

# Evolution in Preparation Plant Projects to Sustain & Profit the Heavy Clay Industry

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## Introduction

What could be said about "sustainability and the profitability" in the heavy clay sector?

All of us surely know about "profitability", being business people and manufacturers, but what to say about "sustainability" in the heavy clay industry?

The mass media nowadays use this term very often, both in the social and ecological fields, in fact as they say, a project is sustainable when it generates a very low social or ecological impact.

As a matter of fact, what is the literal meaning of the word "Sustain"?

If we look at the Oxford Dictionary, it defines, among other things, "Sustain" as "bear up against" or in other words "that can be borne".

According to this definition, the concept can be broadened also to the industrial sector and in particular to the one of the heavy clay products, which is of our interests, since we can say that sustainable is all what can be realized on the grounds of stable topics of any kind, like economic, technical, social, ecological and other, that brings a benefit to the individual and to the community.

Today, a clay bricks or a roofing tiles plant can be defined "sustainable" if for the same production capacity, it realizes great savings, if it proposes technologically up-to-date products which are profit-bearing, if using new technologies ensures energy savings and reduced environmental impacts, if it ensures and creates new jobs and new professional skilled figures transforming the typical craftsman of this sector in to a more defined technological figure who can transfer his experience to the future generations.

## Sustainable Preparation Technology

It is obvious that all these concepts are strictly in connection with "profitability" as it is logical in the industrial sector, since if there is not a

profit the entrepreneur has no basis for beginning a new project.

Nowadays, in particular, the manufacturers of machines have focused their attention on the clay preparation process, to improve its ceramic qualities to the advantage of workability, making easier the following steps of shaping, drying and firing and increasing in this way the global yield of the plant thus reaching a considerable energy saving.

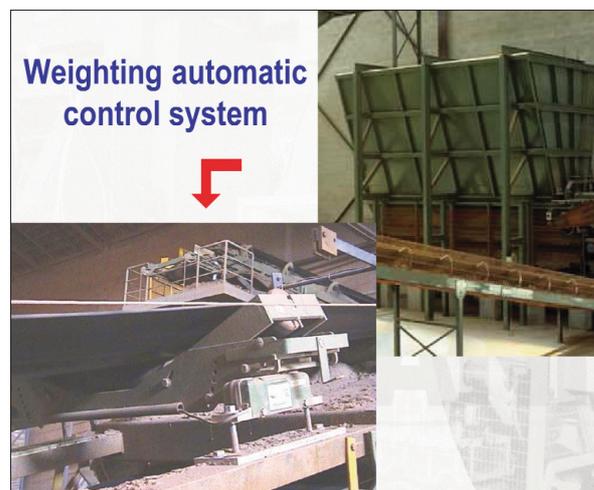
Differently, from the approximate and generic clay treatment, which was typical of the technologies used in the past, today it is possible, on the base of the analysis of the raw material, to personalize the treatment finalized to the mixture homogenization and humidity, thanks to a redesign of the classical preparation machines and to the use of most common automatic control systems.

For example, on the rubber belt conveyors line installed downstream to the box feeders, are more often used weighting systems to adjust the speed of the box feeders, thus granting the correct proportional quantity of the mixtures components (Fig. 1).

On the average, this kind of investment corresponds to 0.5 % of the cost of the machines of a plant, but is able to grant a minimum of 30 % of reduction of the products rejects. Now, to back up the concept of sustainability/profitability and meet the widespread market's requirements, if the type of clay allows it, we have found a technological alternative to the traditional preparation machine, like it would be the wet pan mill.

Such an alternative is represented by the clay disintegrator roller mill that with the same production capacity, guarantees a lower investment cost of about 60 %, an electrical consumptions reduction of approx. 1/3 and maintenance costs equal to 15 % of those of the wet pan mill (Fig. 2).

At the same time, the search for more "high-performance" roller mills brought us, thanks to more stiff structures of the equipment, to new



kind of materials for the sleeves and for the controls on the rolling mill process based on the use of magnetic transducers, to get milling values lower than the millimetre so that the water during the mixing process can be absorbed more rapidly and uniformly. In this way, the moisture will have, in time, a constant composition and humidity (Fig. 3).

