Multi Cell Beam Three Point Bending

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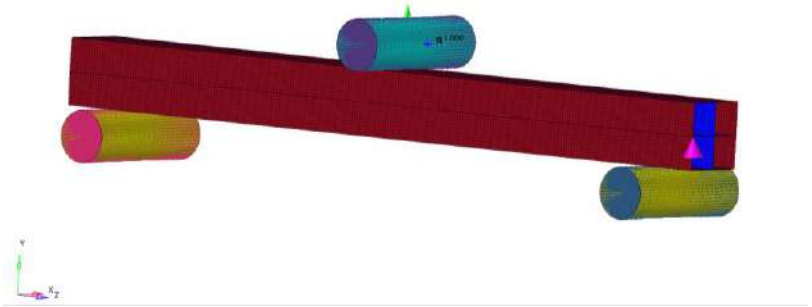
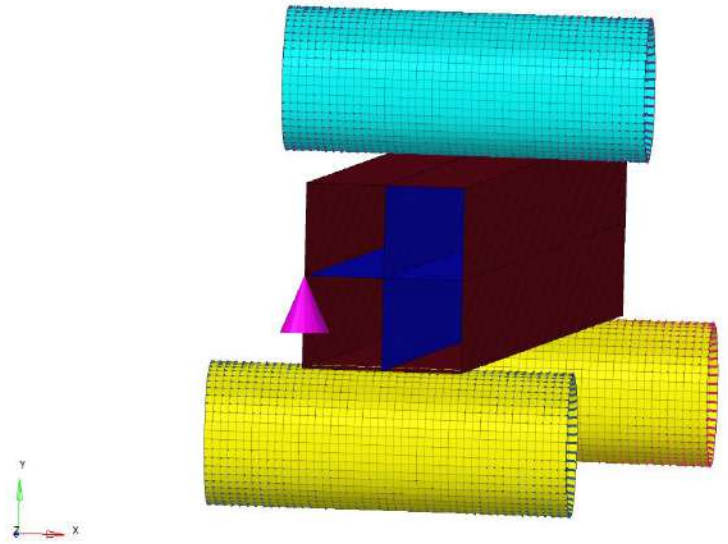
Model Description

- 3-pt bending analysis of a multi cell beam is based on experiments documented in the following paper:
  - X. Fu and X. Zhang, “Theoretical study on the bending collapse of multi-cell thin-walled rectangular beams,” Thin-Walled Structures, vol. 191, p. 110985, Oct. 2023, doi: https://doi.org/10.1016/j.tws.2023.110985.
- Analysis conducted for Aluminum 6063 T1.
- Force response compared to test data documented in paper.
- Note: This analysis does not model material failure.



