

Metal Cube Impact

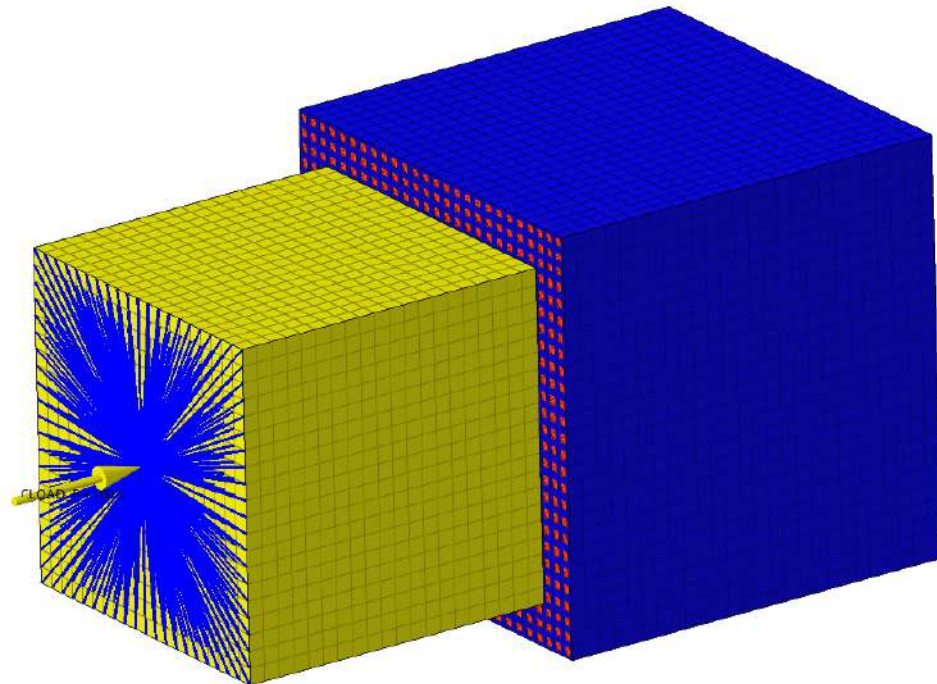
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ALGO
Engineering
Simplifying FEA

Model Description

- Impact between two cubes is modelled to evaluate the force of the impact.
- Results are compared to hand calculations.

