
neccar
IMPIANTI

WHAT ARE ANIMAL BY-PRODUCTS?

Animal by-products are the parts of a slaughtered animal that are not directly consumed by humans, including dead on farm animals and catering waste (i.e. waste food originating from restaurants, catering facilities and kitchens) that contains or has been in contact with meat products, whether cooked or uncooked.

Some of these products are used in animal proteins like meat-and-bone-meal, fats, gelatine, collagen, pet food and other technical products, such as glue, leathers, soaps, fertilisers etc. The alternative is their destruction, most often by incineration.

WHAT QUANTITY OF ANIMAL BY-PRODUCTS ARE WE TALKING ABOUT?

It has been estimated that humans directly consume only 68% of a chicken, 62% of a pig, 54% of a bovine animal and 52% of a sheep or goat. Therefore, every year, more than 10 million tons of meat not destined for direct human consumption derived from healthy animals are produced in the EU. This material is then transformed in a variety of products used in human food, animal feed, cosmetic, pharmaceutical and other technical use. For example:

- Bones, skin and connective tissue such as tendons are used for the production of gelatine which is then used in human food (desserts, gummed candies, marshmallow and prepared meat products), animal feed (coats of vitamins, binders of feed pellet and dog chews), pharmaceutical (hard and soft capsules) and technical use (in the photographic industry for paper coating and as a component in silver halide emulsion coatings, etc.).

- Mixture of bones, meat trimmings and offals are rendered into fats and into animal proteins which are then used in human food, animal feed, cosmetic, pharmaceutical and technical products.

- Offals and meat trimmings are used as fresh raw material in pet food and pharmaceuticals or, following strict heat.

meccar IMPIANTI

RENDERING SYSTEMS FOR PROCESSING ANIMAL BY-PRODUCT MATERIALS

These systems are divided into two classes:

EDIBLE RENDERING

Of animal fatty tissue into edible fats and proteins for human consumption.

INEDIBLE RENDERING

Of animal by-product materials into animal fats and proteins for animal feed and other non-edible applications.

EDIBLE RENDERING

Edible rendering is synonymous with continuous rendering of animal fatty tissue to produce an edible lard or tallow that is light in colour, bland in taste and low in FFA.

PROCESSING

It is no longer a problem to produce a fat which is free from sludge and has a low water content. The problem is reduced to effective separation of the recovered fat. On the other hand, if the fat is to have a low FFA content and a low peroxide value, i.e. if it is to have a good keeping qualities, and a neutral taste and smell, the recovery represents a more involved problem.

meccar IMPIANTI

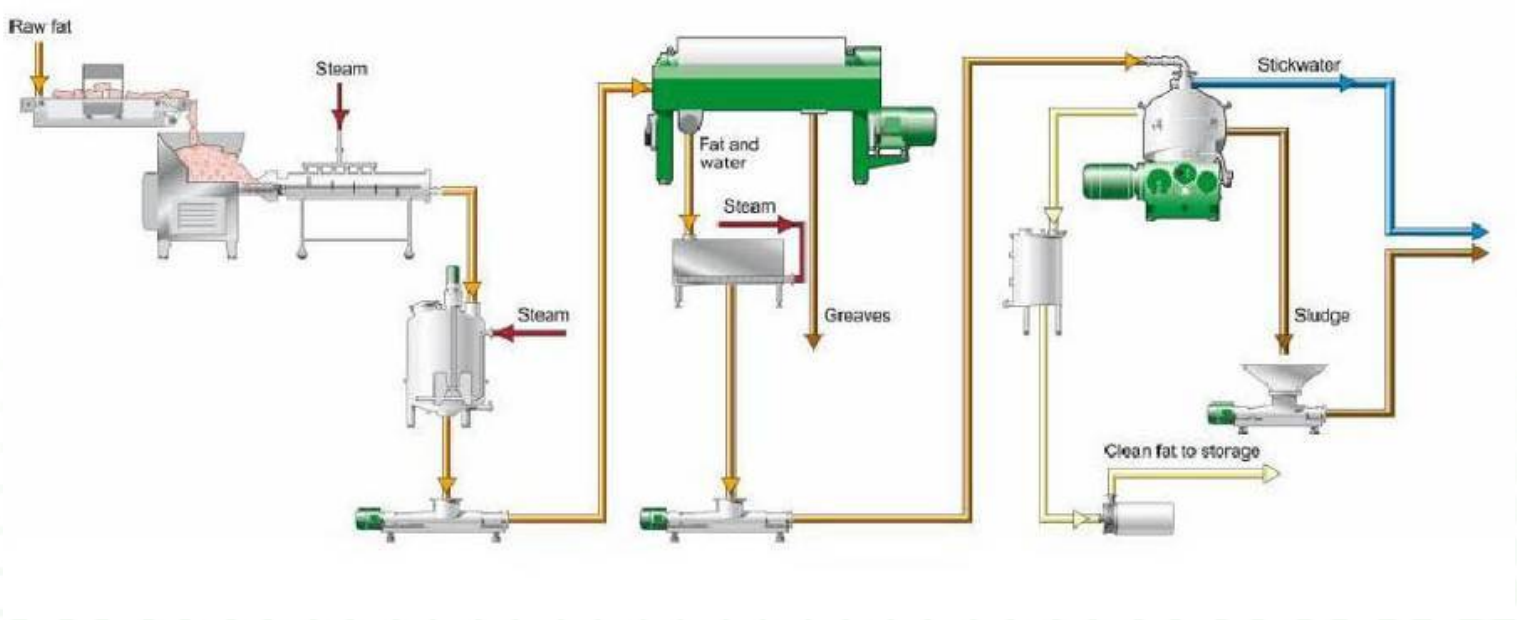
The three most important conditions

A fat rendering plant designed to produce a high quality fat must satisfy the following three conditions:

- The raw material must be as fresh as possible, preferably received directly after slaughtering or from the cold store.
- The temperature of the fat should be kept as low as possible during processing.
- The fat should be exposed to the heating process for as short a period as possible, and should then be cooled as soon as possible down to a low temperature. Heating and cooling should be carried out without the fat coming into contact with atmospheric air.

meccar IMPIANTI

THE PROCESS


Raw fat
Steam
Steam
Fat and water
Steam
Greaves
Stickwater
Sludge
Clean fat to storage

DESCRIPTION OF PROCESS

1 MINCER

The first stage is to charge the mincer. It can be made with wagoner tilter or with screw it depends from the quantity to process. The important is to maintain an uniform and constant feeding to the mincer.

The mincer reduce the dimensions of fat and lard to uniform size, generally 16 mm to facilitate the fusion.

2 MELTING PIPE

From the mincer the fat is pushed continuously in the airtight melting pipe.
This is like a tubular screw where there is the directly steam injection.

The direct steam injection have two function:

- Start with the fusion of the fat
- Eliminate the air from the material that is cause of the fat oxidation

The pressure of steam is at 0,5 bar and the temperature of the fat is automatically controlled at 60°C.
The steam injection stop automatically if the mincer stop.

3 MELTING TANK

So the fat go in the melting tank or “cooker”.

This tank have a mixer and steam injection.

The temperature is automatically controlled for take the fat at 90°C.

There is a level control that for security stop the mincer if the tank is too full.

This tank convert the fat in a perfectly fluid mix.

From here a pump feeds the decanter.

This pump is controlled by an inverter that regulate the velocity and at the same time the capacity of all the line.

3 DECANTER

The decanter consists of a rotating horizontal solid bowl or cylinder inside which a helical screw conveyor rotates in the same direction but at a slightly lower speed.

The solids discharge end of the bowl is fitted with a truncated conical section. The liquid discharge end of the bowl is equipped with an adjustable weir which determines the liquid depth in the bowl. The fat slurry is fed through a stationary nozzle inside the rotating bowl.

Centrifugal separating forces ranging up to 3000 times the forces of gravity cause the solids to be thrown against the cylindrical wall of the bowl. The liquid of lesser density forms a concentric inner ring inside the bowl. The solids are removed by the screw conveyor, which pushes them out of the liquid layer, discharging them from the bowl.

The clarified liquid is removed continuously as it overflows the adjustable weir to discharge from the bowl.

The edible protein discharged from the decanter are conveyed or transported to an inedible rendering plant or if of enough quantity to a specific drier.

The melted fat from the decanter contains moisture and a small percentage of solids or fines. A second stage centrifuge is required to "polish" the edible fat.

4 VERTICAL SEPARATOR

The fat is discharged in an airtight tank where the temperature is taked back to 90°C with steam injection to maintain the viscosity of the fat.

The vertical separator consists of a series of conical shaped discs rotating about a vertical axis inside the bowl. The feed enters through the central shaft and is distributed at the bottom of the bowl. The fat, being lighter in density, tends to rise, passing upward as thin layers past adjacent discs. Due to centrifugal force, a sludge layer of water and protein fines tends to build up in the "sludge space" located outboard from the discs and inside the outer periphery of the bowl. The separator is equipped with a "self-thinker" internal sensor that measures the volume of sludge build up within the bowl and automatically actuates discharge ports around the periphery to discharge the sludge, while operating at full speed.

The polished edible fat discharges from the top of the bowl and is pumped to fat storage. The sludge discharged from the centrifuge is usually pumped or transported to an inedible rendering plant or to the water treatment plant.

5 CONTROL PANEL

The complete process from feeding the plant to all separation is completely automated.

The user-friendly touch screen panel can be used to completely monitor and control the overall process from raw material acceptance, to refrigeration and packing or loading, in addition to the actual edible fat production.

The plant control system prevents pumps from running dry and thus the possible introduction of air into the product.

The complete plant, including decanters and separators, is CIP-compatible. The chemical cleaning system makes for safe and sanitary processing as required by today's food industry.

All equipment and piping in contact with the edible fat or protein is constructed of stainless steel with a suitable food grade finish. The piping is provided with quick opening connections for quick disassembly and cleaning.

6 OPTIONALS

As optional the installation can be supplied with a photo cell that automatically monitors the turbidity of the purified fat so as to exclude impurities or water in the product.

If the quality of the fat is not good it will be re-send to the vertical separator for a new cleaning process.

Another optional is the under vacuum drier for the fat. It eliminate more water from the cleaned fat at low temperature to increase the quality and stability of the final product.

We can supply the line with crystallizer and plasticizer for packing the fat in cartons or cans from ten to twenty kg.

