

Infrared-Reflexions

The Infrared Measurement/Thermography Newsletter by InfraTec GmbH



**Dear thermography experts,
customers and business partners!**

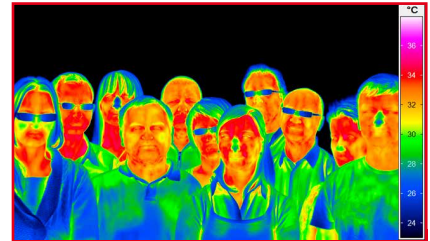
A few weeks ago, we delivered complex, high-resolution **ImageIR®** thermography systems with extensive accessories and full software features to two well-known companies in Silicon Valley, California. Good news indeed, because these companies are global leaders in their respective fields. If they produce something from their research and development departments, it is usually the best you can get. Our international sales team and their partners in the United States are very proud that we were able to place InfraTec products in this way. For our development and production, it is a reaffirmation of the successful quest for leadership in innovation, high quality and consistent focus on maximum customer benefits.

The following newsletter gives you a brief overview of the extended range of our thermal imaging hardware and software solutions and inspired new applications. Of course, you are always welcome to browse the InfraTec website and to develop a solid understanding of the possible solutions to your thermography needs through personal discussions with our employees.

Sincerest greetings from Dresden,



Dr. Matthias Krauß
Managing Director



In this issue:

- Expansion of the IRBIS® 3 software product family
- New ImageIR® 9380 MS and 10 GigE Interface
- Resolution of microstructures in the micro Kelvin range
- Process monitoring in HD resolution
- Well-known customers rely on our expertise

www.InfraTec.eu

InfraTec Service – your satisfaction is our aim



Calibration of your infrared camera

Our service team consists of technically-skilled and reliable employees who are happy to answer your questions about thermal imaging. For fastest possible support, we offer routine calibration and maintenance services in addition to our free 24-hour customer service hotline. Shortest lead times guarantee maximum system availability to our customers. Our comprehensive service spectrum also includes professional, service-oriented and

reliable repair transactions and up to 36 months of free update service, individually tailored to meet your thermography needs.

Do you have to perform complex measurement tasks, but purchasing a new InfraTec system is not yet possible for you? Then use our rental service for different camera technology, accessories and special IR lenses. When purchasing a new system, we offer the best conditions for the exchange of your used thermal imaging system and up to 48 months of warranty on new devices. Have you chosen a device configuration, but your needs have increased since that time? Then we offer you the opportunity to expand your camera equipment with our modular system concept, allowing you to add new applications.

In short: We stand for professional, individually-expandable solutions with outstanding service. With us, you are in good hands before, during and after purchasing your thermography system.

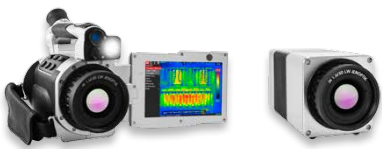
Thermography Day “Research & Development”

Date and venue:

- September 16, 2015
- InfraTec GmbH
Gostritzer Straße 61 – 63
01217 Dresden / GERMANY

For the fourth time we have organised the “Thermography R&D Day” for you, our customers and those from the research and automation field. Take the opportunity to learn more about the possibilities of thermography in different, challenging fields of activity.

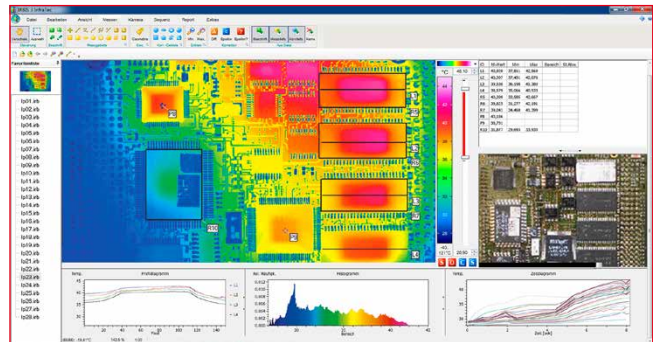




Expansion of the software product family IRBIS® 3 – the right tool for every task

The powerful and easy-to-use IRBIS® 3, IRBIS® 3 plus and IRBIS® 3 professional analysis programs as a part of our product family, offer numerous processing tools and analysis functions focused on the various requirements of individual users. These features allow you to easily create very detailed and informative thermography reports.

