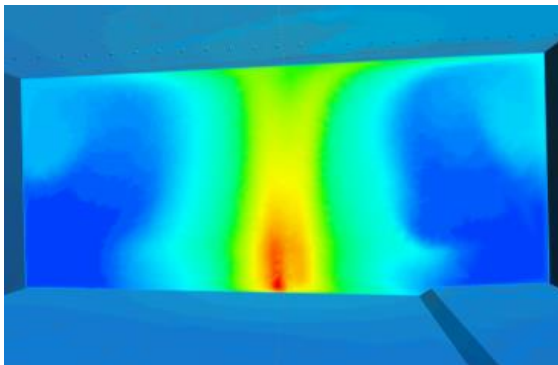
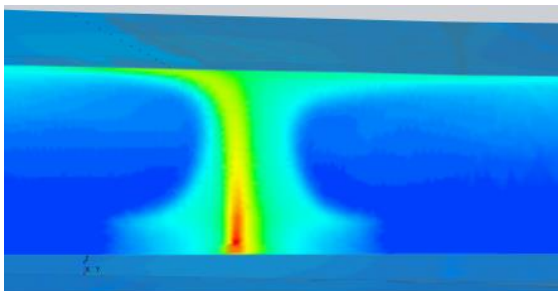


Surface temperature, environment of the fire source



Air temperature in cross section



Air temperature in longitudinal section

## Description

The tunnel section *Champ Coco* with a length of 400 m is a section of the *Traversée de Neuchâtel*, a motorway tunnel that runs under the city of *Neuchâtel*.

A vehicle fire inside a tunnel results in very high local temperatures on the tunnel ceiling. In extreme cases, the temperature load that affects the building can lead to a structural failure of the entire building. In order to be able to estimate the extent of such damage in the event of a fire, the temperature distribution in the area of the concrete slab was calculated and analysed for a 100 MW fire, whereby the air temperature within the boundary layer and the temperatures within the concrete structure were calculated by means of a conjugate heat transfer simulation. Such a simulation not only determines the temperature distribution of the air, but also the thermal transfer to the concrete as well as the thermal conduction within the concrete shell. The temperature data was made available to the person in charge of the project as a basis for the structural strength calculations.

The fire source was modelled as volumetric heat source, the thermal power of which rises to the maximum value within a defined period of time according to the specified curve. For reasons of conservativity, the electro-mechanical equipment was not considered.

## Services

The order comprised the following services:

- 3D CAD modelling of the tunnel tube and tunnel structure
- Spatial discretisation as unstructured polyhedral grids
- Transient fire modelling based on a volumetric heat source
- Calculation of the temperature distribution in the air volume and within the tunnel structure by means of a conjugate heat transfer simulation
- Extraction of the surface temperatures as the basis for statics calculations