



FISHMEAL CATALOGUE

A & S Thai Works

www.asthaiworks.com

99/199 Moo 1 Theparak Rd., Km.22, Bangsaothong, Samutprakarn Thailand 10570

Tel: (+66) 2-313-1540

E-mail: sales@asthaiworks.com



A & S THAI WORKS CO., LTD

Designer and manufacturer of highest quality fishmeal and rendering plants

Call us 
02 313 1540



FISHMEAL PLANTS

ASTW

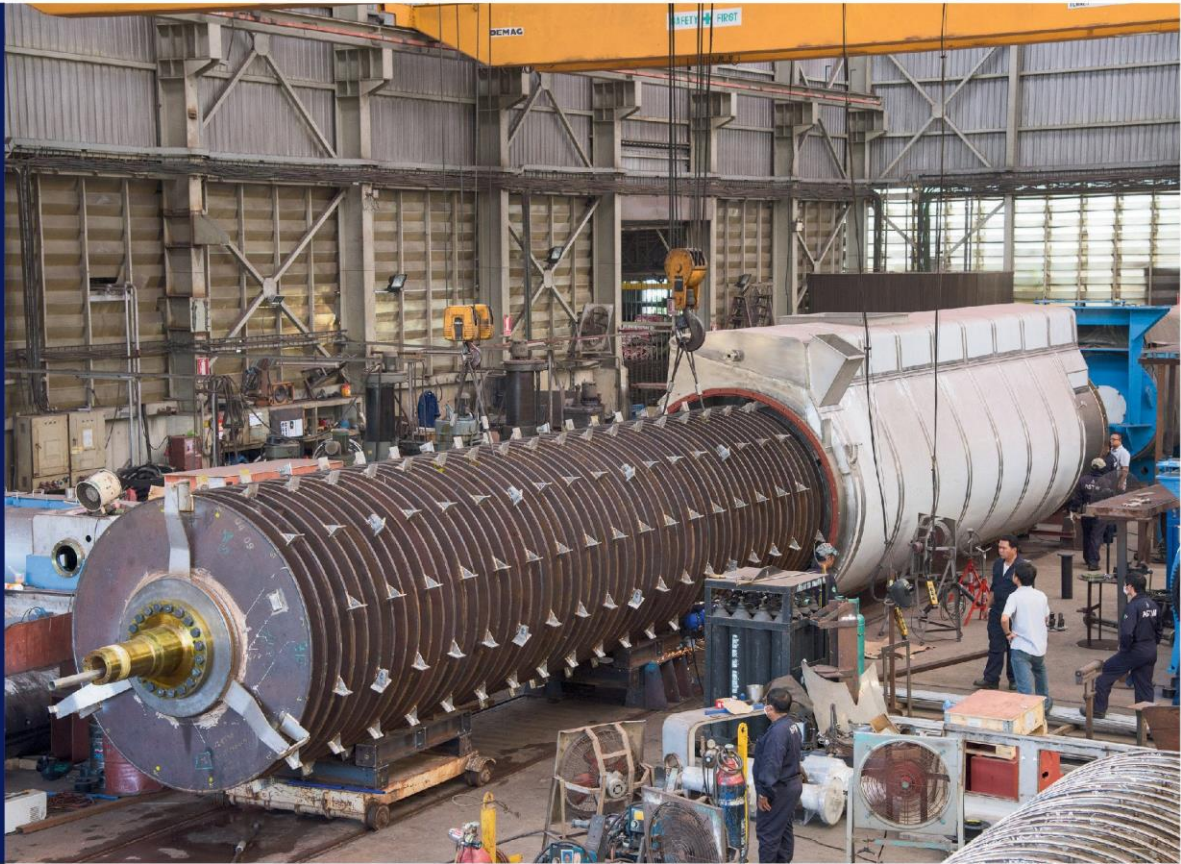
Designer and manufacturer of highest quality fishmeal and rendering plants



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COMPANY PROFILE



A & S Thai Works was established in Bangkok in 1984 as a subsidiary of Stord Bartz, a leading Norwegian supplier of fish meal plants. We supplied and installed the first fish meal plant in 1986. Until 1998 our products were marketed under the name Atlas Stord. In 1998, the Aker Group, the owner of the company, decided to sell out the different parts of their fish meal business.

The Asian part was bought by Mr. Sverre Golten who had been running the business in Bangkok from the outset. He is still the owner and managing director of the company.

Already from the start in 1984, there has been constant product development to improve the already very good technology inherited from the mother company in Norway. Much emphasis has been put on utilizing the advantages of manufacturing in Thailand.

Thailand is a country with low production costs. Still, Thai workers make very high-quality products, fully competitive with products manufactured in Europe. This is one of the reasons why so many industries have established production units in the country. Examples are the car industry, equipment for oil and gas exploration and production, electronics industry and so on.



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COMPANY PROFILE



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ABOUT US



ABOUT US

A & S Thai Works have been manufacturing, installing, running and fine-tuning rendering and fish meal plants for over 30 years using only our own experience team. This gave us the ability to grow and become experts on designing, fabricating and fine-tuning the plants to be as efficient and reliable as possible. Our team has the practical experience by being at customer's site and understanding how each country has its differences in climate, raw material, infrastructure and culture that has an effect on a particular plant.



