Expansion Phase 2

Uberaba Industrial Complex – CIU

by

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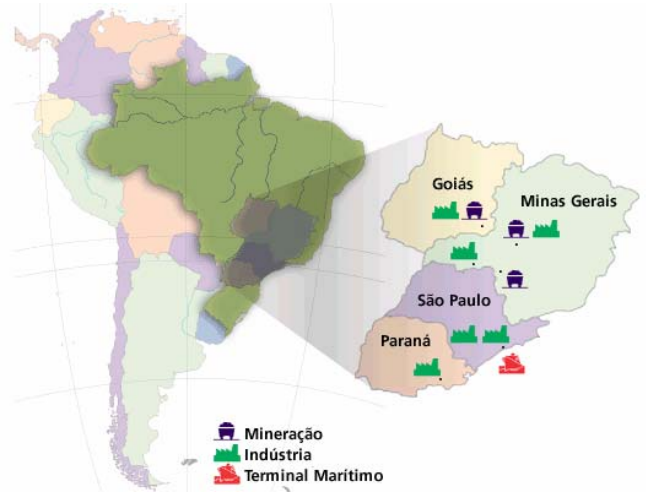
Fosfertil's Industrial Units



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Resumé of the Overall Expansion Project for Fosfertil's Industrial Complex in Uberaba

Original design	940 tpd P_2O_5	296,000 tpa P_2O_5	
Debottlenecking	1200 tpd P_2O_5	400,000 tpa P_2O_5	Modifications to sulphuric & phosphoric acid plants
Phase 1	1490 tpd P_2O_5	496,000 tpa P_2O_5	1 new reaction & filtration section
Phase 2	2001 tpd P_2O_5	675,000 tpa P_2O_5	2 new evaporators
Phases 3&4	3600 tpd P_2O_5	1,200,000 tpa P_2O_5	

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Resumé of the Phase 2 Expansion Project for Fosfertil's Industrial Complex in Uberaba

- Revamping of the ***Monsanto*** sulphuric acid plant
- Up-rating of the air-cooling and scrubbing systems and resizing of pumps on the original ***Technip*** reaction and filtration sections
- Installation of two phosphoric acid evaporator units, cooling tower and storage
- Installation of a MAP granulation unit with ***Incro*** pipe reactor Installation of fertilizer storage facilities
- Installation of a ROP-TSP unit, including phosphate grinding, acidulation den, curing and reclaim
- Revamping of the ammonia storage area
- Improvements to the sulphur discharge system
- Improvements to the filtered liquid sulphur pumping system
- Revamping of the off-sites area
- Modifications to the phosphate slurry reception terminal

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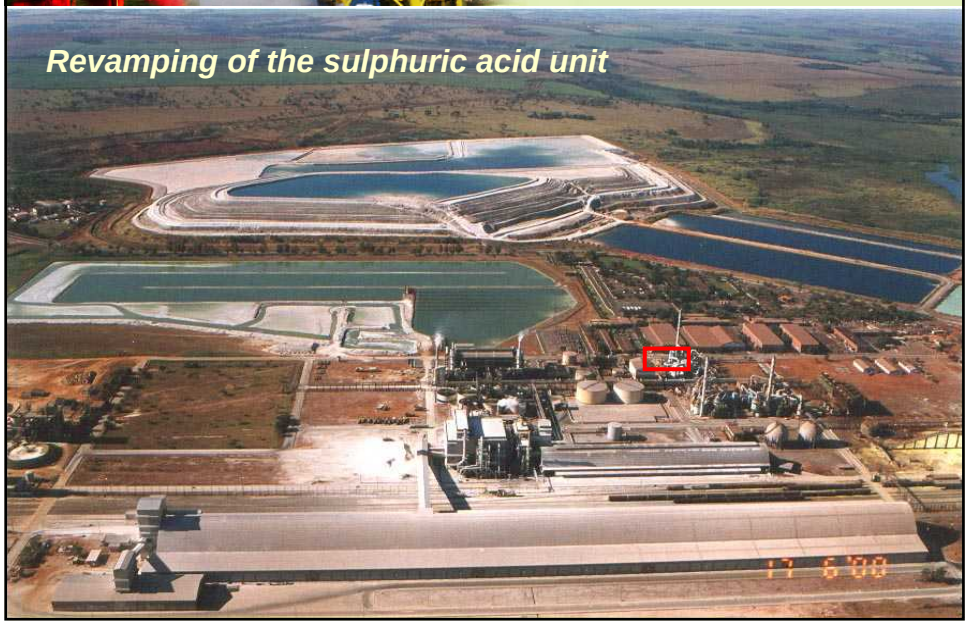

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Revamping of the Sulphuric Acid Unit

- Substitution of the turbo-reduction unit CB-1301T
- Substitution of the rotor of the main blower CB-1301, including the anti-surge system and silencer
- Modifications to the air filter system to cope with the additional flow
- Modification to the demister system in the drying tower TA-1301
- Modification to the upper dome of both of the absorption towers, final & intermediate, to allow the fitting of additional demisters TA-1302/03
- Modifications to the steam drum and boiler to be compatible with the additional steam production VA-1301
- Modifications to the gas inlet and outlet connections to the superheater TE-1301
- Substitution of the hot gas/gas heat exchanger TC-1301
- Modifications to the gas inlets in the converter to allow additional catalyst to be accommodated
- Addition of a second intermediate economiser in parallel to the existing one TE-1303B/04B

