

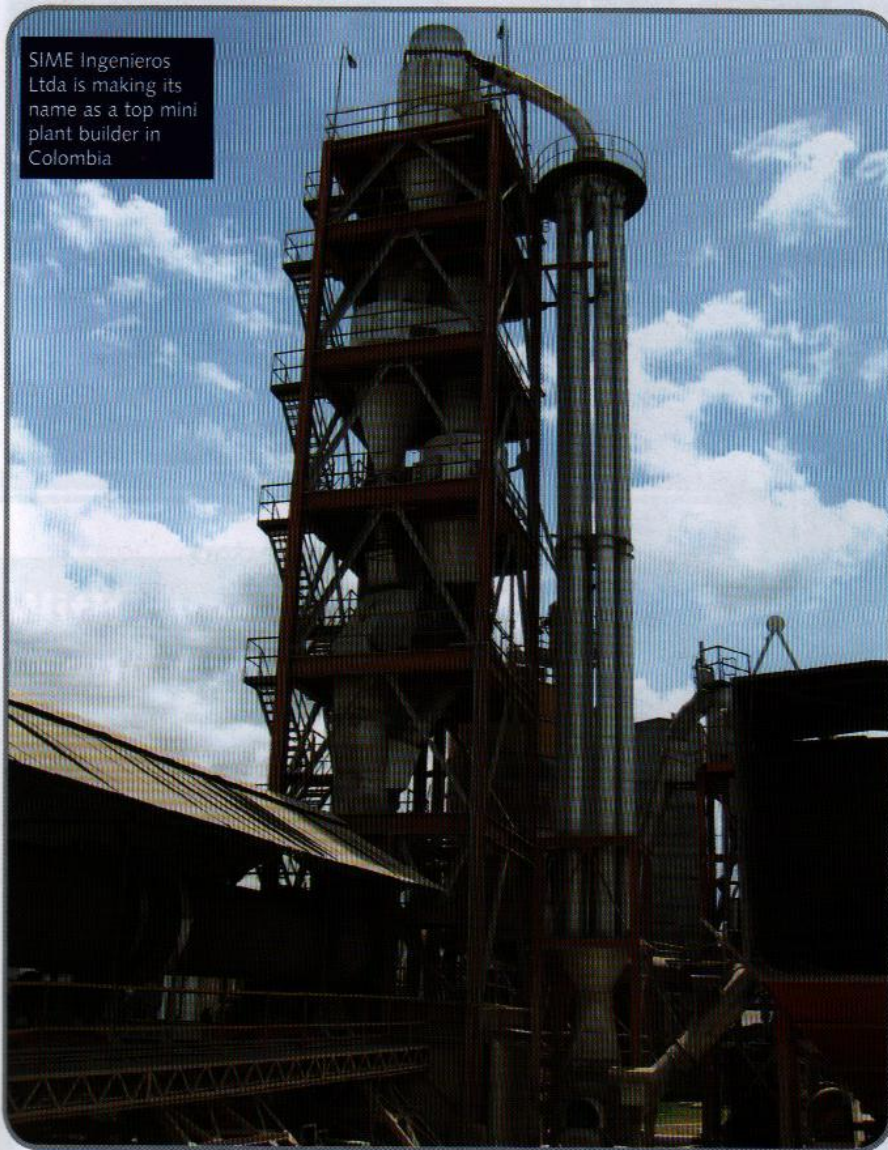
## MINI CEMENT PLANTS IN LATIN AMERICA

# Making mini miracles

by **SIME Ingenieros Ltda,**  
**Colombia**

*In recent years the global trend has generally been to build increasingly larger capacity cement plants, but the establishment of mini plants in Latin America is something of a change. Such interest in mini cement plants has helped SIME Ingenieros Ltda to establish a strong presence as a supplier of 100-300tpd plants in Colombia and Ecuador.*

SIME Ingenieros Ltda is making its name as a top mini plant builder in Colombia



## Economic factor

The 'large' plants produce to a lower cost per unit by employing factors like:

- the incidence of the investment between the production costs, that tend to diminish when increasing the size of the factory, and fewer direct man hours per tonne produced
- a smaller number of man maintenance hours per tonne produced
- a smaller tariff in the energy provision, less consumption of thermal energy in the 'great' plants that operate by dry-process.

