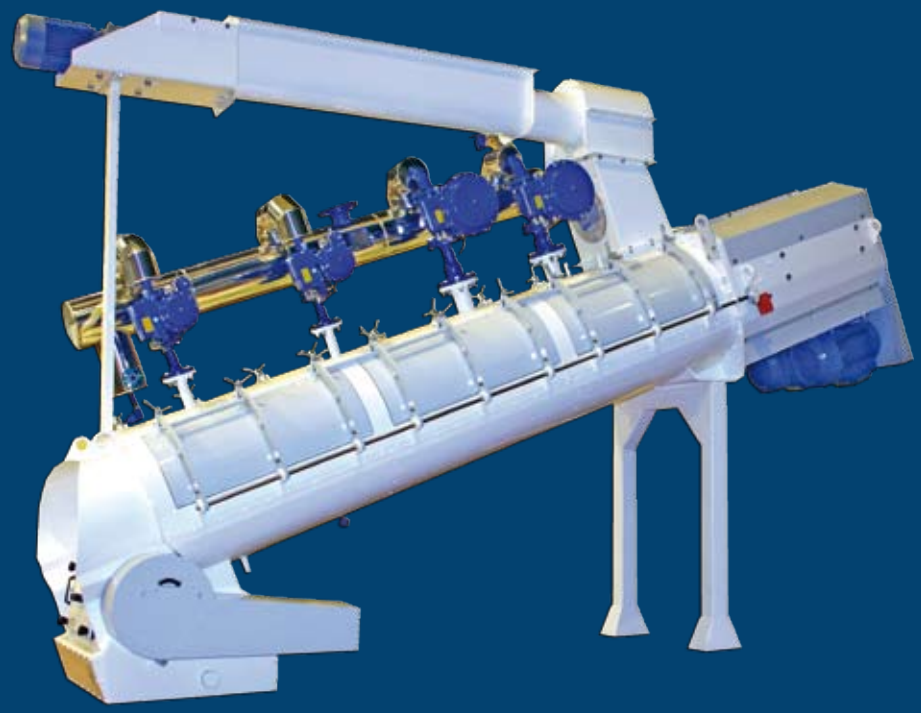
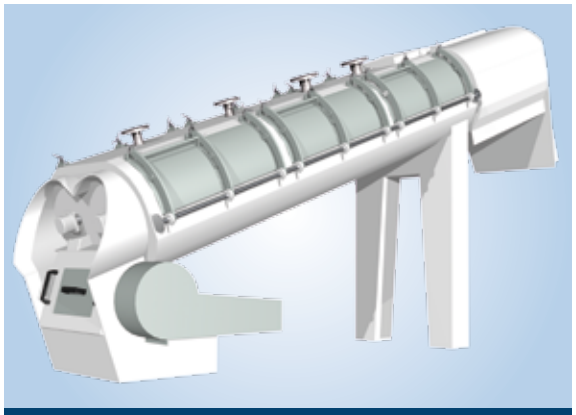
stolz

desmet ballestra

# Thermal treatment



# Thermal conditioner



Thermal conditioner

## Purpose

The thermal conditioner guarantees the sanitary quality, improves the meals flow and the starch digestibility and increases the water content of the product.

## Principle

The super conditioner has a slope angle improving avoiding any damage of the mixing and allowing a good filling control and retention time.

The meal is inserted into the body via a clogging screw ensuring a regular filling of the conditioner.

The product is mixed by the blade(s) of the rotor. It is submitted to a shearing effect in order to stop it before coming out until the opening order is given according to the temperature and selected duration of treatment.

That treatment allows direct steam injection and a homogeneous cooking of the product. The long lasting treatment capacity (up to 6 minutes) of this unit ensures a perfect mixing of starch and gluten molecules.

In case of a pellet mill feeding the transverse and horizontal shearing undergone by the product increases water addition possibilities into meal thus improving the quality of pellets produced by the pellet mill and decreasing the energy consumption. It also has liquid incorporation capacities.

The outlet valve is designed for a regular feeding and a quick response time of the pellet mill. It is designed to be cleaned easily and to avoid any leak-off steam.

## Major advantages

- The unit always operates at 100% refilling preventing any steam leakage
- 100% made of stainless steel

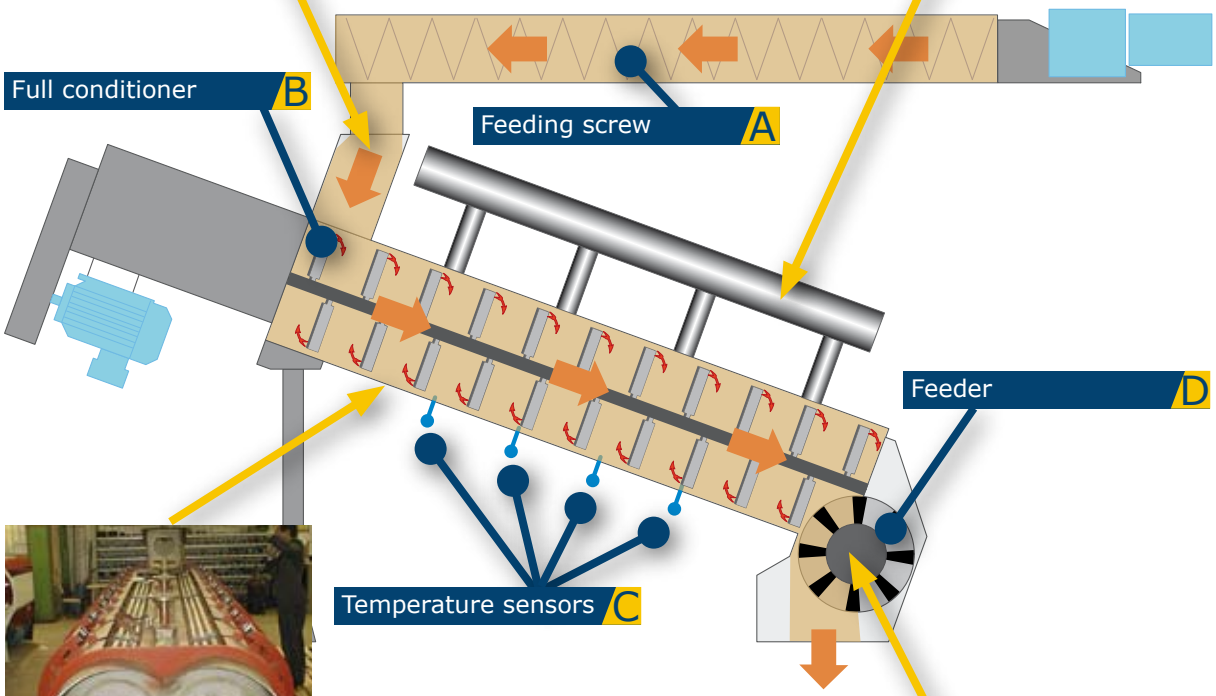
Steam unit on CTID 700

Adjustable paddles

Screw - conditionner connection

Holding bin

Steam injection




Jacket steam piping

A Overfilling

B After overfilling the conditioner, the feeding screw stops.