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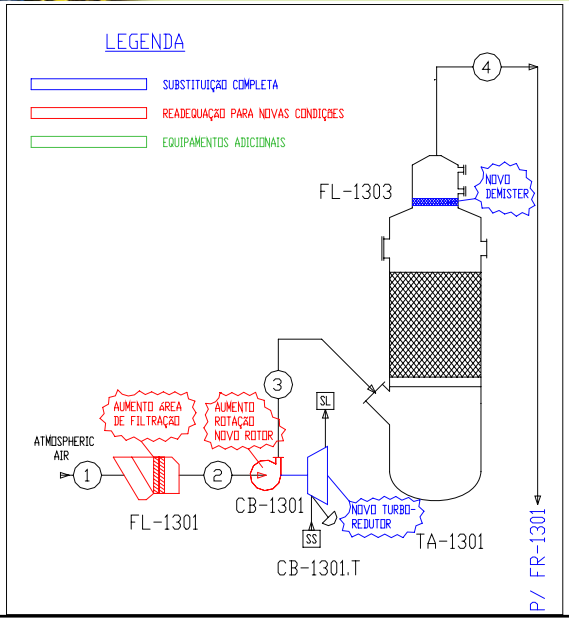
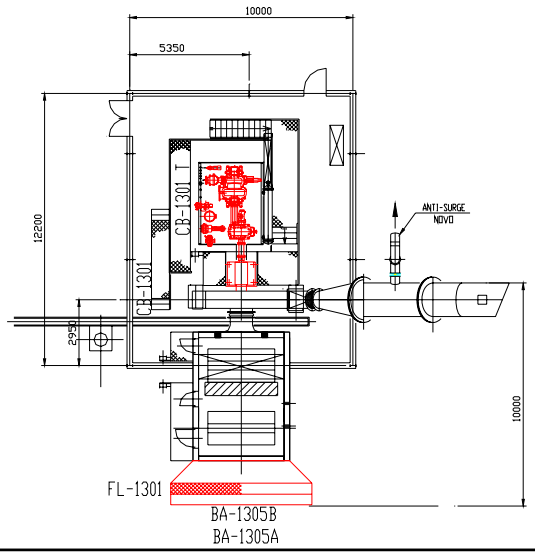
Increase in the area of the air filter

Substitution of the turbo-blower

Substitution of the demister of the drying tower

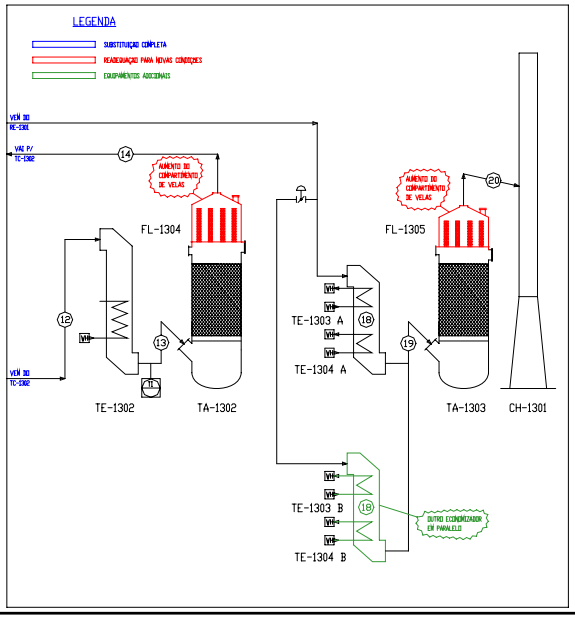


Increase in the capacity of the air blower system

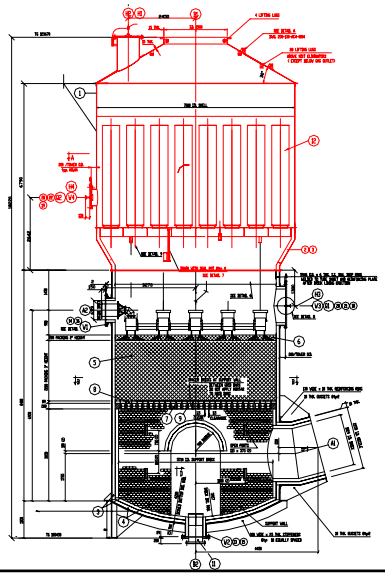


Modification to the upper domes of the absorption towers

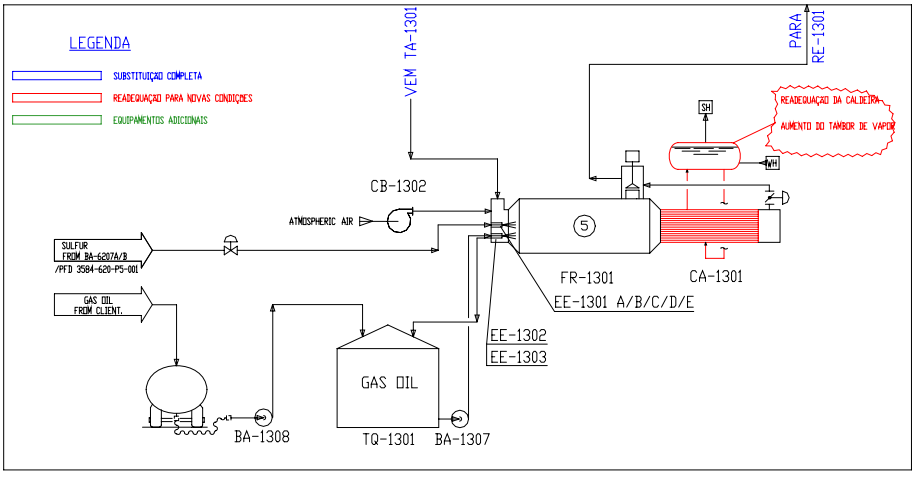
Addition of a second intermediate economiser in parallel



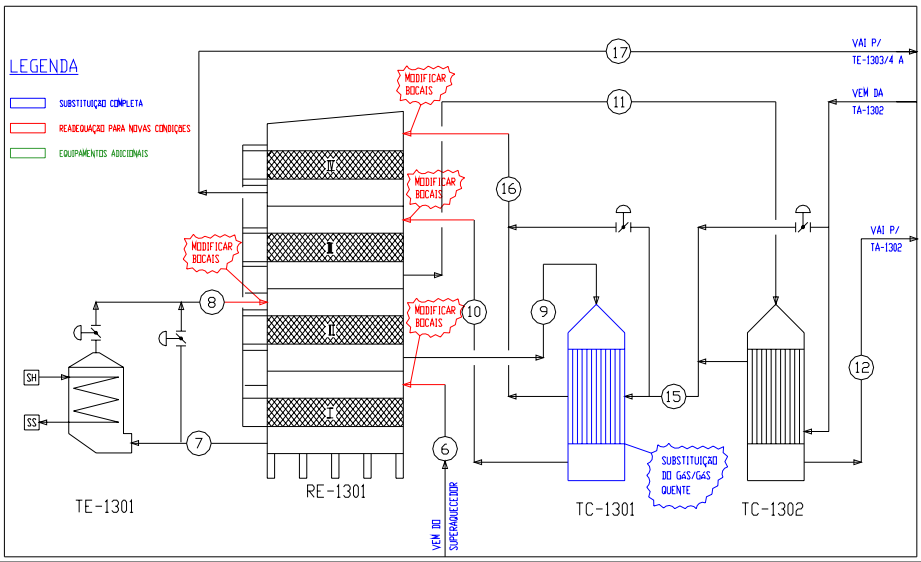
Modification to the upper domes of the absorption towers