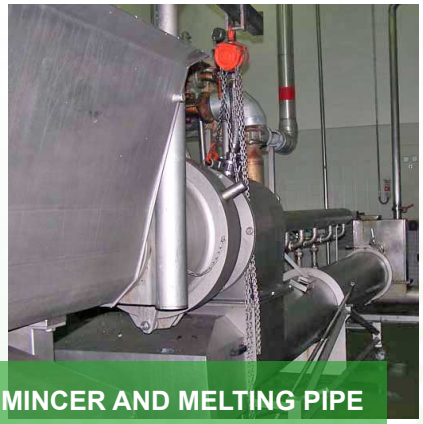
SOME PICTURES

meccar IMPIANTI

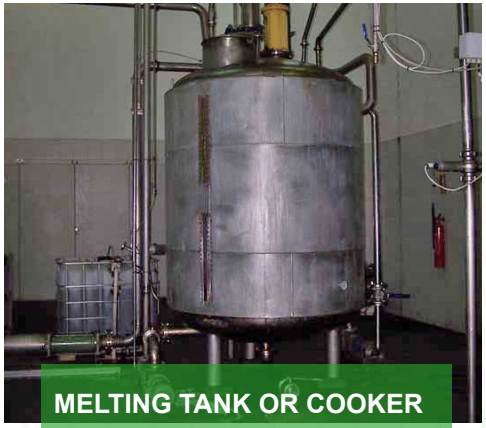
RAW MATERIAL RECEIVING

RAW MATERIAL RECEIVING

METAL DETECTOR



MINCER AND MELTING PIPE

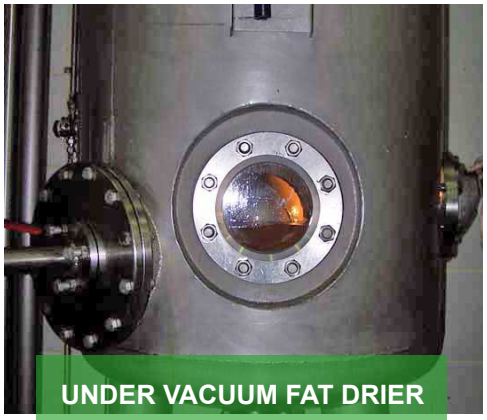


MELTING TANK OR COOKER

DECANTER

meccar IMPIANTI

VERTICAL SEPARATOR



UNDER VACUUM FAT DRIER

EDIBLE MEAL DRIER

FAT PACKING

FAT PACKING

FAT PACKING

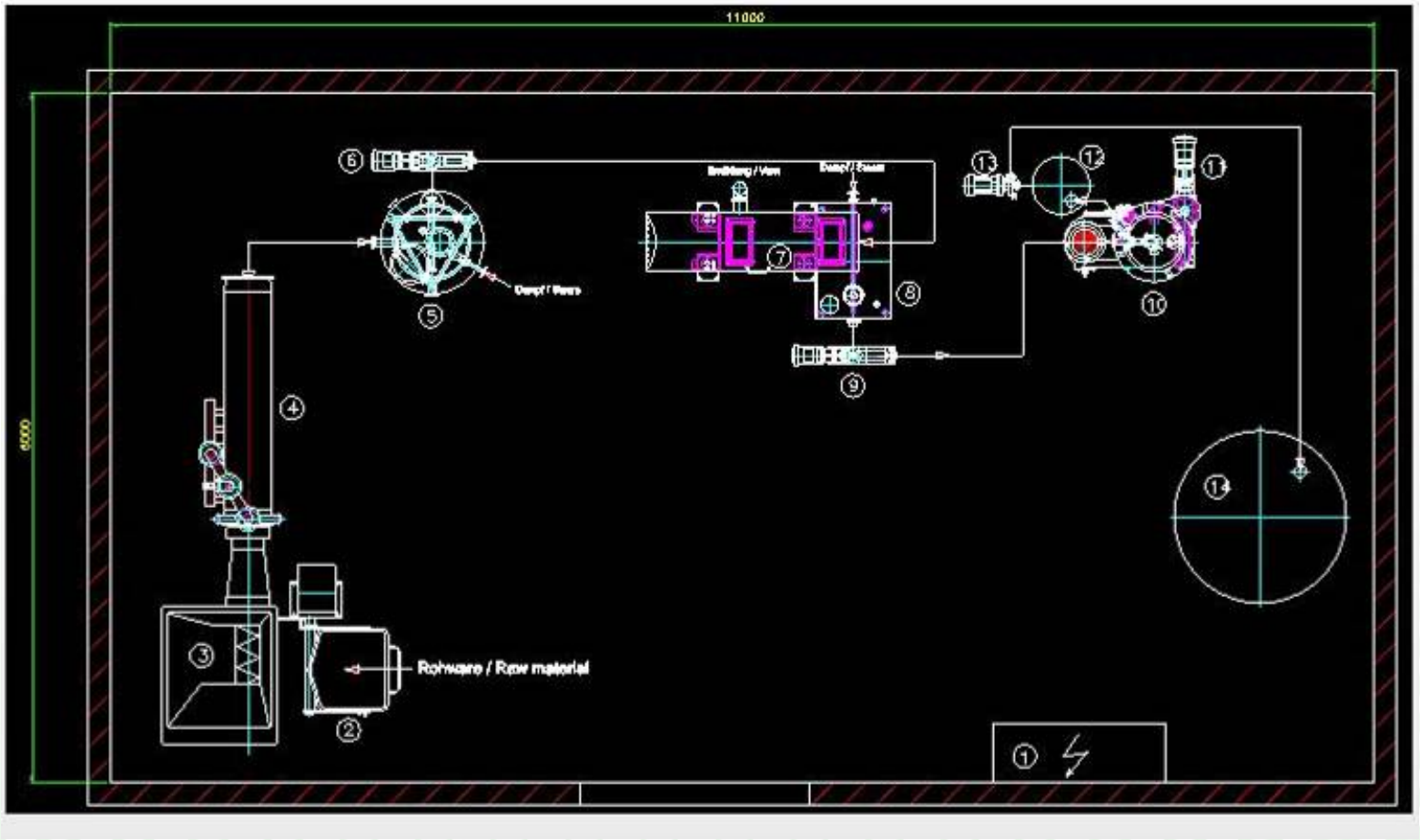
meccar IMPIANTI

The most important advantage

- Minimum personnel requirement due to fully automated processes
- Highest purity standards due to sanitary design of the complete process
- All components with product contact made from stainless steel
- Automatic chemical cleaning of all plant components
- No manual cleaning required
- Minimum product losses in the separator stage
- Simple central control and monitoring via a user-friendly touch-screen panel
- Level dependent control of all pumps for continuous operation
- Automatic turbidity monitoring of the finished product via a photo cell
- Optimum quality of the end product due to individually adapted process parameters
- Optimal consulting by our experienced process engineers
- Require less space

meccar IMPIANTI

DIMENSION



QUESTIONS AND ANSWERS

meccar IMPIANTI

WHAT IS A RENDERING PLANT

Very often slaughter-houses underestimate the value of slaughter-house by-products.

These can be used in the place of vegetable protein flour to feed livestock and thus obtain the same excellent results but at a far lower cost.

Slaughter-house by-products are a good source of income.

Meccar Impianti s.r.l. has the right instruments to reduce transformation costs and obtain high quality finished products.

The price/technology ratio of our systems is very competitive.

meccar IMPIANTI

INTRODUCTION

Slaughter-house by-products are a rich source of animal protein which, after proper treatment, can be used in a wide range of fodder mixes.

When used to replace partially vegetable protein flour, such as soya flour, the same or even better excellent results are obtained, but at a far lower cost.

The conversion of slaughter-house scraps into protein flour is not a mandatory step in modern slaughter-houses and meat processing factories, but is an important source of income for a company.

meccar IMPIANTI

RAW MATERIALS

The raw materials that can be processed are the slaughter-house scraps and by-products of cattle, sheep, goats, poultry and various other carcasses.

CHARACTERISTICS OF THE RAW MATERIALS

	MOISTURE %	FAT %	MEAL %
Mixed by products with 30% of bones	60	17	23
Whole dead cattle	62	19	19
Whole dead pigs	47	36	17
Cattle bones	40	16	44
Pig bones	48	17	35
Poultry offal	65	10	25
Poultry feathers	67	0	33
Blood	82	0	18

THE RENDERING PROCESS

Rendering is a process of both physical and chemical transformation using a variety of equipment and processes. All of the rendering processes involve the application of heat, the extraction of moisture, and the separation of fat. The methods to accomplish this are schematically illustrated in Figure 1.

The temperature and length of time of the cooking process are critical and are the primary determinant of the quality of the finished product. The processes vary according to the raw material composition. All rendering system technologies

include the collection and sanitary transport of raw material to a facility where it is ground into a consistent particle size and conveyed to a cooking vessel, eithercontinuous-flow or batch configuration. Cooking is generally accomplished with steam at temperatures of 115º to 145ºC for 40 to 150 minutes depending upon the type of system and materials. Regardless of the type of cooking, the melted fat is separated from the protein and bone solids and a large portion of the moisture is removed. Most importantly, cooking inactivates bacteria, viruses,

protozoa, and parasites. Alternative methods of raw material disposal such as burial, composting, or landfill applications do not routinely achieve inactivation of microorganisms.

Fat is separated from the cooked material via a screw press within a closed vessel. Following the cooking and fat separation, the cake which includes protein, minerals, and some residual fat, are grinded, then transferred for storage or shipment.

