

# STUDIO CATTANEO

## CONSULTING AND INDUSTRIAL ENGINEERING

*socio associazione italiana progettisti industriali*

*MEMBER ASSOCIATION OF ITALIAN INDUSTRIAL PROJECTS*



# EXAMPLE OF PROJECT FOR COMPLETE GRATING FACTORY

# LAY-OUT DESCRIPTION

- With this presentation we want to illustrate an example of factory wich deals with the production and the working/making of grating .
- The layout below shows schematically all the machinery working , displayed in a logical and productive pattern. It starts from raw material reception area , then go through the various stages of processing , and end in the storage area of the finished products.



# GENERAL DESCRIPTION EQUIPMENT

- WELDING LINE FOR GRATINGS
- TWISTED WIRE MACHINE
- AROUND WIRE MACHINE
- LOADING AND UNLOADING COILS PLANT
- STRAIGHTENING AND PROFILING LINE
- CUTTING GRATING BAR MACHINE TYPE A/B
- CUTTING GRATING WIRE MACHINE
- SHARPENING MACHINE
- FRAMING MACHINE FOR GRATINGS
- CHILLER PLANT

The image displays three technical drawings of the SPS 1000 machine:

- Top View (Left):** A side profile of the machine showing its long, rectangular structure. Dimensions include a total length of 10000 mm and a width of 1500 mm. A small detail of the control panel is shown on the right side.
- Top View (Middle):** A side profile of the machine showing its long, rectangular structure. Dimensions include a total length of 10000 mm, a width of 1500 mm, and a height of 1000 mm. A small detail of the control panel is shown on the right side.
- 3D Perspective View (Right):** A detailed 3D rendering of the machine, highlighting its internal components and structure. Labels point to specific parts: "C-1000" (the main body), "C-1000" (the control panel), "C-1000" (the control panel), and "C-1000" (the control panel).

# WELDING LINE FOR GRATING



NR. 1 WELDING LINE , TYPE CW-1000-CC

Max. welding width	mm.	1000
Bearing bar height	mm.	25-70
Bearing bar thickness	mm.	2 ÷ 4
Connecting round wires diameter	mm.	4 - 5 - 6
Connecting twisted square wires	mm.	5x5 and 6x6
Center-to-center bearing bars	mm.	30
Center-to-center connections	mm.	50 ÷ 200
Width of panel	mm.	800 ÷ 1000
Length of panel	mm.	3000 ÷ 6100

Max. welding section sq. mm. 1200



The plant consists of :

A ) Welding machine

B ) Coils feeding plant unwinders and straightening calenders .

C ) Bearing bars cutter .

D ) Back unloading table, rollers and rolling machine

The welding machine produces grating using the continuous feeding system and more precisely uses the bearing bars which are drawn directly from the roll of a sheared band.

This system is utilized for bearing bars of section mm. 20x3 up to max. mm. 70x4.

For bearing bars section from mm. 40x4 up to mm. 70x4 the welding machine produces grating using bearing bars previously straightened and cut in length using our straightening machine .

The welding machine is supplied ready to manufacture gratings with 2 different center-to-center ( 25-34 ) between bearing bars at your choice you have to precise .



## A) WELDING MACHINE EQUIPMENT

### 1 ) Basic execution

- Machine frame
- Regulable press top cross beam
- Magnets support, with 5 regulable magnets for connecting wire positioning
- Electronic feed devices with bearing bars hoisters.
- Bearing bar holding claws
- Electrical feeding energy 380 V 50 Hz three phase

### 2 ) Control and check board

In the control panel is placed one programmable control PLC ( SIEMENS ) .

The machine , the welding process and all auxiliary functions are totally controlled by a micro-processor.

This micro-processor receives data and information from a series of sensors and detectors placed on the machine.

Such information and data are computed and compared in real time with the software directing the system's eeprom. The micro-processor is thus in condition to immediately act and send the corresponding signals to the actuators.

It thus supervises efficiently the welding machine.

The system's software, memorized in the eeprom, is easily adaptable to the most different customer production requests.

All equipment is completely enclosed into IP 54 protected control panels.

All pushbuttons are ergonomically placed, in order to make the operation easy and to grant maximum safety to the operators.

All the operations are automatic by program or manual by proper controls.

### 3 ) Connection wire dispenser and transversal connection cutter

It consists of a tubular frame, mounted on a grooved wheels, sliding on rails.

On the top part of the trolley is installed the connecting wire distributor, consisting of a storing container, able to contain round or square twisted connecting wires.

In the back of the wire dispenser support it is assembled the cut device to cut simultaneously the connections projecting from the panel of grating.

The cut is done by two cutting shears, each equipped with an hydraulic cutter.

The cutting shears, each equipped with blocking supports, can slide on a bridge guide installed on the supports, in order to allow for a regulation in height of the bridge itself.

Suitable regulable supports drive the panel, coming out from the welding machine, up to the cutting shears.



## **B) COILS FEEDING SYSTEM WITH UNWINDERS AND STRAIGHTENING CALENDERS**

It consists of 8 containers for sheared strip rolls from coils and of 4 container supports.

Each support has a base plate, made of welded steel profiles, on which the bearing shaft and a circular platform are mounted, rotating on heavy duty roller bearings. On the underlying shaft of the platform a disk brake operates pneumatically controlled with two functions:

1st) to maintain a constant braking on the platform.

2nd) to release and block the platform rotation in synchrony with the welding machine advancement.

The container consists of a circular platform, diameter 1300 mm. approx. with a hollow shaft diameter about 400 mm, welded to the platform.

For separation of the strip coils, 15 driving plates are provided.

Each container has a max. capacity of 15 rolls, max. size 40 x 4 mm.

The roll dimensions are:

- minimum inside diameter 500 mm.
- maximum outside diameter 1200 mm.

