



ROCHE
MESHMAKER

TECHNICAL DOCUMENT

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1 Description

The standard equipment includes:

- The vertical double decoiler.
- The strip hot joining welder.
- The pre-puncher.
- The expander with the strip feeder and the sound enclosure.
- The tab-blanker with the grid feeder and the protective covers.
- The vertical double encoiler.

Optional

- The crane for handling the strip coils.
- The cold welder
- An accumulator between the welding machine and the pre-puncher
- Flat decoiler.
- The rotary plate divider.
- The diverging conveyor.
- Buffer device in case of direct connection with the pasting line

The line could be run from left to right (standard) or right to left if required.

The lug profiles are blanked on the tab-blanker.

2 Process

Our **Roche Mesh Maker 4x5 or 5x6** is dedicated to reciprocal expanding of hard calcium lead strip thickness 0.72 mm up to 1mm:

Positive alloy : Sn 1.2%, Al 0.015%, Ca 0.08 %, Nominal UTS 65 N/mm², Elongation 10 %

Negative alloy: Sn 0.2%, Al 0.006%, Ca 0.10%, Nominal UTS 55N/mm², Elongation 8%

We cut the grid on the divider after pasting exactly on the node line.

For this result, the process includes 3 main machines, the **Pre-Puncher**, the **Expander** to produce the mesh, the **Tab-blanker**, to flatten the mesh and punch the lug holes

2.1 Pre-puncher

The pre-puncher punched the lead strip to produce pilot holes with a high accuracy.

2.2 Expander

The strip feeder of the expander uses an indexing sprocket wheel with the same shape as the pilot holes, driven by an indexing mechanism exactly into the expanding tool.

The tooling of the expander unit includes 4 teeth for expansion and one tooth for reshaping suitable to produce high reliability mesh with no wire distortion, no broken wire and **no future corrosion**. The lead is expanded perpendicular with this mechanism.

One adjustable device is included in the indexing advance system in order to adjust the lug position in accordance with the node line. This device is suitable during the machine running.

2.3 Tab-blanker

The expanded grid feeder uses also an indexing sprocket wheel with the same shape as the pilot holes driven by an indexing mechanism in order to insure high reliability in the lug position.

The plates are blanked 2 by 2 for 144 mm width plates and 3 by 3 for 108 mm width plates.

2.4 Technical characteristics of the produced mesh

1. A standard tolerance of +/- 0.6 mm will be achieved with same mesh height, left and right side from centre.
2. The perpendicular tolerance for node cutting will be +/- 0.5 mm.
3. No crack happens on grid lug, top and bottom frame. Within the range of one-meter-length expanded mesh, no broken wire is allowed on first 1/3 part of grids, no more than 1 broken wire in the 1/3 middle part of grids, broken wires at bottom 1/3 part of grids shall not more than 2 to 3. Any broken wire line should not exceed one point and broken wires in any diamond should not be more than one.
4. Wire nodes are kept perpendicular to the node line at all the time. That provides the ability to cut straight on the nodes with no loose wires generating possible short circuits.
5. In any case, to confirm the feasibility, Ateliers ROCHE requests customer's drawings or technical specifications to give its approval. Excepted, if Ateliers ROCHE is advising the grid design and supplying the drawings thanks to his know-how.

3 Scope of the technical proposal

3.1 Vertical strip decoiler

The double strip decoiler is designed according to a vertical model.

It includes:

- Two mandrels for dual stock reel
- One fixed part fitted on the ground and a turret part able to change the full coil in operation. It is change by means of a foot pedal.
- 2 x 3 jaws mandrels
- 2 gear boxes with motor brakes and overload friction on the driving shafts
- Loading of the coils are done by a suitable crane (see above)

Characteristics:

- Double strip coil (2 x 900 Kg) able to receive 2 bobbins (avoids downtime of production)
- Adjustable decoiling/coiling speed by means of a Variable Frequency Controller
- Loop control with ultrasonic sensor
- Only control panel (all the equipment is included in the line panel)
- **C E** standards



3.2 Hot joining welder

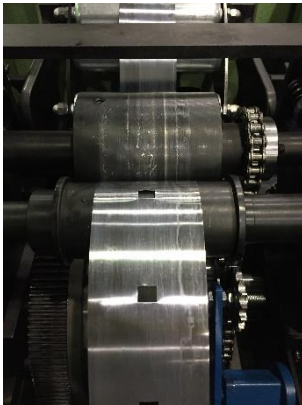
The hot joining welder is designed to quickly strip after strip to insure the continuity of the process even in the paster. It includes:

- Double heating table
- Double zone temperature regulation
- Double handle for pressing
- 2 manual shears for perpendicular cutting of both side
- Low profile frame to save space
- Hot welding with welding wire tin alloy
- Cooling by closed water circuit
- **C E** standards



3.3 Pre Puncher

The pre-puncher is designed to punch pilot holes in the centre of the strip according to the plate design. It includes:



- Base frame to fit on the concrete
- Die cutting head system with multi male / female punches which both cut and eject the blanks while simultaneously indexing the strip on the male die
- Gear box with coupling for die rotation
- One guide box is easily changed in accordance with the strip width
- The guide boxes are pre-set to the dimensions of the strip. 3 guides are supplied.
- Loop control with dancer
- **C E** standards

3.4 Expander

3.4.1 Description



The machine is designed according to a double arch type with double crankshaft and direct drive. The frame is composed of a welded steel lower base and an upper arch fitted onto the base. The lower part receives the expanding tool and the power drive mounted on an adjustable base.

The upper arch features:

- Two crankshafts synchronised together through four drive wheels (lubrication by pump and filter).
- A flywheel powered by an electro-pneumatically actuated clutch/brake.

The crankshafts power four rods mounted on shafts bearings on a slide which is vertically guided by

rollers. The lower part of the slide is fitted with an adjustment wedge.

All the revolving parts are fitted with bearings lubricated by grease in loop.

The dynamic balance is controlled through flyweights.

The tool is fitted onto the slide through 4 hydraulic screws directly onto the upper part of the tool.

The depth of penetration and the expansion of the mesh are set by a wedge system.

3.4.2 Technical characteristics

Nominal power.....	100 kN
Nominal stroke.....	20 mm
Max cutting depth.....	6 mm

3.4.3 Overall tooling dimensions (4+1 teeth)

Positioning is performed through 3 pins and a key.

Length.....	2200 mm
Width.....	400 mm
Height (open).....	290 mm
Punch penetration adjustment.....	4 mm
Nominal rate.....	600 strokes/min
Output (depending on your plate and diamond size).....	up to 40m/min
Motor power (with inverter of 30 HP).....	15 kW - 400 V (IP 55)

The motor features a flywheel.

3.4.4 Overall dimensions of the expander

Length.....	3000 mm
Width.....	900 mm
Height.....	1800 mm
Approximate total weight.....	4000 Kg

The press is mounted onto 2 + 2 absorbers fitted onto 2 ground plates.

3.4.5 Lubrication of the bearings of the expander

The expander lubrication system is centralised in continuous.

The continuous lubrication points are:

- The bearings of the crankshaft on the pinions side, the pinions and the wheel shafts and the connecting rods.
- The manual lubrication point is:
- the rotary coupling (clutch)

3.4.6 Expander tooling configuration

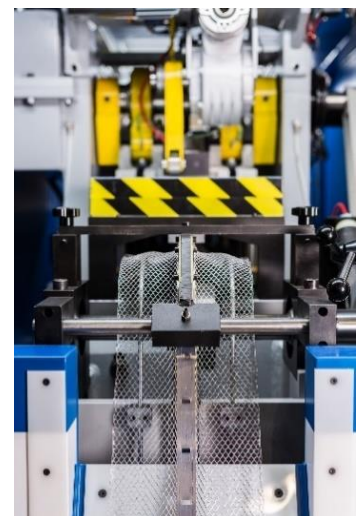
No lubrication is required to expand the mesh. Only dry expansion

The expander tooling is a progressive die tooling suitable to expand the lead strip up to expanded mesh. The central part of the strip is not expanded in order to spare it to punch the lugs of the plates in the middle.

There 4 teeth to expand and 1 tooth to reshape and keep the diamond size with no distortion.

This tooling is suitable to expand mesh with one diamond dimension whatever the grid width.

To be confirmed with plate design.



3.4.7 *Sound and thermal isolation*

It is composed of self-standing panels fitted together.

Structure of each panel:

- Outer steel sheet, thickness 2 mm
- Rock wool, thickness 80 mm
- Protection perforated metal sheet

A local control panel is fitted onto the press through an articulated arm, in order to remove the sound enclosure. The sound enclosure is mobile, mounted on caster wheels for maintenance operations (rearward movement, opposed to the operator).

