



**Make  
fishmeal  
industry no  
pollution**

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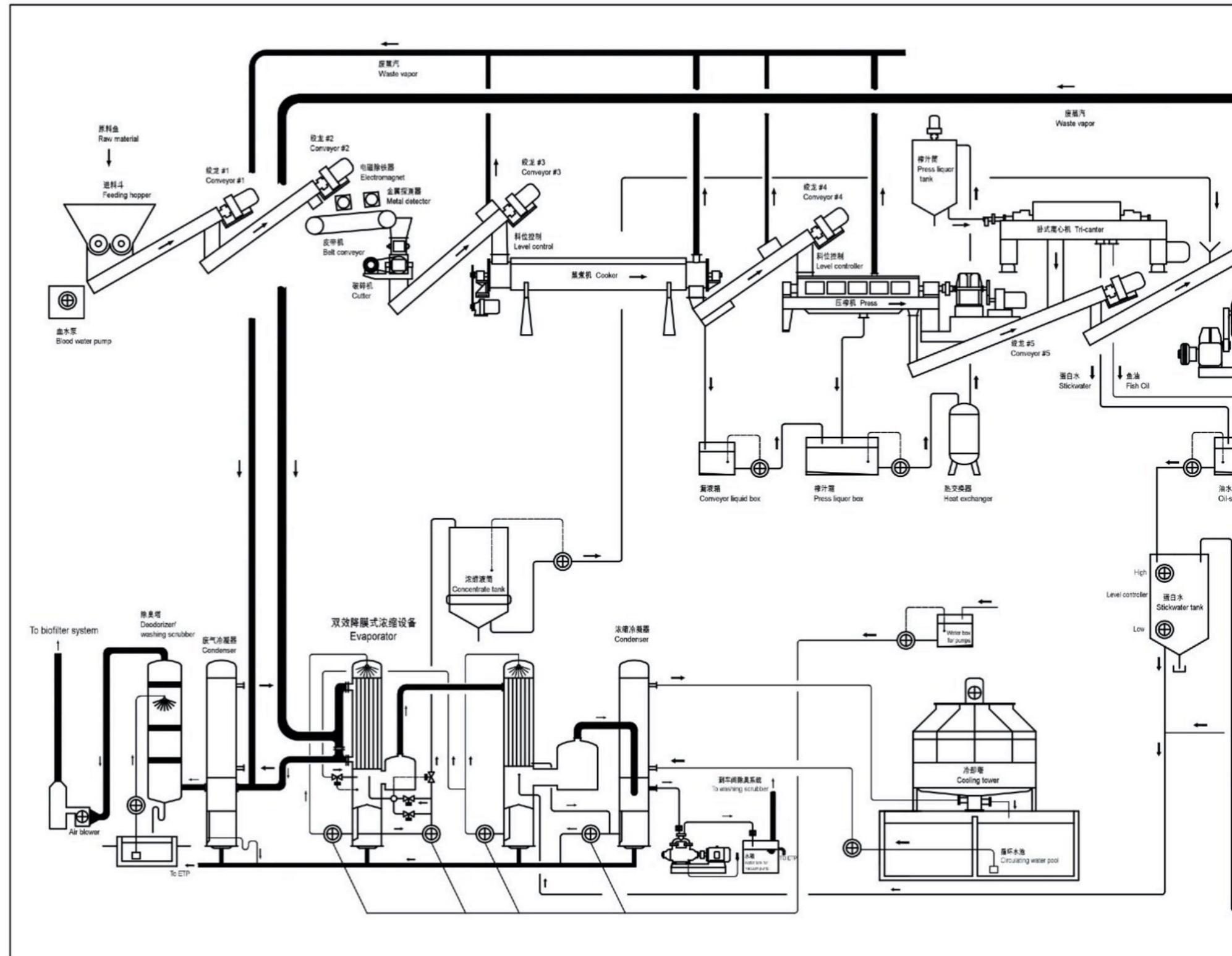
Fishmeal Plant Manufacturer

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**Jiangsu Feeds  
Machinery Co.,Ltd.**

