

Peter Grenfell

Summer 2016

Mechanical Prototyping and Manufacturing Internship

The internship was located at the Johnson Space Center (JSC) Innovation Design Center (IDC), which is a facility where the JSC workforce can meet and conduct hands-on innovative design, fabrication, evaluation, and testing of ideas and concepts relevant to NASA's mission. The tasks of the internship included mechanical prototyping design and manufacturing projects in service of research and development as well as assisting the users of the IDC in completing their manufacturing projects.

The first project was to manufacture hatch mechanisms for a team in the Systems Engineering and Project Advancement Program (SETMAP) hexacopter competition. These mechanisms were intended to improve the performance of the servomotors and offer an access point that would also seal to prevent cross-contamination. I also assisted other teams as they were constructing and modifying their hexacopters. The success of this competition demonstrated a proof of concept for aerial reconnaissance and sample return to be potentially used in future NASA missions.

I also worked with Dr. Kumar Krishen to prototype an improved thermos and a novel, portable solar array. Computer-aided design (CAD) software was used to model the parts for both of these projects. Then, 3D printing as well as conventional techniques were used to produce the parts. These prototypes were then subjected to trials to determine the success of the designs. The solar array is intended to work in a cluster that is easy to set up and take down and doesn't require powered servomechanisms. It could be used terrestrially in areas not serviced by power grids. Both projects improve planetary exploration capabilities to future astronauts.

Other projects included manufacturing custom rail brackets for EG-2, assisting engineers working on underwater instrument and tool cases for the NEEMO project, and helping to create mock-up parts for Space Center Houston. The use of the IDC enabled efficient completion of these projects at significantly reduced cost. I acquired and improved manufacturing and prototyping skills during my tour including learning about CAD program called Creo, gaining valuable conventional machining experience with lathes, CNC milling machines and various other tools, and improving my engineering project communication and collaboration skills. The internship also allowed me to better understand operations at NASA. I plan to work in the aerospace industry or do academic research benefitting space science and exploration, and this internship experience will enable me to have insight into manufacturing processes for research and development.