







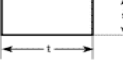

## *EU Steel Works*



**Rolling Mill for Merchant ReBar  
and Round Products**

# Production and Productivity

**The new rolling mill** is able to produce merchant bars, and concrete re-inforcement (“re-bars”). By this generation of the new rolling mill we can offer these new products including rebar, and small dimensioned merchant bars, as steel products for construction and manufacturing.

Profile	Design	Dimensions
<i>U Shaped</i>		<i>From 30 x15 to 100x 50 mm</i>
<i>Round</i>		<i>From 12 dia.to 50 mm dia.</i>
<i>Square</i>		<i>From 10 to 50 mm</i>
<i>Angle</i>		<i>From 30x 3 to 80 x10 mm.</i>
<i>L Shaped</i>		<i>From 40 x20 x3 to 60 x40 x8 mm.</i>
<i>T Shaped</i>		<i>From 25 x3 to 50 x6 mm.</i>
<i>Flat</i>		<i>From 30 x5 to 150 x20 mm.</i>
<i>Rebar</i>		<i>From N8 to N36 mm</i>

**The Rolling Mill Plant was specified for the annual rolling capacity of 700,000 tons.**

*The effective annual production will depend on the market request the planned hours of operation and the mix of the products. The designed maximum productivity of the mill is 100 ton/h. This productivity would potentially be reduced by the rolling of small sections.*

*The production of these products commences with a billet or beam of low or medium carbon steel. A square bloom with the cross section of 160 X 160 mm can be rolled to a cross section ranging from 4.500 mm to 11.700 mm depending on the requirements of the production process. It is possible to use a bloom of lower cross section to make these sizes.*

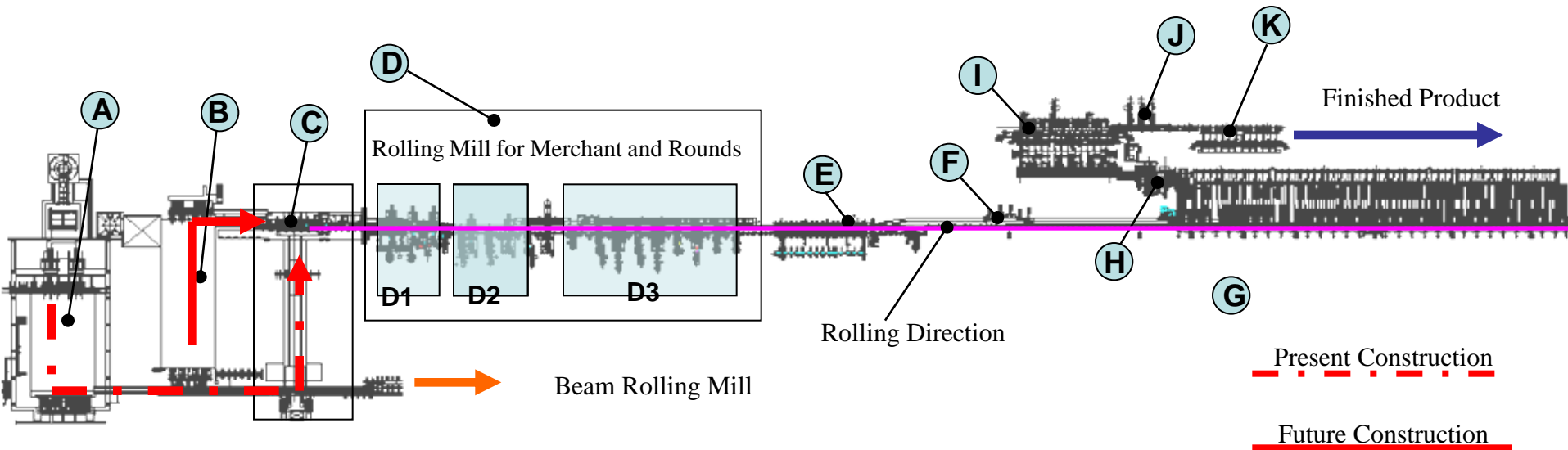
*The table to the left details the products that are now available by the new mill, complete with the dimensional capabilities.*

