

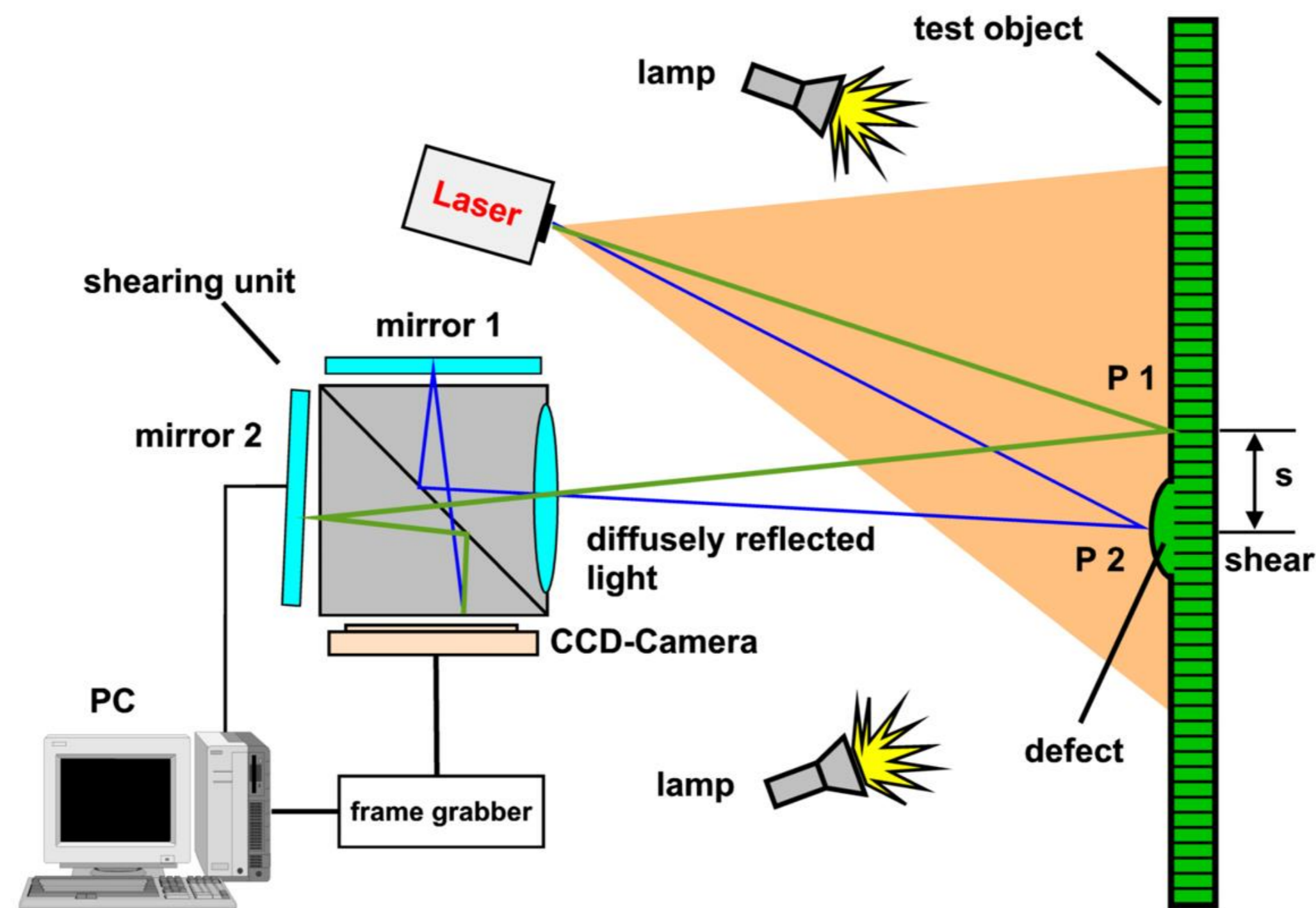


Inspection par Shearographie

Shearographic Testing



Principle : Inspection by shearography consists of using a heat source or another mechanical solicitation that sends a wave or vibration which penetrates an object being inspected. This wave will interact with any discontinuity present in the object which creates a surface deformation (out of place displacement). This surface displacement is detected by the shearographic camera through the projection of a laser which forms a fringe image where defect creates a discontinuity in the fringes. The image interpretation must be done by a certified level 2 ST (Shearographic Testing inspector). The inspection technique must be validated by a level 3 ST.



