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New 3,600 tpd cement plant of Ciments de l'Atlas S.A., Morocco
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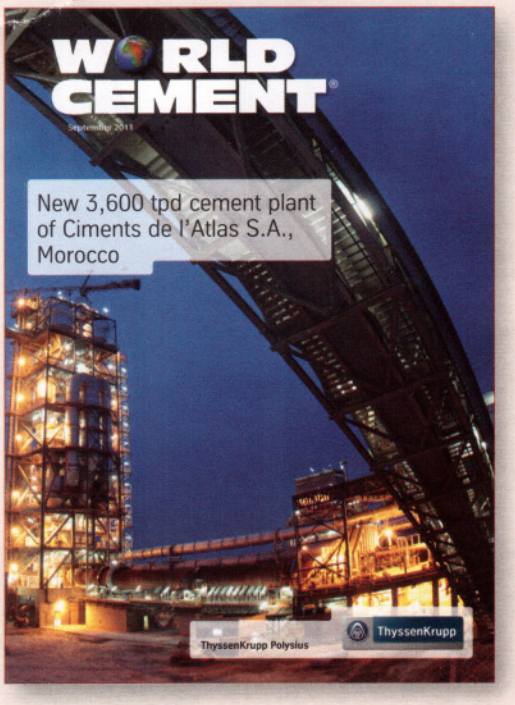


## This month's front cover

In 2008, the Moroccan company Ciments de l'Atlas S.A. and Polysius signed contracts for the construction of two completely identical 3600 tpd cement plants involving all equipment from the limestone crusher to the cement loading facility. The plants were built on greenfield sites at different locations, Ben Ahmed and Beni Mellal (south of Casablanca). The new cement production line in Ben Ahmed commenced operations at the beginning of 2011.

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> Cerritos aimed at activating its own system for automatic kiln management control

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# Upgradable Small Cement Plants: An Investment Opportunity

The slowdown of the global economy has increased interest in infrastructure investment projects in emergent economies, so the challenge to business entrepreneurs now is "How to take advantage of these opportunities?". Pablo Suarez, General Manager, IMSACOL, Colombia, presents one idea.

Some paradigms in the cement industry have persisted over time, preventing small independent investors from stepping into the cement industry. These include:

- A big start-up investment is needed to build efficient cement plants.
- State-of-the-art technology equipment is only available for big production.
- The cost of equipment is too high, which is why small projects are only conceived with used equipment or imitations of western equipment.

In response to the increasing opportunities and to overcome the previous thinking amongst the cement industry experts, a new alternative has emerged for the

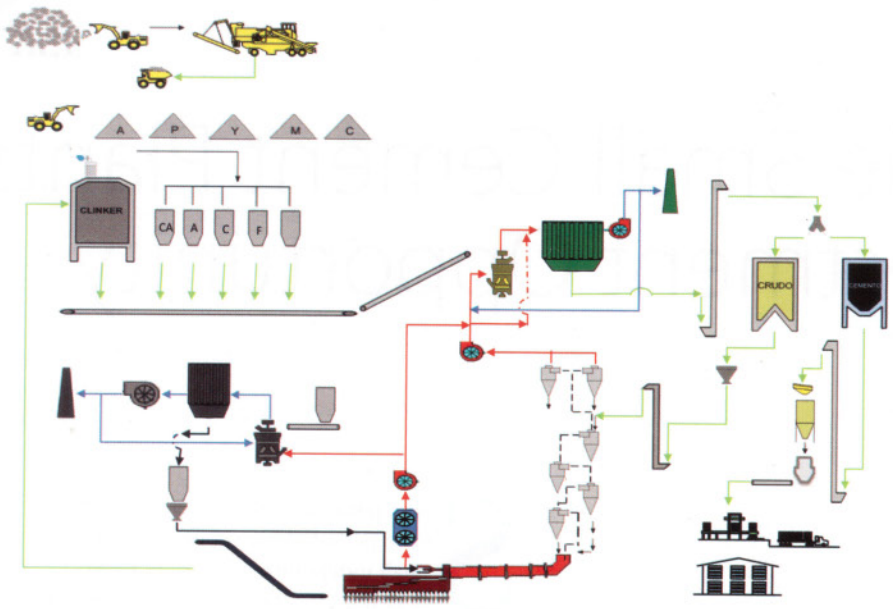


Figure 1. Stage I OCP flow diagram.

