

Tensile test of a notched DP1000 steel coupon

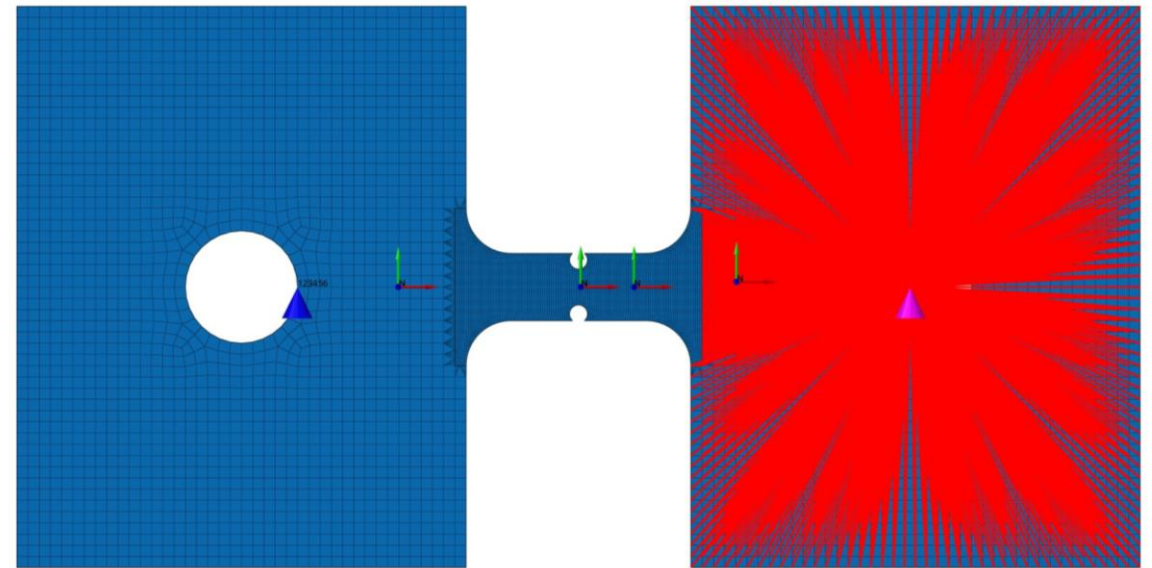
For questions, please use contact form



ALGO
Engineering
Simplifying FEA

Model Description

- Simulation of tensile test of a notched DP1000 steel plate is based on the experimental study documented in the following paper.
 - S. Chandran, W. Liu, J. Lian, S. Münstermann, and P. Verleysen, “Strain rate dependent plasticity and fracture of DP1000 steel under proportional and non-proportional loading,” *European Journal of Mechanics - A/Solids*, vol. 92, pp. 104446–104446, Mar. 2022, doi: <https://doi.org/10.1016/j.euromechsol.2021.104446>.