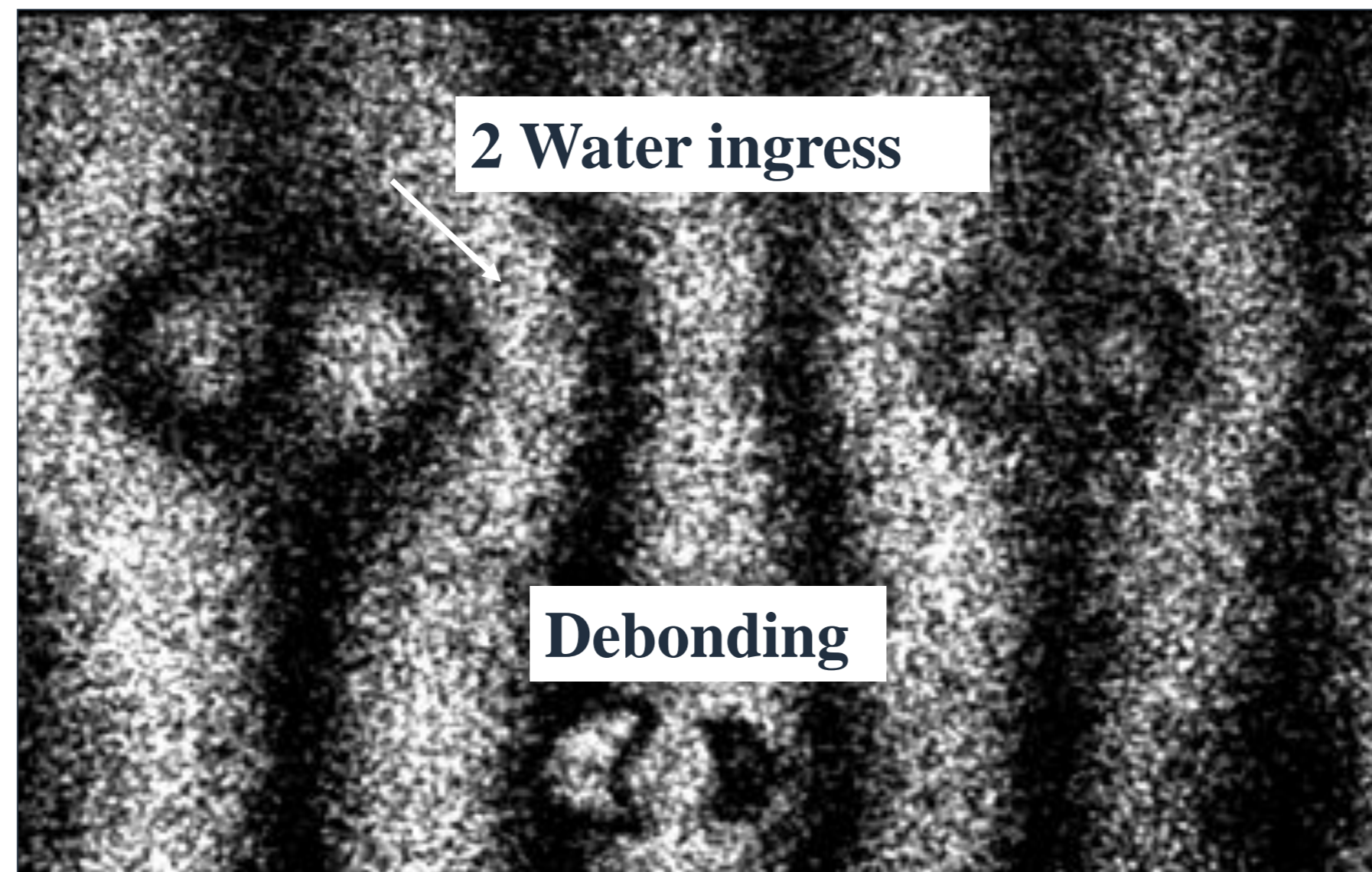
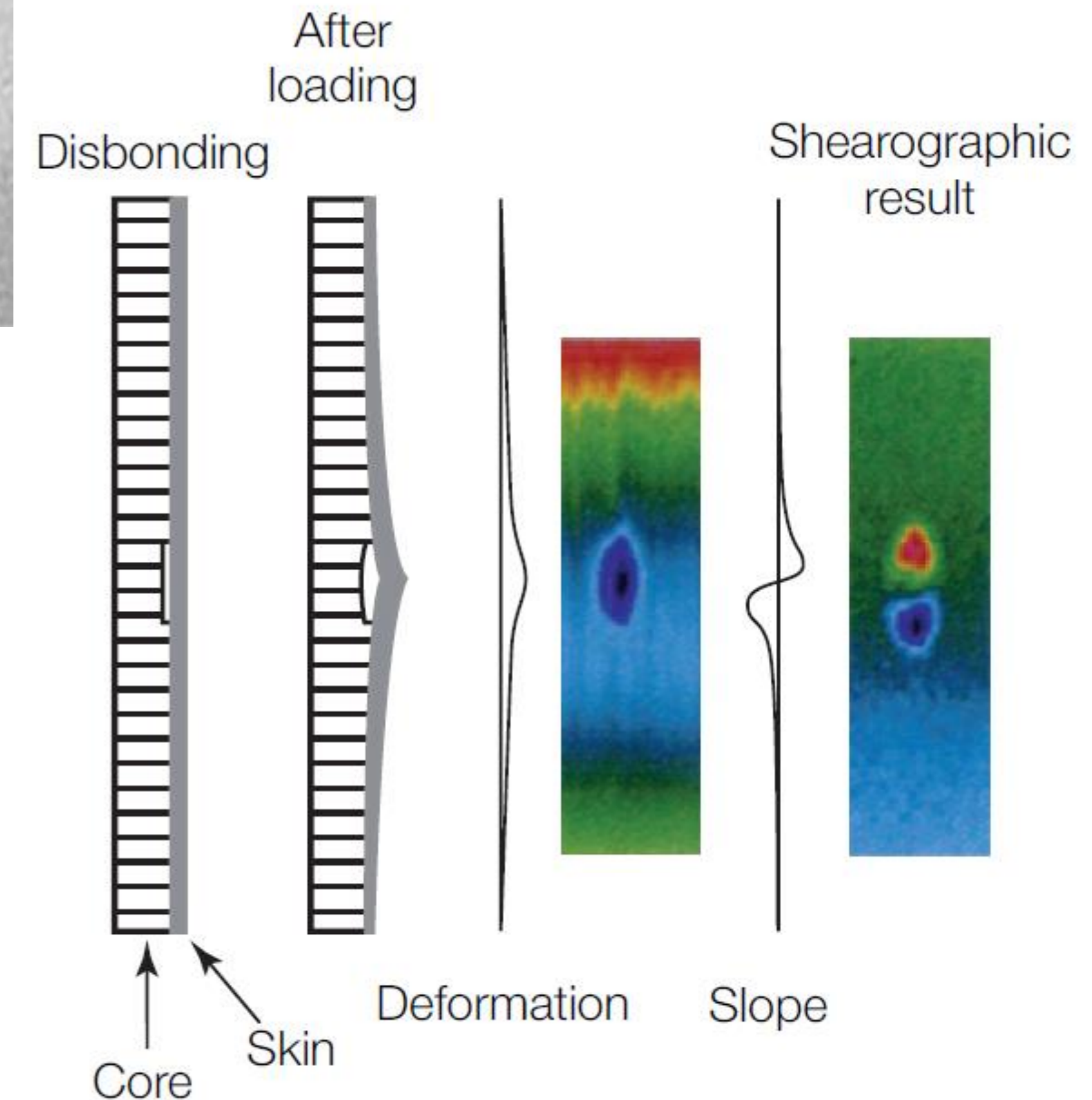
DEFECTS SEARCHED BY SHEAROGRAPHY:

