

Overview of Sludge Treatment and Recycling Equipment

New types of sludge and environmental requirements are resulted from the operational changes from different fields. In particular, the differential gap between the formation of industrial sludge and the chemical properties is enormous. Thus, dewatering equipment, being the end of the industrial chain, shall continuously have further innovations and creations as to be able to provide the corresponding technological services and productions at the right time.

I. Sludge Dewatering

Dried bed from thirty years ago became obsolete due to its labor costs and climatic factors. They were later replaced by belt pressed and decanter centrifugal dewatering machines, and currently plate filter press (pressurization and dehydration) as well as screw press are popular models. In a near future, membrane filter press which emphasizes on high-pressure and multi-functions will become the mainstream model. The reason for this trend is owing to the fact of the increasing demand of lower moisture content in sludge cakes. In regard to the analysis of the physical mechanism of sludge dewatering filtering, filtration pressure is the basic principle for the dehydration process in every kind of machinery; the higher the pressure, the higher the degree of dryness of the sludge cakes. Although the operations of the various types of the dewatering machines differ, yet the newly designed model adopts a higher filtration pressure for lower moisture content in the filtration cake.

Table 1. Overview Table of the Properties of the Common Dewatering Equipments

Dewatering Machine Model	Belt Press Filter	Decanter Centrifugal Filter	Plate Filter Press	Screw Press	Automatic Membrane Filter Press
Construction Principles	By squeezing and driving the pressure rollers, the sludge dewatering process is operated in a single or double filter cloth.	The sludge would withstand the centrifugal forces within the machine. The particles would drop in the circumferential wall of the cone carcass as to achieve solid-liquid separation.	Multiple plates and filter frames or concave plates would be covered with filter cloth. The sludge would be pumped into the filter chamber to be filtered and dewatered through filter cake and filter cloth.	The transportation and squeezing are done with different propeller shafts between the gaps, so that the filtrate and filter cake are separated through the peripheral sieves.	A concave filter is covered with filter cloth and equipped with multiple-membranes. The sludge is pumped into the filter chamber with high pressure, filtered by the filter cake and filter membranes for two squeezing effects and dewatering.
Filtration Rate	100-200 kgDS/m-h	15 m ³ /h-m (Bowl)	2-6 kgDS/m ² -h	< 1.5 rpm	3-12 kg/m ² -h
Filtration Pressure	1-5 kg/cm ²	1000-3000G	Filtration : 1-7 kg/cm ²	--	Filtration: 1-15 kg/cm ² Squeezing: 5-15 kg/cm ²
Moisture Content in the Filter Cake (%)	80-85	70-85	50-75	60-85	35-70

II. Sludge Conditioning

Most of the properties of the sludge can be divided into organic sludge and inorganic sludge. For the past few years, the cost of sludge disposal has been augmenting. Sludge dewatering is just the first step, while a proper sludge conditioning is fundamental as to make it easier to remove the moisture. The main purpose of sludge conditioning is to increase reduce the resistivity factor; the lower the number, the easier to dewater. The following is the type of sludge in numerical order (from larger to smaller): activated sludge > sewage sludge > conditioned activated sludge > conditioned sewage sludge > gelatinous $\text{Al}(\text{OH})_3$ > gelatinous $\text{Fe}(\text{OH})_3$ > CaCO_3 .

Different model of dewatering machines need different type of chemical conditioner. Belt press filter, decanter centrifugal filter and screw press filter require polyacrylamide flocculants, whereas filter press requires ferrous chloride or slacked lime if necessary. Yet the evaluation of the incremental proportion of the amount of dry sludge; if polyacrylamide flocculants is used, then the problem of “appropriate amount” shall be noticed as the excessive or insufficiency would reduce sludge dewatering. As for organic sludge of higher resistivity factor, cell wall breaking technique would be adopted for a deep conditioning with high-pressure dewatering, so that sludge cake can effectively reduce the moisture content and can be used in green building materials or alternative fuels, which would be a meaningful practice for energy-saving and carbon-reduction.

III. Sludge Drying

Apart from conditioning and dewatering, industrial sludge can apply drying method to reduce weight, or to assess in accordance with different conditions of the cases for its demand. If the equipment life is between 7 to 10 years, the energy efficiency could be the key parameter of selection. Not only the initial set-up cost shall be considered, the price variation of the energy shall also be taken into the consideration.

Table 2. Reference table of energy-consumption for moisture content removal of the common dewatering Equipments

Drying Equipment Model	Medium	Energy	Commercial Moisture Content	Energy Consumption / kg Dewatering amount
Hot air drum dryer	Hot air	Waste gas	15-25%	-----
	Hot air	Boiler oil	15-25%	0.1-0.13L
	Hot air	Electricity	20-30%	1.0-1.1kw-hr
Dehumidifier drum dryer	Refrigerant	Electricity	25-40%	0.45-0.65kw-hr
Dehumidifier drying fixed box	Refrigerant	Electricity	30-45%	0.5-0.7kw-hr
Dehumidifier Dryer	Refrigerant	Electricity	30-40%	0.55-0.7kw-hr
Spiral blade dryer	Steam or hot kerosene	Boiler oil	15-30%	0.1-0.14L
Electric oven	Hot air	Electricity	15-30%	1.1-1.5kw-hr
Vacuum drying filter press	Steam	Boiler oil	25-40%	0.1-0.14L
	Steam	Natural gas	25-40%	0.07-0.08m ³
	Hot air	Waste hot water	25-40%	30-35kg×95℃

IV. Differences between Domestic and International Products

Sludge dewatering and drying equipment belongs to standard mechanical manufacturing. International renowned manufacturers which have developed several distinctive machine models cannot provide simple, clear and complete specification lists, and thus only professionals of the manufacturers are capable to select the adequate model. For a further understanding, most people have to solicit an agent to offer the adequate machinery according to their conditions. There are some common problems of the imported products: 1. Some type of industrial sludge is not common in the dewatering machine's country of origin (such as sludge from dyeing, leather processing, optoelectronics and other technology electronics industries). 2. The coagulants included in the process of wastewater treatment in Taiwan are generally PAC, ferrous chloride, calcium chloride, etc. In some other countries, as of the manufacturers' countries of origin are still using lime series. Different components and formation conditions might have a wide variation in their processing features. Without a proper data or sufficient capability, probability of further problem might greatly increase.

On the contrary, lands in Taiwan are expensive and the regulations are strict. Within a limited market size and client-factory space, dewatering machine and dryer manufacturers are constantly making progress. Adopting top-quality electromechanical components made in Taiwan can provide the clients with excellent and customized solutions for every industry. Most of the manufacturers in Taiwan are capable of making oversea exportations as their overall technology and quality are not inferior to those of the international brands.

ULTRA-SAVING WATER FILTER BELT CONTINUOUS SLUDGE DEWATERING MACHINE

1. Structure and principle

The high molecular polymer and sludge are injected into the sludge coagulation mixer through the high molecular dosing machine and sludge feed pump, and after overflowing into the drum thickener, they are evenly distributed on the full width of the filter belt, and after passing through the sludge-water separation zone, Entering the wedge-shaped and roller pressurization zone, through a series of rollers and filter belt tensioning device, the sludge is continuously pressurized along the direction of travel of the filter belt until the sludge cake of the dewatering machine falls from the discharge port.

2. Purpose

Sludge dewatering treatment of various industrial wastewater, slaughter, animal husbandry, urban sewer, water fertilizer, water purification plant.
Waste sewage treatment plant, sludge dewatering treatment, saving the cost of cleaning and transportation.

Solid/liquid separation and dehydration treatment in food, chemical, mining, and various industrial processes.

3. Feature s

- (1) Treat all kinds of sludge, with the dual function of gravity concentration and dewatering.
- (2) It can automatically control operation and continuous production, which is suitable for sludge in all walks of life.
- (3) Continuous processing, the most manpower saving, and high work efficiency.
- (4) Cylinder correction positioning system, control the filter belt to run within the scope of the specification without deviation, prevent the filter cloth from snakes and keep the filter cloth flat and not discounted.
- (5) Pneumatic cylinder automatic tensioning device, the bilateral tension of the filter cloth is not biased evenly, which can keep the filter cloth set to a certain pressure.
- (6) The air pressure tension can be adjusted according to the demand, so that the moisture content of the filter cake is low.