The rolls installed in the same container should have the same outside diameter.

The feeding plant is installed ahead of the welding machine, and is synchronized with the electronic forward movement. The straightened bearing bars are therefore delivered to the machine directly from the roll.

The system gives the possibility to produce grating continuously.

Thus, the grating mat length is obtained as the sum of steps.

### **C) ON LINE BEARING BARS CUTTER**

The welder feeding by wire dispenser unwinders makes the installation of an in-machine bearing bars cutter after the welding zone necessary, in order to obtain the mats of the production in continuous of the grating.

The cross cutter of bearing bars consists of a specially made electrical motor, equipped with a special disk saw max. diameter 600 mm .

The motor is anchored to a support, complete of grooved rolls, sliding on a bridge beam with prismatic guides.

The bridge beam is movable so that it is able to cut in the middle the pitch between the cross bars . The whole is enclosed in a blade protection carter.

The cutting machine has a max. cutting power for the bearing bars up to 40x4 mm.

#### **D) BACK UNLOADING TABLE, ROLLERS AND ROLLING MACHINE**

It consists of an horizontal tubular frame, movable thanks to compass supports, rotating on ball bearings, and of a steel profile base plate. Two threaded move bars, operated by a ratio motor, drive the opening/closing movement of the compass arms in order to change the height of the frame in relation to the base plate.

By changing the height, the table can store several panels.

The table is mounted afterwards the welding machine and can reach up to a max. height equal to the welding level and a minimum height lower than 400 mm. approx.

By adequately selecting this movement it is possible to receive the outgoing grating panels and pile up them in package.

All electrical controls are put together inside of a metal control panel.

In order to improve the discharging phase of the grating raw mat from the welding line and consequently to reduce the catch of the machine, this latter can be supplied with a rollers table and relevant rolling machine for moving the grating raw mats package.

The rollers table is constituted by a steel profiles bearing structure, supporting horizontal arms with rotation of 90 degrees and movable beam equipped with two fixing pneumatic vices and its function is that to shorten the catching time of the machine as, after having executed the cut of the raw mat on the welding machine through the cutting machine mounted on the chariot, the raw mat is immediately seized by the movable beam and sliding on the horizontal arms it is carried to a precise position on the discharging table, in order to allow the welding machine the prosecution of the welding phase.

While the welding machine keeps on welding, the horizontal arms of the rollers table open at 90 degrees, allow the falling of the grating raw mat on the discharging table and get back to the initial position.

Once that on the discharging table a package of raw mats has been formed height 400 mm. abt., the same continues the descent allowing the raw mats package to lean on the fixed rolling machine, which is constituted of a structure with steel profiles and free rollers.

Above the rolling an adequate pushing device provides the scavenging of the grating raw mats package.

Once that the scavenging has passed, the discharging table gets up to a suitable height to receive the grating raw mat from the rollers table. The scavenging and ascending passages of the discharging table happen while the welding machine continues its welding phase.

## **FIXTURE FOR EVERY DISTANCE BETWEEN CENTERS OF BEARING BARS FOR THE WELDING MACHINE**

(FOR THE TYPE OF DISTANCE BETWEEN CENTERS YOU SHALL INDICATE US).

## **PRODUCTION**

The production output is about 75 panels on an 8 hour shift, size mm. 1000 x 6100 with bearing bar thickness 2 and 3 mm .( pitch between cross wires 100 mm. )

With bearing bar thickness 4 mm and cross wire diameter 6 mm. the machine can produce about 25 panels size 800 x 6100 mm. on an 8 hour shift (pitch between cross wires 100 mm. ).



## CONSUMPTIONS WELDING MACHINE CW-1000-CC

### 1) Electrical

N. 1 transformer of 3000 KVA at continuous service with delta connection on the primary circuit of medium voltage and Y-connection on the secondary circuit of low voltage (secondary voltage 380V - frequency 50 Hz).

For the protection of the transformer it is necessary to foresee n. 1 switch of medium voltage with characteristics respecting the norms in force.

For the protection and distribution of the current from the transformer to the welding machine it is necessary to foresee a magnetothermic switch of adequate power ( 6000 A. abt.) with automatic release device.

It is advisable that all other foreseen machines for the different workings and the general services of the factory are fed by an independent medium low-voltage transformer, in order to limit as much as possible troubles caused by the welding machine.

### 2) Compressed air

The welding machine needs compressed air at a pressure of 6 : 8 bars in the quantity of abt. 500 lts/minute.

### 3) Cooling

The cooling circuits of the welding machine and of its control board need clean filtered water in the amount of 30 cubic meters/h at a pressure of 2,5 : 4 bar at a recommended temperature of abt. 15 degrees C.

### IMPORTANT NOTE

The temperature of the cooling water must never exceed 18° degrees Centigrade in order to assure a correct operation of the welding machine and of the welding controls at the maximum speed.

### IMPORTANT

a) For the welding machine CW-1000-CC we inform you that the electrical energy, the transformer characteristics and the feeding lines must assure a max. tension fall of 30 Volts in order to obtain a correct running of the welding machine and of its controls.

