

VIC-3D with *iris* Fatigue & Vibration Synchronization

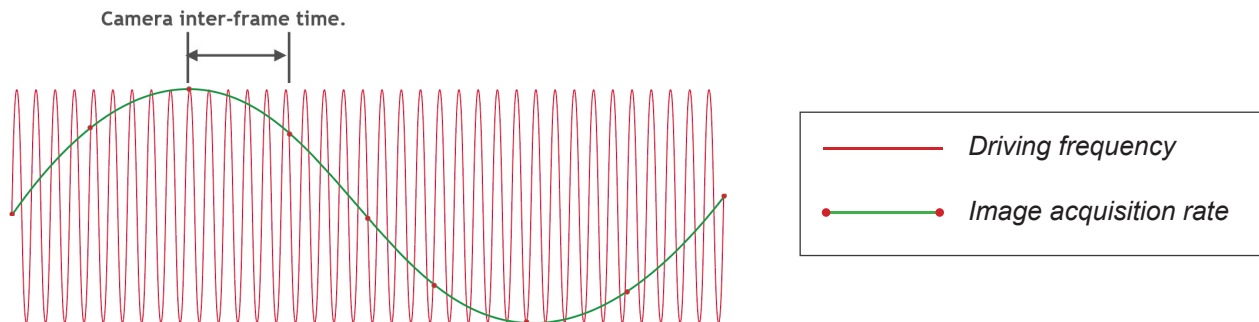
Technology Overview

The VIC-3D System's Fatigue and Vibration Synchronization Module by Correlated Solutions is the ideal measurement solution for fatigue and vibration applications. This module provides an accurate and inexpensive alternative to high-speed cameras and other traditional measurement techniques. The Fatigue and Vibration Synchronization Module can easily measure large & small vibration amplitudes up to test frequencies of 10,000 Hertz.

Background

With this module, low-speed cameras can be precisely triggered to acquire images at arbitrary phase intervals or peaks and valleys from a driving frequency. VIC-3D then analyzes the sequence of images to measure full-field surface shape, deformation, strain, and much more. Data is then displayed across the specimen's surface and can be exported for FEA validation.

Light Source	Frequency Range	Max Frequency
Standard LED	0 - 50 Hz	100 Hz
High-Powered LED	50 - 200 Hz	500 Hz
Stroboscope	200 - 4,000 Hz	10,000 Hz



This module can be purchased either as a turn-key system or as an add-on module to existing VIC-2D or VIC-3D systems. Some ideal application examples are listed below:

- ▶ Fatigue testing
- ▶ Rotating Machinery
- ▶ Tire and wheel testing
- ▶ Engine test stands
- ▶ Crack Growth
- ▶ Crack Tip Opening Displacement
- ▶ Flow-induced vibration
- ▶ Nearly any periodic high-speed event

CASE STUDY

Vibration of Speaker Surrounds

The VIC-3D system's Fatigue and Vibration Synchronization Module was used to successfully measure speaker surrounds during a constant vibration event. Surrounds attach the cone of the speaker to its outer frame and are designed to be pliable enough for the woofer to travel freely, yet strong enough to guide and control cone movement without twisting. They are the part of the speaker most susceptible to mechanical failure, so by measuring the movement and strain of the surround, an optimal design can be produced.

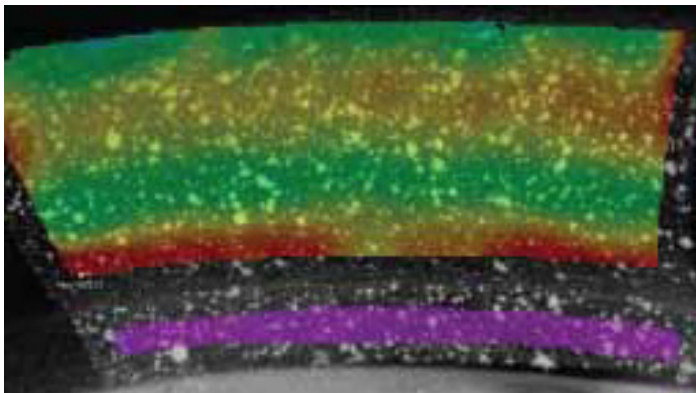


Fatigue and Vibration Synchronization Module

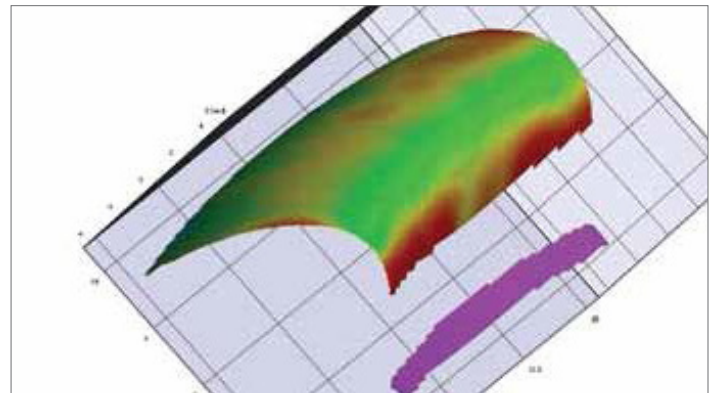
Testing Parameters

The testing parameters included a driving frequency of 30 Hz, a driver voltage of 9.1 Vpp, and a pair of images taken at every 10° of the 360° cycle. There were 37 image pairs recorded of the movement of the speaker surround to help clarify the full-field displacements and strains on the rubber material.

The results showed the maximum out-of-plane displacement for the surround and cone to be 2 mm at 180° and the maximum principal strain on the speaker surround to be 7,675 microstrain at 180°. With this type of data collection, products can be designed with all frequencies analyzed which will lead to more robust designs, fewer failures, and more cost effective merchandise.



2D overlay of major strain at 180°



3D graph of major strain at 180°

Various configurations of the VIC system are available including: high resolution, high speed, infrared capability, microscopy, transient vibration analysis, full-field, real-time, and post-processing software. Contact us today to find out if the Fatigue & Vibration Synchronization System is right for your application!