

# **DESCRIPTION OF PLANT OPERATION**

## **SLEPEER PLAND**

The sleeper plant of THE.MO.S. SA is located near Argos. The unit produces pre-stressed sleepers in a carousel system using moulds.

The empty mould passes through the Oiling Machine (B2) and it is jet-sprayed internally with demoulding oil. The oiled mould, by a conveyor, is taken to the mould preparation place, where the stressing steel is placed in place. The steel is placed by hand and it is fastened in the mould by the tie-rods and bolts using air wrenches (B4). Next, the mould is taken to stressing unit (B5), where each rod is stressed with a force of 81.25 kN. This load is taken entirely by the mould. Since each mould has four cells for sleepers and each sleeper has four wires, the total force on the mould is  $4 \times 4 \times 81,25 = 1300$  kN.

The next stage is the casting station (C1) where the mould is filled with concrete. Filling takes place under constant and powerful vibration. The vibration unit (C2) is under the mould. The casting station is a hopper moving on rails. The concrete is cast into the mould with screw feeders. The casting operation is managed by experienced personnel. The concrete is prepared outside the building in the Batching Plant (K1).

After concrete filling, the mould is taken by an automatic crane (D1) and stacked into a curing chamber (B8). After 13 moulds are placed in the chamber, the cover is put on top of it and the curing cycle starts.

After placing a mould in the curing chamber, the crane takes out from another chamber, an already cured mould from the previous production cycle and places it onto the conveyor (E1) to start the demoulding procedure. It must be noted that the automatic crane performs all the duties assigned to it completely without an operator.

The chambers are filled and emptied on a first in first out basis, while within each chamber the moulds are placed and taken with a first in last out principle.

The de-moulding procedure starts at the de-tensioning machine (E2), where the tie-rods and bolts are unscrewed and the tension is passed onto the sleepers. Next, the mould is taken to the stripping unit (E3) where, by a special hydraulic system the mould is turned upside down and the sleepers are taken out, by a slight vibration, and placed on the finishing line (F1). The empty mould is taken to the oiling station to start a new cycle.

On the finishing line the following tasks are performed:

- Placing the fastenings on the sleepers (manually)
- Placing two pieces of wood on the group of 4 sleepers for stacking
- Automatic stacking in the stacker (F3)

The capacity of the plant depends upon the number of available moulds and the capacity of the curing chambers. With the present equipment the capacity of this plant is around 11.000 per month. The available moulds at the present is:

B-70 moulds: 92: pieces

TBS-1000: 83 pcs.

## **TURN-OUT SLEEPERS**

The turn-out plant was built in 2009. This plant covers an area of approximately 804 square meters.

Up to present, there are 2 double turn-out molds with a length of 43,5 meters each. With these molds we can construct approximately 160 meters of turn-out sleepers every day.

The auxiliary equipment is:

- Tilting tong for removing the ready sleepers from within the molds

- Concrete transportation vehicle. This vehicle carries the fresh concrete for the mixing plant and feeds into the molds
- Stressing wire jack
- feeding /cutting stressing wire.
- Vibrators for concrete
- Special mold for sampling cubes/beams
- Accurate measuring table to measure the coordinates of the holes in bottom plates
- Accurate meter to measure the tension of each wire
- Overhead crane

## **AUXILIARY EQUIPMENT**

### **CURING**

Curing is done with live steam. The increase of temperature and other factors for curing are prescribed in the European Norm 13230.01. The maximum allowed temperature for the cement used is 55° Celcius.

The steam is produced in an appropriate generator with a capacity of 400 kg/h at 12 bar., Curing is applied to the carousel plant. In the turnout plant, curing is done naturally.

### **BATCHING UNIT**

Horizontal drum mixer with a capacity of 1000 litres per batch. It includes all controls to ensure accurate mixing.

### **OTHER MACHINERY**

Air compressor, 3000 l/min at 8 bar and water chiller with a capacity of 750 kg of water per hour from 18 to 2 degrees Celcius.

