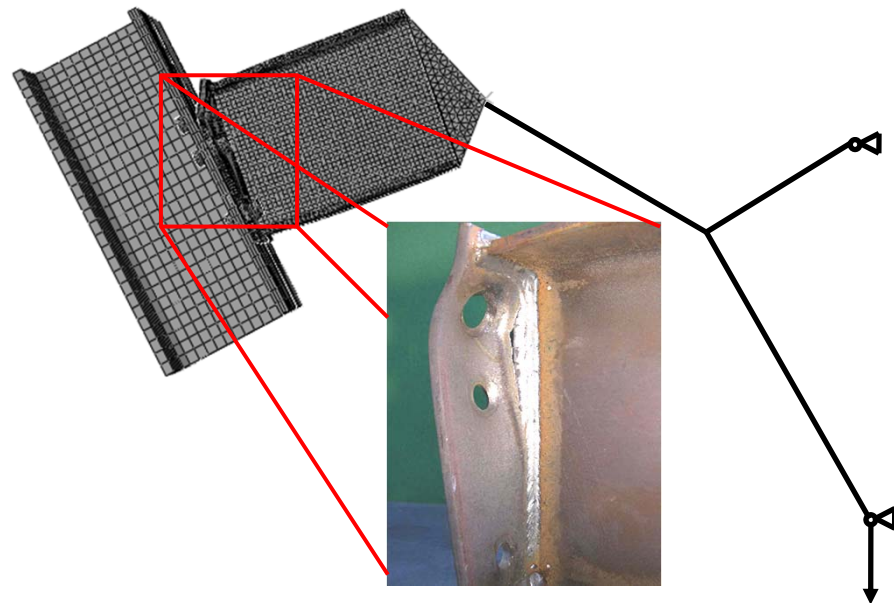




Fracture Simulation in a Steel Connection in Fire

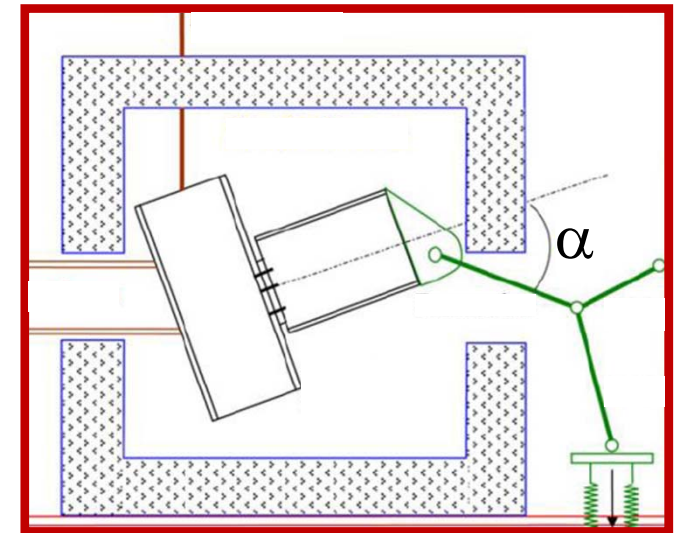
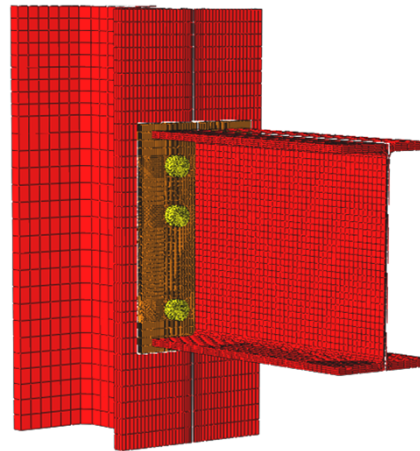
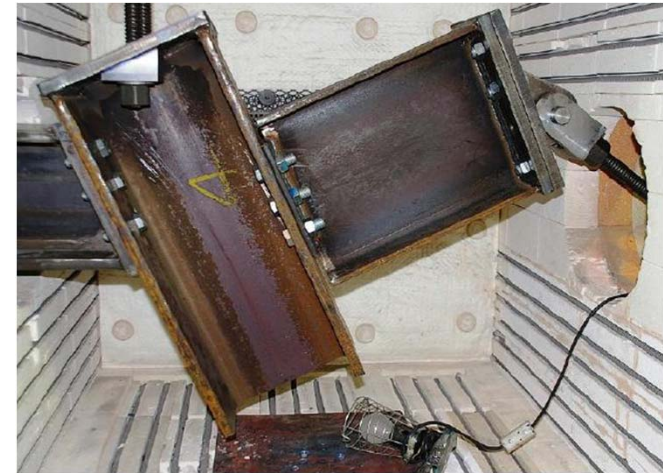


