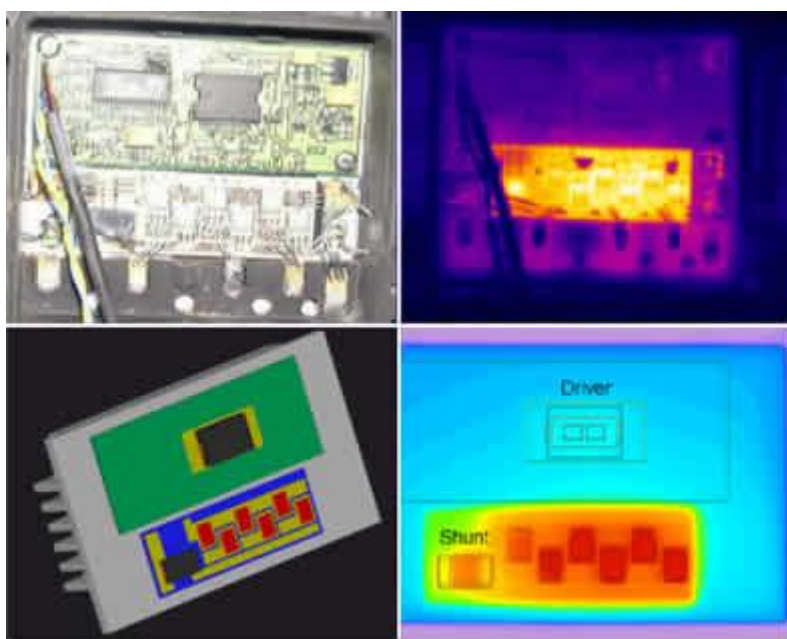


Valeo Uses Flotherm Thermal Simulation Software to Ensure Reliability of Automotive Control System



Top left - Photograph showing motor control unit internals
Top right - Infrared thermal camera image of the motor control unit
Bottom right - Flotherm simulation showing highest temperatures in same location as thermal camera
Bottom left - Detailed view of Flotherm model including copper tracks and transistors

August 2003

When Valeo Electronics & Connective Systems Branch in France needed to ensure the reliability of the electronic motor control unit governing the speed of an engine-cooling fan, they turned immediately to the Flotherm thermal simulation software. The electronic motor control unit is a sealed aluminium and plastic box situated in an extremely harsh environment, close to the engine, and is subject to ambient temperatures of up to 120°C. Using thermal simulation combined with infra-red imaging, Valeo engineer Marc Iliozer was able to predict the temperature of the sensitive electronic devices inside the control unit quickly and accurately, and ensure that all components would operate inside their specified temperature limits – essential for their reliability.

Detailed, board-level thermal simulations were carried out at the beginning of the design process, before fixing the locations of the key components on the board. Thermal engineer Marc Iliozer states "It was vital for me to work closely with the electronic engineers at this early stage, so that thermal solutions such as adding copper layers or thermal vias to reduce the temperature of critical components could be investigated and decided while there was still time to influence the component layout and board design. Working this way, we quickly arrived at a final solution which was acceptable from both electronic and thermal viewpoints."

Throughout the design process, thermal simulations and measurements were combined, with infrared camera and thermocouple measurements being used to check and calibrate the thermal model predictions, and vice-versa.

Excellent correlation between IR measurements and thermal simulations were observed, even on such details as the copper tracks at the surface of the PCB (which are subject to a non-linear

heating phenomenon known as “Joule heating”) and in the components themselves, where the thermal conductivity changes with temperature. Marc Iliozer states, “These comparisons confirmed the temperatures predicted by Flotherm, and gave us full confidence that the prototype motor control unit complied with thermal specifications. At the same time, the simulations allowed us to speed up and optimise the design, minimizing the weight of the product and therefore the costs of manufacturing. For mass-market products such as control units for cars, these cost savings can be huge.”

For further information, please contact:

Mike Reynell
Director of Marketing
Flomerics Group PLC
81 Bridge Road
Hampton Court
Surrey, KT8 9HH
UK

Tel: +44 (0)20 8487 3000
Fax: +44 (0)20 8487 3001