it has a good coefficient of thermal expansion (CTE), it also can transmit loads very well from the composites to other locations in the system, and the other advantage of Titanium, compared with Aluminum, is that there is no Galvanic corrosion problem between the composites and Titanium (fig. 4bis). So even in an all-composites, a socalled all-composite airplane, we will still see perhaps as much as 20% Titanium, that will be more Titanium than for example in the F 16 where there is only 2 or 3%.

Looking beyond the airplanes, the United States Airforce and other countries throughout the world, including the Soviet Union, are looking to moving to space as quickly as possible. Here we are talking about such systems which are advanced beyond the Shuttle; systems which are able to fly into orbit, perform a mission, come back to earth, and then return on demand, that is immediately, into orbit. This would be a system like the National Aerospace Plane (NASP). An artist rendition of what that airplane might look like is shown in fig. 5 a and b. When my son saw this, he said: "That looks like a real fake to me, that looks like somebody made it out of a piece of paper and just stuck it up towards some kind of background". So he didn't like that one... he did like this one. This is what that system will really look like. It will be white heart on the nose and will be red heart along the rest of the surface as indicated in the picture. This is an artist rendition, of course, but those colours do correspond to the real temperatures on that vehicle. So the challenge is very great. We need a low density material and we also, at the same time, need something capable of high temperatures. So Titanium is obviously one of the preferred choices for this system.

I am allowed to do a small amount of advertising in this presentation, beyond talking about my book of course. Federal Express who always guaranteed to deliver parcels on time asked me to show their version of the NASP (fig. 6). Here it is and