

Abstract

Masters of Engineering Degree (Mechanical)

Project Title:

“Dangle” and Regenerative Braking For Improved Efficiency and Performance in Hydraulic Actuation Systems.

Author:

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Abstract:

Traditional robotic actuation uses large amounts of electric power moving and controlling a series of servo motors to move various parts. These motors constantly draw power, and struggle to create life-like robotic movement. Hydraulic actuation can replace the need for servo actuation, consolidate the power draw to one pump and several low power valves, and mimic life-like movement using special techniques. As the world moves towards a sustainable, robotic future, every small bit of power that can be saved is important in building towards optimal efficiency, with the aim of simultaneously improving performance.

We developed and tested two 4/5 directional control valve that functions identically to a 4/3 valve (three positions: hold, pressurize up, and pressurize down), adding another hold as well as a “dangle” state. Fluid flows freely between the two terminals across the reservoir when “dangle” is activated, allowing for in our hydraulic circuit, re-using fluid power normally wasted in a hydraulic system. A test-circuit was built to analyze the performance and feasibility of dangle and regenerative braking. Both technologies were functional in testing and show promise for further investigation.

Report Approved By:

Project Advisor:

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