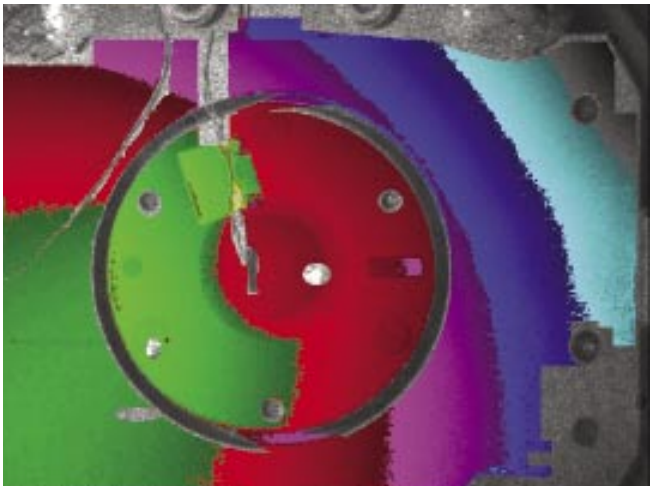
Optical measurement for test monitoring

- FEM updating
- Diagnosis for an optimal mechanical design
- Behaviour of mechanical part in real conditions
- Behaviour of mechanical assembly under thermal loading
- Shock investigation
- Check of prototype behaviour



Displacement measurement of infrared sensor – SAGEM

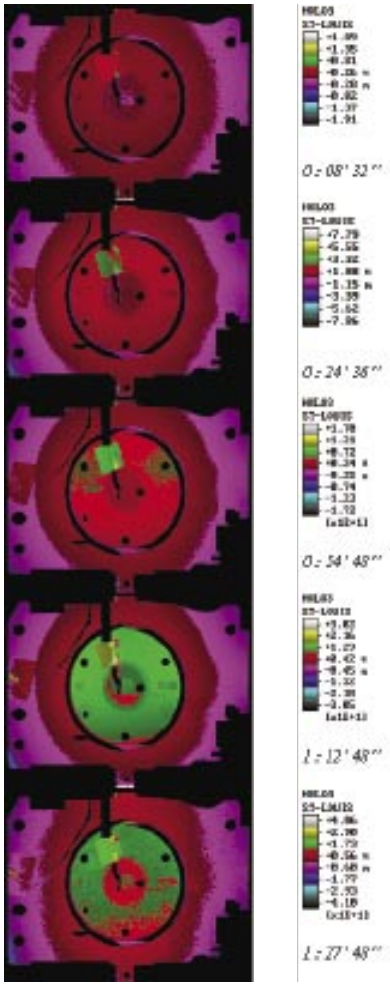
LOW LEVEL QUASI-STATIC DISPLACEMENT MEASUREMENT

Holographic interferometry

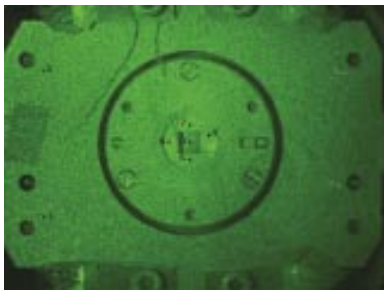
Holographic or speckle interferometry allows displacement map measurement at a very high resolution of 0.1 µm.

By recording the displacement map at a rate of a few hertz and by automatically adding the results, it is possible to monitor the behaviour of a part during the whole duration of a test from a few minutes to several hours. Displacements ranging from micron to several mm may be recorded using this way.

Displacement map of the surface of the sensor as a function of time



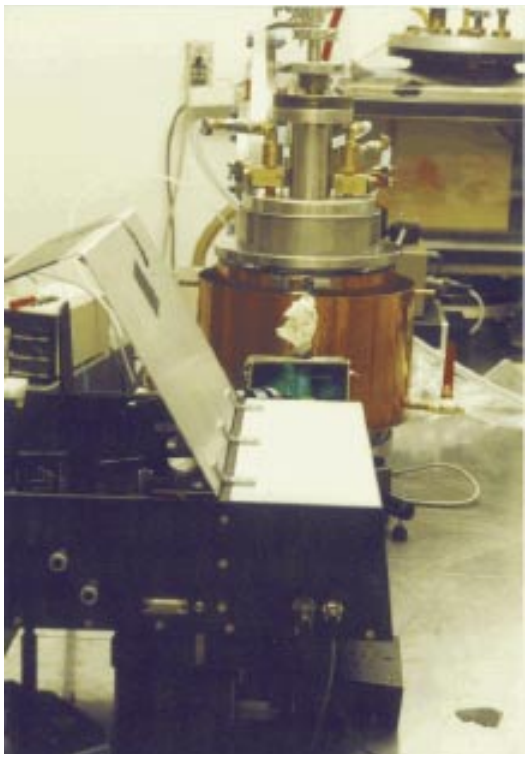
SAGEM : Displacement map measurement of an infrared sensor



View of the sensor illuminated by a laser. The measurement has been done on eight points simultaneously

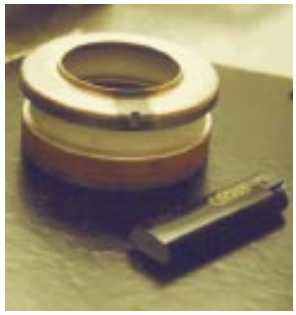
The sensor monted in the cryogenic chamber (80 K).

