

## Strain Mapper Applications

The Strain Mapper comprises of an optics module and a PC.

The optics module contains the laser, optical elements and a progressive scan TV camera. The module can be tripod or bench mounted. The TV camera has an auto focus lens with a motorised zoom and aperture control which are controlled from the PC. Two screw adjusters allow the amount of horizontal or vertical shear to be adjusted. Through the control of the shear and the camera aperture that the sensitivity of the instrument is altered thus allowing small or large displacements or components to be monitored.

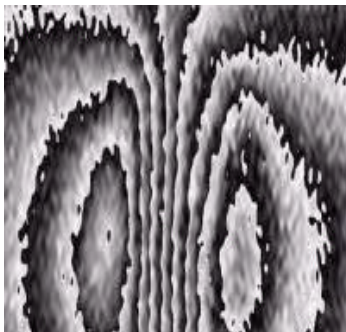
The PC contains a video frame grabber card which enables fast manipulation of the digital images.

Both parts of the system are designed to be robust and can be transported without fear of dislodging components.

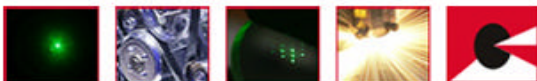
The laser is used to illuminate the target with a diffuse "speckle" pattern. The speckle is formed by interference of the laser light waves as they are reflected from the surface. As the target moves so the speckle pattern alters. A computer is used to store an initial reference image and the target is then stressed usually by means of thermal energy. The resultant speckle pattern is then compared to the reference image and fringes are seen on the screen. These fringes are indicative of the strain pattern moving through the item.

The optical configuration of the instrument allows the strain field to be shown on the screen as a contour pattern with the fringes as the contours. Anomalies in the fringe pattern represent uneven changes in the strain distribution in the target. These may be caused by defects or arise from the physical structure of the item. By interpreting these patterns and the target the user can discern the source of the uneven distribution. Image processing software is used to give a 3D plot of the strain in the target area.

The Strain Mapper can therefore be used either for live strain monitoring or for more detailed inspection of the defect.

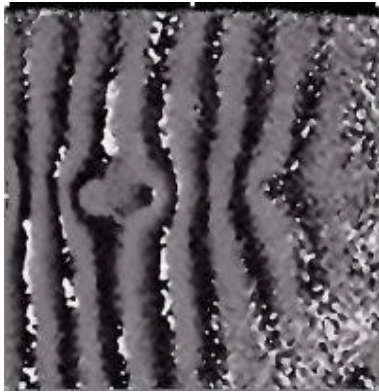


Disbond in Laminate Aircraft Panel



Laser Optical  
Engineering Ltd

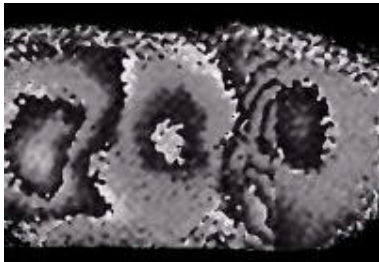




Non-visible impact damage in GRP aircraft panel



Horizontal Joint in aluminium honeycomb beneath 2mm aluminium skin



Defective joint between titanium insert (right) and carbon fibre strut (left)