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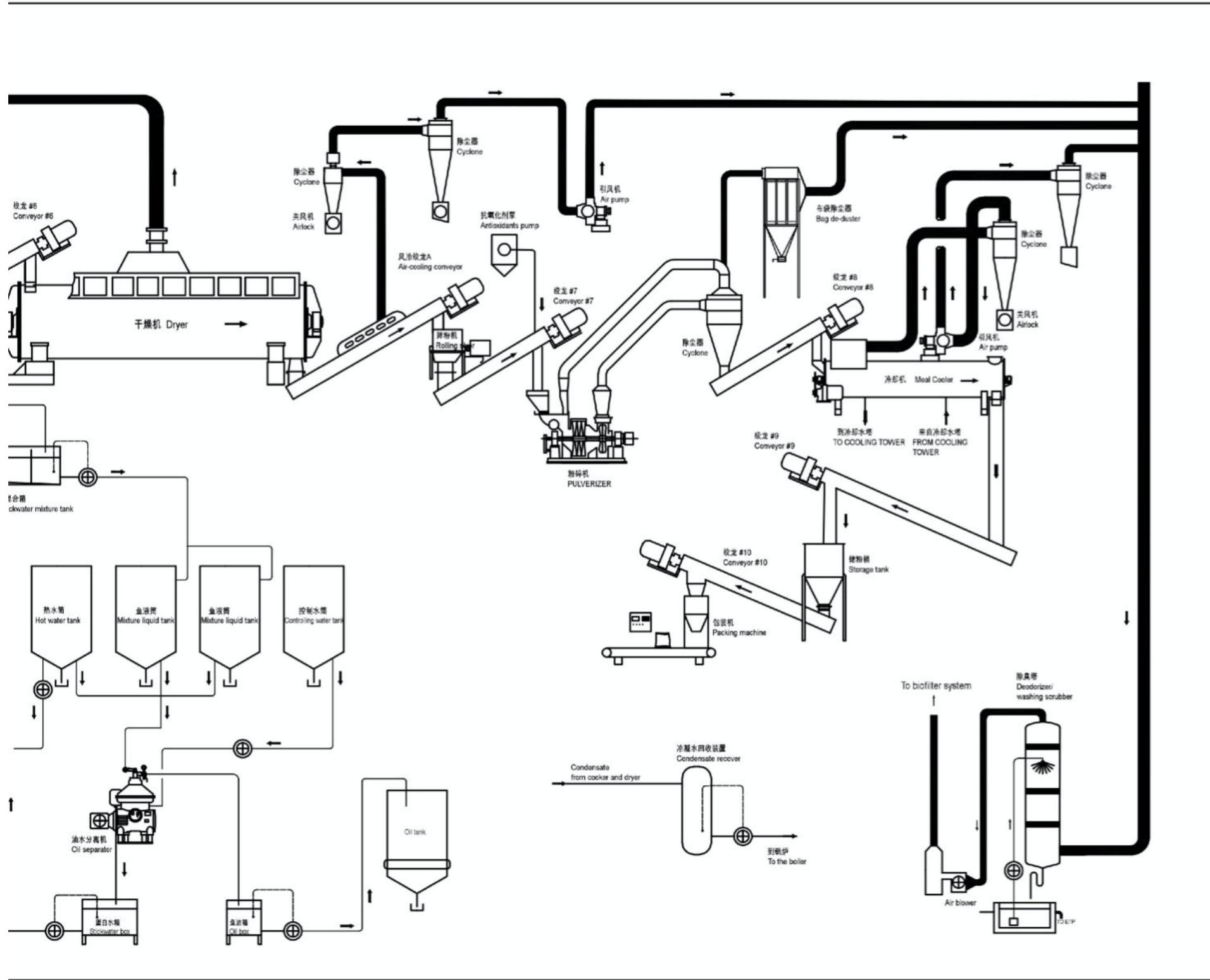
# 鱼粉生产 PROCESSING FLOW DIA



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# 线工艺流程图

## GRAM OF THE FISHMEAL PLANT





## Who we are

Jiangsu Feeds Machinery Co.,Ltd, locating in Yixing City, Jiangsu Province of China, is a specialized manufacturer for complete line of fish meal and fish oil production line. Probably we are the only manufacturer who can make fishmeal production totally pollution-free. We supply complete line of fishmeal plant, ETP for wastewater treatment and bio-filter for odorous emission abatement.

## What we do

- Complete line of fishmeal and oil plant according to different raw material designing and manufacturing.
- Wastewater treatment plant for fishmeal industry designing and manufacturing.
- Malodorous emission abatement plant for fishmeal plant industry designing and manufacturing.
- Fishmeal plant installation, commissioning, training and maintenance service if required.





## Fishmeal plant

Fishmeal plant consists of fish meal processing system, fish oil processing system, stickwater recovery system, ETP and smell control system.

Jiangsu Feeds Machinery Co., Ltd. supplies complete fishmeal plant with capacity ranging from 30MT to 300MT per 24 hours, including wastewater treatment and smell control equipments.



*Nowadays Sardine becomes the main raw material for fishmeal and fish oil*

The raw material resources for fishmeal plant is wide. It can be the whole fish like sardine, anchovy, mackerel, or by-product from canning and other fish processing industry, or by-products from shrimp peeling industry and poultry meat processing industry. Processing starts in an underground double-screw feeding hopper. By conveyors, raw material passes through an electromagnet to ensure any ferric extraneous matters to be removed. If raw material is big like whole fish, a cutter is recommended.

