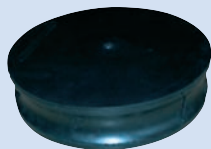
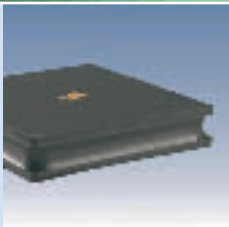


Elastomeric Bearings



*Elastomeric Bearings for heavy
Mass-Spring-Systems*

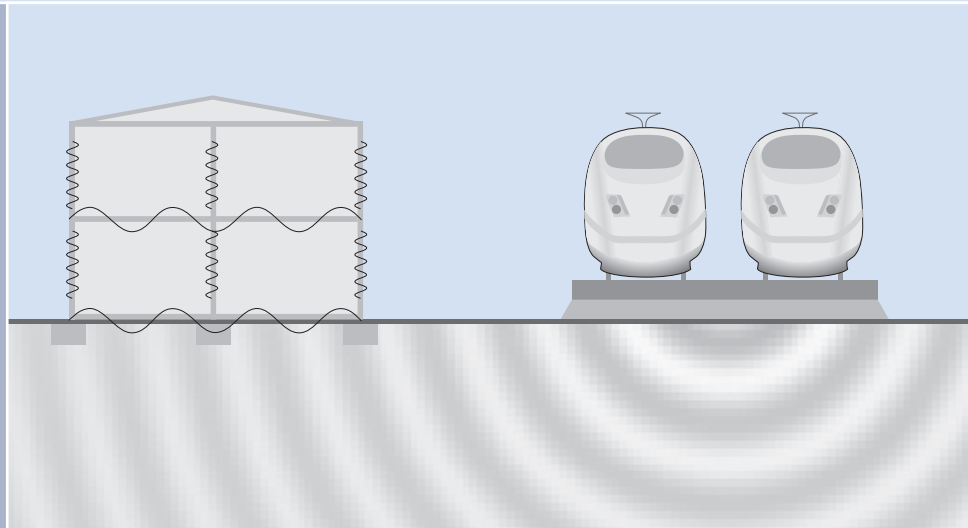
Not a Chance for Vibrations

The operating Mode of heavy Mass-Spring-Systems (Floating Slab Track)

Rail vehicles cause vibrations which propagate through the ground. They can annoy humans, impair the function of technical devices or damage buildings. For a best possible protective action Mass-Spring-Systems (MSS) are used. Such systems at the same time have a big mass as well as supporting points with low stiffness, if technically possible. This way a low tuning frequency can be achieved, providing a maximum of protective action.

The mass consists of a concrete slab or a concrete trough filled with track ballast. Resilient elastomeric bearings are used as spring elements which as single supporting points are placed below the concrete elements. Each bearing carries many tons of mass. Along with a low spring stiffness of the elastomeric bearings the requested low tuning frequency is achieved.

Heavy Mass-Spring-Systems are used with tunnels and elevated rail tracks of light railway, main railway or underground lines running closely along or below buildings. If less protective action



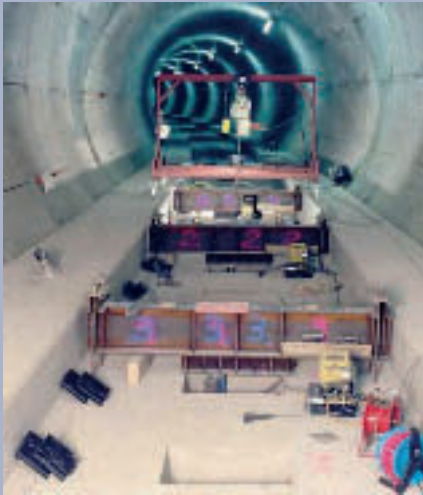
is required also Mass-Spring-Systems with elastomeric track mats as spring elements can be used.

