

mechanical engineering

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SERVOMOTORS SHAKE IT UP

To validate the designs of new products, many manufacturers need to simulate actual operating conditions through vibration and shock testing. Such testing, however, can be expensive. A new vibration tester uses cost-saving electric servomotors to simulate vibration along three axes.

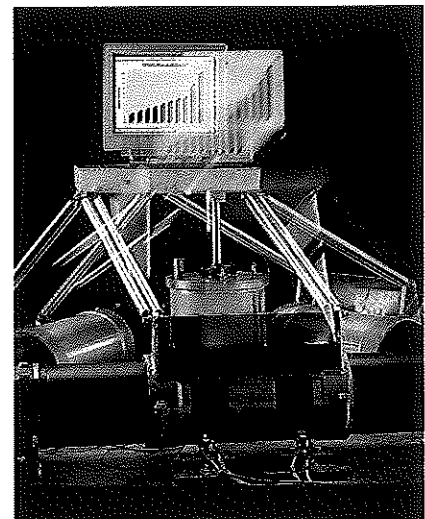
ANCO Engineers Inc in Boulder, Colo., has developed an alternative to servo-hydraulic shake tables. Instead of a hydraulic system, the company combined electric direct-drive servomotors from Parker Hannifin Corp. in Rohnert Park, Calif., with a personal-computer-based control and data-acquisition system, which provides additional testing benefits.

The electric shake tables eliminate or reduce the environmental, safety, maintenance, and power requirements associated with hydraulic systems. However, while a direct-drive servomotor shake table can handle a payload of less than 1 ton and accelerations up to a few g's, anything greater would require a hydraulic system.

Scientific Applications International Corp (SAIC) in Huntsville, Ala., which acquired one of the company's shake tables last year, subjects nuclear power products to a series of acceptance tests to verify that they will perform as intended in a power plant. One procedure determines the test product's behavior during an earthquake, which can be done through either analysis or direct testing. Many seismic-sensitive products require shake-table simulation, where the equipment vibrates in the three rectilinear directions simultaneously.

SAIC's job is to create statistically independent motions in the three directions. This motion is intended to subject equipment to a predictable event, based on the dynamic environment that a piece of equipment could experience in the plant.

The company reported that the servomotor system is better able to envelop the required seismic response spectrum. With a hydraulic system, testing personnel would have to induce excessive high-frequency components or low-frequency operations



ANCO's shake table uses direct-drive servomotors and a PC-based control system to simulate an earthquake in a nuclear power plant.

to achieve acceptable response at mid-level frequencies, which can lead to an overtest condition. "We're finding that with the servomotor simulation, we get good frequency content and good control of that content, without having the higher acceleration levels at low or higher frequencies," said Johnny Jenkins, division manager at SAIC's test facility.

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