Jackson and Tull News

Fall 2014

Ongoing Projects

DC Water Construction Management

For several years Jackson and Tull (J&T) has been a member of engineering teams that have provided overall construction management services for a wide variety of projects at the DC Water Blue Plains Wastewater Treatment Facility in Washington, DC. Some of these projects include: the Enhanced Nitrogen Removal Facilities Upgrade, including a new pump station, channels and process; the Filtration and Disinfection Facilities Upgrade Phase 23—Electrical Improvements, the Raw Wastewater Pump Station 1 Upgrade; and the Biological Sludge Thickening Facility. There is about $240 million in construction that the team is managing.

J&T continues to be responsible for reviewing design documents and providing Construction Management services during the construction phase. Samples of J&T responsibilities include:

- Review of shop drawings, specifications and other contractor submittals
- Witness testing for electrical control panels and instrument calibrations
- Resident engineering services
- Preparation of change orders
- Assistance during bidding phase and pre-construction phase including facilitating required permits and approvals
- Construction management and technical review for electrical/I&C System Design and engineering projects
- Coordination of training for DC Water staff on new equipment and systems

Shown is the Enhanced Nitrogen Removal Facility under construction.

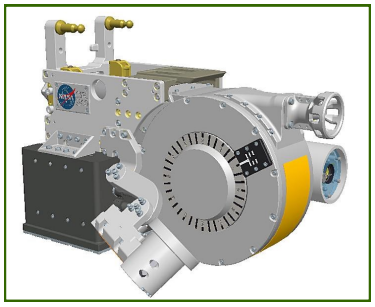
Our Engineering Office Has Moved!

After more than 20 years at Executive Place in Seabrook, MD, our offices moved in October 2013 to 6411 Ivy Lane, Suite 204, Greenbelt, MD, 20770. Our new phone number is 240-553-7000.

Ongoing Projects, Continued

Satellite Servicing Capabilities—VIPIR Inspection Tool

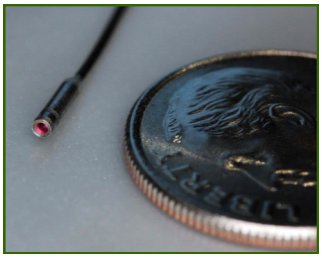
VIPIR, the Visual Inspection Poseable Invertebrate Robot, is a robotic, articulating borescope tool designed to deliver near and midrange inspection capabilities in space. It was designed and built by the SSCO team at NASA GSFC. The VIPIR is actually a miniature robot that looks like a long snake. There will be a miniature camera on the robot's end that will allow this system to perform inspections inside tubes and under thermal blanketing material. By sending it commands to guide it from ground control, the snake will be able to present views of hardware hidden behind other structure or thermal insulation. The long snake will be coiled up on a drum that is a prominent part of VIPIR. In addition, there are two more cameras to serve as means to use VIPIR or to inspect other parts of the Space Station.

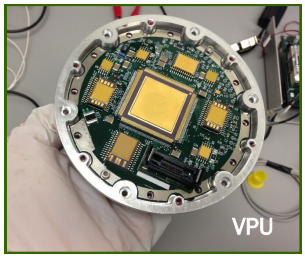


The photo to the right shows a rendering of VIPIR. The snake-like robot will be coiled on the large drum, extending from the circular star opening in the top right of the image. Details of this snake robot are proprietary to NASA, and will not be shown. On the far right in the image is a new camera with motorized zoom and focus. Finally, in the middle of the image is the remaining camera, which is identical to cameras used on Phase 1, and provides a right angle view to best ensure that the VIPIR is positioned properly to deploy the snake robot. All the electronics to control the VIPIR's motors, cameras, lights and sensors will be contained in the dark grey box, called the VEB. This latter box also has the umbilical connector that the SPDM robot uses to power and communicate with VIPIR.

Another subassembly is the Video Processing Unit (VPU) (below) which is the system that processes the signals from the micro-camera on the robot head (image altered for IP) into conventional video. It fits in the lid of the round drum. It represents one of the most intricate and complex circuits Dr. Cheung, Electrical Lead, and his team responsible for the entire electrical and electronic design, has ever developed.

Almost all of the electrical system that runs the motors, cameras and lights on the VIPIR are housed in the unit called the VEB. Here it is completely assembled and represents the work of a large team in itself. The SPDM robot on Space Station plugs into the doors on this face to power up and communicate with the VIPIR.





