

# 3 DoF Testing Tidbits.

3 DoF is a quick way of saying 3 Degrees of Freedom. This type of test is having energy in X axis, Y axis, and Z axis at the same time. Some will call it MIMO, or multi axis – multi input., and other will shorten to multi axis testing. This will shorten the overall time of the project and produce energy in vectors possibly needed to bring out modes that single axis testing cannot. Most see the benefit of the shorten time to test. Say we have 100 hours per axis testing in the traditions X-Y-Z single axis testing. This would be 300 hours of total testing. If we use a 3 DoF test, this testing is now down to 100 hours of testing. This is a 66% savings in time. Not to mention the added benefits of axis summing of energy, the ability to control phase and add COH to the testing. This helps to relate the testing to a closer and more realistic test than 1 DoF testing.

Some are seeing the benefits, not just in normal structure, but in electronics. On the circuit boards, this type of testing can help with creating a closer simulation of real world failures. CALCE has demonstrated this and has an article called “Multi Degree of Freedom Vibration Testing Far Superior to Sequential Single Axis Testing in Precipitating Failures in Electronics.” This is a significant idea that both single axis and 3 DoF have their place in testing.

Educators, such as Wayne Tustin, Alen Payne, David Shires, and several others have been teaching, writing and expressing the benefits of MIMO for several years. Some companies are starting to grasp these concepts, and this type of testing is proving beneficial. Until recently, the problem has been these test rigs have not been easily created. With several companies now creating these rigs, the testing in MIMO (3 DoF) will accelerate. Hopefully the sharing of knowledge, and benefits of this testing will soon be passed on, and accepted by the testing community.