The Avangar Glider

Description

> '…RE: The Avangar glider.
>
> I don't think the engineering is that difficult…'

Oh my…

Here is a little more coherent explanation…

Ceramic composites…the primary challenge is the heat load generated by skin friction heating…

Let's put some numbers to those temperatures…

A plasma is by definition a gas with an electric charge…for air, which is composed of mostly nitrogen [~3/4] and oxygen [~1/4]…the temperature at which ionization occurs is about 9000 C…

The process happens by first N2 and O2 molecules separating [dissociating] into O an N atoms…

> ie O2 —> 2 O at 2000 4000…

Then those N and O atoms begin to lose an electron at even higher temps…

> ie O —> O+ & e-…T > 9000…

This is an incredibly high temperature that **no known material can withstand…**reinforced carbon carbon is used on spacecraft and is good to about 2000 C…

Now spacecraft re-entering the atmosphere are designed to slow down as they begin encountering air drag at the upper atmosphere [where the air is still quite thin…]

They do this by using blunt leading edge shapes…here is how a typical capsule looks like…

Shock_Layer.jpg
Image not found or type unknown

The Space Shuttle similarly uses its blunt underbody to slow down…

B001729.jpg
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An ICBM warhead also inevitably slows down somewhat…but not because it is designed to…it is designed to plummet right in…but still retains a lot of speed as it approaches the ground [it is not designed to hit the ground but to air-burst…]

But it spends a lot **less time** going that fast…giving the heat less time to transfer into its surface… and even then the heat load is a major challenge…

Now with a gliding warhead…you obviously do not want to slow it down like you would the space shuttle…which comes down to land at airplane like speeds…it would be easy to shoot down…

But the glider is also going to spend **a lot more time** flying through the thick air down low…so the heat transfer will have more time to build up…

So here we bring in the other big part of the puzzle…which is the shockwave…in that illustration of the capsule above…the shock wave is seen just in front of the convex blunt curvature of the body…

Fortunately…that shock wave also shields the heat…the temps behind the shockwave are **much** lower…a serendipitous fact of the physical world without which space travel…or at least the re-entry part…would be impossible…

Even so…those heat loads are truly huge…

Now the shockwave geometry clearly mimics the body shape…as seen in that capsule…with a glider you are still going to have a shockwave…but because it is designed to glide it must be more aerodynamic…ie its lift must be greater than its drag…

That means the shape of the shockwave…and its proximity to the body…which is very important…may not be so ideal…

This is a **very large** challenge in terms of aerodynamics and thermodynamics…

Then you have other issues…how are you going to control the flight path…having a gyro is fine…but you need actual control surfaces on the craft…ie movable ‘flippers’ if you will…

Those will require some kind of mechanical or hydro-mechanical actuation…where does the power for that come from…?

What about shielding those mechanical pieces from the heat…?

As you can see it gets complicated pretty fast…