

Workswell

UAV PRODUCT CATALOGUE

www.techno-test.ca



	WIRIS Pro	3
	WIRIS Pro ^{Sc}	4
	WIRIS Agro R	5
	Infographics: water stress indexes comparison	6
	WIRIS Security	7
	GIS-320	8
	Payloads for Gremsy gimbals	9
	Acecore Ready to fly solutions	10
	UAV applications	11

About Workswell

COMPANY AND PRODUCT PORTFOLIO INTRODUCTION

Workswell is a Central European based manufacturing company with headquarters located in Prague and established in 2010. The company is focused on developing, producing and selling thermal imaging cameras, systems and solutions for Industrial, R&D, OEM and Medical applications.

WORKSWELL MISSION

"Our mission are deliveries of complex products & solutions, as well as individual elements for non-contact temperature measurement and data evaluation."

WORKSWELL PRODUCT PORTFOLIO

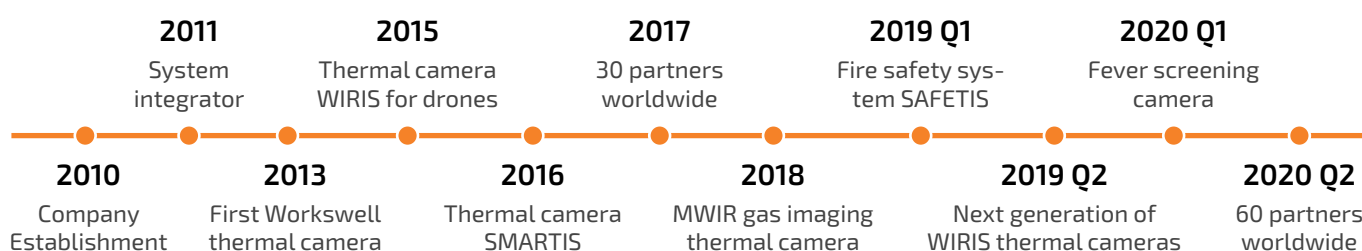
Workswell thermal imaging product portfolio is divided into the several divisions:

- › systems for process control and automation
- › UAV payloads including optical gas imaging cameras
- › early fire detection systems
- › systems for detecting elevated body temperature
- › calibration sources

Workswell is also providing OEM products like **OEM cameras for drones, USB3 and GigE modules** for thermal cores and OEM ThermolInspector. You can find many of our products as part of a third-party solution.

Workswell products are suitable for many applications from many fields such a:

- › process control
- › industrial production
- › technical diagnostics and inspection
- › search and rescue
- › research and development
- › early fire detection systems
- › non-destructive testing (NDT)
- › precious agriculture



SIEMENS



ETH zürich



OSRAM



Workswell WIRIS Pro

RADIOMETRIC DRONE THERMAL CAMERA

UAV

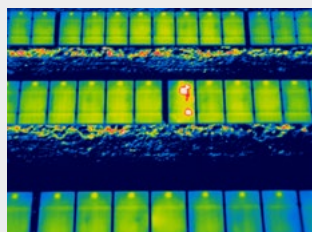


Workswell WIRIS® Pro has been designed first and foremost as an inspection camera. Its thermal camera is equipped with a LWIR microbolometric sensor with 640×512 px resolution (in the $7.5 - 13.5 \mu\text{m}$ range) and the **Super resolution** mode functionality providing an option to have the final thermogram in the **1 266 x 1 010 px resolution**.

The RGB camera comes with a Full HD (1920×1080 px) resolution and, most importantly, it provides an absolutely unrivaled optical ultrazoom **10x in real-time**. The highest possible temperature that the thermal camera can measure is **1 500 °C (2 732 °F)**.

High measurement accuracy and precision metrology. We are aware that industrial applications can be very demanding when it comes to metrology and that at each stage.

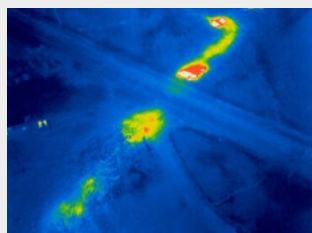
Each thermal camera is precisely and individually manufactured and **calibrated**.