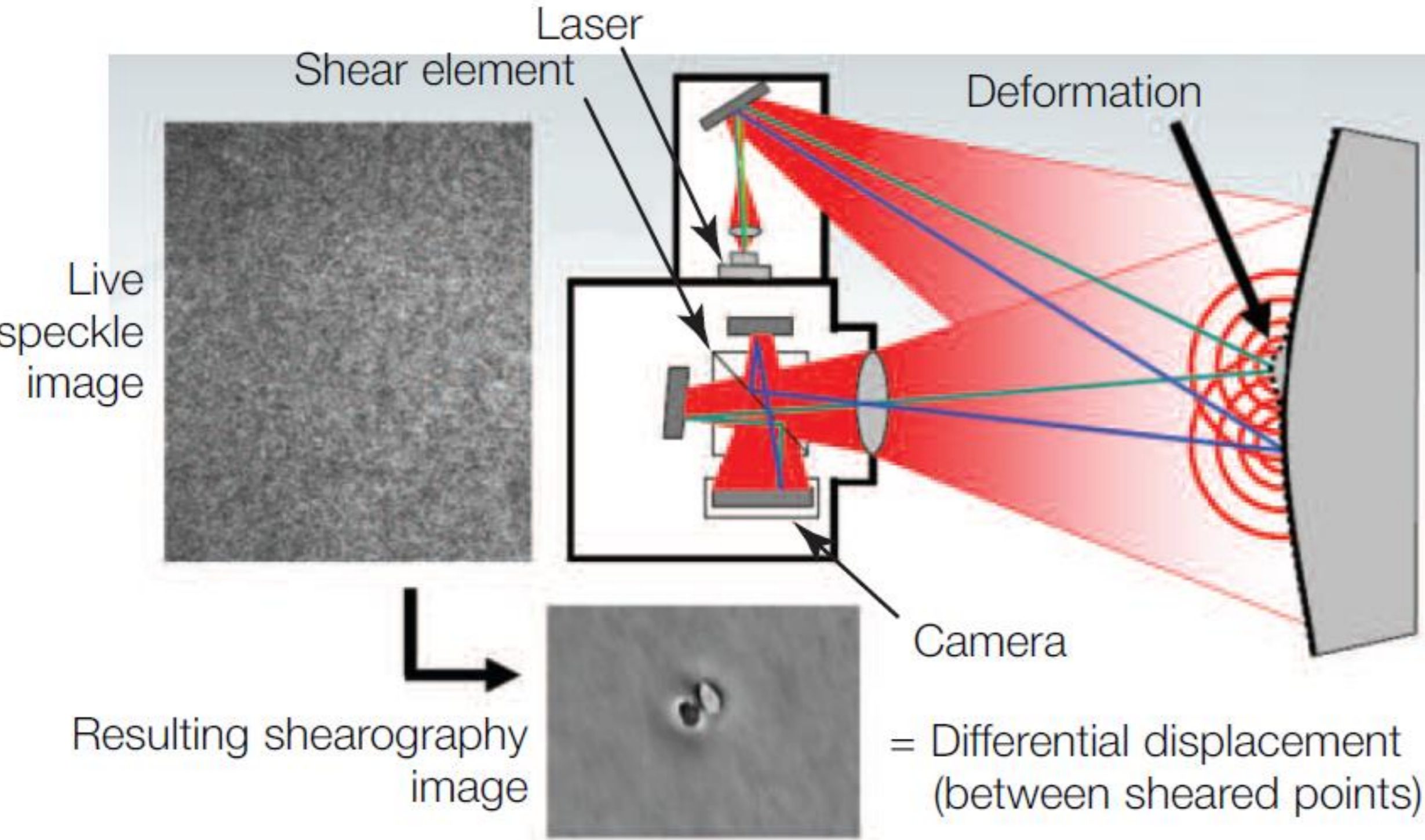
Separation zones
Delamination
Porosity
disbond
Foreign body inclusions
Water infiltration into honeycomb

