HCA Hoverally 2015 Technical Innovation Submission

Coastal Pro 2 Enclosed Lift System

An innovative solution to reduce noise, increase reliability, and ensure safety.

"Wait a minute. That is a twin engine machine?"

This is usually the comment we get when people see the Coastal Pro 2 for the first time.

Many great innovations are actually simple ideas applied in a unique way. When the time came to redesign the successful Coastal Pro 1 into a new model, we had a big list of features we wanted to add. Among those were a bigger thrust duct, more usable interior space, improved aesthetics and a reduced sound signature. But, at the top of that list was a separate lift engine. The British Hovercraft Company (BHC) had produced a one off modified Coastal Pro 1 with a lift engine for a unique project (minesweeping in Kuwait!). The result was a surprisingly versatile machine that everyone loved. We knew we wanted to improve upon this idea for the all new Coastal Pro 2.

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Dedicated lift systems are a challenge

Unfortunately, adding a lift engine usually accomplishes the opposite of our other design goals. First of all, lift engines and direct drive fans are noisy! Ask anyone who's flown a twin engine craft and they'll tell you that the only thing you hear is a screaming lift system.

Second, when operating on big water, particularly saltwater, which is the primary operating environment for these machines, lift systems are especially vulnerable to wave strikes. Several possibilities exist. Waves can hit the fan, causing a catastrophic explosion. Water can be ingested into the engine, shutting it down and making restart difficult, not to mention the corrosion issues from salt inside a motor. In addition, even if the previous two items are avoided, water continually splashing into the air plenum adds weight and reduces performance.

The Solution

With the Coastal Pro 2's unique, enclosed lift system design, we have eliminated all of the problems common to dedicated lift engines.

Noise Reduction

Enclosing the lift system drastically reduces the sound signature.

First, you no longer hear a screaming lift fan and the sharp snap pop of an inadequate small engine muffler. We have totally thrown out the typical small engine muffler setup and created our own. Custom made from a modified motorcycle exhaust system, our muffler drastically reduces the sound output you'd normally get from a lift engine. The muffler output has been redirected back into the enclosure so that it exits the craft through the lift system. This prevents the directional noise from an exhaust pipe's aim.

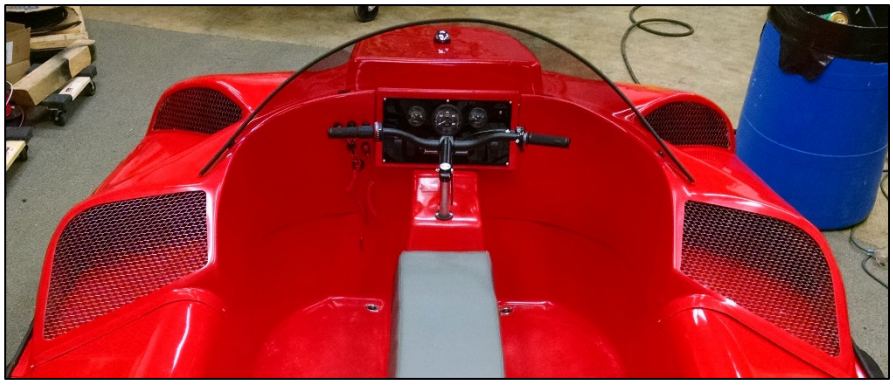
Second, an often overlooked sound source on hovercraft comes from vibrations traveling through the hull. The lift engine frame on the Coastal Pro 2 sits on rubber mounts that isolate any high frequency vibration from the rest of the hull.

Third, by fully enclosing the lift fan under a cover and feeding it nice smooth airflow, we have significantly reduced the perceived fan noise. Using standard sound rating techniques, the Coastal Pro 2 puts out 74db at cruising speed and a maximum of 78db with both engines at full throttle. This is extremely low for any hovercraft, but

especially impressive for a twin engine design and makes it one of the quietest production hovercraft ever made.

Reliability and Safety

Because the lift system is fully enclosed from the front of machine, all of the water issues typically faced by lift engines disappear. All of the lift air feed comes from four aerodynamically placed vents facing the rear of the machine. Therefore, any water that comes over the nose can do no harm.



Fan reliability has increased. We have eliminated any chance of wave strike or water ingestion. This is one of the primary causes of lift fan failure on a twin engine machine and the resulting explosion is a serious safety hazard.

Engine reliability is increased. Lift engines are typically getting doused with water on a regular basis. With an enclosed setup, only minimal spray reaches the engine, and most importantly, the air filter. There is no chance of a wave swamping the engine.

Finally, although reliability itself is a big safety feature, the fact that the lift system has additional physical material between the fan and the outside world adds peace of mind. If something ever were to happen and cause a fan failure, you not only have the typical wire mesh guard in place, but also the additional fiberglass acting a secondary barrier. Further, with the air intakes located at such a large physical distance from the fan itself, there is no possibility of a tree limb making its way through the guard material, or an unexpected fall causing your hand to push through the guard.

The Result

Although enclosing a lift system is a simple concept, that's also the beauty of it. To our knowledge, no one has ever incorporated such an effective design into a hovercraft this size. Not only does it work incredibly well, but it even looks great.

And, as we all know, the world is in desperate need of hovercraft that are both quiet and pretty!