*The grades the mill will be capable of for Rebar and Merchant products are:*

- Rebar B 450 C
- Merchant EN 10025: S235 JR, S275JR, S355JR, S355J0, EN 10083 C40, C43, C45

*The products will all be bundled and secured with wire ties, and in lengths which range from 5 to 18 metres, with weights that range from 1,500 to 3,000 kgs.*

# The General Layout of the New Plant:



**A** Walking Beam Reheat Furnace for two mills in parallel

**B** Existing Reheat furnace under renovation for the TMT mill

**C** Elevator that transfers heated billets to the TMT mill

**D** The Rolling Mill

**D1** Roughing Stands

**D2** Intermediate Stands

**D3** Finishing Stands

**E** Quench and Tempering Treatment

**F** Twin Channel Line for Rebar

**G** Cooling Bed

**H** Straightening Mill

**I** Cold Shears

**J** Stacking Station

**K** Weight and Labelling Station

# *Walking Beam Reheating Furnace rated at 125 ton/hr*

**Furnace Structure-** Length: 23 m x Width 12.2 m

Front Loading

Lateral Discharge

**Reheating systems for the Blooms:** (Walking Beams)

Blooms to be rolled are heated to 1280 °C , and are heated in in 3 zones:

Preheating Zone at 1050°C

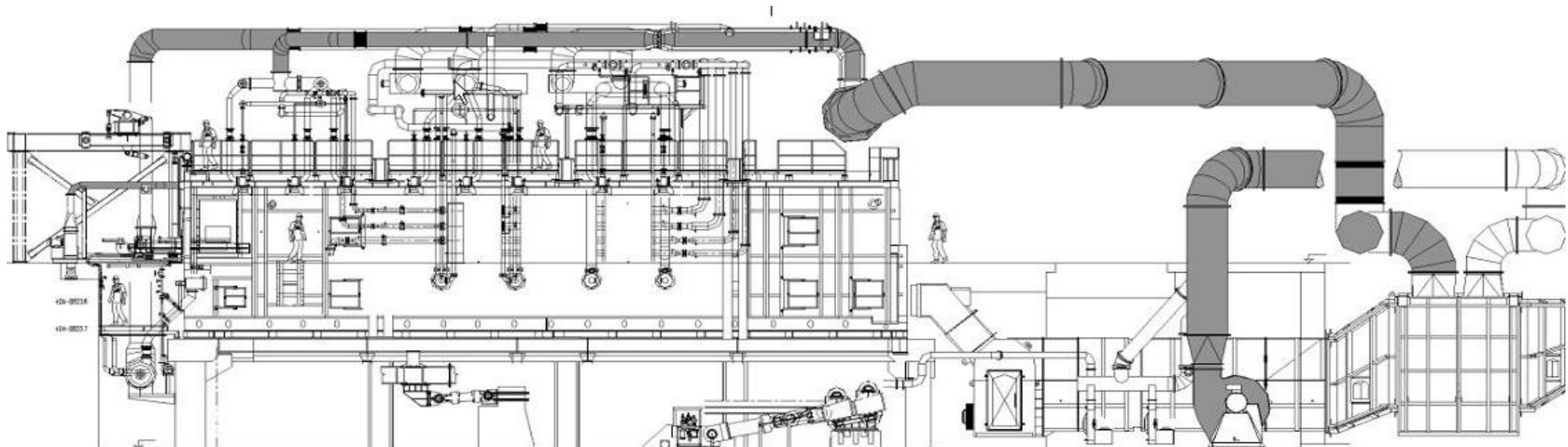
Soak Zone at 1280°C

Equalization Zone 1290°C

**Types of Product Loaded:**

The Blooms must have:

- Cross Section ranging from 150x150mm to 520x400 mm.
- Lengths ranging from 4 to 11 m.



