Pressure Transducer Design

Background

Measurements of pressure are necessary for the accurate prediction of pressure transients in a fast fluctuating pressure system. The data is to be collected using the digital data acquisition system. A strain gage pressure transducer is to be designed for this purpose.

![Figure 1 – Pressure Vessel and General Configuration](image)

Assignment - Develop a pressure transducer to measure pressure vessel pressure

A strain gage measurement system is to be used to design the pressure transducer. The main closure flange of the pressure vessel is to be instrumented with strain gages to design this transducer. In order to allow for different sensitivities, two different cover thicknesses may be required.

Theory

A mathematical model can be developed using circular plate deformation theory. The maximum displacements and strains need to be determined. Any structural mechanics textbook will contain this information. Also a webpage of engineering fundamental may also be of assistance

http://www.efunda.com/formulae/solid_mechanics/plates/theory.cfm

Equipment

The Mechanical Engineering Laboratory is equipped with strain gages, signal conditioning, pressure transducer, manometers, etc to assist in the design of this pressure transducer. The system is to be designed to optimize the 5 volt signal input of the analog to digital converter of the data acquisition system.
Post Analysis and Report

The report should address (but is not limited to) the test setup, calibration, test procedure, digital data acquisition system, underlying principle of operation for the transducers and acquisition system, measurements made, numerical processing of the data, problems associated with the data collection and/or reduction, digital signal processing considerations, accuracy, analog measuring devices used and any other related information to substantiate the results presented.

The results and conclusions should address any problems that were observed. Recommendations to improve the measurement system should be discussed. Weekly progress reports should be written to monitor the status of your work (one page max)