Storage of the protein is either in feed bin structures or enclosed buildings. The fat is stored and transported in tanks.

meccar IMPIANTI

SCHEME OF RENDERING

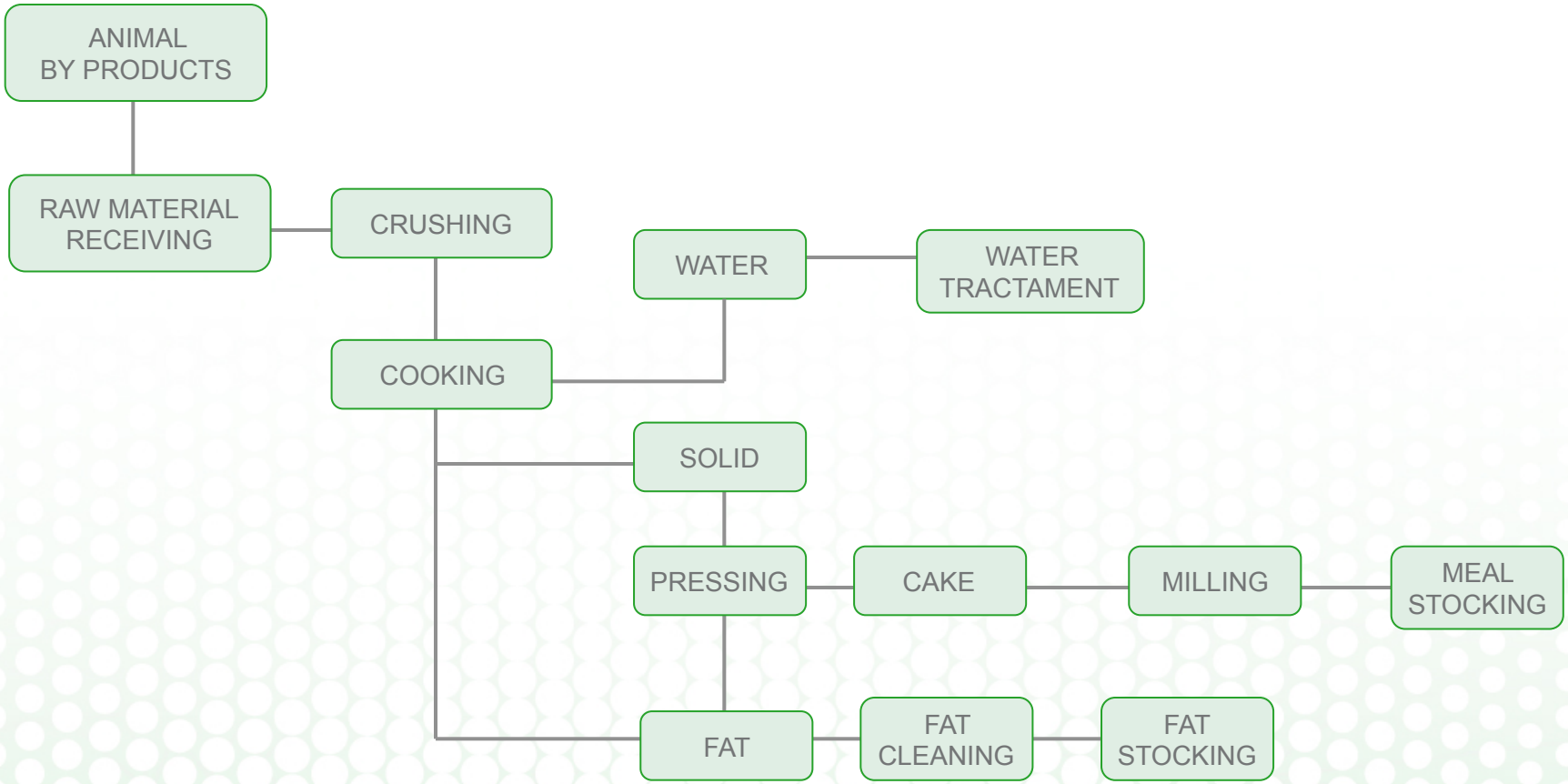


Fig. 1

BATCH RENDERING PLANT FOR CAPACITY FROM 2 TON TO 50 TON IN 24 HOURS

meccar IMPIANTI

SCHEME

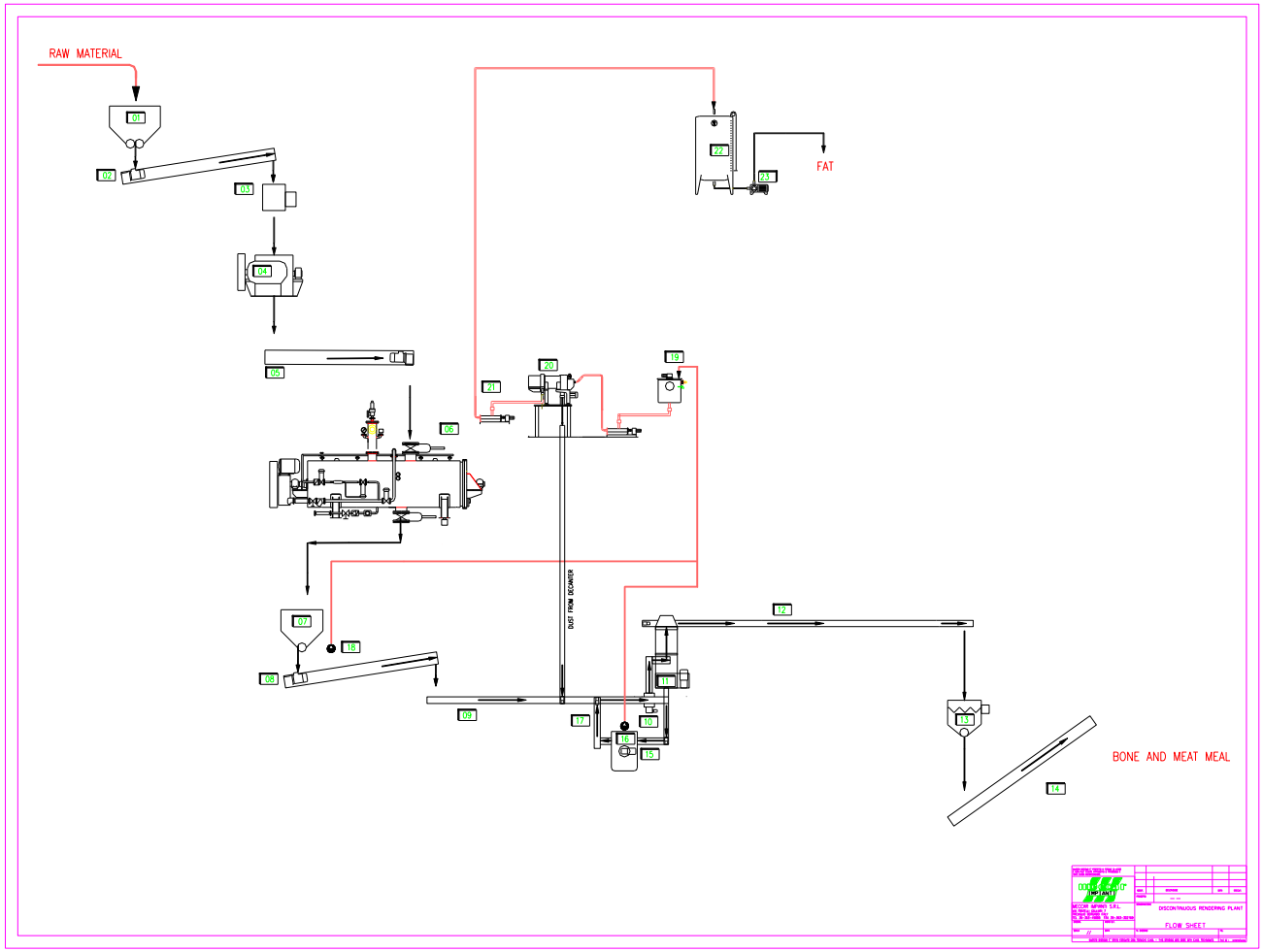

RAW MATERIAL
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
FAT
DUST FROM DECANTER
BONE AND MEAT MEAL
DISCONTINUOUS RENDERING PLANT
FLOW SHEET

Fig. 1

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in a special underground tank (item 1) of a suitable size to meet the needs of the plant. The open-topped tank is made from strong sheet steel and sits in a special concrete-lined ditch.

The product is extracted from the tank by means of two auger screws driven by a gear motor and an inclined auger screw (item 2) then takes it to the crusher (item 4). An electromagnet (item 3) just in front of the bone crusher stops any ferrous metal from entering this.

The crushed product is then sent into the batch cooker (item 6) for cooking by an inclined auger screw (item 5).

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in a special underground tank (item 1) of a suitable size to meet the needs of the plant. The open-topped tank is made from strong sheet steel and sits in a special concrete-lined ditch.

The product is extracted from the tank by means of two auger screws driven by a gear motor and an inclined auger screw (item 2) then takes it to the crusher (item 4). An electromagnet (item 3) just in front of the bone crusher stops any ferrous metal from entering this.

The crushed product is then sent into the batch cooker (item 6) for cooking by an inclined auger screw (item 5).

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in a special underground tank (item 1) of a suitable size to meet the needs of the plant. The open-topped tank is made from strong sheet steel and sits in a special concrete-lined ditch.

The product is extracted from the tank by means of two auger screws driven by a gear motor and an inclined auger screw (item 2) then takes it to the crusher (item 4). An electromagnet (item 3) just in front of the bone crusher stops any ferrous metal from entering this.

The crushed product is then sent into the batch cooker (item 6) for cooking by an inclined auger screw (item 5).

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in a special underground tank (item 1) of a suitable size to meet the needs of the plant. The open-topped tank is made from strong sheet steel and sits in a special concrete-lined ditch.

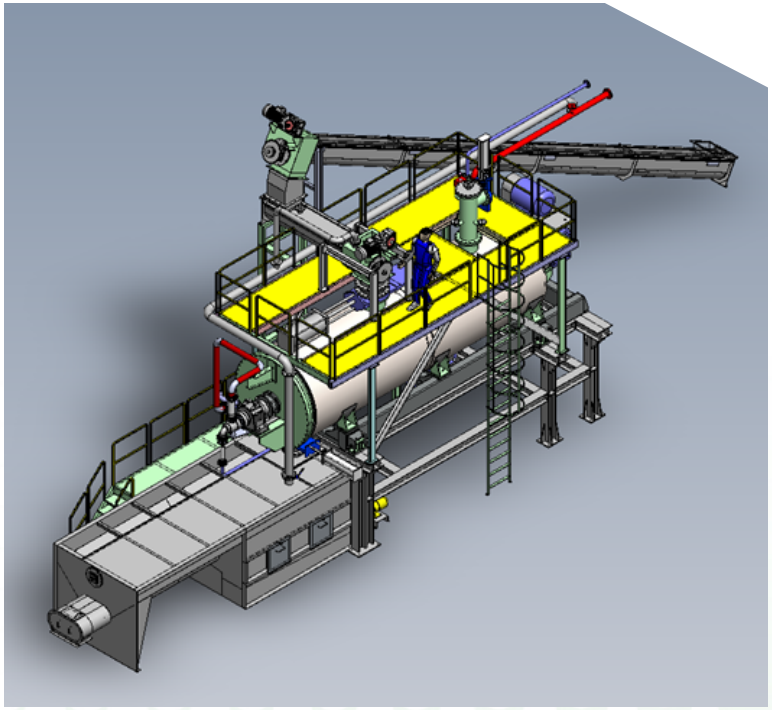
The product is extracted from the tank by means of two auger screws driven by a gear motor and an inclined auger screw (item 2) then takes it to the crusher (item 4). An electromagnet (item 3) just in front of the bone crusher stops any ferrous metal from entering this.