VISION

The world's food industry still needs fishmeal and rendering plants to process the waste and by-products coming from this industry.

The old school of plant managers and operators are gradually retiring and a new generation is coming up and are having a hard time grabbing old and new technology and the abundance of regulations.

There is an increasing need for by-products plants to be ever more complete in delivery, easy to install, reliable and easy to operate and maintain, and at the same time give good quality output with low energy consumption. The balance between inhouse operators and inhouse and contracted maintenance craftsmen may change.



MISSION

01

ASTW's job is firstly to provide complete, sturdy and reliable plants with all the nuts and bolts and installation included, and without compromise and hidden agendas, and full automation when possible.

02

To focus on completeness and what is honestly the best solution for the customers instead of hunting for the lowest price that involves compromises.

03

Secondly to train and upkeep a sufficient team of qualified personnel and offer full installation, after-sale service and maintenance when possible, sometimes by 12 months contracts.



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SOLUTIONS

Turnkey Solution

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



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

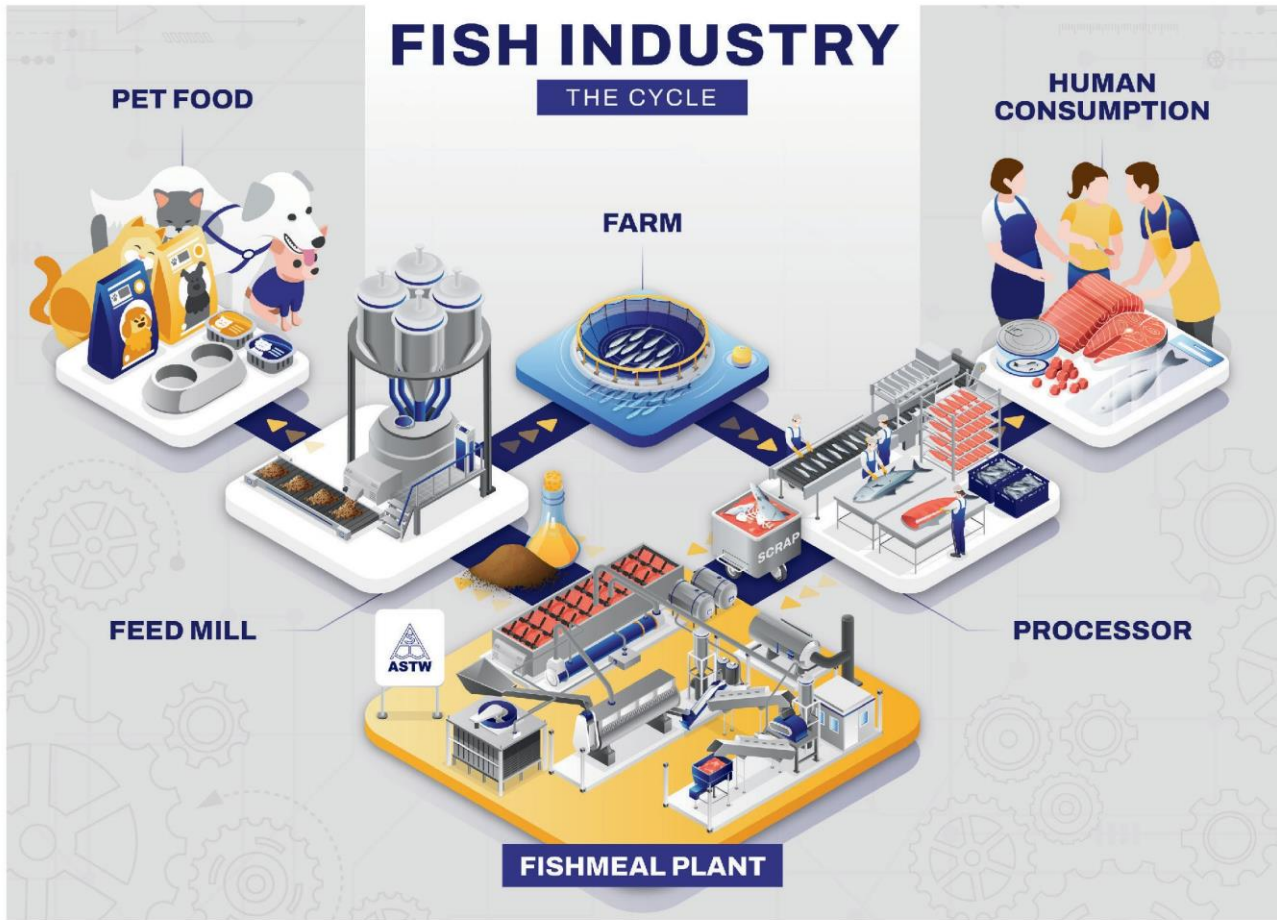
Complete installation and commissioning are available using our highly experienced service teams. Our experience team are capable of installing a complete 360t/day rendering plant within 2 months and even quicker installation for smaller projects. We never use sub-contractor for installation which saves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



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FISH INDUSTRY THE CYCLE



Our company is somewhat in the middle of the food and feed cycle



FISHMEAL PLANT



**PROCESS
EXPERT WITH
PRACTICAL
EXPERIENCE**



WHAT DOES A FISH MEAL PLANT DO?



