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History and current trends of forming fabrics

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Forming fabrics are used at the forming section of a paper machine in the papermaking process.

The main functions of a forming fabric are: ① Dewatering pulp slurry ; ② Dispersing pulp fiber and the creating the sheet; and ③ Transferring sheet from the forming section to the press section of a paper machine.

Before reaching the forming fabric, the pulp slurry consists of about 99% water and is mixed in Head Box. On the forming fabric the pulp slurry is dewatered, and it is transformed to sheet for paper products. As the sheet is transferred from the forming section to the press section, the sheet has a moisture content of about 80%.

It is said that the origin of forming fabric is very old. We have used forming fabric before Louis Robert of France invented the first continuity paper machine in the world in 1798. Early Forming fabric was first made of metal. Metal forming fabrics were still used until around 1975.

Later, plastic forming fabric was developed to aim for high productivity. Paper machines have evolved, increasing in size and speed to meet the current demand from the paper industry, aiming for high quality and high productivity. To meet the current demands of paper industry and the latest machines, forming fabrics have evolved as well.

In this session, we introduce the history of forming fabrics structure from single-layer to triple-layer, and their evolution alongside the advancement of paper machines. Finally, we present NIPPON FILCON's latest designs, including the cutting-edge "N" series for high speed paper machines.

Press part of basic theory and transition, latest trend

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Situation of automatically paper machine operation with high speed ask more efficiency energy cost more stable operation. The main role of press part is removing wetting mechanically before dry part. This is very important because of the amount of water dewatered in the press part affects heat consumption and cost in the subsequent dry part. Further, when dewatering efficiency in press part is quite good, the strength of the wet paper is increased, and trouble due to paper break and wrinkles are less likely to occur. Paper quality also regarded important because it require less difference in density between top and bottom surface, and smoothness and bulkiness of surface.

In this section, according to the required role of the press part, I focus on changing the basic form of the press part and changing press type to improve water removal and operation. And introduce shoe press, equipment, latest trend.

Performance and effects of thermal spray application to various wire rolls -TS-03112μ which greatly extends the life of plastic wire -

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In the wire part of a papermaking machine, the wire roll (Wire roll, Breast roll, Drive roll) is usually a rubber cover roll.

Recently, ceramic spraying has been increasing. Rubber cover rolls cause uneven wear in 1 to 2 years due to friction with plastic wire. Uneven wear has an adverse effect on the life of the plastic wire, and it is necessary to replace the wire early at the papermaking site. As a remedy, ceramic spraying has been used for more than 20 years and has achieved a certain effect. However, the ceramic sprayed coating has a low coefficient of friction and easily slips with the plastic wire, and cannot be used for a drive roll. Therefore, the effect of improving the life of the plastic wire is limited. We started to develop special ceramic thermal spray coating (TS-03112μ) with high friction coefficient more than 15 years ago. After various evaluation tests with the cooperation of a wire manufacturer, the first roll was delivered to the on-top former drive roll in 2005. After undergoing various evaluation tests with the cooperation of a wire manufacturer, the first roll was delivered to the on-top former drive roll in 2005. As a result, it was proved that the slip ratio was equal to or higher than that of a rubber roll for a drive roll. As a result, it was proved that the slip ratio was equal to or higher than that of a rubber roll for a drive roll. Since then, TS-03112μ has been mainly used only for drive rolls, but its surface performance has also greatly contributed to extending the life of wires by adopting it for normal wire rolls and breast rolls. Many customers who have adopted TS-03112μ have reported that the wire life has reached 1.5 to 2 times.

Operating Experience of Canvas Cleaning Equipment

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L-1 M/C in kushiro mill, Oji Materia, which produces linerboard 1,207 ton per day, is one of the largest linerboard machines in Japan. The linerboard of this machine is composed of three layers; bottom layer is formed by Fourdrinier, middle and surface layers are done by Belbond-former.

Although we had taken a variety of measures against paper sheet defects derived from sticky substances in dryer part to improve production yield, we had problems especially at the upper side of the first section canvas. As a countermeasure, we installed the “fabriKeeper” in May 2019 and have obtained good results. We will report consideration of introduction and our operating experience about this equipment.

Latest Dryer Surface Cleaning Technologies

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There are increasing problems of the dirt and rust due to the deterioration of the raw material quality and the unevenness of the dryer surface caused by a long-term usage. The dirt on the dryer causes the paper break, which leads to poor drying efficiency and uneven moisture profile. In addition, the removing the coating waste by hand is a time-consuming work and creates a health and safety issue. Furthermore, the improvement of product quality is more and more required, and the dirt removal from the dryer cylinder is therefore essential. This paper introduces the latest technology of the cylinder surface cleaning on the paper board making machines, specialty paper making machines, and tissue making machines.

