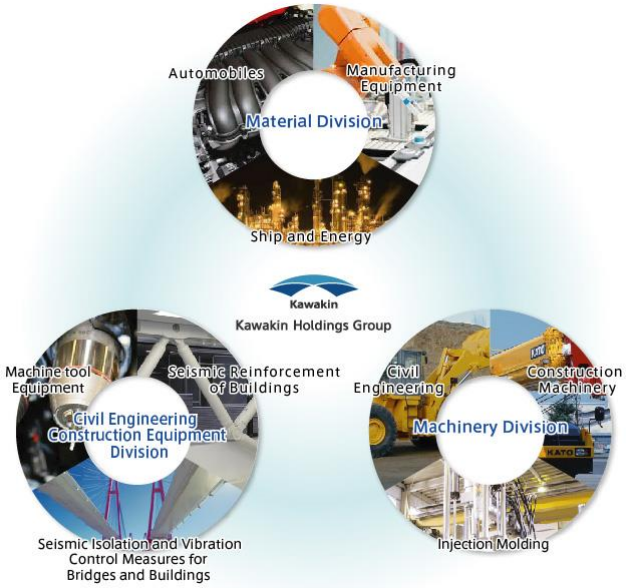
DYNAMIC ISOLATION SYSTEMS

Introduction to DIS

Since 1982

Kawakin – Our Parent Company

Kawakin Holdings Co., Ltd., is a holding company established through the reorganization of Kawaguchi Metal Industries Co., Ltd. The Group companies manufactures and sells fabricated steel products used for machinery and construction work. The main products include cylinders and structural metal products for bridges.



DIS is one of the 17 companies of the "Civil Engineering Construction Equipment Division"

DIS Company Overview

Mission: To partner and deliver the highest quality seismic protection solutions

Vision: Eliminating seismic threats to lives and communities worldwide

- For over 40 years, DIS has been the leading designer and manufacturer of seismic protection systems.
- Markets include; Transportation, Data Centers, Health Care, Wharves, Defense, Bridges, Energy, Hydro Electric, Tall and Historic Buildings, etc.
- Over 27,500 LRBs installed in over 600 projects in 22 countries. (as of 2024 Sep)
- Developed several new product lines since 2006

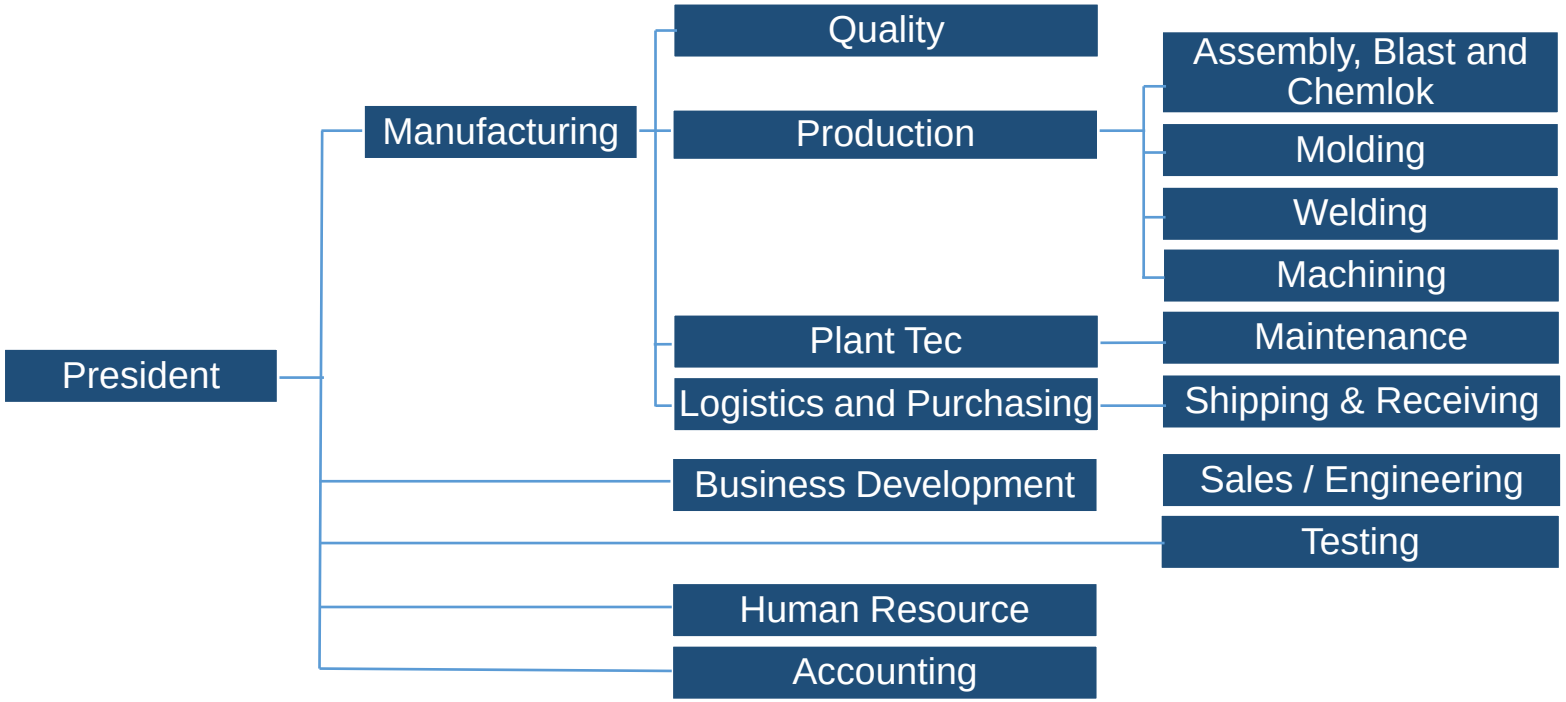
Corporate Data

Company Name	Dynamic Isolation Systems, Inc.
Established	1982
CEO **President**	Shinkichi Suzuki Masaya Ietomi
Head Office	885 Denmark Drive, Suite 101, McCarran, NV 89437
Employees	33
TEL	+1 775.359.3333
Parent company	Kawakin Holdings
Website	http://www.dis-inc.com/

Dynamic Isolation System Organization

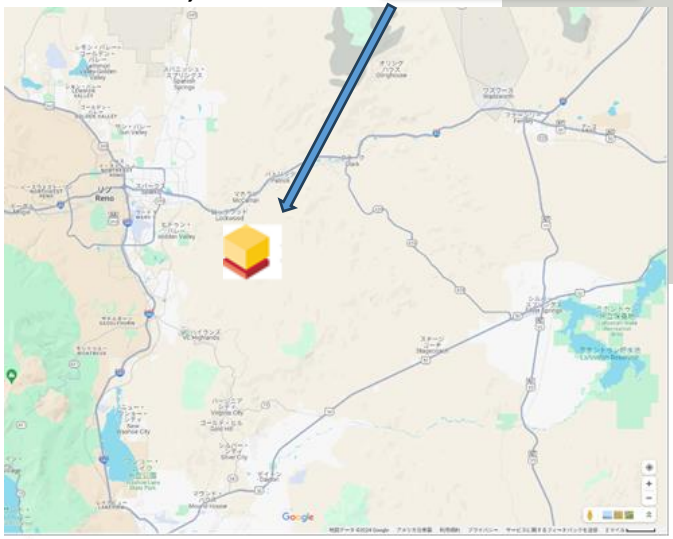
as of current

Mission:
To partner and deliver the highest quality seismic protection solutions
Vision:
Eliminating seismic threats to lives and communities worldwide



DIS location and Global Presence

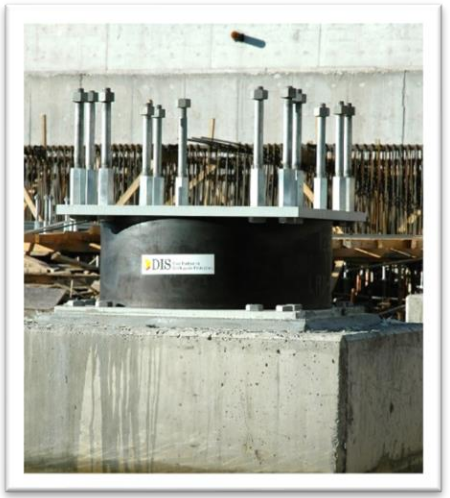
Nevada, USA



Supplying 600 projects in 22 countries

Engineering Capabilities

- Track record of saving costs on design and materials through value engineering
- Provide engineering support from feasibility analysis, planning to full design of seismic isolation systems.
- DIS uses Equivalent Lateral Force Analysis (ELF) for preliminary isolation system design
- DIS provides properties of the isolation system for further analysis by the designer.