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- (7) Low energy consumption, low noise, simple structure, semi-closed structure and convenient maintenance.
- (8) Dual filter cloth operation: The filter cloth adopts one upper filter cloth and one lower filter cloth to operate, so the dehydration rate is fast.
- (9) The running speed of the filter cloth can be adjusted.

4. Specification and Functions

- (1) The main body of the equipment is composed of a drum thickener and a belt filter press. The feeding sludge, dosing, mixing, and reaction are sequentially carried out in the entire concentration and dehydration system. The concentration and dehydration are carried out under steady flow conditions of pipeline operations such as the output of the sludge cake.

- (2) Equally divided sludge mass falls to the gravity dehydration zone of the lower filter belt for the third stage of gravity dehydration. At this time, the sludge solids concentration can reach more than 8-10%. The sludge mass begins to enter the initial pressure wedge-shaped throat, sequentially from initial pressure → low pressure → medium pressure → high pressure, and squeezes and dewaterers in a horizontal wave-shaped motion track. The solid content of the sludge cake can reach over 15.5 to 37%.

5. Representative Performance

- (1) Taiwan major industrial parks WWTP 1997-2021.
- (2) China Petrochemical Development Corporation 2005-2021.
- (3) Systems of Formosa Plastics Group 1997-2021.

6. Award (Certification) project

- (1) ISO 9001:2015 Quality System Certificate.
- (2) Patent certificate No. Taiwan M276045 、 M348113 、 119141 、 110817 、 126352.

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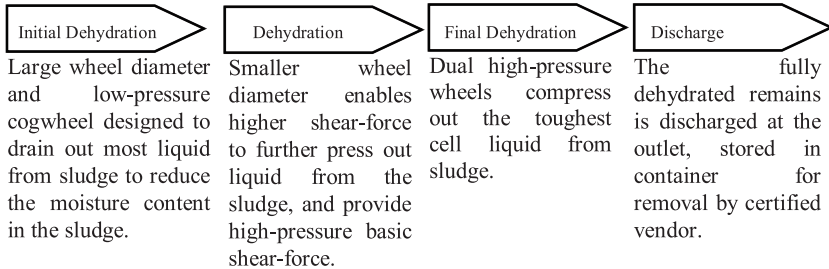
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FILTER-ROLLER SLUDGE DEHYDRATOR

1. Purpose

Applicable for wastewater sludge dehydration and manufacturing process.



2. Features

- (1) Fully automated operating functions.
- (2) Fully zinc-plated to prevent rusting with a rigid base.
- (3) Extended gravity dehydration design.
- (4) Pneumatic filter tension auto control system.
- (5) Pneumatic dynamic snaking calibration system.
- (6) Direct-driven filter mechanism.
- (7) Liquid crystal electronic constant-speed operating functions.
- (8) Complete irregularity alarm and auto stop function.
- (9) High-efficiency low-pressure cogwheel design.
- (10) Made with plated stainless steel and bolts.
- (11) Solid wheel axles.
- (12) All wheel axles are chrome-hardened and center calibrated.
- (13) Swiss Pretext filter set.
- (14) Plat-filter tension mechanism.
- (15) Auto filter washer.
- (16) Vacuum suction accelerator can be installed.
- (17) Pressured cleaner may be installed for water saving.

3. Product Photo



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AUTOMATIC MEMBRANE FILTER CLOTH WALKING TYPE FILTER PRESS

1. Structure and principle

The sludge is pumped into the filter chamber composed of filter plate and filter cloth, and the closed positive pressure is used to force the filtrate to be discharged through the filter cloth and the orifices of the filter plate, so that the moisture content of the sludge slurry is reduced and the sludge cake is formed and then falls. Send out. Feeding on the top of the filter press compartment plate, after pressing, re-pressing, filter core blowing back (optional), unloading, and filter cloth cleaning are automatically completed. Filter cloth walking automatic blanking system: The mud cakes are completely discharged and do not stick to the filter cloth. Due to the filter cloth walking design, even the mud cakes that are not easy to fall off automatically will automatically peel off when the filter cloth is walking and turning.

2. Purpose

Various industrial wastewater inorganic coagulation sedimentation sludge dehydration treatment; stone/construction mud, river/reservoir sludge dehydration treatment; food, pharmaceutical, chemical, dye (color) materials,

ceramics, mining and other various industrial processes in solid/liquid Separate dehydration treatment. Used in the dehydration equipment of industrial sludge, sewage plant sludge, water sludge, and incinerator fly ash.

3. Features

- (1) Automatic high-pressure frontal cleaning system: The two sides of the single filter plate are positioned in the center and thoroughly cleaned with a water source nozzle above 20Bar at the same time. The cleaning water will not splash. The electrical and water pipelines use the swimming protection pipe configuration, which is beautiful and easy to maintain. It adopts PLC + man-machine interface to fully automate, the operation is the simplest.
- (2) Filter element blow-back function: Before returning the plate, the sludge in the feed pipe is blown back by the air source to ensure that the re-feeding will not cause the filter plate to be biased, and to prevent the slurry from dripping to the mud cake when the material is discharged.

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- (3) Fully automated, starting, dewatering, unloading, cleaning, free of manual operation.
- (4) The filter cloth walk-in design, the filter cake can be completely unloaded and can be finished, free of manual operation, revolutionary new initiative.
- (5) Industry 4.0 smart factory is the best tool to realize full automation.

4. Specification and Functionse

- (1) Good dehydration reduction effect (65%~75%), low power consumption, no need to add chemicals, reducing subsequent processing costs.
- (2) Wide application range, the feed concentration can reach more than 5%.
- (3) The filter cloth is heat-set, calendared, and leak-proof. The filter cloth is not easy to block, easy to clean and less water.

5. Representative Performance

- (1) Tripod Technology Corporation 2006-2012.
- (2) China Steel Corporation 2020.
- (3) Systems of Catcher China Group 2007-2021.

6. Product Photo



7. Award (Certification) project

- (1) ISO 9001:2015 Quality System Certificate
- (2) CE Safety Certification
- (3) Patent Certificate No. : Taiwan M584218 、 135682 、 135785 、 139267

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AUTO-CLEANING MEMBRANE FILTER PRESS

1. Structure and Principle

Using chamber filter plate with a membrane adhering to the recess, a filter cloth is draped over each filter plate. All filter plates line up orderly with regular intervals. Between two filter plates, a hollow chamber is formed with feed tunnels channeling through the filter plates and chambers. Once the hydraulic cylinder is triggered to close the filter plates, the concentrated sludge is fed into the chambers via the diaphragm pump; the filtrate is then drained to accumulate sludge solids in the chambers. Hence, the more sludge is fed, the lower the water content of the sludge cake is. When the chambers are filled where sludge can no longer enter, stop the pump and close the feed valve and then execute the membrane second squeezing procedure. The expandable membrane uses its reverse force to further reduce the moisture content of the dewatered sludge cake until the set time lapses. The hydraulic device restarts and opens filter plates one by one or all at once via the high-stability hydraulic driving shifter to allow sludge cakes fall automatically into the running conveyor and transports the cakes to the storage silo or catcher bags for storage.

2. Purpose

- (1) Wastewater sludge dehydration for various industries.
- (2) Chemical manufacturing process's solid and liquid separation.
- (3) Water purification plant's sludge dehydration.
- (4) Construction industry's waste sludge dehydration.

3. Features

- (1) The fabrications are frame structure consisted of a head end, fixed end, traveling end, and sidebars. They are designed as rigid steel with rib reinforced construction. The sidebars are wedged into pockets in the ends of the press frame and fastened by high-tension bolts. The stress loads are calculated to ensure maximum absorption of all mechanical forces. It is adequate for high-pressure operation and sludge pulsation feeding.
- (2) Rubber plates : 10 ~ 12mm steel sheets are used for interior reinforcement, which are molded with rubber throughout. The reinforced multi-support design assures optimal strength and durability.

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- (3) Hydraulic shifter : The pressure is empowered to drive tilted plates straight before shifting, superior to electrical or pneumatic models for free of error current detection and lack of drive that may lead the plates to fall-off.
- (4) Auto cloths cleaner booth-type unit, dual transmission support plus cogwheel configuration for better stability; individual plate is aligned centrally to both sides for thorough cleaning by 20Bar jet to deter splashing; electric cables and water pipe come with mobile trays for aesthetic and easy maintenance.
- (5) Sludge cake water content : generally reduce 20 ~ 70 % of water content; film model is equipped with second film compressing system that further reduces 5 ~ 10 % water content.
- (6) Core-blow design : before the plate shifts back, the sludge inside the feed tunnel is blown back for clearance with water or high pressure air to prevent subsequent feed from crushing the plate and slurry from dripping onto the cakes when cakes are being discharging.

