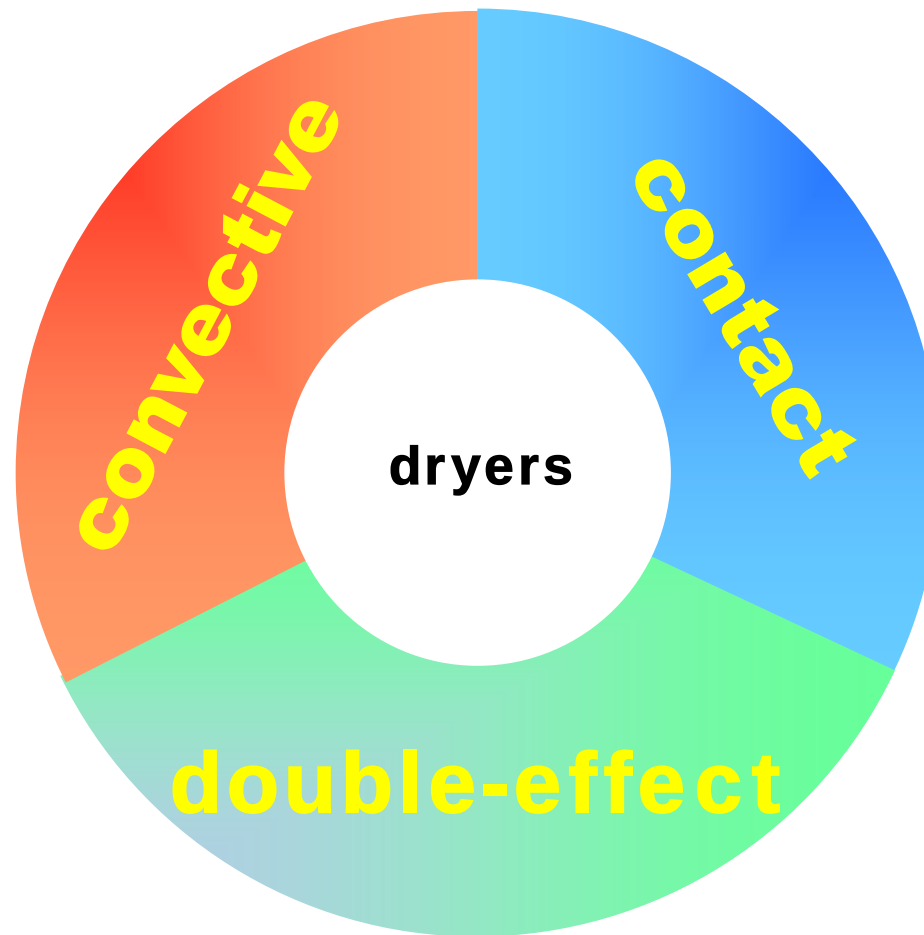


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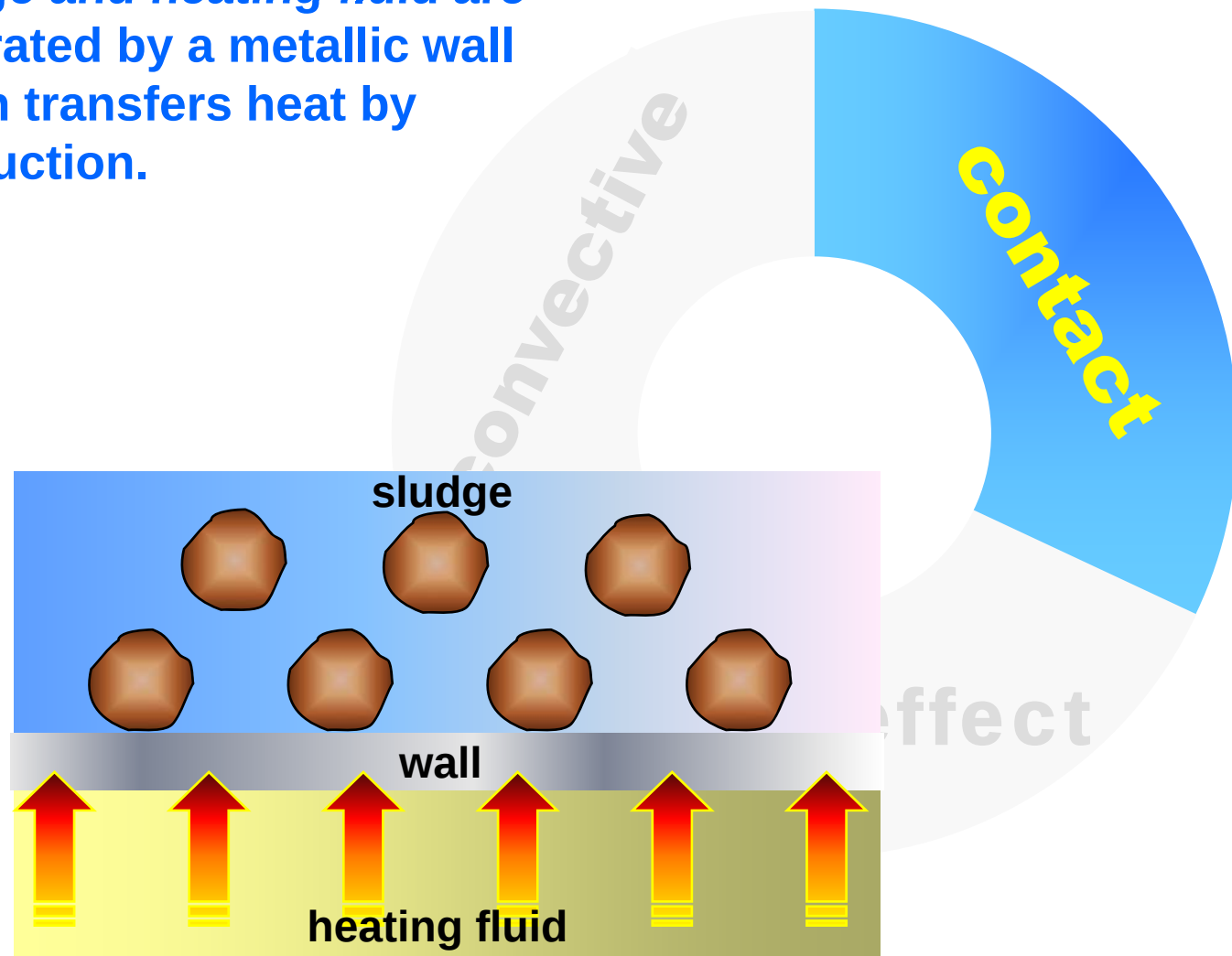
Siemens Water Technologies

SLUDGE THERMAL DRYING

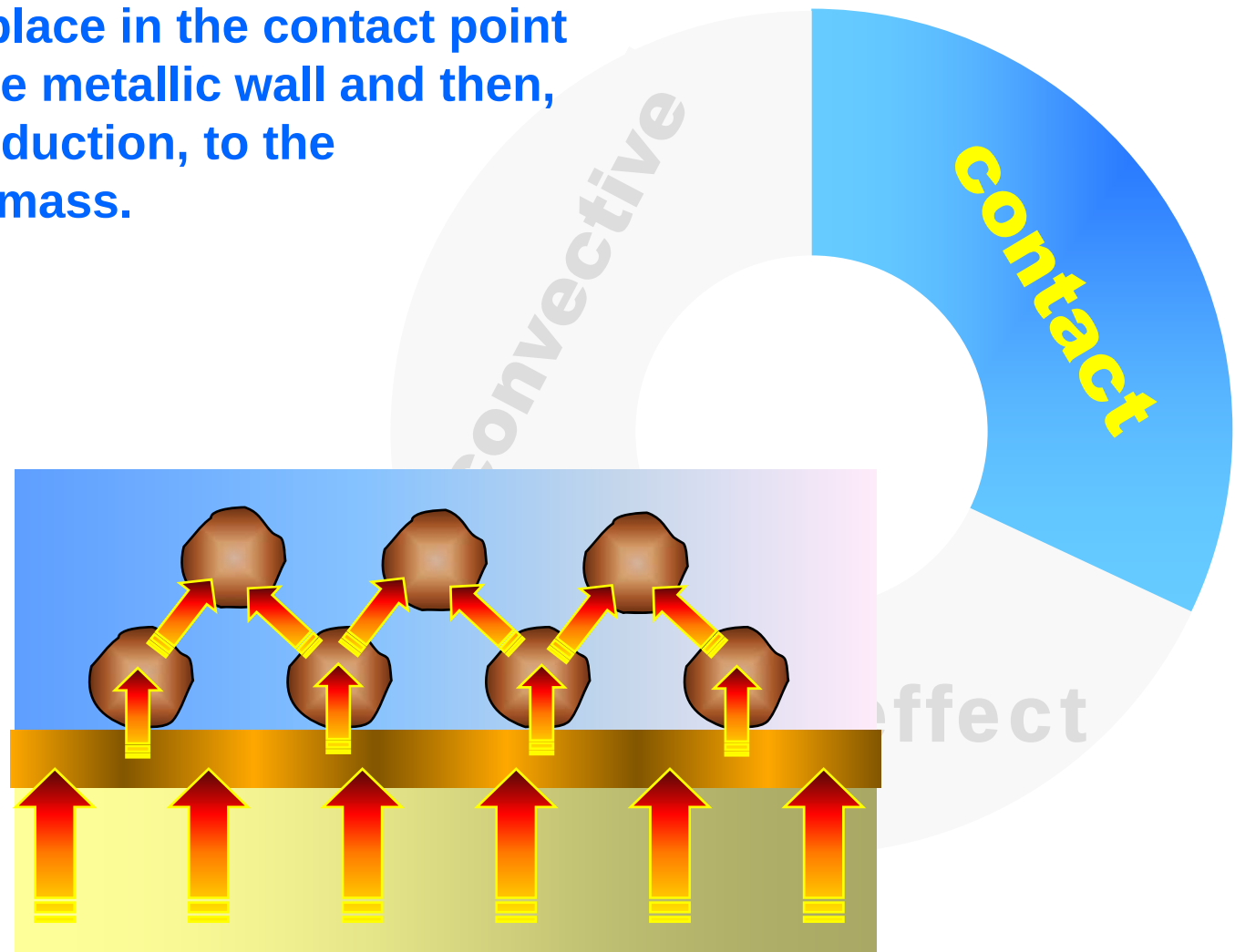




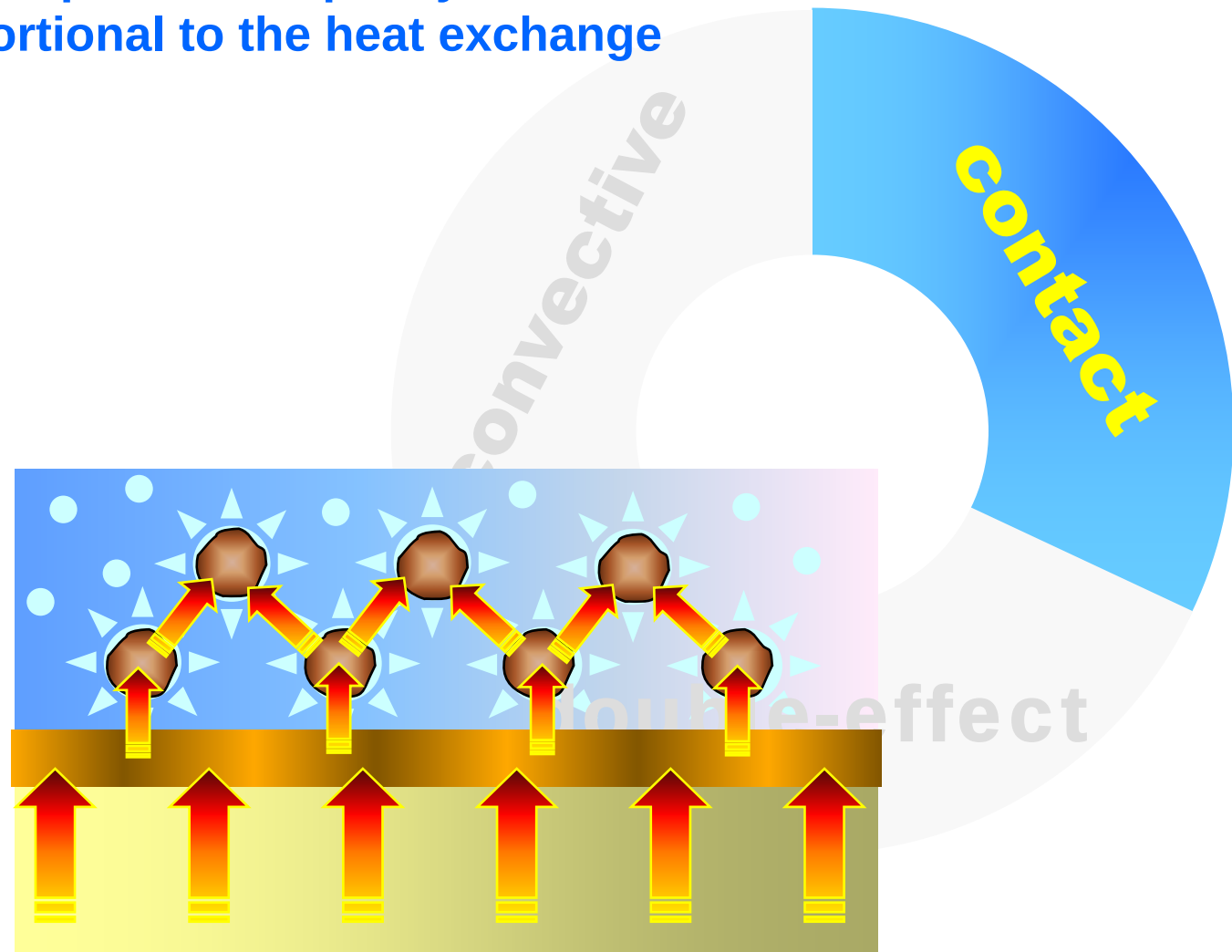
Sludge and heating fluid are separated by a metallic wall which transfers heat by conduction.



