Fives Celes

50 years of expertise in induction heating

February 2015
Fives, an international industrial engineering Group

Fives designs and supplies **machines**, **process equipment** and **production lines** for the world’s biggest industrial players.
Fives,

A trusted partner to many of the leading industrial groups in Aerospace, Aluminium, Automotive and Manufacturing Industries, Cement, Energy, Logistics, Steel and Glass sectors
Fives, a solid Group

€1,626 million of sales

€133 million of EBITDA

€242 million closing net cash position

Breakdown of sales by market:
- 35% Metal
- 28% Energy
- 6% Cement
- 11% Automotive /Logistics & others
- 20% Aerospace & ultra precision machines

Breakdown of sales by geographical area:
- 33% Europe
- 28% Asia & Oceania
- 28% The Americas
- 11% Africa & Middle-East

Sales, EBIT and EBITDA

2013 Figures
Fives, a pioneer which constantly innovates

Fives’ Strength is to develop

— proprietary technologies

— with high added value for the customers

— and high energy and environmental performances

Innovation data:

More than €28 million spent on R&D in 2013 (outside projects)

100 innovations patented in 3 years

504 patent families in force

1,784 patents in force
Fives,

an international organization based on a worldwide network of subsidiaries

Close to 8,000 employees

about 90 subsidiaries and commercial offices in about 30 countries
Fives Celes: history

1967
Establishment of CELES (Constructions ELEctriques Sevylor) in Lautenbach (Alsace) France

1998
CELES joined Fives and became Fives Celes

2015
- 90 personnel
- €12 million turnover
Fives Celes: expert in induction heating and industrial cooling

Induction heating

Industrial cooling

more than 5 000 references worldwide

more than 40 years of experience

Customers:
Induction heating is a direct application of two laws of physics: the Lenz law and the Joule law.

— When immersed in a variable magnetic field (generated by an induction coil or inductor), any material that conducts electricity carries the electrical current induced, also called Foucault currents.

— According to the Joule effect, the movement of the electrons creating these currents dissipates the heat in the substance where they were generated.
Concept of induction heating

Induction heating advantages

- No need to preheat the furnace
- Direct transfer of the energy
- Choice of the area to be heated
- Fast heating, high power density
- Heated material can have higher temperature than the source
- Optimal performance and flexibility
- Easy integration into production lines
Equipement & Solutions

Induction heating
Equipment and Solutions

Small power sources from 3 to 12 kW

- **CELES MP Generator**
  - 3 to 12 kW
  - 50 to 400 kHz

- **CELES MS3 Generator**
  - 3 kW
  - High frequency only
  - 220 V

- **Litz wire Inductors**
  - Especially designed for MS3 generators
Equipment and Solutions

Power sources: 25 kW to 4 MW

- **New MP MOS Parallel Generator**
  - 25 kW to 100 kW
  - 50 kHz to 400 kHz
  - 400 kHz to 1 MHz
  - 2 MHz

- **New MS MOS Series Generator**
  - 25 kW to 100 kW
  - 2 kHz to 80 kHz

- **CELES IS Generator**
  - 50 kW to 4 MW
  - 500 Hz to 50 kHz
High Flux
High-flux induction heating solutions are the perfect answer to the steel industry's most demanding applications with heavy tonnage requiring much higher power levels and densities than conventional induction heating solutions can generate.

Induction
Until now, induction was rarely used to heat nonmagnetic metals because of low energy transmission efficiency.

Induction heating technology
High-flux has made Fives the only equipment maker that can currently offer high-performance induction heating technology for magnetic or nonmagnetic alloys with excellent efficiency at any temperature level.
Equipement & Solutions

Industrial cooling systems
Equipment and Solutions

Industrial cooling systems

- Cooling power converters
- Tempering tanks
- Quenching units

- Aerothermal systems
- Chilling recirculating units
- Heat exchange recirculating units
- Complex fluids (polymer blends)
Induction

Innovations

February 2015
Every year Fives Celes invests 10% of its annual turnover in R & D, making innovations the company's priority.

Cooperation with world industrial leaders, such as EDF and ArcelorMittal.

In 2009, Fives has launched the Celes EcoTransFlux™ project, an innovating technology of induction heating by transversal flux.

In 2012 Fives Celes started a new programme on the upgrade of its equipment, and developed new Celes MP and Celes MS generators of 25, 50, 75 and 100 kW in 2015.
Applications
Processes

Assembly

Bonding

Brazing

Heat sealing

Shrink fitting

Welding
Processes

Forming

Forging

Thixocasting

Melting

Crucible induction furnace

Cold crucible

Glass and Oxides
Processes

Heat treatment

Annealing

Tempering
Processes

Others

Graphitization

Heat fatigue

Plasma

Hyperthermia
Services

Help line

Test platform

Maintenance & spare parts

Training
Name Surname
Job Title
Induction

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