Obviously these new technologies have investment costs higher than 30 % compared to the ones used in the past, but allows lower costs of maintenance and remarkable product quality levels, which are synonymous with profit. This is the reason why we believe they can be widely sustained.

In the final production phase there are the "mixers" which can be the

**Fig. 1**  
System suitable to adjust the speed of the box feeders



**Fig. 2**  
Bongioanni clay disintegrator roller mill with the same production capacity, guarantees a lower investment cost of about 60 %, compared to the wet pan mill

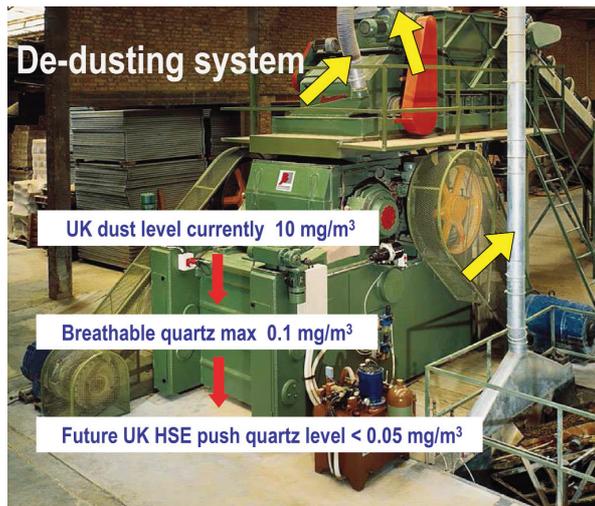


Fig. 3 "High-performance roller mill"- milling values lower than the millimetre



Fig. 4 "Mixers" which can be the traditional double shaft or the vertical sifting mixer

traditional double shaft without grid or equipped with filter, or the vertical "mixers"(Fig. 4).

These "mixers" complete the preparation process homogenising the moisture of raw materials with water, thanks to the optimised shape of their augers and the use of automatic water moisture systems whose percentage cost varies between 0,7 and 0,12 % of the machine, allowing a more wide profit, as it reduces the rejects of 30 %.

Talking again about clay preparation, it is necessary to highlight a point that does not involve directly the process, but it is an unexpected consequence of it.

In fact all the range of machines that we have mentioned so far, "generate" more or less dust, because of the grinding, crushing and milling process and therefore to enforce the European norms the plants have to be equipped with suitable de-dusting systems that ensure the workers and the community the maximum safety against dust pollution.

(Dust levels currently 10 mg/m<sup>3</sup> of which max 0,1 mg/m<sup>3</sup> respirable Quartz – it is understood that the UK HSE are pushing for Quartz level to be reduced to 0,05 mg/m<sup>3</sup> once this can be practically measured).

Obviously, this investment which corresponds to approx. 2,5 % of the machines value, does not bring any profit, but gives an excellent image and has a strong effect on public opinion.

The last stage of a modern preparation plant is the silos. The purpose of a silos is to allow the uniform

spread of the water, coming from the mixers, throughout the raw material for a period of time that can be more or less long, and is called "stocking time".

There can be different type of silos and they can be classified as follows:

- storage bins where the material is taken by a mechanical paddle, front loader.
- storage heap where the material is taken by buckets excavator.
- storage trench with buckets excavator on bridge cranes.

These various solutions have surely different costs but undoubtedly the silos with buckets excavator are automatic and grant a continuity of production.

The value of this investment is around 4-7 % of the machines cost.

## Summary

To conclude, the costs that have to be sustained for a preparation plant, equipped with new the generation of machines, are less than the costs of the machines, if compared to the advantages mentioned so far.

Comparing these costs to the total cost of the entire plant, and taking into account that the costs of the machines normally are 30 % of the total, it can be easily understood that these values becomes overlooked compared to the technological advantages of the quality that can grant, and therefore, justify the fact that we, as manufacturers of preparation machines offer solutions that looks like more expensive, but bring to great profits for the "investor".