Project Identity:
Orthodontic Wire Mechanical System Tester
Group 7
Week 1
Bethany Lepine

Work Completed:

Upon arrival in the senior design lab, it was brought to our attention that none of the parts we had requested had been ordered. We soon learned that this was due to the fact that the client wanted to make absolutely certain that the parts that we used were exactly what was necessary to complete the project, and was the least expensive for our means, with the desired features.

At the first meeting at the Health Center with Michael Holbert, Don Peterson, a biomedical engineer working at the Health Center, met with us. He asked us questions about the specific equipment we chose, and also inquired as to whether or not we had documented our research on other comparable parts. He requested a spreadsheet that would compare other parts and their costs and characteristics. This way he would be better able to determine whether or not the parts that we had chosen would be the best possible parts.

I edited our final report from BME 290 so that only the relevant subunit information was included. This, and the completed spreadsheet of parts analysis, was emailed to Don Peterson.

In order to create the spreadsheet, various companies were researched and prices and properties were compared. After all of the comparison, it was found that the sensors and motors we had chosen for our final report were in fact the best pieces of equipment for use in the tester.

After comparing products, the products selected for the means of this report were found to be the most useful for the project at hand. The Linear slides selected, Anaheim Automations LS100 series, has the built in encoder and driver, can be shipped within 2 weeks, and do not require additional equipment. The less expensive slides either do not have an integrated motor system, and if they do, the driver and encoder need to be assembled separately.
thus increasing the cost. The sensors selected are expensive, yet are able to sense the forces and torques in all 6 directions. We were unable to find a company with this amount of variable at a comparable price.

I then spent some time researching various analog to digital converters. The one selected for the final report was a Texas Instruments 24 bit ADC with a 30kHz sampling rate to be purchased from DigiKey. I was unsure as to what the differences in packaging options were, with wording such as cut tape, tape and reel, or digi-reel, which was described as a custom quality reel with a leader and a trailer. I called the company, and they explained that the packaging options referred to the application for which it was to be used, as in the attachment of the ADC to the printed circuit board.

After doing all of the research, I realized that the selected Texas Instrument ADC is no longer in stock and will have to either be ordered from a different company, or a comparable ADC will need to be found.

I also investigated the various circuitry necessary for the sensors. The output signal of the sensor has a resonant frequency of 7200 Hz in all 6 channels. The sampling rate of the program would therefore have to be 2 times the maximum frequency of the signal. Therefore, an amplifier as well as other conditioning would have to be applied to the sensor signal in order to get a good reading of the signal in the computer program.

The conditioning of the signal used in the final report still applies. This can be seen in Figure 1 on the next page.
Figure 1: Circuit for Conditioning.

One change in this circuit, however, is that instead of using a 6th order bandpass Butterworth filter, a 2nd order filter will be used. This will provide the filtering that we need without complicating the circuit. Original we thought that the signal conditioning could be completed in the LabVIEW software, however Don Peterson brought it to our attention that a printed circuit board circuit would be best.

**Future Work:**

Over the course of the coming weeks, I will be involved in finalizing the bracket setup. Although it has been established that Ultimate NiTi will be providing their machining services, the design of various bracket setups need to be drawn on Unigraphics.

All of the research on the ADC and the circuit design needs to be completed so that building can commence. Since the ADC is out of stock at DigiKey, a new company must be selected. All of the circuit elements need to have defined parameters for the resistor and capacitor values. Once this is completed, these can also be ordered.

Place all purchase orders.

**Project Review:**

Due to the review of Don Peterson, the purchase orders were not yet sent in. This will be done within the week. Our project is in the refining stages due to the need for perfection.

**Hours Worked:** 14