# *Reconditioning of the Heurtey Reheat Furnace*

*It s necessary to reconditon the existing furnace for its reheating abilities and for its reliability. With this reconditioning, the flexibility of the product range will not be affected. Breifly:*

- **Structure of the Furnace.**

*Lateral Loading will replace the previous front loading configuration.*

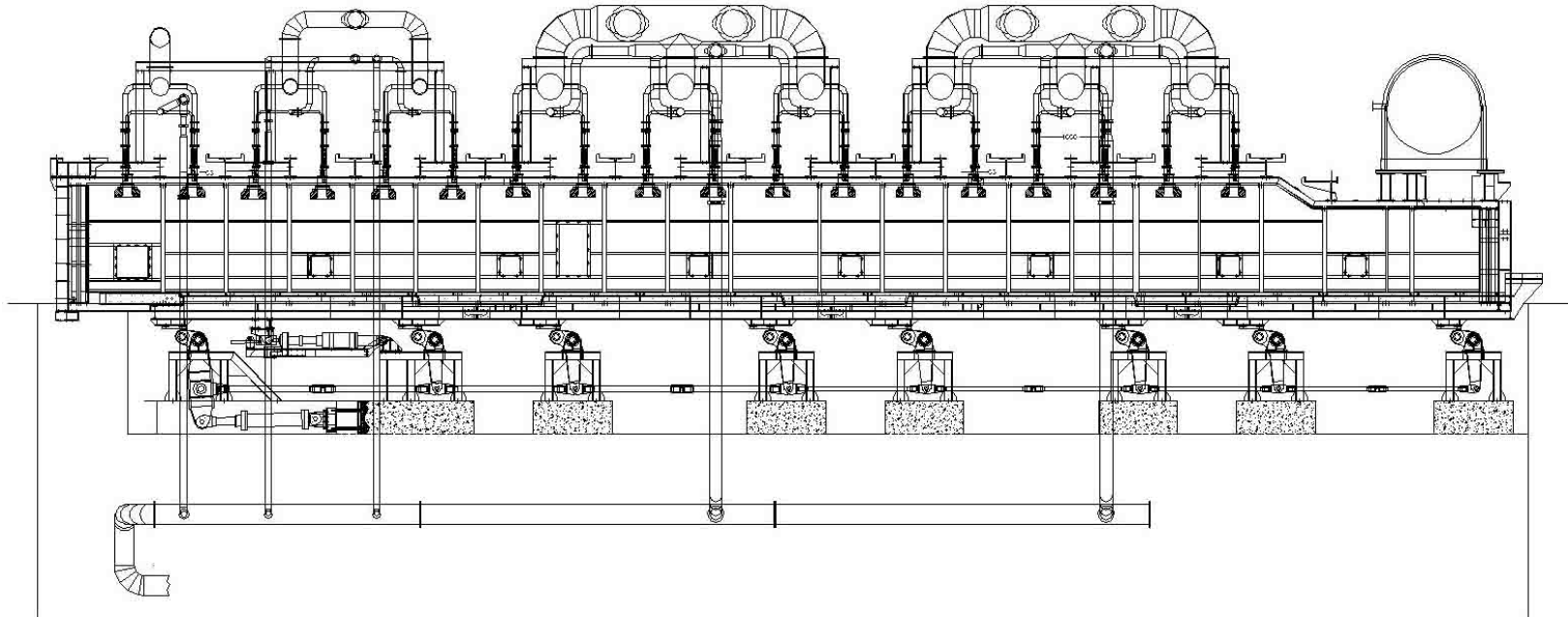
*Lateral Discharging will replace the previous discharge layout which was front discharge.*

*Total rebuild of the mechanical sections of the furnace.*

- **Combustion System**

*Burners: Replaced with new High-efficiency burners.*

*Automation and Control : A new Level 2 Control System will be installed.*



# ***Bloom Transfer and Bench Discharging:***

*The design provides the transfer of the Billets from the furnace with three sections:*

- Pusher and Transfer Car*
- Elevator*
- Entry Roller Tables of the Rolling Mill*

*The design of this section of the facility came out of the need to use the one furnace only during the other's renovation, for both of the mills. The design provided jointly by Duferdofin – and CMV Engineering guarantees that the billets will reach the appropriate temperature for rolling process in times that facilitate the high production of the TMT. This new layout, with the added bench discharging facilities, make it possible to remove the blooms and billets that have not reached the appropriate temperatures to protect the production standards of the TMT Mill.*



Pusher and Transfer Car



Elevator and Discharging Bench

# *The Rolling Mills*

*The entire Rolling Mill was installed on a concrete and steel structural platform that is 5 m in the air. This layout allows accessibility to the auxiliary systems supporting the mill and provides easy access for maintenance. The mill is composed of 20 Mill stands composed of Roughing Mills, Intermediate and Finishing Mill Stands. Between the three groups of millstands are located two shearing machines to cut ends of the product to provide good quality.*

