

MINERALI



INDUSTRIALI

ENGINEERING



[engineering.mineraliindustriali.it](http://engineering.mineraliindustriali.it)

# Solution 360

From mine to products.

100 years of experience in the mining processing sector make Minerali Industriali the ideal partner for the treatment of non-metallic ores, especially for the wet and dry dressing of silica sand and hard materials, as quartz and feldspar. Same job is done on major industrial wastes: glass cullet, ceramic tiles scraps, sanitaryware scraps, fiberglass etc.

Having more than 24 treatment plants all over the world, we use our know-how and experience to offer optimized solutions which are built with the eye of the industrial minerals producer instead of the mining machinery producer only.

We can offer a treatment solution for raw materials from the very first step, the geological survey of the deposit and analysis of relevant samples, to the final realization of the turnkey plant, passing from the engineering and design of each single treatment process and machine. Our design team grants the best solution for any kind of ore dressing: washing, grinding, drying, sorting, flotation, leaching, magnetic separation etc.

We can also support our customers during the start-up stage and through a personnel training.

Cooperating with the leading credit institutions, we are available to study financial dedicated solutions with the customers to support them during the payment procedure.





PHASE

1

# GEOLOGICAL SURVEY

## Minerali Industriali Geologic department

Minerali Industriali Geological department has a multi-year experience in mining research and consulting. Thanks to its support it was possible to find and start the exploitation of several deposits of sand, clays, quartz and feldspar in Europe, North Africa, Middle-east, Centre and South America.

## Geological activities

Minerali Industriali geological activities include all stages of mining research, starting from preliminary identification of possible mining sites, deposit characterization, mining works design, up to the restoration activities.

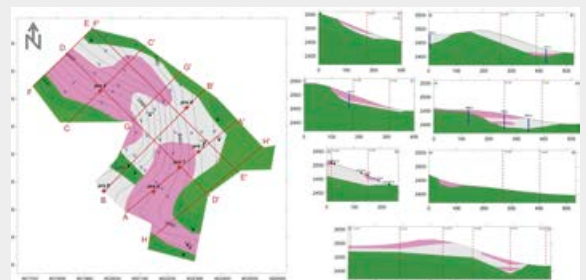


## Preliminary deposit evaluation

- Documental research
- On site sampling
- Laboratory results interpretation

## Deposit characterization

- Detailed geological survey and GPS mapping
- Prospection works (drillings, trenches, etc...)
- Geological interpretive model drafting and mining project





PHASE

2

## LABORATORY TEST

On received samples we can simulate all kind of treatments in order to define the optimal preliminary layout which permits to obtain the final product required quality.

### Minerali Industriali Laboratory

Minerali Industriali's Technological Laboratory has always had a fundamental role in the company's strategy, supporting the mining activity in all its phases: geological research and extraction, industrial simulations, production analysis, research, mine drawing, product development. Thanks to the specialization and experience of its laboratory, Minerali Industriali can effectively interact with the customer, quickly satisfying its requests.

### Competence fields

Technological Laboratory has a wide range of tools. It can provide a comprehensive care in the execution of the main tests to characterize a lot of minerals as quartz sands, feldspar sands, kaolin, clay, olivine and also the simulation of their industrial behaviour. Technological Laboratory also supports Minerali Industriali in its activities of rejects valorization (ceramic and glass for example).

### R&D

Technological Laboratory is permanently engaged in research and development activities for physical and chemical treatment of raw materials and for the identification of potential new materials. Technological Laboratory is able to simulate the industrial behavior of the dressing treatments, supporting Minerali Industriali's production. In this way, the laboratory systematically collaborates with external research centres and universities.





## Chemical and physical tests

- XRF chemical analysis
- Diffractometric analysis
- Granulometric analysis (dry, wet, laser)
- Clay fraction determination
- Loss of ignition determination
- Colorimetric analysis
- C/s determination
- Carbonate determination
- Soluble salts determination
- Metallic iron determination
- Moisture determination

