Sludge Treatment Technology

Sludge Dewatering Technology Expert

LI FENG

Sludge Treatment Solution

Multi-Disk Screw Press
DEWATERING PRESS AND THICKENER

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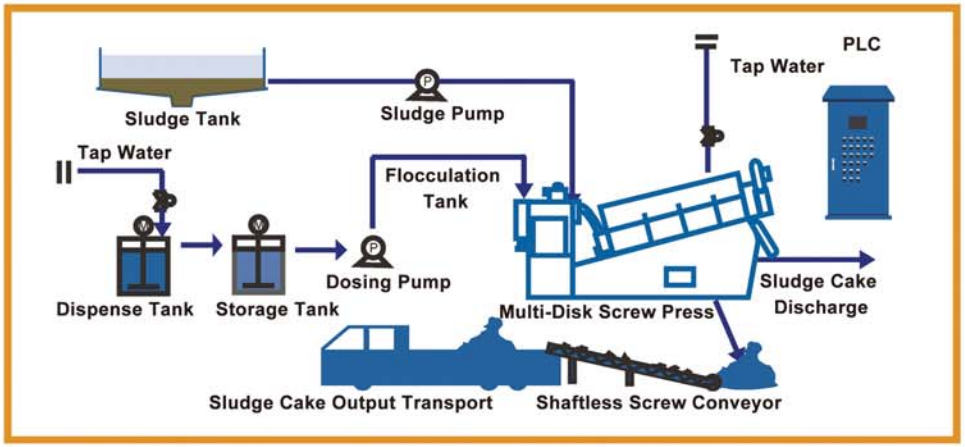
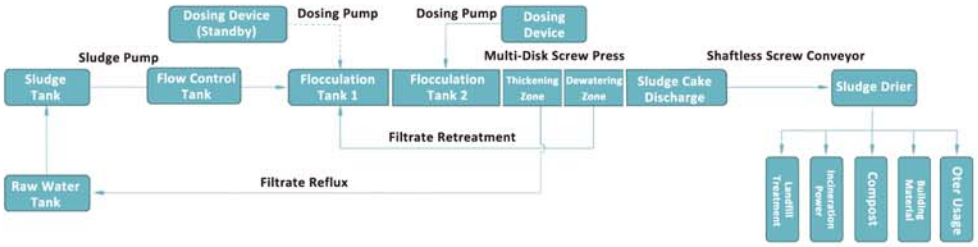
Sludge Treatment Process



* Multi-disk screw press, also known as MDS dewatering press, is a kind of cutting edge sludge dewatering equipment with non-clogging design and low energy consumption, especially applicable for oily sludge.

■ Flow Diagram



MDS Working Principle

■ Structure Principle

Layers of the spacers, which are Fixed and Moving Rings, are secured in place by a tie rod. The inner diameters of the Moving Rings are slightly smaller than the outer diameter of the screw and their rings. Mobilized by the screw, it continuously cleans the sludge out of the gaps, therefore, preventing clogging.

Force-water cocurrent

Force and water are in the same direction, making the free water comes out at the *Fastest Speed*

Moderate pressure

Maintain *Lowest energy Consumption and Mechanical wear* while ensuring the sludge dewatering effect

Thin-layer dewatering

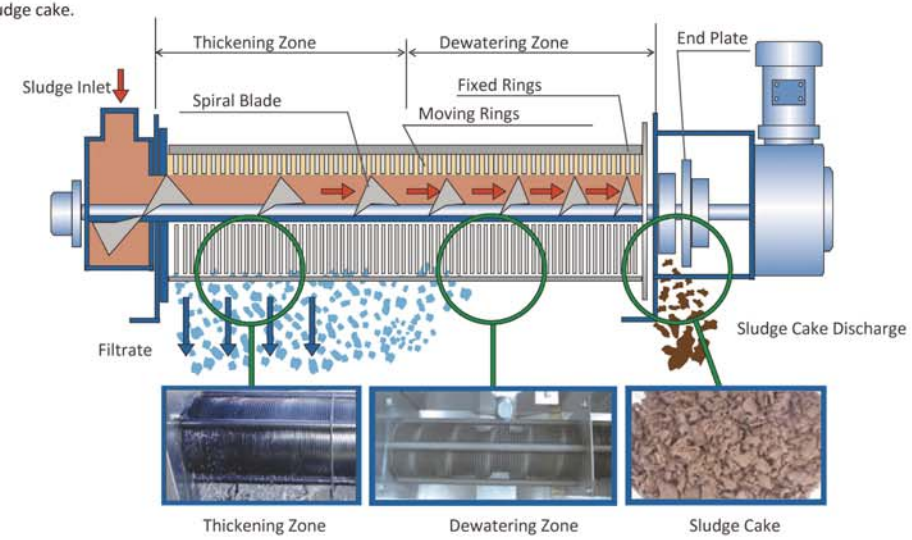
Thinning the sludge to make the free water come out by going a *Shortest Distance*

