



RENDERING CATALOGUE

Designer and manufacturer of highest quality
fishmeal and rendering plants



A & S THAI WORKS CO., LTD

Designer and manufacturer of highest
quality fishmeal and rendering plants

SOLUTIONS

Turnkey Solution

Leading designer and manufacturer of fishmeal and rendering plants in Asia Pacific

SOLUTIONS



Design

ASTW can design and tailor made any size plants according to customer's requirements, which may be in existing building or new greenfield projects. Our team design the plants to match the required capacity with safety margin to increase production if needed. We design the plant from start to finish from raw material area, wet section, dry section, bagging, piping, ducting, walkways and complete smell removal system.

Manufacture

ASTW manufacture 80% of the total machines in the fishmeal and rendering plant inhouse from the smallest parts to the largest machines. Other parts such as decanter, separator, gear box and motors are sourced from trusted well-known suppliers.

Installation

Complete installation and commissioning are available using our highly experienced service teams. Our experience team are capable of installing a complete 360t/day rendering plant within 2 months and even quicker installation for smaller projects. We never use sub-contractor for installation which saves time, money and errors.



A & S THAI WORKS CO., LTD

Designer and manufacturer of highest
quality fishmeal and rendering plants

REFERENCE LIST

A & S Thai Works Co., Ltd. is a leading designer and manufacturer of fishmeal and rendering plants. Since 1986, we have delivered, installed and commissioned more than 260 complete plants. Most are still running.



REFERENCE LIST

FISHMEAL

260 Plants

A & S Thai Works Co., Ltd.
is a leading designer and manufacturer of fishmeal
plants. We have delivered, installed and commissioned
more than 260 complete plants.

RENDERING

36 Plants

A & S Thai Works Co., Ltd.
is a leading designer and manufacturer of rendering
plants. We have delivered, installed and commissioned
more than 36 complete plants.



A & S THAI WORKS CO., LTD

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WHY CHOOSE US?



A & S THAI WORKS CO., LTD.

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01

Installation included in the price

ASTW has gained extensive experience from delivering all plants as turnkey installations, sometimes under the most challenging conditions. Of 180 employees, 40 technicians are trained to perform installations and service.

02

Highest quality and specifications

ASTW supply machinery built to the absolute highest specifications, using thicker steel plates than the competition and highest quality brand name component suppliers. Never buy a drier with less than 12mm steel thickness of the discs.

03

Good maintenance – absolute importance

ASTW supply service technicians and spare parts on shortest possible notice as good maintenance is of absolute importance to ensure continuous and problem free operation with any fishmeal and rendering plant. Our location: 20 minutes from Bangkok International Airport Suvarnabhumi.

04

1-3 Years Warranty

ASTW give a 3 Year Warranty for plants in SE ASIA.



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WHY CHOOSE US?

05

Lowest overhead – lowest price

ASTW can offer the lowest price for the best quality due to low overhead and costs as we have design, manufacturing, installation and after sales service all in one place, all under one roof.

06

Environment – no smell

ASTW solves environmental and smell problems due to wide experience gained from supplying several plants to Australia, a country with some of the strictest environmental regulations in the world.

07

Energy saving

ASTW supply equipment to save energy, supplying waste heat evaporators and pre-heaters, vacuum driers and direct condensate return systems.

08

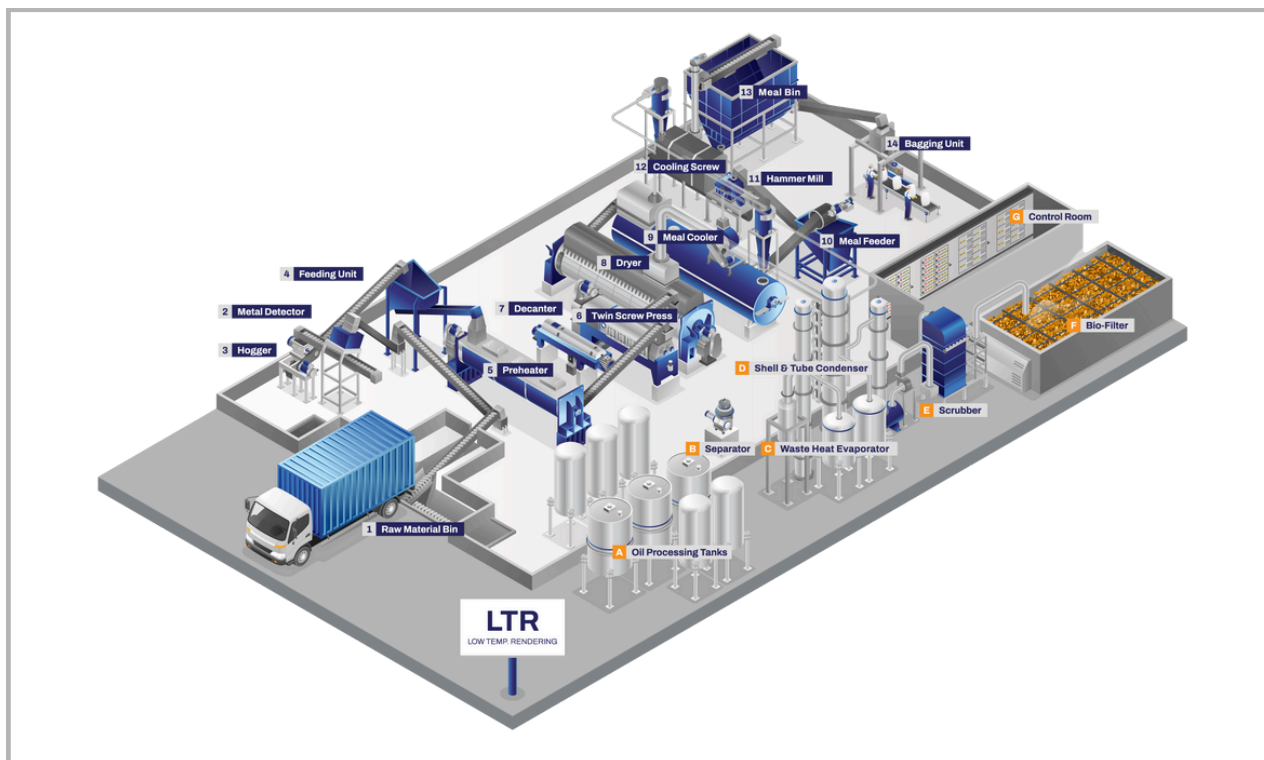
Original Stord

ASTW (A & S Thai Works Co., Ltd.) was established in 1984 by, and uses the original technology from, Stord Norway. Until 1998, we were operating under the name Stord Bartz Thailand and later Atlas Stord Thailand.



ASTW LOW TEMPERATURE RENDERING PLANT - LTR

Low Temperature Rendering plants – LTR: for continuous processing of by-products such as bovine (beef), ovine (sheep) or chicken into high quality meat and bone meal and tallow.



TECHNICAL SPECIFICATION: ASTW LTR - LOW TEMPERATURE RENDERING

This process consist of the basic components: cooker/preheater - twin screw press - disc dryer - decanter/separator liquid oil/water separation - meal handling/cooling/hammermill - optional WHE to reduce steam consumption - odor control - storage

Capacity tons input per 24 hr	Capacity tons input per 24 hr	Steam Consumption ton/hr with stick water in drier	Steam Consumption tons/hr with WHE waste heat evaporator	Electric kW Installed
LTR 2.5	60	2.5	1.5	550
LTR 5	120	5	3	670
LTR 7	168	7	4.2	720
LTR 10	240	10	6	950
LTR 12	288	12	7.2	1,015
LTR 15	360	15	9	1,150

Main advantages:

The LTR plant produces a quality meat and bone meal and tallow and allows the use of WHE – waste heat evaporator that reduces the steam consumption by up to 50%, allowing steam consumption to be 550-600 kg steam per 1 ton raw material at about 65% moisture. All LTR components (except decanters and separators) are slow rotating machines and have low wear for long and reliable lifetime. Components are high quality like SEW gear boxes and Spirax steam equipment, sensors from VEGA and Endress Hauser. No steel material or parts are from low-cost countries.