C Steam addition up to the preset temperature.

D Continuous discharging by maintaining a constant product temperature, the conditioner being 100% refilled with material.

Variable speed feeder

Non-contractual drawings and pictures

# Heat treatment targets

## Regulations

The regulation 2160/2003 EC (december 2003) lays down a schedule from which feeds must be heat treated.

Targeted animal populations :
- Since April 2008 : Breeder hens
- Since December 2008 : Layer hens
- December 2009 (forecast) : Broil chicken
- December 2010 (forecast) : Turkeys
- December 2010 (forecast) : Store pigs
- December 2011 (forecast) : Breeder pigs

## Purposes

- Salmonella free
- Micro granulation
- Starch gelatinization cooking
- Sanitation
- Digest and calories energy savings

## Processing parameters to be achieved

Time-Temperature-Moisture

Residence time :
from 1 to 6 min.

Temperature :
from 80°C to 99°C

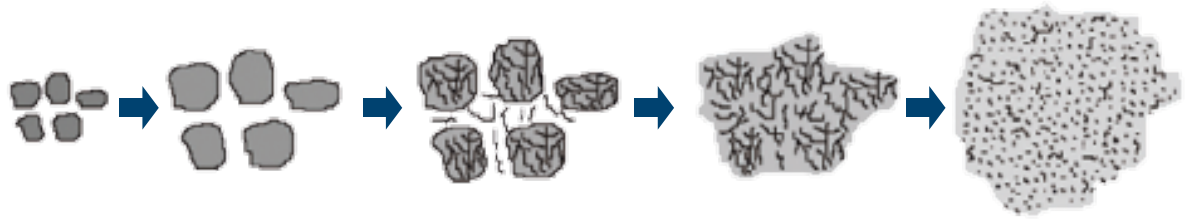
Moisture :
16,5%

# Conditioning improvement

## Starch gelatinization

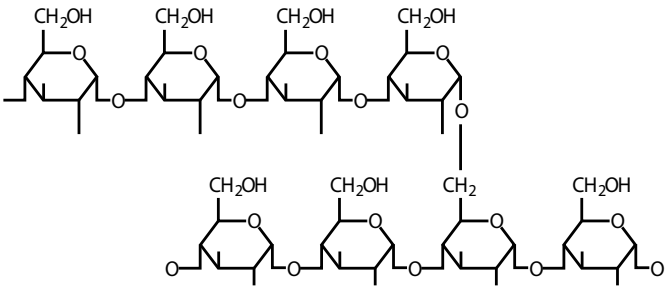
Time : 40 to 70 seconds

| Warm moisturing | Temperature increase | Friction |
|---|---|---|
| Addition of water and steam | Shearing | Intensive shearing |

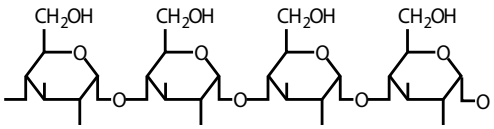


| Growing starch | Swelling | Segregation of amylose | Gelatinisation | Dextrinization |
|---|---|---|---|---|

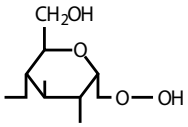
**Before conditioning :**
AMYLOPECTINE (Starch)



**After conditioning :**
AMYLOSE



**Ideal situation :**
GLUCOSE



Philippe SERENE
Aquafeedservice Director

As per for human food, it is necessary to have a well prepared and cooked animal feed to improve digestibility. Thanks to the continuous cooking-conditioning STOLZ system, the raw materials part of the recipe are effectively cooked - carbohydrates for example - by an accurate monitoring of temperature, treatment time, moisture, leading to significant energy savings at cooking level as well as at drying stage.

# Mashfeed cooking and heat treatment

## Purposes

- Digestibility
- Flowability
- Feed integrity
- Higher conversion ratio
- Entero bacterias free

## Optimized processing

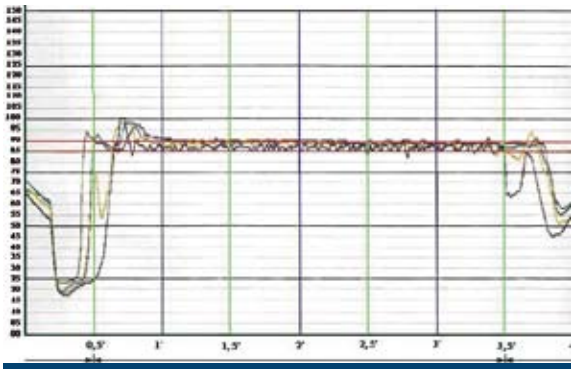
- FIFO
- 100% refilling level
- Regular flowrates
- Digestibility
- Accurate monitoring of residence time and temperatures

## Drying-cooling

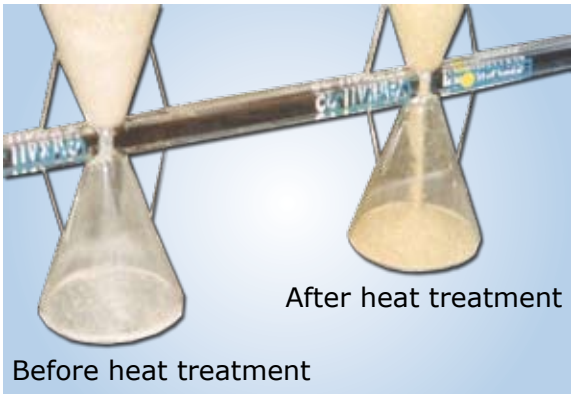
- Specific design for mash feed
- Exchange areas optimized
- Fines agglomeration