Cooking is a key process of the utmost importance for the fishmeal plant. The purpose of cooking is to liberate the oil from the raw material, and to condition the material for the subsequent treatment in the various processing units of the plant. In many conditions, the reason of high fat content in the final product may root in the un-properly cooking. Jiangsu Feeds Machinery Co., Ltd. supplies indirect steam cooker which is heating by jacket and rotor, with speed adjustable by VFD for different material in different conditions.

After cooking the material goes to the press. The purpose of the pressing is to squeeze out as much liquid as possible from the fish solids. This is very important not only to improve the oil yield and the quality of the meal, but also to reduce the moisture as far as possible, thereby reducing the fuel consumption of the dryers and increasing their capacity. Jiangsu Feeds Machinery Co., Ltd. supplies twin-screw press with speed adjustable. Our press is a very efficient dewatering device, yielding presscakes with moisture content 50% below.

After pressing, there are press liquor(around 45%) and presscake(around 55%). The press liquor consists of water, fish oil and other dry matter in suspended and dissolved forms. It is important to recover dry matter and oil from the press liquor. The suspended solids or sludge is firstly removed in a decanter, and then the fish oil is recovered by an oil separator. An important prerequisite for efficient separation is to set temperature. Our experienced engineer will guide the operator to set the proper temperature for the press liquor before entering the centrifuges.

When decanters and oil separators removed the major part of oil and suspended solids from the press liquor, the remaining is stickwater. It's about 35% of the raw material. Besides water, the stickwater will contain protein in dissolved and undissolved forms, residual oil, minerals and vitamins. The content of residual oil should be as low as possible, certainly below 1%. The other components, usually put together and called stickwater dry matter, amount to 5-6% for fresh fish, and correspond to nearly 10% of the yield of meal. If one discharges all the sickwater not only causes huge pollution but also loses fishmeal.

To recover stickwater solids, we have to remove large quantities of watery by evaporation and subsequent drying. This



*Laboratory centrifuge is applied to check the separation efficiency in decanter and oil separator*

requires large quantities of heat. Double-effect falling film evaporator supplied by us will be the best solution for this. The evaporator uses the vapors in the exhaust gases from the dryer as the heat resource. The evaporator is working under vacuum condition and the stickwater starts to evaporate in 50°C or below. Stickwater concentrate or fish solubles from evaporator can be sold separately or be added to dryer to make fish meal.





*Double disc dryer is widely used in the fishmeal industry nowadays*

Drying process is to convert the wet and unstable mixture of presscake, decanter sludge and stickwater concentrate into a dry and stable fish meal. Usually the moisture content in fish meal shall be 10% below. The temperature of drying should not exceed 90°C in order not to impair nutritional value. Dryer is the key unit in the fishmeal plant. We supply indirect rotary double-disc dryer. The double disc dryer is the most advanced drying machine in fishmeal industry. Advantages

including high heat transfer efficiency and long service time. Capacity of single dryer available is ranging from 50Ton to 200Ton per 24 hours.

Fish meal after drying needs to be cooled, sieved, milled and again cooled before packing. Before milling, the fish meal should pass a rolling sieve to remove extraneous matter like pieces of wood, cloth or fish bones

which are not acceptable. Different mesh sizes of sieve will be provided by us to meet different requirements.