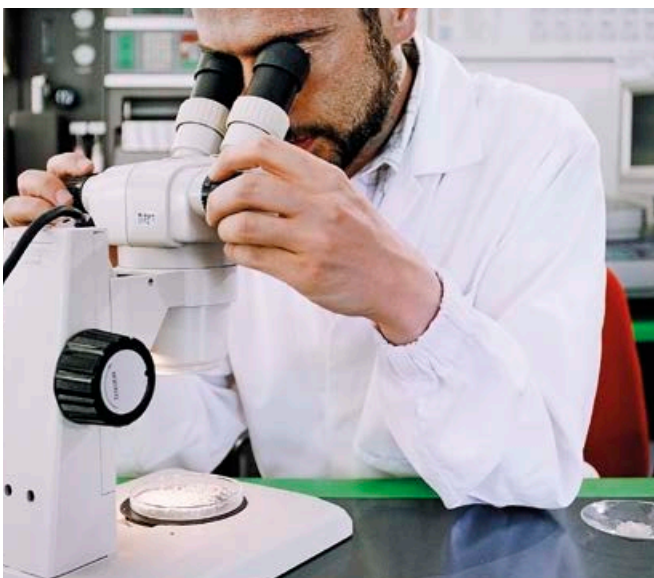


## Glass material tests

- Chemical analysis by xrf (x-ray fluorescence) and by icp (inductivity coupled plasma)
- Semi-quantitative analysis by x-ray diffraction
- Heavy minerals determination by gravimetric separation with shaking table and gravimetric spiral
- Dry and wet magnetic separation
- Moisture determination
- Grain size distribution with vibrating sieves

## Sanitaryware and engineering stone material tests

- Air particle size analysis with alpine air-jet
- Grain size distribution with vibrating sieves
- Laser grain size distribution
- Preparation of cones with ventilated powder
- Firing in muffle with sanitary cycle
- Glaze tests



## Mineral dressing

- Crushing
- Milling (wet and dry)
- Screening
- Air separation
- Magnetic separation (wet and dry)
- Electromagnetic and electrostatic separation
- Dry and wet gravimetric separation with shaking table
- Washing (neutral and basic)
- Friction washing
- Flotation
- Leaching (acid and alkaline)
- Heavy liquids separation (sink and float)

## Ceramic material tests

- Grinding (wet and dry)
- Cones and buttons preparation and grinding (wet and dry)
- Ceramic and sanitary ware firing tests
- Enamels tests
- Determination of linear shrinkage and absorbption
- Specific surface and cec determination (methylen blue)
- Specimens colorimetric determination (on dusts or on fired samples)
- Dry and fire module rupture



PHASE

**3**

## INDUSTRIAL TEST

We can offer a unique service to our customers: we can feed our existing plants with an industrial sample of the customer raw material allowing the customer technical staff to join the trial and understand in detail what kind of plant will be supplied, knowing in advance the production rates, the energy consumptions and even the production troubles. In addition, the customer can obtain an industrial sample of the final product manufactured in his future plant before having built it. This sample can be introduced to potential customers for verifying their interest and collect their purchase commitments.

### DRY PROCESS



- ▶ Crushing
- ▶ Drying
- ▶ Dry Milling
- ▶ Optical Sorting
- ▶ Magnetic separation

### WET PROCESS



- ▶ Washing - Attrition Washing
- ▶ Wet Milling
- ▶ Flotation
- ▶ Acid Leaching





## ACID LEACHING

Leaching is the process of extracting substances from a solid by dissolving them in a liquid. In our beneficiation plant, it is used to reduce the content of iron oxide from ore using sulfuric acid.

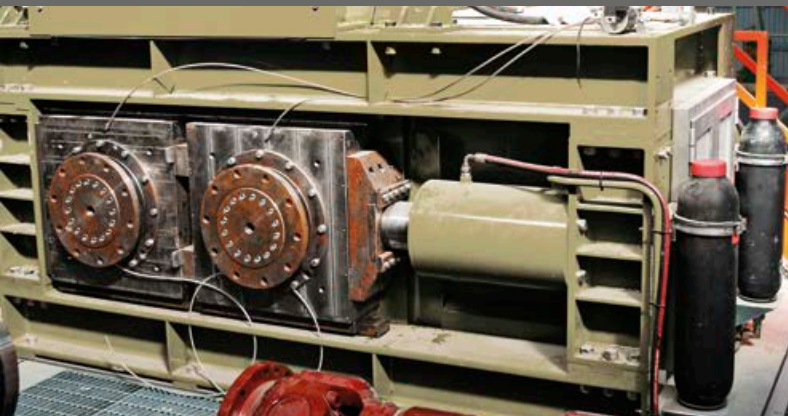
## DRYING

Dryers are machine designed to remove the water from minerals by evaporation. Traditional dryers (cocurrent or countercurrent) are characterized by the mono-directionality of the air flux. On the contrary, our models (HED-13) use a central aspiration so that the inlet material passes through a first stage, cocurrent with the hot air generated by the burner and subsequently in a second stage countercurrent with the environmental air aspirated from the opposite side of the dryer.



