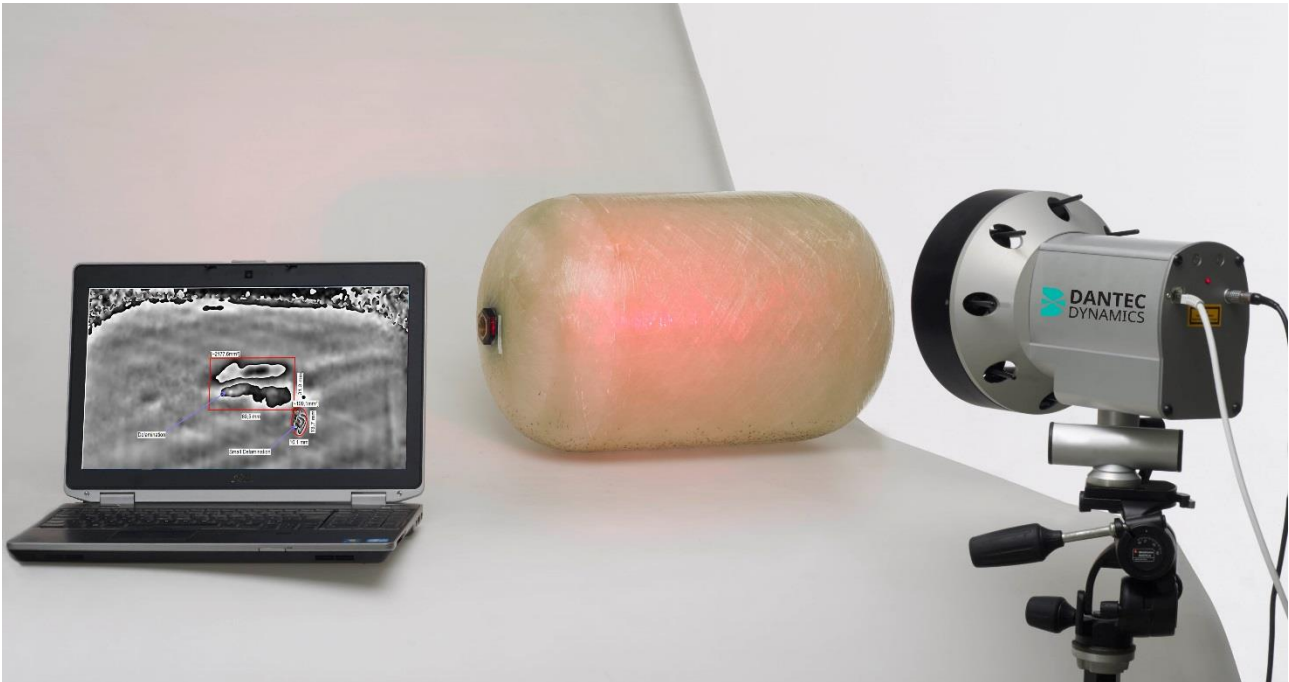


FlawExplorer NDT inspection system

Portable, compact and rugged Shearography solution that takes NDT & Quality Control to a new level by seeing the invisible – fast & cost-effective



Takes NDT & Quality Control to a new level

Dantec Dynamics' FlawExplorer is a portable, compact and robust Laser Shearography inspection system that efficiently finds flaws where other NDT methods don't.

Shearography, an optical based Non-Destructive Testing (NDT) technique identifies internal material discontinuities or anomalies in homogenous and non-homogenous materials in an expedited manner. The FlawExplorer has the ability to inspect areas up to 2 m² (20 ft²) in one shot, saving time and money on any given application.

Key benefits

- Highly portable, easy to set-up and ready to operate within seconds
- Compact, robust design featuring Class 3R laser diodes for use on-site and in-field
- Cost-effective inspection of large areas with fast location and characterization of defects
- Intuitive evaluation of structural integrity of composite components like ply drops, bulkheads, overlaps, splicers, stringers, ribs etc.
- Enhanced live phase maps eliminate the need for time-consuming post-processing
- Advanced image filtering produces clear and unambiguous results
- User friendly software interface allows operators to locate and mark discontinuities directly on the test object surface
- Advanced, customizable reporting functionalities available
- Thermal, vacuum or vibration loading modules can be selected depending on application

Portable, compact and robust Laser Shearography inspection system

The FlawExplorer is an inspection solution for Non-Destructive Evaluation (NDE) and Quality Control applications, commonly used on composites and metallic materials. The system is based on Laser Shearography, an optical measurement technique which efficiently finds flaws where other methods don't.

The Laser Shearography principle consists of interferometric comparison of a test object in two states, a neutral and a loaded one. Advanced software algorithms perform live image processing to identify variations in out-of-plane deformations between both states which in turn reveals surface or sub-surface discontinuities or anomalies by highlighting local weaknesses under certain load conditions.

