Seismic Upgrade of Boeing Commercial Airplane Factory Everett, Washington, USA

Inside View of A Typical Bay

The mammoth Boeing plant, which could contain Disneyland under one roof, is the world's largest building in volume. It was built in phases from 1968-1991, for the assembly of wide-bodied 747 jetliners – world's largest commercial airplane. The steel frame building is 120 feet high with clear spans of 350 feet and covers more than 98 acres.

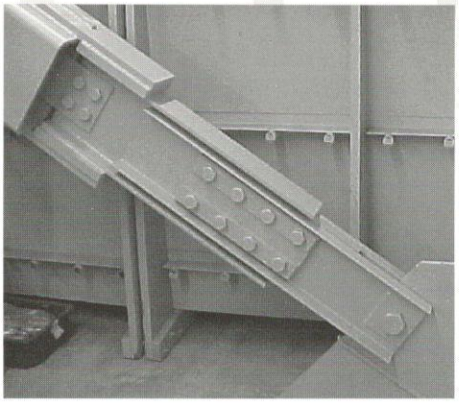
In 1996, the Boeing engineers considered several seismic upgrade schemes for this structure. They chose Pall friction-dampers because they are foolproof in construction and, offer reliable and maintenance free performance at low cost. The performance of friction-dampers is independent of velocity, therefore the forces on the connections remain constant for any future earthquake. Economy in the design of connections and easy installation of dampers provided significant savings in construction cost and time.

Several types of Pall friction-dampers suitably modified to adapt to site conditions, were incorporated in different types of existing bracing.

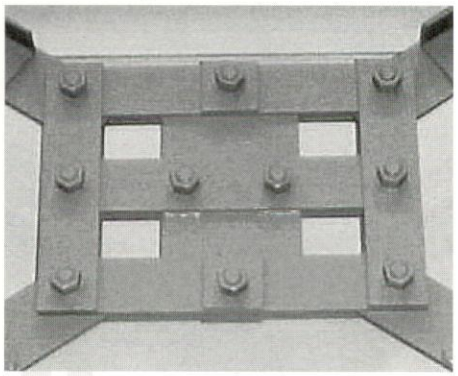
Friction-dampers of capacity up to 200,000 lbs. and stroke up to 15 inch have been used. Pall friction-dampers met or exceeded Boeing's stringent specifications. Work on seismic upgrade was undertaken in 1998.

In-Line Pall Friction-Damper
Slip Load 200,000 lbs, Stroke 12"

In-Line Pall Friction-Damper in Existing Bracing



Pall Friction-Damper in Existing Cross Bracing



Cost of Retrofit: US$65 million
Saving: US$30 million