Skydiver's feat could influence spacesuit design

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CAPE CANAVERAL, Fla. (AP) -- Now that the dust has settled in the New Mexico desert where supersonic skydiver "Fearless Felix" Baumgartner landed safely on his feet, researchers are exhilarated over the possibility his exploit could someday help save the lives of pilots and space travelers in a disaster.

Baumgartner's death-defying jump Sunday from a balloon 24 miles above Earth yielded a wealth of information about the punishing effects of extreme speed and altitude on the human body - insights that could inform the development of improved spacesuits, new training procedures and emergency medical treatment.

A NASA engineer who specializes in astronaut escape systems said Baumgartner's mission "gives us a good foundation" for improving the odds of survival for professional astronauts, space tourists and high-altitude pilots and passengers.

"What I would hope is that, perhaps, this is just the first step of many, many advancements to come" in emergency bailouts, said Dustin Gohmert, who heads NASA's crew survival engineering office at the Johnson Space Center in Houston.

In an interview after Baumgartner became the first skydiver to break the speed of sound, Gohmert noted that researchers have spent decades working on self-contained space escape systems, with no significant advances since Joe Kittinger in 1960 jumped from 19.5 miles up and reached 614 mph, records that stood until Sunday.

Baumgartner's feat was sponsored by energy drink maker Red Bull, and NASA had no role. But Dr. Jonathan Clark, a former NASA flight surgeon who lost his wife, Laurel, in the space shuttle Columbia accident and dedicated himself to improving crew escape systems, was in charge of Baumgartner's medical team.

And he was thrilled at how much was learned.

By going well beyond Mach 1, or the speed of sound, Baumgartner provided even more data than anticipated. Wearing a pressurized suit and helmet, he accelerated to an astonishing 834 mph and was supersonic longer than expected. The speed of sound at that altitude is close to 700 mph.

"It was Mach 1.24, which is really huge. I mean, that's a much higher level than we'd ever anticipated, so we learned a lot by going faster and higher," said Clark, who teaches at the Baylor College School of Medicine.

Clark said his team is still analyzing all the medical data - heart rate, blood pressure and the like - collected from sensors on Baumgartner's body.

During his descent through the stratosphere, Baumgartner went into an out-of-control spin for about 40 seconds, experiencing around 2.5 G's, or 2.5 times the force of gravity, before stabilizing himself.

Baumgartner's technique for righting himself may prove useful for companies like Virgin Galactic that are developing spacecraft that will take tourists up into space and right back down. These enterprises will need to have some sort of emergency escape plan.

NASA's next-generation spaceship, the Orion vehicle intended for deep-space exploration, will parachute home like the old-style Mercury, Gemini and Apollo capsules. The lessons learned from Baumgartner's effort probably won't apply directly to the Orion design, since it will be safer for astronauts to remain in the vessel all the way back to Earth, Gohmert said.

As for the now-ended shuttle program, Columbia was traveling too high and too fast during its 2003 descent for a Baumgartner-style exit to have helped the seven astronauts. The spaceship broke apart about 40 miles up while traveling more than Mach 17, unleashing forces that tore the crew members' bodies apart.

In the 1986 Challenger disaster, the crew capsule shot out of the fireball that erupted during liftoff, but there are too many unknowns to say whether any lessons from Baumgartner's feat might have applied to that tragedy, Gohmert said.

After each accident, NASA improved its efforts to protect crews in an emergency. But by the time the 30-year shuttle program shut down last year, the window for escape was still limited to below about 6 miles and less than 230 mph.

Baumgartner's pressurized suit - a close cousin of the orange suits used by shuttle astronauts and the suits worn by high-altitude U-2 spy pilots - was designed for use in a standing, free-falling position, while conventional spacesuits are made primarily for sitting. By all accounts, the new suit performed well.

"I think all of us here in our lab specifically who have dealt with the shuttle suits have looked at this in wonder and amazement, and really appreciated what they did," Gohmert said. "And that efficiency that they brought it forth with is also a model for us to learn from as well."

The suit was made by the David Clark Co. of Worcester, Mass.

"Perhaps in the future, someone might say, `We want people to be in suits, some type of commercial space thing. We want them to be able to float around better and not in a seated position,'" Dan McCarter, a program manager at the company, said Wednesday.

"Now we know a little more on how to reposition arms and legs on the suit. Of course, we're always doing research and development. ... New knee joints, new elbow joints, lighter hardware. It's nonstop. We are currently working on the next-generation of suit right now for NASA and the Air Force."

The suit Baumgartner used was previously certified to 100,000 feet. "Well, we pretty much say now it's certified to 128,000 feet," McCarter said.

An uncorrected spin could have caused Baumgartner to black out and suffer a deadly stroke. Baumgartner said afterward that he could feel pressure building in his head during the spin, but did not come close to passing out.

His recovery crew had specialized equipment on hand to treat him for a multitude of medical problems he might have suffered. Clark and his team spent years refining the emergency treatments and the mobile gear required. In the end, none of it was needed.

"I tell you, we had a lot of medical support because we were very concerned," Clark said. "We had to be ready for everything."