



**Latest innovations to optimise the investment
of a new grinding plant project.**

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4. THE DEVELOPMENT

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7. CONCLUSIONS

1. INTRODUCTION

“Creativity is to think about new ideas. Innovation is to make these new ideas happen. Development is to improve these ideas”

Modularization is the CEMENGAL’s idea to satisfy the actual market’s demands by offering added value and valuable benefits to its clients...

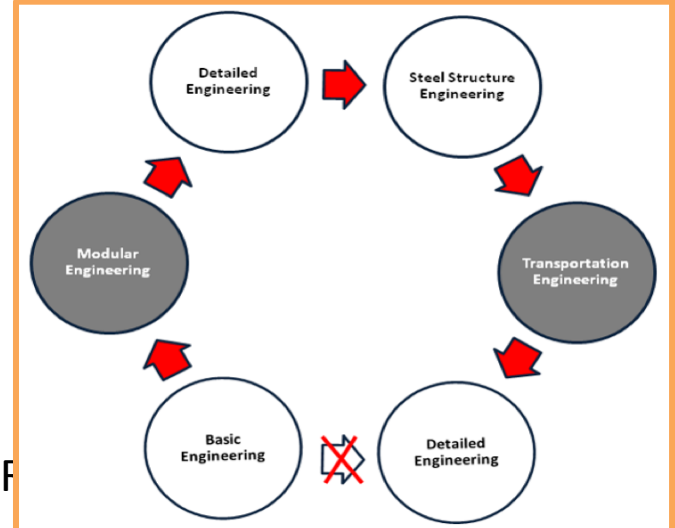
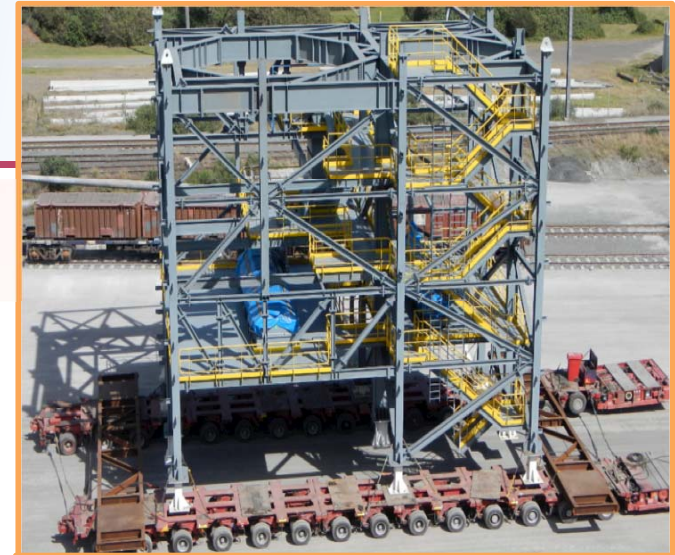
Our philosophy is to continue developing our modular products :

Conventional grinding unit (VP&G)
Port Kembla. Plug&Grind Classic.

Plug&Grind XL.

Plug&Grind XP4i.

Vertical Plug&Grind – VP&G.



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2. The IDEA – THE MODULE

In 2014, CEMENGAL completed its first conventional grinding unit with a modular configuration for Cement Australia, Port Kembla (Sydney).

The plant was built using Modules of 20x15x15m and 250t max with preassembled equipment and structures.