WHAT IS FISHMEAL?

Fishmeal is dried and sterilized fish powder used for animal feed. Fishmeal has the most complete, balanced and nutritious protein content of all food and feed stuffs available and is used as a protein ingredient in animal feeds, mostly for chicken, pig, shrimp and fish. Fishmeal for human consumption is being made in small quantities for high protein additives (Europe) or food additive (Asia), and although its nutrition is superb, the fish powder smells strongly from fish and has a sand like consistency and is not that popular to eat.

WHAT DOES A FISHMEAL PLANT DO?

The job of a fishmeal plant is mainly to remove the water from raw fish and also to separate as much fish oil as possible (OFP plants only). The fishmeal plant does not remove or add protein, what “goes in is what comes out”, but a good fishmeal plant retains the protein and nutrition qualities in the fish.

Raw fish is easy perishable (becomes rotten), can be stored for only a short time under normal temperature and should be kept as cool as possible and processed as soon as possible.

Fish contains nearly 70% water which makes it heavy to transport. Yield ratio is about 4 kg fish to make one kg fishmeal. During the fishmeal processing the fish is sterilized, the water is removed (only 6-10% moisture is left) and the end product is a fine, light brown powder with high protein content, low oil and moisture content and very long storage time.



A & S THAI WORKS CO., LTD

Designer and manufacturer of highest quality fishmeal and rendering plants

WHY CHOOSE US?



A & S THAI WORKS CO., LTD.

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. As of 2016, most are still running.

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.



A & S THAI WORKS CO., LTD

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REFERENCE LIST

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REFERENCE LIST



ASTW

FISHMEAL

RENDERING

ASTW

A & S Thai Works Co., Ltd.
Our locations

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.

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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FISHMEAL PLANT

1 YEAR WARRANTY

ASTW Rotary Disc Dryers come with 1 years warranty for dryer body, gear, bearings and even the motor.

INSPECTION CERTIFICAT

ASTW Rotary Disc Dryers are inspected and certified to British Standard BS (PD) 5500, European Standard PED and Australian Standard AS 1210. International approval, inspection and certification is provided by Lloyd's Register International (Thailand) Limited.

SERVICE TEAM

Complete installation and commissioning is available using our highly experienced service teams, along with full operating documentation for each plant

WHAT WE NEED TO KNOW FROM YOU

- Describe type and size of fish or fish waste, oil content and time from catch to processing.
- To estimate the plant size, multiply with 1.4 your daily average catch in tons input per 24 hours.
- Describe the location, near city, sea or river.
- Describe supply of boiler, electric power available, voltage and frequency.
 - How are you planning to transport the raw material to the fish meal plant? (Truck, pump, screw conveyor)
 - Will the plant be installed in an existing building or is it a greenfield project.
- A & S Thai Works will supply engineering, layout, installation, commissioning and service.



ASTW FISHMEAL PLANTS AND MACHINERY

The plants are a modern design using the Rotary Disc Dryer technology that can operate continuously for years and provides easy operation, low energy consumption, low maintenance and long life. ASTW also provides excellent after sale service and carry a supply of spare parts in stock. ASTW Rotary Dryer design is based on Norwegian technology.

SPARE PARTS

Genuine spare parts are carried in stock for all ASTW manufactured equipment. Contact our sales and marketing team for assistance

LFP – LEAN FISH PLANTS

- Developed and manufactured for operation in Asia by A & S Thai Works.
- For trawler fish and fish waste with less than 3% oil content. The plant can process almost all kinds of raw materials.
- The heavy duty version can withstand wear from sand, shell and stone in the fish.
- Simple design and very easy operation using a “Rotary Disc” dryer and accessories including feeding unit, meal cooler, hammer mill, bagging unit and scrubber deodorizer.



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ADVANTAGES:

Absolutely the **best quality fishmeal machinery** on the market today designed to processes raw fish, fish waste and tuna-waste. The Rotary Disc dryer is easy to operate and maintain by semi-skilled operators.

UNCOMPROMISED QUALITY AND RELIABILITY

ensures continuous and profitable operation for many years with only a minimum of maintenance. A heavy duty version is available and can withstand wear from sand, shell and stone in the fish.

