

Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Investigating the effects of plastic deformation on the dynamic tensile strength of Lean Duplex Stainless Steel¹ ALI AMERI, MSc(Eng.), J.P. ESCOBEDO-DIAZ, M. GONZALES, H. WANG, Z. QUADIR, P. HAZELL, PhD — Lean Duplex Stainless Steel 2404 (LDX 2404) is a new dual phase alloy with equal volume fractions of the austenite (FCC) and ferrite (BCC) phases. This study explores the effects of plastic deformation, in the form of 20% quasi-static compressive strain, on the subsequent mechanical behavior and damage evolution of this alloy when subjected to shock loading. Plate impact experiments were conducted in a single-stage light gas-gun at impact velocities in the 200-400 m/s range. The examination of the damage fields was done using Optical Microscopy (OM) and Electron Backscatter Diffraction (EBSD). Results indicate that the material experienced incipient spall damage at an impact velocity of ~200 m/s and full spall at an impact velocity of ~370 m/s. The pre-strained specimens show an increase in the spall strength compared with the as-received condition. Under all conditions, the spall damage occurs primarily within the ferrite phase while the austenite phase seems to suppress crack propagation, thereby creating barriers for crack propagation into the austenite phase.

¹Authors would like to acknowledge the support by the Air Force Office of Scientific Research under grant number FA2386-17-1-4095.

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No Company Provided

Date submitted: 27 Feb 2019

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