

Study on the utilization of the sewage sludge drying technology

Whole term

1994. 12 ~ 1998.3

(Purpose)

Even though, large heat energy from the melting facility is used in heating and drying the first air, most of the energy wastes in the sewage sludge treatment process. Because of that, effective use of none-used energy and the cost reduction are necessary. In Osaka Prefecture, the heat energy such as steam generated in melting systems is collected, and it is used for drying the dewatered cake. However, 40 percent of the collected steam is wasted in the current system. Therefore, the development of a technology to use none-used energy effectively is necessary.

This technology is a process, in which a mixture of primary sludge and excess sludge, is dewatered without gravity condensation, and then dried in a centrifugal thin film dryer, and eventually sent to a melting facility. Steam from the melting facility is used to heat this process, and it is possible to use none-used energy effectively by this technology.

This study on the utilization was carried out from 1994 to 1997 by a joint research of the Japan Institute of Wastewater Engineering Technology and Osaka Prefecture as a model project of an application of the innovative technology.

(Results)

An investigation of the performance with data in spring and autumn using a real scale facility in 1997 and the durability against the abrasion of the blade of the dryer using a real scale equipment was carried out. Moreover, a comparison of this system with the existing system was conducted. The design and the methods of maintenance were established too.

1. Result of the test on the performance of the dewatering facility with the centrifugal condensation

(1) The centrifugal force was set as 2000 G, and the dam was set as 2P and 4P for the pilot plant and for the actual facility, respectively. There was no change in the process according to the season.

(2) The injection rate of chemicals differed a little with the change of the season, however the proper injection rate of chemicals was 0.4%.

(3) The pilot plant and the actual facility were operated satisfactorily in case of the standard treatment quantity.

(4) Running parallel with a constant control operation of the velocity difference and a constant control operation of the injection rate of chemicals and solids was proper.

2. Result of the test on the performance of the centrifugal thin film dry facility.

(1) The supplement of dewatered cake was proportional to the water content of the drying cake and it was not over-dried, however was 35% in case of a low flow rate. The percentage of the water content of the drying cake was 40-50% in case of the rating supply quantity.

(2) In case that the rotational number of the blade was increased, the water content of the dried cake tended to be less. And there was some difference according to the season.

(3) Magnification of the steam was 1.3 times as the annual average.

3. NEXT system

In case of the heat balance of the overall system, the steam balance can be established by setting the water content of the dewatered cake less than 86 percent.

4. The results of the investigation on the durability against the abrasion of the drying blade.

The abrasion in the actuator of the blade for 1 year was 0.5 mm and based on the designed abrasion, the blade can be used for 3 years without replacing.

5. Result of the comparison of this system with the existing system

(1) The site area of this system was 20 % less than that of the existing system and a site-reduction can be achieved by simplifying the condensing and dewatering process.

(2) The construction cost became approximately 10% less than that of the existing system by simplifying the condensing and dewatering processes.

(3) There was no much difference in the repairing cost, however the management cost including the operational cost was 6-10% less than that of the existing system.

6. Establishment of the design method and the method of operational management.

(1) The design manual written in 1994 was reinvestigated. The role and the operational method of the sludge storage tank and the assistant boiler were also added.

(2) The operational method was arranged to run each facility and the overall plant well.

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Keywords

Thin film dry, Condensing and dewatering, Effective use of thermal energy