



CENTER FOR INFRASTRUCTURE ENGINEERING STUDIES

Acquisition of an Impact Testing Machine

By

Dr. K. Chandrashekhara

**UTC
RE115**

**University Transportation Center Program at
The University of Missouri-Rolla**

Disclaimer

The contents of this report reflect the views of the author(s), who are responsible for the facts and the accuracy of information presented herein. This document is disseminated under the sponsorship of the Department of Transportation, University Transportation Centers Program and the Center for Infrastructure Engineering Studies UTC program at the University of Missouri - Rolla, in the interest of information exchange. The U.S. Government and Center for Infrastructure Engineering Studies assumes no liability for the contents or use thereof.

Technical Report Documentation Page

1. Report No. UTC RE115		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Acquisition of Integrated Testing System for Civil Construction Materials and Structures Phase I & II				5. Report Date June 2004	
				6. Performing Organization Code	
7. Author/s Dr. K. Chandrashekhara				8. Performing Organization Report No. 00000812	
9. Performing Organization Name and Address Center for Infrastructure Engineering Studies/UTC program University of Missouri - Rolla 223 Engineering Research Lab Rolla, MO 65409				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. DTRS98-G-0021	
12. Sponsoring Organization Name and Address U.S. Department of Transportation Research and Special Programs Administration 400 7 th Street, SW Washington, DC 20590-0001				13. Type of Report and Period Covered Final	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract An interdisciplinary team of faculty members has been formed to acquire an Impact Testing Machine. The machine will be useful for both low velocity and high velocity impacts. The maximum physical drop height is up to 1.25 m and can simulate drop height of 20.4 m. The package includes composite test fixture, tup extender, hemispherical tup insert, and software training.					
17. Key Words Impact Testing Machine		18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.			
19. Security Classification (of this report) unclassified		20. Security Classification (of this page) unclassified		21. No. Of Pages	22. Price

ACQUISITION OF AN IMPACT TESTING MACHINE FINAL REPORT

K. Chandrashekhara, Professor
University of Missouri-Rolla
101 Mechanical Engineering Building
Rolla, MO 65409
Telephone: 573-341-4587
chandra@ume.edu

A Dynatup Instron Model 9250 Impact Testing Machine with impulse control and data system has been purchased for composite material research. The machine will be useful for both low velocity and high velocity impacts. The maximum physical drop height is up to 1.25 m and can simulate drop height of 20.4 m. The package includes composite test fixture, tup extender, hemispherical tup insert, and software training. The equipment will be useful to evaluate the performance of fiber reinforced composite structures subjected to impact loadings.

Impact of composite structures can induce a large number of damage modes, such as matrix cracking, fiber breakage, and delamination. This localized damage can significantly reduce the material strength. The parameters such as impactor velocity, ply orientation, and thickness influence the extent of damage. The current fixture has the capability to test composite with 7 in. x 10 in. specimens supported over a 5 in. x 5 in. opening. The impact test instrument has a motor and twin screw drive for rapid crosshead retrieval after impact. The impulse control and data system includes impulse software controller panel for test set-up and high speed impulse signal conditioning unit. The impulse data software can calculate total energy, maximum load, velocity, test time, etc. The measurement of transient deflection, force and impact energy can be used to assess the damage in composite structures.

The impact testing machine will be used for composite research by faculty and students at the University of Missouri-Rolla.

