

CONTENTS

Process Control and Automation/IoT

- 2 General Review of 45th Pulp and Paper Process Control Symposium
.....Process Control and Automation Committee, JAPAN TAPPI
- 6 IoT Measures for Production Facilities with General-purpose AC Drives
.....Daisuke Okino
- 11 European Commission Energy-Related Products Ecodesign Directive and Fujitsu's Environmentally Conscious Design Regarding Electrical and Electric Equipment.....Tomoko Nagano, Satoru Arihara and Satomi Hirooka
- 18 Approach to Smart Maintenance with Digital Technology.....Tomoyasu Akiba
- 22 Contribution to Carbon Neutrality through Optimization Technology
.....Michihisa Suzuki
- 27 The Time to Start Archiving the Operation Data and Its Full Leverage in Pulp & Paper Industry at the "Big Data" Era.....Yasuyoshi Iwase
- 32 Implementation of "Smart Factory 4.0" for the Paper Mills
—Cost Benefits Achieved with Prediction Models and APC—.....Nozomu Wada
- 39 Efforts to Make Maintenance Work Smarter.....Hideyuki Ito
- 43 Sharing and Early Resolution of Issues Through Digitalization of Operational Information Toward DX.....Nobutaka Maki

Topics & Information

- 50 Revolutions in the History of Civilization Induced by Paper
The Summary of the Series : Part 2.....Kiyooki Iida
- 59 Process Optimization by OnEfficiency.Strength.....Nodoka Furubayashi
- 64 dataPARC for Digital Transformation
—Frist Step for Digitalization in Pulp & Paper Mill—.....Takuya Maekawa

Review Article(Original Paper)

- 68 Making Conductive Materials from Paper as an Insulator
—Chemically Morphology-Retaining Carbonization from Various Cellulosic Materials without Thermal Decomposition—.....Mutsumasa Kyotani and Tatsuhiro Okada

03 Committee report

84 Papyrus

90 Industry News (Domestic and International)

95 List of Patents issued and Laid-open Publication

108 Price list of Domestic Logs and Wood Chips by District

109 Other Monthly Statistics

111 News from the Association

IoT measures for production facilities with general-purpose AC drives

Daisuke Okino

Drive System Application Dept. System Engineering & Technology Div.
Yaskawa Automation & Drives Corp.

We, Yaskawa Automation & Drives Corp. undertake system engineering of electrical equipment for iron-steel and Industrial plants and sales & after-sale service of Yaskawa Electric products and general industrial motors.

Recently, trend for productivity improvement is becoming active at manufacturing site with introduction of IoT (Internet of Things) which connects “things” and internet.

With that, demands are growing more to avoid unexpected abnormal stop with visualization of malfunction and anomaly and failure prediction instead of reporting after production machinery breakdown has already occurred.

With YASKAWA general purpose AC drives, status of machines and facilities can be monitored continuously, and any anomaly can be detected not just via AC drives but also via motors, with result of which efficient maintenance can be planned to realize productivity improvement and machines and facilities without unexpected abnormal stop.

In this article we present ideas to lower the bar of introducing IoT, DX in production facilities employing YASKAWA general-purpose AC drives.

European Commission Energy-related Products Ecodesign Directive and Fujitsu's Environmentally Conscious Design regarding Electrical and Electric Equipment

Tomoko Nagano, Satoru Arihara, Satomi Hirooka

Environmental Design Dept. Environmental Technology Div., Sustainability Unit
FUJITSU LIMITED

The climate change has led to a rapid demand for carbon neutrality in recent years. In addition, the increasing use of ICT and digitization has raised concerns about the environmental impact of electrical and electronic equipment. Under these circumstances, this paper introduces EU's Energy-Related Products Directive (2009/125/EC, Eco-design Directive), which concerns environmental considerations related to electrical and electronic equipment, and Fujitsu's Environmentally Conscious Design for products. Fujitsu implements Life Cycle Assessment to reduce environmental impact and improve product value. In addition, this paper outlines global trends where not only environmental consideration of products but also the attitude of brand owners are required.

Approach to Smart Maintenance with Digital Technology

Tomoyasu Akiba*³

Lifecycle Business Div. Yokogawa Solution Service corporation*²

The significant changes in the external environment in recent years, all industries are working toward digital transformation in order to ensure that companies maintain their competitive advantage and develop. This change has been accelerated in various fields and sectors, including production, operations, energy, and maintenance. In response to the shortage of personnel and human resources, which are the challenges of maintenance, it is important to implement a new asset management by applying the technology and data currently in use and new digital technology to the maintenance activities. This is smart maintenance through digital transformation.

In this paper, we describe the technology of making smart maintenance and digital technology by YOKOGAWA, which contributes to solving maintenance challenges.

