Construction of the camera mount system and completion of the temperature control loop remain as my two major responsibilities for the project. The camera mount system is currently under construction and should be completed by the end of the week. The temperature control loop had been delayed because we were waiting on the order for the heater and thermostat Tempco. These products arrived on Tuesday, but I have not had a chance to work with them yet.

The camera mount is progressing well, with only minor complications. The 3/8 inch aluminum plating used for the attachment and mounting plates has worked out very well. The material is easy to work with and quicker to machine than steel. A large plus is that it was also free and there will be more than enough scrap to use for anything other parts that need to be machined. A major pitfall this week was the loss of a five inch section of aluminum bar that is supposed to attach between the mounting plate and actual camera mount. I had previously cut and squared this piece to the correct dimensions and it was one my desk with the machined parts, but at some point earlier this week it disappeared. This piece was also machined from scrap aluminum for free, so I hope that I could be able to find more material to replace the missing piece. In the worst case scenario I will have to cut a piece from the remaining aluminum plate I have from the mounting and attachment plates. This would function the same, but it was a time consuming process which is not very cost effective at this point.

At this point the camera mount and attachment plate are completely finished. The mounting plate is nearly completed, however I ran into a small miscalculation while machining this piece. I had drawn up the dimensions as to where the holes were located for the clevis pin and push pin insertion. These holes need to line up perfectly between the attachment and mounting plate so that the push pin is easily removed and replaced in order to rotate the camera from its testing position to calibration
position. My solution to the problem is that I am going to redesign the mounting plate so that both of the holes are located directly in line with each other. This way I know that as the plate rotates the hole will not be shifted. I believe that my problem was that as the mounting plate rotates I did not account for the thickness of the clevis pin hold the two plates together and this altered the location of the holes. This should be a simple fix and complete the job.

So far a design has not been completed for the base of the camera mount stand. There was discussion of purchasing a camera stage so that position can be fine tuned rather that roughly adjusted. However, no one has made any progress on this decision and I had difficulty finding a suitable product for this application. Typical camera mounts are purchases a complete package, not just the linear stage, and this drastically increases the price. I simply need a stage similar to the one for the bending bars, but it will not be controlled with a step motor, to attach my camera stand to. This may be an addition to the system later on and I will simply machine some sort of base plate for the time being. This base plate needs to attach to the camera stand, which acts as a track for the camera mount to move vertically on. This camera stand is made from stainless steel because it is heavier and stronger. I have never worked with stainless steel and the machining takes much longer, but its added advantages are worth the time. Since so much of the camera will be held way over the testing bath I was concerned about supporting the camera and having it want to lean forward. By using the heavier steel on the camera stand I hope that this will maintain a lower center of gravity near the base rather than up over the testing bath. I plan to machine two ¼ in tracks within the stainless steel bars and have two ¼ bolts slid between the two bars. These bolts will have wing nuts on the end so that they can be used to adjust the vertical position of the camera. This will be critical to testing because the flexural rigidity test and transmural strain test require drastically different fields of view and resolutions. It is essential that the camera be capable of getting close enough to the tissue for the transmural experiment so that the micromarkers can clearly be tracked during deformation.
A part of the system that has not been considered till this point is a setup for the calibration system. We had previously performed the calibration during pilot testing by attaching a ruler vertically and hanging different slot weights from the bending bar using a small loop of suture. This worked for the bench mark tests, but a more professional and standard setup should be included in the device. I have not worked on this design yet and will need to discuss it with my teammates. Hopefully it will be a simple setup that will help with repeatability and reliability of the testing. We currently have four sizes of bending bars and each diameter should have a relatively distinct stiffness so this calibration should not have be performed every test. This is a positive factor because once each bending bar diameter has been calibrated the user will simply need to input the bending bar size and its calibration will be already wired into the system. For this reason a calibration setup is not critical to the device design, but would certainly be useful.