Injection Short-shot detection

Goals: Automatic in-mould short-shot detection.
Applications: Large series and technical parts with severe quality expectations.
Domains: Automotive, Electro-technical, Packaging, Medical, Aeronautics.
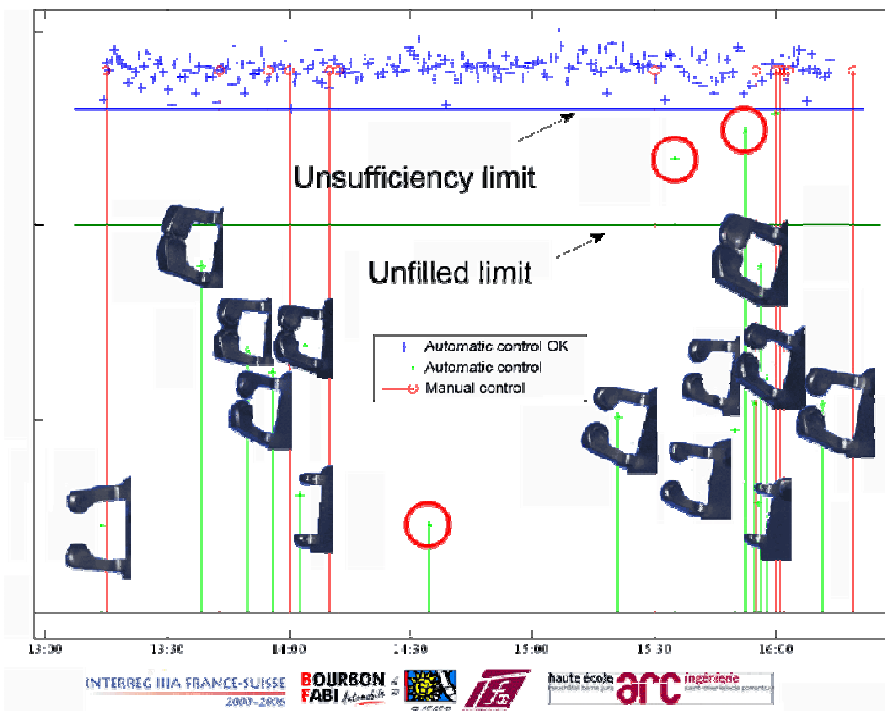
Principle : Heat flux sensor are enough sensitive to measure without direct contact the amount of heat transferred between the material injected and the mould. The quantity of heat measured is directly linked to part's quality and processing parameters.

Sensor location : Heat flux sensor is located 1mm beneath the tool cavity, at 1mm from the material :

The signals delivered by the sensor are processed in real-time by dedicated electronics which compare the amount of heat provided by each injection. A lower heat level can be attributed to a lack of material or a colder material due to filling troubles.

Property measured: Local Heat Flux (W/m²) processed for each part injected. In the graph below, good parts are plotted with blue crosses. Insufficient heat values are plotted in green with a straight line.

Heat flux signal during continuous injection cycles. Each peak is associated to the heat transferred during one shot. The red signal corresponds to the output of electronic device attached to the sensor.

During the tests, parts were manually checked, and bad ones were extracted and identified. Time of detection is represented on the graph below by a red line associated with a picture of the defect.

All bad parts are detected by the sensing system with a green bar before all red ones. One part might have been missed in the manual control (red circle at 14:30), and 2 parts can be considered fragile (15:30 and 15:45) but are not detectable visually.

This system is applicable on medium and large parts and can be easily set in production environment for immediate detection.

Since the system is very sensitive to processing parameters, an automatic procedure is available for calibration after any modification of production settings.