



Rendering is about making the best profit out of animal by-products. Mavitec's rendering technology turns animal by-products into valuable meals, fats and oils with highest protein and digestibility levels. Maximize the value of your by-products!

MAVITEC RENDERING SOLUTIONS
Create the best nutrient values in the market

MAVITEC



MAVITEC GROUP

Mavitec Group is a Dutch company providing solutions for businesses with large quantities of animal by-products, biomass and other organic by-products. Mavitec specializes in high quality recycling processes and is an expert in building, coordination and delivery of individual components up to complete turnkey projects. We provide complex process solutions in a simple and effective way, customized to the needs of our clients.

Mavitec is one of the leading companies in engineering, designing, construction, manufacturing, installation and servicing of high quality process systems. Our goal is to offer the highest quality and excellent service to make a plant more profitable as well as to improve the environment. Mavitec has sales and service offices worldwide, an international network of representatives and a state-of-the art production facility located in Turkey. Mavitec headquarters is based in The Netherlands.

MAVITEC RENDERING

Mavitec is a leader in the rendering industry and offers complete systems and equipment for the processing and rendering of animal by-products. We offer batch and continuous solutions for poultry, red meat and various other kinds of organic by-products. Our unique rendering solutions turn animal by-products into valuable proteins, oils, fats and tallow, suitable for use in e.g. feed, pet food-, aquafeed-, pharmaceutical and oleo-chemical industry. Mavitec rendering solutions create the best nutrient values in the market.

With over twenty years of experience we have installed hundreds of installations worldwide. Thanks to our extensive network, in-house engineering, services and own production facilities, we are able to produce sustainable solutions designed to clients needs and preferences.

MAVITEC RENDERING offers high quality systems and equipment for processing and rendering of animal by-products. Our rendering systems recycle animal by-products and turn them into valuable end-products: meals and oils with the highest protein and digestibility levels. Mavitec batch and continuous solutions create the best nutrient values in the market.

*“Rendering is not
waste handling,
it's nutrient management”*

BENEFITS OF RENDERING

- Rendering is safe and essential
- Helps food recovery hierarchy by recycling animal by-products
- Converts animal by-products into high quality end-products
- Recovered resources have high economic value
- Increasing energy independence
- Helps reducing greenhouse gases

Creating the best nutrient values

Mavitec rendering systems turn animal by-products that are not intended for human consumption into valuable end-products: meals, fats and oils with the highest protein and digestibility levels. To use animal by-products in other processes they have to be treated first. The way of processing determines the value of the end-products.

