



VESUVIUS SYSTEMS

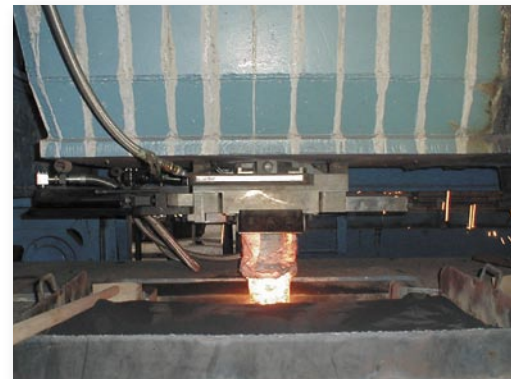
Between furnace and mold: Thermography optimizes steel flow of ladle systems

The Vesuvius Group develops, manufactures and markets high performance specialty ceramics, refractory products and flow control systems for the iron and steel, non-ferrous metal and glass manufacturing industries. Headquartered in Brussels, Belgium, the group employs some 9,000 people in more than 60 manufacturing locations worldwide. Vesuvius devotes more than two percent of its one-billion-Euro annual turnover to improve the processes, products and systems of the industries it serves. Vesuvius Systems, a division of Vesuvius Group SA, located in Ghlin, Belgium, designs, develops and markets steel flow control systems for steel-making plants

Flow Control Products

Flow control systems link the various stages of steel production. Liquid steel, the production of which starts in a converter or an electric furnace, is tapped into a ladle through a furnace gate. Further production steps required to produce a high-grade steel, such as a vacuum treatment

of the liquid steel take place exclusively in the ladle. Such 'ladle metallurgy' is also called secondary metallurgy. After passing the ladle's secondary metallurgy process, the ladle's content is poured in the tundish of a continuous casting machine through a ladle slide gate valve. Then the hot steel is casted from the tundish to



Steel flowing through tundish gate



Infrared picture of a ladle slide gate in the ladle make up area. The infrared picture shows the hot ladle bottom under the slide gate.

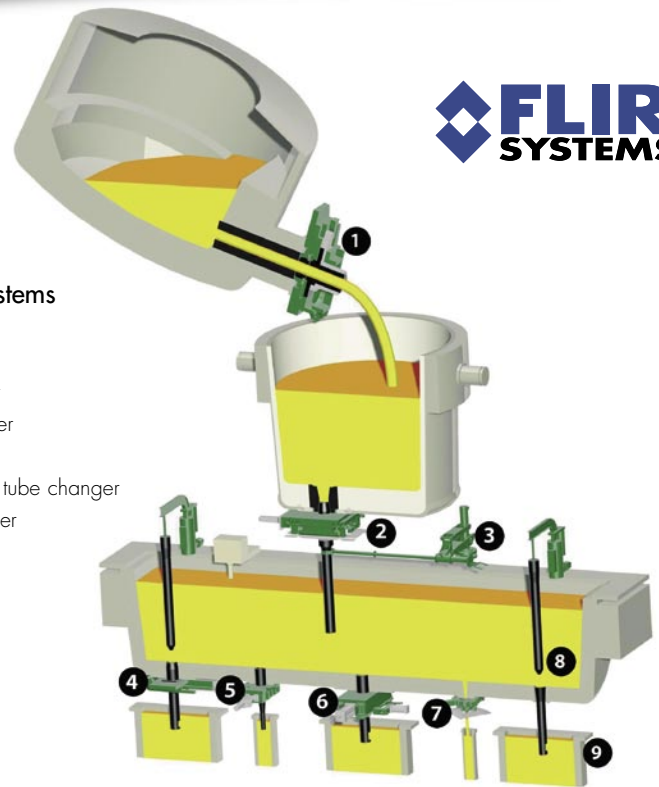




Damien Delsine and Fabrice Sibiet, R&D project engineers and FLIR ThermoCAM users.

Continuous casting systems

1. Furnace gate
2. Ladle gate
3. Ladle shroud manipulator
4. Tube changer with stopper
5. Tundish sliding gate
6. Tundish sliding gate with tube changer
7. Calibrated nozzle changer
8. Stopper control systems
9. Mold level control



the continuous casting machine molds, channeled through tundish slide gate valves which assure an accurate level control of the molds for the steel. The flow control systems are designed by material science specialists such as metallurgists, fluidodynamic and ceramics experts. Supported by project management, these devices are installed and commissioned in the steel making plants.

Time for thermography

Casting system slide gates and other casting systems are designed and developed at the Vesuvius Group's flow control research and development centre which is located in Ghlin, Belgium. Among its customers are major steel makers such as the world's number-one group MITTAL and Arcelor, Europe's leading steel-maker.

Although relying on an extensive know-how, experience and advanced modeling tools and techniques, the Vesuvius Systems development engineers are confronted to some factors which are difficult to measure and define: "We needed a

tool to monitor the thermal development of the installations during our testing" says Fabrice Sibiet, R&D Project Engineer and camera operator. "We don't know what's happening inside. And that is one of the reasons why we have opted for an infrared camera."

A distinct advantage of the infrared camera is that it provides temperature reading across the entire surface area of the flow control system instead of just at a few single points provided by contact-based thermocouples. The ThermoCAM™ P65 camera together with the ThermoCAM Reporter software package also allow to clearly follow and analyze the temperature cycles inside the flow systems.

In addition, the camera is used to understand potential problems of the flow system during trouble shooting investigation. Thermography also serves to monitor the oil level and temperature of the hydraulic parts on the ladle gate and to detect the intrusion of water and air into the hydraulic system which can

cause fluid degradation and installation damages.

Another important field of application for thermography is refractory product development. These refractory materials are needed, among others, to withstand molten metal during the casting process. They are exchanged after a few hours of operation. Their quality and performance feature are vital to a clean, safe and streamlined production process. "We foresee an increasing use of thermography to improve refractory material quality", says Damien Delsine, R&D Project Engineer: "these materials are heat-proof of course, but they also tend to be thermal shock-sensitive."

The ThermoCAM P65 is appreciated for its build-in visual camera, its image quality and its versatility. It allows the Vesuvius Systems research and project engineers to substantially contribute to a productivity and quality increase of the vital parts which they develop for the metallurgic industry.



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