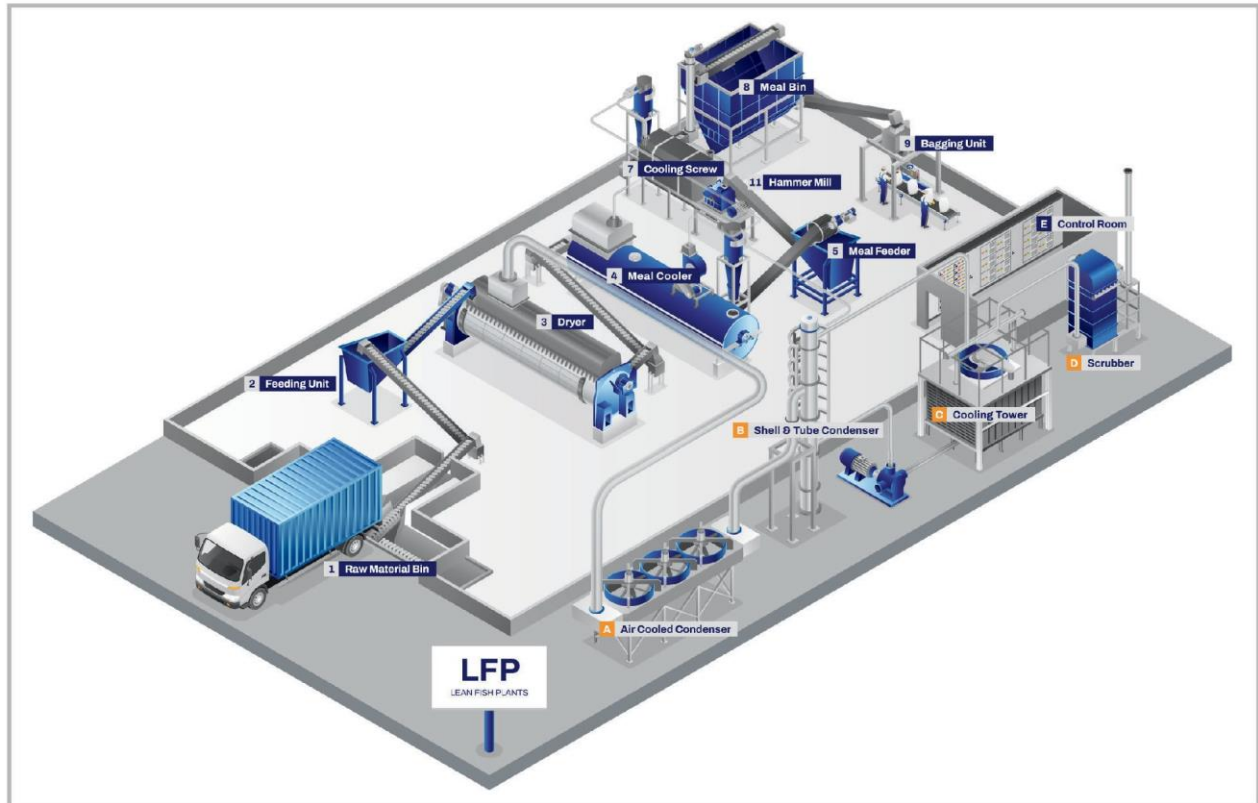
Produces high quality fishmeal and fish oil (OFP), and does not burn and destroy the protein like direct fired or hot oil dryers.

ASTW FISHMEAL PLANTS AND MACHINERY

More than 2,000 units of this famous European designed Rotary Disc, steam heated dryer have been delivered worldwide. ASTW research and development continues to make enhancements to the dryers, presses, pre-heaters, and ancillary equipment. The enhancements in design continue to improve efficiency, reliability and lifetime cost of the plants.

ASTW LEAN FISH PLANTS

LEAN FISH PLANT



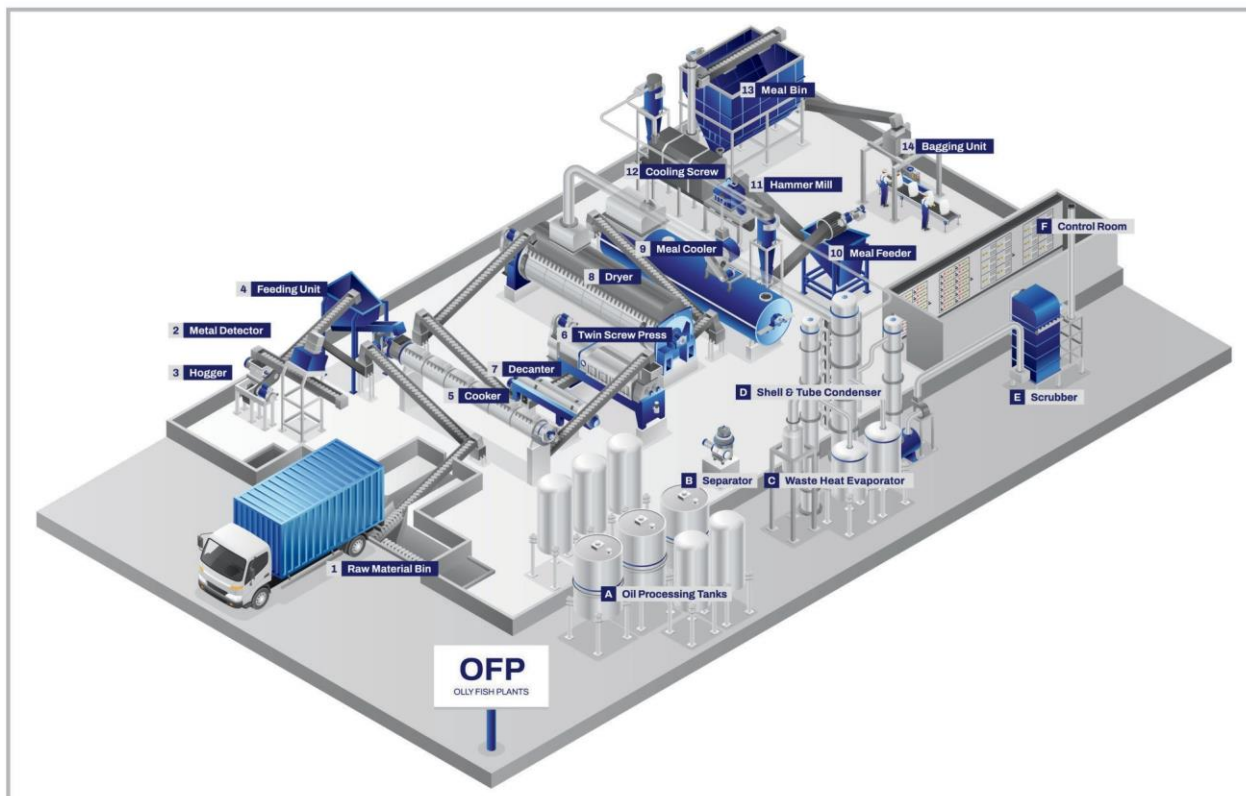
TECHNICAL SPECIFICATION: ASTW LEAN FISH PLANTS (LFP) – THE FIGURES ARE ESTIMATES

