



**JOHN DEERE**

## John Deere Werke Mannheim, Germany, use FLIR Systems ThermaCAM™ SC-series infrared camera to optimize its tractors

John Deere is the world's leading manufacturer of agricultural equipment. The corporation is also known as a major manufacturer of forestry and construction equipment and a leading supplier of equipment used in lawn, grounds and turf care.

Founded in 1837, the company has grown from John Deere's blacksmith shop into an established brand and a world-wide corporation that employs more than 47,000 people worldwide, reaching a USD 22 billion turnover. The company is well established in Europe: the John Deere Werke in Mannheim, Germany, are its second largest production site

worldwide. 2,750 employees, including some 250 engineers, produce more than 37,000 vehicles annually.

### Tractor energy management with Infrared

Tractors are one of the most known manufacturing core businesses of John Deere. Their reliability depend on the quality and versatility of the latter's engines, which have to perform in harsh, dusty and muddy working environments and deal with vast temperature differences. Engines that are built into the tractors at the Mannheim plant are manufactured by John Deere works at other locations. They have to pass severe acceptance tests.



Checking hood surface temperature distribution



Infrared and visual image of a tractor exhaust system



At the Mannheim plant's Product Validation and Verification Department, the engines are adapted to the tractor vehicle models which are subsequently built at the Mannheim plant. The engines are submitted to elaborate testing procedures to be able to adapt them to their tractor environment with regard to sound intensity, heat development, durability and other features. "We put the engines to trial with non-destructive testing methods. And very quickly, we saw the need for a thermal camera to be able to find hot spots, or to conduct temperature measurements across an entire surface area" says Waldemar Stark, Product Validation and Verification Engineer and, together with his colleague Thilo Kazimiers, the company's FLIR Systems SC-series camera operators. Meanwhile, Product Validation and Verification is using thermography to inspect all functional parts of the tractor, such as the cooling system, transmission, electrical and electronic components, and even the air conditioning system.

### Monitoring and quantifying heat patterns

The heat development and distribution on the hood covering the engine is crucial, as the tractor needs to be operative under the most diverse climatic conditions. To realize the simple truth that hot air should be able to leave the engine, air flows have to be traced, captured, analyzed and, eventually, adjusted. An elaborate set of cooling and heating tests at various revs per minute are conducted in order to determine the "good" and "bad" air currents and to show their impact on the hood. Thermography is a powerful indicator: the camera's findings, displayed by the FLIR Systems Researcher imaging software, can indeed lead to an adaptation and even an entire re-design of the tractor model hood to optimize the engine's operation.

The analysis and fact-finding of the infra-

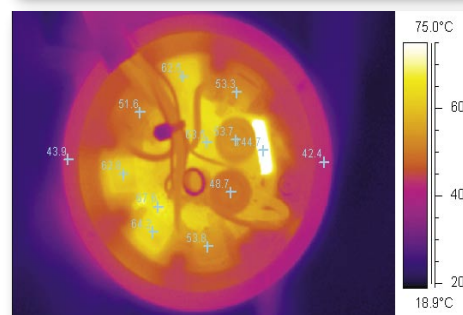
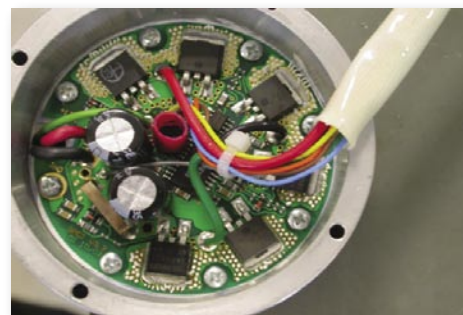
red images or sequences is done together with the design engineers. Nevertheless, the latter expect qualified statements on temperature raise, heat distribution and development from the two engineers. "For us, as thermographers and engineers, it's important to focus on the following questions: what is the background of our findings? What is the value, and what are the consequences of our conclusions? These questions can only be answered properly on the basis of an accurate handling of the camera and a careful analysis of the visual material." says Thilo Kazimiers.

The reports are kept and archived in digital format as well as in hard copy. They are instantly available for consultation. Allowing to compare parts and components quickly and easily, thermography contributes to developing a better product: "We are regularly called to other existing product design groups to take infrared images", says Waldemar Stark. Other infrared applications at the John Deere plant in Mannheim include regular inspection of the tyre stocks with a FLIR Systems E-series camera in order to prevent self-combustion at the storehouse.

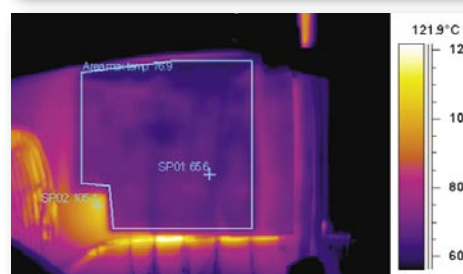
"The FLIR Systems SC-series camera, which we use with the standard 24° and additional 45° lenses fulfils our needs", says Thilo Kazimiers. "Its ability to visualize operating cycles in real-time, is very useful. And the Researcher thermal imaging software package allows us to analyze the dynamic sequences".

'Nothing runs like a John Deere' is the corporation's slogan and maxim. Thermography's ability to visualize and measure contributes to keeping this commitment.

*Acknowledgements to Roland Geipert, Area Sales Manager at FLIR Systems Germany, for establishing contacts and providing support.*



Measuring electronic components: temperature of electric pump at work



adding an aluminum foil on inner side of the hood: visual and IR view.

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