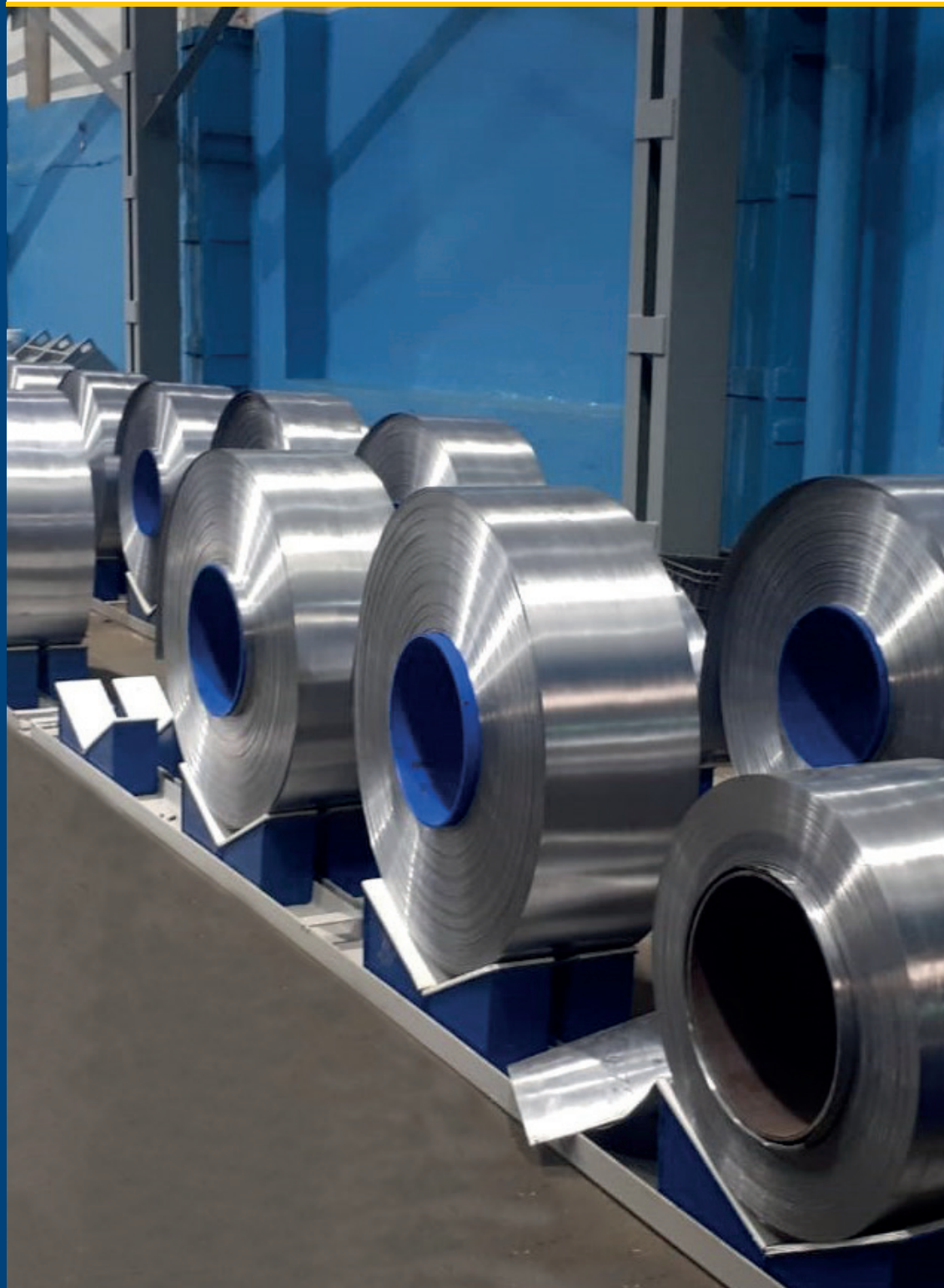
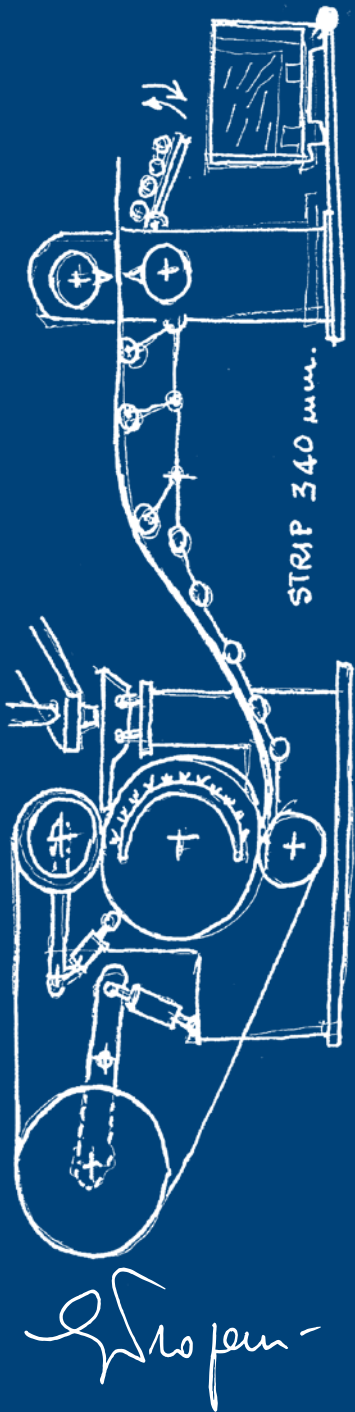