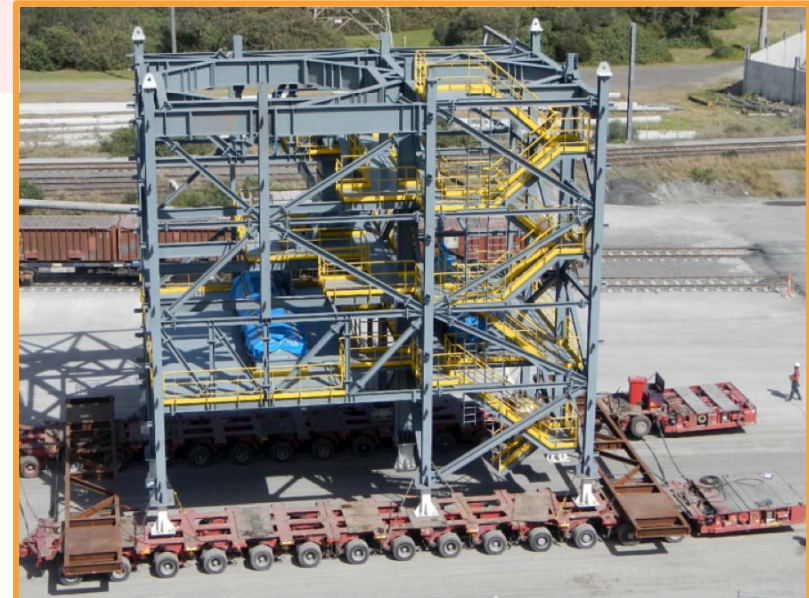
The modules were conceived in our CEMENGAL engineering offices (Madrid) and pre-assembled at the Gijón Port facilities (Northern Spain). This modular solution came to solve the high cost of erection works in Australia. The complete plant was pre-assembled in modules and shipped in 5 vessels.

The plant was built using this LEGO concept.

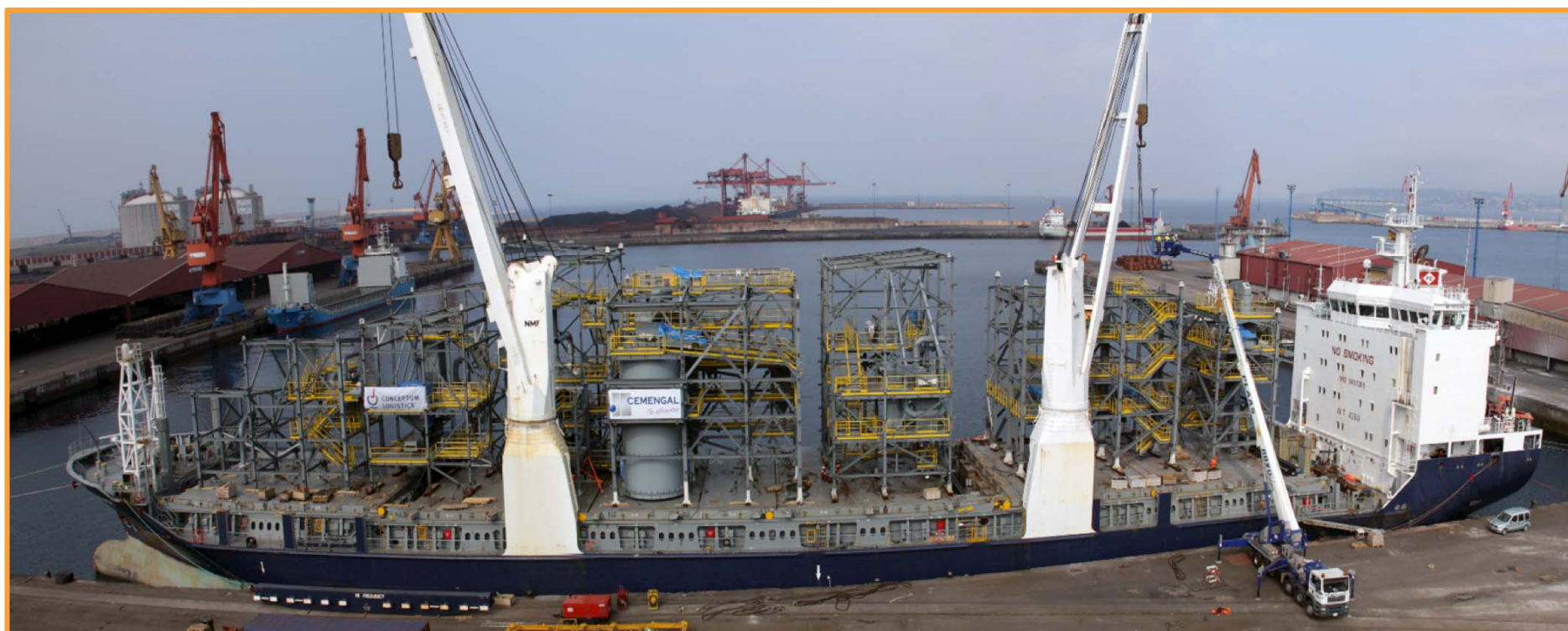
The erection costs were very much reduced on 80% and the delivery time on 30%.