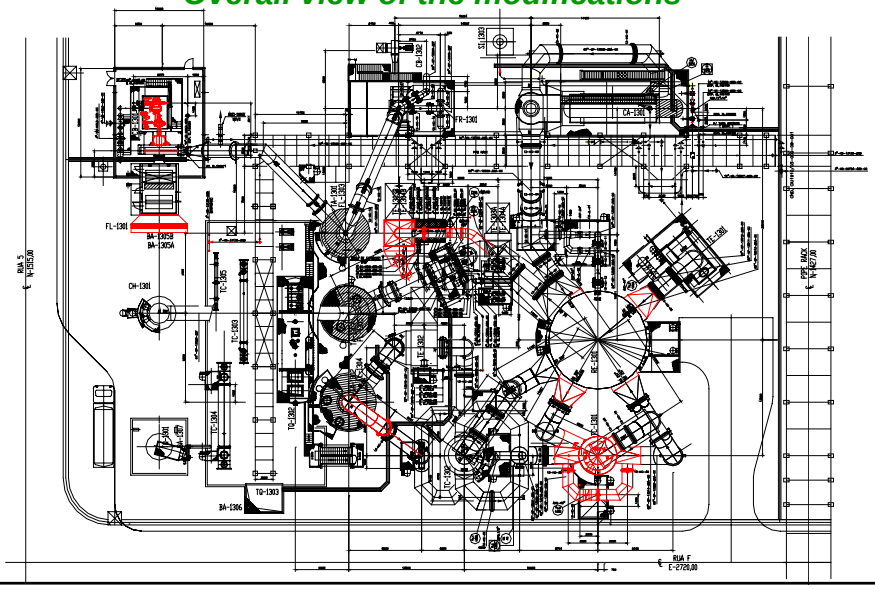
Modifications to the steam drum and boiler

