More Than A SketchUp

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NASA CENTER

Computer Engineering

Small Payload Launch Integrated Testing Services S.P.L.I.T.S.

Universities Space Research Association Spring Session

Date: 7/24/2014

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This 2014 summer internship assignment at John F. Kennedy Space Center (K.S.C) was conducted with the National Aeronautics and Space Administration (NASA) Engineering and Technology (NE) group in support of the Control and Data Systems Division (NE-C) within the Test, Operations & Support Software Engineering Branch (NE-C2). The primary focus of this project was to assist Branch Chief Laurie B. Griffin, to support NASA's Small Payload Launch Integrated Testing Services (SPLITS) mission, by mastering the capabilities of 3-D modeling software called SketchUp. I used SketchUp to create a virtual environment for different laboratories of the NE-00 Division. My mission was to have these models uploaded into a K.S.C Partnerships Website and be used as a visual aid to viewers who browsed the site. The leads of this project were Kay L. Craig, Business and Industry Specialist (AD-A) and Steven E. Cain, (FA-C). I teamed with fellow intern Tait Sorenson of the Flight Structures and Thermal Protection Systems Branch (NE-M5) and met with many K.S.C lab managers willing to display their lab's structure and capabilities. The information collected during these lab tours was vital to the building of the K.S.C Partnerships Website. To accomplish this goal Sorenson and I later teamed with fellow Marketing intern Marlee Pereda-Ramos, of the Spaceport Planning Office In Center Planning And Development (AD-A) Along with Ramos, Tait and I toured an array of laboratories and got first hand exposure to their functions and capabilities.

I. Introduction

The primary objective of my 2014 summer internship assignment at John F. Kennedy Space Center composing 3-D models to assist NE-C2 Division with the Small Payload Launch Integrated Testing Services (SPLITS) mission. This was done by collaborating with the marketing and advertising directorate to promote the capabilities of the K.S.C Partnerships Website and creating three dimensional models of various labs related to SPLITS. Many of the labs visited either have had or are currently interacting with developing and testing elements that directly affect the flight environment and systems integration of small satellites. The models will be used to provide a visualization of the labs to potential partners and customers utilizing the KSC Partnerships Website. These models are crucial to the Small Payload Launch Integrated Testing Services (SPLITS) mission. I teamed with fellow intern Tait Sorenson of the Flight Structures and Thermal Protection Systems Branch (NE-M5), Marlee Pereda-Ramos, of the Spaceport Planning Office In Center Planning And Development (AD-A), and visited multiple laboratories collecting oral, written and visual data about each of the laboratories and their capabilities. I took those pieces of metadata and used them to compose reports about my findings and how they relate to the SPLITS mission.

II. Part 1: The Meet

On Friday June 6, 2014 at 9a.m. I traveled with Tait Sorenson to the Headquarters Building (HQ)where we met with project leads Kay L. Craig, (AD-A), Steven E. Cain, (FA-C) Susan E. Danley, (NEM50); Christine S. Okrepkie, (NEA20) and fellow intern Marlee, Pereda-Ramos for a scheduled SPLITS Website Demo. The goal of the meeting was to get everyone more familiar with the objective of bettering the use and capabilities of the website. We were

shown the websites strengths and weaknesses and prompted for any advice on bettering its overall function.

One of the most important topics focused on during the meeting was the websites overall look and feel. This is very important for an individual searching the site for anything Science, Technology, Engineering, Mathematically (STEM) related to be able to navigate there without getting buried within unrelated webpages. Accomplishing this goal is crucial to the SPLITS mission, for the website is one of the main sources of communication between KSC and a potential partner of customer.

After analyzing the many sectors of the website we were all given a particular objective to complete. Part of my objective was to work alongside Mr. Sorenson and Ms. Pereda-Ramos and collect information that would assist me in creating the 3D models for the website. I accomplished this by obtaining high definition photos of components with key relations to the SPLITS mission. I also gathered information on the dimensions of the laboratories so that the models I created would be up to scale and accurate.

