



16th Quantitative Infrared Thermography Conference

July 4-8, 2022
Paris, France

CONFERENCE BOOKLET

Inria



Université
Gustave Eiffel

UPEC
Connaissance - Action

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PARIS-EST CRÉTEIL
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This is the short version of the booklet for print use.
Full abstracts with all authors, references, and figures can be found at:
<https://qirt2022.sciencesconf.org/>

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About

This 16th edition is a particular one that is held at Paris for its 30th anniversary. The Local Organizing Committee is proud to organize the conference for this particular occasion and extends a warm welcome to all the participants, contributors, partners and exhibitors.

Scope

The biannual Quantitative InfraRed Thermography (QIRT) Conference is a meeting of the scientific and industrial community interested and actively working in research, application and technology related to infrared thermography. All conference topics are intended to quantitative results comprising temperature values as well as further parameters on the tested materials and structures. The latter ones are usually obtained through active thermography, e. g. by exploiting non-stationary heat transfer processes activated by additional heat sources or by considering wavelength dependent effects. Passive and active thermography methods and technologies are spread now along a multitude of areas of applications, which all profit from each other.

Local organizing committee

E. Blin	F. Delaleux	C. Droz	J. Dumoulin
V. Feuillet	L. Ibos	J. Labarrère	J.-L. Manceau
A. Mazioud	L. Mevel	O. Riou	T. Toullier

International Scientific Committee

D. Balageas	J.-C. Batsale	P. Bison	J.-M. Buchlin
G. Busse	G. Cardone	G.M. Carlomagno	J. Dumoulin
J. Liu	C. Maierhofer	X. Maldague	J. Morikawa
A. Nowakowski	B. Oswald-Tranta	A. Rozlosnik	A. Salazar
S. Svaic	S. Shepard	G. Steenackers	T. Schrijer
B. Wiecek	V. Vavilov		

COVID Info

On the 1st July 2022 mask wearing is not mandatory in France. But due to the evolution of the sanitary situation these last 2 weeks, we would like to encourage you to preserve yourself and your colleagues by using mask during sessions.

Timetable

SC: Short Courses, KL: Keynote Lecture, EX: Exhibitor presentation, CT: Contributed Talk.

Monday, 4 of July

8:00-19:00	Registration desk - 08:00-19:00		
9:00-9:55	SC	Pr. Xavier Maldague Short courses	Session 1 - Part 1 – Basic of infrared thermography
10:00-10:55	SC	Pr. Xavier Maldague Short courses	Session 1 - Part 2 – Basic of infrared thermography
10:55-11:15	Coffee break		
11:15-12:15	SC	Pr. Gennaro Cardone Short courses	Session 2 – Thermal Problems in Fluid Dynamics
12:15-13:15	Lunch		
13:15-14:15	SC	Dr. Paolo Bison Short courses	Session 3 – Passive and Active Infrared Thermography applied to buildings and cultural heritage
14:20-15:20	SC	Pr. Gunther Steenackers Short courses	Session 4 – Medical applications of infrared Thermography
15:20-15:35	Coffee break		
15:35-17:05	SC	Dr. Thibaud Toullier Short courses	Session 5 – Joint Estimation of Emissivity and Temperature
17:30-19:00	History of qirt – Special Event		 D. Balageas, X. Maldague, G. Carlomagno
19:00-20:30	Get Together		- FIAP -