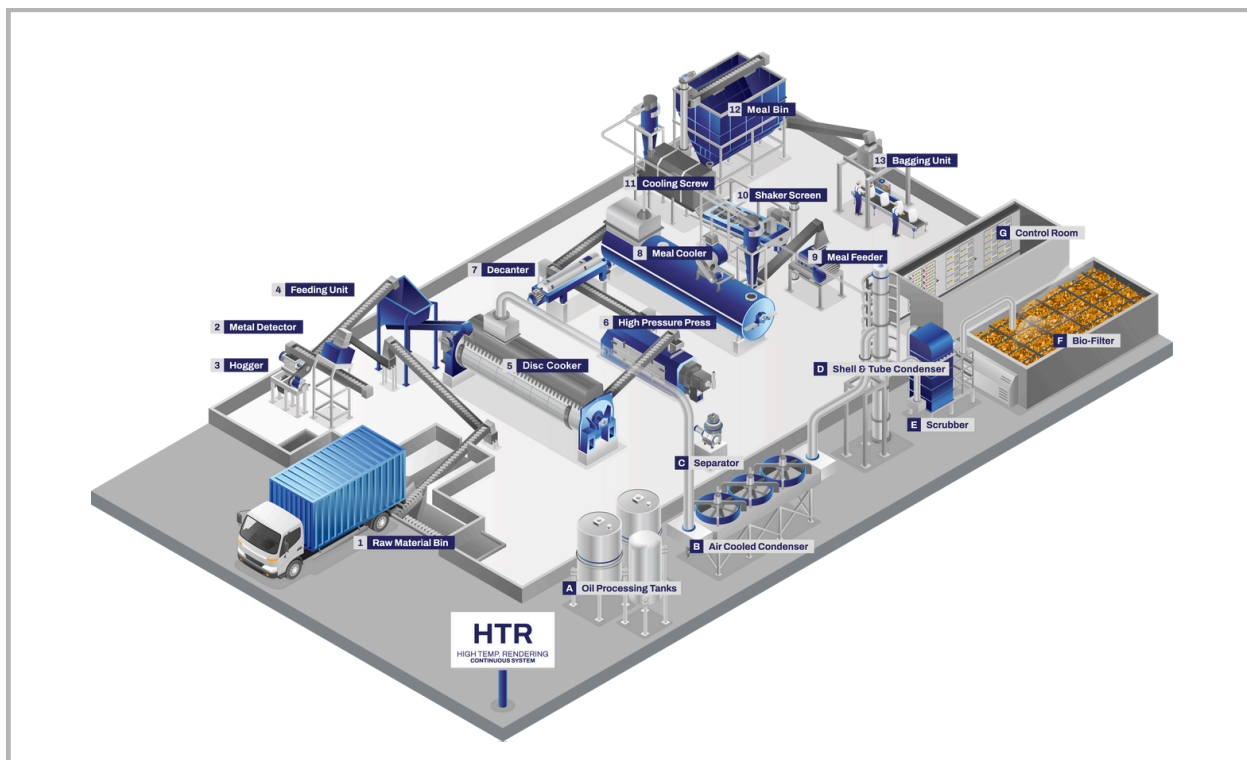
The low temp rendering process is the gentlest method of treating animal by products and originates from fishmeal processing.

The material is scanned for steel scrap in a metal detector, pre-breaker and fine pre breaker the material into small pieces about 25mm. The material is then cooked in a continuous pre-heater/cooker at temp. 95 °C. The cooked material is pressed in a slow rotating twin crew press to separate press cake and press water which is separated to stick water and tallow in a 3- phase decanter and purifier separator. The solid are dried to meat and bone meal in a disc dryer and tallow is purified (polished), and can be further vacuum dried to remove all traces of water. The meal is cooled and ground in a hammer mill for storage. The greatest advantage of the gentle Low Temp Rendering process is that the chicken meal and oil is of high quality if fresh raw material.



ASTW HIGH TEMPERATURE RENDERING PLANT - HTR (CONTINUOUS SYSTEM)

High Temperature Rendering plants – HTR : High temp rendering process is a high evaporation and sterilising method of treating animal byproducts and originates from the world's earliest rendering plants using batch cookers.



The HTR process is especially suitable for deteriorated materials and mixed wastes. The material is scanned for steel scrap in a metal detector, cut in a pre-breaker to 50 mm and then in a fine-breaker to 16 mm. The material melts in the cooker and is cooked in a bath of hot tallow at high temperature 120-130 degrees C. The cooker works like a large frying pan where the water is evaporated, and the greasy output (grax) is pressed in a high pressure press to extract most of the tallow. The hot tallow is clarified in a 2-phase decanter and separator/polisher. The press cake is cooled and ground in a hammer mill for storage as an animal feed component. Wool or hair in the material is partially hydrolysed due to the high frying temperature, and separated in the shaker screen before grinding to meal in the hammer mill.

TECHNICAL SPECIFICATION: ASTW HTR - HIGH TEMPERATURE RENDERING USING

This process consist of the basic components: raw material pre treatment - disc cooker/preheater - high pressure screw press - decanter/separator oil/tallow clarification - meal handling/cooling/hammermill - condenser/odor control - storage

Plants Size	Capacity tons input per 24 hr	Steam Consumption ton/hr with all evaporation in disc cooker	Electric kW Installed
HTR 2.5	60	2.5	360
HTR 5	120	5	450
HTR 7	168	7	700
HTR 10	240	10	920
HTR 12	288	12	995
HTR 15	360	15	1,130

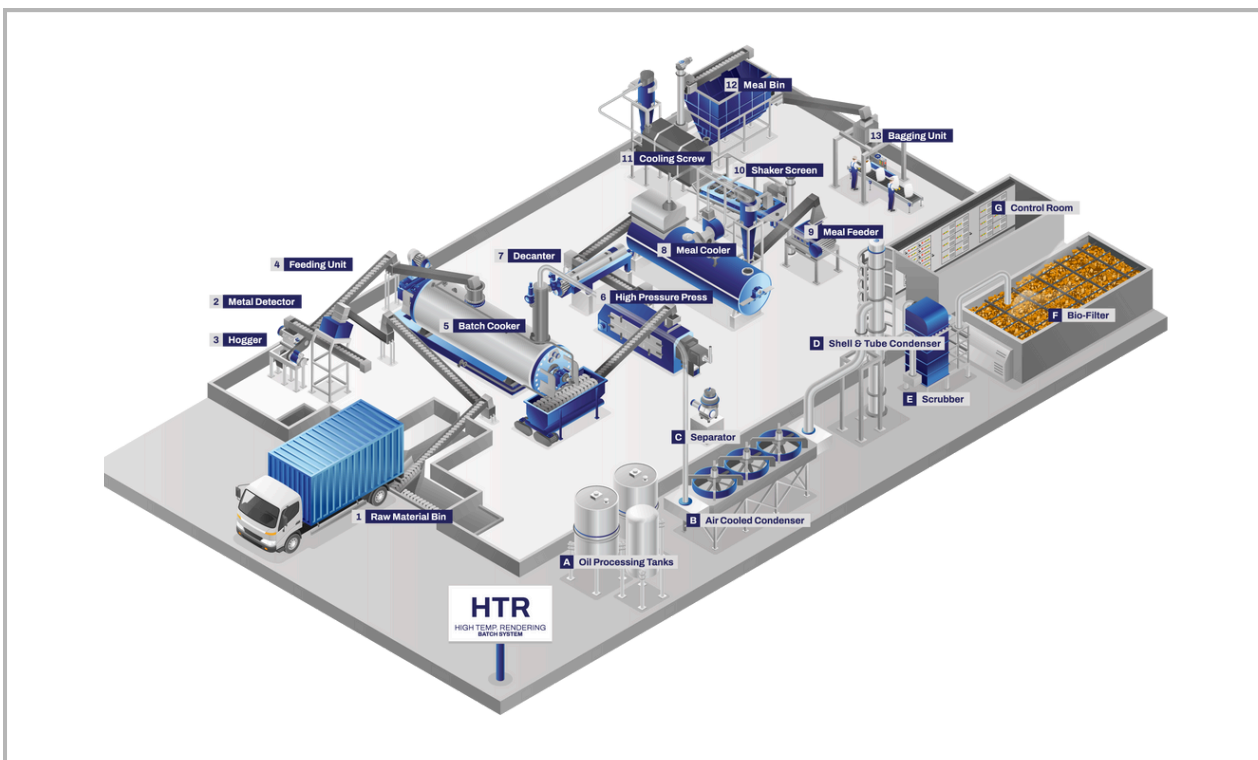
Main advantages:

The advantage of the high temp process is that it is a simple process and that the cooker can be of relatively small size but with a high evaporation capacity up to 24 kg per m2 heating surface per hour.

The HTR process is somewhat simpler than the LTR process, but not as energy efficient.

ASTW HIGH TEMPERATURE RENDERING PLANT - HTR (BATCH SYSTEM)

The batch cooker has been used in the rendering industry since the 1940s. It is a simple steam heated machine with a jacketed cylinder and a mixing rotor that can process, cook and dry materials in "one batch"



- Mixed meat and meat, bone and intestines (high temp drying) fry and dry the material in oil bath at 135 deg C, to be used with high pressure press
- Mixed poultry offal = offal and feathers mixed together (hydrolyzing and drying) => meal for animal feed and tallow/chicken oil, with high pressure press
- Feathers (hydrolyzing and drying) => feather meal for animal feed
- Blood (cooking and drying of decanter cake) => blood meal for animal feed
- Wool and hair from processing of sheep, hog (swine) (hydrolyzing and drying) => feed back into the rendering process

Today batch cookers are used mainly for small, low cost rendering capacities, while continuous systems are being used for larger capacities. For feathers, the batch cooker is sometimes used together with a more efficient disc dryer and increase capacity about 30%.

