Title	Sensitivity of Response of Topside Structures to Firesand Explosions
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Executive Summary	This report describes the work performed to investigate the sensitivity of response of structural members and panels to thermal and blast loadings for the HSE, under contract MaTSUl874413373. The main objectives of the project were to determine the important parameters for calculating the capacity, response and probability of failure (or 'Reliability') of typical. Structural members ~ to thermal and/or blast loads and to calculate the 'Sensitivity Factors' associated with the resistance and load variables. In order to avoid underestimation of the response which would result from a conventional nonlinear, dynamic response analysis, it has been found necessary to quantify the effect of end fixity, in-plane loads, out-of-plane loads and tension effects on member and panel responses. Phase 1 of the project dealt with the response of structural members and panels to thermal And/or blast loads. Phase 2 dealt with the containment capacity of modules during fires and/or explosions. In particular the effect of imposed global loads on the member response or capacity bas been calculated. A 15% increase in the capacity of columns to resist blast loads resulted from the inclusion of load transfer effects during a simulated explosion. A method bas been developed (the Direct Probability Method) which enables the prioritization of the parameters and effects which should be taken into account in the calculation of structural components' response to fires and explosions. The method also gives the probability of failure of a component for any acceptance criterion and probability distribution of the load and resistance variables. The following prioritisation of 'resistance' variables may be made on the basis of the present work:

Case 1 - Blast response of column Load eccentricity (most important) Supported length Yield stress Axial load Young's modulus Fixity	Case 2 -Thermal response of column Emissivity of steel (usually unknown) Axial load Load eccentricity Yield stress Dimensional or geometric variations (least important) Fixity
Case 3- Blast response of floor beam Yield stress Supported length Fixity Equipment loading Dimensional variations Young's modulus	Case 4 Thermal response floor beam Emissivity of steel (usually unknown) Equipment loads Yield stress Supported length Dimensional variations Fixity
Case 5 - Blast response of panel Yield stress Thickness and span Young's modulus	

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