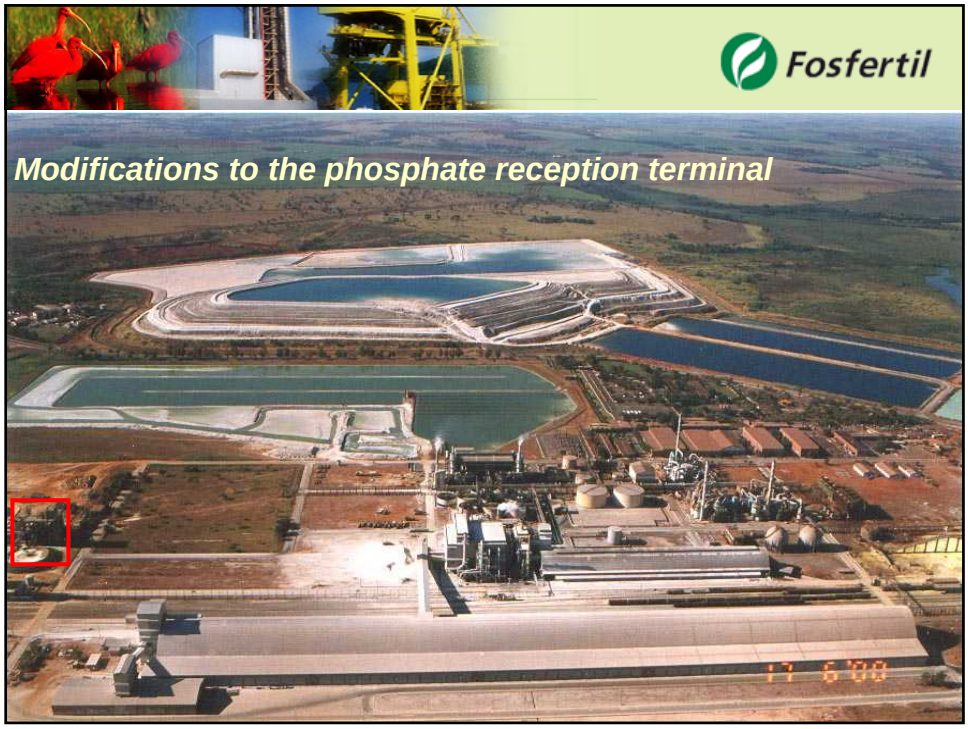


Substitution of the hot gas/gas heat exchanger



Overall view of the modifications

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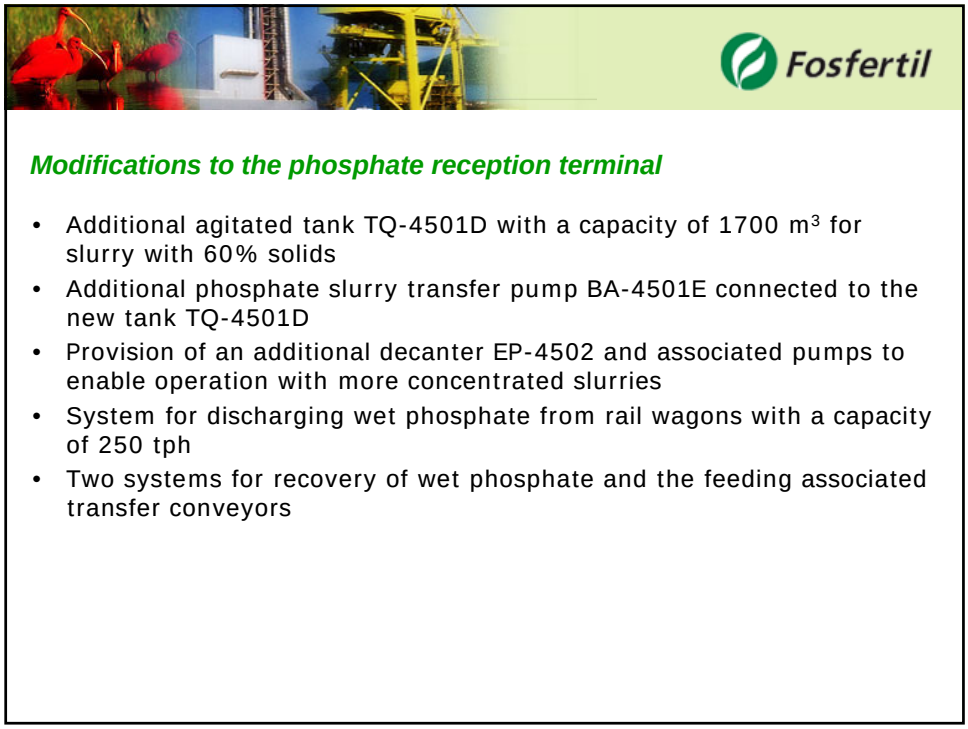
Modifications to the phosphate reception terminal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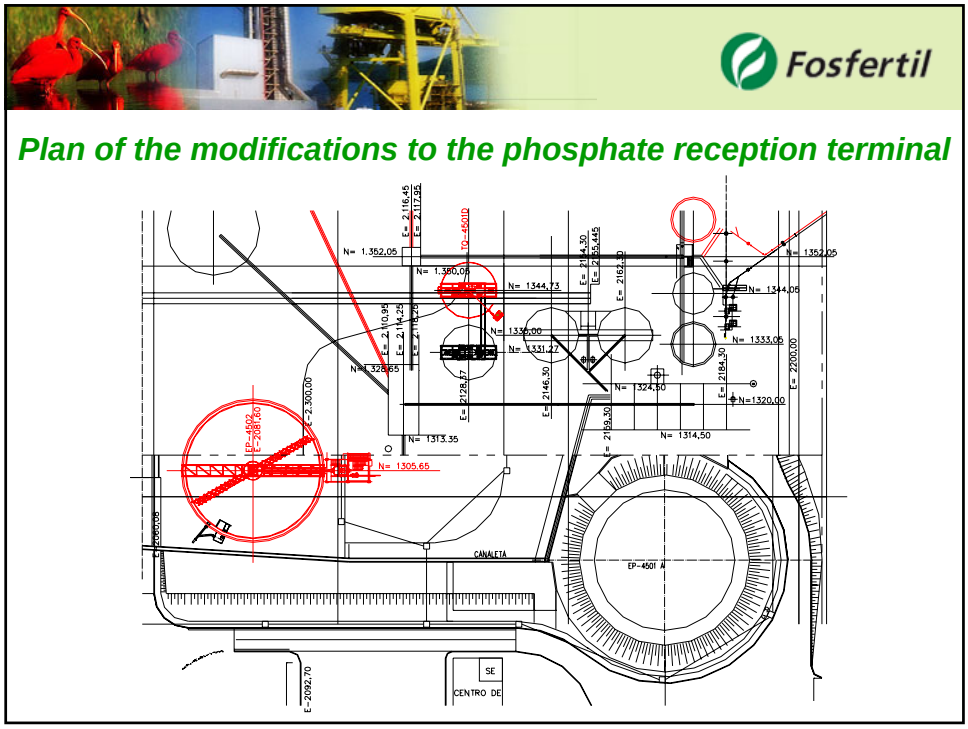
Modifications to the phosphate reception terminal
• Additional agitated tank TQ-4501D with a capacity of 1700 m³ for slurry with 60% solids
• Additional phosphate slurry transfer pump BA-4501E connected to the new tank TQ-4501D
• Provision of an additional decanter EP-4502 and associated pumps to enable operation with more concentrated slurries
• System for discharging wet phosphate from rail wagons with a capacity of 250 tph
• Two systems for recovery of wet phosphate and the feeding associated transfer conveyors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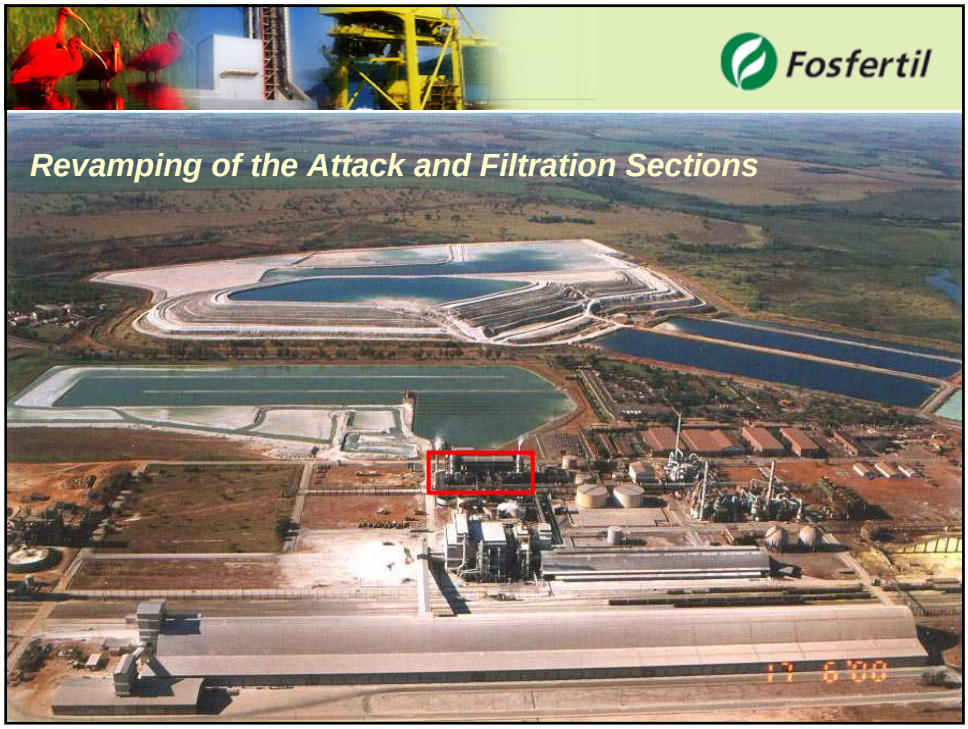
Plan of the modifications to the phosphate reception terminal
N= 1.352,05
N= 1.360,05
N= 1344,73
N= 1336,00
N= 1331,27
N= 1328,65
N= 1313,35
N= 1305,65
N= 1324,50
N= 1314,50
N= 1344,05
N= 1333,05
N=1320,00
E= 2.300,00
EP-4502
EP-4501 A
CANALETA
SE
CENTRO DE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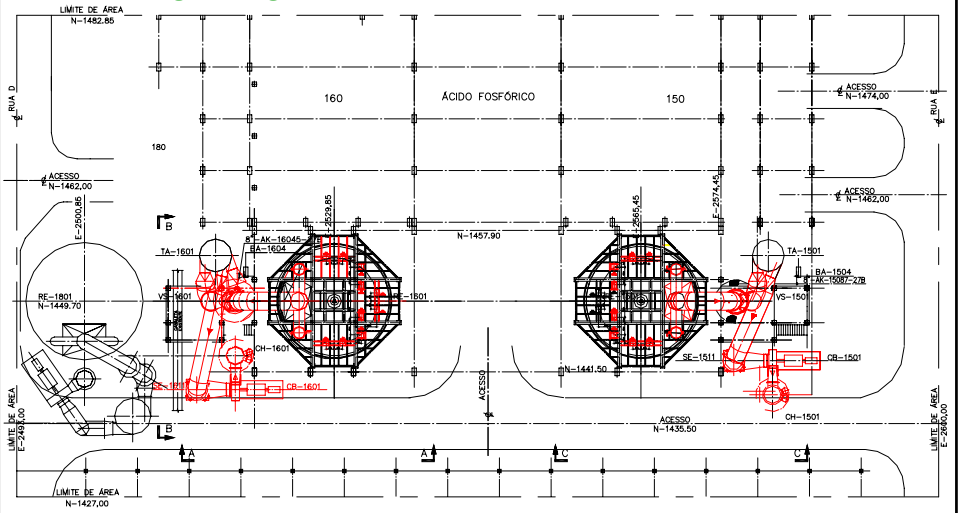
Revamping of the Attack and Filtration Sections

