

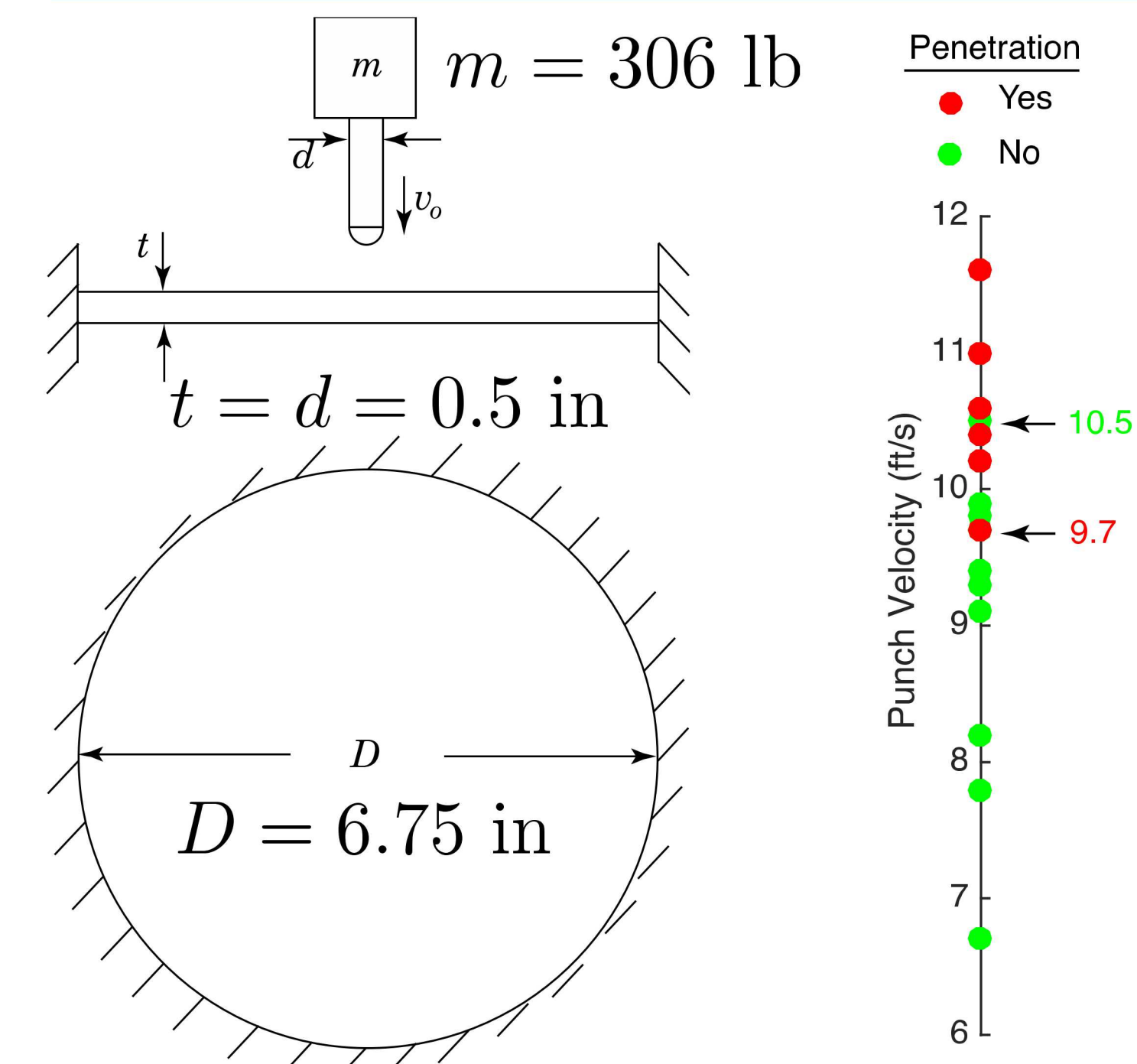


Plugging Puncture of Al 7075 Plates

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Objective