Extension of dewatering path

Not only ensuring the *Amount of Time* during the process of sludge dewatering, but also ensuring the *Continuous Operation*

■ Dewatering Principle

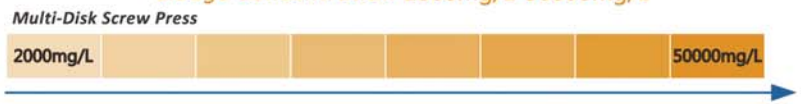
The initial section of dewatering drum is the Thickening Zone, where the solid-liquid separating process takes place and where the filtrate will also be discharged. The pitch of the screw and the gaps between the rings decrease at the end of dewatering drum, hence increasing its internal pressure. At the end, the End Plate further increases the pressure, so as to discharge dry sludge cake.



Technical Advantages

Widely Use

- Can be widely used in municipal sewage, food, slaughtering breeding, printing and dyeing, oil chemical industry, paper making, leather, pharmaceutical and other industries of sludge dewatering;
- Exclusive pre-concentration design, applicable sludge concentration of 2000mg/L-50000mg/L;
- Due to the innovation of the structure design, it is highly suitable to various high and low concentration sludge, most especially for the oily ones.



Clog-free

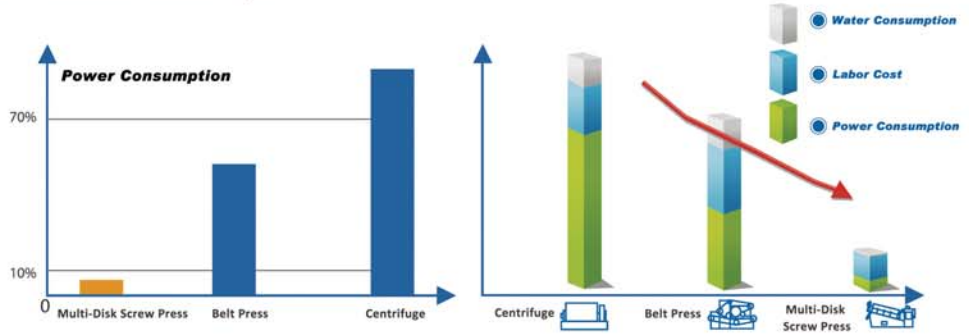
- Due to rotation of helical axis, the moving rings begin detaching from the fixed rings while continuously starting the self-cleaning process. As a result, the ubiquitous clogging is avoided. Therefore, it can handle oily sludge without any trouble while separating the water from the sludge easily. In addition, there is no need to add large quantity of flushing water and there is no odor and no secondary pollution during the dewatering process.

Fully Automatic Control

- There are no easily blocked pieces such as belt and filtration pore in Multi-Disk Screw Press. Combining with the auto control system, the machine runs very safely and simply and can be programmed according to the requirement of the users. It can operate automatically for 24 hours, unmanned.

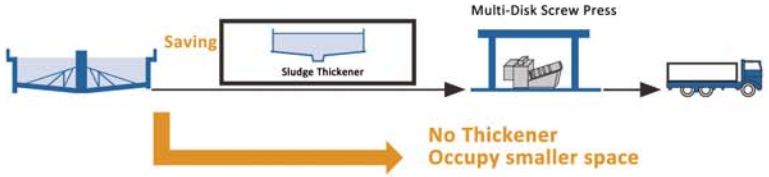
Save Running Cost

- Multi-Disk Screw Press works by the machine's internal pressure and needs no large scale integrations like rollers. It saves energy and water and has very minimal noise because of low running speed (2-4 r/min). The average unit power consumption is only 0.1-0.01kwh/kg-DS (1/8 of Belt Press and 1/20 of Centrifuge), and can greatly reduce the running cost of wastewater treatment system.



