

Introduction of Fujinomiya Micro hydro power plant

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Fujinomiya office, belonging to Fuji mill, Oji Materia, is located in 8km northern area from Fuji mill. After two paper machines stopped operation at Fujinomiya office in 2014, industrial water which had used to make paper production was left over and discharged into the river, therefore, we had to consider how to use this left water effectively in another way. As a result of consideration, we introduced Micro hydro power plant manufactured by ANDRITZ K.K, a leading supplier for hydraulic power generation, and have been able to obtain electric power since 2017. In this paper, we will explain our experience of introduction of this plant.

H State-of-the-art Integration of Energy Balance by Andritz -A Futuristic Pulp Mill with Improving of Recovery Process and Bio Product-

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The kraft pulp mill is consisting of various fiberline processes, recovery processes and various sub-systems as well as auxiliary equipment. By upgrading and integrating the mill process and through optimization, it will be possible to create more green energy and more efficiently from the biomass. The modern kraft pulp mill is also producing bio-products that are also integrating the mill process. Andritz has the state of art for the integrating the mill process to produce more green energy and bio products that contributes to the reduction of greenhouse gases and pulp economy.

Maximum use of home generation of electricity with Model Predictive Control (MPC)

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In order to reduce the energy cost, we introduced a MPC (Model Predictive Control) as a multivariable model predictive control system for the automatically avoiding operation constraints and the maximizing power generation output. As a result, we got more than 3,000kW output compared with last year.

In the private power utility, there are various restrictions under the operation due to the seasonal factor and the demand change of manufacturing process and the operators are always required to adjust the output balance. However, it is difficult to keep fine-tuning constantly while the operator doing other several tasks, so there is inherent loss of operation opportunity that "it cannot be operated even if it is physically possible to increase".

In our case, we developed the control system which maximize the output of the facility constantly and keep the each parameter within the upper and lower limit range, such as steam, condensate, fuel, power etc. We succeeded in increasing the amount of power generation by systemizing the operational know-how and reducing the loss of operational opportunities.

Boiler Cleaning System for Municipal Solid Waste Incineration Plant

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To remove dusts on the boiler heating surface is effective to improve the efficiency of power generation in municipal solid waste incineration plants. But it is difficult to remove dusts on the radiation and convection chamber of the boiler during operation, so that the flue gas temperature at outlet of radiation chamber becomes high and high. To solve these problems, We tried two types new boiler cleaning systems and have good effects.

Activities for energy saving in N2 boiler at Kishu mill

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We Kishu mill has three boilers, biomass boiler (N2 boiler) and recovery boiler (No.6 boiler) for daily operation and heavy oil boiler (N1 boiler) for preliminary. The steam generated from the boiler is used in whole mill through turbine (N1 turbine). In regard to power, we also use purchased power due to lack of power generation.

The biomass boiler (N2 boiler) started operation in July 2008, and has been in operation for 10 years. As we have implemented some energy saving activities, we will introduce some of examples that a great effect has obtained.

Application for Biomass Power Plant Fuel Storage Silo with Material Handling System and for The Better Environment

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Utilization of renewable energy, which is included in the main measures in the Fifth Energy Basic Plan announced by the Agency for Natural Resources and Energy on July 3, 2018.

In order for many paper manufacturers to support their contribution to the regional economy through "entry into new businesses and development" as set forth in their business plans, we can propose to build an overall fuel storage, transportation and supply system that covers large-capacity storage silos for biomass power generation fuels (wood chips, wood pellets, PKS, etc.) and design of a transportation system that integrates necessary functions within a limited site and completion of large silo construction using a proprietary spiral welding method in a shortest fabrication period make it possible to greatly reduce the cost of plant construction.

In addition, this paper introduces the economic effect of the feed water preheating system by waste heat recovery from boilers, which makes it possible to realize energy saving by high-efficiency operation of fossil fuels, which is also one of the main measures.

We expect that by building a system with utilizing those original technologies and extensive knowledge, we can contribute to the sustainability of the globally expanding pulp and paper industry through the revitalization of local economies.

Improvement of paper strength by enzyme cellulase

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Enzyme has been used in various process of paper making. For example, xylanase is used in pulp bleaching, amylase is used for viscosity modification of size press starch, laccase is used to remove lignin for bio-bleaching, and cellulase is used in refining and drainage of paper making.

Hercobond 8922 is a cellulase which accelerates fibrillation of pulp fiber, improve paper

strength. Consequently, we succeeded in saving of energy cost by reduction of DDR load and in improving of pulp quality as well. This article explains the results of improvement of paper strength at laboratory test and case histories at mill trial.

Introduction of Orege effluent treatment system, How this new technology realizes improvement of sludge dryness.

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OREGE SA company basing in Paris / France , who is an engineering & manufacturer of wastewater and sludge treatment equipment. This company spent for 8 years for R&D , and started sales activity for worldwide market from 2015. Their product 「SLG」 has unique patented technology which enable to reform sludge in waste water mechanically and that improve the efficiency of dewatering in latter process. Thanks to the improved efficiency , the volume of sludge is reduced. Also thanks to that efficiency , consumption of polymer can be reduced too.

ITOCHU-MACHINE-TECHNOS CORP introduce about outline of Orege and their equipment hereby especially for Pulp&Paper companies, who mostly have concerns about cost of polymer.

Effect of Sheet Forming Method on Wet Tensile Strength of *Usu-mino-gami* (Japanese Kozo Paper)

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Mino-gami (Japanese *kozo* paper) has been utilized in various ways to conserve cultural properties for many years. Especially, *usu* (thin) *-mino-gami* is frequently used as the first back lining paper of hanging scrolls in order to support the main paper with a painting or a work of calligraphy on it. Improvement of the *usu-mino-gami* quality will more contribute to preservation. In the first stage of our research, the purpose is to clarify the manufacturing conditions of high-quality *usu-mino-gami* produced with different sheet forming techniques. As a lining paper, usability and feedback from users were considered in this study. The results showed that the sheet formation measured based on light transmission homogeneity was ranked as papermaking experts Furuta, Hasegawa and a papermaking beginner in descending order of quality. This sheet formation result agreed well with the wet tensile strength of *usu-mino-gami* both sensorially evaluated and measured by a tensile tester with the *Finch* device. The wet tensile strength decreased as the concentration of alkali solution for moistening paper samples increased. Paper prepared from fibers after net washing and from a top portion of *kozo* branches had a relatively low wet tensile strength. About the relationship between the order of sheet forming and wet tensile strength, the sheet formation and wet tensile strength of paper improved in the sheet forming order presumably because long fibers were filtered and formed into sheets in early sheet forming and remaining short fibers and parenchyma cells composed the paper in late sheet forming.