4. Specifications and Functions

- (1) Number of plates : 30~110pcs.
- (2) Plates materials : Rubber or Polypropylene
- (3) Plates sizes : 1,000 、 1,250 、 1,300 、 1,500 、 2,000mm.
- (4) Filtration area : 42 ~ 700 m².
- (5) Chamber volume : 640 ~ 10,500 L/cycle.

5. Product Photo



6. Award (Certification) Project

Taiwan Environmental Manufacturers Association certified the product for environmental protection quality standard

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MEMBRANE FILTER PRESS



1. Structure and Principle

Theory: Filter presses are manufactured to separate solids from slurries. This machine comprises of several main components including the structured frame, plate pack, filter cloths and various modular components designing for the purpose of automation. During the process of filtration, the filter cloth plus the increasing accumulated thickness of the filter cakes will generate resistance against the flow. More and more hydraulic forces required to overcome this resistance. Once a compact filter cake be formed inside the filter press, it will be discharged out of the machine. Slurry flow will encounter and suffering following three types of resistances, and the total pressure drops ($-\Delta P$) equals to the sum of them.

- (1) Tubing friction resistance--- It is minor and irrelative small and it can be ignored compared to the other two types of resistance.
- (2) Filter cloth resistance----- The initial value of resistance of the brand new cloth was totally different from the used filter cloth! , the filter cloth resistance will be gradually increasing and this resistance will be reached a steady value after certain period of operational times. But, still, this resistance forces was much more less than the filter cakes' resistance.

- (3) Filter cakes' resistance--- This is the major forces which no one can ignore it! The resistance caused by filter cakes will be subjected to change caused by machine's filter run! Resistance is starting from zero ,then, it will be graduated increasing to (by) a steady value after certain times of filter run.

2. Purpose

- (1) Wastewater sludge dehydration for various industries.
- (2) Chemical manufacturing process's solid and liquid separation.
- (3) Water purification plants' sludge dehydration.
- (4) Construction industry's waste sludge dehydration.

3. Features

- (1) Body structure: Head end, fixed end, traveling end and side bar are made by solid steel plate and jointed by high-strength bolts under precise safe strength calculation, able to withstand high pressure operation and suitable to the pulsed input loading.
- (2) Hydraulic driving mechanism: Double acting electricity-driven hydraulic cylinder; move forward/backward and supplement pressure automatically.

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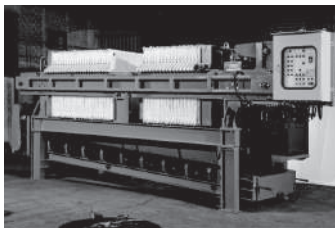
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- (2) Rubber filter plate: apply 10 or 12mm steel plate to build the reinforced core plate and totaled enclosed by rubber; the reinforced "Stay bosses" design can ensure longest operation lifetime; high sealing capability that won't leak; anti-chemicals, elevated temperature and acid/caustic; no cracking or deformed.
- (3) Polypropylene filter plate: integrated into one piece by high tempura & pressure + milling machining; able to create visible and invisible streams; the reinforced "Stay bosses" design can prevent from bad sealing or deformation from insufficient mechanical strength.
- (4) Membrane protection: automatically detect the residual air pressure in membrane, avoiding instant explosion or trip made while rejecting plate and thus would hurt operator.
- (5) Filter cloth: double-side, made by PP or PA (nylon); easy to separate cake rather than sticking on the cloth.
- (6) Control system: feed in from inner/outer door (incl. glass door) + dustproof & waterproof electrical control cabinet; allowing to set auto (constant cycle)/manual operation mode; prints + hot coats, bright, good looking and dirt endured.
- (7) Hydraulic plate-picking machine: pressure is sufficient to push skewed plate back to order and pick it up substantially; the process is better than motor-driven or pneumatic one that would drop down filter plate from error current induction or insufficient thrust force.

4. Specifications and Functions

- (1) Number of plates : 21 ~ 111 pcs.
- (2) Plates materials : Rubber or Polypropylene.
- (3) Plates sizes : 800、930、1,000、1,250、1,300、1,500mm.
- (4) Filtration area : 19 ~ 435 m².
- (5) Chamber volume : 285 ~ 6,460 L/cycle.

5. Product Photo



6. Award (Certification) Project

- (1) Industrial Development Bureau of MOEA certified the product for environmental protection quality standard in 2003.
- (2) The product was certified the award from IDB for environmental protection equipment application benchmark in 2020.

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FILTER PRESS

1. Structure and Principle

Equipment for removing solids from liquids separation.

The opening methods of filter plates, collection of filtered liquid, sludge cake packing

2. Purpose

Removing solids from liquids separation.

3. Features

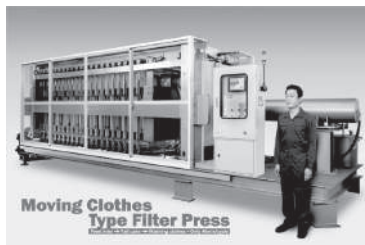
- (1) More Product YIELD per batch.
- (2) Less Handling Loss
- (3) Increased product quality
- (4) Ease of handling and substantial Savings on drying costs.

4. Specification and Functions

Moving Clothes Type Filter Press

model: FA1000

5. Product Photo



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MOVING CLOTHES TYPE FILTER PRESS

1. Structure and Principle

A Moving clothes type filter press is a breakthrough of general filter press. It is a highly efficient, compact, dewatering device for separating solids from liquid slurries in the form of compressed cake. Its major components are a structured framework, filter chambers (formed by recess portion of Recessed plate system, or frames in plate and frame system), and filter clothes.

- (1) Complete automatic operation
- (2) Efficient dewatering to high dryness
- (3) Complete release of mud disks, no contaminations on filter clothes
- (4) Fast cleansing of filter clothes
- (5) Extreme heavy duty cleaning for mud treatment

2. Purpose

- (1) Chemical industry: Medicine, Fertilizer, Dye, Graphite.
- (2) Mining industry: Sand and stone pit, Marbles, Mount Morillonite, Bentonite, Calcium Carbonate, Amino Acid, White Smoke etc.
- (3) Others: Dyes, Resin, Metallurgic Industries, Non-iron Metallic Industries etc. Polluted sludge in the sewer, industrial polluted sludge, and polluted sludge in the tap water etc.

3. Features

Each cycle time only need 40mins included-feeding – decharged -washing clothes total 40mins

4. Specifications and Functions

- (1) Number of plates : 30 ~ 110 pcs.
- (2) Plates materials : Rubber or Polypropylene^[SEP]
- (3) Plates sizes: 1,000、1,250、1,300、1,500、2,000 mm.
- (4) Filtration area : 42 ~ 700 m²_[SEP]
- (5) Chamber volume : 640 ~ 10,500 L/cycle.

5. Product Photo



6. Award (Certification) Project

ISO9001 : 2015 Quality System Certificate.

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FILTER PRESS

1. Structure and Principle

Sludge is pushed into filter centre via a high-pressure pump to filter and compress. The pump then pumps into high-pressure air to bulge the rubber film for further compressing, squeezing out about 50-70% water content at this stage (pending upon sludge property). Before sludge cakes are discharged, high-pressure air is pumped into the feed opening to blow residues through the filter to achieve dehydration. The system is capable of 24-hour automatic operation..

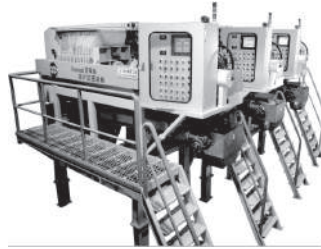
2. Purpose

Sludge drying for semiconductor, electroplating, dye manufacturing or other chemical sludge drying; sludge treatment for water purification plant, reservoir silt treatment, building sludge, tunnel engineering debris, manufacturing raw material hydrating and drying, food industry and steel mills, metal surface treatment industry, electronics, PCB, active sludge and bio-sludge, etc.

