

Facilities for High Velocity Impact Study in Dynamic Mechanics Laboratory in Purdue University

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ABSTRACT

High velocity impact dynamic is a discipline that highly depends on experiments. The Dynamic Mechanics Laboratory in Purdue University has conducted various equipments for the study of dynamic material behavior and impact dynamics. Recent years, the facilities have been expanded to study high velocity impact dynamic. A light gas gun was built and it produces projectile velocity up to 1,000 m/s. A high speed camera, a pulse laser and a flash X-ray system were installed to observe dynamic failure and crack propagation and penetration of specimens.

I. INTRODUCTION

The Dynamic Mechanics Laboratory in Purdue University has expanded its studies to higher strain-rate range and a high speed gas gun was required to achieve it.

II. CONFIGURATION AND PERFORMANCE

The gas gun in Washington State University [1]

and Army Materials & Mechanics Research Center were referred to.

Figure 1 shows the complete configuration of the system. The gas gun has 63.5 mm-bore and 6.01 m-long barrel. A projectile is discharged from the breech, travels through the barrel and hits a target in the target chamber. The high speed camera (Cordin 550) records the impact moments. The flash X-ray (L3 30kV) records the image of X-ray penetration if a target is installed in the path of X-ray. The projectile and target debris are caught by the projectile catcher.

Dynamic crack propagation on brittle materials and penetration instability on granular materials are studied with the system.

REFERENCES

1. G.R. Fowles, G. E. Duvall, J. Asay, P. Bellamy, F. Feistmann, D. Grady, T. Michaels and R. Mitchell, "Gas Gun for Impact Studies", *The Review of Scientific Instruments*, Vol. 41, No. 7, pp. 984-996, July 1970

