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Better Reject Removal Especially for Plastic Contaminants by Combisorter™

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In stock preparation system, “Slot direct system” consisting of pulper and fine slot screen with bypassing coarse hole screen which is used as primary screen has become more common. On the other hand, reject system handling is recently getting more and more important because the quality of raw material is getting worse due to mix rate increase of contaminants such as plastic and sticky. The demand for hole reject screen is growing because it is efficient for removing the plastic contaminants and reducing fiber loss. It is not realistic to add new machine for handling the increasing plastic contaminants in building reject system. In this paper, our hole reject screen “Combisorter™” is described.

Fuel Conversion for Lime Kiln

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UBE Machinery Corporation (UMC), established in 1914 to maintain coal-mining machines, has been supplying products mainly to customers in a variety of industries, including, but not limited to, automobile, ceramics, cement, and steel.

In these industries, there are many examples of fuel conversion from conventional heavy oil to less expensive solid fuel, such as coal, oil cokes, and industrial wastes to be used for the fuel in the combustion facilities.

On the other hand, in pulp industry, which consumes a large amount of heavy oil in the caustic process, the reduction of fuel cost is a major theme; however, the conversion to alternative fuel had not shown advancements.

Accordingly, as a solution of converting fuel from heavy oil to less expensive fuel, UMC has been proposing the co-firing technology of oil cokes, which realized from the combined

know-how of vertical mill and kiln, furnace, and dryer technology. As a result, with the first order in 2007 as a starting point, UMC has delivered 6 plants. The co-firing technology of oil cokes, which UMC's supplied fuel-conversion facility plays a core role in, has been receiving outstanding feedback from customers for the fuel cost reduction effect.

Challenge to "Web Breaks and Defects-Free" Pleiotropic Solution for Realization of Stabilized Operation

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The deposit adherent in the papermaking process causes operation trouble with occurrence of web-breaks and the defects and often brings bad influence to the productivity and the quality of the product in a pulp and paper production plant. The factor which causes web-breaks and the defects are various and therefore also different in the solution for the deposit problem depending on the situations. It's important to derive optimized solution method by analysis from pleiotropic viewpoint to a complicated deposit problem.

We keep investigating the cause of the deposit trouble in a large number of papermaking mills, studying and developing and proposing the measurements since establishment, and we're making an effort in order to propose quickness and the optimized solution by the databased solutions. We will give some examples, and introduce the deposit trouble solutions.

Development of Separation Technology of Wood Constituents for Chemicals

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Nippon paper Industries strive to maximize the value of sustainable forest resources, as a comprehensive biomass company shaping the future with trees. As a part of it, we participate in the project "Technology development of Manufacturing Process for Non-edible Plant-derived Chemicals/Development of an Integrated Process for Manufacturing Chemicals from Woody Biomass" commissioned by New Energy and Industrial Technology Development Organization. The project aims to develop a consistent chemical production process in order to produce chemicals from wood in place of fossil resourced through collaboration between the paper and chemical industries. In that, we have been developing alkaline based cooking technology and it

was selected as the most suitable preparation technology for the integrated process. Now we are refining the alkaline based cooking technology to achieve the commercialization.

Remodeling Effects and Operating Experience of Kraft Pulp Production

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Fiber lines in Mishima mill have been modified and extended step by step along with new installations of paper machines. The total energy cost was pushed up due to increased number of equipment and distance of pulp traffic line.

Most recently, with a change of the production structure after the Lehman shock, two of softwood fiber lines were unified to one. Hardwood fiber line was also retrofitted to get more production and to reduce energy. We decided to modify our softwood fiber line to get more production and energy efficiency improvement, making the most of equipment that had been idle after the retrofit of hardwood fiber line to reduce capital investment.

The concepts of the remodeling are as follows.

1. Upsizing the equipment by using larger one that had been idle
2. Operational improvement by modifying the existing cooking system
3. Chemical reduction with the washing and screening capacity upgrade
4. Improvement of energy efficiency by heat recovery flow change

To increase the production rate, continuous digester has been modified to the Compact Cooking G1™, which could accelerate the downflow of the chip column in the digester, and the capacity of screening and bleaching process has been upgraded.

At the startup, we have experienced quality fluctuations and increase of chemical consumption due to the digester operation which was not stable, but we stabilized the operation by adjusting multi charges feeding ratio of white liquor, liquor-to-wood ratio and chip compaction in digester. After this modification, the softwood production has been increased from 650t/day to 1000t/day with the most highly capacity in Japan.

Operating Experience by Decanter Centrifuge for Green Liquor Dregs Separation

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Chuetsu pulp & paper Co., Ltd. Takaoka mill has modernized its green liquor treatment system including sedimentation tank and washing system. It has been running since December, 2015.