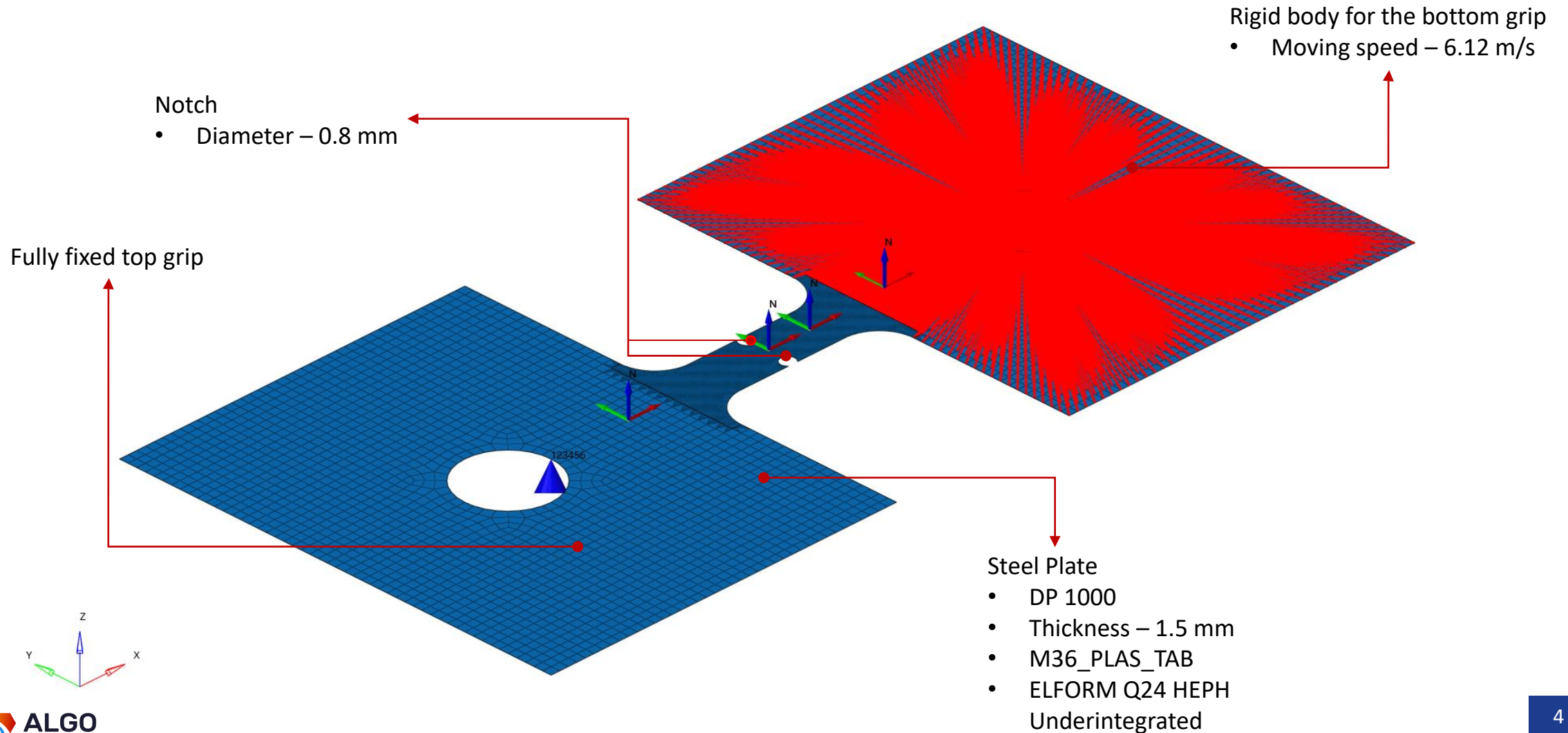


Model Parameters

Entity	Type
Solver	Altair Radioss
Version	2022.1
Processors	2
Threads	2
CPU	Intel(R) Core(TM) i7-9750H CPU @ 2.60GHz
Total run time	20.93 sec