Heat transfer to sludge particles takes place in the contact point with the metallic wall and then, by conduction, to the whole mass.



The evaporation capacity is proportional to the heat exchange area.

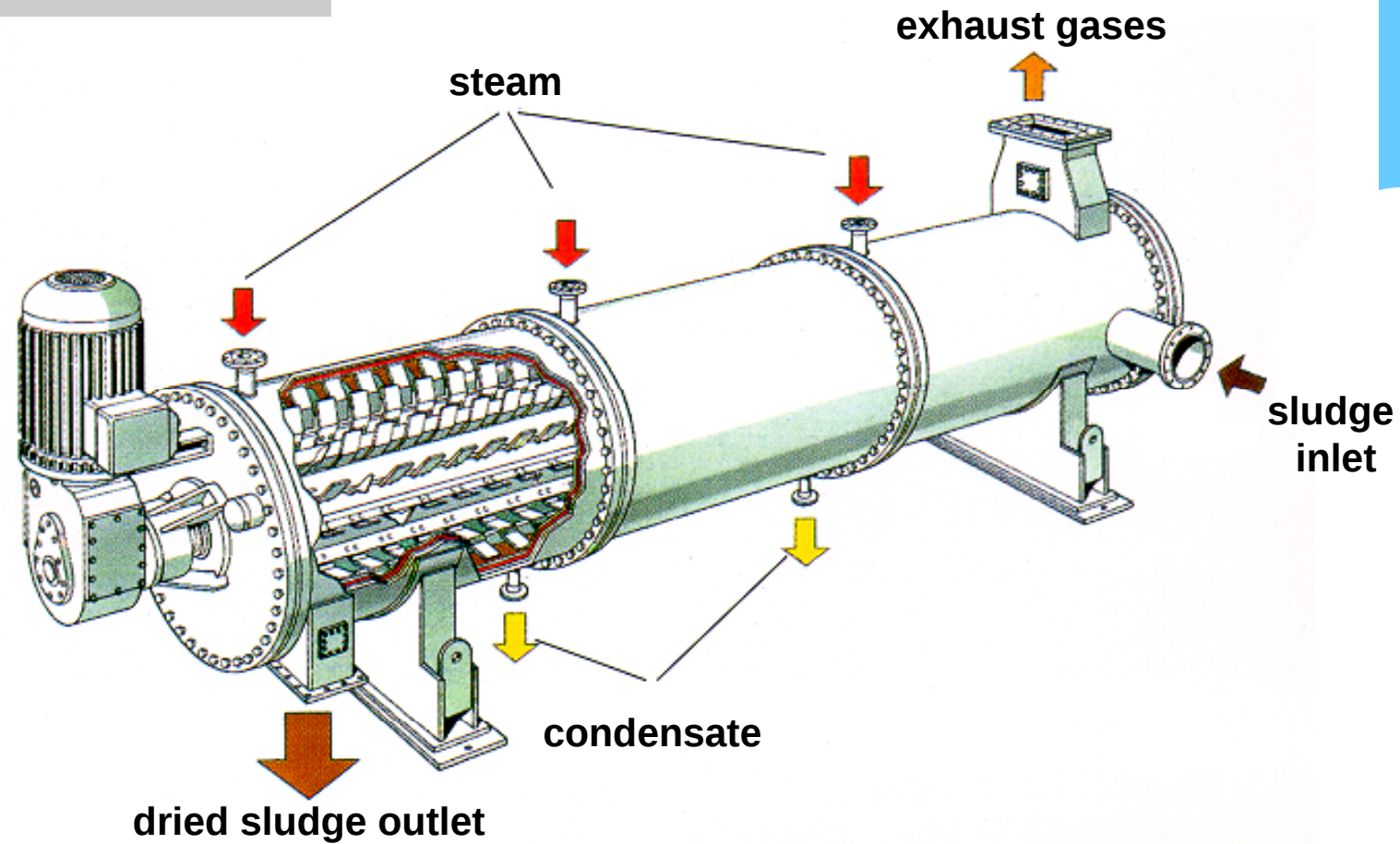


Dryers: Thin film dryers

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Slide 7



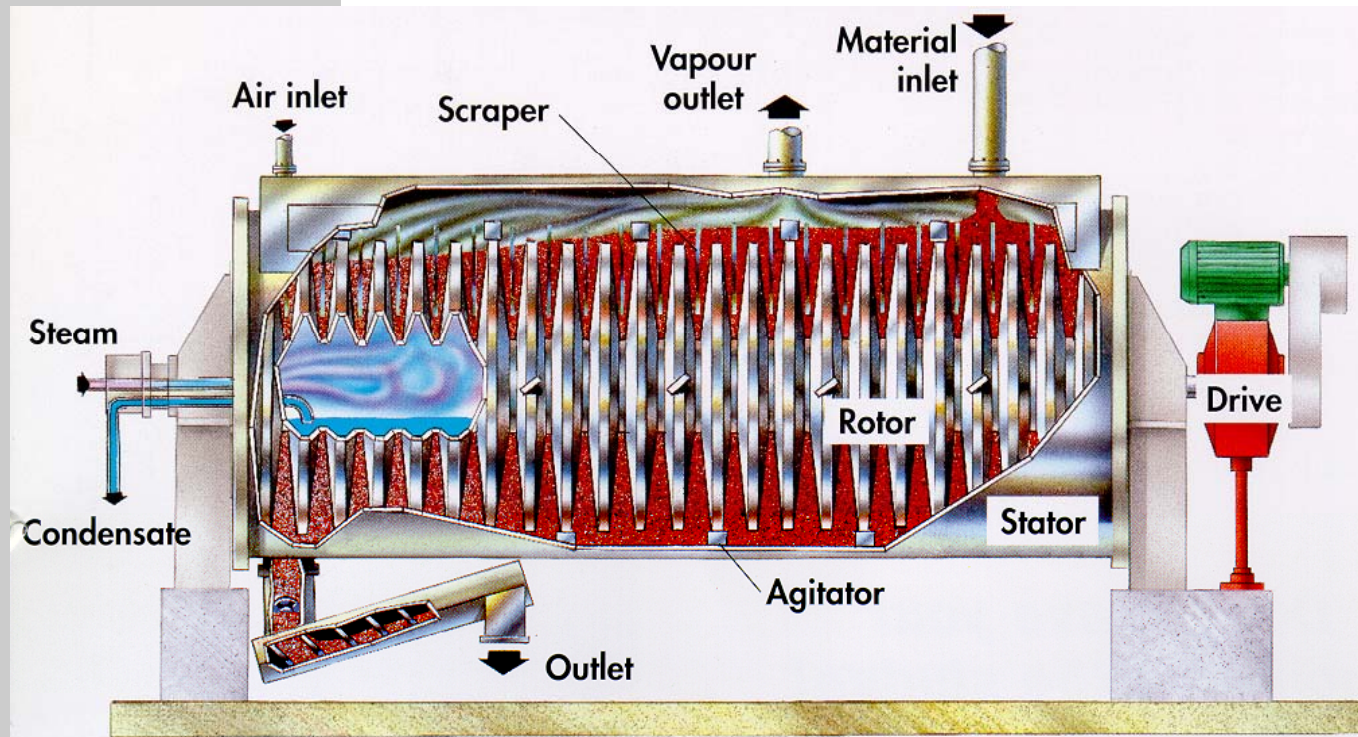
contact

Dryers: Disc dryers

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Slide 8



