

FUSION



Innovative,
eco friendly technology
for the preparation of the
ceramic mixture



Introduction to the innovative concept of FUSION

Thanks to continuous research and development work, Minerali Industriali Engineering holds the patent for an innovative dry preparation technology of the ceramic body: the FUSION® process which allows to obtain a dry ceramic body with similar performance to the traditional spray-dried mixture prepared for humid.

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Traditional wet preparation.

The preparation of the mixture involves two phases: the grinding and the subsequent atomization.

1. GRINDING

Both hard (quartz and feldspar) and soft (clays and kaolins) raw minerals are mixed and wet ground in continuous rotary mills, until a liquid called slip is obtained. This is then stored in underground tanks, equipped with agitators.

Why grind soft and hard minerals with the same machine?

Better to use two different machines.

In this way the work of each machine for the treatment of the specific material is optimized.



2. ATOMIZATION

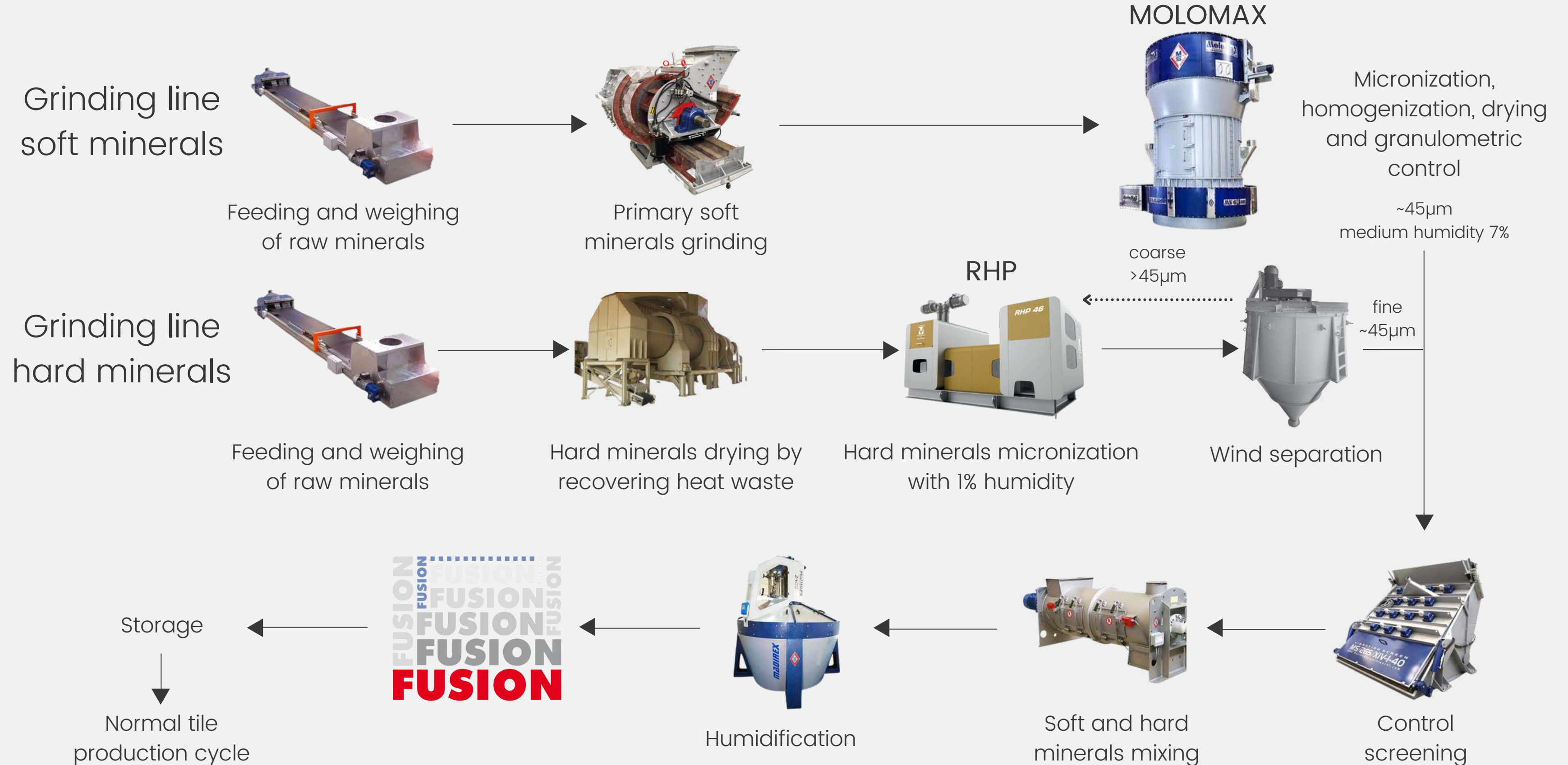
The slip is taken and placed in the atomizer where the high pressure and high temperature cause the water to evaporate, producing a fine and homogeneous granulate, ready to be pressed.

