

## Revisiting adiabatic shear failure

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Adiabatic shear failure is a dynamic failure mechanism that results from the formation of a localized narrow band in which the shear strain concentrates and reaches very high values. An early and well accepted analysis of ASB formation relies on the competition between strain-rate hardening and thermal softening, so that when the latter overcomes the former, the material can no longer harden and fails by shear localization. Therefore, the role of thermally induced strain-softening is viewed as central in ASB formation.

We propose another approach to the phenomenon, based on the dynamically stored energy of cold work, the latter being identified as a key factor for shear localization. This energy affects and dictates the microstructural re-arrangements occurring during dynamic deformation. In this talk, we will present and discuss real-time measurements of the temperature evolution in the impacted specimen, to show that the overall homogeneous temperature rise may remain quite modest. In addition, we will address dynamic recrystallization (DRX) and its central role throughout the deformation process, showing that DRX actually precedes adiabatic shear banding rather than being its consequence.

These results will be discussed to propose another physical explanation to dynamic shear localization.