The crushed product is then sent into the batch cooker (item 6) for cooking by an inclined auger screw (item 5).

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
STERILISING AND FILTERING SECTION

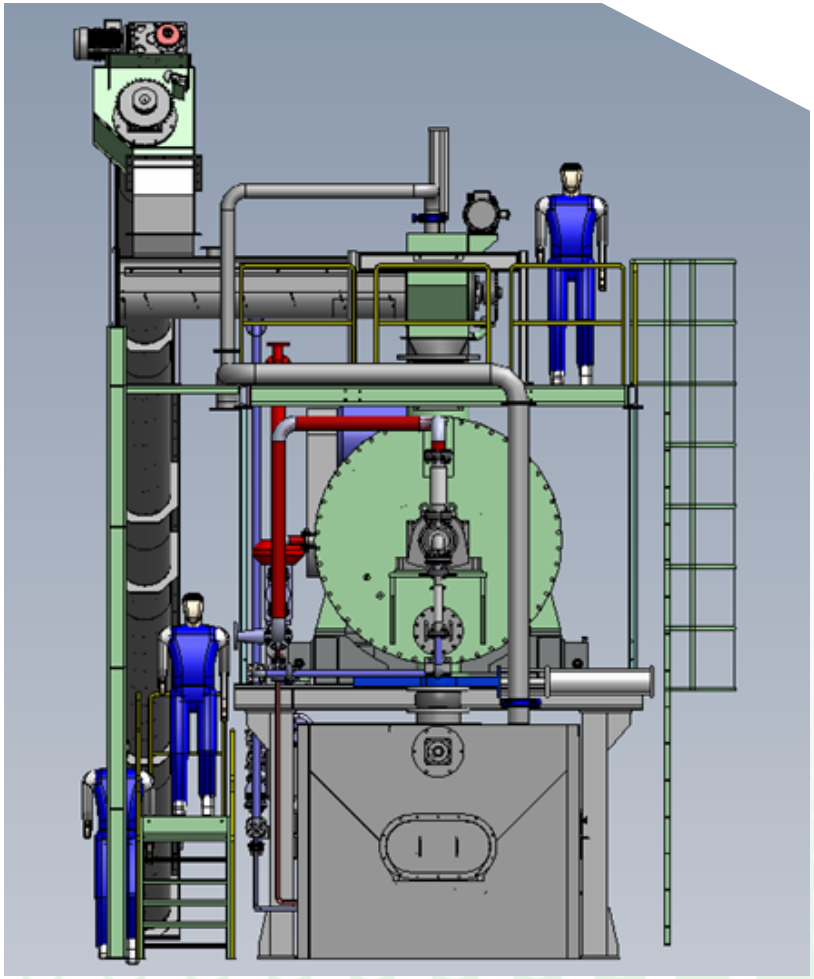
Once the material has entered the cooker, the temperature is raised to 133° C at a pressure of 3 bar absolute for 20 minutes to sterilize the mix thoroughly.
This is mandatory under EU hygiene and health regulations as the raw material can be, and often is, a medium for bacteria and viruses that can lead to a large number of diseases, including B.S.E.
After this stay time in the cooker, the pressure is lowered until it is the same as the external air pressure. This is done by releasing the steam produced through a valve that sends it to an air exchanger (item 24) where it condenses and cools to a temperature of 35°C.



meccar IMPIANTI

DESCRIPTION OF THE PROCESS
STERILISING AND FILTERING SECTION

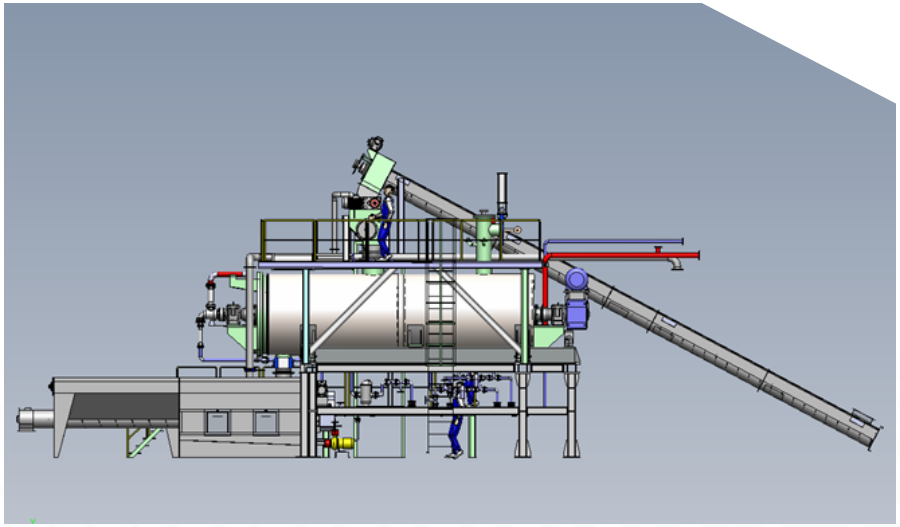
Once the material has entered the cooker, the temperature is raised to 133° C at a pressure of 3 bar absolute for 20 minutes to sterilize the mix thoroughly.
This is mandatory under EU hygiene and health regulations as the raw material can be, and often is, a medium for bacteria and viruses that can lead to a large number of diseases, including B.S.E.
After this stay time in the cooker, the pressure is lowered until it is the same as the external air pressure. This is done by releasing the steam produced through a valve that sends it to an air exchanger (item 24) where it condenses and cools to a temperature of 35°C.



meccar IMPIANTI

DESCRIPTION OF THE PROCESS
STERILISING AND FILTERING SECTION

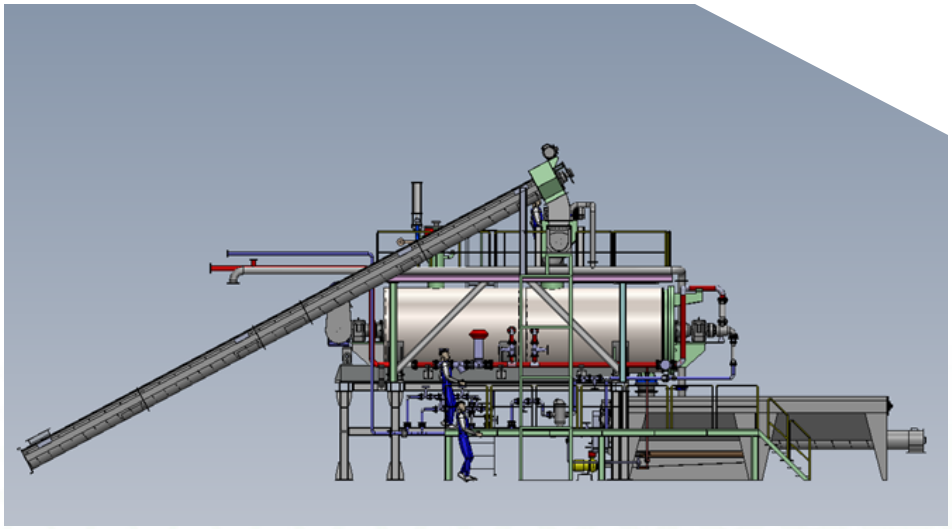
Once the material has entered the cooker, the temperature is raised to 133° C at a pressure of 3 bar absolute for 20 minutes to sterilize the mix thoroughly.
This is mandatory under EU hygiene and health regulations as the raw material can be, and often is, a medium for bacteria and viruses that can lead to a large number of diseases, including B.S.E.
After this stay time in the cooker, the pressure is lowered until it is the same as the external air pressure. This is done by releasing the steam produced through a valve that sends it to an air exchanger (item 24) where it condenses and cools to a temperature of 35°C.



meccar IMPIANTI

DESCRIPTION OF THE PROCESS
STERILISING AND FILTERING SECTION

Once the material has entered the cooker, the temperature is raised to 133° C at a pressure of 3 bar absolute for 20 minutes to sterilize the mix thoroughly.
This is mandatory under EU hygiene and health regulations as the raw material can be, and often is, a medium for bacteria and viruses that can lead to a large number of diseases, including B.S.E.
After this stay time in the cooker, the pressure is lowered until it is the same as the external air pressure. This is done by releasing the steam produced through a valve that sends it to an air exchanger (item 24) where it condenses and cools to a temperature of 35°C.



meccar IMPIANTI

DESCRIPTION OF THE PROCESS
STERILISING AND FILTERING SECTION

The actual “filtering” consists of drying the raw material by evaporation in the cooker (item 6) which has been specifically designed to allow for this. The mix is heated by circulating steam in the gap between the lining and the outside of the autoclave. A rotary shaft inside the autoclave has specially shaped and positioned heated rotors that heat the material during the cooking process and then are used to empty the product when this stage of the process has been completed. The dried product is sent to the filter box (item 7) which has a mesh to allow for the initial separation of fat and cracklings.
Any moisture in the raw material that evaporates in the autoclave is sent to the steam condensation system (item 24).

DESCRIPTION OF THE PROCESS
STERILISING AND FILTERING SECTION

The actual “filtering” consists of drying the raw material by evaporation in the cooker (item 6) which has been specifically designed to allow for this. The mix is heated by circulating steam in the gap between the lining and the outside of the autoclave. A rotary shaft inside the autoclave has specially shaped and positioned heated rotors that heat the material during the cooking process and then are used to empty the product when this stage of the process has been completed. The dried product is sent to the filter box (item 7) which has a mesh to allow for the initial separation of fat and cracklings.
Any moisture in the raw material that evaporates in the autoclave is sent to the steam condensation system (item 24).

DESCRIPTION OF THE PROCESS
STERILISING AND FILTERING SECTION

The actual “filtering” consists of drying the raw material by evaporation in the cooker (item 6) which has been specifically designed to allow for this. The mix is heated by circulating steam in the gap between the lining and the outside of the autoclave. A rotary shaft inside the autoclave has specially shaped and positioned heated rotors that heat the material during the cooking process and then are used to empty the product when this stage of the process has been completed. The dried product is sent to the filter box (item 7) which has a mesh to allow for the initial separation of fat and cracklings.
Any moisture in the raw material that evaporates in the autoclave is sent to the steam condensation system (item 24).