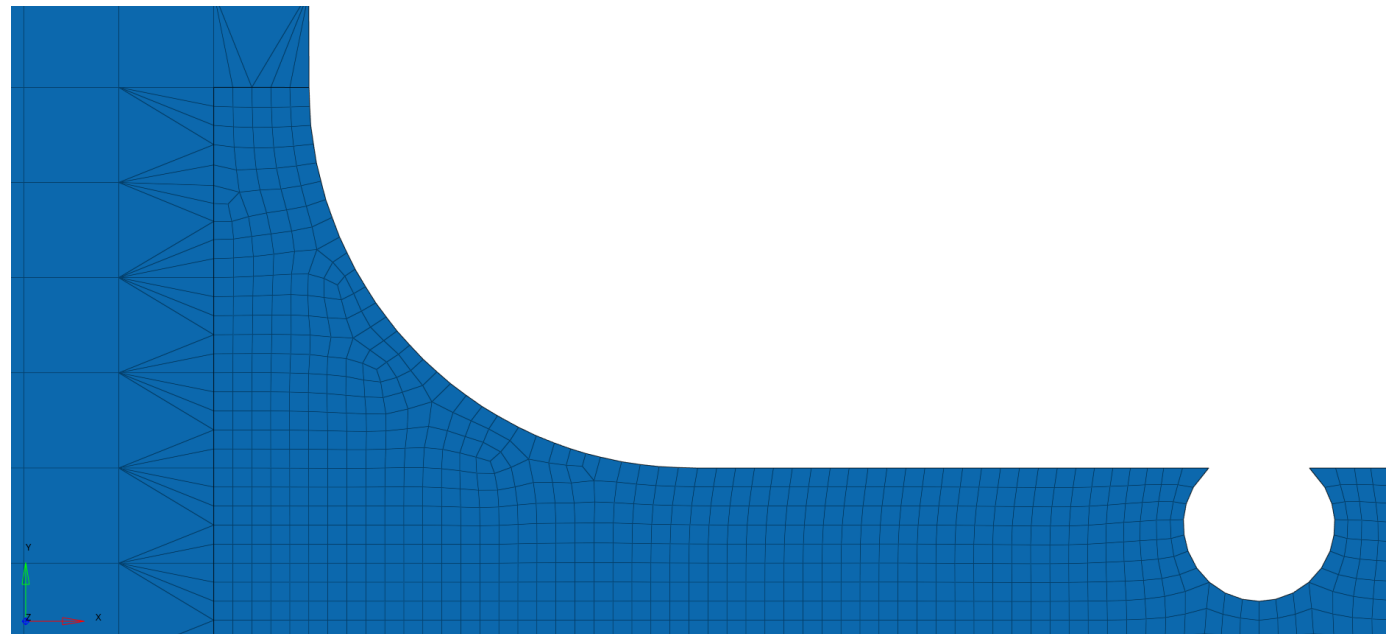
FEA Entities	Type
Analysis Type	Dynamic Explicit
Unit System	kg, mm, ms
Element Type	P1_SHELL
Element Formulation	Q24
Material Type	M36_PLAS_TAB

Analysis Setup



Mesh Quality

- 0.5 mm – Clamp part element
- 0.1 mm – Gauge element
- 0.59 – Min. Jacobian
- 6.11 – Max aspect ratio
- 7712 Shell elements
- 192 SH3N elements