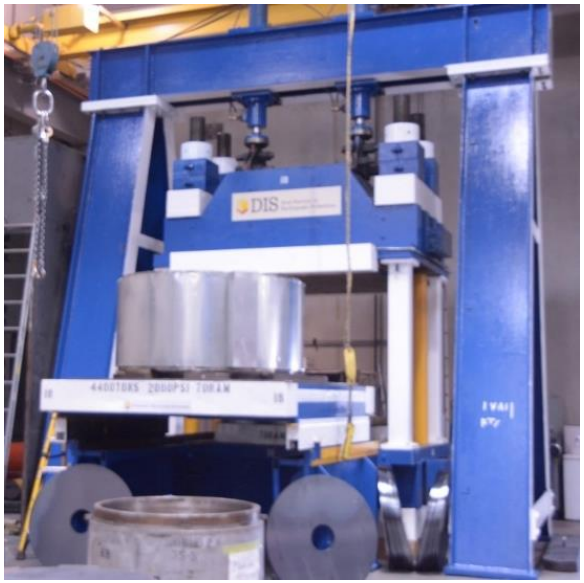


Testing Capabilities

- Custom designed and built test rigs to 3200/700 tons Axial/Shear Force
- Up to a maximum displacement of 750 mm
- At a velocity of 25 mm/sec
- Facilitates customer observation during testing or third-party accredited observer

Manufacturing Capabilities

- All manufacturing is completed in-house, DIS does not outsource.
- Produce Lead Rubber Bearings between 200mm up to 1550mm in diameter
- Extensive CNC machining capabilities
- On-time and on-spec delivery of projects requiring 2,000+ LRB's
- We have manufactured over 27,500 isolators and delivered them to 22 countries throughout the world.
- DIS is well recognized for quality and performance.

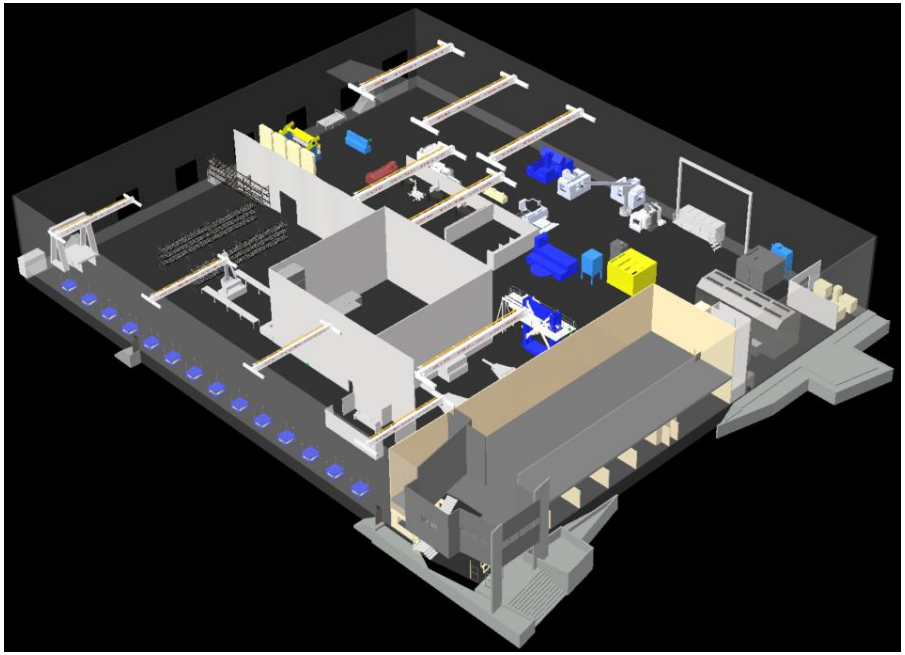


Product Testing Achievements

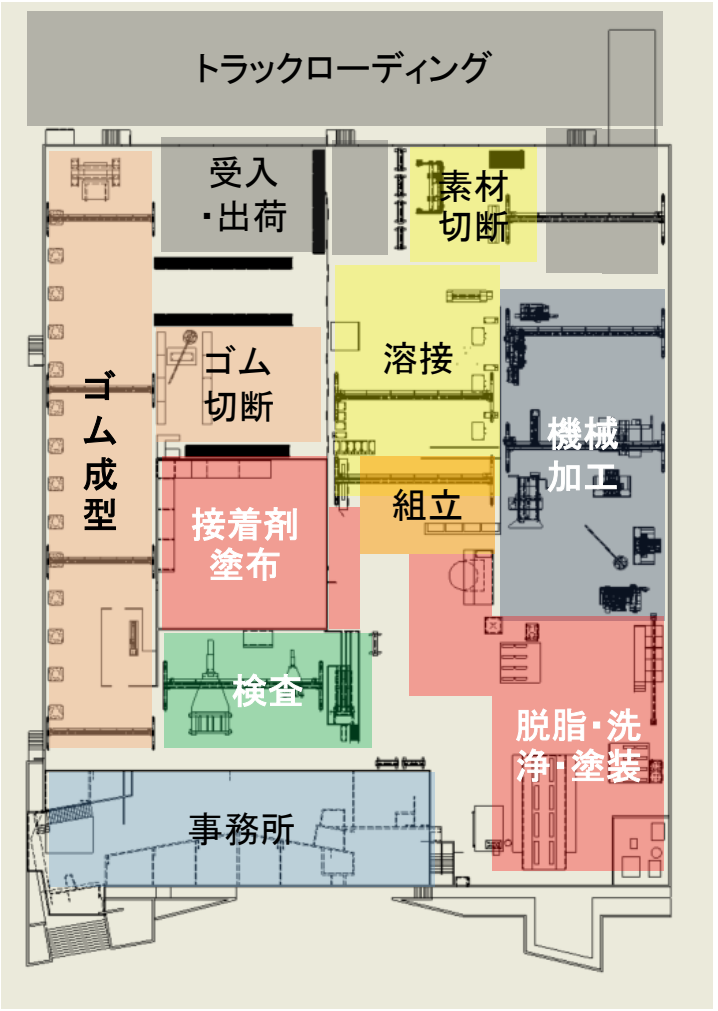
Testing for LRB's and VWD's

- Up to a maximum displacement of 1200 mm.
- Under a vertical load of 40,000 kN.
- At a high velocity of 1.5 m/sec.
- At a low velocity of 0.5 inch/hour
- Large isolators (800 mm to 1300 mm dia.) in excess of 400% shear strain.

DIS Plant information



工場全体スペース　61,800 square feet
(5,741.41㎡）



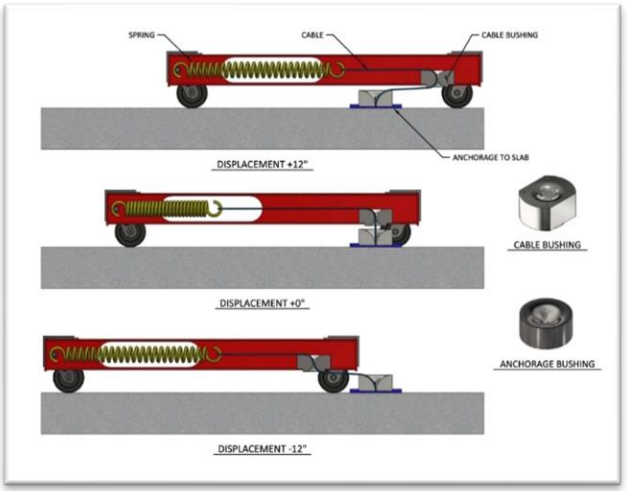
DIS Products & Applications information

DIS Products:

1. Lead Rubber Bearings (LRBs)
2. Non-structural/Low-mass Isolation
3. Viscous Wall Dampers (VWD)

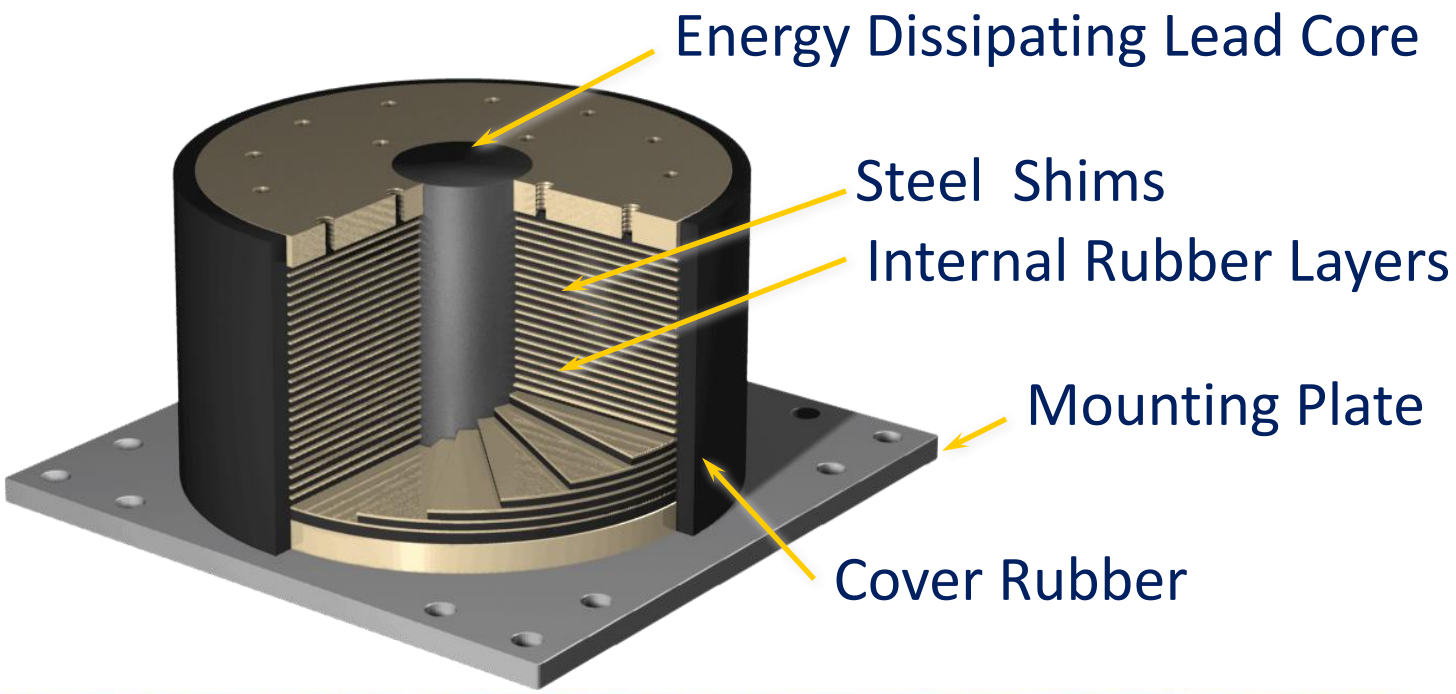
Applications:

- ✓ Buildings
- ✓ Bridges
- ✓ Hospitals
- ✓ Wharfs
- ✓ Data Centers
- ✓ New Construction and Retrofits
- ✓ ……

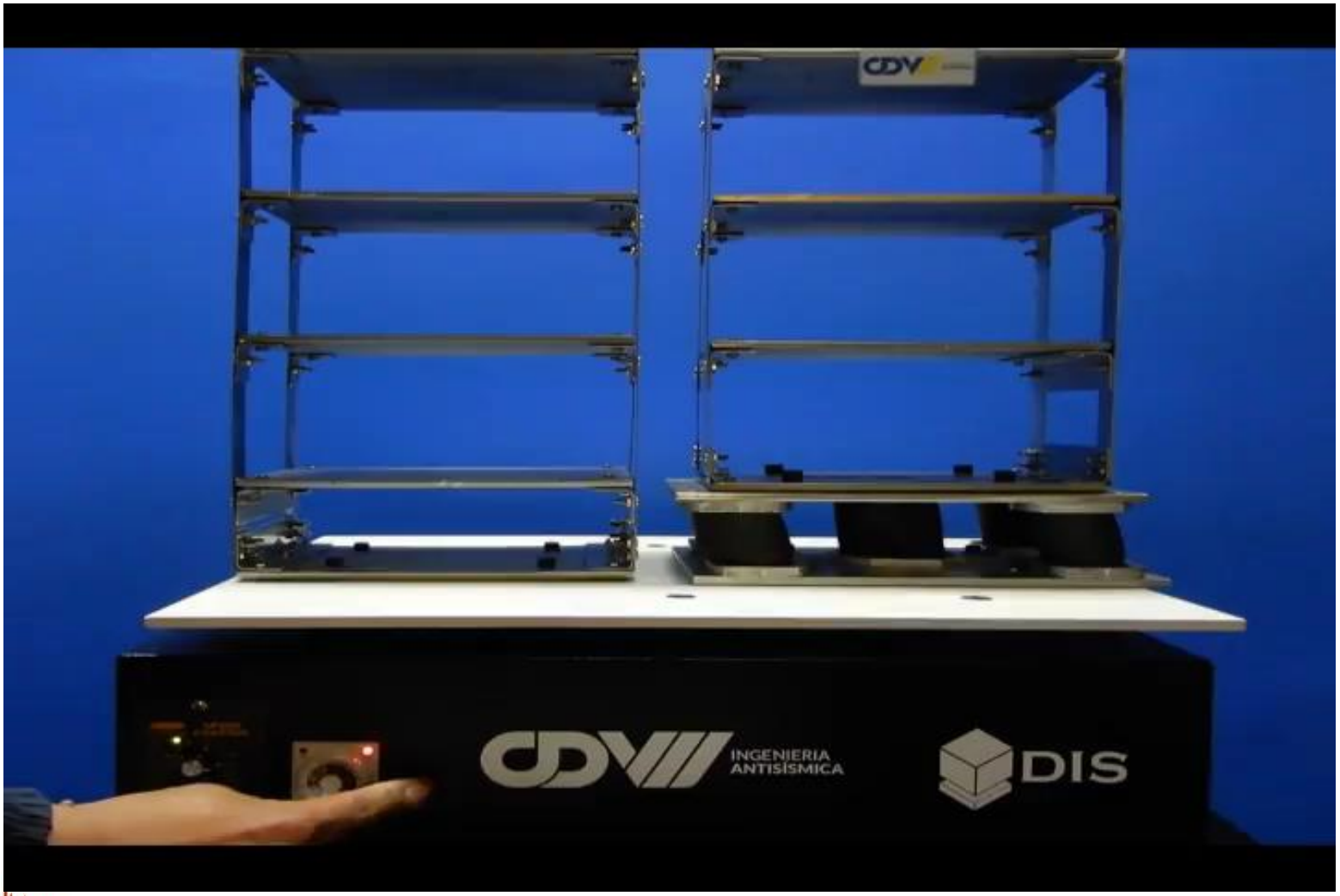


1. Lead Rubber Bearing

- Bearing Diameters up to 60”
- Lead Core Diameters to 15”
- Rubber Moduli 55-120 psi
- Capacities to 4400 tons

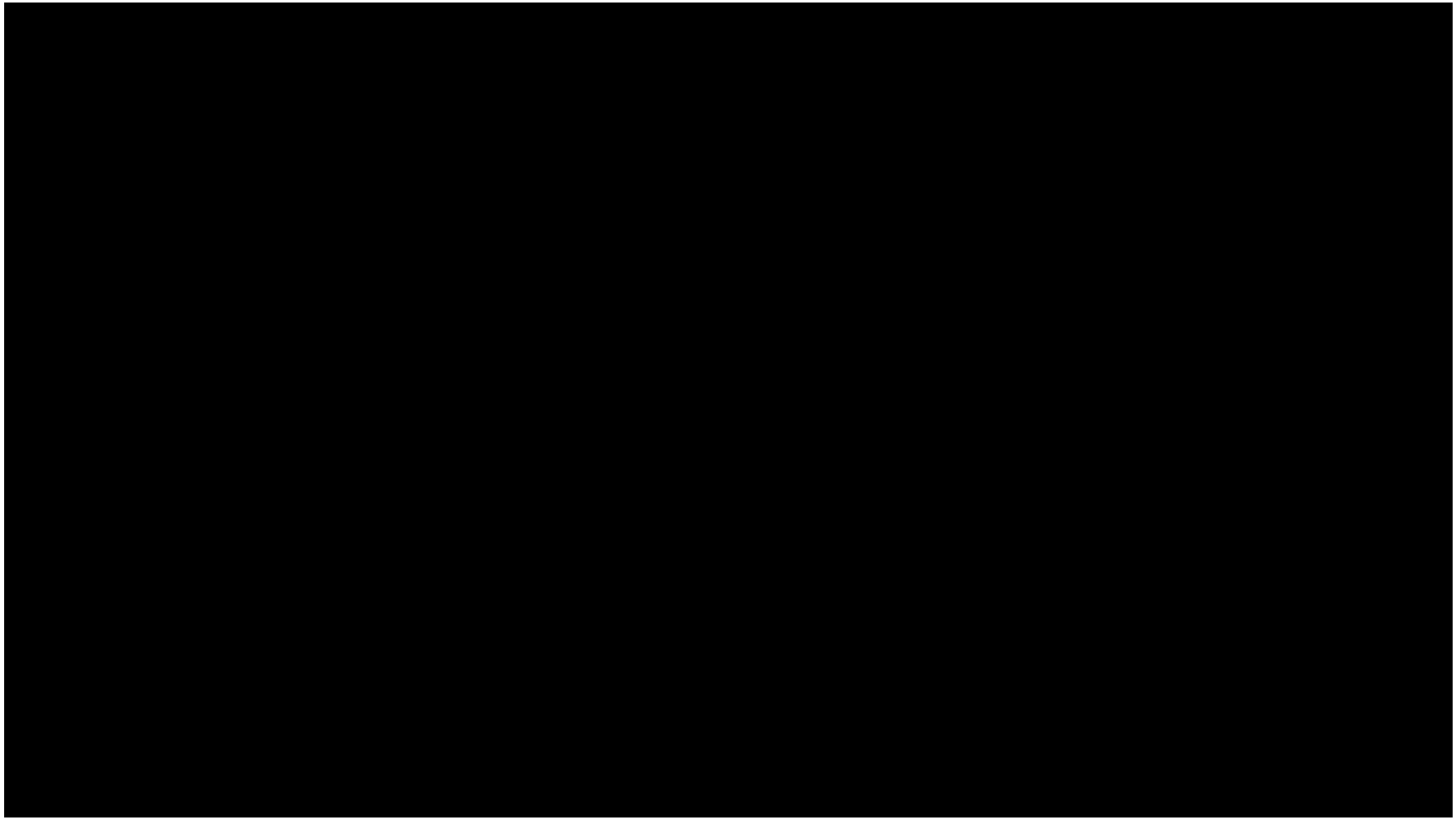


Why Isolate?