III. Part 2: 3D Perspective

The main focus of my portion of this project was to compose 3 dimensional models of each of the laboratories that I and my fellow interns toured. I used to Architectural tool developed by the Trimble Navigation Corporation called Sketch Up to do this. SketchUp was originally an independent company until being purchased in 2006 by Google. The then named Google SketchUp, was owned by Google until 2012 and is now owned by a mapping and navigation equipment company known as Trimble Navigation. Trimble offers various different licensed versions of SketchUp. I'm currently using the government licensed version of SketchUp.

Prior to attending each laboratory tour, I got permission to obtain photos and coupled them with architectural dimensions of the landscapes and structures of the areas we visited. This media was very important to compose components that were to be included within the 3 dimensional models. After filtering through the contents of the photos I then uploaded them into a SharePoint and let others on the project cypher through them. I used these photos as references of length, height and width of the many components to be included within my 3D models.

IV. Part 3: Conversion

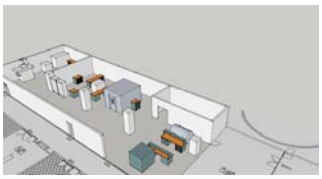
After composing a complete model it was my objective to convert it into a compatible video format that would easily integrate into the web environment the video was meant for. To accomplish the task I used a piece of software called Xilisoft Video Converter. Xilisoft has the ability to convert between HD videos like HD ASF Video, HD AVI Video, HD MPEG-4 Video, and convert general videos and audios. (Xilisoft Corporation, 2014) I used it to suppress the video into a suitable size for the web environment. From my experience the Windows Media Video (.wmv) file extension is most suitable for the task I'm trying to complete. Mostly because .wmv can contain video in one of several video compression formats. My goal was to keep the video less than 54 Mega Bits (Mb) and Xilisoft helped me to achieve this. I then used an

additional piece of multimedia software called Nero Platinum Suite to recode the converted video with proper metadata. Nero Platinum Suite is composed of many different tools used to edit video photo and audio. Nero platform, "…enables consumers to access, enhance and share their digital content across PCs, smart phones, tablets and online social networks. Nero also produces a top-selling multimedia software suite, which contains powerful applications for media management, video editing, video converting, file back-up, content syncing and disc burning." (Nero, 2014) For this particular job, I used Nero Video and Nero Recode tools. The goal is to have an individual model of each individual lab that I toured this summer. The finished products will eventually be uploaded and embedded within their suitable section of the K.S.C Partnerships Website.

V. Part 4: Thermal & Vibrations

On June 20, 2014 in between the hours of 10:00 AM-11:00 AM I traveled with fellow interns Marlee, Pereda-Ramos and Tait Sorenson to the Operations and Checkout Building (O&C) where we met with Daniel B. Ciarlariello, (NEL10) for a scheduled Thermal Test Laboratory tour. Mr. Ciarlariello gave Tait and I an overview of how testing the heating and cooling of a flight environment was very important when developing small satellites. The overall objective of the Cryogenics and thermal testing lab was to monitor how small satellites behave under conditions related to those of outer space. The lab was equipped with machines that could create a vacuumed environment that could cool an object down to -300 degrees Fahrenheit, heat an object up to 400 degrees Fahrenheit. These types of capabilities are essential to teams developing SPLITS applications, for it allows the teams to have a safe environment to test the endurance of different elements of their satellite.

After touring the Thermal and Cryogenics laboratory in O&C Mr. Ciarlariello, escorted us to the Cryogenics Test Laboratory where we met with for a scheduled overview of the Vibrations Laboratory. He then explained to us how understanding vibration is very important during a launch environment. We were told how easily it is for a payload to be damaged by the violent nature of vibrations that a rocket launch creates and how small payload satellites are even more subjected to this. For the final stop of the Vibrations Laboratory Mr. Ciarlariello introduced us to different machines used to test a small satellite under the violent conditions of a launch. The machines ranged from a shaker-table to an enclosure equipped with specialized low frequency components. All these components are critical in the testing of SPLITS applications.

