A new dimension in non-destructive material testing

e/de/vis

PTvis

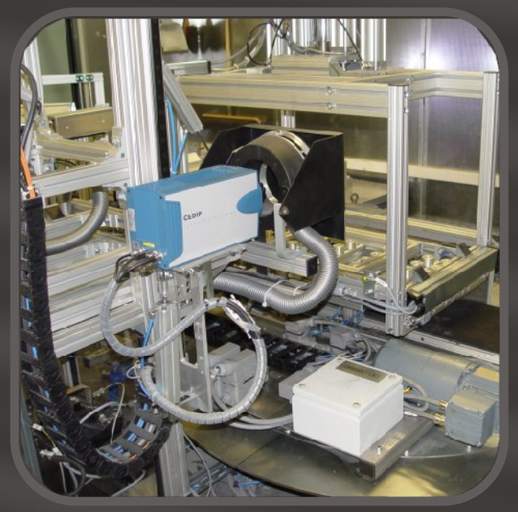
Automated testing

Pulse PhaseThermography for Non-Destructive Material Testing

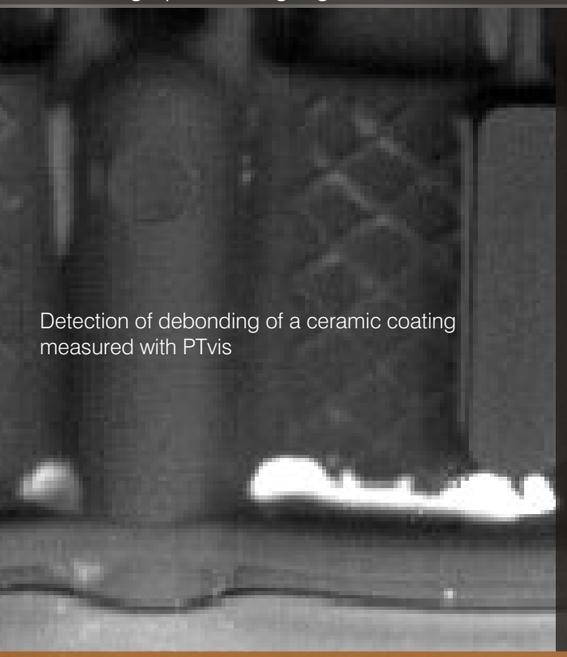
Applications

Fully automated Pulse-Thermography for industrial series production

Test stand for characterisation of ceramic coatings



- 100% control / operation in a three shift system
- Fully automated testing under harsh environmental conditions (casting house)
- Complete integration in conveyor technique / short cycle time (<20s/part)
- Automated defect detection using special adapted image processing algorithms



Detection of debonding of a ceramic coating measured with PTvis

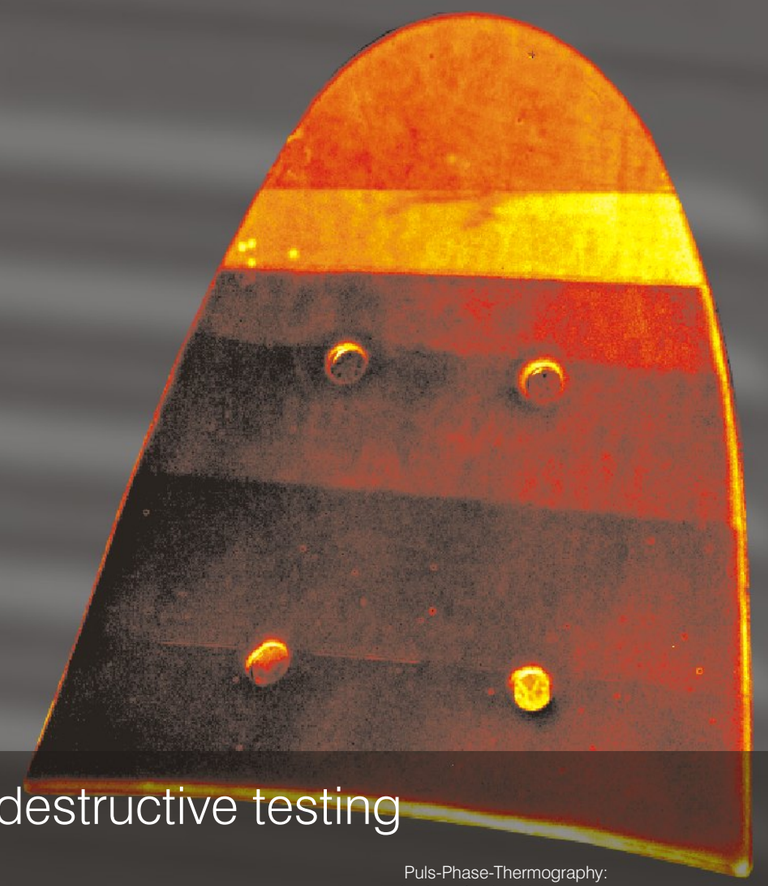
Applications

Pulse phase thermography is well suited for non-destructive inspection in the following applications:

- Characterisation of lacquer and ceramic coatings (thickness, adhesive strength)
- Damage detection in laminate structures
- Testing of adhesive, rivet, and welding joints
- Measuring the temperature conductivity

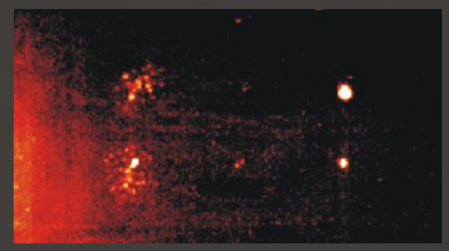
In the laboratory as well as in automated testing, the typical advantages of pulse phase thermography become relevant: short testing periods (only a few seconds) and flexible software filters enables the fast, efficient and reliable usage of this method in quality assurance.