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
PRESSING SECTION

Any filtered cracklings left in the filter box still contain about 6 - 9% moisture and 30 - 40% fat (depending on the type of material being processed). Inclined auger screws (item 8 and item 9) take the cracklings to the container (item 10) which acts as a storage unit and batcher for the continuous press (item 11). The mix is pressed to separate the fat from the cracklings and then sends the resulting cracklings (in scales, with a residual fat content of 8 - 12%) via other auger screws (item 12) to the storage container (item 13). It is then loaded in the vehicles with an inclined auger screw (item 14).
The fat that leaves the press is collected by an auger screw (item 15) with a grid that separates off any impurities in the fat.
These impurities is returned to the press by another auger screw (item 17), while the fat falls into the tank below (item 16) which has a pump that then sends it to the cleaning section.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
PRESSING SECTION

Any filtered cracklings left in the filter box still contain about 6 - 9% moisture and 30 - 40% fat (depending on the type of material being processed). Inclined auger screws (item 8 and item 9) take the cracklings to the container (item 10) which acts as a storage unit and batcher for the continuous press (item 11). The mix is pressed to separate the fat from the cracklings and then sends the resulting cracklings (in scales, with a residual fat content of 8 - 12%) via other auger screws (item 12) to the storage container (item 13). It is then loaded in the vehicles with an inclined auger screw (item 14).
The fat that leaves the press is collected by an auger screw (item 15) with a grid that separates off any impurities in the fat.
These impurities is returned to the press by another auger screw (item 17), while the fat falls into the tank below (item 16) which has a pump that then sends it to the cleaning section.

DESCRIPTION OF THE PROCESS
PRESSING SECTION

Any filtered cracklings left in the filter box still contain about 6 - 9% moisture and 30 - 40% fat (depending on the type of material being processed). Inclined auger screws (item 8 and item 9) take the cracklings to the container (item 10) which acts as a storage unit and batcher for the continuous press (item 11). The mix is pressed to separate the fat from the cracklings and then sends the resulting cracklings (in scales, with a residual fat content of 8 - 12%) via other auger screws (item 12) to the storage container (item 13). It is then loaded in the vehicles with an inclined auger screw (item 14).
The fat that leaves the press is collected by an auger screw (item 15) with a grid that separates off any impurities in the fat.
These impurities is returned to the press by another auger screw (item 17), while the fat falls into the tank below (item 16) which has a pump that then sends it to the cleaning section.

DESCRIPTION OF THE PROCESS
PRESSING SECTION

The fat sent from the filter by the pump (item 18) and from the press goes to the dosing tank (item 19) used to feed the centrifuge (item 20).
This machine separates any flour from the fat by means of centrifugal separation. The centrifuged fat is sent by a centrifugal pump (item 21) to the storage tank (item 22).
This has a pump (item 23) for loading the tank trucks with the fat.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
MILLING SECTION

The cake after a permanence time in the container go to the hammer mill.
The hammer mill reduce the meal to the desired dimension.
So the meal go in the stocking container and with a screw is charged on the trucks.
As optional we can put the meal in bags of 25 or 50 Kg automatically or semi automatically.
There is the possibility to put the meal in big bag of one ton, too.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
ELECTRICAL SYSTEM

The electrical system consists of a centralised power board, complete with personal computer that displays animated drawings depicting the machine in operation.
This panel comes complete with safety devices both for operators and machines.
Complete with automatisms, thermal devices for main motors, ampere meters and temperature and pressure automatic controller and recorder.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
ELECTRICAL SYSTEM

The electrical system consists of a centralised power board, complete with personal computer that displays animated drawings depicting the machine in operation.
This panel comes complete with safety devices both for operators and machines.
Complete with automatisms, thermal devices for main motors, ampere meters and temperature and pressure automatic controller and recorder.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
HEATING SYSTEM

The heating system is essential for the plant to work. Its capacity (in Kcal/h) depends on the size of the plant.
The heating system produces the steam needed to cook the raw materials in the cooker, to keep the fat liquid in the various tanks and for various other services.

meccar IMPIANTI

SAMPLE OF TECHNICAL DATA FOR 30 TON PER DAY. IT CORRESPOND TO 100 TON OF LIVE WEIGHT OF THE ANIMALS SLAUGTHERED

meccar IMPIANTI

TECHNICAL DATAS

Cooker capacity	7,000 litres
Heating fluid	steam
Load capacity	3,500 Kg.
Cooking time	3 hours for a meat/bone mix

NOTE

The “cooking” times vary with the amount of moisture in the product and thus the type of product. If a product is being used with a low moisture content (e.g. lard and pig fat), cooking times can drop to about 1 hour and 30 minutes.

If, on the other hand, the product has a high moisture content (e.g. tripe, intestines, full pig carcasses, poultry feathers, blood etc.), cooking times may rise to about 4 hours.

TECHNICAL DATAS
CONSUMPTION

ELECTRICITY	
POWER INSTALLED	213 Kw
AVERAGE ABSORPTION	150 Kwh

STEAM	
CALORIES	1.000.000 Kcal/h

meccar IMPIANTI

TECHNICAL DATAS
WATER DISCHARGED

WATER DISCHARGED	
QUANTITY	15 m³ in 24 hours

CHARACTERISTICS OF WATER	
COD (Chemical Oxygen Demand)	6.000 mg/l
BOD (Biological Oxygen Demand)	3.500 mg/l
PH	8,5 – 9
TEMPERATURE	40 – 50 °C

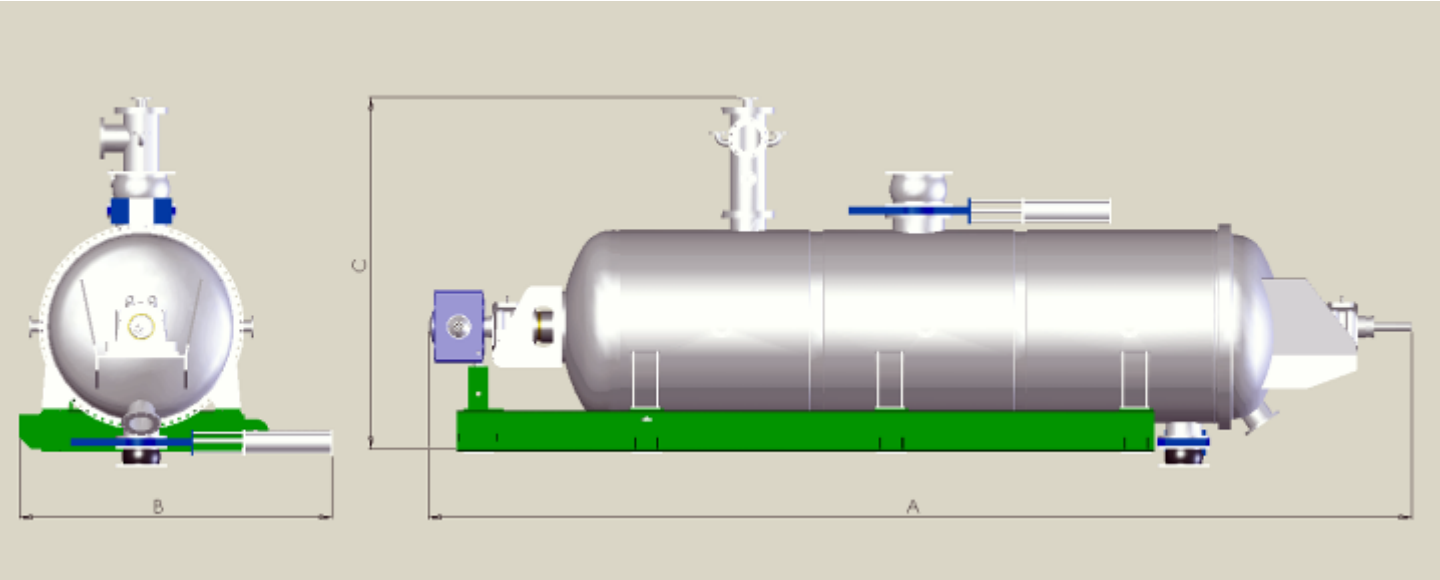
NOTE

The value of COD and BOD of the water discharged can appear very high, but the quantity of water is very low compared to the quantity discharged from the slaughter-house that this rendering plant serve.

In fact a slaughter house discharge approximately 10 m³ of waste water per ton of live weight of the animals slaughtered that in this case is 1.000 m³.

meccar IMPIANTI

MODELS OF BATCH COOKER



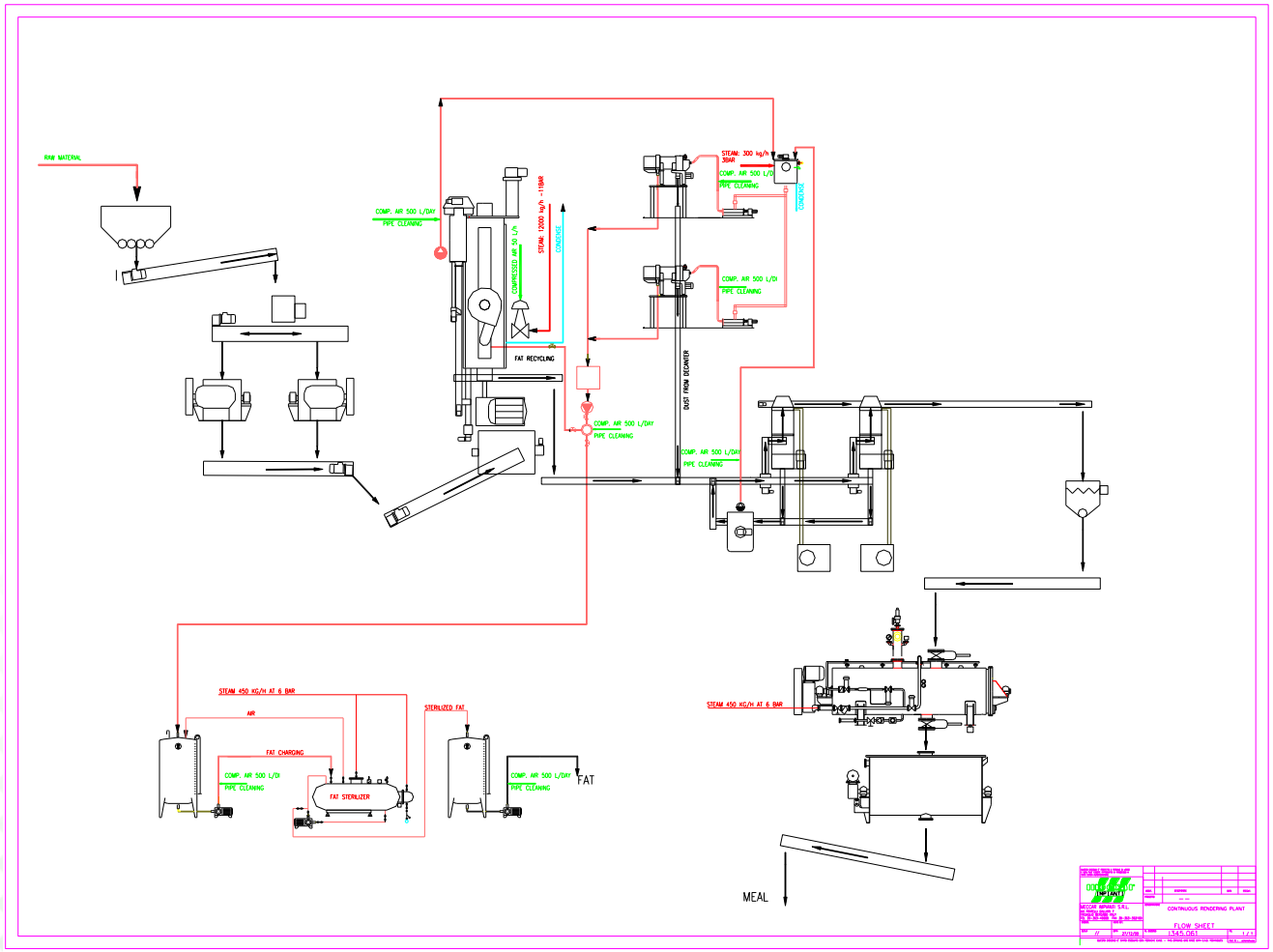
Type	Charge capacity Kg	A	B	C	Power Kw	Weight Kg
AV 360	2.000	5.600	1.200	3.500	22	6.500
AV 700	3.500	8.400	1540	3.700	45	15.000
AV 1600	8.500	7.500	2.400	4.200	90	28.000

