

BEARING THE BRUNT OF EARTHQUAKES

Earthquake Protection Systems is using giant bearings to make buildings more resilient to earthquake damage.

Alex Cannella, News Editor

According to a FEMA study back in 2000, America suffers \$4.4 billion in losses due to earthquakes every year. While that's a drop in the bucket for our \$16 trillion plus GDP, it's still a substantial amount of money, and some people are working to lessen those losses. One group is Earthquake Protection Systems (EPS), a company that is designing bearings to better protect buildings from earthquake damage.

According to EPS Vice President, Dr. Anoop Mokha, standard building regulations are inherently flawed, as they insist that a building be capable of remaining standing during an earthquake, but say little about what state the building needs to be in beyond that. This means that while we've gotten pretty good at making sure buildings don't collapse and hurt people during earthquakes, there's still a high number of buildings that are being crippled and rendered derelict by them. As an example, Mokha pointed to an earthquake that happened in New Zealand in 2010. Only two buildings collapsed during the quake, but the event still left 70 percent of affected buildings so badly damaged that they had to be torn down.



Ever since the company first opened its doors in 1985, EPS has been working to reverse that trend with a product they call a friction pendulum bearing, which is designed to not only keep buildings standing after an earthquake, but to keep them operable and livable.

"What we are doing is allowing engineers and owners to have sustainable structures they can walk in after an earthquake, and they have no damage," Mokha said.

The bearings are designed to absorb excess energy when the force of an earthquake exceeds a building's acceptable horizontal load and safely dissipate it in the form of motion. This means that when an earthquake's force would otherwise



damage a building, the bearings allow the building's foundation to physically move back and forth like a pendulum, finding an outlet to expend otherwise damaging levels of force.

EPS's newest product, the Triple Pendulum Bearing, takes it a step further, with three different bearings in a single product all designed to resist different magnitudes of earthquakes. The bearings activate sequentially, so that only one bearing is active at any given time, but each bearing is ideally suited to different magnitude earthquakes, and when one bearing's ability to resist the earthquake is overloaded, the next bearing immediately takes over.

"If the earthquake is weak, the bearing is weak," Mokha said. "If the earthquake gets stronger, the bearing gets stronger."

According to Mokha, products like the Triple Pendulum Bearing are fairly standard in Japan, where earthquakes are a constant hazard, but are still only just catching on worldwide as an effective countermeasure for earthquakes. Mokha estimates that previously, only about 10 percent of buildings in the U.S. used a pendulum bearing or equivalent product, but that in recent years, that number may have risen as high as 15 or 20 percent and is still growing.

"What Elon Musk did with the electric car in the automotive industry, and now everyone is realizing the benefits...I believe we have crossed that threshold now, where people are realizing the benefits," Mokha said.

EPS' bearings protect over \$20 billion worth of construction today and are installed in 30 countries. They are present in high-profile buildings such as the San Francisco Airport Terminal, the Cathedral of Christ the Light in Oakland, Calif. and Pasadena's city hall and are used in many infrastructure projects such as bridges and viaducts. **PTE**

For more information:

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