

Wave Piercing Design Being Adapted for Unmanned Vessel



An image of Zycraft's high-speed unmanned surface vessel.
ZYCRAFT

Zycraft of Singapore is developing a high-speed unmanned surface vessel (HSUSV) capable of sustained speeds of 35 knots in Sea State 4 carrying a 1,100-pound payload (not including fuel).

The HSUSV has both civil and military applications, from rapid rescue, surveillance of marine accidents, or interdiction of hostile targets. The vessel can be launched from shore or a host platform at sea.

James Soon, Zycraft's CEO and former commander of the Singaporean navy fleet, said the HSUSV has a number of commercial applications such as responding to ship collisions, hijacking, pollution incidents, air crashes at sea, and search and rescue (SAR). "The HSUSV can provide rapid surveillance in maritime incidents such as for salvage companies that need to get early surveillance and situational awareness to better determine the subsequent response."

The HSUSV can be used as rapid rescue platform in man overboard situations or other SAR cases by carrying a life saving device or medical evacuation package. Examples of paramilitary applications include surveillance of naval groups, and possibly attack using a weapon, he said.

The vessel is remotely controlled from Zycraft's operations center in Singapore, but could be controlled from virtually anywhere with satellite connectivity, including a host ship platform.

Sea conditions is a determining factor regarding how fast

manned assets can get to the scene. "Currently available high-speed boats use planning hulls, and leap out and slam on the water and therefore cannot go really fast in high waves," said Soon.

When manually driven, the driver has to constantly adjust the throttles when meeting large waves. This slows the boat down. Controlling such a boat in an unmanned configuration is problematic because it's difficult to sense and respond to the waves autonomously.

The Zycraft HSUSV is based on proven wave-piercing racing boat design with a single engine. The hullform can use a waterjet or propeller. The Zycraft HSUSV is currently planned to have a single propeller.

A very slender wave-piercing hull can avoid slamming by cutting through waves instead of travelling over them. "A wave piercing HSUSV is expected to be able to overcome bad sea conditions and reach the scene several times faster than manned assets," he said.

"The wave piercing concept has been used by a number of manned boats for a long time, but this is the first time it is being adapted for unmanned. With manned boats, the sudden acceleration and deceleration experienced as the boat pushes through a wave and emerges won't be felt by an unmanned boat. That is why wave piercing manned boats are not popular," Soon said. "Imagine being jerked around for days."

The Zycraft HSUSV has an endurance of at least two weeks at a loitering speed of 5 knots. Soon said the HSUSV is designed to be as small as possible – 11 meters or less – to keep costs down and enable it to be carried by mothership when needed. He said it will have a single point lift for launch and recovery, and will have its own launch and recovery bay for small drones or tethered UAVs to carry cameras or other sensors.