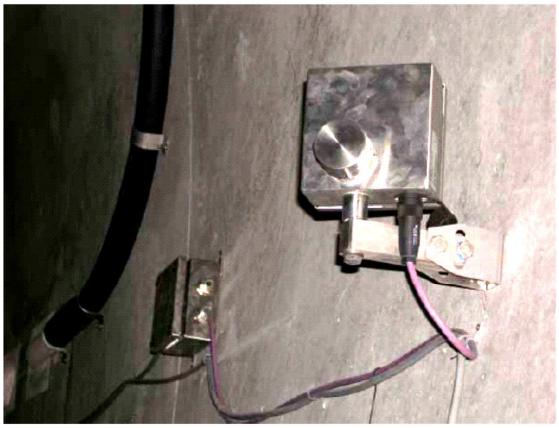
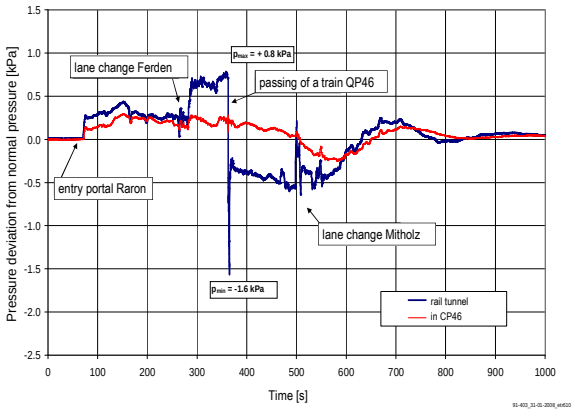
Lötschberg Base Tunnel (CH)
Aerodynamic measurements in tunnel and trains

Pressure transducers (red marks) to record the train-induced pressure variations in the rail tunnel



Transmitting/receiving unit of a 1D-ultrasonic flow measurement system for contact-free measurement of flow velocity



Pressure history in rail tunnel (blue) and in adjoining cross-passage (CP 46) during passage of the Pendolino Due / ETR 610

Description

During the commissioning phase of the Lötschberg Base Tunnel (LBT), extensive test runs with various train types and train speeds were performed as part of the homologation process. The following objectives were achieved by aerodynamic measurements:

- Verification of design assumptions (pressure load, wind load, pressure comfort, etc.) for civil construction, equipment and trains
- Contribution to acceptance process (operation licence regarding aerodynamics and safety approval)
- Collection of base data to reduce uncertainties in the area of aerodynamics for design of future projects

Services

HBI Haerter Consulting Engineers provided the following services:

- Elaboration of the measurement concept for commissioning of the Lötschberg Base Tunnel
- Execution of measurements of train-induced pressure variations and air speed (1D and 3D) in the train tunnel, the service tunnel, in the drainage system and in trains
- Elaboration of the measurement concept regarding pressure comfort measurements on passenger trains
- Analysis of the measured data and allocation to the specific test runs
- Elaboration of maximum positive and negative pressure deviation from normal pressure in rail and service tunnel
- Identification of the maximum pressure difference between rail and service tunnel
- Determination of the maximum pressure variation at the train to check the pressure comfort criteria
- Elaboration of the maximum flow velocities in the rail tunnel (1D and 3D) in relation to operation conditions
- Comparison of the results obtained by measurements and numerical simulations