Shallow delamination in composite

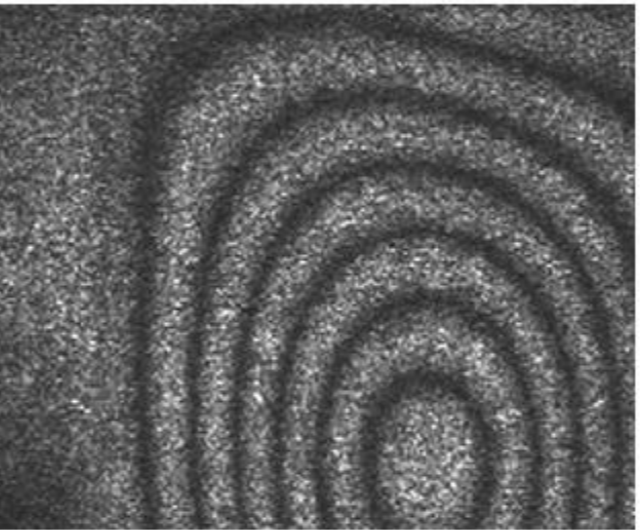


Disbond in honeycomb material

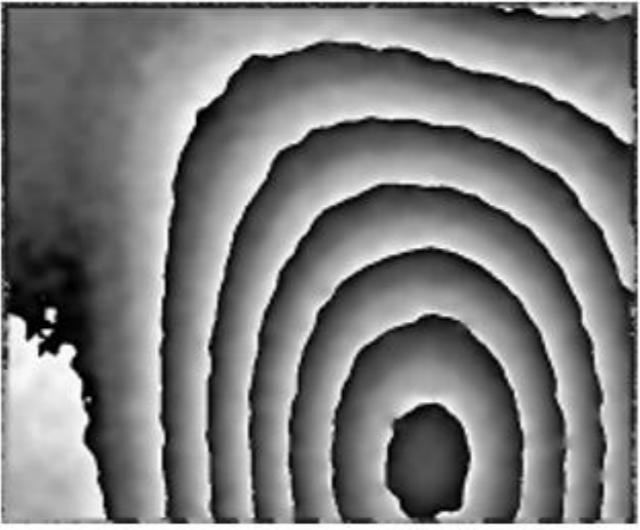




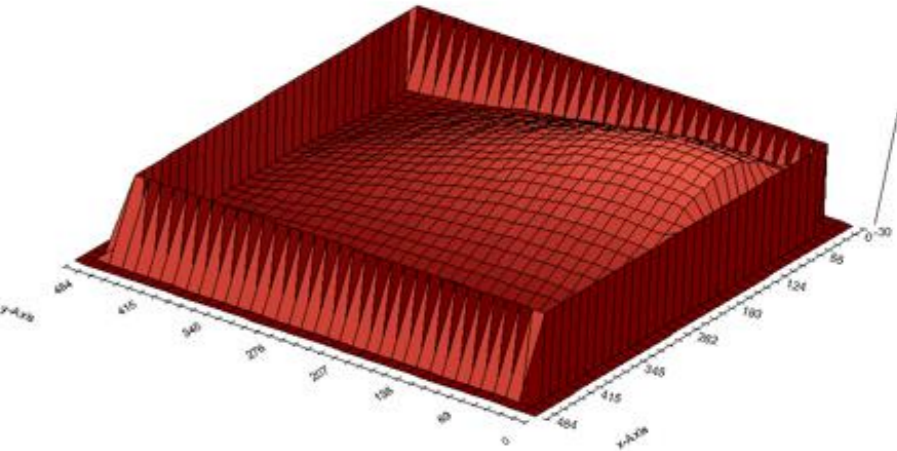
| | Images | Visualization of the results | | |
|-------------------------------|---------------------|---|--|-----------|
| Real-time interferometry | Intensity images | $\propto \sin \left(\frac{\Delta \varphi^{t \rightarrow t'}}{2 \pi} \right)$ | | Real-time |
| Phase-stepping interferometry | Phase images | $\Delta \varphi^{t \rightarrow t'}$ | | ----- |
| | Displacement images | $\Delta d^{t \rightarrow t'}$ | | ----- |



Real-time