SO, MODULARIZATION WAS POSSIBLE !!!

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FREQUENCY – ONE OF THE 5 SHIPMENTS GIJON-SIDNEY



UNLOADING OPERATIONS IN Pt KEMBLA, Australia



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3. INNOVATION – PLUG&GRIND® CLASSIC

As a feasible solution to the worldwide crisis, CEMENGAL applies this modular concept to smaller grinding facilities.

In 2013, The modular Plug&Grind «Classic» is launched:

Production: 12 t/h (CEM I @ 3200 cm²/g)

Ball mill: Ø 2,2m x 8,5m

Total installed power: 680kW

Logistics: 9 regular containers of 40"

References: 14 units sold in Africa, South America, Middle East and SE Asia.



3. THE INNOVATION – PLUG&GRIND® CLASSIC

Some of the **greatest advantages** of this modular grinding system :

A short delivery time. Then, cement will be reached in 10 months.

Electromechanical equipment is pre-supplied at 85% completion. Then, construction works «in situ» are clearly simplified.

Optimization of operations operators per shift with no major technification skills.

Flexibility and portability. Mobilization and versatility. Follow the markets.

Strategic asset for a penetration into a new market.



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4. THE DEVELOPMENT – PLUG&GRIND® XL

As a feasible solution for the growing demand, CEMENGAL develops a new Plug&Grind® size for larger capacities of production.

In 2014, The new Modular Plug&Grind XL is launched into the market:

Production: 30 t/h (CEM I @ 3200cm²/g)

Ball mill: Ø 3,0m x 9,5m

Total installed power: 1500kW

8 containers of 40' and 4 special modules.

References: 6 units sold in Africa, South America and SE Asia



4. THE DEVELOPMENT – PLUG&G

Reasons: to reduce the global size of the Plug&Grind XL facility with the benefit of having a Fourth Generation classifier.

In 2015, The new Modular Plug&Grind XP4i is launched with a 4th generation Magotteaux classifier keeping the production capacity of about 30 t/h

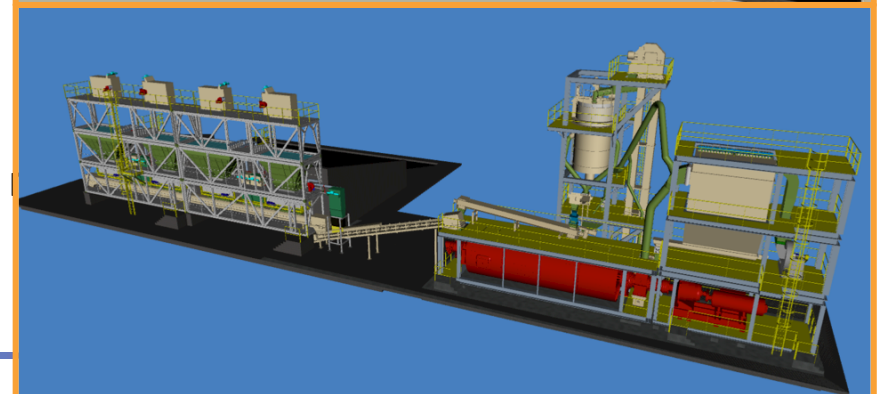
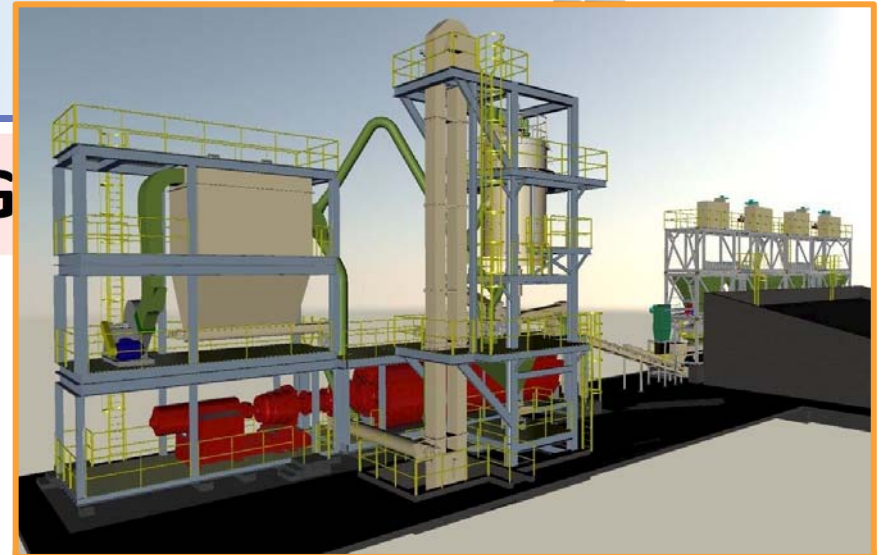
Benefits:

More efficiency,

Less power consumption,

A more simple facility,

Possibility to reach a fineness up to Blaine 7000 cm²/g



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5. VERTICAL PLUG&GRIND[®] (VP&G[®])

As a feasible solution for the growing demand on GGBFS and blended cements with high moisture contents, CEMENGAL develops a new modular Plug&Grind[®] with a VRM integrated.

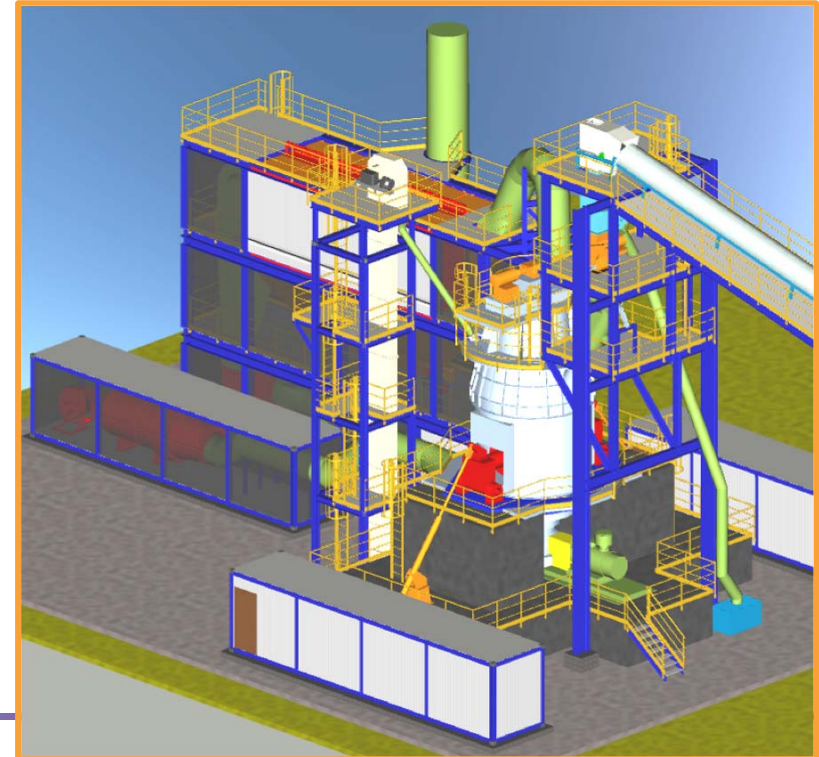
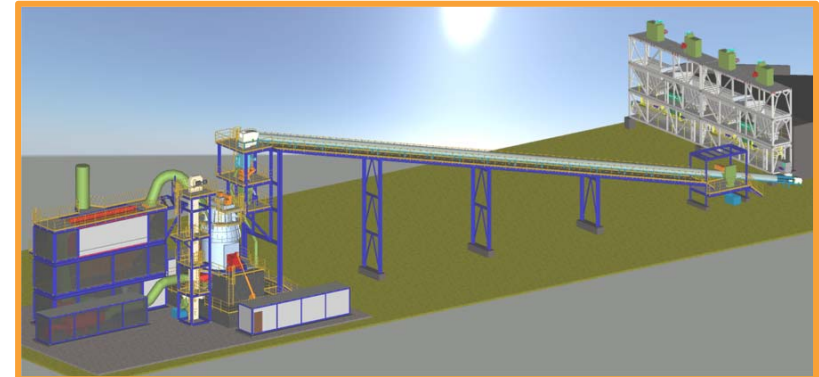
In 2015, The new Vertical Plug&Grind[®] (VP&G[®]) is launched into the market:

Production capacities:

23 t/h (CEM II @ 3800 cm²/g)

17 t/h (GGBFS)

Total installed power: **950 kW**.



