

SpaceTEC[®]

National Aerospace
Technical Education Center

Talk

FALL 2010

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(Virginia)

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(Oklahoma)

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Message from the PI

This issue of *SpaceTEC Talk* provides a summary of key activities, including articles by the SpaceTEC headquarters staff. In addition to work closing out our NSF Center of Excellence grant on July 31, we have begun our second year as an NSF National Resource Center. Some of the most interesting and important activities include:

- The SpaceTEC annual PI Conference was held in conjunction with the NSF ATE Hi-TEC Conference in July. Key observations and recommendations by our National Visiting Committee and National Aerospace Technology Advisory Committee include:
 - The NRC is on track for appropriate actions to accomplish its goals for this year.
 - Adding a prep course is encouraged and should produce improved pass rates.
 - The addition of CertTEC – an affiliated activity in non-aerospace certifications – is a good idea but should be carefully managed separately from SpaceTEC.
 - NASA and DOD programs should be pursued, along with commercial space activities.
- The SpaceTEC “preparatory course” development is well underway using ANGEL software.
- Thomas Nelson CC hosted a meeting at NASA Langley to honor graduates of their AS degree program who received NASA co-op program appointments after having passed the SpaceTEC certification examination as a MANDATORY entry requirement.
- SpaceTEC attended the Commercial Space Transportation Advisory Committee (COMSTAC) meeting in Washington, DC, to obtain first-hand information on emerging commercial space activities related to technician training and certification.
- SpaceTEC submitted a Safety Approval Application to the FAA for our certification process.
- SpaceTEC hosted a successful DACUM for Facilities Technicians, broadening the educational base for performance-based certifications in other technical fields.
- Subaward Contracts, Letters of Understanding, and Memoranda of Agreement have been negotiated with educational and industry partners for the second year of NRC operations.

We are pleased with results in every area of operation thus far and look forward to the upcoming NSF ATE Conference in Washington, DC. We have invited new SpaceTEC affiliate and partner organizations to join us in our next steps toward self-sufficiency. If you are interested in knowing more, please visit the new NRC website at www.spacetec.org.

The website now includes better access to curricular and certification information, SpaceTEC documents, web resources, and an evolving events calendar. You can subscribe to future issues of our newsletter directly from the home page link for that purpose. We look forward to hearing from you.



Dr. Al Koller

TNCC-NASA Langley Co-op Program: Establishing an Aerospace Technician Pipeline

A technician at NASA Langley Research Center (LaRC) is likely to be 50 years or older with at least 25 years of service. With an aging workforce, a strategy was needed to develop a pipeline of technicians to meet future workforce needs. Attracting these technicians from other employers did not expand the technical skill base of the industry or benefit the region's overall economy. In 2007, NASA LaRC and Thomas Nelson Community College (TNCC) partnered to develop a pipeline of technicians using a program that included education, certification and apprenticeship.

The co-op program with Thomas Nelson Community College began in 1971 shortly after the formation of the Virginia Community College System, but languished in the mid 90's as an emphasis was placed on hiring contractors rather than civil servants due to NASA budget restraints. Getting the program up and running again was a challenge. TNCC became a partner in SpaceTEC and the concept of offering degree programs that led to a Certified Aerospace Technician were just what was needed to reinvigorate the co-op program.

The first applicants were interviewed and selected based on their math placement tests, leadership ability and demonstrated interest in technical applications. Several were recent high school graduates, others were home-schooled, some had attended a local aviation academy and all were eager for an opportunity of employment at NASA LaRC Langley. Fourteen students were selected to begin a cooperative education program of 20 hours a week. Tuition was paid by NASA, with students enrolled in a mechanical or electrical engineering technology associate's degree program while earning a competitive salary and benefits for onsite work experience. Upon graduation, students would be required to pass the SpaceTEC exam

to be eligible to continue at NASA Langley LaRC in an apprenticeship.

The first graduate was Chris Christopher Moss in summer 2009, who passed the SpaceTEC exam and began his apprenticeship in the Fabrication Directorate area within the Engineering Directorate. Four additional students graduated the next year and began their preparation for the SpaceTEC exam. The associate degree programs in mechanical and electrical engineering technology had provided each graduate with background for some of the core exam areas. Fifteen co-op rotations of 280 hours provided within 18 technical areas and 23 facilities had provided a broad understanding of the capability of LaRC in research, wind tunnels, manufacturing, composite modeling and engineering. Reviewing what students had experienced over the three-year period and focusing the knowledge towards the SpaceTEC exam was the next challenge.

