

## GRINDING of TITANIUM DIOXIDE (TiO<sub>2</sub>) with ROLLER PRESS

Because of his high index of refraction, the **Titanium Dioxide** is the most used white pigment. With an optimum size of particles (generally 0,2 to 0,3µm), this pigment diffuses as best the light and provides whiteness, brightness and opacity to a vast range of everyday products like paints, plastics, papers, coatings, foods, cosmetics, medicines, etc...

The raw material used during the manufacture of Titanium Dioxide pigments, often issued of ores as Rutile (R) or Anatase (A), undergo calcination treatments before to be finely grinded. This grinding process is very important due to its influences on the next steps of process but also because of important energetic costs generated during this grinding.

During their passage in the furnace, the TiO<sub>2</sub> particles with an initial size in the range of 0,2 to 0,3 µm agglomerate to form crystals with around 1 to 10 mm size range. Then, these crystals are grinded with the bringing of important energy, especially for the grinding particles with an important size range.

In the past, this grinding operation, usually carried out by pendulum mills or hammer-mills generated a great energy consumption associated to important maintenance costs. Since several years, the introduction of the **Roller Press** at this process step generates :

- **Energy savings**, up to 50% compared to the pendulum mills or hammer-mills technologies.
- An **output increase** of grinded product, of about 50 to 100% compared to the traditionnal technologies.
- A **cost decrease** of production and maintenance of these installations.

The grinding with Roller Press can be installed either in a new plant or an existing one by replacing old technologies.



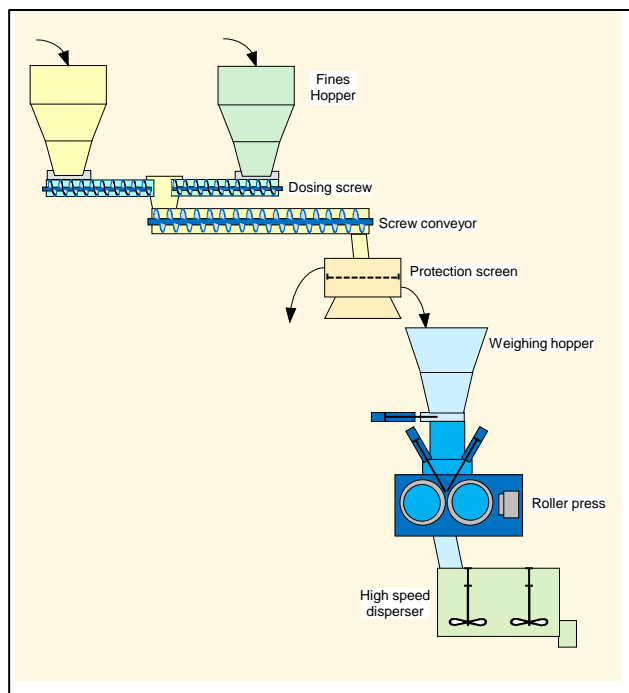
## PROCESS

This grinding technology of Titanium Dioxide is based on the association of two successive grinding steps :

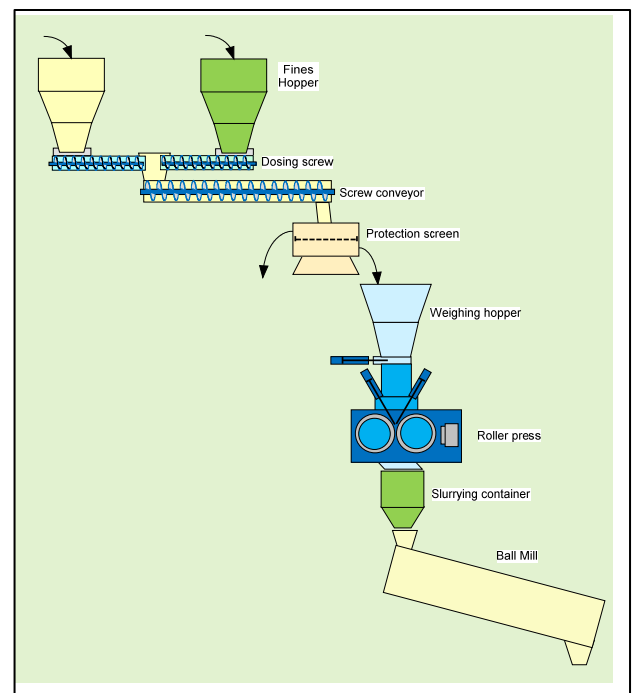
- A high-pressure primary grinding realised by a Roller Press. This equipment allows to change the  $\text{TiO}_2$  particles agglomerated at the furnace output in crumbly flakes, thanks to their passages between two cylinders under pressure turning in the opposite direction. The size range of these flakes, obtained at the Roller Press output, is in the range of 1 to 10 mm.
- A secondary grinding realised by a ball mill or a high-speed disperser allowing the flake breaking shaped during the first step and the obtaining of a very fine product with a size range of about 0,2 to 3  $\mu\text{m}$ . Beforehand this secondary grinding, the  $\text{TiO}_2$  flakes are mashed in the ball mill or the high-speed disperser.