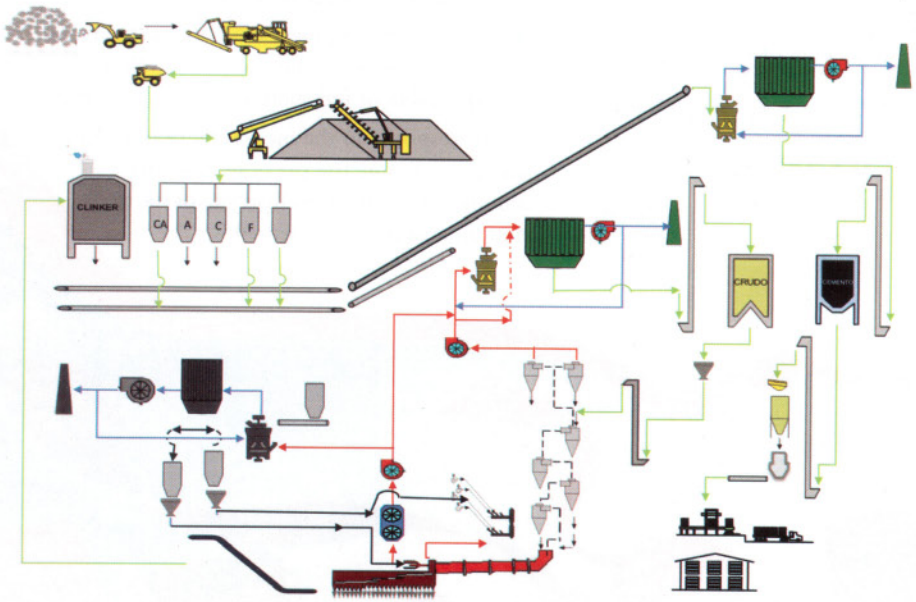


Figure 2. Stage II OCP flow diagram.

## OCP: the Optimised Cement Plant

Optimising the cement plant requires special attention to key parameters from the initial conceptualisation of the project, always aiming towards minimising energy consumption, targeting investment cost at a determined production capacity, and optimising the use of clinker in cement production. At the same time, the use of alternative fuels and raw materials is maximised.

OCPs can be either initially designed for a fixed clinker production capacity, or designed with the flexibility to upgrade from an initial clinker production level that is about 60% of its final production capacity, ready for the quickest and least expensive upgrade. In that regard, an OCP project can be developed in two stages, as outlined below.

### Stage I

- Start with only one high efficiency vertical roller mill, used for the dual purpose of processing raw materials, as well as clinker plus additives. This equipment has been called the swing mill.
- Utilise one multi-cell silo for both cement and raw meal.
- One integrated baghouse filter: unified process gases management.
- A state-of-the-art clinker cooler designed for modular expansion.
- The rest of the plant is designed over-dimensioned in order to start operation at approximately half of the nominal capacity in the first stage, leaving the rest for the plant upgrade.

### Stage II

- Addition of another high efficiency swing mill.
- Addition of another multi-cell silo for cement and cement additives.

Splitting the investment in these two stages improves the project financial analysis and softens the cash flow requirements.

execution of cement plant projects under the name of OCP, which stands for Optimised Cement Plant. The features of this alternative offer:

- State-of-the-art cement production technology.
- Environmentally friendly operation.
- Moderate investment amounts.

The concept was developed over a few years of studying the market and in collaboration with first-class western companies that design and supply the main equipment for cement plants. It is a simplified version of the standard dry process, with some key variants.