### b) Cooling water

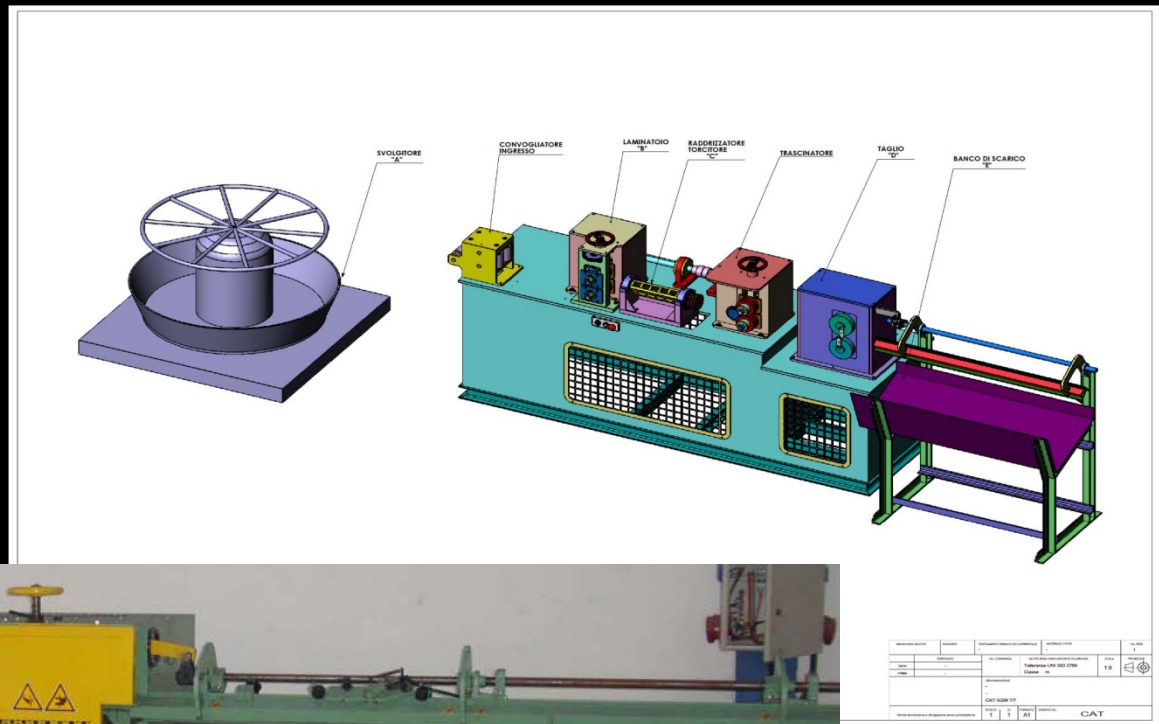
The cooling water must have a hardness minor than 10 degrees (French) and must be filtered with 100 microns .

**MACCHINE ACCESSORIE**

**ACCESSORY MACHINES**

# LINEA PRODUZIONE FILO QUADRO RITORTO

## TWISTED WIRE MACHINE



## MACHINE TYPE CW-SQW-7/7 FOR MANUFACTURING TWISTED WIRE

This special machine has been designed to twist, straighten and cut wire, max. section 7 mm. , min. section 4 mm , starting from round section wire.

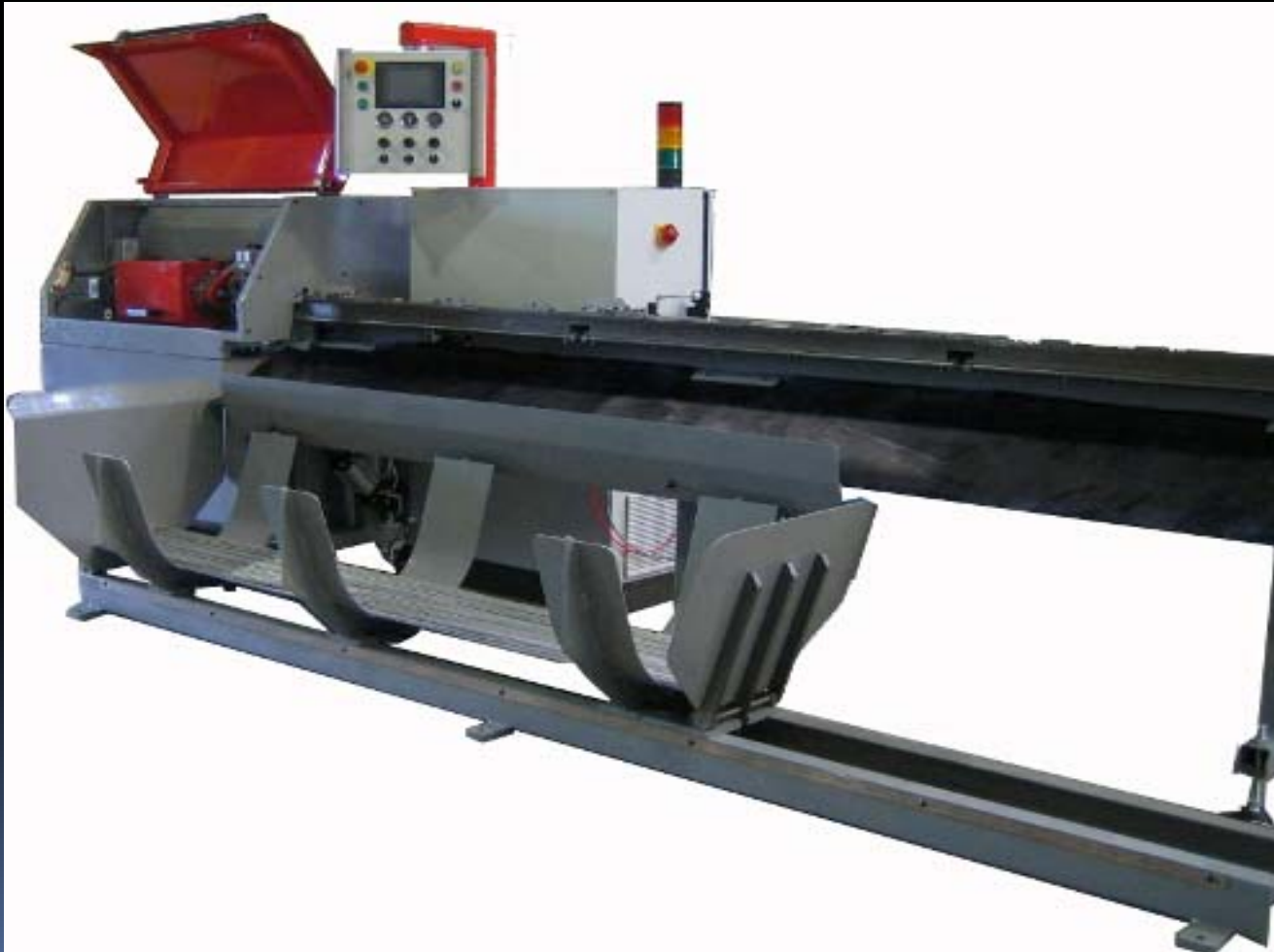
The machine supplies the product twisted, straightened and cut according to a pre-selected length .

