The Big Shakeout Test for Mars

MARK ADLER: In order to land things on Mars, we need to slow them down before they hit the surface. We use the Martian atmosphere to do that but the Martian atmosphere is very, very thin - it's only 1% as thick as Earth's atmosphere, so these decelerators have to go out very high speeds at Mars, at supersonic speed and have to be very large to slow the vehicle even down to speeds of a couple of hundred miles an hour.

IAN CLARK: What we have are an inflatable aerodynamic decelerator - that's the soft goods, this yellow textile article that you see in the side. And what will happen is that this will inflate very rapidly at a fraction of a second, about a third of second and it will increase the size of the aeroshell and it will create a surface much larger than the vehicle alone with which we can react against the atmosphere and generate more drag and slow the vehicle down further.

MICHAEL GAZARIK: What we have out at the test range off of Hawaii is an ability of the infrastructure to be able to do this testing safely, effectively and efficiently.

Mark Adler: In the background here, we have our launch tower. We launch a large scientific balloon, a 34 million cubic foot helium balloon that carries our 7,000 lb. test vehicle up to a 120,000 feet in the atmosphere. That vehicle has on it a large rocket motor which then fires and takes the vehicle even higher up to 160 to 180,000 feet where the atmosphere is like it is at Mars where we'd use these decelerators and then it's going about sideways we deploy at Mach 4 the first decelerator which we call the SIAD - our supersonic inflatable aerodynamic decelerator – it's a large tube that inflates around the vehicle. That slows it down to Mach 2 1/2. At Mach 2 ½, we deploy a large 30-meter parachute. Those are the two technologies that we're testing. This is a shakeout test to see if we can get the vehicle up to the proper conditions.

Whatever happens after that point – if the vehicle goes off-course or if it doesn't reach the trajectory that we want or we don't get the conditions we want or the cameras aren't working or any of those things – those are exactly what we're looking for to learn what happens, take that information, incorporate it into the next two flights that we have next to do.

GAZARIK: Some would argue in technology development that if you don't push the boundary a little bit you'll never learn. So we have to take the right amount of risk. We do the right calculations, we do good engineering but we are pushing the boundaries with these technologies.

ADLER: My boss told me that if this thing works perfectly, if it does exactly what we expected it to do, it exactly hits the targets that we want, it flies that way we want, it gets the data back exactly like we want, all the cameras work, all of that then I get an A. But if we have some failures, if we have some problems, if we see things that we learn from that we can apply to the next flight, then I get an A+