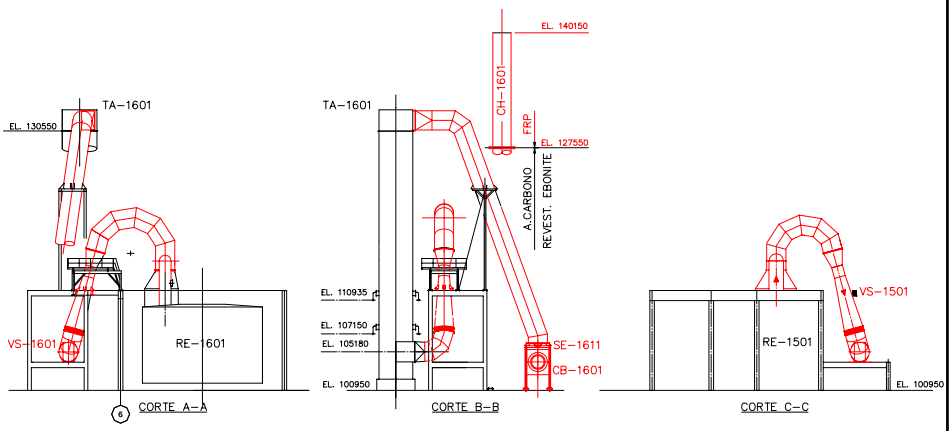
Revamping of the Attack and Filtration Sections

- Additional surface agitators for sulphuric acid dispersion and air-cooling
- Modifications to the scrubbing system to increase the air-flow including a new fan and venturi and scrubbing tower
- Resizing of several of the centrifugal pumps for the new capacities
- Provision of an additional storage tank for phosphoric acid

Air-cooling and gas-scrubber modifications



Air-cooling and gas-scrubber modifications



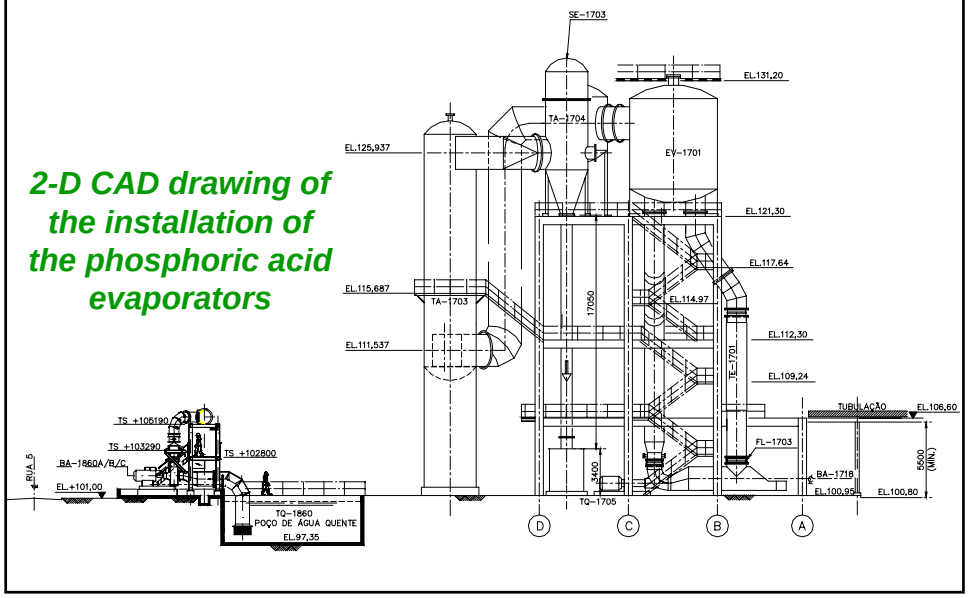
Two Phosphoric Acid Evaporators & Cooling Tower