A Decanter centrifuge has been adopted for dregs washing aiming to achieve better alkaline recovery, space saving and less running load for operators.

During commissioning period, it was found that torque on the decanter became too low after starting the machine and dewatering efficiency was low, it took some time to tune up the machine after start up period but now as it is getting steady running, a performance trial especially to tune-up the machine more precisely has been done.

Following results are obtained:

1) When increasing torque on the screw, concentration of dregs is increased, at the same time, suspended solid concentration on filtrate is also increased.
2) In order to stop suspended solid concentration of separation liquid low, the centrifugal force beyond 1500G is required. Moreover, with the centrifugal force not more than 1000G, heavy vibration is caused with poor dewatering.
3) Suspended solid concentration in the filtrate was getting lower when increasing polymer dosing. However, too much charge of polymer resulted lower the dryness of dregs due to increasing volume of dregs required higher speed on the screw.

Development of Fiber Reinforced Thermoplastic Materials via Paper Making Technology

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In this paper we describe the feature of non-woven consisting of reinforcement fibers and thermoplastic fibers that can be molded by heat-and-compression methods.

The non-woven materials can be easily molded into relatively complex shapes because the reinforcement and thermoplastic fibers are uniformly dispersed in the non-woven.

The mechanical properties of the materials are mainly determined by the spacial alignment and the volume fraction of the reinforcement fiber in addition to the components' properties. The length of the fiber also influences the properties. The adhesive strength of the interface between the thermoplastic matrix and reinforcement fiber is important to improve the strength of the hot-press molded FRP body.

An Improvement in Operation and the Quality of the Product by Renewing the Winding Drums

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PM8 in the HOKUETSU KISYU Niigata Mill is producing A2 grade coated paper and has two JR-winders. When A2 grade coated paper was worked on these JR-winders, PM8 had been running with a few problems for many years.

The biggest problem is the groove marks on the surface of the paper. The winding drums have grooves, so when paper touches the winding drums, the grooves' pattern transfers to the surface of paper as groove marks. These groove marks on the surface of the paper make the quality of the product go down. To prevent the incidence of these marks, we had to do some actions, for example, limiting the winding acceleration and lowering the winding nip pressures. But these actions also caused other problems in efficiency and productivity in operation.

By renewing the winding drums from the original hard steel drums to the soft covered drums, the quality of the product has been drastically improved. Efficiency and productivity in operation have also been enhanced. This renewing of the winding drums from hard roll to soft roll was the first try in Japan.

This report shows the details of the problems from which PM8 had been suffering, our work to improve these problems and what its effects were.

Operating Experience of Gas Turbine Cogeneration System

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In recent years, company activities for environmental issue are required. Rengo Co., Ltd. has set a target, which is called Eco Challenge 020, of a 32% reduction in CO_2 emissions from fossil fuels during production in fiscal 2020 compared with fiscal 1990. In order to pursue this company goal, Amagasaki mill installed highly efficient and eco-friendly two gas turbine cogeneration systems as a substitute for aged facility.

This report shows outline and the reason for selection of this facility, operating experience and its effect.

Basics of Ozone Bleaching

Part 2：The Reaction of Ozone with Pulp

Takanori Miyanishi, JAPAN TAPPI

Ozone is a strong electrophile and reacts with functional groups in residual lignin. Conjugated aliphatic double bonds and enol ether structures react with ozone via intermediates to form carbonyl groups and peroxides. Most phenolic groups are oxidized by ozone. Ozone may react also with aromatic lignin structures to form acids. Ozone is better than chlorine and chlorine dioxide in solubilizing lignin by these reactions. Ozone removes most of the residual lignin. This is based on the much faster reaction of ozone with lignin than with polysaccharides. But intermediate inorganic by-products formed by direct decomposition, such as hydroxyl (HO・) and perhydroxyl (HOO・) radicals, can be very reactive with carbohydrates. Carbohydrate degradation occurs from the formation of carbonyl and carboxyl structures on the polysaccharide chains, which induce chain cleavage in alkaline environment. Reducing reaction of ozonized pulp with strong reducing agent such as borohydride converts alkali-sensitive functional groups to alkali-stable ones and prevents chain cleavage reaction. The response of pulp to an ozone treatment is characterized by the amount of lignin removal (as measured by Kappa number) and the degree of cellulose degradation (as measured by pulp viscosity or strength). The cellulose viscosity deceases with the increase of ozone charge. But the viscosity loss due to the introduction of zone in the ECF sequence does not translate into a similar loss in strength.