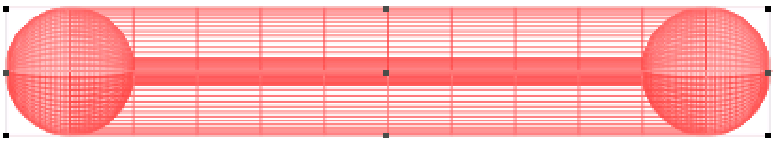
Tank habitats

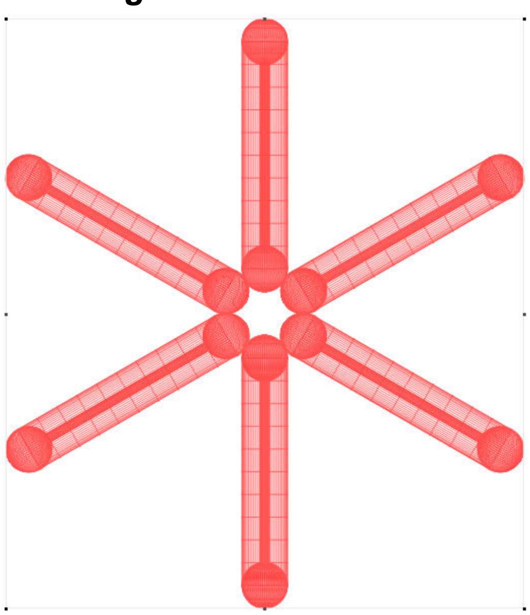
This kind of scum barge is very common across the solar system. It is based on the 50-by-10s, the standard fuel tanks used by early HO and nuclear rockets. They are 50-meter long cylinders 10 meter in diameter, with spherical endcaps. During space colonization they were ubiqitious and cheap, so used fuel tanks were often repurposed as parts of tincan and cluster habitats, or as storage containers for volatiles from the outer system. As scum culture emerged the art of turning 50-by-10s into habitats was refined; by the time of the fall skilled habitat engineers could turn a newly emptied tank into a livable space in days.



A standard 50-by-10 has a hull made of sturdy carbon composites extracted from C-type asteroids. It is relatively transparent to cosmic radiation, so radiation shielding is usually sprayed on the outside or water tanks placed as protection at the edge. Still, the rate of radiation sickness among scum during solar maxima is worrysome.

The tank itself is typically divided into two 10-meter diameter end-spheres connected by a central hallway, 2 meters across and 40 meters long. The remaining space is partitioned into living spaces. The end-spheres are used for communal areas, docking equipment, public fabbers, and local life support. The hallway is equipped with handholds and cables helping transport. The number of people who can live in a tank varies; during extreme circumstances more than 400 people can cram into a tank, in a normal scum habitat about 40 people live per tank.