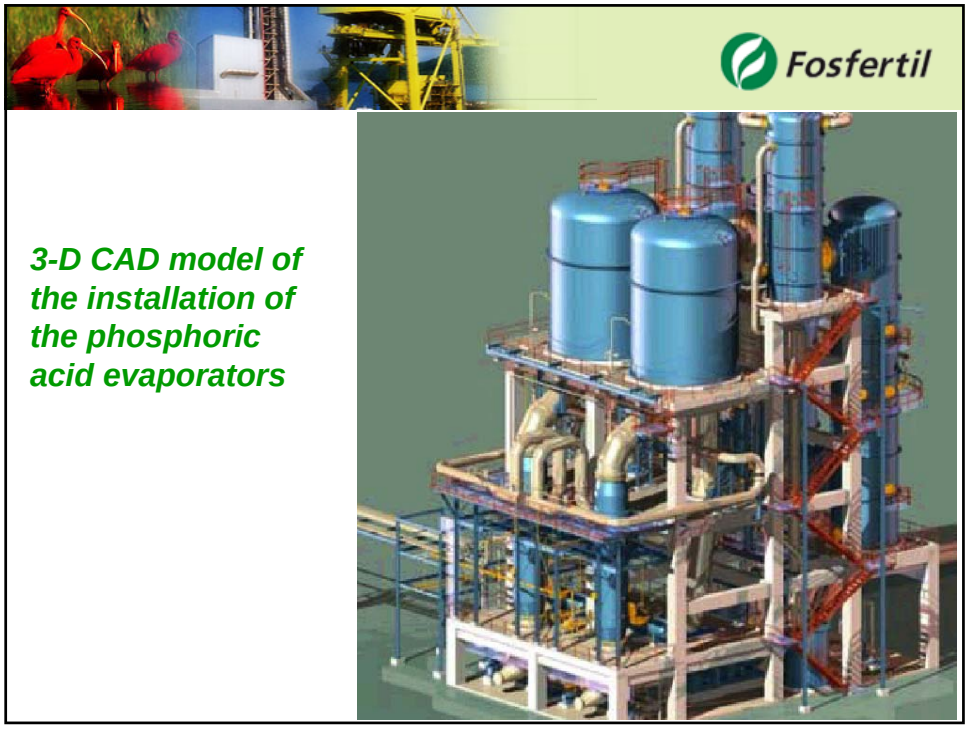
Two Phosphoric Acid Evaporation Units

Principal characteristics of the units

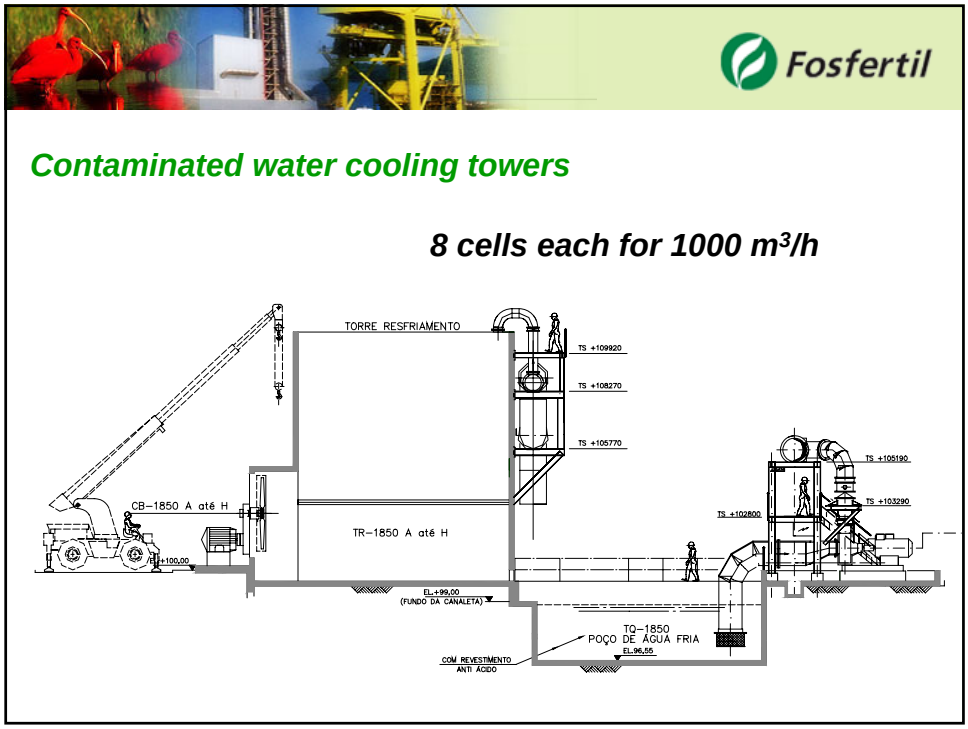
- Each line with a capacity to evaporate 1100 tpd H_2O
- Fitted with fluorine recovery units
- The largest Carbon-tube heat exchangers on phosphoric acid service in the world, 979 tubes (50/37mm x 7.5m),
  Heat exchange area 1135/840 m^2 based on o.d/i.d. 54tph of steam condensed – supplied by **SGL - Germany**
- Acid recirculation provided by an axial-flow pump with a capacity of 11500 m^3/h and a TDH of 6.3 m, Speed 411 RPM, Diameter 1000mm Installed power 800HP Elbow in 904L, Impeller & wear ring in Sanicro 28 – supplied by **Ensival-Moret**
- Water from the barometric condensers pumped to a new forced draft cooling tower with 8 cells each handing 1000 m^3/h

