Mike Pessin:
We had to go in and make changes that were relatively massive (or very significant); and we had to come up with a test program for that – and still be able to fit that into the budget in the time available.

Parker Counts:
Fortunately, the contractor had done some research in aluminum-lithium; and that was a proposal that was there – while it had never been used in a space vehicle or space application – its properties are such that it gives you greater strength for less weight, so it became one of the critical parameters that we looked at. And having had some initial work done on this was a benefit – so we had the aluminum-lithium as a material base to work from, as well as the corporate memory from all the original designers of the tank (both at Marshall and the contractor). So those things were a head start for us as we got into the super lightweight development.

The second thing it contributed to the weight savings: was the decision that we made to go to an *orthogrid* structure as opposed to a *skin stringer* original to the tank design structure. What this allowed is that we could take – we could use a different pattern of orthogrid in the high-strength areas or the high-load areas, and then we could reduce it; so we were able to take advantage of machining it. Now it's much more expensive: skin stringer panels are very clear, they're simple, and they're unique – they're a standard design; where orthogrid has to be machined out in several patterns. And if you do that – then that's a significant amount of cost increase to do the machine operations; and you lose about 85% of an original panel that you're machining.