Tuesday, 5 of July

8:00-18:00	Registration desk - 08:00-18:00		
9:00-9:30	Opening session		
9:40-10:30	KL	Francis Bach - Inria Keynote 1	Efficient optimization methods for machine learning
10:30-11:00	Coffee break		
11:00-12:40	Session 1-1 - Artificial Intelligence I		 Bogusław Więcek
11:00-11:20	CT	Liangliang Cheng	Irt-gan: a gan framework for automated defect segmentation in composites using infrared thermography
11:20-11:40	CT	Tout Karim	Defect detection on inductive thermography images using convolutional neural networks
11:40-12:00	CT	Kaczmarek Mariusz	The use of machine learning for face regions detection in thermograms
12:00-12:20	CT	Vardasca Ricardo	Infrared thermal imaging: a dataset definition towards decision making and intelligence
12:20-12:40	CT	Toullier Thibaud	Toward the development of intelligent wayside hot bearings detector system : combining the thermal vision with the strength of yolo-v4
11:00-12:40	Session 2-1 - Biomedical I		 Gunther Steenackers
11:00-11:20	CT	Fernandes Henrique	Effects of region of interest on breast cancer detection using cnn and infrared imaging
11:20-11:40	CT	Fuentes-Oliver Edgar Israel , Ortiz-Sosa Rosalinda	Temporal changes in the radiometric information of patients with diabetic foot disease
11:40-12:00	CT	Magalhães Carolina	Ir thermal and uv imaging characterization of melanocytic lesions
12:00-12:20	CT	Szramel Joanna Maria	Monitoring drosophila melanogaster thermogenesis by infrared thermography
12:20-12:40	CT	Steenackers Gunther	Diep flap perforator mapping by infrared thermography: state of the art and research progression.
12:40-14:00	Lunch		
14:00-15:40	Session 1-2 - Multidisciplinary		 Xavier Maldague
14:00-14:20	CT	Kim Hyeonjin	Development of steel bridge coating condition evaluation system using uv based active thermography and vision technique
14:20-14:40	CT	Boubanga Tombet Stephane	Quantification of co2 passive degassing at sulphur banks from kilauea volcano using thermal infrared multispectral imaging
14:40-15:00	CT	Garcia Marine	Measurements of mass transfer in a microfluidic membraneless fuel cell using microscale infrared spectroscopy

15:00–15:20	CT	Bison Paolo	Moisture diffusion assessment in porous media by ir thermography
15:20–15:40	CT	Nicola Ludwig	Infrared thermography analysis of the ancient soapstone quarry in chiavenna
14:00–15:40	Session 2-2 - NDT I  Jean-Michel Roche		
14:00–14:20	CT	Netzelmann Udo	Induction thermography with automated defect detection in comparison with magnetic particle inspection
14:20–14:40	CT	Maillard Samuel	Industrial inspection of composites acoustic panels for aircraft components using infrared thermography
14:40–15:00	CT	Netzelmann Udo	Thermographic crack detection by liquid gas in materials with low emissivity
15:00–15:20	CT	Lopez De Uralde Pablo	Industrial applications of inductive thermography: a novel inductor for multi-directional crack detection
15:20–15:40	CT	Zhang Hai	A comparative study of infrared, terahertz and air-coupled ultrasonic ndt for an old hand-bound book of the sixth century
15:40–16:00	Coffee break		
16:00–17:40	Session 1-3 - Photothermal, Thermophysics  Paolo Bison		
16:00–16:20	CT	Nolte Peter W.	Evaluating a custom-built led-based excitation source for lock-in thermography
16:20–16:40	CT	Bourges Coline	Contactless temperature field measurements in infrared semi-transparent materials using thermotransmittance imaging.
16:40–17:00	CT	Kim Wontae	Automated object recognition of circular defects using infrared thermographic
17:00–17:20	CT	Medina Milton	Application of newton's cooling model to interpret thermoregulation in the breast using dynamic infrared thermography
17:20–17:40	CT	Thomas Lafargue	Absolute measurement of temperature evolution by infrared imaging in extreme conditions using high power lasers
16:00–17:40	Session 2-3 - NDT II  Agustin Salazar		
16:00–16:20	CT	Jensen Friederike	Damage development of initial defects in coated gfrp-structures due to rain exposure
16:20–16:40	CT	Srajbr Christian	Qualification of active thermographic methods for testing welded joints

16:40-17:00	CT	Swiderski Waldemar	Methods of improving the detection of defects in aramid fiber-reinforced composites in non-destructive testing by pulsed thermography
17:00-17:20	CT	Roche Jean-Michel	Contribution of ir thermography to assess lightning-strike impact resistance of carbon fiber composite materials
17:20-17:40	CT	Li Voti Roberto	Advances in hardness depth profiling by photothermal radiometry of steel mechanical components in vehicles
19:00-21:00		Ice Breaker	Péniche La Baleine Blanche 11 Port de la gare 75013 Paris