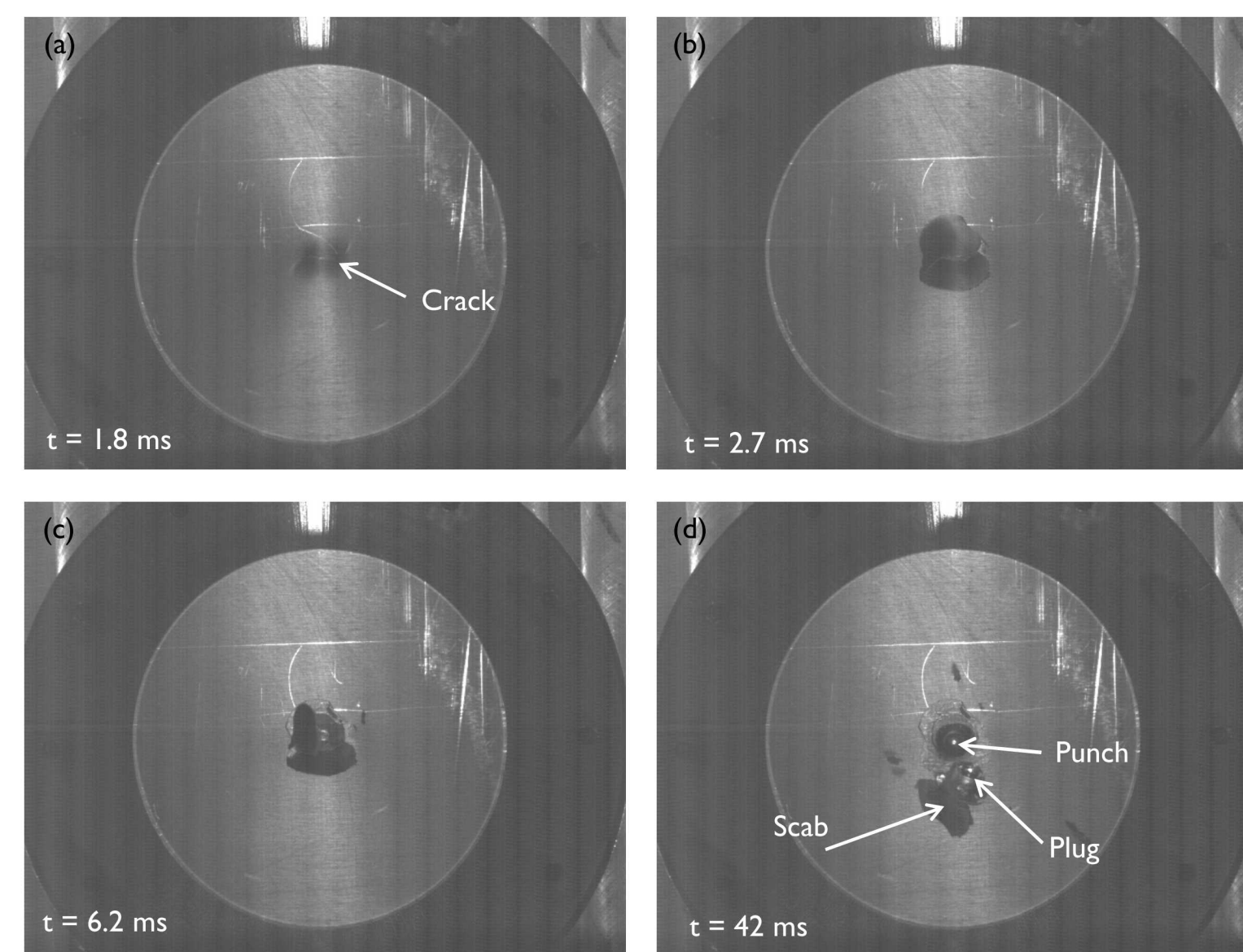
Validate finite element model for calculating threshold puncture speed for moderately thick aluminum plates