Dryer-cooler

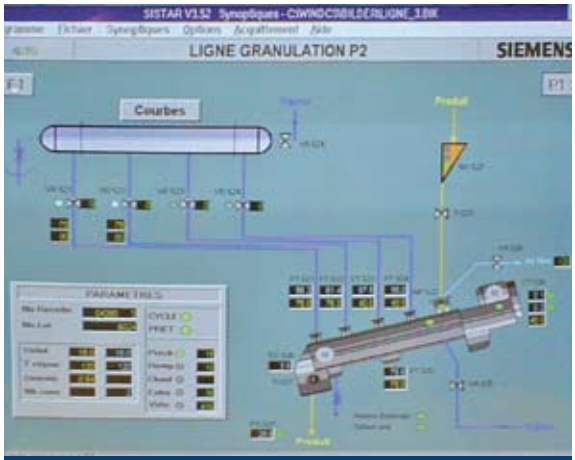
Layer equalizer and stirrer



Stable product temperature - resident time

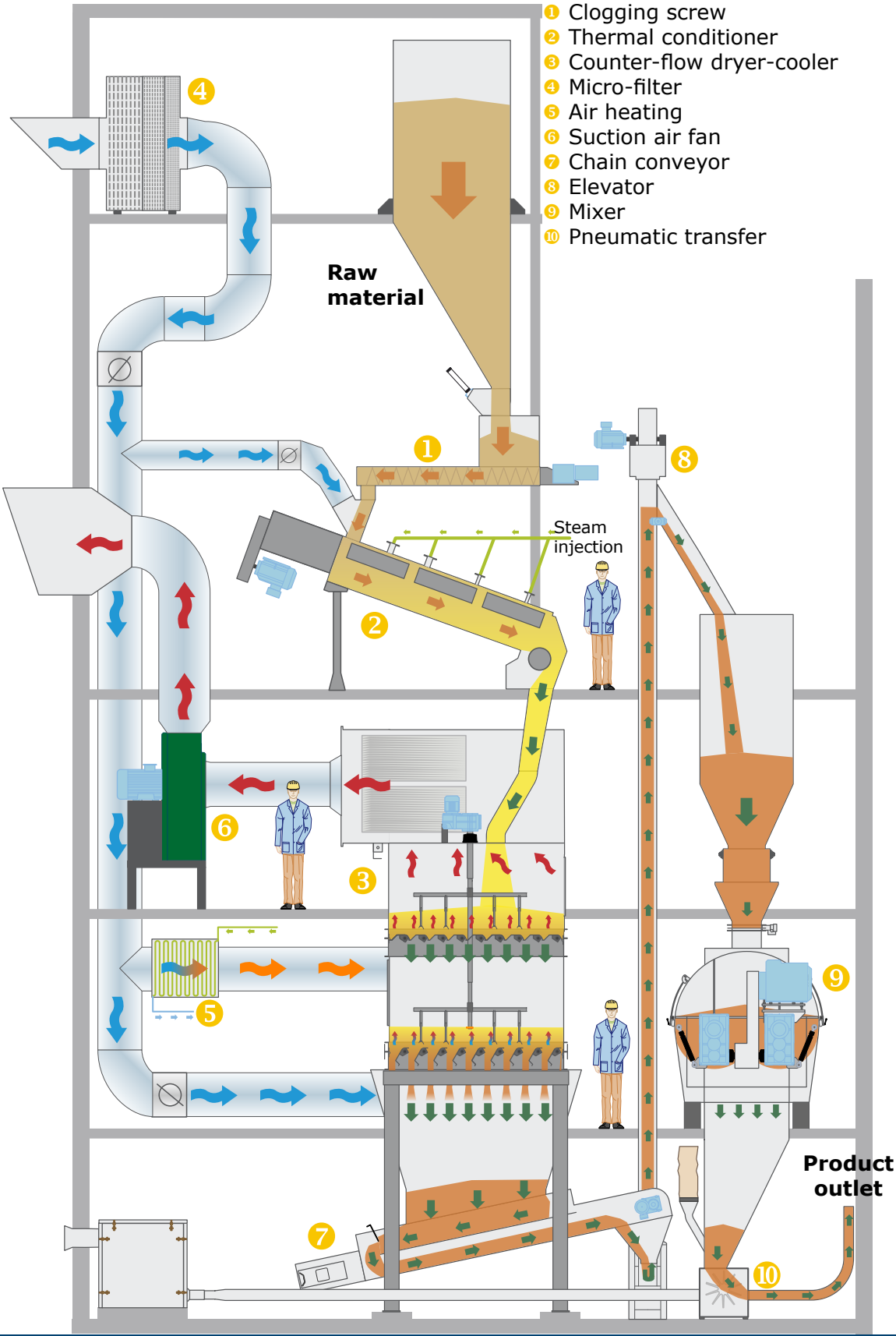



Product flowability measurement




Parameters settings and display

Non-contractual drawings and pictures




Principle drawing

# Long term conditioning before pelletizing

Super conditioner preparation stage on pellet mill

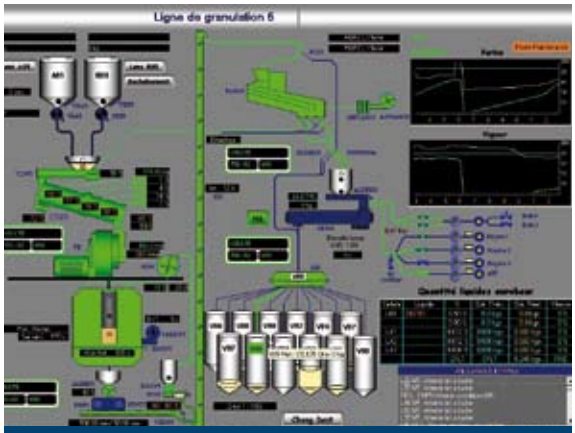
When installed upstream a pellet mill, the super conditioner increases its capacity from 15 to 30%, and dramatically improves its P.D.I. (Pellets Durability Index).

The super conditioner has a slope angle improving avoiding any damage of the mixing and allowing a good filling control and retention time.

