MICRO-EPSILON

More Precision

moldCONTROL // Inline thermography for injection molding processes

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moldCONTROL

Innovative inspection using thermal imaging cameras

Inline thermography is a new solution for recognising quality fluctuations in injection molding production. Potential defects often only appear by chance on the geometrical shape of the plastic part, which is why other inspection methods are not suitable. However, infrared thermal imaging cameras detect the complete part and inspect it according to predefined parameters. Here, the advantages of the moldCONTROL system come into full effect. This system incorporates compact, fast and very flexible industrial thermal imaging cameras, including miniature PC and industry-specific evaluation software.

With modern injection molding machines, the injection-molded component is removed using a handling system. This system removes the plastic component from the tool and transfers it e.g. onto a conveyor belt or into a corresponding transport container. Automatic removal, particularly of high specification components, includes making a good/bad quality decision on the part, in order to avoid further problems downstream.

In order to perform the evaluation, the handling system presents the newly injected component to the moldCONTROL thermal imaging camera, from one or more sides, while respectively one IR image is taken. The image recording is synchronised with the handling system in such a way that the images are taken automatically after the corresponding measuring position has been reached.

The software compares the infrared images associated with the component (actual) to stored references (target). Based on the identified temperature differences (reference to the current component), a good/bad decision is made. Furthermore, the alarm limits (tolerances) are freely definable. The good/bad decision is reported back to the handling system, which sorts/removes any defective components.

The limit values for different components and tools can be stored in a component database and retrieved from there.
Based on these settings, defective components are removed. Optionally, the IR image of the defective part can be stored onto the hard disk of the miniature PC.

moldCONTROL in injection molding machines:

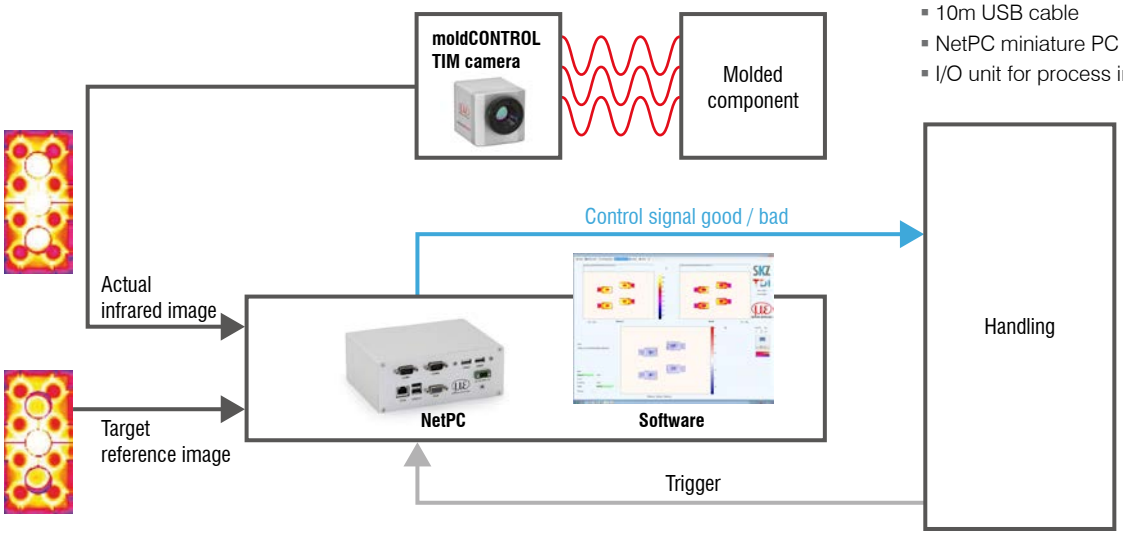
- 100 % process control
- Faster tool approach
- Inspection of 2K bodies with soft components (not possible with visual systems)
- Early detection of quality fluctuations
- Optimised tool temperature adjustment in order to avoid waste

Possible camera variants

- TIM160: resolution 160x120 px
- TIM400: resolution 382x288 px
- TIM640: resolution 640x480 px

System design moldCONTROL

- TIM thermal imaging camera
- 10m USB cable
- NetPC miniature PC with operating software
- I/O unit for process integration



Recognition of

- Incomplete injected components
- Temperature deviations in the extrusion
- Temperature deviations of the tool
- Temperature deviations of individual cooling circuits
- Low or fluctuating pressure (via demolding temperature)
- Detection of invisible short-shots of 2K components

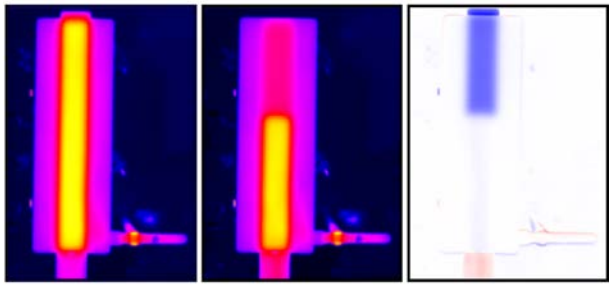
Factors enabling accurate measurements

- Only exact cycle times enable comparable measurements
- Reproducible component positioning (handling)
- Gripper design
- Dimensionally stable component

Advantages of moldCONTROL:

- Excellent price/performance ratio
- No contrast problems with black and dark grey specimens compared to visual image processing
- 360° inspection via up to 6 views of a component
- Different IR camera models for best possible adaptation to the respective component size
- Cost-effective and fast integration into existing removal systems and machine control systems
- Increased productivity due to reduced cycle times

moldCONTROL thermal imaging camera on the traverse of a handling system



2K specimens with soft component; left side: fully injected, right side: partially injected. The infrared image shows the fully injected side of the hard component - the rear-situated soft component that is not fully injected is recognised „throughout the component“ because of the missing heat quantity.

High performance sensors made by Micro-Epsilon

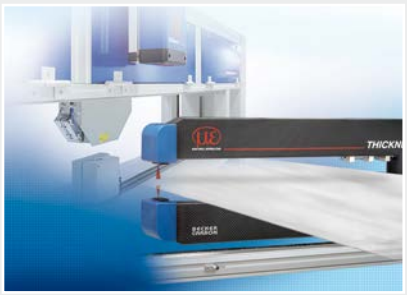
Sensors and systems for displacement and position

Sensors and measurement devices for non-contact temperature measurement

2D/3D profile sensors (laser scanner)

Optical micrometers, fibre optic sensors and fibre optics

Colour recognition sensors, LED analyzers and colour online spectrometer



Measurement and inspection systems

MICRO-EPSILON

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