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Creative Design of Practical Robots

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Although the word “robot” was inspired by human workers, we do not need to imitate human figures when we design a practical robotic system for some specific applications. Instead, we should be free from all the preconceptions and we should select unconventional shapes in the design of the robots. In my career as a robot researcher in Tokyo Tech for more than 40 years, and CTO of Tokyo Tech start-up company HiBot corporation, I have been enjoying the design of more than 150 robots.

In this talk, I will show some of the examples of creative designs, such as the design of snake-like amphibious robots, the snake-like rescue robots, the snake-like multi-joint arm, which is already in use in the assembly line of automobile industry. The spider-like walking robots, such as a walking and roller skating hybrid robot, a walking and crawler hybrid robot will also introduced.

In the final part of the talk, I will summarize the tips to make creative design of robotics mechanisms and discuss the future direction of the development of robots and ideal relation between robots and human society.

Maintenance Work Efficiency Related to Field Instruments by Using Digital Communication

Hirokazu Kamei

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Recently the HART devices have been increasingly used in Japan. HART devices which are used more than 30 million units in the world have the overwhelming share compared to the other field protocols. However about 85% of the devices transmit the process variable of 4-20mA only and the diagnostic and other information are not utilized effectively. This paper describes how to make maintenance work efficiency of field instruments by using the full

potential of HART devices with case examples.

Introduction of Color Web-Inspection-System at Kishu Mill

Hideaki Sakai

Kishu Mill, Hokuetsu Kishu Paper Co., Ltd.

Various defects occur even if they put a papermaking process as demand quality of the paper diversifies by other kinds small lot apparition product and in front of the visitor needs correspondence. To the defect detector which is an important instrument preventing a defective article outflow to the in front of the visitor, superior ability for inspection and stability are found.

Four paper machines operated, and a defect tester of the examination with each F elt side was installed in the Kishu Mill, Hokuetsu Kishu Paper Co., Ltd. but the inspection ability that a light color defect where both sides inspection and a color line defect and the making paper of the light color included it was detectable became unavoidable because I hit it and added the defect detector of the No.6 machine to conventional fine paper, color fine paper in after 2009, and special paper was targeted for inspection in transfer papermaking from other factories. In addition, I carried out color defect detector introduction and winder support equipment update in 2011 because the defect check with the winder, the processing number of times increased by Tokushu Paper Mfg. papermaking, and machine slowdown came to produce an operation trouble with the winder support equipment of the threshold method in operation. I introduce introduction progress and operation experience this time.

Digital Hydraulics

Junji Masunaga

Paper Projects, Valmet K.K.

Valmet developed digital hydraulics for nip control based on new groundbreaking control technology in cooperation with universities. With digital hydraulics the energy saving is significant compared to conventional hydraulics. The key principle in digital hydraulics is to use parallel-connected two-way on/off valves to achieve digital flow control. With a sufficient number of valves and intelligent control algorithms, it is possible to achieve good controllability with simple and low-cost on/off valves.

This paper introduces the outline of basic principle and the example of calender nip operation result with digital hydraulics. And, the applications on sizer and winder are also described.

Efforts to Strengthen the Environmental Information Management System

Kuniaki Yamaji

Otake Mill, Nippon Paper Industries Co., Ltd.

Nippon Paper Industries Co., Ltd. was established the "Guidelines for compliance in smoke generation facility" in 2008 for strength of environmental information management system (EIMS). Then EIMS had been structure accordingly at each mill of Nippon paper industries Co., Ltd.

Otake Mill also needs to follow the guidelines because of merger with Nippon Paper Group in 2012.

This report will introduce the examples of EIMS as modified equipment corresponding to the guidelines.

The Optimal Security Design for a Production Control System

Shoichi Doi

Solution Service Business Headquarters, Yokogawa Electric Corporation

In recent years, sophisticated cyber-attacks that target factories and plants have increased even in production control systems. Due to such increases in threats and changes in the environment, the importance of security measures has become even more urgent. In fact, since 2010 damage caused by malware infection has increased significantly.

