Danieli Centro Combustion is a global leader in heating and heat treatment systems for the metals industry.

Today it has invested considerable resources to offer the market new and competitive products with the added value of an in-house developed, high-performance heating technology.
Excellent lead-time: seven months to execute the project — on a turnkey basis — from contract signing to startup.

CAL VERTICAL FURNACE REVAMPING
at ArcelorMittal Liège, Belgium

The main purposes for revamping the Continuous Vertical Annealing Furnace for tin plate (Line DRC1), located in the plant of Tilleur are:
— Increase of the furnace production for 700°C thermal cycle (from 42 to 52 tph).
— Implementation of new thermal cycles (up to 820°C).
— Improve thermal efficiency (average consumption ≤ 0,8 GJ/t).
— Lower NOx emissions (< 400 mg/Nm³ with 3% O₂ in the waste gas).
— Future increased strip speed, from 490 to 560 mpm.
— Improve overall availability of the equipment.

The project was very challenging due to the following reasons:
— Space constraints.
— Short time for engineering, purchasing and manufacturing.
— Short line stoppage for the revamping activities (42 days).

The order includes the following activities:
— Advisory service for refractory lining replacement in the heating and soaking sections (dismantling, erection and commissioning).
— Revamping the combustions system for heating and soaking sections (increase of the installed power): basic and detail engineering, supply, delivery, erection and commissioning.
— Automation system Level 1 and 2 for the combustion system: basic and detail engineering, supply, delivery, erection and commissioning.
— Replacement of the 2 steering systems for future increased strip speed: basic and detail engineering, supply, delivery, erection and commissioning.
— Cleaning unit automation system Level 1 revamping: basic and detail engineering, supply, delivery, erection and commissioning.
— Replacement of the power cabinets for the cooling towers pumps and fans (6 inverters for 6 pumps and 8 fixed speed drives for 2 pumps and 6 fans): basic and detail engineering, supply, delivery, erection and commissioning.
— Replacement of the power cabinets for the controlled cooling: basic and detail engineering, supply, delivery, erection and commissioning.
— Replacement of the power cabinets for the rapid cooling: basic and detail engineering, supply, delivery, erection and commissioning.

The combustion system is a push-pull type, consisting of 10 combustion zones, each one controlled independently from the others, 181 burners in total.
The waste gas pressure is controlled in each zone header, as well as in the main headers upstream the exhauster fans.
One combustion air fan and one exhauster fan are foreseen.

The combustion system will be equipped with innovative, radiant-tube burners, designed, tested and supplied by Danieli Centro Combustion, and will provide reduced energy consumption and less environmental impact thanks to the latest cutting-edge technologies developed by the Research and Development Centre located in Savona. Moreover, optimized combustion (including gas/air regulation to control excess air, temperature zones, and the percentage of oxygen in the exhausts) will increase radiant tubes life.

The Level 2 mathematical model for the combustion system will be developed and tested by Danieli Automation.

The main purposes of the Level 2 are the following:
— Creation, modification and storing of Heating Curves.
— Tracking data for each coil in production.
— Calculating the delta heating power for the zones in order to speed up the thermal stability.
— Storing all the process data in real time and creating of quality reports.
— Optimization of the combustion system.

Particular care will be taken in the design of the combustion air ducts (not present before the revamping, the air being sucked from the ambient), due to the space restrictions. The waste-gas ducts will be reused as much as possible, in order to minimize the erection activities.