For Mixed meat, bone and intestines the batch cooker will act as a HIGH TEMP frying pan where the material is cooked and dried in a high temperature oil bath, up to 135 deg C. Then the hot material is pressed in a high pressure press where the tallow/fat/oil is separated.

The batch cooker design has a heated shell with a steam jacket and a heated mixer rotor. There is an inlet chute and a bottom outlet, both with knife gate valves. The body is designed to withstand internal pressure up to 5 bar (operation 3 bar)

The batch cooker design has a heated shell with a steam jacket and a heated mixer rotor. There is an inlet chute and a bottom outlet, both with knife gate valves. The body is designed to withstand internal pressure up to 5 bar (operation 3 bar)

BATCH PROCESS INCLUDES THE FOLLOWING STEPS: FEATHERS, WOOL AND HOG HAIR:

- HYDROLYZING and drying in a batch cooker at internal pressure about 3 bar for 20 minutes to make the feathers digestible – (pressure and time can vary)
- Hydrolyzing and then drying in a disc dryer
- Cooling of meal and hammer milling

ASTW make three most common sizes;

- 5,000 liters, popular name 5 x 12 foot batch cooker
- 10,000 liters, popular name 5.5 x 18.5 foot batch cooker
- 1,700 liters, popular name 3 x 9 foot batch cooker,

2 options! a) normal batch cooker. b) no jacket, injection of live steam for hydrolysis of wool and direct injection into dryer



ASTW HIGH TEMPERATURE RENDERING PLANT - HTR (BATCH SYSTEM)

Technical Specification: ASTW HTR - High Temperature Rendering using batch cooker
Capacity will vary depending on the raw material

This process consist of the basic components: raw material pre treatment - batch cooker - high pressure screw press (when fat and oil is present)- decanter/separator oil/tallow clarification - meal handling/cooling/hammermill - condenser/odor control - storage

<i>Dimension mm. Approx.</i>	BC 1,700 liters	BC 5,000 liters	BC 10,000 liters
Body diameter	950	1400	1540
Body length flange to flange	3000	3560	5640
Total installation length	5500	5937	8169
Total installation width	1400	2827	2902
Total installation height	3200	4236	4432

Internal pressure in body	5 bar	5 bar	5 bar
Design pressure	7 bar	7 bar	7 bar
Heating surface	11 m2/live steam*	29 m2	50 m2
Power	11 kW	37 kW	75 kW
Shipping weight	6 tons	14 tons	24 tons

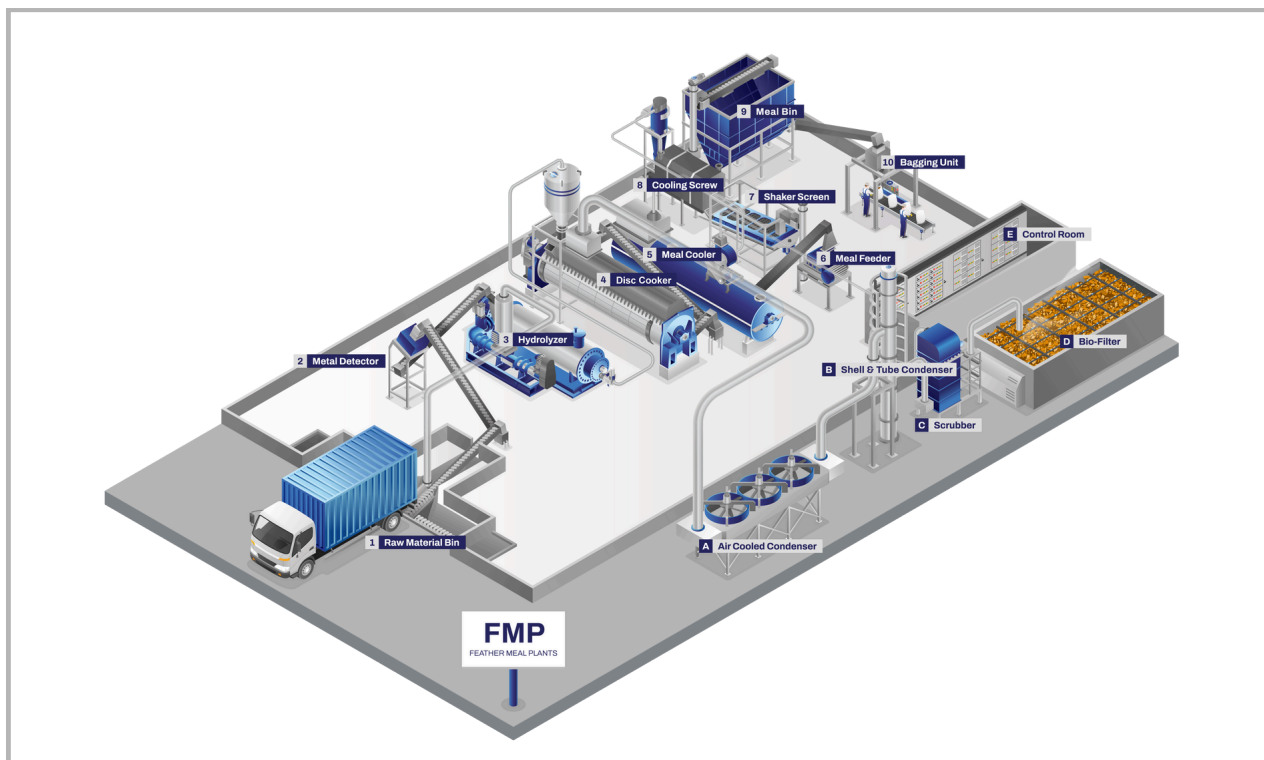
Plant Process	Capacity tons input per hr (feather & mix), (meat & bone)	Total Steam Consumption ton/hr	Electric total KW installed
5000 liter only	0.5 - 0.7	2	135
2 x 5000 liter	1 - 1.5	4	235
10,000 liter only	1 - 1.5	4	280
2 x 10,000 liter	2 - 2.8	8	375



ASTW FEATHER MEAL PLANT (CONTINUOUS SYSTEM)

Poultry feathers are non-digestible and have to be pressure cooked (hydrolized) at about 3 bar for 20 minutes to be made digestible and to be used as animal feed ingredient.

Therefore, for higher capacities 3.5 to 5 tons raw feathers per hour and up continuous hydrolyzers were introduced, with typical sizes 5.0, 7.5, 10.0 and 15.0 tons input per hour.



TECHNICAL SPECIFICATION: ASTW FEATHER MEAL LINES, CONTINUOUS HYDROLYSER WITH DISC DRYER

This process consist of the basic components: hydrolyser - disc dryer - meal handling/cooling/hammermill - condenser/odor control - storage

Plant Process	Capacity tons input per hr (feather & mix), (meat & bone)	Total Steam Consumption ton/hr	Electric total kW installed
continuous hydrolyzer 5 t/hr with disc dryer	5	4.5	450
continuous hydrolyzer 10 t/hr with disc dryer	10	9	600

