

# AL 6061-T6 Tensile Testing Intermediate Strain Rates

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# Model Description

- Intermediate Strain Tensile Testing is based on the experimental study documented in the following paper.
  - Zhu, D., Mobasher, B., Rajan, S.D. and Peralta, P., 2011. Characterization of dynamic tensile testing using aluminum alloy 6061-T6 at intermediate strain rates. J Eng Mech.  
[https://doi.org/10.1061/\(ASCE\)EM.1943-7889.0000264](https://doi.org/10.1061/(ASCE)EM.1943-7889.0000264)
- Two tensile test dog bone specimens
  - 25 mm Gauge Specimen (Small Dog Bone Specimen)
  - 50 mm Gauge specimen (Large Dog Bone Specimen)
- Analysis is conducted for the Al 6061-T6 at following strain rates.
  - Small Dog Bone – 45 S<sup>-1</sup>, 90 S<sup>-1</sup>, 143 S<sup>-1</sup>, 203 S<sup>-1</sup>
  - Large Dog Bone – 35 S<sup>-1</sup>, 85 S<sup>-1</sup>, 120 S<sup>-1</sup>

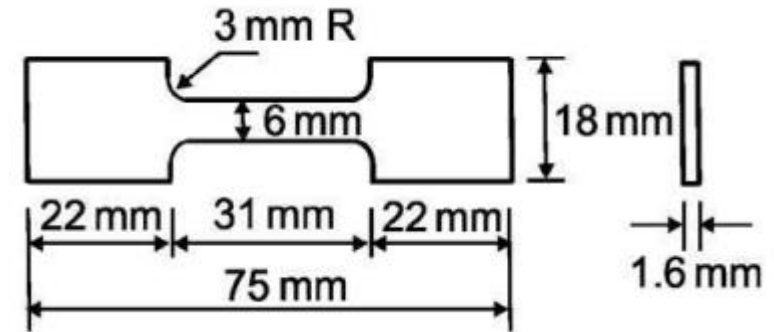


Figure 1 – Small Dog Bone Specimen (25mm Gauge)