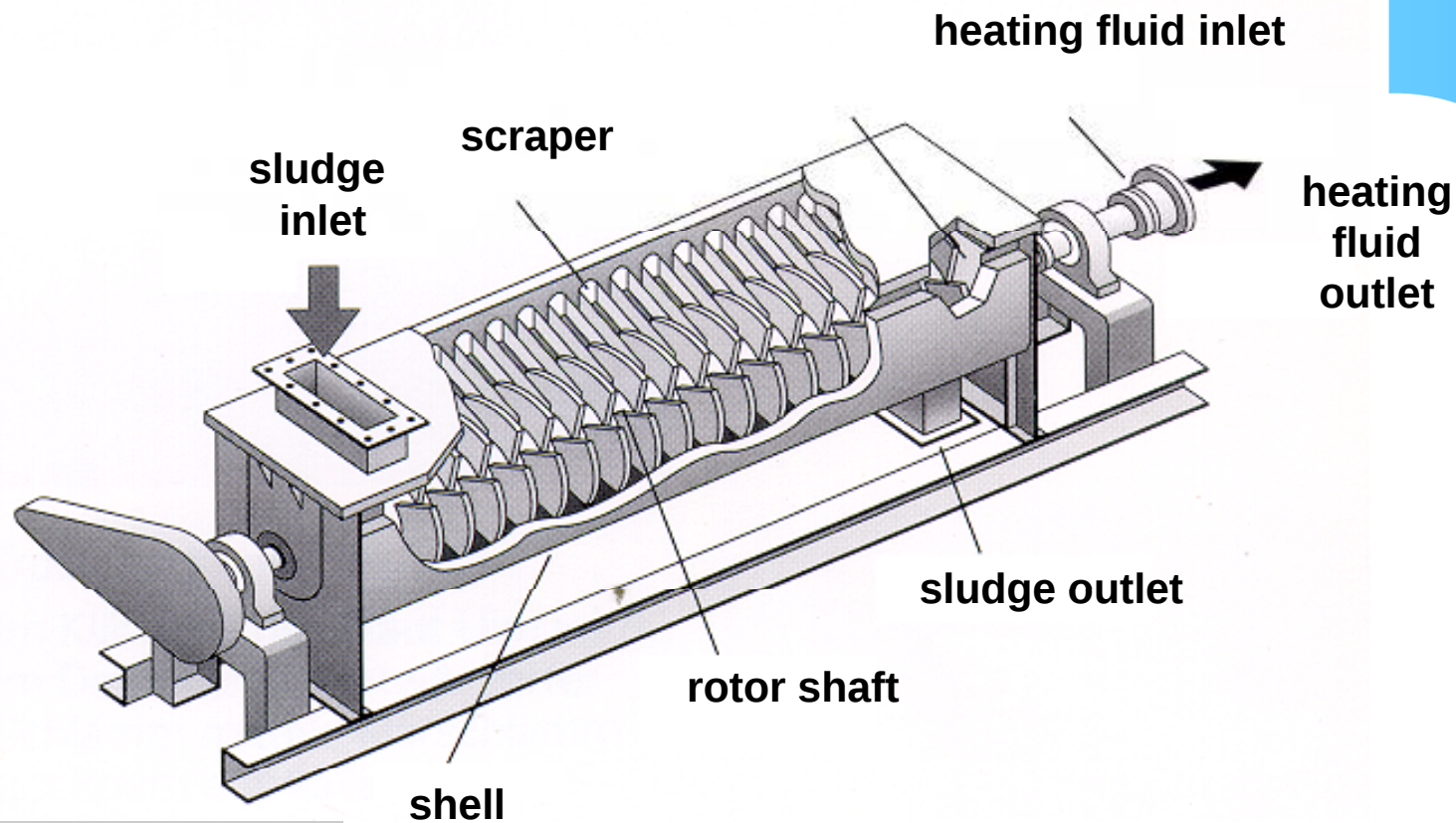
contact

Dryers: Paddle dryers

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Slide 9



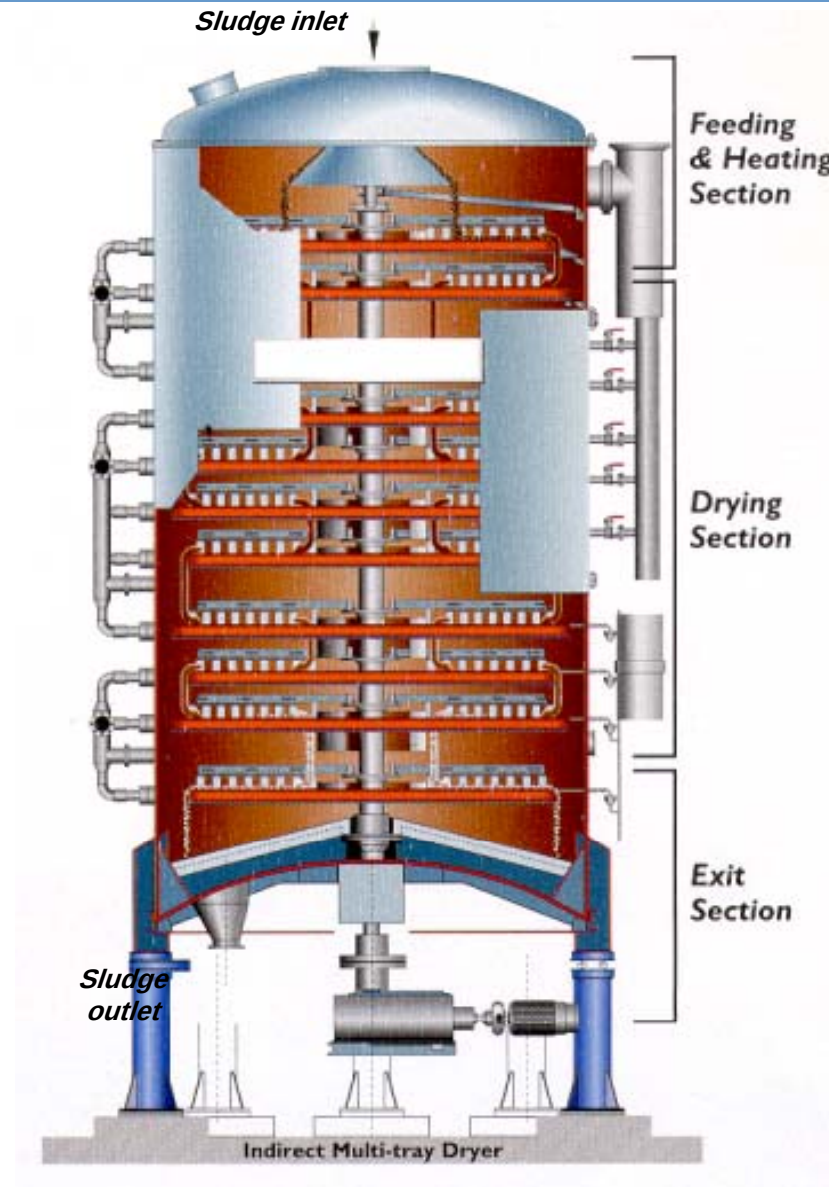
contact

Dryers: Multifloor dryers

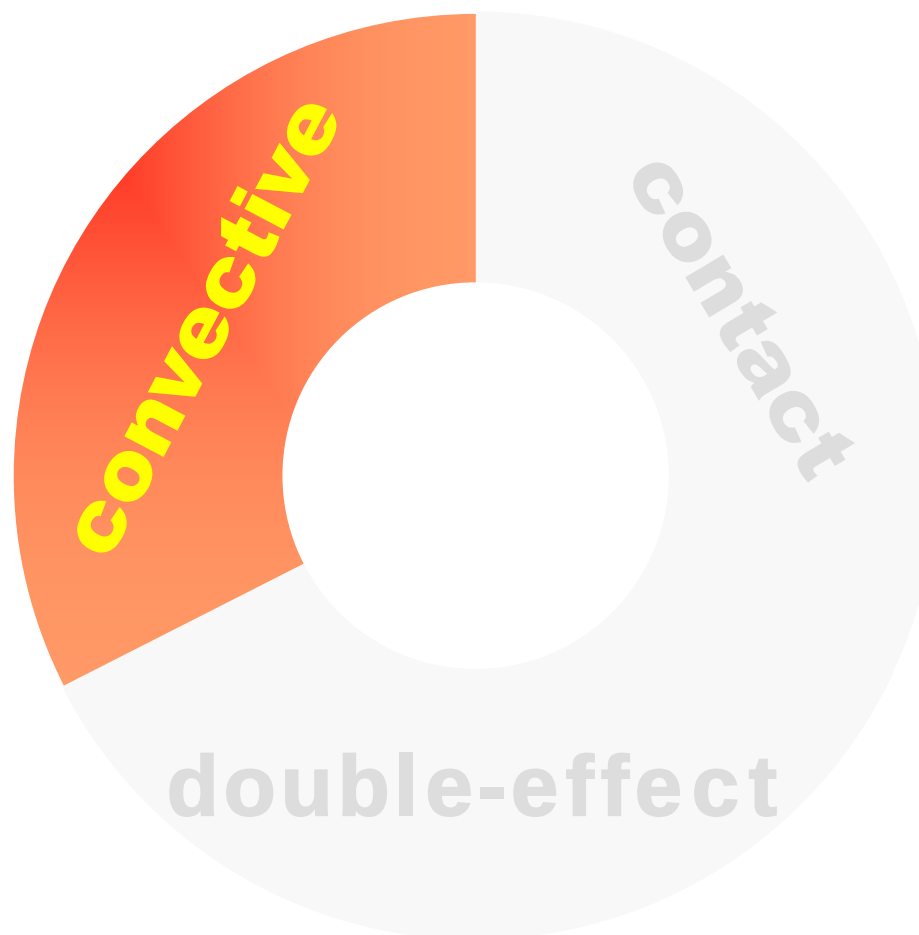
SIEMENS

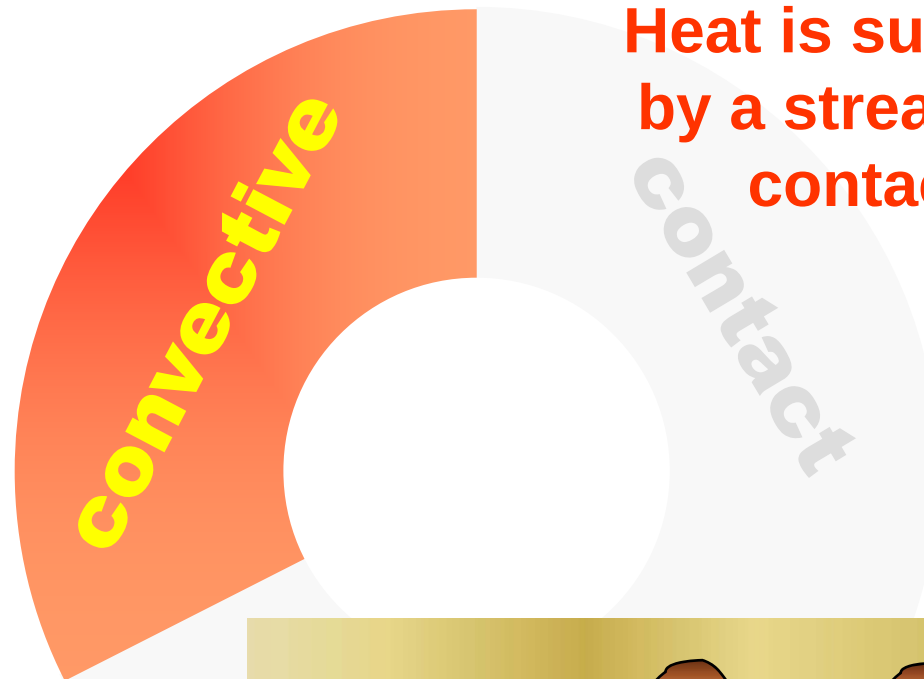
Water Technologies

Slide 10

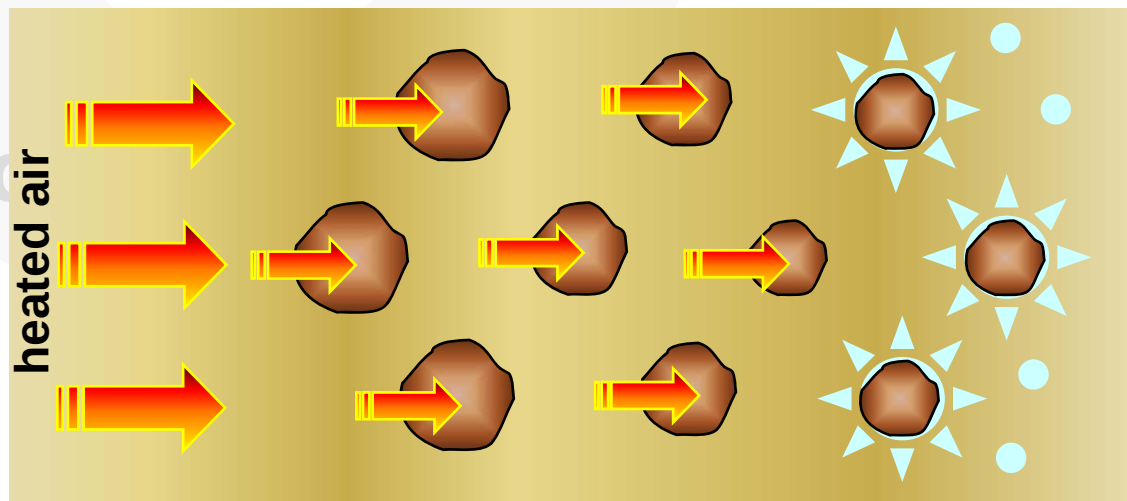


contact





**Heat is supplied directly
by a stream of hot air in
contact with the wet
sludge.**

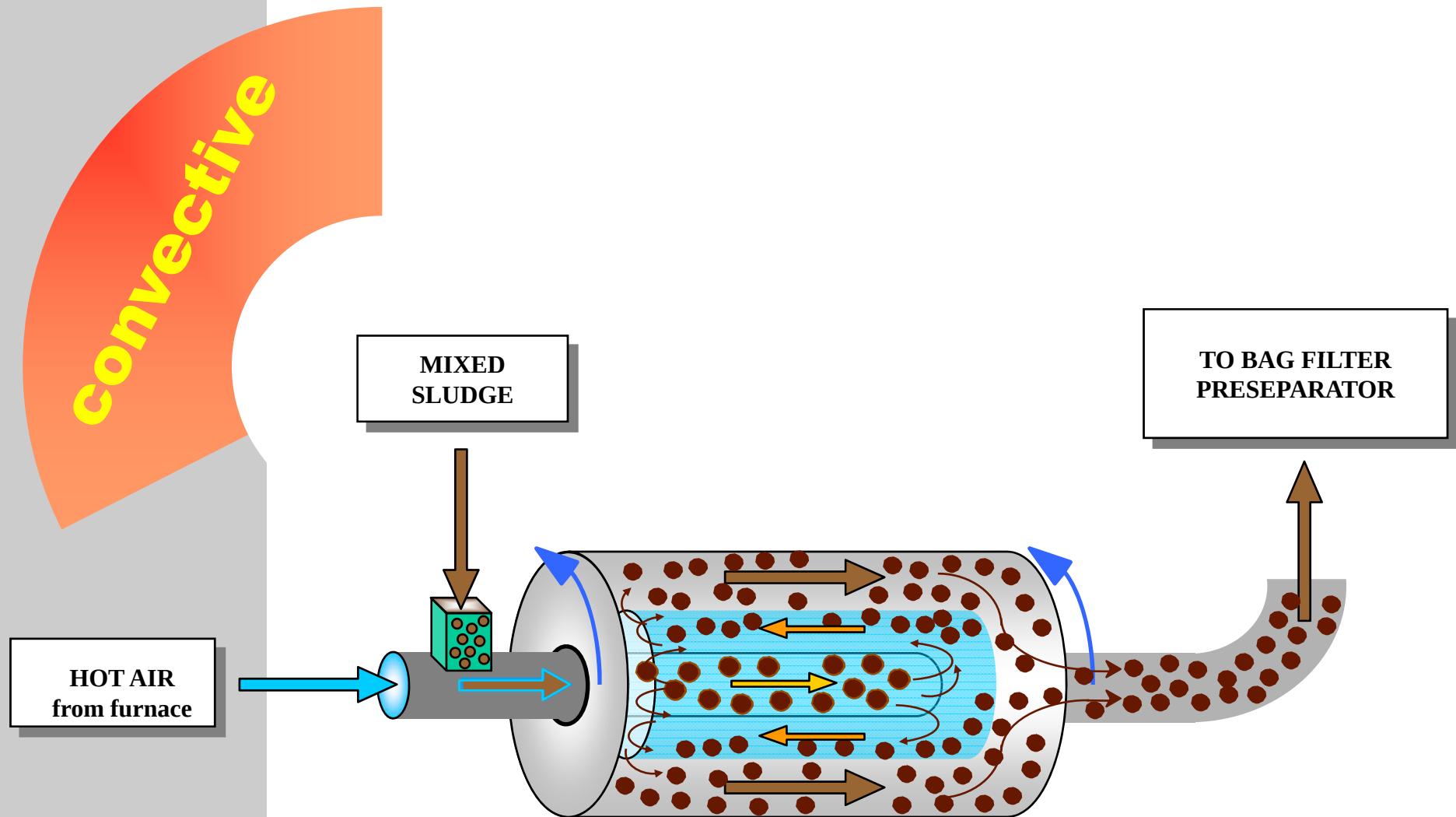


