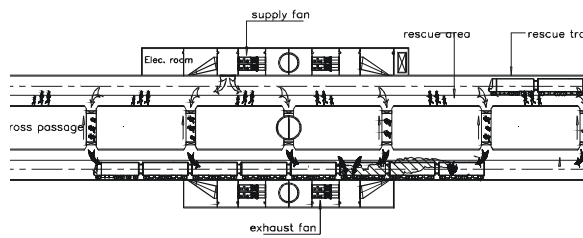
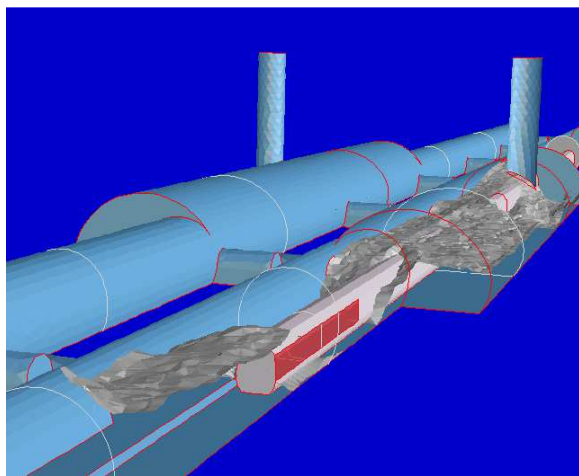


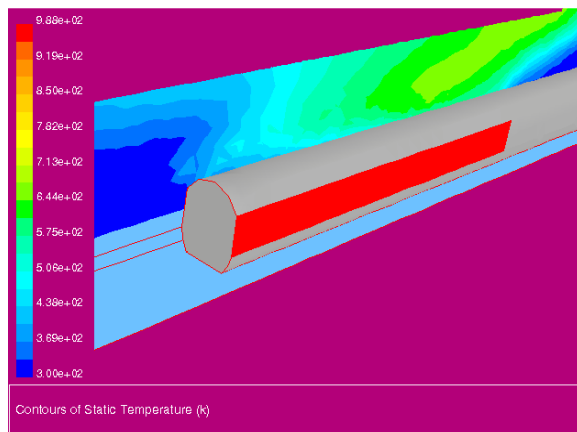
Start of rescue station



Central part of rescue station at the crossovers



Smoke dispersion in the rescue station



Temperature distribution in the tunnel in the event of a train fire

Description

The Young Dong Tunnel is designed as a 16.3 km single-track rail tunnel with a maximum gradient of 2.5 % and contains a crossing station.

HBI Haerter Consulting Engineers was mandated by the Daewoo Consortium for consultancy in the areas of ventilation and risk control.

In order to achieve the required high standards of safety, HBI carried out a detailed risk analysis. On the basis of this study, HBI proposed that the crossovers should be upgraded to a rescue station, with smoke control facilities for fire emergencies.

The newly-designed rescue station has eight cross-passages connecting the two platform tunnels. In case of a train fire, passengers can escape to the non-incident platform through the cross-passages, with the ventilation system protecting them from smoke.

The CFD (3-dimensional) results were particularly useful in convincing Daewoo Consortium and the end client (Korea National Railroad) of the effectiveness of the chosen emergency ventilation concept in satisfying the required high standards of smoke control.

Services

HBI Haerter Consulting Engineers provided the following services:

- Development of a one-dimensional model of the entire tunnel including the rescue station and the three shafts
- Specifying the required critical velocities for smoke control
- Carrying out aerodynamic calculations in order to design the ventilation system for normal and emergency operation
- Specifying the supply and extract air flowrates for the ventilation equipment
- Evaluation of the effectiveness of the smoke extraction in case of fire using Computational Fluid Dynamics CFD