Issue 2019

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 binning technology implemented into our cameras with digital readout circuit.

With kind regards from Dresden

Dr. Matthias Krauß
Managing Director and Partner

In this issue:

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 the 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 appropriate temperature range determined. The calibration will be maintained even with changed integration times.

New HD Format

The special feature of the new ImageIR® 9500 is its highly sensitive mercury-cadmium telluride (MCT) based detector with **(1,280 × 720) IR pixels.** With the help of the opto-mechanical MicroScan, the geometrical resolution of the camera can be increased to **3.7 Megapixels.** This model enables frame rates up to 1.5 kHz in subframe format with (320 × 180) IR pixels and is intended for worldwide marketing.

Commitment to Research

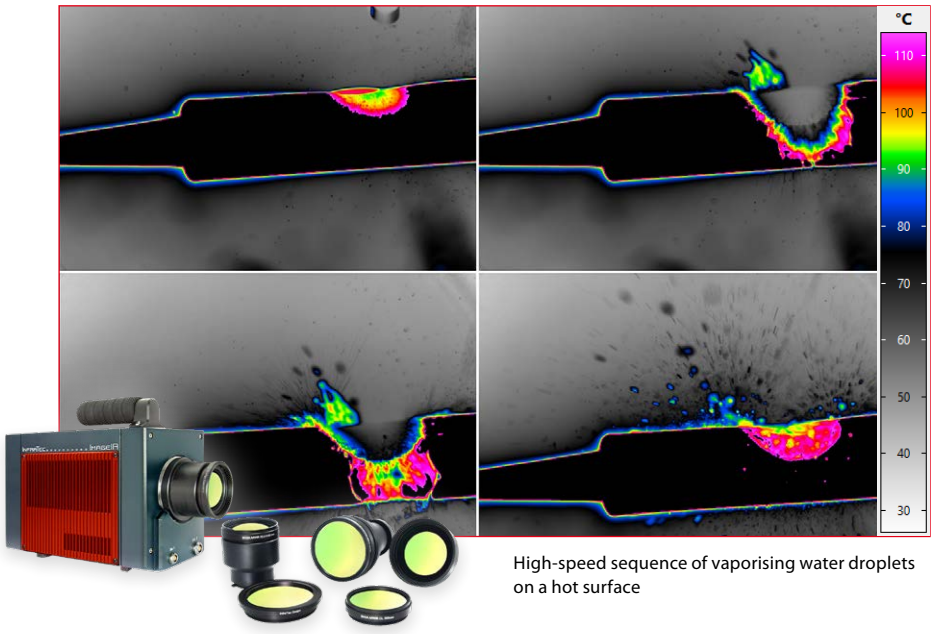
InfraTec regularly expands its know-how in the field of thermography by participating in various research projects. As a partner of the GEWOL project, for example, we have actively further developed **laser-excited thermography.** This technique is used, e.g. for testing adhesive joints of CFRP and GFRP components as well as the bonding of plastic materials with steel or aluminium.

High-speed 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 speed at which processes run is undoubtedly one of them. InfraTec takes different paths to exceed the previous peak values of its own cameras.

Choice Between Two Excellent Options

New High-speed Mode of the ImageIR® Camera Series for Recordings with Significantly Higher Frame Rates



High-speed sequence of vaporising water droplets on a hot surface

The high-end camera series ImageIR® from InfraTec offers a new level of flexibility. Users 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.

Reducing the number of pixels, increasing thermal sensitivity

The principle behind the high-speed mode is called Binning. Four pixels of adjacent lines and columns are combined to one pixel.

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.

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.

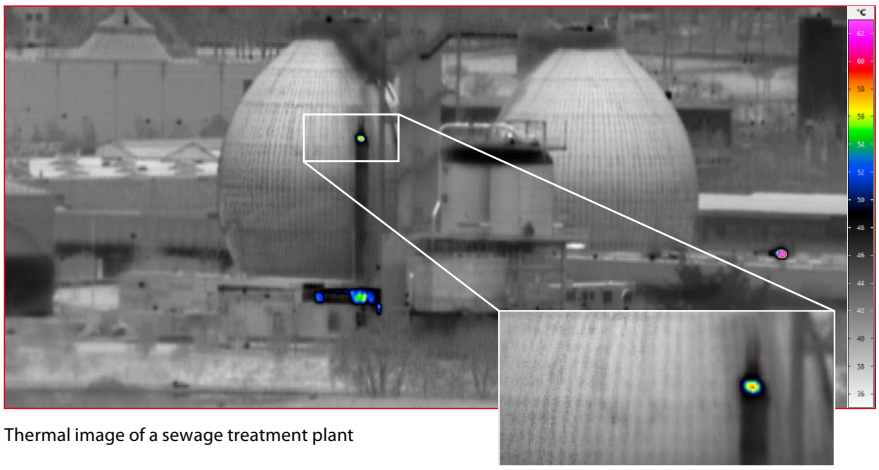
High-speed rotation test using infrared camera ImageIR® 5300 and software IRBIS® 3 rotate

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 ther-mal 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.

