correlated SOLUTIONS

Measure with Confidence

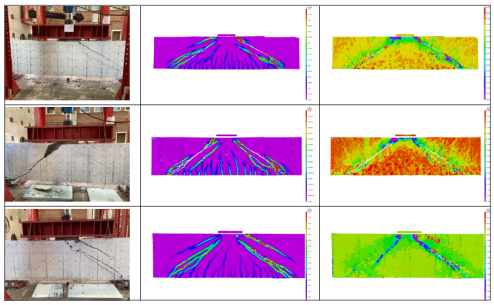
VIC-3D with *iris*

Industry-leading Digital Image Correlation

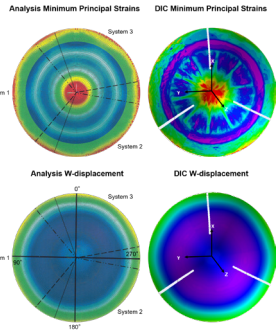
The VIC-3D digital image correlation (DIC) system from Correlated Solutions is the most powerful turnkey system for non-contact measurement of full-field surface shape, deformation, strain, vibration, and much more. With a range of new features including direct data comparison with finite element models (FEA) and a new graphics engine called iris, the VIC-3D system is poised to change the way engineers around the world validate models and share their results. Give us a call to find out how you can do better work in less time than you ever thought possible.

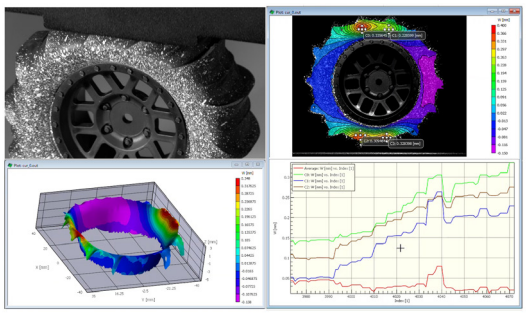
Non-Contacting & Full-Field Measurements

- No mechanical interaction with the sample
- Eliminate the need for strain guages, LVDTs, extensometers, etc.
- Rigid body motion can be easily removed
- Measure dynamic mechanical properties & vibration simultaneously
- Up to 31 million data points possible
- Automatically identify strain concentration locations, even in complex structures under complex loading conditions
- Fast data processing: up to 1,000,000 data points/second and intuitive inspection and extraction tools
- Data can be imported and exported for easy FEA comparison/ validation
- Fully integrated camera control



Images courtesy of NASA





VIC-3D is still the fastest, most accurate digital image correlation system on the market. Additional key features include:

- Python scripting for customized and repeatable analysis, including batch processing
- Hybrid calibration options for improving calibration via the use of speckle images
- Customizable calibration options for modeling radial, prismatic, and tangential distortions
- Completely integrated and customized turnkey systems with training, system maintenance, and technical support

Contact our Sales Team to explore the range of industry-leading digital image correlation systems from Correlated Solutions.

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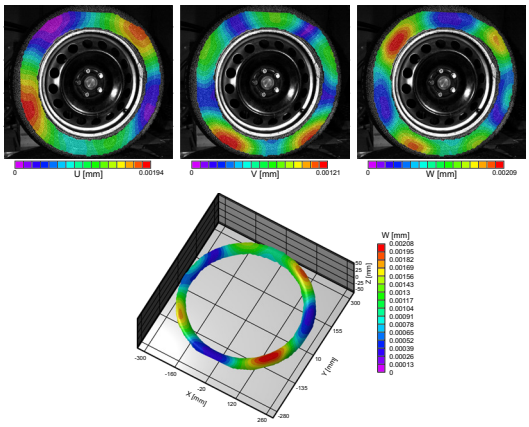
CASE STUDY

Improving Tire Vibration Measurements with VIC-3D



Noise and vibration characteristics are critically important for understanding the mechanical behavior of tires under various loading conditions. Measurements acquired during testing are used to validate finite element computer models to ensure the product meets safety, durability, performance, and longevity requirements. Traditional measurement techniques, such as accelerometers and strain gauges, have been widely used in the industry for decades, but offer minimal information at discrete locations. Full-field 3D non-contact displacement and strain measurements speed up the validation process by providing an abundance of information during a single test which can quickly help engineers visualize how the tire's surface is behaving. Laser doppler velocimetry systems have been used for such measurements, but this method requires a multitude of points to be scanned on the tire surface. Digital image correlation (DIC) measurements, on the other hand, are a very effective tool to rapidly obtain full-field vibration measurements with high spatial resolution. The advantages of the DIC method include ease of use, rapid turn-around, simple calibration, and simultaneous acquisition of data on the entire surface, permitting full-field measurement of transient phenomena, as illustrated in this hammer strike example. The VIC-3D vibration analysis module integrates vibration analysis through a high performance Fast Fourier Transform (FFT) implementation and an FFT workspace with numerous post-processing and analysis options. Vibration results can also be visualized and animated using the powerful *iris* graphics engine, and data export compatible with major vibration analysis software packages is available.

In this example, a 24" diameter tire is excited with a modal hammer at the top of the tire. Images are acquired at 4,000 frames per second using two high-speed cameras mounted on a stereo bar. The images are then post-processed to compute the three-dimensional (U, V, and W) displacement fields. This full-field displacement data is then transformed into the frequency domain using the built-in FFT module. The results are displayed graphically and visually with animated 3D contour plots. In-plane and out-of-plane amplitude distributions, strains, and accelerations are shown in 3D or as a 2D overlay on the image, and may be animated in 2D or 3D. The results here show the amplitude distribution in all three directions at a frequency of 145.5 Hz. Further analysis using the synchronized force data from the modal hammer may be used to compute the frequency response function (FRF). This measurement data is then compared to the computer model predictions to improve the design and overall performance of the tire. With the VIC-3D system, manufacturers save time and money in the R&D phase of development, enabling them to stay ahead of the competition.

	VIC-3D LS	VIC-3D QX	VIC-3D HS	VIC-3D UHS
Camera Resolution	2.3 MP - 45 MP	12.3 MP	Up to 4 MP	400 x 250 pixels
Frame Rate	400 Hz - 16 Hz	Up to 335 Hz	Up to 500 KHz *	Up to 5 MHz **
In-Plane Resolution	1/200,000 • FOV	1/200,000 • FOV	1/100,000 • FOV	1/50,000 • FOV
Out-of-Plane Resolution	1/100,000 • FOV	1/100,000 • FOV	1/50,000 • FOV	1/25,000 • FOV
Strain Resolution	down to 10 με			
Strain Range	from 0.005% to > 2,000%			
Analog Data Recording	Up to 32 inputs	Up to 16 inputs	8 inputs	10 MS/s / 4 inputs
Full-field Real-Time Analysis	Yes, up to 10 Hz	Yes, up to 10 Hz	n/a	n/a
VIC-Gauge 3D Real-Time Analysis (output of points, gauges, extensometers, etc.)	Yes, up to 100 Hz Up to 4 real-time analog outputs	Yes, up to 100 Hz Up to 4 real-time analog outputs	n/a	n/a
FFT Module	Available	Available	Available	n/a

*Achievable at reduced resolutions, **Achievable at full resolution

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