3. Features

- (1) Fully Automatic : PLC + Touch Screen Interface.
- (2) Dewatering effect : Water Content : 30%~60%.
- (3) Easy to operate : Auto Back washing system + Auto Cake dropping system.
- (4) R & D + Manufacturing 100% in Taiwan.
- (5) High Efficiency : slurry feeding 10 bar , membrane squeezing 15 bar.

4. Product Photo



台灣卜力斯股份有限公司 TAIWAN PASSAL CO.,LTD.

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ULTRA-HIGH PRESSURE SCREW TYPE EXTRUSION DEWATERING MACHINE

1. Structure and principle

Utilizing the screw conveying and squeezing principle of the screw, under the condition of gradual pressure, the moisture in the material flows out through the metal screen to achieve the purpose of dehydration.

Low-pressure section: The first section is a low-pressure section, this section mainly discharges excess free water in the treated material.

Medium-pressure section: The second section is a medium-pressure section. This section mainly pre-compresses the processed material into a cake.

High-pressure section: The third section is a high-pressure section. This section mainly squeezes and compresses the processed material to reduce the water content.

2. Purpose

- (1) In the food industry, wine residues, coffee residues, vegetable residues, raw/cooked kitchen waste, vegetable and fruit, aquatic product processing...etc. are squeezed and dehydrated.

- (2) Dehydration of scum / fibrous / particulate related substances in food processing, agricultural product processing, aquatic product processing, chemical industry, pulping and papermaking, textile fiber, slaughter industry...etc.
- (3) The raw and cooked materials are separated and dewatered by solid-liquid separation after crushing or crushing.
- (4) Palm oil and coconut oil extrusion manufacturing.
- (5) Vegetable oil and various types of edible oil extrusion manufacturing.

3. Features

- (1) Design cleaning function, filter screen intermittent cleaning and cleaning system before shutdown, reduce filter screen clogging, cleaning water consumption is very small.
- (2) Sturdy and simple structure design, low speed, low consumption parts, can be operated at different speeds according to the frequency conversion of physical properties, and low maintenance costs.

元錫工業股份有限公司

YUAN CHANG TSAY INDUSTRY CO., LTD.

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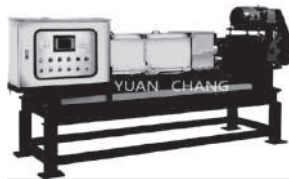
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- (3) It can be operated intermittently or continuously, with stable production capacity and high efficiency.
- (4) Coaxial deceleration, direct drive design, high torque, low noise, low vibration, low wear and low operating cost.
- (5) Closed structure design, no pollution to the environment, can also be used with a gas collecting hood, easy to operate.
- (3) Patented outlet design, the internal pressure is fixed and there is no problem of synchronous rotation.

5. Representative Performance

- (1) Taiwan Scott Paper Corporation 2014-2019.
- (2) Taita Chemical Co., Ltd. 2018.
- (3) Tai Roun Products Co., Ltd. 2015.

6. Product Photo



4. Specification and Functions

- (1) Using the Archimedes screw principle, a special combination screw with large processing capacity, stable effect and low slag moisture content is designed for various sludge and processed materials.
- (2) Stainless steel triangular wedge-shaped filter screen or drilling screen, with high structural strength, wear resistance, durability, corrosion resistance, long service life, high open rate, the filter surface is not easy to block, and has good filterability to maximize performance.

7. Award (Certification) project

- (1) ISO 9001:2015 Quality System Certificate.
- (2) Patent Certificate No. : Taiwan M394332 、 M524217 ; China ZL201020581618.9.

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VOLUTE SLUDGE DEWATERING EQUIPMENT

1. Structure and principle

When the equipment is running, the sludge enters the filter cartridge from the feed port and is pushed by the spiral blades to move to the discharge port. As the pitch of the screw shaft blades is gradually reduced along the mud cake outlet direction, the pressure on the sludge also increases continuously, and the dehydration starts under the action of the pressure, and the water flows out from the gap between the fixed ring and the moving ring. At the same time, the equipment relies on the self-cleaning function between the fixed ring and the moving ring to clean the filter gap to prevent clogging. The mud cake is discharged from the discharge port under the push of the screw shaft after dehydration.

- (1) The same direction of force and water: make the free water separate at the fastest speed.
- (2) Appropriate pressure: While ensuring the effect of sludge dewatering, it keeps the lowest energy consumption and mechanical wear.

- (3) Thin-layer dewatering: make free water in the sludge go the shortest distance to separate from the muddy water.
- (4) Extend the path: Extend the dewatering path, which not only gives the sludge a little more time in the dewatering process, but also ensures the continuous operation of dewatering production.

2. Purpose

- (1) Dewatering of industrial wastewater and municipal sewage sludge.
- (2) Sludge dehydration in food, beverage and brewing industries.
- (3) Dewatering of sludge from medical and health institutions.
- (4) Sludge dewatering in petroleum and chemical industries.
- (5) Sludge dewatering in animal husbandry and breeding industries.
- (6) Machine manufacturing, metal processing sludge dewatering.
- (7) Dyeing, washing, papermaking sludge dewatering.

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3. Features

- (1) Strong resistance to oily sludge, the best oily sludge dewatering machine.
 - (2) Using low-speed screw extrusion, stable performance, low power consumption, no clogging, high efficiency, self-cleaning function, and greatly reduced flushing water.
 - (3) Automatic operation, simple operation, short daily maintenance time and simple maintenance operations. Clean and environmentally friendly, no pollution, easy daily maintenance.
 - (4) Small footprint, easy maintenance and replacement; small weight, easy to carry.
 - (5) Using 304 stainless steel material, corrosion resistance, acid and alkali resistance, good chemical resistance, sturdiness and durability, and long service life.
- (2) Using low-speed screw extrusion, stable performance, low power consumption, no clogging, high efficiency, self-cleaning function, and greatly reduced flushing water.
 - (3) Automatic operation, simple operation, short daily maintenance time and simple maintenance operations. Clean and environmentally friendly, no pollution, easy daily maintenance.
 - (4) Small footprint, easy maintenance and replacement; small weight, easy to carry.
 - (5) Using 304 stainless steel material, corrosion resistance, acid and alkali resistance, good chemical resistance, sturdiness and durability, and long service life.

5. Representative Performance

- (1) Charoen Pokphand Enterprise (Taiwan) Co., Ltd. 2019.
- (2) Kuang Chuan Dairy Co., Ltd. 2020.
- (3) Central Union Oil Corp. 2020.

4. Specification and Functions

- (1) Strong resistance to oily sludge, the best oily sludge dewatering machine.

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SLURRY DEWATERING MACHINE

1. Structure and Principle

It is a centrifugal sedimentation machine. When the mud treatment enters the mechanism, it is separated by high-speed rotary sedimentation, and the solid and water are separately discharged to achieve dehydration or separation of solid and liquid.

2. Purpose

- (1) Sludge dewatering function in sewage treatment process
- (2) Separation of solids from liquids in suspensions, emulsions, and mud-water mixtures
- (3) separation of solids and liquids from crystals and precipitates
- (4) Separation of solid slag from animal and vegetable oils
- (5) Dehydration of raw materials or distiller's grains
- (6) Solid-liquid separation of various other substances

3. Features

- (1) It can operate continuously.
- (2) The particle size in the mud can be continuously and smoothly operated
- (3) The solid concentration and particle size during operation will not affect the operation if there is any change.
- (4) The mechanism is strong and the machine is small.
- (5) If the machine is overloaded during operation, there is an automatic stop device.
- (6) solid-liquid separation of oil sludge.
- (7) The squeezing machine is used for squeezing moisture out of fibers, films, waste vegetables and fruits, etc.

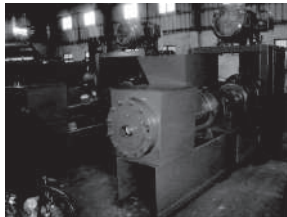
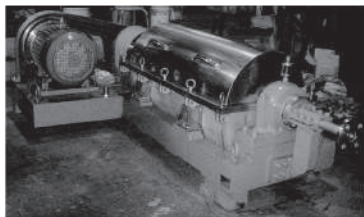
新國環境開發股份有限公司

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5. Specification and Functions

model	Internal size	capacity	power	length	width	high
	mm	m ³ / hr	kw	mm	mm	mm
SD-210	φ 210	1 ~ 2	2.2 ~ 3.7	1,500	1,000	750
SD-300	φ 300	3 ~ 5	7.5 ~ 11	1,950	1,150	800
SD-400	φ 400	7 ~ 10	18.5 ~ 22	2,260	1,401	1,018
SD-600	φ 600	15 ~ 20	22 ~ 30	3,200	1,770	1,150
Remarks: The dehydrator body can be sold separately						

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DEOILER

1. Structure and Principle

The metal is cooled and lubricated during the CNC machining process. Special cutting oil or cutting fluid is usually added to the cutting contact surface. Because of its adhesiveness, it will adhere to the surface of the metal slag and the surface of the product.

