MINERALI INDUSTRIALI

*Mining solutions and ore dressing*

# HED-13

## Dryer

Energy efficiency

$CO_2$ reduction

Emissions trading

# High efficiency dryer HED-13

## *The rotary drum dryers evolution*

### Drying sand with environmental air

To dry the same amount of sand, HED-13 uses from 20% to 30% less energy than a traditional dryer.
The secret? The residual steam saturation capacity of environmental air.

### Advantages

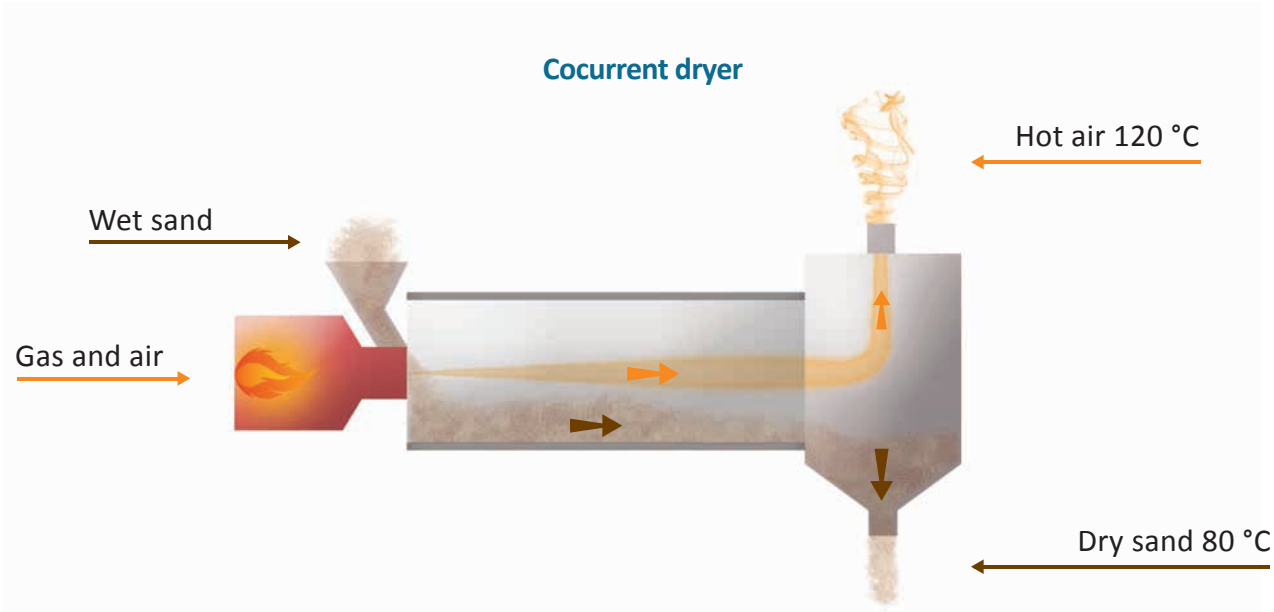
- Consumption till 1 kWh/l (energy per liter of evaporated water).
- Energy saving from 20% to 30%.
- Outgoing material temperature slightly higher than the environmental one.
- Automatic optimization of the sand flow.

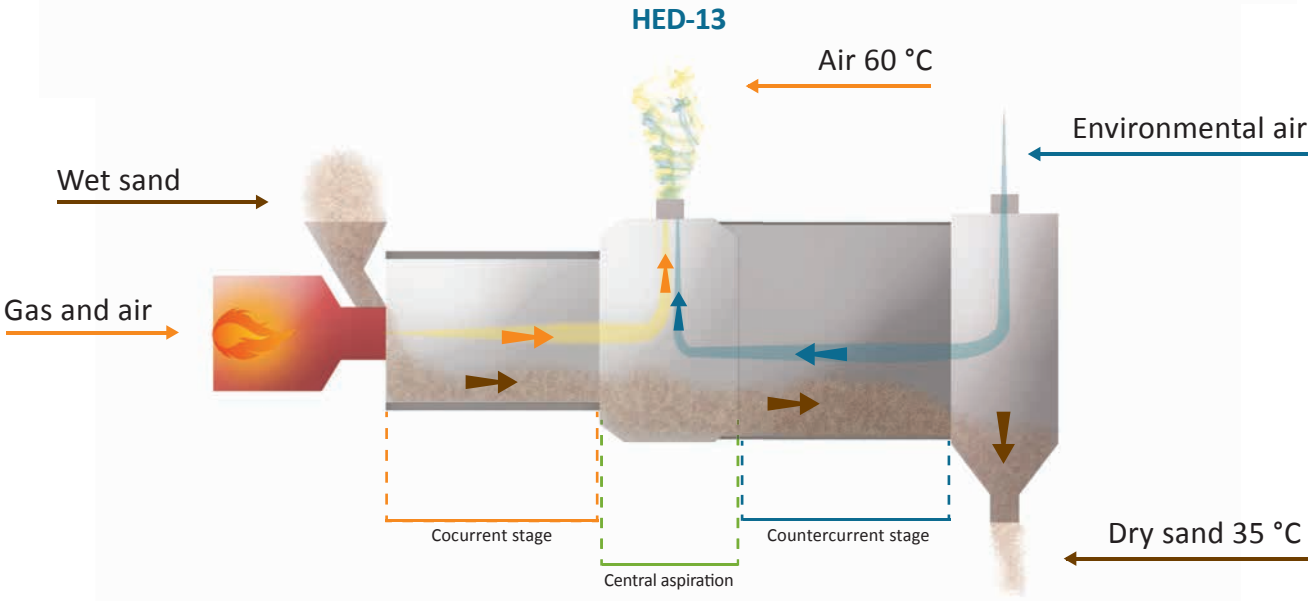
*"This year we avoided 171 t of $CO_2$ entering in the atmosphere, equal to what is emitted from 114 city cars in the same period."*