Plant size	Capacity tons input per 24 hr	Steam Consumption ton/hr	Recommended boiler size ton/hr at 10 bar	Electric Consumption in kW Installed/load 70%
LFP 24	24 - 30 tons	0.9	1.2	60/42
LFP 55	55 - 60 tons	2.1	2.5	107/75
LFP 90	90 - 100 tons	3.4	4.5	142/99
LFP 120	120 - 140 tons	4.5	6.0	180/126
LFP 160	160 - 180 tons	6.0	8.5	235/165

- For trawler fish, fish waste, crab, marine life and bones with less than 3% oil content. The plant can process almost all kinds of raw materials.
- The LFP plant can later be extended to be OFP plant by adding cooker, press, decanter and tanks and pumps.
- Simple design and very easy operation using basically a Disc Dryer and accessories including feeding (metering) unit, meal cooler, hammer mill, bagging unit and vapor condenser and smell removal unit



ASTW OILY FISH PLANTS



OILY FISH PLANTS

- For fish and fish waste with more than 3% oil content. Produces high quality fishmeal and fish oil.
- The OFP – Oily Fish Plant uses the same components as the LFP – Lean Fish Plant but with addition of a cooker, twin screw press, solid/liquid decanter separator, oil separator, plus pumps and tanks.
- The plants are a modern design that will operate continuously for years and provides easy operation, low energy consumption, low maintenance and long life time. ASTW also provides excellent after sale service and carry a supply of spare parts in stock. All designs are based on Stord Norway technology.
- A Waste Heat Evaporator (WHE) can be included for plants larger than OFP 55 to save 40% steam.

TECHNICAL SPECIFICATION: ASTW OILY FISH PLANTS (OFP) – THE FIGURES ARE ESTIMATES

Plant size	Capacity tons input per 24 hr	Steam Consumption ton/hr	Recommended boiler size ton/hr at 10 bar	Electric Consumption in kW Installed/load 70%
OFP 24	24 - 30 tons	0.9	1.2	160/112
OFP 55	55 - 60 tons	2.1/1.4 WHE	2.5	195/136
OFP 90	90 - 100 tons	3.4/2.0 WHE	4.5	260/182
OFP 120	120 - 140 tons	3.2 WHE	5.0 WHE	275/195
OFP 160	160 - 180 tons	4.5 WHE	6.5 WHE	300/210
OFP 336	336 - 350 tons	8.6 WHE	12.0 WHE	570/400



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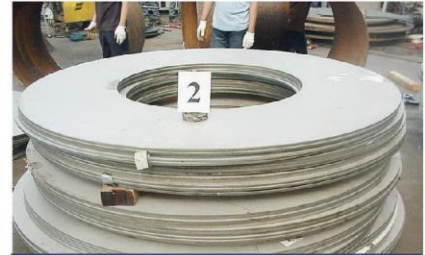
WHAT'S HIGH QUALITY?

FISHMEAL ROTARY DISC DRYERS

WHAT'S HIGH QUALITY?



Very good finish, painting and stainless cladding for insulation. Our Rotary disc dryer come with 3 years warranty* for dryer body, gear, bearings and even the motor. Rotary disc dryer after 20 years of operation and still in Good condition.



Thick steel plates with Certificate



Welding with MIG flux core/CO2 the best method for quality welding.



Special high grade rotor pipe from Europe made in one price.



Special forged from Europe, same steel as a tool spanner.



Stainless cladding on all area with high wear.



High grade steam joints with carbon rings and special High-temp SKF roller bearings



Highest quality Gearboxes from SEW/METSO, Germany and Cyclo, Sumitomo with high safety factor.