Photo of the Roughing Stands



*To make the product requirements of the long products, the first 12 mill stands alternate between vertical and horizontal configurations. The next 3 mill stands can be converted between horizontal and vertical configuration. This flexibility in mill configuration provides flexibility in the shapes of merchant bars that the mill can produce.*

**The Roughing Mill Stands are composed of 8 sections with the layout :**

- **Pinch Roll**
- **H1-Horizontal Mill**
- **V2-Vertical Mill**
- **H3-Horizontal Mill**
- **V4-Vertical Mill**
- **H5-Horizontal Mill**
- **V6-Vertical Mill**
- **CV1-Shear No. 1**



Layout of the Roughing Mill Stands

# *Rolling Mill*

The **Intermediate Stands** are composed of 7 sections with the following layout:

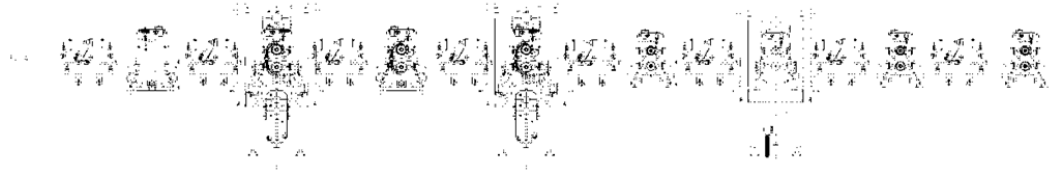
- **H7-Horizontal Mill**
- **V8-Verticle Mill**
- **H9-Horizontal Mill**
- **V10-Verticle Mill**
- **H11-Horizontal Mill**
- **V12-Verticle Mill**
- **CV2-Shear No. 2**



Layout of the Intermediate Mill

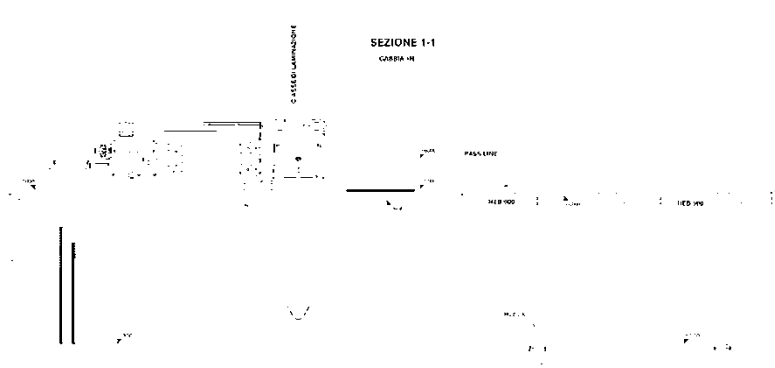
The **Finishing Stands** are composed of 8 sections with the following layout:

- **H13-Horizontal Mill**
- **C14-Convertible Mill**
- **H15-Horizontal Mill**
- **C16-Convertible Mill**
- **H17-Horizontal Mill**
- **C18-Convertible Mill**
- **H19-Horizontal Mill**
- **H20-Horizontal Mill**