TNCC faculty and NASA Langley LaRC technicians and engineers collaborated to assist the students in preparing for the exam. Throughout the summer, sessions were held on campus to review concepts, mini labs were set-up, and where the college did not have the expertise or the lab facilities, LaRC filled the gap with their numerous volunteers and onsite tutoring. Knowing that the national pass rate for the exam was less than 35%, everyone was determined to

raise the bar for these co-ops. In August, all four graduates passed each of the six core competencies and successfully completed the Oral and Practical. TNCC and NASA Langley LaRC had a 100% pass rate and four additional technicians as a result of the partnership.

More co-ops will graduate in 2010-2011, some from the first cohort and others from the second cohort of 10 students that began in Fall 2008. New co-ops are expected to be added as a second contractor joins the program. The first graduates who are now apprentices are also eligible for guaranteed admission to Old Dominion University to complete their bachelor's degrees. With support of SpaceTEC and the opportunities the certification provided, the pipeline is in place for new aerospace technicians at NASA Langley LaRC.



Christopher Moss, Kevin McLain, Matthew Hayes, Stephen Jennings



NASA co-ops with TNCC faculty mentors, Stewart Harris (left) and Dr. Alvin J. Schexnider (right).

TNCC and BCC Students Accepted to NASA's National Community College Aerospace Scholars Program

Earlier this summer, we received the announcement requesting student participation in NASA's National Community College Aerospace Scholars, and we are pleased to announce that Trevor Jackson, a TNCC engineering student from Poquoson, and James Helmberger of Brevard Community College's Aerospace Technology Program in Cocoa have been selected to travel to NASA's Johnson Space Center in Houston, TX, from October 20-22, 2010, to participate in a three-day on-site event.

They were selected as two of the 89 community and junior college students from across the nation to be part of the National Community College Aerospace Scholars program. Students completed four Web-based assignments during the school year, maintaining a 93 average to qualify for the experience. They will apply what they have learned during the year to work with

NASA engineers.

The program is a three-day on-site event and offers students from across the nation the opportunity to interact with each other as they learn more about careers in science and engineering. While at Johnson, students form teams and establish fictional companies interested in Mars exploration. Each company is responsible for developing a prototype rover, designing a line drawing of the rover, and forming the company infrastructure including budget, communications, and presentations.

The on-site experience includes a tour of facilities and briefings by noted NASA employees—including astronauts.

National Community College Aerospace Scholars is a program based on Texas Aerospace Scholars, originally created by the state of Texas in partnership with NASA and the Texas educational

community. Both programs are designed to encourage community and junior college students to enter careers in science and engineering and ultimately join the nation's highly technical workforce.

With this program, NASA continues the agency's investment in educational programs that attract and retain students in science, technology, engineering and mathematics, disciplines critical to NASA's future missions.

Please join us in congratulating Trevor and James, with special thanks to the faculty who distributed the announcement and encouraged their engineering and technology students to participate. Along with the partnerships in SpaceTEC and the TNCC co-ops at NASA Langley, we are earning quite a reputation for our aerospace programs. Our thanks to all of you for being instrumental in that success!



Dr. Tom Steffen

Nine years ago, Dr. Al Koller, Dr. Tom Steffen, Dave Brotemarkle, and Juanita Curtis put together an NSF grant for what we now know as SpaceTEC. Dr. Tom has been involved in SpaceTEC activities for 7 of those years as a project manager or as a contractor. The one year that he was missing from the SpaceTEC lineup, he served as the Interim Director of the Electrical Power Program at Palm Beach Community

He's Back!

College, where he was responsible for starting the program, hiring teachers and coordinating curriculum for the program. Dr. Tom was the SpaceTEC Project Manager for the DOL Super Loki Rocket program. The deliverables included Super Loki launches and the reactivation of Pad 47 at Cape Canaveral for educational purposes.

Additionally, Dr. Tom acted as the SpaceTEC Project Manager to write curriculum for near space balloon launches. The project was to provide teachers with enough information and background so that they could launch their own balloons. The project culminated with the launching of a radio and direction transmitter from a local high school football field. The payload was returned to SpaceTEC after being picked up from the ocean 10 miles off the coast of Daytona, Florida .

In May of this year, Calhoun students Zachary Bridges and Adam and Desiree Dziubanek also participated in the program. Dr. Tom was one of the earliest Co-PI's at Palm Beach Community College, where his engineering students participated in SpaceTEC activities including a clean room exercise outside the Engineering Building. The students were dressed in clean room suits. The school security terminated the exercise because of the sightings of 30 students running around in white jump suits and rubber gloves.