Approved by Quality control certified by Lloyd's Register



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 4.4	3.0	44
AST/TST 8.0	44	80
AST/TST 10.0	55	100
AST/TST 16.0	90	160
AST/TST 24.0	120	240
AST/TST 30.0	160	300
AST/TST 40.0	220	400



COOKERS

- The cooker is indirect steam heated in the rotor screw and jacket to cook/preheat the raw material to 95 deg C.
- Variable speed gear motor by frequency inverter and variable steam pressure control the cooking/preheating process.
- The cooker rotates very slowly to avoid breaking up the fish to a “soup” before pressing.
- The raw material must have 95 deg C temperatures for good pressing.

Type	Capacity (tons/hr)	Inner Dia.	Length (Fl./Fl.)	Drive (kW)	RPM	Remark: Component to use for Oilly Plant type (OFP)
PH 55	3.0	700	3000	3.7	2-4	OFP 24/ OFP 55
PH 90	4.0	700	6000	5.5	0.8-4.8	OFP 90
SS 25/8	7.0	700	8000	5.5	0.8-4.8	OFP 120
SS 45/9	12	796	9000	7.5	0.8-4.8	OFP 160
SS 75/12	18	900	12000	15	0.8-4.8	
SS 100/15	25	1000	15000	22	0.8-4.8	
SS 130/14	40	1300	14000	30	0.8-4.8	





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.

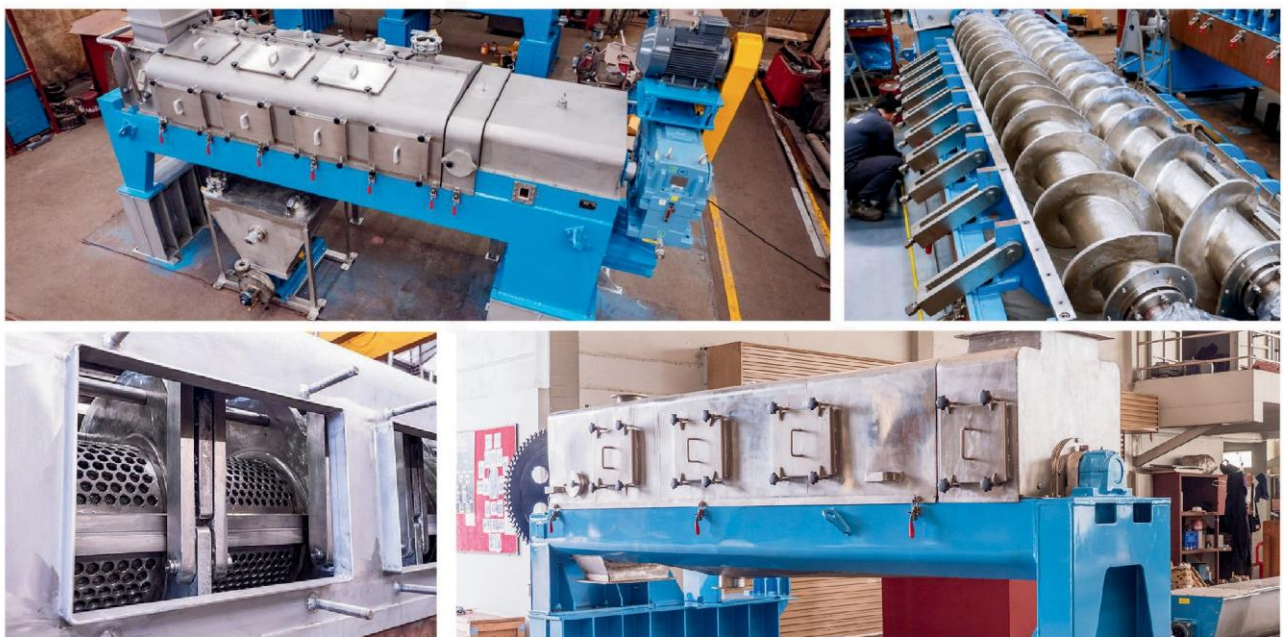
● **THERE ARE TWO TYPES OF PRESSES:**

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.

However, ASTW has modified the design so that the single screw presses perform almost as good, and often just as good as the twin screw presses. The simple design makes the single screw presses much cheaper than the twin screw presses but just as sturdy and with the same long life time.

Sizes of presses for fishmeal production:

All presses are of solid stainless steel design and come with a variable speed gear motor controlled by a frequency inverter (included). Operating capacity should be about 50 – 75% of maximum capacity.



