Project: "Linz Linien 'Wheel Wear'"

URBANIA
TRAFFIC SOLUTIONS GMBH

Client:	Linz Linien
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Project Duration:	2007 - 2014

Project Brief:

In October 2008, it was decided to service the Linz Linien rails through build-up welding and re-grinding the rail profile, in order to:

- ensure derailment safety
- minimize exterior noise and floor vibrations
- reduce wheel and rail wear, and consequently reduce the cumulative costs

Already in 2007, the decision was made to adopt rail type 60Ri2 in the municipal area. But faceting the rail head curvature along the running edge, throughout the Linz Linien network, proved to be a particular challenge. The main difficulty was that, in the process of grinding down corrugations, the running edge became increasingly sharp-edged.

What lead to a significant improvement in wear behaviour, however, was the development of a profile pairing deliberately designed for two-point contact. Before the profile was optimised, the radius loss due to natural wear amounted to about 1,2mm/10.000km, and with every wheel re-profiling, the wheel diameter loss amounted to about 20-25mm. These values were reduced to 0,6-0,8mm/10.000km, and 10-15mm of material loss per re-profiling, thanks to the new wheel profile design and large-scale rail grinding.

Because the vehicles run unidirectionally, with reversing loops in the terminal stations, the bogies have usually been turned around after half their mileage (30.000-35.000km), between two wheel re-profilings (60.000-70.000km). That way, the wheel flange of the leading wheel set, which is the most stressed, may recover as the trailing wheel set. The optimised profile pairing allowed for two significant improvements: not only was the wheel and rail wear significantly reduced, but there was also observable material migration, caused by a milling process during rollovers, which accounted for an increase in wheel flange thickness.

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Task Description:

1. Current state survey:

- Summary of previous profile measurements
- Analysis and evaluation of the collected data
- Development of a targeted improvement program

2. Improvement of wheel-rail contact:

- Projecting and evaluating changes that would ensue from an altered wheel profile
- Recommendation of a new wheel profile
- Preservation of the existing rail profile by means of regular rail grinding
- Recommendations for outsourcing the rail grinding project

3. Comparative evaluation and cost survey:

- Evaluation of the rail and wheel wear development over an extended period of time
- Determining the costs for the rail grinding project
- Comparing the estimated costs with the savings achieved through the improved wheel mileage

4. Additional recommendations for further optimisation:

- Continued and consistent measuring of the wheel/rail profiles
- Continued periodic rail grinding
- Reduced material loss during wheel re-profiling process
- Increased intervals between bogie-turnarounds and wheel re-profilings
- New reversing loops (clockwise)
- Use of economic profiles for further increase in mileage

Profile pairing, old and new (after 2008)

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