Performance in the Real World

Noto Earthquake in Japan
(M7.5)
January 1, 2024



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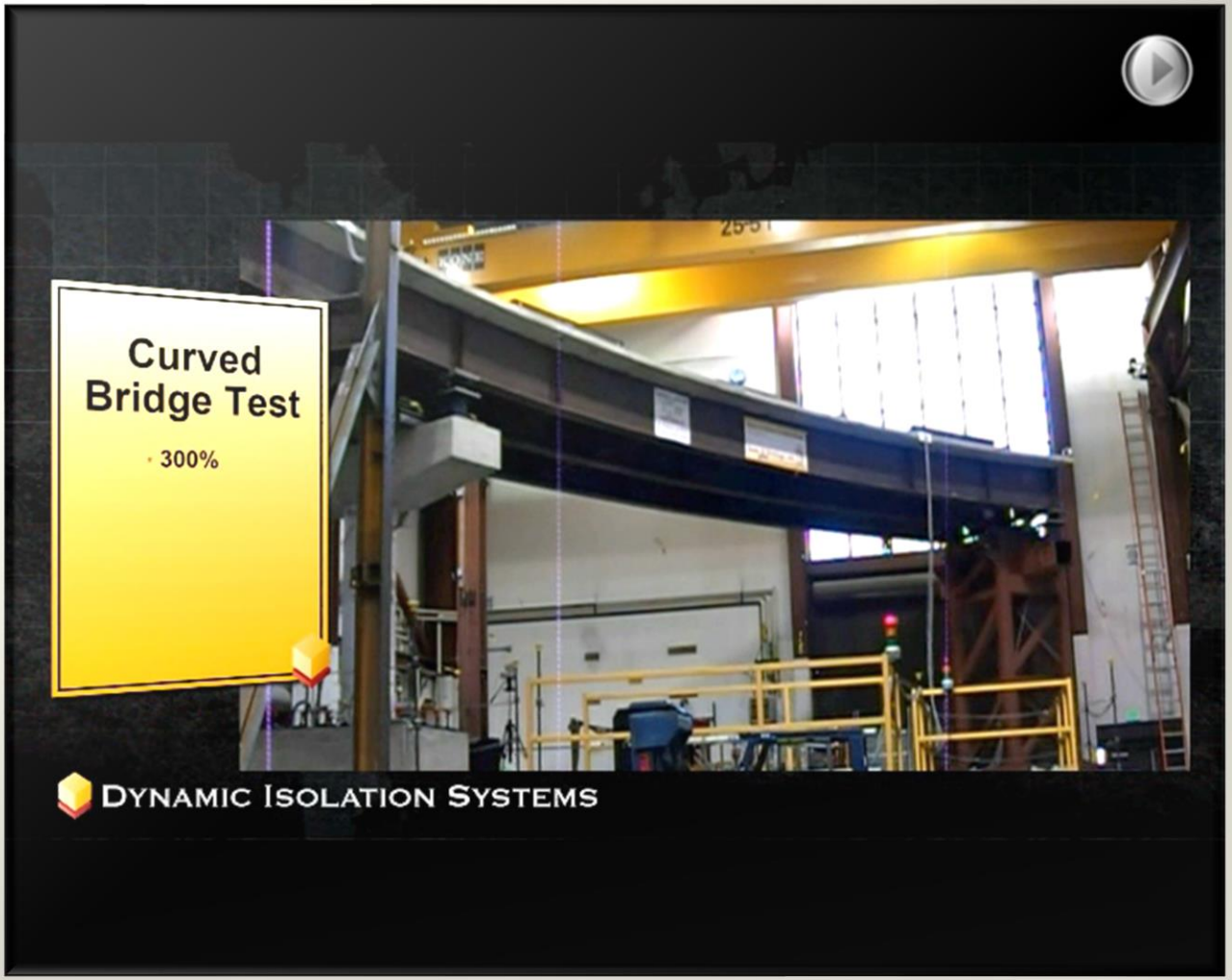


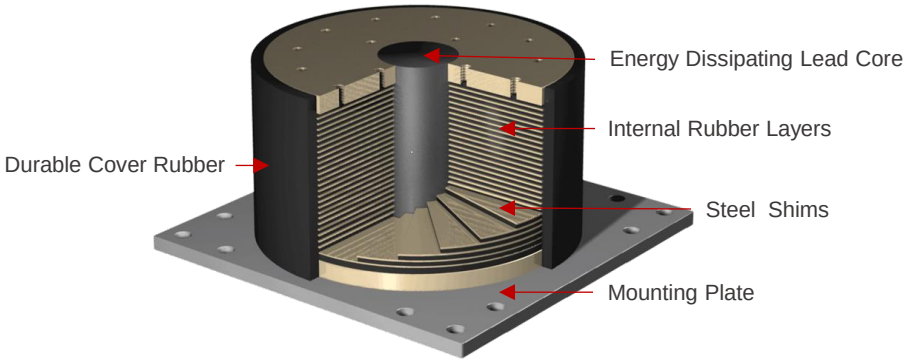
Why Isolate?


UC SAN DIEGO
CALTRANS SRMD
TEST FACILITY
DIS
MANAWATŪ
TYPE LRB A
BRG NO 26747
TEST NO I4A 5
1 SEP 2021

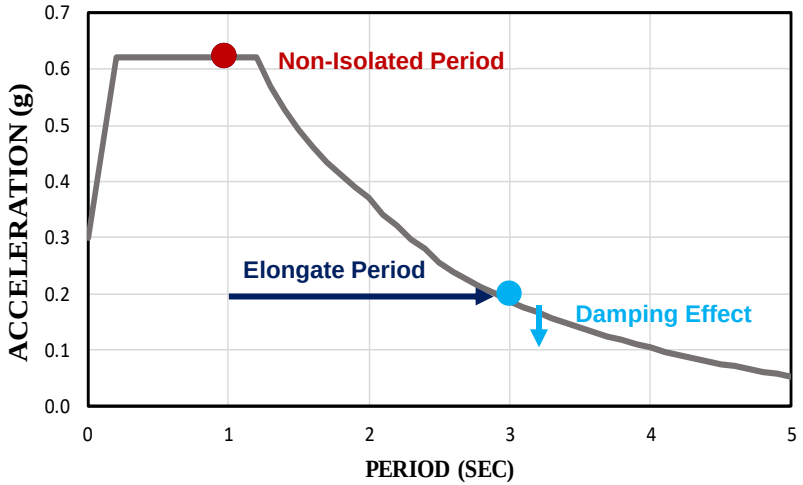
Main Functions

- Vertical load support
- Horizontal load support
- Displacement accommodation

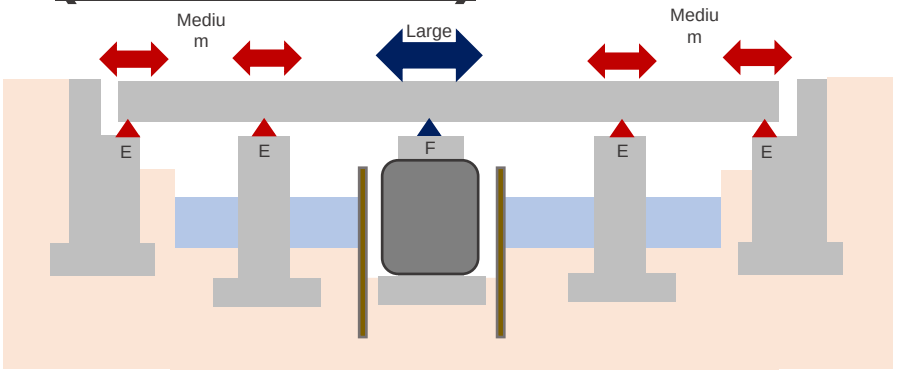
  (expansion and contraction and rotation)

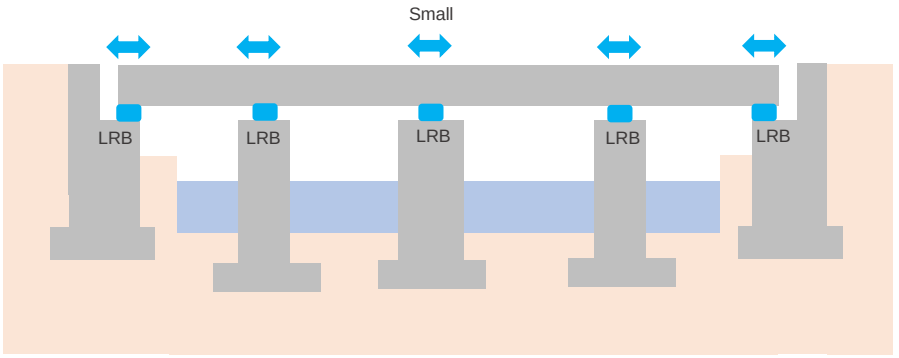


- **Isolation effect** (to reduce seismic force by elongating periods and decoupling the superstructure from substructure)
- **Damping effect** (to reduce seismic force by absorbing seismic energy)
- **Self-centering** (to return to its original position after experiencing displacement during an earthquake)



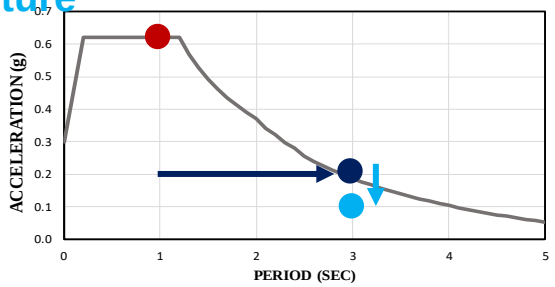
Cost and Environmental Impact Reduction (Retrofit/New)





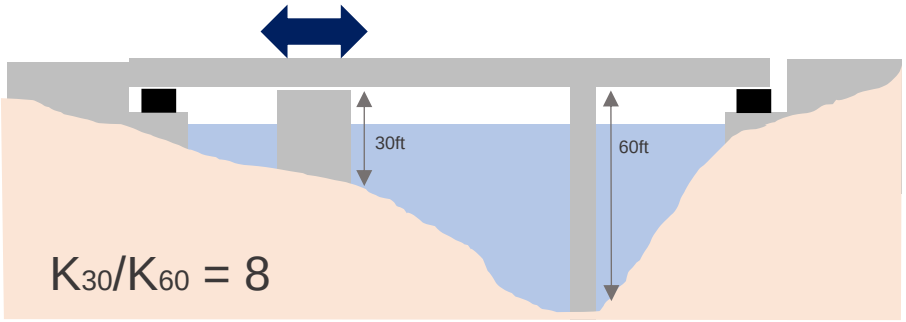
- Seismic force will be concentrated on the pier with fixed bent connection
- Retrofit: Strengthening piers in the river… (trestle, cofferdam…)
- New Construction: Constructing larger size of substructure elements or more piers in the water…