Dryers: Triple pass rotating dryers

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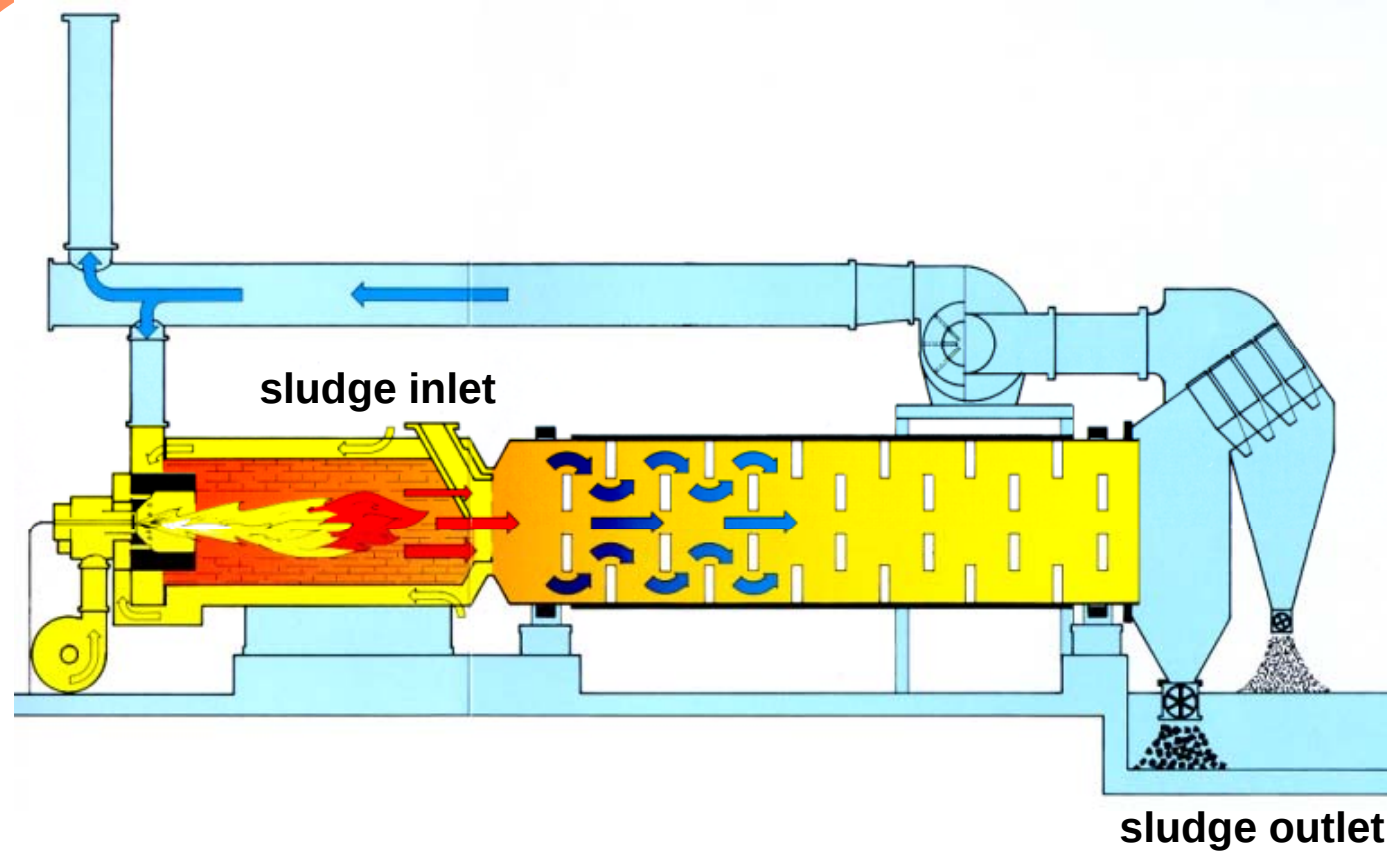
Dryers: Single passage rotating dryers

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Slide 14

convective



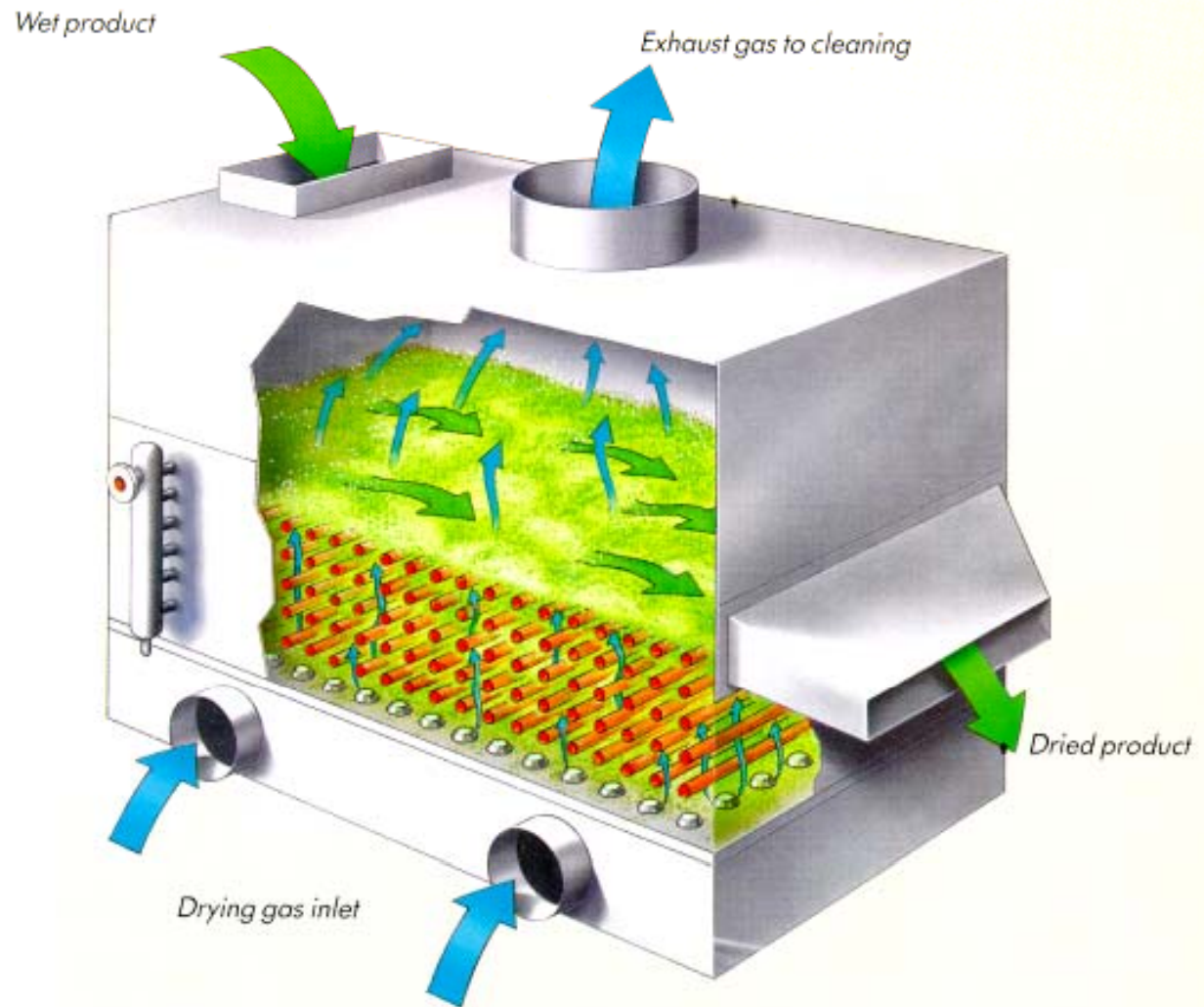
Dryers: Fluidized bed dryers

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Slide 15

convective

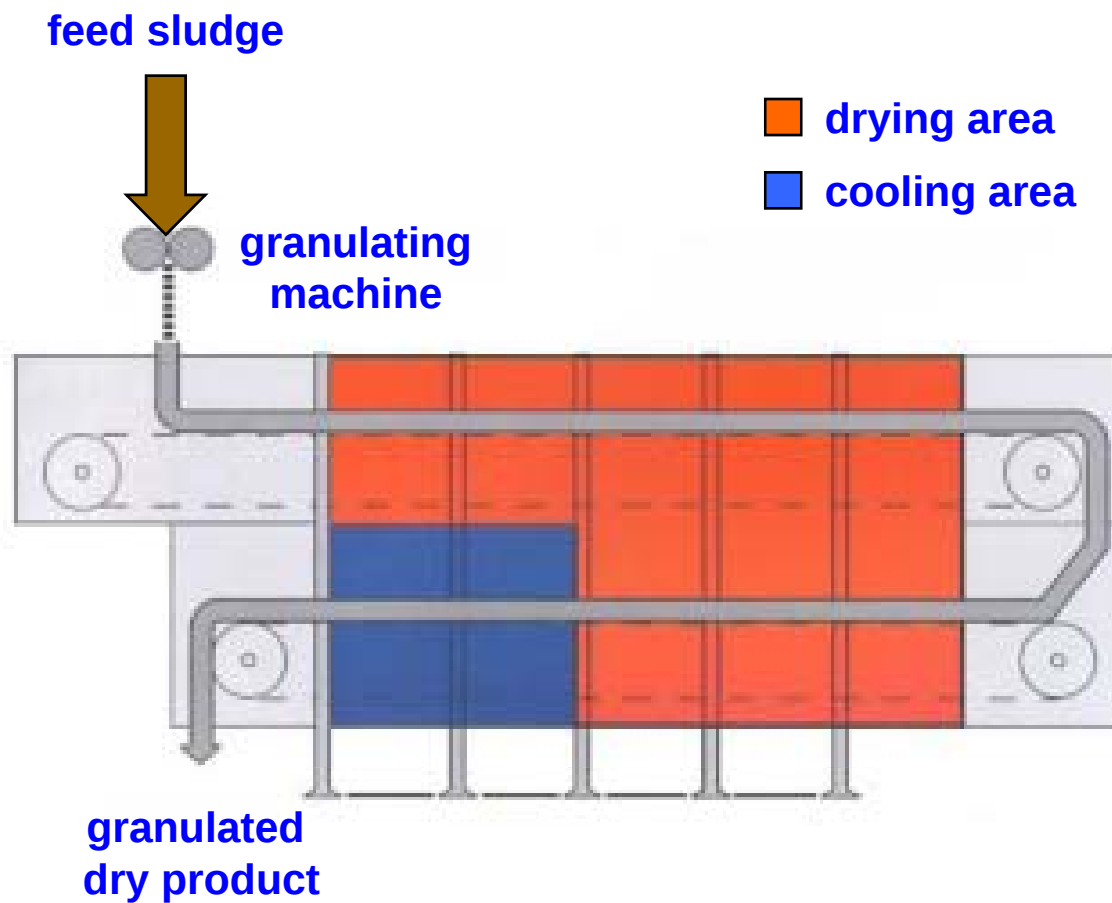
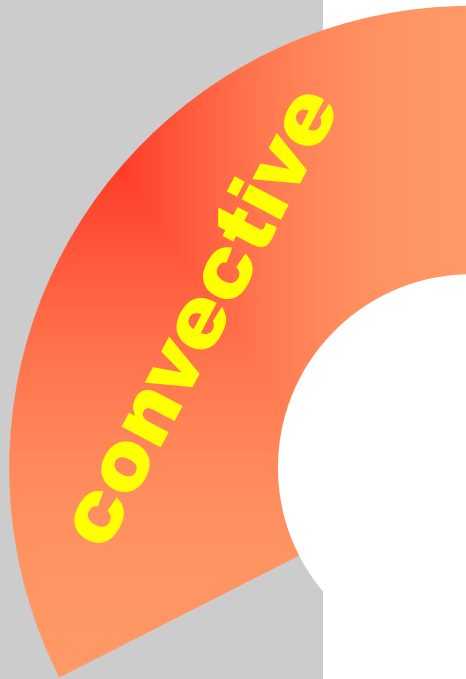