The machine is equipped with an electronic motor 30 HP, an pneumatic friction and a motor 5,5 HP for the cutting .

### Characteristics

- |                       |           |
|-----------------------|-----------|
| - Speed approx.       | 55 m/min. |
| - Min. cutting length | 600 mm.   |
| - Max. cutting length | 2000 mm.  |

# LINEA PRODUZIONE FILO TONDO AROUND WIRE MACHINE



## WIRE STRAIGHTENING MACHINE TYPE CW-RW-6/20

Machine for straightening and cutting-off round wire up to max. 6 mm. diameter and max. 2000 mm. length.

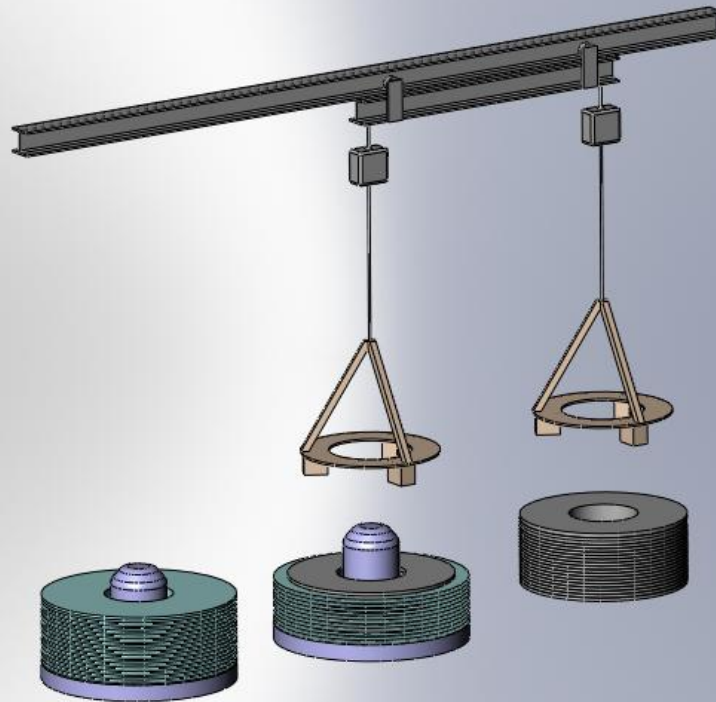
Machine works with wire rod in rolls of 1000 Kg.

Production: 60 m./minute

The machine is driven by one electrical motor , of 20 HP , 380 V - 50 Hz.

# LINEA PREPARAZIONE CARICATORI COILS

## LOAD AND UNLOADING COILS PLANT TYPE CW-LOAD-1200



# LOAD AND UNLOADING COILS PLANT TYPE CW-LOAD-1200

## Characteristics

Max. weight sheared plate coil	Kg.	500
Max. weight baffle plate separator	Kg.	60
Max. plant carrying capacity	Kg.	1000
Coils lifting: electric hoist chain type		
Separators lifting: by pneumatic group		
Feeding voltage		380V 50HZ

## The plant is composed by:

Nr. 1 movable sliding beam length m. 6 approx.

Nr. 1 hoister in iron structure complete of nr. 3 electropermanent groups , suitable to lift the strip coils.

The above hoister is hooked to the electric hoist.

