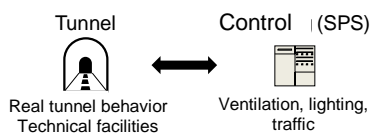
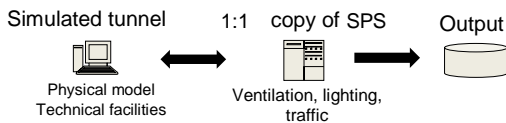


Operating panel: fire programs for tunnel ventilation

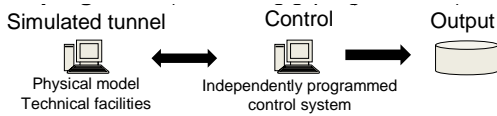
Reality



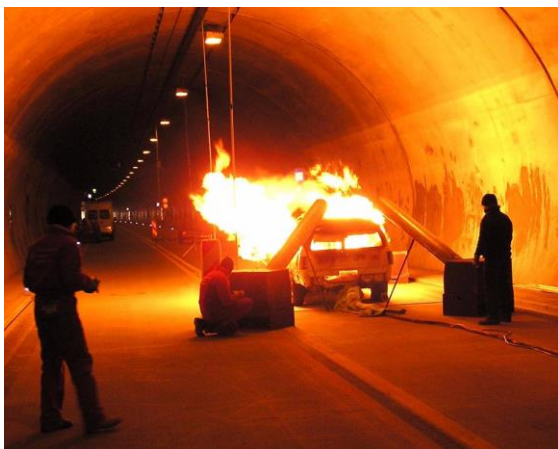
Tunnel simulator



Test program (independently programmed)



Relation between tunnel and control in reality, in the tunnel simulator and the tunnel simulator test program



Fire test in the southern pipe of the tunnel

Description

The Schwarzer Berg Tunnel is part of the BAB A70 between Schweinfurt and Bamberg. The northern pipe and the newly built southern pipe are used in two-way traffic respectively on two lanes without hard shoulder. A longitudinal ventilation with jet fans is installed in both pipes of the tunnel.

Services

A tunnel simulator has been developed to be able to test the comprehensive variation options in the automatic control of the tunnel ventilation for the fire case and to ensure a correct operation. HBI Haerter Consulting Engineers has defined the technical model requirements for the ventilation and the calculation bases for the tunnel simulator. The tunnel simulator, which also covers the reactions of all technical safety equipment (lighting, video etc.), was realized by an executing contractor.

For an efficient test of the tunnel simulator, HBI developed a test software. By comparison of the evaluation of the test results to the results of the tunnel simulator and the tunnel ventilation control, the correct operation was verified. The test software consists of an aerodynamic and a control module. The aerodynamic module models the development of the physical values in time, like e.g. thermal power, pressure difference, air speed, smoke spread, etc.. The control module imitates the reactions of the control system of the ventilation and of the traffic influence facilities. A total of 210 test scenarios were modeled and tested.

On the basis of the results, it was decided to optimize the existing control of the ventilation in a fire case. The tunnel simulator also serves to simulate the control activities for the tunnel supervision personnel without impacting the real technical installation for the internal operation on site. This allows the operators to achieve the operating safety of the technical operations equipment.