The sheet output side features a flap window (horizontal hinge), safety height 2 m.

The sheet input side features a flap window (horizontal hinge), a window and a roller feeding basket, safety height 2 m.

2 mobile side windows enable access to the machine (one at the front, one at the back).

On the operator side, 2 articulated doors give access for maintenance and movement.

The glass flap windows are powered by means of hooks.

All the mobile parts are controlled by safety sensors.

Approximate overall dimensions: L = 3,20 m - W = 1,40 m - H = 2 m

Lighting is provided by 2 lights

Noise insulation: - 20 Db A

Noise rating: less than 85 Db A

Upper ventilation tube ϕ 200 (able to be plugged onto your factory air recycling).

A fan insures air circulation.

Air inlet to the motor is fitted with noise insulation.

Electric heaters insure a constant temperature inside the cabin to stabilise the dimensions of the mesh.

Temperature regulation is included.

An air cooler with temperature control could be fitted into as an extra cost option.

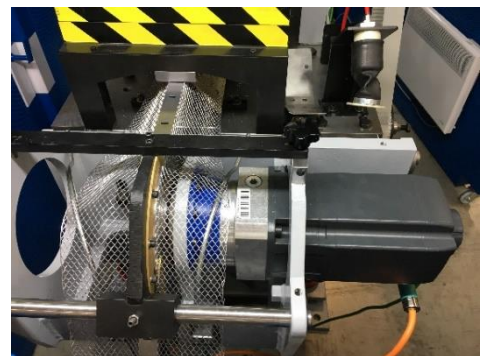
3.4.8 *Servo strip feeder*

It is located on the outlet side for the main drum of the expander.

The strip feeder is provided by means of a drive wheel which meshes with holes punched by a pre-puncher. The distance between holes is half a grid, the dimensions of the holes are in accordance with the plates dimensions. The lead strip feeder is provided by means of a sprocket wheel which move the lead in opposite of a guide.

The feeder is motorized by a servo gearmotor ensuring accuracy, easy adjustment and higher speed.

The pitch of the grid is easily adjustable through the HMI. That solution ease the setting of the line during tooling changeover.



3.5 Tab blanker

3.5.1 Description

The tab blanker is a two-column press with lower control power mechanism. In the lower part, the frame carries a two-bearing crankshaft which drives an eccentric. The eccentric presses on a lower beam connected to two traction columns, ensuring the guidance of the upper beam.

The crankshaft is controlled by a clutch-brake and a flywheel.

The tool is fitted on the upper part of the frame and the tool shutting is triggered by the upper beam coming down.

An hydraulic device protects the press against overload.

The lower beam is adjustable to allow the blanking adjustment (by screw and ratchet). The frame features a chute to evacuate the scrap material and a tool guiding key. It includes a mechanical system to secure the blanking adjustment.

A pulley on the crankshaft drives the sheet advance mechanism.

The lower beam features 2 compensating pneumatic cylinders.



3.5.2 Technical characteristics

Nominal power.....	300 kN
Variable rate	40 to 125 Strokes/min
Motor (Inverter 7.5 Kw)	5 KW / 400 V
Tool overall dimensions	400 x 425 x 200 mm

3.5.3 Overall dimensions

Length.....	2500 mm
Width	1500 mm
Height	1700 mm
Approximate weight	3000 Kg

3.5.4 Scrap

After blanking the lugs, the lead scraps fall down in an internal guide inside the frame of the T-B. At the outlet of the guide, the lead scraps fall down to your disparities (scrap skid).

3.5.5 Protection

The tab blanker is completely protected by means of a sound enclosure which is an integral part of the press. It affords a maximum protection for the operator within a minimum of space. The lower part is composed of mobile panels, allowing easy and fast intervention on the machine. These panels are lined with glass-fibre reinforced rock wool sheets, greatly reducing the sound level.

The upper part is composed of a protection panel with polycarbonate panels, and a mobile cover powered by two gas actuators. This part affords an efficient control of the process while protecting the operator (Safety height 2 m).

All the mobile parts are controlled by safety sensors.

At the entrance of the protective of the tab-blanker, a mobile cover allows easy access to load the grid feeder.

3.5.6 Lubrication of the bearings of the Tab Blanker

The tab blanker lubrication system is centralised, with a timing program.

