VIC-3D IR System

by Correlated Solutions

System Overview

The VIC-3D IR System is a new addition to Correlated Solutions growing DIC product line. The VIC-3D IR System features an infrared (IR) camera that is integrated with the DIC cameras enabling temperature data to be accurately acquired and analyzed with the full-field strain data. The system works by first calibrating the intrinsic optical parameters of the IR camera and then calibrating the position of the IR camera relative to the stereo DIC system. This triangulation allows VIC-3D to place the thermal and strain data into a common coordinate system. The calibration procedure has been streamlined by integrating the IR camera into our VIC-Snap image acquisition software, which allows the user to capture images from the IR and DIC cameras simultaneously. The result is an easy to use turn-key thermal imaging system that utilizes digital image correlation to accurately measure temperature and strain concurrently without any contact with the sample. Thermal and strain data can be viewed, analyzed, and extracted over the entire field or at precise locations.

The system is sold as a turn-key solution which includes all software, hardware, onsite installation, and one year of unlimited technical support and software upgrades giving you piece of mind that your system functions as intended, so you can start acquiring data immediately. This unique thermal integration capability may also be added to any existing VIC-3D system for increased functionality. Call today for a quote.

Features:

- Temperatures up to 2,000C
- Synchronized IR and DIC images
- User-friendly setup and calibration
- Uniquely designed IR calibration targets
- Analog data synchronization
- Extract points, regions, or node locations for FEA validation
- Accurately measure deformation and thermal data concurrently
- Remotely view and acquire images using the Vic-Snap remote
- Measure 3D full-field displacements and strains
- All the features for the VIC-3D system included

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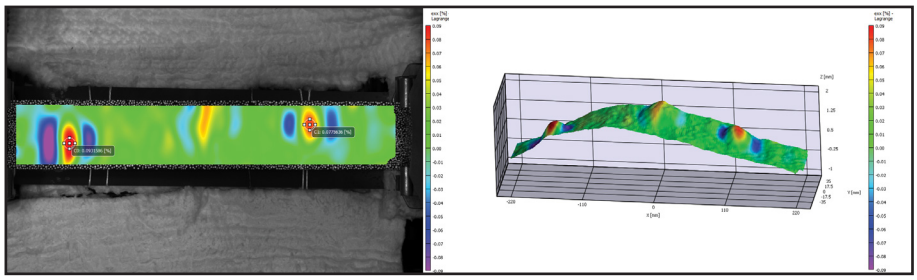
E-glass/Vinyl Ester/Balsa Wood Sandwich Composite

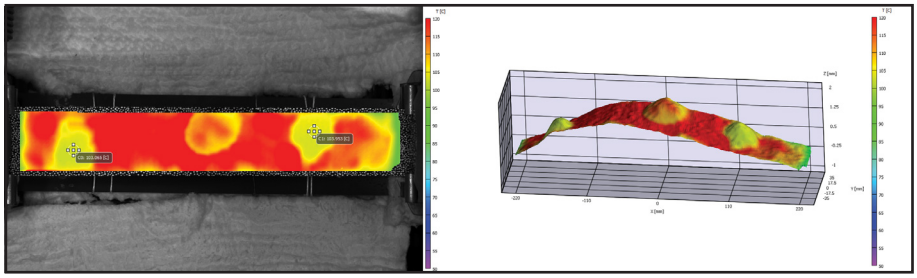
Application Example

Understanding thermo-mechanical behavior of material can be a vital component when designing vehicles and structures that may become exposed to high temperatures. Virginia Tech's Extreme Environments, Robotics, and Materials (ExtReMe) Laboratory focuses on the impact of extreme environments on materials. This includes research that is focused on understanding the thermo-mechanical behavior of materials both during and following fires. Experimental investigations are performed to understand the evolution of the material due to elevated temperature.

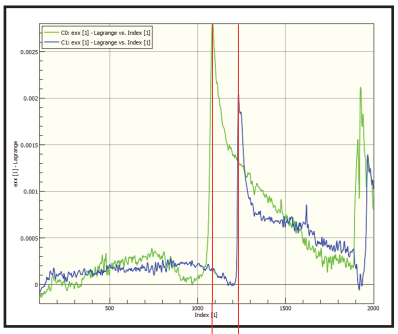
The senior research associates in the lab used the VIC-3D IR system to find the effects of a simultaneous one-sided heating and compressive loading test on an e-glass/vinyl ester/balsa wood sandwich composite sample. As one researcher stated, "The VIC-3D IR system identified several transient events during the compression tests which would not have otherwise been fully understood using either DIC or IRT independently. Through this testing, several features of sandwich composite thermomechanical behavior were elucidated which would not have been possible with traditional point measurements (e.g. strain gages, deflectometers, or thermocouples)."

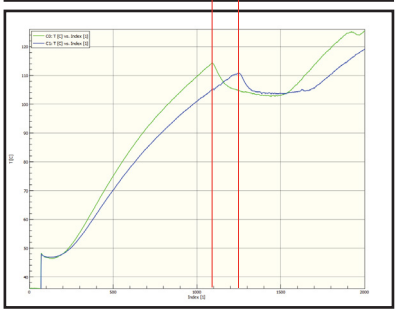


Longitudinal Strain (Exx)



Temperature Data from IR Camera





Strain & Temperature vs. time

The data in the images and graphs above display the strain and temperature data extracted from the two locations C1 and C2. The strains peak during delamination and blistering at the highest temperature and then become smaller as the surface cools.

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