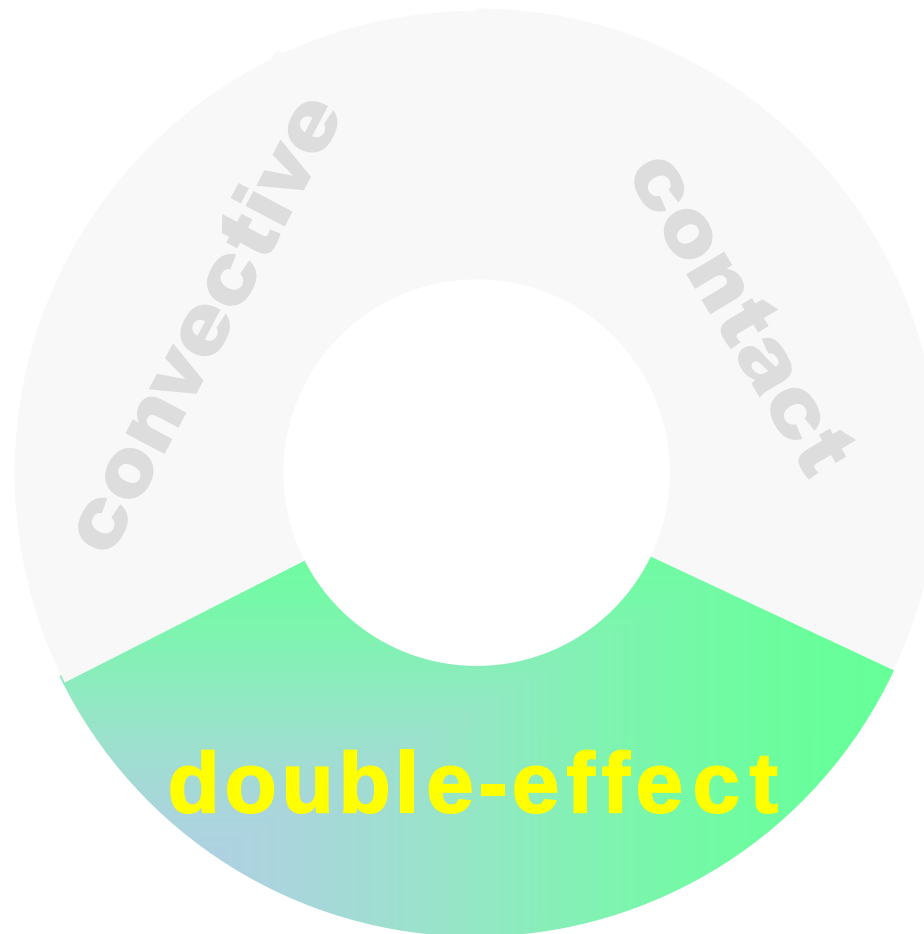
Dryers: Belt dryers

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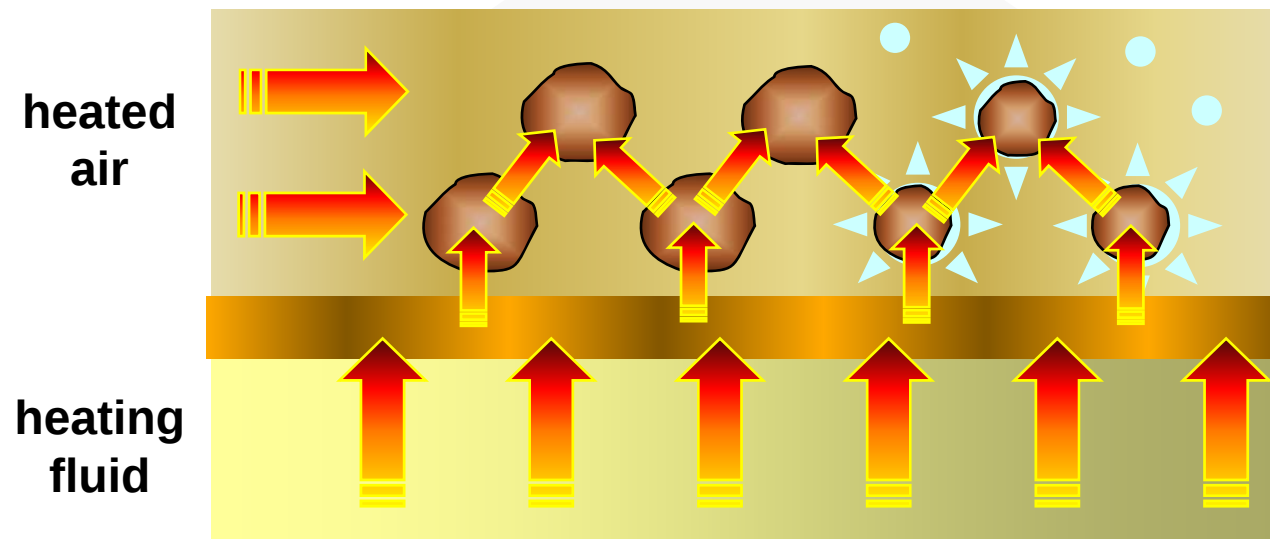
Water Technologies

Slide 16

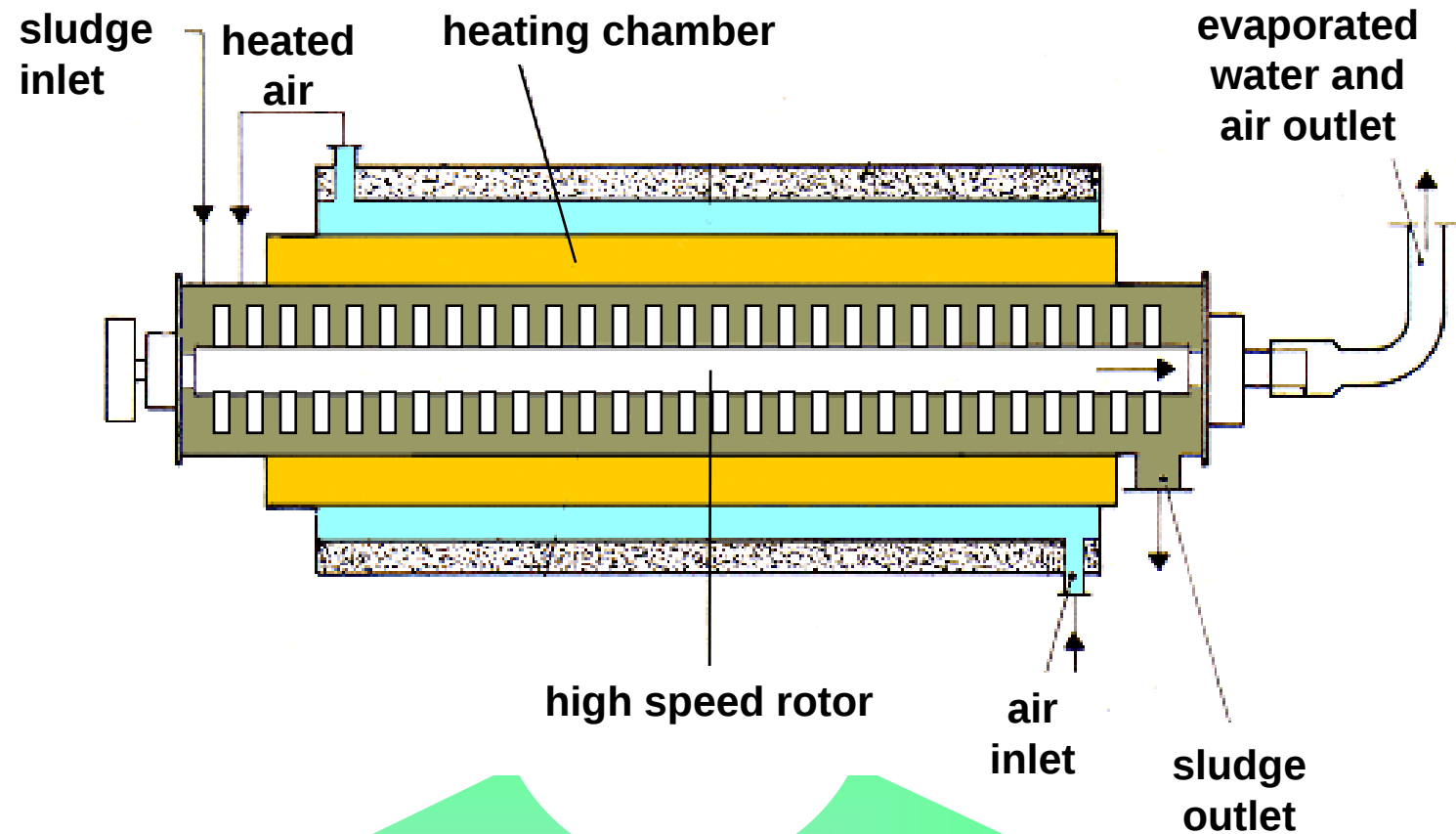




Heat is supplied both by a stream of hot air and by contact, through a metallic wall, with the heating fluid.



double-effect



double-effect

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SLUDGE THERMAL DRYING

Drying Technologies

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Slide 21

CTD



CSD



ECOFLASH



SBD



Convective thermal dryer CTD: Process scheme

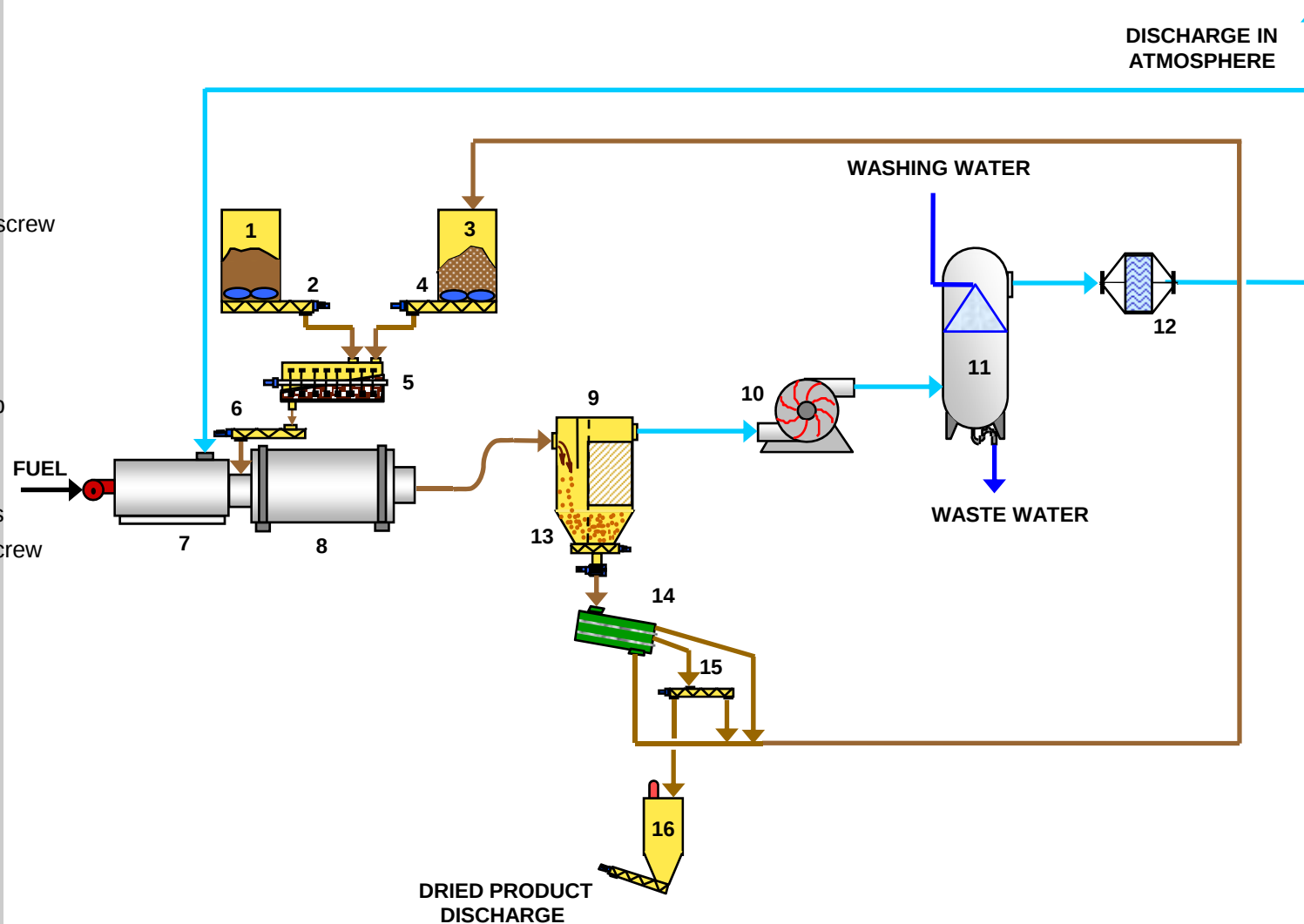
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LEGEND

- 1 Wet product silo
- 2 Wet product dosing screw
- 3 Recycling product silo
- 4 Recycling product dosing screw
- 5 Mixer
- 6 Feeding screw
- 7 Furnace with burner
- 8 Drying drum
- 9 Air-solids separation group
- 10 Delivery fan
- 11 Scrubber saturator
- 12 Demister-drops separators
- 13 Dried product extraction screw
- 14 Sieve
- 15 Screw conveyor
- 16 Dried product storage silo

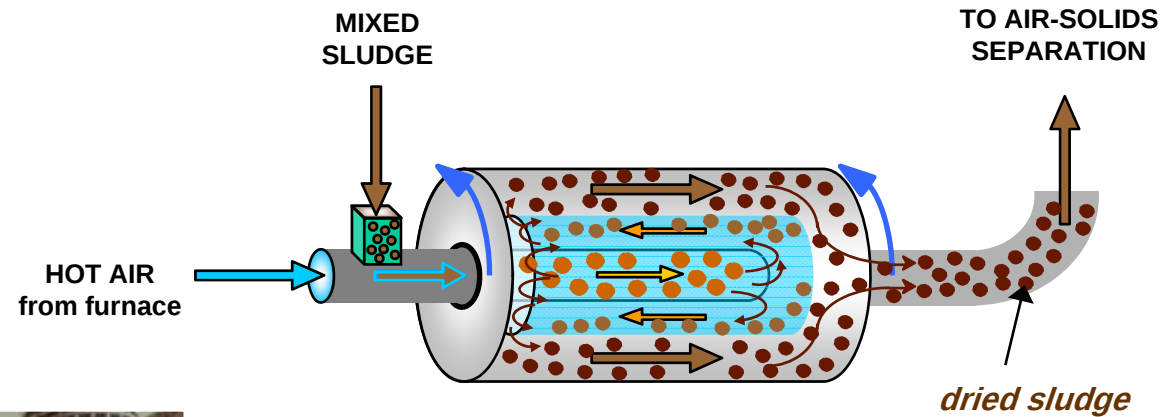


Convective thermal dryer CTD: Drying drum

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CTD: Convective sludge dryer