Decrease Capital Investment

- Multi-Disk Screw Press can treat sludge in aeration tank and secondary sedimentation tank without setting sludge thickeners. Therefore, this can decrease the total investment, avoid phosphorus release from the sludge thickeners and sludge storage tanks and enhance phosphorus removal effect of the wastewater treatment system.



- ◎ Save construction investments on sludge thickeners and costs on mixers, air compressors, flushing pumps and other auxiliary equipment.
- ◎ Occupy smaller space, reducing the construction investment on dewatering room.

■ Comparison Chart

Items	Multi-Disk Screw Press	Frame Filter Press	Belt Press	Centrifuge
Dewatering of Low Concentrated Sludge	✓	×	×	×
No need Thickener	✓	×	×	×
24-hour auto-matic operation	✓	×	×	×
Occupied Space	▲	▲▲▲	▲▲▲	▲▲
Energy Consumption	▲	▲▲▲	▲▲▲	▲▲▲▲
Labor Intensity	▲	▲▲▲	▲▲	▲
Noise	▲	▲▲▲	▲▲	▲▲▲▲
Maintenance	▲	▲▲	▲▲▲	▲▲▲
Running Cost	▲	▲▲▲	▲▲▲	▲▲▲▲

■ Models Reference

Model ①	Raw Wastewater Waste Activated Sludge Chemically Precipitated Sludge		Dissolved-air Flotation Sludge		Mixed Raw Sludge Aerobic Digested Sludge Sewage Sludge
Sludge Concentration (TS)	0.2%	0.5%	2%	5%	3%
MDS-101	~2kg-DS/h ② (~1.0m³/h)	~3kg-DS/h (~0.3m³/h)	~5kg-DS/h (~0.25m³/h)	~10kg-DS/h (~0.2m³/h)	~13kg-DS/h (~0.43m³/h)
MDS-131	~4kg-DS/h (~2.0m³/h)	~6kg-DS/h (~0.6m³/h)	~10kg-DS/h (~0.5m³/h)	~20kg-DS/h (~0.4m³/h)	~26kg-DS/h (~0.87m³/h)
MDS-132	~8kg-DS/h (~4.0m³/h)	~12kg-DS/h (~1.2m³/h)	~20kg-DS/h (~1.0m³/h)	~40kg-DS/h (~0.8m³/h)	~52kg-DS/h (~1.73m³/h)
MDS-202	~16kg-DS/h (~8.0m³/h)	~24kg-DS/h (~2.4m³/h)	~40kg-DS/h (~2.0m³/h)	~80kg-DS/h (~1.6m³/h)	~104kg-DS/h (~3.47m³/h)
MDS-311	~20kg-DS/h (~10m³/h)	~30kg-DS/h (~3.0m³/h)	~50kg-DS/h (~2.5m³/h)	~100kg-DS/h (~2.0m³/h)	~130kg-DS/h (~4.33m³/h)
MDS-312	~40kg-DS/h (~20m³/h)	~60kg-DS/h (~6.0m³/h)	~100kg-DS/h (~5.0m³/h)	~200kg-DS/h (~4.0m³/h)	~260kg-DS/h (~8.67m³/h)
MDS-313	~60kg-DS/h (~30m³/h)	~90kg-DS/h (~9.0m³/h)	~150kg-DS/h (~7.5m³/h)	~300kg-DS/h (~6.0m³/h)	~390kg-DS/h (~13m³/h)
MDS-412	~80kg-DS/h (~40m³/h)	~120kg-DS/h (~12m³/h)	~200kg-DS/h (~10m³/h)	~400kg-DS/h (~8.0m³/h)	~520kg-DS/h (~17.3m³/h)
MDS-413	~120kg-DS/h (~60m³/h)	~180kg-DS/h (~18m³/h)	~300kg-DS/h (~15m³/h)	~600kg-DS/h (~12m³/h)	~780kg-DS/h (~26m³/h)

Specifications & Models

■ Specifications

Model	Screw Shaft Specifications (mm)	Sludge Cake Outlet Distance (mm)	Machine Specifications (mm) Length	Width	Height	Net Weight (kg)	Running Weight (kg)	Power (kW)	Rinsing water (L/h)
MDS 101	φ100×1	215	1816	756	1040	200	290	0.2	24
MDS 131	φ130×1	250	1969	756	1040	220	315	0.2	24
MDS 132	φ130×2	250	2069	910	1040	305	450	0.3	48
MDS 202	φ200×2	350	2500	935	1270	520	730	0.8	64
MDS 311	φ310×1	495	3255	985	1600	910	1320	0.8	40
MDS 312	φ310×2	495	3455	1295	1600	1530	2230	1.2	80
MDS 313	φ310×3	495	3605	1690	1600	2090	3080	1.95	120
MDS 412	φ410×2	585	4140	1550	2250	2450	3400	3.75	144
MDS 413	φ410×3	585	4420	2100	2250	3350	4850	6.0	216

Specifications update without notice in advance, please ask for the design drawings.