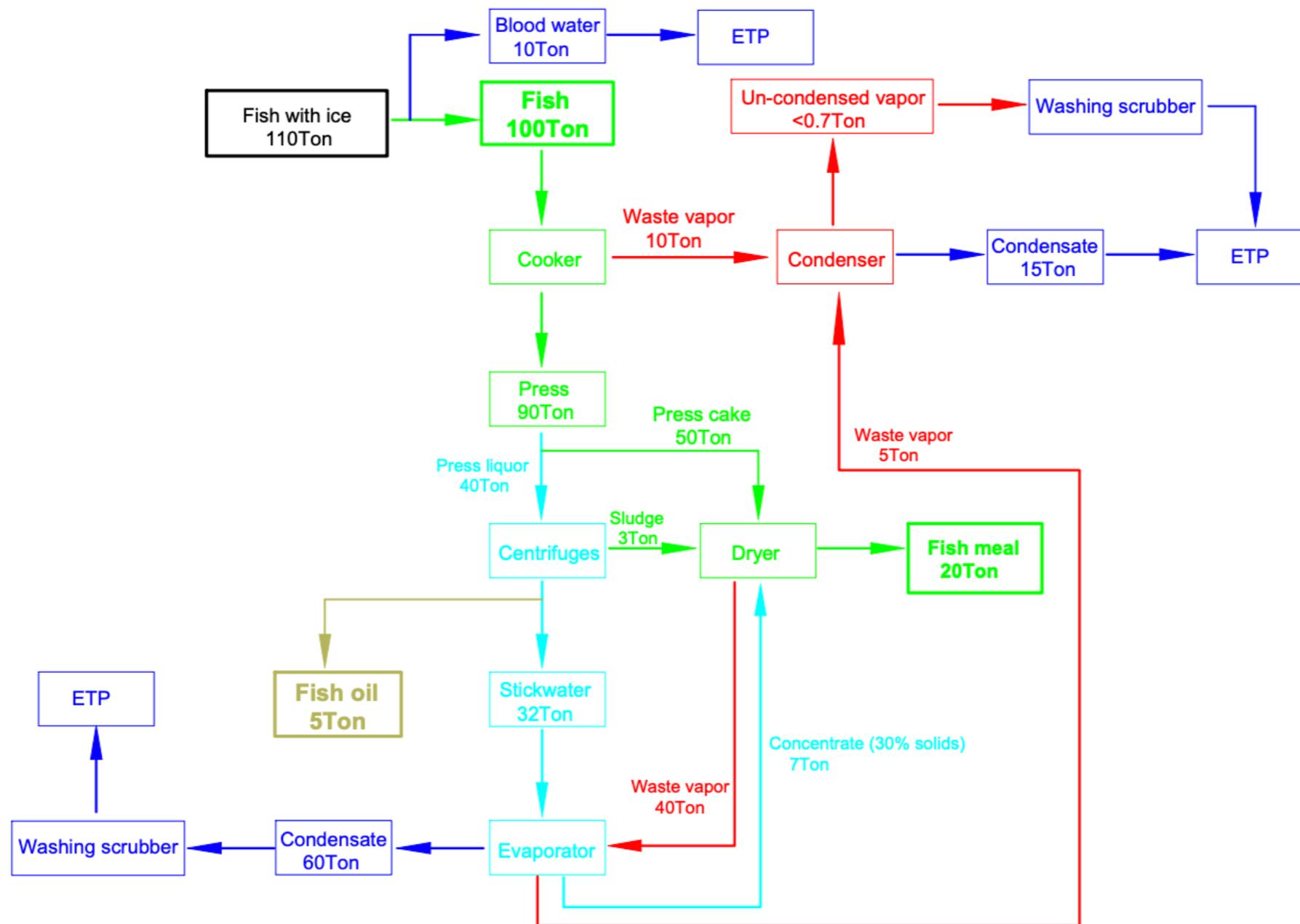
Weighting and packing will be done in an automatic packing machine.

Above is the complete processing of fish meal and fish oil production. In our fishmeal plant, many critical point, like level of the liquid, temperature, or electrical current is detected and controlled by PLC to avoid production errors and reduce the labor cost.



*Fishmeal after drying before milling*

# Mass Balance in Fishmeal plant



# Fishmeal Plant Series

NO.	Content	FISHMEAL PLANT MODEL NUMBER					
	Parameters	FM-30	FM-50	FM-100	FM-150	FM-200	FM-300
1	Processing capacity	30MT/24h	50MT/24h	100MT/24h	150MT/24h	200MT/24h	300MT/24h
2	Fishmeal Yield	10%-25% of capacity according to raw material					
3	Fish oil yield	2%-20% of capacity according to raw material					
4	Power required (kW)	150	200	280	350	450	550
5	Area required (m <sup>2</sup> )	400	500	500	600	800	1000
6	Steam consumption (kg/h)	700	1100	2200	3200	4300	6500
7	Recommended Boiler capacity (t/h) (1MPa)	1	2	4	5	6	10
8	Cooling tower required (RT)	>200	>200	>400	>600	>800	>1200
9	ETP capacity (t/h)	1.2	1.9	3.8	5.7	7.6	11.4
10	Biofitler capacity (m <sup>3</sup> )	35	35	65	65	130	130
11	Manufacturing time (days)	30	30	45	60	60	80
12	Installation time (days)	30	30	30	30	45	45
<i>Pls note: Practical data varies according to raw material and clients' requirements</i>							

# Fish oil refinery

Why we need fish oil refinery? Free fatty acid(FFA) are generated during enzymatic spoilage of the fish. Spoiled fish inevitable leads to fish FFA levels in the fish oil. Fish oil containing high levels of FFA means low quality and is prone to degrade during storage. Fish oil refinery provide solution for FFA reduction in fish oil. Jiangsu Feeds Machinery Co.,Ltd. provides fish oil refinery with processing capacity from 1200l/h to 7000l/h.

