ABSTRACT

TITLE:	Design of a Rocket Propellant Feed System for Flow Analysis and Visualization
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ABSTRACT: The goal of this project was to design a rocket propellant feed system to conduct water flow tests. This system will be used for flow analysis and visualization in order to assure that propellants will flow as expected. The system is required to be capable of performing two varieties of tests: Transient and Steady State tests. The Transient tests use regulated high pressure helium to pressurize a pressure rated cylinder filled with water. The system is capable of creating short duration bursts lasting from 10 milliseconds to 1 second while logging pressure data throughout the system. The Steady State tests include Resistance and Qualitative tests. The Resistance tests use the same regulated helium and cylinder that is used in the Transient tests, but is used for longer duration pulses. The system is capable of creating pulses lasting up to 10 seconds while logging pressure and flow rate data. The Qualitative tests use a pump to drive flow at a much lower pressure while maintaining a high flow rate. These tests can last for up to 30 minutes where pressure and flow rate data are logged. The system has undergone several test that include all three types of tests. The Transient and Resistance tests work as designed and record and save test data in real-time. This data has shown that the system can be used for flow analysis for a variety of different situations. The Qualitative test flows with minor system issues. Visualization and flow analysis can still be conducted using this system, but extensive troubleshooting of the system led to our recommendations for altering some aspects of the system. These alterations will lead to the Qualitative test system functioning as designed.