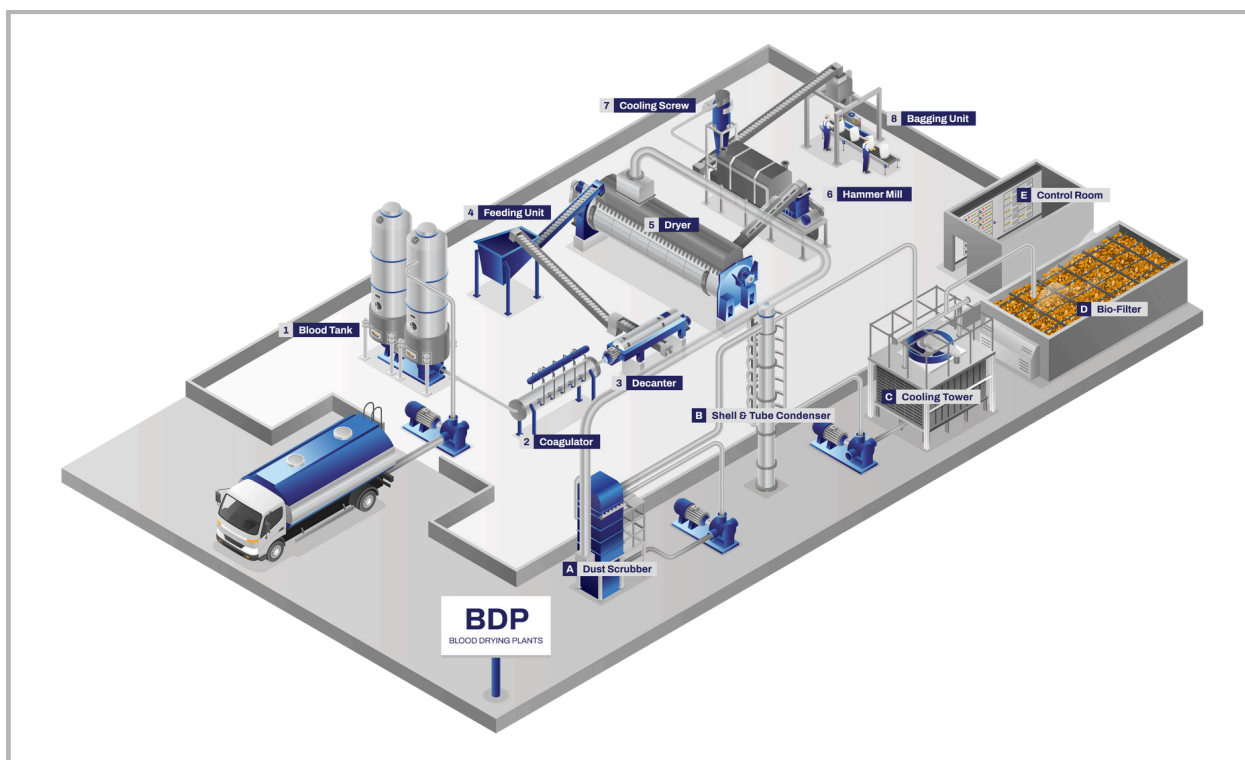
The feathers are fed into a single screw press that compresses the feathers to a pressure tight “plug” that is channeled into a processing body which is filled with steam under a set pressure of 3 bar. The processing body is a long, heated cylinder with a rotor with mounted paddles that mixes, disintegrates and pushes the feathers forward to reach a set processing time of about 20 minutes.

The hydrolyzed feathers turn into a porridge state and is fed out through a pipe with 2 knife gate valves that open and close in sequence, and the material is then piped into a fairly large disc dryer for final drying. Once set up, the continuous hydrolyzer is fully automated and can run unattended or partly attended for as long as raw material is available.

ASTW BLOOD PLANTS

Continuous drying of fresh blood to blood meal.

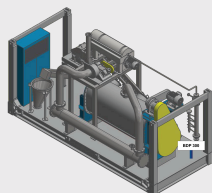
Blood is a valuable, high protein (~ 80%) raw material, but with high water content and low meal yield, typically 13-15%. Blood meal is sold to animal feed producers (feed mills), or mixed in with the meat and bone meal process.



THE BLOOD DRYING PLANT INCLUDES THE FOLLOWING STEPS:

- Unloading from truck using mechanical diaphragm pump.
- Blood filter, automatic, self-cleaning.
- Second pump transport to blood tank.
- Storage in stainless tank for up to 24 hours.
- Feed metering pump to the process.
- Live steam-heated controlled coagulator (ASTW vortex design).
- Decanter for solids separation. Stick water is thrown away to waste water plant.
- Drying to blood meal in steam heated stainless steel disc dryer.
- Meal handling, cooling, hammer milling and bagging.
- Vapor cleaning in dust water scrubber, condensing of vapor in a shell and tube condenser with cooling tower, optional bio filter to remove final smell

BDP 300



Using a decanter and a disc dryer, ASTW provides a cost-effective method for the production of blood meal.

The indirectly heated disc dryer gives a continuous drying process, specially designed to handle difficult and sticky materials

TECHNICAL SPECIFICATION: ASTW BDP - BLOOD DRYING PLANT

Process: Filter raw blood - storage - coagulation - decanter 2-phase - disc dryer - cooling - hammer mill - bagging - dust scrubber

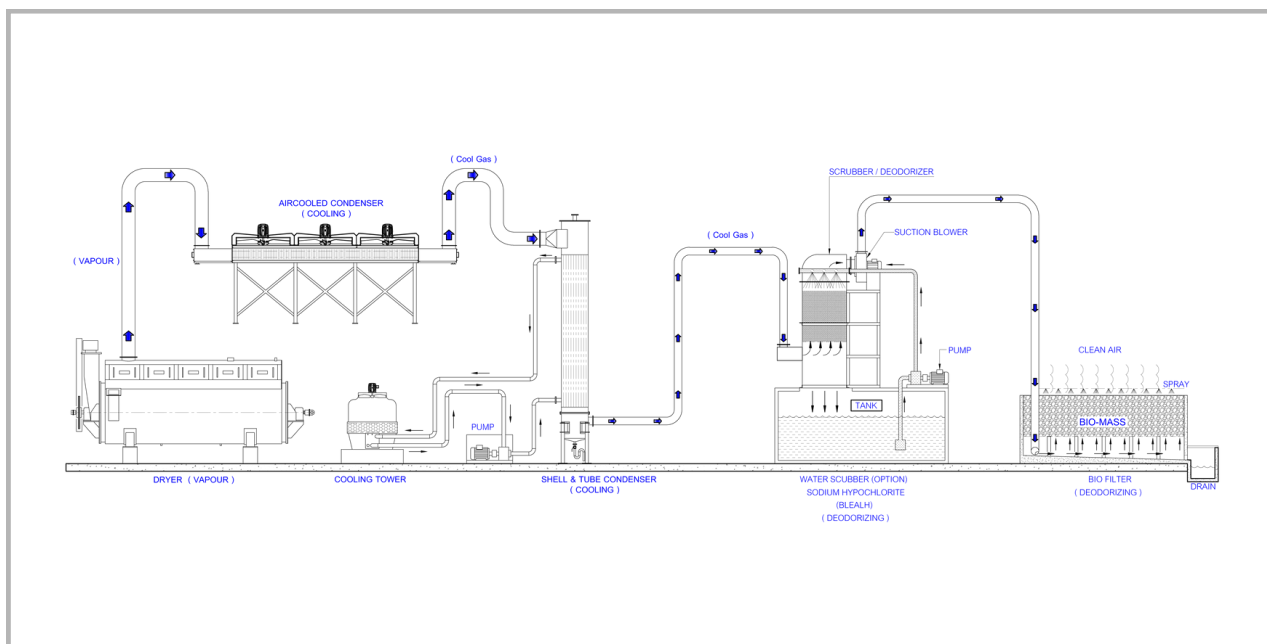
Drying of press cake, stick water discharged to waste water plant

Capacity raw blood	Dryer size installed	Steam consumption kg/hr	Total kW installed
BDP 300 liter/hr	11 m2	120	40
BDP 1,300 liter/hr	44 m2	520	80
BDP 3,000 liter/hr	100 m2	1200	215
BDP 5,000 liter/hr	160 m2	2000	250

- Large screen filter to separate lumps, wool, hair and scrap from the raw blood.
- To be installed between truck and storage tank using two pumps.
- The cleaning cycle is fully automatic and adjustable with timers.
- Interval cleaning is by means of high pressure sprays nozzles.
- The unit can be positioned over raw material bin.
- All stainless design.

ASTW SMELL REMOVAL - AIR COOLED CONDENSER, SHELL AND TUBE CONDENSER AND WATER SCRUBBER-DEODORIZER

Smell removal (odour control or deodorising) is becoming increasingly important in the fishmeal and meat and bone rendering industries, with stricter regulations issued by governments all over the world. The ASTW smell removal systems are composed of one or more elements as described in the following chapters.



The hot vapor exhaust from the drier is quite smelly and must be treated by condensing (cooling) to water.

The air cooled condenser is cooled by air, while a shell and tube condensers cooled by water.

The remaining gas is treated in a scrubber using water or a chemical solution of sodium hypochlorite and water.

If seawater or river water is available, a water scrubber condenser can be used. Otherwise an air-cooled condenser is used.



The systems are divided into 6 main categories:

- Condensing (cooling)
- Scrubbing (washing with water)
- Chemical (additive)
- Ozone (added to the rest gas)
- Burning in boiler or thermal oxidiser
- Bio-filter

For increased effect, a water scrubber and air cooled condenser can be used in combination, a solution that is increasingly common due to more rigid environmental regulations.

If the rest gas from the water/chemical scrubber still has some smell, it can be channelled to the burner and burnt in the boiler.



