

Ionic liquid treatment for increasing the wet strength of paper and its application for aquatic condition

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In this study, ionic liquid treatment for increasing the wet strength of cellulose paper was studied. The effects of treatment conditions with the ionic liquid 1-butyl-3-methylimidazolium chloride ([BMIM]Cl) on the wet strength were investigated. First, the [BMIM]Cl (20 g) was melted at 80–100 °C and the paper was immersed in it for 5–30 s. Next, the paper was immersed in ethanol, and finally, it was washed with distilled water. The paper was dried in a hot press at 110 °C and 1.1 MPa for 5 min. The [BMIM]Cl treatment improved the wet strength of the paper. Disintegration of the papers was investigated by immersing them in distilled water, and the paper treated with [BMIM]Cl did not disintegrate. The minimum treatment time required for improvement of the wet strength of the paper was only 5 s. Excess [BMIM]Cl from the original treatment was recovered by vacuum distillation and dehydration was used to treat new paper. This recovered [BMIM]Cl enhanced the wet strength to a level similar to that obtained with the virgin [BMIM]Cl. Therefore, the [BMIM]Cl can be efficiently re-used in this method. The paper treated with [BMIM]Cl will be composed completely of cellulose. Therefore, this method is a viable alternative to treatment by adding chemical such as a polyamideamin epichlorohydrin (PAE).

Estimation of forest biomass volume by Unmanned Aerial Vehicle (UAV)

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In this study, we have developed high efficient estimation method of forest biomass volume using an Unmanned Aerial Vehicle (UAV). Three-dimensional data of forest canopy was generated by Structure from Motion from sequence aerial photographs taken by UAV and the biomass volume was calculated from the spatial volume between canopy and terrain on 15 plots (0.04 ha/plot) in northern Brazil plantation. We could investigate larger forest area by UAV than current method. The coefficient of correlation between spatial volume and actual biomass volume was high ($R=0.88$).

The Reality and the Future of Digital Print

— **How to Make a Personalized Brochure: the Key Point of Digital Solution from the Case Study** —

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This report illustrates the recent trend and the future of digital print as well as a digital print solution. As for the recent trend, most OEMs launch new high-speed machines with high resolution. Furthermore, they propose new solutions trying to print on offset coated paper using aqueous pigment inks. The solutions are classified into three ways; 1) primer treatment, 2) direct print without any primer and bonding agent, and 3) intermediate transfer system. On the other hand, as for the printing market, “the value of paper” is now being re-evaluated. Because the paper media is a device sensuous to the human five senses. Many marketers realized that particularly, catalogues, brochures, and direct-mails are very stronger

tools to impress customers than the web marketing alone. We show these case studies from the global media, and the making of the personalized brochure based on a real content.

The New Technology & the Transition of Thermal Paper

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The thermal paper, which is imaged and printed by heat, has been launched for over 40 years. The application at the dawning of the thermal paper was for facsimiles, and then the receipt of stores was developed. The applications of the thermal paper have been extended to various areas, such as transportation and logistics labels, food packing and weighing labels, tickets and the imaging media for medical.

The quality at the dawning of the thermal paper was not so good. The dynamic sensitivity was low and the printed image faded out little by little. The dynamic sensitivity was improved with various technologies. As one of the examples, an undercoat layer was applied between base paper and thermal layer to improve insulation. The image fading also was improved with thermal formulas, which applied new developers and various kinds of chemicals as additives.

This article describes the development and the changing applications of the thermal paper, and introduces the latest technology of the thermal paper.

Development of Digital Printing Paper

— Technical Development of Inkjet paper —

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In the publishing and advertising industry, digital printing has expanded the market as a promotion tool that meets customers' needs. Digital printing, which makes it possible to print such variable information as customers' addresses and names, local advertisement, and guidance of goods based on customers' preference, has steadily become popular in the market with the spread of the device. Credit card bill, cell phone invoice and direct mail etc. are very familiar to us, and we can imagine that digital printing related would increase in the daily life.

Inkjet printing which doesn't require plate making and is advantage of a small

amount of printing, has begun to penetrate even in the printing industry. The authors have developed the inkjet paper by the selection of optimum ink fixative, the setting of optimum range of ink fixative volume and size press coat weight in order to add the quality of each grade required for the inkjet paper. This paper introduces the technical development of inkjet paper which the authors have studied so far.

For sound or noise in industrial world Part VIII

— It thinks about the noise as part of T.F.O from SKF —

Yasuhiko Yamasaki

RSS RS SKF Japan.

“For sound or noise in industrial world” is the five in this time. This explanation is a noise by the contamination. The contamination accounts for 14% of the whole of the problem that the damage at the early stage of the bearing doesn't reach the calculation longevity. The contamination exists from small one to the big one, and from rigid to soft. And, there is the solid and liquid. I present the example of the soft solid one by this contamination, deprave the longevity of the bearing by it, and tell how the noise is generated.