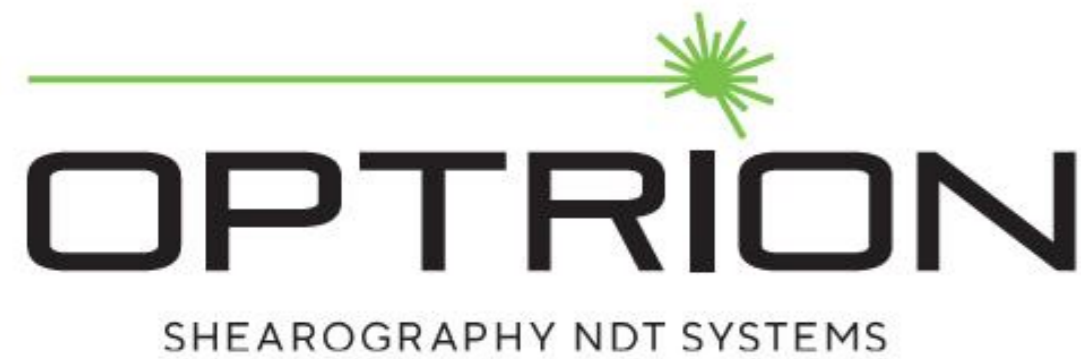
Phase-stepping



Optical Setup for Laser Shearography inspection

Different output from shearographic images

portable shearographic system from our partner Optrion in Belgium



Non-Destructive Testing
for Composite Materials



Camera Specifications

Dimensions (L x H x W): 300x150x105 mm

Weight: 5.2 kg (with IR)

Aircraft cabin compatible dimensions and weight

Light source: laser 200 mW SLM @ 532 nm (green) –
Class 1M

CMOS Sensor: GiGE camera (H x V) 2464×2056 pixels
– FOV 17° - 12 bit resolution

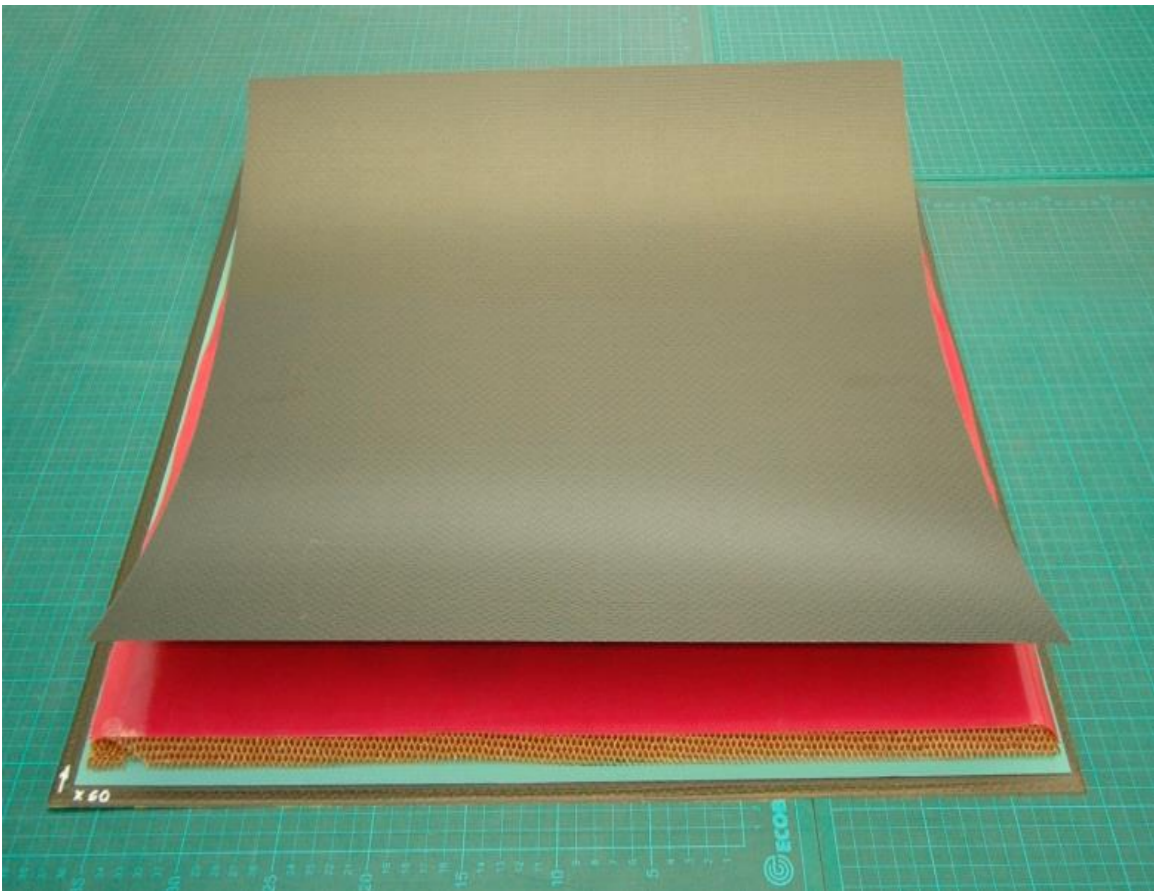
Thermal sensor: 640 x 480 px – 55 mK – 50 fps