Wednesday, 6 of July

8:00-18:00	Registration desk - 08:00-18:00		
9:00-9:50	KL	Jacques Ameury - LNE Keynote 2	Infrared Radiative Properties of Materials
9:50-10:30	Technical session 1 - Exhibitors		 Olivier Riou
9:50-10:00	EX	Noxant	
10:00-10:10	EX	Themacs	
10:10-10:20	EX	Thermoconcept	
10:30-11:00	Coffee break		
11:00-12:40	Session 1-a - Student Award		 Gennaro Cardone
11:00-11:25	CT	Parrey Ann-Marie	Detection and localization of premature flow transitions on rotor blades
11:25-11:50	CT	Lecompagnon Julien	Detection of internal defects applying photothermal super resolution reconstruction utilizing two-dimensional high-power random pixel patterns
11:50-12:15	CT	Krause Kevin	Reaction enthalpy measurement in an acid-base microfluidic reactor using infrared thermospectroscopy
12:15-12:40	CT	Lecardonnell Aude , Laboureur Delphine	Aerothermal characterization of additively manufactured compact heat exchanger modules by infrared thermography
11:00-12:40	Session 2-a - Artificial Intelligence II		 Bogusław Więcek
11:00-11:20	CT	Helvig Kevin	Toward deep learning fusion of flying spot thermography and visible inspection for surface cracks detection on metallic materials
11:20-11:40	CT	Albert-Weiss Dominique	Multitask learning approach for fruit ripeness prediction using a dual band thermal camera
11:40-12:00	CT	Albert-Weiss Dominique	Continual learning to study the ripening of agricultural commodities using infrared thermography
12:00-12:20	CT	Pareek Kaushal Arun	Development of an intelligent failure analysis system based on infrared thermography and finite element modelling supported data augmentation for deep learning
12:20-12:40	CT	Urbaś Sebastian	Simulation of single-pixel ir camera with cnn reconstruction algorithm
12:40-14:00	Lunch		
14:00-15:40	Poster session - 2mn speech & poster session		 Fabien Delaleux
14:00-14:02	CT	Ghibaudo Olivier	Simulation of induction heating for infrared thermography with consideration of spectrum artefacts
14:02-14:04	CT	Bedoya Adrian , Rodriguez Felix , Marin Ernesto	Determining thermal anisotropy of woods using active infrared thermography
14:04-14:06	CT	Maldague Xavier	Multi-modal point cloud registration for inspection of industrial components

14:06-14:08	CT	Ebrahimi Samira	Undercomplete autoencoder for dimensional reduction applied to pulsed thermography
14:08-14:10	CT	Kasikowski Rafal	Impact of temperature on resonant tank components in IIC resonant smps
14:10-14:12	CT	Mateos Canseco Alejandro	Scanning fast photothermal radiometry
14:12-14:14	CT	Mouhoubi Kamel	Examples of singular value decomposition contribution in helping cultural heritage works of art conservation using stimulated infrared thermography
14:14-14:16	CT	Sosnowski Tomasz , Kastek Mariusz	Method and test stand for calibrating the thermal imaging camera
14:16-14:18	CT	Strąkowska Maria	Thermal modeling and measurement of led optical power using ir thermography
14:18-14:20	CT	Ebrahimi Samira	Bag-of-features for defect depth estimation and material identification, applied to carbon fiber reinforced polymers
14:20-14:22	CT	Nooralishahi Parham	Measuring patient temperature in clinical environments by infrared thermography: the reach of the gold standard
14:22-14:24	CT	Brazane Samy	Thermal drift of the flir a325sc camera. determination of optimal camera temperature
14:24-14:26	CT	Ennass Kamal	Temperature measurements of opaque materials at high temperatures using multi-spectral methods
14:26-14:28	CT	Ibos Laurent	Importance of correction of surface temperature maps in urban environment
14:28-14:30	CT		Poster session at oslo
15:40-16:00		Coffee break	
16:00-17:40		Session 1-4 – Calibration & Metrology	
			 Srecko Svaic
16:00-16:20	CT	Schramm Sebastian	Compensating the size-of-source effect: relationship between the mtf and a data-driven convolution filter approach
16:20-16:40	CT	Dziarski Krzysztof	Indirect thermographic temperature measurements of a diode die made on a silicon carbonide substrate
16:40-17:00	CT	Felczak Mariusz	Performance analysis of a microbolometer camera with and without peltier temperature stabilizer
17:00-17:20	CT	Brazane Samy	Method for non-contact detection of wind erosion effects on soda-lime glass. threshold of detectability by apparent emissivity