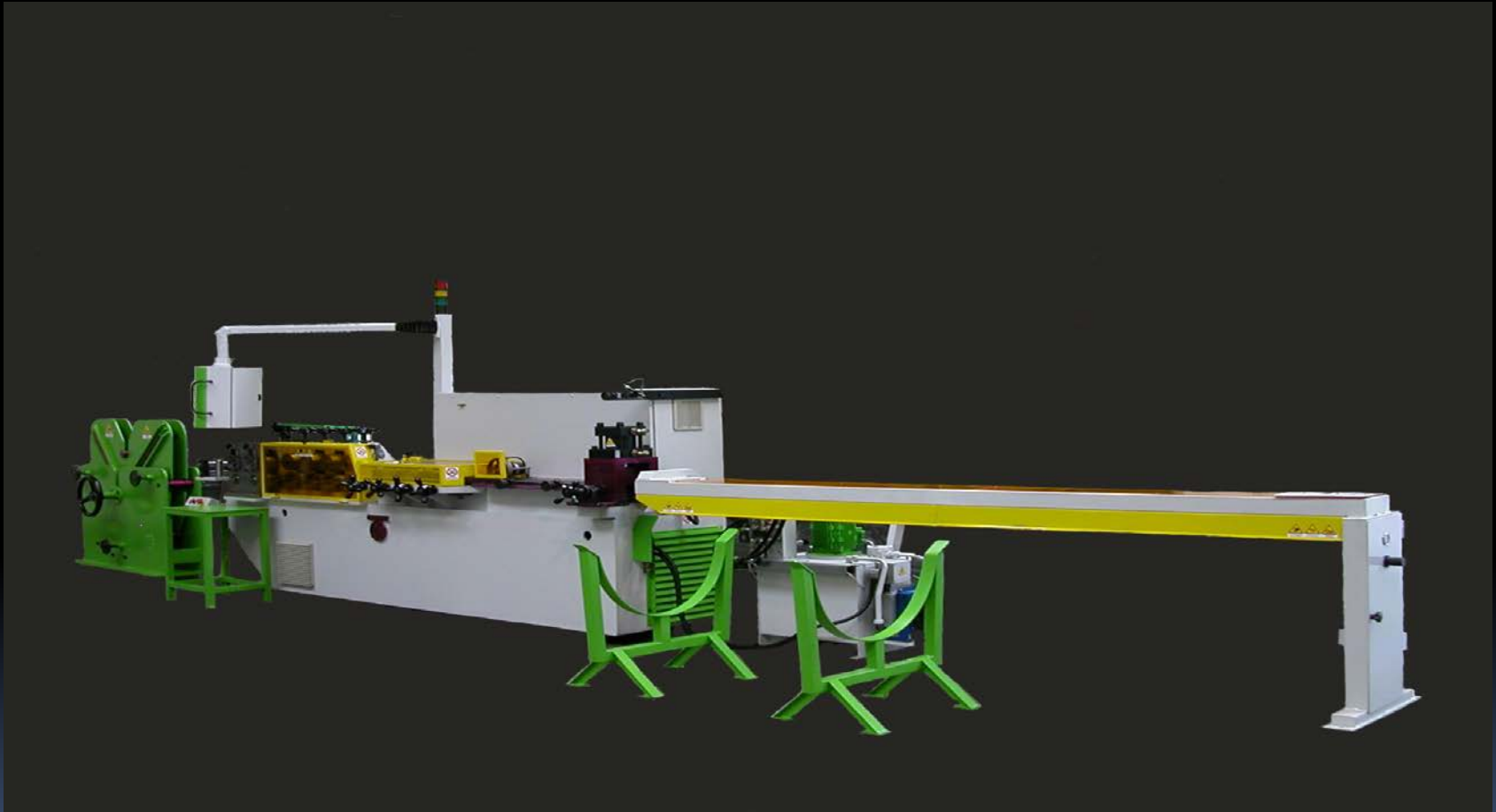
Nr. 1 hoister in iron structure complete of Nr. 3 electropermanent groups , suitable to lift the coils separators. The above hoister is hooked to the group of the pneumatic cylinders suitable for the lifting.

Nr. 1 check equipment for the magnetization and demagnetization of the electropermanent groups. It includes the automation for the de-coupling of the two hoisters.

The six electropermanent groups installed on the above plant allow that in case of black-out due to electric energy the possible suspended coils or separators remain attached avoiding their casual fall.



**LINEA DI PROFILATURA E RADDRIZZATURA PIATTO**  
**STRAIGHTENING AND PROFILING MACHINE TYPE CW-PRF-70/5**



# STRAIGHTENING AND PROFILING MACHINE

## TYPE CW-PRF-70/5

Straightening and cutting machine to straighten and cut iron material with flat section, up to 70 x 4 mm .

Straightening and advancing system of the material through rollers with horizontal and vertical axles.

Cutting system with shears and hydraulic control.

The machine is supplied complete of n. 2 engines:

one for the shears and one at variable speed for straightening and advancing.

Cutting table with pneumatic discharge by electronic control length 7 m. .

Advancing speed: 30 - 60 m/l'

By an adequate equipment mounted on the chassis of the machine profiled flat bars ( frames) can be obtained. They are necessary to frame the grating panels by the welding machine CW-FRM-1000 .

# TAGLIERINA PER GRIGLIATO

## CUTTING MACHINE TYPE CW-CUT-1000/A



# CUTTING MACHINE TYPE CW-CUT-1000/A

The cutting machine is intended for cutting the grating panels to the wished lengths.

## Characteristics:

Effective cutting length 1300 mm.

Cutting efficiency 60 x 4 mm.

It consists of a special made electrical motor, 35 HP, which drives a cutting blade of special steel, max. diameter 600 mm. and max. thickness 6 mm.

The motor is anchored to a support equipped with grooved wheels, which rides on prismatic rails.

The advance movement of the motor support is given by means of a hydro-pneumatic driving cylinder, and its speed is continuously regulable by flow control.

The lock of the grating to be cut is obtained by two chucks, controlled by pneumatic cylinders.

# TAGLIERINA PER RECINZIONE O PANNELLI SANDWICH CUTTING MACHINE TYPE CW-UNDERCUT-2000/B



# CUTTING MACHINE TYPE CW-UNDERCUT-2000/B

This special machine is a high speed cutting machine , for cutting grating panels to the wished lengths.

## Characteristics:

Effective cutting length 2000 mm .

Cutting efficiency 40 x 4 mm .

It consists of a special made electronic motor, 40 HP, which drives a cutting blade of special steel, max. diameter 600 mm. and max. thickness 6 mm.

The motor is anchored to a support equipped with another brushless motor that handles the translation .

A laser beam allows to control the perfect regularity of the cut .

A sophisticated software, manages all aspects: speed , torque , advancement , rotation of the blade . The machine can receive for USB all cutting length .

One touch screen display , allows you to interact with all the functions of the machine .

The lock of the grating , that have to be cut , is obtained by two chucks, controlled by electronic cylinders.



# REFILATRICE TRASVERSALE PANNELLI TRIMMING MACHINE TYPE CW-WR-10



# TRIMMING MACHINE TYPE CW-WR-10

This machine is intended for trimming the grating panels.

It is driven by an electronic motor 380V, 50HZ. and a hydraulic unit .

The cut is made with a special hydraulic tool .