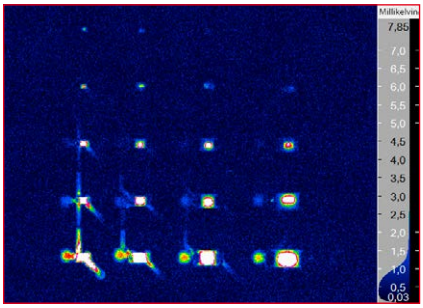
VarioCAM® HD Z – Module with zoom lens

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.

Energiezentrale Forsthaus (EZF) in Bern

Early Fire Detection in Power Plants

Infrared monitoring system WASTE-SCAN from InfraTec in a power plant

The Energiezentrale Forsthaus (EZF) is a waste-to-energy plant of the city of Bern. Approximately 120,000 tons of waste are utilized here annually. The infrared monitoring system WASTE-SCAN from InfraTec is used for early fire detection on site.

The system comprises seven cameras with protective housings. „Two are fixed. We use them to monitor the feed hopper and shredder hole," explains Thomas Andres, head of plant operations at EZF. „The other cameras are equipped with pan / tilt heads and serve to secure the soft dirt bunker, two storage areas and the crane parking areas."

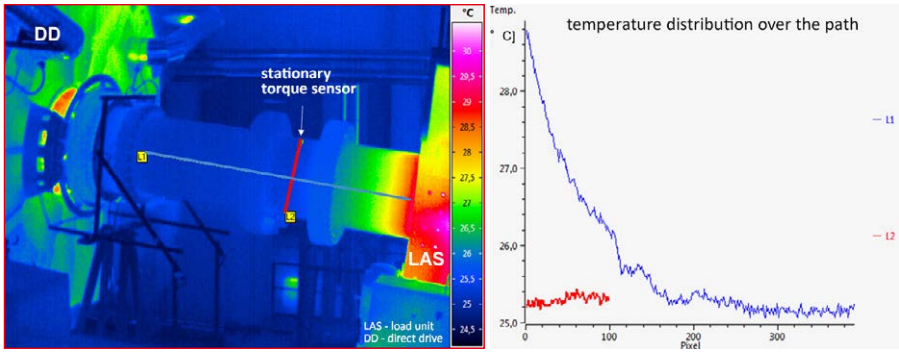
Some of these infrared cameras are combined with visual cameras referred to as a twin system. Combined with their electronically controlled pan / tilt heads, they offer the possibility of optimised area monitoring. Twin systems and individual cameras are divided into two separate asynchronous systems, each with its own computer and software architecture. This ensures maximum safety and reliability.

The infrared cameras are connected to the control and extinguishing systems of the fire alarm control panel via Profibus interfaces. Detecting a fire via cameras or other sensors automatically triggers an alarm, which is reported to the extinguishing system and activates a spray flood system. Thomas Andres does not need additional employees, who constantly keep an eye on the early fire detection system. „WASTE-SCAN runs automatically. Our two crane operators only check whether it is in operation."

RWTH Aachen University

Torque Measurement in Wind Turbines Test Benches

The Temperature is considered to be a decisive environmental parameter for torque measurement on wind turbine test benches. The Chair for Wind Power Drives of RWTH Aachen University is therefore investigating their influence on such test rigs.



Temperature distribution of the torque transducer of the 4 MW wind turbine test bench of RWTH Aachen University

Components such as prime movers, hydraulic power units, load application systems and electrical converters are responsible for the heat input in such test benches. They contribute to the temperature fluctuations of the test bench shaft and the torque transducer and can thus reduce the accuracy of the torque measurement.

Complete power train measured

To quantify the influence of temperature on torque measurement accuracy in the MN·m range (meganewton meter range), it is important to measure the area temperature of the entire torque transducer. The InfraTec VarioCAM® HD research 700 thermographic camera is very well suited for this purpose. It allows simultaneous temperature measurement of the entire power train using a 15 mm wide-angle lens.

RWTH Aachen University uses a 4 MW wind turbine test bench for analysis. The temperature measurements are carried out under different operating conditions and as long-term measurements of up to 10 hours to investigate the cooling and heating process of the drive train. The VarioCAM® HD research 700 is positioned at different locations to separately measure the temperature distribution of a tested 5 MN·m torque transducer and following that of the existing stationary torque transducer of the test bench.

The measurement results can be used to optimise simulation models by adjusting the material properties of the transducer and the strain gauge factors. The result is a more precise quantification of accuracy in torque measurement.

Imprint
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