Novel Combination Strategy of Branched-type Amphoteric Polyacrylamides for Paper Strengthening Agent

Makoto Kobayashi

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In recent years, recycling of waste paper and closure of water systems in paper machines have been progressing from the viewpoint of environmental protection. However, if waste paper is recycled, the strength of pulp fiber and the fibrils on fiber surface are reduced, and the strength of paper obtained from recycled pulp fiber is reduced. In addition, since the fiber length of the pulp is shortened, the freeness is reduced and the productivity is deteriorated. In order to supplement them, paper strengthening agent is essential at the time of paper making. As paper recycling and water systems closure progresses, fine fibers and dissolved electrolytes are accumulated in the papermaking system, leading to an increase in electrical conductivity. Under these circumstances, the internal paper strengthening agent cannot give an inherent flocculating and strengthening effect, because the ionic bonds between pulp and paper strengthening agents are blocked by dissolved electrolytic substances such as anionic trash.

We have internal paper strengthening agent suitable for high electrical conductivity, but we are not able to deal with sudden environmental change caused by increased usage of waste paper and seasonal factors meticulously. In order to solve these problems, we have developed a novel combination strategy by using two kinds of branched-type amphoteric paper strengthening agents which have different properties and adjusting their mixing ratio in accordance with changes of the papermaking condition.

GOEBEL-IMS – IMS Technologies Group -Tailormade Slitter Rewinders for Specialty Papers-

Shinichi Tanaka

Itochu Machine-Technos Corporation

GOEBEL IMS is the world's leading provider of slitter rewinders for converting paper and board, tobacco, films, alum foil, aseptic packaging and other special materials. The range of products includes slitter rewinders and winding machines for the production and converting process, as well as inspection and spindle machines for processing. Our machines are developed and manufactured at production sites in Germany and Italy. Itochu Machine-Technos Corporation is responsible for Japanese market.

Everyone knows the several advantages of paper, however, not all people are aware about the thousands of innovation and improvement to give to paper new applications on new markets. Everyday somewhere around the world someone is experimenting a way to combine paper with other materials to reach new features and find an application on the market. Sometimes the single markets are pushing the innovation, sometimes the scientific community is offering new products or new features to be profited on the market. We share our fundamental philosophy to manufacture the tailormade machine.

Revolutions in the history of civilization induced by paper

Part 8: Islamic Empire

Kiyoaki Iida

The Islamic Empire which rapidly expanded its territory, starting from the Arabian Peninsula, collided with the Tang dynasty which enlarged its control over central Asia at the Talas River. Due to their direct contact, the paper making technology was transferred to the Islamic society.

Abbasid Caliphate made use of paper enthusiastically to govern its large territory and to civilize society around. In 300 years since the Talas war, paper production even spread to the Iberia Peninsular. A book market was born and prosperous in Bagdad. It moved to Damascus after the devastation by Mongol. After the Timur occupation of Damascus, Cairo became the center. In the 13th century, Italian who got the production know-how exported paper to Islamic world. Then, the Islamic production and book market was prosperous in Iran in the 14 century and on.

The Islamic paper was made of linen rag from fax, which was beaten using wheel power. After sheet-forming, the sheet was air-dried. Then, it was coated several times with slurry of wheat powder to make its surface hard enough for pen-writing.

The paper, in the beginning, was accepted to write Koran on it. Then, encouraged by Abbasid Caliphate, book production, mostly hand-copied, exponentially increased, as civilizations such as Heroinism and Indian's were translated and Islamic civilization itself developed finely such as in mathematics, commerce and so on. The 14th century was regarded as its golden age.

An Essay on Methodology for Innovating “*JAPAN TAPPI JOURNAL*” Part 15: A Futurological Perspective required by the Journal

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We are living in a chaotic contemporary society and it is not an easy task to foresee the future fraught with uncertainties. Covid 19's pandemic environment further increases the haziness and uncertainties in the future society. However, the management judgement has to be adequately done even under these difficult business environments.

The fifteenth article of this series attempts to analyze the methodology of futures studies associated with the paper industry based on the recent academic achievements of “futurology” or “futures studies”. The overall contents are described as below.

1. Introduction
2. What is “futurology” like ?
3. The reason for considering plural scenarios for painting a vision of the future
4. The difference between the science & technology and political, economical & social issues in future prediction
5. The new areas created to the paper industry's perspectives by the futurology
6. An author's experience from “Pulp and Paper Technology Forecasting Committee”
7. The necessity of developing scenarios and roadmaps with multi-layered perspectives
8. Epilogue

Inkjet Printable Polypyrrole-ITO Conducting Inks

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We have prepared organic conducting nanocomposite particles which utilize polypyrrole as conducting parts and small ITO particles as dispersants. The nanocomposite particles of polypyrrole and ITO represent potentially useful processable forms of polypyrrole, normally intractable conducting polymers. The conductivity of polypyrrole-ITO nanocomposite particles was two orders of magnitude higher than bulk polypyrrole under the same condition. We confirmed that these polypyrrole-ITO nanocomposite particles can be utilized as conducting inks due to their high colloidal stabilities.