

Re: VTVL?

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- *From:* "Wayne C. Gramlich" <Gramlich@xxxxxxxxxxx>
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Russell Wallace wrote:

Wayne C. Gramlich wrote:

If you arrange your launch site such that the recovery site is in the ocean, the range of possible recovery sites becomes much larger.

Plus there are fewer regulatory headaches with an ocean site.

I suspect that this is a major plus.

I'm guessing you'd want to land it on a ship rather than dumping it into the ocean, to avoid the headache of refurbishing equipment that's been soaked in salt water? That also gives you the option of having the ship hold tanks of propellant so it can refill the vehicle and let it fly straight back.

I can imagine both landing on a ship or just landing directly on the water. Both involve those engineering/business trade-offs that Jonathan mentions...

Landing on a ship requires the additional cost of acquiring the ship and installing a landing pad that is big enough for your vehicle. Sparring a landing pad in the middle of the ocean (even with GPS) is going to take some careful engineering. Once it lands, you can either refuel and fly back, float the entire assembly back, or hire a chopper to fly just the engine and electronics back. There is lots of operational flexibility once the first stage is sitting on the boat deck.

Landing on any old patch of ocean reduces the targeting requirements substantially, but requires extra effort to keep the salt water from wrecking everything. If a heat shield is already needed to help slow the rocket down, it

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could be made water tight as well. When the rocket is just above the water, the engine could be shut off, and a hatch could close off the compartment. A little tricky, but not inconceivable. Inspecting for salt water corrosion would be a pain, but compared to the cost of buying a whole boat to own and operate, it might be preferable.

An outfit like Armadillo Aerospace could probably try out both options, lose a rocket or two and get some real useful operational experience for not all that much money expenditure. Getting a 2x or 3x increase in payload (Jonathan's numbers, not mine) for the additional hassle of figuring out how to recover in the ocean seems like it is worth exploring a little (to me anyhow.) Indeed, maybe somebody could sponsor an X prize to make it a little more sporting.

Irrespective of whether the recovery site is on land or on ocean, the weather at both launch and reentry site must be acceptable. This will also adversely influence flight rate.

Indeed the landing site probably needs even better weather than the launch site?

Of course you could always use ships for both sites, which would improve the weather dependence and get bonus site flexibility; I imagine there'd be extra cost associated with doing that, though.

Agreed. It is obviously possible since that is exactly what SeaLaunch does. SeaLaunch spent a huge amount of money on their floating launch platform. In contrast, launching from a slab of concrete on some dirt near a convenient coast seems likely to be substantially cheaper though.

-Wayne

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