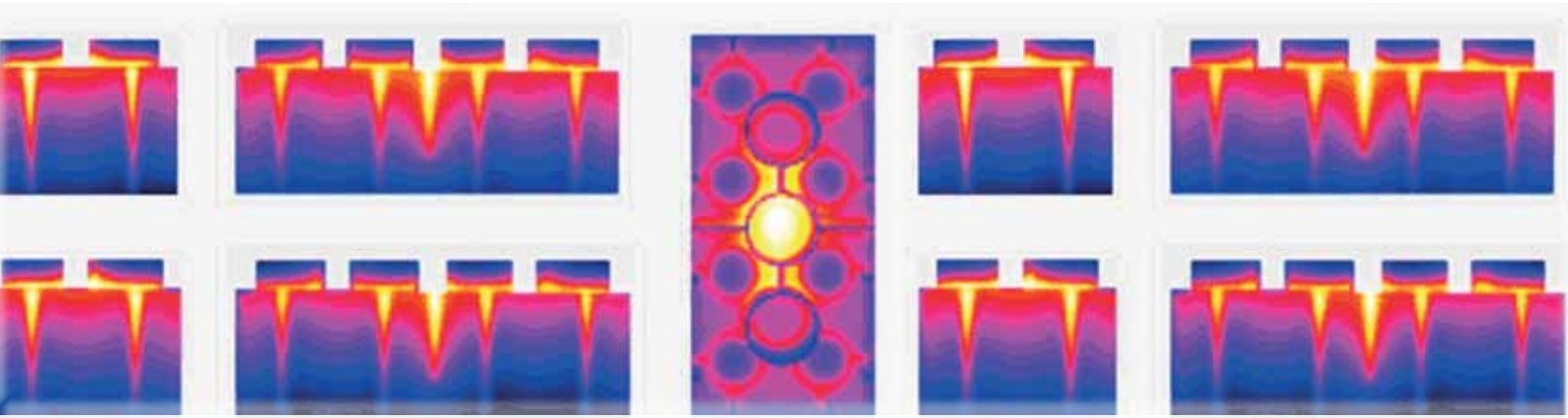


Quality and process control through Inline thermography

"Inline thermography" is an innovative process to monitor and control parts quality, thermal fluctuations in the mold and process parameters. With this system, quality variations due to temperature fluctuations in the mold can be both visualized and rectified as required.



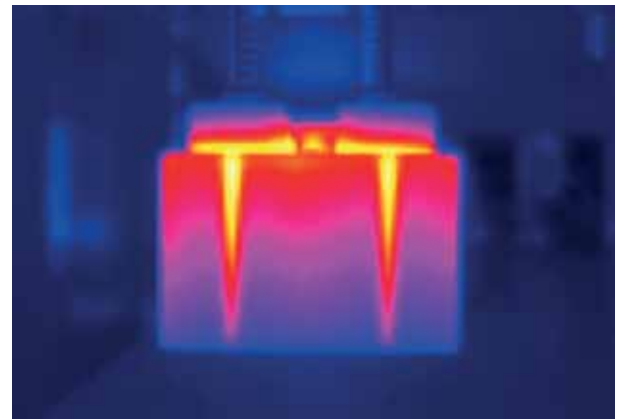
Thermographic quality management

Thermal images of molded plastic parts have been in use for many years to help with the development and optimization of injection molding tools and with debugging. The thermal analysis by means of thermal imaging is a quality management tool to detect flaws in existing molds and processes,

and to rectify them. This system offers a simple method to verify simulation-assisted optimization loops during the sampling stage of new molds.

Advantages of inline thermography

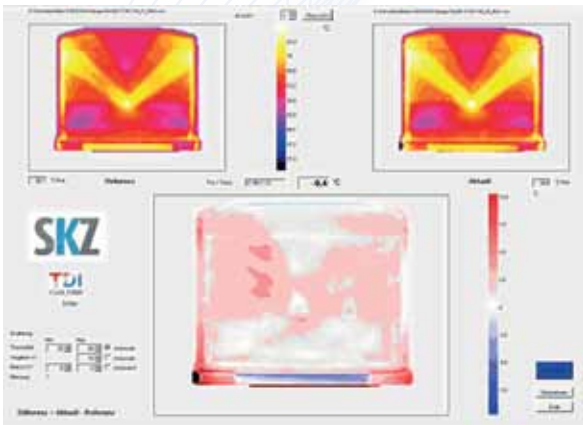
- Temperature measurement directly on the demolded part.
- Improvement of start-up conditions.
- Reduction in reject rates.
- Detection of "short shots".
- Quality improvement through even temperature distribution in the mold.
- Thermal images to provide relevant process and maintenance parameters.
- Closed-loop quality control in conjunction with WITTMANN WFC: Water Flow Control.



IR – picture of a molded part immediately after demolding.

Parts with a thermal fingerprint

With the help of an infrared camera, a picture of a part's surface temperatures is taken directly following demolding, while it is still hot. In this process, a robot presents the part to the camera at several different angles immediately after injection molding. The evaluation of the thermal images is carried out by the integrated software. Any deviations from a defined reference part are visualized and analyzed. Quality sorting devices can be used to sort out defective parts automatically, and to rectify fluctuations in the temperature control system.



*Incompletely formed part – "short shot"
(the defect is marked in black – on the bottom left the part)*



Correction of the mold temperature by addressing the individual cooling circuits of the WITTMANN FLOWCON flow controller.

Application and economic aspects

Inline thermography offers an enormous potential to achieve error-free, cost-efficient production of high-quality plastic parts. For example, in the course of a mold sampling process, the optimized temperature control parameters established at the point of product release in the form of thermal images can be used directly for series production. With the help of SPC, possible changes in the temperature control system and the mold can be recognized early, and costly downtimes can thus be prevented by appropriate maintenance. Moreover the "early warning system" will detect even the most minute

irregularities, which virtually eliminates the production of any defective parts. The relatively low costs of the hardware and software for professional use of thermal images in series production generally lead to an extremely short payback period. 2 different versions are available: an open-loop version to visualize thermal images and detect "short shots" with a signal function to separate good and bad parts, as well as a closed-loop version to visualize thermal images and short shots, which also includes a signal for good/bad part selection and regulation of mold temperature control.



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