### TWO TYPES OF PRODUCTS AT THE OUTLET OF THE ROLLER PRESS



**$\text{TiO}_2$  GRINDING PROCESS  
WITH ROLLER PRESS  
AND HIGH SPEED DISPERSER**



**$\text{TiO}_2$  GRINDING PROCESS  
WITH ROLLER PRESS  
AND BALL MILL**

# ROLLER PRESS

SAHUT-CONREUR designs and manufacture Roller Presses for heavy-duty operation under hard and difficult conditions, with reliable use and minimal maintenance.

The main components of our Roller press are:

## FEED SYSTEM

Usually the roller press is fitted with a hopper with inclined manual flaps. Electric actuators, enabling to adjust the flaps and to control the flow of material above the rollers can be installed in option. However, for a large scale of output and a better flowability of the product, a screw-feeder can be installed.

## CYLINDERS

The Roller Press is composed of two rollers : One is fixed in the Roller Press frame whereas the other one can move perpendicularly to its axis varying the space between them. The size of the Roller Press is characterised by the roll diameter (from **400 to 800 mm**) and the roll width (from **100 to 400 mm**)

Two technological solutions are possible for the working surface of the rolls:

- Shafts with smooth tyres.
- Shafts with grooved tyres.

A special treated steel is used for the manufacture of tyres, dictated by the product abrasiveness and also the conditions of grinding.

These cylinders are mounted on heavy-duty bearings sized for a long life-time. For particular applications, the cooling of shafts and bearings can be installed.

## HYDRAULIC CIRCUIT

The roller press is equipped with an hydraulic system able to apply a force on the mobile roll by means of jacks. This force can be different in certain cases on each bearing block of the mobile roll thanks to a double hydraulic circuit. This system also includes safety devices and nitrogen accumulators to dampen the movement and quick return of the mobile roll and protect the Roller Press when tramp material is inadvertently fed to the rolls.

The force applied on the product can vary from **10 to 80 KN/Lcm** (Linear centimeter of roller width).

## ROLLS DRIVE

The Roller Press is equipped with a special double-output gear-box and internal gear couplings able to withstand the axial misalignment caused by the mobile roll movement. The roll speed can go up to **25 Rpm** and even higher in particular cases; it corresponds to a tangential roll speed up to around **0,8 m/s**.

