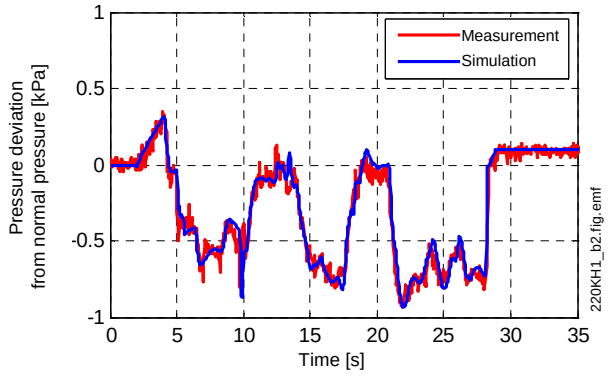
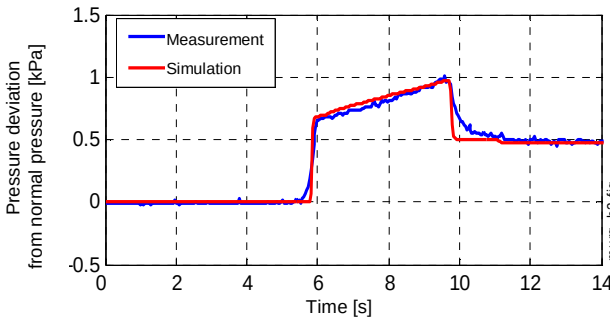
New Rail Link Mattstetten-Rothrist (CH)
Measurements on performance of pressure relief shafts

Test train with measurement equipment entering the Tunnel Murgenthal; positions of pressure transducers are indicated



Calculated and measured pressure variation at head of train during tunnel transit of Tunnel Emmequerung with v_{train} = 220 km/h



Calculated and measured pressure variation in Tunnel Murgenthal with entry velocity of 180 km/h

Description

The New Rail Link Mattstetten-Rothrist in Switzerland incorporates several tunnels with cross-passages and shafts for pressure relief. To this extend and purpose, these have not been applied to other European railway tunnels. Obtaining the equal pressure comfort for passengers, the tunnel-cross-sections and thus the construction costs were reduced. During the period of commissioning, HBI Consulting Engineers conducted aerodynamic measurements to verify the efficiency of the pressure relief shafts.

Services

The sizing and positioning of the pressure relief shafts has been done by HBI during the planning phase about 8 years before the commissioning of the new railway link. For the aerodynamic measurements, the following services have been provided:

- Preparation of measurements by simulation of the aerodynamic conditions during train passages of the tunnel
- Planning and coordination of train runs with data acquisition in cooperation with Swiss Federal Railways (SBB)
- Installation of data acquisition equipment on trains and in tunnels
- External and internal measurements of pressure at head and tail of train (160–220 km/h)
- Measurements of pressure fluctuations in tunnels
- Measurements of deceleration during coasting runs
- Evaluation and analysis of recorded data
- Confirmation of the aerodynamic performance of the shafts based on comparison of measurements and simulation
- Verification of effectiveness of pressure relief shafts by confirming pressure comfort criteria (Δp_{max} < 1.5 kPa in 4 s)
- Determination of vital train parameters for aerodynamic simulations based on pressures measured in the tunnel
- Determination of pressure tightness of trains by on-board data acquisition (coefficient of pressure tightness)