## DRY MILLING

The reduction we can obtain by crushing is limited to a certain size (10 – 20 mm) for the final product. If we need further reduction we have to use a milling process which uses the rock mechanical forces of impaction, compression, shearing and attrition. Thanks to the MI milling process, we are able to liberate minerals trapped in rock crystals for further enrichment. Our milling machines (RHP) use the Auto-Comminution principle.



## MAGNETIC SEPARATION

Magnetic separation is a process in which magnetic material is separated and extracted from a mixture using a magnetic force. Magnetic separators are ideal devices to deironing a wide range of sand materials. Paramagnetic minerals (hematite, biotite, ilmenite, ecc...) are simply captured by MAG-3's powerful magnets. MAG-3 magnetic separators are particularly indicated for the iron removal of fine particle size products (typically from 0,1 to 1,8 mm).

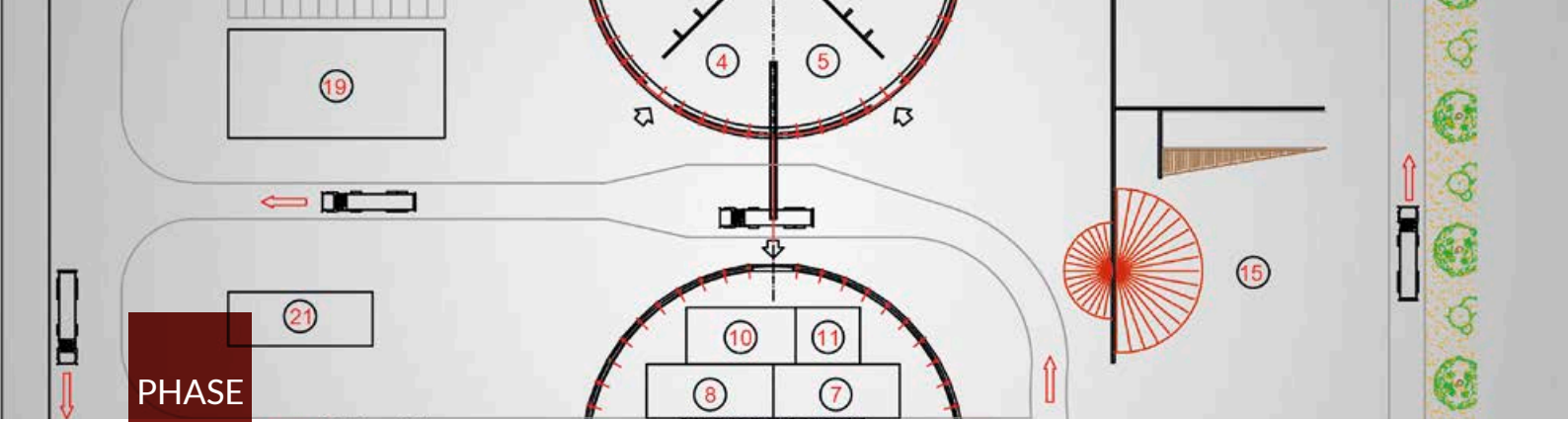


## FLOTATION

Froth flotation is an ore beneficiation process in which valuable minerals are separated from worthless material by inducing them to gather on the surface of a froth layer. The collection of these minerals on the surface is possible thanks to the introduction of air bubbles into the pulp which are able to trap the minerals. The air bubble and mineral particle rise through the pulp to the surface of the froth that is present on the flotation cell. Even though the air bubbles often break at this point, the mineral remains on the surface of the froth and can be physically separated from the remaining pulp material and removed for further processing.