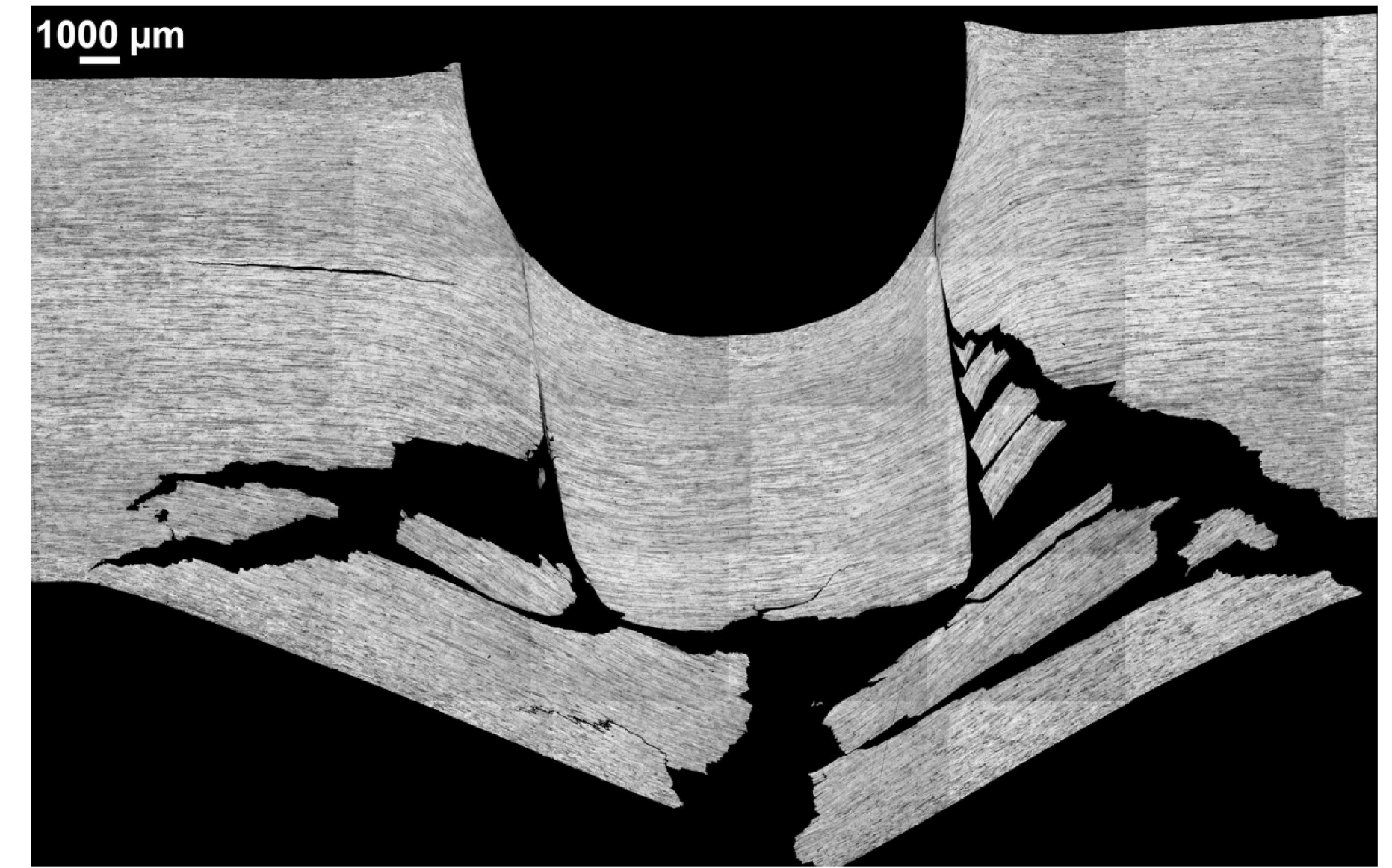
Problem Schematic

Results

Experiments