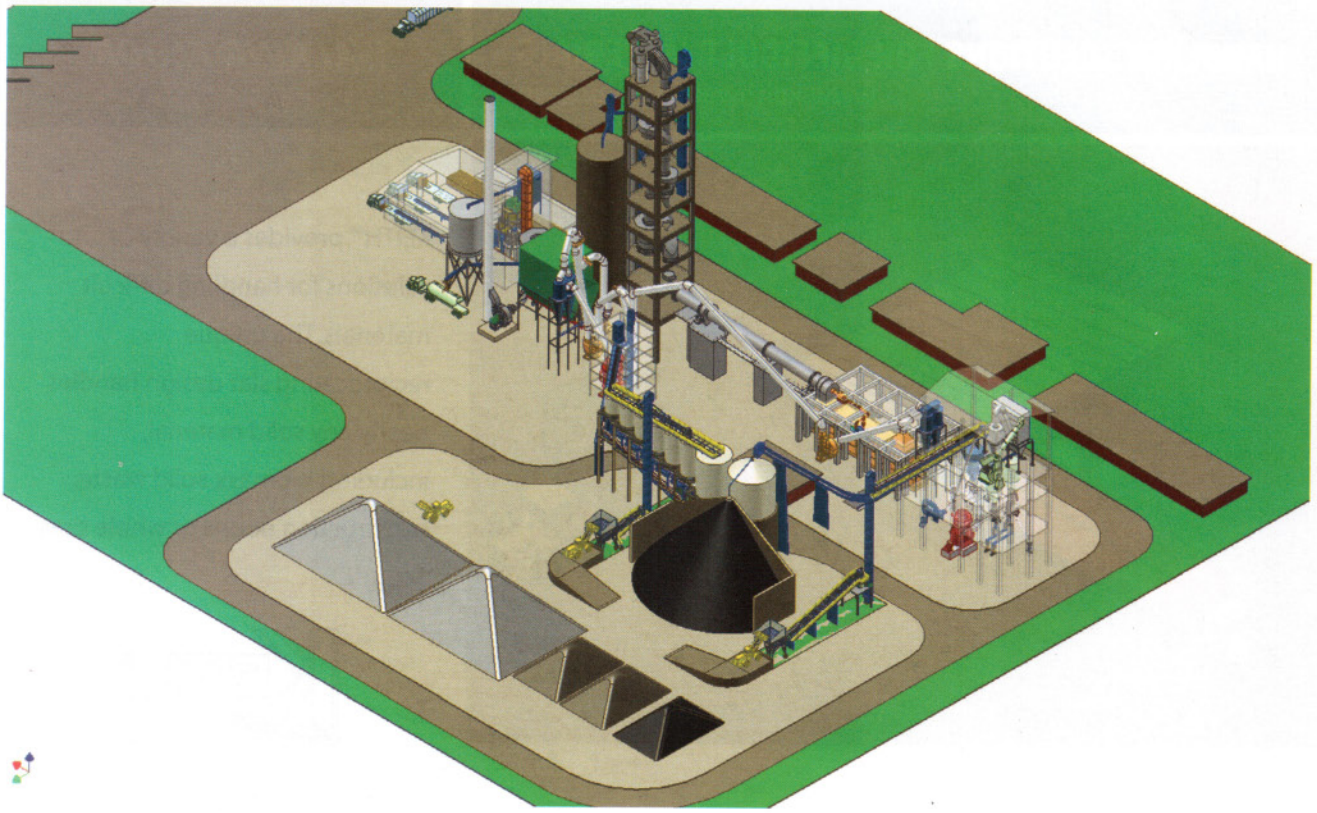

Figure 3. Typical design OCP.

## OCP operation

- One integrated baghouse filter for pyroprocessing and grinding process.
- Swing mill operating alternatively for:
  - Raw meal grinding.
  - Cement grinding.
  - Cement additive grinding (pozzolana, slag, limestone, etc.).
- The plant's energy efficiency is at the most advanced state-of-the-art technological level.
- Designed for use of alternative fuels.
- Filter designed for minimal time requirement for the changeover.
- Material handling equipment remains running during the changeover.

The changeover can be performed during high electrical demand/costs hours, in order to optimise energy savings.

The implementation of a swing mill gives an OCP the flexibility to produce tailor made cements, and even dry mortars.

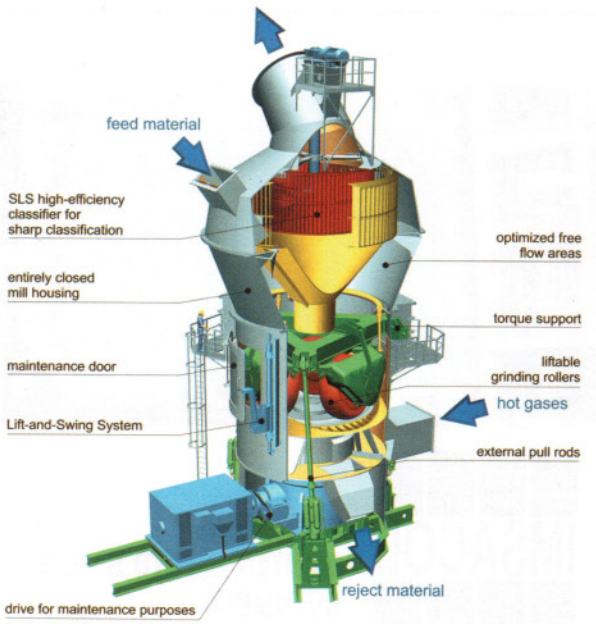


Figure 4. Pfeiffer MPS roller mill: the swing mill.