Photovoltaic panels inspection



Industrial pipeline inspection



Underground pipeline leakage detection



High voltage inspection



WIRIS Pro Key features description

Super Resolution Mode	WIRIS Pro takes Super Resolution Mode 1.3Mpx IR images in one shot
Operating onboard system	WIRIS OS for full real-time data streaming and control during the flight - operating system ensures the full access to all camera functions - easy camera control via S.Bus, CAN bus, MavLink, RJ-45 or Trigger

10x Optical Anti-vibration zoom	Full HD 10x optical zoom camera with anti-vibration compensation
---------------------------------	--

Thermal camera specification

IR camera resolution	640 x 512 pixels
IR Super Resolution Mode	1 266 x 1 010 pixels (improvement of native resolution up to 1.3 Mpx)
FPA active sensor size	1.088 x 0.8705 cm
Temperature ranges	-25 °C to +150 °C (13 °F to +302 °F) -40 °C to +550 °C (-40 °F to +1022 °F) optional temperature range 50 °C to 1 000 °C (122 °F to 1 832 °F) optional temperature range 400 °C to 1 500 °C (752 °F to 2 732 °F)
Temperature sensitivity	Standard 0.05 °C (50 mK, 0.09 °F) or optional 0.03 °C (30 mK, 0.054 °F)
Accuracy	±2 % or ±2 °C (±3.6 °F) in temperature range 0 °C to +150 °C (32 °F to +302 °F), after camera stabilization • climate chamber and black body testing for all products
Frame rate	30 Hz or < 9 Hz
Spectral range / detector	7.5 – 13.5 μm / Uncooled VOx microbolometer
Calibration of each lens	Package includes a calibration certificate
Available lenses	18°, 32°, 45°, 69° (exchangeable lenses, all calibrated), visit FOV calculator
Protective filter on lens	Filter protects the lens against external damage during the flight
IR Digital zoom	1 – 14x continuous

Digital visual camera

Resolution	1 920 x 1 080 pixels (Full HD), 1/3" sensor Auto white balance, Wide dynamic range Backlight compensation Exposure and Gamma control
------------	---

Optical zoom	10x optical zoom with vibration compensation
View angle	ultra zoom 6.9° - extra wide 58.2°, focal 33.0 mm - 3.3 mm
Noise reduction	Special 3D noise reduction function
Focus	Autofocus with Direct Focus Zoom synchronization

Memory and data recording

Memory	Internal high-speed SSD 128 GB or 256 GB for image and video recording External slot for Micro SD card & USB 2.0 for USB stick for taking images
--------	---

Image and video formats	Radiometric JPEG images and Digital camera Full HD JPEG images Radiometric TIFF images (Pix4D and Agisoft compatible for 3D modeling) Digital camera h.264 encode video HD recording Radiometric full-frame IR recording (raw data recording in 30 Hz or < 9 Hz)
-------------------------	---

Workswell WIRIS Pro^{Sc}

THERMAL CAMERA FOR THE MOST DEMANDING APPLICATIONS

4

UAV



Workswell WIRIS Pro^{Sc} is a state of the art thermal imaging camera used for the **most challenging applications** like a geological, archeological and forest research, ecological and environmental research, structural research of buildings (dams, chimneys, bridges) etc.

Workswell WIRIS Pro^{Sc} camera is designed for applications requiring the **highest temperature sensitivity and accuracy**, excellent service and software support. That's why the camera is offered in a **research and education kit** with **WIRIS Data SDK** for users application development and **WIRIS Ethernet SDK** for ethernet application development.

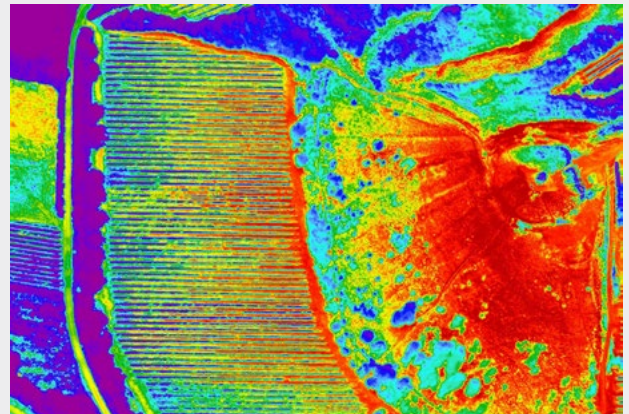


We want you... to measure accurately. Each WIRIS Pro^{Sc} thermal camera is **precisely calibrated in the climatic chamber**. Not only is the accuracy of the thermal camera when measuring different temperatures, but also at different operating temperatures. We managed to achieve unmatched measurement accuracy in the field of aerial thermography, ie. $\pm 2\text{ }^{\circ}\text{C}$ or $\pm 2\%$ ($\pm 3.6\text{ }^{\circ}\text{F}$).

Many interfaces (CAN, S.BUS, Ethernet, USB and more) make Workswell WIRIS^{Sc} a completely versatile system that can be placed on the DJI M600 Pro drone and the most drones by other manufacturers such as **AceCore Zoe, VideoDrone, Flydeo, Height Technologies** etc.

Workswell WIRIS Pro^{Sc} is the only UAV thermal imaging camera that can meet all the requirements of this extremely demanding application.

