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Direct Firing Furnace honoured Grand Prix at Fives’ Innovation Awards

Fives, a global industrial engineering group, has developed a new flameless Direct Firing Furnace (DFF) for continuous annealing or galvanizing lines, which will enable the production of new generation steels (Gen3 AHSS) for the automotive industry.

It is a breakthrough innovation responding to the constraints associated with the production of Gen3 AHSS, the new steel grades needed to manufacture lightweight vehicles with reduced emissions. The new concept received the Grand Prix at Fives’ Innovation Award in Paris on September 24, 2020. Fives’ Innovation Award is an annual event, held by the group, to support innovative ideas and solutions among its employees.

Homogeneous heating

In strip processing lines, the furnace is a key technology for achieving the final product properties – but if preheating temperature in DFF is not homogenous, those properties can be compromised. The innovative DFF uses new S-shaped tunnel geometry combined with flameless combustion to achieve homogeneous heating in all the sections of the furnace by using a new generation of lateral burners. The result is a homogeneous temperature of +/-10°C along the whole width of the strip at the exit of the furnace.

Sustainable advantages

“We conducted CFD modelling to optimize the furnace design – in particular the waste flue gas passage between the active and recuperative zones – and define the design of the burners. By running a series of tests, we were able to come up with a totally new burner concept that achieves a flameless combustion mode. The final DFF concept was validated by CFD modelling on a complete furnace,” explains Sébastien Lemaire, R&D Engineer at Fives Stein, a Fives’ subsidiary in France.

“This technological solution offers steelmakers many different advantages,” highlights Camille Moukarzel, Business Development Manager at Fives Stein. “Reduced operational costs, thanks to the 600°C preheated air flameless side burners; simplified control; minimized maintenance and, more importantly, a dramatic reduction of NOx and CO₂ emissions.”



About Fives

As an industrial engineering Group with a heritage of over 200 years, Fives designs and supplies machines, process equipment and production lines for the world's largest industrial players in various sectors such as steel, aerospace and special machining, aluminium, automotive and manufacturing industries, cement, energy, logistics and glass.

In the steel industry, Fives offers process expertise, ground-breaking technologies and digital tools, supporting steel manufacturers ability to achieve the ultimate in performance excellence, including:

- Customer strategic development support
- Digital tools: automatic strip processing line control, real-time quality management technology, and more
- Ultra-low NOx reheating furnaces
- Advanced cold rolling mills for stainless, silicon and carbon giga steels
- Complete strip processing lines for carbon (including AHSS and UHSS), stainless and silicon steel
- Unique transverse flux and longitudinal induction heating technologies
- A full range of services: process optimization, upgrades, modernization, training and maintenance assistance

In 2019, Fives achieved €1,999 million of sales and employed close to 8,500 people in about 30 countries.

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