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FINISH PRODUCT



MEAT & BONE MEAL



FEATHER MEAL

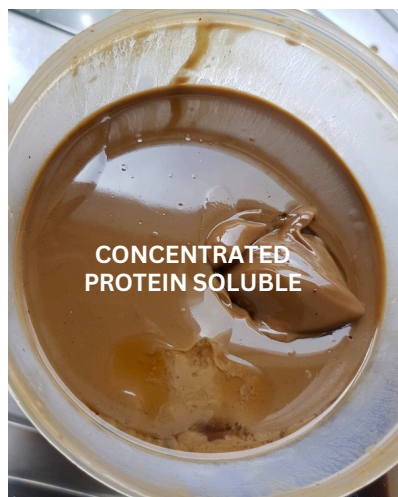


FISHMEAL



BLOOD MEAL

**ASTW FINISH
PRODUCT**



**CONCENTRATED
PROTEIN SOLUBLE**

FINISH PRODUCT

OIL / TALLOW



SARDINE OIL



POLLOCK OIL



TUNA OIL



CHICKEN OIL



CATTLE OIL



DRYER

Disc dryers are the most used dryer in the fishmeal industry worldwide, using clean steam for heating, not hot oil that which is no more accepted.

ASTW dryers have been developed and improved continuously since 1986 when the first LFP dryer was installed in Thailand. Many dryers are still in operation after 20 years. Since 1986, we have produce 260 dryers and currently make about 15 dryers per year.

ASTW make the most heavy duty dryers with 12mm mild steel discs with stainless anti-wear U-caps, 19mm stator shell and 6mm stainless cladding on exposed areas. We can also deliver dryers with stainless steel discs. As a customer you pay for wear allowance, safe operation and long lifetime.



ASTW DISC DRYERS HAVE MORE DISTANCE BETWEEN THE DISCS FOR :

- Better material flow and easy operation.
- Less wear and long lifetime.
- Low electric consumption.
- More efficiency.

ASTW dryers always have steam jackets as it is very effective heating surface and increase the efficiency of the dryer. Note that steam pressure should be maximum 6 bar. Higher pressure will burn and destroy the protein in the fishmeal. Inspected and certified to British Standard BS/PD 5500 cat. 2, European PED and Australian AS1210.



Type	Input capacity tons/24 hrs.	Heating Surface
AST/TST D - 44 - 34	24	44
AST/TST D - 80 - 32	45	80
AST/TST D - 100 - 40	55	100
AST/TST D - 130 - 34	70	130
AST/TST D - 160 - 46	90	160
AST/TST D - 240 - 46	120	240
AST/TST D - 300 - 56	160	300
AST/TST D - 400 - 60	220	400

HIGH TEMP COOKERS

Continuous high temperature disc cooker for rendering

Traditionally batch cookers are being used for all types of rendering materials as steam pressure, heat and time can be adjusted and controlled 100%.

Batch cookers are, however, slow and cumbersome to operate, especially when the volume of material increases, and they also have a high steam consumption.

For large capacities, a high number of batch cookers are needed and there was a call for a continuous process to simplify and make the process automated.

In the beginning horizontal tube-type continuous cookers were used and are still in operation, but later the disc type continuous cookers were introduced that had advantages and are easier to operate. Also disc cookers could be made in stainless steel that gave longer life time.

Disc type cookers and disc type dryers are basically the same machines, but the cooker version has better stub shaft seals as the internal is floating in hot tallow (fat/oil) and there is a more sturdy liquid tight outlet bottom screw conveyor system.

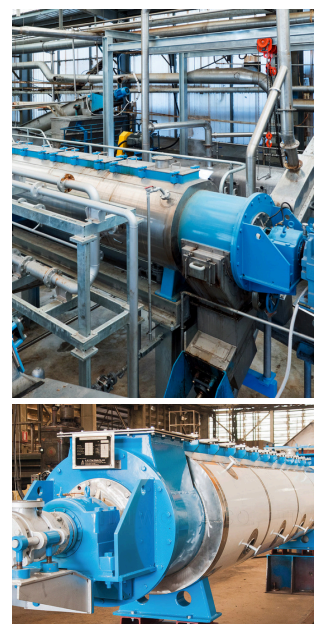
The evaporation in a cooker type (fryer) can reach a very high 24 kg water per m² heating surface while a dryer, processing press or decanter cake normally reach about 8 kg water per m².

The grax or fatty output from a high temp cooker is normally fed to a high pressure press to squeeze out most of the fat to reach about 12% remaining fat in the final meal.

HIGH TEMP CONTINUOUS DISCS COOKER, TO BE USED WITH HTR PLANT

Type	M2 heating surface	Capacity input (tons/hr)*	Length (FL/FL)	Drive (kW)	Weight (tons)
AST/TST C - 44 - 34	44.0	1.8	4600	18.5	12
AST/TST C - 80 - 32	80.0	3.3	4800	30	16
AST/TST C - 100 - 40	100.0	4	5930	37	22
AST/TST C - 130 - 34	130.0	5.5	5390	55	30
AST/TST C - 160 - 46	160.0	7	7480	55	42
AST/TST C - 200 - 38	200.0	8.3	7880	75	52
AST/TST C - 240 - 46	240.0	10	7880	75	52
AST/TST C - 300 - 56	300.0	12.5	8780	90	60

larger sizes upon request, * estimate capacity, actual figures will vary depending on raw material





PRE HEATERS

Pre heaters for low temp plants, disc type with steam jacket type AST/RPH.

- Proven RPH disc design but with steam jacket.
- Steam jacket, bulb type, provide superior and cheap heating surface.
- Complete with insulation, galvanized walkway and stairway, temperature control, steam system and heavy duty SEW drive.

TECHNICAL SPECIFICATION: ASTW DISC TYPE PRE-HEATER, TO BE USED WITH LTR LOW TEMP RENDERING PLANT THIS UNIT COOKS/PRE-HEATS AND MIXES THE RAW MATERIAL VIGOROUSLY

Size	Capacity raw blood tons input per hr	Total steam Consumption kg/hr (est)	Drive kW	Weight (tons)
RPH 20+6 = 26	8	1,200	7.5	5
RPH 30+8 = 38	12	1,800	11	8
RPH 50+12 = 62	20	3,000	22	12.5
RPH 66+14 = 80	25	3,750	30	16



OIL SEPARATION AREA

Using a 3-phase decanter centrifuge separates fish oil pumped to tank, stick water (pumped to tank) and meat sludge (pumped straight to the dryer).

Each pump is started by a float level switch and stopped by an adjustable timer. The decanter needs to be flushed with hot water during startup and especially during close down so that all liquids and deposits are removed before the decanter is stopped.

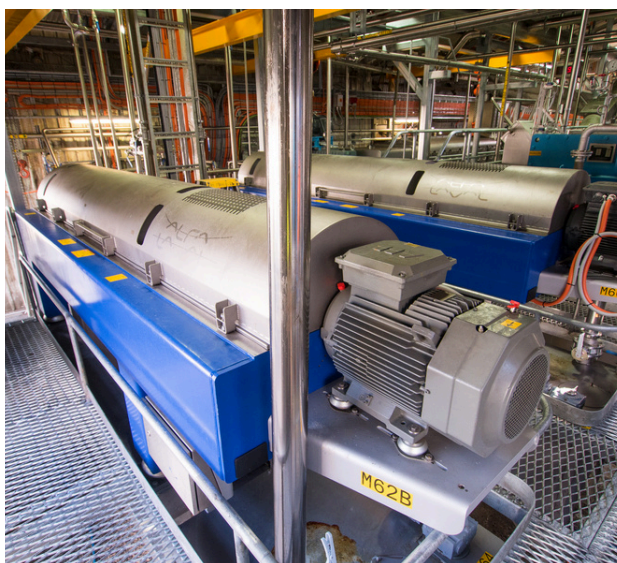
● DECANTERS

Decanters are high speed machines that need special care, cleaning, lubrication and relative frequent change of bearings (Every 1 - 1.5 years or so) by qualified technicians.

● SEPARATOR PURIFIER (ALSO CALLED FISH OIL POLISHER OR CLEANER)

The fish oil from the decanter still contains a little water and solids, and this “dirty” fish oil is heated in the tank and then pumped (control fed) to the separator for cleaning.

The separator has three outlets, clean fish oil which is pumped to the tank, water which is pumped to the dryer, and once in a while the separator automatically “blows” and cleans itself from solids which is also pumped to the drier. All pumps are controlled by float level switches and adjustable timers.



PRESSES

In oily fish plants the raw fish must be properly cooked to 95 °C and pressed to separate: solids (press cake) which goes to the drier and liquids (press water) which must be further separated in a 2 or 3-phase decanter and separated to: fish oil, stick water, and meat sludge (to dryer).

Note that the fish or fish waste must go through a fish hogger (pre-breaker) before cooking to ensure that no large pieces of fish can get stuck and block the press.