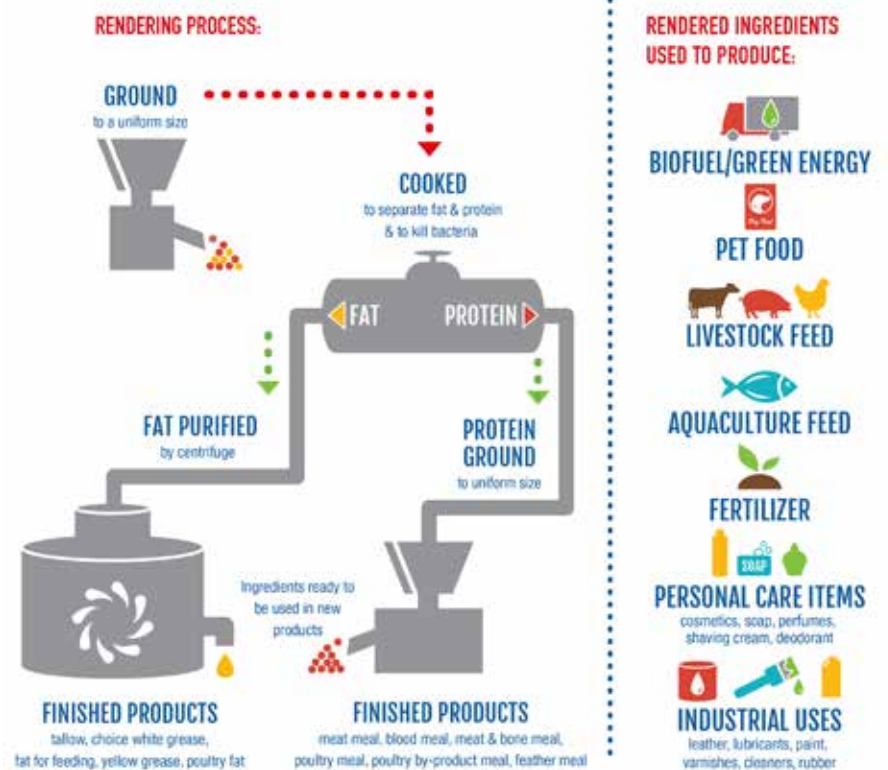
Rendering and protein recovery

After collecting the animal by-products the process of rendering is followed by cooking to reduce moisture content and to eliminate micro-organisms. Mavitec's rendering solutions are based on the separation of liquids (such as water, oil, fat and tallow) from the solid (protein). End-products can be used to produce renewable energy, pet food, livestock feed, aquaculture feed, fertilizer, personal care items and other industrial applications.



Mavitec rendering solutions create the **best nutrient values** in the market. Our batch and continuous systems produce the highest quality meals, tallow, fat and oils for use in other industries such as pet food, feed, cosmetic or oleochemical industry.

- Meat and bone meal
- Poultry meat meal
- Feather meal
- Blood meal
- Whole meal
- Hatchery meal
- Tallow
- Fat and oil



Source: North American Renderers Association



Processing methods



Mavitec is specialized in various processing methods, based on approved methods for processing animal by-products: batch and continuous rendering solutions for poultry, red meat and various other kinds of organic by-products. We offer high quality solutions and services for every step of the rendering process, resulting in a full range of single equipment and turn-key solutions for:

- **Poultry by-products** Chicken, turkey, etc
- **Red meat by-products** Porcin, cattle, etc
- **Feather / hair**
- **Blood**
- **Hatchery waste** Hatched eggs, shells, etc
- **Mix of by-products / fallen stock**
- **Other organic by-products** Fish, insect rearing, etc



Batch or continuous processing

The choice between batch or continuous processing depends on the type and volume of the input material and is mostly driven by economical arguments. In general batch systems are advised for lower capacities and multiple stream solutions, offering more flexibility thanks to combined product streams. Continuous processing offers advantages for higher capacities and single stream by-products.

	BATCH	CONTINUOUS
Input material Meat / feathers / blood	Single and multiple streams, mixed	Multiple single stream
Poultry material / day	5 - 100 ton	> 80 ton
Red meat / day	5 - 60 ton	> 60 ton

Rendering processes

1. Batch processing
2. Continuous meat by-products processing
3. Continuous feather/hair processing
4. Continuous blood processing

Rendering sections

- Storage & Handling
- Resizing
- Cooking & Heating
- Drying
- Separating
- Pressing
- Conveyors & Pumps
- Air control
- Energy control
- Process control

LEGISLATION

Mavitec offers approved methods according to latest international legislation for the processing of organic by-products:

- CAT 1
- CAT 2
- CAT 3



Rendering sections



Raw material

The raw material section is the first section of the rendering plant. Because of the wide variety in type and nature of animal by-products, specific methods of storage, transfer and pre-treatment can be required. The choice of design and execution depends on the type of raw material, such as poultry (white meat) by-products or red meat by-products. This section takes care of the raw material input (meat, bones, offal, blood, feathers, hair).

EQUIPMENT

Bins / Tanks / Hoppers

Storage

Conveyors

Transferring raw material

Prehogor / Precrusher / Small crusher

Size reduction

Separator / Metal detection / Dewatering/Feather press

Separation



Processing

The purpose of the processing section is to **condition, sterilize, hydrolyze** and **cook/dry** the animal by-products.

Mavitec offers two system methods:

- batch processing
- continuous processing

The choice between these methods is driven by economical arguments and depends on various factors such as available space and feasibility.

EQUIPMENT

Batch cooker

Batch processing of all by-products

Supercookor®

Continuous drying of meat, bones and offal

Continuous hydrolyzor™

Continuous hydrolyzing of feathers/hair

Blood coagulator®

Continuous coagulating of blood

Ring dryer / Disc dryer / Drum dryer

Continuous drying of feathers, blood, hair



Fat handling

After cooking meat, bones and offal, the solid fraction still contains fat. Removing these fats is called **defatting**. Separating fat from solids offers various advantages such as:

- positive effects on meal handling
- improved shelf life of end-product
- higher value of recovered fats compared to the solids (protein).