- highest thermal sensitivity ($< 30\text{ mK}$)
- really low temperature drift even during long flight
- very high homogeneity in thermogram



Water and plant management influence the local microclimate. By draining and removing greenery on large areas, we induce a desert climate, especially in cities or fields, that does not solve any technical equipment.

Thanks to this image, it is clear from which places in the landscape drought and loss of vegetation coming from. We can see that the naked hill on the right above the vineyard warms its surroundings and reaches through the vineyard.

We believe, that in terms of land management, Workswell WIRIS Pro^{Sc} is a useful tool. And with its help it is possible to localize, visualize and reverse local processes, the cause of which is currently considered global and the processes are considered as locally irreversible.

Workswell WIRIS Agro R

CAMERA DESIGNED TO MAP WATER STRESS ACROSS LARGE AREAS



BIOMASS COVER INDEX
ONLINE EVALUATION



AERIAL INSPECTION OF
IRRIGATION SYSTEMS



DETERMINATION OF
ONGOING VEGETATION
STRESS



NEW PLANT BREEDING
EVALUATION



IRRIGATION
CHEDULING BASED ON
PLANT WATER STATUS



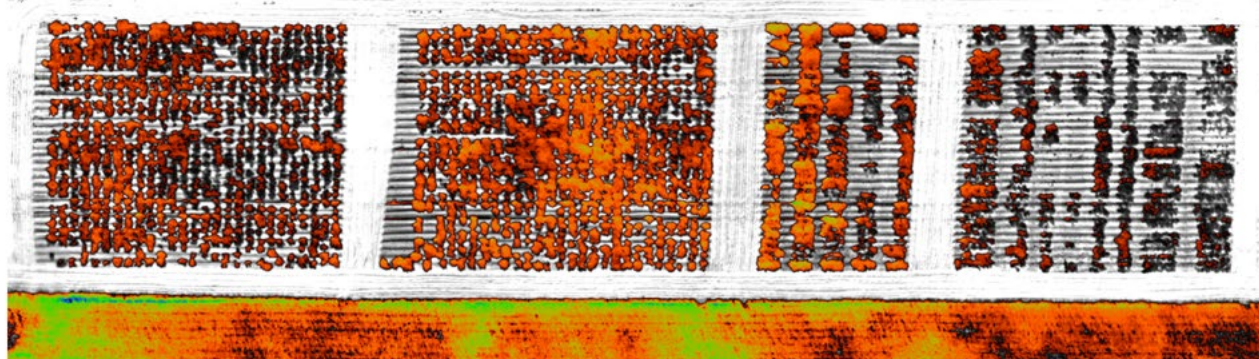
AREAL DETERMINATION
OF CWSI

Workswell's WIRIS Agro R is the first device of its kind designed to map water stress across large areas in the field of precision agriculture. The aim of this method and device is to determine the value of water stress in the plant stand.

Crop drought - actual and real value. In the dry season what we are usually interested in is the **actual effects of drought on crops**. These impacts are not only dependent on the condition of the so-called climatic drought, but also on the groundwater drought, the size of the plant root system, etc. Measuring the water stress of plants with CWSI (Crop Water Stress Index) camera will **help you to determine the actual and real effects of drought on the crop**.

WIRIS Agro R offers four different colourmaps. From the point of view of data processing it is not important which colourmap you choose. In the application point of view a suitable palette choice can be very helpful.

CWSI



WIRIS Agro R Camera key features description

CWSI onboard processing	Evaluation of Crop Water Stress Index (CWSI) onboard in real-time as well as temperature value
Operating onboard system	WIRIS OS for full real-time data streaming and evaluation during the flight - operating system ensures the full access to all camera functions - easy camera control via S.Bus, CAN bus, MavLink, RJ-45 or Trigger
Biomass cover index in %	Real-time percentage calculation of the mass of the vegetation in RGB

WIRIS Agro R specification

Sensor resolution	640 x 512 pixels
Real-time CWSI evaluation	Workswell patented WIRIS Agro R camera technology based on crop water stress index (normalized to value from 0 to 1) brings information about the crop stress and crop water management on large areas. The information can then be used to determine yield maps, manage irrigation or implement water management related remedies.
FPA active sensor size	1.088 x 0.8705 cm (LWIR band sensor)
Radiometry	Yes, temperature value in each pixel
CWSI evaluation range	0 – 100 % (100 % means very stressed)
Temperature sensitivity	0.03 °C (30 mK, 0.054 °F)
Field of view of the lens	45°
Color maps	4 color maps for CWSI and Water management evaluation
CWSI Range settings	Automatic or manual
CWSI digital zoom	1 – 14x continuous
Software ThermoLab	Yes, included in the package 2 licenses
3D mapping SW compatibility	Agrisoft and Pix4D