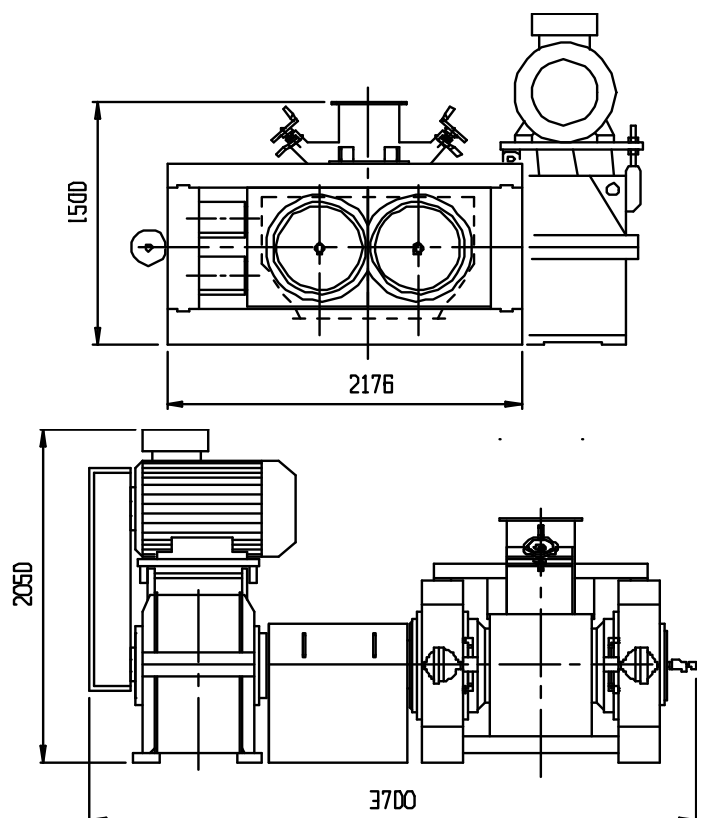
## CONTROL—AUTOMATION

The Roller Press is equipped with sensors sand a control system which ensure a continuous production of constant quality without the need for operators.

This system can be:

- Regulation between power absorbed by the main motor and the positioning of the flaps.
- Regulation between the roller gap and the positioning of flaps.
- Regulation between power absorbed by the main motor and the screw-feeder speed.

## Roller Press type HP600/400



## COMPARISON BETWEEN TWO PROCESSES

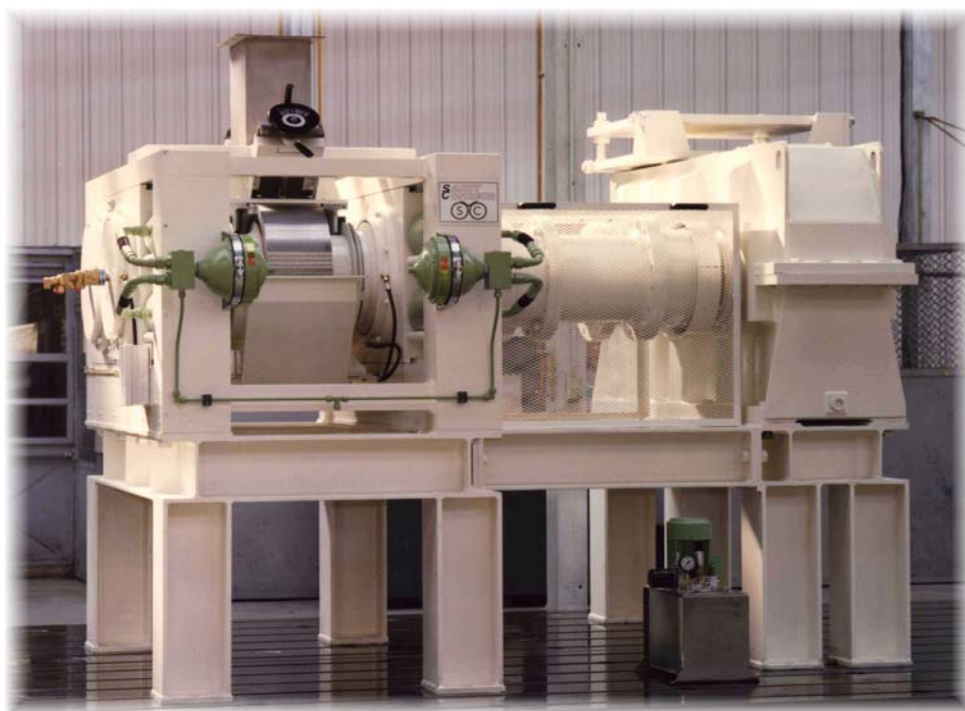
The hereafter comparison shows the advantages generated by the introduction of grinding by Roller Press associate to high speed disperser instead of hammer-mill.

	Hammer-Mill	Roller Press with high speed disperser
Output (t/h)	4-5	8
Noise (dB)	120	80
Electric consumption (Kw/h)	52	25
Annual output (t)	20.000	50.000
Maintenance time (h/year)	—	4 to 5 times less

## SERVICES PROVIDED

**SAHUT-CONREUR** offers the following services :

- Test runs and feasibility studies at the pilot plant
- Custom-made production of batches at the production plant.
- Rental of industrial presses for industrial tests on site.
- Design and manufacture of key-equipment of these unit, Roller Press.
- Technical assistance for mounting and commissioning of the units.
- Training of operators
- Supply of spare parts.
- Modernization of existing plants and equipments.
- Adaptation of SAHUT-CONREUR technology to equipment manufactured by other makers.



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