## Purposes

- Easy maintenance
- Low running costs

Rotors detail on CTID 700



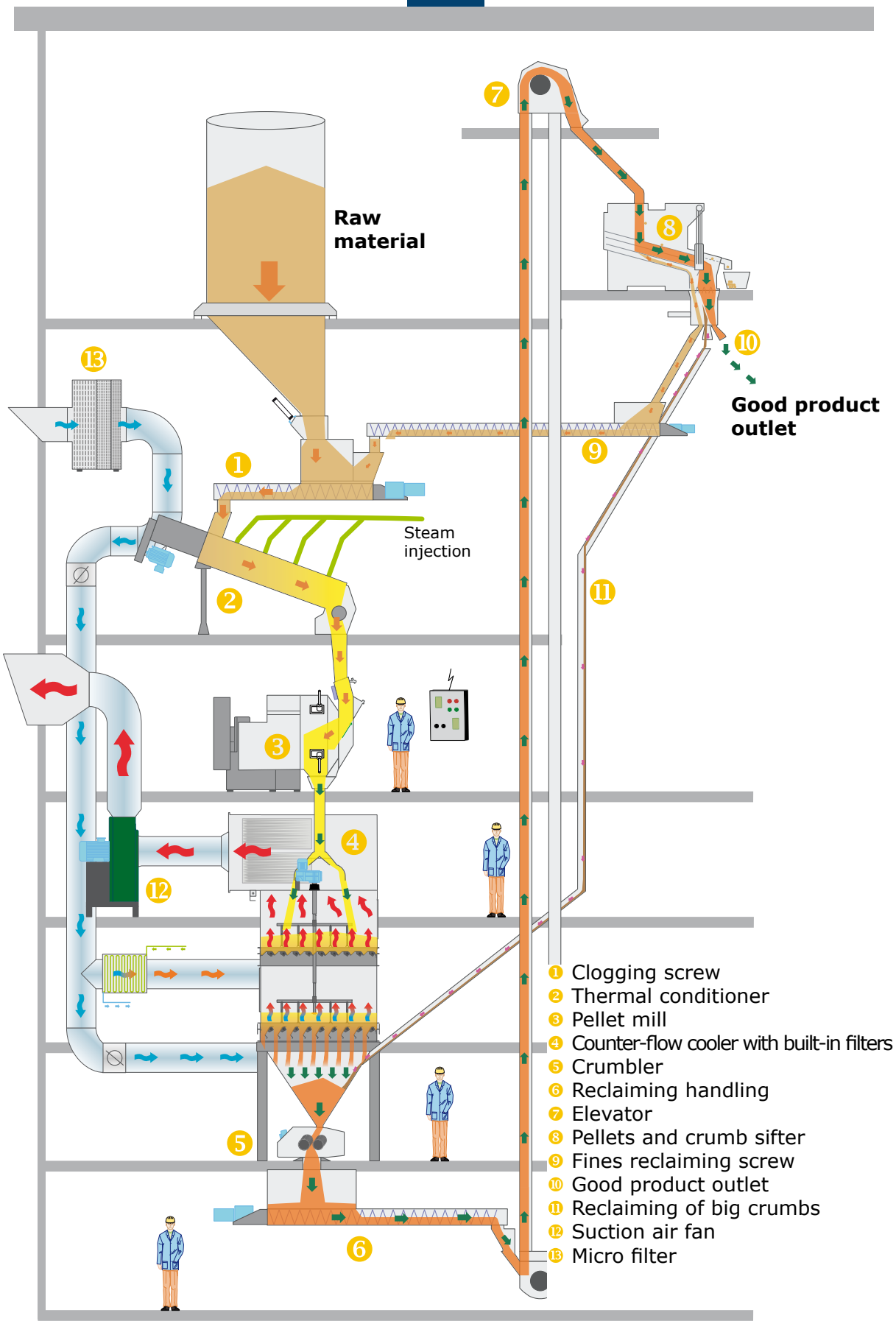
Typical flowsheet

- Lack of steam leakage
- Decrease of wearing
- Capacity improvement
- Energy saving
- Management of shrinkage
- Improved durability

## Typical flowsheet

- Adjustable feeding
- Long term conditioning
- Adjustable flowrates
- Pelletizing
- Cooling

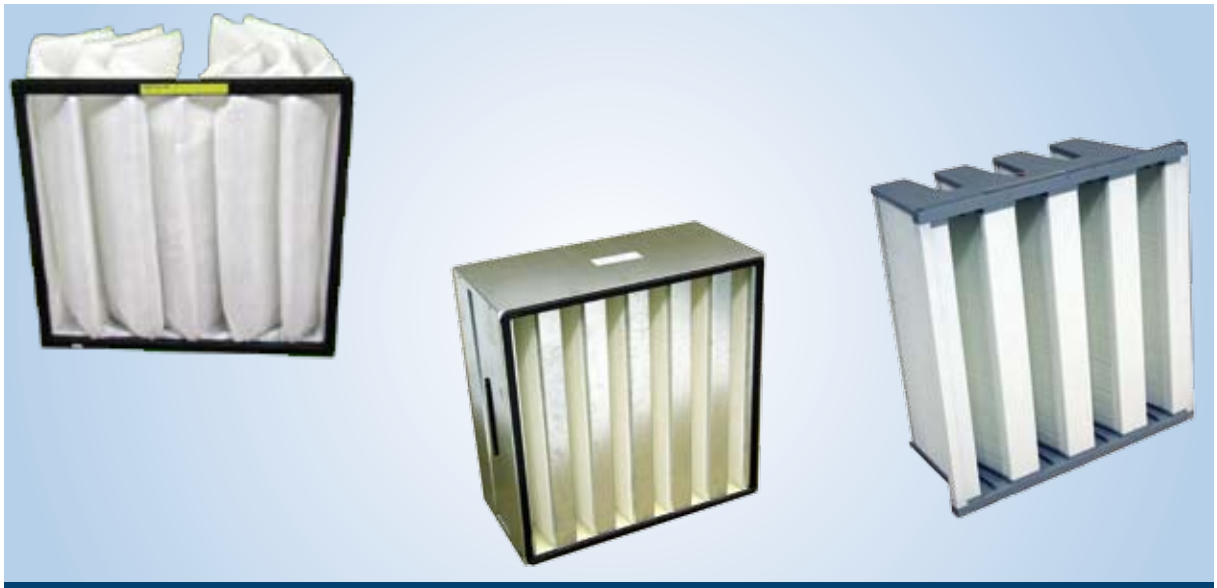
Super conditioner preparation stage on pellet mill




Principle drawing

Non-contractual drawings and pictures

# Process sanitation



Filters opening <0,3 µm for bacterias removing

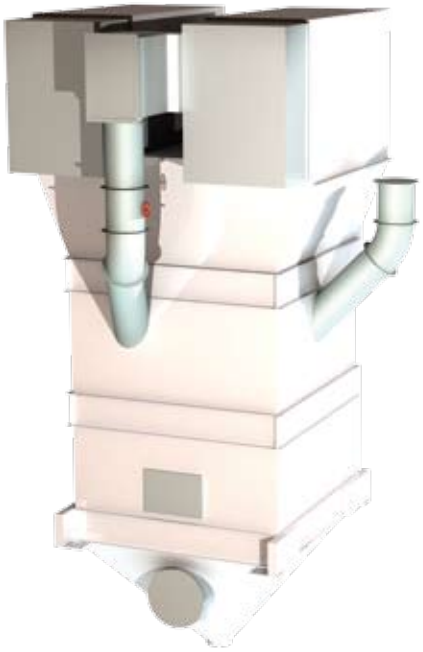

Heat treatment tower «Coop du Garun, France» fully isolated for non contamination.

