Earthquake Damage Control

CONSTRUCTION: A brilliant invention sucks the earthquake’s power out of buildings being shaken by tremors and converts the motion energy into heat – exactly like when a car brakes.

It is all about converting kinetic energy to heat. Transforming destructive energy into harmless oscillation. Enabling people to survive instead of risking them being buried under tons of collapsed masonry.

It is earthquake damage control.

In one of the few parts of the world that rarely if ever experience any of the half million earthquakes which happen every year, a small Danish company called Damptech has developed the most efficient – and certainly the cheapest – system for protecting houses, bridges and roads against the devastating effects of earthquakes.

“The principle is very simple,” says the inventor, Imad Mualla, an Iraqi engineer who is now a Danish citizen. “When a car brakes, the pads are pressed against the disks. The resultant friction transforms kinetic energy – the energy of motion – into heat. My invention, which was conceived during my PhD studies at the Technical University of Denmark, builds on transforming the motion energy of an earthquake’s impact on a building into heat. It dampens the movement, burns off the energy so to speak, so that the building survives the shock.”

The friction damper device consists in its simplest form of three steel plates held by a single bolt. Between each set of plates there is a “brake disk” made from a special composite material. Depending on the required degree of damping the bolt is tightened accordingly. The middle plate is secured to the external wall’s bearing beam while the two outer plates are secured to the building’s columns with cross-braces. When the wall starts to sway or vibrate, the movement is absorbed by the friction material and is dramatically reduced.

It sounds simple, but a great deal of development work, modelling and testing lie behind Imad Mualla’s device. The results were so convincing that among the first to invest in Damptech’s friction damper devices were Japan’s most respected and valuable temples, all centuries old. The system has been placed discreetly in between the ground and floor level, where they will greatly reduce the risk of destruction of the temples should earthquakes occur.

The friction damper device has been through the world’s toughest test, which takes place at the Technical University of Taipei in Taiwan. The university houses one of the world’s largest shaking tables, where the system has been tested on a construction which corresponds to a three storey house. The shaking table can simulate many of the biggest earthquakes in history. Regardless of the rating on the Richter scale, any earthquake rarely lasts more than a minute. In Taipei the friction damper device from Damptech was continuously exposed to 14 of the worst known earthquakes. The results were amazing. The construction was not only undamaged, but the damper devices could be used again and again with only minor adjustments.

Damptech is currently busy producing friction damper devices for a large delivery to South Korea. Even though the country is not immediately threatened by earthquakes, it has been decided that the country’s 32 large power stations must be safeguarded in the best possible way. Several other customers are also interested in Imad Mualla’s invention for projects in Taiwan, India, Greece, Japan, Serbia and Turkey.

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