However, this does not mean that blindly introducing security technology will be sufficient. Unlike information systems in general, a stable, real-time operation on a 365 day/ 24 hour basis is essential considering the sophisticated environment of control systems.

YOKOGAWA group support has taken a holistic approach to security measures in which strategic defense-in-depth concepts are used to effectively evaluate potential risks, consider technical measures and continuously update the system's lifecycle. We believe improvements on a continuous basis are important during operation. Measures are necessary to assess and mitigate the risks identified within the control system and to be better prepared to recover the system in the case of an emergency.

In YOKOGAWA group, by investigating and researching conditions in which security measures are implemented in control systems and the practical use of the latest security technology, we are currently developing effective solutions and optimal measures for a variety of system configurations for different industries and applications. Over the lifecycle of the system, we are committed to providing the best possible solutions and services to ensure high reliability of systems and to provide customer-specific security measures so that stable operation can be maintained.

The Reduction Approach and Action to the Scratch Spot by the Contacting Caliper Sensor

Ryuta Abe

Mishima Mill, Daio Engineering Corporation

The Daio paper new Mishima mill has the large production of the newsprint in the main product. PM N5 is using the Honeywell QCS of MXOpen from 1997. This QCS was equipped the contacting caliper sensor, it is standard sensor of QCS. However, it has problem of the scratch spot on the sheet by the loading material and foreign material as it is known.

We were trying to the solution for the scratch spot on the sheet by the contacting caliper sensor of QCS with Honeywell Japan Inc. It realized the large reduction of the scratch spot by our suggestion to the Honeywell, and improvement to the caliper sensor by the Honeywell. The usage conditions of the improvement to contacting caliper sensor and the results of solution are also introduced.

Introduction of Compact Wireless Diagnostic System for Environment of Electronic Equipment TMe²SMART

Noriyuki Maehata

Systems Development Section, Automation Systems Development Department, Industrial Automation & Drive Systems Division, TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION

Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC) has released the wireless sensor system "TMe²SMART" that implements both data acquisition and data analysis functions. TMEIC has already furnished the equipment diagnosis using TMe²SMART in ten sites or more. As the result, the precious data such as observation of the noise exceeding the

maximum rating, and the detection of failure of power supplies, have been acquired. These results show that TMe²SMART is effective to fix problems unsolved. Moreover, it also shows that TMe²SMART can improve a latent incongruent factor.

Construction of Roll Finishing System by FA Controller

Tetsuya Nakamura

Gifu Mill, Oji Materia Co., Ltd.

The system constructed with YEWMAC and FA500 made by Yokogawa Electric Works, Ltd. is used in the conveyance process from the winder to the product warehouse at Ena mill. This system is a very important in the finish process at our mill, because it generalizes the transportation equipment, the weighing machine, and the automatic IJP (Ink Jet Printer) , etc.

This system has been using for 20 years after operating in 1994 up to the present, and a trouble occurs not only equipment but also the trouble in the software . We launched out into the update of the system, falling into the situation to stop the operation in the cause. I introduce the system that was updated this time.

The Control Room of the Future

Kenji Ishibashi

Energy & Chemical Markets, Honeywell Japan Inc.

“Innovation of Control Room solution”

With "Experion PKS System" the newest DCS of Honeywell, the perfect system integration of the form which included "TDC(S)3000LCN" is made possible, and it connects with QCS, Advanced Control, Information System, Operation Procedure Software and Safety System simply, and is performing the newest technology and collaboration according to a time.

With the technical innovation of the system, plant operation by DCS is also changing a lot, and further innovation is performed.