The main structure is a U-shaped continuous centrifugal design with a vertical rotation. The oil-containing metal particle solids are collected and transported by the conveyor, fed from the upper center, and dropped into the U-shaped high-speed rotating body. The particles are forced to be detached by the centrifugal force through the filter screen, and flow out from the side filter of the rotating body, and the deoiled metal solid particles are removed. It is discharged from the bottom of the centrifuge, so it can be continuously fed and discharged..

2. Purpose

Iron slag deoiling, copper slag deoiling, aluminum slag deoiling, plastic pellet dehydration, etc.

3. Features

- (1) Continuous operation.
 - A. Continuous feeding, automatic oil discharge, automatic chipping.
 - B. Save manpower
 - C. A deoiler can process multiple processing machinery to discharge metal scrap at the same time.
- (2) Special drive structure
Adopting the direct connection motor drive mode, the transmission mechanism is solid and small, saving space.
- (3) Cutting oil can be recycled and reused.
The oil removal rate is over 95%, reducing the cost.
- (4) Smooth operation, sturdy and durable.
Continuous feeding and discharging are different from batch feeding, so the rotating body does not have a small load.
- (5) Easy maintenance, easy to clean and wash.

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4. Specification and Functions

capacity Model	Steel ton / hr	Copper ton / hr	Aluminum ton / hr	Power hp	Revolu- tion RPM	A mm	B mm	C mm	D mm
FMU-600	0.9~1.6	1.2~2.0	0.6~1.2	10	1,100	1,15	1,530	1,530	1,623
FMU-500	0.4~0.8	0.7~1.3	0.3~0.6	7.5	1,500	980	1,300	1,235	1,460
FMU-400	0.3~0.5	0.5~0.9	0.1~0.4	5	1,750	880	1,032	1,150	1,328
FMU-300	0.2~0.4	0.3~0.6	0.08~0.3	3	2,000	750	960	1,000	1,328

5. Product Photo



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HEAT PUMP SLUDGE DRYER (INTEGRATED MODEL)

1. Structure and Principle

- (1) The integrated model sludge dryer is a batch dryer for small to medium sludge volumes.
- (2) The dryer consists of an upper drying unit and a lower drying cart/container. Its small footprint allows it to fit in a variety of factory layouts.
- (3) It operates based on the energy amplification of a heat pump, consuming three to four times less energy than a traditional electric heater for the same amount of heat produced. Dry, low temperature air (40~60 C) is cycled through the sludge, absorbing its moisture. The moist air gets cooled in the condenser, releasing water as condensate, and is reheated for the next cycle, with no exhaust air released into the environment. The moisture content and weight of the sludge is consequently reduced.

2. Purpose

Dewatered sludge at the end of the wastewater treatment process can be sent into the dryer for an additional reduction in weight of 40% or more. This not only decreases waste disposal fees by 40% or more, but also eases the increasing load on waste disposal facilities and reduces carbon emissions from the transport of waste.

3. Features

- (1) Modular design: A variety of customizable models are available based on sludge volume, factory layout, process flow, etc.
- (2) Heat pump drying system: energy-saving, efficient, and environmentally friendly.
- (3) Hermetic circulation system: no combustion or exhaust is required, eliminating the risk of flammable or explosive fumes and curtailing the release of odors.

二方企業股份有限公司 DILEMMA CO., LTD.

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- (4) Intelligent control system:
temperature control, timer
settings, error logs, process
monitoring, etc.
- (5) Anti-corrosion treatment:
corrosion protection techniques
allow our systems to handle a
variety of sludges.

4. Specifications and Functions

Capacity: 2,250 kg/day.
Weight Reduction: 1,125 kg/day.
Power Consumption: 22.3~27.2kw.
Energy Consumption per kg of
Water Evaporated: 0.45 kWh/kg.
Material: SUS304.
Dimensions: 300x212x270 cm.
Compressor Unit: Scroll
compressor, environmentally
friendly refrigerant.
Auxiliary Radiator: High efficiency
finned-tube heat exchanger.
(aluminum fins and copper tubes),
anti-corrosion tubing, anti-corrosion
resin coating, cooling fan.

Heat Exchangers: High efficiency
finned-tube heat exchanger
(aluminum fins and copper tubes),
anti-corrosion tubing, anti-corrosion
resin coating.

5. Representative performance

Nan Ya Plastics Corporation 2018.05.

6. Product Photo



二方企業股份有限公司 DILEMMA CO., LTD.

桃園市八德區廣福路 879 巷 192 弄 8 號

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HEAT PUMP SLUDGE DRYER (SPLIT MODEL)

1. Structure and Principle

- (1) 1.The split model sludge dryer consists of a drying unit and an independent drying chamber to accommodate sludge volumes from small to large. Its small footprint allows it to fit in a variety of factory layouts.
- (2) 2.It operates based on the energy amplification of a heat pump, consuming three to four times less energy than a traditional electric heater for the same amount of heat produced. Dry, low temperature air (40~60 ℃) is cycled through the sludge, absorbing its moisture. The moist air gets cooled in the condenser, releasing water as condensate, and is reheated for the next cycle, with no exhaust air released into the environment. The moisture content and weight of the sludge is consequently reduced.

2. Purpose

Dewatered sludge at the end of the wastewater treatment process can be sent into the dryer for an additional reduction in weight of 40% or more. This not only decreases waste disposal fees by 40% or more, but also eases the increasing load on waste disposal facilities and reduces carbon emissions from the transport of waste.

3. Features

- (1) Modular design: A variety of customizable models are available based on sludge volume, factory layout, process flow, etc.
- (2) Heat pump drying system: energy-saving, efficient, and environmentally friendly.
- (3) Hermetic circulation system: no combustion or exhaust is required, eliminating the risk of flammable or explosive fumes and curtailing the release of odors.

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- (4) Intelligent control system:
temperature control, timer
settings, error logs, process
monitoring, etc.
- (5) Anti-corrosion treatment:
corrosion protection techniques
allow our systems to handle a
variety of sludges.

4. Specifications and Functions

- (1) Capacity: 4,500 kg/day
- (2) Weight Reduction: 2,160
kg/day
- (3) Power Consumption: 45 kw
- (4) Energy Consumption per kg of
Water Evaporated: 0.45 kWh/kg
- (5) Material: SUS304.
- (6) Compressor Unit: Scroll
compressor, environmentally
friendly refrigerant.
- (7) Auxiliary Radiator: High
efficiency finned-tube heat
exchanger (aluminum fins and
copper tubes), anti-corrosion
tubing, anti-corrosion resin
coating, cooling fan.
- (8) Heat Exchangers: High
efficiency finned-tube heat
exchanger (aluminum fins and
copper tubes), anti-corrosion
tubing, anti-corrosion resin
coating..

5. Representative Performance

Eclat Textile Co., Ltd. 2016.03.

6. Product Photo



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HEAT PUMP SLUDGE DRYER (CONTINUOUS MODEL)

1. Structure and Principle

- (1) The continuous model sludge dryer continuously takes in wet sludge and produces dry sludge using internal and external bulk conveyors. The automated design saves manpower and can manage large-scale sludge volumes.
- (2) It operates based on the energy amplification of a heat pump, consuming three to four times less energy than a traditional electric heater for the same amount of heat produced. Dry, low temperature air (40~60 °C) is cycled through the sludge, absorbing its moisture. The moist air gets cooled in the condenser, releasing water as condensate, and is reheated for the next cycle, with no exhaust air released into the environment. The moisture content and weight of the sludge is consequently reduced.

2. Purpose

Dewatered sludge at the end of the wastewater treatment process can be sent into the dryer for an additional reduction in weight of 40% or more. This not only decreases waste disposal fees by 40% or more, but also eases the increasing load on waste disposal facilities and reduces carbon emissions from the transport of waste.