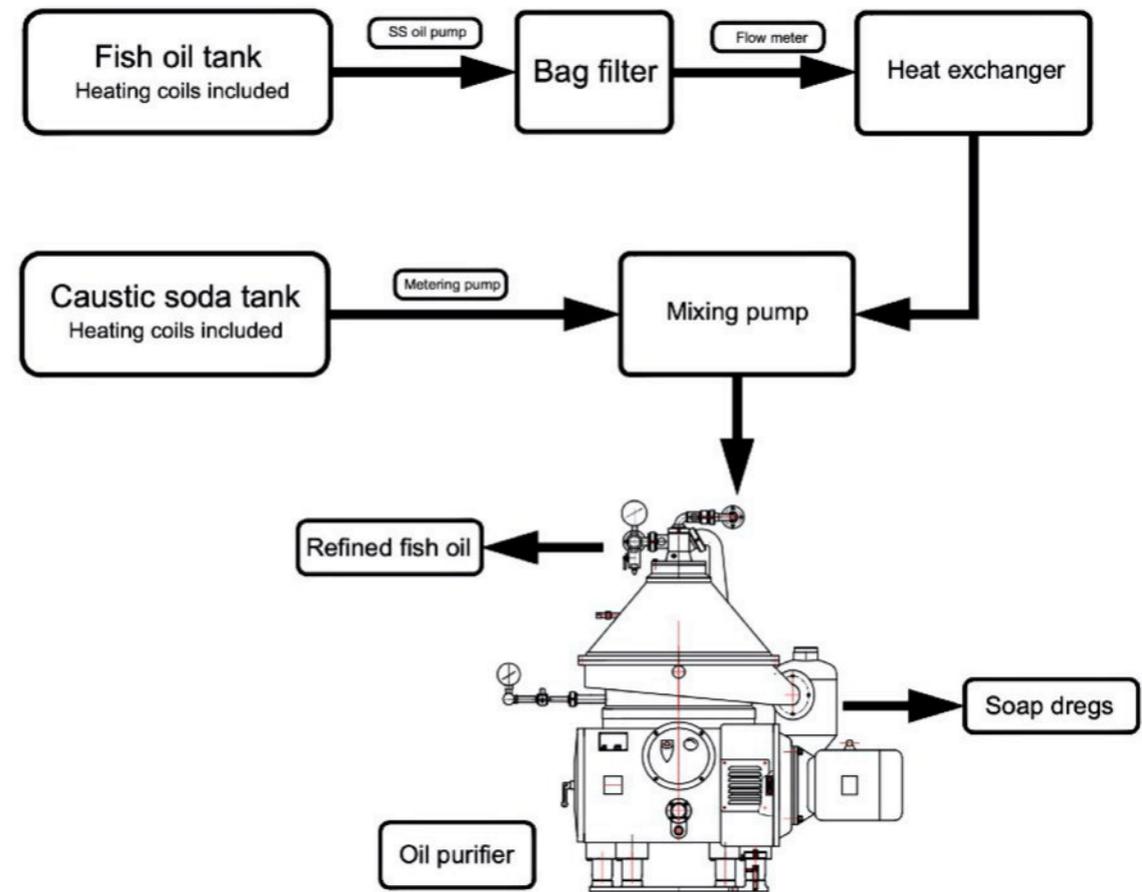
Oil refinery series		
NO.	Model Number	Processing Capacity (l/h)
1	OF-360	1200-2500
2	OF-470	2500-7000



Refined fish oil



Crude fish oil



Fish oil refinery flow diagram



## Pollution control

From an environmental point of view, the major problems of the fish meal industry are discharges of waste water which is rich in organic matter and nutrients and odor emissions.

Legislation on pollution requires the abatement of malodors and of liquid effluent from the fishmeal plant. Jiangsu Feeds Machinery Co., Ltd. provides effective solutions for malodors and wastewater from fishmeal industry.