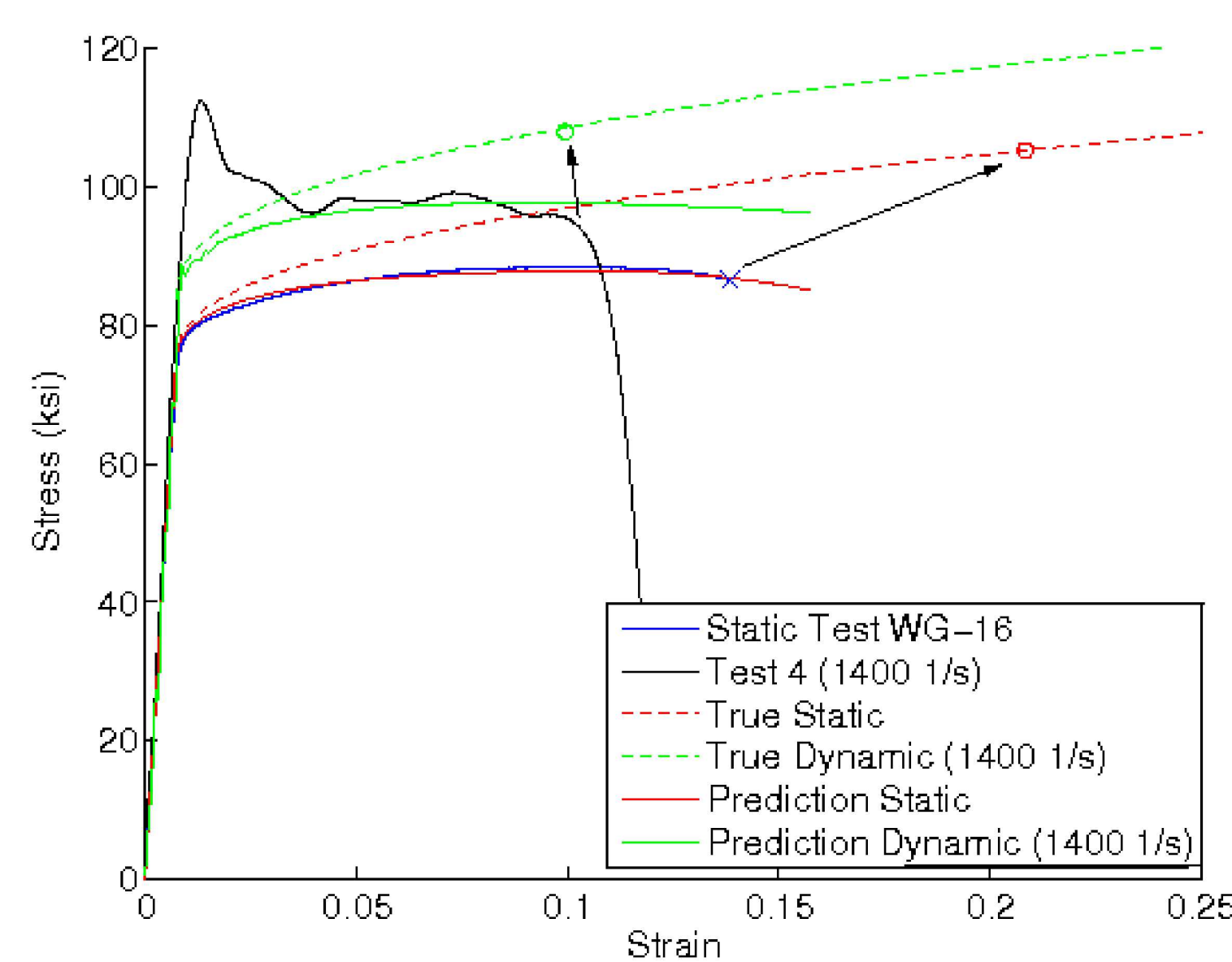


Puncture Sequence

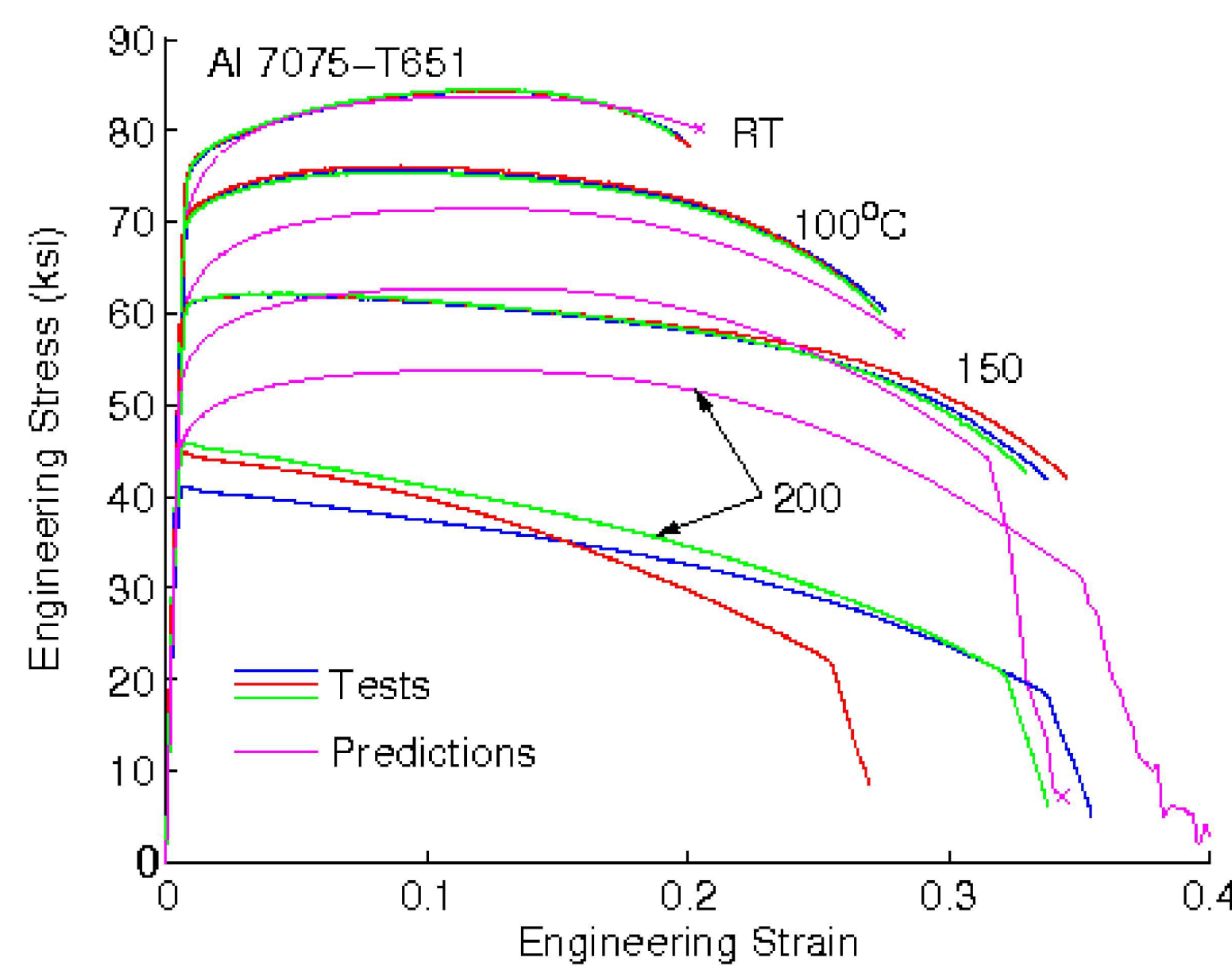


