Animal based products

Today the environmental awareness among citizens is steadily growing therefore the processes to reuse and give value to food industry waste become a priority. In this regard, most of animal by-products are convertible from a waste to a market valuable product. Meat and fish processing waste can be converted in products for pharma, cosmetics and food applications and in other specific products for several non-food applications. Pieralisi, through its long term experience on this field, is able to supply decanters and centrifugal separators for animal fat rendering, animal meal production, mechanical meat defatting and blood processing. Our proposed solutions consist of multiple steps of separation, two or three phases, which allow to obtain top quality products, investments cost saving, waste reduction and lower energy consumption.

1. Wet Rendering
2. Dry Rendering
3. Blood Plasma Recovery
4. Blood Meal Production
5. Fish Oil Recovery
6. Meat Oil Recovery
7. Mechanical Meat Defatting
6 Meat Oil Recovery

- Raw meat
  - Grinder
  - Sterilization
  - Strainer conveyor
    - Solid → Press
    - Liquid → Solid
  - Separation
    - Pages 12-13
      - Stickwater
      - Solid → Dryer
      - Solid → Mill
      - Evaporator
      - Meat Bone meal
        - Bone chips
      - Waste
      - Oil
      - Waste and washing water treatment

7 Mechanical Meat Defatting

- Raw skin
  - Grinder
  - Heat exchanger
  - Separation
    - Pages 14-15
      - Defatted meat
      - Water
      - Oil
      - Waste
      - Buffer tank
      - Heat exchanger
      - Separation
        - Pages 16-15
Single Step 2 Phases

This configuration includes the following pieces of equipment:

1. Product pump  
2. Heat exchanger  
3. Decanter centrifuge  
4. Screw conveyor  
5. Press  
6. Mill  
7. Light phase tank  
8. Light phase pump  
9. Main control panel  
10. Steam generator  
11. Heating system control panel

CIP washing system

Flushing line

Water

Heavy phase - Meal

Light phase

Heating system

Fuel

Water

Condensate

Steam

Condensate
Double Step 2 Phases

This configuration includes the following pieces of equipment:

1. Filter
2. Heat exchanger
3. Decanter centrifuge
4. Decanter centrifuge control panel
5. Screw conveyor
6. Press
7. Mill
8. Fat / oil tank
9. Feeding pump
10. Heat exchanger
11. Centrifugal separator
12. Solid discharge tank
13. Solid discharge pump
14. Centrifugal separator control panel
15. Steam generator
16. Heating system control panel

CIP washing system

Flushing line

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17. Water
18. Water
19. Drainage
Double Step 2 Phases (Mechanical Meat Defatting)

This configuration includes the following pieces of equipment:

1. Product pump
2. Heat exchanger
3. Decanter centrifuge
4. Decanter centrifuge control panel
5. Defatted meat tank
6. Oil phase tank
7. Defatted meat pump
8. Centrifugal separator feeding pump
9. Heat exchanger
10. Centrifugal separator
11. Centrifugal separator control panel
12. Clean oil tank
13. Clean oil pump
14. Clean water tank
15. Clean water pump
16. Steam generator
17. Heating system control panel

CIP washing system

Flushing line

Drainage
Double Step 3 Phases

This configuration includes the following pieces of equipment:

1. Product pump
2. Heat exchanger
3. Decanter centrifuge
4. Decanter centrifugal control panel
5. Screw conveyor
6. Dryer
7. Mill
8. Fat oil tank
9. Fat oil pump
10. Heat exchanger
11. Stickwater tank
12. Stickwater pump
13. Evaporation plant
14. Centrifugal separator control panel
15. Centrifugal separator
16. Clean fat/oil tank
17. Clean fat/oil pump
18. Water tank
19. Water pump
20. Solid discharge tank
21. Solid discharge pump
22. Steam generator
23. Heating system control panel

CIP washing system

Flushing line

Drainage
Pieralisi decanter centrifuges are based on a modern technology that combines the ability of treating high solids content products with an excellent clarification efficiency. Separation performances are related not only to mechanical details but also to operating parameters (centrifugal force, flow rate, differential speed, liquid levels) and to the specific characteristics of the product (density, viscosity, quantity and dimension of solid particles).

