

# Development of Large Tuned Mass Damper for Seismic Upgrading of High-rise Building

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Since the Great East Japan Earthquake of 2011, the necessity of the reinforcement to the existing high-rise buildings as a countermeasure against a long-period earthquake ground motion has been commonly recognized. Seismic upgrading using a TMD has the advantages that the construction points are limited to the roof floor, and the influence on the building users is minimized. However, it had not been realized so far because it was difficult to design the mechanism that supports heavy weight and allows long stroke under large earthquake.

In this TMD, following two methods were employed to resolve above problems.

## 1. Sufficient mass ratio and stably supporting system

To realize enough control performance, This TMD was designed with sufficiently heavy weights (1800 ton) supported by strong cables.

## 2. Oil damper with stroke control system

To prevent an excessive displacement under unexpected earthquakes, newly developed oil dampers were employed. They increase damping force automatically when the velocity of the weight exceeds the target velocity.

This TMD is effective against wide range vibration, therefore it is valid for not only seismic upgrading but also habitability improvement, and it has a capability as a part of the attractive renewal technology of existing high-rise buildings in future.