

ABSTRACT

McCoy, Michael Ian, M.S.E. Purdue University, August, 2011. O-ring Leakage Sensor using Capacitance Technology. Major Professor: Dr. Gary W. Krutz.

The purpose of this research was to develop a sensor for detecting leakage of hydraulic fluid past a static seal. A unique capacitance sensor was developed and tested. A computer model was created to predict capacitance values and sensitivities of the sensor. The model can also be used to design additional sensors. Dielectric properties of hydraulic fluids were tested and reported. Artificial leakage events were created to determine a sensor design of highest sensitivity. Leakage tests were performed to verify sensor design performance and resulted in a 44% increase in capacitance signal with the presence of leaking fluid.