Alternative Design 3: Grid-like Orientation

There are many possible ways to set up the tissue samples for this testing machine. Each orientation has its own advantages and disadvantages. Many different designs were considered, including a circular orientation, a triangular orientation, parallel rows, and a grid-like orientation.

The grid-like orientation is essentially a 3 by 4 matrix of samples. This provides the twelve samples requested by the client. This orientation is very compact, which provides many of its advantages. Its compactness allows it to use a smaller bath than the other designs which could save money on fluids. It also might be cheaper to manufacture. A smaller footprint also means that if the client ever desires the ability to test more than twelve samples simultaneously, than more devices could fit on the same baseplate in order to ramp up testing. Another final benefit is that the sample clips could all be interconnected, giving them less flex. In the parallel row design the rows might flex depending on how long and stiff the arms are. A grid-like setup would have all the clamps closer to the movement bar resulting in less flex. This might mean more accurate results than some of the other designs.

The grid-like orientation is not without disadvantages. The biggest problem is loading the samples into the clips. Already a process that requires maneuvering tiny samples into hard to reach places, having some samples that are completely surrounded by other clamps would make it very difficult to place the samples. Another problem comes with attaching the tissue clamps to the Bose Testbench system. Ideally the Bose Testbench system will attach via a bar that moves the bottom tissue samples through the water. This allows the load cells to remain stationary, which means more accurate results. A grid-like orientation would likely have no room for a bar to pass through meaning the Bose Testbench would attach and move the upper clamps. Because the load cells cannot be submerged in the bath they would need to move with the upper clamps and results could be somewhat compromised. A final problem may come from the fluid resistance of the bath. Other designs are more open and have many holes in them allowing the bath solution to flow through. This creates minimal resistance. In this more compact design there are fewer places for the bath solution to flow through. If there is enough resistance for the strain gauges to register than this could have a big impact on the results.