- LRBs **reduce seismic forces** and **redistribute forces throughout the structure**

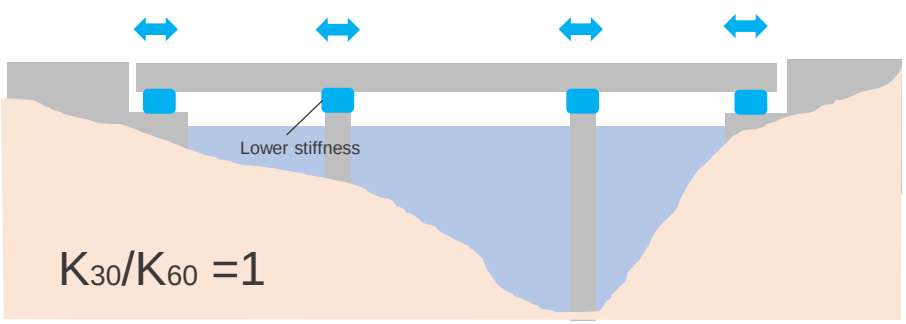


Cost and Environmental Impact Reduction (Retrofit/New)

Force Distribution (Conventional)



Force Distribution (Isolated)

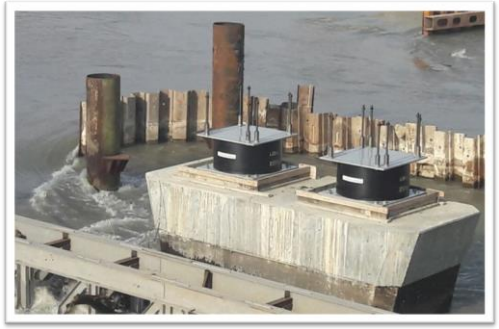


- Conventional bridges **distribute loads according to the stiffness**.
- Shorter pier
  - → Higher stiffness
  - → Higher loads
  - → **Section sizes increase**

- LRBs allow to **reconfigure load distribution** in the system.
- Shorter pier
  - → **Bearings with lower stiffness**
  - → **Reduced loads**
  - → **Decreased section sizes**

Why Use Lead Rubber Bearings?

- Durability
- Stable Long-Term Performance
- Properties not affected by moisture or contamination
- Proven Track Record
- Maintenance Free



Azerbaijan Bridge

Tacoma Wharf

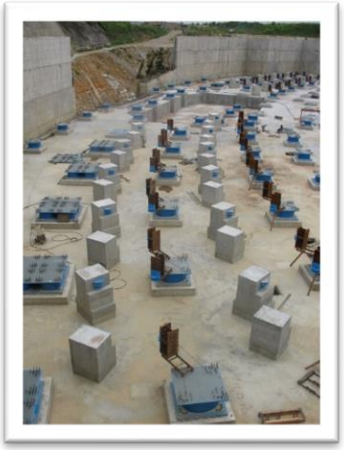
New Buildings

Residential Building Japan

Car Dealer
Chile

U-Tech University Peru

F-Museum, Japan



Tan Tzu Hospital, Taiwan

Hi-City Kiyosumi-Shirakawa
Station Plaza, Japan

Bridges

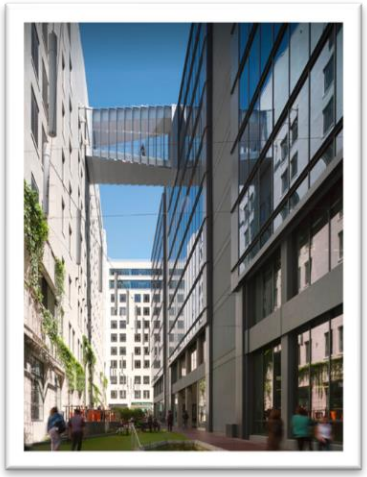
Turkey

Colombia

Peru

Coronado Bridge

Golden Gate Bridge North Approach



Twitter Sky Bridge

Bridge in Mexico

JFK Light Rail

- Cost savings for substructure
- Cost savings due to less re-location of services along Van Wyck Freeway and at JFK airport
- Accelerated construction time

Snake River Bridge

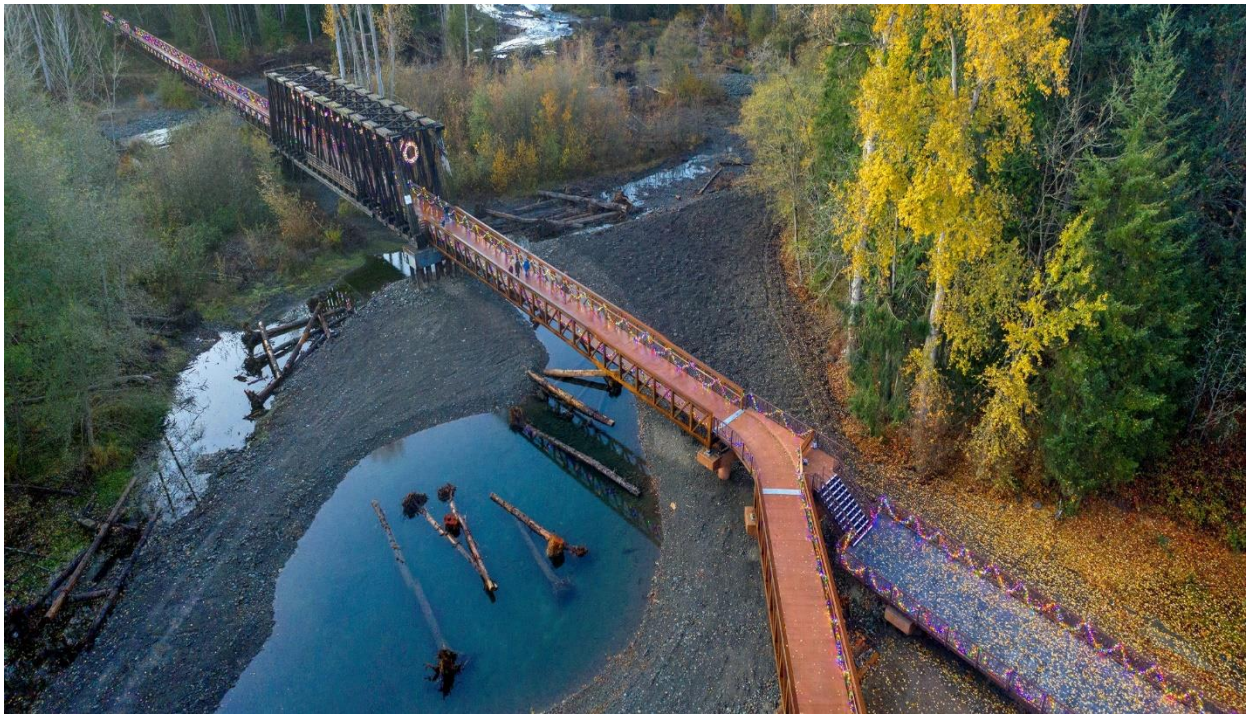
- Snake River bridge in Wyoming: **4 piers and 2 abutments**

  48 LRBs for 2 bridges

- The challenge involved a **tight delivery schedule**, with the construction timeframe limited to a specific period within the year.
- Successfully manufactured, tested, and delivered custom-made LRBs in a timely manner.

Rails to Trails

- Dungeness River Bridge (Sequim, Washington), 156 feet long – **historical significance**
- **Preserve the bridge for as long as possible by isolation technology** instead of relying on ductility



Retrofits

Utah State Capitol

Asian Art Museum

Salt Lake City Building

OAK City Hall

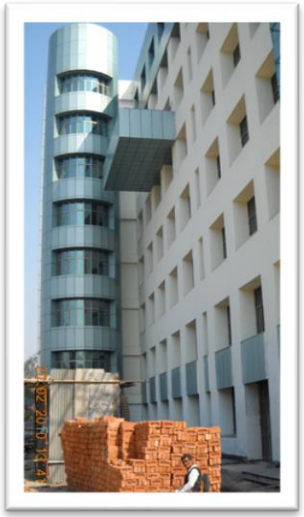
SF City Hall

China Basin

Hospitals

DIS has Isolated more than 50 hospitals in 8 Countries

Tan Tzu Medical Center, Taiwan



GTB Hospital, India

Xindian Hospital, Taiwan

Arrowhead Medical Center, USA

Erzurum Hospital, Turkey

Yuzawa Hospital, Japan

Broadway Pier

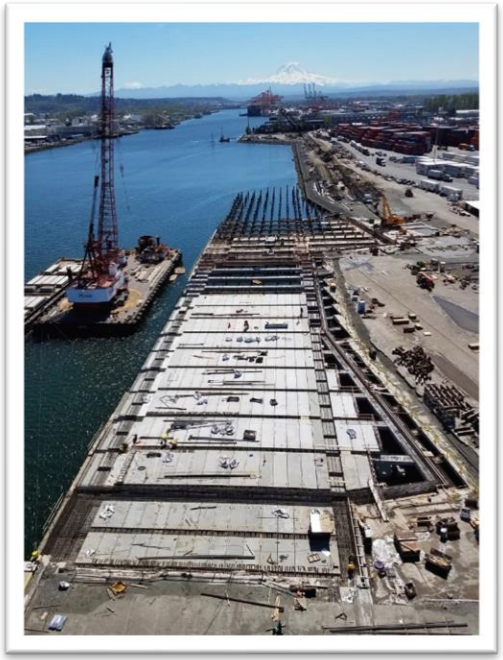
Conventional Design

- 54” diameter piles
- Thick Heavy Deck required to fix piles
- Less damping-higher force
- **$4MM Project Cost**