A main motor, connected to the decanter shaft, drives the bowl rotation. The extremely high centrifugal force generated inside the bowl is proportional to the rotational speed and to the bowl diameter. The product to be clarified enters through the feeding pipe; it passes in the diffuser to be distributed to the rotational speed and to the bowl diameter. The product to be clarified enters through the feeding pipe; it is undergone to centrifugal force and then it is accelerated. The centrifugal force acting on the solid particles is responsible for the solid-liquid separation.

Every decanter centrifuge can be tailored to any specific application, being both structural and mechanical details but also to operating parameters (centrifugal force, flow rate, differential speed, liquid levels) and to the specific characteristics of the product, solid quantity and type, temperature). Pieralisi centrifugal separators are specifically developed to reach the maximum quality levels by using internal components designed to remove also the smallest solid particles.

The PLC automatically handles and controls the centrifugal separator by smoothly acting on the scroll differential speed. The last control release optimizes the separation performances and stabilizes the operation conditions by controlling the decanter centrifuge in “torque mode”. The logic is continuously calculating the torque on the decanter scroll, keeping it stable at its set point value, by smoothly acting on the scroll differential speed. The PLC automatically handles and controls the centrifugal separator in each operating step (start-up, duty, discharge, flushing and shutdown), monitors the main parameters and effectively manages any anomaly or emergency.

All Pieralisi control panels can be equipped with a dedicated module suitable for remote connection, supervision, diagnostics and support. Upon request, only the control unit (TCP) can be supplied: this solution does not consider the possibility to control the auxiliaries and does not have the electrical section with VFD and breakers.

Liquid discharge configurations

Two phases discharge
- Inlet product
- Liquid phase

Three phases discharge
- Inlet product
- Solid phase
- Heavy liquid phase
- Light liquid phase
- Interchangeable liquid discharge outlets and levels

Electrical and control panel

“Pieralisi Control System” is divided in two main sections: power and control. The main switches and the variable frequency drives (VFD) for both decanter, separator and auxiliaries are placed in the power side. The control module is based on the latest generation PLC and HMI with a touch screen panel. A dedicated software, designed by Pieralisi automation department, is embedded in the PLC to automatically control the whole separation plant during each operating phase: start-up, duty, flushing, shutdown and emergency. The HMI allows navigating through several areas:
- separation process monitoring
- operating parameters control
- alarms detection and interlocks
- main parameters trend display

The last control release optimizes the separation performances and stabilizes the operation conditions by controlling the decanter centrifuge in “torque mode”. The logic is continuously calculating the torque on the decanter scroll, keeping it stable at its set point value, by smoothly acting on the scroll differential speed. The PLC automatically handles and controls the centrifugal separator in each operating step (start-up, duty, discharge, flushing and shutdown), monitors the main parameters and effectively manages any anomaly or emergency.