3. Features

- (1) Modular design: A variety of customizable models are available based on sludge volume, factory layout, process flow, etc.
- (2) Heat pump drying system: energy-saving, efficient, and environmentally friendly.
- (3) Hermetic circulation system: no combustion or exhaust is required, eliminating the risk of flammable or explosive fumes and curtailing the release of odors.

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- (4) Automated drying process:
sludge can be dried 24 hours a day with automated feed-in and discharge, saving manpower and time.
- (5) Intelligent control system:
temperature control, timer settings, error logs, process monitoring, etc.
- (6) Anti-corrosion treatment:
corrosion protection techniques allow our systems to handle a variety of sludges.

4. Specifications and Functions

- (1) Capacity: 7,000 kg/day.
- (2) Weight Reduction:
3,600kg/day.
- (3) Power Consumption: 225 kw.
- (4) Heating Capacity: 366 kw.
- (5) Energy Consumption per kg of
Water Evaporated: 0.5 kWh/kg.
- (6) Material: SUS304.
- (7) Dimensions: 1,280x230x245
cm.
- (8) Compressor Unit: Scroll
compressor, environmentally
friendly refrigerant.

- (1) Auxiliary Radiator: High
efficiency finned-tube heat
exchanger (aluminum fins and
copper tubes), anti-corrosion
tubing, anti-corrosion resin
coating, cooling fan.
- (2) Heat Exchangers: High
efficiency finned-tube heat
exchanger (aluminum fins and
copper tubes), anti-corrosion
tubing, anti-corrosion resin
coating.

5. Representative Performance

Sewage treatment plant of Tucheng
industrial area 2020.01.

6. Product Photo



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SLUDGE PLASTIC DRYING BED

1. Structure and Principle

- (1) The facility includes
- (2) Drying bed are assembled with Filters,
- (3) RC base with drainage,
- (4) sludge conditioning equipment and pipings.
- (5) Design and construction depend on the volume of sludge and space of field. A special design for equipment of pour and transport cake if necessary.
- (6) Sludge→Conditioning→Dumping into the drying bed→Naturally drying 7 – 30 days (depend on water content of cake we need) → Cake disposal. °

2. Purpose

Sludge drying for water and wastewater treatment plants , especially suitable for small and medium volume of sludge.

3. Features

- (1) Simple structure, invincible material, easy to construct, operate and maintain.
- (2) It might use no land by constructing the drying bed above the basin with RC.
- (3) Low investment cost , less 20 – 50 % than mechanical drying machines.

- (4) High solid content of cake that might save cost of waste disposal.
- (5) Totally avoid of defects which sand drying bed would form obstruction and sandy-cake.

4. Specifications and Functions

- (1) The dimension of a filter unit is 304.8 mm × 304.8 mm × 50.8 mm.
- (2) Each filter has several tenons that make it easy to assemble. HDPE reinforced material with treating by UV on surface for anti-aging.
- (3) Hardness is above 63 (D Scale , Shore Durometer) and its compressive strength is over 4,500 kgf.

5. Product Photo



山亞環境科技股份有限公司

SHAN YA ENVIRONMENTAL TECHNOLOGY CO., LTD.

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HIGH-EFFICIENCY AND ENERGY- SAVING SLUDGE DRYING REDUCTION EQUIPMENT

1. Structure and principle

The main components of the dryer are compressor, condenser, expansion valve, evaporator, auxiliary condenser and drying box. The expansion valve sends the refrigerant to the evaporator. The refrigerant absorbs heat and vaporizes. The gaseous refrigerant is compressed into a high-pressure liquid by the compressor and enters the condensation. The refrigerant returns to the accumulator and evaporates through the expansion valve to complete the refrigeration cycle. The high-humidity gas extracted from the drying chamber is condensed and dehumidified by the evaporator to become dry and cold air. The dry and cold air is heated by the condenser into high-temperature and low-humidity air. The high-temperature and low-humidity air enters the drying chamber to bring out the moisture of the material to complete the drying cycle.

2. Purpose

- (1) Factory wastewater treatment inorganic sludge and biological sludge drying.
- (2) Drying reduction of industrial organic and inorganic waste.
- (3) Biological sludge drying in the primary sedimentation tank and secondary sedimentation tank of municipal sewage treatment plants.
- (4) The sand-containing sludge is dried in the primary sedimentation tank of urban domestic sewage.
- (5) The solidification of food and drug products is convenient for packaging and transportation.
- (6) Dry powder processing of agricultural products and medicinal materials improves product quality.

3. Features

- (1) Low temperature dehumidification and drying, low energy consumption, no change in physical properties, stable quality, high drying

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reduction and volume reduction, odorless waste gas and dust generation, and pollution-free wastewater generation.

- (2) The best drying reduction system for organic sludge and inorganic sludge.
- (3) The equipment has compact structure, small floor space, simple operation, convenient maintenance and stable operation.
- (4) Have the ability to meet large-scale production, high efficiency, energy saving, and continuous production.

4. Specification and Functions

High-efficiency and energy-saving device, energy consumption per kilogram of weight removal is only 0.4kwh, low temperature drying under normal pressure (45°~70°C), the weight of dried sludge is reduced by 75%, the volume is reduced by 60%, the drying medium is closed and circulating, and there is no waste gas. And waste heat pollution.

5. Representative Performance

- (1) Murata Group-Taiwan/China Systems
- (2) Dajia Youth Industrial Park WWTP 2019.
- (3) Epistar Corporation 2020.

6. Product photo



7. Award (Certification) Project

- (1) ISO 9001:2015 Quality System Certificate.
- (2) Patent Certificate No. : Taiwan M585786.

元鋈工業股份有限公司

YUAN CHANG TSAY INDUSTRY CO., LTD.

台中市梧棲區向上路九段 382 巷 106 號

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PLATE TYPE CONTINUOUS DRYER

1. Structure and Principle

Plate-type continuous dryer is to continuously send sludge cakes into feeding opening under constant feeding rate; cake is cutted to tiny grains and dropped to porous plate surface under continuous operation; machine will use auto poker to uniformly distribute the sludge grains; each plate is closely connecting to other plates to form conveyor shapeto run, normally designed to 4~8 loops lining up by different layers. Then, hot airflow (or dry airflow at normal temperature) generated by varied energy source is introduced into the dryer; sludge grains will be directly blown by hot airflow (or dry airflow at normal temperature) in the forward and backward stroke steadily to dry out moisture inside them. Vapor product is circulatesly introduced to regirating compressor to dehydrate, or to stake by inducing fan. Under the slight negative pressure operation, odor won't dissipate out; normally the exhaust can meet emission standard. Or we can follow the physical property of drying treatment process to equip simple air polution protection facility, such as bag precipitator or waterwash scrubber, and able to meet environmental code.

The dried sludge normally is in the shape of dried grains or powder, being sent to collection bag or hopper to make temporary storage by screw conveyor. To prevent powder dissipation, it should seal the bag opening onto screw conveyor outlet. If designed to store dried sludge grains or powders by temporary storage hopper, it should apply small dust collector or precipitator instead.

2. Purpose

- (1) Dry wastewater sludge.
- (2) Dry farming products.
- (3) Dry chemical process.
- (4) Maintain.

3. Feature

- (1) Consecutively send in/out sludge; can automatically operate, easy to manage and
- (2) Sludge conveying plate is by single-ring, two-layer drying design; both upper/lower layer of conveying plate can load sludge and receive hot airflow (or dry airflow at normal temperature), better drying efficiency can derive rather than the ordinary conveying belt type dryer using single drying layer.

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TEL : +886-2-2518-3499 FAX : +886-2-2518-4336
E-mail : sales@dewater.com.tw http://www.dewater.com.tw

- (3) Hot airflow (or dry airflow at normal temperature) directly blows to sludge cake, the heat transfer efficiency is higher than indirect dry, energy effectiveness is better.
- (4) Module hot wind generator can operate by coordinating to various energy form including steam, electric heat or boiler oil, etc.
- (5) Slight negative pressure operation; no odor dissipation; only require wet-type scrubbing tower or bag precipitator to treat exhaust in order to meet pollution protection code standard.
- (6) Follow requirement to meet various dehydrating rate; the low limit is 20 %.
- (7) Available treating capacity: 6 ~ 25 tons / day °

4. Product Photo



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VACUUM DRYING FILTER PRESS

1. Structure and Principle

- (1) The vacuum drying filter press operates as a standard press , compressing The cake material with the feed pump , There will always be moisture remaining in the small void spaces between the solid cake particles °
- (2) Membrane plate squeeze: compressed air or steam cause expansion of the membrane plates , further reducing cake volume and moisture content, Free water Is removed through this standard membrane filter operation.
- (3) The drying process begins after the membrane squeeze and slurry inlet closed. While the filter cakes are still close in the press , a vacuum is pulled on the liquid drain lines.
- (4) Heat is transferred to the cake from steam or hot water circulating through the core of membrane plate. The vacuum allows the moisture in the cake to vaporize at a reduced temperature.

