**Subway Berlin, Germany**

Subway tunnel below residential buildings

Completion 1994

Prefabricated short concrete troughs (2.5 m), spring units underneath

Total length: 2 x 200 m

Axle load: 9 t

Dead load: 5.0 t/m

Velocity: 70 km/h

System natural frequency: 7.5 Hz

**Subway Cologne, Germany**

Subway tunnel below residential buildings

Completion 1997

Floating track slabs (30 m), spring units embedded

Total length: 2 x 900 m

Axle load: 10 t

Dead load: 3.4 t/m

Velocity: 70 km/h

System natural frequency: 6.5 Hz

**Tramway Bielefeld, Germany**

Tramway passing a hotel building, slab used by trams and vehicles

Completion 1995

Common floating track slab for two tracks, spring units embedded

Slab length: 65 m

Axle load: 10 t

Dead load: 1.67 t/m<sup>2</sup>

Velocity: 50 km/h

System natural frequency: 5.0 Hz

**Passenger-Transfer-System Frankfurt/M., Germany**

International Airport; fully automatic elevated train system passing partially through buildings

Completion 1997

Spring supported steel girders and concrete troughs, spring units partially combined with sliding elements

Total length: 2 x 600 m in different sections

Axle load: 7 t

Dead load: 3.0 t/m

Velocity: 60 km/h

System natural frequency: 5.0 Hz

**Puchon Station, Korea**

Rail track on top of station building for passenger and freight trains

Completion 1997

Long ballast troughs (46 m), spring units underneath

Total length: 6 x 225 m

Axle load: 22 t

Dead load: 7.2 t/m

Velocity: 120 km/h

System natural frequency: 6.1 Hz

**Chonan Station, Korea**

High Speed Track (TGV) on top of station building

Completion 1999

Floating track slabs with ballast bed, prestressable spring units and Viscodampers underneath

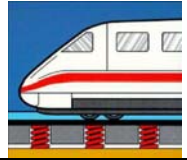
Total length: 4 x 1200 m

Axle load: 22 t

Dead load: 3.5 t/m<sup>2</sup>

Velocity: 350 km/h

System natural frequency: 6 Hz

**Metro Sao Paulo, Brazil****Line 3**

Subway tunnel below residential buildings

Completion 2000

Long floating track slabs, spring units embedded

Total length: 2 x 250 m

Axle load: 20 t

Dead load: 3.4 t/m

System natural frequency: 7 Hz

**DLR Lewisham Extension London/UK**

Tunnel below residential buildings

Completion 1999

Floating track slabs (30 m), spring units embedded

Total length: 2 x 430 m

Axle load: 10 t

Velocity: 80 km/h

Dead load: 3.4 t/m

System natural frequency: 6.5 Hz

**Stuttgart/Ruit, Germany**

Tramway Tunnel below residential buildings

Completion 2000

Floating track slabs (45 m), spring units embedded

Total length: 2 x 135 m

Axle load: 10 t

Dead load: 4.3 t/m

System natural frequency: 5.7 Hz

**Frechen/Cologne, Germany**

Tramway switches,

Completion 1999

2 floating track slabs, spring units embedded

Dimensions: 115 m<sup>2</sup> / 120 m<sup>2</sup>

Axle load: 9 t

Dead load: 2.8 t/m<sup>2</sup> / 2.0 t/m<sup>2</sup>

System natural frequency: 6.5 Hz

**Metro Brasilia, Brazil**Tunnel close to buildings,  
single track and switches

Completion 2000

Floating track slabs, spring units embedded.

Total length: 2 x 195 m

Axle load: 16 t

Velocity: 85 km/h

Dead load: 3.4 t/m

System natural frequency: 6.9 Hz

**Rinkai Line, Tokyo, Japan**

Test slab in subway tunnel

Completion 2000

Floating track slab on jack-up system

Total length: 20 m

Axle load: 10 t

Velocity: 100 km/h

Dead load: 2.7 t/m

System natural frequency: 10.2 Hz

**Rinkai Fukutoshin Line, Tokyo, Japan**

Subway tunnel below residential buildings

Completion 2002

Floating track slabs on jack-up system

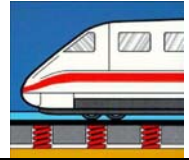
Total length: 180 m

Axle load: 10 t

Velocity: 50 km/h

Dead load: 2.8 t/m

System natural frequency: 9.5 Hz



**Beijing Metro, China  
Xizhimen Station**

Completion 2002

Floating track slabs  
 Total length: 3 x 126 m  
 Axle load: 14 t  
 Velocity: 40 km/h  
 Slab dead load: 5.4 t/m  
 System natural frequency: 6.5 Hz

**Charlotte NC, USA,  
Station for Vintage Trolley and LRT  
within a Convention Centre**

Completion 2002

Floating twin-track slabs on jack-up system  
 Total length: 221 m  
 Design axle load: 12,5 t  
 Velocity: 25 km/h  
 Slab dead load: 1.4 t/m<sup>2</sup>  
 System natural frequency: 6.5 Hz

