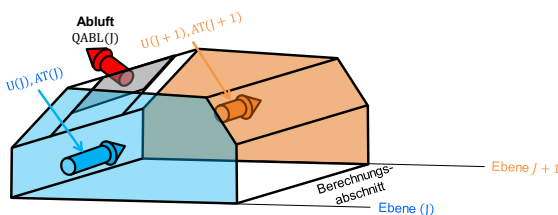
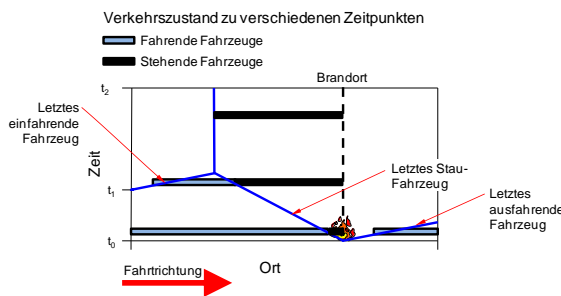




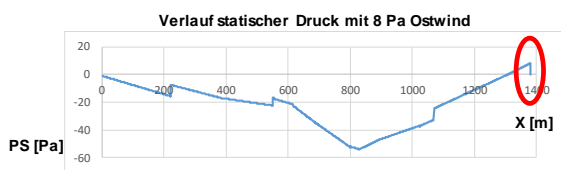
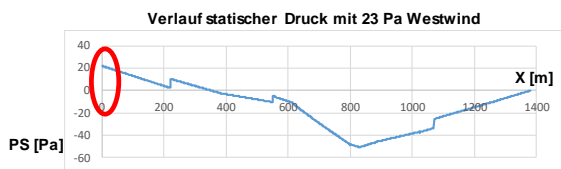
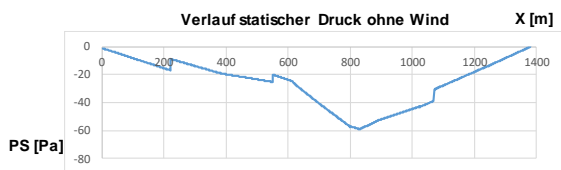
Tunnel cross-section with sliding window for smoke extraction



Change in tunnel air speed when air is admitted to or extracted from the tunnel in a plotted section



Calculation of traffic conditions at different times



Sample depiction of pressure curve over tunnel length under differing wind pressures

Description

The Goldbach/Hösbach noise-protection enclosure forms part of the A3 motorway between Frankfurt and Nuremberg and comprises the east and west sections. The west enclosure measures 1,382 meters in length, while the east enclosure is 379 meters long in the north tunnel and 718 meters in the south tunnel. Both sections have a longitudinal inclination of 0.2 percent facing east and are used on three lanes.

The tunnel has longitudinal ventilation facility integrating 14 jet fans for normal operation. In the event of a fire outbreak, smoke is extracted through sliding windows located in the roof of the tunnel. The windows are hydraulically actuated, allowing the hot smoke to rise up and escape of its own accord.

Services

The tunnel simulator developed facilitates extensive functional testing of the automatic ventilation control system during a fire outbreak scenario as well as during normal operation while safeguarding detailed validation of the system's operative function. To this end, the PLC programmed with the ventilation control system links to the simulation program (tunnel simulator), which simulates tunnel response with its various properties and interfaces.

HBI Haerter Consulting Engineers developed the module "tunnel ventilation" module for the tunnel simulator. This module simulates the ventilation characteristics of the tunnel and the response of the tunnel ventilation system and associated metrology during normal operation as well as during a fire outbreak.

To this end, the module factors in account pressure losses attributed to cross-sectional transitions, vehicles, jet fans, the chimney effect, wind, inertia, friction and inlet and outlet losses in the portal areas.

The operator can simulate normal operation and fire outbreak scenarios as well as thoroughly familiarize himself with all aspects of tunnel operation. Practicing the necessary action sequences during an emergency and in extreme situations in particular can significantly improve safety and operation speed.