The trimming machine is equipped with an electronic forward movement for an easy working . In this way the panel moves automatically on the guides and the operator does not tire .



AFFILATRICE AUTOMATICA PER LAME DENTATE  
AUTOMATIC SAW-TOOTH DISK SHARPENING MACHINE TYPE CW-SH-600/6-A



# AUTOMATIC SAW-TOOTH DISK SHARPENING MACHINE TYPE CW-SH-600/6-A

Automatic machine to notch and sharpen the cutting - disks.

Maximum diameter sharpened disk mm. 600  
and thickness 6 mm.

# BORDATRICE AUTOMATICA PANNELLI GRIGLIATO/RECINZIONE

## FRAMING MACHINE FOR GRATINGS TYPE CW-FRM-1000



# FRAMING MACHINE FOR GRATINGS TYPE CW-FRM-1000

## WELDING MACHINE TYPE CW-FRM-1000 FOR WELDING THE HEAD-FRAMES TO THE BEARING BARS

### Technical characteristics

This machine has been specially designed to solve the problem of framing the grating panels ; it welds the banding bars ( frame) to the bearing bars.

The panels lock is guaranteed by hydraulic vices, which ensure an optimum contact with the bottom fixed electrode.

When introducing the frame to be welded into the machine, a series of electro magnets provides to place it in convenient position, in line with the moving electrodes, which are driven by the welding heads.

The max. welding width is of 1000 mm.

The minimum distance between bearing bars is of abt. 15 mm .

The ratios between thicknesses of bearing bars and banding bars are the following:

Bearing bar thickness

heights 20 to 40 mm.

Banding bar thickness

heights 20 to 40 mm.

Thickness 2 mm .

" " 3 "

" " 4 "

Thickness 2 mm .

" " 3 "

" " 3 "

All the operating phases are completely automatic.

Thus, after introducing the banding bar and the panel to be welded, and started up the machine by means of push button or foot pedal, the machine programmes automatically all following operations to the end.

The hydraulic system is controlled by solenoid valve and is fed by a high pressure pump.

There is an oil cooling system, with circulating water, to keep the oil temperature low.

The pneumatic plant is centralized, and the air must be lubricated.

Precision regulators control the pressure.

The operating pressure is of abt. 4-6 bar.

The machine is cooled by recirculation cooling water, which cools the transformers, the thyristors, the current conductors, the electrode bearers, both moving and fixed.

The electronic control is enclosed into a metallic panel, and ensures a perfect regulation on the welding power.

A series of electrical controls ensures the perfect working of the hydraulic circuit.



# CONSUMPTIONS OF THE MACHINE TYPE CW-FRM-1000

## A) Electrical

The machine needs for its operation a line transformer 400 KVA, continuous duty.

Connecting voltage 380 V, 50 HZ.

## B) Compressed air

The machine needs compressed air at 6 bar, quantity 400 l/min.

## C) Water

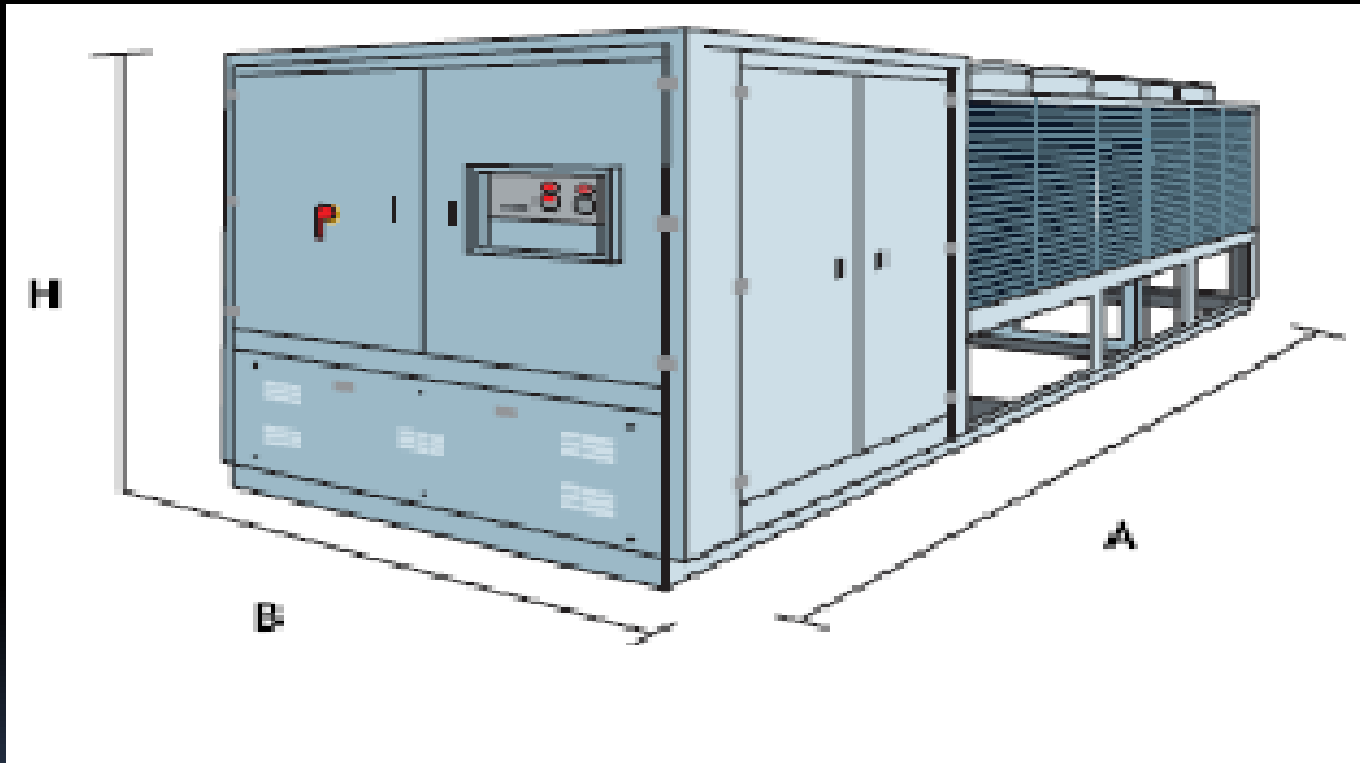
The cooling system of the welding machine needs clean filtered water in the amount of 2 - 3 m<sup>3</sup>/h. at the pressure of 2,5 to 4 bar.