**Metro Sao Paulo, Brazil  
Line 5**

Completion 2002

Floating track slabs on PUR-strips  
 Total length: 14.4 km  
 Axle load: 16 t  
 Velocity: 80 km/h  
 Slab dead load: 1.9 t/m  
 System natural frequency: 17.2 Hz

**Beijing Metro, China  
Xizhimen Station**

Completion 2002

Spring supported 3-span bridge girders  
 Total length: 3 x 75 m  
 Axle load: 14 t  
 Velocity: 40 km/h  
 System natural frequency: 5 Hz

**Beijing Metro, China  
Hepingli Section**

Completion 2002

Floating track slabs  
 Total length: 2 x 120 m  
 Axle load: 14 t  
 Velocity: 80 km/h  
 Slab dead load: 5.2 t/m  
 System natural frequency: 5 Hz

**Shenzen Metro, China**

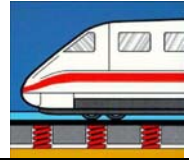
Completion 2003

Floating track slabs  
 Total length: 2 x 253 m  
 Axle load: 16 t  
 Velocity: 80 km/h  
 Slab dead load: 4.8 t/m  
 System natural frequency: 5.0 Hz

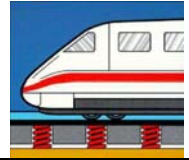
**Shanghai Metro, China  
Pearl Line, Lin Ping Rd.**

Completion 2003

Floating track slabs  
 Total length: 2 x 120 m  
 Axle load: 16 t  
 Velocity: 80 km/h  
 Slab dead load: 3.1 t/m, l = 30 m  
 System natural frequency: 8.0 Hz



<p><b>Tokyo, Japan</b>  <b>Joban Shinsen Line I</b>            Minami-Nagareyoma Section</p> <p>Completion 2004</p>	<p>Floating track slabs in a tunnel</p> <p>Total length: 2 x 154 m + 2 x 140 m</p> <p>Design axle load: 15 t</p> <p>Velocity: 160 km/h</p> <p>Slabs: 3.4 t/m; l = 20 m</p> <p>System natural frequency: 8.7 Hz</p>
<p><b>Shanghai Metro, China</b>  <b>Pearl Line, Pu Dong</b>            below Medicine Institute</p> <p>Completion 2004</p>	<p>Floating track slabs in a tunnel</p> <p>Total length: 2 x 120 m</p> <p>Axle load: 16 t</p> <p>Velocity: 80 km/h</p> <p>Slab dead load: 3.1 t/m, l = 30 m</p> <p>System natural frequency: 8.0 Hz</p>
<p><b>Shanghai Metro, China</b>  <b>Pearl Line, Sichuan Rd.</b>            on a bridge</p> <p>Completion 2004</p>	<p>Floating track slabs</p> <p>Total length: 2 x 97 m</p> <p>Axle load: 16 t</p> <p>Velocity: 80 km/h</p> <p>Slab dead load: 2.5t/m, l = 30 m</p> <p>System natural frequency: 9.0 Hz</p>
<p><b>Guangzhou Metro, China</b>            Tunnel below film studios</p> <p>Completion 2004</p>	<p>Floating track slabs incl. turnouts</p> <p>Total length: 890 m</p> <p>Thickness of slabs: approx. 550 mm</p> <p>Design axle load: 16 t</p> <p>Velocity: 80 km/h</p> <p>System natural frequency: 6-7 Hz</p>
<p><b>Nanjing Metro, China</b>            Tunnel below Golou Hospital</p> <p>Completion 2004</p>	<p>Floating track slabs</p> <p>Total length: 2 x 120 m</p> <p>Thickness of slabs: approx. 460 mm</p> <p>Design axle load: 14 t</p> <p>Velocity: 80 km/h</p> <p>System natural frequency: 8 Hz</p>
<p><b>Bochum, Germany</b>            LRT Tunnel</p> <p>Completion 2004</p>	<p>Floating troughs with ballast</p> <p>Total length: 90 m</p> <p>Dead load: 7.8 t/m</p> <p>Design axle load: 10 t</p> <p>Velocity: 80 km/h</p> <p>System natural frequency: 6.4 Hz</p>
<p><b>Tokyo, Japan</b>  <b>Joban Shinsen Line II</b>            Nishiayaso-Osoni Section</p> <p>Completion 2004</p>	<p>Floating track slabs in a tunnel</p> <p>Total length: 2 x 272 m</p> <p>Design axle load: 15 t</p> <p>Velocity: 85 km/h</p> <p>Slabs: 2.6 t/m</p> <p>System natural frequency: 10 Hz</p>



**Tokyo, Japan**  
**Joban Shinsen Line II**  
Oosone Tunnel

Completion 2004

Floating track slabs

Total length: 2 x 140 m  
Design axle load: 15 t  
Velocity: 130 km/h  
Slabs: 2.3 t/m  
System natural frequency: 10 Hz

**Oslo, Norway**  
**Wessels Plass**

Completion 2004

Floating slab for double track on top of a shopping center

Total length: 25 m  
Design axle load: 10 t  
System natural frequency: 5Hz\* \*dead load only

State: 03/2004