Alessio Lorenzi
Technical Director, Minerali Industriali

## HED-13 configuration

Traditional dryers (cocurrent or countercurrent) are characterized by the mono-directionality of the air flux. HED-13 aspiration origins from the center of the drum: the inlet material passes through a first stage, cocurrent with the hot air generated by the burner, then passes in a second stage countercurrent the environmental air, aspirated from the opposite side of the dryer. There is only a drum, with a single motorization.



## The air saturation capacity

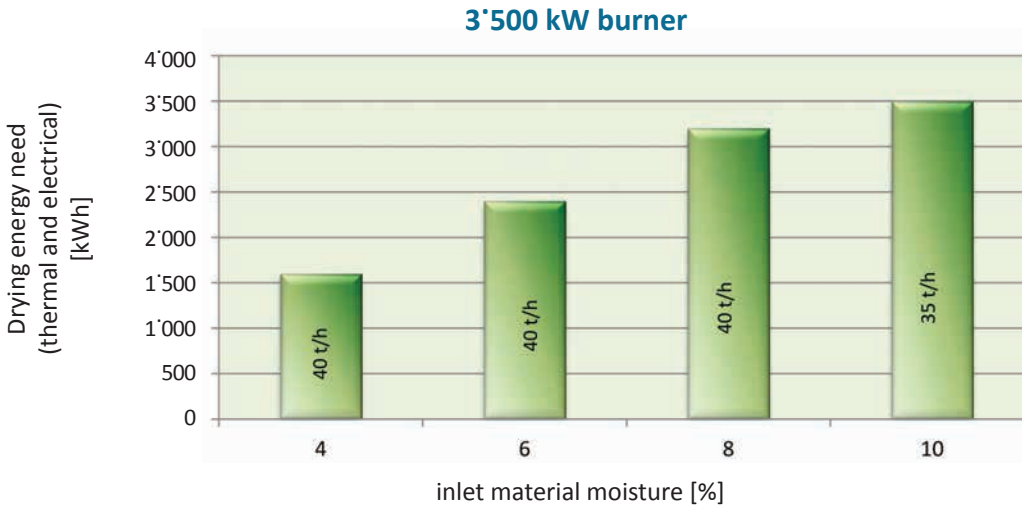
Passing the first cocurrent section, the sand is still slightly humid.
The environmental countercurrent air flux, with its steam saturation capacity, guarantees the complete exsiccation of the sand, without any other thermal energy contributions.

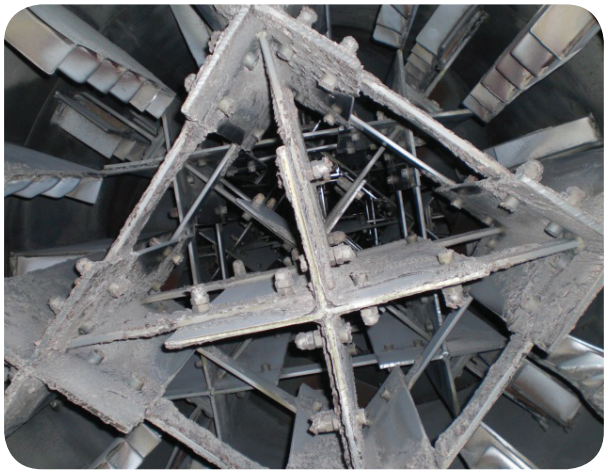
## Lower temperatures

HED-13 configuration allows a relevant temperature decrease of both chimney air and outlet sand.
Sand cooling is no longer need for following treatments (for example magnetic separation, foundry uses, etc...).

## Operational characteristics and maximum sand flow as a function of moisture (3'500 kW burner)

*Consumption reduced till 1 kWh/l (energy per liter of evaporated water)*



## Internal blading

The internal blading design is the result of a long operational experience and allows to maximize the heat exchange between air and sand.

