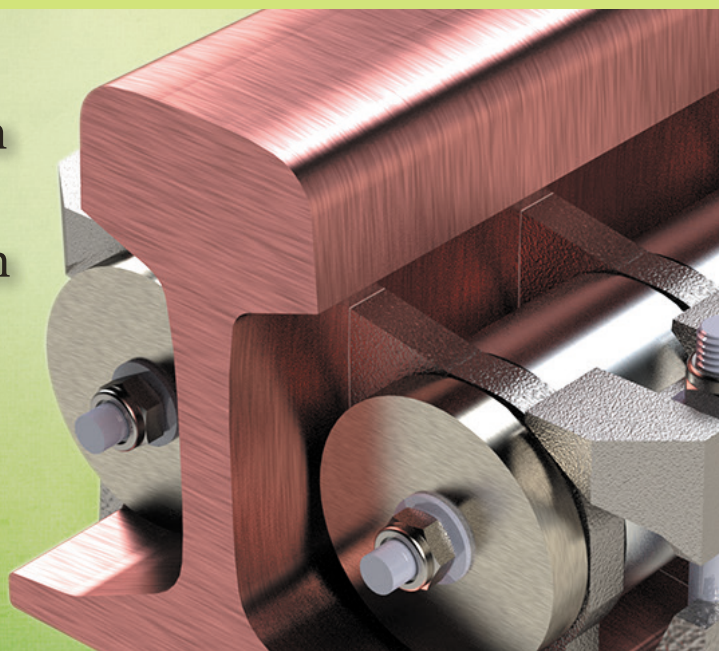


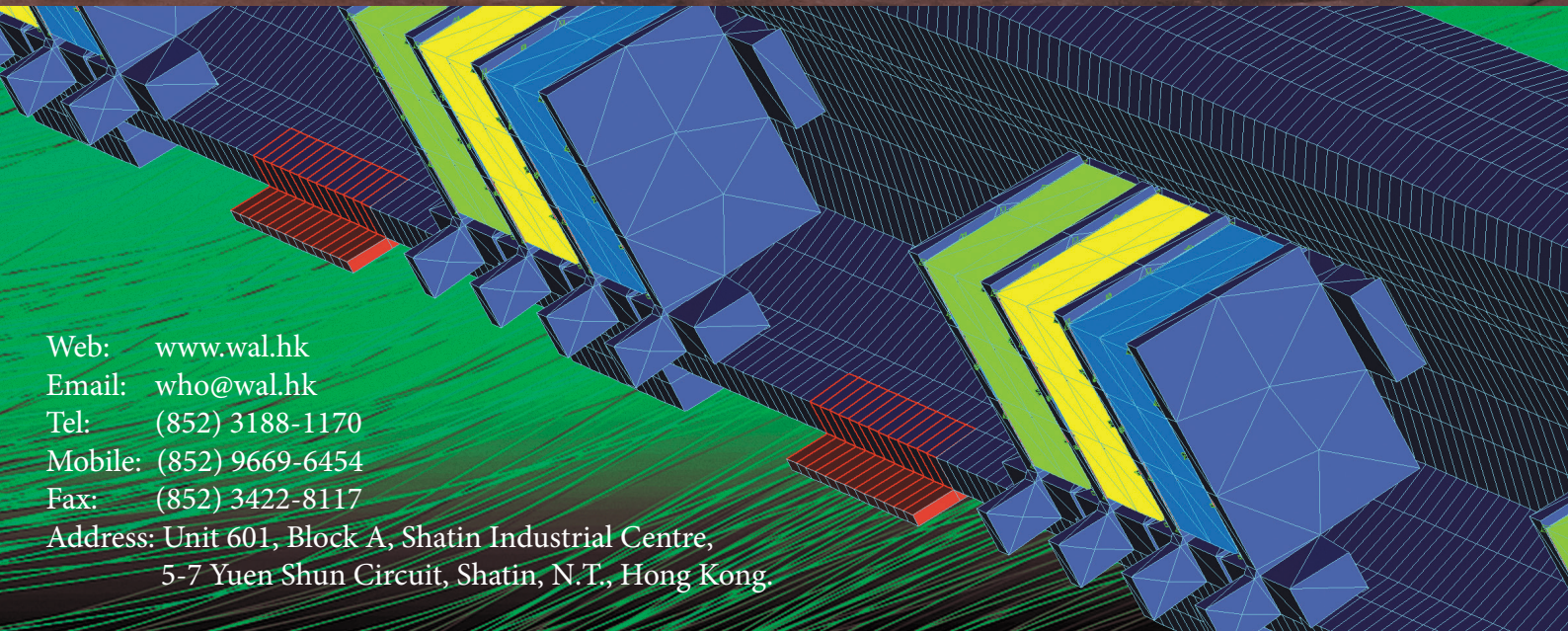
Multi-directional Tuned Mass Rail Damper



