EcoTransFlux™
Transverse Flux Induction Heating Solutions

Heating of carbon steel, stainless steel, silicon steel and non-ferrous products
High power density: > 3 MW injected power per sqm
High efficiency
Fast heating: up to 300°C/s
Annealing lines compactness

→ EcoTransFlux™ opens a new era of technically and environmentally efficient processes for the steel industry.
Carbon application:

Fives group, in partnership with the ADEME and INSA Lyons University has participated to the elaboration of a PhD thesis, outlining the benefits of the rapid heating cycles on carbon steels (200 - 400°C/s), EcoTransFlux™ makes the implementation of such new processes now possible on an industrial scale.

Benefits:

• mechanical resistance improved of the steel by 5 to 10% by the industrial rapid cycle,
• preservation of elongation capability.

As a consequence, thinner steel sheets might be used than before whilst maintaining mechanical properties, thus resulting in significant weight reduction of steel assemblies like car bodies, and associated benefits for the environment (fuel consumption and CO₂ emissions reduction).

EcoTransFlux™ INdUCToR

Benefiting from a decade of development activities, and having led to several patent applications, EcoTransFlux™ is transverse flux induction heating technique, enabling to heat up steel strips ad reach high temperature levels, even beyond the Curie Point, while maintaining high efficiency rates (> 70 %).

One or several 3.5 MW nominal power each modules can ensure 1200°C heating on the strip, with heating gradients up to 300°C/s, thus offering multiple possibilities on steel processing lines.

Its power capacity and compactness make EcoTransFlux™ an appropriate solution for optimization of new or existing processing lines, over the 900-1550 strip width range, as long as one of the following requirements are of essence:

• Fast heating
• Compactness
• Process flexibility
• Production cost optimization

What is Transverse Flux Induction Heating?

Unlike the Longitudinal Flux Induction, whereby the part to be heated passes inside a coil, for Transverse Flux Induction the steel strip passes through induction coil pairs located on both sides of the strip.

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Combining Fives Celes’ transverse flow induction technology EcoTransFlux™ with Fives Stein’s FlashCooling® rapid cooling technology, the I-BAL system allows for the annual processing of as much as 350,000 tonnes of bright annealed stainless steel strips of B.A. quality.

**Stainless application:**
**I-BAL (induction Bright Annealing Line) system**

The EcoTransFlux™ inductors can replace gas-heated furnaces of the Bright Annealing Lines (BAL) by the innotative so-called I-BAL (Induction heated Bright Annealing Line).

**Benefits:**
- high capacity production rates (250-350,000 tpy) due to its high energy density,
- excellent energy efficiency (consumption below 250kWh/t whereas a gas heated BAL will be above 350 kWh/t) with reduced environmental impacts (CO₂ emissions...),
- compact design and reduced associated environmental side effects.

On top of these aforementioned advantages, EcoTransFlux™, when applied on Cold Annealing and Picking Line (CAPL) enables drastic reduction, even elimination of effluents and acid wastes thanks to its ability to operate in non-oxidizing atmospheres.

**I-BAL CONCEPT:**
A breakthrough technology for bright annealing lines

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Through the Life+ programme, the European Union tends to create an environment favourable to initiative, development of companies, industrial cooperation and improved utilisation of the industrial potential of the innovation, research and technological development policies.

Within the scope of the third call for proposals for the Life+ programme (2007-2013) Fives Celes submitted a financing file to the European Commission, with the help of the Regional Agency for Innovation in Alsace and presented its innovation of steel strip heating by transverse flux: the EcoTransFlux™ programme.

Programme beginning: September 1st, 2010
Programme end: September 30th, 2012

Fives Celes, with the EcoTransFlux™ programme, aims to demonstrate that transverse flux induction heating technology can be implemented on new process lines plants for stainless and carbon steel to reduce greenhouse gas emissions and acid waste, whilst meeting quality, economic and capacity criteria.

A scale 1 Induction heating demonstrating unit has been installed in Fives Celes premises, readily available for steelmakers to carry out fast heating tests with 900-1600 mm width steel strips, for process qualification purposes.

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