In the **fat handling** process solids are further separated from the fats, which increases the value of the fat. The end-product can be **tallow, fat and oil**. Mavitec offers two methods: **settling** or **decanting**. The choice between these methods is economical driven, where decanting can achieve lower residual solid content in the fat.

EQUIPMENT

Fat press

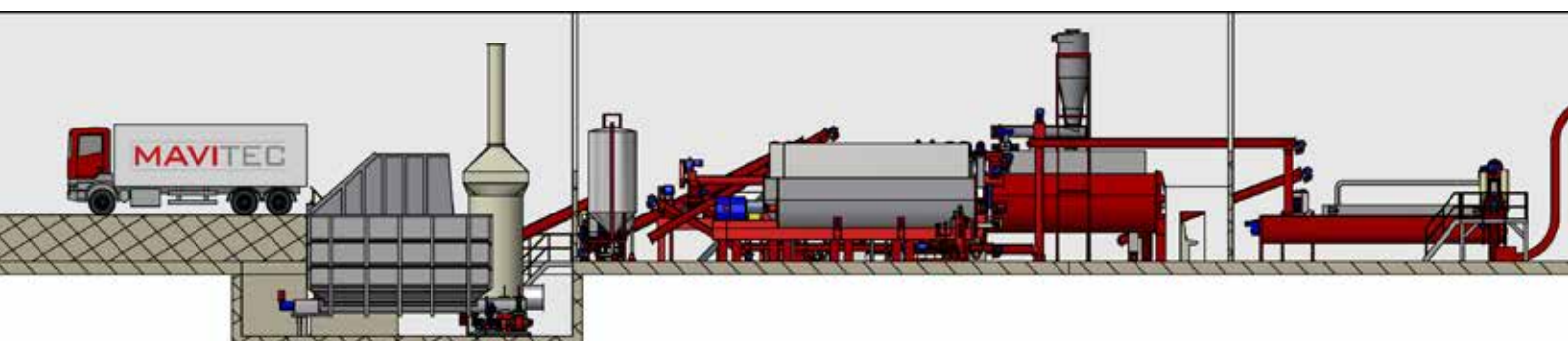
Separating liquids from solids by applying high pressure

Fat sterilizer

Sterilizing system in automated cycle

Decanter (centrifuge) / Settling tank

Separating liquid from solid



Rendering sections



Meal handling

In this section the meal is cured, cooled, grinded and stored. The end-product can be transported to the end user (e.g. pet food, feed industry).

Possible end-products:

- **Whole meal**
- **Poultry meat meal**
- **Meat and/or bone meal**
- **Feather meal**
- **Blood meal**
- **Hatchery meal**

EQUIPMENT

Curing bin / Meal cooler

Cooling down directly from cooker or press section with counter-flow airstream

Grinder / Cake breaker / Sieve

Size reduction and screening

Storage & Bins

Storage and handling



Vapour handling

In the processing/drying section the moisture is evaporated from the raw material. The evaporated water turns into vapours which are handled in the vapour handling section.

Heat recovery from vapour stream

The vapour stream still contains energy in the form of heat. If the energy can be utilized in the rendering plant, for example to make hot water for cleaning or other purposes, the installation can be extended with a heat exchanger. This is feasible from small batch to large continuous installations.

EQUIPMENT

Air Cooled Condensor

Condensing of vapours

Thermal Oxidizer

Eliminating odors from vapours

Heat Exchanger

Recovery of energy from vapour stream



Odour handling

The non-condensable gasses, process air and room air released during the rendering process, require treatment. Mavitec recognises the importance of effective odour control for the rendering sector.

EQUIPMENT

Deodorizing System

Chemical treatment of non-condensable gas

Chemical Tower(s)

Chemical way to reduce and remove odours

Thermal Oxidizer

Odour handling

Biofilter (modular/containerized)