The automatic lubrication points are:

- the rod
- the bearings and rings of the slide
- the slide adjustment screw bearing
- The manual lubrication point is:
 - the rotary coupling (clutch)

The actuation of the lubrication pump is performed by a timer.

The timing device is only active in auto mode and local control mode.

There is no lubrication on the mesh.

3.5.7 Servo grid feeder

It is located at the inlet in of the tab blanker. The lead sheet feed is provided by means of a drive wheel with sprockets. The drive wheel is powered by a servo strip feeder with close loop control ensuring higher accuracy on the lug size.

The lead grid is maintained against the wheel by 2 lateral crescent-shaped guides. The movement of the sheet is performed on a quarter of a circle, the output of the expanded metal is downward and vertical, after straightening between two rollers.

3.6 Vertical strip encoiler

The double strip encoiler is designed according to a vertical model.

It includes:

- Two mandrels for dual stock reel
- One fixed part fitted on the ground and a turret part able to change the full coil in operation. It is change by means of a foot pedal.
- 2 x 3 jaws mandrels
- 2 gear boxes with motor brakes and overload friction on the driving shafts
- Loading of the coils are done by a suitable crane (see above)
- Pneumatic pressing arm
- Mesh tensioning rollers with guiding rings



Characteristics:

- Double strip coil (2 x 900 Kg) able to receive 2 bobbins (avoids downtime of production)
- Adjustable decoiling/coiling speed by means of a Variable Frequency Controller
- Loop control with ultrasonic sensor
- Only control panel (all the equipment is included in the line panel)
- **C E** standards

3.7 Electrical and Pneumatic equipment of the line

The whole synchronization of the line is done through the loop control arms or ultrasonic sensors between each machinery. The speed calculation is performed with a PLC with 19" touch screen HMI.



The electrical equipment controls the expander and the tab-blanker, the intercommunication with the line, the chute and all the defects. One local control panel is fitted on the expander, the control panel of the T Blanker is included in the front mobile panel of the protection.

Ethernet connection for data collection and telemaintenance available.

3.7.1 Power

- Mains: 3 phases, 380 V up to 415 V, 50 Hz, with neutral and ground, total consumption is 25 KW.
- Control 24 VAC, 50 Hz, 1 PH
- Air consumption is 1 m³ per hour, 6 bars, connections 2 x 1/2 "

3.7.2 Material

- Electrical equipment: Siemens or Allen Bradley
- Protection: for mains equipment: IP 65
- Pneumatics: Aventics

3.7.3 Line operation

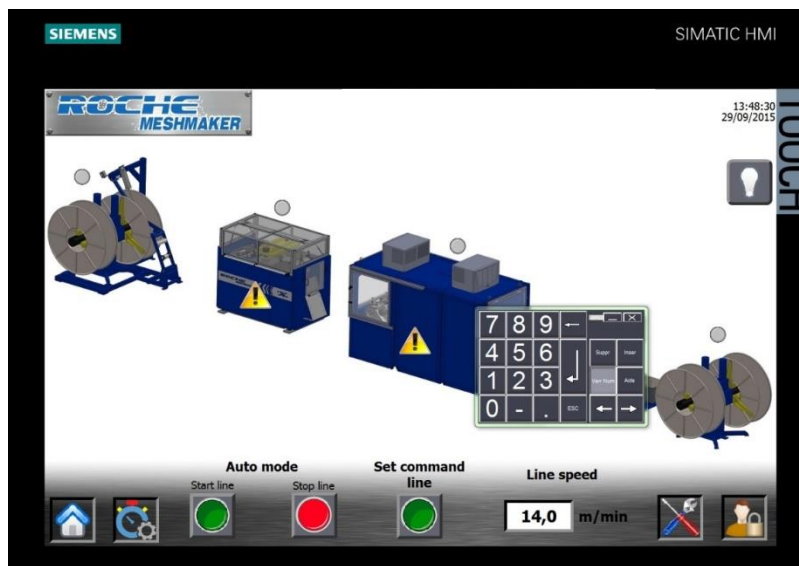
All the operations are performed from the control panels. There are 3 operation modes:

Jog mode Individual mode
 Local control mode..... Individual mode
 Auto mode Mode common to the line