meccar IMPIANTI

CONTINUOUS RENDERING PLANT FOR CAPACITY FROM 50 TON IN 24 HOURS

meccar IMPIANTI

SCHEME



meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in an underground container sized to meet system requirements. The open type strong sheet steel container is placed in an appropriate concrete lined pit.
The product is extracted by two screw feeders and sent to the grinder through a tilted screw. An electromagnet is placed before the bone crusher to stop any ferrous bodies.
The crushed product is let into the continuous cooker dosing tank through the tilted screw.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in an underground container sized to meet system requirements. The open type strong sheet steel container is placed in an appropriate concrete lined pit.
The product is extracted by two screw feeders and sent to the grinder through a tilted screw. An electromagnet is placed before the bone crusher to stop any ferrous bodies.
The crushed product is let into the continuous cooker dosing tank through the tilted screw.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in an underground container sized to meet system requirements. The open type strong sheet steel container is placed in an appropriate concrete lined pit.
The product is extracted by two screw feeders and sent to the grinder through a tilted screw. An electromagnet is placed before the bone crusher to stop any ferrous bodies.
The crushed product is let into the continuous cooker dosing tank through the tilted screw.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in an underground container sized to meet system requirements. The open type strong sheet steel container is placed in an appropriate concrete lined pit.
The product is extracted by two screw feeders and sent to the grinder through a tilted screw. An electromagnet is placed before the bone crusher to stop any ferrous bodies.
The crushed product is let into the continuous cooker dosing tank through the tilted screw.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FRESH PRODUCT INFEED SECTION

The raw material is received and stored in an underground container sized to meet system requirements. The open type strong sheet steel container is placed in an appropriate concrete lined pit.
The product is extracted by two screw feeders and sent to the grinder through a tilted screw. An electromagnet is placed before the bone crusher to stop any ferrous bodies.
The crushed product is let into the continuous cooker dosing tank through the tilted screw.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
COOKING/DRYING SECTION

The Continuous cooker is a horizontal, steam-jacketed cylindrical vessel equipped with a rotating shaft to which are attached paddles that lift and move the material horizontally through the cooker.
Steam also is injected into the hollow shaft to provide increased heat transfer.
The feed rate to the continuous cooker is controlled by the computer adjusting the speed of the variable speed drive for the feed screw which establishes the production rate for the system.
The discharge rate for the continuous cooker is controlled by the speed at which the control wheel rotates.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
COOKING/DRYING SECTION

The Continuous cooker is a horizontal, steam-jacketed cylindrical vessel equipped with a rotating shaft to which are attached paddles that lift and move the material horizontally through the cooker.
Steam also is injected into the hollow shaft to provide increased heat transfer.
The feed rate to the continuous cooker is controlled by the computer adjusting the speed of the variable speed drive for the feed screw which establishes the production rate for the system.
The discharge rate for the continuous cooker is controlled by the speed at which the control wheel rotates.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
COOKING/DRYING SECTION

The control wheel contains buckets similar to those used in a bucket elevator that pick up the cooked material from the continuous cooker and discharge it to the continuous percolator.
This performs the same function as the percolator drain pan in the batch cooker process, but it is continuous.
It is an enclosed screw conveyor that contains a section of perforated trough for the free melted fat to drain through to the fat settling tank.
In the discharge conveyor, solids from the continuous percolator are combined with the solids discharge from the settling tank.
The protein solids containing residual fat are then conveyed to the screw presses for additional separation of fat.

DESCRIPTION OF THE PROCESS
PRESSING SECTION

The drained product still contains 6-9% humidity and 30-40% of fat (depending on the type of material processed). The solid material is then sent to a container placed over the press that acts as a tank and feeder for the continuous screw press. Pressing forcibly separates the fat from the meal and discharges the cake with 8-12% residual fat. (Removing the fat increases protein and meal preservability and digestibility).
The cake obtained in this way are collected in the hammer mill dosing container or, if required in the sterilizer dosing container.
The fat that comes out of the press is collected by the screw equipped with a perforated grille that separates the dust from the fat. The fat falls into the tank equipped with a pump and is sent to the cleaning phase.
The dust continues along the screw that recycles it in the press.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
PRESSING SECTION

The drained product still contains 6-9% humidity and 30-40% of fat (depending on the type of material processed). The solid material is then sent to a container placed over the press that acts as a tank and feeder for the continuous screw press. Pressing forcibly separates the fat from the meal and discharges the cake with 8-12% residual fat. (Removing the fat increases protein and meal preservability and digestibility).
The cake obtained in this way are collected in the hammer mill dosing container or, if required in the sterilizer dosing container.
The fat that comes out of the press is collected by the screw equipped with a perforated grille that separates the dust from the fat. The fat falls into the tank equipped with a pump and is sent to the cleaning phase.
The dust continues along the screw that recycles it in the press.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS

MEAL STERILIZATION PHASE
IF REQUIRED BY THE LAW AS IN THE EUROPEAN COMMUNITY

The bone meal is charged in the sterilizer.
Once the material has entered in the sterilizer, automatically, the temperature is raised to 133° C at a pressure of 3 bar absolute for 20 minutes.
This is mandatory under EU hygiene and health regulations as the raw material can be, and often is, a medium for bacteria and viruses that can lead to a large number of diseases, including B.S.E.
After this stay time in the cooker, the pressure is lowered until it is the same as the external air pressure.
All the sterilization process is recorded on paper as required by the European law.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
MILLING SECTION

The cake after a permanence time in the container go to the hammer mill.
The hammer mill reduce the meal to the desired dimension.
So the meal go in the stocking container and with a screw is charged on the trucks.
As optional we can put the meal in bags of 25 or 50 Kg automatically or semi automatically.
There is the possibility to put the meal in big bag of one ton, too.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
MILLING SECTION

The cake after a permanence time in the container go to the hammer mill.
The hammer mill reduce the meal to the desired dimension.
So the meal go in the stocking container and with a screw is charged on the trucks.
As optional we can put the meal in bags of 25 or 50 Kg automatically or semi automatically.
There is the possibility to put the meal in big bag of one ton, too.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
FAT PURIFYING

The fat from the continuous cooker and from the presses is sent to the decanter. This machine separates the impurities from the fat, through centrifuging. Centrifuged fat is stored in the appropriate tank for charge the trucks or, if required in the fat sterilizer dosing tank.
The solid is recycled in the presses by screws.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS

FAT STERILIZATION PHASE IF REQUIRED BY THE LAW AS IN THE EUROPEAN COMMUNITY

The fat is charged in the sterilizer.
Once the material has entered in the sterilizer, automatically, the temperature is raised to 133° C at a pressure of 3 bar absolute for 20 minutes.
This is mandatory under EU hygiene and health regulations as the raw material can be, and often is, a medium for bacteria and viruses that can lead to a large number of diseases, including B.S.E.
After this stay time in the cooker, the pressure is lowered until it is the same as the external air pressure.
All the sterilization process is recorded on paper as required by the European law.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
ELECTRICAL SYSTEM

The electrical system consists of a centralised power board, complete with personal computer that displays animated drawings depicting the machine in operation.
This panel comes complete with safety devices both for operators and machines.
Complete with automatisms, thermal devices for main motors, ampere meters and temperature recorders.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
ELECTRICAL SYSTEM

The electrical system consists of a centralised power board, complete with personal computer that displays animated drawings depicting the machine in operation.
This panel comes complete with safety devices both for operators and machines.
Complete with automatisms, thermal devices for main motors, ampere meters and temperature recorders.

meccar IMPIANTI

SAMPLE OF TECHNICAL DATA FOR 140 TON IN 24 HOURS. IT CORRESPOND TO 470 TON OF LIVE WEIGHT OF THE ANIMALS SLAUGTHERED

meccar IMPIANTI

TECHNICAL DATAS

Cooker evaporation capacity	3.000 kg/h
Heating fluid	steam
Capacity with raw material with 50% of moisture	6.000 kg/h

NOTE

The capacity vary with the amount of moisture in the product and thus the type of product. If a product is being used with a low moisture content (e.g. lard and pig fat), the capacity of the continuous cooker increase.