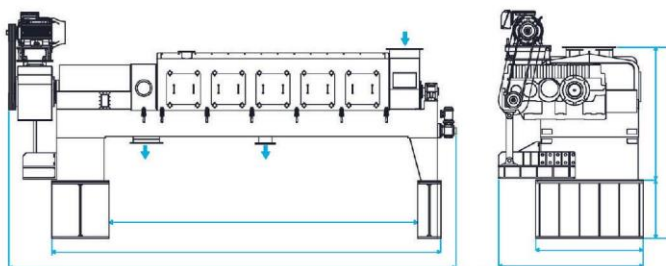
● **Twin Screw Presses:** Max. capacity in tons input/hr: 3 – 7 – 10 – 18 – 25

● **Single Screw Presses:** Max. capacity in tons input/hr: 1.5 – 3.0 – 4.0 – 7.0

TECHNICAL FOR PRESSES

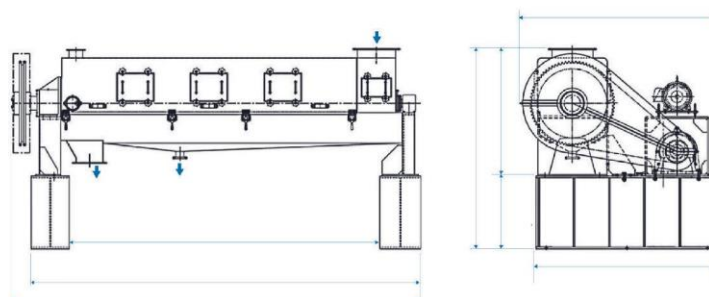
● TECHNICAL DATA FOR TWIN SCREW PRESS

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



● TECHNICAL DATA FOR SINGLE SCREW PRESS

Type	Nominal capacity raw material tons/hour	H	H1*	H2	W	W1	L	L1	Net weight/ kg.
AST/TP 24	1.5	1770	800	970	1850	1600	3400	3250	2500
AST/TP 32-1	3.0	1850	800	1050	2050	1850	3500	3365	3500
AST/TP 41-1	4.0	2200	800	1400	2160	2000	4500	4287	4500
AST/TP 49-1	7.0	2500	800	1650	2450	2560	6000	5550	6000





ACCESSORIES FOR FISHMEAL PLANTS

FISH BIN

Raw material bin where the fish is dumped coming from processing or port.

One or two bottom screw conveyors transport the raw fish to an inclined conveyor and then to the hogger (OFP Plants) or to feeding unit (LFP Plants).



FISH 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 FISHMEAL 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.

FEEDING UNIT, MEAL COOLERS,
COOLING SCREW CONVEYORS



ACCESSORIES FOR FISHMEAL 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.



ROTARY STRAINER AND MEAL FEEDER,
HAMMER MILL, BAGGING UNIT



ACCESSORIES FOR FISHMEAL 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.

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.



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

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.



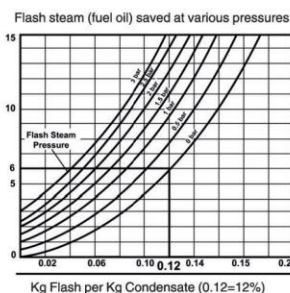
DIRECT CONDENSATE RETURN SYSTEM (SAVE TANK)



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.

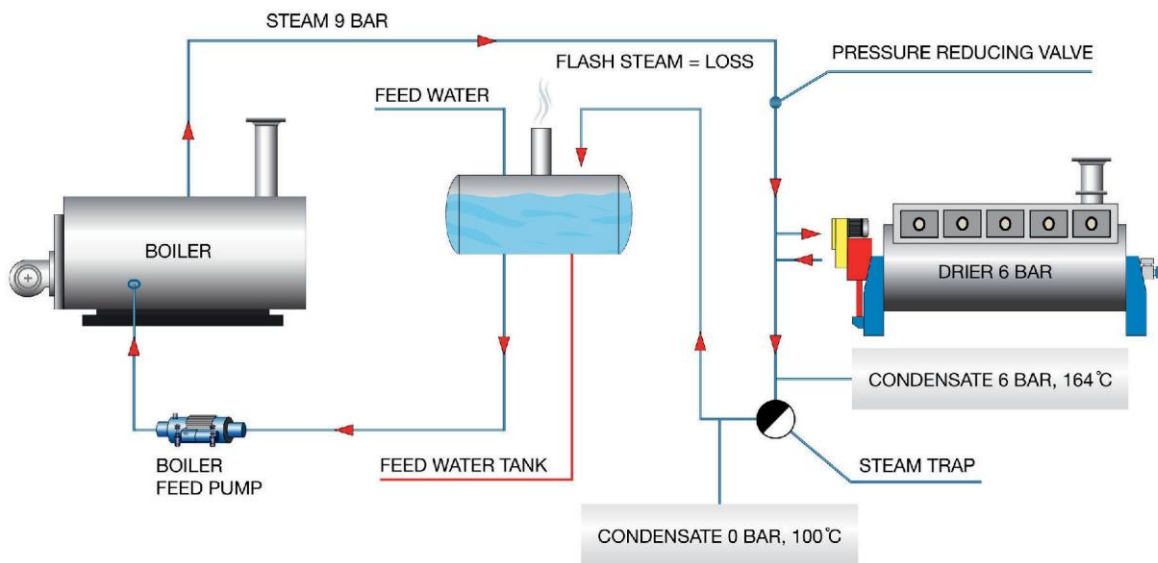


The system comes in a compact unit and consists of :