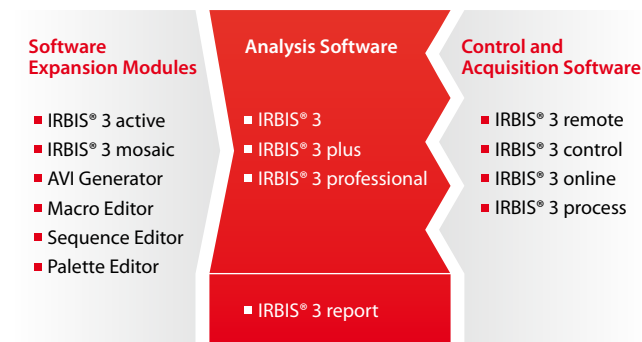
The modular software concept allows for program configuration based on its intended application and use. In addition to the various software packages, extensions and modules for camera control and data acquisition are also available. Depending on your requirements, the functions of pre-configured software with special additional functions can be extended individually, such as the active thermography module, IRBIS® 3 active. This universal module for non-destructive material testing implements active thermography to detect material defects such as delaminations, voids or cracks.



Intuitively operating concept of the software user interface

Regardless of the respective digital interfaces of the thermographic camera, your camera can be controlled remotely directly through your tablet or PC using IRBIS® 3 remote, IRBIS® 3 control or IRBIS® 3 online. The acquisition of thermal imaging data can be carried out actively or scheduled; even particularly fast thermal processes can be documented with frame rates of up to 13 kHz.

Designed for inspection tasks, thermography report software IRBIS® 3 report provides an extremely time-efficient reporting tool using individually-designed or backed templates that correspond to the VdS guidelines. Routine evaluations of even the largest data volumes and their automated processing can be carried out just as easily and quickly as documented reports in PDF format. An extensive range of analysis tools allows for easy and convenient use, including analysis and reporting of measurement scenarios.



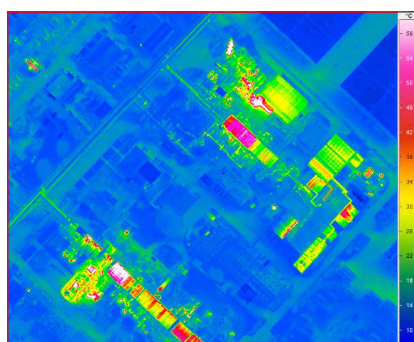
Overview of the software product family IRBIS® 3

ImageIR® 9380 MS with 100° superwide-angle lens for the highest demands

The new thermal imaging camera ImageIR® 9380 MS with SXGA detector and 100° superwide-angle lens realises thermal images with the highest geometrical and thermal resolution in an extremely large field of view without any additional movement of the camera. The robust camera housing (IP67) makes it possible to use this device under the most adverse operating conditions even in extreme environmental conditions outside, for example in aviation-based thermography. The passive athermalisation of the optical channel ensures optimal image sharpness for all objects in a distance range of (10 m ... ~) and with changing ambient temperatures (-20 ... 55) °C.



100° super-wide-angle lens for an extremely large field of view



Aviation based, high resolution thermographic image of an industrial area

10 GigE interface for the camera series ImageIR®

The high-end camera series ImageIR® are now available with the 10 Gigabit Ethernet interface – 10 GigE. Fiber optic cable and transceivers enable the use of this rapid transmission standard, which means a considerably increased transmission distance of several kilometers is now possible. This is made possible by the robust material used, when compared to sensitive electromagnetic radiation. Thus, a channel capacity of up to 475 Hz in (1,280 × 1,024) IR pixel aspect ratio can be achieved. 10 GigE is a field-proven standard for industrial applications with GigE and thus easily integrated into existing systems. The high-end camera series ImageIR® remains compatible with Gigabit Ethernet interfaces.





The new dimension of the thermal failure analysis for electronic components – resolution of microstructures in the micro Kelvin range



The smallest structural elements of a large scale extensive PCB surface provide the imaging properties of the camera technology for demanding tasks.