Thomas Kirsch

Experiments for validation



- Test by Yu et al. in Sheffield
- Test setup
 - Stiffened column
 - Beam loaded at angle α
 - Constant temperature
 - Increasing load until failure
- Connection detail
 - Flush endplate
 - 6 bolts

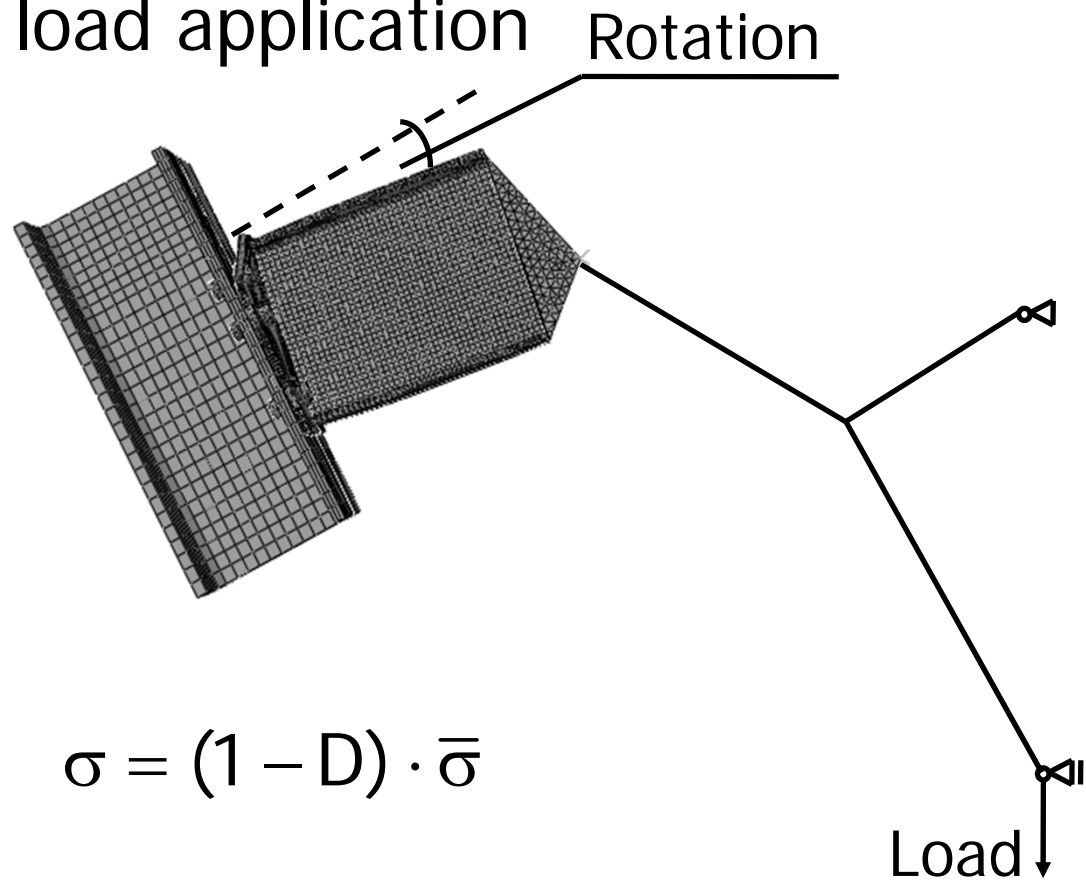