The non-contact method can accommodate test specimen with curved and complex surface geometries. Laser Shearography is widely used by leading manufacturers within Aerospace, Automotive and Wind Power, Marine, Aviation, Textile and similar composite related industries. This recognized NDT method is in compliance with the NAS410/EN4179 for NDT of composite structures.

The FlawExplorer system consists of a sensor unit on a tripod, a controlling laptop computer with inspection/reporting software, cabling and power supply. The sensor unit is packaged in a portable, compact and rugged flight case, and the laptop and tripod are contained in individual carrying bags.

The system is available in two versions with 4 or 8 laser diodes that support inspection of areas from 10x10 cm (0.1 ft²) up to 2m² (20 ft²) in one shot. The FlawExplorer system can be configured with optional excitation modules based on heat, vacuum or vibration excitation respectively, making it suitable for a range of applications from QA in Manufacturing over Research to in-field Inspection operations.



FlawExplorer sensor unit with 4 or 8 laser diodes for inspection of areas up to 2 m² (20 ft²) in one shot

Seeing the invisible - fast & cost-effectively

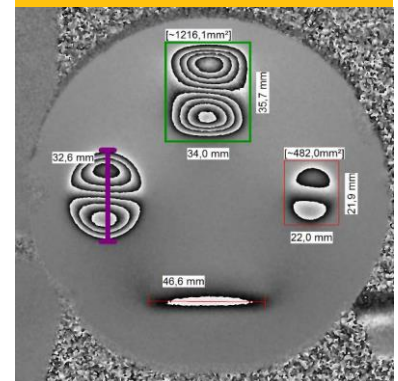
Dantec Dynamics' FlawExplorer inspection solution quickly detects and locates discontinuities in composites materials. The system systematically finds flaws like: Wrinkles, Disbonds, Delaminations, Cracks, Crushed core, Kissing bonds, Fluid ingress, Cracked cores, Repair defects, Voids, Foreign Objects, Impact damage (BVID's), etc.

The FlawExplorer system inspects large areas over a short period of time. The result from a 2 m² (20 ft²) inspection area is obtained in less than 30 seconds which makes it the perfect solution for time-sensitive, large scale industrial NDT related applications.

The FlawExplorer solution takes NDT & Quality Control to a new level featuring:

- Simple, easy to use inspection system that is ready to operate within seconds
- Fast inspection with real-time results
- Intuitive evaluation of structural integrity of composite components like ply drops, bulkheads, overlaps, splicers, stringers, ribs etc.
- Image filtering that produces clear, unambiguous and reproducible results
- Lower false calls and higher probability of detection (POD) rates
- Advanced customizable reporting functionalities

For inspection of composite honeycomb, rubber, composite overwrapped pressure vessels (COPV), ceramics, fiberglass, carbonfiber & fiber-metal laminates, bi-metals, foam-cores, leather, metal-metal bonds a.o.



A state-of-the-art inspection solution that saves time and money

Fast – With FlawExplorer you can inspect large areas or high volume of test objects in a timely manner. This is a key benefit of Laser Shearography against alternative NDT methods. Once discontinuities are identified and located, other NDT techniques can be used for further evaluation and characterization.

Easy – Compared to other NDT inspection techniques the use of Laser Shearography requires no particular expertise. Thanks to the user-friendly inspection and reporting software any technician can easily acquire clear, reliable, and useful inspection data. In comparison with other NDT techniques, the FlawExplorer requires no collection of waste/couplant material and eliminates the need for health safe environments that are inherent to other NDT methods.

Efficient – While Ultrasonic testing (UT) and Thermography inspection techniques are struggling to access particular composites as GFRP and honeycomb, Laser Shearography has the ability to detect flaws in these types of materials thanks to the versatility in choosing the proper excitation method. Three optional excitation modules with thermal, vacuum or vibration loading make the FlawExplorer suitable for a wide range of applications.

Cost effective – The FlawExplorer helps expedite your complete NDT & Quality Control processes which in turn saves time and money. It can also be fully integrated with robotic systems to support automated inspection applications in production environments. This unique capability increases the throughput of a given inspection station and significantly decreases associated labor costs. Inspection processes can be optimized from R&D to production line environments. Inspection flows can be streamlined throughout the complete product lifecycle; on-site as well as in-field.

Optional excitation modules

Heat Excitation

Heating excitation is widely used because of its ease-of-implementation and speed of acquisition. The ready to use heat excitation module comes with appropriate quartz heaters. These emit both in the visible and infra-red range in order to trigger best material response for a wide variety of material. The nature of the heat transfer allows the user to collect depth information. The heat excitation modules are fully controlled via the laptop. This allows the operator to create and implement automatic procedures where image acquisition and sample excitation are merged for reproducible and accurate results. Heat excitation is best suited for inspection of CFRPs laminates, metal sheets, thin GFRPs, etc.