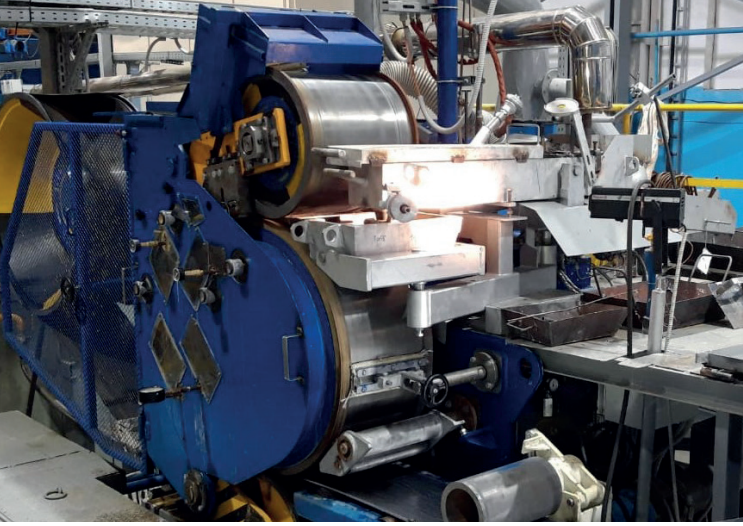


