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Purpose of Research

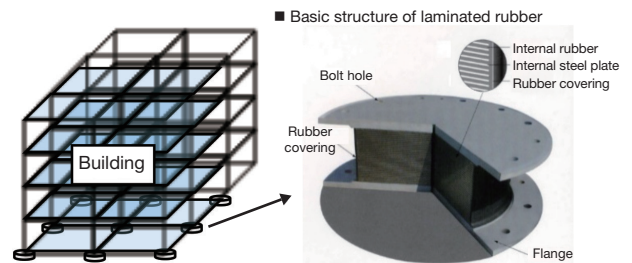
We conduct research on seismic isolated structures that are effective against the risk of earthquake.

Problems with existing seismic isolators

- Laminated rubber with metal plugs: Negative effects of lead on humans and the environment
- High-damping rubber: Needed to be replaced due to the mislabeling incident

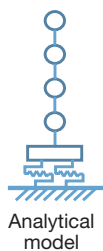
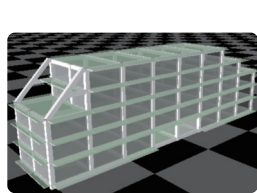
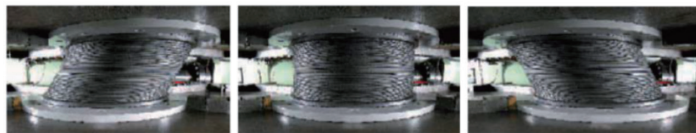
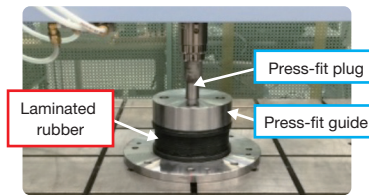
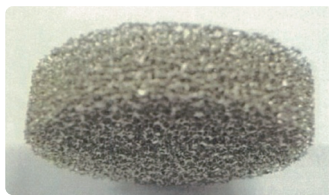
Research conducted in our laboratory

- (1) Development of laminated rubber with the use of plugs made of materials that are not toxic to humans or the environment, and can be manufactured and discarded at low cost
- (2) Research on structural safety when laminated rubber is replaced



Summary of Research

(1) Development of laminated rubber with foam metal used as a plug



Primary characteristic period (seconds) by eigenvalue analysis

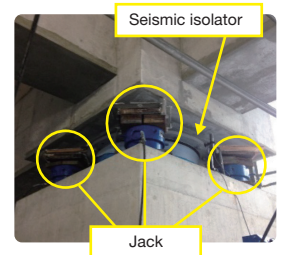
Laminated rubber	Longitudinal direction
eRB	2.71
LRB	3.21
HDR	4.36
SnRB	2.91
Foam metal and silicone rubber	3.15
Only foam metal	3.42

(White: Manufactured product, Yellow: Developed product)

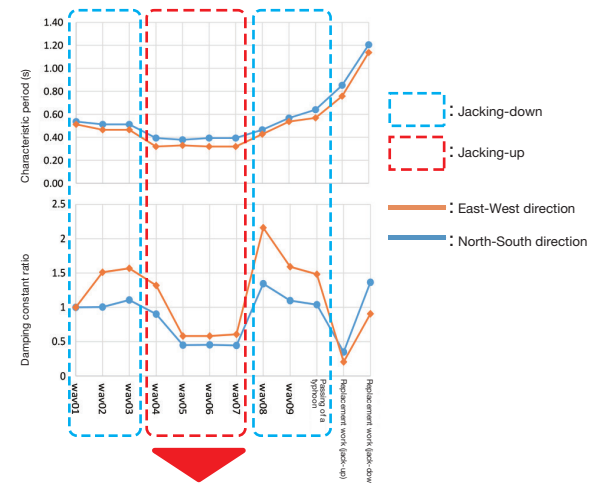
- The effect of seismic isolation of the developed product was confirmed.
- The damping function of the developed product was unsatisfactory.
- It is necessary to reconsider using nickel chrome and silicone rubber.

(2) Structural characteristics when replacing laminated rubber

When we replaced the laminated rubber, we measured the microtremors while the building was being jacked up and jacked down.



We evaluated the natural period and the damping constant through frequency analysis of the measurements.



During jacking-up,

- (1) the natural period gets shorter and the rigidity gets larger, and
- (2) the damping constant gets smaller.

Future Developments

Improving the performance of plugs for practical use