10x optical zoom RGB camera

Resolution	1 920 x 1 080 pixels (Full HD), 1/3" sensor, Auto white balance, Wide dynamic range, Backlight compensation, Exposure and Gamma control
Optical zoom	10x optical zoom with vibration compensation
View angle	ultra zoom 6.9° - extra wide 58.2°, focal 33.0 mm – 3.3 mm
Biomass cover index	Calculation of the index in real-time with Threshold function
Focus	Autofocus with Direct Focus Zoom synchronization

Memory and data recording

Memory	Internal high-speed SSD 128 GB for image and video recording External slot for Micro SD card & USB 2.0 for USB stick for taking images
--------	---

INDEX COMAPRISON

CWSI VS NDVI

Crop Water Stress Index

Normalized Differential Vegetation Index

Situation in a real time

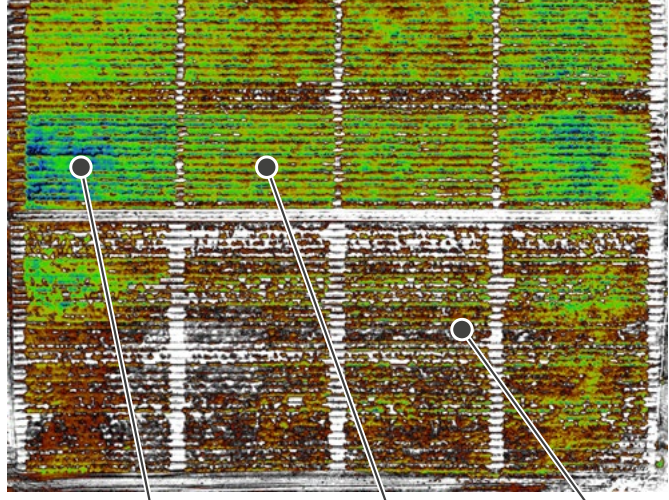
See the current situation! You can see how "it works" and how to "improve it" in a real time. Intervention could be evaluated during a few hours.

Physiological process

You observe the actual crop's physiological process under given conditions at a given time. This is great, for example, for controlling of irrigation systems or locating vegetation infested by pests.

Before it's too late!

You can take actions before the crops die, ie when the stress is already occurring but the process is still reversible. The effectiveness of the intervention can be evaluated immediately after applying it.



Water wasting
CWSI is very low. Water could be better distributed over the land or saved. No drought effect.

Under the correct irrigation
The water stress level corresponds to the current situation (sunny day, no precipitation). Irrigation helps prevent crop damage and works properly.

High level of stress
The irrigation system is not functioning properly and part of the crop is wilting. High level of water stress.

Dead or live

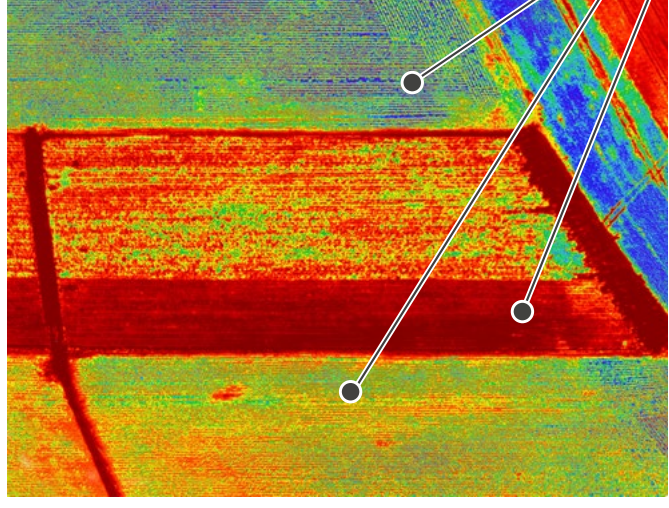
NDVI is used to detect live green plant canopies in multispectral remote sensing data. So you can only quantify the photosynthetic capacity of plant canopies in that time.

Not the process but the result

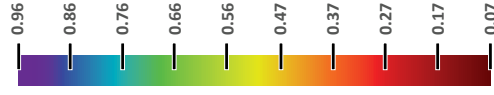
You observe the long-term effects of stress factors and environmental conditions on the state of vegetation but it is often very difficult to identify the causes.

It is too late!

It is very difficult to make the right intervention as you cannot monitor the response quickly enough after applying the intervention. The NDVI shows the impact and result after longer period of time.



NDVI



Index range 0.33 - 1

Crops are feeling better or worse, but it is not clear from the NDVI map why and whether they are currently under stress. Any corrective action to improve their condition will not be reflected quickly in the NDVI picture and will be difficult to evaluate.