In order to be able to successfully install and operate a mini cement plant, the above factors must be considered. By doing this SIME Ingenieros Ltda has successfully developed a totally automated mini plant for dry-process cement manufacture, which requires fewer man hours per tonne produced.

## Restrictions of the economy of scale

In Colombia there is no restriction for the development of economies of scale. Nevertheless, there are areas that are not taken care of by the 'large' distributors, due to the limitation of infrastructure.

Economies of scale do exist for independent concrete producers. This leads to investors watching the possibility of establishing mini cement plants for cement distribution to give added value to the concrete products produced. The design, construction, operation and maintenance of 'great' factories require many personnel and a lot of provision as they utilise expensive machinery, in addition to the long run time of the project – generally they take about five years to construct.

SIME Ingenieros Ltda has designed the mini cement plant to be constructed locally and with second hand machinery, if desired, which is easily attained at low cost. Personnel can also be trained quickly.

**T**he objective of this article is to offer a general vision of the economic and technical benefits of mini cement plants that utilise dry-process manufacturing. Today, we can classify the cement industry into three levels according to production capacity:

1. home-based industry: production of 2 to 50tpd
2. small industry: production of 70 to 300tpd

3. large industry: production in excess of 300tpd.

SIME Ingenieros Ltda has focused its engineering in developing the dry-processing technique for the applied production of cement to the 'small' industry. The factors that have determined this decision are: the economic factor, the restrictions to the scale economy, the technical limitations of the market, other factors and experience.





Control room



Kiln burner firing

Mini plants are a new development in Colombia – Cementos del Oriente is the first plant of its kind to be built in the country



The maximum time of a mini cement plant project, from planning to construction, is approximately two years.

### Limitation of the market

Large-scale cement production needs efficient channels of distribution, in addition to a large distribution area which of course leads to higher product prices with increased transportation costs. Mini plants have very low cost for administration and trade.

### Technical factors

The selection of the best process for production for a cement plant is always based on the availability of the raw material and fuels. In the design of mini plants the following points are the bases for a successful project:

- compact design
- size of balanced machinery
- use of new or second hand machinery
- construction of parts on-site parts fabrication
- lower consumption of electrical energy
- lower fuel consumption

Cementos del Oriente







Covered rotary cement kiln

## General design and operation performance at Oriente SA works

- Year of initiation of project: 2001
- Year of initiation of production: November 2003
- Production real average: 2200tpm of OPC Type 1
- Combustible: coal  
consumption average of fuel: 1000kcal/kg (with precalciner kcal/kg is hoped to diminish the consumption to 900kcal/kg)
- Consumption average of energy: 130KW/t of cement
- Personal operative: 65 people for three shifts of eight hours each.
- Six persons for personal administrative and sales:  
When increasing the production to 4400tpm staffing levels stay the same for personnel of operation, administration and sales
- Total area of the plant: 12,000m<sup>2</sup>.

- minimum water consumption
- automation of the process
- easy maintenance
- total environmental control
- training of personnel.

### Experience

SIME Ingenieros Ltda has designed and constructed, its first plant for Cementos del Oriente SA and is located in the industrial park of Sogamoso, department of Boyacá, Colombia. This plant has a real capacity of 2200tpm of Portland cement Type 1, using a short rotary kiln with a heat exchanger consisting of five

cyclones for preheating. The design of the precalciner has been contracted to increase the real production to 4400tpm. This calciner is now being designed along with manufacturing parts for the erection of a mini plant in Ecuador with an initial real capacity of 2200tpm, and with future expansion to 4400tpm of Portland cement Type 1, with the same characteristics to the previous described plant.

Plants developed by engineers at SIME for cement production are between 100tpd and 300tpd and have a cost approximately between US\$4-8m excluding assembly expenses.



Cement grinding