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High strain rate constitutive and fracture characterization of AA6065-T6 sheet under various stress states

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The strain rate- and stress state-dependent fracture behavior of high-strength AA6005-T6 aluminum sheet is characterized experimentally and numerically. Tests employed shear, hole tension, and notch tension specimens across strain rates of 10–310–3 to 500 s–1500 s–1. Positive strain rate sensitivity emerged in axial force responses for hole and notch tension specimens, with fracture limits increasing at higher rates. A temperature- and strain rate-dependent Johnson-Cook model captures flow stress dependence on equivalent plastic strain, strain rate, and temperature. An isotropic modified Hosford criterion accounts for the J3J3 effect on yield stress, while a strain rate-extended Mohr-Coulomb model predicts fracture initiation.

Primary authors: UTZERI, Mattia (Università Politecnica delle Marche); CHIAPPINI, Gianluca (Università eCampus); ROSSI, Marco (Università Politecnica delle Marche); SASSO, Marco (Università Politecnica delle Marche)

Presenter: UTZERI, Mattia (Università Politecnica delle Marche)

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