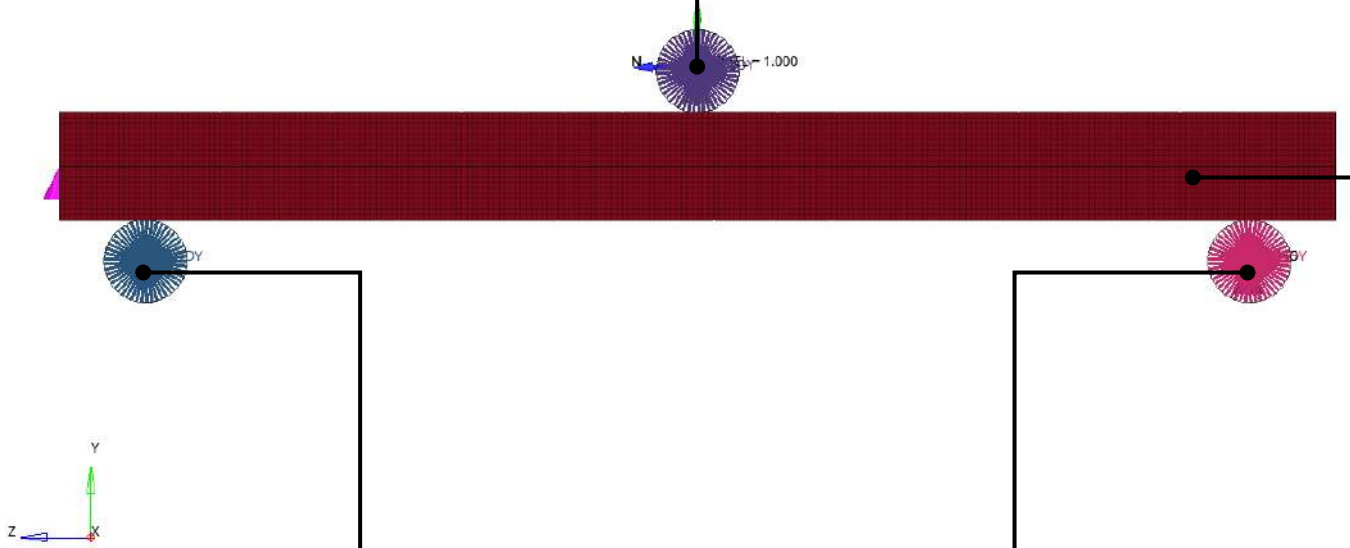


Model Parameters

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	2716.03 sec

FEA Entities	Type
Analysis Type	Dynamic Explicit
Unit System	kg, mm, ms
Element Type	P1_SHELL
Material Type	M1_ELAST (impactor, supports)
Material Type	M36_PLAS_TAB (specimen)
Contact Type	Type 25 – Multi type impacting

Analysis Setup



Steel Impactor
- Shell elements
- Elastic material
- Rigid body

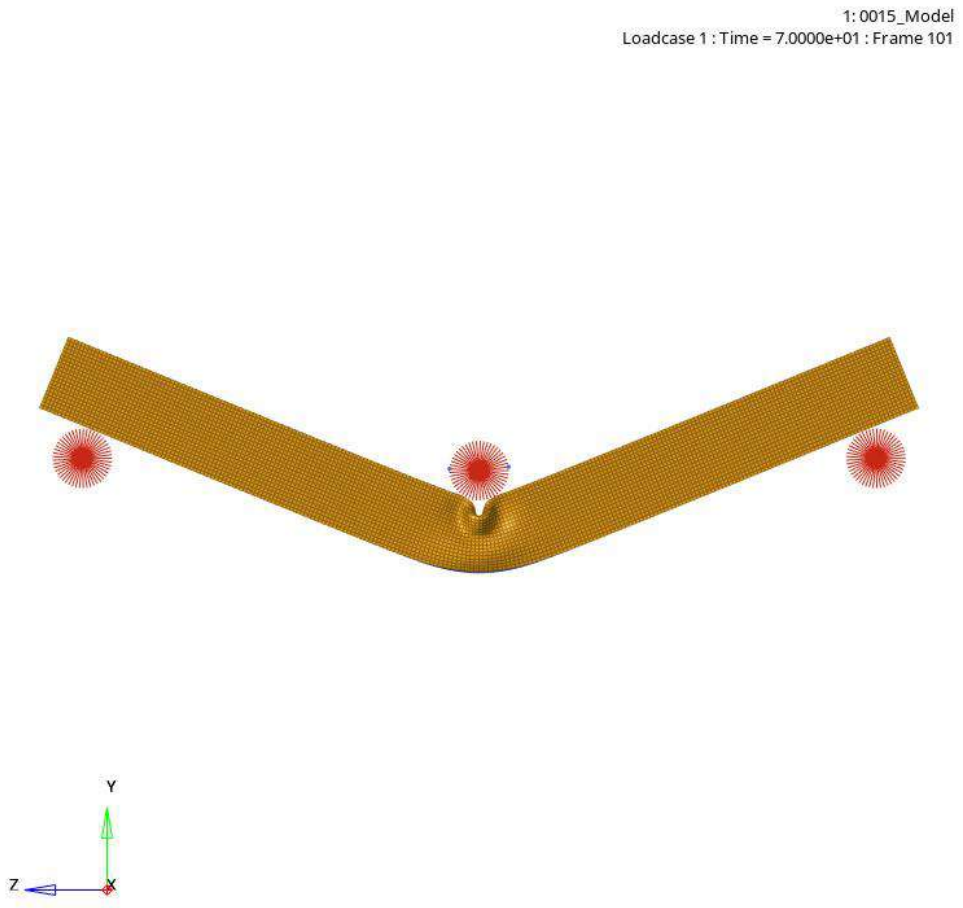
Aluminum Specimen
- 6063-T1
- Shell elements
- Plastic tabulated material

