Cal Poly Students Have Lift-Off

Engineering and physics students take to the skies in a zero-gravity NASA jet to test satellite technology

By Mary McNally

Six Cal Poly students got the ride of their lives in the spring when NASA accepted electrical engineering student John Abel’s 2008 research proposal postulating the effects that zero gravity would have on a satellite application, which is being developed thanks to a grant from Northrop Grumman.

Twice each year, NASA offers university students the opportunity to take a ride in a 727 while it simulates zero gravity. Students submit proposals for research that needs to be conducted in conditions that simulate weightlessness. Participants had to have been undergraduates at the time the proposal was submitted.

The selection meant the Cal Poly team got to take their research project aboard a NASA airship while it executed 30 parabolas – 20 seconds straight up into the cosmos followed by 20 seconds in an accelerated nosedive toward the Earth. In concept, it’s similar to a roller coaster; when you get to the top of the “hill” or the apex of a sine wave, you float.

Abel used an analogy to describe the application they were testing, called a “particle damper.” “It’s kind of like a shock absorber. When you have sensitive equipment like a camera lens, you want it steady, not vibrating; that’s when you use a particle damper to absorb the vibration.”

“As fun as being weightless was, I enjoyed the hands-on, real world experience this provided,” he said. “That’s part of the reason I chose Cal Poly, because the school can give me that kind of experience, not just classroom instruction. Joining the PolySat program took that a step further.”

Just before the cabin returns to normal gravity, NASA staffers inside the plane alert the students to plant their feet firmly on the floor. Sometimes the warning works; sometimes it doesn’t. One student was being videotaped in a backward somersault – which wasn’t quite complete – just when gravity re-exerted itself. Luckily, the floor, ceiling and walls are padded for just such situations.

The Cal Poly students were advised by Aerospace Engineering Professor Jordi Puig-Suari, who deemed the experiment a terrific success.

“We actually did learn something we
hadn’t expected,” Puig-Suari said. “The behavior of the system in zero gravity wasn’t what we thought it would be.”

That knowledge will help the team develop appropriate experiments for the next phase in the development cycle.

Cal Poly crewmates included Abel and fellow engineering students Sean Fitzsimmons, Alicia Johnstone, Austin Williams (B.S. Electrical Engineering, 2008) and Stephanie Wong, along with physics student Justin Foley (B.S., Physics, 2009). Ivan Bland (B.S. Electrical Engineering, 2008) served as ground support.