If, on the other hand, the product has a high moisture content (e.g. tripe, intestines, full pig carcasses, etc.), the capacity of the continuous cooker reduces.

meccar IMPIANTI

TECHNICAL DATAS
CONSUMPTION

ELECTRICITY	
POWER INSTALLED	466 Kw
AVERAGE ABSORPTION	326 Kwh

STEAM	
CALORIES	4.000.000 Kcal/h

meccar IMPIANTI

TECHNICAL DATAS
WATER DISCHARGED

WATER DISCHARGED	
QUANTITY	72 m³ in 24 hours

CHARACTERISTICS OF WATER	
COD (Chemical Oxygen Demand)	6.000 mg/l
BOD (Biological Oxygen Demand)	3.500 mg/l
PH	8,5 – 9
TEMPERATURE	40 – 50 °C

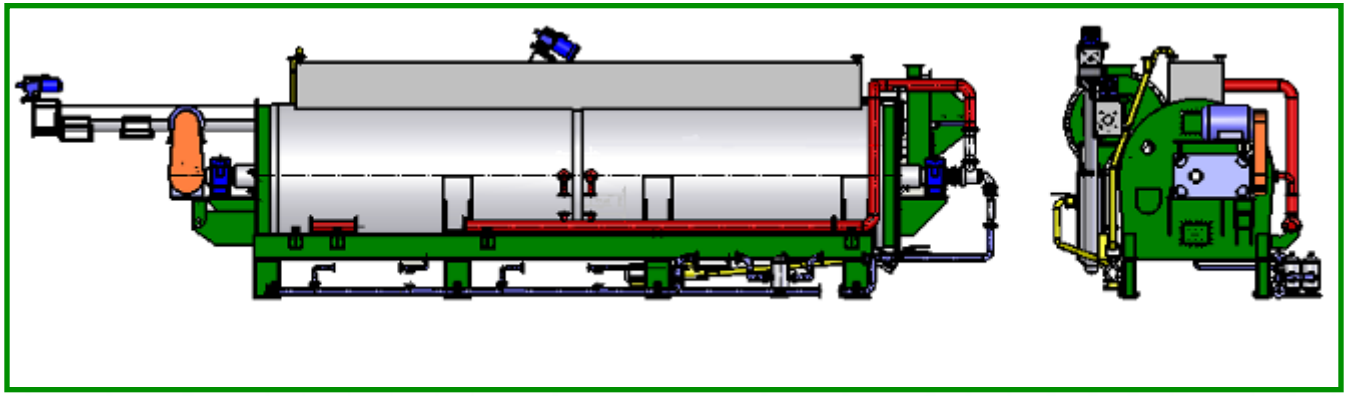
NOTE

The value of COD and BOD of the water discharged can appear very high, but the quantity of water is very low compared to the quantity discharged from the slaughter-house that this rendering plant serve.

In fact a slaughter house discharge approximately 10 m³ of waste water per ton of live weight of the animals slaughtered that in this case is 4.700 m³.

meccar IMPIANTI

MODELS OF CONTINUOUS COOKER



Type	Surface	Evaporation	Production	Power	Steam consumption	Dimensions mm		
	m²	Kg/h	Ton/h	Kw	Kg/h	A	B	C
SAV 30	45	1.500	3	22	1.950	8.000	5.300	2.600
MCC 60	90	3.000	6	45	3.900	10.000	5.600	2.600
SAV 120	120	4.000	8	45	5.200	12.000	6.400	2.600
SAV 140	140	4.600	9,2	55	6.000	13.000	6.400	2.800
SAV 180	180	6.000	12	55	7.800	13.000	6.400	2.800
SAV 240	240	8.000	16	90	10.400	15.000	6.400	2.800
SAV 320	320	10.000	20	110	13.000	17.000	6.400	2.800
SAV 400	400	13.200	26	132	17.000	17.000	7.600	3.800

meccar IMPIANTI

Comparison between batch and continuous

- A continuous rendering system normally consists of a single continuous cooker, whereas the batch cooker system consists of multiple cooker units.
- A continuous system usually has a higher capacity than the batch cooker system it replaces. This increased capacity provides for more efficient processing of the raw material by processing more material in less time.
- Continuous rendering also has a number of other inherent advantages over the batch system.
- Since a continuous process requires less cooking time or exposure to heat, improved product quality normally results.
- Further, the continuous system occupies considerably less space than a batch cooker system with equivalent capacity, thus saving building construction costs.
- Finally, a single cooker unit is inherently more efficient than multiple cooker units in terms of steam consumption and achieves a significant saving in fuel usage by the boilers.
- Likewise, less electrical power is consumed for agitation in the single continuous cooker unit.
- The only advantage of the batch cooker is that it can work under pressure so it can process feathers and hair.

BLOOD PROCESSING

meccar IMPIANTI

BLOOD PROCESSING

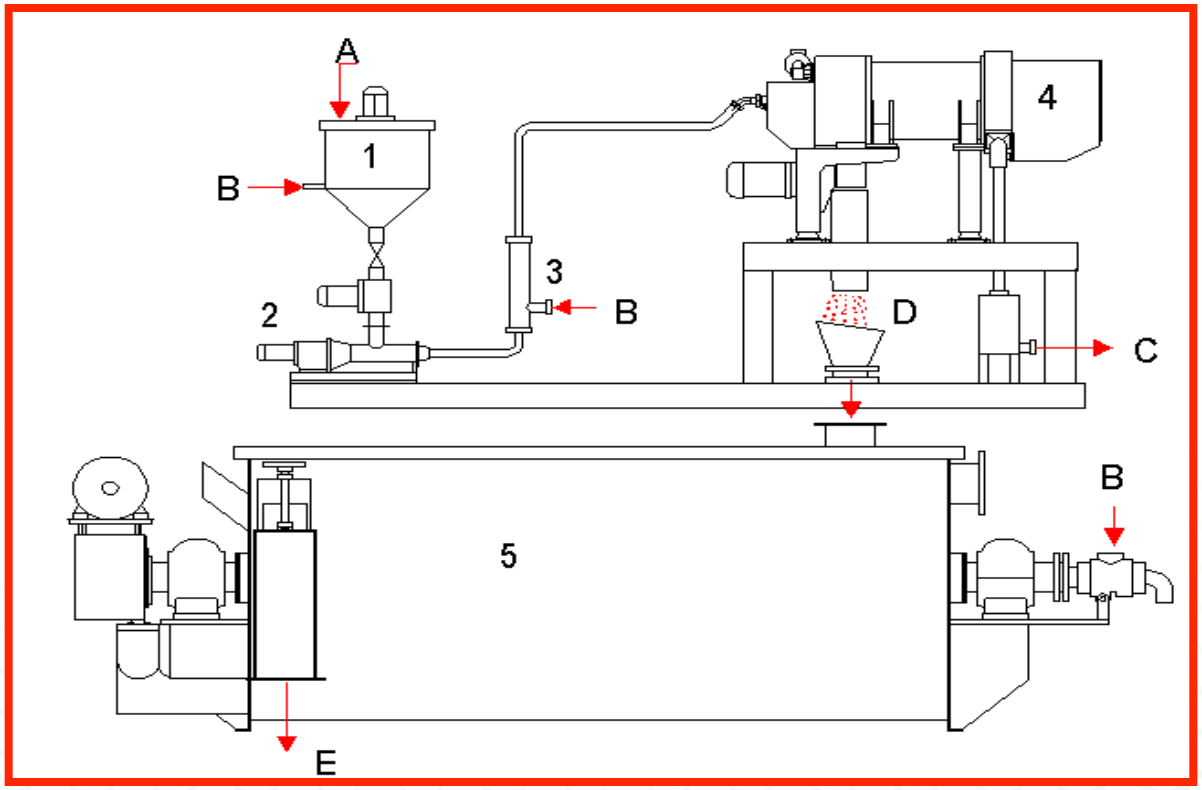
A = blood

B = steam

C = drainage water

D= coagulated and centrifuged blood

E = dried meal



1 = preheater

2 = pump

3 = coagulator

4 = decanter

5 = drier

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
RICEPTION AND DOSING

The blood arrives from the slaughter-house in a tank that serves as a storage tank and feeder for the system.
It is then sent to the system from here by a mono screw pump passing through a mini macerator that breaks up any clots and pieces of cartilage and bones.

DESCRIPTION OF THE PROCESS
PREHEATING AND COAGULATION

The blood then reaches a tank (item 1) equipped with an agitator, direct steam input and thermoregulating device.
It is then sent to a continuous coagulator (item 3) and decanter (item 4) by means of a pump (item 2).

DESCRIPTION OF THE PROCESS
MECHANICAL DEHYDRATION AND DRYING

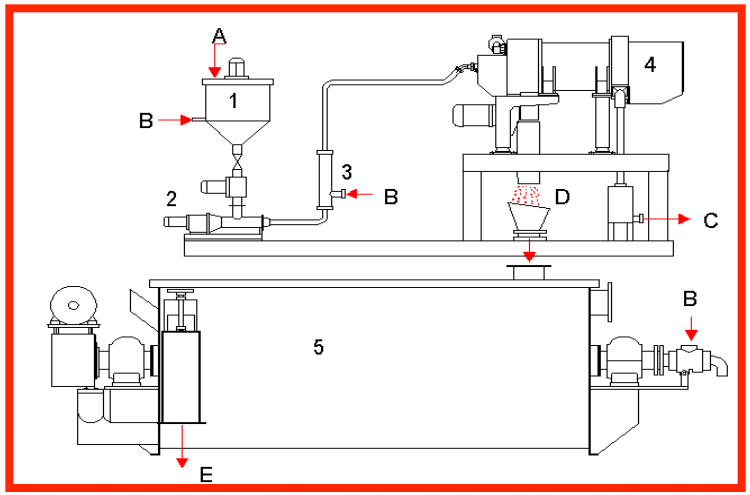
The solid protein part is separated from the serum in the decanter.
Therefore 75% of the water originally contained in the blood is eliminated mechanically.
The solid discharge, consisting of around 50% meal and 50% water, passes through a continuous drier (item 5) from which protein meal having a residual humidity below 8% comes out continuously.

meccar IMPIANTI

DESCRIPTION OF THE PROCESS
MILLING AND BAGGING

The flakes that come out of the drier are sent to the mill dosing tank.
The hammer mill reduces the blood meal into the particle size desired.
The meal is then sent to the automatic weighing and bagging machine through a tilted chute.

