

CONTENTS

Welcomig New Employees

- 2 Contribute to Saving Energy and Maintenance and Low Noise for Aeration Blower and Flotator Blower
—New Technology Linked by IoT Support Stable Operation of Wastewater Treatment with Cloud Monitoring and Machine Learning—……Daiki Yamaura and Go Kawazu
- 7 Abrasion Mechanism and Characteristics of Cast Material for Refiner Plates
……Masahiro Matsushima
- 11 Latest Mechanical Seal Face Technology
—Operational Reliability Improvement by Technical Specialty of Seal Face—
……Atomu Ono
- 16 Shaft Voltage Measurement to Protect Roller Bearings……Yuta Konishi
- 20 Innovative Roll Handling Module Driven by Compressed Air……Kazuho Imagawa
- 24 The Approaches to Achieve Efficient and Simplified Pest Management
……Takeo Ishizaki
- 29 Effect of Two Colors of New UV-Absorbing Films on the Adult Chironomids
……Goro Kimura, Hiroyuki Watanabe, Mitsuteru Hirono and Michio Yamada
- 31 Speedy! Safety! High Repeatability! ABB L&W Reliable Paper Testing Technology
—L&W New Testing Method Provides New Quality Management Way—
……Hiromichi Yoda
- 36 Development of the New Formation Tester “FMT-4”……Kazuhiro Nomura
- 41 Report on the Results of the Fiscal 2022 Follow-up Survey on “JPA’s Carbon Neutrality Action Plan” and Related Information on Measures against Global Warming in the Japanese Paper Industry……Yasuharu Sakina

Introduction of Research Laboratories(150)

- 60 Laboratory of Applied Microbiology and Microbial Metabology, Department of Biochemistry and Molecular Biology, Faculty of Agriculture and Life Science, Hirosaki University

Research Report(Original Paper)

- 65 Novel Analysis of Recycled Pulp-Containing Paper, Including Fluorescent Whitening Agent:
Part 1 Confocal Laser Scanning Microscopy Method……Atsushi Narita, Susumu Kawanobe, Satoshi Nakaba, Ryota Kose, Ryo Funada and Takayuki Okayama

Pulp and Paper Mills in Japan(102)

- 85 Kani Mill, Daio Paper Corporation

03 Committee report

62 Essay on Intellectual Property

63 Coffee break

90 Papyrus

95 Industry News (Domestic and International)

99 List of Patents issued and Laid-open Publication

105 Price list of Domestic Logs and Wood Chips by District

106 Other Monthly Statistics

108 News from the Association

**Contribute to Saving Energy and Maintenance and Low Noise for aeration blower and flotator blower
New technology linked by IoT
Support stable operation of wastewater treatment with cloud monitoring and machine learning**

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In this paper I would like to introduce the advantages and technologies of TurboMAX turbo blower. TurboMAX turbo blower consists of superior technologies like air-foil bearing, permanent magnet synchronous motor, high efficiency impeller, high speed control technique and so on. As for the overall structure, blower, motor, inverter, touch panel controller and blow off valve are installed in one enclosure. This is a new style turbo blower called "air foil bearing-variable speed-single stage turbo blower". Compare to the conventional blowers, TurboMAX turbo blower has many advantages in "Saving energy" "Low noise and vibration" "Saving maintenance cost" "Space-saving and lightweight". Especially, compare to the conventional root blowers, TurboMAX turbo blower can reduce power consumption by 20% on average.

As global warming is serious issue around the world now, reducing the power consumption is required to all industries regardless of its type and scale. Especially for paper industry which uses and disposes a large amount of water, reducing the cost for waste water treatment is a big challenge. In the process of waste water treatment, aeration blower's power consumption makes up the large proportion, and aeration blower usually runs for 24 hours every day. So, high efficiency aeration blower can contribute to the cost reduction of waste water treatment significantly.

In the latter half of this paper, I introduce an actual case of replacing 2 root blowers with 1 turbo blower (MAX100) at municipal sewage-treatment plant for the field trial. As the result, we could confirm 25% energy saving, 16dB noise reduction, 25 μ m vibration reduction, and 6°C blower room's temperature reduction.

ShinMaywa Industries, Ltd. launched TurboMAX turbo blower since 2012 in Japan, and some blowers have been delivered to paper factories. As for paper factory, we have delivered blowers to 8 paper factories so far and 12 blowers are in operation now. Especially, one of these blowers are used for flotator which is used in the deinking process during manufacturing recycled paper from used paper, and we confirmed TurboMAX turbo blower can reduce power consumption in non-aeration use too. I expect TurboMAX turbo blower can reduce the power consumption in many other uses too. I hope TurboMAX turbo blower contributes to the energy saving in many fields and it leads to the reduction of environmental burden of the globe.

Abrasion Mechanism and characteristics of cast material for refiner plates

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Investigation of the reason why refiner segment's blade made by abrasion resistant hard material will wear during refining pulp which is much softer. Investigation was performed by observing worn out section of used refiner segment.