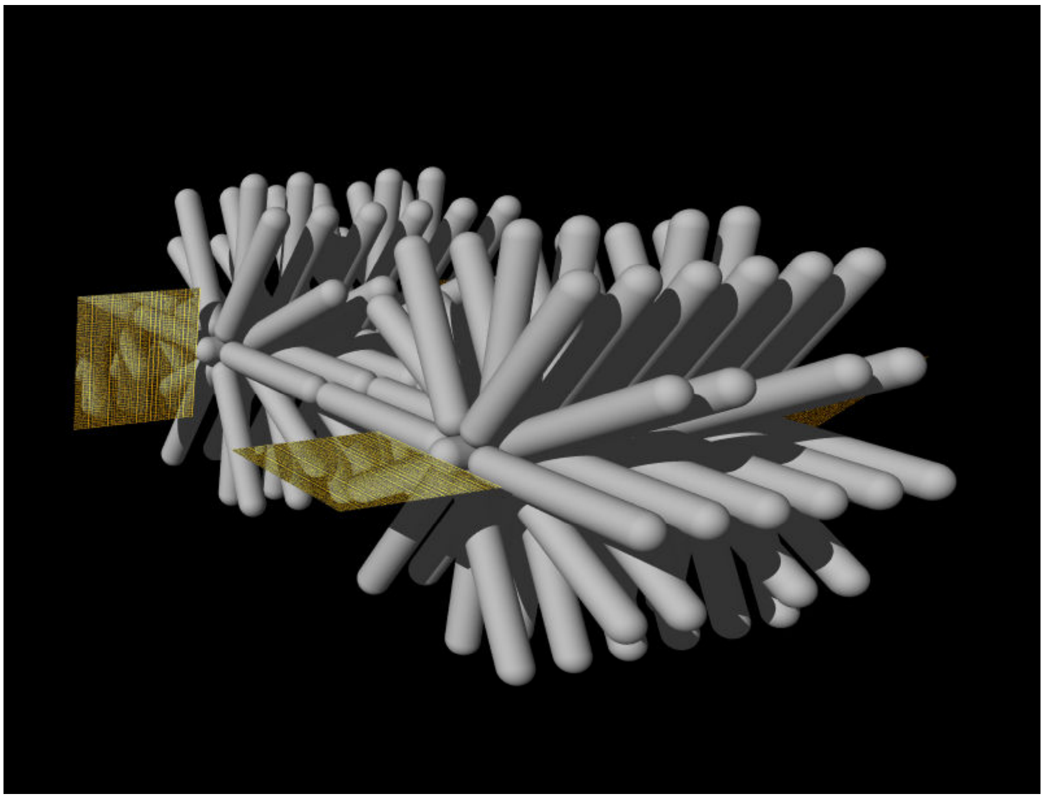
Bundling



The spherical endcaps can be equipped with openings allowing more tanks to be connected. A common design is “stars”, where six tanks are placed as a star. This structure can be reinforced and rotated, creating six "vertical" shafts with different degrees of gravity. Another approach is to connect them in a hexagon for a bit more even and "horizontal" gravity. Another approach is to bundle together tanks in a honeycomb pattern; this has the advantage of the inner tanks being relatively protected from micrometeorites and radiation, and is more common in the inner solar system.

Stars, hexagons or bundles can in turn be bundled into larger structures. For example, a central tank can be used as a connector for five stars, allowing 30 tanks of living space. The central tank can be used for central life support, power, spacecraft docking and moving between the living tanks. Often it becomes the central forum of the barge.

It is entirely possible to continue the bundling process, for example by adding bundled stars end to end or connect them through free endcaps.



In the above example, the barge Navas del Pinar consists of 124 tanks arranged in bundles around central tanks and connected through endcaps. Radiators are placed at the sides, providing cooling for the system. Fullerene cables connect the tanks and hold them in place; the whole barge can be towed at 0.03 G without risk. Total width 110 meters (plus 120 meters of radiators), length 240 meters. There is space for 5,000 inhabitants, divided into a number of barrios separated by pressure doors.

This kind of design emerged in the Belt during the Fall when refugee streams forced continual extension of habitats. The staggered placement makes adding and removing tanks easier, but would cause too much heat stresses and radiation risk in the inner system.

While the classic image of a scum barge is based on an extended cargo ship, many tank habitats lack propulsion. They are typically towed by other craft, or remain in permanent orbits. Some are hybrids: a basic craft containing power and life support is covered with tanks for extending the living space. Over time such accretions can turn them into (slowly) mobile cluster habitats.

Life support

Many scum barges have life support systems close to their limits. A biomorph consumes about 1.4 kg of food per day and between 2-20 liters of water. A single tank needs to recycle between 56 and 560 kg of food and 80 to 8000 kg of water per day (depending on population). At the lower end this can be solved even with fairly primitive algae cultures pumped through transparent lightspaces (about 200 liters per person; carniculture requires a few times larger systems), but at the higher end nano-recycling is absolutely essential. This requires a few hundred watts per person, and if there is any disruption – due to energy shortage, software faults, poisoned nanosystems, plumbing blockages, or anything else - life quality rapidly drops.

Most tanks are painted with low emissivity white, trying to avoid the intense heating from sunlight (at least in the inner system) that would both heat up the interior and cause heat stresses in the hull, and to avoid radiating away heat too readily in shadow. Overall heating/cooling is regulated using radiators on the outside. These often double as solar power collectors in inner system habitats.

The weak point of tank habitats is the joints between the tanks. Often made by non-experts, subjected to various stresses and strains, they can easily break. Especially when there is a sudden torque that cannot be distributed by cabling (such as an impacting spacecraft) there is high risk that the joints break and cause serious decompression. A tank can reach 50% air pressure in just 12 seconds, although it may take 80 seconds to reach the 1% pressure limit to low-pressure morphs. The main threat is the massive airflow that tends to blow anybody in the connecting tunnel and end sphere through the breach. Normal hull breaches due to impacts or explosions are far less risky, since they produce small holes that are easily patched and do not let through much air.