

Elastomeric Bearing Test System

Multi-Axial Tests on Elastomer Bearings

Elastomeric bearings can be subjected to a wide range of multi axial inputs. Characterizing them, or running fatigue tests on them require very sophisticated systems. In this seven channel example, the system was configured to input axial load, with beam-wise and cord-wise cocking, beam-wise and cord-wise shear, and axial torque. The challenge with this system was to be able to accurately control beam-wise and cord-wise shear forces to a fraction of a pound, while applying tens of thousands of pounds axially. This was accomplished using a hydrostatic pad to support a delta fixture for the three shear actuators and their load cells. The pad bearing was deigned to react the axial load, plus the overturning moments generated by the

rotation inputs. A separate gimbal mount was used above the specimen for the cocking rotary actuators with angular displacement sensors. An axial torsion actuator package was installed in the base for the other two inputs. The integrated control system is able to resolve all the forces angles and displacements into their constituent inputs to the specimen. Two systems were built with similar specifications. One was designed to run at low frequency for characterization, the other at 22Hz for fatigue testing.



Features for this example

- Very high static loads combined with very small oscillatory inputs
- Axial Load 23,000 lb (100 kN) static, ± 535 lb (2.4 kN) dynamic.
- Beam shear 457 lbs (2 kN) static, ± 608 lb (2.7 kN) dynamic
- Cord shear 533 lbs (2.4 kN) static, ± 180 lb (0.8 kN) dynamic
- Axial windup 12.37° static, $\pm 2.92^\circ$ dynamic
- Axial torque 30,000 inlb (3,400 N-m) peak
- Beam cocking 1.63° static, $\pm 5.05^\circ$ dynamic
- Beam cocking torque 1,900 inlb (214 Nm) peak
- Cord cocking 0.82° static, $\pm 0.42^\circ$ dynamic
- Cord cocking torque 7,000 inlb (791 Nm) peak