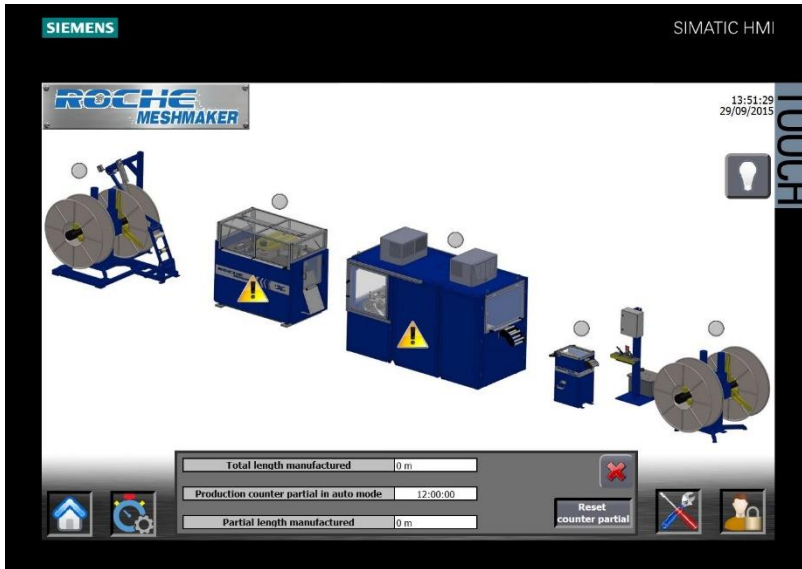
3.7.4 Touch screen

A large touch screen of 19" allows now the operator to adjust the parameters, control the production, and survey the maintenance of the line.

