

### **The Effects of Dryer Fabrics for Paper Drying**

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Dryer section is a part consuming the highest energy in the paper machine. In these days, it is required in dryer section to reduce steam consumption with increasing thermal efficiency ratio and also electric energy consumption for driving cylinder dryer and blower fan in the environment and cost point of view. The main task of dryer fabric is to promote paper drying by pressing wet paper with cylinder dryers heated by steam; that is to say, we can say that dryer fabric is quite important tool which is directly related to energy efficiency of paper machine. Therefore, it is very important to understand the relationship between paper drying section, the change of dryer section history, dryer fabrics and its mechanism on paper drying process.

Dryer fabric composed by cotton has been used in dryer section until 1970's, and, afterwards the raw materials was changed from cotton to synthetic fiber. By using the synthetic dryer fabric, we could be provided a better dryness significantly. Because it became possible to have a higher fabric tension load by synthetic fiber. Additionally, synthetic dryer fabric has a higher air-permeability character which can bring a better ventilation of air-moist in dryer pocket, and it also promotes a better evaporation from wet paper.

However unknown factors are still existing in relation between drying efficiently and dryer fabric. Therefore we are trying to figure it out what the interactive relationship between drying efficiency and the fabric surface,-internal weaving structure is. Anyway, we will continue researching them intensively and in near future, we would like to contribute on the development of paper industry.

### **Energy Saving in the Steam & Condensate System**

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Compared to the original operating conditions for a paper machine, almost all current

operating conditions, such as paper weight and speed, have changed.

Saving energy may be possible by investigating and examining whether or not the drainage system has kept up with these changes.

By changing the drainage system to match the paper being made, there should be many cases that can expect improvements in quality and efficiency as well as realizing steam savings.

Here we report on what can be done from now on for the possibility of saving energy considering the drainage system, within recent significant improvements in drying efficiency through sealed hoods, air supply and exhaust, heat recovery system, etc.

### **The Case of Energy Saving by Installing Exhaust Heat Recovery System at the Dryer Hood**

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The dryer section accounts for a high percentage of energy consumption in papermaking process, therefore energy saving at the dryer section is one of the crucial issues in the paper mill.

The dryer hood system in Osaka PM2 has some problems such as low efficiency of the air supply/exhaust equipment, air leak and heat loss, insufficient intake and exhaust flow ratio, low dew point.

In addition, we have a problem with significant energy loss by hot exhaust air from dryer hood.

This paper reports the outline of modification of the dryer hood system by installing the heat recovery system and describes the reduction of steam consumption after we installed and optimized it based on process investigations.

### **Doctor Systems & Canvas Cleaner**

#### **— Case Studies of Deposit Removal Facilities on Dry Part —**

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By recent badly quality of recycling paper, the difficulties of impurity removal at paper stock preparation stages are underscored year by year. As the result, the fine impurities reached to

paper machine side are increasing, they have chances to deposit everywhere, and bring dirt troubles. Because cleaning up the deposit by hands requires long time and hard tasks with the paper productivity drastic reduction, its improvement would be one of the most important subjects for paper making. We introduce our newest profitable doctors and cleaners for paper machines to improve this big problem.

### **Solution for Sheet Breaks and Paper Defects Using “ Dry part Passivation Technology ”**

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In recent years, a paper recycling rate in Japan marked 64% in 2015, in response to a higher interest in a recycling society and environmental sustainability. By reuse of old papers, adhesive substances derived from adhesive tapes and labels contained in old papers stick to a paper machine, which causes sheet breaks and defects, and it finally lowers production efficiency. Especially in a making of linerboard and corrugating medium which use more than 90% recycled paper, sticky deposits problem in a dryer part becomes remarkably serious, and which is the most common cause of sheet breaks and paper defects.

### **Trends and Recent Technologies of Sizer and Dryer Sections**

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In this paper, the author briefly describes the developments of sizer and dryer parts of paper machine.

First, the technical development of sizers is described, starting with pond sizers, then followed by gate-roll sizers and ending up with rod-metering sizers and spray sizer. As the sizer-related effective equipments, FoilForce1 which enables to execute successful tail threading quickly without any mistake, and iRoll which enables to measure nip load profile and rod load profile in real time during operation, are introduced.

Second, the technical development of dryers are described. At present, single tier type can be seen in high speed papermachines. Runnability improvement systems such as HiRun blow boxes are required to achieve stable operation at high machine efficiency with reduced draw and good paper qualities. An innovative dryer, OptiDry impingement dryer is also introduced,

which makes it possible to evaporate water with high efficiency by direct impingement of heated air against the web.

## **Operation Experience of PM8**

### **— New Liner Machine —**

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Marusan Paper PM 8 started the trial operation from December 26, 2014, and has produced commercial paper since January 26, 2015. In February of the year, we achieve 500 t/day. Currently extracts various problem towards the stable operation, it is the stage which is carried out operation while solved.

PM 8, corresponding to the thin of containerboard growing from the environmental aspects of the needs was built the quality, productivity and cost competitiveness in the concept, was built as a round paper machine PM 6 of S&B.

In this paper, we describe paper machine equipment overview, and the elapsed operating experience about 1.5 years from the start of the commercial operations.

## **Energy Saving by Introduction of GHC 2 Rotor in OCC Process**

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Rengo has formulated the “Eco Challenge 020” which has been set internal action plan for environmental impact reduction. We set up medium-term target in 2020 of reduction in CO<sub>2</sub> emissions by 32% compared with 1990 and have worked for the achievement of it.

This report shows our energy conservation experience in Yodogawa mill with GHC 2 rotor, the latest energy-saving design in Aikawa, in OCC coarse screening process.

### **— Peer Reviewed —**

## **Development of New BM Sensor System without Radiation**

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In paper industries, the measurement of basis weight and moisture ratio of the paper sheets is very important for not only quality control but also trading on commercial. Typical BM sensor systems have been using the infrared for the moisture ratio and the radiation for the basis weight for about 40 years. But it is said that the radiation has bad influence on human body. On the other hand, we had developed an on-line fiber orientation sensor system and an on-line moisture sensor system using microwaves. The fiber orientation sensor is based on the anisotropy of dielectric constant of the paper sheet and the moisture sensor is based on the dielectric loss of the paper sheet. When we were developing the fiber orientation sensor, we notified that it might be able to measure not only the fiber orientation but also the basis weight from the resonant frequency shift based on the dielectric constant of the paper sheet. So we started to examine the possibility of BM measurement of our sensor head. As a result, we found the unique method for measuring the basis weight and the moisture ratio by combining the fiber orientation sensor technology and the moisture sensor technology. As we examined the capability of the new method for BM measurement by using the prototype on an actual machine with comparing the typical BM sensor system, we would like to report the results and the measurement principle.