# ETP (Effluent treatment plant)

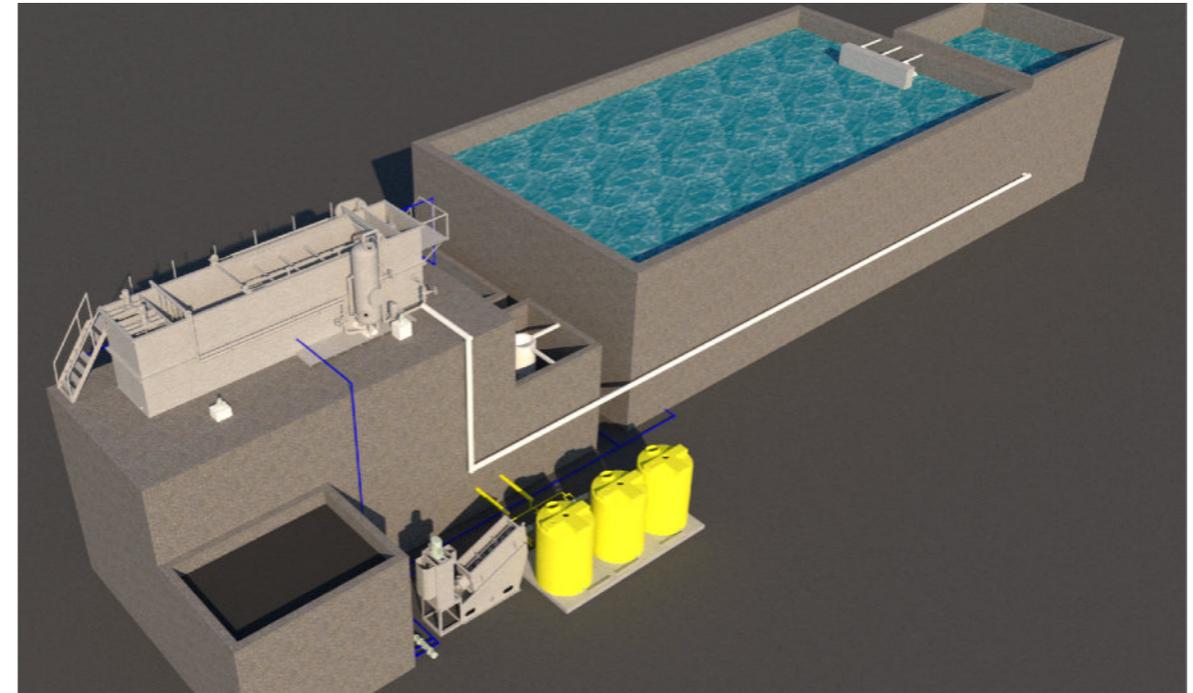
## Waste water resources:

- Untreated condensate from heat exchangers including evaporators and condensers (75% of raw material)
- Industrial wastewater including spillage from inappropriate operation and cleaning water from fish trucks, feeding hopper, screw conveyors, centrifuges and other equipments (10% of raw material)
- Water from washing scrubbers (5% of raw material)

Parameter	Untreated Condensate	Industrial Wastewater
<b>COD mg/l</b>	2000~10000	2000~11000
<b>BOD mg/l</b>	1500~8000	1300~7000
<b>Total-N mg/l</b>	400~1000	200~7700
<b>SS mg/l</b>	<0.001	100~3600
<b>pH</b>	8.0~10.0	2.0~12.0

*Characteristic values of untreated condensate and industrial wastewater. The data of wastewater quality varies according to freshness of the raw material. Proper preservation of raw material before entering fishmeal plant is highly important.*

## Anaerobic digester + SBR(Sequencing Batch Reactor Activated Sludge Process)



Anaerobic digester + SBR is a successful method in fishmeal Industry for biological removal of nitrogen. This method is proved to be efficient with a nitrogen removal of >90% and organic matter reduction >95%.

### Advantages

- Cost-effective, less tanks required comparing with AAO method
- Highly automation, easy operation
- High efficiency, up to 90% nitrogen and 95% COD removal