PHASE

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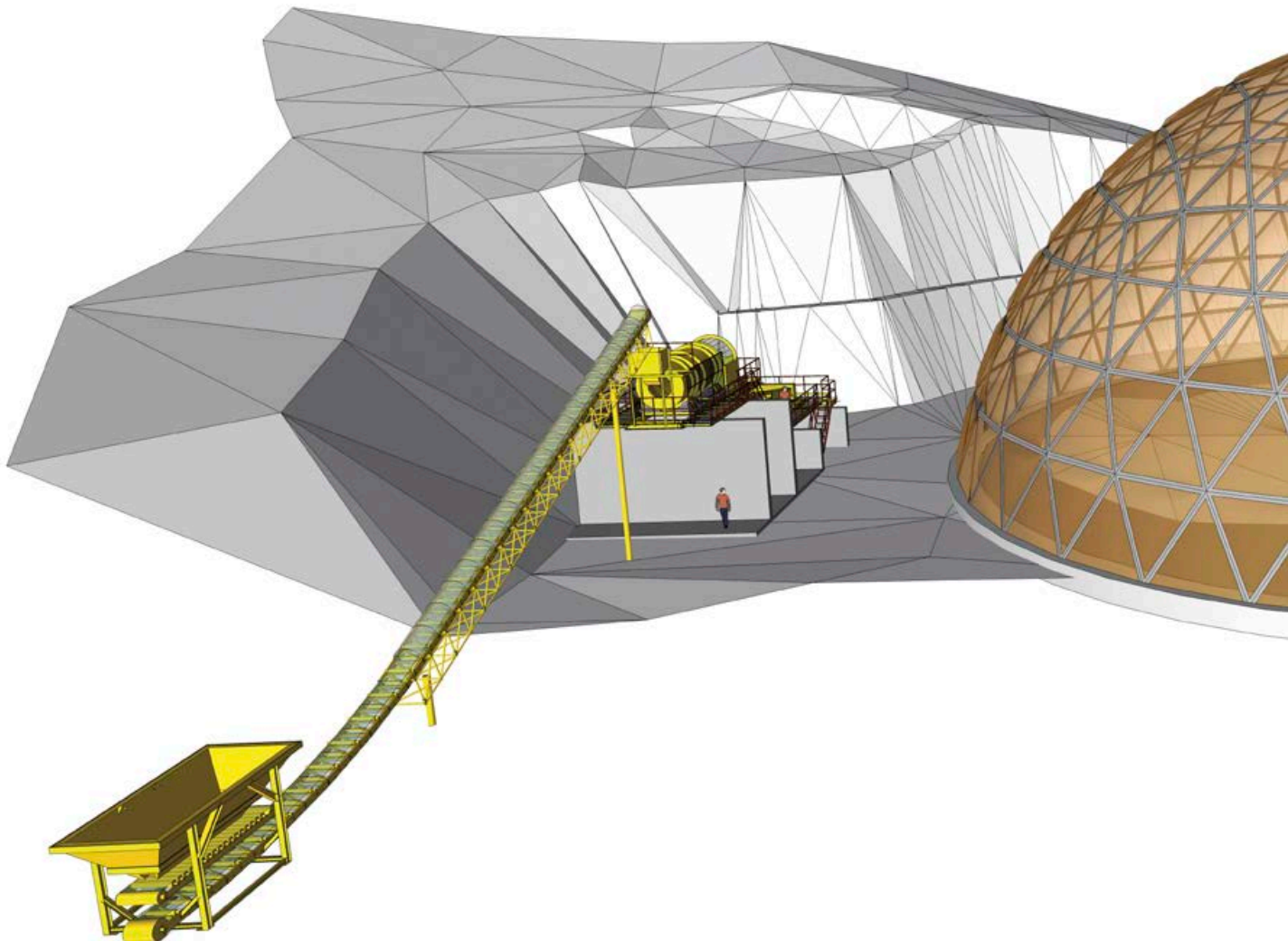
## LAYOUT DEFINITION & ENGINEERING