Properzi and the Lead Acid Batteries Expanded and Punched Grids





Since the very beginning, in the late 1940s, when Continuous-Properzi began experimenting with lead and lead alloys to transform them through continuous casting and rolling into wire and very narrow strip, we have accumulated a tremendous amount of experience.

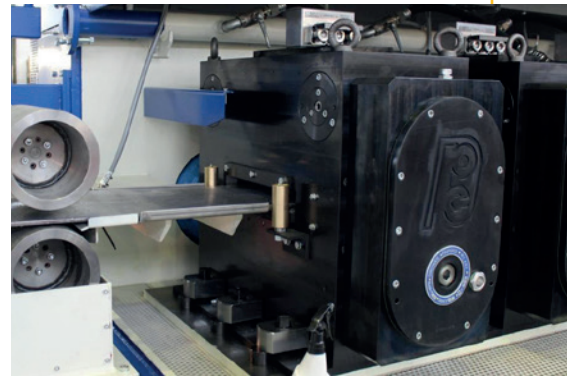
This helped us during the 1980s when Properzi collaborated with the Fiat group, specifically Magneti Marelli, to build the first expanded lead metal strip line for the production of automotive battery grids.

After more than five decades, we have more than 40 lines in operation around the world and, thanks to continuous development, the Properzi CRS Casting and Rolling Lines provide the following benefits and features that are unmatched in the market:

1. High reliability equipment resulting in numerous cases of OEE values of 92% or higher
2. User friendly equipment fully adjustable
3. Dross free Casting Machine - the Casting Machine has been designed to reduce the amount of dross and easily eliminate it from the liquid to avoid any contamination after solidification
4. Casting Machine cooling system designed to operate with water from a cooling tower (max. temperature 35°C); there is no need for a chiller as strictly required by other systems
5. High flexibility of the Rolling Train
6. Coiling Section automatically changes collection of the strip from one mandrel to the other. Coiler can be configured to work in fully automatic mode for discharge of the lead coils and/or spools

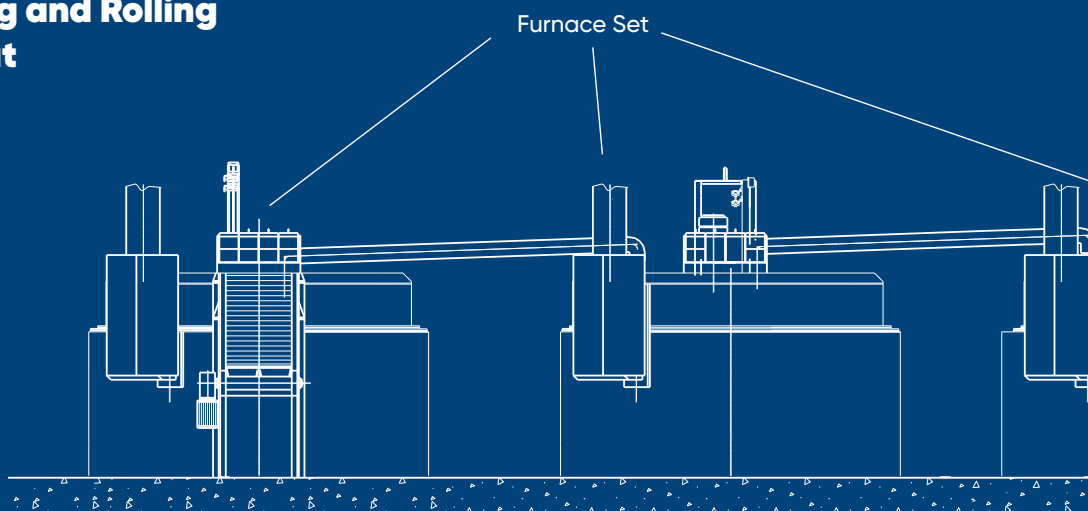
Here is a detailed summary of the possible capacities and configurations that we can provide:

- Nominal capacity range of 60 to 110 mm wide strip from 1 tph (corresponding battery output of ~ 500'000 batteries/year) to 9 tph (corresponding battery output of ~ 5'000'000 batteries/year) or even higher
- Furnace Set is available in various configurations to melt lead ingots, either standard 48 kg and/or large blocks weighing 1 ton
- Wheel & Belt type Continuous Casting Machine to cast the molten lead continuously coming from the holding furnace. The cooling system is completely adjustable (chiller not required)
- Conveyor/Sensor to synchronize the casting and rolling speeds
- Cast Bar Shear to cut the cast bar
- Rolling Mill to roll the strip to the desired thickness

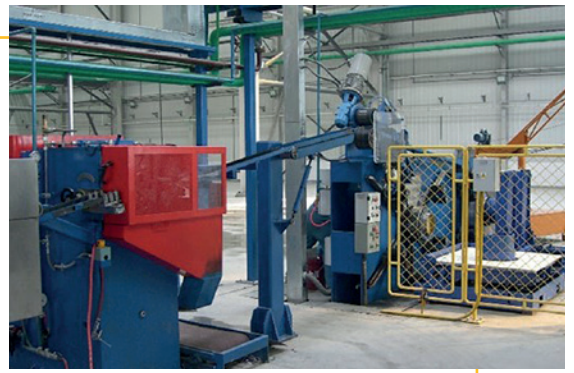


▲
ROLLING TRAIN – ENTRY SIDE

Continuous Casting and Rolling of Wide Strip layout



- Drying Tunnel to eliminate any trace of emulsion from the strip
- Trimming Unit to cut the strip to the desired width
- Twin Reel Coiler to continuously collect the strip and provide the desired length per coil
- One single process for the production of positive and negative grids
- The lines are easily upgradable
- Environmentally-friendly with no waste as all the circuits are closed-loop type



