

TURNING DOWN THE HEAT WITH COOL INVENTION

by Brad Thomas

A TRIP TO A LOCAL DISCOUNT RETAILER

and a little ingenuity led to a “cool” invention for two Cooperative Education Program (co-op) students at JSC. Garret Fitzpatrick and Josh Hunter designed a way to keep the astronauts cool while training in their flight suits.

The device, called the Multiple User Cooling Unit (MUCU), is used to keep astronauts comfortable when they are not in the Shuttle Simulator at Johnson Space Center (JSC). The astronauts are hooked up to the simulator’s system while inside.

MUCU consists of a swirling maze of copper tubes inside a regular ice chest. A water pump mounted on top of the chest forces water through the tubes, where it is cooled by ice water inside the chest. The water is then pumped through the right pant leg of the flight suit in a series of tubes.

Fitzpatrick, currently a senior at the University of Wisconsin, worked on the project during his internship at JSC in the fall of 2003. He said that he was given the challenge by NASA to develop a cooling system that could be used by several astronauts. Fitzpatrick came up with the initial design and built the prototype. He took the cheap route.

“Basically, I was looking for the solution that was the simplest,” he said. “It was better to do that than to throw thousands of dollars into the system.”

Hunter, who is currently a junior aerospace engineering major at the Georgia Institute of Technology, made some modifications to the design and prepared it for use during crew training in the summer of 2004. One of the modifications included enclosing the pump in a case to reduce noise.



The STS-121 crewmembers await the start of an emergency egress training session in the crew compartment trainer (CCT-1). The CCT is one of several Shuttle-training components located in the Space Vehicle Mockup Facility at Johnson Space Center. Pictured, from the left, are Astronauts Steven W. Lindsey, commander; Mark E. Kelly, pilot; Lisa M. Nowak, Michael E. Fossum and Piers J. Sellers, all mission specialists.

Hunter was surprised with the simplicity of the design. “When I first saw it, I was shocked,” he said. “But when I began to work with it, it made sense to me.”

Ethan Reid, a lead project engineer in the Shuttle Crew Escape Lab at JSC, worked with the students on the project. He said the MUCU design is more efficient than the individual briefcase-like device previously used, which he described as cumbersome and loud. With MUCU, four astronauts can be hooked up at one time. “It is much easier to deal with,” Reid said. “It is mobile.”

According to Reid, MUCU is used as often as possible. The STS-114 crew, which is slated to fly on NASA’s Return to Flight mission this month, and the STS-121 crew have both used the MUCU during training. The 2004 Astronaut Candidate Class has also recently been cooled by the MUCU.

Reid said that Fitzpatrick and Hunter seemed to be excited about their work at NASA and on the MUCU project. “They are really smart guys,” Reid said. “It was fun to have them around because they wanted to learn.”

Fitzpatrick said that he and Hunter are good friends and they are both planning to return to NASA this summer for another tour as co-ops. Fitzpatrick said that he has enjoyed his first tour with the Agency and that it was not what he expected.

“I was surprised at the level of responsibility,” he said. “It was a great challenge. I was treated as an equal, instead of just getting busy work.”

Hunter said he had an interest in working with NASA as a fifth grader. “When I was younger, I wanted to be an astronaut,” he said, “and I still do. I knew NASA was a great place to be.”

The Cooperative Education Program at JSC is open to graduate and undergraduate students from around the country. A co-op regularly alternates semesters at school with semesters at JSC working in a paid, full-time position directly related to the student’s particular field of study.



NASA KSC-09RFD-0613

Space Shuttle *Discovery* at launch pad for Return to Flight

The Space Shuttle *Discovery* is at the launch pad. Following more than two years of safety modifications and vehicle upgrades, *Discovery* arrived at Launch Pad 39B at NASA's Kennedy Space Center, Fla., around 12:30 a.m. EDT on April 7.

"This is a big milestone," William Readdy, NASA associate administrator for Space Operations, said, "and what a welcome sight to see *Discovery* at the pad, especially knowing the work we're doing to make it a stronger vehicle. But we're not finished yet. There are still some important milestones we're working toward before we're ready to fly," he added.

"Having *Discovery* on the pad puts us one step closer to resuming the Space Shuttle's important mission of supplying and assembling the International Space Station," Michael Kostelnik, NASA deputy associate administrator for International Space Station and Space Shuttle Programs, said.

Discovery's journey to the launch pad from the Vehicle Assembly Building (VAB) was a slow and careful one. The fully assembled Space Shuttle Vehicle "stack" that includes the orbiter, the External Tank and the twin Solid Rocket Boosters, was mounted on the Mobile Launcher Platform. The whole assembly was carried to the launch pad on a vehicle known as a Crawler-Transporter. The Crawler's maximum speed during the four-mile journey was less than one mile per hour.

Left: At NASA's Kennedy Space Center, Space Shuttle Discovery, atop the Mobile Launcher Platform, crawls toward Launch Complex 39B. Barely visible on the horizon at right is Pad 39A.



Above: The orange glow of the setting sun paints a silhouette of Space Shuttle Discovery as it rolls out to Launch Pad 39B at NASA's Kennedy Space Center.

Right: The Space Shuttle Discovery is viewed from the side as it sits atop the Mobile Launcher Platform rolling out to Launch Complex 39B.



NASA KSC-09RFD-0612

Discovery's rollout was not without its challenges. Shortly before moving it out of the VAB, *Discovery* and its propulsion elements were thoroughly inspected and engineers spotted a tiny, hairline crack in the External Tank's insulating foam. After reviewing the data, engineers determined the crack, on the opposite side of the tank from the orbiter, was not in a location where it could become hazardous. The "go" was then given for roll.

"We plan to reassess the area during and after a tanking test we have planned for next week, but based on our preliminary analysis, we don't expect to have to repair the crack," Sandy Coleman, External Tank project manager, said.

Several hours later, when *Discovery* neared the pad, the mechanism that keeps the Shuttle level as it moves up a ramp gave conflicting readings. The process was stopped, the issues were addressed, and the Shuttle was moved securely onto the pad.

Now at the launch pad, the Space Shuttle will undergo final connections for launch, and a pressurized cargo container will be installed. The special "tanking test" – another step

verifying design modifications to the External Tank – on April 14 will check out the Space Shuttle.

"This milestone signifies an outstanding effort of thousands of people throughout the country who came together as a team to ensure a safe Return to Flight," said Bill Parsons, Space Shuttle program manager. "I have tremendous confidence in their work," he said.

Launch of *Discovery* for its Return to Flight mission, designated STS-114, is targeted for May 15, with a launch window that extends until June 3. During their 12-day mission, Commander Eileen Collins and the rest of *Discovery's* seven-person crew will test new hardware and techniques to improve Shuttle safety, as well as deliver supplies to the International Space Station.