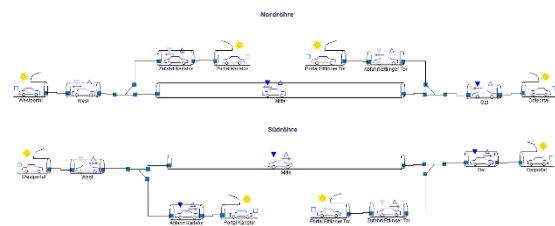
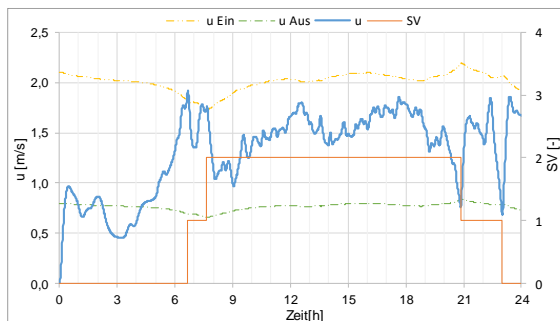


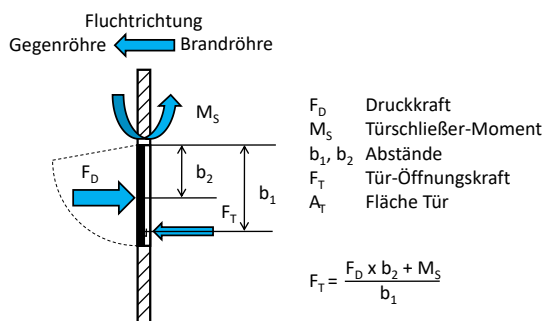
Arrangement of jet fans in the ceiling recesses



Modeling of the Kriegsstrasse tunnel in IDA RTV (computational program). The program calculates transient flows while factoring in all relevant effective forces such as traffic, friction levels, tunnel ventilation and fire buoyancy.



Control of the jet fans via enable and disable limit values



Derivation of the moment balance at the pivot point of the door for analyzing the maximum permissible door opening force of the escape route doors

Description

The Kriegsstrasse tunnel, which comprises two 1,400 meter tunnel tubes and features multiple entrance and exit points as well as connects to an underground parking garage, is a subproject of the inner-city combination traffic project engineered for Karlsruhe (Kombilösung Karlsruhe).

The tunnel will boast no fewer than 36 jet fans, which will be used in the “passenger rescue” and “fire-fighting” phases in the event of a fire outbreak.

During normal operation, the jet fans are switched on and off in line with the emissions regulations defined by HBI. Critical emissions exceedance events at the west portal are thereby avoided, while pollutant emissions from the tunnel in the parking garage are reduced to a minimum.

In the Kriegsstrasse tunnel, nine emergency exits lead directly from the respective fire section to the adjacent, unaffected section. In the event of a fire outbreak, the longitudinal ventilation system builds up an overpressure level in the adjacent tube structure not impacted by the fire to prevent smoke entering the surrounding area of the escape doors. At this time, the jet fans are switched on and off accordingly to ensure compliance with the maximum rated door opening force of 80 N as defined in the RABT guideline requirements.

Services

HBI Haerter Consulting Engineers rendered the following services for planning of the ventilation system:

- Preparation of ventilation assessment report
- Implementation of service phases “Basic evaluation, preliminary planning and design planning”
- Implementation planning for ventilation equipment
- Drafting of control requirement specifications as part of implementation planning for ventilation control parameters

This project required additional services that were rendered by HBI:

- Preparation of emissions reports
- Assessment for developing an energy-efficient control system for tunnel ventilation
- Creation of a tunnel simulator for tunnel ventilation