### **BUILDING**

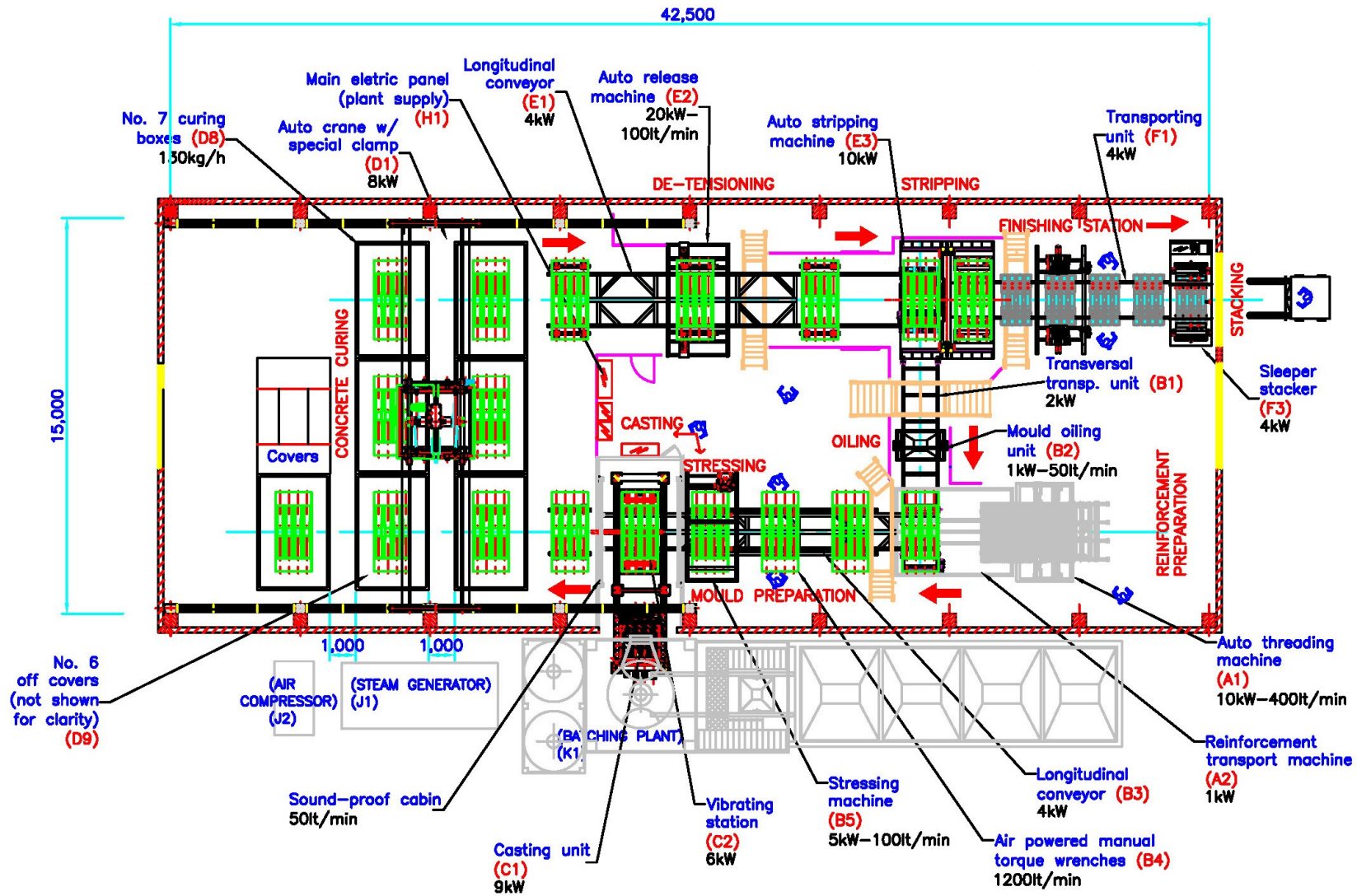
The main building is made of steel frame clad with metal sheeting. The outside dimensions are: 43,5 X 16 X 9,5 μέτρα (L X W X H). The height of 9,5 m is necessary to accommodate the two cranes, the automatic one and a general purpose crane over the automatic.

The building for turnout sleepers is 12 X 55 m with an extension of 18 X 8 m.

### **LABORATORY**

There is a fully equipped laboratory to perform the quality checks on the aggregates, the concrete and the finished product as well as the control of operational parameters of equipment.

# PLANT FLOWSHEET



## TURN-OUT PLANT

