Production resumed at the Marcegaglia ZIN4 hot-dip galvanizing line on January 22, 2013 after the programmed shut down, essential to complete the upgrade of the horizontal annealing furnace, begun in September 2012. The customer's dual requests for both improved plant production capacity and the option of producing special steel grades were fulfilled.

Daníel Centro Combustion (DCC) recently fine-tuned its activities concerning modifications and upgrades to the horizontal furnace for the new ZIN4 hot-dip galvanizing line at Marcegaglia Spa in Ravenna, Italy. Offering widths that include medium- to high-value products based on a product mix of cold and pickled hot-rolled materials makes it possible to boost the line’s production capacity and inventory by approximately 10% per year. The following functions were involved in these activities:

> In the soaking section, strip re-crystallization temperature residence time has been increased, as required for the production of a critical range of HSS and AHSS steels. The layout evolved from a horizontal furnace equipped entirely with electrical heating elements to a combined horizontal and vertical solution. This new layout was designed to bring together the use of gas-fired radiant tubes and electric heating elements, thus also taking advantage of the space from the old controlled cooling section.

> Strip handling, customized to suit the new furnace layout with the insertion of new tensiometric deflect rolls and a strip tension and alignment control system. The latter was installed in the new upper chamber.

> The new cooling section is seen in the vertical portion of the furnace moving down toward the old hot bridle, and consists of three separate, new modules.

> Strip cooling is adjusted by means of a trimming mechanism for temperature control on the strip edges, coupled with a new scanning pyrometer and blowers with mobile diffusers that vary the cooling capacity by modifying the distance between the diffusers and the strip.

> Fitting a new air-conditioned cooling unit in
the final cooling tower to reduce the bath temperature time necessary to guarantee the metallographic structure when AHSS materials are produced, and to control lining quality aspects, uniformity and spangling.

Instrumentation (Level 0), process automation, and strip movement (Level 1 and 2) have been updated successfully, with respect to the installation of new equipment and different plant functioning techniques. Upgrading activities lasted approximately five months, of which only two required plant shutdown and an interruption of production activities. The plant reached new production values almost immediately after start-up; the learning curve time and material waste and downgrading linked to the furnace was negligible.

Now, the furnace is capable of reliably and continuously processing different grades of raw or pickled materials, with different annealing cycles for cold rolling, and in particular:
- Low-carbon steel (LC/ULC, EN 10327);
- Structural steel (HSLA, EN 10326);
- High-strength steel (HSS, EN 10292);
- Advanced high-strength steel (AHSS, EN 10336).

Only two months after the positive restart of the plant, DCC’s commissioning team along with personnel from Marcegaglia are now in the fine-tuning stages for the remodeled plant, which is geared toward offering consistent production of certain steel grades, and specifically several advanced high-strength steels.

Materials with elevated mechanical properties are the current trend in this market sector, not only in the installation of new and modern plants, but also in revamps to existing plants where strip treatment using thermal annealing cycles are necessary, and subsequently tend to be tailored to the requirements of the end user. Planning similar plug-and-play activities to modify/enhance the furnace promotes valid investment strategies for the end user because of the diminishing impacts on production and learning curves.

Overall view of the ZIN4 hot-dip galvanizing line at Marcegaglia Ravenna. X-Jet air knives were chosen to produce the lowest possible coating weight at very high speeds, while achieving superior coating uniformity.