



## **SMART FRICTION PENDULUM SYSTEM**

ID# 2022041

### **HIGHLIGHTS**

- Improves on the recovery capability of current friction pendulum systems
- Increases energy dissipation capacity

### **OPPORTUNITY**

A research team from the University of Alberta has developed a novel Friction Pendulum System (FPS) design that incorporates Shape Memory Alloy (SMA) elements in such a way to improve on the device's recentering ability, as well as reduce the separation of FPS elements when experiencing vertical seismic loads. By integrating SMA elements, this Smart FPS design improves on the energy dissipation capacity of conventional FPS designs, and also features a specialized technique to apply pre-stress to the SMA elements, eliminating the permanent deformation that can result from degradation of the SMA under dynamic loads. These features improve on the overall recovery capability of current FPS designs, further reducing the damage to buildings that experience seismic events.

The Smart FPS has been designed for use in steel, concrete, and timber buildings, particularly high-rises, to maintain their stability and serviceability when experiencing ground motion having different intensities, frequency content, and magnitudes. It can be easily integrated into building foundations without the need to change structural elements.

### **COMPETITIVE ADVANTAGE**

- Smart FPS enhances the dynamic behavior of structures as it is installed, reducing the permanent deformations and drifts caused by applied seismic loads by providing enhanced energy dissipation capacity, damping, and re-centering of structures.
- SMAs provide exceptional recovery capability after deformation, and can recover their initial shape after experiencing large deformations of up to 14% of their initial length.
- More resistant to 3D ground motion, and prevents vertical separation of FPS elements

### **STATUS**

- Patent Pending; [WO2023108301A1](#)

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### **MORE INFORMATION**

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