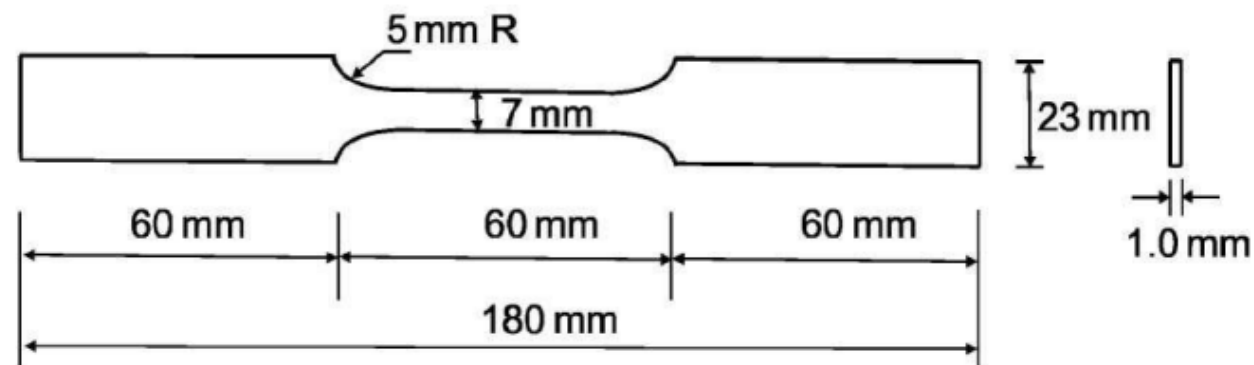
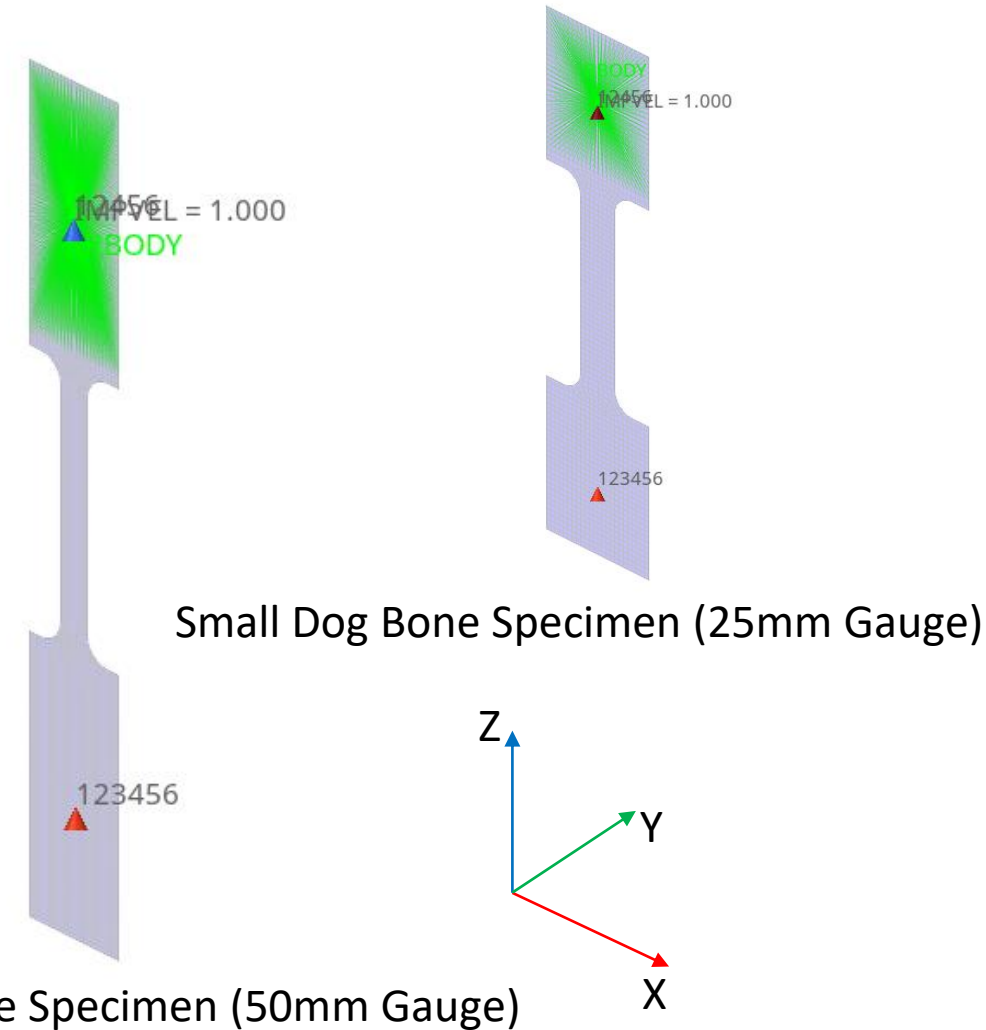


Figure 2 – Large Dog Bone Specimen (50mm Gauge)

# Model Description – Cont.

- Models are meshed with 2D Shell Elements.
- Test specimen is clamped at the bottom.
- Displacement boundary condition is enforced at independent node of the rigid body element.
- Applied load is extracted from the rigid body element.
- Displacement is extracted from the independent node of the rigid body element.
- The engineering strain and stress are calculated using FEA results and compared with experimental results documented in the paper.



# Conclusions

- Intermediate strain tensile testing is conducted using Altair Radioss based on the paper listed in slide 2.
- Since the material model parameters provided in paper have broad variation, parametric study has been conducted to identify the suitable values.
- The simulation shows good correlation in Eng. Stress Vs Eng. Strain results when compared to the test data presented in the paper.
- The model runs very fast so it can be useful to study the effects of different material models and property parameters.