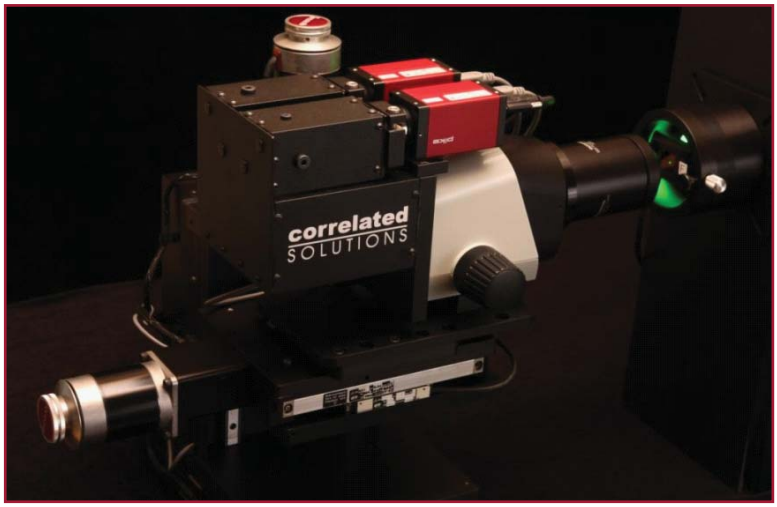
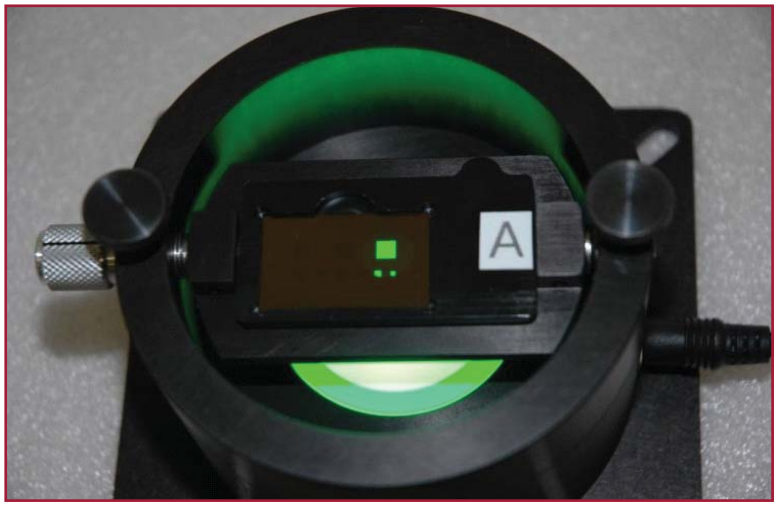
Stereo Microscope Deformation & Strain Measurement

by Correlated Solutions, Inc.

VIC-Micro 3D™ by Correlated Solutions, Inc. is a new addition to the VIC-3D product line of measurement solutions. VIC-Micro 3D enables accurate displacement and strain measurements under high magnification.



CCD Stereo Microscope with Motorized 3-axis Stage



Stereo Microscope Calibration Target Fixture

Background

Three-dimensional digital image correlation (DIC) has found widespread popularity for strain measurements due to its excellent accuracy, robustness and ease of use. However, the three-dimensional image correlation method has so far found very little application in measurement problems that require high magnification. This is mainly attributed to the lack of suitable optics that provide sufficient depth-of-field to acquire two high magnification images from different viewing angles.

Stereo microscopes solve this problem and appear ideally suited to applying the three-dimensional image correlation technique to high-magnification measurements. However, the internal construction of stereo microscopes prevents proper calibration of the image distortions using traditional models such as Seidel lens distortions. The data typically contains severely bias shape and strain measurements without proper implementing calibration techniques. In this case it is not uncommon to observe bias levels of several thousand microstrain.

To overcome this problem, Correlated Solutions, Inc., has developed a simple to use calibration method that does not suffer from the problems associated with the traditional parametric distortion models that are commonly used. The calibration method uses a planar object with a speckle pattern to compute the non-parametric distortion fields of the stereo microscope and has been shown to completely eliminate shape and strain bias from the measurements.

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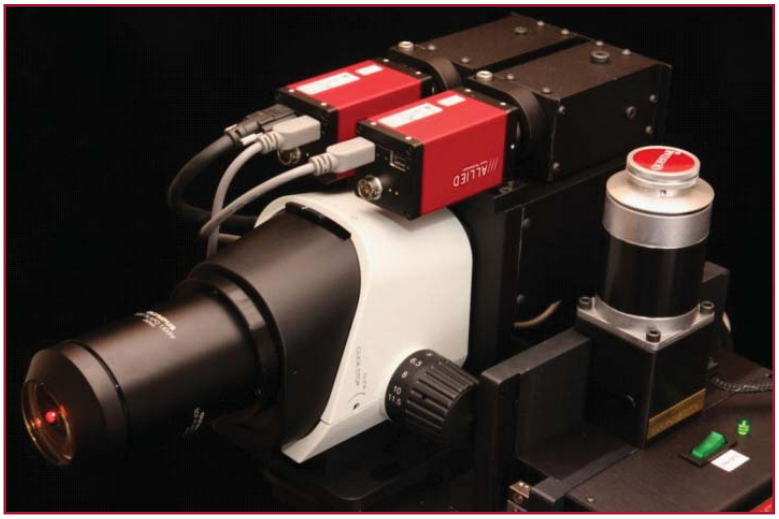
System Features

- Full-field measurements of 3D coordinates, displacements, velocities, and complete strain tensors
- Field of view (zoom range): 0.8mm-7mm
- Automatic calibration
- Accurately overlap images with simple adjustment
- Data export: Full-field data can be exported in Tecplot/plain ASCII, Matlab, and STL format
- VIC-3D 2009 includes graphical contour display of deformations and strain distributions over a 3D and 2D overlay depiction of the geometry of the test article
- VIC-3D 2009 includes post-processing features such as minimum/maximum, mean and standard deviation, time-slice extraction, stress-strain curve generation, data extraction along lines, and much more
- Data extraction from 3D plots based on user defined lines and circles
- Node data can be easily extracted for FEA validation.
- System is sold as a complete turnkey package on the Windows XP/Vista platform with easy FLEXPort data extraction
- The system includes one year of technical support via telephone/email and software upgrades. Technical support is available Mon-Fri 9am-5pm EST. On-site support and consulting is also available.
- The system includes a one-year replacement warranty for defects in materials and/or workmanship on all parts.



Stereo Microscope System

Stereo Microscope Specifications

Field of View (Zoom Range)	0.8mm-7mm
In-plane Displacement Resolution	±60nm
Out-of-Plane Displacement Resolution	±120nm
Strain Resolution	±0.015%
Frame Rate	up to 120 fps
Translation Range	100mm x 100mm
Stage Movement Step	1 µm
Camera Resolution	VGA, 1MP, 2MP, 5MP
Computer Automated Stage Movement	3 Axis
Image Correlation Processing Speed	up to 80,000 pts/s

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