THE NORTHERNMOST UNIVERSITY
of Technology in Scandinavia

Thermal Boundary Conditions Based on Field Modelling of Fires

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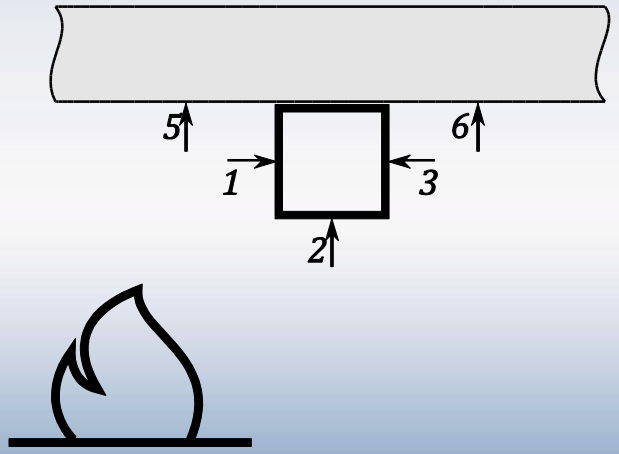
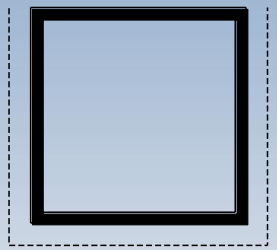
Methods for temperature calculation

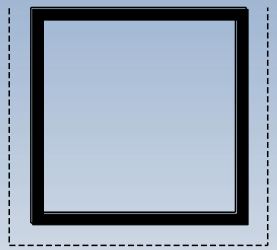
- Given a set of fire exposing temperatures, the thermal response can be calculated with different levels of accuracy
- Four different methods with increased complexity were compared