As the new Business Manager, Dr. Tom will bring continuity to the work done by Maria Peterson, and as some of the older SpaceTEC partners remember, a friendly face to the voice on the telephone. Welcome aboard, Dr. Tom.

Questionmark Case Study

SpaceTEC® Training Certifications for Aerospace Technicians

Background

Brevard Community College is a two-year public institution located on the “space coast” of Florida. The college, which has four campuses throughout the county and a center at Kennedy Space Center, is also the home of the SpaceTEC® National Resource Center for Aerospace Technical Education. SpaceTEC® provides skill-based, nationally recognized and industry utilized professional certifications for U. S. Aerospace Technicians who work in civil, defense and commercial organizations, nationwide.

Partner Colleges

Through its 13 partner colleges located in 10 states, the SpaceTEC® Consortium offers Aerospace Technical Education skills training and college degrees for the U. S. aerospace industry. In addition to offering performance-driven certifications, SpaceTEC provides Knowledge/Skills Inventories (KSIs) that are designed to identify and quantify workforce skills and abilities in not only the Aerospace Core but also fields such as Aerospace Composites, Vehicle Processing, and Aerospace Manufacturing.

Hosted Assessments

SpaceTEC® runs all of its certification exams as well as low-stakes pre-tests and quizzes using Questionmark’s hosting services. Candidates who want to take quizzes or pre-tests to check their knowledge can access them openly, any time, while participants in certification exams must log in under a proctor’s direction. Test logins are scheduled within a predetermined two-hour time frame requiring an ID and password.

Some of the test centers have trained Questionmark Perception administrators. “Administrators are allowed to register their group participants and schedule the tests,” explains SpaceTEC® Certification

Manager Dave Friction. “This also allows them to generate necessary reports for participants in their respective group. It works very well.” Centers that do not have trained administrators are dependent on SpaceTEC® headquarters to schedule all certification exams and generate reports.

Entry-Level and Advanced Certifications

The SpaceTEC® certified aerospace technician examination process offers a Core Certification for entry-level employees covering general knowledge in six areas: Introduction to Aerospace, Applied Mechanics, Basic Electricity, Test & Measurements, Materials and Processes and Aerospace Safety. There are also advanced examinations in Aerospace Vehicle Processing, Aerospace Manufacturing and Aerospace Composites. In addition to the online exam, oral examinations and practical performance-based skills exams are administered by certified SpaceTEC Examiners (STEs).

Friction explains that SpaceTEC®, which is funded through the National Science Foundation, was established eight years ago to provide a specified level of expertise for entry-level technicians. “Before that, there was no industry-endorsed credential for them to earn. Typically, industry would train new hires once they started to work. Now, technicians can demonstrate their basic knowledge through the certification program. It can save industry time and money by not having to start from scratch in their training programs,” commented Friction.

Using Questionmark Perception

An item bank of 420 multiple choice questions is used to generate SpaceTEC®’s 70-question Core Certification exam. The questions are organized into topics and sub-topics,

and post-test reporting relates to these topics. Questions that involve reading a caliper, micrometer or other instrument include high-resolution photographs for candidates to refer to.

Friction and his team use Perception’s Coaching Report extensively to help students understand how well they have done on pre-tests and to indicate where they should focus more study. The Question Statistics Report, which analyzes scores and outcomes, has helped staff members identify questions that might need revision.

“We recently went through a question review, and that was one of the reports that was very useful to us,” recalls Friction. “We flagged anything with less than a 65% pass rate, then went back and looked carefully at those questions, which did a lot to improve our item bank,” he added. Also, representatives from the aerospace industry advise SpaceTEC® in the make-up of item banks, ensuring that questions apply to current industry practices.

Future Plans

Based on input from the aerospace industry, SpaceTEC® plans to add some additional certifications. Typically a DACUM (**D**eveloping **A** **C**urriculum) is conducted with representatives from industry who are subject matter experts. The DACUM identifies duties and tasks; knowledge and skills; tools and equipment; and traits and attitudes for inclusion in new certifications. Competencies are then developed and SMEs are identified who can help develop the test bank. After a beta test of the question bank is completed and analyzed, the new certification examination is approved for use and released, opening a new credentialing opportunity for technicians. In today’s work environment, certifications are an indispensable element for qualifying employees, and Questionmark plays a key role in that effort.