Isolated Design

- LRBs with 36” diameter piles
- Thinner deck-less mass
- More-damping-less force
- **$2.8MM Project Cost**

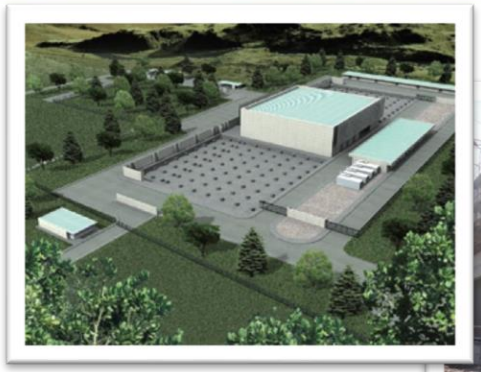
Tacoma Wharf



Data Center Isolation

Data Center Claro, Chile

- Designed for Tier IV rating by the Uptime Institute.
- To do this it must have 99.995% uptime per year which is 8 minutes of downtime
- A non isolated data center in this location would not meet Tier IV requirements
- The owner was targeting clients that needed continuous operation such as banks and businesses
- The data center market spends significant amounts on backup power systems and data storage and seismic protection is viewed positively.



AFCU Data Center, Utah

Amgen Campus, Seattle

Projects Worldwide General/More

Sakhalin Offshore Platform

BAPS Shri Swaminarayan Mandir

Tomata Dam, Japan

- This dam building was isolated in 2003.
- It generates 4.6 MW of power
- Its key functions are for flood control and irrigation

Projects Worldwide

New Zealand Projects

Kawakin

200 projects since 1996

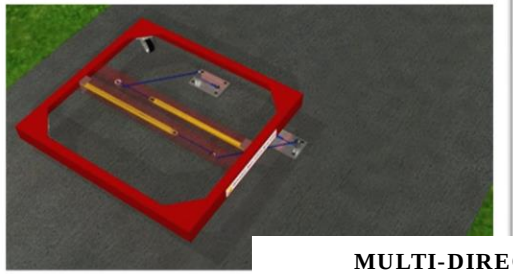
- Mainly condominiums, hospitals, city halls, communications buildings and more recently warehouses.
- DIS is owned by Kawakin a leading Bridge Bearing and damper manufacturer in Japan

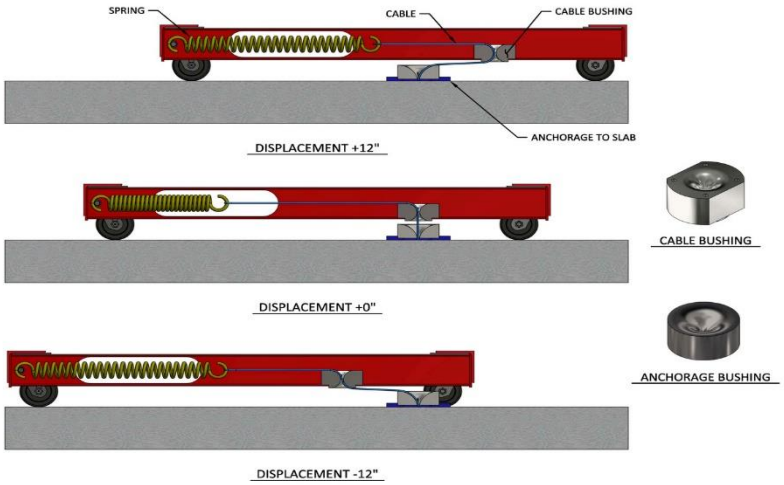
DIS Structures in Major Earthquakes

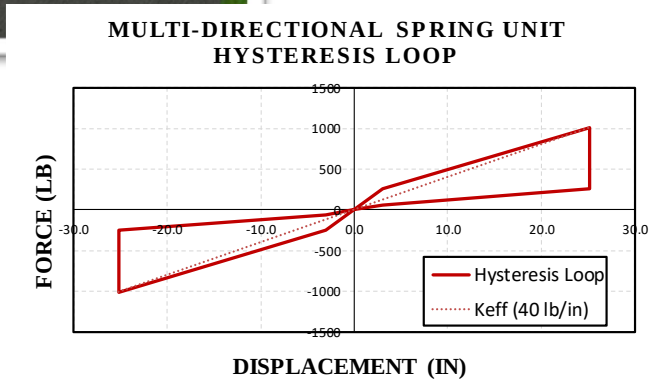
Low Mass Isolation
Equipment Isolation

Non-Structural Isolation: Mechanics

US Patent 8,061,692







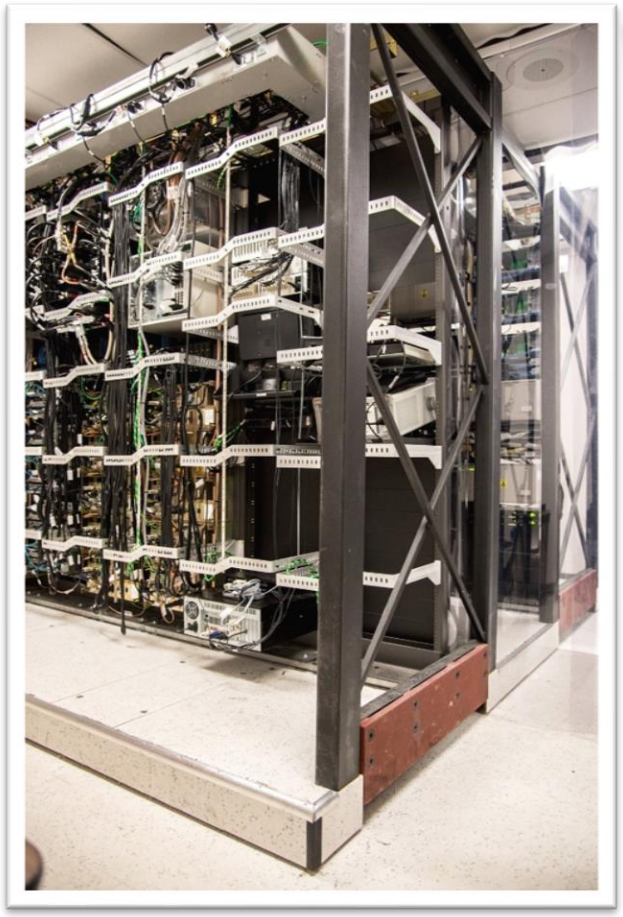
Server Isolation Shake Table Testing

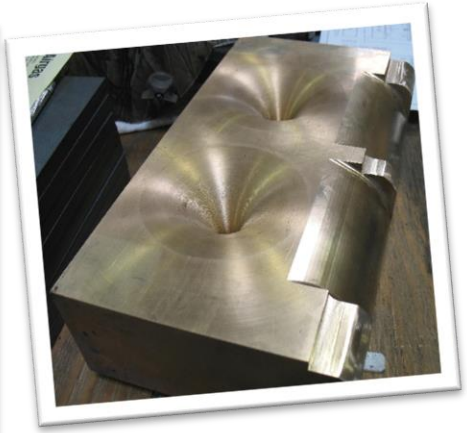
- NEBS N-S 100%.
- Fixed Base NEBS 50%.

DYNAMIC ISOLATION SYSTEMS

Shake Table Demonstration

Platform Isolation of Servers

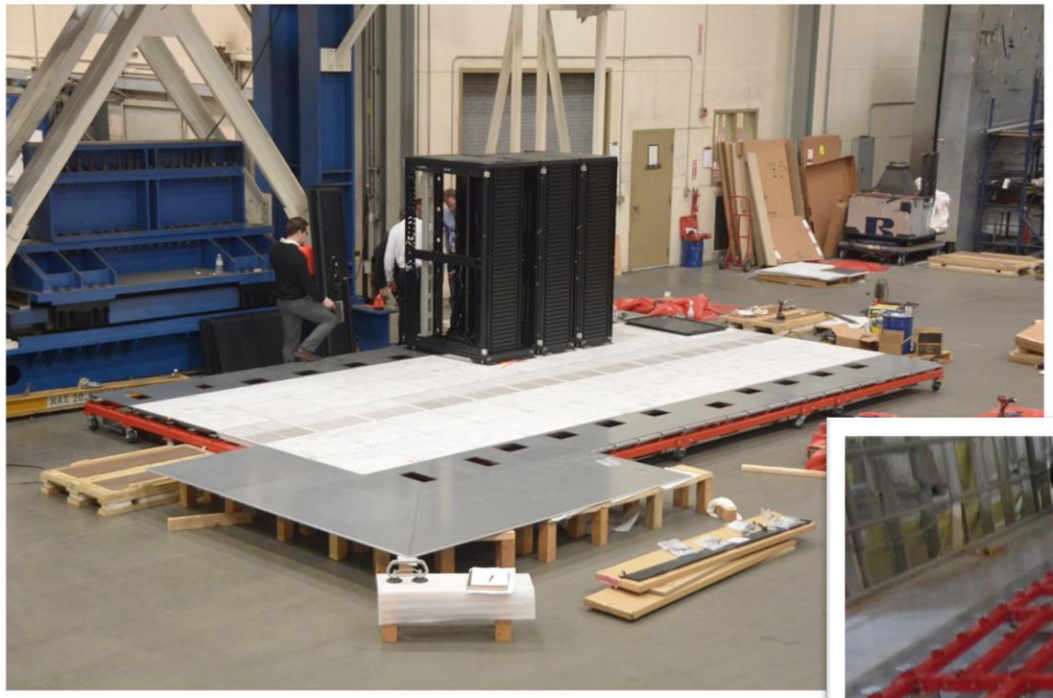




Platform Isolation

- DIS has manufactured platforms for use in data rooms
- Used in Salt Lake City Public Safety Building
- Building was well designed moment frame with dampers.
- Now have applications for Pharmaceutical refrigerators and 3D metallic printers

