

LARGE SHOCK TUBE EXPANSION DESIGN VALIDATION

J. Wesevich,¹ J. Geng,¹ J. Thomas,¹ and B. Bingham¹

¹*Baker Engineering and Risk Consultants, 3330 Oakwell Court, Suite 100
San Antonio, TX 78218, United States*

Key words : airblast, shock tube, driver, expansion, loaded area, test specimens

The world's largest currently operated air-driven shock tube was recently modified to increase the available loaded area for test specimens from 8 ft by 8 ft (2.4 m by 2.4 m) up to 10 ft by 16 ft (3.0 m wide by 4.9 m). The purpose of the larger loaded area was to allow testing of larger full-scale building cladding systems. This paper discussed the driver, dual diaphragm, movable bulkhead, and expansion section of the recently enhanced shock tube, and the computational efforts behind its design. Two-dimensional axis-symmetric CFD simulations were completed to develop the needed driver, venting, and expansion section configurations to achieve reasonable HE blast waveforms. After selecting the modified shock tube configurations, the CFD results were used to provide the applied blast loads for designing the structural framing of the expansion section. FEA computations using LS-DYNA were used to verify the structural framing associated with dynamic elastic flexural and hoop responses of the newly constructed expansion section.