Power: 85 – 264 VAC / 50-60 Hz 60W

Laser telemeter

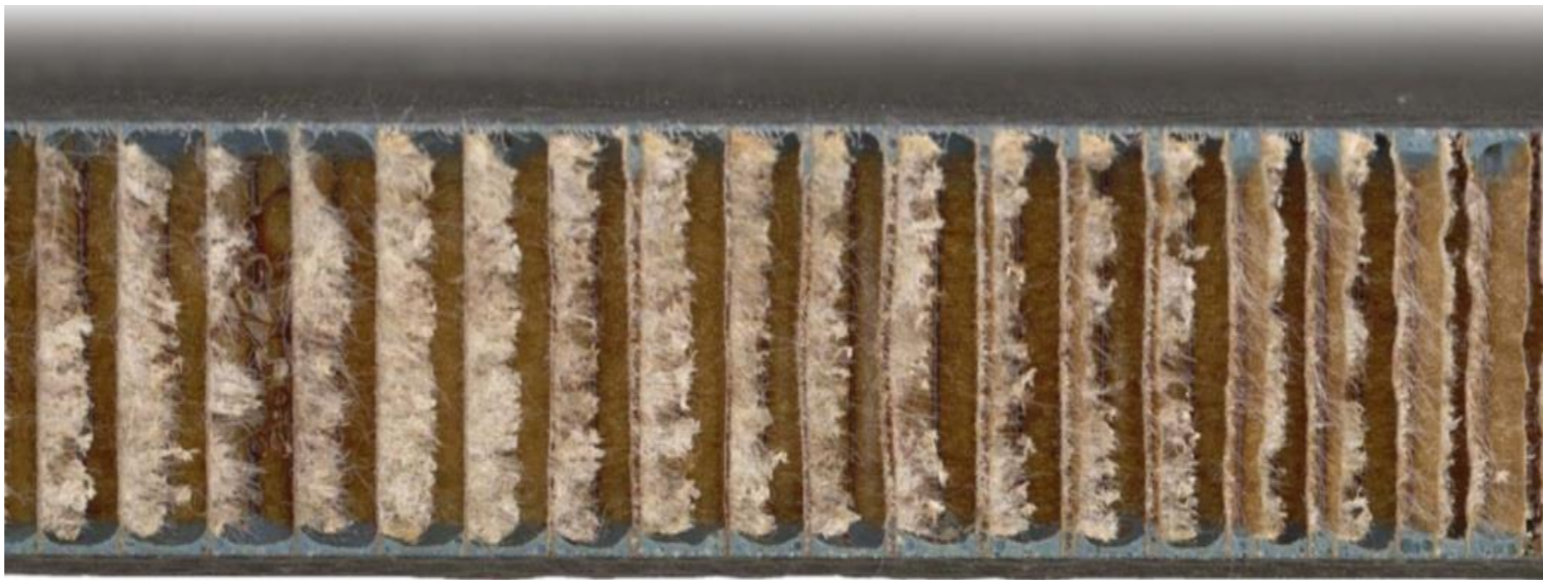
Inspection

Part inspected