Equipment diagnosis in Rotary lime kiln

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Lime kiln is important in the causticizing process, but it is hard to notice abnormal for large facilities. Therefore, we made equipment diagnosis in order to understand the current state of the kiln. The main diagnosis item is the kiln core accuracy, shell ovality, and wear of tires and rollers. A result of the diagnosis, it was found that kiln core runout and shell ovality and roller wear is large.

We have promoted the repair using the submitted recommended maintenance items from the facility diagnostic manufacturers.

New automated method for macro-contaminant analysis: Industrial experiences

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In recycled paper processes, stickies are at the origin of many production disturbances. In this paper, we present how the recently developed method for macro-contaminant analysis was used with industrial samples for process analysis. The new automated stickies measurement method allows to (i) determine the 3 dimensional morphology of screened particles (without any deformation) and (ii) classify the particles as stickies among contaminants. This is achieved by a combination of laser triangulation and local near-infrared (NIR) spectroscopy.

Measurement of macro-contaminants in pulp samples and their classification allows concluding on their specific removal. Chemical nature and amount of the macro-contaminants coming from different raw materials was studied and was shown to be very different in two different mills. In an Asian mill, a low PSA removal in the process (46%) was found in comparison with high other stickies removal (99%).

Optimization of fiberline operation by multi-variable model predictive control

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Multi-variable model predictive controller (MPC) is widely used at process industry for more than 20 years. MPC makes significant quantities of benefit by stabilizing and optimizing process operation. MPC is also widely applied to fiberline units in North America and Europe. However, only few application experiences are exist in Japanese pulp and paper industry at this moment. This paper introduces Honeywell's proven state of art MPC, Profit Controller and its application results to continuous digester. Profit Controller already has many experiences at other process industries in Japan. Some implementation and maintenance tips obtained from these previous experiences will help MPC application and utilization at fiberline units. MPC will make large benefits at fiberline units and enhance

international competitiveness of Japanese pulp and paper industry.

Technology of Pulp Analyzer system with Fiber Wall Thickness measurements

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Fiber wall thickness is an important parameter as it influences the strength properties of the pulp, but so far it has not been possible to measure it online. There can be a number of reasons to measure fiber wall thickness online. It is an efficient method for raw material control to make sure that the mix of e.g. saw mill chips, roundwood from thinnings, different species etc. is done so that a consistent pulp quality is maintained. The FWT module can control the efficiency of a fiber fractioning process. By measuring fiber wall thickness it is possible to calculate strength data and suggest level of refining to pulp customers, helping them achieve the requested paper and board strength properties.

Color Defect Classification by New Inspection System

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AMETEK SurfaceVision developed new inspection system “SmartView 7.2C” with color line camera. The system allows users to set color defect classes by additional more than 20 color defect features. Learning classification tool “SmartLearn” is useful for classification especially for color defects. Users can focus on making Defect Library of color defects without struggling with color defect parameters.

The History of Technological Developments of the Paper Industry in Japan after World War II

Part5 Recovered Paper for Newsprint and Printing paper (3)

The progress of using recovered paper in the world

Kiyoaki Iida

Worldwide, the use of recovered paper accelerated around 1990. The yearly increment of paper and paperboard production was supplemented with recovered paper, leaving wood pulp production stagnated. By region, Europe as a whole and especially Germany among them promoted the use of recovered paper like Japan. In the USA, on the other hand, its utilization rate was limited, 21% for newsprint and 27% for paper board. It exported 40% of the recovered mostly to China (2015). China is increasing its output, using imported recovered paper since 2000, and now the largest producer in the world.

According to the statistics by FAO, the world production of paper and paperboard in 2014 was 400 million tons and that of wood pulp was 173 million tons and that of recovered paper was 221 million tons. The world paper industry could not exist without recovered paper.

The recycling rates of other industries in Japan in 2012-2014: glass: 35%, steel: 25% and copper: 24%. The paper industry is a recycling industry indeed.

Accelerate Ageing Test of Naturally Aged Paper

— Comparison of Predicted Degradation Rate Indicators at Room Temperature by Suspension Method and Sealed Tube Method —

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Research was conducted to clarify the relationship between natural ageing and accelerated ageing of paper using paper naturally aged for 90 to 130 years.

In order to estimate the degradation rate of paper at room temperature, sealed tube method was conducted in four temperature conditions between 60 and 90°C. The degradation rate indicators at room temperature were calculated by Arrhenius plots. With regard to the estimated degradation rate indicators of tear and burst indices of paper samples at room temperature, degradation tended to be faster in sealed tube method than in suspension method.

On the other hand, degradation rate of discolouration showed an opposite result. The correlation of the hydrogen ion concentration before accelerated ageing and the estimated degradation rate indicator of tear index at room temperature showed better relationship than those at uniform higher temperature. Thus, in order to evaluate the permanence of papers, it is desirable to obtain room temperature degradation rate through Arrhenius plot.