## Odor emissions control

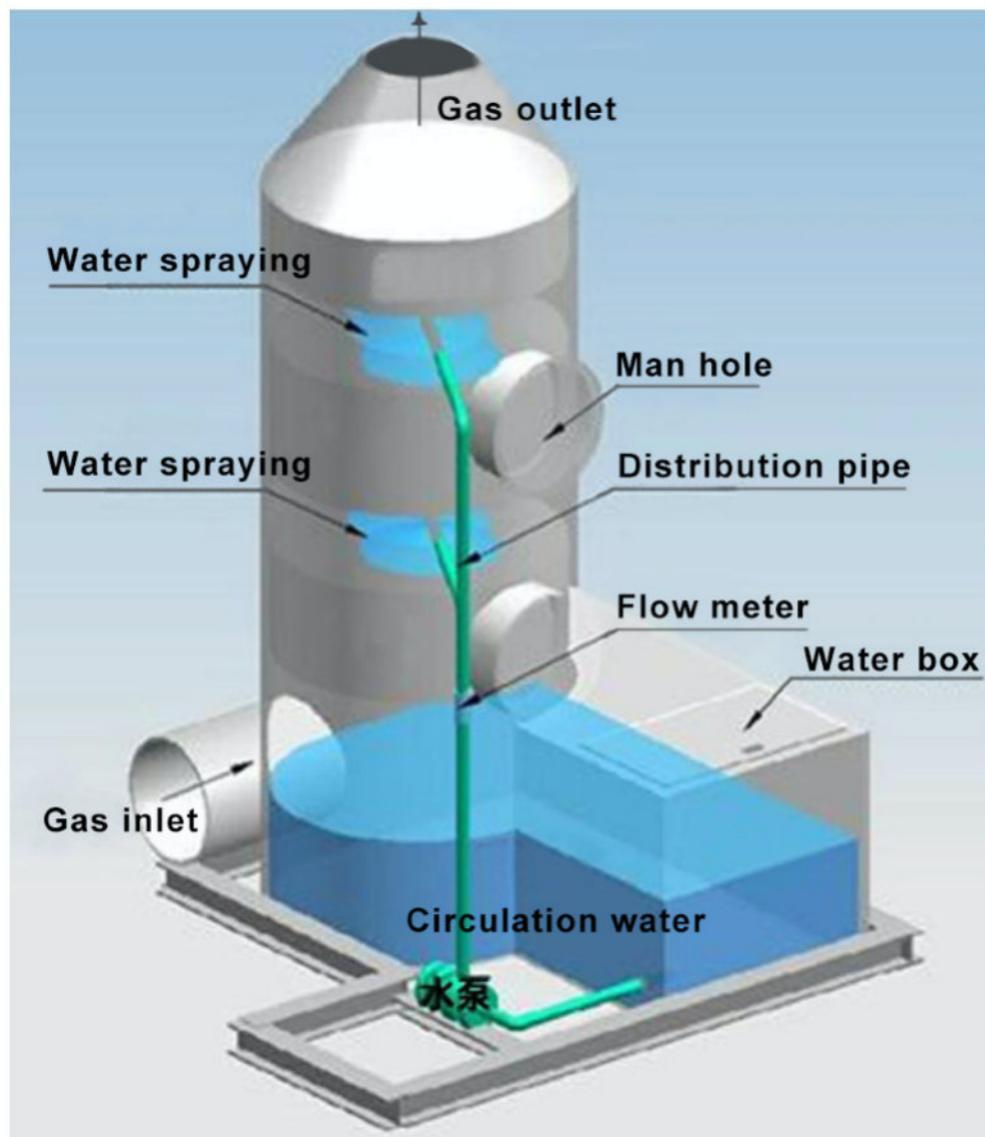
During storage bacteriological and enzymatic decay results in the formation of highly odorous substances, such as

- Trimethylamine(TMA)
- Ethylmercaptan
- Hydrogensulphide(H<sub>2</sub>S)
- Ammonia(NH<sub>3</sub>)

During processing, malodors also may be formed. Gases with high concentrations of odorous substances result from cooking, pressing and drying operations. Gases with low concentrations of odorous substances may result from conveyors, milling, meal cooling and room ventilation.

## Washing scrubber

A washing scrubber is a properly designed, water-film type tower. It is filled with porous packing material to produce a large contact area between gas and washing water. The gases pass upward and the water flows as a downward film. Chemical such as hydrogen chloride and sodium hydroxide may be added in the washing water with pH adjusted to achieve result efficiently.



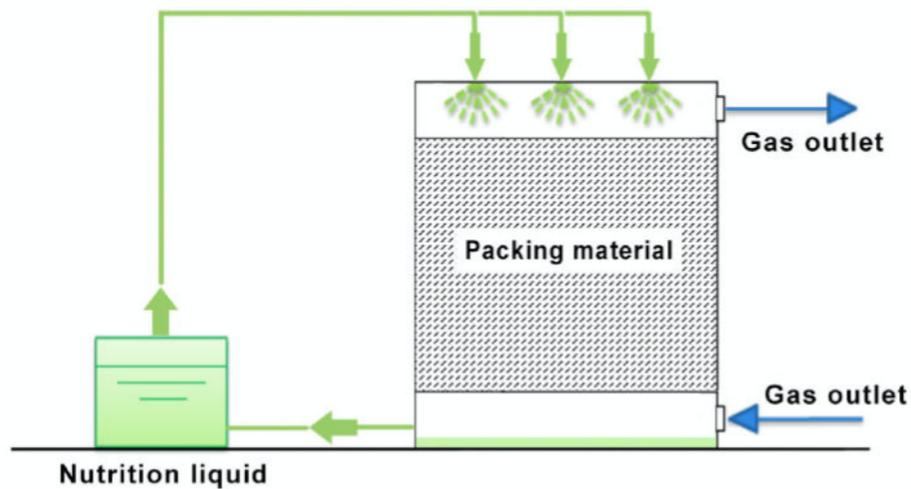
Washing scrubber structure



Washing scrubber installation in a fishmeal plant

## Biofilter

Biofilter uses microorganisms to remove air pollution. The air from washing scrubbers flows through a packed bed and the pollutants transfer into a thin biofilm on the surface of the packing material. Microorganisms are immobilized in the biofilm and degrade the pollutant. Watering system is applied for nutrition liquid circulation.