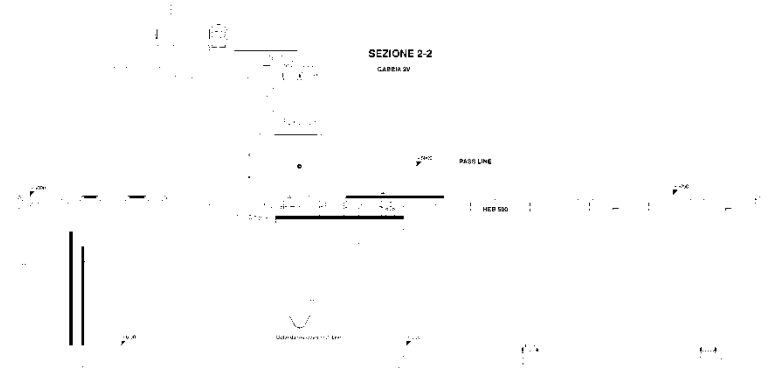


Layout of the Finishing Mill

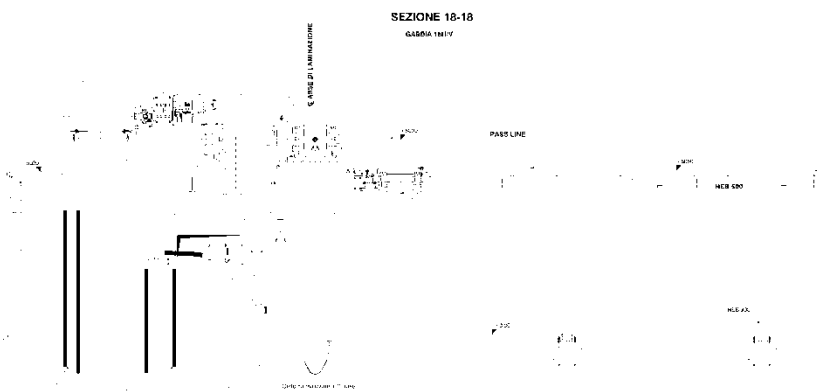
# Rolling Mill



Design of the Horizontal Mill



Design of the Vertical Mill



Design of the Convertable Mill



Photo of the Convertable Mill

# Control Rooms

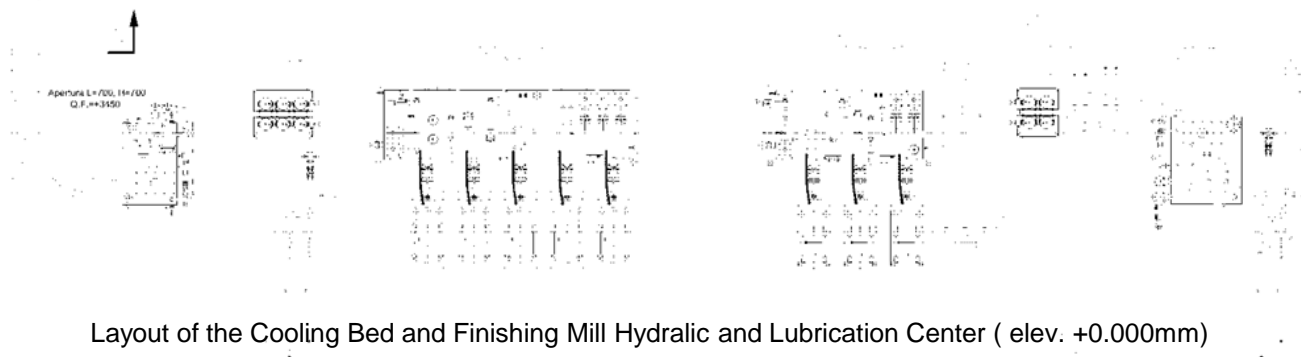
The positioning of the mill on the platform 5 m in the air provides access for the positioning of the Hydraulic, Lubrication and Electrical Control rooms to be placed on the ground level. This position grants easy maintenance and replacement of components.



Hydraulic and Lubrication Equipment



Mill Hydraulic Control Room



Layout of the Cooling Bed and Finishing Mill Hydraulic and Lubrication Center ( elev. +0.000mm)

# *In-Line Quench and Tempering*

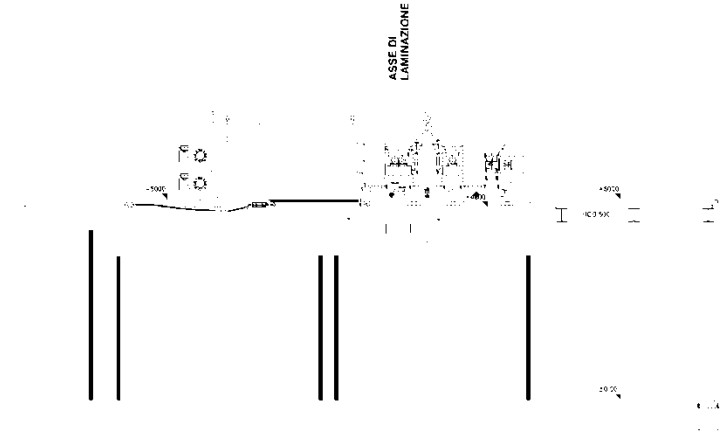
*Provided in the design was an in-line quench and tempering box. At the end of the cooling bed the product is sheared and bundled. These facilities are required for the production of Rebar that meets the international quality standards.*

