Development of New Alloy-Steel Seismic Damper with Superior Fatigue-Resistance

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Currently, the performance required for the response control devices increases dramatically and durability to cyclic deformation becomes essential. Viscous dampers and oil dampers with high durability have become major countermeasure technologies against long-period, long-duration seismic motion of buildings.

Meanwhile, low-yield-point steel dampers have outstanding cost performance, large load capacity and high rigidity, so they have been most widely used and indispensable particularly for economical vibration control structure. However, in a case where insufficient durability due to metal fatigue is concerned, the conventional low-yield-point steel dampers have been difficult to be countermeasure technologies against long-period, long-duration seismic motion of buildings.

With this background, in order to greatly improve the performance of steel dampers, we created a new metallic response control damper that can be used as the world's first countermeasure technology for long-period, long-duration seismic motion, using a fatigue-resistant Fe-15Mn-4Si-10Cr-8Ni alloy with ten times the low-cycle fatigue life of conventional low-yield-point steel. In 2014, sixteen seismic dampers using this alloy were installed in a 196-metre super high rise building, "JP Tower Nagoya".

By applying the new fatigue-resistant alloy seismic dampers in these places, it was possible to achieve an extra high-grade vibration control building with a high margin of safety ratio even against long-period, long-duration seismic motion and repeated after quakes.