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## Decanter Centrifuge

**Configuration Table**

<table>
<thead>
<tr>
<th>ROTATING ASSEMBLY</th>
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<tbody>
<tr>
<td><strong>Bowl</strong></td>
<td>Shallow cone</td>
<td>Inner surface with grooves</td>
<td>Wear protections solid discharge bushings AISI 440C (replaceable)</td>
<td>Wear protections solid discharge bushings Stainless Steel (replaceable)</td>
<td>Single Right (S), Redundant (R), Variable pitch (V), Double Right (D)</td>
<td>Flight with windows</td>
<td>Flight wear protections: sprayed tungsten carbide</td>
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<tr>
<td><strong>Scroll</strong></td>
<td>Diffuser replaceable wear protection AISI 440 or STC</td>
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<table>
<thead>
<tr>
<th>MATERIALS</th>
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</thead>
<tbody>
<tr>
<td><strong>Bowl</strong></td>
<td>AISI 440 stainless steel / AISI 304 stainless steel</td>
<td>SAF 2205 Duplex stainless steel / AISI 316 stainless steel</td>
<td></td>
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</tr>
<tr>
<td><strong>Case</strong></td>
<td>Cylindrical body Painted carbon steel (PCS), Stainless steel (SS)</td>
<td>Stainless steel solid liquid chambers Subframe Painted carbon steel (PCS), Stainless Steel (SS)</td>
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<tr>
<td><strong>Parts in contact with the product</strong></td>
<td>Stainless Steel</td>
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<tr>
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<tbody>
<tr>
<td><strong>Installation area</strong></td>
<td>Safe area; no Hazardous area</td>
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<table>
<thead>
<tr>
<th>LUBRICATION</th>
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<tbody>
<tr>
<td><strong>Gearbox</strong></td>
<td>Oil baths (tailored on the FDA specifications)</td>
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<tr>
<td><strong>Bearings</strong></td>
<td>Automatic greasing (grease tailored on the FDA specifications)</td>
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<table>
<thead>
<tr>
<th>PROCESS CONFIGURATION</th>
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<tbody>
<tr>
<td><strong>Liquid process handling</strong></td>
<td>Two phases</td>
<td>Three phases</td>
<td>Interchangeable liquid outlet levels</td>
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<table>
<thead>
<tr>
<th>DRIVES</th>
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<tbody>
<tr>
<td><strong>Bowl drive</strong></td>
<td>Electric motor</td>
<td></td>
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<tr>
<td><strong>Scroll drive</strong></td>
<td>Fixed differential speed (countershaft)</td>
<td>Electric motor BDS, Rotovariator ® (RTV), Hydraulic motor (SH)</td>
<td>Electric control panel</td>
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<table>
<thead>
<tr>
<th>DECANTER OPTIONS</th>
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<tbody>
<tr>
<td><strong>Kits and systems</strong></td>
<td>Cooling fan</td>
<td>Solids scraper device</td>
<td>Cyclone kit</td>
<td>CIP washing system</td>
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<table>
<thead>
<tr>
<th>PLANT OPTIONS</th>
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<tbody>
<tr>
<td><strong>Kits and systems</strong></td>
<td>Solid conveying system</td>
<td>Homogenizing system</td>
<td>Feeding pump</td>
<td>Flow rate measurement kit</td>
<td>Heating system</td>
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## Centrifugal Separator

<table>
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</thead>
<tbody>
<tr>
<td><strong>Liquid discharge</strong></td>
<td>Double outlet free exit</td>
<td>Single outlet under pressure (FL), TH, double outlet under pressure (2T)</td>
<td></td>
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<tr>
<td><strong>Solid discharge</strong></td>
<td>Automatic</td>
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<tr>
<td><strong>Type of separation discs</strong></td>
<td>Clarifier (C), Purgler (P)</td>
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<table>
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<tbody>
<tr>
<td><strong>Bowl</strong></td>
<td>SAF 2205 Duplex</td>
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</tr>
<tr>
<td><strong>Cover</strong></td>
<td>AISI 304 stainless steel</td>
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</tr>
<tr>
<td><strong>Frame</strong></td>
<td>Cast iron with stainless steel inner protection</td>
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<tr>
<td><strong>Wet parts</strong></td>
<td>Tailored on the application and international standard</td>
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<thead>
<tr>
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<tbody>
<tr>
<td><strong>Gaskets</strong></td>
<td>High wear and corrosion resistance</td>
<td></td>
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<tr>
<td><strong>Seal</strong></td>
<td>With wear and corrosion special protection system</td>
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<table>
<thead>
<tr>
<th>TRANSMISSION</th>
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<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Gears (G), Belts (B)</td>
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<tr>
<td><strong>Lubrication</strong></td>
<td>Oil baths (tailored on the FDA specifications)</td>
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<tr>
<td><strong>Area</strong></td>
<td>Safe area; no Hazardous area</td>
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<table>
<thead>
<tr>
<th>INSTALLATION</th>
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</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Stand alone separation, equipped with shock absorbers and anchor devices</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Stainless steel skirt and anchor devices</strong></td>
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<tr>
<td><strong>Stainless steel skirt equipped with control panel and auxiliary units</strong></td>
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<table>
<thead>
<tr>
<th>SEPARATOR OPTIONS</th>
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<tbody>
<tr>
<td><strong>Kits and systems</strong></td>
<td>Activation of the solid discharge: manual (M) or automatic (A)</td>
<td>Counter pressure valve on light (L), heavy (H) or both liquid outlets (LH)</td>
<td>CIP washing system</td>
<td></td>
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<table>
<thead>
<tr>
<th>PLANT OPTIONS</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Kits and systems</strong></td>
<td>Feeding pump</td>
<td>Flow rate measurement kit</td>
<td>Heating system</td>
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</tbody>
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