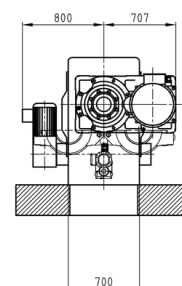
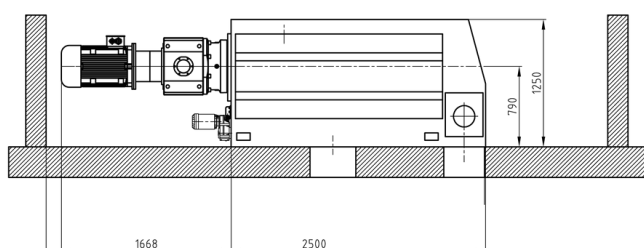
• THERE ARE TWO TYPES OF PRESSES:

Twin screw presses have two counter rotating screws that prevent rotation of the raw material. Invented by Stord Bartz of Norway 50 years ago, this is the world known ultimate press for fishmeal production and with a very sturdy design that lasts 30 years or more. The “negative” side of the press is that it has a complex (but very reliable) design that gives a relatively high price. The other type is the single screw press that has one screw, a much simpler design and therefore a lower price. The problem with only a single screw is a greater chance that the material “rotates” and don’t move forward, “blocking” the press.



• TECHNICAL DATA FOR TWIN SCREW PRESS

Type	Nominal capacity raw material tons/hour	H	H1*	H2	W	W1	L	L1	Net weight/ kg.
AST/BS 24	3.5	1850	850	1000	2000	1850	3500	3300	5500
AST/BS 35	7.0	3215	850	2365	1635	1650	5290	4300	7000
AST/BS 41	10	2760	850	1910	2300	2200	5500	4780	10000
AST/BS 49	18	3060	850	2210	2950	2600	6000	5660	18000
AST/BS 56	25	3280	850	2430	2700	2665	8500	7000	24000





HIGH PRESSURE PRESS (HP PRESS)

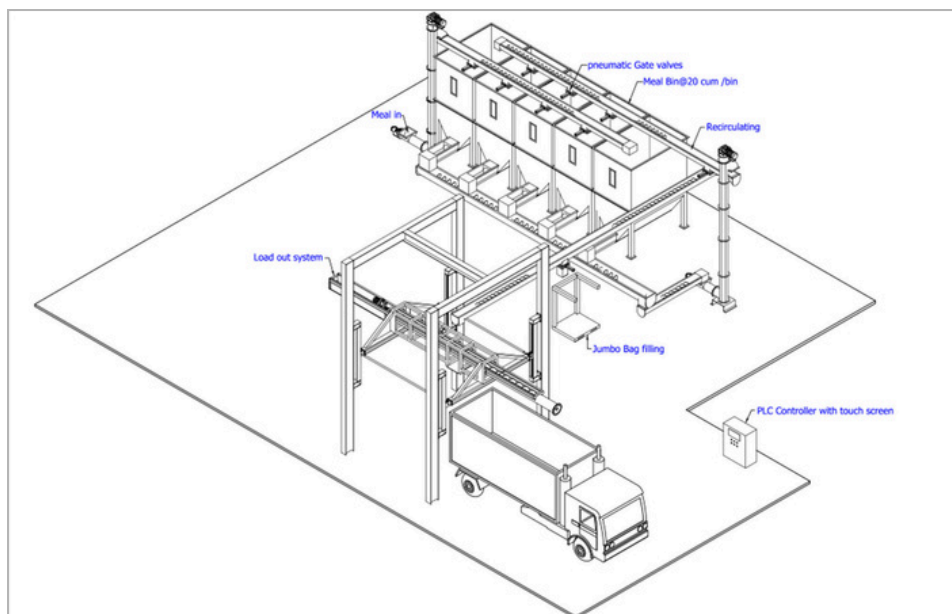
- The output material from a high temp cooker is free from water but contains all the fat and oil (tallow) that needs to be removed.
- The HP press will squeeze out most of the fat to reach about 12% remaining fat in the final meal. The input material needs to be heated to 90-95 deg C before pressing.
- The HP press is an extremely strong and sturdy machine with a large motor drive to cope with the intense friction and wear on the single screw, static hold-back bars and the screen itself.
- Due to the high wear frequent maintenance and change of wear parts is necessary.
- The HP press is different from the twin screw press used in the low temp rendering process as the twin screw press squeezes out a mix of water and oil, often 50 to 65% of the cooked raw material input volume. The twin screw press design is also quite different and more light duty, as it is not subject to the high wear and tear as the HP press.

TECHNICAL SPECIFICATION: ASTW HIGH PRESSURE PRESS (HP PRESS)

MODEL	DISCHARGE MEAL CAPACITY		DIMENSIONS			WEIGHT	SCREW/ INFEED POWER
			LENGTH	WIDTH	HEIGHT		
	PPH	KGPH	M	M	M	KG	KW
202-2	2,200	1,000	3.0	1.1	1.8	5,500	30/1.5
202-4	4,400	2,000	3.4	1.8	1.8	6,800	55/1.5
202-6	6,600	3,000	3.7	1.2	1.8	8,950	110
202-8	8,800	4,000	3.8	1.2	1.8	9,100	150

MEAL HANDLING SYSTEMS

- Consist of bins, hoppers, screw conveyors, vertical screw conveyors, hammer mills, shaker screens, meal cooling systems, loading systems.
- Layouts, we have the experience from making hundreds of plants.
- Tailor made or “block” systems, all parts fit into 40 foot containers.
- Manufacture and design to highest standards, no compromises.
- Installation included, mostly while the rendering plant is operating.
- Focus: SALMONELLA PREVENTION.



CONTAINER AND TRUCK LOADER

Telescopic M&B (meat and bone meal) loader for 20 foot containers through the door, and also for top loading of trucks.

Loading a 20 foot container with M&B meal efficiently has always been difficult as some use a “belt type-meal thrower” which is slow and gives dust problems.

ASTW have therefore developed a sturdy, semi automatic container and truck meal loader.

Function:

- The telescopic screw conveyor feeds through one open (the right hand) container door, goes all the way in close to ceiling of the container before it starts feeding and then moves slowly backwards.
- The feed rate is controlled by the pressure of the outflowing meal and 20 tons of meal is filled in about 30 minutes.
- The whole telescopic unit is mounted on a strong portal and lifts up and down to preset positions:
 - a) low position for container loading
 - b) high position for truck loading, about 4 meters
 - c) top position 4.2 meters so that trucks can pass underneath
- The fully pre-programmed automatic functions are set on a touch screen PLC that can be adjusted by the operator and switched to manual mode if needed.





ACCESSORIES FOR RENDERING PLANTS

RAW MATERIAL BIN

Raw material bin is where the by-product is dumped coming from the slaughterhouse or farm. The by-product could be small pieces of meat and bones, feathers and as big as a full-grown cattle.

Depending on required volume to store by-product, there may be 2-4 bottom screw conveyors to convey the material efficiently. There is an option to include a hydraulic hatch to close the top when not in use to prevent bad odor released from the raw material. While closed there are ducting



PRE-BREAKER / HOGGER

Hogger to reduce the size of larger pieces of fish and fish waste so that it can cook properly and not block the press. Hopper under the hogger with an inclined screw conveyor to transport the raw material to the feeding unit.

A level switch is installed in the hopper under the hogger and will stop the screw conveyors to the hogger when full.



ACCESSORIES FOR RENDERING PLANTS



FEEDING UNIT

Feeding unit with adjustable speed screw conveyor by frequency inverter which controls the capacity of the plant and volume of raw material entering the machinery per minute. A second level switch stops the conveyor from the hogger when the feeding unit is full and starts again by an adjustable timer.



MEAL COOLERS

For plant size larger than 60 tons input per 24 hours. Using air is the best way to cool fishmeal. Avoids “burning”, protects the quality of protein and makes grinding easier. Complete with stainless blower, ducting and cyclone with rotary airlock. No fishmeal dust should be carried over if the fishmeal is not over dried. Cooling of fishmeal is very important as it stops the heat deterioration of the protein, reduces the reaction of the fish oil left in the fishmeal and makes the fishmeal particles brittle and easier to grind.



COOLING SCREW CONVEYORS

For plant size under 60 tons input per 24 hours. Combined screw conveyor and meal cooler in one unit. Cooling screw conveyors is mounted after the drier and cools down the fishmeal by airflow, connected to a cyclone and blower, the outlet can be inside or outside the factory. It is important to air-cool the fishmeal just after drying. The reason are to avoid oxidation and self-heating of the fishmeal and to make the fishmeal particles more free-flowing and brittle before grinding. The fishmeal also heats up during grinding so there is a meal cooler after the hammer mill just before bagging.

ACCESSORIES FOR RENDERING PLANTS

ROTARY STRAINER AND MEAL FEEDER

Rotary strainer separator for stone, steel scrap, rope and plastic, mounted on top of the meal feeder. Meal feeder, buffer hopper and screw conveyor for feeding to the hammer mill.



