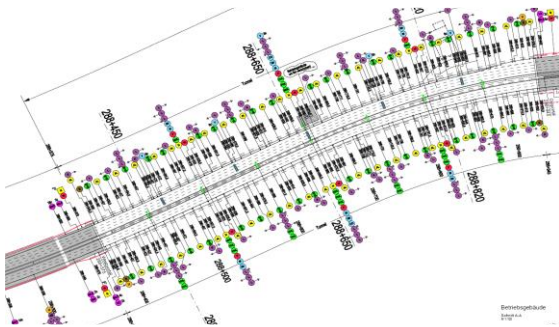




Location of Katzenberg tunnel near Würzburg on A3 federal highway (from: V-KON.media GmbH)



Overview of technical facilities in the Katzenberg tunnel near Würzburg



Jet fans above the lanes



Fire test to verify airflow and smoke propagation velocities

Description

A tunnel simulator was developed for the twin-tube, 570 m Katzenberg tunnel near Würzburg on the A3 federal highway. Integrated in the simulator, among other things, is an aerodynamic model that links to the control system. The aerodynamic model coordinates the time sequences of the physical variables, including the fire load, air speed, smoke propagation and pressure differential, while the responses of the ventilation system and overall technical safety equipment (lighting, traffic control, video, etc.) are saved as data points in the controller. The primary objective was to test and validate the extensive variation options of the automatic controller for the tunnel ventilation system in the event of a fire outbreak. Training the tunnel operators on the tunnel simulator also ensures the best possible staff response in an emergency situation.

The simulation results of numerous test scenarios conducted on the tunnel simulator as manufactured by the implementing company in line with HBI requirements were compared against an independent test program to safeguard correct operative function of the simulator and the tunnel ventilation controller. Fire and smoke tests were also conducted to validate the theoretical physical principles of the tunnel simulator. The experimental measured values were then compared against the corresponding simulated values of the tunnel simulator and revealed very good agreement of the measured and calculated values for airflow and smoke propagation speeds. The operative function of the tunnel ventilation controller had therefore been demonstrated.

Services

HBI Haerter Consulting Engineers rendered the following services:

- Preparation of concept, detailed design and requirement specifications for tunnel simulator
- Verification of ventilation and physical properties of tunnel simulator as based on computations and comparison against 525 fire outbreak scenarios
- Optimization of tunnel ventilation controller in line with analysis of results
- Evaluation of fire and smoke tests to verify basic aspects of tunnel simulator