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The importance of fixture design in vibration testing

Vibration test fixtures are important because they require planning and forethought as one prepares for testing and because of the physical characteristics the end product brings to the test results.

If we first look at why the physical characteristics of a fixture impact test outcomes, the principle component is the transfer of energy from the input through the fixture to the test component. It is only through the fixture that the test input gets to the unit under test. The other factors in the test may be exactly what they need to be (representative sample, vibration input spectrum, controlled tolerance) but if the vibration input does not reach the component or if it does not reach the component where the vibration is seen in application the test is not representative and loses validity perhaps even to the point of an invalid test.

So how do you know if a vibration test fixture is properly representing the vibration the component sees in application? First the fixture should not change the vibration modes of the test unit by changing the mounting locations and / or adding stiffness. Second, the fixture should be as resonance free as is practical so additional resonances are not added to the test. Third, the fixture should not significantly reduce the amount of energy in the control which may result in over or under testing of a test component.

When a fixture design is in development it forces test engineers to think about the objectives of the test component and the appropriateness of mounting, vibration isolation and what / how much of the surrounding carrying environment is reasonable to include or replicate. Additional elements to review as part of the planning process include the determination of the vibration profile or test spectrum and what are the points of critical resonance excitation.

DATASYST is experienced in the design of vibration test fixtures and are available to assist you with your project, contact us at 800-968-4008 to discuss your needs. We serve the clients from our Midwest location with many clients able to drive to witness testing who are located in the Milwaukee &, Madison, Wisconsin, Chicago, Illinois region and Minneapolis/ St. Paul areas.