HAMMER MILL

Milling in the hammer mill. The feed mills request the fishmeal to be ground quite fine in a hammer mill. The requirements from different feed mills can vary. The hammer mill hits and cracks the fishmeal particles with “hammers” mounted on a rotor, and when the particles are fine enough they fall down through a screen. The hammers are made from hardened steel and changeable to use all 4 sides. The manufacture tolerances of the hammers must be small to avoid vibration in the hammer mill. A magnet is mounted inside the mill to pick up mild steel scrap.



BAGGING UNIT

Bagging unit with hopper and built in screw conveyor for electric start/stop operation. Complete with gear motor and weighing machine capacity.





ACCESSORIES FOR RENDERING PLANTS



PROCESSING TANKS

Animal oils and fats are bound in the cells and must be heated (cooked) to about 80 to 95 degree C. to break the cell walls and make the fats and oils free flowing and separateable. The cooked mass is separated to solids and liquids in a screw press or a high speed decanter separator, both at inlet about 95 deg C.



CIRCULATING MEAL BIN

Meal bins must have a vertical or zig-zag screw conveyor or bucket elevator that transport the meal to the top and circulates the meal from bottom outlet to top of the bin to avoid self-heating and forming of bridges and hard blocks of meal that are difficult to discharge. These meal bins often circulate the meal 24 hours per day to avoid self-heating and bridging. ASTW offers such circulating bins and vertical screw conveyors.



TRUCK LOADER

Telescopic M&B (meat and bone meal) loader for 20 foot containers through the door, and also for top loading of trucks.

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WASTE HEAT EVAPORATOR FROM ASTW

The only purpose of the WHE is to save energy and lower the steam consumption.

The WHE can reduce the steam consumption by about 50 %, this is important if the boiler fuel is expensive, like diesel oil, heavy fuel oil or natural gas.

The WHE is mostly used for OFP (Oily Fish Plants) with cooker and press where the stick water and fish oil is separated anyway, but can also be used for lean fish to save energy. The WHE come in 1-stage if there is little stick water (tuna waste) and 2-stage if there is more stick water (sardine). Calculation will show what is needed.

The Rotary Disc Dryer is a dryer for solids (fishmeal). The WHE is a dryer for stick water, coming from the decanter and separator.

The stick water contains dissolved protein (like sugar is dissolved in water). This protein is valuable and must be recovered for higher protein % and better price, also called whole fishmeal. If the stick water is thrown away it is very polluting.

The WHE does not use steam from the boiler, but use the wasted vapor from the disc dryer that would normally be thrown away.

The disc dryer will evaporate water at normal boiling point 100 deg C. The WHE will evaporate water under vacuum where the boiling point is only 60 deg C. (that is the whole secret with the WHE : vacuum!)

The design of a WHE is basically a stainless heat exchanger with tubes, a circulation pump for the stick water which is pumped around and around, a vacuum pump plus two in and out feed pumps, and a condenser.

When the WHE has run for a while, the stick water will concentrate to a thick syrup that is pumped into the dryer and mixed with the fishmeal. WHE requires skilled operators and good maintenance and must often be cleaned by flushing with caustic soda. The WHE can be installed after the OFP fishmeal plant is installed.



WASTE HEAT EVAPORATOR COST SAVINGS CALCULATION

OFP-90 = OILY FISHMEAL PLANT 90 TONS/DAY (3.75 TONS/HOUR)

OFP – 90 (WITHOUT WHE)

Capacity:	3.75t/hour
Operation:	250days/year x 24hours/day = 6,000 hours/year [68% operation]
Raw material:	3.75t x 6000hr = 22,500 t/year
Oil consumption:	22,500t x 72 liters oil = 1,620,000 liters oil/year
Total cost:	1,620,000 liters x \$0.6 = USD \$972,000/year

(72 liters oil or oil equivalent is needed to make 1 ton of steam)

(1 ton of steam is needed to process 1 ton of raw material)

OFP-90 (WITH WHE)

Fishmeal plants with WHE uses about 0.55 – 0.6 ton steam to process 1 ton of raw material.
That means more than 40% total steam saving.

Oil consumption:	1,620,000 liters x 60% steam consumption = 972,000 liters/year
Total cost:	972,000 liters x \$0.6 = USD \$583,200/year

SAVING PER YEAR

Cost of oil used to produce steam:	\$972,000/year (Without WHE)
	<u>-\$583,200/year (With WHE).</u>
	USD \$388,800/year

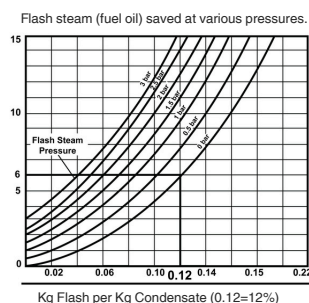
Note: This calculation is to give an estimate of the possible cost saving when using WHE – Waste Heat Evaporator. Real figures may vary.



ASTW DIRECT CONDENSATE RETURN SYSTEM (SAVE TANK) FROM ASTW

Direct condensate return system, Save up to 12% of your boiler fuel oil consumption and save boiler feed water and boiler chemicals.

- For all types of dryers, cookers and sterilizers that use indirect heating.
 - The system pumps the pressurized hot condensate directly into the boiler in a completely closed system and without loss of flash steam.
 - Example (see chart): a dryer operating at 6 bar steam pressure will lose 12% flash steam after the steam trap when condensate boils to reduce the temperature from 164°C to 100°C.
 - Automatic operation; if the pump stops, the system automatically switches over to normal steam trap operation.
- Single or multiple boiler installation.



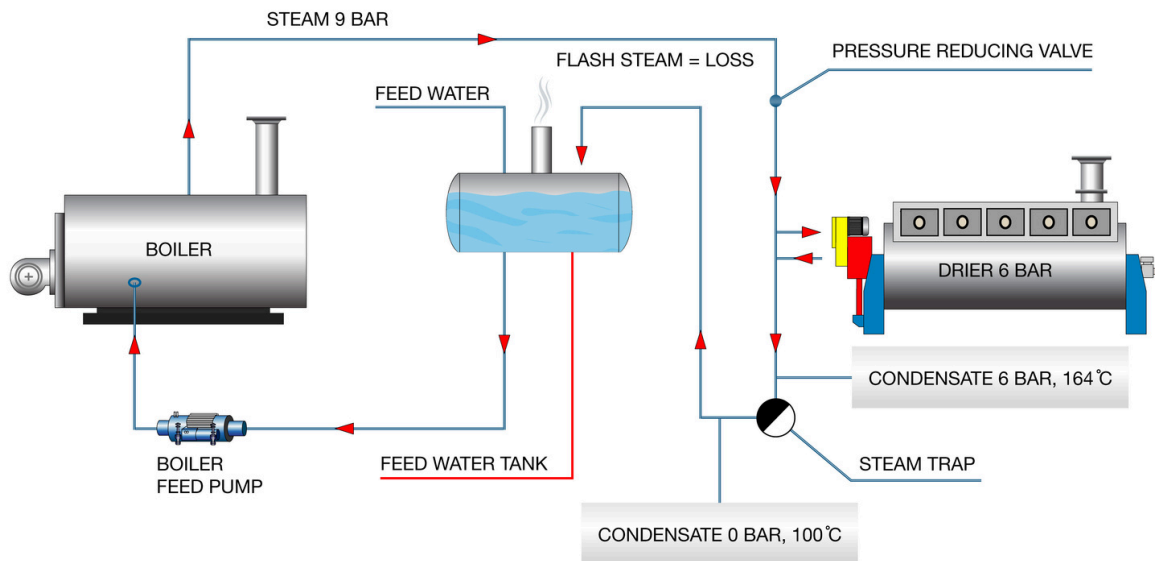
The system comes in a compact unit and consists of :

- Receiver tank (certified for 10 bar).
- High temperature, high pressure pump.
- Flow controllers and level switch.
- Automatic bypass systems using a steam trap.
- Electric control panel.
- Safety high water level switch for the boiler.
- Installation and commissioning included.
- Weight 1,275 kg. Volume 8.0 m³.
- Dimension: W 2.0 x D 2.0 x H 1.90 (m)

Note: One unit is required for each dryer.

