Issue 2019-02

Infrared Reflexions

The Infrared Measurement / Thermography Newsletter by InfraTec GmbH

Dear Readers of Infrared Reflexions,

2018 was the most successful year in InfraTec's 25-year history. The booming economy has proven to be an excellent basis for the sales of our innovative products.

Good business results are a prerequisite for further establishment, expansion and development of new products. With an investment of 10 million EUR in the expansion of our cleanroom production and a new office wing, we are preparing ourselves sustainably for the future.

Our latest edition of infrared reflections, presented to you in good tradition, once again ranges from our new products to well-known and novel applications of thermography as a method of temperature measurement.

Our products rank in the upper performance segment and their further development always serves to improve customer benefits. A clear trend in this respect is the increase in flexibility by combining different unique features in one single camera. I invite you to read the following information and learn more about exactly this flexibility also offered by the HDR technology implemented into our cameras with digital readout circuit.

With kind regards from Dresden

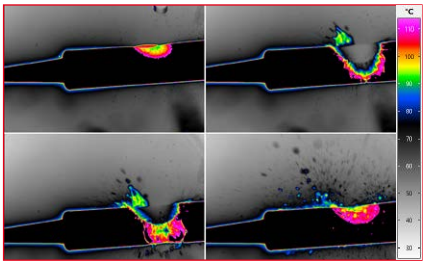
Dr. Matthias Krauß
Managing Director and Partner

In this issue:

High-speed Mode of the ImageIR® Camera Series

Users of the **high-end camera series ImageIR®** from InfraTec can work with the same camera in two speed modes. The regular mode achieves the known frame rates for full, half and sub-frames with the full geometrical resolution. In **high-speed mode,** frames can be captured with the identical field of view (FOV) – while the frame rate increases to more than three times the previous value. The **ImageIR® 9400** demonstrates the potential of this development. Usually, this camera can be used to take full frame images with (1,280 × 1,024) IR pixels at 180 Hz. In high-speed mode, the frame rate more than triples to 622 Hz with (640 × 512) IR pixels and the same FOV.

The larger effective pixel area also improves the signal-to-noise ratio by a factor of almost 2 while maintaining a constant FOV. This increase in thermal resolution ensures that users can detect even smaller temperature differences with absolute precision.



Impact of a drop of water on a soldering iron, recorded with the high-speed mode of ImageIR® 9400

Automatically to Perfect Recording

Different measurement scenarios often require individually adjusted temperature measurement ranges or integration times that deviate from the factory calibration. This is where **HighSense** comes in, the latest innovation for **high-end camera series ImageIR®.** This function allows users to apply individual temperature measurement ranges in addition to factory calibrations. They select a temperature range and the optimum integration time is automatically calculated. Alternatively, they can define an integration time and get the precision of the appropriate temperature range determined. The calibration will be maintained even with changed integration times.

High-end Thermography at a New Level with ImageIR®

In thermographic analysis, there are a number of factors that present a particular challenge for the infrared camera used. The wide temperature measurement range is undoubtedly one of them. InfraTec takes different paths to exceed the previous peak values of its own cameras.

Simultaneous Mapping of Wide Temperature Ranges

HDR Function of High-end Camera Series ImageIR® Facilitates the Analysis of Objects with Extreme Temperature Gradients

The new **High Dynamic Range (HDR)** function of the Infrared ImageIR® camera series from InfraTec enables measurement scenarios with extremely different temperatures to be recorded continuously. The starting point of the HDR function is a **fast rotating filter wheel.** The wheel provides up to six positions ensuring maximum flexibility for demanding measurement tasks.

When recording in HDR mode, multiple thermograms with different integration times and different filters are recorded quickly in succession and compiled into an overall image with a high dynamic range. To activate the HDR function, it is sufficient to select a previously defined calibration range. After that, the rotation of the rotating filter wheel and the composition of the thermogram starts automatically. The measuring range can span **up to 1,500 K.** In the case of the ImageIR® 8300 hp, this setting can be used to capture full-frame images with (640 × 512) IR pixels and a temporal resolution of 350 Hz. In addition to extremely high temperature applications, the fast rotating filter wheel offers a wide range of measurement options, in which different spectral ranges need to be measured. Lastly, users can also use up to six spectral filters instead of neutral density filters.

Consistently Dynamic

Frame Rate Exceeds 100 kHz Limit

For some years now, the **ImageIR® 5300** has been the top model in terms of frame rates within the ImageIR® series. The special status of the ImageIR® 5300 goes back to its detector. Its sensitive elements are arranged at a distance of 30 µm. This **pitch is twice the size** of conventional detectors. Therefore, this model not only has an enormous thermal sensitivity, but now also enables sub-frame rates of **up to 105 kHz.**

The camera is predestined for the solution of measurement and testing tasks in which extremely fast thermal processes are to be recorded. This applies, for example, to the investigation of combustion processes. Such high frame rates also play a role in much of basic scientific research. These include, for example, aerodynamics and fluid dynamics issues in the aerospace sector as well as applications in which laser technology is used.

