

The Continuous Processing of Stainless Steel at Ugine

A new continuous annealing, pickling, and rolling line just 380 m long that reduces production time from 3 weeks to 20 minutes has been commissioned at Isbergues. The LC2i (Ligne Continue Intégrée Inox) continuous pickling and rolling line for stainless steel was commissioned at Usinor's Ugine Isbergues works in the north of France in October 1998.

The line is the most extensive of its kind, replacing the usual coiling reversing Sendzimir mill -- in which a small diameter work roll is supported by a cluster of intermediate and back-up rolls -- with a two-stand tandem Z-high mill in which a cluster cartridge replaces the conventional single work roll. This allows a small-diameter work roll to be used, thus enabling the achievement of heavy reductions.

An additional very important difference in the line, compared with a conventional Sendzimir rolling line, is the continuous passage of the strip through the line from the pickling of the hot coil, through the rolling mill, through the continuous annealer, and to final pickling. This enables strip to be processed from hot band to final, cold-rolled strip in a matter of 20 minutes compared with the conventional three weeks.

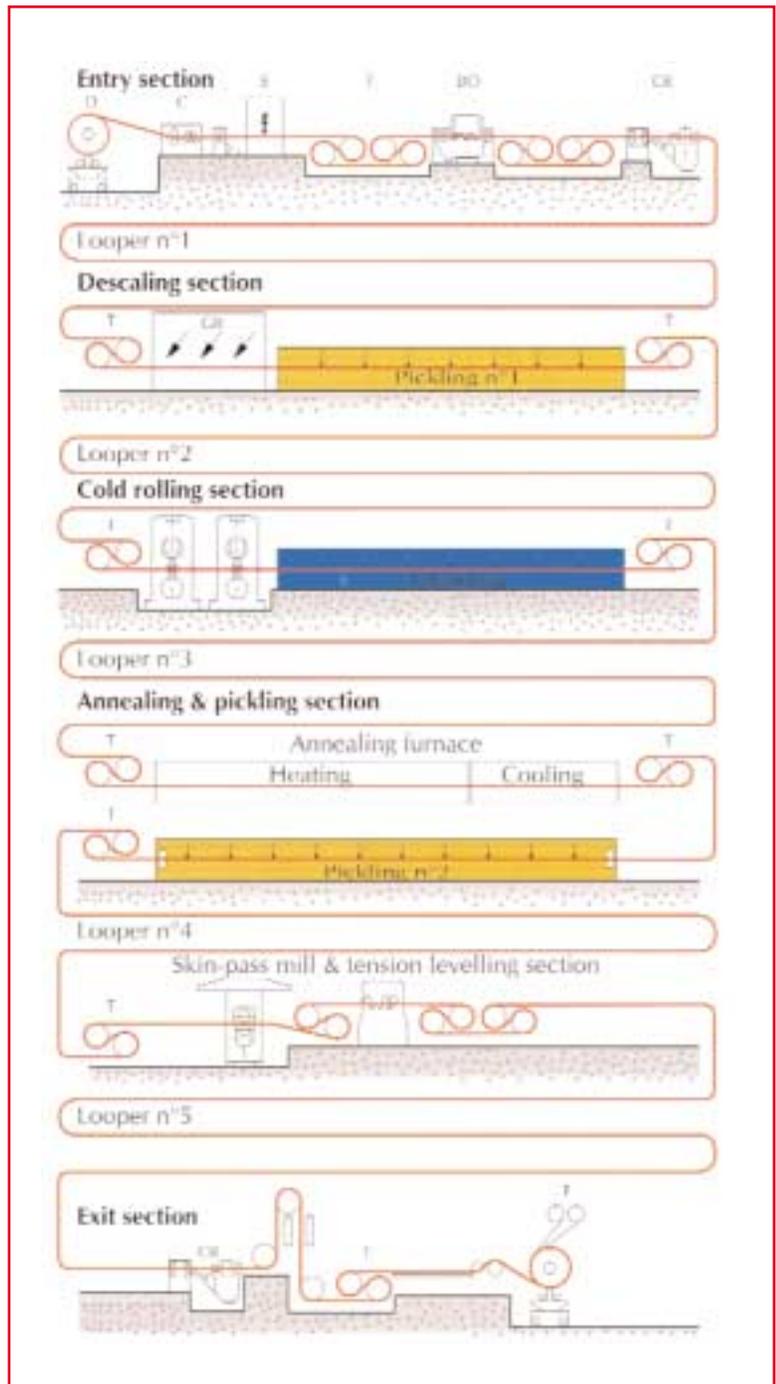
Some background

The design of the LC2i line took account of the performance of earlier continuous lines. In 1990, Avesta's Nyby works in Sweden installed a Z-high cold mill at the entry of the annealing and pickling line to achieve partial cold reduction of the strip, still with an oxidized surface. A further development of continuous processing of stainless strip commenced in May 1997 with the commissioning of the DRAP line at J&L Specialty Steel, USA. Here, the operations of Direct Rolling, Annealing, and Pickling (DRAP) are performed in a continuous sequence.

Layout and performance of the LC2i line

The LC2i line provides continuous processing of both ferritic and austenitic stainless steels. Annealed, hot-rolled coil is passed through a scale breaker and shot blaster prior to chemical pickling. It then passes via an accumulator to the two-stand Z-high mill for reduction. The continuous band of strip next passes through a continuous annealing furnace, followed by cooling and then pickling, first in an electrolytic solution and then in a chemical bath. The strip finally passes through a skinpass stand and a leveler before being coiled for shipment or slit.

The line has a capacity of 250-270 kt/y and can roll strip up to 15000 mm wide to gauges of 4.0-0.3 mm. Grades rolled include 14% Cr ferritic steels for construction applications and 18Cr-10Ni austenitic grades for high corrosion resistant applications such as required by the chemical and nuclear industries.



The mill stands are fitted with roll shift and bending. In late 1999, a Dynamic Shape Roll was installed as the back-up roll in one stand to evaluate its performance. Results are still awaited.

The line achieves its objectives of producing strip conforming to 2B surface quality with minimum handling and at minimum costs. Standardization of rolls, mechanical parts, motors, and instrumentation has been implemented to reduce the spare parts inventory.

Extensive training of the workforce was provided prior to start-up. This, together with a high degree of automation, enabled 2B quality to be achieved on a regular basis within five months of commissioning.