Newsletter

The Marine Advanced Technology Education Center Triannual Newsletter

Volume 7, Issue 3—Summer/Fall 2005

# IN THE spotlight:

## *Mike Gernhardt, NASA Astronaut*

Students who participated in this summer's ROV competition at NASA's Neutral Buoyancy Lab at the Johnson Space Center received a special treat on their last night in Houston. Mike Gernhardt, a former commercial diver and ocean engineer who's now a NASA astronaut, addressed the students at the closing banquet.

Courtesy of Mike Gernhardt/NASA

Mike Gernhardt stands on the end of the space shuttle's robot arm and looks down on Hurricane Marilyn in September 1995.

Because the competition highlighted the links between the extreme environments of space and sea, Gernhardt was the perfect choice to address the students. "Being underwater is similar to being in space because they're both hostile and uncontrolled environments," he says. "When you do a task in these types of environments, it's very different from doing the same task on earth."

### Similarities and Differences between Sea and Space

Diving and walking in space require the same mental process, according to Gernhardt. "Because of the extreme environments of the ocean and space, you use the same mental discipline and logic to complete a task," he says. "You think through the operations and everything that can go wrong. You make the tasks as simple as possible, and have a backup plan for everything."

Gernhardt says that ROVs are a good example of adapting one's thought process to an extreme environment. "First you have to understand the limits of the environment and then you have to optimize the machine to do the task," he continues. "If you don't understand this, you can be a great robot technologist but your robot will fail in the ocean."

Even though the mental process is the same, Gernhardt says that the physical parameters of diving and

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spacewalking are very different. For example, commercial divers often find themselves in a situation where mud causes poor visibility. But in space, visibility is millions of miles. And commercial divers often lift a lot of heavy equipment, but that isn't a problem for astronauts due to the zero gravity in space. The space suit, pressurized to 4.3 pounds per square inch (psi) to keep astronauts alive in the vacuum of space, is probably the biggest difference between diving and spacewalking. "The pressure across the suit is about the same as the inflation pressure of a football," says Gernhardt. "So every time you move it takes a lot of force."

Together, an astronaut and his or her suit weigh 500 pounds, and the center of gravity is different because of a heavy backpack. Gernhardt says walking in the suit is not intuitive because of zero gravity. "Even though you don't feel the weight of the suit and the pack, you still have the inertial properties of a 500-pound mass," he continues. "So if you try to come to a quick stop, you'll go tumbling."

## "Do What You Like Doing the Most"

Gernhardt's path to a career as a NASA astronaut was far from conventional. His love for the ocean began as a boy—he spent vacations fishing with his dad and became a certified diver when he was only twelve years old. Gernhardt decided that he wanted to become an astronaut at fourteen, when he made the connection between diving and space in his high school physics class. He went on to earn a BS in physics, and an MS and PhD in bioengineering.

Before becoming an astronaut, Gernhardt worked for Oceaneering, Inc. (an ROV competition sponsor) as a professional diver and project engineer for subsea oil field construction and repair projects. He helped to develop and managed a new division of Oceaneering that specialized in transferring subsea technology and experience to the space program.

Gernhardt has been with NASA since 1992, where he has been a member of four shuttle missions and participated in four spacewalks, including making the first space walk from the International Space Station. He has worked on many research projects, but his most important contribution has been in the area of decompression methods. Rapid decompression in space can be a problem because both the space shuttle and the space station are pressurized to 14.7 psi—roughly the same atmospheric pressure at sea level—while the astronauts' space suits are pressured to 4.3 psi—roughly the same atmospheric pressure of Mt. Everest. Decompression sickness, also known as "the bends," would be a problem if appropriate measures weren't taken.

Because of his diving experience and doctoral work developing diving decompression tables, Gernhardt was the principal investigator in a multi-lab research effort to improve NASA's decompression methods and reduce decompression sickness. His team developed a combination of exercise and oxygen pre-breathing that has cut decompression time in half. Thanks in part to Gernhardt's work, no astronaut has ever gotten decompression sickness on the space shuttle or space station. "My diving experience was an invaluable part of that research project," he says.

Gernhardt says that students who are interested in being astronauts should plan on getting as much education as possible in a technical field such a engineering, science, or math. "The better you do in academics, the higher your chances are for getting selected by NASA," he says.

But most of all, Gernhardt says, "Do what you like doing the most. If you're doing something you like, you'll be good at it."

"A lot of people have different ideas about what path a person should take if they want to be an astronaut," he continues. "But I set my own path. I felt there was a big connection between sea and space at the time, even though no one else saw it that way."