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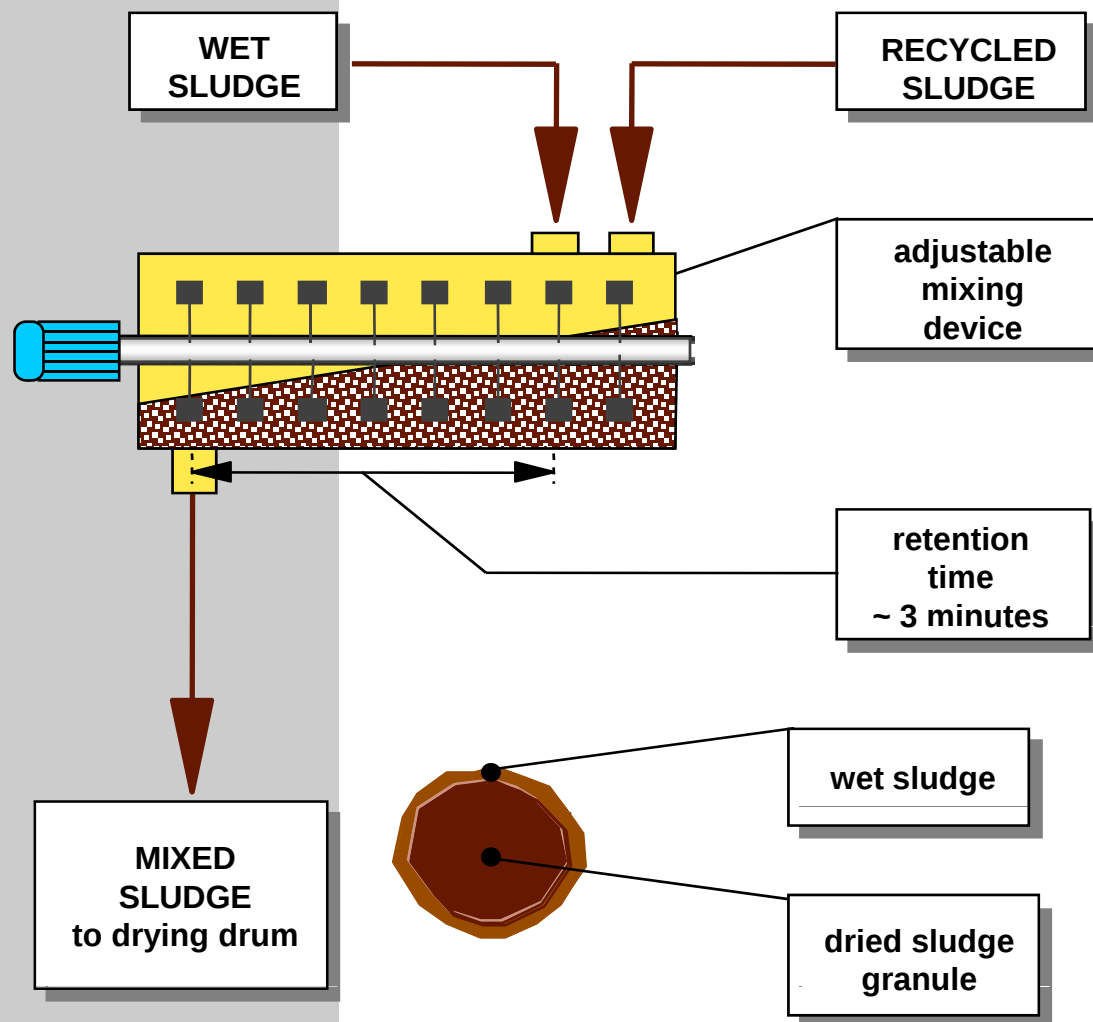
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CTD: Sludge mixer

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Slide 25



Sernagiotto Products



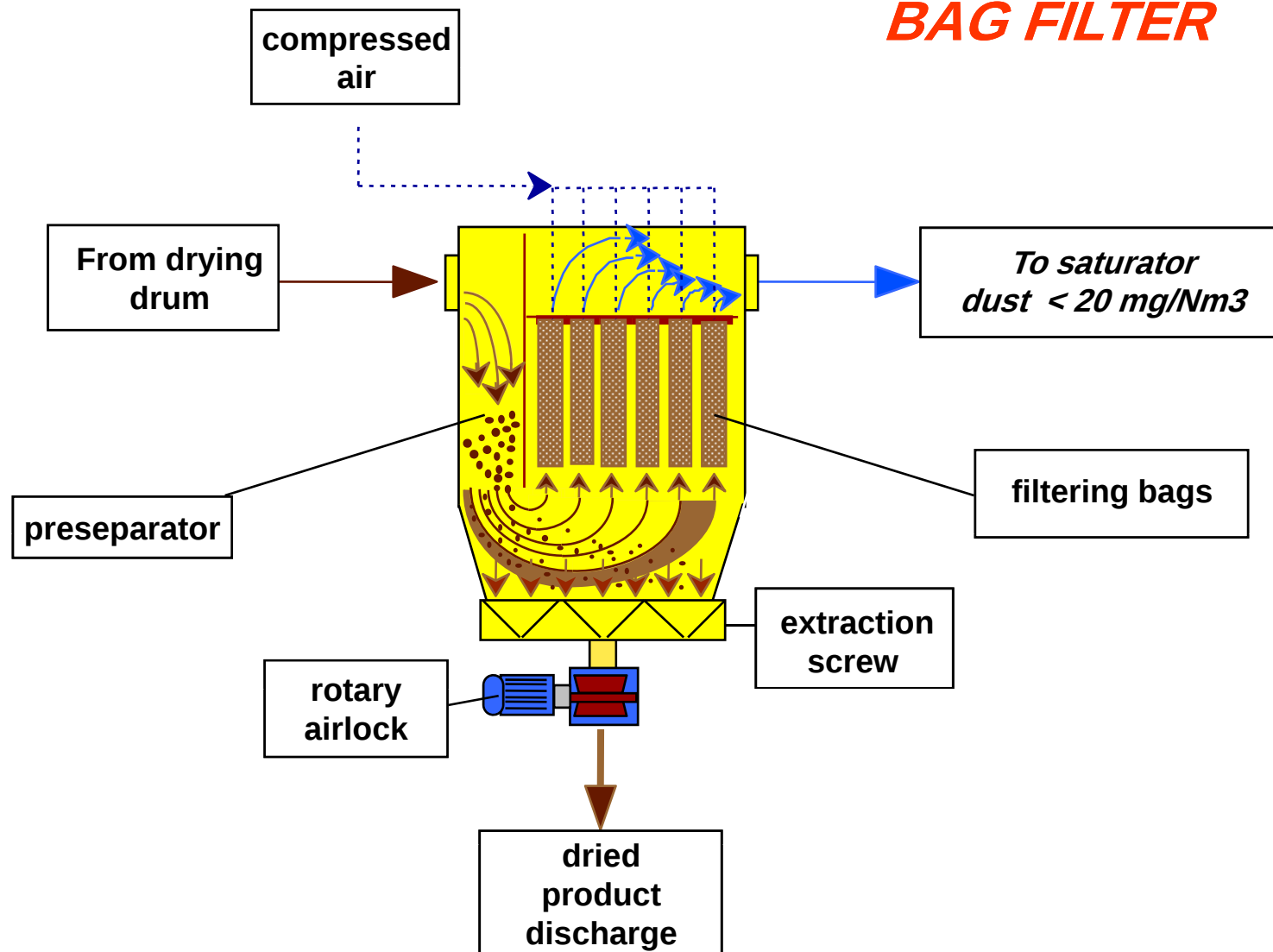
CTD: Air-solids separation group: option A

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BAG FILTER

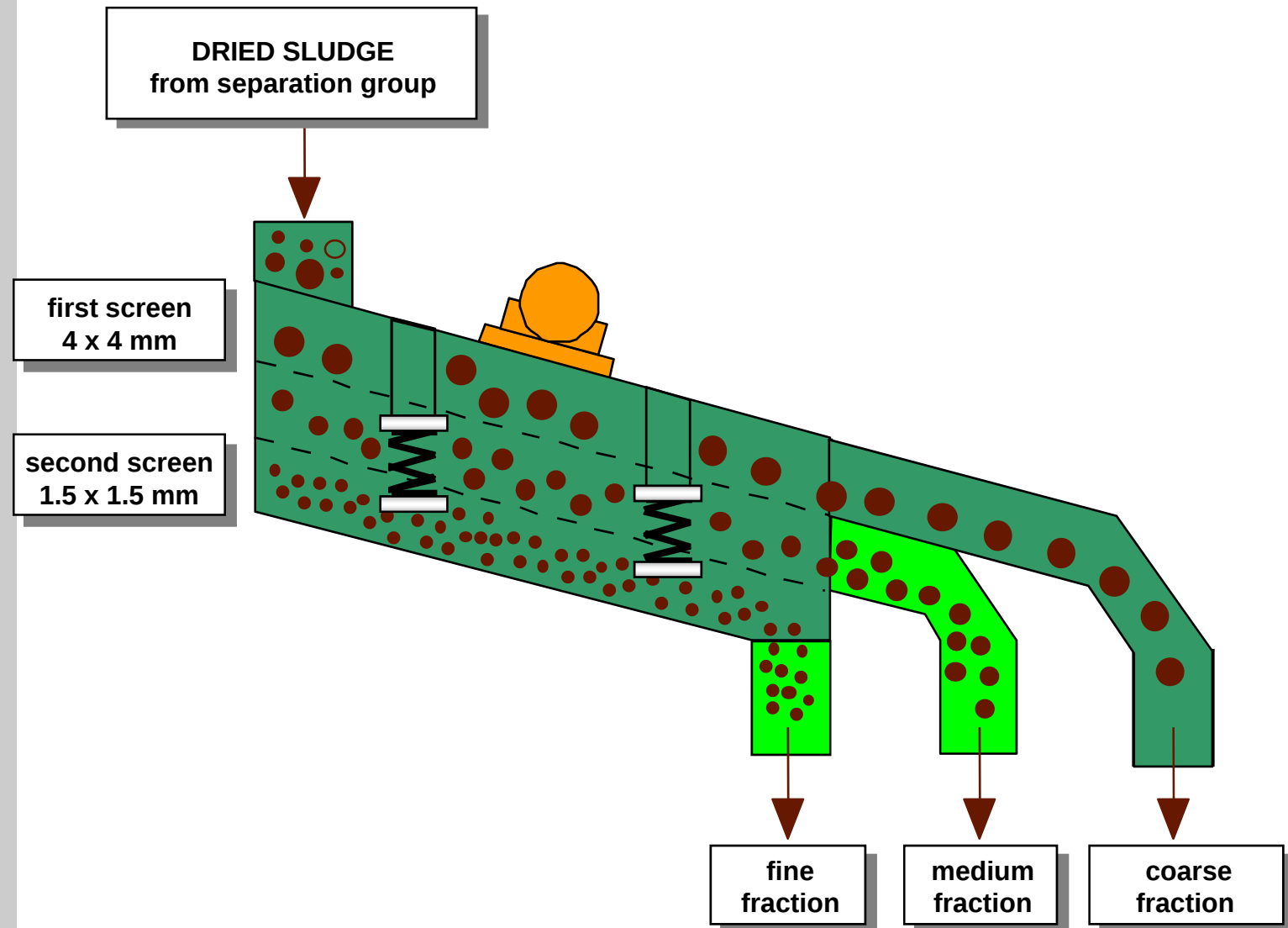


CTD: Sieve (option)

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CTD: Dried product handling systems

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Bagging system



Storage silo



*Dried product discharge
telescopic unloader*

CTD: Final product

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Convective thermal dryer CTD: Main features

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➤ **VALUABLE FINAL PRODUCT:**

- *Granular shape (no dust)*
- *Hygienized*
- *Low temperature*

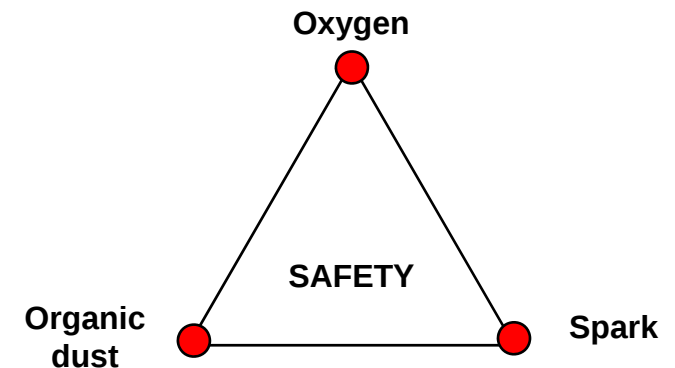
➤ **LOW ENVIRONMENTAL IMPACT**

➤ **PROCESS SAFETY:**

- *Intrinsecally safe process*
- *Safety device*
- *Certification ATEX 94/9/EC*

➤ **EASY OPERATION:**

- *Short start-up and shut down time*
- *Process flexibility*
- **PLC controlled: completely automatized operation**
- **No need of specialized personnel**



Convective thermal dryer CTD: Evaporation capacity

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MODEL	Evaporation capacity kg/h evaporated water
CTD 1000	1000
CTD 2000	2000
CTD 3000	3000
CTD 4000	4000
CTD 5000	5000
CTD 6000	6000
CTD 7000	7000
CTD 8000	8000
CTD 9000	9000
CTD 10000	10000

Convective thermal dryer CTD: Corona sludge drying plant (USA)

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Customer:

CITY OF CORONA
CA (USA)

Contractor: US Filter (USA)

