

NFPA Sponsored Project  
Hydraulic Dynamometer Design  
Interim Report  
Worcester Polytechnic Institute  
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**Project Goal:** The goal of the proposed project is to develop a hydraulic dynamometer for the purpose of building understanding of fluid power systems among students and as a research tool for fluid power and energy conversion projects.

**Project Description:** To maximize the impact of the project, the dynamometer will be designed for four applications: testing and tuning of the SAE Baja engine, research testing of a liquid piston Stirling engine, research testing of a switch-mode continuously variable transmission, and research testing of a high-speed valve for pulse-width-modulated hydraulic circuits. Because this tool will be utilized by a large number of projects, numerous students will be exposed to the flexibility and power density of a fluid power system.

A senior capstone team of four students are currently designing the active hydraulic dynamometer. The work will be conducted over three contiguous seven week terms starting in the Fall of 2009 and concluding in March of 2010. Adam Allard of U.S. Hydraulics in Manchester, NH is acting as the industry advisor. This project integrates principles of machine design, fluid power, heat transfer, controls, data acquisition, and experiment design.

Tasks completed by the project team to date include:

- Background research on fluid power components and existing hydraulic dynamometer designs.
- Developing a project scope document for the entire project.
- Developing task/performance specifications for the dynamometer.
- Developing conceptual designs and presenting the designs to the academic and industry advisors in a formal setting.

A more detailed final report will be provided near the completion of the project.