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Development of a Dual Windowed Test Vehicle for Live Streaming of Cook-Off in Energetic Materials. PHIL CHEESE, TOM REEVES, NATHAN WHITE, DE&S, MoD Abbey Wood, CHRISTOPHER STENNETT, Cranfield University, ANDREW WOOD, MALCOLM COOK, Syanco Ltd, SYANCO LTD TEAM, CRANFIELD UNIVERSITY TEAM, DE&S, MOD ABBEY WOOD TEAM — A modular, axially connected test vehicle for researching the influence of various heating rates (cook-off) on energetic materials and how they fundamentally decompose, leading to a violent reaction has been developed and tested. The vehicle can accommodate samples measuring up to 50 mm in diameter, with thicknesses variable from 0.5 mm up to 50 mm long. A unique feature of this vehicle is the ability to have a live high speed camera view, without compromising confinement during the cook-off process. This is achieved via two special windows that allow artificial backlighting to be provided at one end for clear observation of the test sample; this has allowed unprecedented views of how explosives decompose and runaway to violent reactions, and has given insight into the reaction mechanisms operating, and challenges current theories. Using glass windows, a burst pressure of 20 MPa has been measured. The heating rate is fully adjustable from slow to fast rates, and its design allows for confinement to be varied to study the influence on the violence of reaction during cook-off. In addition to being able to view the test sample during cook-off, embedded thermocouples provide detailed temperature records and the ability to use PDV instrumentation is also incorporated.

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