Contribution to Carbon Neutrality through Optimization Technology

Michihisa Suzuki

Advanced Solution department, Engineering Headquarters, Advanced Automation Company, Azbil Corporation

The Government of Japan is aiming to reduce greenhouse gases by 46% in FY2030 compared to FY2013 and to be carbon neutral by FY2050.

Against this background, utility plant operation optimization by optimization technology is drawing attention as one of the methods for realizing carbon neutrality with immediate effect. Operational optimization is a very investment-effective Quick Win approach that improves the energy intensity by improving the operation of existing equipment without the need for new equipment / renewal / modification. (Recovery period is from a few months to 2 years).

Furthermore, it is becoming important to control the consumer side by the optimization method as a function of the aggregator that adjusts the supply and demand between the electric power distribution company and the consumer side.

This paper introduces our solution by optimization technology toward the realization of carbon neutrality.

The Time to Start Archiving the Operation Data and Its Full Leverage in Pulp & Paper Industry at the “Big Data” Era.

Yasuyoshi Iwase

Honeywell Japan Ltd. Honeywell Connected Plant

The archiving the long-history operating data, and the connection with digitalized records and reports systemizes the operational intelligences, reveals the overlooked values, and finally reaches the goals of an innovative business that we never seen in pulp & paper industry. The first step on this way is to implement the Historian, a historical database software, to store time-series operation data in 100 years the longest. This “Big” data archive lets you go the right way. This data-driven decision can be made on the useful insights obtained via clear visualization of the plant performances, derived from sanitized, true and real-time plus history data. What we do from today is to build the plant archive, by correcting the sensor & operation data in the control system, and synergized with another data source, and reveals the operational insights.

Implementation of “Smart Factory 4.0” for the Paper Mills –Cost Benefits Achieved with Prediction Models and APC–

Nozomu Wada

Voith Turbo Co., Ltd. BTG Japan, Process Solutions

The Smart Factory 4.0 was introduced by the German government in 2011, as a next generation advanced technology which based on Industrial Revolution 4.0, that expands digital computing technology of Industrial Revolution 3.0 in 1980s-2010s with Internet of things. In the 2020s, we are now going on a rapid growing stream of development of Factory automations as beyond of the last generation's digitalization.

In this generation, we can use big data with high frequent scanning which includes tons of information, such like process values, quality check results, production stocks, production plan, PID loop status and so on.

BTG's dataPARC and CONTROLsuite provide sophisticated visualizations such like health diagnostics around PID loops, valves, actuators, and the other sensors, easy to handle historical trends that project future status with prediction models, and more which make the operator's awareness/thinking/actions/reviews so much easily. Furthermore, BTG's MACS solutions provides predictive control based on the prediction models which considers much complicated multiple cross-correlations between each unit operations in processes.

In this paper, those BTG's solutions are introduced as which useful for achieving smart factory 4.0 at the paper mills with its implementation results and procedure. To make the projects be succeeded and utilized while long time after the implementation by the mill operators, BTG provides continuous improvement which reflects the operators thinking, and discussion/ reviewing.

Efforts to make maintenance work smarter

Hideyuki Ito
Matsumoto Mill, Ojimateria co.,ltd.

Japanese society is facing a shortage of labor force and a decrease in skilled engineers due to falling birthrate and the aging population. This is also an important issue for us and we have taken on various challenges to improve productivity and pass on technology. In Germany, the concept "Papermaking4.0" is set up as part of Fourth Industrial Revolution and paper mills are becoming smarter and more productive.

For these reasons, our company "Oji Materia Co.,Ltd – Matumoto Mill", have attempted to make us smart to use IoT technology since last year. There are many methods to make smart such as using a platform that major vender has released for making smart of whole mill and analyzing the data obtained from the reasonable sensor on cloud.

In the past, when the introduction of DCS progressed rapidly in paper mill, benefits of DCS could be expected. However the benefits of IoT are unknown for us. So we decided to verify the usefulness of IoT technology by using reasonable tools.

Sharing and early resolution of issues through digitalization of operational information toward DX

Nobutaka Maki

Energy Technical Department, Energy Business Division,
Nippon Paper industries CO., LTD.

In recent years, many companies have been promoting Digital Transformation (DX) using IoT, AI, Big Data analysis, etc., and our company is also striving every day to build a next-generation business model. For process data in production plants, systemization has already been established with the introduction of DCS and main control systems. However, the operational information is lagging behind for digitalization. That's why we introduced PLM (PlantLogMeister) manufactured by Toshiba Mitsubishi Electric Industrial Systems Corporation in 2019, and started digitalization efforts for issues sharing and early resolution between each mill and head office.

Revolutions in the history of civilization induced by paper

The summary of the series : Part 2

Kiyoaki Iida

Tang Dynasty collided Islamic Empire in the 8th century in the central Asia to which paper making was transferred. Islam made use of it, translated previous cultures on paper and developed sciences and arts of themselves.

