

# Research on a High-efficient Twin Screw Press Dehydrator

Year of Research	2008 • 2009	
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**(Purpose)**

As for dehydrators for treating sewage sludge, the use of dehydrators made of metal filtering materials is spreading rapidly, and a high-efficient twin screw press dehydrator has been developed with a view to achieving a lower moisture content in sludge that is hard to dehydrate, as well as space saving and energy saving.

The purpose of research in FY 2008 was to make an experimental comparison of the dehydration performance of the high-efficient twin screw press dehydrator with a conventional screw press dehydrator in the treatment of anaerobic digested sludge, thereby clearly identifying the advantages, construction, and dehydration performance of the high-efficient twin screw press dehydrator.

**(Results)**

Figs. 1 and 2 show an outline of the conventional machine and the developed machine. With the conventional machine, the filter chamber volume is gradually reduced by increasing the screw shaft diameter from the supply side toward the discharge side;

whereas with the developed machine, the filter chamber volume is gradually reduced by decreasing the screw pitch (distance between the adjacent screw flights).

The developed machine allows shear force to be applied to sludge by rotating the two screws in opposite directions, and therefore the machine makes it possible to reduce cake moisture content even when supplied with sludge which is hard to dehydrate, as compared with the conventional machine.

(1) Research target  
The performance target value was set at the level of at least two percentage points lower in the cake moisture content than that of the conventional machine, when treating the digested sludge.

(2) Results of research obtained

① Investigation of the influence on sludge properties according to the region  
Table 1 shows the result of investigation. With the developed machine, the cake moisture content was 2.0 - 2.7 percentage points lower than that with the conventional machine; no great difference was found between the two in terms of the solid substance recovery ratio.

② Investigation of influence due to seasonal changes  
In any season the cake moisture content with the developed machine was 2.0 - 2.9 percentage points

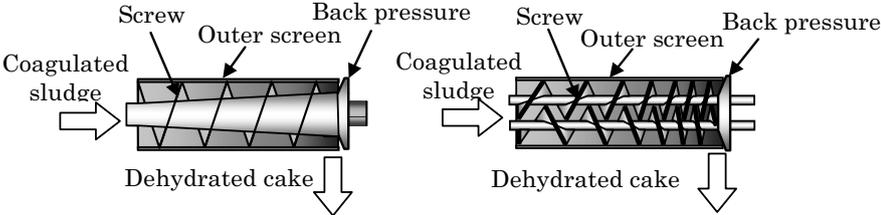


Figure 1 Conventional machine                      Figure 2 Developed machine

Table 1 Result of investigation of the influence on sludge properties according to the region

Type of sludge	Sludge properties			Type of dehydrator	Dosage of Polymer flocculant (%·TS)	Moisture content of cake (%)	SS recovery rate (%)
	Sludge concentration (TS)	Ingection loss(%·TS)	Fiber (100mesh residue)				
Digested sludge cocentrated by gravity	1	73.2	6.2	Developed	1.5	77.7	97
				Conventional	1.6	79.7	95
Digested sludge cocentrated mechanically	1.5	58.6	6.9	Developed	1.5	77.4	97
				Conventional	1.5	79.5	95
Digested sludge cocentrated mechanically	1.5	71.1	9.8	Developed	1.7	80.4	97
				Conventional	1.8	82.6	96
	2.2	60.4	7.9	Developed	1.5	76.7	97
				Conventional	1.5	79.4	96

lower than that with the conventional machine; therefore it is clear that it can function well without the effect of seasonal changes.

③Investigation of stability after a long period of operation

The cake moisture content stabilized around one hour after the start of operation, and thereafter as well no great change was found in cake moisture content and solid substance recovery ratio either, in a condition in which no great change was made to the polymer dosing ratio and filtering speed.

④Verification on scaling-up

No significant difference in cake moisture content and solid substance recovery ratio was found between a testing machine of 150 in diameter and a testing machine of 400 in diameter that is equivalent to a commercial machine, and no great difference was found in solid substance recovery ratio either. Therefore, it can be thought that no great change will arise in the dehydration performance even in the case of scaling-up of the developed machine when being put into commercial use.

**(Future schedules)**

FY 2009, the first edition of a technical manual on digested sludge will be issued in October. At the same time, a demonstration experiment will be carried out by using mixed raw sludge, and a revised edition of the technical manual will be issued by the end of the fiscal year.

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Key words

high-efficient type twin screw press dehydrator, digested sludge, reduction in dehydrated cake moisture content