

Sensors on the Huygens probe

Clip: INHO10267_clip1

Transcript:

Professor John Zarnecki:

Here's a schematic then of the sensors in the structure – oh, I should just show you this, this is actually a real structure made of GRP (Glass-Reinforced Plastic), and it's incredibly light. This fits on the experiment platform and then the various sensors were attached at various points on here – and you might wonder what these holes are for, well weight was at such a premium that we actually had to mill away as much of the material as possible without compromising the strength of the overall structure. It's remarkably tough, but incredibly light.

Okay, some of the sensors, let me say a few words about them. Here we've got a thermal properties instrument, hotwire sensors which measure both temperature and thermal conductivity, of both atmosphere and liquid. Incredibly thin, delicate wires – 10 and 25 microns. The designer of that subsystem as we call it is here – I still remember to the day, we had a sweepstake at launch on various things, the main one was how many of those wires would survive launch. And the person who designed and was responsible for that voted for 3 out of 4, which gave me cause for concern, but in fact they all survived not only that, they actually survived impact with the surface of Titan, and carried on working on the surface.

The penetrometer, this device here which you can see there on the schematic, and on the model it's the stick which sticks out through the front of Huygens. And in fact I've got here... this is an early prototype that we made, I think it's 2 or 3 times actual size. And it's a very simple device, it has in the tip a force sensor, and as long as the probe is not swinging too much, then this was expected to be the first part of Huygens that would strike the surface of Titan – and for a tiny fraction of a second, before the probe with its very complicated structure struck the surface, the only interaction would be between this sensor and the surface of Titan. And by analysing the signal from the force transducer, you can say something about the physical nature of the surface: how hard is it, how soft is it, and so on.

Over here, across the top of the structure, we have two sensors which measure the speed of sound. So one transmits a soundwave, and the other receives it. So we transmit a soundwave, and we measure the speed of sound. And Philip Rosenberg will say a few words about that. That enables you to say something about the nature of the medium that you're passing through. If it's a gas for example, an ideal gas, you can determine the mean molecular mass.

Another acoustic sensor is this one over here, and I have an actual version of that. This is the real size. So this is a sonar, so you imagine that's on the front of the Surface Science Package here, and as the probe comes down, it's pointing towards the surface of Titan, it emits acoustic waves and the idea was that before hitting the surface we detect the echo, and so we can say something about the nature of the surface, and if we landed in liquid it would work as a depth sounder.