 **TRIMMING UNIT**

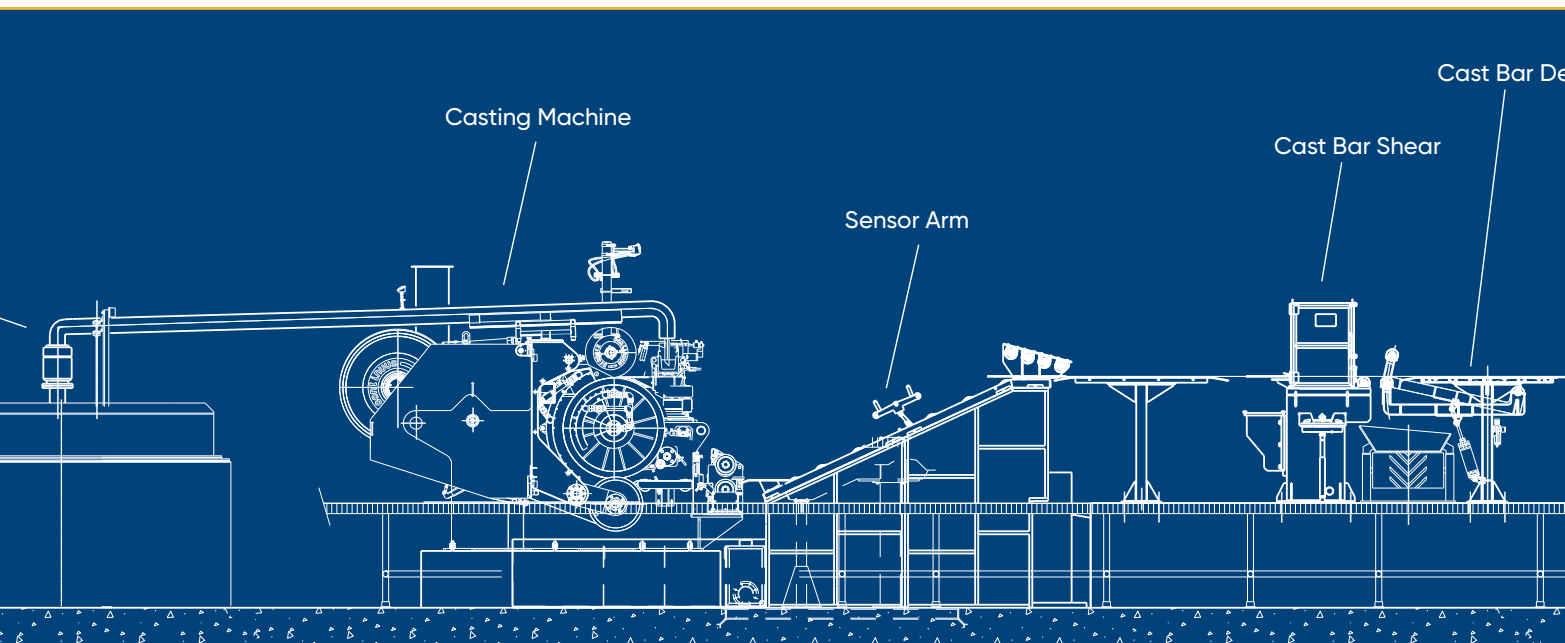
Grid production in the market is moving towards the utilization of punched grids requiring a wider lead strip, approximately 320 mm wide. The wide strip is punched into grids with a full frame and can therefore withstand the high compression