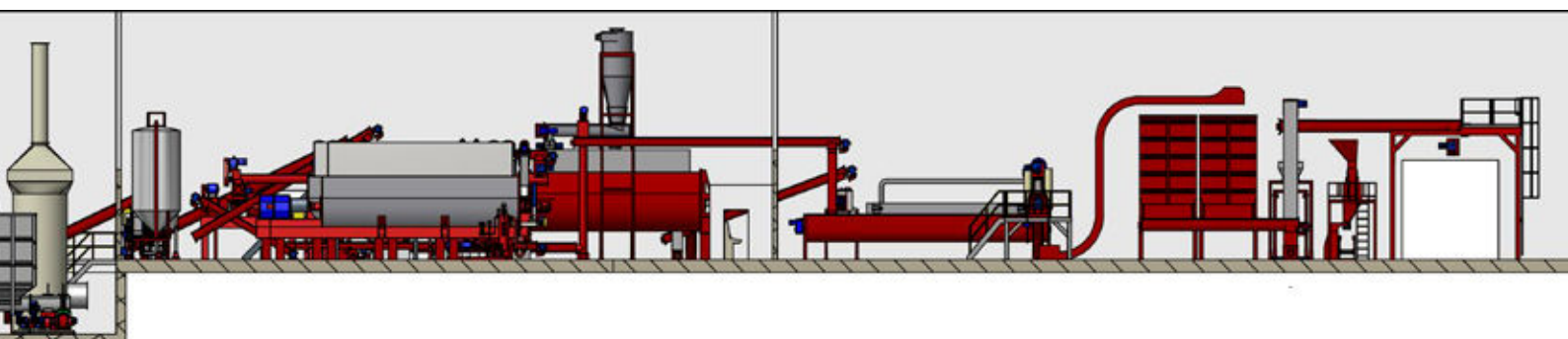
Biological treatment of room air and process air



Mavitec's biofilter:

a biological way to reduce and remove odours.

Micro-organisms break down the volatile organic components.



1. Batch processing



FUNCTION

The function of the batch cooker in the rendering process is conditioning, sterilizing, hydrolyzing and drying of the product. Mavitec's batch cooker can handle capacities from 1.000 kg up to 9.700 kg/batch. Due to the special design of shaft and shell, our batch times are up to two hours shorter than standard batch cooker designs. Shorter batch times result in higher quality proteins and lower energy consumption.

BATCH COOKER

Model Cooker litre	Capacity kg/batch
1800	1100
3500	2200
5000	3500
7200	4600
8500	5500
10.000	6300
12.500	7800
16.000	9700

Containerized system

Mavitec's containerized batch solution is a fully functional rendering plant designed to process small quantities of poultry or red meat by-products. The small footprint makes it possible to place this unit inside a small building or even outside if weather conditions allow it. The system just needs to be connected to the water, steam and electricity supply. The unit can also be equipped with a defatting container. If so, the containers need to be connected.

FEATURES BATCH COOKER

- High performance shaft for short batch times
- Less exposure to heat resulting in positive effect on nutrient value of end-products
- Heated shell and shaft
- Wide range of capacities
- Adding additional batch cooker(s) possible
- Frame mounted gear reducer and drive for strength and rigidity
- Small footprint



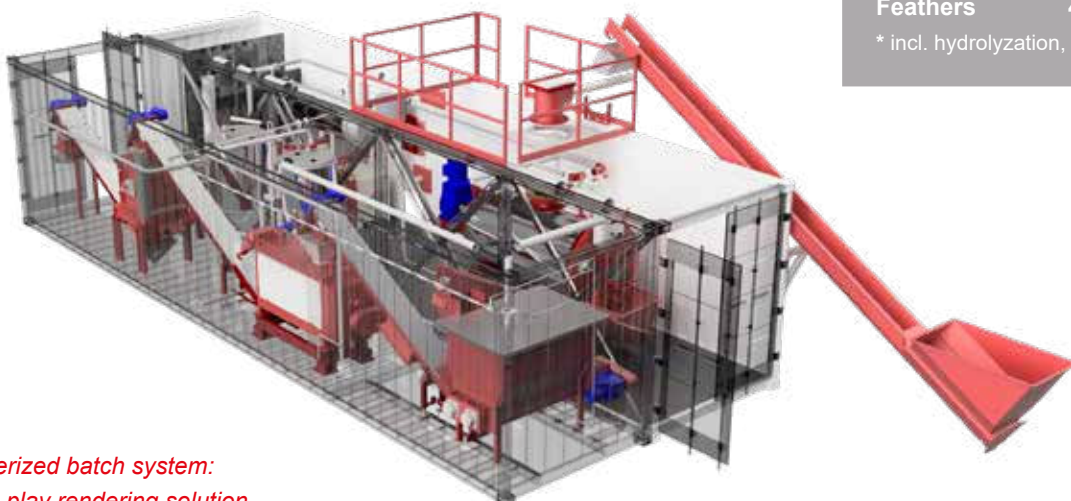
Unique batch cooker shaft design

SHORTEST BATCH TIMES

Smart technology and excellence in experience enables Mavitec to realize the shortest batch times in the industry, resulting in the highest levels of proteins. Examples of batch times based on full load including loading and discharge:

Red meat	1,5 - 2 hrs
Soft poultry	2,5 - 3 hrs
Mixed	4 - 4,5 hrs *
Feathers	4 - 4,5 hrs *

* incl. hydrolyzation, loading, unloading



*Containerized batch system:
a plug & play rendering solution
available in 1800 and 3500 L model*



Video containerized batch system

2. Continuous processing meat by-products



FUNCTION

The Supercookor® is designed to create high evaporation capacities from 2 up to 16 ton per hour. Supercookors® are used for the continuous cooking process of meat, bones and offal and the function in the rendering process is to cook/dry the product. If your company requires high capacities, low energy input and the best possible end-product the Supercookor® is the perfect solution.



Supercookor shaft

SUPERCOOKOR®

Evaporation capacity / hour	2 - 16 ton
Capacity	Up to 30 ton raw material throughput

FEATURES SUPERCOOKOR

- Continuous cooking process of meat, bones and offal
- High evaporation capacities
- Low energy input
- Easy inspection and maintenance of shaft
- Heavy walled tubes for long life
- Carbon and stainless steel execution available
- Low maintenance costs
- Easy control

DISC COOKER

Evaporation capacity / hour	Up to 11.7 ton
Capacity	Up to 22 ton raw material throughput

FEATURES DISC COOKER

- Continuous drying process of meat, bones, offal and blood
- Rotary closed-loop steam system for efficient heat transfer
- Space efficient



Meat & bone meal

3. Continuous feather/hair processing



FUNCTION

Mavitec's continuous hydrolyzor is used for the continuous hydrolyzing process of feathers or hair. Hydrolyzing is a thermal process that breaks up the molecule chain in order to make the protein digestible. This process will not completely dry the material. After this process the material is dried in the **ring dryer**. The result is a highly digestible feather meal. Hydrolyzed feather/hair meal is an excellent source of natural protein.

FEATURES HYDROLYZOR

- High capacities
- Low energy input
- Consistent high-quality end-product
- Proven screw feeder technology
- Integrated feather press
- Optimum heat transfer and steam efficiency
- Low steam usage
- Low operating costs
- Few moving parts for lower maintenance costs
- Flexible revering the raw material input wet or dry
- Stainless steel execution
- Easy control

CONTINUOUS HYDROLYZOR

Model	Capacity kg/hr
CH2820	Up to 5.000
CH3828	Up to 9.000
CH4828	Up to 13.000

Also available as batch system

- **High capacities**
- **Low energy input**
- **Consistent, high quality end-product**



Thanks to the extreme short heat contact time the ring dryer is able to produce feather meal with highest digestibility levels



Feather meal

4. Continuous blood processing



FUNCTION

Coagulation is the process through which blood changes from a liquid and becomes thicker. Mavitec's blood coagulator is designed to continuously coagulate the raw blood flow with the injection of direct steam into the blood.

After this step the material is ready for further processing/drying in the ring dryer or disc dryer. The **ring dryer** makes it possible to achieve the highest protein levels > 90%.

FEATURES BLOOD COAGULATOR®

- High throughput from 1 up to 10 ton per hour
- Large capacities
- Direct steam injection
- Low energy consumption
- Easy controllability
- Full stainless steel executing
- Sight glasses for inspection during process

BLOOD COAGULATOR®

Capacity / hour	1 - 10 ton raw blood
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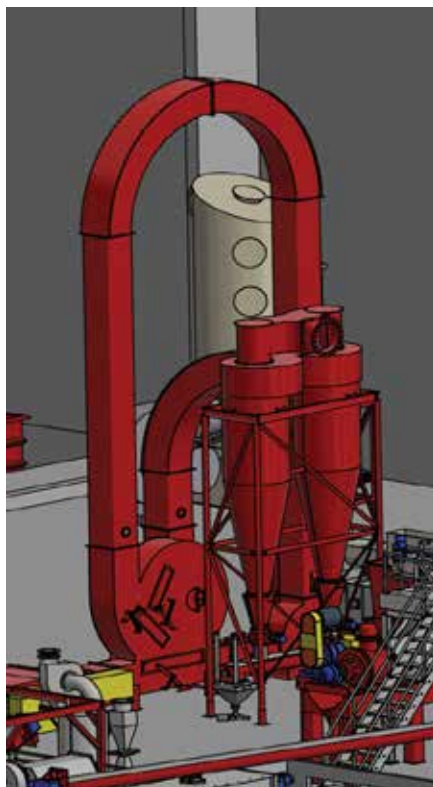
- **High capacities**
- **Low energy input**
- **Best possible end-products**

The ring dryer is able to produce the highest protein levels, an essential part in achieving the best quality blood meal.