## Case study

IMSACOL has presented the OCP concept to different investors in countries including Mexico, Brazil, Ecuador, Panama, Peru, and Colombia. Participants of the past ATEC GRECO IV Brazilian Cement and Lime Seminar, held at São Paulo, Brazil, have also benefited from an in-depth presentation of the new OCP concept. Numerous proposals presented include all engineering stages, supplier selection assistance, project management, project audit and turnkey projects.

IMSACOL is running several studies in Colombia for the construction of various different plants applying the OCP concept. One of those studies has already been

> This technical proposal lets the small and medium investors step into the cement industry without a large investment, dividing the project into sequenced phases: building a small plant with design, secondary fabrications, and erection with local manpower and western technology.

converted into a project. This is the Cementos San Marcos (CSM) project, which started in May 2010, located in San Marcos, near the city of Cali in Colombia. This plant is planned to start up in February 2012 with an initial production of 360 tpd clinker in phase I, and designed to be increased later to over 600 tpd clinker.

CSM is an example of the application of the key parameters described above and is optimised by including the latest Western technology and practices from first level suppliers around the world. This integration of technology leads to a simplification of the layout design. The following describes the key improvements.

For this project IMSACOL has developed the basic engineering, the budgetary phase and the whole mechanical and control detailed engineering, integrating and managing the information provided by civil and electrical contractors.

The process and preheater design consider alternative fuels as the strategy for the reduction of costs and contamination.

For the grinding process, IMSACOL, in collaboration with Gebr. Pfeiffer SE, developed the concept for a double purpose mill that fits the size and capacity required for this project. Pfeiffer had designed a small mill with the capability to work as a swing mill. After raw material grinding tests using the sample material from the CSM quarry, and considering the minimal production capacity required for the expected production, the MPS 2500 BC swing mill fits the technical and budget specifications. The Pfeiffer mill selected will have an automatic system control to alternate the hydraulic pressure of milling rods to admit a different material, reducing the time to change over.

There are several advantages of the Gebr. Pfeiffer SE MPS mill when considered for the swing mill application:

- The difference in air required to carry both raw limestone material and ground cement material through the mill is minimal.
- Therefore, the mill can operate in optimised condition for both materials without losses due to either too much or too little air flow.
- No need for any mechanical changes when switching from raw material to clinker grinding and vice versa.
- No need for mill table speed changes.
- Same parallel position of roller and table for different material depth between roller and table.

For clinker cooling, among many first class cooler designers, the SF 1x3 Cross Bar cooler was chosen, which fits the technical and budget specification. The proposal offers the advantage for phase II so that the cooling area is increased only by installing an additional module, optimising the scale design by lowering efficiency loss; fitting the production air volume required for both phases and minimising the first installation investment.

Another strategy for reducing the cost of the first investment is to minimise the amount of imported equipment and increase the local fabrication, as was the case for this cooler where only the main parts and the spare parts were imported from Germany.

Improvements were also made for the process filter where only the clean air side top-lids Plenum, bags, and control elements were imported and local fabrication was offered for structure, panels and hoppers. IMSACOL's OCP proposal for layout optimisation includes integrated baghouse process filter to manage kiln hot gases, and cooler air excess, resulting in a fast cleaning sequence to change the processed material.

The versatility and a simple layout lead to a variation of the OCP concept by offering the following alternate steps:

- Phase 1 – Starting with a mixing station for imported ordinary Portland cement and national cementitious additives.
- Phase 2 – The milling station.
- Phase 3 – Erection of the OCP plant surrounding the cement grinding mill. To achieve this highly partitioned project IMSACOL considers from the outset all scenarios up to establishing the final plant, so that the detailed engineering should be easy to develop.

## Conclusion

Cement demand in Central and Latin America, Southeast Asia and Africa is growing due to the increase in infrastructure projects, the necessity to repair the damages caused by last year's extreme winter and the growth of new family housing projects.

This technical proposal lets the small and medium investors step into the cement industry without a large investment, dividing the project into sequenced phases: building a small plant with design, secondary fabrications, and erection with local manpower and western technology.

The OCP concept allows gradual investment along the phases, so the financial results of earlier operation in Phase I can be invested in the next phase.

With the technological developments made by suppliers like Pfeiffer it is possible to mill different materials in the same circuit to be mixed later for tailor made cement, reducing the investment on civil works, electrical and control installation compared to standard dry process cement plants.

The Pfeiffer swing mill application for cement plants allows investment reduction; IMSACOL developments enable the design of an energy efficient plant and a certified quality product that is tailor made.