Why add water when it needs to be removed later?

Better not to add it, using an innovative technology.

With dry grinding there is a substantial energy and water saving throughout the manufacturing process. Consequently, a significantly lower quantity of CO₂ is emitted than the traditional wet system.

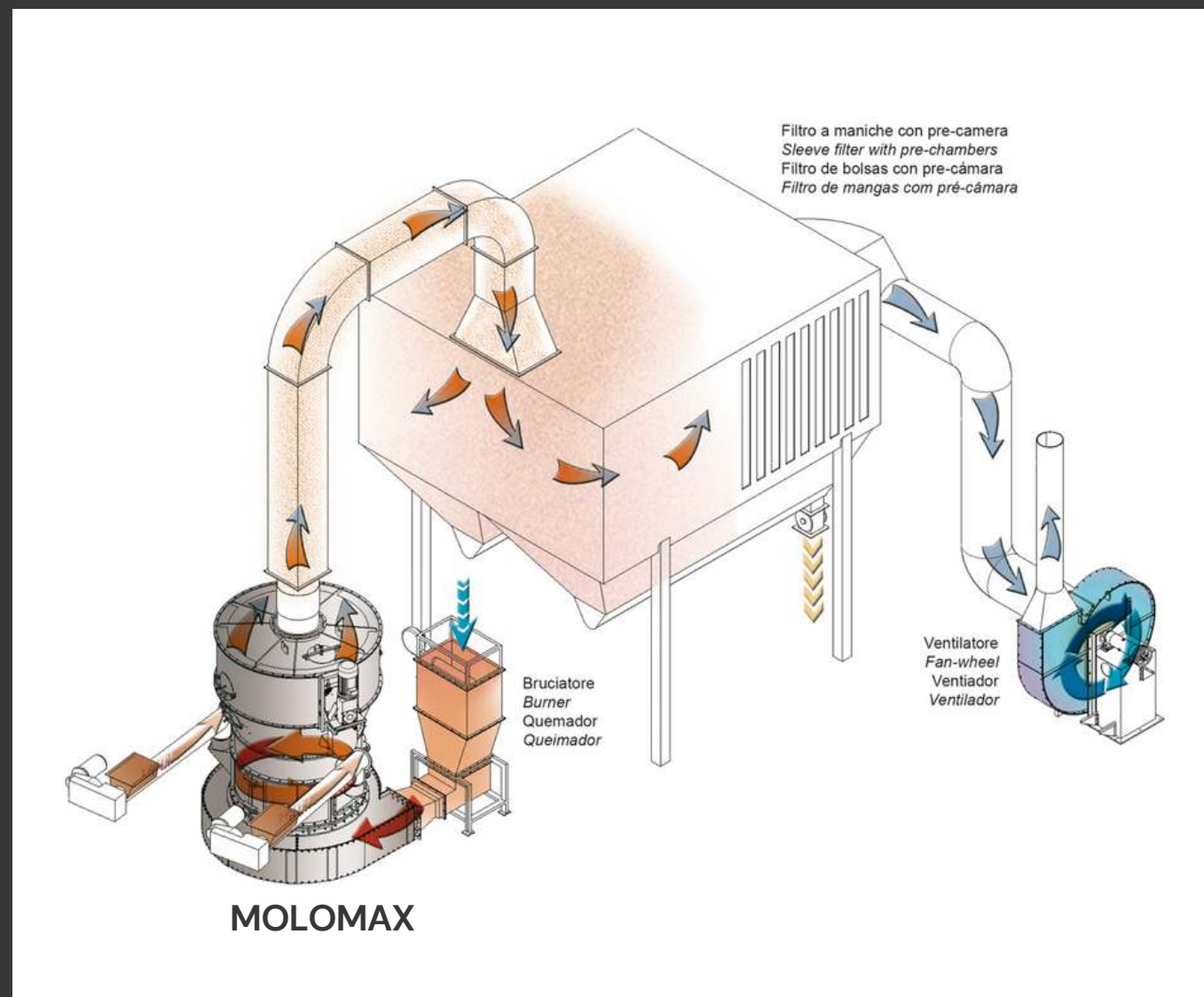
Process description



Molomax

The machine dedicated to the grinding, drying and selection of soft raw minerals.

Micronization
Homogenization
Drying
Particle size control



The MOLOMAX Pendular Mills are used for the grinding of raw minerals of various nature, specific weight and humidity up to medium hardness (clays, calcium carbonate, bentonite, gypsum, dolomite, etc.) with very high production and exceptional quantities of fine material.

In the MOLOMAX MS-AIR Pendular Mills (also called "open cycle") the ground material is classified and collected by a process filter, which will unload it in the next phase of the plant cycle.

RHP – High Pressure Roll Mill

The smart way of fine milling.

New energy-efficient grinding methods.

RHP is a high pressure roller mill suitable for dry grinding (maximum humidity 1%), whose main components are two grinding rollers and the compression screw. In the RHP high pressure cylinder the mineral is forced to pass through two rollers and it is the pressure between the grains that causes the grinding.

The results?

An efficient, light, versatile and reliable machine.



FUSION Technology



A technology capable to increase the quality performance of the finished product.

This result is possible thanks to the particular characteristics of homogenization, smoothness and density of the final granulate (like the wet atomised product), with consequent high stability in the pressing, drying and firing phases.

A patented technology for sustainable ceramics.

