

### **The Latest Trend of Folio size sheeter and Wrapping technology**

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Maruishi has been working for paper industry for a long time providing various total system for paper manufacturing process from the dewatering section to finishing equipment. Today, the finishing line is the one of the main products and especially, Maruishi has been sold more than 190 unites of ream warping machines not only to domestic customer but also all over the world. The ream wrapping machine as the first place, Maruishi is capable to provide from the single unit of the various finishing equipment to the whole turnkey project.

Today, the technological innovation is getting tough, considering high demand for the long-term reliability with maintainability for introducing new equipment. Based on experience of manufacturing and service of paper manufacturing machines for over 70 years, we introduce Folio size sheeter, high speed Ream Wrapping Machine, and Kraft roll packaging machine with advanced technology.

### **AI Auto Depalletizing System**

**-AI robot making distribution operation unmanned and labor-saving-**

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In recent years, our country is suffering from a serious labor shortage due to the decreasing birthrate and aging population.

Especially the distribution industry faces with this labor shortage. Among the logistics tasks, the unloading (depalletizing) work of cardboards stacked on pallets is a heavy work leading to occupational accidents such as back pain. Therefore, it is difficult to secure labor force and even if they can be hired, workers' retention rate is low. So now it is urgent to make the distribution operation unmanned and labor-saving

by robots.

In this paper, we introduce the features of the depalletizing system with AI as an approach to unmanned and labor-saving.

### **Transition of Web Inspection System and State-of-the-art Technology**

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Web inspection system is determining a fault by lighting on the sheet of paper or the like, to measure the received light amount between the defect and the base such as black spots and holes in the camera is for determining a defect with the difference. This is advanced total system designed by a combination of optical, electronics, mechanical, control computer, software and variety of technologies. In this paper we describe the evolution of WIS.

### **Development of Quality Inspection Sensor for the Paper Mill Finishing Line**

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JFE Plant Engineering Co., Ltd is a comprehensive engineering company of machinery, electricity and control, which was established by JFE Mechanical and JFE Electrical & Control Systems in April 2016. In the previous JFE Electrical & Control Systems, we have been working on sensor solution business related to quality control from 2004. For the paper making industry, we have developed many sensors in the finishing line for communication paper, printing paper and household paper. We are developing the inspection system that substitutes for visual inspection by acquiring information on the inspection object mainly by using a laser or a camera and performing advanced mathematical processing on it. It has been acknowledged as one of the suppliers of quality sensors for the paper making industry by proposing and developing unique methods aiming for high accuracy inspection. Through these developments, we have delivered more than 30 quality sensors for the Paper mill finishing line. In this paper, we introduce a part of the technology that we have cultivated through experience.

## **Andritz Fiber Flow Drum Pulping Technology for OCC Application**

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" Paper is made At Stock Preparation System. " This is a word of Papermaking Engineering. In other words, " KP is made at a Continuous Cooking Digester.", " Mechanical Pulp is made At a Refiner". " Recycled Fiber pulp is made At a Pulper". A Fiber-flow Drum pulper ( FFD ) is able to produce the recycled pulp of excellent quality for both DIP and OCC from low quality and inexpensive raw materials that include lots of foreign materials and contaminants. That will be able to contribute a lot in the reduction of production costs. In this paper, is described the application of FFD to the OCC area that has increased rapidly for the last 10 years by introducing the reference results, flow sheets, application examples. In addition, it is stressed that FFD can be utilized effectively for OCC as well as for ONP ( Old News Papers ). The writer will start from the basic descriptions about FFD and then go into the application to OCC.

## **How The Paper Industry in Japan has technologically responded to The Paradigm shifts of the Japanese society**

### **Part 3 : Groping in 1990s**

Kiyoaki Iida

The paper industry in Japan, which had got over a crisis of existence, started to restructure the industry itself, rationalize its traditional distribution system and work on international deployment, as the Japanese economy was drastically slowing down. The restructuring proceeded to some extent. The international expansion, however, was not successful and the overseas sales ratio of the industry in 2002 was the least among industries.

Though paper demand was stagnating, which rather removed the stress of wood supply for its favor, an alternative to paper was not in sight and the industry was regarded sustainable, having a kind of recycling system within, and could afforded to have some relief for its future.

The technological development, successfully carried out with using solid state technology since the 1960s as seen in scale-upping equipment like paper machine,

staleminated and a next key-technology was not found yet. The industry was losing its advantage over foreign followers.

Exactly in this period, the new technological revolution, which would lead to information oriented society and would challenge the essence of paper and become a key- tech in the future, had begun.

### **Preparation of Dissolving Pulp by Totally Chlorine-free Bleaching: Roles of Hardwood Syringyl and Guaiacyl Lignins**

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Dissolving pulp was produced from four different hardwoods by prehydrolysis-kraft cooking and totally chlorine-free (TCF) bleaching using oxygen (O), peroxymonosulfuric acid (Psa), and alkali extraction with hydrogen peroxide (Ep) in an O-Psa-Ep-Psa-Ep sequence. The hardwood lignin structures were characterized by the nitrobenzene oxidation method, which provided syringaldehyde (Sa) to vanillin (Va) molar ratios (S/V ratios) of the lignin. Eucalyptus globulus wood had the highest S/V ratio of 5.81 and a combined yield of Sa and Va of 3.04 mmol/g-lignin, while the Acacia hybrid wood exhibited the lowest S/V ratio and the combined yield. The E. globulus wood provided a final pulp with an acceptable level of viscosity 7.0 mPa·s, a weight-average molecular weight (Mw)  $3.04 \times 10^5$  g/mol, a number-average molecular weight (Mn)  $5.56 \times 10^4$  g/mol, polydispersity (Mw/Mn) 5.47, a high brightness of 90.1% ISO, and an  $\alpha$ -cellulose content of 94.2%. It is attributed to the high S/V ratio and the high combined Sa and Va yield, which is suggestive of a less-condensed lignin structure compared to the other hardwoods tested. No significant differences in the cellulose crystallinities of the bleached pulp produced from the four hardwoods were observed.