## Important notice

The cooling water temperature should never be allowed to exceed 18 degrees C. (in order to assure a correct working of the welding machine and of the welding controls).

# CENTRALE CHILLER PER RAFFREDDAMENTO IMPIANTI SALDATURA

## CHILLER PLANT CW-RACA-E1942 SUPERPLUS



# CHILLER PLANT CW-RACA-E1942 SUPERPLUS

## TECHNICAL

## CHARACTERISTICS

<b>Refrigerating section</b>	<b>T. OUT</b>
Refrigerant	Raca Type R134A Type
Capacity rating	
Outlet water temperature	420kW
Ambient temperature	12 °C
Riduzione di capacità	35 °C
Water temperature range	0-25-50-75-100 %
Ambient temperature range	-8 / +15 °C ÷ °C
Cooling circuits	-10 ÷ +45 °C ÷ °C
Water circuits	2 No.
<b>Compressor section</b>	1 No.
	Semi-hermetic screw
Compressor	comp. Type
Absorption power per one	2 No.
<b>Condensator section</b>	63 kW
Design ambient temperature	A Type
Airflow In - Out	45 °C
	Directio
<b>Evaporator section</b>	Horiz/Vertn
Evaporator section	shell & tube Type
Pressure drop	1 No.



<b>Fan section.</b>	//kPa	
Fans No	EE Type	
Fans type	10 No.	
External pressure	Axial Type	
<b>Hydraulic section recycle</b>	//Pa	
Tank capacity		
Pump	700 Lt.	
Recycle pump capacity	n° 1	
Recycle pump pressure	63 m <sup>3</sup> /h	
<b>Hydraulic section Consumer</b>	1,6 bar	
Pump		
Consumer pump capacity	n° 1	
Consumer pump pressure	42 m <sup>3</sup> /h	
<b>Electro-electronic section</b>	4,5 bar	
Control system		
Power supply	Electronic Type	
Auxiliary power	400/3/50 V/F/Hz	
Total power input	STANDARD	V/F/Hz
Absorption power	251,2 kW	
<b>Structural</b>	188,2 kW	
Dimensions AxBxH		
structure	4310X2222X2420 mm	
Color STAINLESS STIL	Inox + Allum + Perallum	
Weight approx	4450 Kg.	

**PROGETTI REALIZZATI NEL  
SETTORE DELL'ACCIAIO**

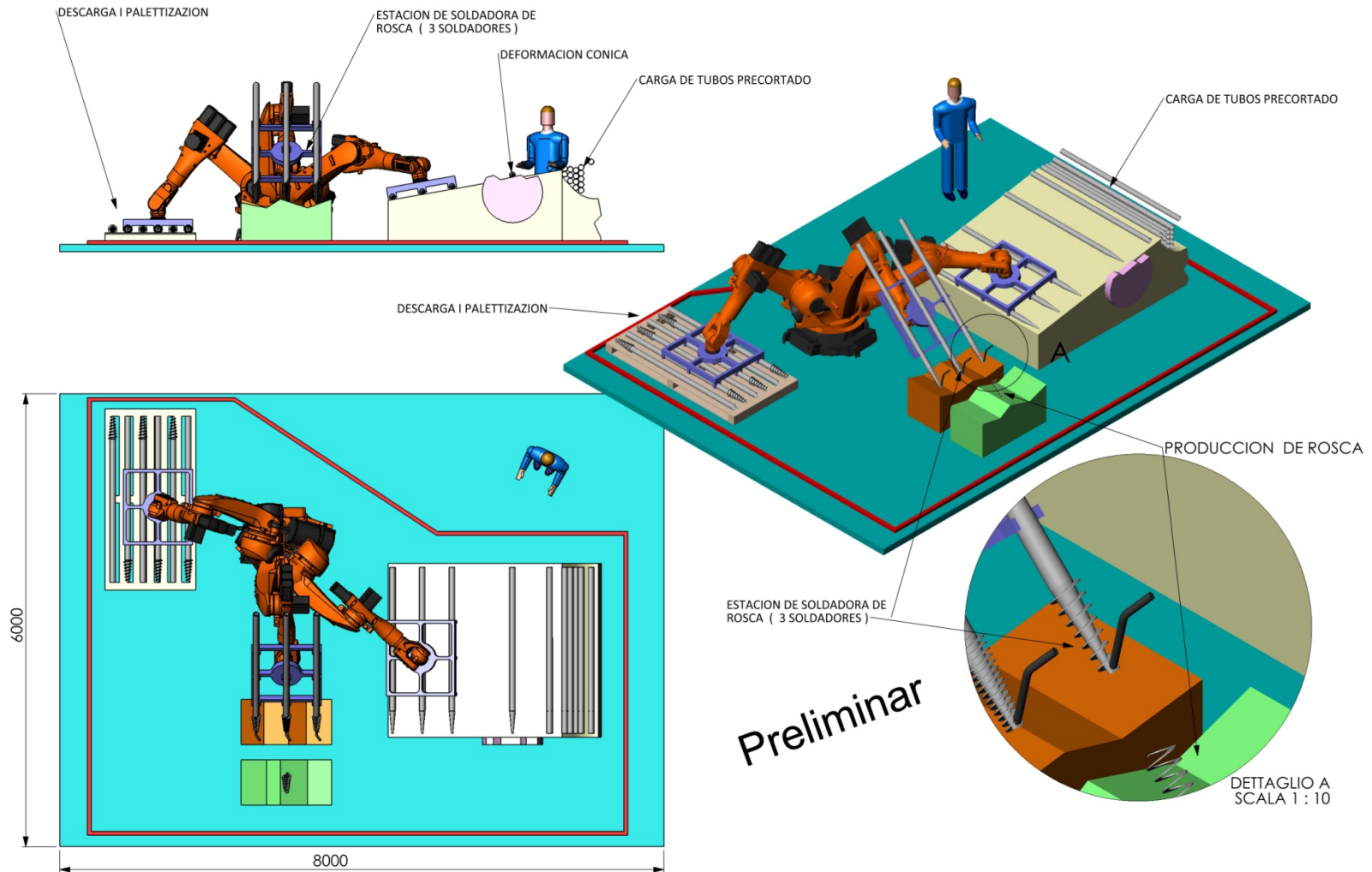
**PROJECTS IMPLEMENTED IN  
THE STEEL INDUSTRY**