Blood meal

Drying process: ring dryer & disc dryer



The ring dryer produces the best quality end-products with the highest digestibility in the market. The ring dryer grinds, conveys and dries in one energy efficient system. The product has a short retention time of only a few seconds inside the ring dryer. The result is feather and blood meal with incredibly high protein and digestibility levels.



FUNCTION RING DRYER

The ring dryer dries pre-treated material such as blood clot or hydrolyzed feather/hair mass. It uses direct heat as an efficient drying medium. This results in short heat contact time, creating the highest possible end-product quality with lowest possible energy costs.

FEATURES

- Short exposure to heat
- Extreme short drying time
- Highest end-product quality
- Highest digestibility
- Simple and accurate control of moisture content
- Consistent product without wet spots, ready to bag or store
- Indirect room air treatment
- Optional: recirculation of the heated exhaust air to save fuel



FUNCTION DISC DRYER

Disc dryers are used for the indirect continuous drying process of feathers and hair.

FEATURES

- Rotary closed loop steam system prevents condensate and non-condensable gas build-up in the discs for more efficient heat transfer
- Space efficient packs maximum heat transfer area into each square foot of floor space
- Extra corrosion allowance on discs for longer life and low maintenance costs
- Full length underframe for uniform load distribution and rigid drive mount
- Direct-coupled, base-mounted reducer
- Optional: stainless steel construction

PREMIUM QUALITY, LOW ENERGY COSTS

Thanks to the extreme short heat contact time our ring dryer produces the highest quality end-products with the highest digestibility in the market. Mavitec's ring dryer makes it possible to achieve the highest protein levels, up to 96%. Thanks to efficient engineering and innovative design the ring dryer saves on energy costs as well.

RING DRYER

Input material	Blood, feathers, hair
Evaporation capacity / hour	Up to 1.633 kg

DISC DRYER

Input material	Feathers, hair
Evaporation capacity / hour	Up to 3.350 kg

Other equipment



Feather Press

Mavitec's feather press is designed for pre-separation of transfer water from broiler feathers and therewith reducing the amount of bound water in the feathers.

FEATURES

- Special inlet hopper
- Stainless steel splash shields
- Stainless steel drip pan
- V-Belt arrangement
- Carbon steel main cage
- Replaceable bar spacers
- Main shaft with continuous flight arrangement

Capacity

Up to 15.000 birds per hour



Separator

Mavitec's separator is a water separator for soft material and feathers. The unit is completed with a stainless steel frame, a rotating drum sieve driven by an electric motor with fixed speed and transport auger for the offal and feathers in the sieve.

FEATURES

- The soft/feather material separator separates water by using gravity
- Saves energy because free water does not have to be evaporated
- Smart design
- Cost-effective

Capacity

Up to 15.000 birds per hour



Lamella Pump

The lamella pump transfers large particle flows, such as pre-broken animal by-products. The pump is positioned just after the raw material bin and transports the material towards the cooking process. The pump creates a smooth and consistent flow of material into the cooking process and is useable in different places in the process

FEATURES

- Easy interchangeable knives in the inlet and outlet side
- Low energy consumption
- Trasco 90 coupling
- Parts manufactured in hardox 500
- Oil grease lubricated mechanical shaft seals
- 1 set of mating flanges in the pump inlet and outlet

Capacity

Up to 50 m³ per hour

Optimizing rendering processes

Mavitec offers a complete range of equipment to optimize your rendering process such as a Pressurized Condensate Return System (PCRS) to reduce steam energy consumption.

