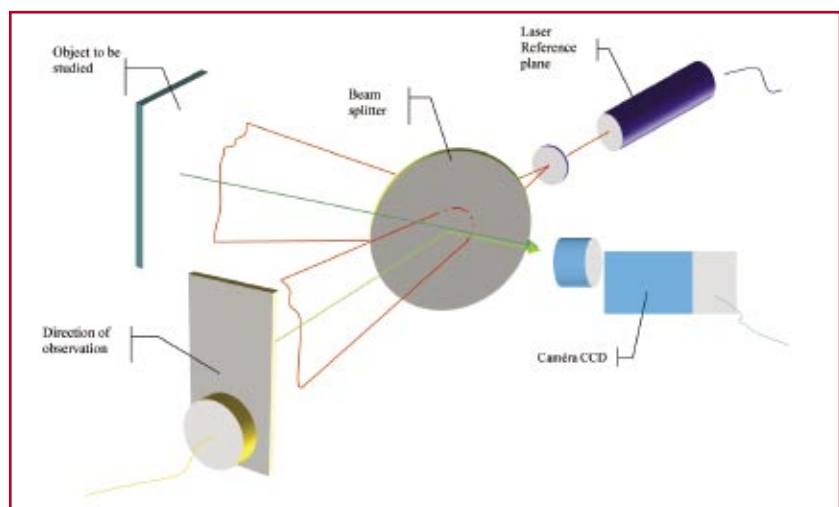


# Speckle interferometry bench for vibration analysis and displacements measurement

Vibration analysis and displacement measurement are used particularly when testing new products and investigating them so that they can be improved or developed.

Optical techniques are especially suited to such analyses.

- Measurement resolution is very high (greater than  $0.1 \mu\text{m}$ ).
- Measurement does not influence the behaviour of structures, as the method is contact-free.
- The measurement result is an overall representation of displacements on the surface of the object along the sensitivity vector.
- Measurement can be made very quickly. Indeed, as the optical part is already configured, preparation consists only of fixing the object to a loading device.
- Direct recording onto a CCD camera allows measurements to be viewed in real time or with a slight delay whilst stresses are being applied.
- The interpretation of results is simple even for the non-specialist. Displacements are displayed in false colour or in pseudo-relief.
- The whole of the optical assembly is accessible to allow a specific interferometric approach. The associated software enables step-by-step monitoring of transformations.
- The optical part is supplied in standard configuration. However, the assembly can be adjusted by the user.



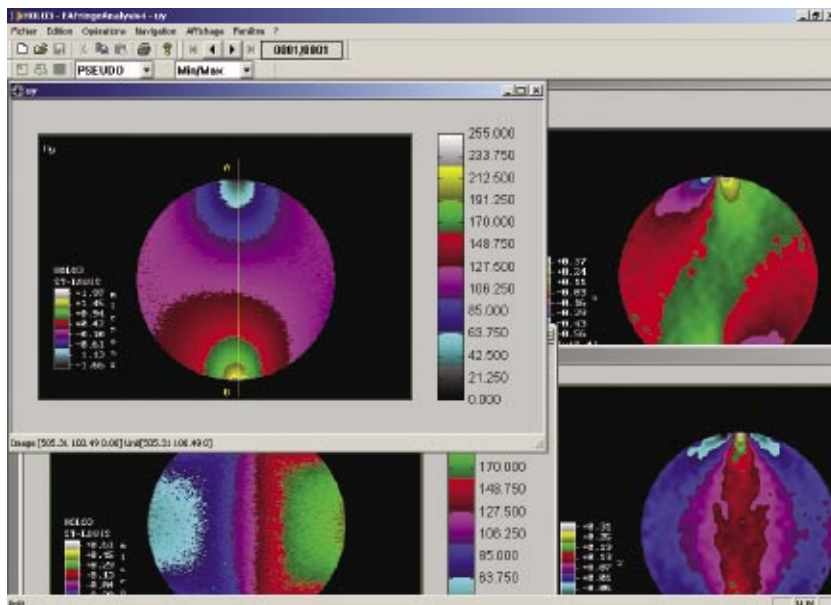
*The technique implemented is based on speckle interferometry. A source of coherent light (laser) simultaneously illuminates a reference plane and the object of interest. The beams reflected by these two items interfere on the CCD matrix of a camera. Displacements of the object's surface along the line of sight modify the interference figure obtained. Special software translates this modification into displacement for the user*

## F. A. - Fringe Analysis®

F.A. - Fringe Analysis® is a special software package for grabbing and processing image, developed by HOLO 3.

The software is very user-friendly and easy to learn; it offers a broad range of functions:

- Capture, storage and manipulation of images
- Control of a piezo or galvanometer for making phase shifts
- Geometrical operations, filtering, masking
- Arithmetical and logic operations; inter-image operations
- Interpretation of interferometric images, false-colour and pseudo-3D displays



F.A. - Fringe Analysis® has all the capabilities for making simple and quick displacement measurements and vibration analyses. Its versatility enables the integration of further functions for measuring mechanical magnitudes (deformations, stresses) or measuring forms.

## Equipment characteristics

### Vibratory analysis

- Viewing lines of iso-displacement in real time
- Usable frequency range: 0 - 50 kHz
- Resolution of displacement: 0.25  $\mu\text{m}$  (0,1  $\mu\text{m}$  with special image processing)
- Field studied: 100 x 100  $\text{mm}^2$
- Exciter (on request): loud-speaker or vibration generator
- Spatial resolution: 512 x 512 pixel images

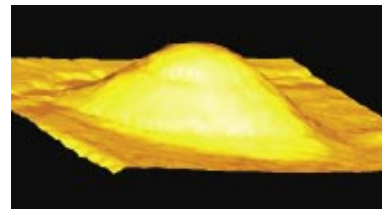
Further information on request from the following address:

### Measurement of displacement

- Displacement fields along the optical axis of the camera
- Deformation amplitude: several microns
- Resolution of displacement: 0.1  $\mu\text{m}$
- Field studied: 100 x 100  $\text{mm}^2$
- Deformations of mechanical or thermal origin
- Spatial resolution: 512 x 512 pixel images
- Viewing deformation in false colour, pseudo-3D, cross-sections

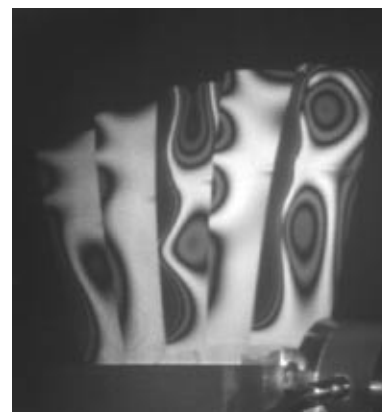
## Measuring displacements

Deformation by focussed pressure on an clamped plate. Pseudo-3D representation of displacements between an initial state and a deformed state.



## Vibration analysis

Vibration modes of a blade section (Framatome). The part is excited by a sinusoidal signal. A frequency sweep enables the various modes of the structure to be determined in real time, as well as associated gain and damping factors.



**HOLO3** 

7 rue du Général Cassagnou F-68300 Saint-Louis T : +33 (0)3 89 69 82 08  
F : +33 (0)3 89 67 74 06 info@holo3.com http://www.holo3.com