### Defining the Preliminary Offer

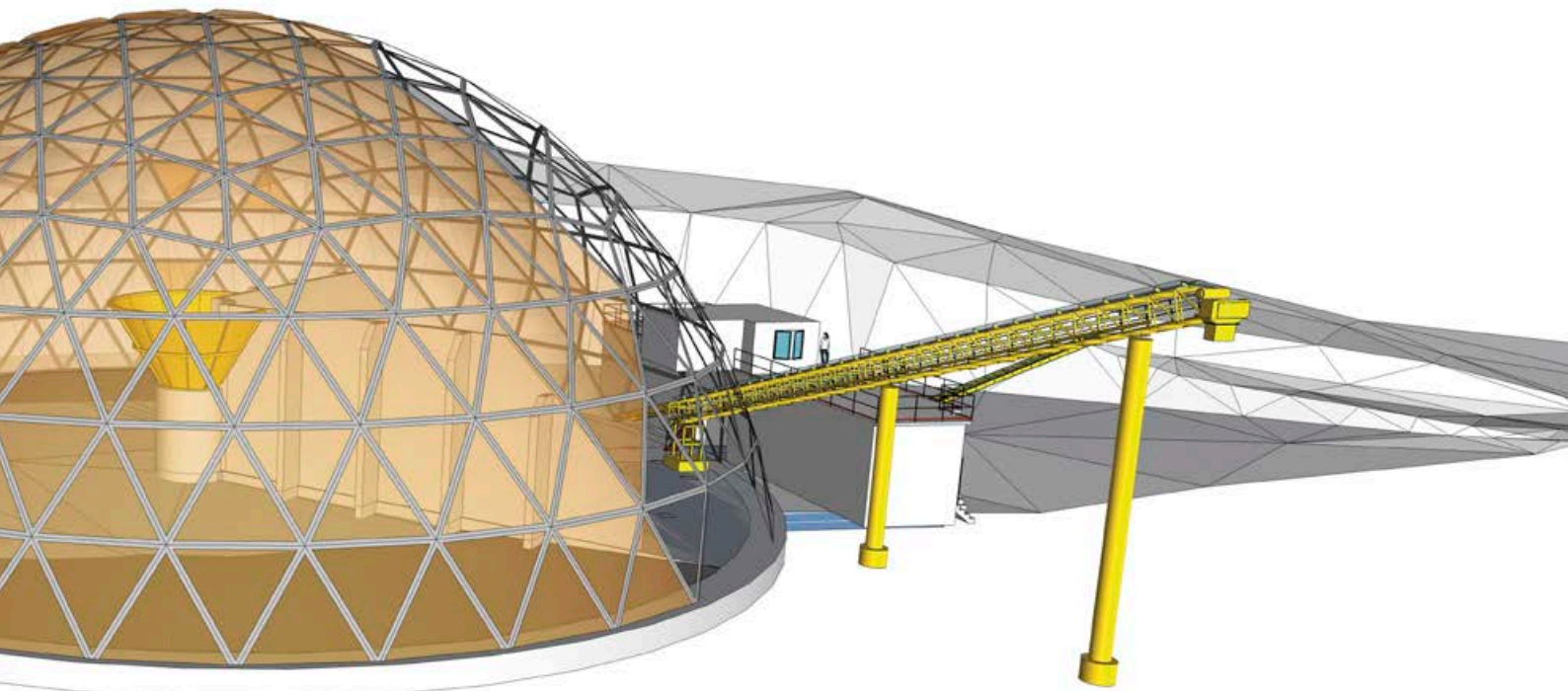
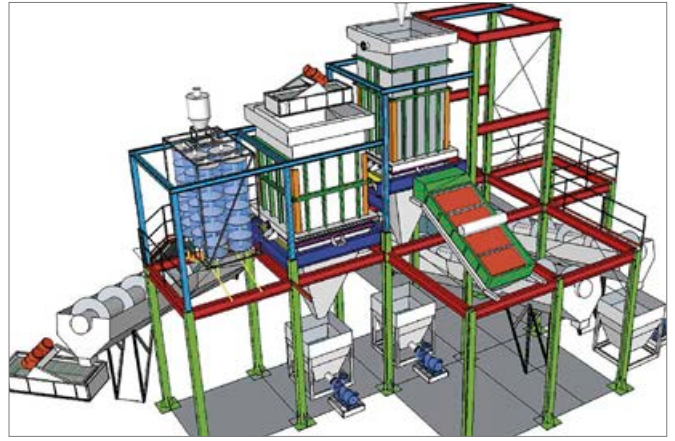
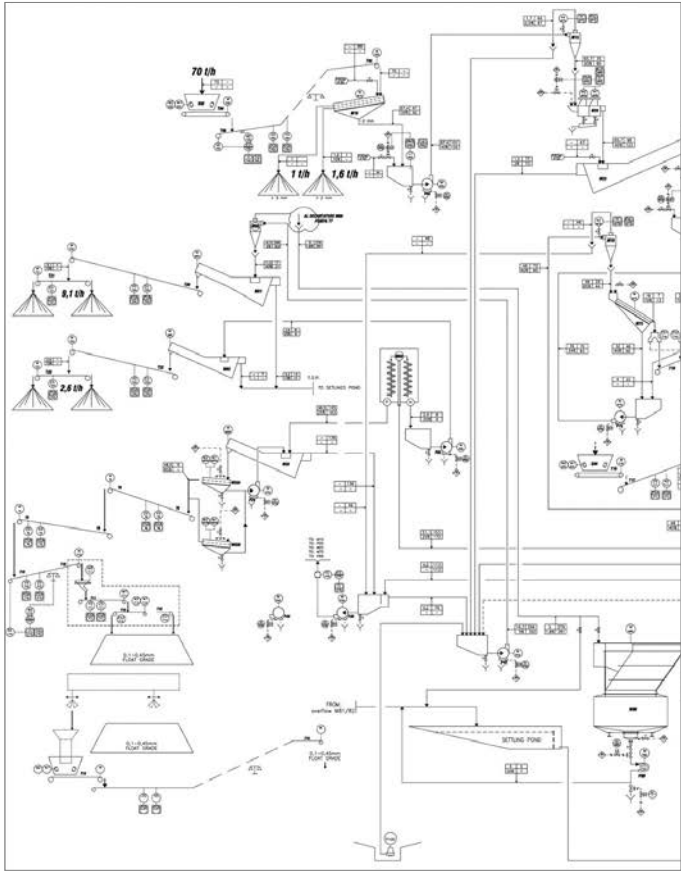
Combining our customer's needs with the results obtained from the geological survey, the laboratory and industrial tests, we are able to define a Final Layout of the plant together with the flow sheet with mass flow. Based on this layout, we prepare our Preliminary Offer and submit it to the customer.

