

SEESL

*University at Buffalo's Structural Engineering and
Earthquake Simulation Laboratory*

Added damping in structural systems

Department of Civil, Structural and Environmental Engineering
University at Buffalo (SUNY)

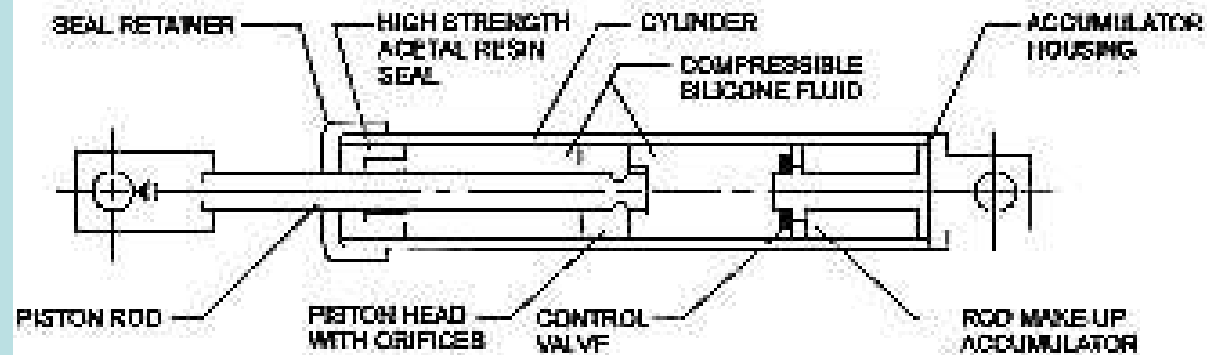


Opening Ceremonies September 26, 2004



Added Damping

Taylor Devices Fluid Damper

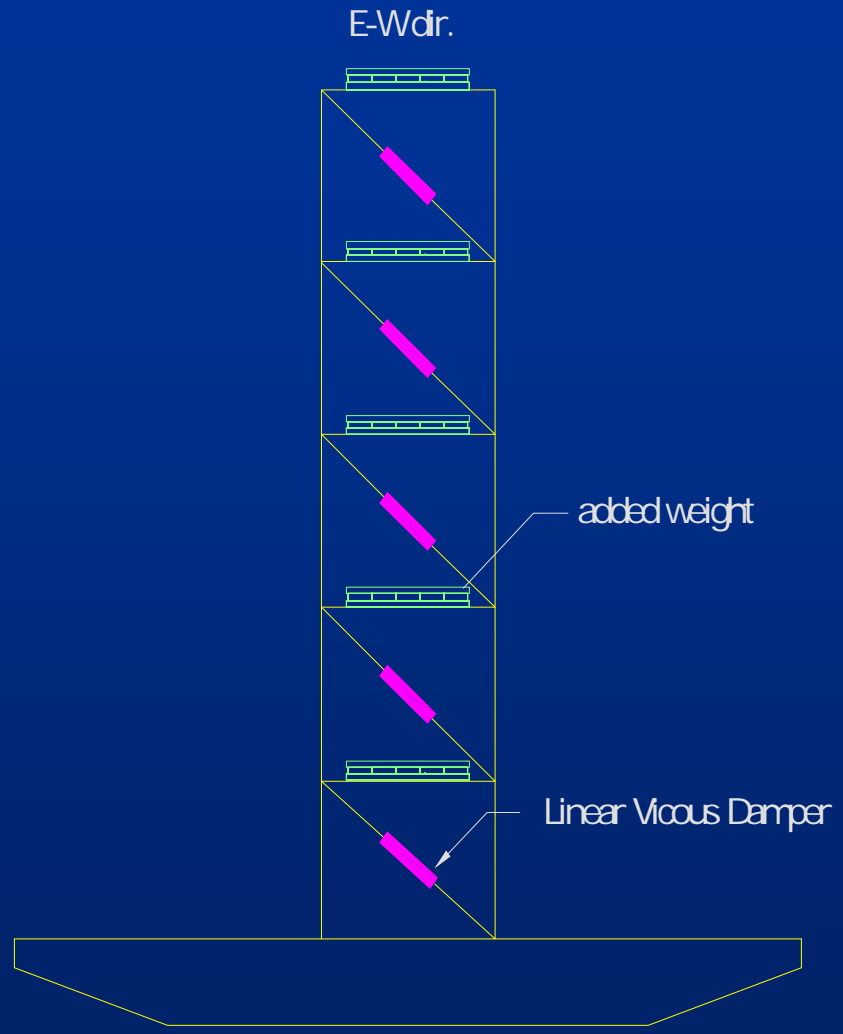


Added Damping – Scaled Tests

Length	λ_L	L_p/L_m	4
Young's modulus	λ_E	E_p/E_m	1
Acceleration	λ_a	$\lambda_E / (\lambda_L * \lambda_p)$	1
Density(provided)	$\lambda_{\rho 1}$	ρ_p / ρ_m	1
Cross section area	λ_A	$(\lambda_L)^2$	16
Moment of inertia	λ_I	$(\lambda_L)^4$	256
Volume	λ_V	$(\lambda_L)^3$	64
Time	λ_t	$(\lambda_L / \lambda_a)^5$	2
Velocity	λ_v	$\lambda_a * \lambda_t$	2
Mass(provided)	λ_{m1}	$\lambda_{\rho 1} * \lambda_V$	17.42
Mass(required)	λ_{m2}	$\lambda_{\rho 2} * \lambda_V$	16
Force(provided)	λ_{F1}	$\lambda_{m1} * \lambda_a$	17.42
Force(required)	λ_{F2}	$\lambda_{m2} * \lambda_a$	16
Stress	λ_σ	λ_E	1
Strain	λ_ϵ	λ_E / λ_E	1
Impulse(provided)	λ_{im1}	$\lambda_{F1} * \lambda_t$	34.84
Impulse(required)	λ_{im2}	$\lambda_{F2} * \lambda_t$	32
Stiffness(provided)	λ_{k1}	λ_{F1} / λ_L	4.355
Stiffness(required)	λ_{k2}	λ_{F2} / λ_L	4
Frequency	$\lambda_{\omega 1}$	$(\lambda_{K1} / \lambda_{m1})^5$	0.5
Energy(provided)	λ_{e1}	$\lambda_{F1} * \lambda_L$	69.68
Energy(required)	λ_{e2}	$\lambda_{F2} * \lambda_L$	64



Added Damping – Scaled Tests



Torre Mayor Tower in Mexico City



Torre Mayor Tower in Mexico City

Cooperative Work:

- **WSF Cantor Seinuk Group** — Ahmed Rahimian
- **Enrique Martinez Romero .SA** — EM Romero
- **Taylor Devices Inc.** — Doug Taylor
- **University at Buffalo** — MC. Constantinou & AM Reinhorn

Torre Mayor Tower in Mexico City 2005 CERF Pankow Award for Innovation



CERF Charles Pankow Award For Innovation

The CERF Charles Pankow Award for Innovation was created in 1996 to celebrate innovative collaboration in the design and construction industry and to complement existing industry awards.

As a leader in the design and construction industry for almost 50 years, Mr. Pankow was instrumental in launching CERF, serving as one of its first board members and as Chairman of CERF's New Century Partnership.

The award recognizes the contribution of organizations working collaboratively to demonstrate innovative approaches to design, materials use, or the construction process.