17:20-17:40	CT	Monchau Jean-Pierre	Emissivity measurement for infrared thermography and radiative exchanges
16:00-18:00		Session 2-4 - Modelling	 Christophe Droz
16:00-16:24	CT	Tong Zongfei	A versatile and fast 3d thermography simulator with open gui
16:24-16:48	CT	Bagavac Petra	Modeling and simulation of pulse thermography: comparison with measurements
16:48-17:12	CT	Unnikrishnakurup Sreedhar	Numerical and experimental investigations of pulsed infrared thermography for damage detection in honeycomb sandwich composites
17:12-17:36	CT	Maillard Samuel	Parametric study of excitation and processing parameters applied to composites parts using analytic calculation
17:36-18:00	CT	Aouali Abderezak	Estimation of high fluxes delivered by laser multikw using thermal inverse methods
18:00-19:30		Qirt steering committee	

Thursday, 7 of July

8:00-18:00	Registration desk - 08:00-18:00		
9:00-9:50	KL	Christophe Pradère - EPSILON (previously at I2M) Keynote 3	IR thermal imaging, a tool for control and tomography
9:50-10:30	Technical session 2 - Exhibitors		 Olivier Riou
9:50-10:00	EX		Hgh
10:00-10:10	EX		Infratec.
10:10-10:20	EX		Telops
10:20-10:30	EX		Teledyne flir
10:30-11:00	Coffee break		
11:00-12:40	Grinzato award -		 Xavier Maldague
11:00-11:30	CT	Mendioroz Arantza	Determining the thermal diffusivity and principal directions of anisotropic materials in motion by laser-spot thermography
11:30-12:00	CT	Greco Carlo Salvatore	Heat transfer of impinging sweeping jets
12:00-12:30	CT	Oswald-Tranta Beate	Probability of detection for short surface cracks using inductive thermography
12:40-14:00	Lunch		
12:40-13:10	Qirt journal editors meeting		
14:00-15:40	Session 1-5 - Industrial Applications		 Jean Dumoulin
14:00-14:20	CT	D'accardi Ester	Monitoring the laser metal deposition (lmd) process by means of thermal methods
14:20-14:40	CT	Venegas Pablo	Thermographic inspection system for micro-perforated metal sheets in hybrid laminar flow control wings
14:40-15:00	CT	Ecochard Maxime	Early detection and in situ monitoring of the oxidation of a mcraly coating by thermoreflectometry
15:00-15:20	CT	Fuente Raquel	Thermo-optical corrections for accurate temperature determination by thermography in an industrial furnace
15:20-15:40	CT	Gaverina Ludovic	Investigation of a lock-in thermography method using embedded piezoelectric transducers into composite plates.
14:00-15:40	Session 2-5 - NDT III		 Jean-Christophe Batsale
14:00-14:20	CT	Poelman Gaétan	A simulation study into the effect of the defect and material properties on the defect detectability with flash thermography
14:20-14:40	CT	Hsiao Tung-Yu	Application of hilbert-huang transform to thermographic data analysis for enhanced nondestructive testing of materials
14:40-15:00	CT	Tuschl Christoph	Scanning pulse phase thermography with changing scanning speed