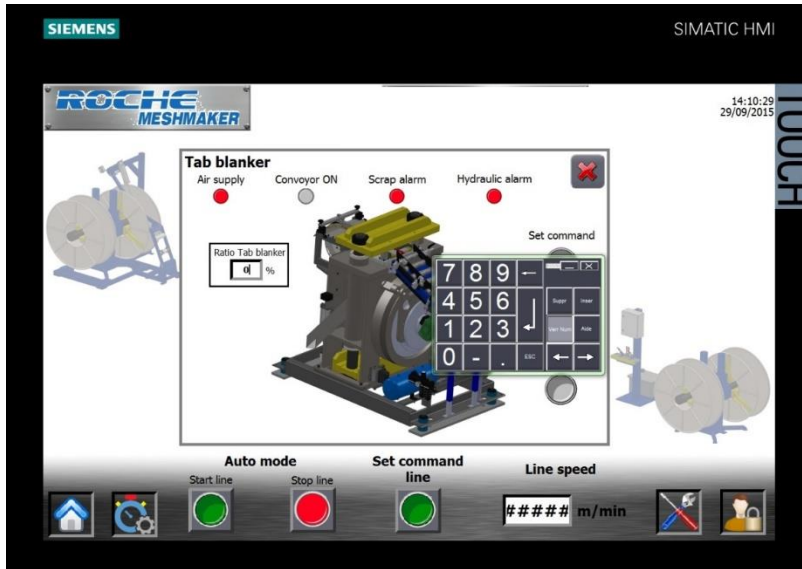
SET UP OF THE LINE SPEED



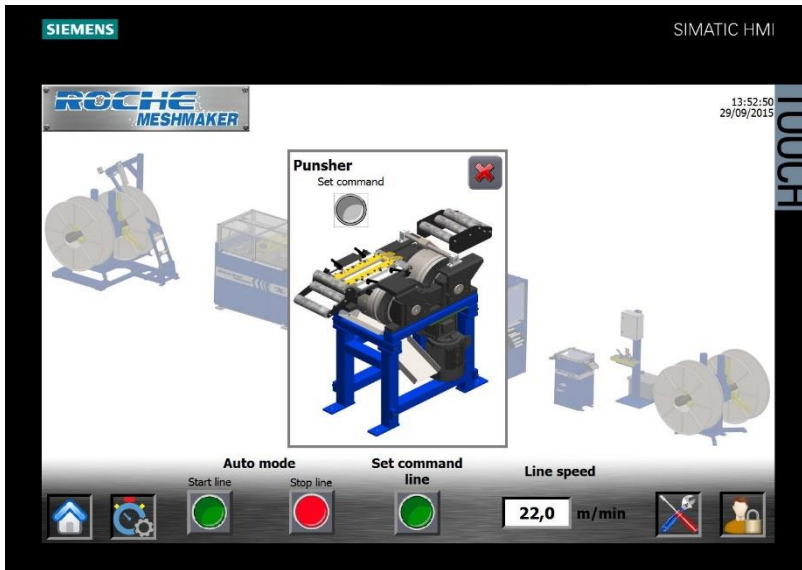
LINE PRODUCTION



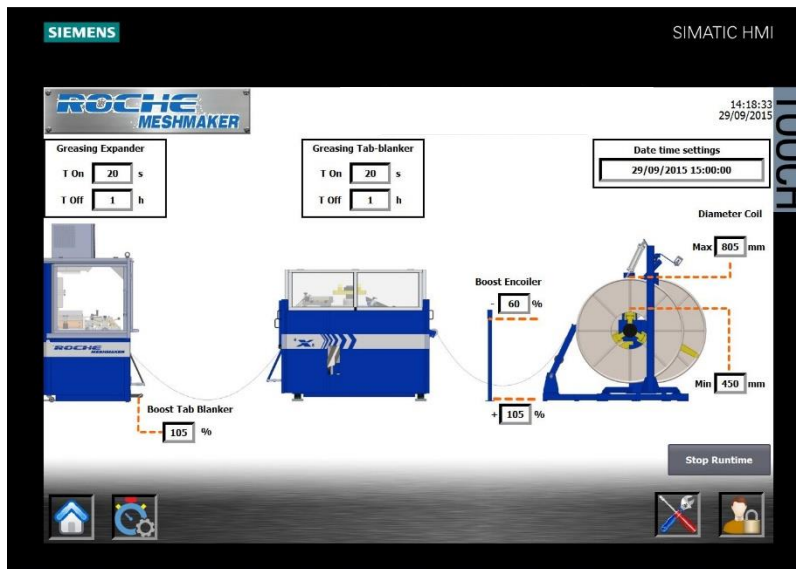
TAB BLANKER SPEED AND ALARMS



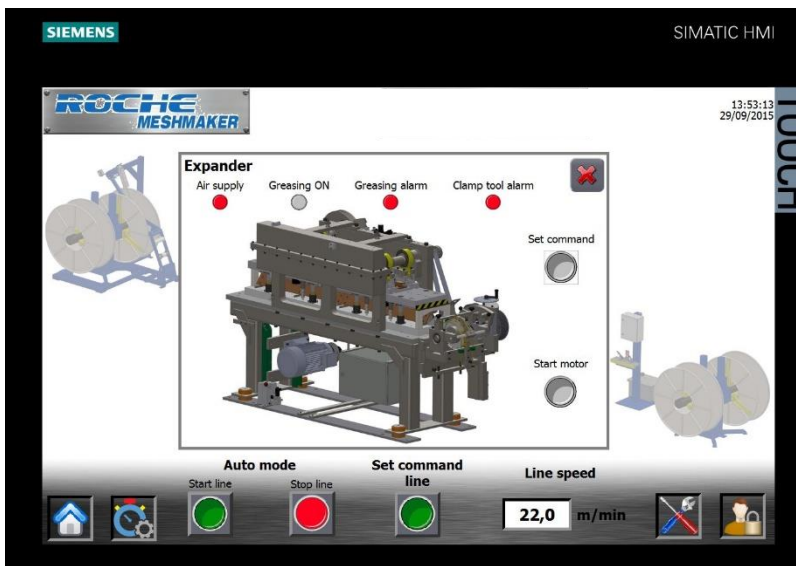
PRE-PUNCHER SCREEN



ENCOILER ADJUSTMENT



EXPANDER ALARMS



4 Optional equipment

4.1 Crane

The floor-mounted jib crane is used to handle the lead coil to load the decoiler and unload the encoiler.

Characteristics:

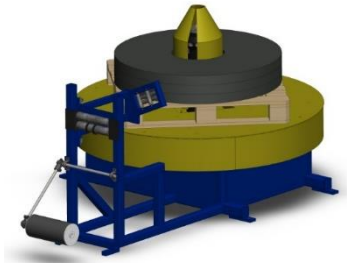
- Lift force: 1 000 Kg
- Electric hoist
- 2 speeds: 4 and 1 meter/ minute
- Arm length: 3 m
- Height under the hook: 3 m
- Complete with emergency stop, anchor bolts, reel cable, control box
- **CE** standards

4.2 Horizontal strip decoiler

As an alternative to the vertical decoiler, we could offer the flat decoiler designed according to a horizontal model.