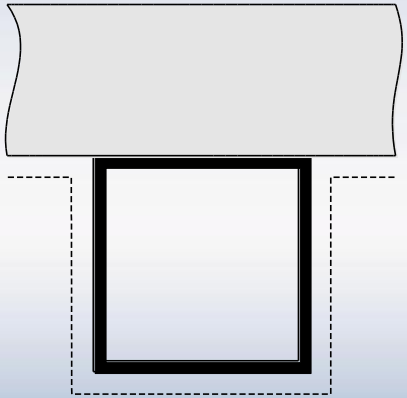
Methods for temperature calculation



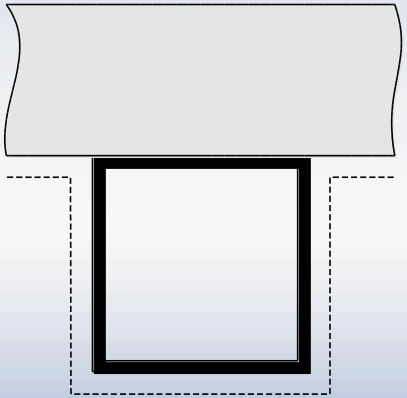
1. Spread sheet



2. FEA



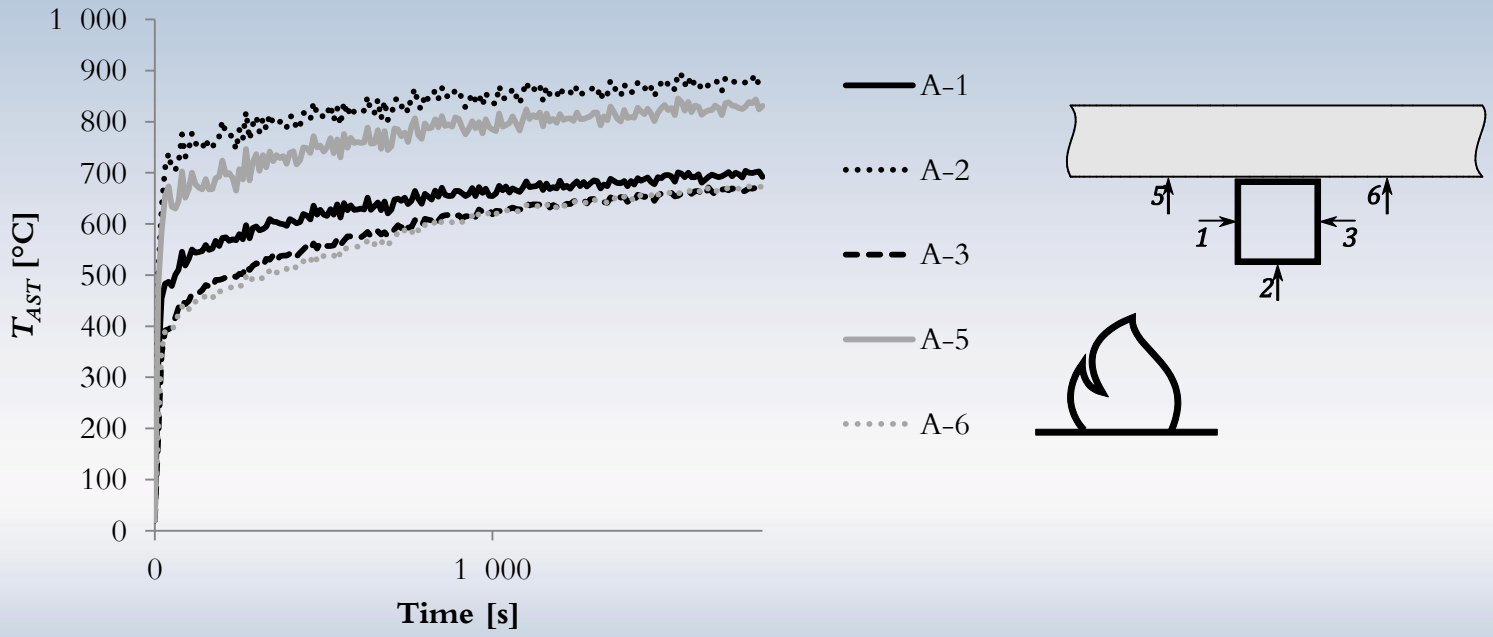
3. FEA



4. Full FEA

Methods for temperature calculation

T_{AST} calculated in FDS



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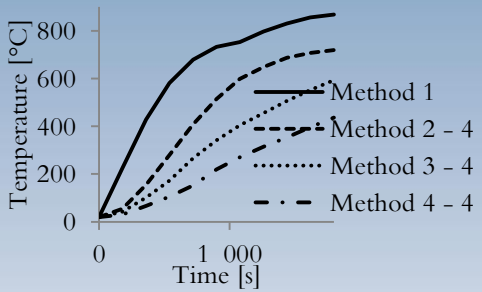

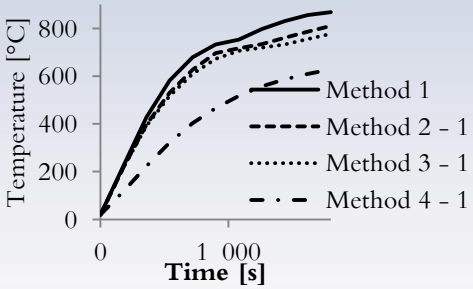

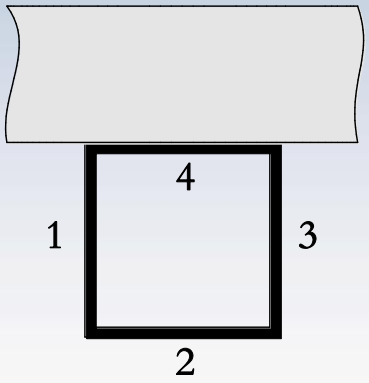

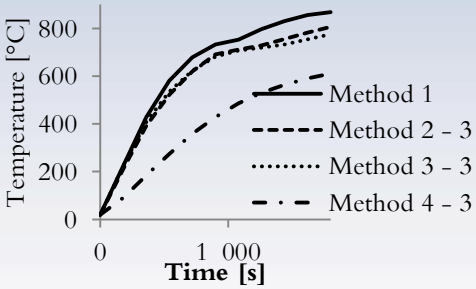

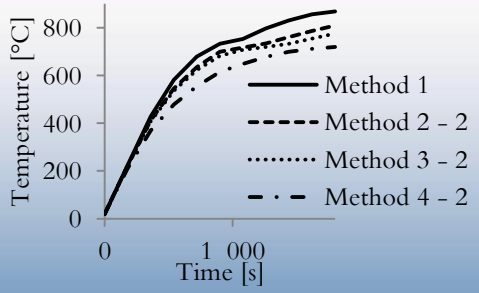

Methods for temperature calculation

- Regardless of FE-method, upper flange is cooler
- Design temperature difference is large

	Side 1	Lower flange	Side 3	Upper flange
Method 1	877°C	877°C	877°C	877°C
Method 2	811°C	809°C	807°C	719°C
Method 3	777°C	776°C	772°C	594°C
Method 4	628°C	719°C	611°C	436°C