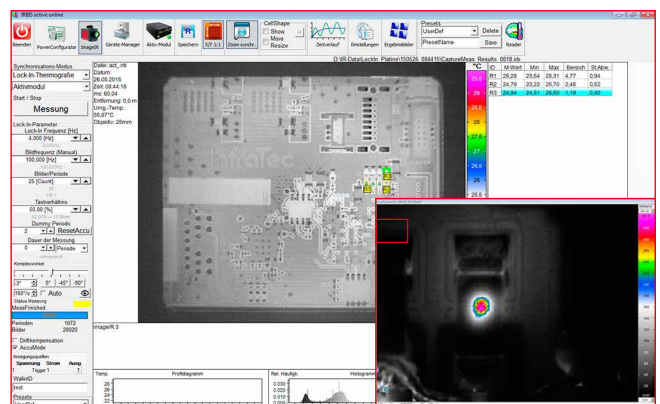
The detection of the smallest hotspots is largely determined by the geometric resolution of the camera – a function of the implemented detector and the optics used. With thermographic cameras by InfraTec, the user has detector formats of up to (1,024 × 768) IR pixels in uncooled and (1,280 × 1,024) IR pixels in cooled operation – values that go far beyond others found on the market and that guarantee thermographic images in unprecedented detail resolution.

In addition to the limits of the geometric resolution, further details in the thermographic analysis of electronic circuits must be observed. In many failure cases to be examined, the object is heated so evenly that a thermal isolation of the cause of the problem is almost impossible. This can be remedied by using a technique for non-destructive material testing with heat flow thermography, making the smallest temperature differences visible- this is called lock-in thermography or active thermography.

The power supply is clocked in this process with a synchronisation module, becoming the active excitation unit. When evaluating a fast image sequence, errors that only affect temperature

differences in the milli Kelvin and micro Kelvin range can reliably be detected through evaluation algorithms with active thermography software IRBIS® 3 active.

For the camera series **ImagelR®** and **VarioCAM®** by InfraTec, a wide range of optics and additional **microscope objectives** with the required special accessories are available – such as special holding and positioning devices – allowing for **professional micro-thermography**. The different configurations for microscopic imaging conditions permit the **analysis of small image structures** in the range of **15 microns, 5 microns and up to 1.9 microns**.



Analysing the smallest structural elements by Active Thermography

Thermal process monitoring in HD resolution in the time of industry 4.0

Especially in the field of material optimisation – such as in lightweight construction – quality-optimised thermal treatment processes play an increasingly decisive role. Together with renowned users, end users and development institutes, InfraTec has set a **new milestone** with its System **PRESS-CHECK**, able to **monitor the press hardening process of car body parts**.



Automated thermographic inspection system PRESS-CHECK for press hardening processes of car bodies

Fully automated and integrated via PROFINET or Profibus into the production lines of the **world's leading press manufacturers**, this system provides synchronous thermal process measurement data in real time. Here, two or more industrial thermography sensors are integrated into the production line. In order to test before pressing, the short-wave camera system **PIR uc SWIR HD** with a high-resolution detector in the format (1,280 × 1,024)

IR pixels has been specially developed. The control of the formed product is done with the **VarioCAM® HD head**, a long-wave microbolometer system with a detector format of (1,024 × 768) IR pixels. In addition to professional **thermal data analysis using self-developed algorithms**, integrated additional functions such as the **position control of the component and client-oriented data storage strategies** are a prerequisite for modern processes in the period of industry 4.0.

The consistent, gradual approach, starting with the analysis of the process requirement and feasibility studies, through the proposal to the project implementation including system documentation, leads to a stable automated production solution. At the customer's request, InfraTec can take over as part of the maintenance agreement, full service and regular system maintenance.

With over **20 years of industry experience** in the use of automated thermography solutions, InfraTec is always a reliable partner. With worldwide references of complex automation systems, such as **WASTE-SCAN** for early fire detection, the rotation test system **TRC** (Thermal Rotate Check) or **WELD-CHECK** for testing of welds, as well as **PV-LIT** (PV lock-in thermography) for the testing of solar cells and modules, InfraTec is among the global leading suppliers.

Well-known customers rely on our expertise in numerous fields

New test methods for off-the-road tires from the tire manufacturer Bridgestone

Mechanically heavy-duty vehicle components such as tires are a permanent issue for quality control and research and development. The tire manufacturer Bridgestone in Hofu (Yamaguchi Prefecture in southwestern Japan) has developed new test methods to meet the growing performance requirements of extremely large off-the-road tires for use in construction and mining vehicles.

