FLIR APPLICATION STORY

FLIR SYSTEMS

FLIR Systems infrared camera contributes to optimizing moulds for the production of aluminum automobile engine parts

Fonderie Aluminium de Cléon, located near the ancient city of Rouen, some 120 km from Paris, specializes in the design, development, production and sale of die casting parts for the automotive industry such as cylinder blocks, bed plates, clutch housings, engine oil sumps and gearboxes which are predominantly made from aluminum. Its customers are the major European car manufacturers and brands. A FLIR Systems ThermaCAM E65 handheld infrared camera is used to inspect the quality of the moulds, both in their development phase as during the molding process.

Automobile engine parts made at the Fonderie Cleon

Cylinder bloc manufactured at the Cléon plant

The foundry is owned by the Teksid Aluminum Group, a world leader in the production of aluminum die casting for the automotive industry with operations in Europe, North and South America and Asia. At the Cléon foundry, some 360 engineers and skilled workers realize a turnover of approx. EUR 90 million per year, melting some 20,000 ton of aluminum.

The casting of robust and vital parts as cylinder blocks and gearboxes is a complex process. The forms of the pieces is irregular and complicated, and their role as vital motor engine parts require an absolutely constant production quality.

Before the molding of the pieces, the casting (mould development) itself is a process with elaborate product development stages. First, the pieces are designed, then, the mould is built, carefully adjusted after elaborate prototyping and test molding, and finally accepted by the customer. All stages, from product design of the pieces by the in-house CAD department to their validation and production can be done in-house at Cléon. The customer, who remains the owner of the

mould, is involved in every product development stage. His engine part moulds are true company assets; they are worth some EUR 0.5 million each.

High-pressure die casting

Most parts are manufactured through high-pressure die casting, a process which is very suitable for components with complicated shapes and thin walls. During the high-pressure casting, 680°C liquid aluminum is sprayed into the mould at a pressure rate of 800 to 900 Megapascal and a speed of up to 60 m/s. This technique allows to maintaining a high production rate; a piece comes out of the mold every 2 minutes. Fonderie Aluminium Cléon's has gained extensive expertise in this technology and the Cléon plant has become the pressure casting development knowledge platform for all the Teksid Group's production sites and units.

A uniform distribution of the temperature inside the mould is mandatory to obtain top quality pieces. "Temperature differences inside the mould cause differences in the aluminum distribution of the piece", says Olivier Renouf, High Pressure Die Casting Development Platform Process Engineer: "this can provoke spots where the metal might remain liquid after cooling and increase the risk of holes in the piece."

An exact, balanced regulation of the cooling process after the metal has been injected into the mould is also important to obtain fault-free parts. This is obtained by regular supervision of the cooling circuits around the mould during production.

E-Series handheld camera does the job

To trace, measure and observe relevant temperature differences and thresholds, Fonderie de Cléon uses a FLIR Systems ThermaCAM E65 handheld thermal camera. The camera is calibrated to measure temperatures up to 900°C and equipped with a 4.5 mm/ 60x45 wide angle lens to be able to watch the molds from a short distance and an additional 36mm/ 9x7 telescope lens to detect the mold's cavities, edges and corners. "The E65 model comes in a very handy format to look at our large molds which are embedded into huge machinery in a cramped environment", says Olivier Renouf. During inspections, he makes extensively use of the movable spots facility offered in the E-series camera to measure various surface zones simultaneously. As moulds are made from oxidized steel, reflection is low and Renouf sets the emissivity at 0.79. The extensive functions of the FLIR Systems ThermaCAM Reporter software are used to process the information and to report to all interested parties concerned, from the design and production department to the automotive customer.

Other applications at the company

After the validation of a particular mould and its acceptance by the customer, the camera is not resting on the shelves: Renouf has trained production technicians to use the camera, so that they can check the mould's temperature developments during production. "A consistent follow up is important: the better the adjustment of the cooling process, the better the quality of the parts and also, the more energy resources we save during the cooling process", he says. The information gathered by the development and production engineers is fed into the company-wide Teksid knowledge exchange platform.

Furthermore, the ThermaCAM E65 at the Cleon plant is also regularly used for classic preventive maintenance inspection of electrical switchboards and machines.

As an instrument able to provide non-contact temperature measurement of entire surfaces, the infrared camera has proved its value many times. At the Fonderie Aluminum Cléon, it has developed into an indispensable tool for product optimization, improvement of manufacturing efficiencies, energy management and worker safety that is permanently used.

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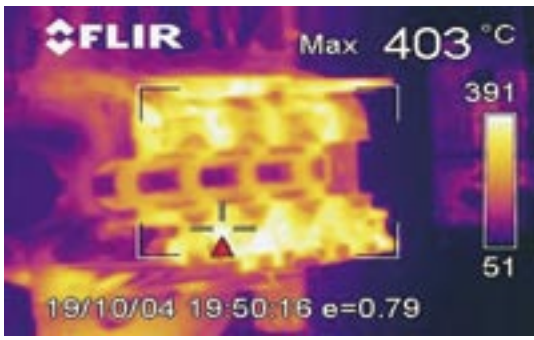
Visual picture of the fixed part of the mould



Fixed part of the mould before the aluminum spraying and just after extraction of the previous piece

Fixed part of the mould: hot spot shows bad water cooling due to blocked cooling valve

Mobile part of the mould just before spraying after extraction of the previous piece

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