Index range 0 - 0.33

Crop has already died and it is impossible to tell from the picture how this happened and what intervention would help. Corrective intervention does not exist.

Healthy

Moderately Healthy

Dead crop

Workswell WIRIS Security

UAV THERMAL AND VISUAL CAMERA FOR SEARCH & RESCUE

UAV



Workswell WIRIS® Security is a LWIR (7.5 – 13.5 μm) thermal camera for drones designed specifically for **search & rescue applications**, such as building and perimeter surveillance, searching for missing persons, fire-fighting operations etc.

This thermal camera is fully adapted to these applications with a **high-resolution thermal camera (800 × 600 px)**, **30x optical zoom in RGB spectrum**, search & rescue functionalities, excellent temperature sensitivity, as well as rugged mechanical construction made of lightweight aluminium.

High resolution and great thermal sensitivity. The thermal camera offers unrivaled resolution **800 × 600 px** and **thermal sensitivity 40 mK!** No other thermal imaging camera for drones will offer you the same parameters!

Great night vision RGB camera, 30x optical zoom and more. Workswell WIRIS® Security camera is equipped by incorporated specialized visual band imagery RGB camera with high sensitivity for dusk and night vision and possibility of optical ZOOM. Thus, the RGB camera image is clear even with minimum light of 0.0008 lux. Focal length is variable within interval of 129.0 mm – 4.3 mm and it equals up to **30x optical ZOOM**.

Workswell WIRIS Security also brings an interface enabling the widest range of connections to the drone, the control unit, an **external GPS sensor**, etc. **Wi-Fi low latency live video streaming** is also available.

WIRIS Security Key feature specification

800px Infrared UAV camera	800 x 600 px IR sensor with 25 Hz frame rate (Worldwide shipping)
High sensitivity Night vision modes in visual Full HD camera	Advanced Noise Reduction Technology - filters noise from the image for clearer results in low-light conditions - the de-fog feature allows clearer viewing in foggy or misty scenes - when the feature is activated, the camera detects the haze level and automatically applies the required effects.
	Auto IR-cut Filter Function - in low-light conditions, the camera automatically switches from Day to Night vision mode - the IR-cut filter function allows to boost sensitivity for clear pictures in darkness.
	Wide-D Image Processing Technology gives the ability to see clear, detailed images in high-contrast or backlit environments

Operating onboard system

- operating system ensures the full access to all camera functions
- easy camera control via S.Bus, CAN bus, MavLink, RJ-45 or Trigger

30x Optical Antivibration zoom	Full HD 30x optical zoom camera with anti-vibration compensation
---------------------------------------	--

Thermal camera specification

IR camera resolution	800 x 600 pixels
Scene range	-20 °C to +150 °C (-4 °F to +302 °F)
Temperature sensitivity	Extra sensitivity of 0.04 °C (40 mK, 0.072 °F)
Frame rate	25 Hz or 9 Hz
Spectral range / detector	7.5 – 13.5 μm / Uncooled VOx microbolometer
Available lenses	35 mm (21.2" x 16.2"), visit FOV calculator
Digital zoom	1 – 12x continuous

Digital visual camera

Resolution	1 920 x 1 080 pixels (Full HD), 1/2.8" EXMOR R CMOS sensor
Optical zoom	30x optical zoom with vibration compensation and image stabilization
Minimum illumination	0.0008 lux (ICR on, Slow shutter 1/4s, High sensitivity on)
View angle / Focal length	Ultra zoom 2.3° - extra wide 63.7° / 129.0 mm – 4.3 mm
Focus and exposure time	Autofocus with automatic or manual exposure time control
Image enhancement	Auto-white balance, WDR, IR cut filtering, DEFOG, 3D Noise reduction

Memory and data recording

Memory	Internal SSD 256 GB or 512 GB for image and video recording External slot for Micro SD card & USB 2.0 for USB stick for taking images
---------------	--



Payloads for Gremsy gimbals

CAMERAS COMPATIBLE WITH GREMSY S1, T7 AND PIXY WS



GREMSY

UAV



S1

Payloads for Gremsy S1 (S1/S1V2/S1V3)

Gremsy S1 is the world's first ever small gimbal (camera stabilizer) with **onboard HDMI and SMA ports** fully supported for infrared camera WIRIS Pro. Developed based on Gremsy T1 technology with a larger camera cage, the **S1 can plug and play with various platforms** to provide **high precision pointing accuracies** for every industrial need.

S1 is first single arm gimbal made by Gremsy that supports multiple camera models. Gremsy S1 is the **most advanced single arm gimbal for industry experts** in the market. Small and lightweight.