2-D CAD drawing of the installation of the phosphoric acid evaporators



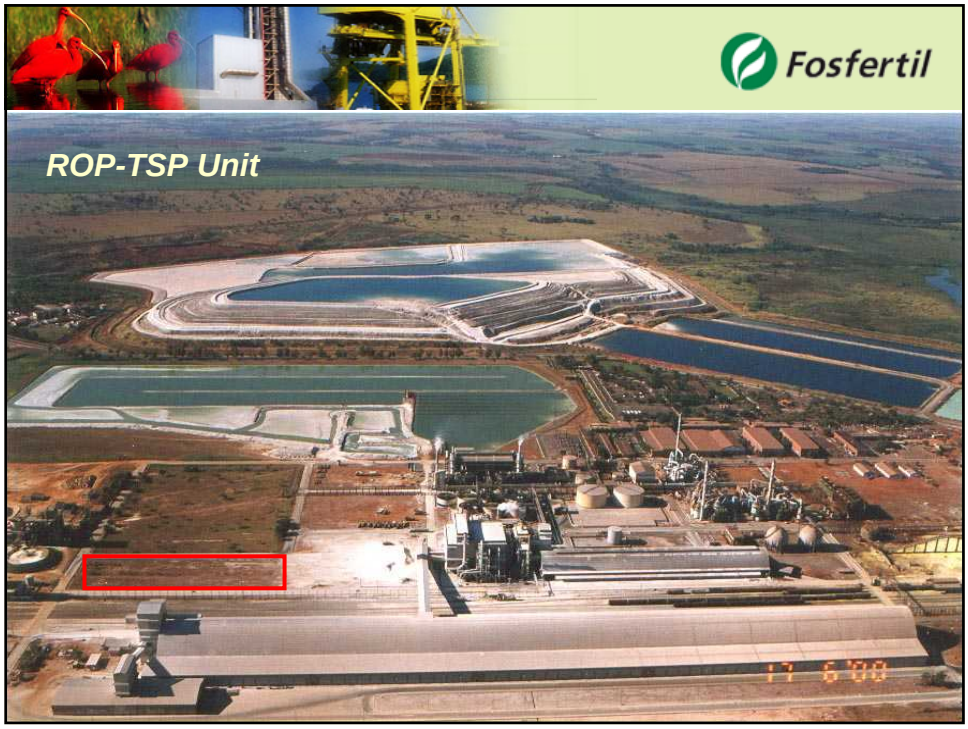


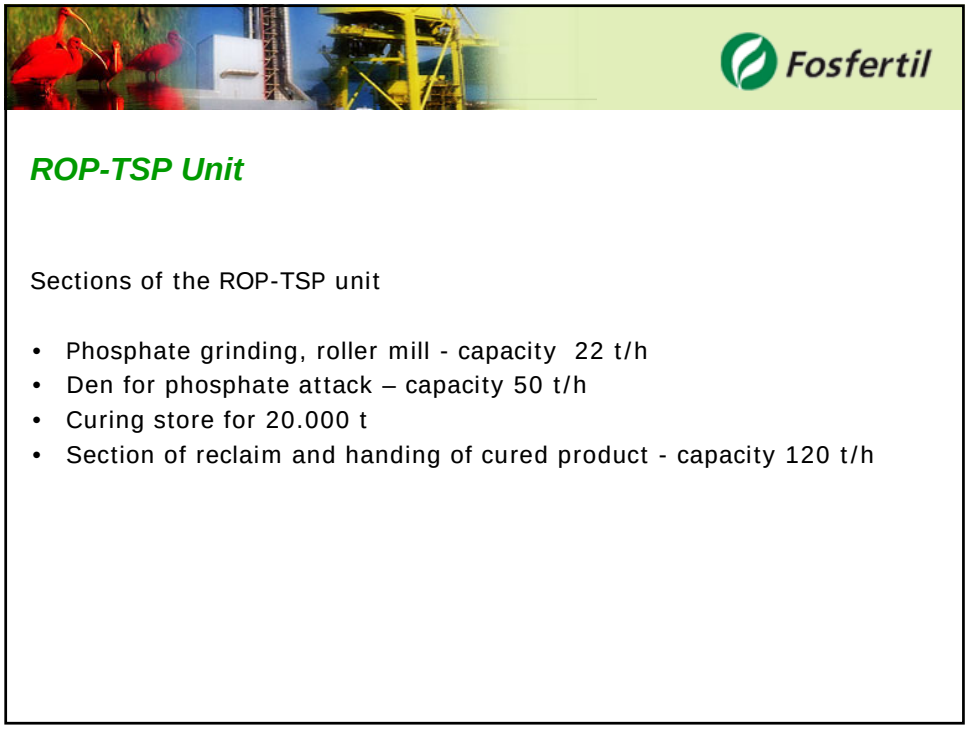
3-D CAD model of the installation of the phosphoric acid evaporators