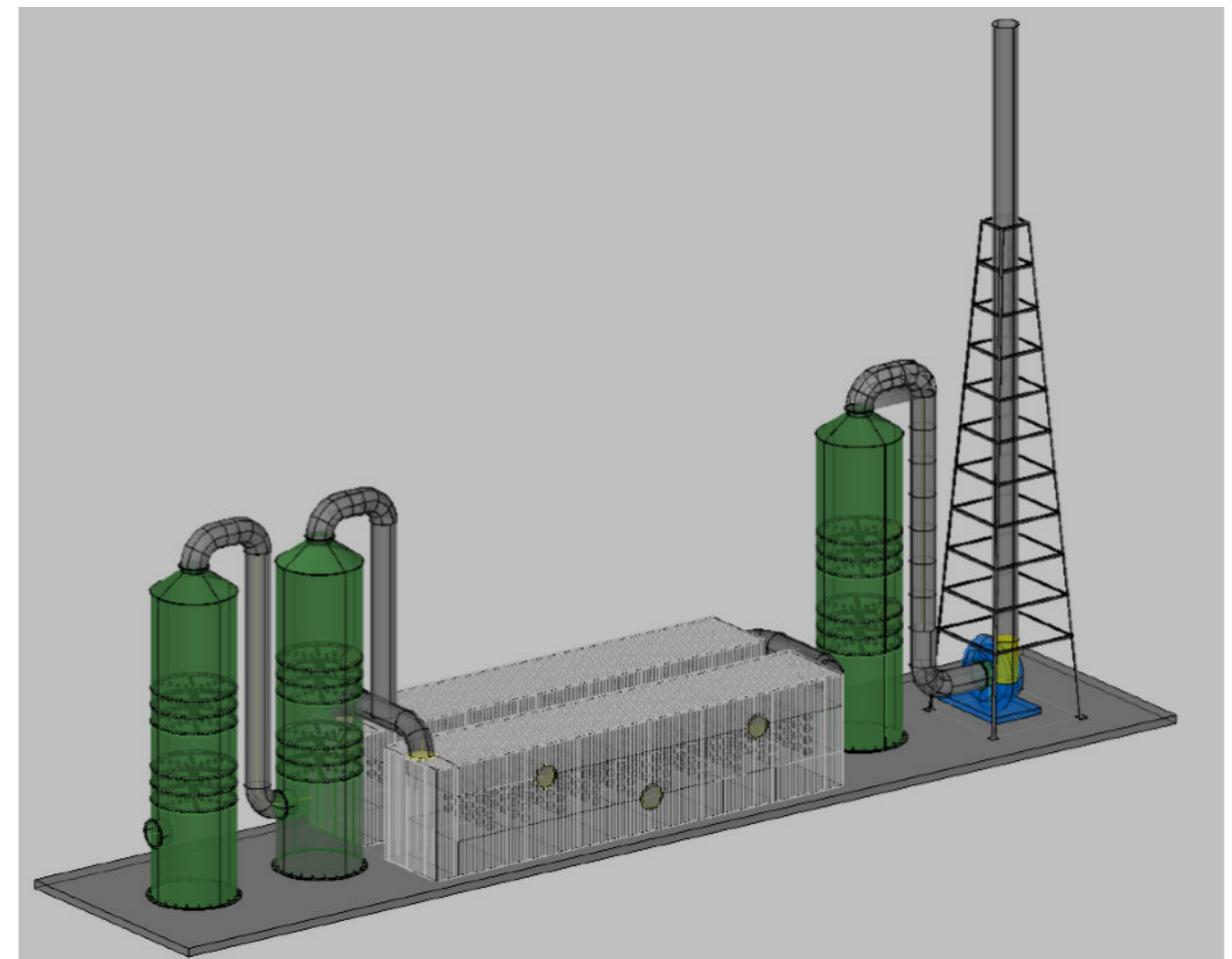
Biofilter combined with multiple washing scrubbers is proved effective solution for fishmeal plant malodors control.

Advantages:

- Cost-effective
- Inorganic media last for more than 10 years

- Movable
- Less space required comparing with conventional biofilter
- No secondary pollution

Jiangsu Feeds Machinery Co., Ltd. designs biofilter system according to malodorous gas emission volume and pollutants concentrations. We will supply installation, bacteria seeding and maintenance service for



*Malodors control system combining washing scrubbers and biofilters*





# Make fishmeal industry no pollution

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