



DIGITAL CLOSED LOOP CONTROLLER OF HYDRAULIC CYNLINDER  
USING LINEAR TRANSDUCER

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“I declared that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree.”

Signed :   
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## ABSTRACT

Hydraulic power plays leading role in many heavy duty industry applications. However, the open controlling scheme is most widely used in hydraulic power system. Therefore, this study present the implementation of linear transducer for purpose of implementing a closed-loop controlling scheme for a linear hydraulic cylinder. For the development of closed-loop digital controller several components were used; personal computer, data acquisition board (Quanser-MPCIQ8), linear transducer and linear hydraulic cylinder. The personal computer is for generating the outputs/inputs signals, from MATLAB/SIMULINK software package, to the data acquisition board. SIMULINK is integrated with MATLAB, providing immediate access to an extensive range of tools that can develop algorithms, analyze and visualize simulations, customize the modeling environment, define signal, parameter, and test data. A data acquisition board is multipurpose board used to connect computer with outside environment. It contains of Digital Analog Converter (DAC) and Analog Digital Converter ADC). Receiving the digital signals from the computer and convert them to analog signals and via versa.

Linear transducer provides highly accurate and reliable position control signals. It also can convert mechanical motion into electrical signals with high accuracy and precision. This linear transducer need to calibrate with MATLAB/SIMULINK in order to detect the signals. A calibration was done manually by using oscilloscope and compares the result with signal that provide to MATLAB/SIMULINK. Hydraulic cylinder produces linear motion and force by using pressurized hydraulic fluid. Hydraulic cylinders are able to work at a very high force with a relatively small supply of highly pressurized fluid. Hydraulic cylinder and linear transducer will attach together

in order to give the feedback to MATLAB/SIMULINK. Feedback signal will show the displacement of hydraulic cylinder when it retracts or extract. The fabrication of base to attach the sensor wit hydraulic cylinder was done using traditional machining. The calibrations on this linear sensor have been carried out by using MATLAB and oscilloscope. The objective of the study was achieved by implementing the linear transducer sensor a closed-loop controller in linear hydraulic cylinder.