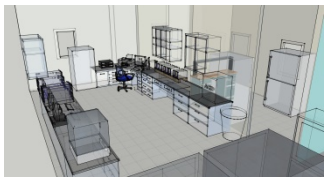


VI. Part 6: Corrosion: Lab

On Monday, June 23, 2014 in between the hours of 9:00 AM -11:00 AM I traveled with fellow interns Marlee, Pereda-Ramos and Tait Sorenson to the Operations and Checkout Building (O&C) where we met with Luz M. Calle, (NEL40) for a scheduled Corrosion Technology Lab tour. Mrs. Calle gave us an overview of how testing the corrosive environment of launches is very important when developing small satellites. Mrs. Calle also explained how the fuel mixtures used to launch rockets have a profound effect on the surrounding areas of a launchpad.

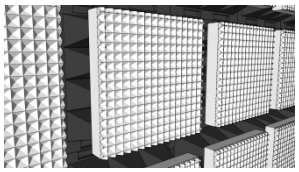
Mrs. Calle continued the tour by showing us different materials in which her lab had tested in corrosive environments. She also showed us a machine called the Q-FOG Cyclic Corrosion Testers that simulates the corrosive environments that the launch structures and land are exposed to. Mrs. Calle also discussed the need to create special coatings to protect the land and structures here at KSC from the corrosive environment. She made this clearer on Tuesday, June 24, 2014 in between the hours of 10:00 AM-11:00 AM when I traveled with fellow interns Marlee Pereda-Ramos and Tait Sorenson to the Operations and Checkout Building (O&C) where she introduced us to Michele N. (ESC-870) and Mary E. Hummerick, for a scheduled Microbiology Capabilities Lab tour. Mrs. Calle gave us an overview of how testing different formulas on the molecular level made for a more reliable and efficient solution to the damage caused by KSC's corrosive environments.

VII. Part 7: Corrosion: Beach Side



On Tuesday, June 24, 2014 in between the hours of 8:01 AM-10:00 AM I traveled with fellow interns Marlee Pereda-Ramos and Tait Sorenson to the Operations and Checkout Building (O&C) where we met with Jerome P. Curran, for a scheduled Beach Site tour for summer interns. Mr. Curran gave us an overview of how testing different solutions for the corrosive environment of launches is very important when developing small satellites. We were given a full tour of the Beach Side Site and had explained how because of the high salt content in the air, the site was perfect for testing short term and long term effects of the corrosion. We were given first hand exposure to how different formulated coatings have different effects on different material. The testing platforms ranged from masonry, wooden, to metals. These are the materials that one will find at the launch pads at Kennedy Space Center and testing the effects of the corrosive atmosphere is critical in maintaining the endurance and durability of the launch support structures.

VIII. Part 8: Electromagnetic



On Wednesday, June 25, 2014 in between the hours of 10:00 AM-11:00 AM I traveled with fellow intern Tait Sorenson to the Electromagnetic Laboratory (EML) where we met with Peter S. Aragona, (NEE10) for a scheduled EML Facility Tour and EMI discussion tour. Mr. Aragona gave us an overview of how testing different solutions for electromagnetic environment of launches is very important when developing small satellites. We were shown an actual application that was used to test a small satellite under a high Radio Frequency (RF) wave situation. We were told how RF was a vital element to control during a launch environment, for the wrong signal strength of RF during an important cycle of a launch, could result in miscommunications and communication failure. We were given a tour of rooms with padded walls and equipment engineered to direct a controlled amount of RF at any given object. It is in rooms

such as this one that SPLITS applications are tested for communication capabilities under controlled environments.

IX. Part 9: Conclusion

Overall, from an engineer's viewpoint, having a chance to tour all of the labs really put things in perspective. Getting a chance to view more than one are and to see their individual capability allows one to put the pieces of the puzzle together. When you are able to see how two skills collaborate to accomplish a common goal, you get a broader picture of why some divisions are interlinked. To have a broader view point allows for a greater understanding of how and why things need to be done in a certain fashion. This frame of thought and understanding is critical to the SPLITS mission.

Works Cited

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Xilisoft Corporation. (2014). *Products*. Retrieved July 20, 2014, from Xilisoft: http://www.xilisoft.com/products-all.html