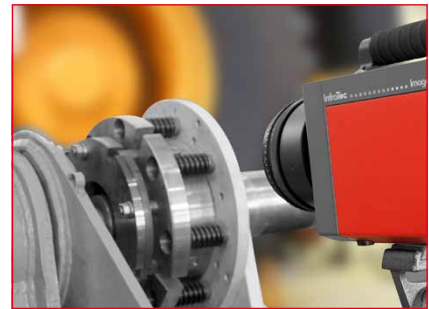
Huge dump trucks, such as the Komatsu 960E-1K, can transport more than 300 tons of mined rock. The strain on these



Quality control of heavy-duty tires of dump trucks

2-meter high tires is extremely high as they traverse rocky paths for several hours a day. The stress tests carried out at different production sites of Bridgestone consist of thermographic inspections of different layers of the tire. Numerous holes in the tire enable the control measures of the tire interior. Audits focus on the peripheral structures of the tire.

To obtain the most accurate measurements at different speeds, a thermal imaging camera with an interface for precise external control is required. The high-end camera **ImageIR® 8325** by InfraTec collects data with a thermal sensitivity of 20 mK, thanks to its high-precision triggering, very short integration times in the micro-second range and extremely high frame rates. Equipped with durable coolers with an average service life of exceeding 10,000 hours, monitoring processes are performed for extensive testing phases.



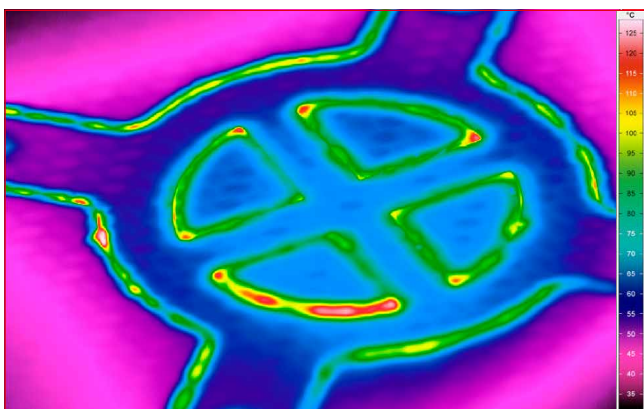
ImageIR® test control unit

Due to the efficient use and excellent performance of low maintenance and stable **ImageIR®** cameras in their current test facility, Bridgestone is committed to using these instruments in the future as an integral part of other projects. InfraTec's Japanese partners for IR systems have developed a complete turnkey solution for long-term and automated test sequence with constant, exact thermography measurements.

With the friendly support of Bridgestone; abbreviated text version.

Thermography in CFRP processing

The Laser Zentrum Hannover e. V. is one of the world's leading institutions in exploring new applications for lasers and their technological implementation. Since lasers often operate with high intensities, non-contact temperature measurement with thermography for the purpose of monitoring their application plays an important role.



Temperature distribution of a CFRP component

Laser beam cutting – and welding of carbon fiber reinforced composites (CFRP) requires a precisely-tuned energy input. Thus, although the carbon fibers are first cut at temperatures of over

3,000 °C, the plastic matrix of the composite materials will melt or vaporises at temperatures of only 130 °C. Due to the large differences in the thermo-physical properties of the components, a precise high-resolution temperature measurement is required. The short process times require a high measurement frequency – only then reliable statements can be made regarding thermal influences of the base material at the cut edges and feasible joint seams.

For the measurement and evaluation of the various scenarios, the cooled thermal imaging camera **ImageIR® 8300** is used. This camera, equipped with **two separate filter wheels**, allows the representation of spectral abnormalities in the CFRP laser processing. The high measurement accuracy of the relevant process temperatures of $\pm 1\%$ is achieved by the specially-developed precision calibration, the optimal use of the dynamic range of the infrared detector and, through the integration of several calibration curves for the necessary drift compensation, and thus for long-term stability. With the use of special lenses, the smallest details can be detected from a safe distance. The control of the camera and the storage and evaluation of measurement data is carried out completely with the thermography software **IRBIS® 3**.

Kindly supported by the Laser Zentrum Hannover e.V.; abbreviated text version.

Impint

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