- ▷ Guarantee 3dB(A) noise reduction
- ▷ 10dB vibration reduction
- ▷ 45% corrugation growth reduction
- ▷ Track decay rate improved to 6-11dB/m
- ▷ >1 tonne clamping force



- ▷ Installed at 5 sections in Hong Kong
- ▷ Flexible for all complicated situations
- ▷ For new tracks and retrofit
- ▷ Designed for easy install and un-install
- ▷ Tailor-made orders are welcome
- ▷ Since year 2010

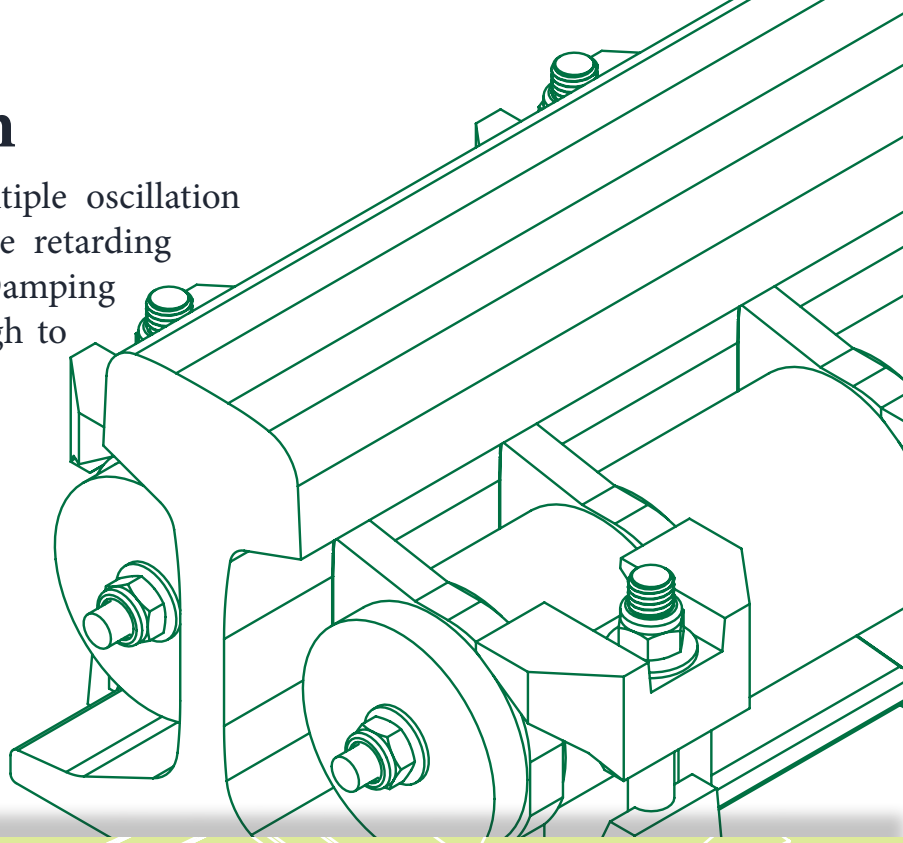


Web: www.wal.hk
Email: who@wal.hk
Tel: (852) 3188-1170
Mobile: (852) 9669-6454
Fax: (852) 3422-8117
Address: Unit 601, Block A, Shatin Industrial Centre,
5-7 Yuen Shun Circuit, Shatin, N.T., Hong Kong.