Vacuum Excitation

Vacuum excitation is a mechanical excitation that aims to trigger defect indications by pulling the surface of the sample with a tunable vacuum. Our easy to use vacuum hood is specifically designed for this purpose. Vacuum excitation is best suitable for inspection of honeycombs, sandwich structures, foams, plastics, corks, etc.

Vibration Excitation

Vibration excitation is a dual purpose inspection method allowing defects to vibrate and thus deform. The method can also be used for Eigen Modes and Eigen frequency analysis. The frequency analysis application is primarily utilized in turbomachine testing. This can also be applied to any structural parts facing vibrations during their lifetime. The vibration excitation solution provides the user with a powerful piezo-

Its capabilities of non-contact large area inspection makes Shearography the ideal technique for a solution in combination with an **automated robotic inspection** in a production environment



shaker that triggers local vibrations through the inspected material. It is highly portable and offers a wide frequency sweep range that will disclose any defects in non-damping material.

Technical specifications

Specifications	
System components	Sensor unit on tripod Laptop computer (optional: rugged laptop computer) Inspection and reporting software GigE cabling and power supply Pan-tilt with remote control for tripod (Option) Mounting for robot automation (Option)
Sensor unit	4 or 8 laser diodes
Laptop computer	Display: 15.6" full HD (1920 x 1080) Hard disk: 256 GB Optical Drive: DVD Writer Battery: 44 Wh Li-Ion
Laptop computer, rugged (option)	Display: 14" touchscreen 720p HD (1366 x 768), outdoor readable & usable with gloves Hard disk: 512 GB Optical Drive: DVD Writer Battery: 97 Wh Li-Ion Keyboard: Sealed QWERTY US layout, background illuminated Protection classification: IP52 Test conditions: According to MIL-STD-810G tests including transport drops (36" height), dust, vibration, shock during operation, height tests and extreme temperatures
Software	Istra4D Software Platform Istra4D Shearography Software Module Istra4D Measurement & Control Software Module
Dimensions	Sensor: 22 x 22 x 25 cm Tripod: 100 x 20 x 20 cm Transport case for sensor: 35 x 30 x 31 cm
Weight	Sensor unit: 5.7 kg (9.7 kg including flight case) Tripod: 5.5 kg Laptop: 2.0 kg (Laptop, rugged: 3.0 kg) Cabling: 0.5 kg
Operating conditions	Altitude 0 - 2000m / 0 - 6560ft Temperature 15 - 35°C / 58 - 95°F
Power supply	110 - 240 V AC 60 Watt
Max field-of-view	4 laser diodes version: 1,3 m ² 8 laser diodes version: 2 m ²
Objective lenses	Varifocal 10 - 40 mm, F 1.8 max - 5.6 standard MOD at tele 60cm MOD at wide 20cm
Camera	2Mpx 5Mpx (Option)
Laser class	Class 3R DIN EN 60825-1:2007 IEC 60825-1:2007 ANSI Z136.1-2014
Laser diodes	120mW (CW) @ 660nm



Order information

Category	Item	Item no
Sensor unit	FlawExplorer Sensor (4 Laser Diodes)	DSM 13140
	FlawExplorer Sensor (8 Laser Diodes)	DSM 13180
Computer	Laptop for FlawExplorer	DSM 20130
	Ruggedized Laptop for FlawExplorer	DSM 20135
Software	Istra4D Software Platform	DSM 32000
	Istra4D Shearography Software Module	DSM 32110
	Istra4D Vibro Software Module	DSM 32120
	Istra4D Measurement & Control Software Module	DSM 32130
Excitation modules	Handheld Heat Excitation	DSM 60091
	Convection Excitation	DSM 60092
	Automatic Heat Excitation Module (2 Heat Lamps)	DSM 60100
	Vibro Excitation Module	DSM 61025
	Vacuum Excitation Module	DSM 61100
Accessories	Motorized Zoom/Focus lens	DSM 50036
	Fixed Focal 25mm Lens	DSM 50038
	Fixed Focal 50mm Lens	DSM 50039
	Laser Safety Goggles	DSM 50050
	Pan/Tilt Motorized Head	DSM 60036
	Optical Table Mounting Bracket	DSM 60060
	Vacuum held Tripod	DSM 60080
	External Heat Frame	DSM 81021

Certified training

Certified training (Level 1 or 2) can be provided in accordance with SNTTC-1A or NAS 410 (EN 4179) through our accredited training partners.



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