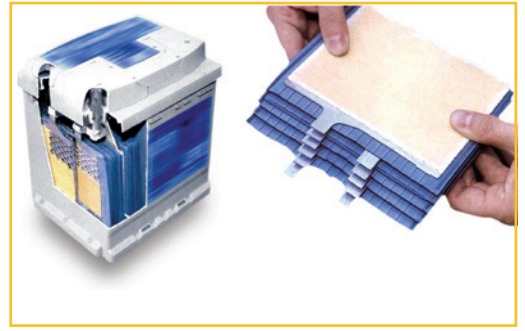
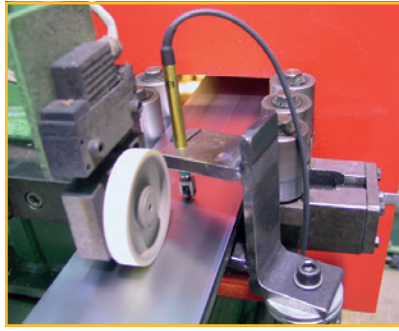
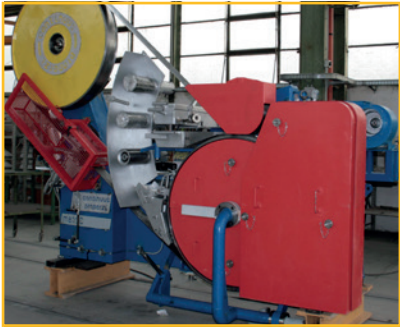
required in the elements of AGM (Absorbed Glass Mat) and semi-AGM batteries and it can also be used for the production of motorcycle batteries. We have further developed and optimized the casting and rolling of wide lead strip (CRSw).

MAIN CHARACTERISTICS

CRSw Line nominal capacity (tph)*	Corresponding wide strip speed (m/min)**
6.0 tph	~ 32
12 tph	~ 65
18 tph	~ 96

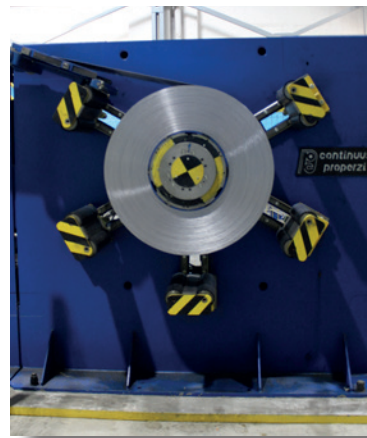
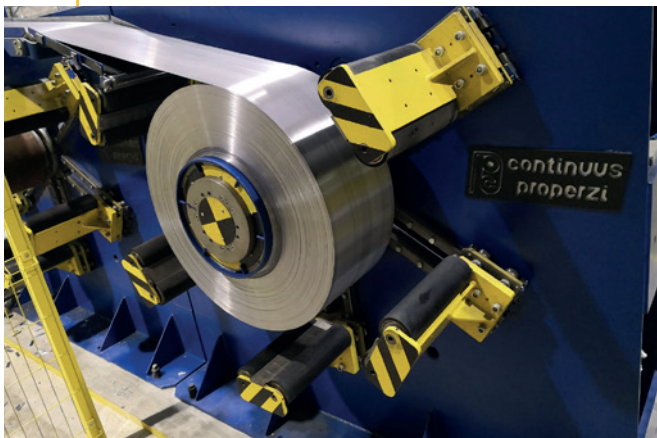
*Capacities refer to the finished strip
 **Speeds refer to strip thickness = 0.85 mm
 Higher capacities are available upon request





ENTIRE PROCESS FOR EXPANDED GRIDS PRODUCTION

- Furnace Set available in various configurations to melt lead ingots as well as re-melt the large amount of scrap returning from the punching process
- Wheel-type in-line casting specifically developed for large size (wide) cast bar in order to avoid any deviation from the rolling mill axis
- Fully adjustable casting machine cooling system (chiller not required)
- Rolling Mill on a single frame with independently-driven rolling stands this solution allows the highest machine flexibility
- Trimming Unit able to cut the strip according to the desired final width
- Double Strip Coiler able to collect the wide strip in manual, semi-automatic or fully automatic manner
- One single process for the production of positive and negative grids



