We Brake for Mars

Hi! My name is Mike Meacham. I'm an engineer here at the Jet Propulsion Laboratory and I want to talk to you about some of the technologies we're developing for landing bigger and heavier things on Mars.

One of which is a much larger supersonic parachute.

(music)

When we land spacecraft on Mars we're going extremely fast.

We have got to slow down. So we use a parachute and we use a really big parachute.

To make these large parachutes you have to test them before you go.

You need a way to apply the same load that you're going to feel on Mars.

And you need a way to do that here on Earth.

In the past, we've always used a wind tunnel, but the parachutes themselves are getting so large that they can't fit into any of these wind tunnels any more.

We needed a way to apply this same type of wind in a controlled way and we had to get outside the building.

You want to go to Mars. You want to go big then you've got to test big here on Earth.

You got to be a little crazy sometimes if you want to do crazy things.

The crazy idea we came up with was to attach it to a rocket sled and have that rocket sled pull it around a pulley with a huge one-kilometer long rope.

And the way you have to do that is extremely complicated.

Remember that came mousetrap when you were a kid?

When all these mechanical things had to happen in sequence? This test is a lot like that.

There's a whole bunch of stuff that's got to happen in sequence, one after another, for us to be able to test this parachute.

(music)

First a Nighthawk helicopter has got to pick this parachute off the ground inside of a bag.

Underneath that is an instrumentation plate.

Underneath that is almost a kilometer of big heavy rope.

At the bottom of that rope is a two foot long steel bullet.

It weighs a hundred pounds.

That's all swinging up in the air underneath this helicopter.

The bottom of that bullet is a fishing line - a smaller nylon line that goes another 400 meters or so, all the way down to the ground, through some rollers, down through some pipes, around a pulley in the back in the sled attached to a 300 horsepower winch. That winch is turned on all the time pulling on this parachute.

The helicopter releases the parachute. The winch spools up sucking the parachute down towards the ground and maintaining tension to the whole line.

Our parachute is now inflated, our winch is still spooling it in and its pulling that bullet right down to the ground through all those same rollers, same pipes, into the back of the sled.

As soon as that bullet latches into the back of the sled we've got the parachute. We cut away that fishing line turn off the winch light the rockets and now our rocket sled is pulling our parachute down toward the ground around a pulley.

(music)

And that's our outdoor wind tunnel.

Okay so you're seeing the parachute rip right? It looks bad. It's not as bad as it looks because really the point of these tests is to find these flaws. We want to see how far we can push these parachutes, we want to see what's wrong with them.

And more important than anything, we want to see if it happens here on Earth before we spend all the real big bucks and go to Mars.

(music)