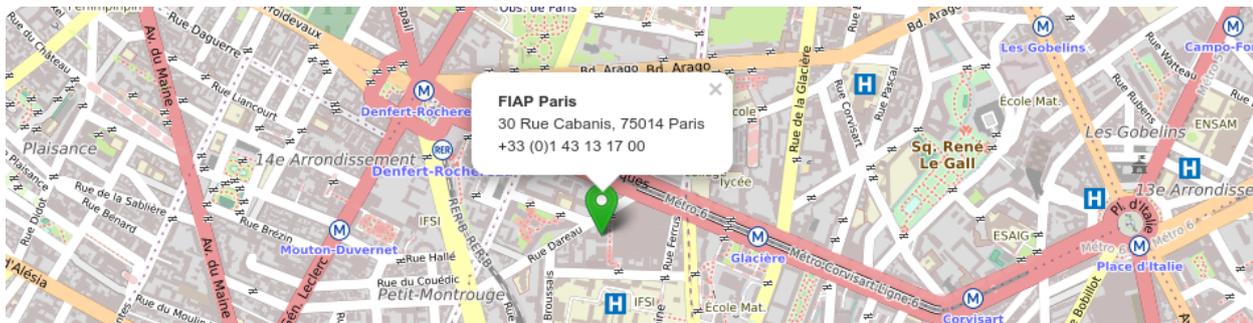
15:00-15:20	CT	Lasso-Martínez Iván-Darío	Discrete trigonometric transform thermography for defect detection in composites
15:20-15:40	CT	Medina Milton	Non-invasive analysis with dynamic infrared thermography to calculate dry matter in hass avocado via neural networks
15:40-16:00	Coffee break		
16:00-17:40	Session 1-6 – Image & Data Processing		 Thibaud Toullier
16:00-16:20	CT	Kim Changmin	Automated protective cell detection for photovoltaic panels using drone
16:20-16:40	CT	Gahleitner Lukas	3d photothermal imaging of subsurface damage evolution in fibrous composite materials due to fatigue loading
16:40-17:00	CT	Anke Simon H.	Thermographic network identification for non-destructive testing
17:00-17:20	CT	Hu Jue , Zhang Hai	3d infrared-terahertz fusion non-destructive inspection for cultural heritage and composite materials
17:20-17:40	CT	Vdovjak Kresimir	Radiometric data estimation using thermogram and comparison to the data provided by the camera
16:00-17:40	Session 2-6 – NDT IV		 Stefano Sfarra
16:00-16:20	CT	Pech-May Nelson	Robot-assisted laser thermography: towards automatic characterization of surface defects
16:20-16:40	CT	D'accardi Ester	Evaluation of superficial cracks as real defects in railway applications by means of active thermographic techniques
16:40-17:00	CT	Maldague Xavier	Passive multivariate thermography on the mitigation of corrosion under insulation
17:00-17:20	CT	Bouanga Tombet Stephane	Active thermography for panel paintings inspection: a comparative study of mid-wave and long-wave infrared spectra.
17:20-17:40	CT	Salerno Antonio	Recognising decals in second world war camouflage german helmets.
19:00-22:00	Gala Dinner		Le Procope 13 rue de l'Ancienne Comédie 75006 Paris

Friday, 8 of July

9:00-12:00	Registration desk - 09:00-12:00		
9:30-10:20	KL	Franck-Michael Götsche - KIT Keynote 4	Retrieval and Validation of Land Surface Temperature
10:20-10:40	Coffee break		
10:40-12:20	Session 1-7 - Biomedical II		 Mariusz Kaczmarek
10:40-11:00	CT	Fernandes Henrique	Influence of the fat layer, size, metabolism, and blood perfusion of thyroid tumors on the surface temperature of a human neck
11:00-11:20	CT	Strąkowska Maria	Experimental verification of non-fourier heat transfer in a multilayer skin tissue structure by ir temperature measurement
11:20-11:40	CT	Verstockt Jan	Dynamic infrared thermography for skin lesion screening
11:40-12:00	CT	Maldague Xavier	Covid-19, wearing n-95 masks in clinical environments: thermographic detection of air leaks
12:00-12:20	CT	Vardasca Ricardo	Thermal symmetry - is it a good indicator?
10:40-12:20	Session 2-7 - NDT V		 Laurent Ibos
10:40-11:00	CT	Amiel Stephane	Search for surface defects on metallic aeronautical parts by thermography with laser line
11:00-11:20	CT	Groz Marie-Marthe	Super-resolution based on laser flying spot technique coupled with ir thermography
11:20-11:40	CT	Panahandeh Sara	Laser lock-in thermography for inspection of silver-sintered die attaches
11:40-12:00	CT	Menner Philipp	Laser-thermographic crack detection on an industrial scale
12:00-12:20	CT	Rodríguez Aseguinolaza Javier	Numerical modeling of static and flying spot thermography for narrow crack characterization
12:20-12:30	Awards ceremony		
12:30-12:40	Closing ceremony		
12:40-14:00	Lunch		
14:00-15:00	Transit to technical visits		
15:00-17:30	Technical visits		

Useful Information

How to get to the FIAP Paris?