It includes:

- One welded machine base
- One rotary turn table suitable to receive one pallet of 3 coils of lead
- One dancer stand with strip guide, rollers and control.
- One drive gearbox with VFC
- **CE** standards



Loading of the coils is done by a fork lift.

Characteristics:

- Three coils table with expendable center pin with strip guide
- Table diameter of 1300mm
- Speed from 0 to 20 rpm
- Max. load of 3000 Kg
- Adjustable decoiling speed by means of a Variable Frequency Controller
- Local control panel with all the equipment included
- **CE** standards

4.3 Cold welder

The use of cold welding provides the above advantages.

- **Better productivity using even connected parts.** The cold welding machine is not using heat but only physical force which is oil pressure for welding strips making use of lead metallic construction feature under normal temperature. Thus cold welding system can guarantee higher operating rate of machine of machine of all the process than heat welding system because there is no need of cutting out the connected parts of strips stopping the machine which is difficult in heat welding system. This will also economize lead consumption.
- **Stronger construction and easier-to-use design.** The machine's main parts are 2 welding which heads are made of only 1 body so that it does not get damaged even after long time use. The movement is very simple which enables whoever could run the machine.
- **Wider compatibility.** The cold welding machine is designed to be able to be controlled welding distance and welding speed, with which customer could weld wider variety of strip kinds depending on thickness, width, strength and alloy ratio.
- **Shorter changing over time.** Tooling parts are assembled of inserting system. So customer can change it in a very short time and very easily.
- **Shorter tack time.** Tack time is shorter than the old model because horizontal and vertical welding is done simultaneously.



4.4 Horizontal lead strip accumulator

The strip accumulator is dedicated to the accumulation of lead strip in order to enable continuous running of the main expanded metal line.

Technical features

- Local control panel
- Entry Stand included
- Exit Pull-Out Pinch Roll included
- Exit Stand with pass-line compensator with loop arm
- Powered inner table drive
- Outer basket pneumatic expansion

Technical specifications

- Strip width : 50 to 100mm
- Strip thickness : 0,55 to 1,2mm
- Storage capacity : 400m
- Line speed : 40 m/min
- Feeding speed : 60m/min



4.5 Buffer device

The buffer device is used when you have the pasting line directly after the meshmaker line. It is designed to store several meters of meshed grid in order to damp the different time of acceleration between the meshmaker line and your paster. It includes:

- Double roll for traction
- Insure continuous speed for the paster and enough spare mesh for acceleration when the line start with the master done by the paster
- Time acceleration 5 seconds max
- Variable speed with an inverter
- Roll guides
- Loop control with 2 ultrasonic sensors
- Only control panel, all the equipment is included in the line panel
- **C E** standards



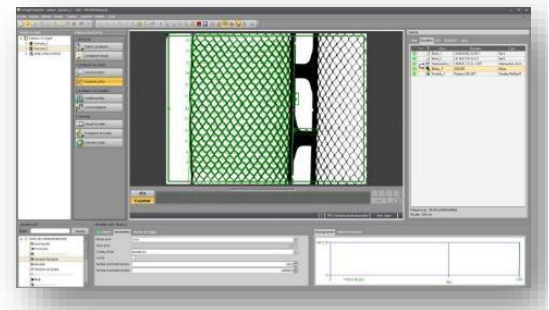
4.6 Camera control – Quality process improvement

Last innovation from Ateliers ROCHE, the camera is getting your grids production in a new era of quality. Positioned just after the tab-blanker, the camera is monitoring:

- Height dimension
- Nodes alignment
- Broken wires

Specifications:

- Accuracy: 0,3 mm
- Acquisition time: 1 ms
- Field of view: 350 x 300 mm
- Local display



4.7 Rotary plate divider

4.7.1 Description

The rotary plate divider is designed to separate grids from pasted mesh according to the plate design. It includes:

- Base frame to fit on the concrete
- Die cutting head module for one grid size
- Gear box with coupling for die rotation
- One guide box is easily changed in accordance with the strip width
- The guide boxes are pre-set to the dimensions of the strip
- Dancing roller arm for loop control with emergency stop
- Only control panel (all the equipment is included in the line panel)
- **Fast tooling change device**
- **C E** standards

4.7.2 Accessories

- Set of cutting blades
- Diverging conveyor to be placed after the rotary divider