Continuous hot dip galvanising at Severstal North America, Dearborn

Severstal North America commissioned a new hot dipped galvanising line with advanced high-strength steel capabilities in September 2011. This highly automated line, designed and built by CMI, produces steels for the most critical and demanding applications, and includes a number of innovative design features.

Author: Michel Boyer
CMI Industry

The Severstal Dearborn plant in Michigan, USA (see Figure 1) has, over many years, been at the centre of steel innovation and performance improvement. A US$1.23bn modernisation programme from 2007 to 2011, ensured it remains one of the leading steel producers in the world. Upgrades include a new Pickling Line Tandem Cold Mill (PLTCM) and a new hot dipped galvanising line (HDGL) targeting critically exposed applications for the automotive market and other original equipment manufacturers.

CUSTOMER NEEDS
Severstal, serving the highly demanding automotive market, is continually focused on developing the most advanced steel operations and technologies. This required that the new Dearborn HDGL was capable of meeting the most critical requirements for demanding applications, including:
- Lighter weight and higher strength products
- Advanced High Strength Steels (AHSS) for automotive applications
- High reduction interstitial-free, dual-phase and TRIP steels
- Coated products for exposed and another demanding applications

HDGL DESIGN
CMI Industry proposed the most up-to-date continuous galvanising line in NAFTA with the following key benefits:
- High productivity to reduce the capital cost per tonne produced
- High energy efficiency thanks to new combustion system, patented Blowstab® coolers and patented L-TOP mathematical model
- High product quality thanks to maximum in-line strip control
- Environmentally friendly with reduced air and water emissions
- High level of quality control on-line (Level 2), including control of process parameters, mathematical models, mechanical properties measurement, surface automatic inspection and zinc gauge measurement
- High degree of automation (coil preparation, coil exit)

The first coil was produced on 1 December, 2011.

LINE DESIGN
Entry section The line is designed to change quickly from under wind to over wind in order to assure prime side orientation. Coils are welded end-to-end with a dual wheel, lap seam welder which ensures reliable welding across the full range of products.

Process section A high-powered, extensive cleaning system creates an extremely clean surface for the highest quality hot dipped galvanised and galvannealed products. The system comprises a pre-degreasing section of dip and...
FINISHING PROCESSES

better strip quality (no heat buckles), productivity increases and consumption reduction.

The furnace is also equipped with CMI’s patented Blowstab® technology to rapidly cool the strip from approximately 1,400°F (760°C) to 900°F (482°C) without the need for stabilising rolls (see Figure 3). Blowstab® is a patented geometry gas jet cooling device giving a high cooling rate without strip fluttering. Rapid cooling enables higher strip strength to be produced across a greater thickness range and the production of lighter range products.

**Dual 350t zinc pots** The two-pot system enables the production of both exposed galvanised and galvanneal products on the same line, and robotic pot maintenance ensures zinc pot cleanliness by dross removal. Air knives provide both atmospheric air and nitrogen wiping, combined with closed loop coating weight control.

**Galvanneal furnace** The line uses the most advanced technology in galvanneal furnaces.

**APC Cooling Tower** The After Pot Cooling Tower, the tallest in North America at 240ft (73m), uses CMI patented Blowstab® and supports line speed flexibility without vibration.

**Skin pass mill** A skin pass mill is installed to apply a uniform texture to the strip and to remove strain lines. The unique post-skin pass hot water wash system removes very fine particles of zinc from the strip.

**Tension leveller** The tension leveller delivers an extremely flat surface. Used in conjunction with a state-of-the-art continuous property testing system supplied by SNA, mechanical properties can be automatically adjusted.

**Exit Section** An in-line roll coater produces very uniform roll coatings of various water-based products for surface protection and conditioning. An automated inspection system provides a fully automated 100% inspection of the surface quality of the entire coil to detect any surface aspect not admitted for automotive exposed panels. The exit accumulator is shown in Figure 4.

Both top and bottom surface inspection stations are equipped with full-spectrum lighting to confirm defect-free surfaces on both sides of the coil. An in-line side trimmer provides precise finished widths and continuous edge quality and an electrostatic oiler enables the application of multiple oil options precisely matched to customer specifications.

**Figure 5** shows coated, wrapped coils ready for dispatch.

**ENVIRONMENTAL GAINS**

The yearly gain compared to conventional solutions with recuperative burners is 38Gwh (3,500t oil equivalent).

Michel Boyer is Vice President Marketing CMI Industry, Liege, Belgium.

**CONTACT:** manuel.romero@cmigroupe.com