General Information

WAL railway damper comprises multiple oscillation masses to generate exceptionally large retarding forces to rail vibration by Tuned Mass Damping (TMD) mechanism. It is strong enough to slow down corrugation growth.

Oscillation frequencies and damping ratios are optimized for rail vibration characteristics at individual sites. Each single mass provides TMD at both vertical and lateral vibrations. This design feature makes the damper superior than other dampers in the world.



Novel Design Features

Enhanced Vibration Absorption at Vertical and Lateral Directions

In principle, rail damper must be massive in order to be effective. TMD is the best technique to enhance the mass effect, and most rail dampers employ TMD to provide effective damping. By TMD, small oscillation mass is able to provide strong vibration retarding force similar to a larger mass in the order of tens times.

WAL damper design adopts novel mounting orientation, such that each single mass provides TMD at both vertical and lateral vibrations by shearing of resilient layers. Shearing modulus of rubber is in general much lower than the elastic modulus. TMD at compressive direction is often affected by vibration at shearing directions, while TMD at shearing direction is generally not affected by

vibration at compressive direction for dampers with resilient layers.

Over 1 tonne Clamping Force

Vibration displacement of rails at noise radiation frequency is less than a few microns. Movement gaps at the attachment interface would significantly hinder vibration energy transfer from the rail to the vibration absorbers (oscillation masses). The new mounting design allows the damper have rigid contacts to provide >1 tonne mounting force to the rail foot and web.

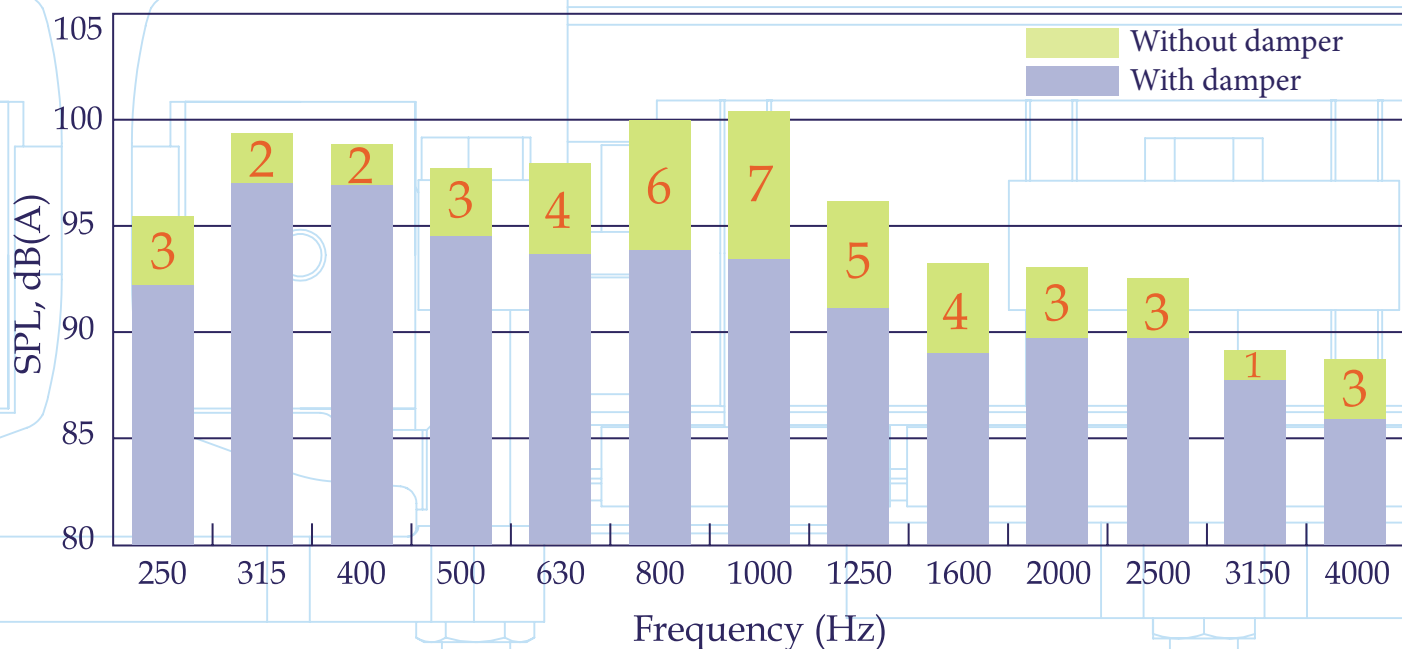
Design for Extreme Climate

For extreme climate, the anti-corrosion coating for metal parts could sustain over 30 years, or comply with Class 75(the highest level) regarding BS EN 17688. EPDM rubber is employed to provide over 25 years life span.

