

An accelerometer was used to determine which tube thicknesses provided the largest force and to verify the effects of increased orifice size. A 10 lb weight was hung from the bottom of the muscle. The accelerometer was placed on the top of the weight. Results show a sinusoidal acceleration profile with different magnitudes, depending on tube thickness and orifice size.

Initially the goal was to extract a muscle force profile for use in a Matlab simulation. Knowing the weight moved and its acceleration, a dynamic analysis could be applied to find the force. Because of uncertainty surrounding where the data started and ended, these force profiles were unable to be obtained. However, looking at the magnitudes of the accelerometer data told us two important things. First, the largest orifice size provides the largest acceleration. Second, the largest tube thickness had the smallest acceleration and there was no notable difference between the middle and smallest thicknesses. However, the medium tube diameter handles the fatigue of repeated actuation better than the small tube diameter. Overall the results of this test determined the 3/8" orifice size and the 1/4" tube thickness used in the final design. Data for varying orifice size and tube thickness is shown below in figures 1 and 2.

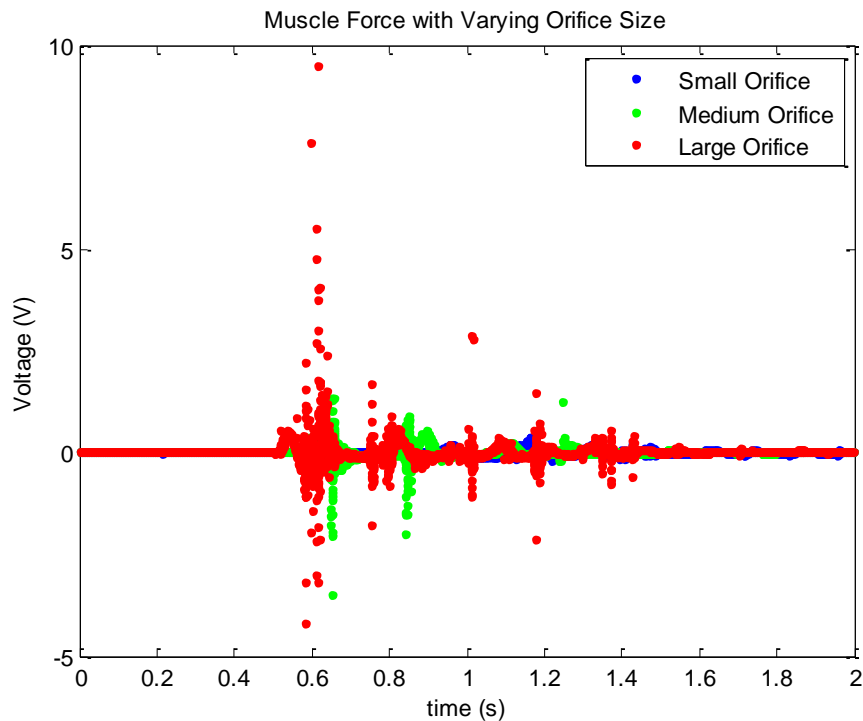


Figure 1: Comparison of Orifice Sizes

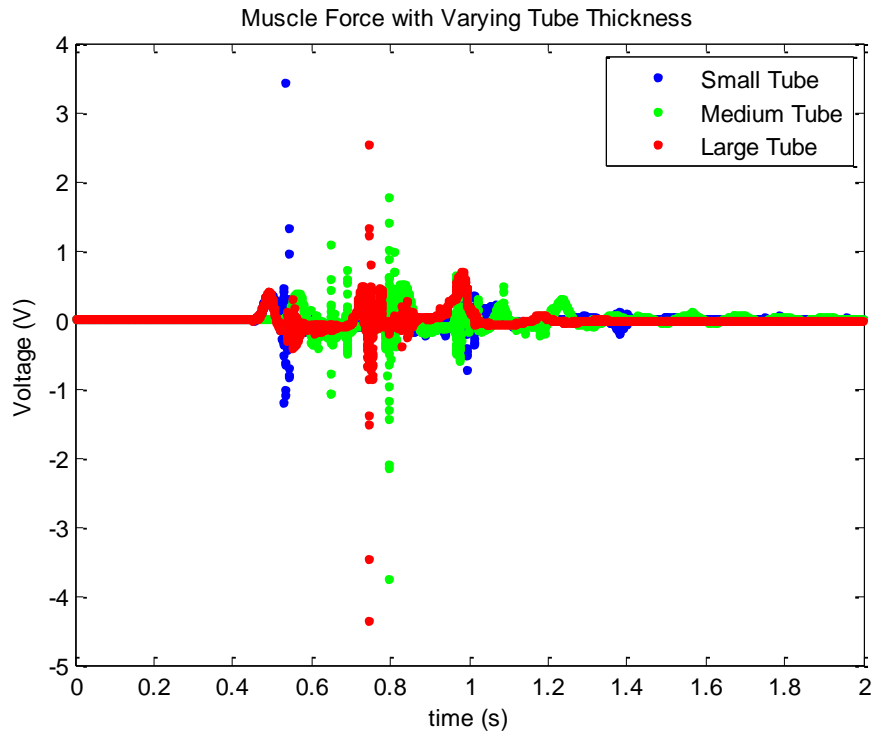


Figure 2: Comparison of Tube Sizes