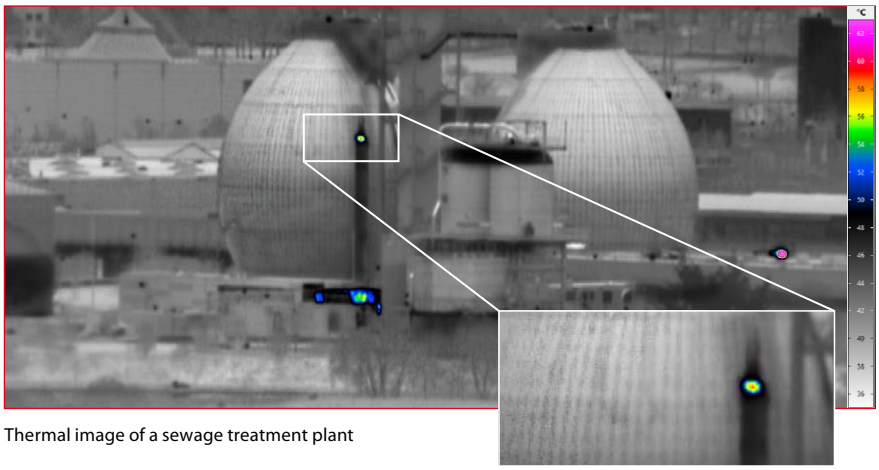
High-speed rotation test using infrared camera ImageIR® 5300 and software IRBIS® 3 rotate

Peak Values as Common Denominator

The VarioCAM® High Definition series defines standards for the potential of cameras with uncooled microbolometer detectors. This status is supported by two new models. Both are suitable for very different applications. Common to them is the enormous performance they offer users.

An Eye on Everything

Motorised 6× Zoom Lens Opens Up New Opportunities for Large-area Surveillance



Thermal image of a sewage treatment plant

The thermographic system VarioCAM® HD Z from InfraTec is the world's first commercially available **radiometric microbolometer camera** that offers a **motorised 6× infrared zoom lens** with (25 … 150) mm focal length for the spectral range from (7.5 … 14) µm. Equipped with an FPA detector, it provides high-quality thermal images with (1,024 × 768) IR pixels. The combination of large-format detector and **continuous zoom** lens makes it suitable for applications such as securing large outdoor areas and security areas such as chemical plants and tank farms, environmental monitoring and the detection of hotspots as part of early fire detection. These tasks can be mastered with precision even at night and in poor visibility due to automatic image stabilisation. Equipped with high-quality components, the system supports 24/7 use.

The VarioCAM® HD Z can optionally be integrated as a component in an automation solution, for example for thermographic monitoring of potentially explosive areas. As a part of fast pan / tilt systems, the camera enables precise manual analysis of thermal defects. Depending on individual needs, flexible zoom levels are used for the different sectors. ATEX-compliant protective housings ensure the camera's enduring reliability and precision.

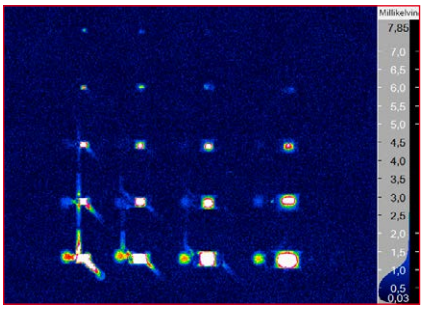
VarioCAM® HD Z – Module with zoom lens

All-in-one High Quality Solution

Powerful Package for Lock-in Thermography

Lock-in Thermography package with VarioCAM® HDx and IRBIS® 3 active software

Our **Lock-in Thermography** package allows electronics manufacturers to use a high-performance infrared camera for **product development and quality assurance** at a price starting at 17,900 EUR*. We offer the infrared camera VarioCAM® HDx – as stationary or handheld model – together with the special software IRBIS® 3 active, the suitable trigger unit and the corresponding connection cables. In combination with a high-performance microscopic lens, structures up to a pixel size of 17 µm can be depicted.



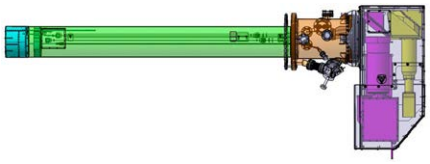
Thermal image of a demonstrator

*Prices are without statutory value added tax and shipping costs. Sale only to commercial customers, government agencies, and public facilities.