*The Quench and Temper box is 20 metres long and it rapidly cools the surface of the rebar with water injection once the product leaves the Finish Stands and before the Cooling Bed.*

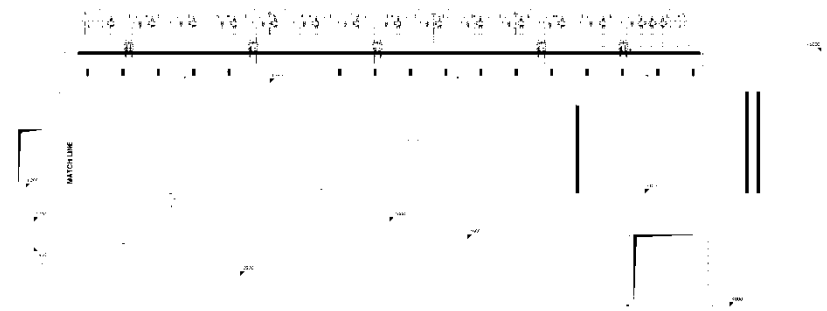
*The flow rate of water is regulated from zero to 800 mc/hr; the water is provided by a dedicated water supply circuit and is filtered and cooled according to the cooling needs required by the product. Only a small part of this water is lost to evaporation, the water lost is replaced by automatically by the pump systems.*



In-Line Quench and Tempering Box



Transverse section of the In-Line Quench and Tempering Platform



Longitudinal section of the In-Line Quench and Tempering Platform

# Wimlér Cooling Bed

The product coming from the finishing mill stand is collected on the cooling bed.

The Cooling Bed is 90 m long and 9.5 m in width.

The cooling surface is a total of 850 square meters, and this is required for the controlled cooling of the product which will reach temperatures acceptable for shearing and banding.

The cooling of the product is natural (by conduction and radiation), however, for products of great thicknesses and high temperatures, the equipment activates a forced cooling of water mist spray (coming from the bottom surface of the cooling bed). This can guarantee the uniform cooling of the product, which at the exit of the cooling bed, will be below 200°C.



Cooling Bed



Transverse section of the Cooling Bed



Foundation of Cooling Bed



Working Level of Cooling Bed

# Straightening and Shearing Stands

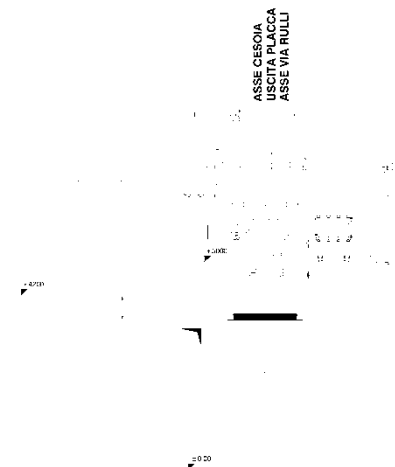
After the product has gone through the cooling bed, it is necessary to straighten the product to achieve geometrical consistency.

Immediately after the Multi-Strand Straightener is located the Pendulum shear to cut the products to length, standard commercial lengths (6 to 12 m) or, by special request of the customer, the lengths can be sectioned from 5 to 18 m.

The shear operates while the product is still moving by cutting with a pendulum motion. During this operation, the shear cuts the edge to eliminate the deformation of the head and tail of the product. Crop ends and mill scale are collected at the ground level (elev. +0.000). This will assure that the shear operates without interruption.



Transverse view and photo of Multi-Strand Straightener



Transverse view and photo of Pendulum Shear



Lateral view of the Multi-Strand Straightener

# Stacking Station

The product after shear is delivered to the Stacking Station where the bars are layered and counted and inserted into a dedicated box where the packages are formed that are suitable for banding and shipment. This station provides many options for dimensions and weight to meet the customer's packaging requirements.

For rounds that are not squared, the bundle is made free form, and are packaged for easy movement with a crane without breaking packaging...

