usage of economical raw materials, higher content of recycled furnish, higher machine speed operation and still the same requirement on board strength properties.

Valmet has developed advanced technologies for multi-Fourdrinier, hybrid and gap formers to manufacture various types of board grades.

The author introduces some of representative technologies in Valmet's advanced wet parts of board machines.

Case Study of Solving Issues by Optimized Spray Nozzles

Shoichi Shimose

Everloy Syhoji Co., Ltd.

Everloy is well known as a quality spray nozzle manufacturer in the world, especially, in the fields of industry like steel manufacturer, pulp & paper manufacturer, and waste incineration plant, and LCD manufacturer, and so on.

In the pulp & paper industry, various types of Everloy spray nozzles have been installed in

paper machines for years.

The functions of these spray nozzles are, for instance, washing, cooling, edge trimming, humidification, spraying of chemicals and water.

Recently, in the point of ecology, reduction of water consumption, water pressure, and electricity are quite important. Also, in the point of production quality, uniform spray of coating and cooling is necessary.

We, Everloy, are able to propose the best and the most appropriate solutions for the customer requests. Please contact Everloy.

Problems and Measures to Offensive Odor of Wastewater Treatment Facilities and Paper Making Processes

Hidenori Kojima

Kurita Water Industries Ltd.

In a papermill, a bad odor occurs in a wastewater treatment system and a papermaking process. Although the odor control chemicals are used for the measure against a bad odor, a more effective application is demanded. Moreover, some odor substances which occur in a papermill have serious influence for the trouble free operation and productivity of a factory. From such a viewpoint, optimize of the measure against a bad odor and the measure from which merits are obtained for a factory which is not a mere prevention of bad odor are introduced.

At a papermaking process, hydrogen sulfide generated in paper material slurry and diffuses at a storage tank or a machine, as this measure, application of odor control chemical which do not have bad influence in paper making process is effective, and this injection volume can optimize by ORP. Moreover, microbe control of paper material slurry by an inorganic biocide can prevent generating of bad odor, and it can improve the productivity of a factory, such as the amount-used cutbacks of papermaking agents. On the other hand, at a wastewater-treatment process, application of anaerobic inhibitor can remove the hydrogen sulfide in an activated sludge, and, it contributes to improvement of wastewater-treatment capability. Furthermore, the purifying equipment which improves corrosive environment can remove low concentration hydrogen sulfide which exists in a control room, and trouble of control units is prevented.

Corporate Profile & Products Information (25)

NISSIN KAGAKU KENKYUSYO CO., LTD..

Ever since the establishment in 1931, we Nissin Kagaku Kenkyusho Co., Ltd., have produced and supplied various kinds of chemicals. We tried hard to be a part as chemical assistants solving troubles at production sites.

It is our honor, as a forerunner in this field of research, to answer all kind demands of users. At the same time, we will create a novel value with users day by day.

We will try harder to open new aspects for producing chemicals.

—Peer Reviewed—

Novel Analysis Method for Pulp Furnish Using Tube Flow Fractionator (Part 2)

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The agglomeration and/or fixation behavior of hydrophobic colloidal substances (HCS) in deinked pulp (DIP) furnish was investigated by using a method combined with confocal laser scanning microscopy (CLSM) and a tube flow fractionator (TFF) in order to clarify the influence of wet-end chemicals. A solvatochromic fluoresce dye (SFD) was employed as a hydrophobic probe to visualize the HCS. The effect of wet-end chemicals addition into DIP furnish was evaluated. The furnish was classified into several fractions, as long fibers, short fibers, fines and colloidal materials by using the TFF, and the fluorescence of SFD attached onto HCS in each fraction was observed by CLSM. In the case of DIP without chemicals, the fluorescence was hardly observed in the fractions of long and short fibers, and a lot of fluorescence patches were confirmed in the fraction of colloidal materials. On the other hand, after the coagulant addition to DIP, the patches of fluorescence were observed on the surface of fibers and the amount of patches in colloidal fraction decreased significantly. It was thought that the addition of coagulant induced the attachment of HCS onto fiber surfaces without excess agglomeration of them. Consequently, this method combined with CLSM and TFF, visualized the distribution and behavior of HCS in pulp furnish. It can contribute to get more efficient and effective approach to select proper wet-end chemicals.