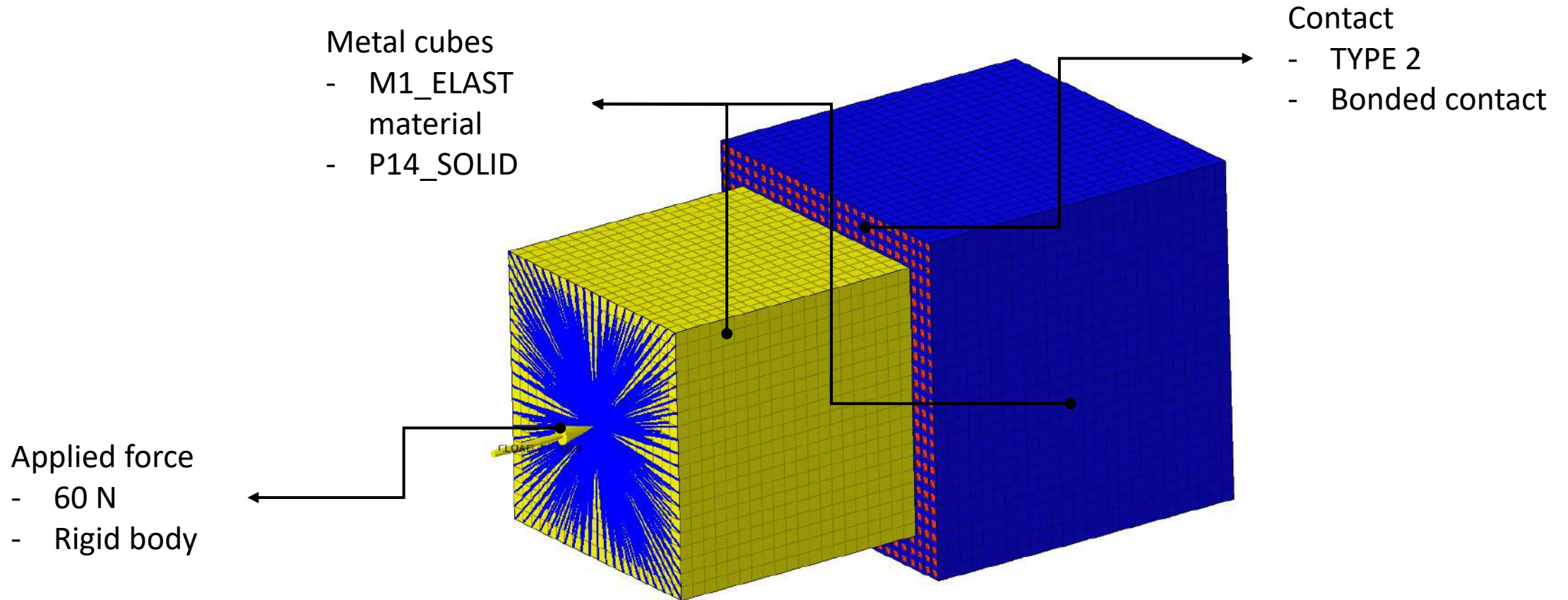


Model Parameters

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	8.31s

FEA Entities	Type
Analysis Type	Dynamic Explicit
Unit System	kg, mm, ms
Element Type	P14_SOLID
Material Type	M1_ELAST

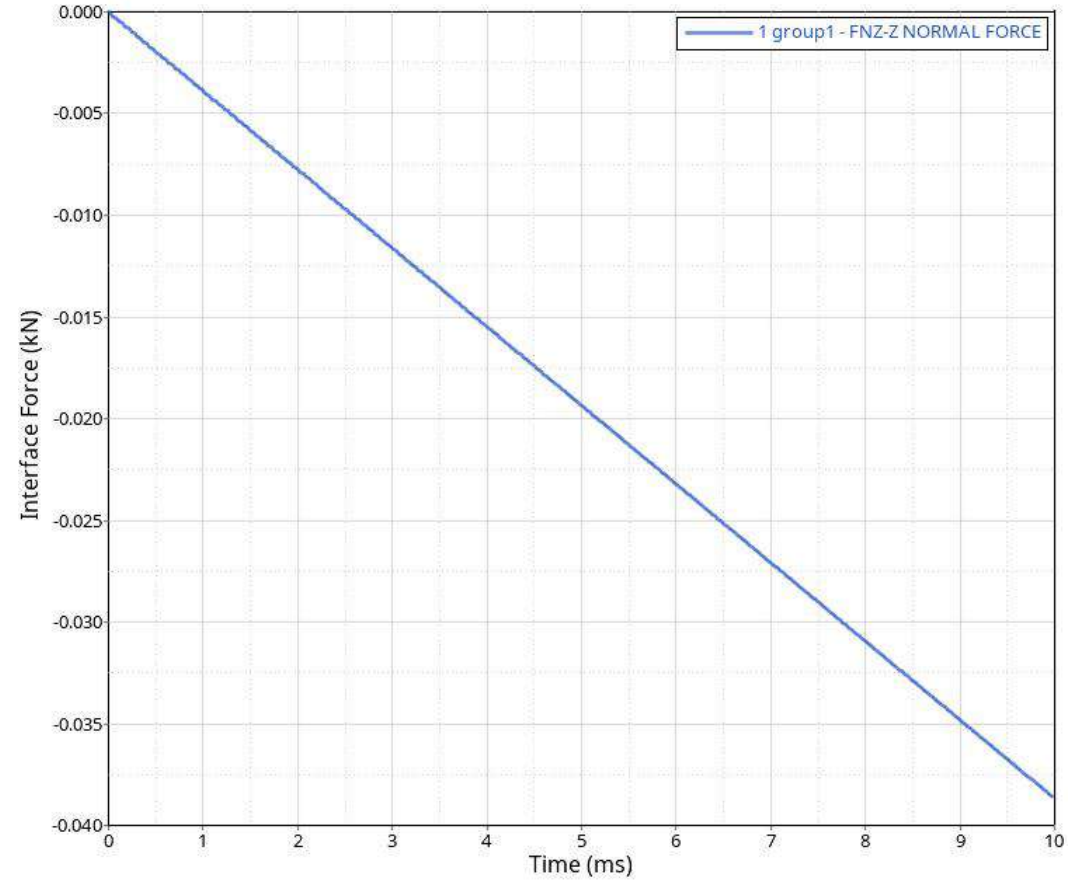
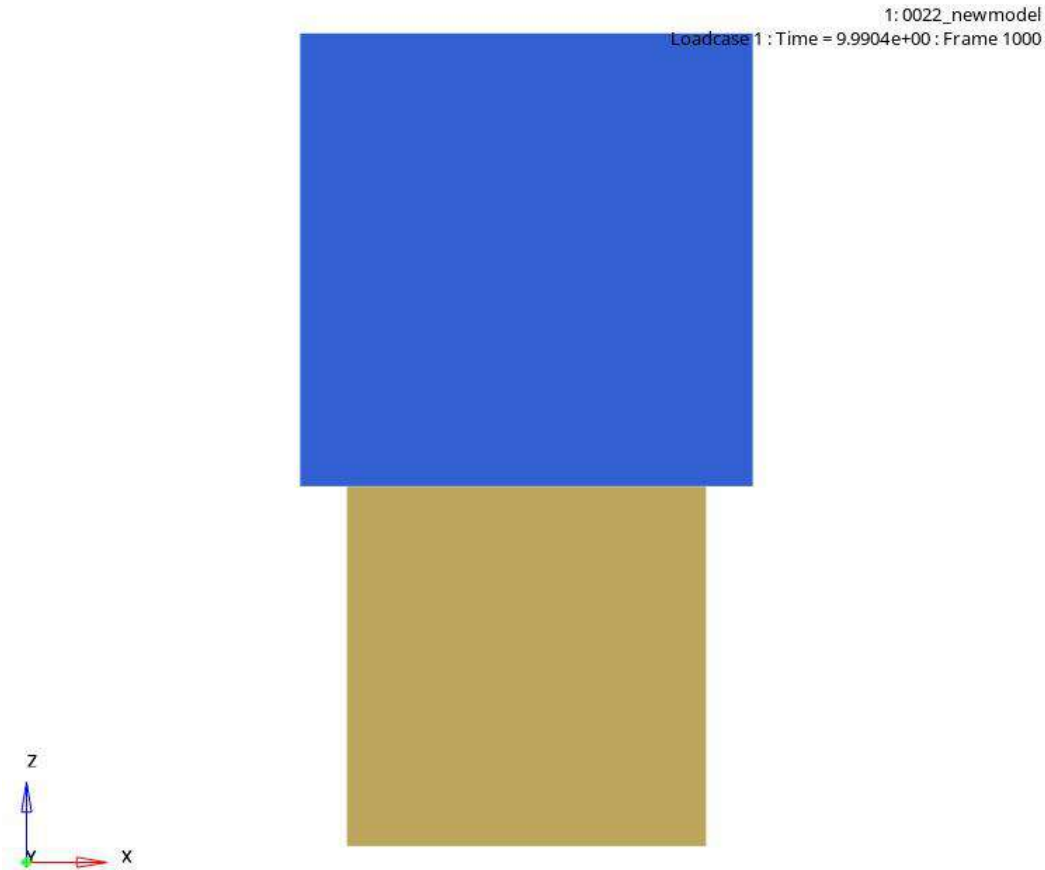
Analysis Setup