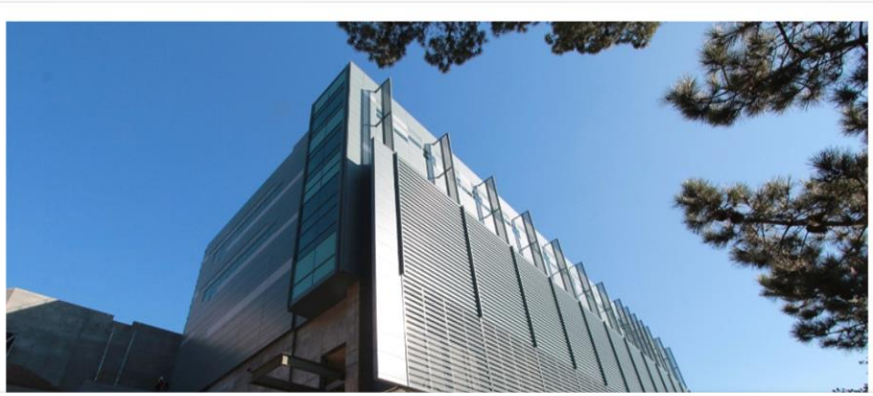
Platform Isolation of Radar Servers



Platform Isolation

- Provided this platform for DOD servers that process radar data.
- The facilities track space debris and enable satellites to navigate and avoid colliding with them .

Floor Isolation of Supercomputers



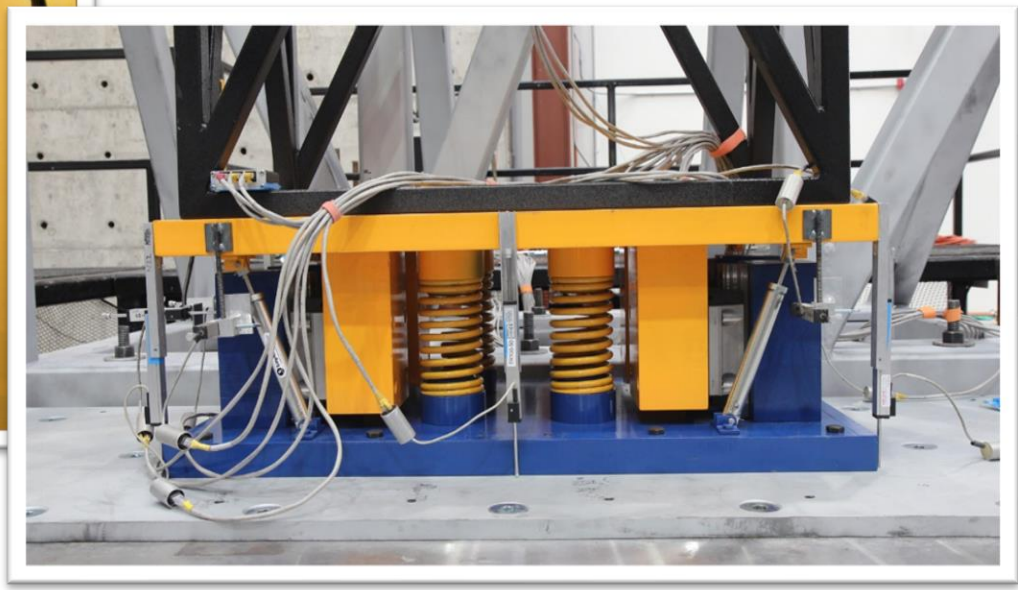
Floor Isolation

- System Isolates 2 Lawrence Berkeley National Lab. Supercomputers
- Isolates the computers within the building
- Computers value is $100MM
- Computers run DOE electricty grid
- 1500 sq meters of floor system

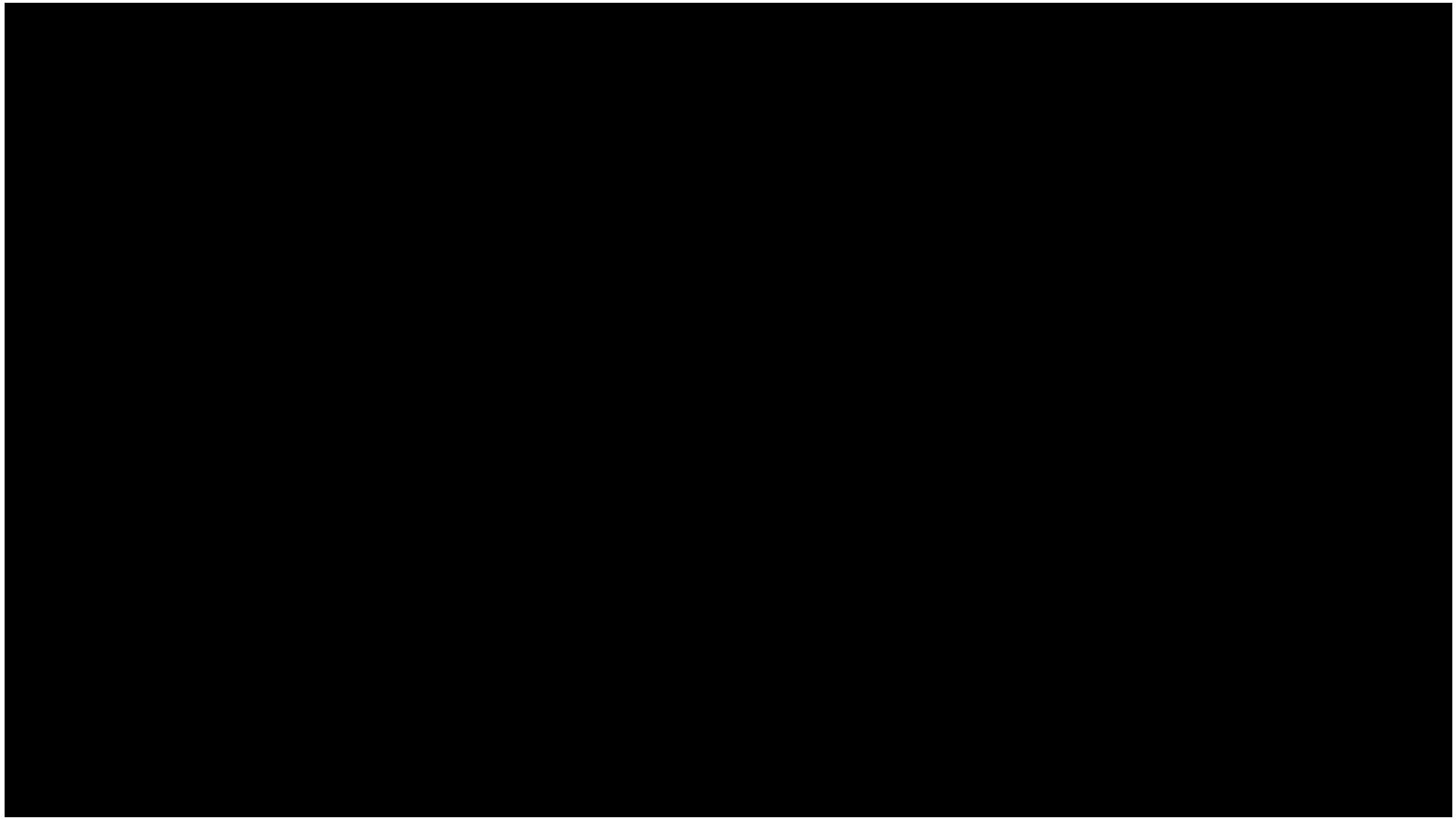
3D Equipment Isolation

3D Equipment Isolation

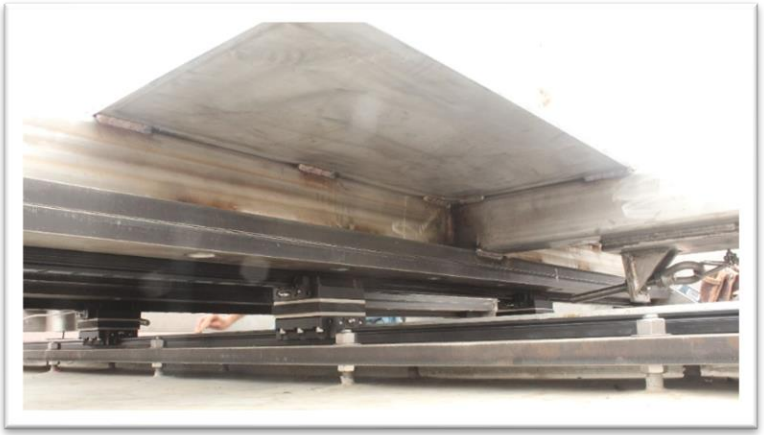
- DIS developed a 3D equipment isolation system for the HLK project
- Vertical equipment isolation combined with horizontal building isolation was used for Ruskin Dam
- Shake Table Testing performed at UNR and DCL in Reno