## Insulation

To reach the described energy benefits, all the surfaces involved by the outlet air flow until the chimney are insulated.

## Sand flow regulation

The feeding conveyor belt is controlled via VSD, according to a continuously regulation of the inlet sand flow.

## Rotation control

Also the drum rotation is controlled via VSD: the speed is related to the flow, allowing the material residence time optimization into the dryer.

## Aspiration power

Thanks to the automatic regulation air flow system (via VSD), aspiration power is always reduced to the minimum requested.

## Stock dome

HED-13 dryer coupled with the draining storage domes of DOMSTOCK Series, permits both the storage and the wet material feed automation.

| | |
|---|---|
| Length | 13 m |
| Maximum diameter | 2,5 m |
| Burner thermal power | from 1˙500 to 3˙500 kW |
| Fuel | Natural gas – LPG – Cogeneration heat |
| Electrical power | 70 kW installed – 40 kW employed |
| Aspirated air flow | till 30˙000 $m^3/h$ |
| Maximum sand inlet flow | 40 t/h |
| Inlet sand moisture | till 15% |
| Specific consumption per liter of evaporated water | 1 kWh/l * |

* may be less, depending from moisture, particle size, etc... .

*VSD engines control*

## Case study: cocurrent dryer substitution with an HED-13 at Sasil S.p.A. (Italy)

| *Annual values* | Old cocurrent dryer | HED-13 | Difference (difference %) | | Money saving* [€] |
|---|---|---|---|---|---|
| Sand flow [t] | 50˙000 | **50˙000** | | | |
| Average moisture [%] | 6 | **6** | | | |
| Evaporated water quantity [t] | 3˙000 | **3˙000** | | | |
| Natural gas consumption [$Nm^3$] | 469˙100 | **336˙000** | 133˙100 | (-28%) | 45˙000 |
| Electrical energy consumption [MWh] | 129 | **63** | -67 | (-51%) | 12˙000 |
| Electrical energy aspiration consumption [MWh] | 92 | **38** | -54 | (-59%) | 9˙500 |
| Total energy consumption [tep] | 370 | **262** | -107 | (-29%) | |
| Energy consumption for liter of evaporated water [kWh/l] | 1,43 | **1,02** | -0,41 | (-29%) | |
| $CO_2$ emissions [t] | 251 | **180** | -71 | (-26%) | |

| | |
|---|---|
| Emission trading (330 € / tep) | 36˙000 €/year |
| **Energy saving + TEE** | **103˙000 €/year** |

* costs based on italian rates.

### Dust reduction on the filter

HED-13 recovers the dust's coarse part, leaving in correspondence of the central aspiration. Considering the lower aspiration power, dust extraction is reduced, simplifying the dust treatment plant.

### Emissions trading

According with the local law, the substitution of a traditional dryer with an HED-13 may permit the access to the emissions trading market.

### Environmental sustainability: $CO_2$ and cogeneration

Hed-13 dryer reduces from 20% to 30 % the $CO_2$ emissions respect traditional solutions. Furthermore, HED-13 may accept an external heat source, for example from cogeneration.

## Automation

HED-13 is furnished by own software that registers and regulates more than 20 parameters in real time, dust filter included. Monitored data are elaborated to minimize energy consumption and maximize continuously the dryer efficiency.


## Dew point

Without a good control system HED-13 will not work in efficient way.
The chimney dew point measure allows to maintain the air temperature as low as possible without obstruction problems in the dust filter.

*"Dryer software adjusts automatically the gas consumptions in function of the moisture's sand variation."*

Cosimo De Blasi
Dry Treatments Responsible, Sasil S.p.A.

*A global offer at customer's service*

## Safety

Minerali Industriali's machines are designed and realized according to the best available standards, ensuring the highest degree of safety for the operators. All machines are CE certified.

## Laboratory tests

Minerali Industriali, as raw materials manufacturer for glass and ceramic industry, makes available its laboratories and experimental equipments for analysis and industrial simulations.

## Industrial trials

Minerali Industriali's plants are available to the customers for industrial trials.

## Efficiency warranty

Minerali Industriali equipment performances depend on the material to be treated.
Based on the outcome of the industrial trial, Minerali Industriali declares and warrants the machine's production rate.

## Refunded trials

Minerali industriali asks to the interested customers to cover only the execution tests cost in its laboratories or plants. In case of machine purchase, this amount will be entirely refunded.

## Turnkey solutions

Minerali Industriali offer involves design, installation assistance, start-up and personnel training.

## Customer care

Minerali Industriali technical office is available for spare parts supply and for any assistance the customer may need.

## Payments facilities

Minerali Industriali collaborates with the leading credit institutions and it is available to study financial dedicated solutions with the customer.

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