Based on customers evaluation of abrasion resistance of refiner segment materials obtained during their actual operation, several laboratory abrasion tests were performed to find which test method leads to results closest to customers actual operation results. Throughout the tests micro structure image analysis, micro area hardness test and multiple regression analysis were also performed to consider influencing factors for the abrasion resistance.

As a result, Suga system abrasion test showed the closest results to the customers actual operation results and largest influencing factors were as following in influencing order;

①Hardness of Eutectic carbide ②Hardness of other carbides ③Volume of Eutectic carbide ④Bulk hardness ⑤Max. Dia. of Eutectic carbide ⑥Min. Dia. of Eutectic carbide, ⑦Volume of other carbide.

Latest Mechanical Seal Face Technology

—Operational reliability improvement by technical specialty of seal face—

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In the pulp and paper industry, many rotating equipment peculiar to this industry are used. In addition, these are often difficult operating conditions for mechanical seals. There are many voices of issues and requests for improvement such as seal performance improvement, complex auxiliary systems, reducing repair frequency and maintenance costs, operational reliability improvement, and reducing water usage.

We have solved many difficult problems by using our own product development and technology as a seal manufacturer. Fully split seal and auxiliary wet seal system which can reduce water usage introduced until last year are part of solutions that represent our company. Also, we picked up latest seal face technology as a theme of this year and introduce following three technologies and its successful cases.

Case-1, problem for unstable pressure resource, heat load and slurry damage on inboard seal, and high load on outboard seal can be resolved by USP seal. Inboard seal surface of the seal has a unique surface groove structure, and the seal water (barrier water) is taken in between seal surfaces. Then, seal water is pressurized and pushed into process fluid side. The seal has same seal performance as a double arrangement seal.

Case-2, seal face damage problems which are caused by slurry, insufficient lubrication, and heat generation of the seal can be resolved by John Crane Diamond™ seal face material. This material of seal face which has higher wear resistance and chemical resistance than general hard face materials, and at the same time, it has a lower coefficient of friction than carbon face material.

Case-3, steam leakage issue on shaft sealing device of steam turbine can be resolved by Type-28ST dry gas seal. The seal has surface groove and can reduce leakage drastically.

These high-value-added technologies are used on wide range of applications. And, these are used not only improve productivity and reduce costs, but also contribute to environmental conservation, such as stable operation of rotating equipment, longer life of shaft seals, and reduction of equipment load.

Shaft Voltage Measurement to Protect Roller Bearings

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In this paper, we introduce bearing premature failures due to bearing currents, which mostly exist when motors are operated by Variable Frequency Drives (VFD). In the past few decades, a number of pulp and paper mills have experienced bearing failures such as fluting, also known as ridge marks or washboard patterns. However, bearing currents also degrade lubricants in bearings and/or on gearbox gears. To evaluate its risk, we introduce how motor shaft voltages are measured and a remedy of the grease degradation in addition to bearing premature failures.

Innovative roll handling module driven by Compressed air

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Matsubo Corporation

Many paper manufacturers install or consider automatic roll handling equipment, but conventional equipment requires large space, foundation work for pit and long non running period for installation. These causes cost increases, decreases in production and inflexibility of roll handling routes. Additionally, manual hand transportation is a big burden to operators, and it also has a risk for an accident. Therefore, The Finnish company called "MoveRoll" developed an innovative roll transfer equipment which can solve those issues. It makes the automatic roll handling simpler, cheaper and safer. MoveRoll various applications of the unique conveying system can help most of paper manufacturers reduce manpower and improve safety in paper mill inter logistics.

The Approaches to Achieve Efficient and Simplified Pest Management

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We need efficient and simplified pest management abilities suited to the times, because many factories have limited staff and time to spare for pest management due to a decrease in population, the reform of working practices, and COVID-19 pandemic.

In this paper, I examined some points in order to solve these problems. First, we have to build Plan-Do-Check-Action cycle (hereinafter called "PDCA-cycle"). It is important to set on appropriate objectives for pest management in specific to make PDCA-cycle work smoothly and efficiently, and also to match several inspection activities to the needs precisely.

As for the monthly improvement activities, if we apply measurements based on the characteristics of insects or root cause of the problems, it helps to cut extra time. We can also shape the meeting style in order to have simpler related meetings, and our ESCOEVO system is particularly beneficial method to shorten the meeting time, to help factory staff understand what they should do, and to promote preventive pest controls.

At last, I introduce the latest rat-monitoring system called "Pescle", which we developed in partnership with Ryoden Trading Co., Ltd.. One of the most differentiated features of it is that it solves the problems for on-line monitoring systems that we have to check the rat-monitoring devices on site due to some misdetections. Using our original AI techniques, we can only get accurate information, so that we can contribute to formulation of sustainable pest-control systems.

Effect of two colors of new UV-absorbing films on the adult chironomids

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The use of UV-absorbing films that block near-UV light radiation in factory has been shown to be effective for preventing pests from entering factory. However, our previous study indicate that there was no significant difference between the attracted number of adult chironomids with a white fluorescent lamp (with UV radiation) and a white LED lamp (without UV radiation). In the present study, we attempted to clarify the preventing effect of red and green colors of new UV-absorbing films on the adult chironomids in the field. The collection number of chironomid adults in the UV-absorbing film treatment of each color was significantly lower than the without film (control experiment). The results suggest that UV-absorbing film is one of the useful method of control of nuisance chironomid adults.