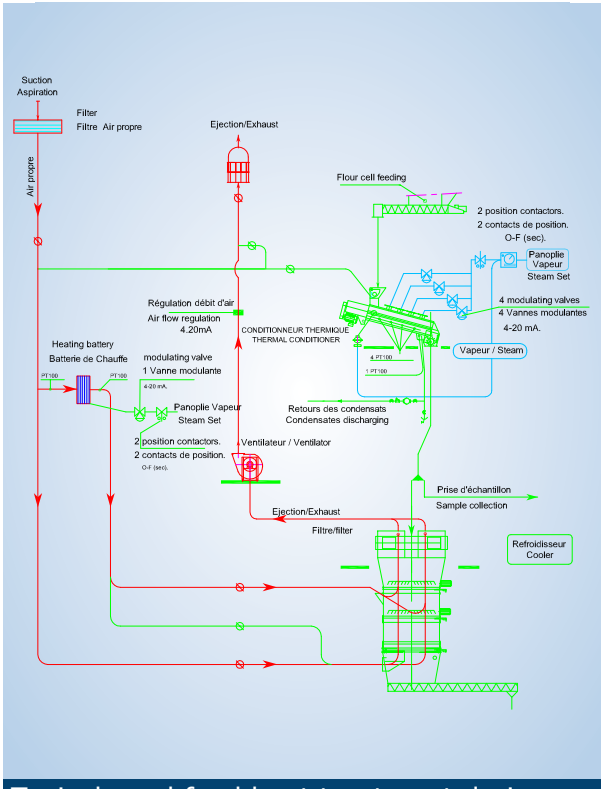
Cleaning filter

Hygienic environment

## Typical installation flowsheet

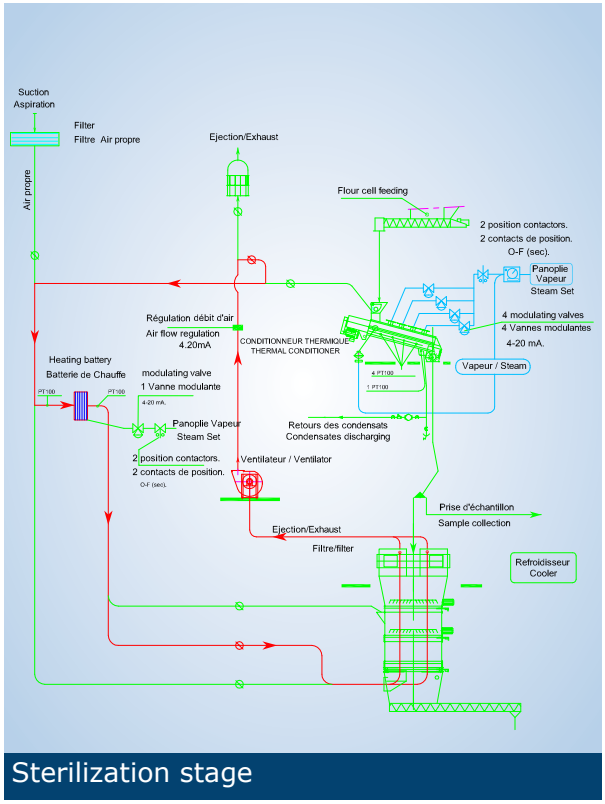
- Adjustable feeding
- Sanitation
- Adjustable capacity
- Drying and cooling



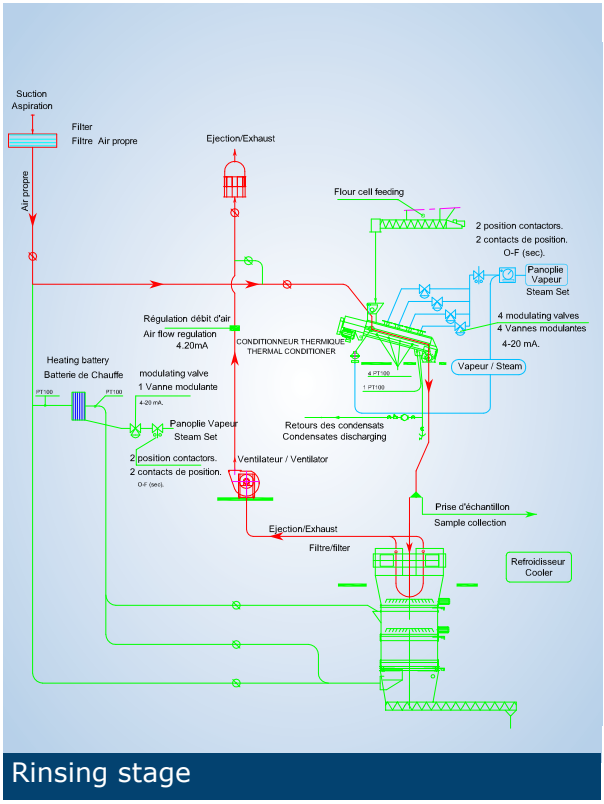



Typical mashfeed heat treatment drying and cooling phases flowsheet

# Fully automated process sanitation



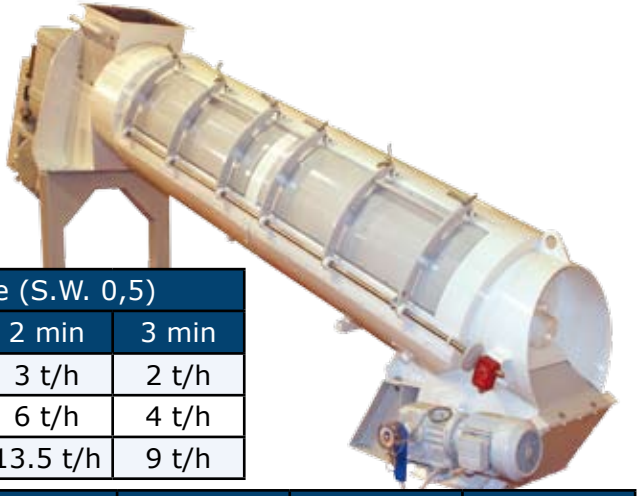

Sterilization stage




Rinsing stage

# Inclined thermal conditioners range

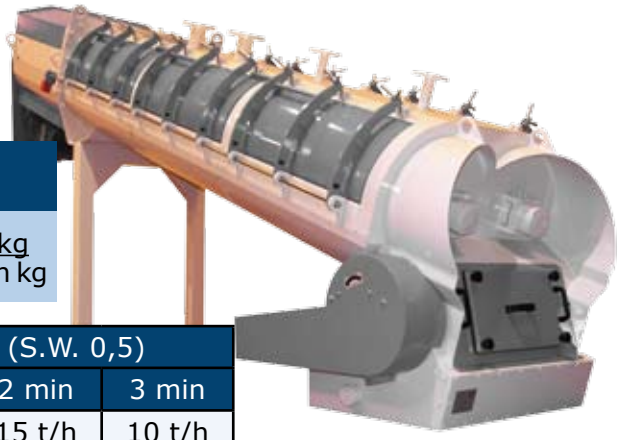
## Single shaft



| Type | Capacity | Residence time (S.W. 0,5) | | | |
|---|---|---|---|---|---|
| | | 1 min | 1.5 min | 2 min | 3 min |
| **CTIS 400** | 180 L | 6.5 t/h | 4 t/h | 3 t/h | 2 t/h |
| **CTIS 520** | 450 L | 12 t/h | 8 t/h | 6 t/h | 4 t/h |
| **CTIS 680** | 1040 L | 27 t/h | 18 t/h | 13.5 t/h | 9 t/h |

| Type | Overall dimensions | | | Weight | Power installed | Speed at 50 Hz |
|---|---|---|---|---|---|---|
| | Length | Width | Height | | | |
| **CTIS 400** | 3400 mm | 895 mm | 1540 mm | 1350 kg | 15 kW | 94 rpm |
| **CTIS 520** | 4491 mm | 1095 mm | 2028 mm | 1550 kg | 22 kW | 73 rpm |
| **CTIS 680** | 3700 mm | 1100 mm | 2330 mm | 2000 kg | 30 kW | 60 rpm |