# ROBOT CARTESIANO PER LINEA PRODUZIONE SILOS CARTESIAN ROBOT FOR SILOS WELDING LINE



# LINEA ROBOTIZZATA PER PRODUZIONE PALI ELICOIDALI PER FOTOVOLTAICO

## ROBOTIC WELDING STATION FOR SOLAR STRUCTURES



100324L2 LAY OUT

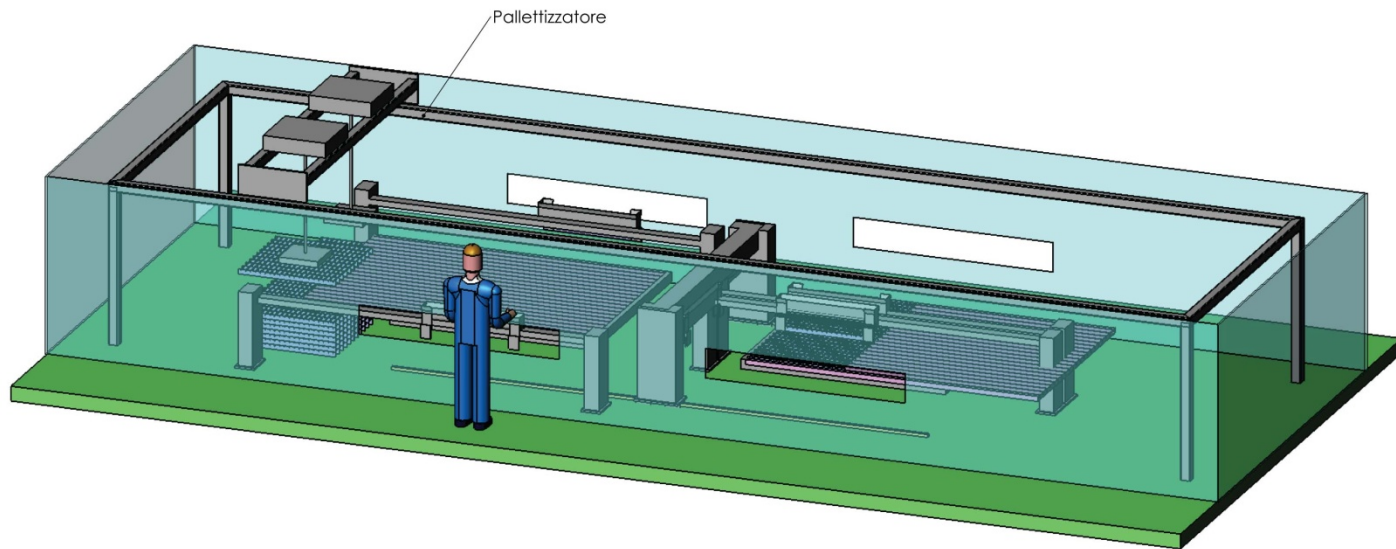


## SETTORE FOTOVOLTAICO PHOTOVOLTAIC SECTOR



# LINEA AUTOMATICA PER ASSEMBLAGGIO GRIGLIATO MECCANICO

## AUTOMATIC LINE FOR MECCANICAL GRATINGS



### SCARICATORE-PALLETIZZATORE ROBOTIZZATO

SMUSSI NON QUOTATI		RUGOSITÀ	TRATTAMENTO TERMICO E/O SUPERFICIALE	MATERIALE / NOTE	No. PEZZI
			-	-	1
DISEGNATO		No. COMMESSA		QUOTE SENZA INDICAZIONE DI TOLLERANZA	SCALA
DATA	-			Tolleranze UNI ISO 2768	1:35
FIRMA	-			Classe m	PROIEZIONE
<b>STUDIO CATTANEO</b> CONSULTING AND INDUSTRIAL ENGINEERING Via Don Luigi Moroni 37/A 20080 Pagnanico-Seregno (CMO) e-mail: studio_cattaneo@gmail.com Tel.: +39 390 61 62 491		DENOMINAZIONE			
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In addition to the above, STUDIO CATTANEO can offer consulting service for industrial medium-voltage supply system, cooling water system, hot dip galvanizing plants, slitting lines for gratings plants and painting plants .



# STUDIO CATTANEO

CONSULTING AND INDUSTRIAL ENGINEERING

*socio associazione italiana progettisti industriali*  
MEMBER ASSOCIATION OF ITALIAN INDUSTRIAL PROJECTS



NICE TO MEET YOU AND WORK FOR YOU