The main feature of VIPIR is a tiny micro camera that is only about 1mm in diameter, thinner than a dime. Contained in this small space is the optics, the imager and the electronics needed to send the image electronically to the VPU (right).

VIPIR was launched on the European Ariane 5 rocket on ATV-5 from Europe's Spaceport in Kourou French Guiana in July 29, 2014. The entire team feels that VIPIR represents a new high water mark for mechanical and electronic sophistication, built in a very short time and with a small staff. We expect to do on-orbit operations sometime near the Spring of 2015.

The assembled VIPIR. The micro camera is the bottom most camera, and has a ring of white LEDs surrounding it.

Ongoing Projects, Continued

Space and Missile Systems Center, Kirtland AFB, NM

The Jackson and Tull (J&T) team supporting the Space and Missile Systems Center (SMC) Advanced Systems and Development Directorate (SMC/AD) is assisting the Government with the largest, most-advanced mission in the 45-year history of the Department of Defense (DoD) Space Test Program (STP). The STP-2 mission will demonstrate the capability to manifest numerous spacecraft on a Falcon Heavy. This launch will represent the first use of a Falcon Heavy by the United States Air Force. The Falcon Heavy is described as "the world's most powerful rocket" with 27 Merlin engines providing with nearly double the lift capacity of other heavy launch vehicles.

Falcon Heavy

On top of the Falcon Heavy, the STP team will mount the Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC)-2 space mission comprised of six spacecraft fabricated and integrated by a joint Taiwanese-British team in collaboration with the National Oceanic and Atmospheric Administration (NOAA). The COSMIC-2 constellation of 12 spacecraft will collect atmospheric data for weather prediction and for ionosphere, climate and gravity research. The six COSMIC-2 spacecraft on STP-2 will be configured on two circular payload adapters being designed and fabricated specifically for this mission.

The other primary spacecraft on the STP-2 mission is the Air Force Research Laboratory (AFRL) Demonstration and Science Experiment (DSX), a multi-payload spacecraft permanently attached to an EELV Secondary Payload Adapter (ESPA). The DSX will be inserted in an elliptical orbit intended to take it through the most hostile mid-altitude space between the Van Allen radiation belts in order to measure the effects of solar weather on space systems. With space booms deployed to a distance of 80 meters (Y-antenna) and 16 meters (Z-antenna) scientists intend to inject electro-magnetic waves into the magnetosphere to measure and test the effects. This unusual spacecraft required the development of a specialized separation system. In fact, the J&T Beltsville team was involved in early testing of the 62-inch lightband separation system during 2012.

In addition to our space mission efforts, J&T is also supporting the Government acquisition of a new spacecraft to host research and development (R&D) payloads. To reduce the cost of space system acquisitions, the Air Force is emphasizing that a pre-requisite for the introduction of new technology requires testing and demonstration in realistic operational environments.

Ongoing Projects, Continued

Space and Missile Systems Center, Kirtland AFB, NM

The STPSat-5 will provide the DoD STP with a small, affordable platform for demonstrating new technologies on orbit. The J&T team assisted the Government by writing technical requirements and the statement of work (SOW) for the effort. J&T engineers participated in a review of deliverables from five contractor teams as part of a market study before the acquisition was initiated.

J&T provided launch integration and flight operations support for the AFRL Automated Navigation and Guidance Experiment for Local Space (ANGELS) program. The ANGELS spacecraft was the next generation of spacecraft based on the XSS-10 and XSS-11 programs designed and built by J&T engineers and technicians. For ANGELS, J&T engineers performed required reporting for system safety certification and launch readiness packages in preparation for launch on the AFSPC-4 mission. The successful launch of ANGELS on July 28, 2014 was testament to effective mission support and a rideshare concept that the STP has been working on for many years. The addition of a secondary payload to a high-cost primary spacecraft is a difficult proposition since the risk profiles may not match. In this case, analysis supported pairing two classified spacecraft intended for similar orbits and the concept was proven by a flawless launch.

Comments? Contact Us!

Manhattan Bridge at Night

Jackson and Tull
Attn: Lori Keesee
Senior Administrator
2705 Bladensburg Road, NE
Washington, DC 20018
(202) 333-9100 Ext. 100
lkeesee@jnt.com
www.jnt.com