Plugging Failure

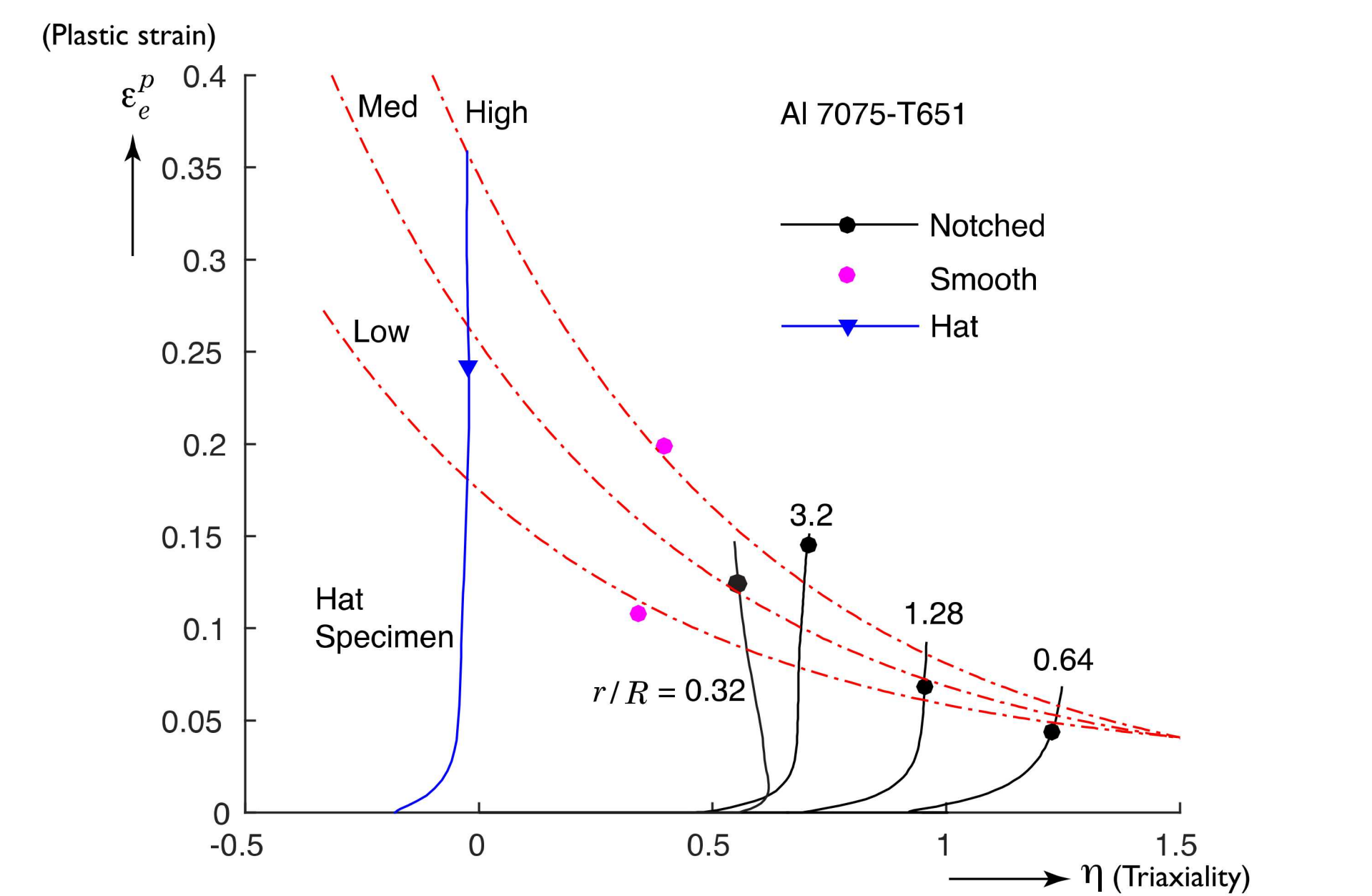
Johnson-Cook Material