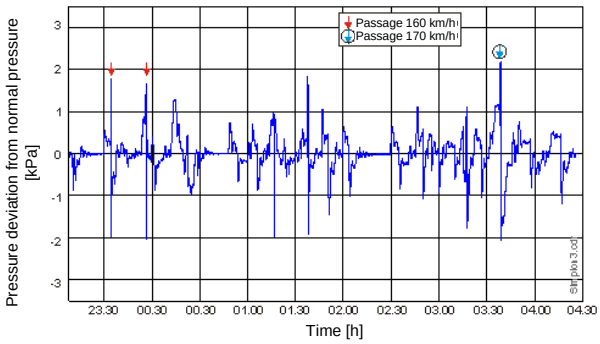
Simplon Tunnel (CH/IT)
Measurements of train-induced pressure variations

Northern portal of the Simplon tunnel

Installation inside of the cross-passage for data acquisition (left)



Pressure deviation from normal pressure in the tunnel during test run of high-speed train ETR 470

Description

The 20 km long Simplon rail tunnel connects the Italian and Swiss railway networks. It is operated by the Swiss Federal Railways (SBB).

The free cross-sectional area of the two single-track tunnel tubes of the Simplon tunnel is smaller than the free cross-sectional area of the Lötschberg base tunnel as well as the existing rail tunnels (double-track) at Gotthard and Lötschberg. Accordingly, in the Simplon tunnel more extreme aerodynamic conditions appear at the same speed compared to other existing rail tunnels in Switzerland. The train-induced pressure variation had to be determined for an increase of travel speed from V_{train} = 140 km/h to V_{train} = 160 km/h in the tunnel.

Train-induced pressure variations in railway tunnels are caused by:

- Train entry and exit of tunnel
- Train passages at changes of cross-sectional area (for example in crossover)
- Train passage at the measurement location due to pressure changes along the train

Services

HBI Haerter Consulting Engineers provided the following services:

- Elaboration of the concept for measurements, commissioning of the measurement system and realization of the measurements of train-induced pressure variations in the Simplon tunnel
- Analysis of the measured data and checking of the plausibility of the data
- Determination of the maximum positive and negative pressure deviation from normal pressure in the railway tunnel for single runs with the train ETR 470
- Determination of the maximum positive and negative pressure deviation from normal pressure in the railway tunnel during normal train operation of several days
- Summary report as decision bases for safety authority