- 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

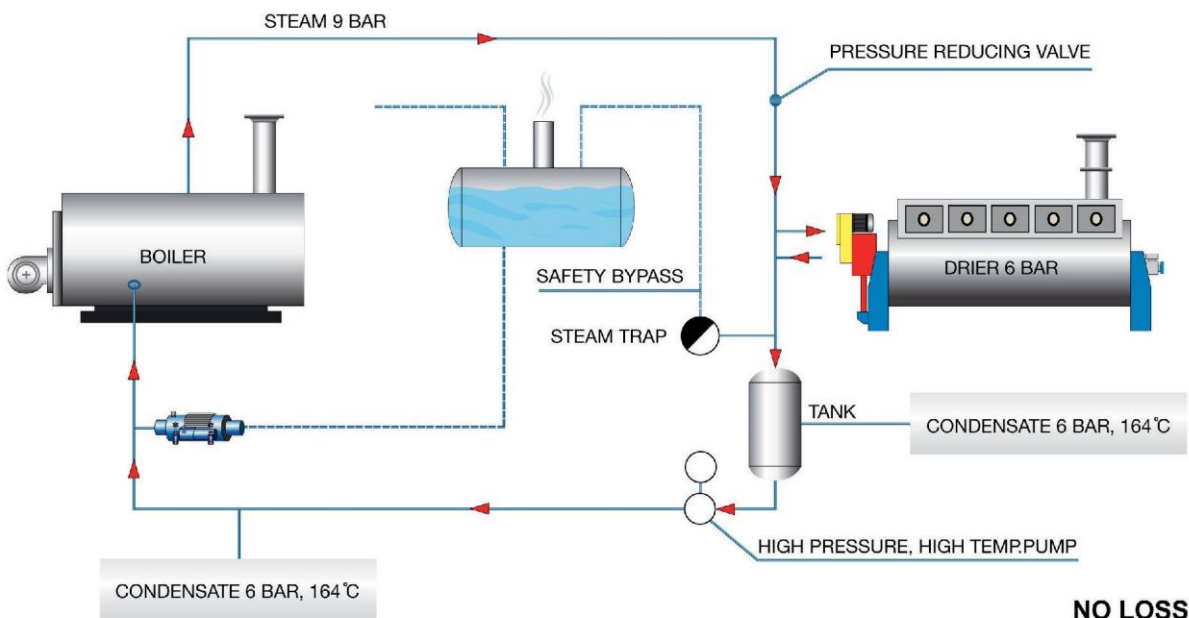
NORMAL SYSTEM



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

THERMAL CALCULATION
 : 100% x 64 KCAL ≈ 12% LOSS
 : 560 KCAL

CONDENSATE RECOVERY SYSTEM



NO LOSS

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.





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SPARE PARTS

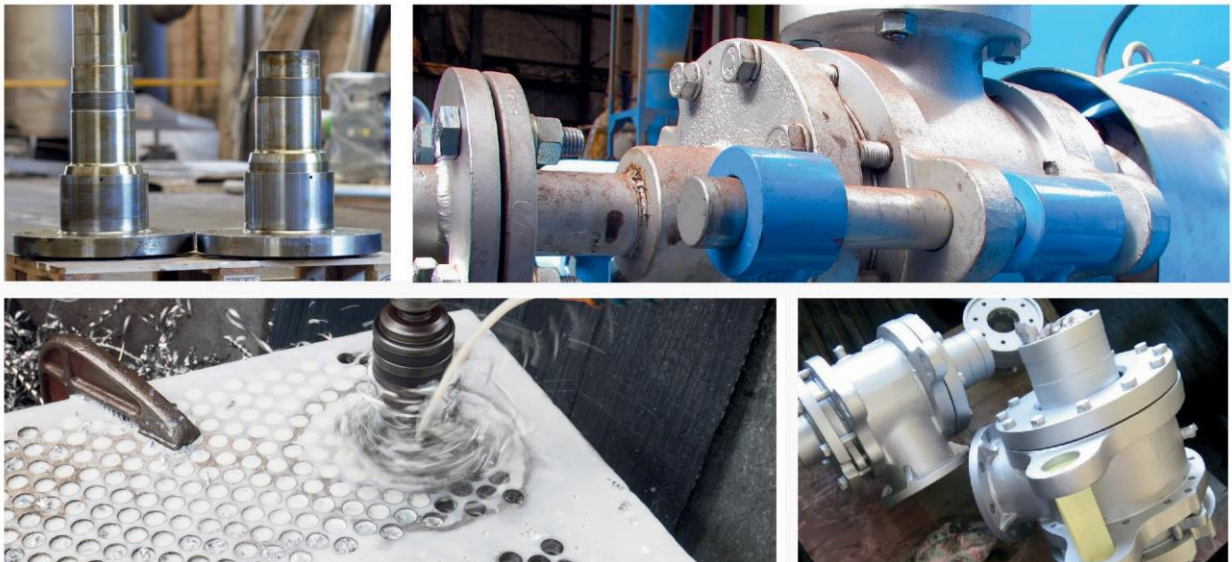
A & S Thai Works strive to keep stock of major spare parts for main machinery, such as:

- 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





A & S Thai Works Co., Ltd.
Animal Byproducts Processing Machinery

99/199 Moo 1 Theparak Rd., Km.22, Bangsaothong, Samutprakarn Thailand 10570

Tel: (+66) 2-313-1540

E-mail: sales@asthaiworks.com

www.asthaiworks.com