COMPATIBLE CAMERAS



WIRIS Pro



WIRIS Pro^{Sc}



WIRIS Agro R

Payload for Gremsy PIXY WS

PIXY WS is a particular version of Pixy series, **specifically designed to fit Wiris Security camera** to provide for the most demanding metrological applications such as security, search and rescue.

Pixy WS is only 470g, what makes it one of the **lightest gimbals among Gremsy gimbals**. Built for a specific camera on tray, **no balancing nor tuning is required**. Pixy WS delivers **excellent quality stabilization**.

COMPATIBLE CAMERAS



WIRIS Security



PIXY WS

Payload for Gremsy T7

Gremsy T7 brings the next level of industrial gimbals. Boasting a **robust design and powerful motor**, Gremsy T7 is the next level of heavy lifting gimbal for industrial applications.

With a **large camera cage and ability to carry up to 7 lbs**, the T7 expands the range of compatible cameras and is capable of loading multiple specialized sensors at once.

COMPATIBLE CAMERAS



GIS-320



Acecore Ready to fly solutions

ACECORE DRONES COMPATIBLE WITH WORKSWELL CAMERAS

10

UAV



Acecore ZOE

Acecore Zoe could offer max. **40 minutes fly time** with max. **6 kilograms payload weight** and **4 independent motors**. Acecore Zoe impressive flytime up to 40 minutes before changing battery packs and there is also option for a tethered solution for unlimited flight time.

Zoe has **triple redundant autopilot** that compensates any error. It is also equipped with **encrypted radio link** that guarantees a secured operation.

Zoe is compatible with George Base Station and different controllers may be used - Hereling George, FrSky George, FrSky GCS Pro and other options.

COMPATIBLE GIMBALS



Gremsy S1



Gremsy Pixy WS

COMPATIBLE CAMERAS



WIRIS Pro



WIRIS Pro^{Sc}



WIRIS Security



WIRIS Agro R

Acecore NEO

Acecore Neo is a very robust drone with a **maximum flight time of 25 minutes**, max. **payload 9 kg** and 8 independent motors.

The Acecore Neo drone is completely made of carbon fibers and it is ready for any weather conditions. The **triple redundant autopilot will compensate for any error**. Encrypted radio link guarantees a secured operation.

Done is compatible with **George Base Station**. The station can be selected as an accessory.



COMPATIBLE CAMERA



Workswell GIS-320

COMPATIBLE GIMBAL



Gremsy T7

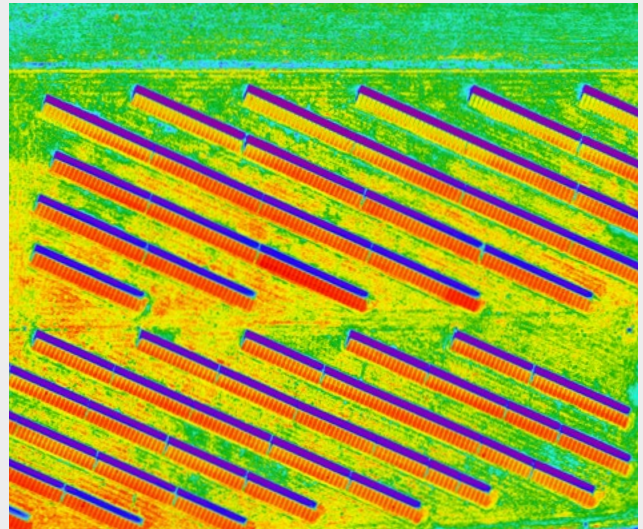
George is a modular base station that allows drone pilots to work with up to **three FPV displays** or other modules, which is capable of powering the controller and attachments through multiple flights.

Thermodiagnosis of photovoltaic power plants

The worldwide increased knowledge of the environment and the risk of exhausting non-recoverable energy sources is a reason that various methods of using alternative resources have been sought.

Solar energy is an inexhaustible source which, thanks to the programmes for the support of the construction of solar power plants is most often used.

A fast, cheap and reliable method where it is possible to check the quality of a large area of solar panels is thermodiagnostics using the Workswell WIRIS thermal imaging system attached to the drone.

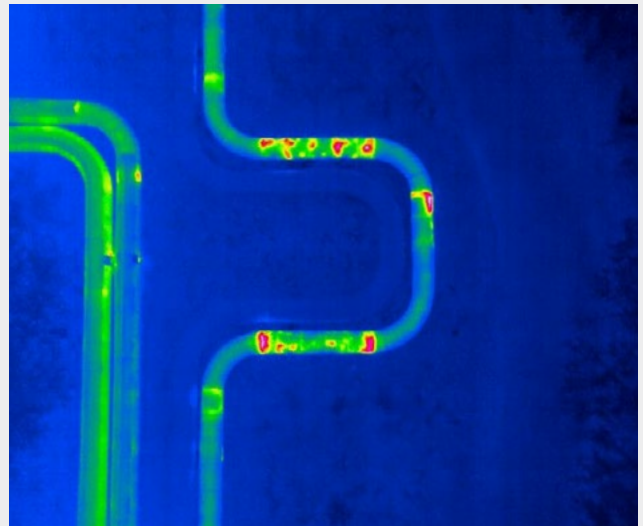


Pipeline inspection with thermal diagnostics

Pipeline – this is defined as a “special form of transport used to transport liquids (i.e. liquids and gases), or liquid mixtures with solid particles”.