You can search for an itinerary on RATP website (<https://www.ratp.fr/en/>) or through their mobile application called "Bonjour RATP" (🤖 Android and 🍏 iOS)

🚌 Bus

- Line 21: Gare Saint-Lazare / Porte de Gentilly – Stop : Daviel
- Line 38: Porte d'Orléans / Gare du Nord. Stop : Denfert-Rochereau
- Line 68: Châtillon-Montrouge Métro / Place de Clichy Métro. Stop : Denfert-Rochereau
- Line Orlybus: Aéroport d'Orly Sud / Denfert-Rochereau. Stop : Dareau-Saint-Jacques
- Line 216 : Denfert- Rochereau/Metro/Rer . Stop : Dareau – Saint -Jacques

🚇 Metro / 🚆 RER

- (Metro) Line 6: Nation / Charles de Gaulle-Etoile. Stop: Glacière. Take street called Rue de la Santé. Turn right, street Rue Cabanis
- (RER) Line B: Stop: Denfert-Rochereau

✈️ Plane

- From Orly Airport: Take Orlybus until Denfert-Rochereau, then metro line 6 toward Nation. Stop at Glacière then get back to Boulevard Saint-Jacques until street called Rue de la Santé.
- From Orly's Airport (choice 2) Take Orlyval until Anthony, RER B toward Roissy-Charles de Gaulle/Mitry-Claye. Stop at Denfert-Rochereau and take metro line 6, toward Nation. Stop at Glacière and take by feet the Boulevard Saint-Jacques until the street called Rue de la Santé.
- From Roissy-Charles de Gaulle Airport: Take RER B, toward Robinson/St-Rémy-lès-Chevreuses. Stop at Denfert-Rochereau and take metro line 6, toward Nation. Stop at Glacière and take by feet the Boulevard Saint-Jacques until the street called Rue de la Santé.

Events locations

Ice Breaker (Tuesday 05/07)

Péniche La Baleine Blanche
11 Port de la Gare, 75013 Paris

Gala Dinner (Thursday 07/07)

Le Procope
13 rue de l'Ancienne Comédie, 75006 Paris

Scientific Partnerships and Exhibitors

Scientific Partnerships

SFT

Founded in 1961, SFT « Société Française de Thermique » is a French learned society around thermics.

It aims at covering, through its members, all the theoretical and applied fields of thermics. Each year, the SFT organizes a national conference that gathers its French specialists members.



COFREND

Founded in 1967, COFREND - the French Confederation for Non-destructive Testing - is the reference body in certifying and qualifying non-destructive testing operators in France.



This multi-sectoral interprofessional confederation brings together all persons involved in NDT: industrialists, equipment manufacturers and distributors, professional associations, certified operators, research and training bodies, service providers and public institutions (Cham-

bers of Commerce, Standardization, Ministries, Education...).

IUT Sénart-Fontainebleau

Created in 1988, "IUT Sénart-Fontainebleau", part of "Université Paris-Est Créteil", is a University Institute of Technology.

It propose to students professional training built in close partnership with industrials and professionnall in many different sectors. The objective is to train middle managers who are operational and capable of participating in business development.



Exhibitors

Noxant

The logo for Noxant, featuring the word "noxant" in a bold, sans-serif font. The letters "nox" are black, and "ant" is green.

Noxant designs and manufactures NOXCAM HSi high-performance modular infrared cameras for R&D and industrial measurement, radiometry, NDT, active thermography as well as for IR signature applications.

Established since 2015 by experts of IR cameras based on cooled infrared detectors, our NOXCAM HSi products feature high measurement performance while being easy to use and integrate into a measurement environment. NOXCAM HSi IR cameras are available in the SWIR, MWIR and LWIR spectrum.

All Noxant's products are designed, manufactured and service on our 700m² factory in Palaiseau, France, at the heart of the optronic ecosystem of the Paris region.

We believe users should focus on their experiment, not how to use an IR camera. And thanks to our unique and evolutive technologies, we can adapt our products to perfectly match the application needs, while preserving the product's maturity and ease of use.