THOMSON TTE : Deformations of a soldered assembly

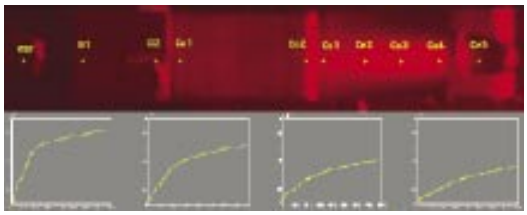


The part is put in an oven and the optical head is viewing the part through a window

The soldering is done at 800 °C. Due to the different thermal expansion coefficient of the materials, stresses appear during cooling.



The part to be measured is a ceramic-metal assembly



The points measured and the displacement recorded as a function of time.

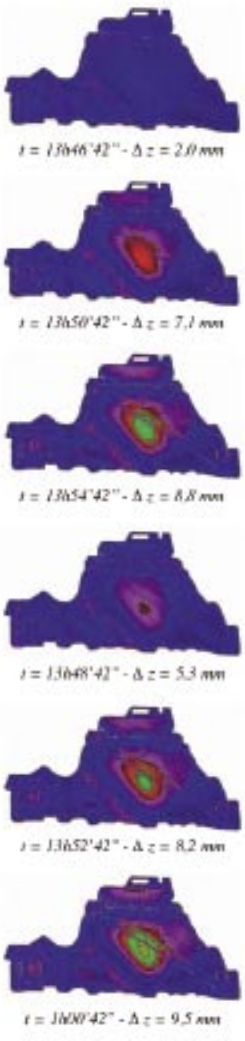
HIGH LEVEL QUASI-STATIC DISPLACEMENT

Structured lighting

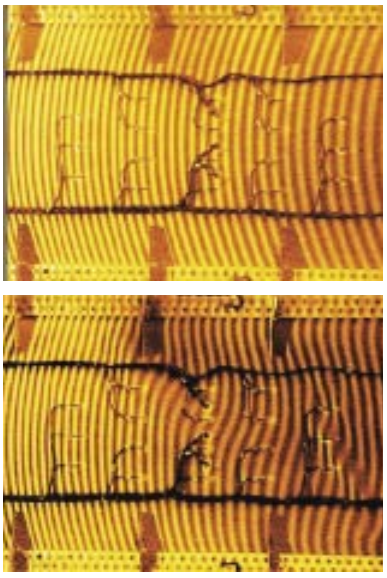
Structured light allows to obtain displacement map of an object for displacement ranging from 0.1 mm to several centimetres.

It works on object having a size ranging from the centimetre to several metres.

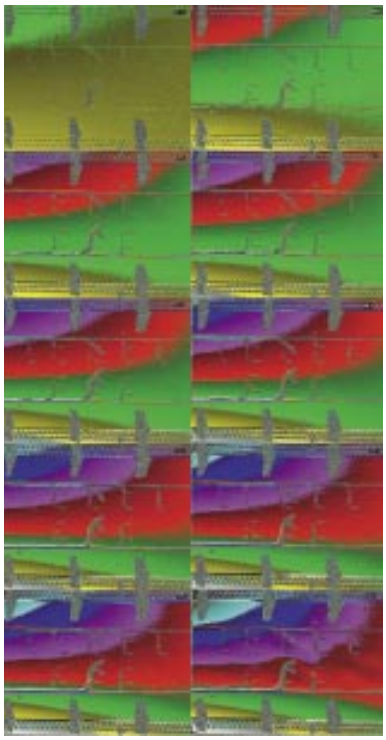
Inergy Automotive Systems Deformation of a fuel tank during cooling.



EADS : Deformation of an airplane fuselage during mechanical loading



Projected fringes on the fuselage



Deformation during bending-compression loading.
Surface studied : 1200 x 1800 mm².

Deformation of a fuel tank during cooling

Display of the cloud of 3D point of the tank.

DYNAMIC DISPLACEMENT MEASUREMENT

Use of pulsed illumination sources

Flash lamps or pulsed laser may be used to study transient events.

The recording are synchronised at different time in order to recover the full transient event.

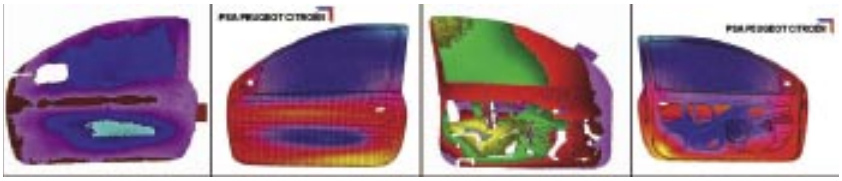
PSA PEUGEOT CITROEN
Transient phenomenon after door shutting

FEM model. The objective is to update the FEM

The tested door.

Time after shock : 6 ms

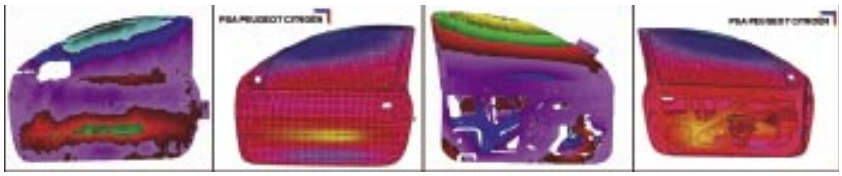
Outside part **Inside part**



Mesure *Calcul E.F.* *Mesure* *Calcul E.F.*

Time after shock : 14 ms

Outside part **Inside part**



Mesure *Calcul E.F.* *Mesure* *Calcul E.F.*

The full field recording gives an information similar to that of FEM calculation. It is then easy to compare the results.
The optical system, easy to handle is very well adapted to this kind of experiment and allows to obtain the results quickly after the test.

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