Contaminated water cooling towers

8 cells each for 1000 m³/h

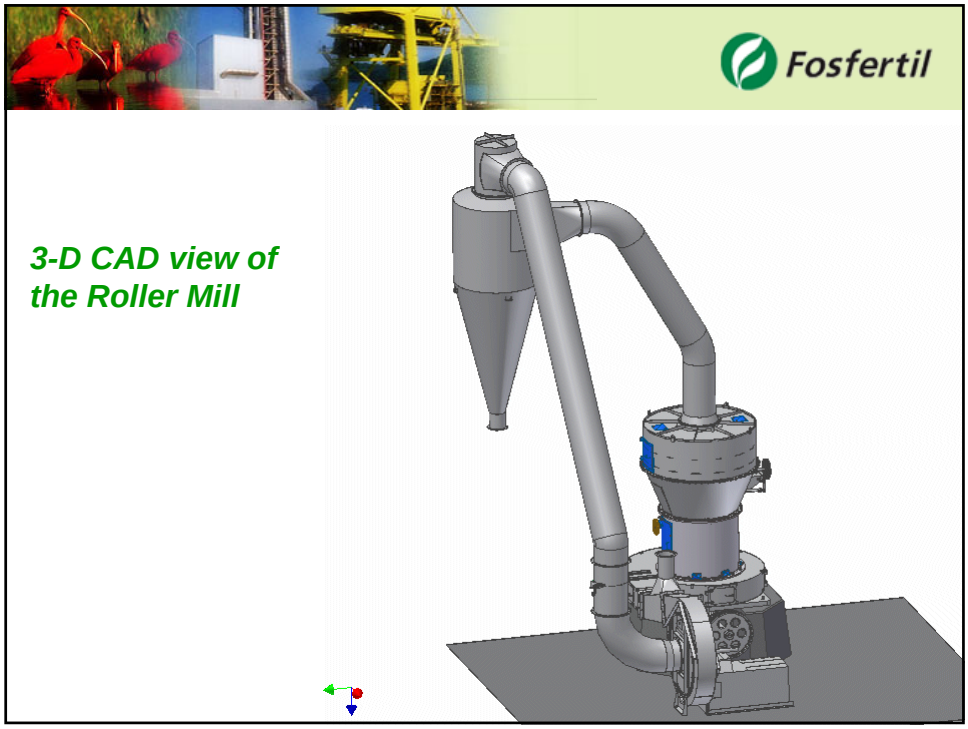




ROP-TSP Unit

Sections of the ROP-TSP unit

- Phosphate grinding, roller mill - capacity 22 t/h
- Den for phosphate attack – capacity 50 t/h
- Curing store for 20.000 t
- Section of reclaim and handing of cured product - capacity 120 t/h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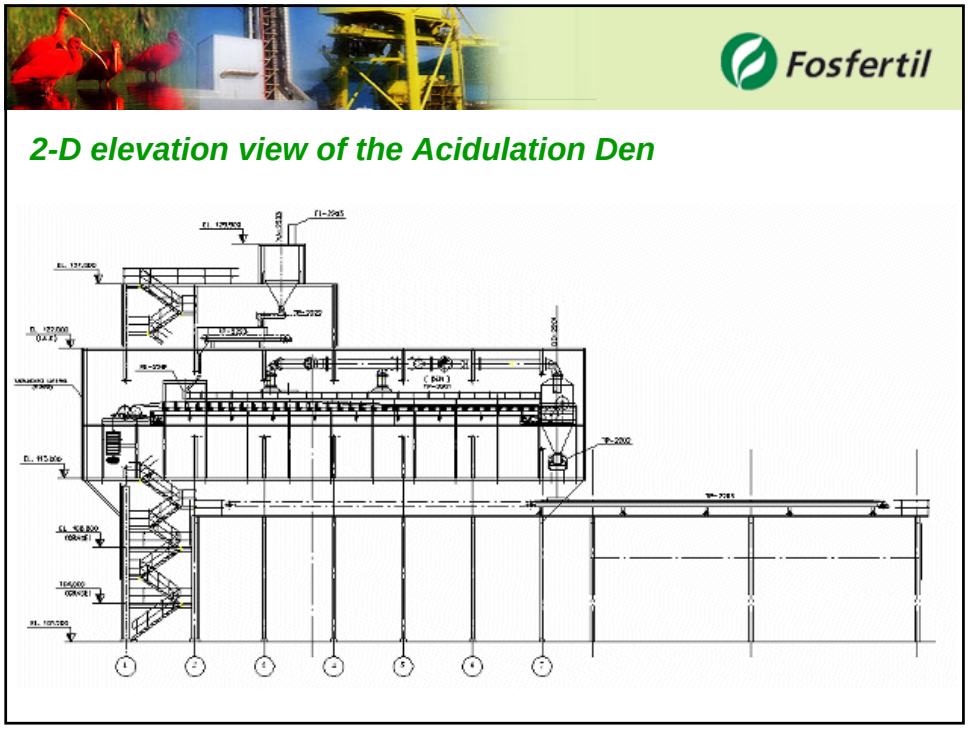
3-D CAD view of
the Roller Mill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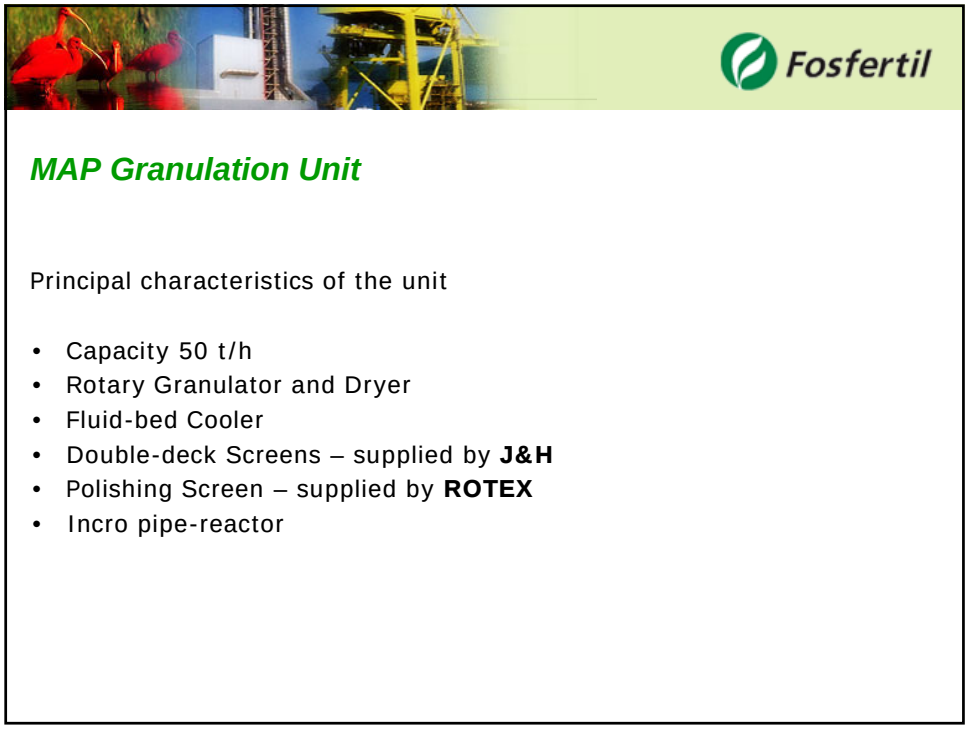
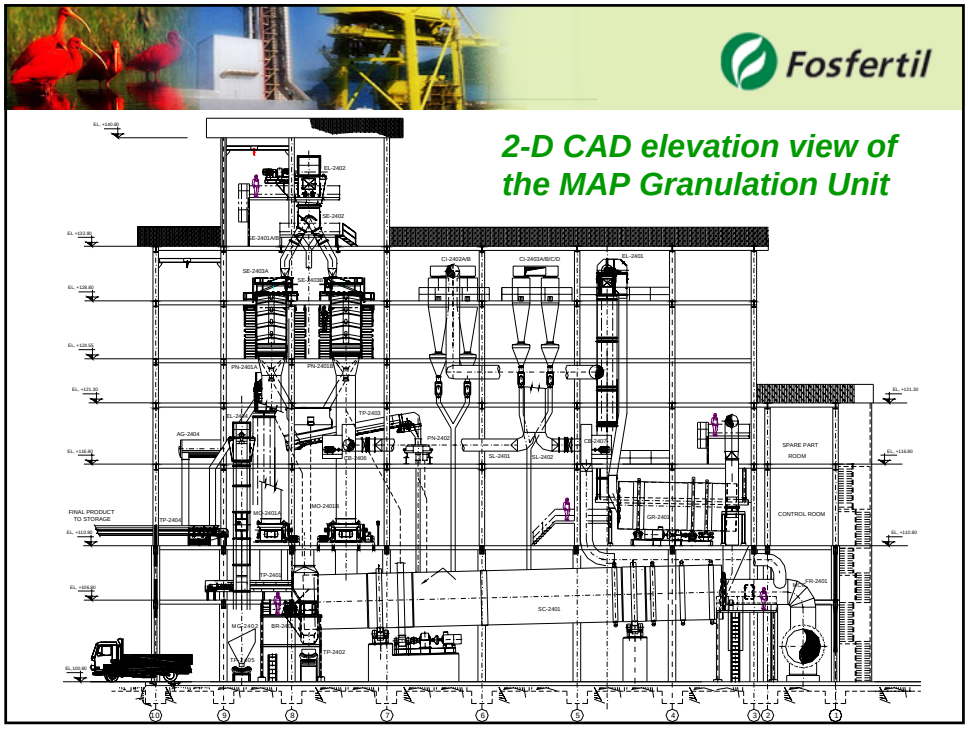
2-D elevation view of the Acidulation Den



MAP Granulation Unit

Principal characteristics of the unit

- Capacity 50 t/h
- Rotary Granulator and Dryer
- Fluid-bed Cooler
- Double-deck Screens – supplied by **J&H**
- Polishing Screen – supplied by **ROTEX**
- Incro pipe-reactor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2-D CAD elevation view of the MAP Granulation Unit
EL-2402
SE-2402
SE-2401A/B
SE-2403A
SE-2403B
CI-2402A/B
CI-2403A/B/C/D
EL-2401
PN-2402A
PN-2402B
TP-2403
PN-2403
SR-2404
AG-2404
SL-2401
SL-2402
SR-2405
SPARE PART ROOM
CONTROL ROOM
FINAL PRODUCT TO STORAGE
TP-2404
MO-2401A
MO-2401B
GR-2406
TP-2405
SC-2401
MG-2402
BR-2401
TP-2402
PR-2401