## Twin shaft



## Residence time calculation

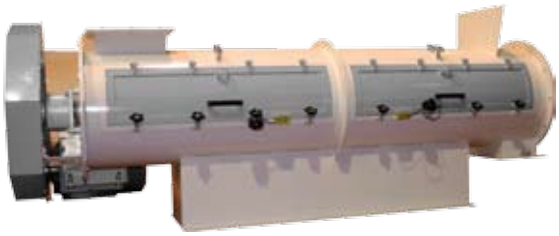
Residence time = $\frac{\text{3600 sec x Capacity in kg}}{\text{Throughput rate per hour in kg}}$

| Type | Capacity | Residence time (S.W. 0,5) | | | |
|---|---|---|---|---|---|
| | | 1 min | 1.5 min | 2 min | 3 min |
| **CTID 520** | 1160 L | 30 t/h | 20 t/h | 15 t/h | 10 t/h |
| **CTID 700** | 2200 L | 60 t/h | 40 t/h | 30 t/h | 20 t/h |

| Type | Overall dimensions | | | Weight | Power installed | Speed at 50 Hz |
|---|---|---|---|---|---|---|
| | Length | Width | Height | | | |
| **CTID 520** | 4600 mm | 1170 mm | 2380 mm | 2900 kg | 2 x 15 kW | 50 rpm |
| **CTID 700** | 5700 mm | 1450 mm | 2722 mm | 4000 kg | 2 x 30 kW | 47 rpm |

# Horizontal thermal conditioners range

## Short term treatment



| Single shaft | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Overall dimensions | | | Dia. | Useful length | Installed power | Speed at 50 Hz |
| | Length | Width | Height | | | | |
| **PEP 315** | 2600 mm | 450 mm | 630 mm | 315 mm | 2175 mm | 7,5 kW | 320 rpm |
| **PEP 400** | 3000 mm | 500 mm | 700 mm | 400 mm | 2456 mm | 11 kW | 272 rpm |
| **PEP 450** | 3000 mm | 600 mm | 800 mm | 450 mm | 2175 mm | 11 kW | 272 rpm |
| **PEP 550** | 3000 mm | 700 mm | 800 mm | 550 mm | 2456 mm | 15 kW | 245 rpm |
| **PEP 680** | 3500 mm | 800 mm | 1160 mm | 680 mm | 2900 mm | 18,5 kW | 168 rpm |

| Twin shaft | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Overall dimensions | | | Dia. | Useful length | Installed power | Speed at 50 Hz |
| | Length | Width | Height | | | | |
| **MD 420** | 2900 mm | 840 mm | 730 mm | 450 mm | 2425 mm | 18,5 kW | 308 rpm |

## Long residence time

| Type | Overall dimensions | | | Dia. | Useful length | Installed power | Speed at 50 Hz |
|---|---|---|---|---|---|---|---|
| | Length | Width | Height | | | | |
| **MLD 550** | 3150 mm | 900 mm | 1000 mm | 550 mm | 2450 mm | 18,5 kW | 70 rpm |
| **MLD 680** | 3700 mm | 1100 mm | 1160 mm | 680 mm | 3000 mm | 30 kW | 60 rpm |

# Before pelletizing and extrusion conditioning

## Purposes

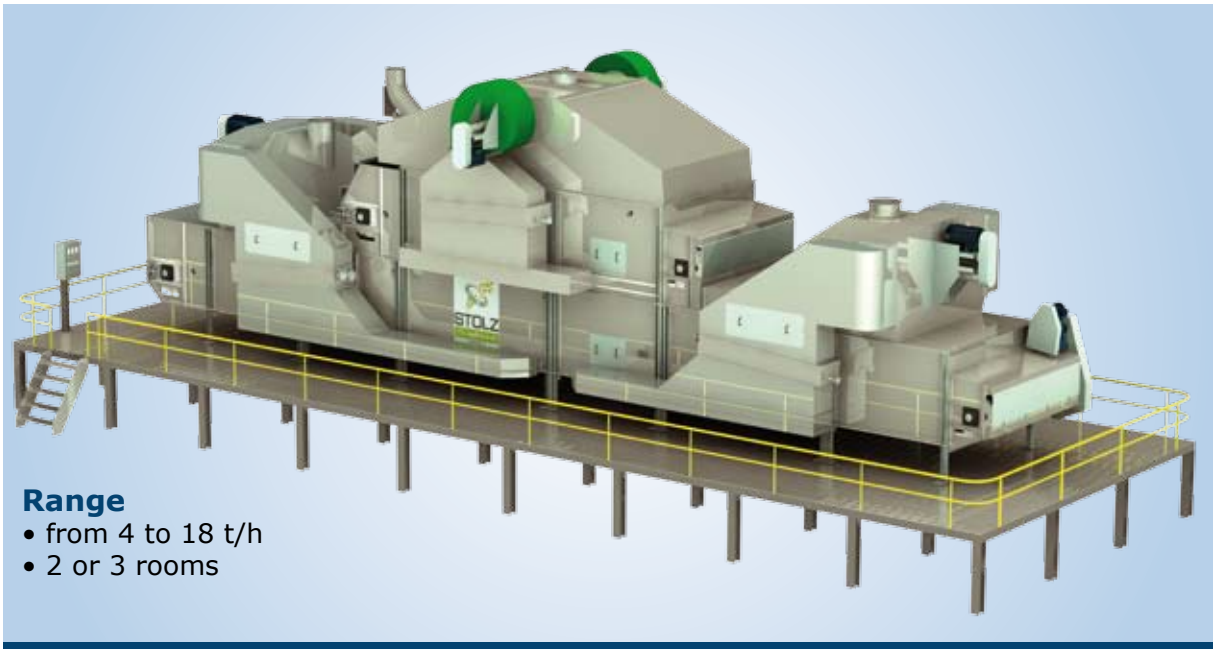
- Homogeneity
- Productivity
- Energy savings


CTIS 520 in front of extruder

**Louis-Marie TRICOT**
Shrimp and fish feed process engineer

Based on my own experience in shrimp feed production, the world unique STOLZ CTIS system design is the best guarantee to ensure efficiency and perfect control of the cooking process before pelleting, through a high starch and gluten mixing capacity through an accurate long term conditioning monitoring - up to 6 min - with high water stability improvement and pellets quality - not only regarding hardness. By involving extruded fish feed, the double shaft type - CTID - ensures a complete horizontal and transversal shearing, allowing higher water addition before extruder, ensuring a better water absorption by the mash, providing higher extruded pellets quality level and mechanical energy savings.