- ITvis
- OTvis
- UTvis
- **PTvis**



- imaging non-destructive testing
- fast
- depth-resolving
- ready for automation
- robust

Puls-Phase-Thermography: characterisation of paint thickness on wooden automotive interieur.



Detection of corrosion under paint with PTvis

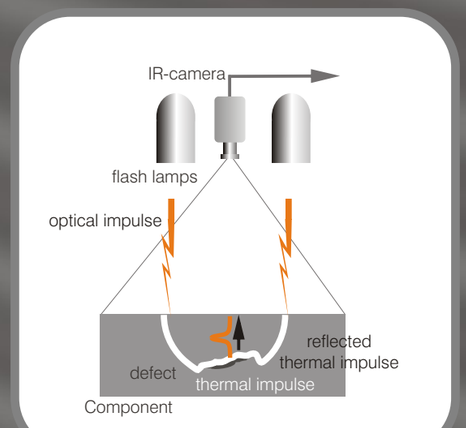
edevis GmbH
Nobelstr. 15
D-70569 Stuttgart
Tel.: +49 711 6868 7790
Fax: +49 711 6868 7796
E-Mail: info@edevis.de

www.edevis.de

e/de/vis GmbH
enhanced defect visualization

Pulse PhaseThermography for Non-Destructive Material Testing

PTvis



Concept

The basic idea of pulse phase thermography is the disturbance of the thermal equilibrium with an energy impulse for a very short period of time (typically a few 1/1000 seconds). The decay behaviour provides information about the temperature conductivity. The temperature raise has to be high enough to track the decay in an optimal way. Therefore, the component is excited by powerful xenon flash lamps.

Reliability with phase images

The decay behaviour of heat is analysed by pulse phase analysis. This is the reason, why influences of disturbances or inhomogeneities can be avoided and the signal-to-noise ratio can be increased significantly. By analysing at different frequencies, a depth-resolved material characterisation is achieved.

Infrared camera

Detector	InSb or MCT with 320 x 256 / 640 x 512 pixel
Spectral response	3-5 μm or 8-12 μm
Lens	25 mm, f/2
Frame rate	up to 380 Hz [subwindow: >1kHz]
NETD	up to 16 mK at 25 °C
Integration time	adjustable 1 μs - 10 ms
Synchronisation	Internal or external FPA-Sync.
Temperature range	-40°C - 200 °C

Excitation

Type	ring flash or single lamps
Impulse energy	up to 14 kJ
Impuls duration	1 ms (typical)

Software

Data acquisition	Digital data acquisition and processing in real time. Control of the excitation sources and synchronisation with the infrared images.
Analysis	Evaluation algorithms: image subtraction, Fourier transformation, calculation of temperature conductivity. Disturbance and noise suppression by phase analysis.

PTvis

Non-destructive testing system for Pulse Thermography

PTvis test stands are based on fast CEDIP Jade/Emerald/Silver infrared cameras in combination with high-power flash lamps as excitation source. A frame rate of up 650 Hz, a temperature resolution of 16 mK, and a short flash duration of 1/1000 seconds allows the tracking of fast heat transport processes and therefore the characterisation of thin films with thicknesses in the region of microns.

RB-10800 with cooling unit and mounting kit for a CEDIP Jade or Silver camera

RB flash lamp series is a new generation of high-power flash lamps specially designed for the application in active thermography.

The ring arrangement of the high-power xenon tubes allows a highly efficient and homogenous heatexcitation of the specimen.
The lamp is available in three versions, differing in the maximum flash energy ranging from 7.2 kJ up to 14 .4 kJ with pulse durations of typically 1ms.
Maximum flash repetition rate is 2,8 s at highest energy level. **PT-10800** and **PT14400**, provide an integrated active cooling system, in order to avoid heating-up during rapid flash series. The exhaust air is drawn off to avoid convective distortions by hot air in the infrared transmission range between lens and object.

Available versions:

RB-7200
E_{max}=7,2 kJ (two tubes, each 3,6 kJ max.)
Cooling unit is optional.

RB-10800
E_{max}=10,8 kJ (three tubes each 3,6 kJ max.)
Cooling unit included.

RB-14400
E_{max}=14,4 kJ (four tubes, each 3,6 kJ max.)
Cooling unit included.

edevis GmbH
Nobelstr. 15
D-70569 Stuttgart
Tel.: +49 711 6868 7790
Fax: +49 711 6868 7796
E-Mail: info@edevis.de

www.edevis.de

e/de/vis GmbH
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