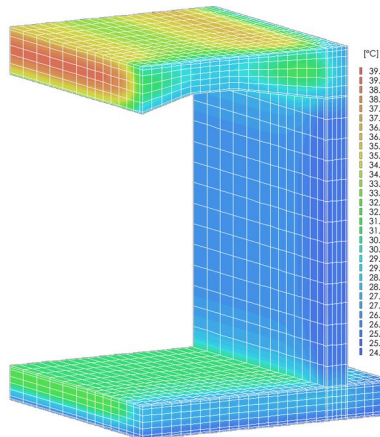
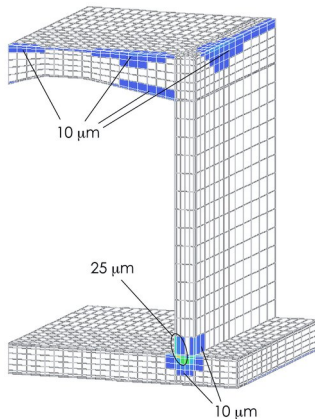


## Reference Engineering

### Cracking in Tunnel Constructions, Lüsslingen/SO



#### Facts

##### Object:

New building of the highway sector A5 Yverdon-Lutterbach, roofing Lüsslingen and Spitalhof, Tunnel Birchi, tunnel model Lüsslingen.

##### Duration of the project:

March 1997 to August 2003

##### Building owner and client:

Civil Engineering Office Kanton Solothurn

#### Problem and task

Crackings in reinforced concrete structures can lead to a considerable reduction of the repair-free occupancy period. Especially massive or monolithic construction units are at risk. The main reason for durability-relevant cracking are combined mechanically, hygrally and thermally induced tensions. To be able to predict cracking in newly built tunnels, it is important to experimentally determine the time-dependent spreading of moisture and temperature in the concrete using a tunnel model produced in advance. Based on this model, it is possible to obtain a forecast referring to the risk of cracking in tunnel constructions.

#### Solution

- Carrying out of experimental measurements on a tunnel model (spreading of moisture and temperature, deformation).
- Parameter study to establish a suitable curing concept.
- Numerical simulation of hygral and thermic tensions and cracking which are to be expected in tunnel constructions.

#### Judgement

Based on the results of the numerical simulation, it was possible to establish an optimized concrete and curing concept and to therefore avoid the development of durability-relevant cracking despite the difficult conditions. The knowledge gained from this project about development and influence of thermally and hygrally induced cracking has served as a basis for an increase in durability of similar constructions.