**Abstract**

This report details the process of designing and producing a manifold that connects ultra-high purity (UHP) pressure and vacuum switches to an air supply so that the parts may be tested in an environmental chamber. Using the DMAIC (define, measure, analyze, improve, and control) methodology of problem solving, progress on the project includes thorough research about the problem, preliminary design solutions, iterative prototyping, and testing specific functionalities. Manufacturing engineering topics of tooling, fixturing, metrology, quality, and machining with manual and computer numerical control (CNC) varieties of both mills and lathes are applied during the course of the project. The report concludes with a final manifold design and comparison against the old manifold.