Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Identification of Two Constitutive Models for a Low Alloy Structural Steel S355K2G3 JEROME MESPOULET, AURELIEN LACHAUD, PIERRE HEREIL, Thiot-Ingenierie — An experimental characterization of the dynamic response of a low strength structural steel (S355K2G3) has been investigated using various experimental techniques performed at THIOT INGENIERIE impact shock physics test facility: Taylor impacts, hat shaped shear tests, dynamic tensile tests and plate impact experiments. This paper presents simulations of these experiments performed in a wide range of strain-rate conditions. The objective is to simulate impact, blast and explosion on a whole structure. Impacts generate huge gradients of stress and strain because of shock waves propagation and interaction on free surfaces. Blast and explosion have a tendency to induce large strains. Based on the overall experiments, it is proposed to identify two classical constitutive models (Johnson-Cook and Zerilli-Amstrong) integrated in two non-linear explicit finite element hydrocodes ANSYS-AUTODYN and LS-DYNA. Both hydrocodes take into account various modes of fracture from single conventional fracture thresholds such as critical strain value or hydro tensile failure model to more complex modes such as Johnson Holmquist damage failure model. Choice between models is discussed with respect to material nature and to solicitations the material is subjected to.

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Date submitted: 24 Feb 2009 Electronic form version 1.4