Model Calibration



Uniaxial Tension at High Strain Rate

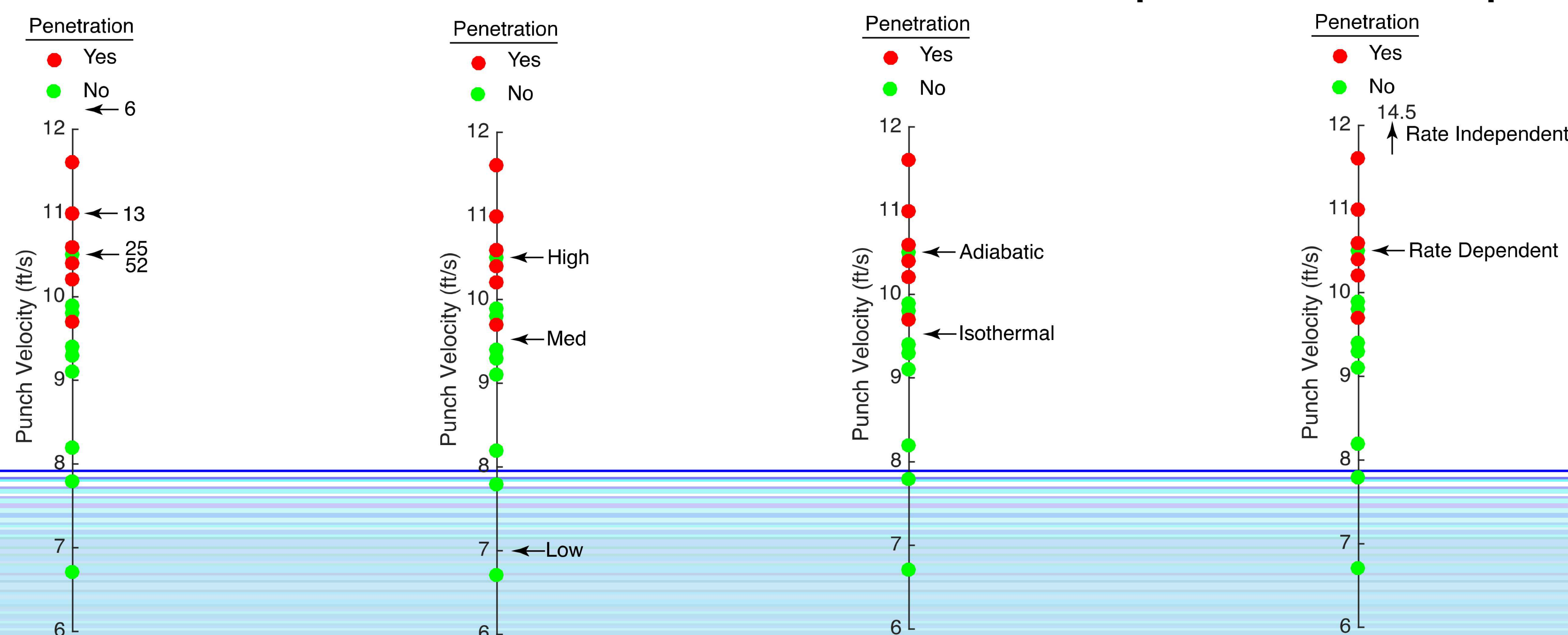


Uniaxial Tension at Temperature



Failure data (Notched Tensile and Shear)