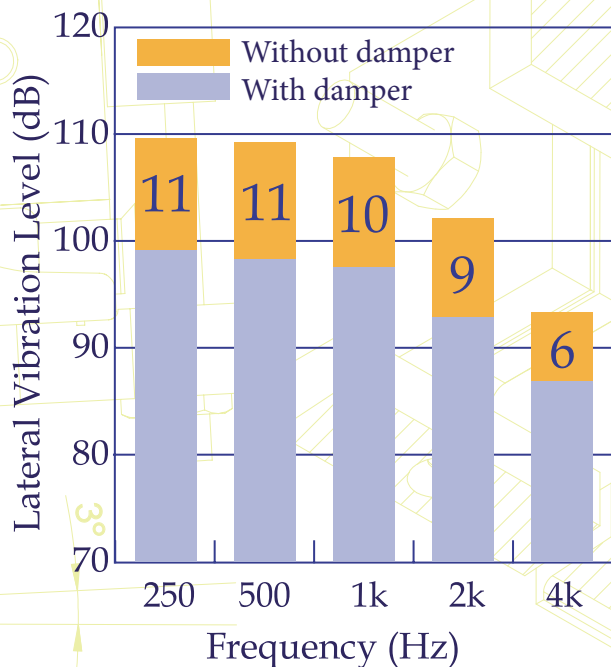
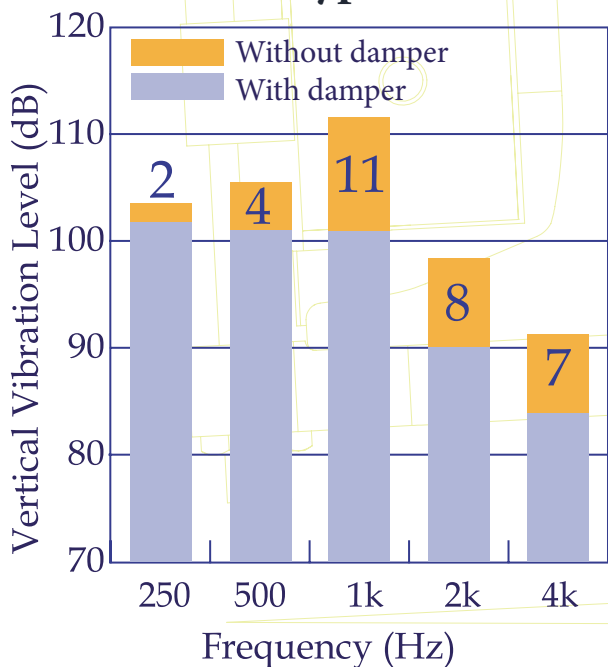
Publications

1. Wilson Ho, Banting Wong, Hilton Tam, Tang Cai, *Tuned Mass Damper*, The 22nd International Congress on Sound and Vibration (ICSV22), 2015
2. Wilson Ho, Ting Cai and Banting Wong, *Analytical Study on Railway Corrugation Growth Control by Tuned Mass Damper*, The 21st International Congress on Sound and Vibration (ICSV21), 2014
3. Wilson Ho, Banting Wong, Dragon Tsui, Calvin Kong, *Reducing Rail Corrugation Growth by Tuned Mass Damper*, The 11th International Workshop on Railway Noise (IWRN11), 2013.
4. Wilson Ho, Cai Ting and Banting Wong, *Dynamic Model of Resilient Booted Sleeper and Rail Damper*, The 20th International Congress on Sound & Vibration (ICSV20), 2013
5. Wilson Ho, Banting Wong, David England, Alson Pang and C.W.S To, *Reduction of Corrugation Growth Rate by Rail Dampers*, TDH Rail Magazine March 2013 Issue.
6. Wilson Ho, Banting Wong, David England and Alson Pang, *Tuned Mass Damper for Rail Noise and Corrugation Control*, Acoustics 2012.
7. Wilson Ho, Banting Wong and David England, *Tuned Mass Damper for Rail Noise Control*, Noise and Vibration Mitigation for Rail Transit System, NNFM Vol.118, page 89-96, Springer-Verlag Berlin Heidelberg 2011.