ASTW DIRECT CONDENSATE RETURN SYSTEM SAVES UP TO 12% OF BOILER FULE COST

NORMAL SYSTEM

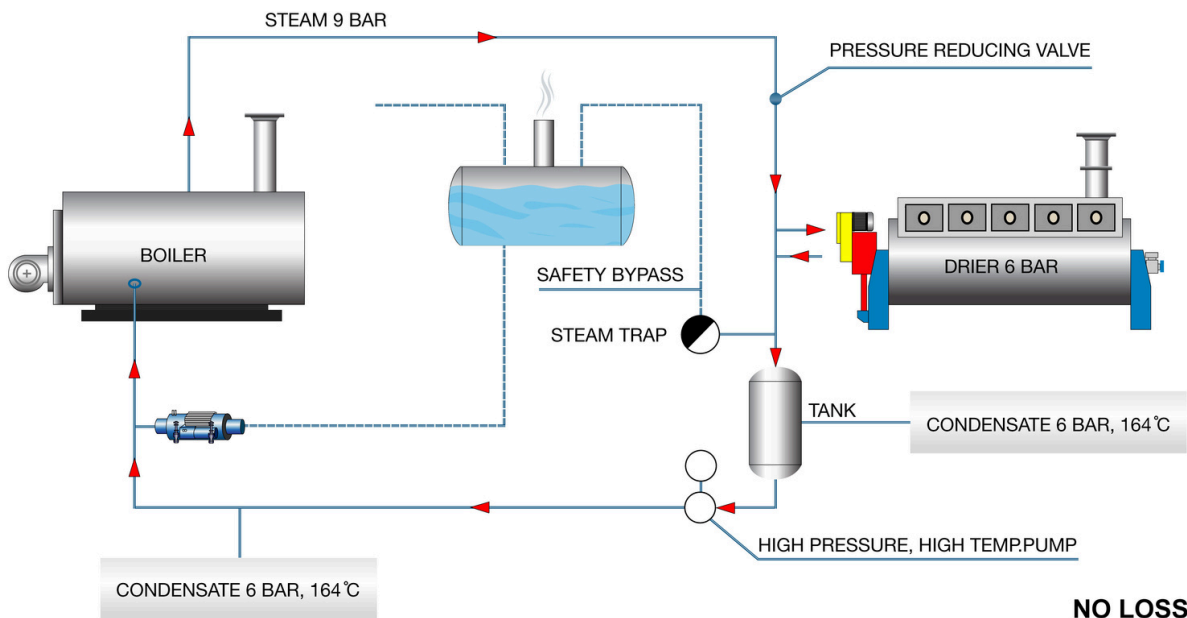


164 -100 °C \approx 12% FLASH STEAM
THE CONDENSATE BOILS OFF FLASHSTEAM
TO REDUCE THE TEMPERATURE BY 64 °C

THERMAL CALCULATION

$$\begin{aligned} & 100\% \times 64 \text{ KCAL} \approx 12\% \text{ LOSS} \\ & : 560 \text{ KCAL} \end{aligned}$$

CONDENSATE RECOVERY SYSTEM

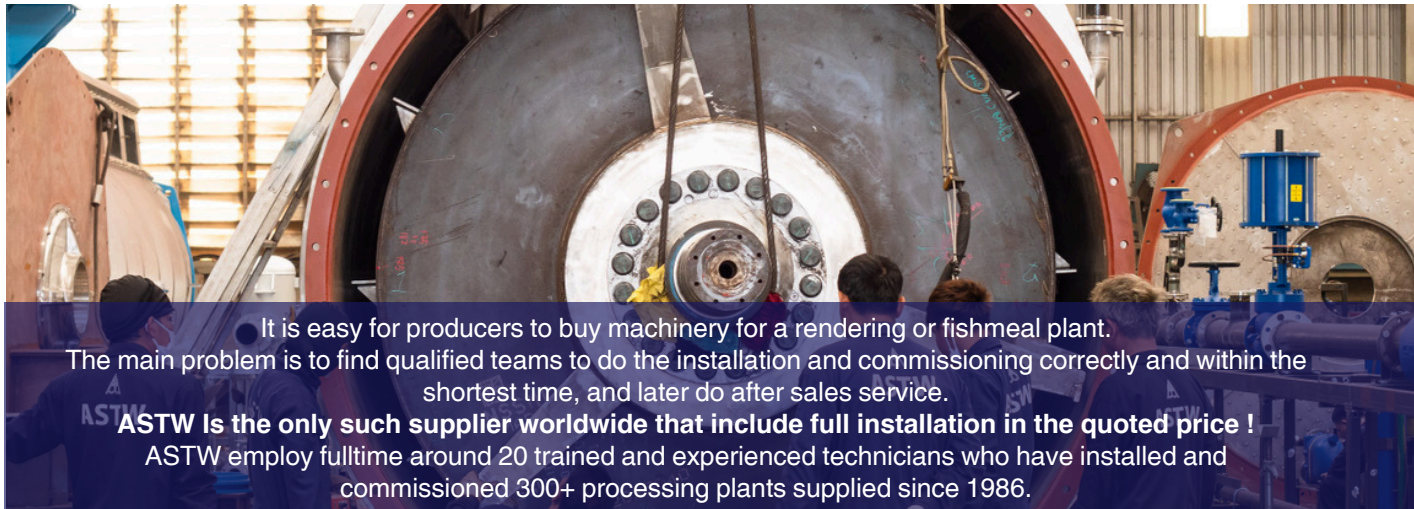


DIRECT CONDENSATE RETURN
SYSTEM (SAVE TANK)



A & S THAI WORKS CO., LTD

Designer and manufacturer of highest quality fishmeal and rendering plants



It is easy for producers to buy machinery for a rendering or fishmeal plant. The main problem is to find qualified teams to do the installation and commissioning correctly and within the shortest time, and later do after sales service.

ASTW is the only such supplier worldwide that include full installation in the quoted price !

ASTW employ fulltime around 20 trained and experienced technicians who have installed and commissioned 300+ processing plants supplied since 1986.

TYPICAL TASKS:

- Assuring that induction and safety and work rules are implemented
- Positioning and assembly of all components
- Install all gear motors and drives
- Erecting and welding of ducting, steam and processing piping using TIG welding with Argon purging, carried out by qualified welders
- Erecting cable trays, – and install cables where permitted (in Australia only local electricians can install electric cables)
- Commissioning and test run
- Fine tuning
- The same team members can later be called for after sales service

PRACTICAL EXAMPLE TO ILLUSTRATE:

ASTW supplied a large 21 ton/hr processing plant in 2020, and when the shipment of 73 units of 40 foot containers and 3 large dryers arrived at customers site, a 15 member installation team from ASTW followed shortly after.

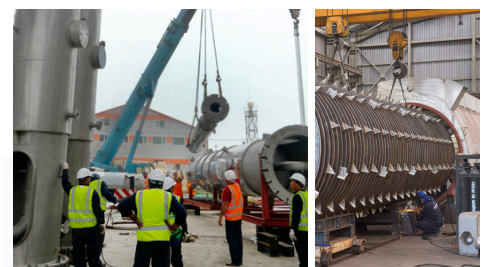
In a statement, the customer said that the team members, within the first days opened up all the containers without much talk and knew exactly where every part of the 180 components, piping, cables, nuts and bolts were to be located and installed. Included in the team were one electrician, one draftsman and one programmer.

All the ducting, steam piping, stainless process piping and electric work with cables and cable trays were included in the contract.

Within 4 months the plant was commissioned and up and running.

We hear that plants from other suppliers have taken up to a year to install similar plants as only a supervisor is normally included to lead a hired team of local workers who are not familiar with such machinery.

ASTW's experienced installation teams save time and cost for the customer and remove the risk of wrong installation.





A & S THAI WORKS CO., LTD

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SPARE PARTS

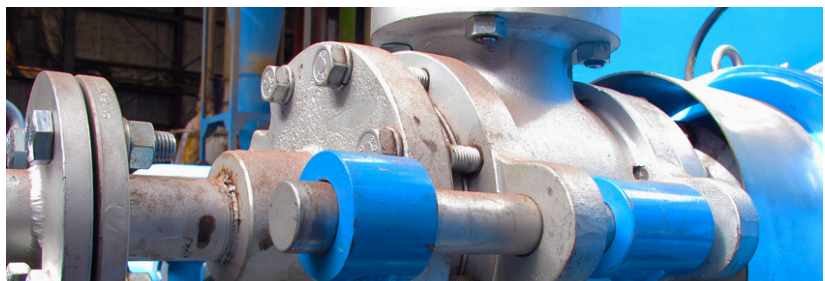
A & S Thai Works strive to keep stock of major spare parts for main machinery, such as:

- Bearings, sleeves and bearing houses for cookers and dryers
- Carbon ring and parts, and complete units for rotary steam joints
- Stub shafts for cookers and dryers (forged and machined)
- Special high tensile bolts, washers and gaskets for stub shafts
- Smaller items like sight glasses and special valves
- Complete gear boxes for some of the large dryers, but only for certain periods of long delivery time

Some parts like forged stub shafts and large, high temperature bearings have long delivery time: up to 8 months, so ASTW buy the items in numbers and keep stock for immediate delivery.

In case of break down, customers need urgent delivery of spare parts to avoid long shutdown of their processing plants.

ASTW is located near Bangkok airport and can pack and deliver spare parts for air freight within one or two days. Some times our service teams even hand carry spare parts for quick delivery to customers plants





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