CHARACTERIZATION AND NONDIMENSIONAL ANALYSIS OF A VARIABLE SPEED CENTRIFUGAL PUMP

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ABSTRACT

When dealing with centrifugal pumps in the aerospace field, current industry standards dictate the use of single speed drive pumps. The performance of these pumps is then modulated using simply an electro-mechanical valve, which is controlled by an aircraft’s onboard CPU. The French pump manufacturer, Intertechnique, has provided the University of Missouri with a variable speed pump for the purposes of this project.

The purpose of this project is to show how this variable speed pump performs over a wide range of testing parameters. Plots showing capacity (volumetric flow rate), pump head (pressure), temperature, vibration and efficiency will be discussed. In addition, experiments have been analyzed non-dimensionally, so that these results may be applied to any pump with the same impeller shape. The experimental results were then analyzed against existing data in the field of centrifugal pump performance. The significance of the experimental results to the field of mechanical engineering is then discussed, showing the relative efficiencies of the testing done on this pump, and where those efficiencies fall in comparison to other centrifugal pumps.