- (5) As the cake dries and loses volume , the membrane plate construction allows the diaphragm to expand and maintain heat transfer throughout the drying cycle.

2. Purpose

Dehydrate and direct dry up the organic/inorganic sludge.

3. Features

- (1) Solidified ratio of filtered sludge can reach 99%; moisture content is lower than 1%.
- (2) Associate the press, filtering and dehydrating process together in one shift rather than separated into several sections that would waste space and transporting manpower.
- (3) No the odor or secondary air pollution made in ordinary dryer's operating process; no need to apply for emission permit.
- (4) Extremely low moisture content makes cake easy to apart; filter cloth cleaning or maintaining cost is reduced.

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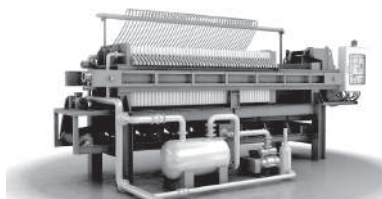
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- (5) Low power consumption; able to apply the low-pressure steam exhaust from factory in the process and largely save energy cost.
- (6) No need to clean filter cloth: after dry, cake's moisture content is largely reduced, the viscosity coefficient is low and cake separates from filter cloth neatly.
- (7) Leading technology and mature experience can delicately combine the heat transfer and vacuum skills to rapidly evaporate and remove moisture.

4. Product Photo



5. Award (Certification) Project

- (1) Taiwan Environmental Manufacturers Association certified the product for environmental protection quality standard in 1999.
- (2) Industrial Development Bureau of MOEA certified the product for environmental protection quality standard in 2003.

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SLUDGE ADVANCED CONDITIONING AND HIGH PRESSURE DEWATERING SYSTEM

1. Structure and Principle

A cost-effective dewatering system for sludge is developed with a packaged in-depth dosing reactor and a high pressure membrane type filter press, which comprise (1) a smart diagnosis module, including sludge parameter sensing/controlling units, which detect several key parameters of sludge and control doping of reagent; (2) a microcontroller-PLC unit, processing above-mentioned detected parameter signals collected through sensors, then sending out instructions after analyzing those signals upon proprietary algorithm to control doping of reagents; (3) a reagent addition unit, receiving the above-mentioned doping control signals to add in reagents accordingly. (4) a high pressure membrane type filter press, maintaining feed pressure as high as 15kg/cm^2 and durable membrane for pressure filtration that results in reduced water content of sludge from 80~98% down to 40~60%.

Principle: This chemical conditioning method is to mix reagents and sludge through sol-gel synthesis, in which organic complexes are added to form metallic organic complex, then cell walls are preliminarily broken by controlling pH and reaction temperature, etc. Organics thus released are hydrated and oligomerized with those metallic-organic complexes through sol-gel process to form a more densified but better oxidizable nano-ceramic like microstructure. Upon high-performance mixing and

conditioning, loosely flocs suspension within sludge can be broken and riddled, as adjustment of static potential and pH reconstruct granules via precipitation and complexing to form self-assembled microstructures. Upon adding cell lysing reagent and further sol-gel processing to excrete water out of cells, more densely spatial microstructures are thus formed. Those excreted and interstitial water are discharged through homogeneously constructed microchannels upon consequential press filtration.

Fed into the high pressure membrane type filter press, microstructures and slurry phase of sludge is well reduced thus improving dewatering performance of the consequential press filtration to reduce water content of sludge from 80~98% down to 40~60%. The output volume or mass of final sludge cake can be therefore reduce no less than 50% as the filtered sludge cake still contains dry-base heat value of 2000~3500 kCal/kg, of which can be further utilized as resource regeneration such as environmental construction materials or substitute fuels.

2. Purpose

- (1) Especially useful for conditioning and dewatering of sludge containing massive organics and micro-biologics
- (2) Dewatering and conditioning of municipal sewage sludge.

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E-mail : sales@dewater.com.tw http://www.dewater.com.tw

- (3) Dewatering and conditioning of residual biologic sludge out of variety of industrial sewage
- (4) Further reduction of sludge volume prior to disposal, reclamation or landfills.

3. Features

- (1) Enhancement of cell-wall breaking treatment.
- (2) Continuous sludge treatment in automation with ease to manage and maintain.
- (3) Automated operation to pre-diagnose variety of sludge and accordingly deploy different reagent addition sequences, timing and dosages via built-in microcontroller algorithm.
- (4) Massively reducing usages of expensive flocculent yet to obtain better flocculation outcome of conditioned sludge.
- (5) No significant increase on absolute dry sludge in tot.

- (6) Automated high pressure membrane-type filter press resulting to increased sludge cake production at lower water content, as well as reducing batch operating times of filtration and pressing.
- (7) Sludge cake upon in-depth dosing and high pressure filter pressing subjective to drying by natural ventilation or variety of dryers due to better volatility
- (8) In-depth dosing module of this system is authorized by Greenway Environment Technology Corp. to assemble and distribute in Taiwan, of which the proprietary technology has been successfully demonstrated and commercialized in Asia.

4. Specifications and Functions

Sludge on dry basis (kg / d-24h)		2000	4000	6000	9000	15000
In-depth dosing mixer	type	CMDS-A-05	CMDS-A-10	CMDS-A-15	CMDS-A-25	CMDS-A-40
	dimension, mm,L*W*H	1,600 × 2,250 × 2,300	2,000 × 2,250 × 2,300	2,200 × 2,250 × 2,300	3,000 × 2,250 × 2,300	4,600 × 2,250 × 2,300
	power rating, kw	9	11	19	26.4	36
High pressure membrane type filter press	type	CK - FP100 - 35 APP	CK - FP 100 - 71 APP	CK - FP 125 - 65 APP	CK - FP 125 - 91 APP	CK - FP 125 - 81 APP*2 台
	filtration area, m ²	53	109	153.6	216	384
	chamber volume, L	750	1,545	2,624	3,690	6, 560
	dimension, mm,L*W*H	5,720 × 1,500 × 2,280	8,220 × 1,500 × 2,280	8,620 × 1,790 × 2,780	10,630 × 1,790 × 2,780	9,860 × 1,790 × 2,780 × 2 台
	power rating,kw	8.6	9.3	11.2	12.7	22.5

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DEHUMIDIFICATION SLUDGE DRYER

1. Structure and Principle

(1) There are batch type and continuous type. Batch type is suitable below 1.5 ton/batch, operating time is 10~11 hours /batch. The operation is automatic for wet sludge inputting and dry cake discharging. Continuous types are 6-10 layers of perforated plates operating continuously in the drying oven. The plates carry sludge of the same thickness, over which dry, hot air is circulated. Circulating this air causes the water content of the sludge to evaporate. The resultant high-humidity air is then cooled with the refrigerant, allowing its water content to be removed. This achieves the goal of drying sludge at lower temperatures than conventional dryers.

(2) Principle

- A. The DHD Dryer operates by forcing phase changes of water. First, the liquid water in the sludge comes in contact with dry air. The difference in water concentration causes water to transfer from the sludge to the dry air, which then becomes wet air. Cooling down the wet air causes the water molecules to condense into liquid water which is then separated from the air. The wet air is thus dry again and is recirculated to further dry the sludge.
- B. The refrigerant is easily compressed or vaporized, and has a high latent heat. Thus, the DHD Dryer uses vapor-compression refrigeration to remove water from this wet air, as illustrated in the diagram at right. Once the air has been dried, it is then reused to continue the sludge DHD process. Excess heat from the refrigerant is also recycled in the system to heat the dry air.

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3. Purpose

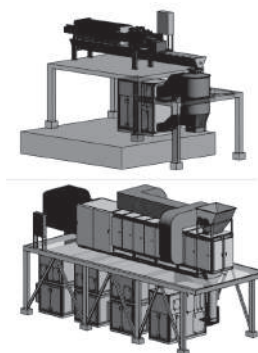
- (1) Drying for organic sludge.
- (2) Drying for inorganic sludge.

