

WAVE SHAPING BY VALVE MOTION

OSOFSKY,I.B.;MASON,G.;HOVE,D.;MCLAUGHLIN,D.

The authors conducted a study of the design of driver systems for the proposed US LBTS facility. The driver system designs that were studied used compressed air or nitrogen pressurized at 2250 psi. Heated and unheated driver gas was considered in the study. Heating the driver gas to the required temperature of 1060 R resulted in large incremental capital and operating costs as well as operational complexity.

Unheated compressed gas released from a shock tube driver by a diaphragm or fast acting valve produces static pressure wave forms which follow the Brode weapon curve reasonably well. The dynamic pressure wave form, however, is distorted due to the contact surface discontinuity and the peak dynamic pressure is in the order of 3 times the desired one as given by the Brode curve. This discrepancy in wave shape and pressure level can be eliminated by heating the driver gas which results in a very complicated and costly system,

A fast acting valve with programmable area vs time capability was designed to replace the conventional driver diaphragm. The study showed that if a fast acting valve can be closed shortly after opening, both the static and dynamic pressure waves can be tailored to conform with the Brode weapon effects relation.

The valve wave shaping works on both heated and unheated drivers and can eliminate the requirement for other wave shaping mechanisms such as internal baffles in the driver.