Dynamic Properties of the MSS elastomeric Bearings

The stiffness of elastomeric bearings increases with rising frequency of the vibrations effecting them. This effect is called dynamic hardening and should be as small as possible, because otherwise the effectiveness with higher frequencies is impaired. Calenberg MSS

elastomeric bearings have an excellent dynamic behaviour. For standard bearing forces and frequencies the dynamic hardening of the elastomeric bearings is considerably low.

The MSS elastomeric bearings are made from high quality natural rubber (NR) and proven quality synthetic chloroprene rubber (CR) respectively. Such bearings and materials have been used successfully for decades. The bearings are manufactured and tested according to DIN 45673-7. The share of chloroprene rubber is more than 60 %.



Picture 1: Lifting of the Concrete Element



Picture 2: Hydraulic Press

This synthetic material is highly durable and resistant to:

- Ozone
- Atmospheric influences
- Environmental influences, such as SO₂, NO_x and HCl

MSS elastomeric bearings come in different standard sizes and stiffnesses (table 1). Custom designs are possible if requested. Thus each Mass-Spring-System is provided with individually fitted bearings.

Mounting and Placement of the Bearings

The bearings are mounted in pairs and symmetrically to the track axis (see also pictures 4 and 5). In order to be able to mount the bearings and to replace them if necessary, the concrete elements of the Mass-Spring-System are provided with inspection holes.

With cast in situ concrete elements the elastomeric bearings are mostly built in subsequently. For that the concrete elements have to be lifted after they have hardened. This happens by means of cross beams fixed to the concrete elements (picture 1) and hydraulic presses pushing upwards the beams

and elements respectively (picture 2). The inspection holes are then used to push the bearings into their final positions underneath the concrete component (picture 3).

In comparison prefabricated components can be put straight onto the elastomeric bearings which were put into position before.

Test Certificates

Among others the MSS elastomeric bearings were tested and certified by the following testing institutes:

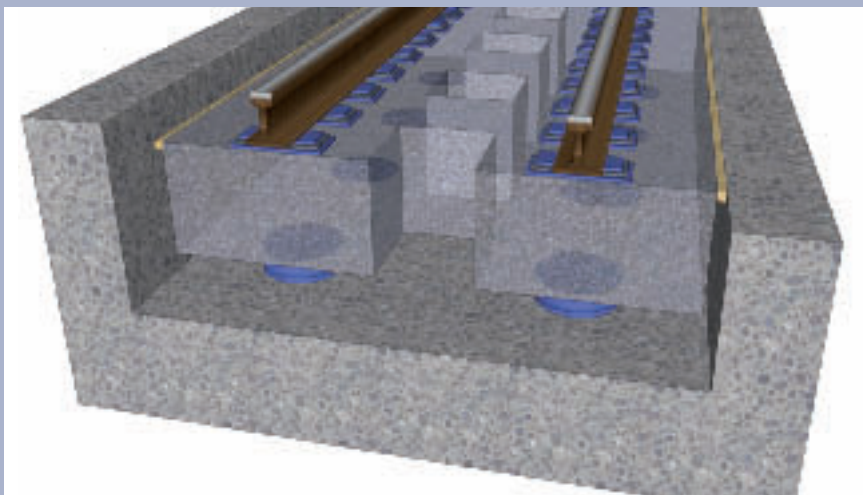
- TU München
- TU Berlin
- MPA Dortmund



Picture 3: Positioning of the MSS elastomeric Bearings

Small Spring Elements with great Effect

Technical Data



Picture 4: MSS with concrete slab track and inspection holes (schematic)

Technical Data Standard Elastomeric Bearings

	Type 1	Type 2	Type 3
Length [mm]	–	–	335
Width [mm]	–	–	335
Diameter [mm]	240	280	–
Thickness [mm]	59	69	69
Weight [kg]	4	7	13
Bearing Capacity [kN]	100–250		
Static Stiffness [kN/mm]	7–30		

Table 1: Standard elastomeric Bearings



Picture 5: MSS in tunnel



Picture 6: Section through MSS bearing

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