# Extruded pellets drying

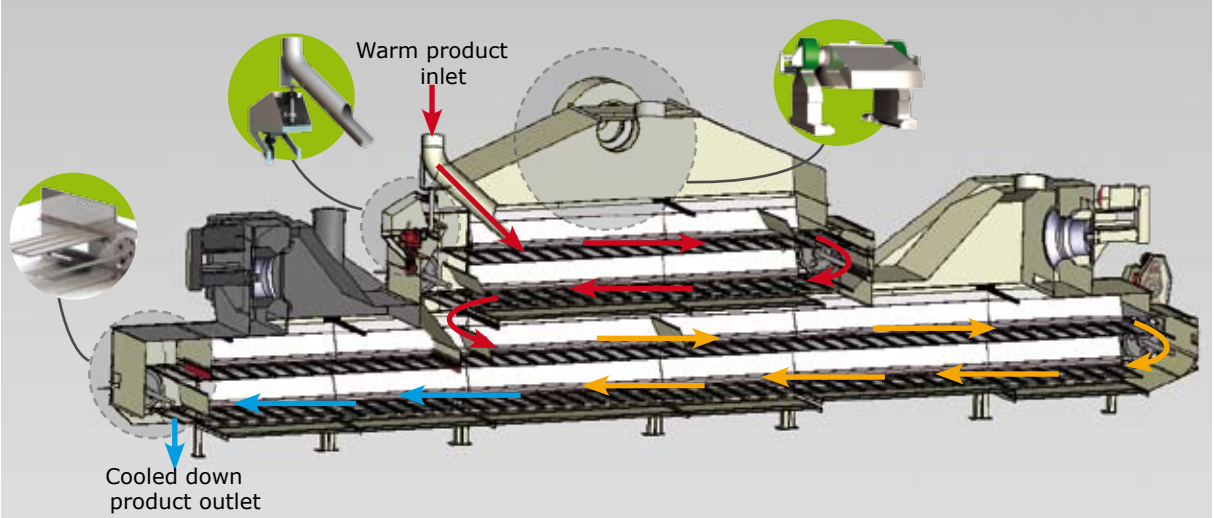



**Range**
- from 4 to 18 t/h
- 2 or 3 rooms

Fishfeed extruded pellets dryer

## Fields

- Floating - semi-floating - seeking fisheed and shrimp feed
- Pet food
- Starter feed
- Raw materials cooking




Working principle of SVHS dryer (3 rooms type)

# Vertical counter-flow cooler

Counter-flow coolers

## Purpose

The cooler is designed to bring the temperature and moisture of the products to values close to ambient temperature.
This operation improves the durability and preservation of the pellets.

## Characteristics

The RCCS is a machine with a simple and compact design.
It has been designed to lower the maintenance costs, limit the remaining particles that could contaminate the product or increase the amount of bacteria and mould.
The limited power cost results from an optimization of the internal air flow.
Several types and variants can meet any application with or without built-in filters.

19x55 counter-flow cooler

| Range | Length | Width | Area | Theorical capacity in t/h (P.S. 0.60) | | | | |
|---|---|---|---|---|---|---|---|---|
| | mm | mm | m² | Pellets Ø2 mm | Pellets Ø3.5 mm | Pellets Ø6 mm | Pellets Ø8 mm | Pellets Ø10 mm |
| **RCCS 9x8** | 900 | 900 | 0,8 | 2,7 | 2,2 | 1,7 | 1,4 | 1,2 |
| **RCCS 19x17** | 900 | 1900 | 1,70 | 5,8 | 4,7 | 3,7 | 3,1 | 2,6 |
| **RCCS 19x26** | 1400 | 1900 | 2,60 | 9,4 | 7,7 | 6,0 | 5,0 | 4,2 |
| **RCCS 19x36** | 1900 | 1900 | 3,60 | 13,0 | 10,6 | 8,3 | 6,9 | 5,8 |
| **RCCS 19x45** | 2400 | 1900 | 4,50 | 18,0 | 14,7 | 11,6 | 9,5 | 8,1 |
| **RCCS 19x55** | 2900 | 1900 | 5,50 | 22,0 | 18,0 | 14,1 | 11,6 | 9,9 |
| **RCCS 22x64** | 2900 | 2200 | 6,40 | 25,6 | 20,9 | 16,5 | 13,6 | 11,5 |
| **RCCS 22x78** | 3525 | 2200 | 7,75 | 31,0 | 25,4 | 19,9 | 16,4 | 14,0 |
| **RCCS 28x88** | 3200 | 2740 | 8,75 | 35,0 | 28,6 | 22,5 | 18,5 | 15,8 |
| **RCCS 28x100** | 3840 | 2740 | 10,00 | 40,0 | 32,7 | 25,7 | 21,2 | 18,0 |
| **RCCS 29x125** | 4320 | 2880 | 12,5 | 50 | 41 | 44 | 26,5 | 22,5 |
| **RCCS 29x135** | 4720 | 2880 | 13,5 | 54 | 44 | 35 | 28,6 | 24,3 |
| **RCCS 29x170** | 6000 | 2880 | 17 | 68 | 56 | 43,7 | 36 | 30,6 |

## Advantages

- First In First Out
- Optimized filling rate
- Output evenness
- Reliability and simplicity
- Control of the residence times and temperatures
- Dynamic optimization of the exchange areas

## Options

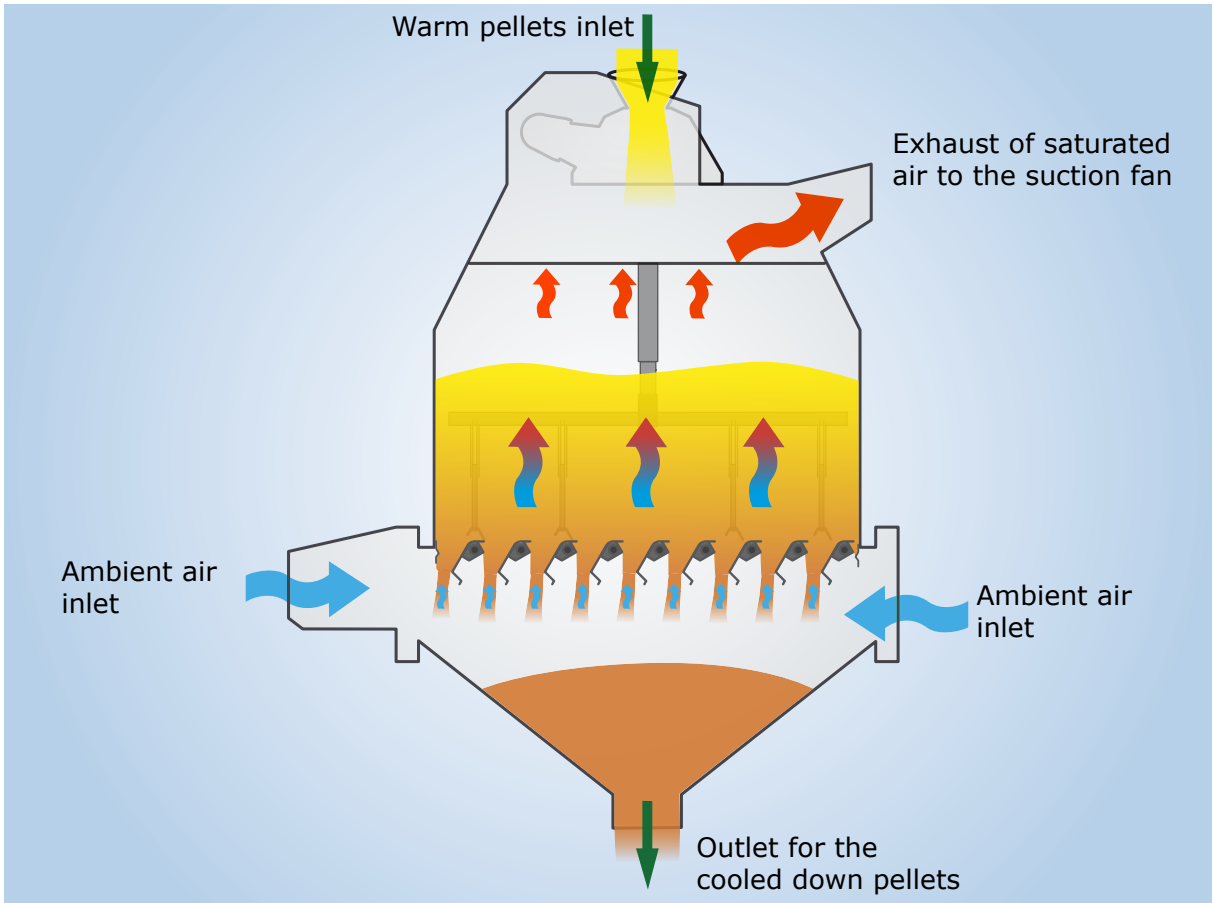
- Possibility of several levels to lower time waste between 2 batches
- Thermal insulation
- Built-in filters
- Driven mechanically
- Drying level
- Extracting system by rotating flaps
- Inerting by gas injection
- Product layer levelling system

