Performance Based Design

Within the ‘Black Box’

by

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Premise

Current seismic building codes anchor and brace equipment with almost total disregard for the internal systems and their structural support within the ‘Black Box’
Black Box
Major equipment damage in earthquake is due to overturning or collapse of the Box.
Electric A-C Harmonic Filter Reactors

1971 San Fernando Earthquake
With Performance Based Structural Design, equipment will be subjected to greater inertial and anchorage forces.
Will the ‘Black Box’ shell hang together and support the components inside?

- At anchorage points to building
- At internal component anchor points
How will the Black Box contents / components respond to:

- Shaking
- Impact
- Rocking
- Collapse
1979 Mexicali, Mexico
Will the static building code forces used in anchorage design be altered by the Black Box contents?

- Gyroscopic forces of motors
- Fluids sloshing
- Impact of internal mass
Gyroscope

- Outer gimbal
- Rotor
- Axle
- Bearing
- Inner gimbal
- Supporting frame
- Gyro Compass School
Vane Axial Fan

Olive View Hospital
1994 Northridge
Summary

It is time to start thinking

‘Out of the Box’

– the code approach that neglects the design of the Black Box and its contents
IBM Automated Tape Library
Rolling Storage adjacent to IBM Tape Library
What Collateral Hazards will the contents of the Black Box inflict on it’s surroundings?

Acid Spill from Cracked Batteries
Paloma Recycling Plant
1952 Bakersfield Earthquake
Questions and Answers
Electric Transformers

1971 San Fernando Earthquake
Collapsed Batteries - Olive View Hospital

1971 San Fernando Earthquake