① Use three letters and three digits to represent the Model. The letter MDS means machine type—Multi-Disk Screw. Two former digits means the MDS cylinder diameter, the last digit shows the number of the screw shafts, such as MDS 312, it means the MDS cylinder diameter is 310mm, the number of the screw shafts is two.

② Sludge Treatment Capacity=DS Standard Capacity÷Sludge Concentration (DS stands for Dried Sludge, 0% moisture.)

* Throughput of each model is based on sludge cake with 85% water content.

* There is no certain upper limitation on inlet sludge concentration, however, the target sludge must be flowable.

* Throughput of DAF Sludge is based on sludge containing much fat, oil, and grease such as meat processing applications etc.

* Throughput of Mixed Sludge (Primary Sludge and Waste Activated Sludge) and Aerobically Digested Sludge is based on sludge containing more than 30% fiber (200 mesh) against Total Solids.

Integrated System Composition

We supply integrated matching equipment based on our Multi-Disk Screw Press in the sludge dewatering system, to ensure automatic, stable and highly efficient operation.

- Sludge Pumps Submersible Sewage Pump, Screw Pump
- Chemicals Dosing Device Dosing Barrel, Auto-dosing Unit
- Sludge Conveyor Device Shaftless Screw Conveyor

Model Selection: The selected pump should continuously transfer quantificational sludge from sludge tank to the flocculation tank as per actual running request.

Flow = DS Reference Treatment Capacity per hour of configured dewatering machine/ sludge concentration.

• *Submersible Sewage Pump*

Description : The pump is concentrically connected with the motor and works in the sludge tank. It can realize long time continuous running without causing cavitation. Its flow can be adjusted by frequency converter to reduce sludge sedimentation during transferring sludge containing solid grains & long fiber.

Specifications

Model	Flow(m^3/h)	Lift(m)	Flow(m^3/h)	Lift(m)	Power(kW)
40DVSP5. 25A	1. 2	8. 7	5. 0	5. 4	0. 25
50DVSP5. 25A	2. 1	6. 6	12. 8	1. 8	0. 25
50DVSP5. 4A	2. 1	10. 2	15	3. 0	0. 4
50DVSP5. 75A	2. 1	14. 8	12	9. 0	0. 75
50DVSP51. 5A	2. 1	21. 4	13. 2	13. 5	1. 5
60DVSP5. 75A	8. 4	10. 9	24	3. 8	0. 75
60DVSP51. 5A	8. 4	15. 9	34	4. 2	1. 5
60DVSP52. 2A	8. 4	18. 3	46	6. 0	2. 2
60DVSP53. 7A	8. 4	23. 6	54	10. 4	3. 7
80DVSP5. 75A	8. 4	10. 9	24	3. 8	0. 75
80DVSP51. 5A	8. 4	15. 9	34	4. 2	1. 5
80DVSP52. 2A	8. 4	18. 3	46	6. 0	2. 2
80DVSP53. 7A	8. 4	23. 6	54	10. 4	3. 7

• *Screw Pump*

Description : The screw pump is a positive displacement pump that use one or several screws to move fluids or solids along the screw(s) axis. In its simplest form, a single screw rotates in a cylindrical cavity, thereby moving the material along the screw's spindle.

Specifications

Model	Flow(m^3/h)	Pressure(Mpa)	Power(kW)
G20-1	0. 8	0. 6	0. 75
G20-2		1. 2	1. 5
G25-1	2	0. 6	1. 5
G25-2		1. 2	2. 2
G30-1	5	0. 6	2. 2
G30-2		1. 2	3
G35-1	8	0. 6	3
G35-2		1. 2	4
G40-1	12	0. 6	4
G40-2		1. 2	5. 5
G50-1	14	0. 6	5. 5
G50-2		1. 2	7. 5
G60-1	22	0. 6	11
G60-2		1. 2	15

Chemical Dosing Device :

Model Selection: The function of chemical dosing device is to dissolve powder flocculants or dilute liquid flocculants.