4. Features

- (1) Lower temperature operation: There is no risk of starting a fire. Noxious odors are also minimized because the metabolic activity of microorganisms in the sludge is inhibited at this temperature.
- (2) Closed-loop system: There is no need for exhaust ventilation, which limits volatile organic compounds (VOC) and noxious odors.
- (3) Fully automatic continuous operation: Reduces labor costs.
- (4) Patented high efficiency plate conveyor: This conveyor design is able to carry sludge on both the outgoing and return directions each loop, which reduces the filling height of sludge and allows it to dry evenly. This also increases the drying rate of the sludge by increasing available surface area for evaporation.

- (5) Easily scalable: The number of dehumidifiers can be easily changed, allowing fine control of the sludge's water content as desired.
- (6) Energy efficient: The DHD Dryer uses a high efficiency heat pump, so average power consumption for drying is only 0.4-0.7 kwh per kg of H₂O removed
- (7) High-quality industrial design: Anti-corrosion components provide a long lifetime for internal mechanisms and are also easy to maintain. The DHD Dryer is also very clean and will not dirty its surroundings.

5. Product Photo



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E-mail : sales@dewater.com.tw <http://www.dewater.com.tw>

AVACUUM DRYER FILTER PRESS

1. Structure and Principle

Sludge Dryer :

Sludge is pushed into filter centre via the high-pressure pump to filter and compress, squeezing out about 60~70% water content at this stage. Then, the pump compresses again through the air film (this process is same as conventional filter); heat is introduced for indirect heating to the sludge in the vacuum state until dry (water content under 35%); after the treatment, sludge cake can be removed from the filter neatly without sticking. The course of process for each batch takes 6~8 hours.

2. Purpose

Sludge drying for semiconductor, electroplating, dye manufacturing or other chemical sludge drying; sludge treatment for water purification plant, reservoir silt treatment, building sludge, tunnel engineering debris, manufacturing raw material hydrating and drying, food industry and steel mills, metal surface treatment industry, electronics, PCB, active sludge and bio-sludge, etc.

3. Features

- (1) Dehydrating + Vacuum + Drying Three – in – One.
- (2) Water Content from 99% to 30% below with one machine.
- (3) Recycled steam with 2 ~ 3 kg / cm² is available.
- (4) Efficiently saving running cost.
- (5) No Air pollution.
- (6) Patent Certificated in China & Taiwan.

4. Product Photo



5. Specifications and Functions

Model	Unit	PAH-15	PAH-20	PAH-30	PAH-40	PAH-50	PAH-60	PAH-70	PAH-80
Plate No. of filter	Plate	15	20	30	40	50	60	70	80
Area of filter	(m ²)	36.3	48.4	72.6	96.8	121	145.2	169.4	217.8
Capacity	(L/cycle)	450	600	900	1,200	1,500	1,800	2,100	2,400

台灣卜力斯股份有限公司 TAIWAN PASSAL CO., LTD.

桃園市蘆竹區富國路二段 533 號之 3 No.533-3, Fu Kuo Rd., Sec2, Lu Chu Hsing Taoyuan, Taiwan

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V-SHAPED DRYER

1. Structure and Principle

- (1) After the object is placed in the drying chamber, it is completely sealed. The vacuum pump is strongly attracted to the rear of the process. After the volatile gas passes through the filter, it is cooled by the heat exchanger and discharged into condensed water. The remaining small amount of gas can be directly discharged or reprocessed.
- (2) It is a vacuum dryer that reduces the evaporation temperature of water and improves drying efficiency.
- (3) It is a V-shaped agitating dryer. The main body is provided with a jacket, which can inject auxiliary heat source such as hot water or steam or low-temperature cooling water.
- (4) It is a conical spiral dryer. It has a rotating spiral and a revolving arm inside to drive and close to the inner surface for continuous rotary motion. The screw machine makes the objects from bottom to top and stirs each other to produce a uniform mixing effect, and the water is easy to evaporate.

2. Purpose

- (1) It is a sludge dryer and can process water up to 10% or less.
- (2) It is a homogeneous mixer of raw materials, with the functions of drying, dehumidification and cooling.
- (3) The sludge, bean dregs, tea residues, peeling residues, and Chinese medicine residues from food factories are dried and reused.

3. Features

- (1) It is treated by a vacuum sealed dryer, and the outside air cannot enter, so the exhaust gas is discharged less.
- (2) Treated by vacuum sealing, taste and dust will not leak.
- (3) Batch operation mode, saving manpower.
- (4) Discharge once after drying.
- (5) Dry matter has high moisture content and can be operated
- (6) Special transmission structure, so it is durable.
- (7) Maintenance and cleaning is easy.
- (8) Dryness can be adjusted.

新國環境開發股份有限公司

NEW FACE ENVIRONMENTAL DEVELOPMENT CO.,LTD.

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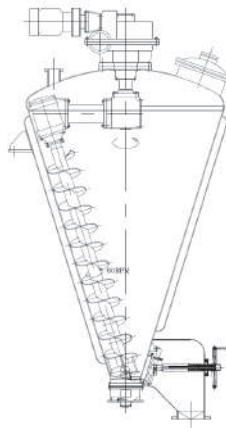
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E-mail : newface@ms19.hinet.net http : //www.nface.com.tw

4. Specifications and Functions

Model	Capacity	Power	Body Size (mm)	
	Lit/Batch	HP	Diameter	Height
NVD-07	700	2+ 5.0	1,362	3,583
NVD-10	1,000	2+ 5.0	1,650	4,485
NVD-15	1,500	2+ 7.5	1,800	4,970
NVD-20	2,000	3+ 7.5	1,930	5,735
NVD-40	4,000	3+ 7.5	2,255	6,200
NVD-50	5,000	5+ 10.0	2,369	6,363
NVD-60	6,000	5+ 10.0	2,416	7,048
NVD-70	7,000	5+ 15.0	2,889	7,740
Remarks: dryer body can be sold separately				

5. Product Photo



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ROLLING DRYER

1. Structure and Principle

- (1) It is a steam-heated dryer that uses steam as a heat source to inject into the metal roller of the dryer and conducts heat quickly to the surface of the roller
- (2) It is a roller dryer(or drum dryer) that feeds the object continuously into the upper part of the roller for preheating, and after being rolled by two rollers, the attached surface is heated and dried.
- (3) After a few seconds, it is dried and turned into a powder or flake shape. The scraper on both sides of the roller will scrape it off and continue to be discharged by the conveyor. '
- (4) Evaporate the water and then enter the scrubber for treatment before discharging

2. Purpose

The use of various substances to reduce moisture, reduce weight, reduce capacity, recycle, and process.

- (1) Drying and reduction of various types of wastewater sludge.
- (2) Concentration treatment of sodium salt solution.
- (3) Drying and solidification of sodium salt solution.
- (4) Distillation of waste solvent..
- (5) Solidification of waste solvent concentrate.

- (6) Drying of feed and distiller's grains.
- (7) Drying of viscous liquids, high-concentration wastewater, mud and suspension.
- (8) The drying of other substances has a wide range of uses

3. Features

- (1) Treated by low temperature physical method, stable quality.
- (2) Drying can be completed in a short time, the moisture content can be as low as 5%.
- (3) Continuous operation.
- (4) It can be used for objects with high water content and high viscosity.
- (5) The heat exchange efficiency is very high, about 70 ~ 90%, which can save operating cost.
- (6) The roller mash embodiment, the machine durable.
- (7) The object is pressed into a thin sheet by means of a roller, and the machine is durable.
- (8) Dryness can be adjusted.
- (9) Large processing capacity, complete model.

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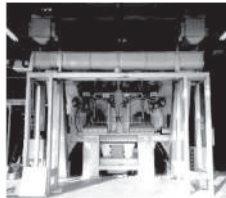
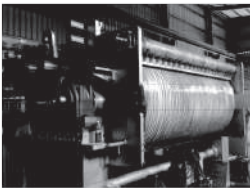
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4. Specifications and Functions

model	Capacity (kg/hr)	Body size (mm)		
		L	W	H
RD-400	400	4,700	3,600	2,800
RD-600	600	5,500	4,300	3,200
RD-800	800	6,500	4,700	3,700
RD-1000	1,000	7,000	5,000	4,500
Remarks: The dryer body can be sold separately.				

5. Product Photo



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