

NEW TECHNOLOGY FOR GRINDING PORCELAIN TILE RAW MATERIALS

The production of technical porcelain tile, a product that is currently undergoing rapid growth on the Italian and international markets, involves using increasingly large percentages of “hard” raw materials, consisting essentially of feldspar and quartziferous sand.

The raw materials, to be mixed with traditional “plastic” materials (clays, kaolins), have very different morphological characteristics.

In particular, their high grindability index makes them difficult to treat, especially as high degree of fineness is required (down to 50 μm). This drastically reduces the hourly output of conventional wet mills, (both continuous and discontinuous).

Further consequence include a considerable increase in electrical power consumption (kWh/t of finished product) and a reduction in the production capacity of the grinding department, thereby creating a bottleneck in the production process.

The conventional solution would suggest to expand the grinding department by installing additional wet mills, obviously involving:

- High investment;
- Increase in production costs due to :
 - ↪ high consumption of electrical energy;
 - ↪ increased labour requirements for the same overall output due to the longer operating hours;
 - ↪ increased maintenance costs due to the use of a larger number of machines;
 - ↪ greater wear of grinding bodies and mill linings.

➤ An innovative solution

An alternative and innovative solution, involves separate dry grinding of “hard” materials in a grinding plant with particularly innovative technological characteristics.

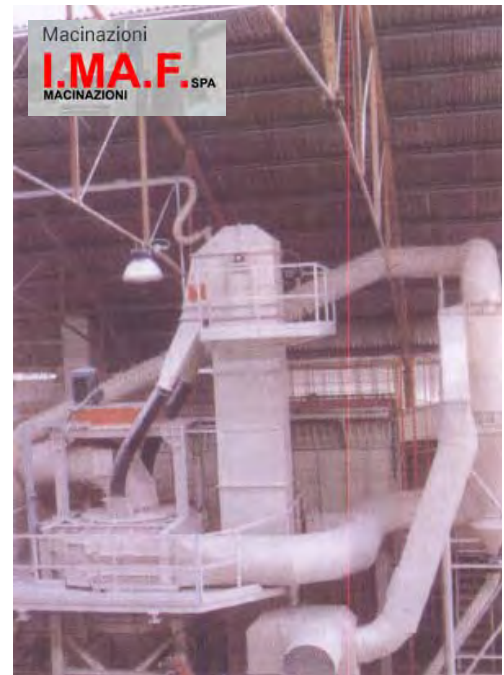
Adding pre-ground “hard” materials to “soft” materials in traditional wet mills guarantees a perfectly homogeneous mixture and a high quality, so polished surfaces have a low susceptibility to soiling.

This separate dry grinding process considerably improves the operations downstream of the grinding department in terms of both quality and output, as it is possible to select in advance – on both separately ground “hard” and “plastic” raw materials – the optimal particle size distributions for the successive process.

On the contrary, with conventional grinding the particle size distribution of the mixture is casual and cannot be controlled because its fineness depends solely on the residue values consisting essentially in the “harder” raw materials.

➔ **A new dry grinding plant**

*The first dry grinding plant with these characteristics was installed in the Carpineti factory (province of Reggio Emilia, Italy) of **I.M.A.F. (CBC Group)**, a ceramic raw materials supplier, 15 years ago.*



➔ Characteristics of the plant

The basic characteristics of the plant are:


- elimination of the drying plant upstream of grinding;
- adoption of tubular mill with drying pre-chamber to simultaneously grind and dry “hard” raw materials, even if they are very moist (drying is an essential step in dry grinding);
- a product free of contaminating ferrous substance, ensured by a mill with linings and grinding media made of high-density ceramic alumina. The plant also has a deferrisation units for this purpose;
- use of a third generation high-efficiency separator, this separator adopts system for solving the problem of severe wear that is common in separators treating “hard” raw materials.
The fineness of the ground product can be easily set to predetermined values by remote-controlling the speed of the grinding rotor.
The new separator can produce a wide range of finenesses, up to 100% of fine below 30 μm ;
- storage and treatment of finished products to allow for subsequent transport in tank trucks (loose powder) and normal trucks (moist agglomerate).

The first plant was put into service in January 1999. It has a regular, fully-automatic operation and is controlled from a centralised control room.

The results obtained to date with the grinding of feldspar to particle size of below 45 μm have confirmed the validity of the plant’s design and the efficiency of its constituent machines.

➔ Other Plant – Same Process

Other plants, with the same process, were in successive time realized and installed.

It is important to mention the last installation of n°2 plants by  **SCG** – THAI CERMIC CO. LTD. in Thailand.

