Sample Environment Department

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Introduction

This summer I worked in the Sample Environment Department(SED), more specifically in the Injector Characterization Laboratory (ICL). The SED's job is to inject users' samples into the Free Electron Laser (FEL) in the smoothest, and most sample efficient way. While SED has to try and be careful about the amount of sample used, it also has to be conscious of the impact SED has on the laser beam's operations. If SED is not run efficiently, the beam may be interrupted, costing thousands of dollars per hour.

Keywords: ICL, SED, Free Electron Laser, Sample, User

Research

SED is made up of a couple very bright and talented people who can do almost everything needed to allow the department to run smoothly. There are however some jobs that are simpler and so left for later. While these projects are simple, they still are very important and take time to accomplish. This summer my job was to complete many of these time demanding tasks that the rest of the team was too busy to finish.

My very first project was to build a holder for the flow focusing tubes that previously were stored just lying on a counter. These tubes are delicate and cost hundreds of dollars. In order to create the holder my mentor had me learn Solid Edge, a 3 dimensional modeling program used at SLAC.

Figure 1. Wall mount for Sample Injector Rods.

Some of the different projects I did this summer include; designing and then building a holder for 1/16 inch tubing to stop the spool from unraveling, adding another testing station in the ICL so two groups of users could work simultaneously, and helping my mentor set up and take down Coherent X-Ray Imaging (CXI), one of the experiment hutches, for each of the users' experiments.

The most important job I did this summer was probably designing a bracket that the allowed the EtherCAT Modules in the Switch Box, box that switches which sample is injected into the FEL beam, to stand perpendicular to the ground.

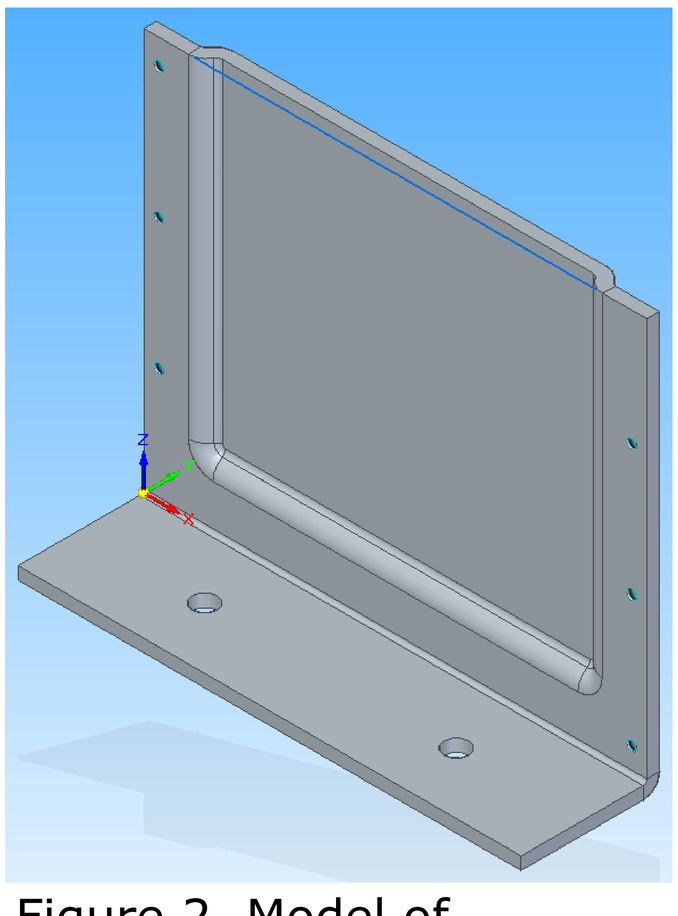

Figure 2. Model of Aluminum bracket designed on Solid Edge.

This new design created space for a third EtherCAT Module which allowed the control software to configure itself when a switch box is added or removed. Previously, in order to configure the program, SED had to change the software code manually which took lots of time and effort.

I was able to see this project go from just an idea in our heads to a design then to be built and actually implemented.

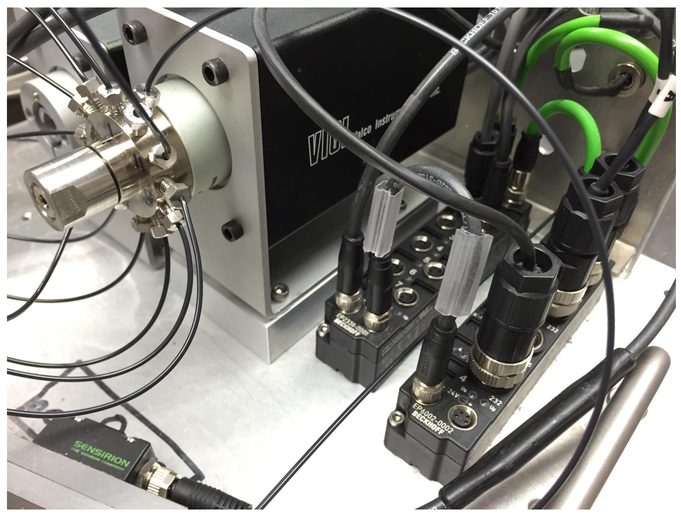

Figure 3. Switchbox before EtherCAT Bracket added.

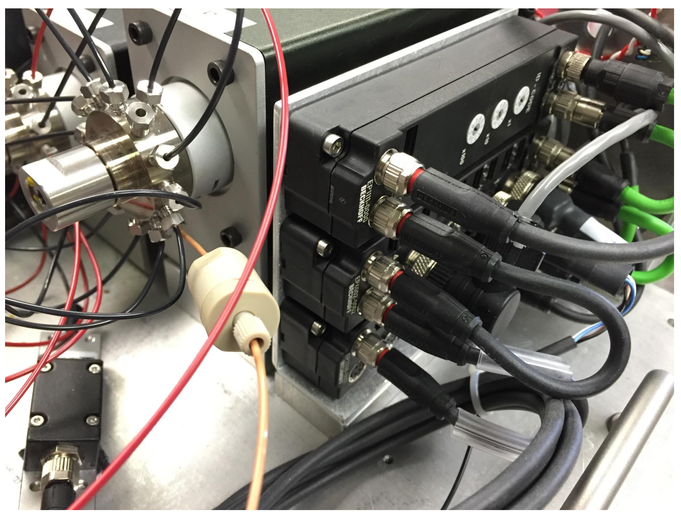

Figure 4. Switchbox with new EtherCAT module and bracket.

Conclusions

This internship was my first experience at a laboratory and I really enjoyed learning all the science and engineering that the SED does. I was able to learn all about how sample injection works, and quite a bit on using 3 dimensional modeling software particularly Solid Edge. My biggest take away was how little tasks that really are not difficult to accomplish often times have just as much importance as the difficult/mentally demanding projects.

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