### Detailed Engineering

Once our Preliminary Offer is accepted, we start working on the Detailed Engineering of the plant from which we make the offer fine-tuning.







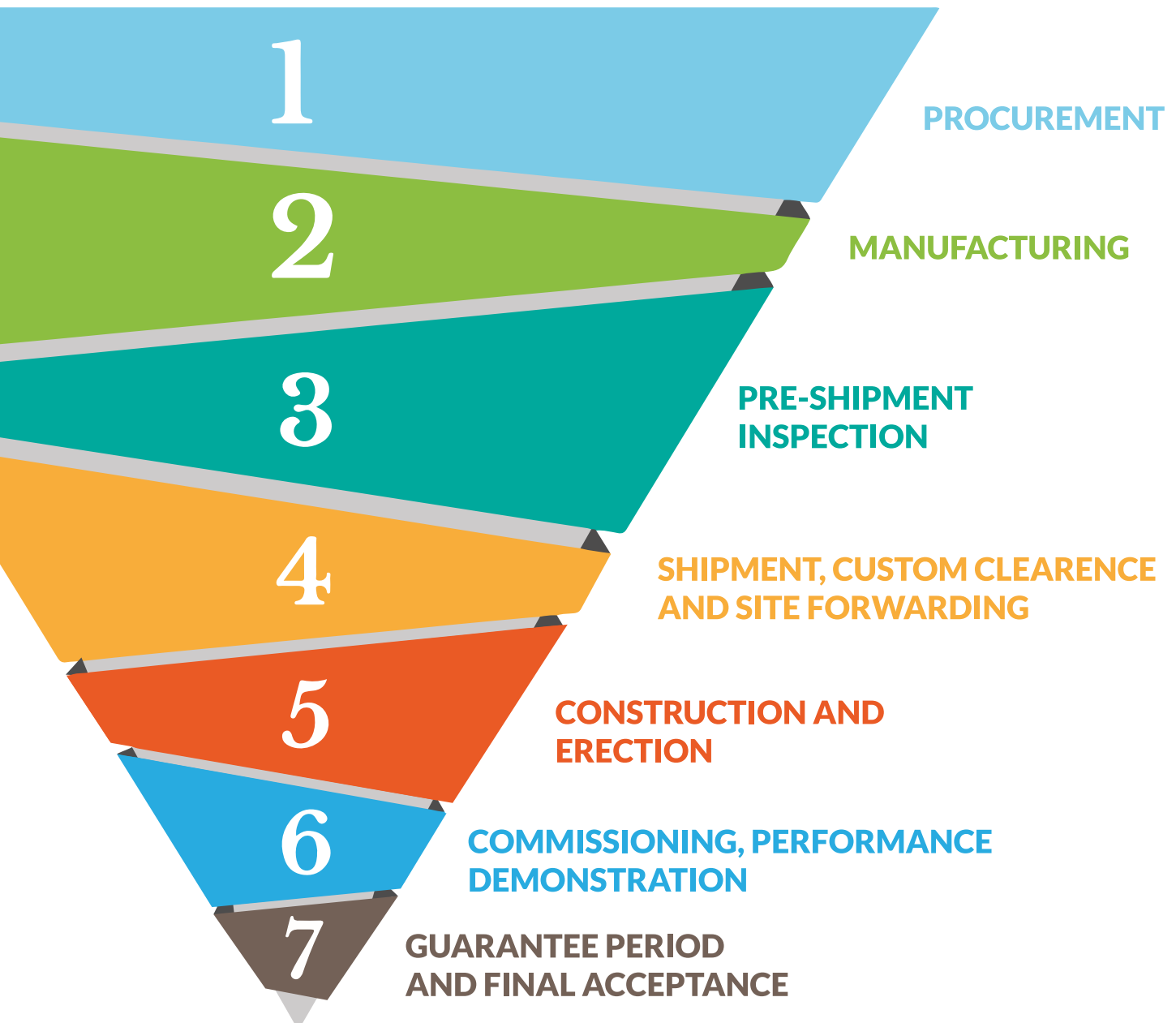


PHASE

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## DEDICATED TURN-KEY SOLUTIONS

Upon the order receipt (on which amount we will deduct the costs already incurred for the geological survey, laboratory and industrial tests), we start realizing the plant through the following steps:





**The plant is realized with the help  
of the following resources:**

### **INTERNAL RESOURCES**

- ▶ Technical Department
- ▶ Purchase Department
- ▶ Logistic Department
- ▶ Project Management and Planning
- ▶ Control and Administration Department
- ▶ Finance Department
- ▶ Legal Department

### **EXTERNAL RESOURCES**

- ▶ Customer Organization
- ▶ External Engineers
- ▶ Equipment and Manufacturing Sub-Suppliers
- ▶ Civil Works and Assembly Sub-Suppliers
- ▶ Logistic Sub-Suppliers
- ▶ Banks
- ▶ Insurance Company

# OUR TURN-KEY PLANTS IN THE WORLD



## Zacatlán (Mexico)

Ecominerali. Wet treatment plant to beneficiate feldspars



## Monterrey (Mexico)

MMM. Flexible grinding platform equipped with different treatment technology to beneficiate industrial minerals



## Tlaxcala (Mexico)

Mexican Silicates. A good example of an outsourcing milling project inside the customer's premises



## Villanueva (Guatemala)

MRG. Dry grinding platform to supply raw materials in Central America



## Sibaté (Colombia)

Comind. Washing treatment plant to beneficiate silica sand

## Recife (Brazil)

Turn key wet and dry plant for producing silica sand, limestone and dolomite for the glass industry





**Lochaline (Scotland)**

LQS. Underground silica sand mine and wet treatment plant for producing high purity silica sand



**Horni Slavkov (Czech Rep.)**

CS. Dry grinding platform with magnetic separation for the treatment of industrial minerals



**Brusnengo (Italy)**

Sasil Srl. A multimineral dressing platform with wet and dry treatment

**Vedelago (Italy)**

Grinding plant for granulates and fillers materials

**Vishnevogorsky (Russia)**

High field magnetic separation for nepheline syenite

**Rio Maior (Portugal)**

Flotation plant to remove impurity from silica sand

**Çine (Turkey)**

Flotation plant to beneficiate sodium feldspar



**Oueslatia (Tunisia)**

M.I.T. Sand treatment plant for the glass industry



**Suez (Egypt)**

SCM. High production capacity platform for grinding different types of industrial minerals







**SOLUTION**

**360°**

**FROM MINE TO PRODUCTS**



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