In this paper, we introduce following basic concept to the innovation in a control room solution of;

“Operation Environment”

- 1) Abnormal Situation Management Consortium (ASM Consortium)
- 2) Orion Consol

3) Collaboration Station

“Operation Awareness”

1) Make more important things stand out

2) Data computerization

“Control Efficiency”

1) C300 Universal I/O Module

Intelligent Web Monitoring System “SmartAdvisor 5.0”

Shuichi Shoda

COGNEX K.K.

Cognex will present a new Intelligent Web Monitoring System “SmartAdvisor 5.0” that has advanced defect detection and filtering function (SmartTrack™). One of the advantages is defect classification. The system has Classification tool with Self Organization Mapping (SOM), and defects can be classified automatically by defect image features. The system also allows to integrate Cognex Vision Library (CVL). CVL is widely used as vision tool for “Detection” , “Identification” and “Measurement” in semiconductor, electric parts and other industries, that will help for paper process improvement.

New SmartAdvisor hardware architecture is simple and scalable. 1 camera system consists of Gig-E camera, environmental small cabinet and PC. It is easily to be used as research tool and to be extended to multiple camera system.

A Report on 2014 International Conference on Nanotechnology for Renewable Materials

Haruo Konno

Nippon Paper Industries Co., Ltd.

2014 International Conference on Nanotechnology for Renewable materials was held at Vancouver, Canada from 23/6 to 26/6, 2014. I attended this conference to know the current situation of nanocellulose development in the world.

More than half of attendees in this conference come from North America. Number of attendees from Japan is 25, which is third largest in this conference. This conference comprised from 82 oral presentations and 34 poster presentations. Summary of some presentations are reported in this paper.

Corporate Profile & Products Information (19)

TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION

TOSHIBA MITSUBISHI-ELECTRIC INDUSTRIAL SYSTEMS CORPORATION (Brand name: TMEIC) was established in October 2003 through the integration of Toshiba Corporation's and Mitsubishi Electric Corporation's businesses in the industrial field. Our corporate statement "We drive industry" represents our commitment to "contribute to development by becoming a driving force of industry."

TMEIC has achieved sustainable growth through contributing to manufacturing and environmental management by leveraging our leading-edge technologies underpinned by rotating machinery, power electronics and world-class engineering. Having marked our 10th anniversary in 2013 and relocated our head office in March 2014, TMEIC has taken a new step forward toward the next decade.

The business environment surrounding TMEIC is rapidly changing due to various social issues including globalization, energy concerns and environmental issues. In addition to contributing to strengthening the competitiveness of customers by providing products, technologies and services that will respond to these changes along with the ongoing globalization of our conventional businesses, TMEIC also actively invests its management resources into green business with a focus on solutions for reducing environmental impact and energy.

With regard to markets overseas, including rapidly developing emerging countries, TMEIC globally responds to customer needs by developing bases for sales, engineering, manufacturing and services throughout the world. TMEIC has delivered products to 125 countries worldwide to date and the overseas sales ratio currently exceeds 45%. Going forward, TMEIC will continue to realize the further globalization of our business.

As the world's leading company in industrial system integration field, TMEIC will advance together with our customers, always seeking to deliver even greater satisfaction.

—Peer Reviewed—

Hemicellulose Recovery from Black Liquor Discharged during Soda–Anthraquinone Cooking of Bamboo

Kengo Magara, Tomoko Shimokawa, and Tsutomu Ikeda
Forestry and Forest Products Research Institute

We investigated the soda–anthraquinone cooking process of bamboo chips and the recovery of hemicellulose precipitated from the resulting black liquor to study how bamboo hemicellulose may be utilized. The cooking efficiency of bamboo chips improved after hot water extraction, probably because a part of the starch that consumes the active alkali during the cooking process was removed by the extraction. After cooking, hemicellulose with higher molar mass value was precipitated from the black liquor. Recovery yield of the precipitate by decantation was approximately 6.5 g from 300 g of dried bamboo chips, and it was increased by adjusting the pH of the black liquor to 11.5.