Numerical Results and Comparison to Experimental Data

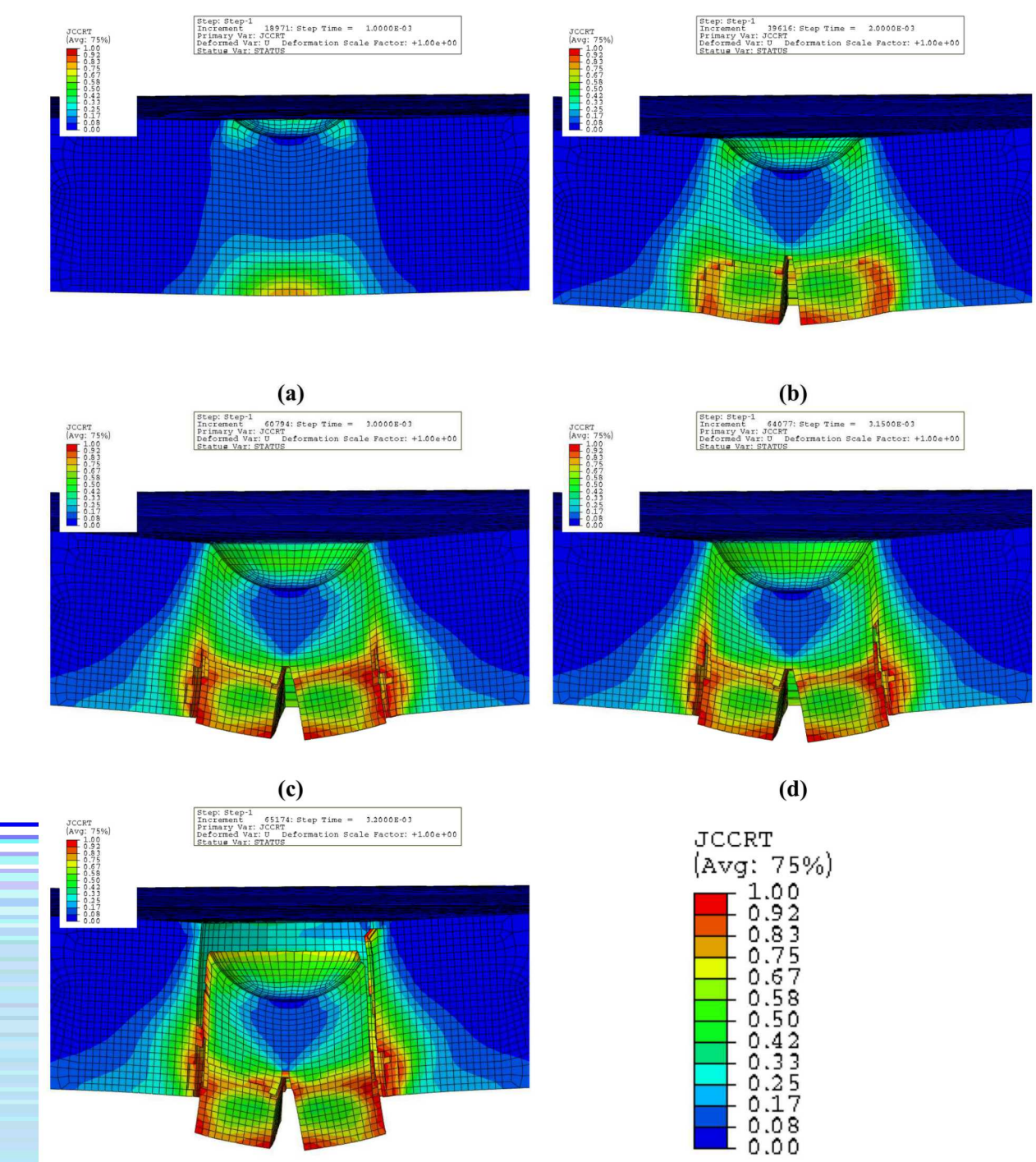


Elements through thickness (High Fit)

Failure Fit (25 Elements)

Failure Thermal Effect (High, 25)

Failure Rate Dependence (High, 25)



Johnson-Cook Damage Evolution (High, 25)

Conclusions

Reasonable calculations for the threshold puncture speed were obtained via adiabatic explicit calculations and a complete calibration of the Johnson-Cook strength and failure models.