Islamic paper making was then transferred to Italy where paper mills started production in the 13th century. In the same period, Europe began to transform itself dynamically. A huge volume of literature was translated and studied in the Renaissance. In the 15th century, metal-typo printing was invented that brought a new phase in the history of paper. The Reformation starting in 1517 was called a media revolution as many printed matters circulated. Reading books became common in the Enlightenment Age. The Industrial Revolution in which information exchange was essential was supported by paper industry in U.K. The rise of paper industry brought economic development, and then social reform followed.

In the 19th century, GDP increased at the rate 3-4 times of that in preceding ages. Paper machine was invented and became wider and ran faster. Wood was finally pulped. USA, being rich, enjoyed a society of mass-production and mass-consumption. Packaging paper and boxes, made of paper, for promoting marketing, and corrugated boxes for distributing goods were developed. The system spread in the world, and its output became as much as that of traditional paper.

The development in digital technology has worked out new devices for information storage, and the volume they take is increasing exponentially. Paper, on the other hand, is drastically losing its share.

Preservation and persistence of new devices are a subject of the present culture.

Process Optimization by OnEfficiency.Strength

Nodoka Furubayashi
Sales department, Voith IHI Paper Technology Co., Ltd.

Papermaking processes have been automated in recent years, but there are still many processes that depend on the experience and intuition of operators, and it can be said that there is room for improvement in the goal of “maintaining product quality at necessary minimum costs.” OnEfficiency, the solution developed by Voith to reduce such unnecessary costs, realizes smart control of processes through the three steps of “visualization of process fluctuation”, “process stabilization”, and “process optimization” by the autonomous distributed control modules using big data analysis.

OnEfficiency.Strength, one solution in the OnEfficiency product line, aims to optimize paper strength using virtual sensors that calculate paper strength parameters online in real time. In closed-loop control, where the effect of OnEfficiency.Strength is most exerted, OnEfficiency.Strength automatically operates the actuator to keep the strength value within the target range in real time, reducing the production cost to the limit.

dataPARC for Digital transformation - Frist step for digitalization in pulp & paper mill -

Takuya Maekawa
Voith Turbo Co., LTD. BTG Japan

BTG is a technical company who has been innovating and providing several advanced sensors, analyzers, consumables (High performance blade and rod/bed) to pulp and paper mills in the world. Under BTG clear strategy -selling value and saving customer's cost-, now BTG is focusing Digital transformation (DX) in pulp and paper mills tying to our PIMS “dataPARC” to the market.

Pulp & Paper mills seem to face difficulties in data utilization across their pulp and paper making processes, despite DX is recently highly promoted by METI (Ministry of Economy, Trade and Industry). Their challenges in approaches to carrying out DX is the employees and managers often less interested in DX, but a true meaning of DX is to transform organization, people's behavior and way of thinking to become more competitive in market.

If the mills cannot overcome these challenges, -leaving the existing old system became “Legacy”, lack of IT engineer and maintenance cost increasing for old system-, they may suffer huge economic loss of up after 2025. This is report by METI as “2025 Digital Cliff”

dataPARC innovated by Capstone technology (BTG group since 2016) is a solution for this challenges work as a strong digitalization platform to integrate and utilize all existing data in mills. dataPARC is well known in North America mainly and the installation reference is around 400 cases in P&P industry, 800 in all industries.

Making Conductive Materials from Paper as an Insulator : Chemically Morphology-Retaining Carbonization from Various Cellulosic Materials without Thermal Decomposition

Mutsumasa Kyotani and Tatsuhiro Okada
Tsukuba Fuel Cell Laboratory, Inc.

Paper is made from plant fibers obtained mainly from wood pulp and non-wood pulp. Cellulose is a main component of paper. However, cellulose materials are very hard to carbonize at high temperature because they decompose thermally and change to hydrocarbons having low molecular weights even in inactive gases. Most of the hydrocarbon molecules tend to evaporate as various gases at high temperature. So, we are not able to make a two-dimensional carbonized paper in conventionally reported method. We have tried to make carbon materials from various organic ones including paper. We have found that iodine is an effective catalyst in the carbonization process of cellulosic materials such as paper at high temperature. However, experimental apparatuses are tended to be contaminated by iodine. After that we also have found that sulfonic acids having leave group activity are more appropriate for the carbonization process as a catalyst.

In this paper, we have described that well carbon sheets having electrical conductivities are able to be made from various papers treated with a methane sulfonic acid solution by carbonization at a temperature of 800°C in a nitrogen gas. The carbon sheets are amorphous and tend to crystallize with heat-treatment at higher temperature. Mechanical and electrical properties of the carbon sheets are improved by the heat-treatment.