

What is the difference between a Hovercraft and a Sev?

Your designer, the wet one with the earplugs in this image, is doing a little industrial espionage on this commercially built Scat hovercraft.



Surface skimmers were developed over the years under names of Air Cushion Vehicle, ACV, Ground Effect Machine, GEM, Surface Effect Vehicle, SEV, and other names.

Serious development of these machines started in the early fifties in the English aerospace industry. These vehicles ultimately came to be called "hovercraft", and in the fifties, the vehicles were built by individuals in England and used in recreational racing. The racing craft, which were usually one or two place, were also called hovercraft and this term became generic for this type of craft.

I entered the picture in the early sixties, when after building a small air cushion platform I began doing numerical analysis on the small amount of information coming out of England on the new hovercraft. I found that while there were scholarly looking papers on the subject, things did not make sense. Analytical efforts were not directed in the area of making the vehicles more efficient, and less costly. These hovercraft required far too much power to fit into the real world and compete with even the expensive helicopter, except where the physics of scale effects (and possibly some government subsidy) allowed large vehicles a small niche in the scheme of things.

It became quite evident to me that the English efforts were directed at merely getting surface skimmers to work, and there was little effort in making them fit into the real world of commerce. The approach to design seemed to be "gadgeteering", rather than analysis of the designs as systems. The craft were built using aircraft technology, which worked fine on a 350 knot aircraft, but was far too expensive for a 40 knot surface skimmer.

In numerical analysis one builds a model of the system using mathematics and then applies estimates of the empirical part of the design (such as friction coefficients and diffusion losses). It is up to the designer of the vehicle to try to achieve these empirical aspects in real hardware (usually the estimates are too optimistic at the start), or at least approach their values as closely as possible. Then the next time, more realistic empirical input can be used to improve the next generation of vehicles. For instance, if this had been done in early English efforts such items as skirt elements that are pressurized well above cushion pressure, and peripheral jet surface skimmers would never have been built, as they cannot be made to work with reasonable efficiency in numerical analysis even with the most optimistic empirical input.

To this day, design of hovercraft suffers from designers that copy what they assume is mature technology, derived from the English efforts.

Design areas that should have been addressed by surface skimmer people were "farmed out" to others, and as a result the craft were exceptionally expensive to build. Bulky, heavy and cumbersome mixed flow lift fans were used, where a one or two stage axial fan, with perhaps one twentieth of the size would do a better job, and expensive aircraft propellers would be selected where a much less sophisticated propeller would do for a surface skimmer. The flexible edge, or skirt also evolved along a line that requires much complexity and surface area, and a built in ability to destroy itself even on the simplest terrain. Low cost and simplicity seemed to not be an objective.

Two hovercraft of note are the SRN 4, and the SRN 6. A few SRN 4 craft were built and put into service as vehicle and passenger ferries crossing the English Channel. Age and wearout, (and the Channel Tunnel?) have been causes for this craft to cease operations (At last word, the SRN 4 is in operation!

[http://www.hoverspeed.co.uk/hover/.](http://www.hoverspeed.co.uk/hover/))

The SRN 6, which of which several dozen were built, is also disappearing, with a small remnant population still operating, even though there are similarly sized and powered specialty craft, notably excursion jet boats, that continue to operate as economically successful entities.

The era of the hovercraft is not dead, however, as the professionals began copying the amateurs by using more sensible, less costly construction for ferry hovercraft, such as welded aluminum and diesel engines in the AP 1-88, and numerous efforts have been made to get the hovercraft into manufacture as a recreational vehicle, and for specialized applications such as search and rescue.

However, these hovercraft still suffered from high costs, due to their low efficiency, inherited from the older designs, and the World community still assumes the hovercraft technology to be mature. The resultant vehicles usually use high power for their size, with attendant high vehicle construction and operating costs as a result. It is not unusual to have the order of 100horsepower in a 4 place hovercraft, and unlike the case of a powerful automobile, much of the power must be used most of the time.

Sevtec has taken a new course, for this old idea. By backing up and re-evaluating the surface skimmer concept, craft have been designed and built that use only one half to one fourth the power, which results in a much smaller vehicle for a given payload and speed, and the Sevtec surface skimmers have a skirt system that requires only a fraction of the material used on hovercraft. The resultant vehicles are far cheaper to build and operate, and as a bonus are more reliable and much quieter than hovercraft. An older term is taken for these craft, the SEV, or sev.

I do not consider the Sevtec technology to be mature. In a world where if your product is just a few percent better than competing products, it will eventually win the market, Sevtec technology cuts 50 to 75 percent off costs. However, as in any new technology, advances will occur through time, as economic commitment increases. Research in this area would be an ideal project for a university program, where costs are low, and where advances could be made while preserving the skills involved in working in hydrodynamics and low speed aerodynamics.

Welcome to this new concept with an old name, the sev. Join the adventure!