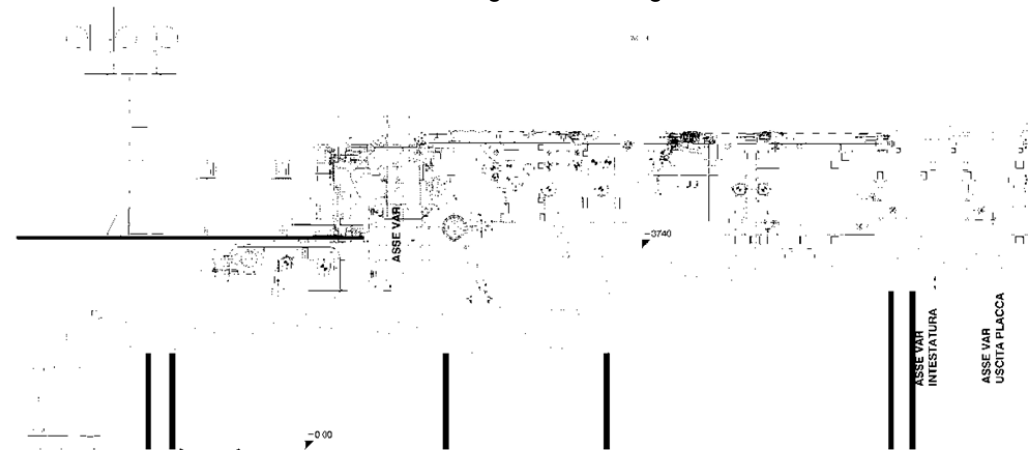
In this area it is possible to form packaging with lengths of product from 5 to 18 m. In cases where the product is less than 9 m in length, the equipment is capable of making two bundles at a time.



Finishing and Stacking Area



A view of the Stand for the preparation of the layers of product



Transverse section of the Finishing and Stacking Area

# Banding, Weighing and Labelling Station

The product at this stage, undergoes the following steps:

- **Banding:** by means of a dedicated machines, the bundles are secured with wire rope of sufficient strength to maintain package integrity sufficient for transport.
- **Weighing:** in-line continuous scale while the product moves on rollers.
- **Labelling:** the application of a label with the following product data:
  - Product.
  - "Heat Number".
  - Weight.
  - Length.
  - Etc.... (Date and lot of production, customer, ....)

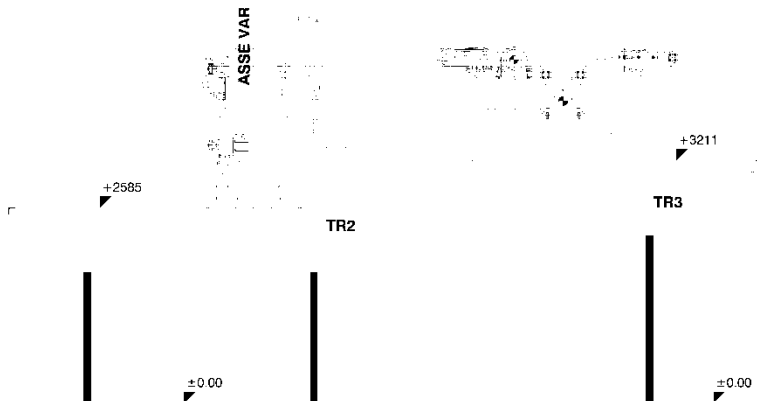
**Accumulator:** Allows the right amount of product to collect to make a crane move.



Bander



Bundle accumulator – Transfer Chains



Cross section of Bundle accumulator and Transfer Chain Bench

# Automation – Control – Product Tracking

Danieli Automation was utilized to accomplish the following :  
Regulate the functional parameters of all of the phases of the production :

- **Rolling:** The Mill Control Speeds, .....
- **Cooling:** The flow and pressure of the cooling water, ...
- **Shear Cut:** The length of the product at the shear, ...
- **Packaging:** Number of pieces and weight of the package, .....

To check , control, and record the the parameters which assure quality

- The **Control** is accomplished by **H.M.I. (Human Machine Interface)**
- The **Recording** and analysis is performed by a **FDA (Fast Data Analyser)**.

The software allows the user to track each aspect of the production which provides the product their characteristics.