Cooler fed by 3 pellet mills

Cooler with built-in filters

Extractor with grids

Double swivelling valve




Working principle (version without built-in filters)

# Horizontal cooler

Horizontal cooler

## Purpose

The cooler is designed to bring the temperature and moisture of the product to values close to ambient temperature.

That operation improves the durability and preservation of the pellets.

## Principle

The warm products produced by the pellet mill are placed into the horizontal cooler via a swivelling valve distributing them uniformly all over the machine width.

The pellets to be cooled down are thus laid down onto a metal belt made of bored components conveying them and preventing them from moving, thus not breaking them, for a preset time and speed to reach a temperature between 5 to 10°C maximum above the ambient temperature.

| Range | Number of passages | Max length | Width | Height |
|---|---|---|---|---|
| | | m | mm | mm |
| **RHS 10** | 1 | 12 | 1275 | 1775 |
| **RHS 15** | 2 | 12 | 1740 | 2000 |
| **RHS 17** | 3 | 12 | 1990 | 3160 |
| **RHS 20** | 4 | 12 | 2240 | 3410 |

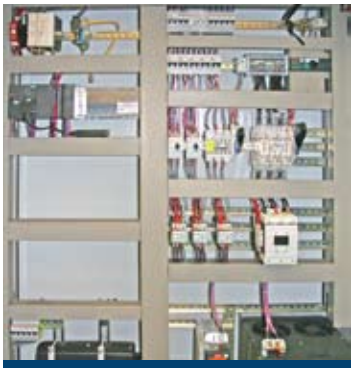
2 passages cooler fitted with filters

Conveying belt

2 passages cooler fitted with filters

Non-contractual drawings and pictures

Horizontal cooler



Dual regulation, air flow and layer thickness

## Operating principle

❶ A swivelling valve ensures a uniform and regular feeding all over the belt width.

❷ Conveying belt designed with bored components assembled on traction chains. The sliding paths of the chains are isolated from the product avoiding any crushing risks of the pellets

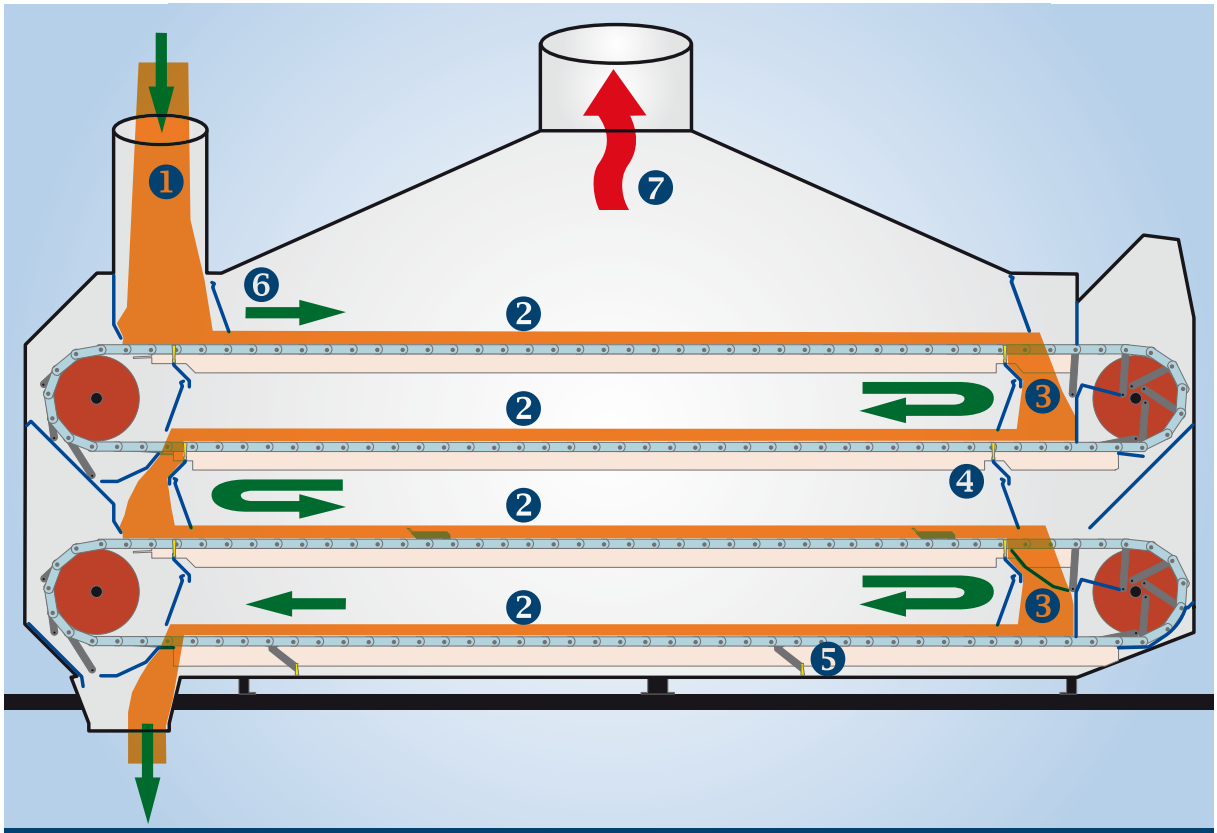
❸ Automatic device for pellets cooling level change ensuring the layer height uniformity. A permanent cleaning device is installed at the end of each level.

❹ Guide flaps forcing the air to pass through the pellets layer.

❺ Complete cleaning of the cooler with a silent bottom scraping brushes device.

❻ Flap for layer height control.

❼ Warm air suction.




Working principle of the horizontal cooler

stolz

desmet ballestra

*Handling equipment & Dedusting*

*Grinding and milling*

*Thermal conditionning & Cooling*

*Pelletizing*

*Mixing & Coating*

*Sifting & Cleaning*

*Services*

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