Save energy costs with PCRS

Within the rendering process there are plenty of opportunities to reduce energy costs. Mavitec's Pressurized Condensate Return System (PCRS) is designed to reduce steam energy consumption up to 15%. This collection and pumping system returns steam condensate directly to the boiler without flash losses and improves heat transfer performance. Our PCRS reduces steam energy consumption up to 15% @10 bar(g) operation pressure. Interested in the opportunities and want to know what we can do for your business? Contact our energy experts at sales@mavitec.com.



Pressurized Condensate Return System

Other equipment



Heat Exchanger

Mavitec's heat exchanger recovers the energy from the vapour stream created by the Batch cooker, Supercookor or Hydrolyzor. This energy can be used to make hot water for cleaning or other purposes. The heat exchanger is feasible from small batch to large continuous installations.

FEATURES

- Closed system, the two streams do not come in direct contact with each other
- Rigid construction
- Stainless steel (including tubes)

Capacity

According to specific clients needs



Chemical Towers

Mavitec offers effective solutions to reduce or eliminate volatile organic compounds in the effluents coming from typical rendering processes. Scrubbers are composed of one or more towers equipped with recirculation pump, tank for pumps and liquid storage and chimney with sample opening.

FEATURES

- Complete with recirculation pump, tank for pumps and liquid storage
- Chimney with sample opening
- Chemical dosing pumps
- Chemical storage tanks

Capacity

From 6.000 up to 75.000 m³/hr



Continuous Sterilizer

Original Mavitec design for pressure sterilization of animal by-products (ABP) for a continuous processing facility according to method 1 - 142/2011. By utilizing the energy from the cooking process little extra energy is required to bring the cooked product up to required parameters. This unique method makes it possible to guarantee the retention time in a continuous process.

FEATURES & ADVANTAGES

- Sterilizes fat and protein in one go
- Suitable for all capacities
- No influences on quality end-product
- Less steam usage, only time and pressure needed
- Implementation in existing processing lines possible
- Traditional system stays intact
- Security controls to convey material back into the cooker temporarily
- Bypass included
- Small footprint

Bins & Conveyors

Thanks to extensive experience in designing and manufacturing of storage and handling equipment, we are able to offer cost effective solutions that guarantee the best handling of your material with the best appropriate hygiene standards.

- Heavy duty
- Easy maintenance
- Standard or custom made
- Special demands/designs possible



Meal storage bin

In-house engineering & production



Mavitec offers in-house engineering and manufacturing, using latest technologies and software to meet international safety standards. With a private owned state-of-the-art production facility in Turkey and The Netherlands we are able to produce the highest quality systems and equipment, standard or customized to clients needs.

- **7.000 m² certified production space**
- **Carbon and stainless steel production**
- **In-house control panels and electrical engineering**

Mavitec equipment is designed to **reduce energy consumption** and **minimize environmental impact**. Our R&D department is constantly improving and developing new procedures and machines. This way we are able to finetune processes to ensure higher quality end-products and a better turnover as a result. Control panels are designed, programmed and built in-house and offer a complete visualisation of the working process. The control panels provide management information and live processdata, according to customer needs. Mavitec offers professional 24/7 worldwide support. To assure optimal performance our service engineers offer thorough analysis and problem solving for electrical issues, also from a distance.

- **In-house Engineering & Manufacturing of equipment**
- **In-house Control Panels & Electrical Engineering**
- **High quality equipment for long term operation**
- **Low energy consumption**
- **Low maintenance, minimum downtime**
- **Highest quality meals and oils, best nutrient values**
- **Over 600 plants built worldwide**
- **Experienced staff for installation, supervision and training of local personnel**
- **Dedicated After Sales Department (24h service)**
- **Remote assistance / engineering**
- **Preventive maintenance**
- **Local support**

SPARE PARTS

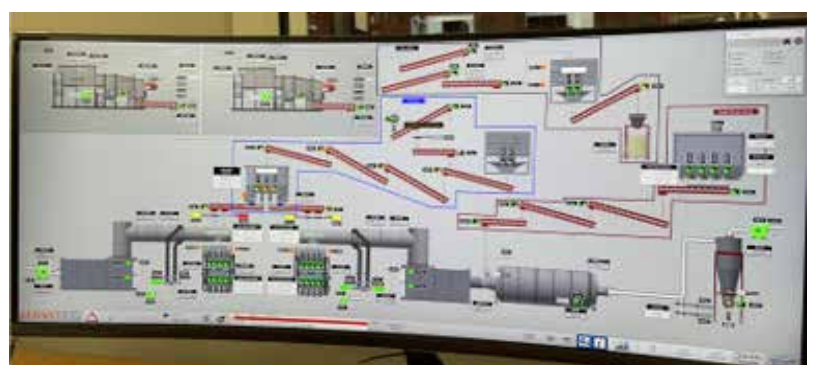
Mavitec holds a large stock of essential spare parts which are ready to ship within 24 hours. The spare parts are located worldwide at warehouses in The Netherlands, Turkey, U.S.A. and Russia.