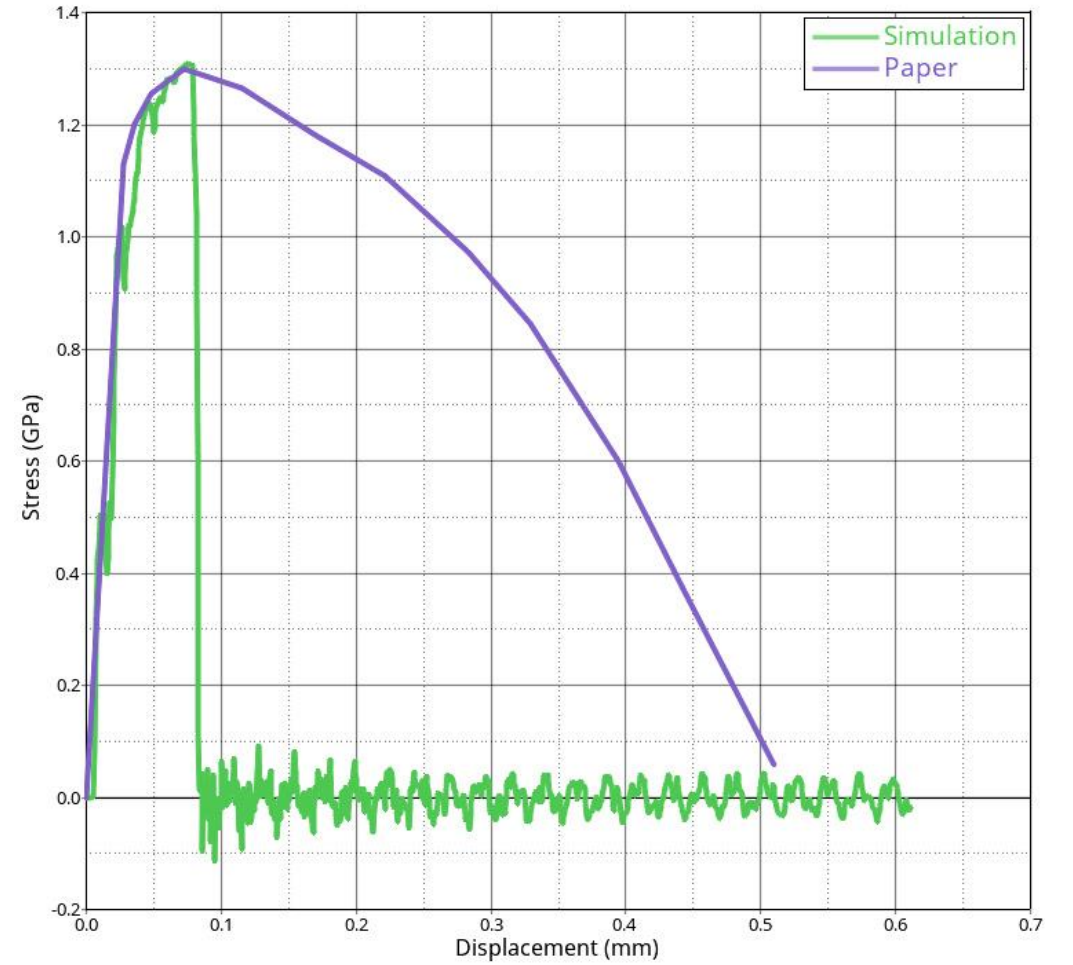
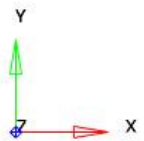
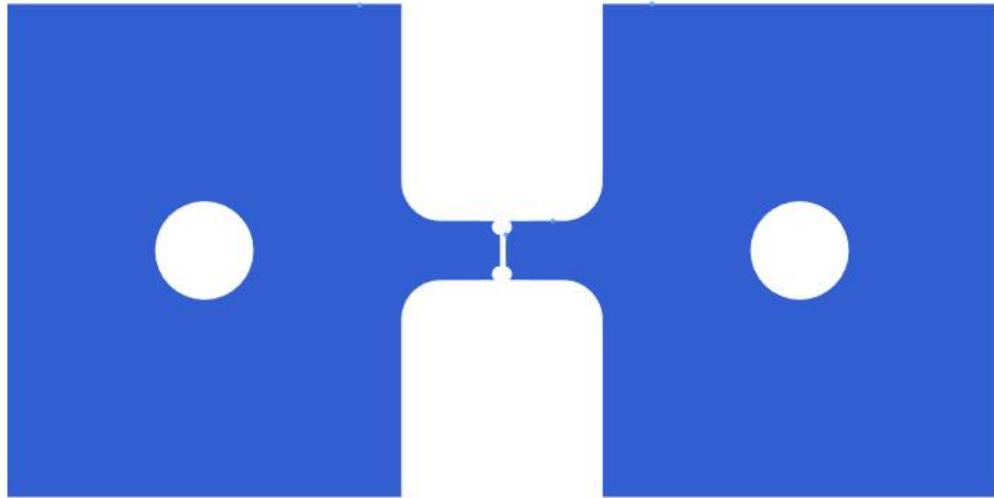


Assumptions

- It is assumed that there is no slip between grips and the plate.
- Temperature change in the specimen is neglected.
- Stress Displacement behavior only up to the fracture initiation point is modelled because of the complexity of the fracture behavior.
- Experimental curve with a temperature correction is compared with the simulation.
- Young's modulus and Poisson's ratio are not mentioned in the paper and are thus assumed.

Analysis Results

1: 0011_Model
Loadcase 1 : Time = 3.5006e-02 : Frame 36



Conclusions

- Simulation of tensile test of DP1000 steel was conducted.
- The simulation shows good correlation for the stress displacement curve when compared to the test data presented in the paper.
- The model mesh can be further refined to study detailed stress and strain distributions in the plate.
 - i.e. Mesh size and clearances based on your application
- The model can also be used to simulate tensile test of other materials.