5. VERTICAL PLUG&GRIND® (VP&G®)

Some technical descriptions:

6 modules for raw material reception and dust precipitation: similar to Plug&Grind® XL.

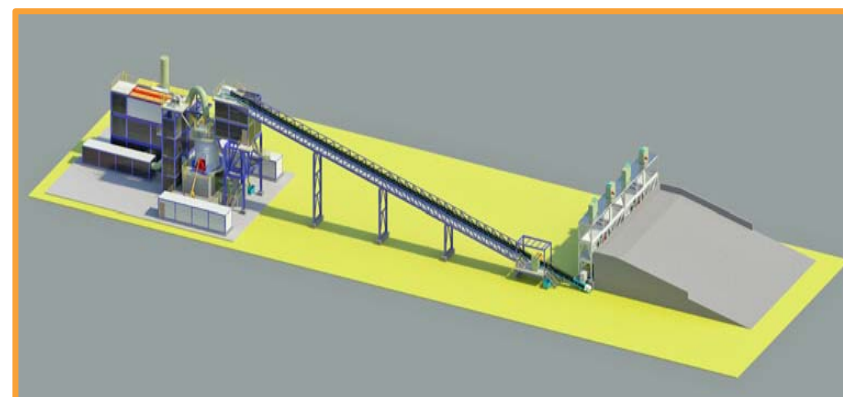
VRM: Pre-assembled in modules. Erection in situ.

3 process modules: similar to Plug&Grind® XL

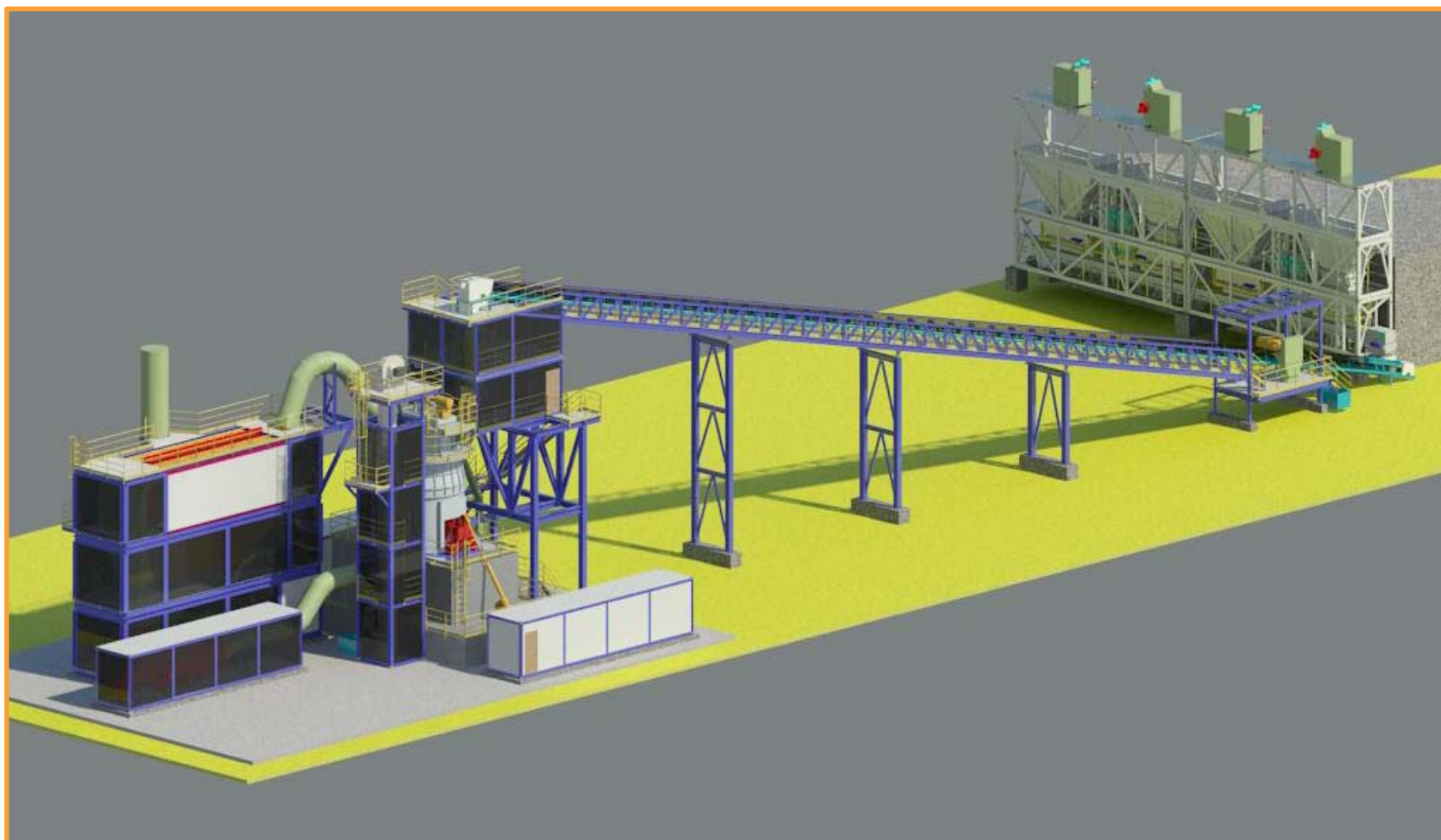
3 modules for auxiliary and peripheral equipment: hot gas generator, electrical & control room, oil central units, air compressor room: similar to Plug&Grind® XL.