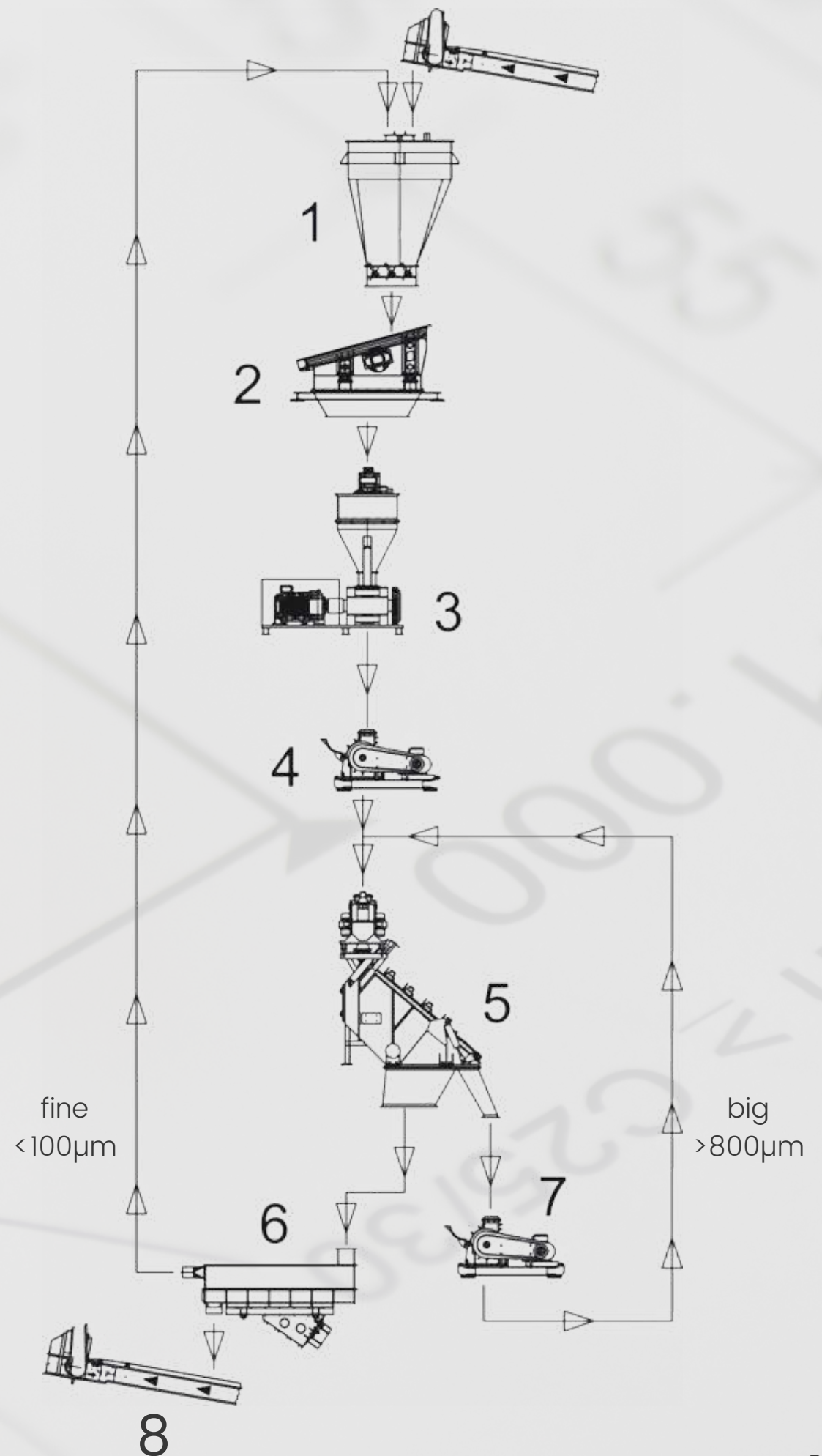
From an environmental point of view, Fusion technology stands out for its very low impact, since it reduces water consumption by 80% and, combined with energy recovery technologies, allows a drastic reduction in CO₂ emissions, allowing the production of eco-sustainable ceramic materials.

www.msgreentech.com/fusion/



Lay Out FUSION process

1. Silos
2. Screening
3. Compactor
4. Primary hammer mill
5. Screening at 0,8 mm
6. Removal of the fine
7. Secondary hammer mill
8. Finished product ($100 \div 800 \mu\text{m}$)





Electric consumption

(kWh/ton)

Atomization process	FUSION Technology
46	64

Water consumption

(lt/ton)

Atomization process	FUSION Technology
240÷280	50

Thermal consumption

(Nm³/ton)

Atomization process	FUSION Technology
47	9.6*

CO₂ emissions

(kg CO₂/ton)

Atomization process	FUSION Technology
121	60*

(*) in case of heat recovery from the main kiln, gas & ETF costs will be ZERO.

Savings estimate

Annual amount:
100,000 ton/year

		Atomized	Fusion
Electrical consumption Price kWh 0.175 €/kWh	kWh/ton	46	64
	€/ton	8.05	11.20
	€/year	805,000	1,120,000
	difference		+315,000
	difference %		+39%
Thermal consumption Price m ³ 0.75 €/Nm ³	Nm ³ /ton	47	9.6 *
	€/ton	35.25	7.20 *
	€/year	3,525,000	720,000 *
	difference		-2,805,000 *
	difference %		-80% *
CO₂ emissions Price ETS 60 €/tonCO ₂	(kg CO ₂ /ton)	121	60 *
	€/ton	7.26	3.60 *
	€/year	726,000	360,000 *
	difference		-366,000 *
	difference %		-50% *
TOTAL	€/ton	50.56	22.00
	€/year	5,056,000	2,200,000
	difference		-2,856,000
	difference %		-56%

(*) in case of heat recovery from the main kiln, gas & ETF costs will be ZERO.

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