

FLOW BEHAVIOR OF CERAMIC GRANULES

J. Barr (BSME), E. Wetzel (ARL), F. Zhou (PhDME), and S. G. Advani

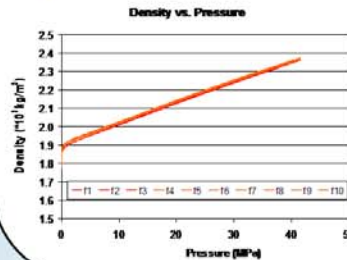
University of Delaware • Center for Composite Materials • Department of Mechanical Engineering

INTRODUCTION

- Experiments are run using an alumina ceramic
- Three sizes of ceramic are used for testing
- Bulk of the research is calculating drag coefficients
- Characterizing the physical properties of the ceramic also important

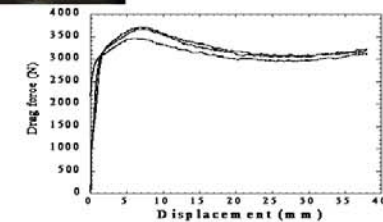
COMPRESSION

- Testing is done using an INSTRON in the compression mode
- Objective is to characterize the density of the granules with respect to the compaction pressure



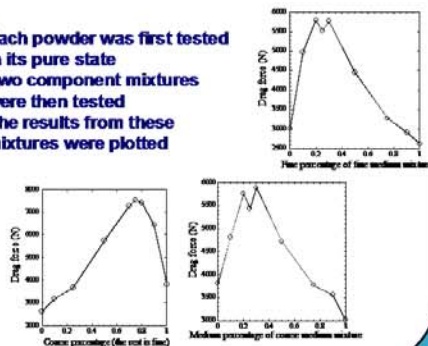
DRAG

- Drag experiments are an extension of compression
- The shell is now sealed after compression and placed in the tensile portion of the INSTRON
- A steel rod is extracted and the resulting force is measured and used to calculate the drag coefficient



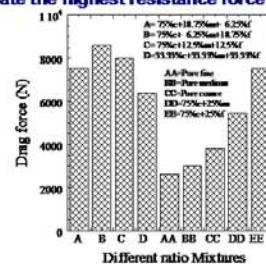
CURRENT WORK

- Each powder was first tested in its pure state
- Two component mixtures were then tested
- The results from these mixtures were plotted



CURRENT WORK

- Results from the two component mixture lead to trials using all three granule sizes
- Object is to find the mixture that will create the highest resistance force



FUTURE WORK

Current work using transparent pipe will be improved to help understand the flow of granules around the pipe

ACKNOWLEDGEMENTS

This work is supported by the Army Research Laboratory through the Composite Materials Research program.

- ♦ Dr. Suresh Advani,
- ♦ Dr. Eric Wetzel,
- ♦ Fuping Zhou,
- ♦ Roger Stahl