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Automotive seat tested for real-world vibrational motion

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# Fitting multi-axis vibration testing into a small laboratory

**H**igh-frequency, multi-axis vibration testing—controlled vibration in all six degrees of freedom—was recently conducted in a small laboratory. While this application focused on the automotive industry, the techniques and equipment are being applied to a variety of test applications.

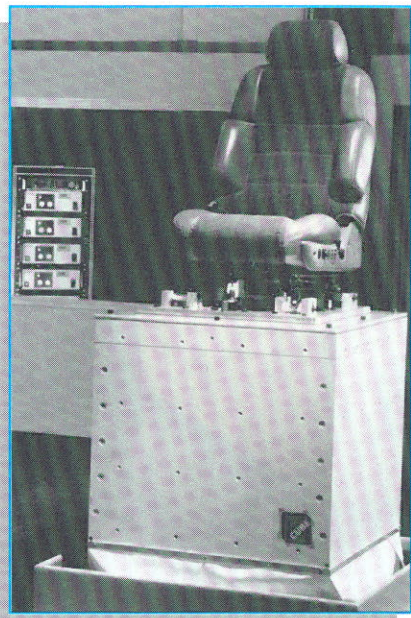
Automotive component suppliers are frequently required to perform testing on their products to meet the increasing quality demands of their customers. This in turn creates multi-axis test requirements for seats, instrument panels, and other automobile components. These requirements present several problems to the component supplier.

Component suppliers usually do not have large test equipment budgets to purchase sophisticated multi-axis test systems. In addition, vibration laboratory areas are often very small. In short, they simply do not have the room for a large multi-axis test system.

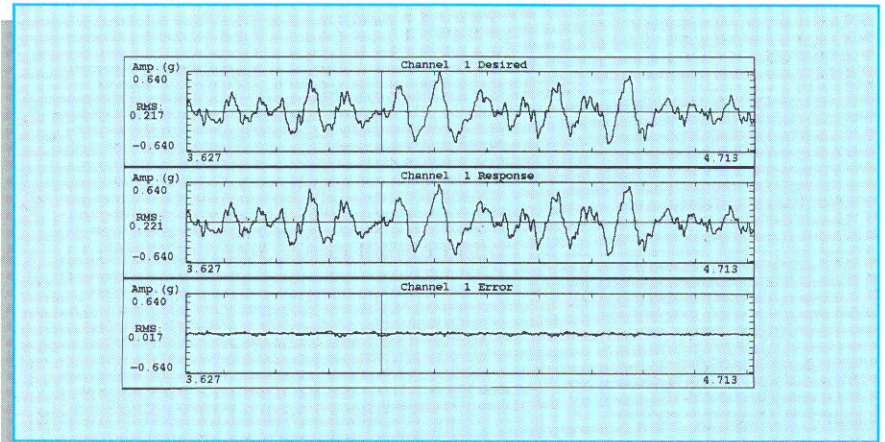
One automobile component supplier recently came face to face with these problems when it was compelled to perform multi-axis testing on its product. With a limited budget—and even more limited space—they set out to find a system to perform multi-axis squeak-and-rattle testing on their product.

## Test requirements

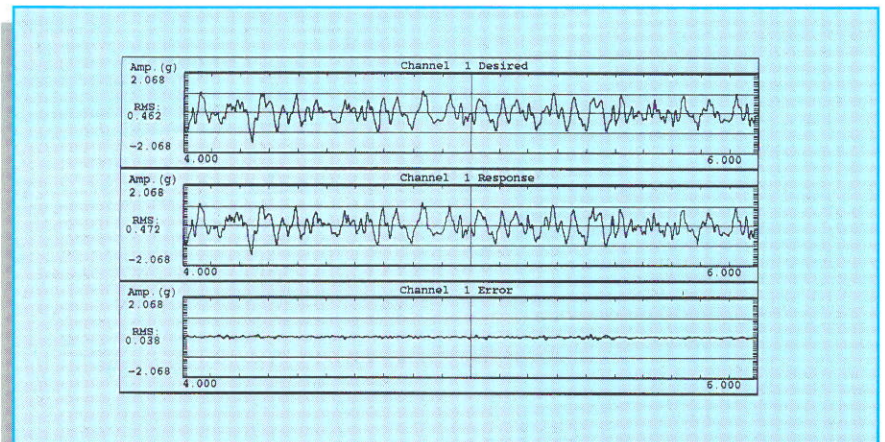
The test requirements were to recreate recorded vehicle motions, in all six degrees



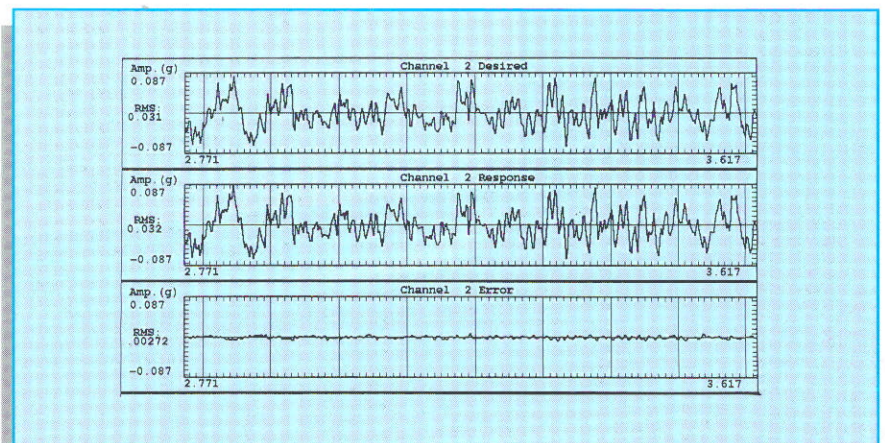
**FIG. 1**—Setup of the CUBE used for evaluation of seat testing capabilities. Note the six accelerometers used to measure the motion of the test system in all six degrees of freedom.



**FIG. 2**—Test results for one axis using mid-size sedan data. From top to bottom the traces are desired motion; CUBE response; and error history.



**FIG. 3**—Test results for a sub-compact coupe. Traces are the same as in Figure 2.



**FIG. 4**—Test results for a luxury sedan. Traces are the same as in Figures 2 and 3.