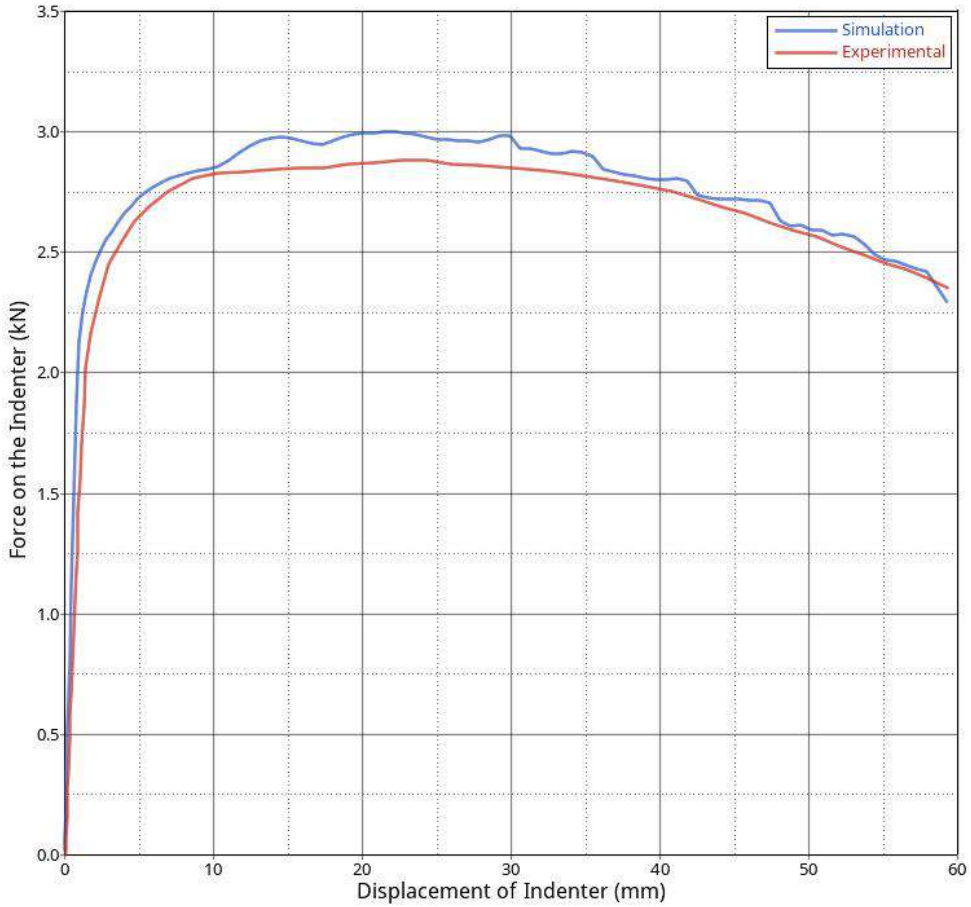
Fixed BC

Analysis Assumptions and Limitations

- Thickness of shell elements for supports and indenter is assumed.

Analysis Results





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Conclusions

- Three-point bending analysis of a multi cell beam conducted using Altair Radioss based on the paper listed in slide 2.
- The simulation shows good correlation in force response measured by the impactor when compared to test data presented in the paper.
- This model provides a good starting point for 3-pt bending FEA and can be further utilized to model damage and failure. The user can also explore the effect of different contacts, element formulations, mesh size and material models.