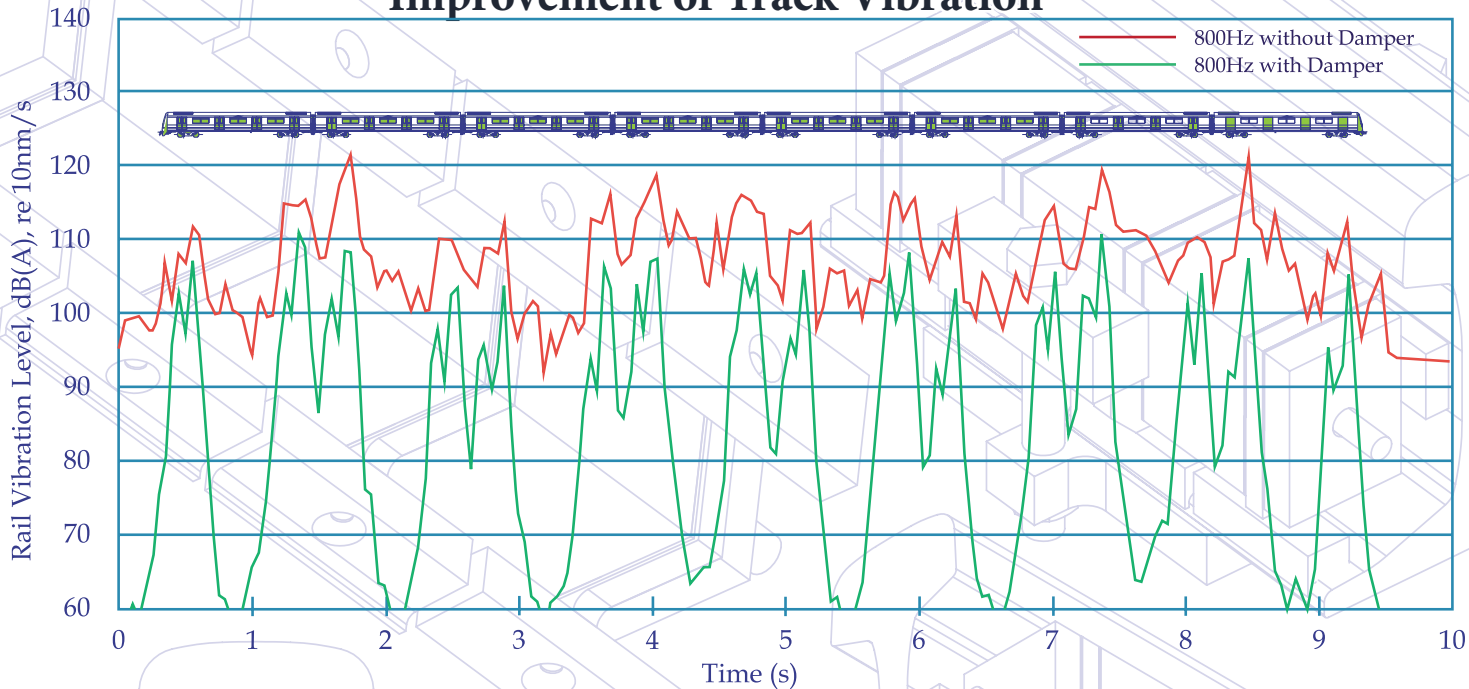
Typical Noise Reduction Performance



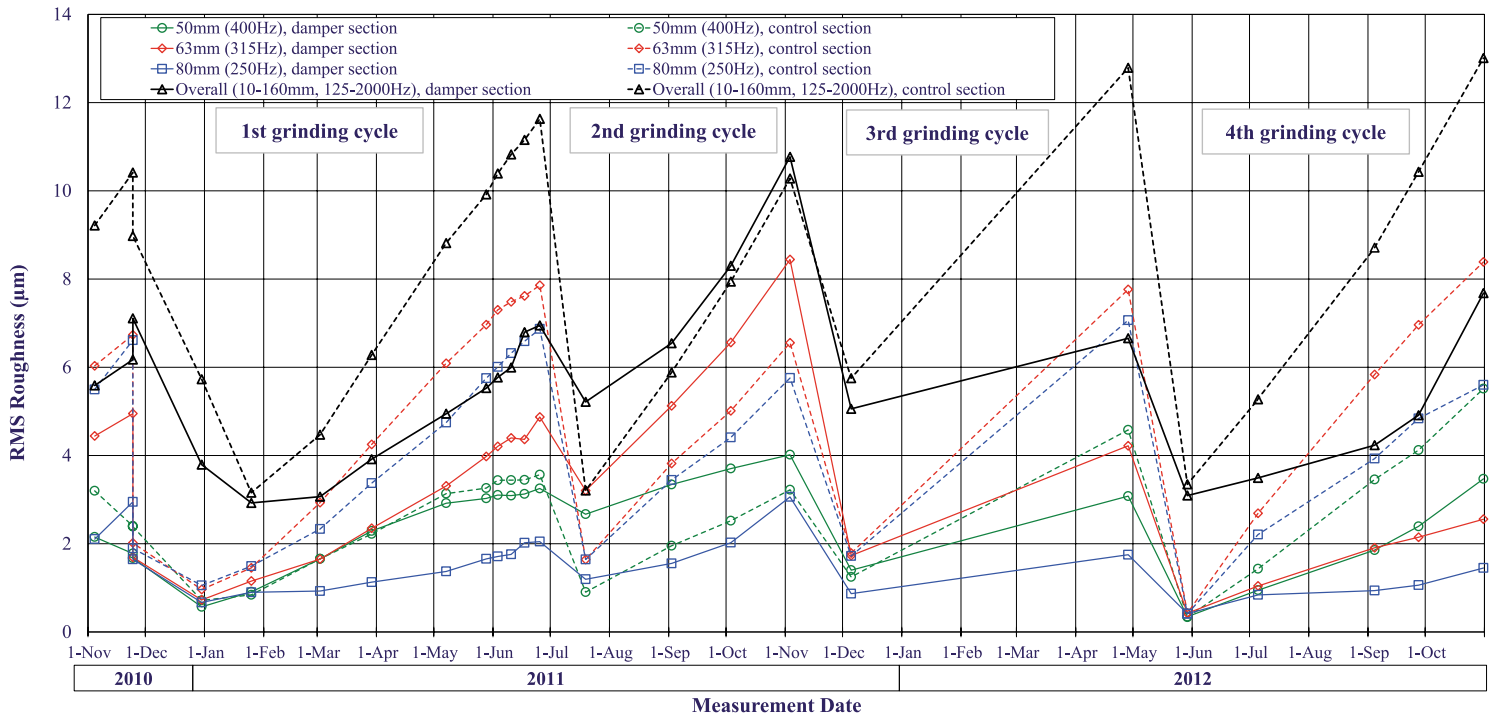
Typical Vibration Reduction Performance



Improvement of Track Vibration



Suppression of Corrugation Growth



Slight Corrugation at Damper Section (E Type)



Corrugation at Adjacent Control Section

Recommended Workflow for Retrofit Work

1. Preparation Stage

- Investigate trackform type and site situation
- Noise & vibration levels and spectrum
- Clearance requirement
- Weather resistance and signaling requirement



2. Design Stage

- Determine target frequency
- Meet user's requirement



4. Installation Stage

- In-situ installation
- Post-installation measurement
- O&M Manual



3. Production Stage

- Mass production
- QA test
- Package for delivery



Post-installation Measurement



Web: www.wal.hk
 Email: who@wal.hk
 Tel: (852) 3188-1170
 Mobile: (852) 9669-6454
 Fax: (852) 3422-8117

Address: Unit 601, Block A, Shatin Industrial Centre,
 5-7 Yuen Shun Circuit, Shatin, N.T., Hong Kong.