The issue of thermographic pipeline inspection applies to long-distance piping systems supplying variable media with a temperature different from the temperature of the surrounding atmosphere.

By using thermographic systems, it is possible to determine and localize defects to pipeline insulation and leaks of the transferred media. In some cases, leaks can even be determined and localized in underground pipelines.

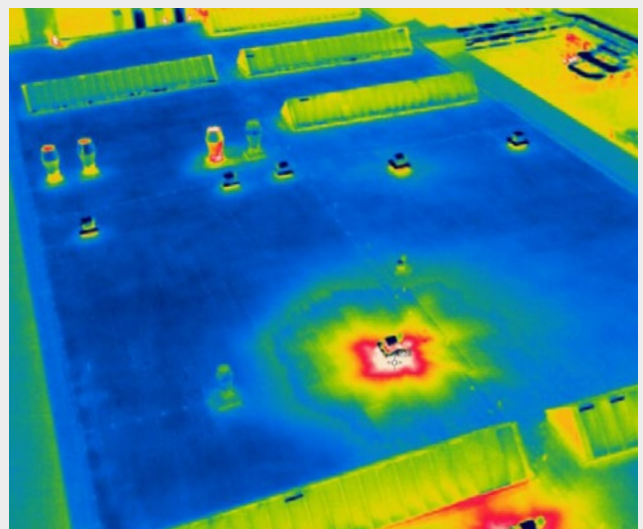


Thermodiagnostics of flat roofs

Flat roofs were originally built in areas with low rainfall. For example, they can be found in the architecture. In the modern era, the quality of insulation against atmospheric conditions increased so flat roofs appeared on factory halls as well as highly architecturally appreciated buildings.

The benefits of such roofs are that they save material, are less labour intensive, provide the option of variable roofing layouts and the potential use of roof areas. Thermal imaging systems provide the perfect tool to evaluate the technical condition.

The thermal imaging system located on the drone provides a fast and economical solution for surveying wide roofs on industrial sites.