Please contact our team, Dominique Comberati and Emmanuel Vanneau, at noxinfo@noxant.com

InfraTec

The logo for InfraTec, featuring the word "INFRA" in red and "TEC." in black, in a bold, sans-serif font.

The owner-managed InfraTec GmbH Infrarotsensorik und Messtechnik from Dresden, founded in 1991, offers innovative products and services in the field of infrared technology.

About 230 employees consider the requirements of the market as a challenge and face them with profound expert and market knowledge as well as with extensive quality awareness. Optimal consultation, exemplary service and individual product configuration through internal development and manufacturing capacities are the main facts to satisfy the customers at the best and to assure their sustained success.

The infrared measurement division operates in all areas of thermographic applications, with its scope of performance ranging from sales of thermographic cameras to the self-developed and manufactured high-end thermal camera series ImageIR®. The range of services include the delivery of turnkey automated solutions as well.

The sensor division designs infrared detectors in the spectral range of 2-25 μm . On more than 1.600 m² of clean room space custom-made components are produced – especially pyroelectrical infrared detectors. Leading manufacturers of flame detectors, industrial and medical gas analysis and physical measurement technology use these detectors worldwide.

Telops



Located in Quebec City, Canada, Telops designs and manufactures high-performance hyperspectral imaging systems and infrared cameras for defence, industrial, and academic research applications. Telops also offers R&D services for optical systems technology development in

order to respond to the specific needs of its customers.

Since its beginnings in 2000, Telops has distinguished itself with the quality of its personnel and its innovative approach to the technological challenges of the optics and photonics field. Today, the expertise of its scientists, engineers and technicians and the performance of its infrared cameras and hyperspectral imagers are internationally recognized.

While being headquartered in Canada, Telops caters to an international market using an efficient network of distribution and representation.

Whether you are looking for equipment, expertise or subcontracting for your optical systems projects, Telops will turn your high expectations into successes.

Thermoconcept



Founded in 2005 by Richard HUILLERY, Thermoconcept is now specialized and expert in Non Destructive Testing (NDT) and Thermal Analysis of materials, and works with industries as well as universities.

The NDT activity consists in the detection of defects by active thermography like cracks, delamination, grinding burn, ... THERMOCONCEPT provides the complete equipment for defect detection, including infrared (IR) cameras and excitation systems developed by EDEVIS (induction, optical lockin, pulse, laser, ultrasound excitations). All IR cameras from TELEDYNE FLIR, NOXANT, TELOPS and INFRATEC are compatible with our NDT systems. THERMOCONCEPT works also with HGH to provide black bodies to its customers.

Themacs



THEMACS Ingénierie was created in 2014 by 6 thermal researchers following a patent application on an emissivity measuring device and sells emissometer device.

THEMACS Ingénierie has several patents, particularly in the field of infrared thermography measurements.

THEMACS Ingénierie is specialized in thermal characterization of materials (emissivity, thermal conductivity, albedo, SRI, etc.) and specific instrumentation in the fields of thermal,

structures and the environment.

THEMACS Ingénierie works for companies in aeronautics (SAFRAN, THALES, AIRBUS,...), transport (SNCF, ALSTOM,...) and construction (VINCI, EUROVIA,...).

Teledyne FLIR



Teledyne FLIR designs, develops, manufactures, markets, and distributes technologies that enhance perception and awareness. We bring innovative sensing solutions into daily life through our thermal imaging, visible-light imaging, video analytics, measurement and diagnostic,

and advanced threat detection systems.

Teledyne FLIR offers a diversified portfolio that serves a number of applications in government & defense, industrial, and commercial markets. Our products help first responders and military personnel protect and save lives, promote efficiency within the trades, and innovate consumer-facing technologies. Teledyne FLIR strives to strengthen public safety and well-being, increase energy and time efficiency, and contribute to healthy and intelligent communities.

HGH



Enlighten the Unseen

HGH offers comprehensive optical testing solutions for optronics equipment.

HGH's leading-edge infrared and visible test equipment ranges from blackbodies, integrated spheres and collimators to integrated test benches which are all driven by the turnkey INFRATEST electro-optical testing software. Our equipment serve universities, research labs, detector manufacturers and test centers around the world.

Beyond the quest for technical excellence, we strive to provide comprehensive testing services and unparalleled technical support to our customers.

