

## User report

# PZ glide shoe at Kombiverkehr Bonn

An excursion to Kombiverkehr Bonn, Am Eifeltor, Cologne in March 2014

### Challenge / customer requirements

The rail cars used for combined rail transport travel more than **150,000 km** each year and thus naturally have to be extremely robust. This is particularly true of the coupling and wear elements. In the articulated cars, these include several components of the articulated joints. Articulated cars consist of two car sections:

car section A with 2 upper rotary pans for 2 bogies, and car section B with only one upper rotating pan for the 3rd bogie. Car section B is equipped with swivelling joint shoes on the articulated joint side, which transfer a portion of car section B's load amounting to approximately 20 tons to car section A. When the car is moving, the surface of the joint shoe glides on a counter-plate, which is attached to car section A. On curvy routes such as those encountered on transalpine trips, the gliding movements are particularly intensive.

### The customer

#### Kombiverkehr Deutsche Ges. für komb. Güterverkehr mbH & Co.KG

Kombiverkehr, which means „combined transport“ in Germany, is a logistics service provider which develops, organizes and markets a network for combined road-rail transport across Europe. In 2013 the company moved 21.8 million tones of goods, or 0.94 million lorry shipments, from road to rail.

### Specific problem definition

Welded manganese plates were used in the original version of these components for the surface of the joint shoe and the counter-plate. The joint shoe was made in two parts so as to be able to adjust the coupling height of car section B using spacer sheets.

This version has proven to be ineffective for the following reasons:

- > **Severe wear of gliding surfaces and uneven abrasion of the counter-plate.**
- > **Not-fixed and axially flexible bushings cause the joint shoes to jam**

The cost of maintenance is high because the counter-plate's weld has to be removed completely before a new base plate can be welded again. In addition to the costs of material and work, the calculation also has to include transport to a repair shop, loss of freight transport time and rent for a replacement car. At least **1 working day with two professionals** is required for repair (approximate cost is over **1,000 euro**) per car.

### Solution and efficiency optimization by PZ friction

Together with the car manufacturer Ferrierre Cattaneo (Switzerland) and PZ Friction, Kombiverkehr developed an improved version and tested it in transport operations.

The primary features include:

- > **Single-component joint shoe without bushings with bound and glued PZ 7010/J148 friction lining. The applied heat adhesion procedure guarantees a durable and reliable connection between the friction lining and the glide shoe.**
- > **Stainless counter-plate, which is bolted to car section A. Additional sheets made of the same material can be placed between the counter-plate and the lower frame of car section A. The friction plate's bolt connection is used for the glide unit on the bogie side.**

Welding work is no longer required. All parts can now be replaced easily and inexpensively in less than **2 hours** (approximate costs **100 euro**). Kombiverkehr can even perform this work within the context of mobile maintenance at the terminal. PZ Friction's PZ 7010/J148 linings applied using heat adhesion in combination with the stainless counter-plates have proven to be exceptionally durable with life cycles of over **500,000 kilometres**.

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Using the new material saves 90% of the costs for shoe replacement and results in a 330% increase in the annual performance results until replacement is necessary in direct comparison.

### BEFORE

## Old glide shoe

Material: welded, steel manganese surface

Effort: 1 working day, 2 technicians

Cost: **1,000 euro**

Performance: **150,000 km per year**

Problem:
 

- difficult removal using levers
- grinding out welding seams
- forceful removal of bushing and the glide shoe

Conclusion: Consequential damage caused by wear of the old glide shoe. Upper brackets worn down. Load-bearing axis in the middle of the bogie is exposed to high pressure and thus sinks. Target play 10 – 15 mm.

### AFTER

## PZ glide shoe

Material: bolted using Jurid 148, Hardox on opposite surface

Effort: **2 hours**

Cost: **100 euro**

Performance: **500,000 km per year**

Solution:
 

- simple bolting
- no corrosion problems
- no bushings

Conclusion: The glide shoe is replaced less often, due to minimized wear of the Hardox stainless steel.

