Joint Study on Double Cylindrical Filter Press

Whole term	2006. 4～2008. 3	

(Purpose)

In Japanese sewage sludge plants, there has recently been an increase in the installation number of the dewatering machine using metal mesh filter, such as Screwpress and Rotary-pressurized-dehydrator. Now, we have developed Double Cylindrical Filter Press(DCFP) as new type dewatering machine using metal filter, which can achieve higher DS-content in dewatered cake than that of conventional one.

This research is intended to organize the characteristics, constructions, performance, to compile technical matters on the process planning & designing and maintenance in the form of a technical manual.

(Details of research)

Figure-1 shows the detailed configuration. This machine mainly consists of following parts, inner and outer cylindrical screens, spiral wall, vertical scrapers set on spiral wall, back pressure plate around the end of the spiral channel, washing water pipe for washing the surface of the two cylindrical screens, closed casing for preventing filtrate leakage and odor diffusion, piping of sludge, filtrate, washing water.

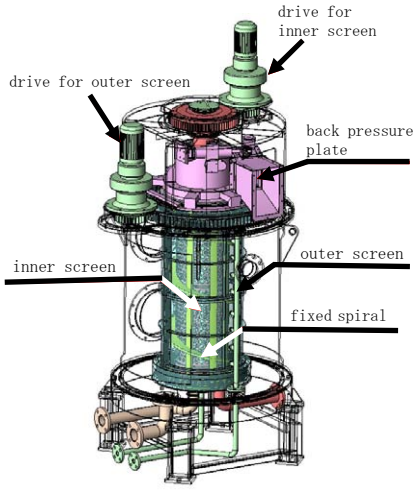

Figure 1 Schematic diagrams of DCFP

This machine has the following features;

1) Higher DS-content can be achieved than that of conventional machine.
2) Installation area of machine can be reduced for vertical layout.
3) The same advantages (low energy consumption, simplified structure, etc) as conventional dewatering machine using metal filter can be followed.

(1) Research items

1) Evaluation of dewatering performance and stability of continuous operating.

Performance of DCFP was compared with performance of conventional dewatering machine for raw mixed sludge and digested sludge in each one plant during four seasons.

Target value of DS-content is an increase of more than 4 points for raw mixed sludge and an increase of more than 1 point for digested sludge.

2) Evaluation of dewatering performance for various types of sludge.

Performance of DCFP was compared with that of conventional dewatering machine for various type of raw mixed sludge, which are different concentration and generated from the sewage plant having different thickening process.

3) Scale-up test

From the result of dewatering experiment by DCFP that of cylindrical screens have different diameter and height, design concept, the capacity of DCFP is linear with filtration area, is verified.

(2) Results of research until the present

1) Evaluation of dewatering performance and stability of continuous operating

Table 1 shows typical result of dewatering experiment raw mixed sludge generated from the sewage sludge plant having centrifugal thickening process in four seasons. It has been clear that the DS-content of dewatered sludge could be increased more than 4 points compared with that of the existing belt-press filter dewatering machine. And on examining the continuous running for more than 5 hours in each four season, the stable performance can be confirmed.

Table 1 Result of the evaluation during four season (raw mixed sludge)

	Summer		Autumn		Winter		Spring	
Sludge	Raw mixed sludge (mechanical thekened) TS2.6~2.8%, VTS83~85%, fibrous contents35~42%							
Dewatering	DCFP	Belt press	DCFP	Belt press	DCFP	Belt press	DCFP	Belt press
Polymer dosage(%)	0.7	0.5	0.7	0.5	0.8	0.7	0.7	0.6
Moisture content(%)	73.3	77.4	69.2	76.8	72.1	76.7	72.4	77.6
Difference of moisture content※ (point)	4.1		7.6		4.6		5.2	

※ Difference of moisture content shows difference at equal rate of standard throughput

2) Evaluation of dewatering performance for raw mixed sludge.

It has been clear that the DS-content of dewatered sludge can be increased more than 4 points compared with that of conventional machine for mixed raw sludge, which is different concentration and generated from the sewage plant having different thickening process (gravity and mechanical). The standard dewatering performance of DCFP for raw mixed sludge was set by these results.

3) Scale-up test

Relation between the filtration area and the capacity of DCFP has been investigated in following 3 cases, first comparison of two DCFPs having different diameter of cylindrical screens, second different height cylindrical screens, third different diameter and height cylindrical screens. At all case, the capacity of DCFP is linear with filtration area.

(Study schedule)

At the study in 2007, following research items shall be checked and renewal version of the technical manual was made up.

1) The standard dewatering performance of DCFP for digested sludge is set by additional data of dewatering for digested sludge.

2) The specification of DCFP shall be renewal, based on the modified structure in following parts ; commoditized drives for inner and outer screens, Changing structure of cake discharge.

Collaborators : Japan Institute of Wastewater Engineering Technology, Kubota Corp., Tsukishima Kikai Co., Ltd.

Researchers : Masayuki Matsuura, Toru Meguro, Kunio Tamura, Hideaki Nagaoka

Key words	Double Cylindrical Filter Press, Dewatering machine using metal filter, Higher-DS content, Vertical layout