Analysis Assumptions and Limitations

- It is assumed that both cubes move together in the same direction after the impact.

Analysis Results



Impact Force from Simulation – 38.5 N

Hand Calculations

Applying,

$$F = ma$$

To $M+m$,

$$60 = (M + m)a \quad \text{————— (1)}$$

To M ,

$$F = Ma \quad \text{————— (2)}$$

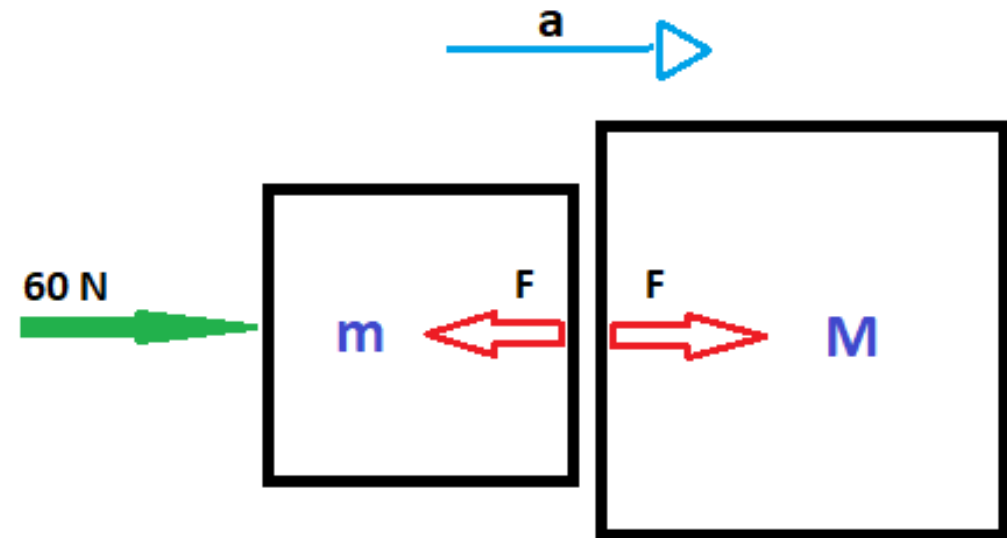
(2)/(1),

$$\frac{F}{60} = \frac{M}{M + m}$$

$$F = 60 \left(\frac{M}{M + m} \right)$$

Here, $M = 20 \text{ kg}$ and $m = 10 \text{ kg}$

$$F = 40 \text{ N}$$



Conclusions

- Plastic bending analysis of a beam was conducted to evaluate the impact force between objects.