5 auxiliary modules: bucket elevator, conveyor belt, support tower and process ducts perassembled in lots.

Optional modules: lab, power generator, packing&palletising, storage silos of 500 m³ capacity and bulk loading device, similar to Plug&Grind® XL



5. VERTICAL PLUG&GRIND® - VP&G



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6. BENCHMARKING - CIVIL WORKS

Vertical Plug&Grind® VP&G® generally requires a more complex and a larger civil work foundation.

Usually, a VRM needs a minimum depth of 3m foundation (PP=0,75 kg/cm²).

Including the dynamic loads of the mill, a total surface forces of 2 kg/cm² would oblige to build a deep foundation in most type of soils.

In case of poor soil conditions or high water table, a BM format will be the recommended solution, therefore a Plug&Grind Classic, XL or XP4i is the preferable option.

Vertical Plug&Grind VP&G® requires a larger plant footprint, therefore in case of space constraints, a Plug&Grind Classic, XL or XP4i is more recommended.

6. COMPARATIVE TABLE : ENERGY & WATER CONSUMPTION

As a preliminary analysis of the process, please see the following comparative table to help with the right choice of your modular Plug&Grind :

		OPC	GGBFS
P&G®	Electrical Power	30 kwh/t mil shaft 42 kwh/t totales	60 kwh/t mill shaft 76 kwh/t totales
	Thermal Power	Not necessary	External drying
	Water	Not necessary	Not necessary
VP&G®	Electrical Power	22 kwh/t mil shaft 40 kwh/t total	30 kwh/t mill shaft 52 kwh/t total
	Thermal Power	22000 kcal/ht	80000 kcal/ht External drying
	Water	16 l/t	Not necessary

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« *Success is to make amovement in a reduced space* »

CEMENGAL has become the worldwide expert in modular grinding plants for small to medium capacities.

CEMENGAL is the only engineering company with references already on production.

Therefore, CEMENGAL is happy to listen our clients' requests and provide them an independent advice in order to choice the correct type of modular grinding unit to fit the markets demands.

GENERAL OVERVIEW

Niche markets OPC	➡	P&G Classic
Consolidated markets OPC	➡	P&G XL / XP4i
High moisture / GBBFS	➡	VP&G
Strategic projects	➡	Please consult





Thank you very much for your attention

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