PROPERZI COILER

ector

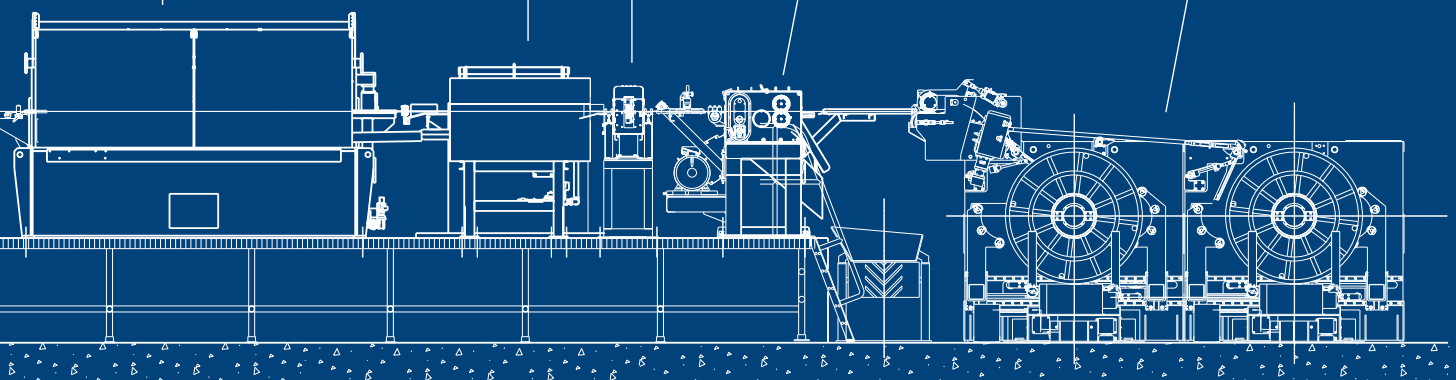
Rolling Train

Laser Gauge

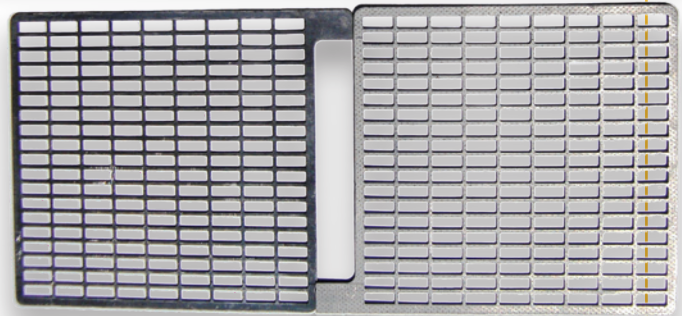
Drying Tunnel

Trimming Unit

Automatic Double Coiler



- The only upgradeable equipment that is available on the market (the line capacity can easily be increased by 30% if/when desired)
- Various options available:
 - Finishing Stand Servo Calibration - the last stand is equipped with a servomotor to adjust rolling stand calibration to produce the desired strip thickness
 - In-Line Thickness Laser Gauge
 - IULIUS 4.0 Automation - the system provides an access to the Line's automation system from mobiles and a package of add-on I4.0 functionalities for the digital integration of the Line with the Customer's IT system
 - SCADA system - Supervision Control And Data Acquisition, in single or multiple stations
 - Other options on demand



