

**The lecture of Activated Sludge Treatment and The introduction of “extremely low DO control”**

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This lecture explains the basic traits of a microbe called activated sludge in the first half, and introduces the “extremely low dissolved oxygen (DO) control” technique in the second half. The “extremely low DO control” is a method of keeping the DO level in the aeration tank at nearly 0mg/l. The operation is as follows: Inject strong air in the activated sludge mixed liquor in the aeration tank and then stop injecting it; based on the change in the DO levels of the time, calculate the air volume which would make the oxygen supply through aeration equal to the oxygen consumption speed of the sludge, and inject the calculated volume to keep the DO levels in the aeration tank at nearly 0mg/l. A comparative study was made using the glucose-peptone wastewater and methanol-involving wastewater between the new technique where  $DO \approx 0\text{mg/l}$  and the normal technique where  $DO \approx 1.5\text{mg/l}$ . As a result, with the new technique, the aeration volume was reduced to approximately 35% of the normal volume, and the total organic carbon (TOC) within the treated water improved equal to or more, and the nitrogen removal efficiency was seen to be greater than 90%.

Furthermore, the new technique was seen to be able to properly keep up with a very large daily variation of raw water load with the maximum/minimum ratio of 5. Meanwhile, we showed the specific configuration of the “extremely low DO control” system, and showed that if it is applied to the existing activated sludge process, the system can be installed with small initial investment without the need of building a partition in the aeration tank, if the output volume in the aeration blower can be controlled from the water control room.

In the aeration tank, areas in which DO levels are nearly 0mg/l are neither aerobic nor oxygen free nor anaerobic. It is quite noteworthy that areas which have rarely been used previously can become usable using the “extremely low DO control” system.

## **Practical know-how of odor control : Case of paperboard factory**

Hidenori Kojima

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Considering from the viewpoint of water used in the paperboard factory, following points are important about the odor problems.

1. White water of the paperboard factory has a water quality that is prone to smell.
2. Odor substances such as hydrogen sulfide and volatile fatty acids generated in white water cause deterioration of products quality and factories productivity.
3. Control of microbe improves problems both the odor and the productivity during the papermaking process.

## **Energy-saving Diffuser “MICRAS”**

### **-The Best Way to Reduce the Power Consumption of Aeration System-**

Yuko Matsuzaki

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In wastewater treatment process, air blowers consume vast amounts of power to send air to aeration tanks. One of the effective technologies to reduce power consumption of blowers is the ultra-fine bubble diffuser system, which generates small bubbles and efficiently transfers oxygen into the water. This paper illustrates the outlines and the energy-saving effect of “MICRAS”, pipe shaped ultra-fine bubble membrane diffuser. MICRAS has reduced 40% of air requirements at the municipal wastewater treatment plant without sacrificing treated water quality.

## **Trends of Forming and Scum Troubles in The Activated Sludge Treatment Process and Countermeasures**

Kenji Hayashi

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One of the troubles that are easy to occur by activated sludge treatment of the pulp

and paper wastewater treatment has foaming scum trouble. The large amount of scum is not only increasing the load to a latter half processing process under the effect of scum flowing out, but also decreasing the MLSS and decline in performance of the activated sludge treatment process in itself and cause the serious trouble to deteriorate the water quality of final effluent synergistically.

With most cases, the defoaming agent as the symptomatic treatment is added more, but there is the case that an effect is not provided. It is the present conditions that effective measures have not been established.

In this paper, we describe about the tendency of the foaming scum trouble and a conceivable factor and measures from the experience that we were concerned with pulp and paper wastewater treatment.

## **Basic and the case study of low-frequency noise Countermeasure in a factory Part2.**

### **— Listen and feel how we can resolve the noise problem —**

Masahiko Aoki

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Several interesting cases of the countermeasures for the noise problems in plant are introduced. In addition, during our experiences, we have met many countermeasures. Some of them are effective for noise reduction, however, we met several cases which cannot reach expectations. Both effective and non-effective countermeasures are introduced. And the comparison of actual noise reduction and predicted by simulation are presented for helping to understand these differences.