Model: CTD 4000

Flow rate: 31.200 t/year

**Dry solids content in
the dewatered sludge:** 16% SS

**Dry solids content in
the dried sludge:** 95% SS

Evaporation capacity: 4.000 kg /h

Plant operation: 300 d/year - 24 h/d

Year of construction: 2004

Start-up: September 2005

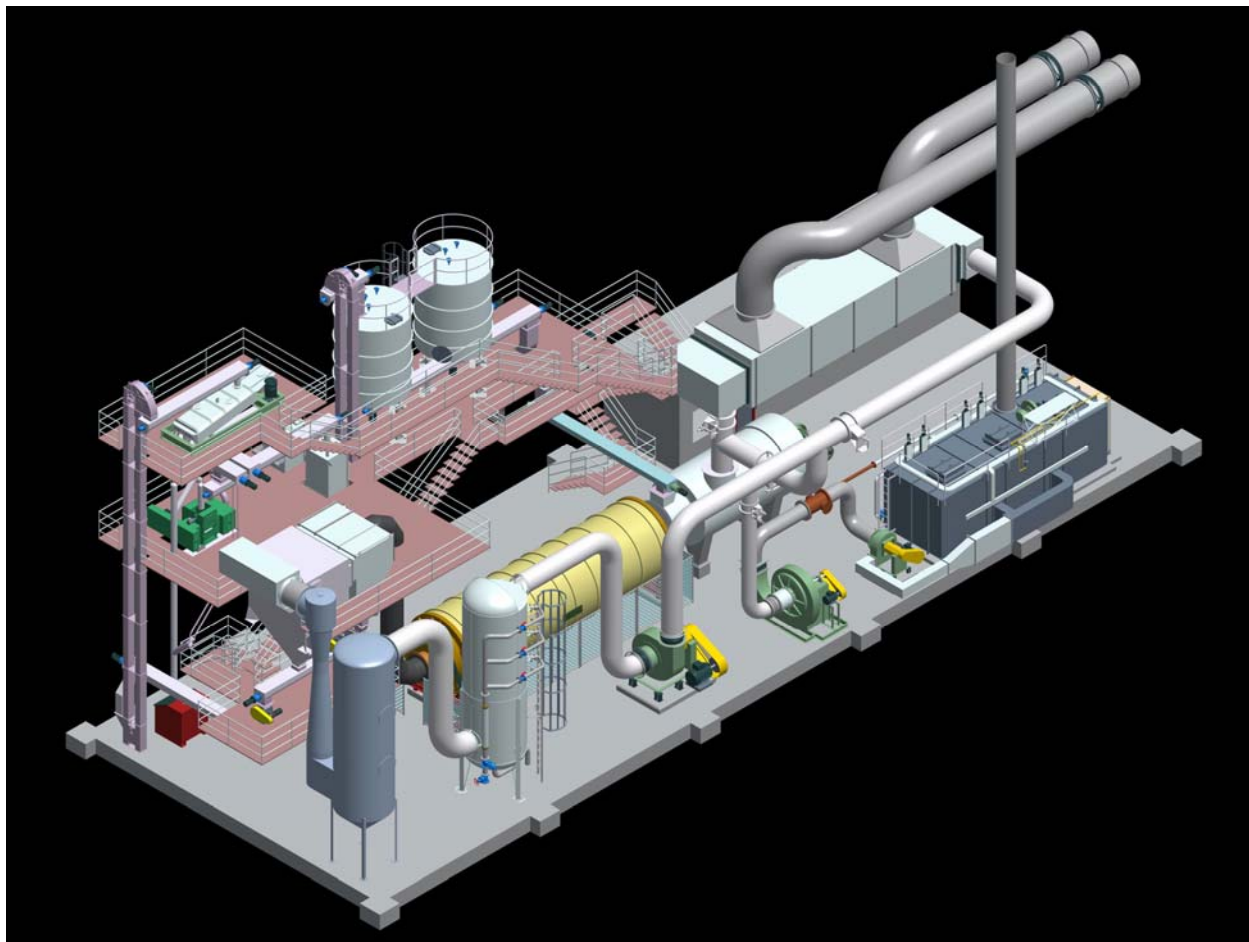
HEAT RECOVERY FROM GAS ENGINES

Heat requirement: 2.800.000 kcal/h

Heat recovery: 1.500.000 kcal/h

Heat to be supplied: 1.300.000 kcal/h

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Convective thermal dryer CTD: Arzignano sludge drying plant (Italy)

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Customer:

ACQUE DEL CHIAMPO
Arzignano WWTP
Vicenza - Italy

Model: (2) CTD 4000

Flow rate:

90.000 t/year

**Dry solids content in
the dewatered sludge:**

30% SS

**Dry solids content in
the dried sludge:**

> 90% SS

Evaporation capacity:

8.000 kg/h

Plant operation:

300 d/year - 24 h/d

Year of construction:

1992

Start-up:

1998

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CTD: Dundalk - Drogheda sludge drying plant (Ireland)

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Customer:

DUNDALK AND
DROGHEDA STW
Dundalk - Ireland

Contractor: EPS

Model: CTD 2000

Flow rate: 40 t/d

**Dry solids content in
the dewatered sludge:**

18% SS

**Dry solids content
in the dried sludge:**

90% SS

Evaporation capacity:

2.000 kg /h

Plant operation:

300 d/year - 16 h/d

Year of construction:

2004-2005

Start-up:

December 2005

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Contact thermal dryer Ecoflash: Process scheme

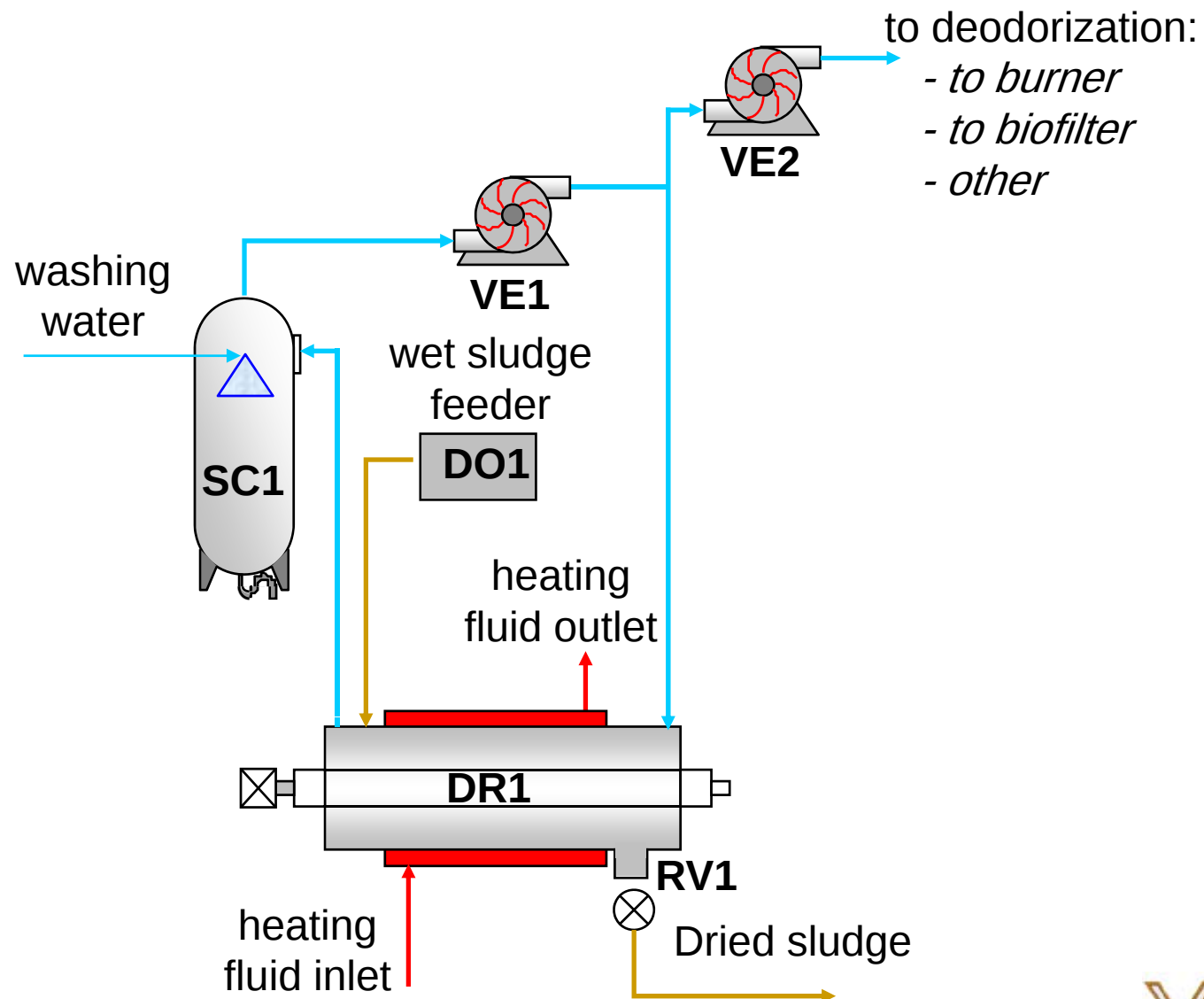
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Legend:

DO1 Sludge feeder
DR1 Dryer
RV1 Rotovalve
SC1 Scrubber
VE1 Recycle fan
VE2 Extraction fan

