Team CERAMICS
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Team CERAMICS – three ceramic engineering students and a December 2000 graduate of the School of Ceramic Engineering and Materials Science at Alfred University – say their flights aboard the "Vomit Comet" were well worth it, even if they experienced the motion sickness which earned NASA's Reduced Gravity Student Flight Opportunities Program its unappealing name.Anne Ebert, a senior from Fulton, NY; Theresa Totedo, a senior from Rochester, NY; Robert Schaut, a sophomore from St. Mary's, PA; and Lea Kennard, a December 2000 graduate from Palmyra, NY, were among the 49 teams chosen to fly this spring. They spent more than a week earlier this month at the Johnson Space Center in Houston, TX, and flew aboard the "Weightless Wonder," the official name of the KC-135 A aircraft. Prior to flight, the students went through a rigorous training program physiology, safety and how to cope with the motion sickness that afflicts many of those who attempt the reduced gravity flights. They also spent some time in a flight simulation chamber to better prepare them for the conditions they could expect on the their flights. Students were given 100 percent oxygen to breathe for 30 minutes, then removed their breathing masks for up to five minutes so they could test the effects of hypoxia (low oxygen) on their bodies, explained Kennard. But the pre-flight sessions weren't all work. The students were given tours of the space center, including the various labs, and met with NASA personnel, including Astronaut Dr. Bonnie Dunbar, an honorary alumnus of Alfred University, and a Russian astronaut."I didn't quite know what to expect, but the experience of the zero-gravity flight, tours of the Johnson Space Center, meetings with astronauts and NASA personnel, and seeing our experiment work was almost too much to bear in a single week's time," said Schaut.For all, though, the flights themselves were the highlight. The KC-135A flies an elliptical flight pattern, meaning that it ascends, then drops precipitously. As the plane goes into its controlled drop, the passengers experience 12-15 seconds of near-zero gravity in each cycle. In a typical flight, the plane flies several cycles. "Obviously, experiencing zero-gravity was the highlight," said Ebert. "But I was lucky enough to have the opportunity to sit in the cockpit during take-off. Being able to listen and see the crew go through the commands over the headset was very awesome." Kennard had a sensation of dj vu. "The actual flight somehow seemed like an experience I had already felt before," she said. "It was like floating in your dreams where there is no force on you at all."She said the best part of the flight "was the first parabola… I felt cold tingles all through my legs as they floated up behind me.""Not only was the zero-gravity environment unbelievable to experience and definitely an unforgettable feeling, but it is also great to see science work and all of our hard work and dedication for the past year and a half pay off," said Totedo. She admitted that she got chills "when I first walked into the hangar at Ellington Field… knowing that in just a few days, I would be flying in the 'Weightless Wonder.'" All the students were pleased with the way their experiment went. They were trying to precisely measure what happens at the interface between a ceramic material and a polymer when a composite is being formed. Under normal atmospheric conditions, it's difficult to measure the exact area of the interface because gravity pulls the matrix material (in the students' experiment, a polymer) into elliptical droplets. The students hoped that in reduced gravity conditions, they would be able to make an absolutely spherical droplet from which a precise measurement of the area of interface could be obtained.Dr. Linda Jones, associate professor of ceramic engineering and one of the team's advisors, said that knowing the precise measurement of the area of interface will allow them to compute the interfacial shear stress for the composite system, and that, in turn, will allow materials scientists to develop lighter, more refined composite materials."We definitely accomplished what we set out to do," said Ebert, the team leader. "During any experiment or experience, things happen that you did not plan for and did not expect. These unexpected happenings take you to new places, making the experiment even more sophisticated and interesting.""During the third parabola, I was able to create a sample that exceeded our expectations," said Schaut. "The second I pulled the sample and looked at it after it had cured, I knew that the experiment was going to work. At that moment, [I realized] that the many hours we had put into our experiment were worth it."He admitted that actually performing the experiment was more difficult than he had anticipated, "but once I was comfortable moving in zero-g, it proceeded rather well. We haven't compiled any specific results… but the samples we collected look really promising. I only wish we'd had more time to float and play, rather than concentrating on the experiment."It took "a few parabolas" to get accustomed to zero-g conditions, "a few more… to get the hang of applying the polymer to the fibers," said Totedo. "Even though three of the four students experienced

motion sickness, the experiment still went on." During the first flight, Dr. John Williams, assistant professor of mechanical engineering and an advisor who accompanied the students, helped with the sample preparation for the experiment, Totedo noted. By 12 parabolas into the second flight, what had been a two-person job had to become a one-person task, "just a minor obstacle that was overcome by performing unexpected tasks during the 1.8 G… It was such an exciting sight to see the polymer forming a perfect sphere around the fiber." The aftermath of the flight was "quite interesting," too, Kennard said. "That night, I felt like I was still experiencing the parabolas of the flight. First I would feel as though I were pressed against the bed with sandbags attached (akin to the 1.8 gravity conditions they felt as the plane ascended), then I felt like I was being lifted off the bed and floating above it (the experience of near-weightlessness under zero-gravity.) It made for an interesting night's sleep."The entire experience was definitely worth it, the students agreed. Asked what she thought was the best part of the trip, Totedo responded, "I would have to say every minute of it, but if I had to narrow it down, then the feeling of going from 1.8 G (gravity) to zero g – first having your body weight almost double then the next second floating in mid-air. It was an amazing feeling.""Anyone who has an opportunity to compete in this program or any others sponsored by the Johnson Space Center crew should do it!" said Schaut. "It is an amazing experience."Photos of AU's Team CERAMICS are posted on the Texas Space Grant Consortium web site: http://www.tsgc.utexas.ed... (There is an underscore between zerog and tv).Team CERAMICS members: Anne M. Ebert, team leader, is a daughter of Roger and Susan Ebert of Fulton, NY. A senior ceramic engineering major at Alfred University, she is a graduate of G. Ray Bodley High School in Fulton.Robert A. Schaut, the only sophomore on the team, is a son of Donald and Mary Schaut of St. Mary's, PA. He is a graduate of Elk County Christian High School.Theresa M. Totedo, a senior ceramic engineering major, is a daughter of Michael and Barbara Totedo of Wood Run Circle, Rochester. She is a graduate of Aquinas Institute.Lea D. Kennard, a December 2000 graduate of Alfred University with a B.S. degree in ceramic engineering, is a daughter of Stephen and Randy Kennard of Quaker Road, Palmyra. She is a graduate of Palmyra-Macedon High School.