IOT Heavy Lander Shuttle Craft

The HLS vehicle is primarily a reusable shuttle bringing in supplies to the surface of Mars, and redocking with the round-trip container transporter in orbit. It is also a means of escape from the IOT in the event of catastrophic failure, accident, or meteor impact, acting as the main 'lifeboat'. Its forward position is as remote as possible from engines, fuel tanks, and other hazardous components of the drive systems in the event of fire or explosion.

The potentially corny 'flying saucer' appearance was considered, shades of kitsch 1950's movie 'They Came From Outer Space'! However, if one calls the configuration 'discus shaped', it then emphasises its purely aerodynamic potential. Consider the Olympian application of that shape in sport. All ideas are worth revisiting at least once, however originated, to see what useful elements can be extracted.

The craft is transported at the head of the Interorbital Transporter bolt-on system train. Here it performs as a meteor screen which was its original role, a passive deflection mass. At one stage, a solid ice shield encased in an alloy skin was an option. Only later did the obvious need for an independent atmospheric lander coincide with that position on the IOT already occupied by the shield. This became transformed into this lander configuration. Any movement of another piloted ship away from the host carrier must allow maximum clearance and manoeuvrability. This attachment point satisfies that requirement.

The functions of deflection screen and re-entry shield merged. As a heat shield shape this seems ideal for re-entry in the thin Mars atmosphere travelling head first. When travelling tail first in final landing stages, it is almost a parachute shape for some air-braking effect.

The globular pods underneath are cargo modules (including fuel) like fighter plane drop tanks, discarded before return to space. These can be conveniently winched down from a wide and stable platform, without unbalancing the ship or requiring additional extensible cranes.

The pods are manufactured outside any gravity well, from asteroidal metals (including the gold plating), and are not returned as 'empties' back into orbit. As another form of materials delivery to Mars, they would be used for storage, melted down or re-engineered into new structures as needed.

So a few factors came together in the one solution. When the Heavy Lander is in retrofire braking manoeuvre close to landfall, the landing legs would be fully extended. These would be kept retracted until the last moment to avoid aerodynamic turbulence. The discus shaped lander body provides some retarding effect on descent in the thin atmosphere. Radar triangulation calculates the reducing velocity and controls the main engines, and small vernier nozzles around the lander's rim balance orientation and drift. Due to the splayed configuration of the main engines, variable throttling allows for movement laterally in various directions while descending, by adjusting power reduction in one or more units. Facing about one third Earth's gravity, Mars' vehicles final landing speeds are less drastic.

Due to the nature of the lander's life support system's capability, and hardened construction, there is also a potential role in providing various bases seeded around Mars, equipped as permanent ground-based living quarters, or specialist scientific centres. This could occur after a certain number of predefined round missions, where deep-space structural viability, or natural technological obsolescence renders it less efficient for navigation and re-entries.

It is ideally configured for life on the surface with a sufficiency of radiation shielding, and a hardened carapace in the form of its heatshield (the meteor buffer when otherwise in transit). Mars' land surface is regularly struck by small meteorites that penetrate the negligible atmosphere with little resistance, this is a crucial consideration for surface dwellers. Recent NASA Mars Rover photos of the landscape show fresh craters a foot or more radius, in transitory windblown dust drifts. These appear to be sufficient in size and frequency to cause a significant hazard.

Most other dwelling spaces would be subsurface to avoid intense cold, radiation and these impacts, but where observation posts or instrumentation sampling needed to be endured above ground, older landers would provide an ideal site. This is similar to the Vikings using old upturned boats to form the roofs of their buildings. A mode of travel and a tool of colonisation metamorphoses into a mode of architecture, whose structural ideas can still be visible in later Earth-side church vaulting.