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Driver Charge Characterisation in the Foulness Air Blast Tunnel

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The Air Blast Tunnel (ABT) is a facility designed to replicate the blast environment that would be created by a very large explosion. Its conical design enables the blast wave from a charge of no more than a few kilograms to be constrained and directed so as to generate a long duration blast pulse characteristic of a detonation of a few kilotonnes of TNT equivalent.

This paper builds on work previously presented at MABS 24 where a driver charge made up of double strand Davyflex © and 17 tubes of diesel was modelled (using a Flux Corrected Transport (FCT) algorithm) and tested. The blast overpressure requirement has now been extended to 200kPa in the 2.4m section of the tunnel requiring further modelling and refinement of this driver. Idealised gas comparisons are made between FCT and the EDEN code in order to show consistency between the two. The modelling of the burn rate using the multi-phase capability in EDEN is described by using the following sequence of events: PETN detonates, sheath is shattered and fuel dispersed, PETN afterburns along with fuel droplet and sheath particle combustion. The paper will illustrate the difference between mixing of diesel in the driver section for 2 Davyflex © and 1 Davyflex © strand configurations.

Blast profiles predicted by the EDEN code will be compared to ABT calibration shot test results using several different types of diesel based driver configurations which will be described and presented. The paper will demonstrate how the blast environment was characterised and show plots of incident and dynamic pressure.

The paper will conclude with an experimentally validated prediction for blast overpressure in the 2.4m section as a function of number of diesel tubes, demonstrating that the revised requirement of 200kPa peak static pressure can be met.