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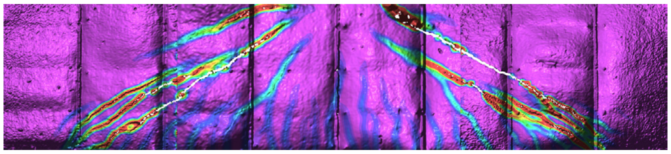
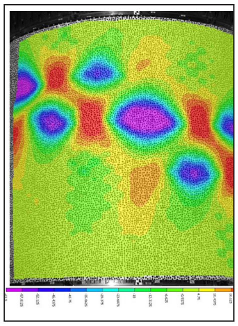
Confidence

VIC-3D with *iris*
for Industrial Engineering

Industrial applications are often complex in nature as they typically require advanced hardware and expertise. Whether measuring vibration of pipes or deformation of wind turbines, we have you covered. Continued advancements in machine vision cameras and advanced software have allowed digital image correlation to become the go-to measurement technology for more industrial applications. Applying a speckle pattern to large-scale objects can be a challenge, but typically the benefit of the measurement results obtained far outweigh the time it takes to apply the pattern. However, if only displacements at discrete points are needed, ellipse or quadrant markers may be substituted for a speckle pattern to track these points using VIC-3D's marker tracking interface. Furthermore, with VIC-3D's intelligent large-scale stereo calibration feature, a calibration target no larger than 90 cm x 60 cm is used to calibrate the stereo system with a field of view of virtually any size. For example, this setup would be used to calibrate a VIC-3D system in order to measure the blade deflections of a ~100 m diameter wind turbine.





DIC Technology Advantages

- No mechanical interaction with the sample
- Eliminate the need for strain guages, LVDTs, extensometers, etc.
- Rigid body motion can be easily removed
- Measure mechanical properties easily
- Measure dynamic and vibration behavior utilizing high-speed cameras or a stroboscope
- Up to 45 million data points possible per stereo system
- Automatically identify strain concentrations, 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
- Easily import and export data for FEA comparison/validation
- Fully-integrated camera control software with analog inputs

VIC-3D is 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
- Unique calibration for underwater applications using Variable Ray Origin (VRO) algorithm
- 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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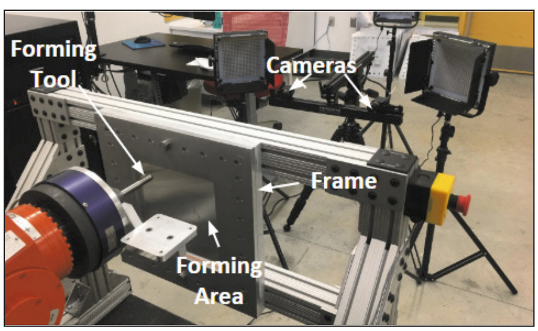
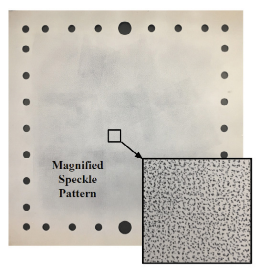
CASE STUDY - Accuracy and Thickness Reduction in Multistage Incremental Sheet Forming using DIC

Abstract: Incremental Sheet Forming (ISF) is a freeform manufacturing method whereby a 3D geometry is created by progressively deforming a metal sheet with a single point tool following a defined trajectory. The thickness distribution of a formed part is a major consideration of the process and is believed to be improved by forming the geometry in multiple stages. This paper describes a series of experiments in which truncated cone geometries were formed using two multistage methods and compared to the same geometry formed using the traditional single stage method. The geometric accuracy and thickness distributions, including 3D thickness distribution plots, of each are examined using digital image correlation (DIC). The data collected indicate that multistage forming, compared to single stage forming, has a significant effect on the geometric accuracy of the processed sheets. Moreover, the results of the experiments conducted in this paper show that sheets processed with multistage forming do not have a uniform sheet thickness reduction, rather they have a parabolic-like thickness distribution in the processed region.





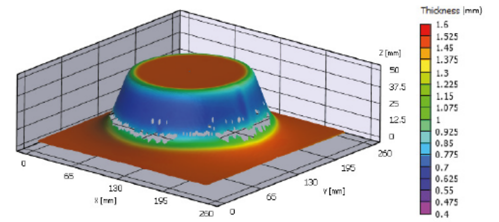


Figure 23. Form 1 - 3D Thickness Model

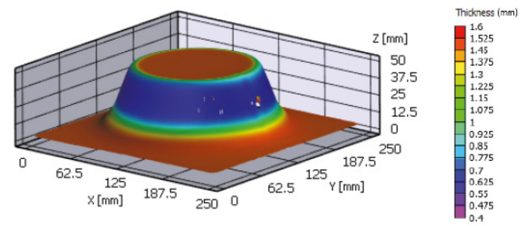


Figure 24. Form 2 - 3D Thickness Model

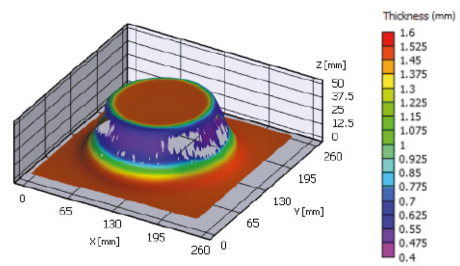


Figure 25. Form 3 - 3D Thickness Model

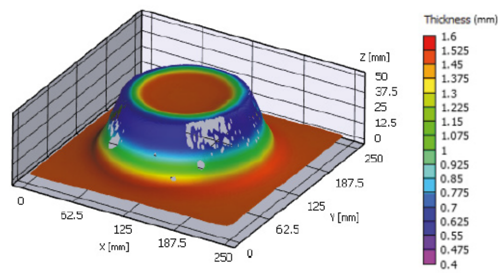


Figure 26. Form 4 - 3D Thickness Model

	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

M. M. Gonzalez et al., “Analysis of Geometric Accuracy and Thickness Reduction in Multistage Incremental Sheet Forming using Digital Image Correlation,” *Procedia Manufacturing*, vol. 34, pp. 950-960, Elsevier B.V., Jun 2019.