CFRP sandwich specimen; 50 x 50 cm

2 carbon skins with honeycomb

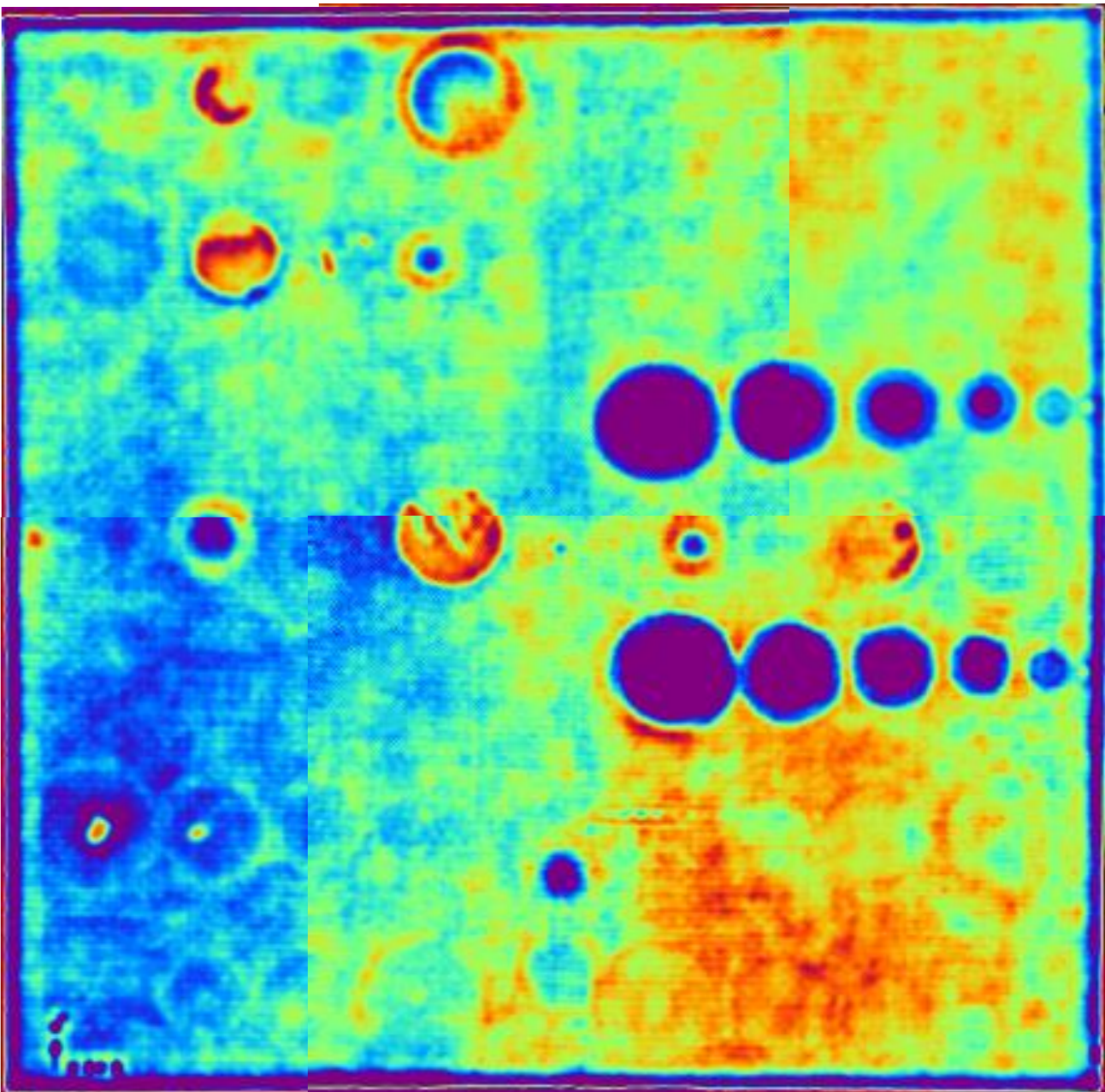
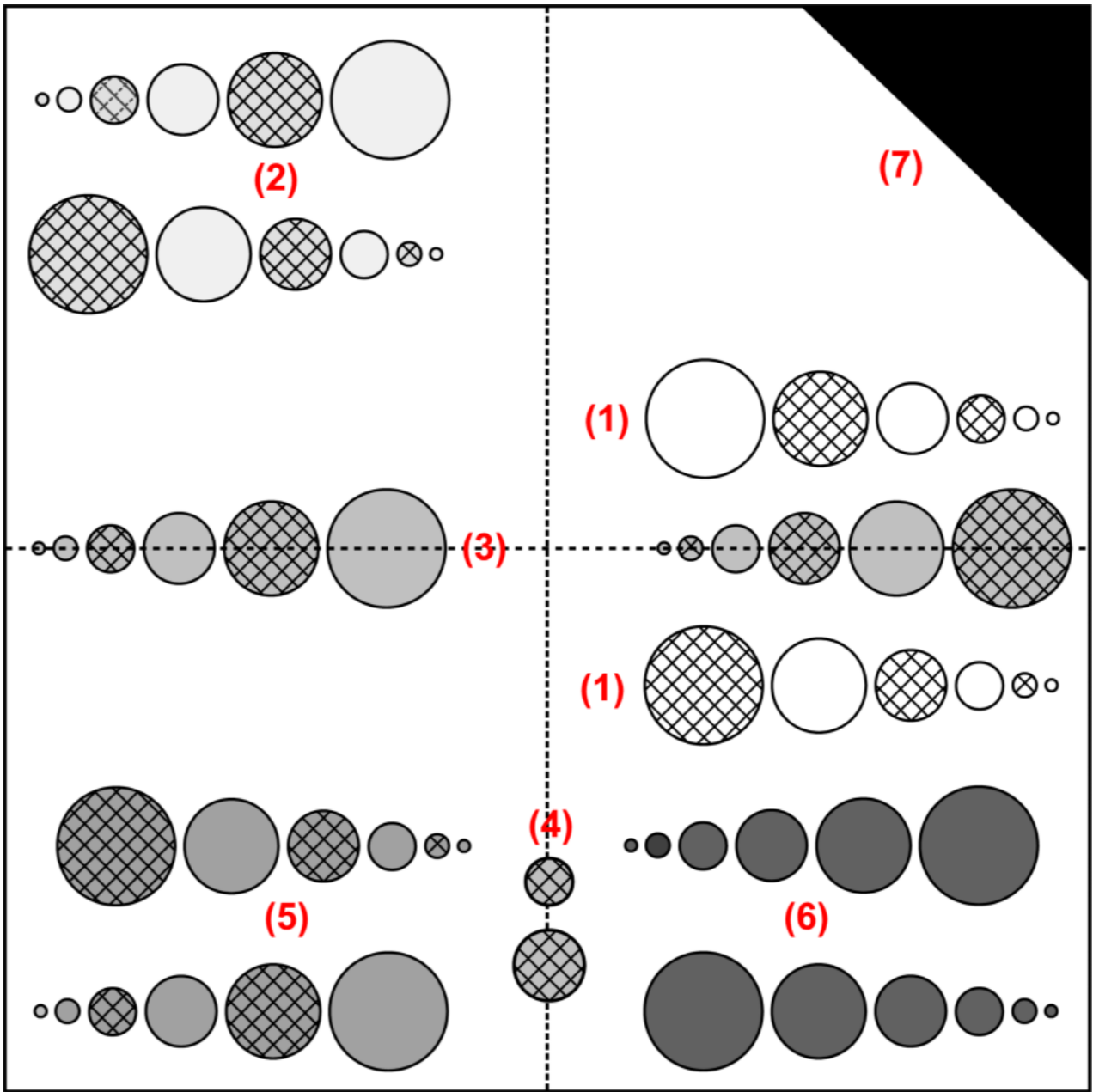