## **What is “Waste” ?**

### **—Dilemma between proper disposal and recycling.—**

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Waste Management and Public Cleansing Act." (Act No. 137 of 1970.) is most important for the practice of waste disposal. But, what is “Waste”. It is pointed out that its judgment is difficult.

Administrative agencies and the court assert that this can be decided by “total judgment”. However, this "total judgment" has a bad reputation. It is criticized that the standard is unclear. Still why "total judgment" necessary. The regulation of

waste is reversing the guarantee of personal property rights. This is an important key. On the other hand, promoting the recycling of waste will not proceed if the proper treatment of waste is thoroughly ensured. This "dilemma" is occurring. Criminal trials also struggle with this dilemma (or harmony) . In any case, citizens and administrative agencies share awareness about the necessity of recycling based on the current situation concerning the proper disposal of waste and the ideal of leaving a beautiful environment for future generations. It is of great importance.

### **Revision of Soil Contamination Countermeasures Act and Case Concerning Soil Contamination and Underground Obstacles**

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Introduction of new effluent management procedure have been discussed at the committee of Ministry of the Environment, Japan from 2010. The existence of the effluent management with bioassay will be discussed in 2016, with the participation of newly selected committee member from industry. Introduction of new effluent management is considered as voluntary management system. The bioassay is considered three toxicity tests which are fish embryo larvae short term toxicity test, daphnia reproduction test and algae growth inhibition test. Some major company voluntarily addressed new effluent management with bioassay as part of activities for a conservation of biodiversity. Major issue facing test facilities are raring management of test animals, the cost of bioassay and accuracy management of bioassay.

### **Environment measurement technology using Drone**

#### **—Application to maintenance and inspection—**

Dai Sakamoto

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In order to maintain and manage the infrastructures efficiently, it is important to accurately grasp soundness through regular inspections.

Therefore, the research on utilization of infrastructure structure for maintenance

and inspection by using Drone (Unmanned Aerial Vehicle) which can approach to the place where access is difficult, measure and take pictures, is under way.

In this paper, we report some examples of application to measurement and facility maintenance and management by using Drone.

### **Significant points for operation of the new e-Manifest**

— **Small mistake could lead to violation of laws and ordinances** —

Hironao Sakamoto

Re-Tem Corporation

First of all, the article describes some case studies in an inappropriate operation on a paper based manifest with some questions and answers and actual manifests, such as omission of quantity on a manifest form A, lack of confirmation of a manifest form E, D and B2, excess of the return limit, returning a manifest before treatment and entrusting waste to a disposer without manifests.

In the next section, the e-Manifest system which started the operation in December 1998 is described. The system is for three parties involved the generator, the transporter and the disposer to exchange computerized manifest data via the Information Processing Center over the internet. A clear explanation of comparing operation with a paper based manifest on the three parties and advantages by the introduction of the system such as reduction effect of a paper work are given using a table and flowchart.

In addition, mistakable points in the operation of e-Manifest as for delivery of waste before registration, deadline for manifest registration and use of the e-Manifest are explained with some questions and answers and charts.

### **The reinforced effect of micro-fibrillated cellulose on composites prepared from paper sludge ash**

Akiko Isa

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Fiber In this study, we investigated reinforcement effect of micro-fibrillated cellulose (MFC) on composites prepared from paper sludge (PS) ash. The bending strength of MFC + PS ash composites was 1.5-5 times higher than that for PS ash

only when additive rate of MFC was adjusted at 1, 3, 5, 10, 20, and 40%. The reinforcement effect of MFC on the composites was due to adhesive effect between PS ash particles coated with MFC. The bending strength of MFC 5 + PS ash 95 composite was equal to the value of Japanese Industrial Standards for calcium silicate board (10 MPa).

PS ash and wet MFC were mixed in equal amount of additive water to the solid content (PS ash + MFC solid). The additive water (free water) was regulated depending on MFC content. The free water content in the compound had a large influence on PS ash hydration rate and the structure of resultant hydrate, consequently PS ash particles dispersion in MFC network varied by a combination of PS ash, MFC, and free water ratio. The increase in bending strength of PS ash + MFC composites may have decreased when free water content for PS ash was small.