UAV application overview

LIST OF MOST COMMON WIRIS APPLICATIONS

12

UAV



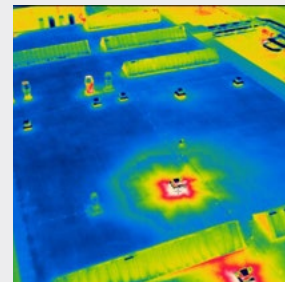
Photovoltaic panels



Pipelines inspection



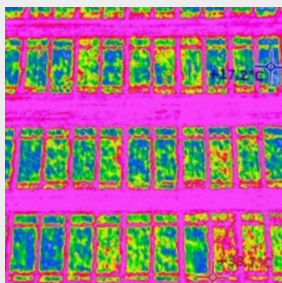
High voltage power lines



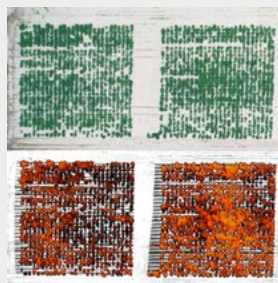
Checking flat roofs



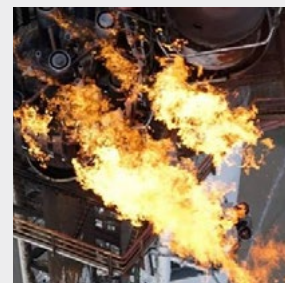
Building diagnostics



Cultivation and phenotyping of cereals



Detection of water stress



Fakel burner inspection



Security applications



Firefighting



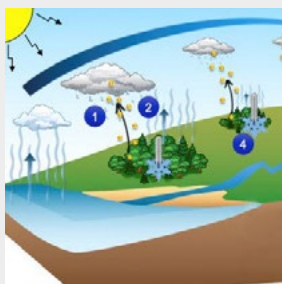
Gas leaks visualization



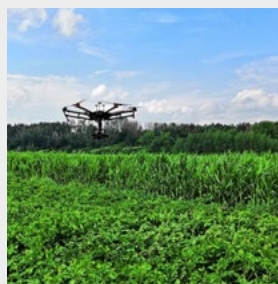
Roe deer mortality reduction



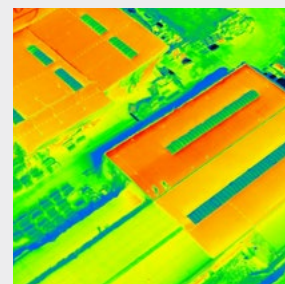
Drone based 3D thermal modeling



Monitoring in climate change research



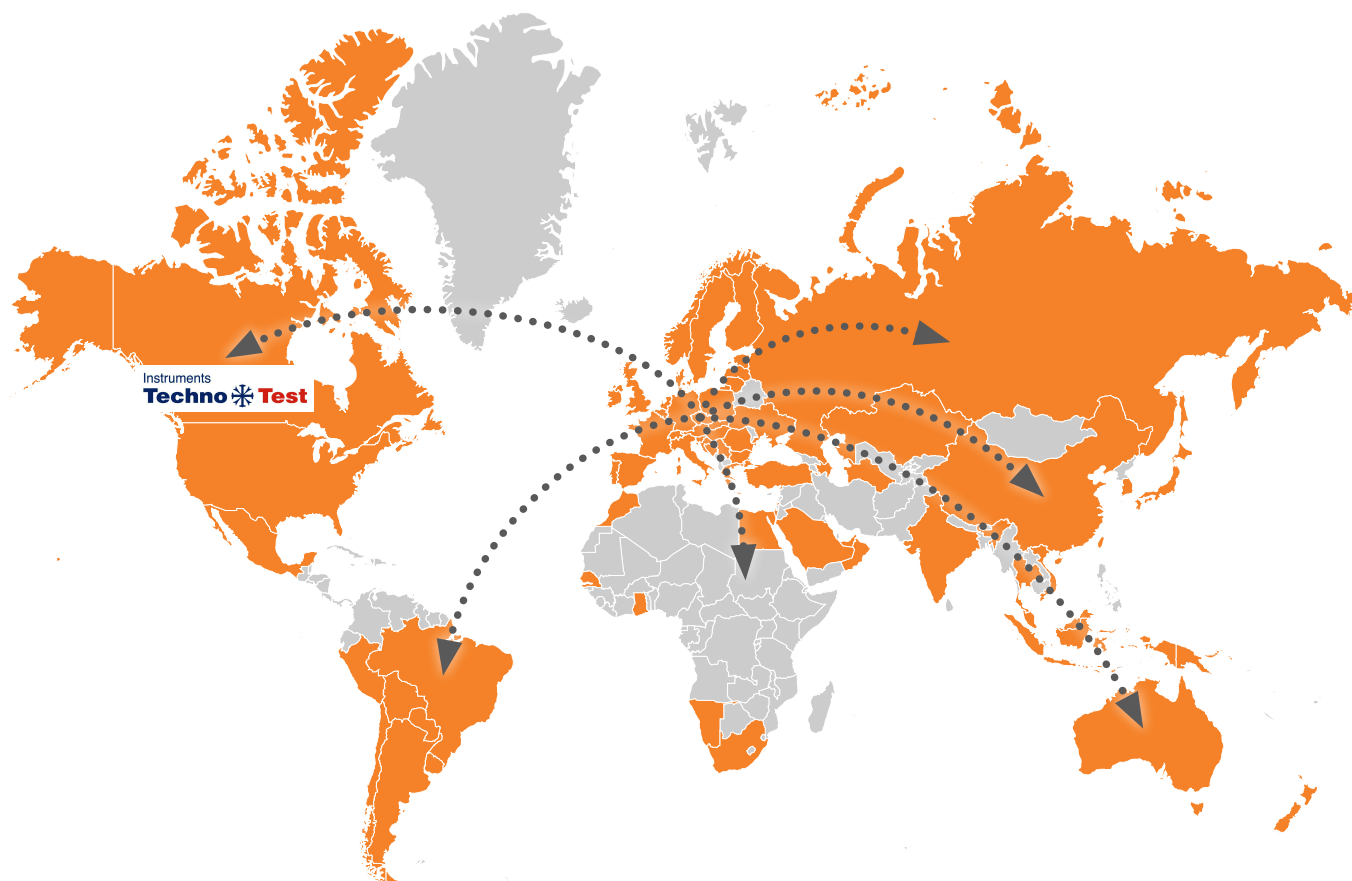
Improvement of potatoes phenotyping



Green roof inspection

Contact information

WORKSWELL IN THE WORLD



Instruments
Techno  Test

2345 Michelin suite 100, Laval, Qc H7L 5B9

Tel. : 450-681-5777 Fax. : 450-681-3773

info@techno-test.com

OFFICE LOCATIONS

Europe - Prague United

States of America

Canda

Global partner network