Speedy! Safety! High repeatability!

ABB L&W reliable paper testing technology

-L&W New Testing Method provides new quality management way-

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Currently, industry got strong pressure from the market because Japan government announced carbon neutral industry by 2050. In Japanese industry, especially material industry, there are several serious potential issues like lack of human resource due to less attractiveness for young people, retirement of baby boomer and the technical transfer. On the other hand, there are bright future in paper industry because paper is excellent material for plastic reduction and new functional material, Cellulose Nano Fiber.

ABB started following four approaches to cooperate with customer to solve facing issues.

- 1) Reliable and high performance online measurement for Refiner, Wet end control
- 2) Cutting-edge fiber analyzer for new material development
- 3) Speedy, Safety and high precise paper testing machine
- 4) High speed, high precise and reliable automated paper testing machine

In the paper, 3) Speedy, Safety and high precise paper testing machine is described. You can understand new method for paper flatness and CMT plateau measurement which allows you to have quick and precise measurement for process optimization.

Development of the new formation tester "FMT-4"

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We have developed the new model of the formation tester "FMT-4" and will start selling it. FMT is the light transmission type formation tester that has sold more than 70 units in total to paper manufacturers and non-woven fabric manufacturers in Japan and overseas since the release of the first generation FMT-100 in 1990. In this development, which is the fourth generation, it is possible to strengthen and adjust the transmitted light by adopting an LED unit for the light source of the transmitted light for the first time. It is now possible to measure thick paper with a basis weight of about 300 g/m², which was not possible with the previous model. The housing has also been revamped, making it possible to install it in a smaller space by realizing a more compact design. We will introduce the basic functions of the formation tester and the points that have been renewed in the "FMT-4".

Report on the Results of the Fiscal 2022 Follow-up Survey on" JPA's Carbon Neutrality Action Plan" and Related Information on Measures against Global Warming in the Japanese Paper Industry

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The Japan Paper Association (JPA) established its "Voluntary Action Plan on Environment" in 1997, in response to The Japan Business Federation's call to the Japanese business community to organize "The Voluntary Action Plan on Environment". Since then, JPA has carried out a follow-up survey and published the results every year.

As the Voluntary Action Plan finished in fiscal year (FY)2012, JPA newly started "the Action Plan towards a Low Carbon Society" which is renamed "Carbon Neutrality Action Plan (Phase II)" this year and has been actively addressing global warming prevention in order to achieve the following targets set in the plan:

- Reduce energy derived CO₂ emissions by 38% by FY2030 from the FY2013 level .
- As a source of CO₂ absorption, increase total forest plantation area at home and abroad by 375,000 ha to 650,000 ha by FY2030 from the FY1990 level .

According to the results of FY 2022 follow-up survey (actual results for FY 2021), fossil-energy derived CO₂ emissions in FY 2021 was 15.83 million tons, which is 0.19 million tons higher than those in FY 2020(15.64 million tons) but is 3.0 million tons lower compared to those in FY 2013(18.83 million tons). This is attributed to each manufacturer's active efforts including energy saving and energy conversion from fossil energy to non-fossil energy such as biomass energy.

In addition to the results of the follow-up survey, this report introduces the current energy situation in the Japanese paper industry.

Novel analysis of recycled pulp-containing paper, including fluorescent whitening agent: part 1 confocal laser scanning microscopy method

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In recent years, the use of recycled pulp-containing paper has spread widely with the increase in the recovery rate of wastepaper. This increased use is sustained by the concern regarding environmental pollution and the concept of sustainable development. In Japan, the “Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities” stipulated in 2009 that the percentage of wastepaper pulp should be at least 70% for recycled copy paper and 60% for recycled printing paper as the eco-friendly products¹⁾. Recently, a precise method to assess the wastepaper pulp content in recycled paper products has been required with the increasing use of wastepaper pulp.

A new method using a confocal laser scanning microscope (CLSM) to assess wastepaper pulp content in recycled pulp-containing paper was tested in this study. Most printing and writing papers contain fluorescent whitening agents that enhance the whiteness of paper and, partially remain after recycling treatment. This characteristic can be used to distinguish wastepaper pulp from virgin pulp.

A wastepaper pulp sample was prepared using a typical deinking treatment of handsheets made from hardwood bleached kraft pulp and bleached chemi-thermomechanical pulp (BCTMP). A controlled amount of fluorescent whitening agent was added to the pulps. Several recycled handsheets were prepared by changing the ratio of wastepaper pulp to virgin pulp. Images of pulp fibers with the adhered fluorescent whitening agent were observed without breaking the form of the sheet, and the difference between the wastepaper pulp content was confirmed by CLSM. Following image analysis, it was found that the mean intensity of the images of the handsheets correlated well with the actual wastepaper pulp contents.