MODELS OF BLOOD LINE



Type	Kg/h INCOMING	KWH ABSORBED	STEAM CONSUMPTION KG/H	MEAL PRODUCED KG/H
IS1	1.000	24	430	150-200
IS2	2.000	30	860	300-400
IS3	3.000	34	1290	450-600
IS4	4.000	53	1720	600-800
IS5	5.000	66	2150	750-1.000

meccar IMPIANTI

POSSIBLE SOLUTION FOR THE CONTROL OF THE SMELL FROM RENDERING PLANT

meccar IMPIANTI

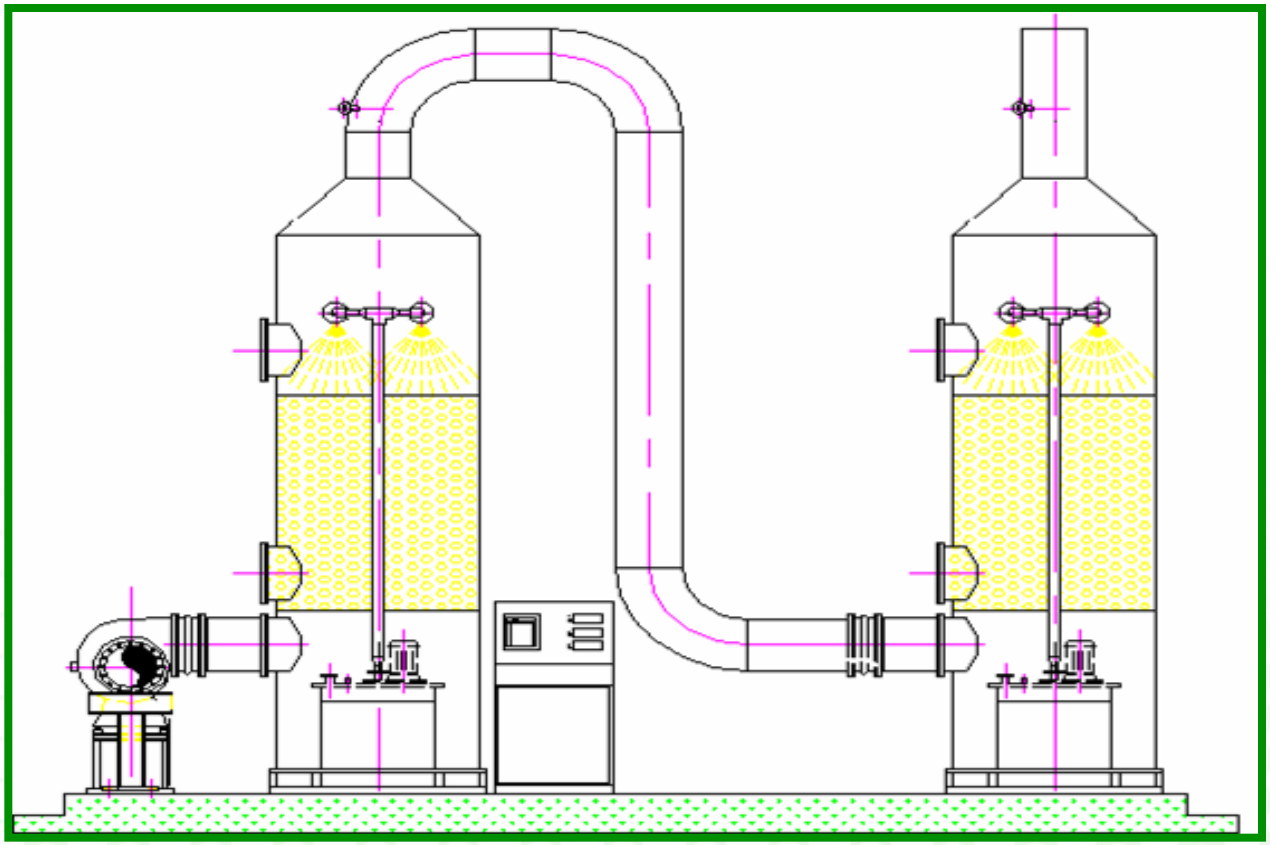
FIRST POSSIBILITY

SMOKE VENTILATION AND SMOKE SCRUBBING SYSTEM

SCRUBBER

meccar IMPIANTI

SCRUBBER



meccar IMPIANTI

DESCRIPTION OF THE PROCESS

Our removal system has been designed to absorb malodorous fumes contained in the air coming from production areas where your machinery is situated. Malodorous substances are removed internally by a wet scrubber which utilizes re-circulating water H2O + NaOH.
Configuration of our group is of the packed STATIC BED type, with PALL rings in PP packed into the column.
The gas is introduced at the bottom, while the liquid is introduced at the top though ramps of spray nozzles.
During the process, the gas to be treated will initially bubble in the cleaning solution and then passes through the packed bed fed by a counter-flow of service water. The amount of re-circulated water in the column is regulated by a special valve. The gas passes through a drop separator situated at the top of the system (which traps any particles of re-circulated liquid carried by the flow of gas as it leaves the column) and is discharged into the atmosphere through the flue.
If the washing process is not enough can be added a second tower that receive the air from the first and using sulfuric acid give more efficiency

meccar IMPIANTI

SECOND POSSIBILITY
BIOFILTER

BIOFILTER

Fig. 2 – Grigliato e piedini di supporto

BIOFILTER

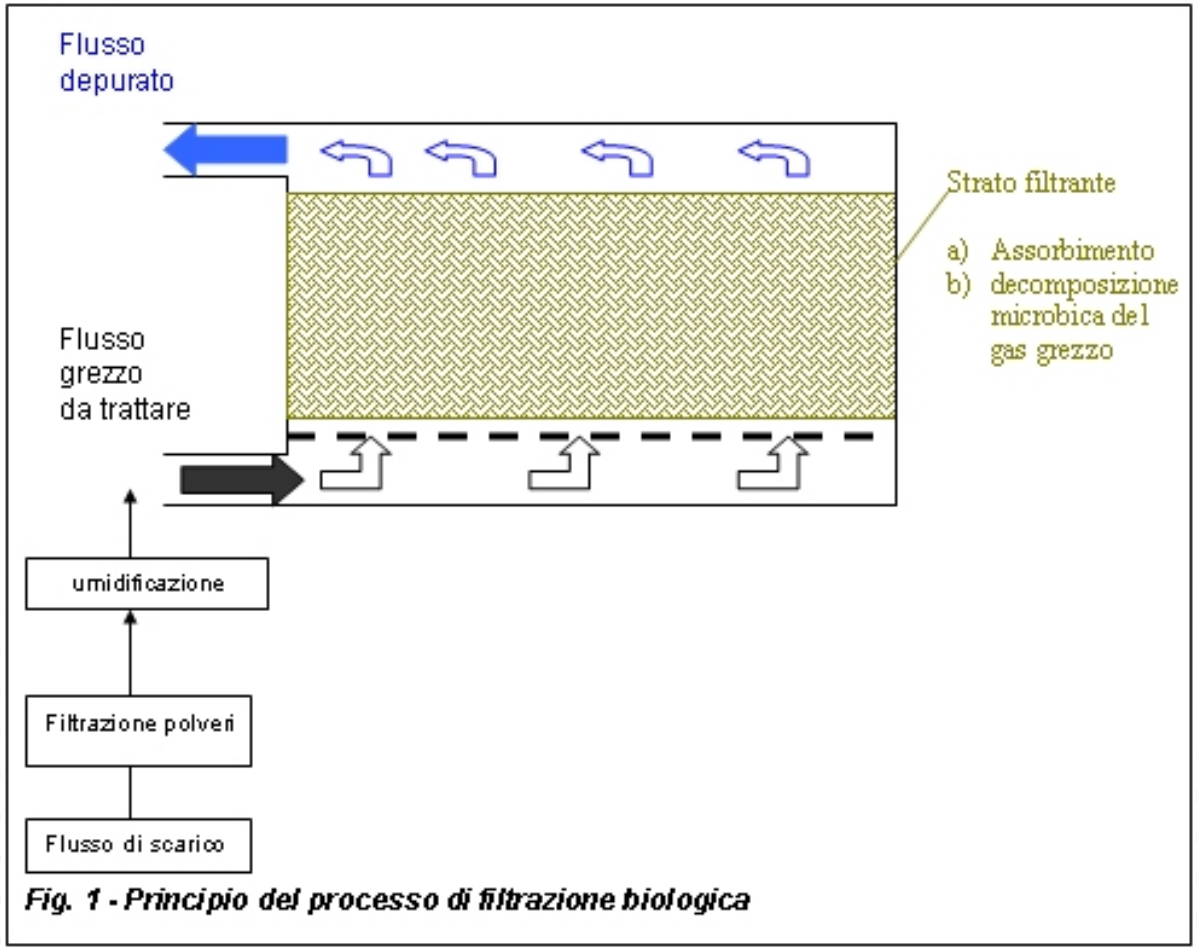


Fig. 1 - Principio del processo di filtrazione biologica

DESCRIPTION OF THE PROCESS

Biofiltration is an air pollution control technology which utilizes microorganisms to biologically degrade odors and other volatile air pollutants contained in waste air streams. The microorganisms exist on the surface, and in a thin water film surrounding the surface, of the biofilter material. During the biofiltration process, the contaminated air is slowly pumped through the biofilter material. The pollutants are adsorbed onto the filter material´s surface, and absorbed into the water film. Simultaneously, the microorganisms biologically consume i.e. metabolize the pollutants, producing energy, biomass, and metabolic end products, mainly CO2 and H2O. The biofiltration process results in a complete decomposition of the pollutants, creating no hazardous byproducts.

THIRD POSSIBILITY
THERMAL OXIDISER

meccar IMPIANTI

THERMAL OXIDISER

meccar IMPIANTI

DESCRIPTION OF THE PROCESS

The effluent (vapour from the cooker and smelling air from the machines) flows to an isolated combustion chamber where it is heated to 950 °C and maintained at this temperature for at least 0.8 seconds.
The chamber has dimensions and characteristics such as to create considerable turbulence of the gas flow that will provide a homogenous mixture at one uniform temperature.
The pollutants present are eliminated during the thermal oxidisation process (combustion) which heats the flow of pollutants to a temperature sufficient.
The reaction is exothermic and as a consequence the temperature rises in proportion to the concentration of pollutants at the inlet and their calorific value.
After the residence time in combustion chamber the flux enter in a recuperative boiler that produce the necessary quantity of steam for the operation of the rendering plant.

ADVANTAGE OF THERMAL OXIDATION

The effluent (vapour from the cooker and smelling air from the machines) flows to an isolated combustion chamber where it is heated to 950 °C and maintained at this temperature for at least 0.8 seconds.
The chamber has dimensions and characteristics such as to create considerable turbulence of the gas flow that will provide a homogenous mixture at one uniform temperature.
The pollutants present are eliminated during the thermal oxidisation process (combustion) which heats the flow of pollutants to a temperature sufficient.
The reaction is exothermic and as a consequence the temperature rises in proportion to the concentration of pollutants at the inlet and their calorific value.
After the residence time in combustion chamber the flux enter in a recuperative boiler that produce the necessary quantity of steam for the operation of the rendering plant.

meccar IMPIANTI

ADVANTAGE OF THERMAL OXIDATION

- NO FURTHER EFFLUENT TREATMENT NEEDED
- NO FURTHER EFFLUENT HANDLING
- NO SITE STORAGE OF CONDENSATE
- NO ODOUR FROM MACHINES
- NO LARGE ELECTRICAL LOAD INCREASE
- NO EFFLUENT CHEMICAL DEMAND

meccar IMPIANTI

QUESTIONS AND ANSWERS

meccar IMPIANTI