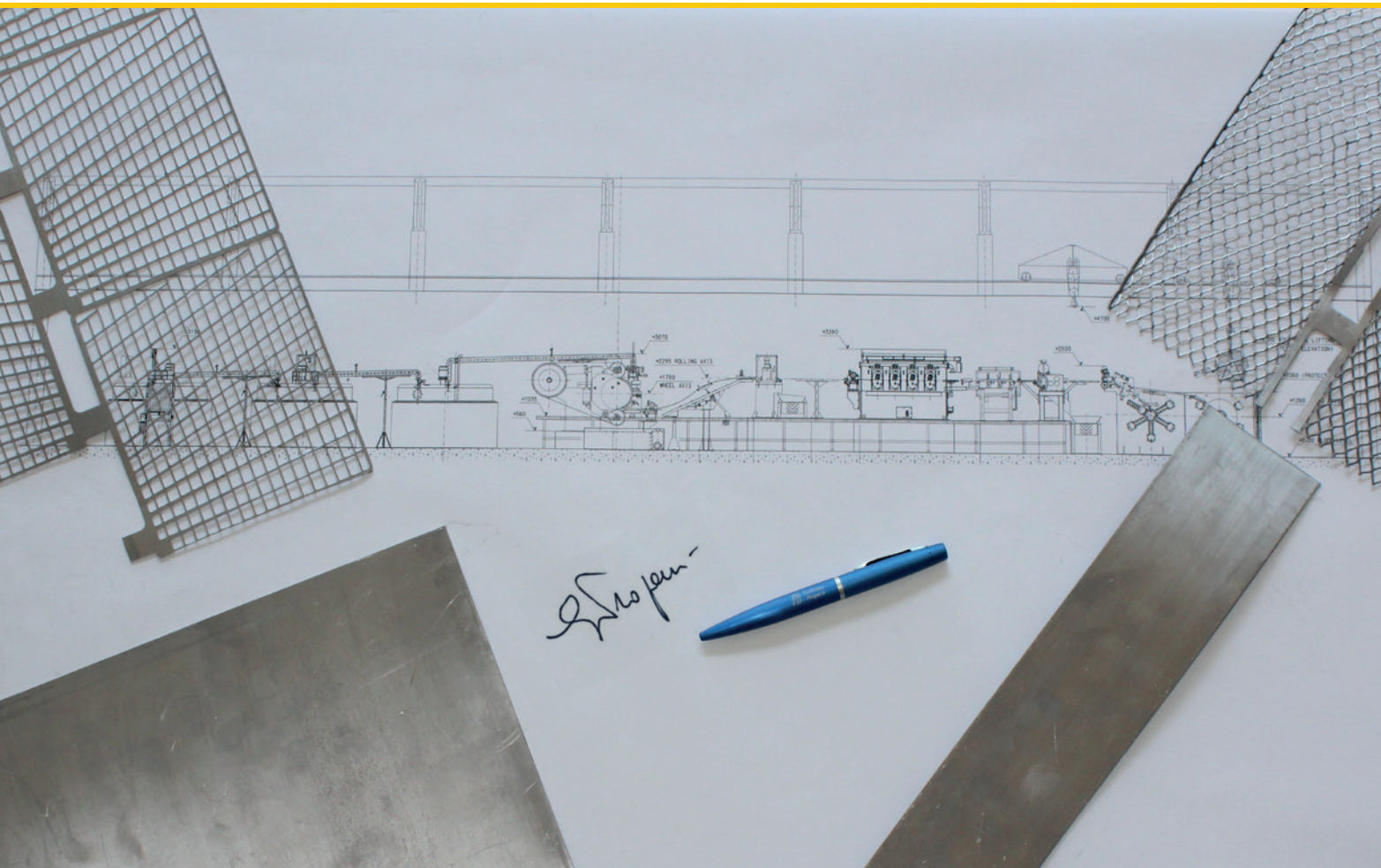
EXAMPLE OF LEAD STRIP FOR EXPANDED AND PUNCHED GRIDS

METALLURGICAL CHARACTERISTICS OF THE PROPERZI LEAD STRIP INCLUDE

- Effective weight reduction
- Increase of specific performance
- Grid with elevated mechanical characteristics
- Strip width up to 360 mm (wider strip can be produced upon request)
- Grid thickness as thin as 0.60 mm (thinner strips can be produced upon request)

Due to our extensive experience and our continuous improvement approach, we have developed capabilities and knowledge to supply complete turnkey plants on an EPC (Engineering, Procurement and Construction) basis so that the Buyer is only minimally involved with the installation of the plant.

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