Max Planck Institute for Plasma Physics (IPP), Greifswald

Monitoring Plasma at Wendelstein 7-X

What will the energy supply of the future look like? The Max Planck Institute for Plasma Physics (IPP) in Greifswald is dealing with this question while working with Wendelstein 7-X, the world's largest stellarator-type nuclear fusion facility. The aim is to achieve plasma discharges lasting up to 30 minutes with this plant.



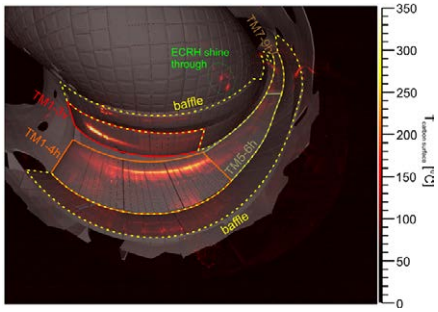
Snapshot of CAD model of high-resolution IR/VIS prototype endoscope. The IR and visible cameras are mounted at the end of the endoscope via holder

Graphite Tiles Protect Divertor from High Plasma Temperatures

Temperature measurements in this context play a central role. At Wendelstein 7-X graphite tiles are thermographically monitored which cover parts of the inner plasma vessel, the divertor. The tiles allow higher temperatures and longer plasma discharges. The temperature control is intended to prevent the system from being damaged by overloading and possible damage to the tile elements caused by plasma discharges not being detected.

This task is performed by special endoscopes equipped with models of the infrared camera series ImageIR® 9300 from InfraTec and visual cameras. The thermographic cameras are positioned at the end of each endoscope. Their internal filter wheel is equipped with multiple neutral density filters, providing the basis for accurate measurements over the entire, very wide temperature measurement range.

High-resolution detectors with (1,280 × 1,024) IR pixels and corresponding special lenses ensure that large areas of the horizontal and vertical fields of the divertor can be monitored with a single image. The option of taking partial images at speeds of several kilohertz enables to record even extremely short-term temperature changes.



Infrared image obtained with InfraTec ImageIR® 9300 (ECHR – Electron Cyclotron Resonance Heating, a main heating system of the plasma. TM1-3v, TM1-4h, TM5-6h, TM7-9h – Description of target modules whose temperatures are measured.)

Netze Duisburg GmbH

Inspection of District Heating Pipelines Using Thermography

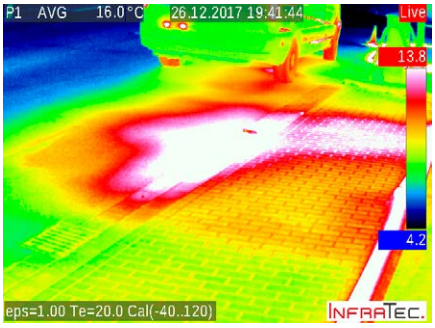
Based on industrial waste heat or renewable energy sources, district heating offers the possibility of heating water and thus supplying private, commercial and industrial customers. Prerequisite for this is an intact transport system. Only then energy reaches the consumers with minimal losses. This is precisely what Netze Duisburg GmbH is doing to control the city's entire district heating network supported by InfraTec infrared cameras.

Special construction on the roof rack.

Several Hundred Kilometres of Pipelines in Focus

Netze Duisburg GmbH use InfraTec thermography systems to regularly inspect the district heating network, which covers almost 465 kilometres, for possible leaks and check the sleeves of plastic-coated pipes for perfect thermal insulation.

Not a job to be accomplished on foot. Therefore, an infrared camera of the VarioCAM® HDx research 600 series with a pan/tilt head mounted on the roof rack of a car is used. The camera's robust light metal housing, combined with the LEMO® plug connections that maintain the degree of protection, ensures that the system is not affected by any weather conditions. The custom-built design includes a cable entry into the vehicle interior. Here, the recordings can be monitored and evaluated live on the monitor of a notebook.



The image was captured due to damage that led to water losses in the district heating network. Using an infrared camera, the damage to the connection pipe for the district heating could be located quickly and accurately.

Optionally, the camera can be removed from the pan/tilt head and simply used as a handheld device. The 5.6 inch extremely large and very bright colour TFT display allows the immediate evaluation of recordings, even if the camera is not live connected to a computer. This considerably expands the range of applications for the thermography system.

Imprint
InfraTec GmbH | Gostritzer Straße 61 – 63 | 01217 Dresden / GERMANY
Phone: +49 351 82876-610 | Fax: + 49 351 82876-543 | **thermo@InfraTec.de** | **www.InfraTec.eu**