skin thickness: 1 mm
core thickness: 16 mm

Shearographic result




4 x 1000 W Heat Pulse



| Method | Equipment / Techniques | STAFF |
|--------------------------------------|---|--|
| RT Radiographic Testing | <ul style="list-style-type: none"> Digital radiography (from 50KV – 320KV) Resolution from 50 µm – 200 µm | 2 RT Level 1 2 RT level 2 and 1 RT3 |
| UT Ultrasonic Testing | <ul style="list-style-type: none"> Immersion Testing Thickness measurement Phased Array Pulse Echo | 1 UT level 1 2 UT level 2 1 UT level 3 |
| PT Penetrant Testing | <ul style="list-style-type: none"> Red Dye or Fluorescent penetrant Alkaline or Solvent Degreasing | 4 PT level 2 1 PT level 3 |
| MT Magnetic Particle Inspection | <ul style="list-style-type: none"> Hand yokes Stationary MT bench | 3 MT level 2 1 MT level 3 |
| IRT Infrared Thermography Testing | <ul style="list-style-type: none"> Hot air heater or 4 x 1000 W Halogen heaters IR Camera Flir T450sc | 2 IRT level 2 1 IRT level 3 |
| ST Shearographic Testing | <ul style="list-style-type: none"> Hot air heater or 4 x 1000 W Halogen heaters Optron Digital Shearographic Camera | 1 ST level 1 1 ST level 3 |
| ET Eddy Current Testing | <ul style="list-style-type: none"> High and low Frequency Eddy Current Testing Rotating Probe ET | 2 ET level 2 1 ET level 3 |
| VT Visual Testing | <ul style="list-style-type: none"> Direct VT of welds, castings and composite parts Indirect VT (endoscopy and digital microscope 220x) | 1 VT level 2 1 VT level 3 |

Jean-Charles Montanier

Commercial Director

 +32 (0) 477 63 42 32

 jcm@mpp.be



 **Head office**

Rue du Pont 25C
B-4180 - Hamoir

 **Operational office**

Parc Industriel des Hauts-Sarts
1er avenue 66
B-4040-Hertsal

 **Our Phone**

+32 4 248 06 00

 **Email / Website**

info@mpp.be
<https://mpp.be/>