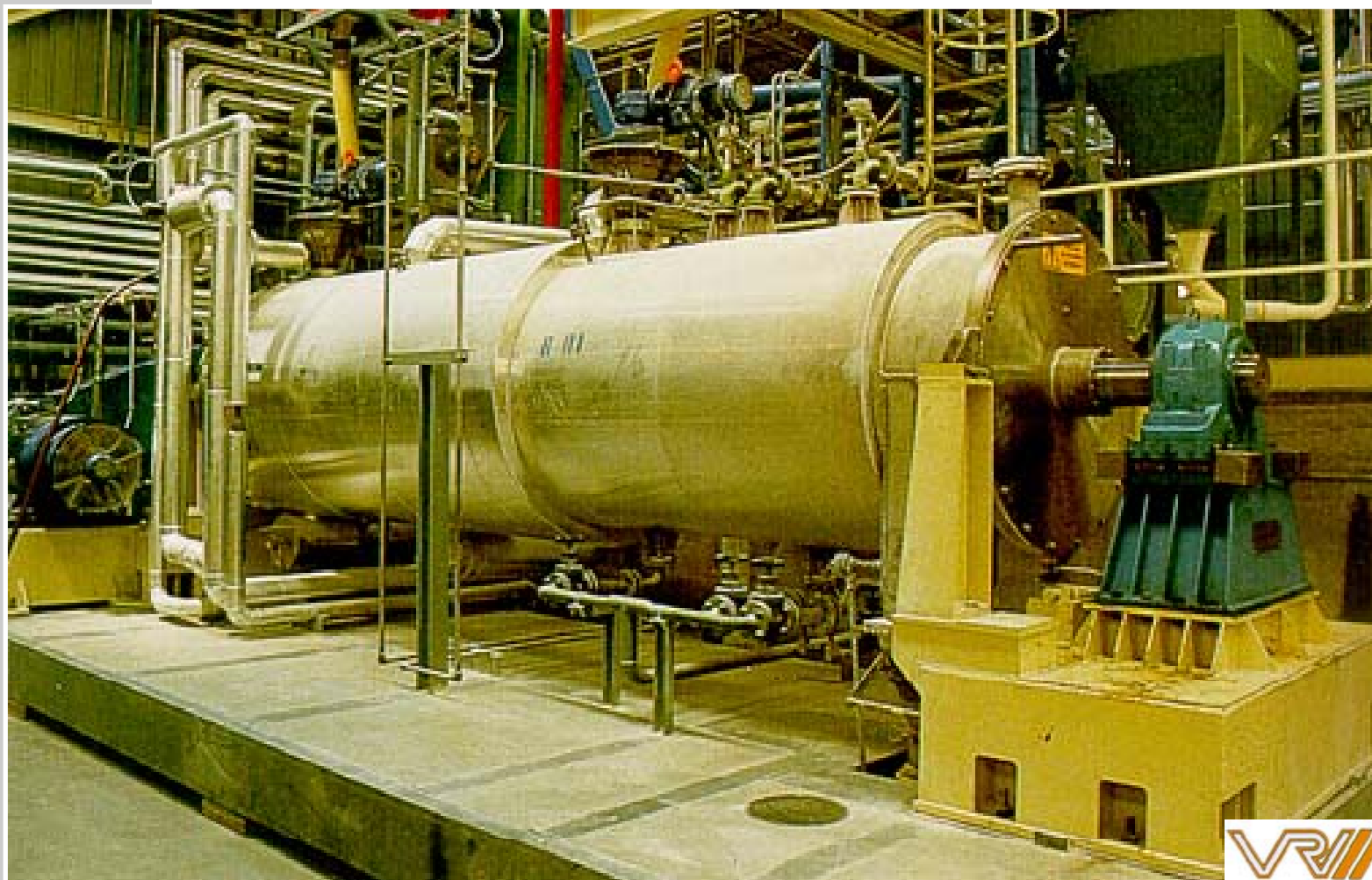


ECOFLASH: Thin layer dryer

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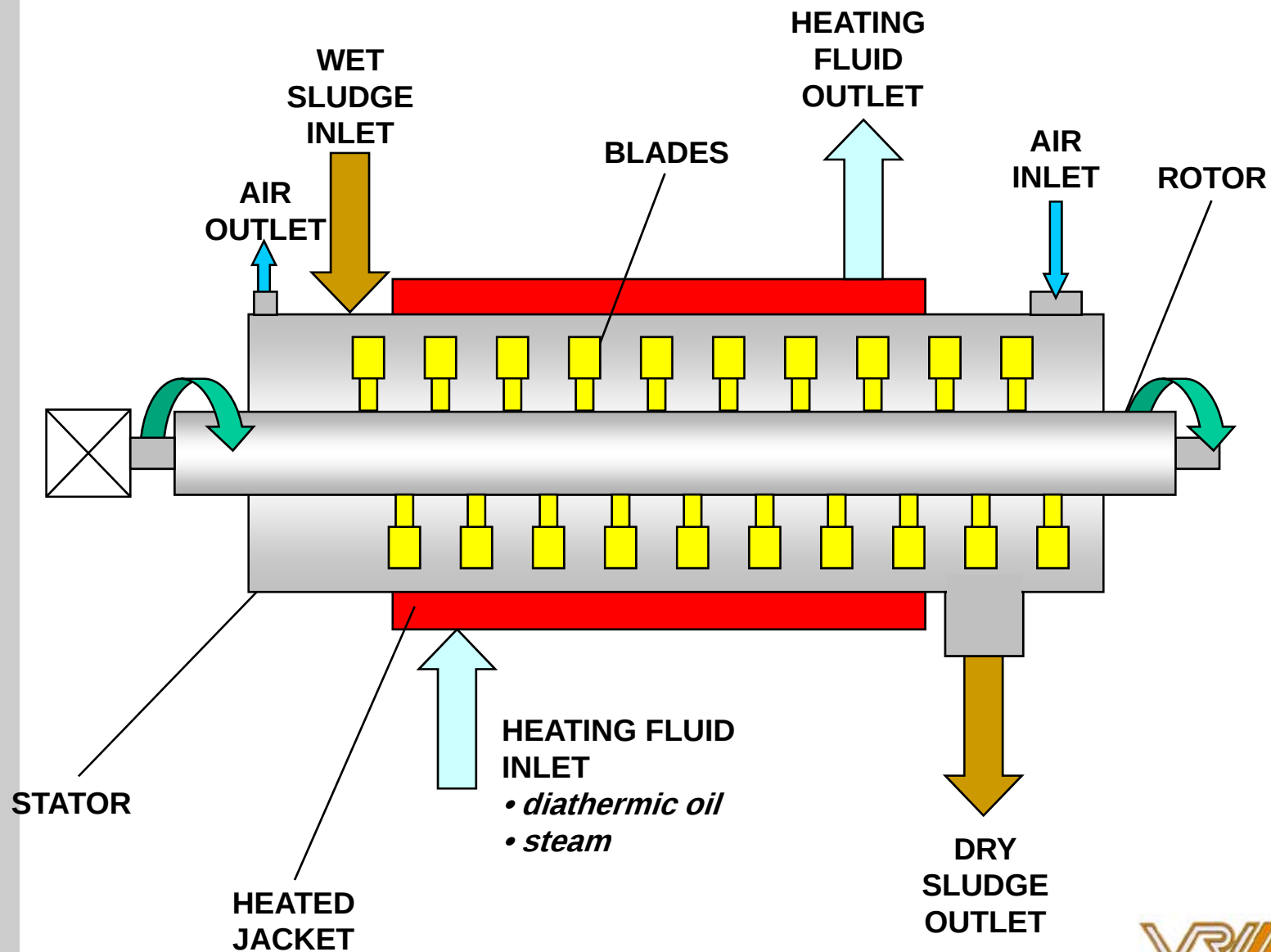


ECOFLASH: Thin layer dryer

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ECOFLASH: What is the thin layer ?

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“Thin layer” is defined as a sludge layer with a thickness of few millimeters ($\approx 5 \text{ mm}$) which is maintained in turbulence mechanically.



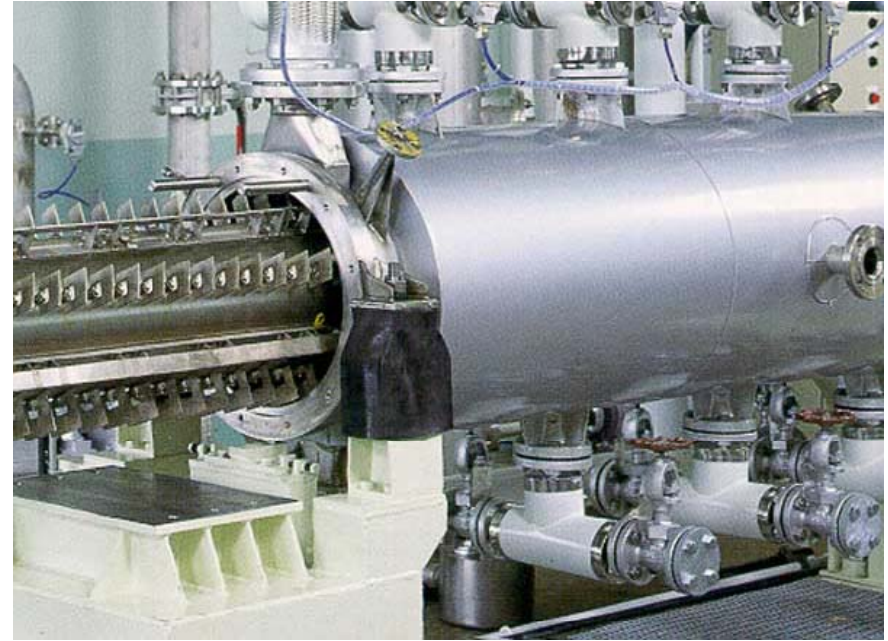
ECOFLASH: How is obtained the thin layer ?

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The thin layer is
obtained by
centrifugation of
the sludge with
high speed rotor. The rotor spreads the
sludge on the wall of a jacketed cylindrical stator.

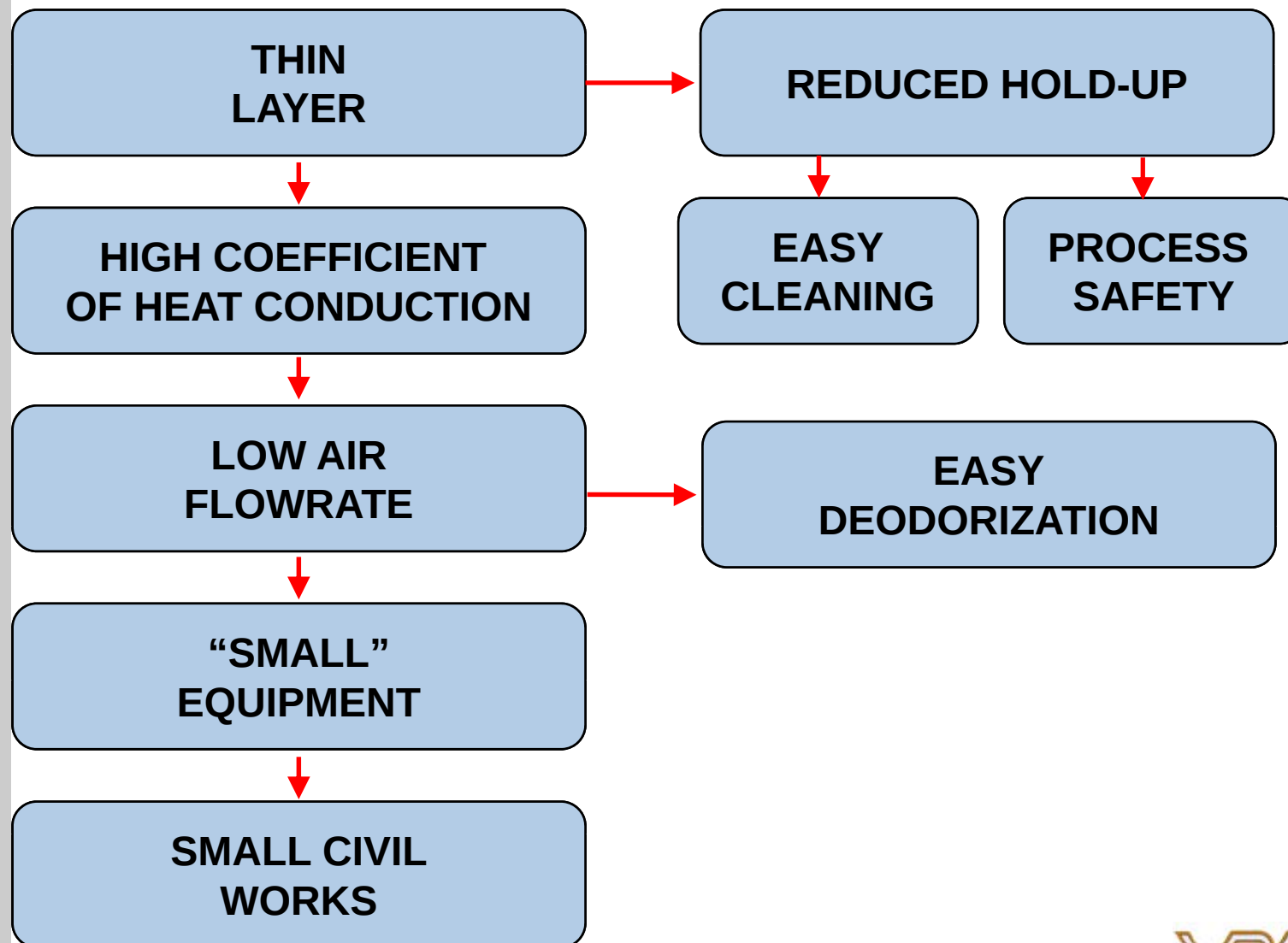


Contact thermal dryer Ecoflash: Advantages

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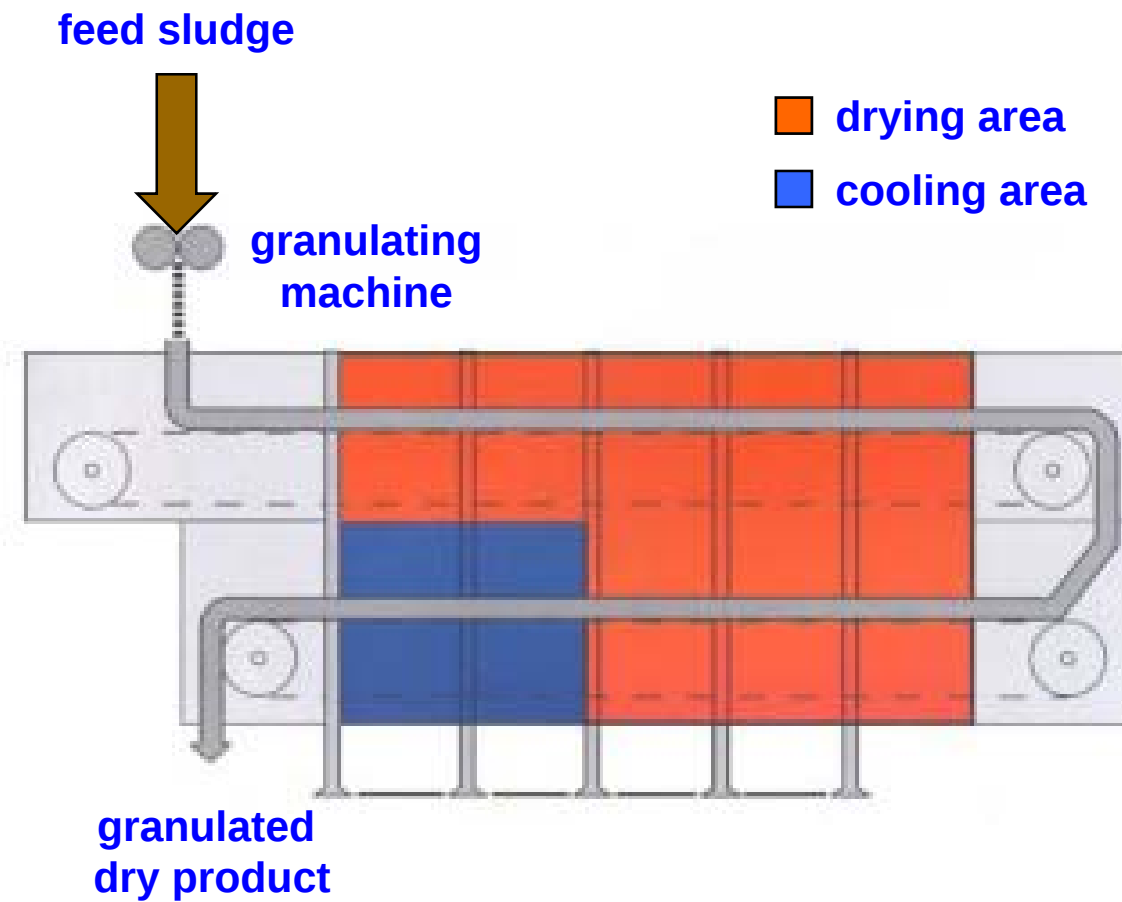


Belt dryer SBD: Process scheme

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Belt dryer SBD:

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**THANK YOU FOR
YOUR ATTENTION**