\x hwd1+533; ,

Numerical model



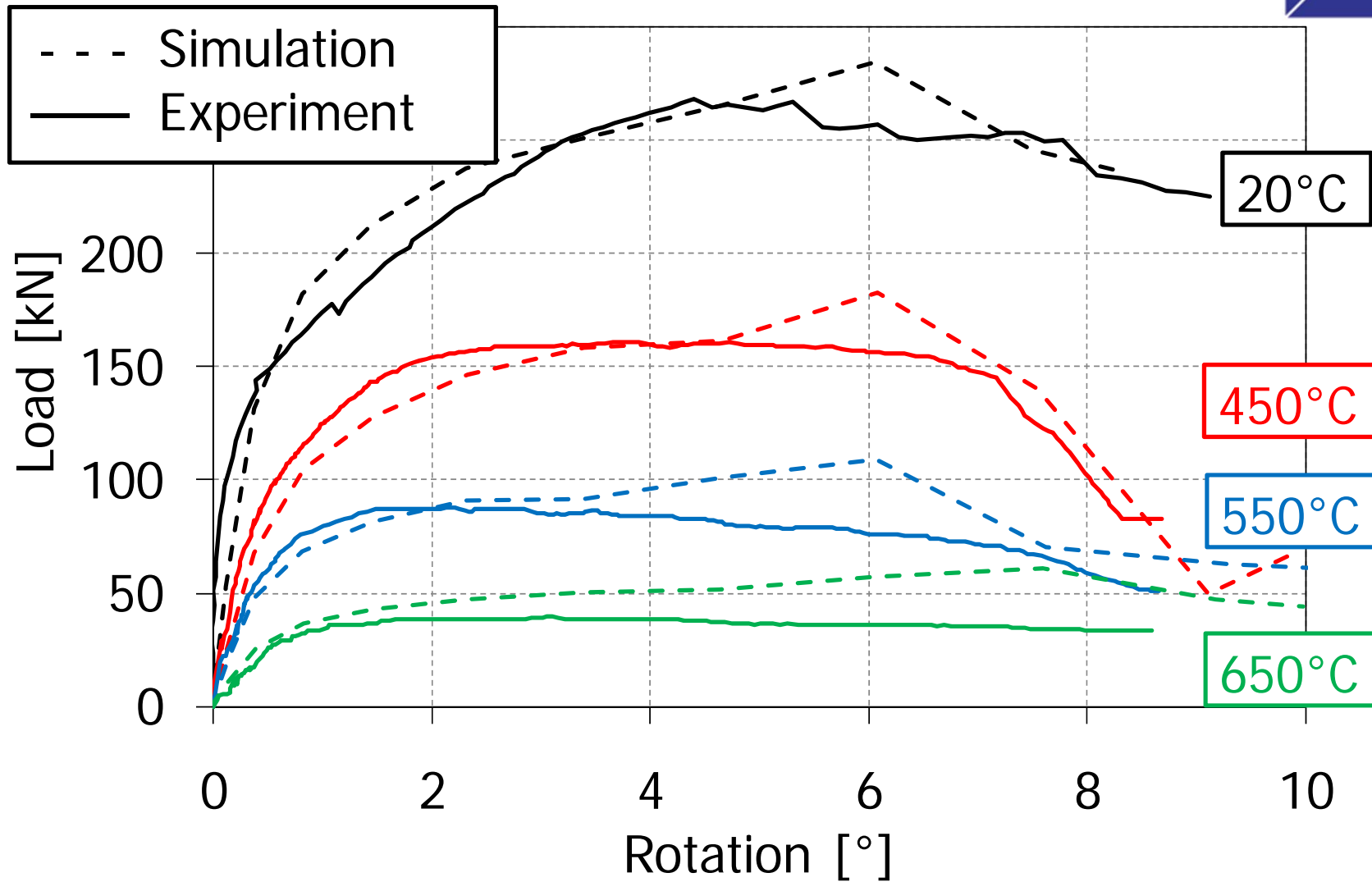
- 3D-model using solid elements
- Beam elements for load application
- Parametric studies
 - Mesh size
 - Solver algorithm
 - Fracture algorithm



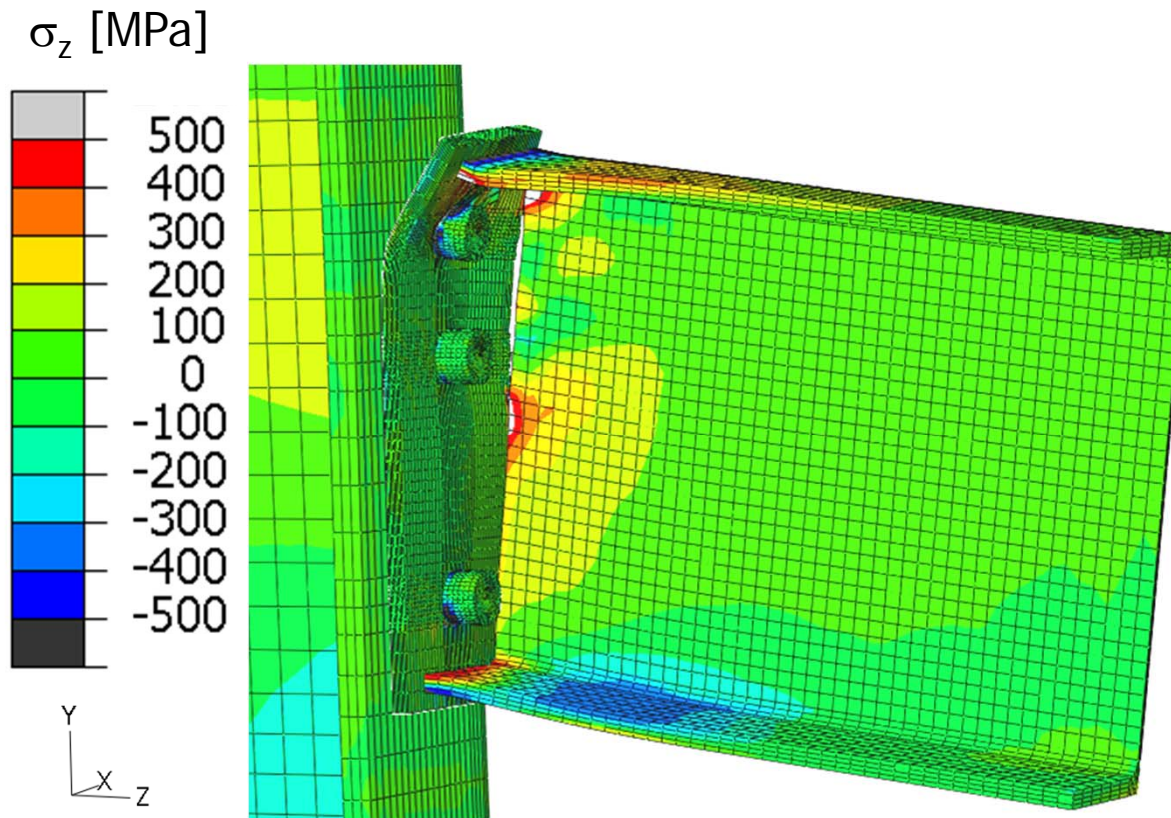
→ Chosen approach:

Ductile damage $\sigma = (1 - D) \cdot \bar{\sigma}$

Numerical results



Failure of connection



Stress in beam direction in test at 20°C
and rotation of 7.5°



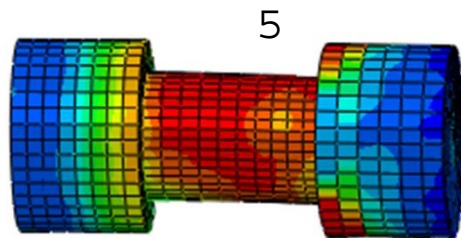
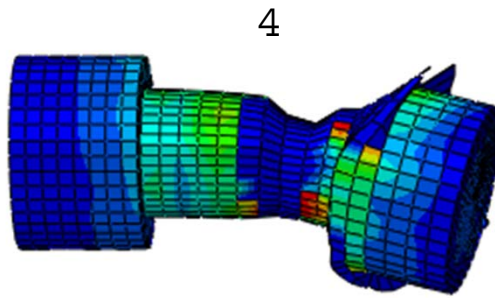
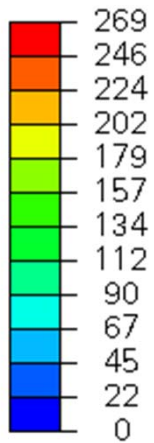
Deformed specimen
after test at 20°C

Thank you for your attention!

Idbuxh ri erow dwk.ljk wnp shudwxuhv

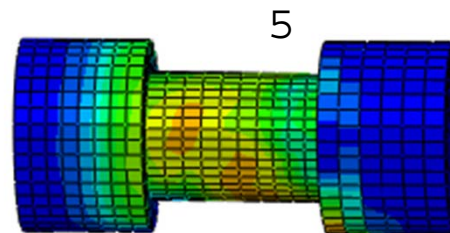
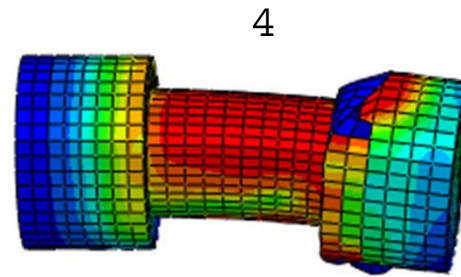
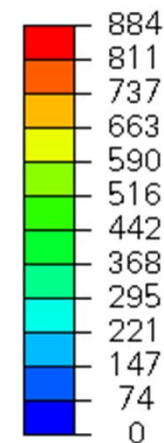


σ_p Mhv
 $\hat{Q} \hat{p} \hat{a}$

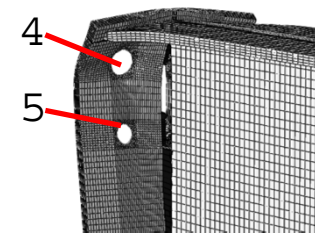


HSb883b88 W@883°F,

σ_p Mhv
 $\hat{Q} \hat{p} \hat{a}$



HSb53b88 W@53°F,



Erow 4 dqg 5 dwurwawirg ri : B°