Volume = DS Reference Treatment Capacity per hour of configured dewatering machine x Flocculants addition rate x Dilution ratio x Retention time.

• *Dosing Barrel*

Description: It is composed of stirring motor, stirrer, feeding hole and clean hatch. It is used for small-scale projects and requires personnel supervision due to limited capacity.

Specifications

Model	Capacity(L)	Power(kW)
APT-500	500	0. 75
APT-1000	1000	0. 75

• *Auto-dosing Unit*

This equipment is automatic continuous allocation and dosing system. Dry powder enters into pre-mixe from screw propeller underneath the hopper. The moist material enters into the allocation tank to make the thinning mixing. It will be allocated as per the requirement of customer. The allocation solution enters into storage tank from allocation tank after the curing. When the storage tank is in high liquid position, the allocation process stops automatically.When the solution drops to low liquid position, the allocation process, then, starts automatically. Both the allocation tank and curing tank set the mixer and guarantee the dilution and curing for the flocculants.

Specifications

Model	*Capacity(L/h)*	*Size(B×L×H)*	*Screw Pump Flow(m^3/h)*
HTJY-500	500	900×1500×1650	1.0
HTJY-1000	1000	1000×1652×1750	1.0
HTJY-1500	1500	1000×2440×1800	1.5-2.0
HTJY-2000	2000	1220×2440×1800	1.5-2.0
HTJY-3000	3000	1220×3200×2000	3.0-5.0
HTJY-4000	4000	1450×3200×2000	3.0-5.0

Dosing Pumps :

Model Selection : Dosing pumps are used to deliver polymeric coagulant or inorganic flocculants to the flocculating tank. Due to the high viscosity of polymer coagulants, we should choose high viscosity resistance dosing pumps.

Flow = DS Capacity per hour of configured dewatering machine ÷ Flocculants addition rate ÷ Dilution ratio.

- ***Mechanical Diaphragm Pump***

Description: The diaphragm pump has two sections separated by a diaphragm. In one section a piston or plunger operates in a cylinder in which a non-corrosive fluid is displaced. The movement of the fluid is transmitted by means of flexible diaphragm to the liquid to be pumped. The only moving parts of the pump that are in contact with the liquid are the valves, and these can be specially designed to handle the material. In some cases, the movement of the diaphragm is produced by direct mechanical action, or the diaphragm may be air actuated.

Specifications

GM0050	50	1.0	0.25
GM0090	85	0.7	0.25
GM0120	115	0.7	0.25
GM0170	170	0.7	0.25
GM0240	235	0.7	0.25
GM0400	400	0.5	0.37
GM0500	500	0.5	0.37
GB0180	167	1.0	0.55
GB0240	237	1.0	0.55
GB0450	416	1.0	0.55
GB0500	464	0.7	0.55
GB1200	1200	0.35	0.75
GB1500	1500	0.3	0.75
GB1800	1800	0.3	0.75

Sludge Conveyor Device :

Model Selection: Sludge conveyor unit is used to convey the discharged sludge cake. The height from the bottom of sludge cake outlet to the ground must be put into consideration during selection, and the width of inlet of sludge conveyor should be slightly wider than the carrier plate.

Sludge cake throughput = DS Capacity per hour of configured dewatering machine / solid content of sludge cake.

- ***Shaftless Screw Conveyor***

Description: Shaftless screw conveyor is a kind of non-axis conveying equipment which conveys sludge along with screw rotating. It has advantages such as simple structure, sage and reliable operation, convenience usage and repair, continuum and level liquids discharging, stable pressure. It is totally enclosed for corrosive or hazardous requirements and will not cause secondary pollution.

Specifications

Model	*Delivery Capacity(m^3/h)*			*Delivery Length(m)*
	0°	15°	30°	
WLS-220	1	0.36	0.24(22°)	≤5
WLS-260	3	2.1	1.3	≤12
WLS-320	6	4.5	2.5	≤15
WLS-360	9.5	6.5	4.3	≤20
WLS-400	11	8.5	5.7	≤25

Installation Angle should be less than 20° , if request 20-30°, it's a custom-design.

■ *Global Sales Network*

Overseas Customers :
Australia , Canada , France ,
Poland , USA , UK , Morocco , Turkey ,
Indonesia, Malaysia, Vietnam, Russia,
Mongolia, Thailand, Ukraine, India, etc .

There are more than 100 overseas cases located across the globe and in more than 20 countries.
Most cases are located in the Southeast Asian countries,
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