3D Equipment Isolation



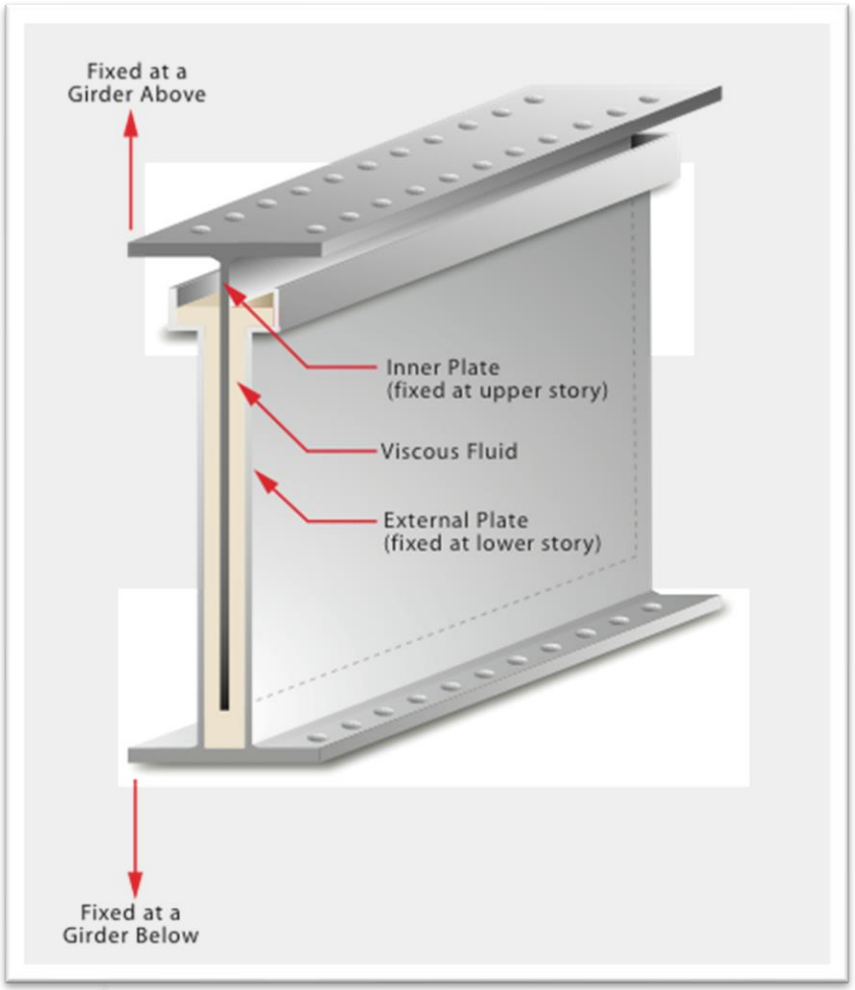
Artwork: Union City

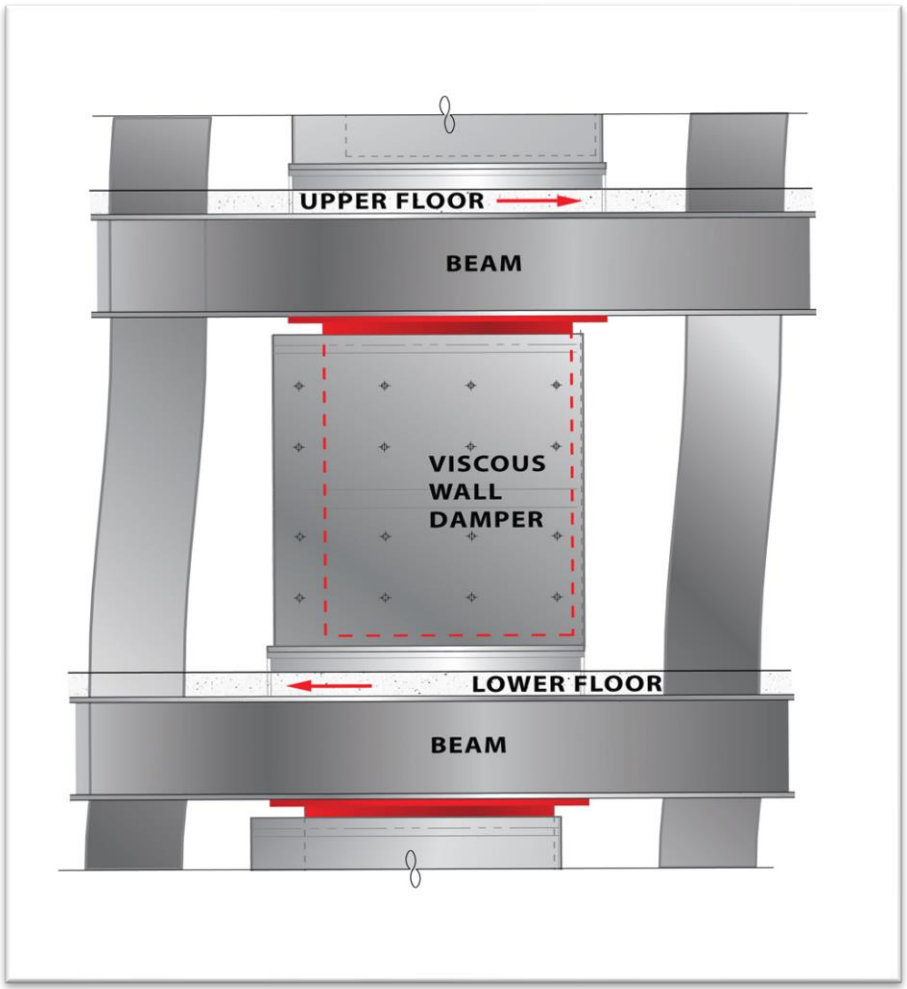


DYNAMIC ISOLATION SYSTEMS

Viscous Wall Dampers

Viscous Wall Damper - Schematic

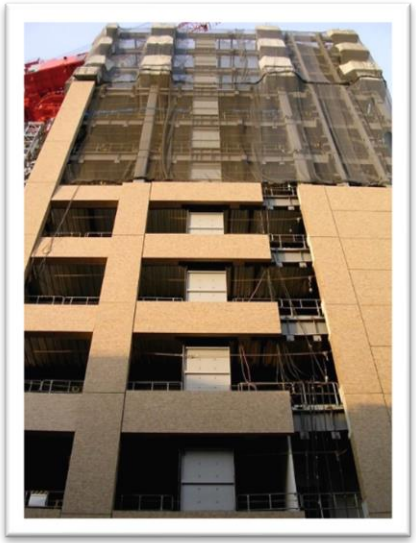




Viscous Wall Dampers - History

late 1980's	Developed in Japan
1993	1st Building in Japan with 170 VWDs
	More than 100 projects in Japan
Early 2000's	Introduced to the US by technology transfer
2014-2019	Hospital project in USA
2018	Residential project in Mexico

Kanto-Post Office



Waseda University

Roppongi Towers

Project in Mexico

VWD Projects USA – CPMC Hospital

- 12 stories and 2 parking levels
- 11 km from San Andreas fault
- 1st project in the US to use VWDs
- 119 VWDs were used

- VWDs were used to help achieve the structural and non-structural performance goals
- Reduce drifts and floor accelerations

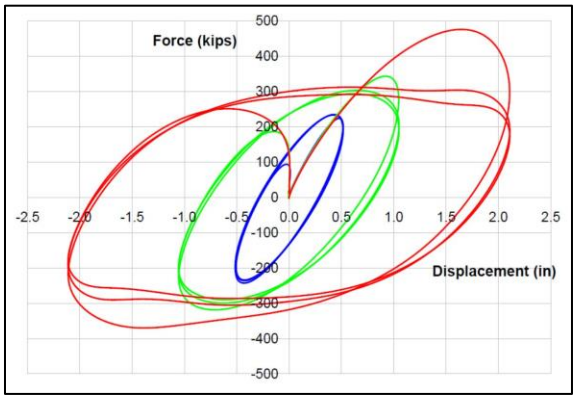
- Reduced drifts from 2% to 1%
- Saved about 25% of the total cost of structural steel

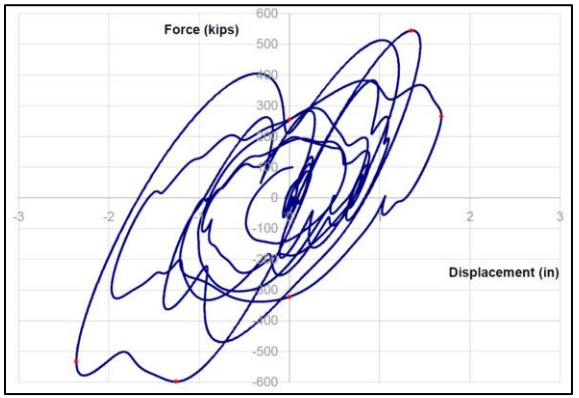
- No high pressure involved – No leaks – No Maintenance
- Offers Architectural Flexibility

VWD Projects USA – CPMC Hospital

Prototype testing at UCSD:

- 5 Dampers were tested
- Sinusoidal and EQ tests
- 2500 Cycle Wind Displacement tests
- Over 25 tests and Stable Performance





Thanks for Listening

Brochures and media available at:

www.dis-inc.com