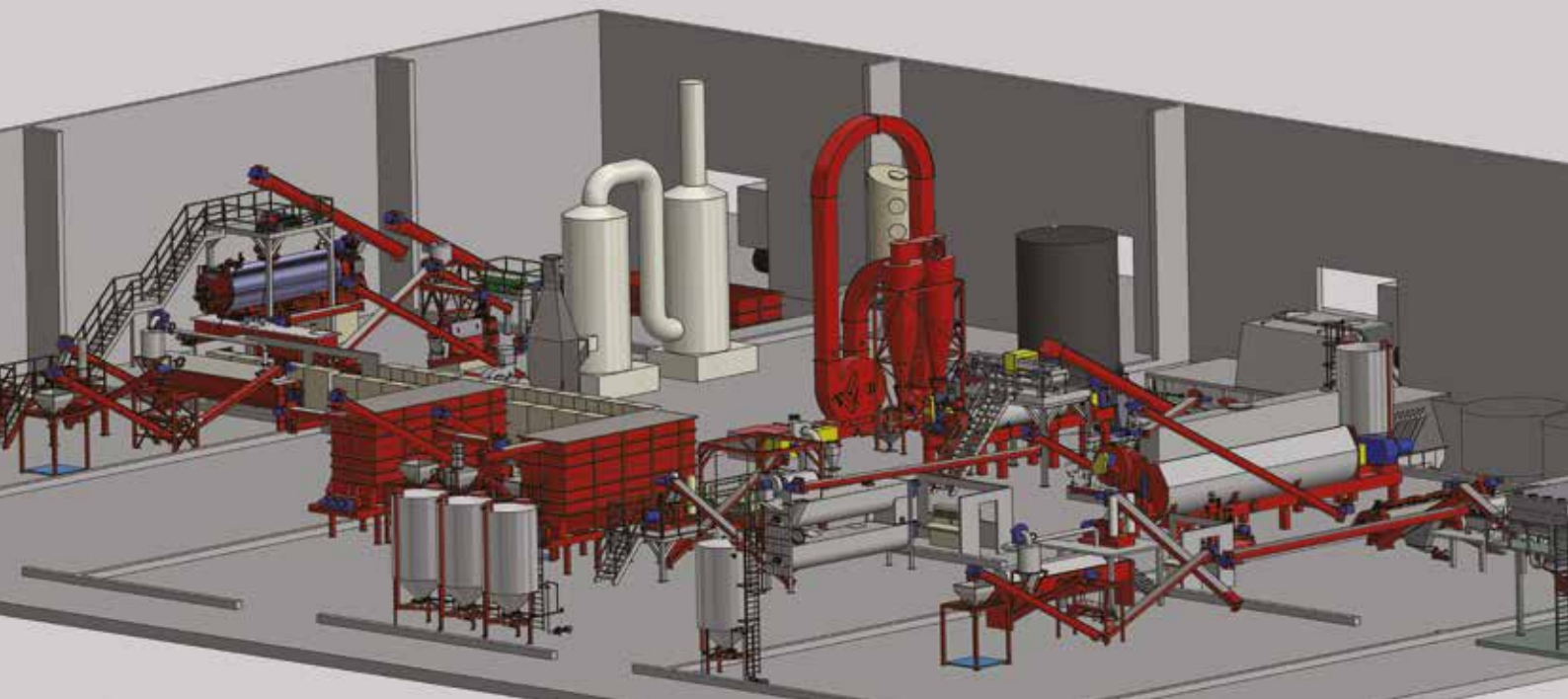
SERVICE PROGRAMS

Maintenance is important to ensure the continuity of the installation. Mavitec offers various service programs and packages to minimize unnecessary downtime. With this, you can increase operational reliability and achieve maximum return.

Service you can count on!

Mavitec control panels are designed, built and programmed in-house and provide management information and live processdata





References





MAVITEC

Maximize the value of your by-products!

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