Final acceptance for a hot-dip galvanizing line

at Arvedi Italy

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This the third Danieli galvanizing line supplied to Arvedi since 2000. Thanks to a valuable collaboration between the project teams, the line reached its full availability and productivity in advance of the agreed Learning Curve, leading to the release of the Final Acceptance Certificate on June, 2013 for the entire Cremona Cold Mill Complex.

After the positive startup in continuous annealing mode, the hot commissioning of the galvanizing line focused on thin gauges (0.25x1.500 mm), with the target of producing the entire thickness range of special grades (e.g. DP high-strength steels) to be produced at the complex.
The level of reliability achieved for producing thin wide strips of special steels represents for the customer a strategic product for the final market demand. The line was designed to process strip with thicknesses from 0.25 to 2.0 mm and widths from 800 to 1,570 mm, with a maximum process speed of 180 mpm, for a capacity of 350,000 tpy.
Danieli's scope of supply included a double-entry, horizontal-entry accumulator, and the vertical furnace (from Danieli Centro Combustion).
The furnace can perform programmed thermal cycles distinguished by high-speed cooling gradients, followed by electric over-aging and final heating using an induction booster before dipping in the zinc bath.
Mobile pre-cooling devices installed in the final air-cooling sections are used to perform several thermal cycles downstream of the air knives during the production of special steels, and to improve the aesthetic quality of the coating.

Main advantages

> The free-flame section flexibility makes it possible to preheat both maximum strip widths and thin strips without oxidization throughout all the thermal ranges;
> A transversal shortening strip-heating system in the last heating zone prevents uncontrolled strip edge overheating.
> The indirect reheating and soaking furnace chamber houses radiant tubes made of welded sheet metal. This makes it possible to modify thermal cycles and/or vary the line's production capacity without compromising final product quality in terms of mechanical characteristics, also when producing ultra-thin strip or special grade steels;
> 2P-type radiant tubes guarantee excellent strip heating uniformity, limiting consumption and pollution thanks to hybrid modulation/on-off power control;
> Gas consumption in particular is decreased;
> The processing atmosphere is controlled by reducing nitrogen consumption and enriching it with pure hydrogen;
> Reliability and precision of strip handling and pulling inside the furnace, and temperature control in the various sections, have made it possible to process particularly critical wide and thin strips at high processing speeds without generating surface defects;
> The high-speed cooling section -in a controlled atmosphere- normally is used by varying a number of process parameters to avoid strip fluttering and strip edge over-cooling.

The zinc thickness is controlled by the new Danieli Kohler X-Jet air knives that precisely meter the liquid zinc and give superior coating uniformity. The X-Jet air knives system is equipped with automatic lip cleaners, no-touch/low-touch edge baffles and a narrow traversing sink roll scraper.
The after-pot cooling tower has been designed to produce DP high-strength steel as well, and includes a movable cooler to reduce as soon as possible the strip temperature.
After being cooled the strip is skin-passed for final roughness control, tension leveled, and passivated, and after passing a vertical exit looper it is visually inspected prior to being rewound. Danieli also supplied the complete electrical and automation package for the galvanizing line. To fully integrate the electrical and automation equipment of the line in the cold complex plant, an overall study was performed to optimize the electrical distribution system and the drives system. The extensive use of high-speed field bus (Ethercat) made it possible to reduce the cable lengths and the related electric installation work.

Main features of the automation system

> A complete set of math models for the cold complex plant, from the pickling process through the rolling mill, annealing, and galvanizing process.
> Advanced controls based on the latest technologies to achieve tight tolerance on the final product.
> An innovative operator interface that guides the operators to take timely action to run the complex.

This successful commissioning is the result of good cooperation and the trust between Danieli and Arvedi teams built during the execution of previous projects.
The conclusion of the activity on the galvanizing line represents the successful completion of the Cold Mill Complex installed at Cremona, consisting of a PLTCM (Pickling Line-Tandem Cold Mill plant for a total capacity of 1.4 Mtpy) and two hot-dip galvanizing lines supplied, installed and commissioned in the last five years ▫


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