Alternative Design 1

Figure 2. Profile and top views of alternate design one, designed by Leah Pruzinsky

Figure 2a. Tissue clamping mechanism
The biaxial testing device is setup on a base plate with screw holes for anchoring to any site that it is transported to. Tissue samples to be tested with this machine are contained in a small square saline bath pictured in the center of the design. Inside the bath is the sample that will be cut into a cross shape. Four motors (in green) will be used to pull the tissue in four directions, negative and positive x and y, (planar, biaxial). The tissues are introduced to force by loading cycles which stretch the tissue. Each motor produces a circular motion, which is translated into a uniaxial linear movement by the linear actuator (in purple). A load cell is placed on two of the motors, one which pulls in the x direction the other in the y. An arm (light blue) is then connected at a ninety degree angle to this actuator to connect the tissue sample to the linear pulling motion. The four motors are arranged such that space is optimized. This is done by placing each motor along the edge of the saline bath, with an arm connected to the sample which is at a ninety degree angle to the linear actuator. This is contrasted to a design in which the motor/actuator/arm connection does not change directions. That design takes up more space, which was an important consideration in our design, because the client requires a device which is compact and transportable.

Another important consideration to our design was the clamping mechanism. Previously, sutures or hooks have been more commonly used as a mechanism for attaching the tissue sample for testing. However, due to the decreased size of our device, and therefore specimen size a new method is required. The clamping mechanism in this design is such that the faces in direct contact to the sample are lined with a gritted sandpaper to grip the tissue. Additionally, this mechanism has adjustable screws to tighten the clamps onto the tissue and is pictured in Figure 2a.

Lastly, drivers and controls for the motors are not included in this initial design. This is because the NI hardware and software which will perform these necessary functions are already in the possession of the client and will be easily coupled to our device upon assembly.