OCEAN AURORA

Offshore Contractors MCS has developed an innovative remote survey system to increase the speed of inspection. Called the *Ocean Aurora*, the company believes that it can reduce the cost by 50% or more depending on the type of operation.

Units 1 and 2 will be operational this year and we hope to be building further units through 2025 and 2026.
John Howes Reports

A perennial challenge with deploying underwater vehicles, is physically getting them to the site.

Traditionally, the vehicles were launched from surface support vessels, from which they were also controlled. ROV data could be processed in real time by the support staff.

The downside was the cost.

In recent years, the development of smaller uncrewed support vessels (USVs) has revolutionised the sector. In addition to delivering the underwater vehicle to site, the USV can also act as a gateway, allowing vehicle to be controlled, sometime is real time, from a remote onshore location.

A limiting factor of a small surface vehicles, however, is that they cannot operate in the sort of seas that a traditional heavier support vessel would be comfortable with. Typically, the light vessel would be more easily thrown around by the high-energy waves, making launch and recovery of the ROV much more difficult.

“We were looking to design an autonomous deployment system, but wanted to move away from a surface vessel arrangement,” said Alasdair Cowie, MCS Group Business Development Director. "No matter what you do, you're always going to be dependent upon surface conditions to be able to deploy and recover normally.

"We wanted a dynamically positioned submersible to perform shallow to deepwater geophysical survey, tethered and non-tethered ROV & AUV operations. We took a blank sheet of paper and arrived at the Ocean Aurora concept."

The Ocean Aurora is based on twin submarine hull- structure. The hulls are connected together to form a rigid structure, but an ingenious design feature is that it is hard-connected by a gantry piercing the water surface.

"The ocean Aurora is designed to do is operate as a submarine," said Cowie. "It can transit on the surface but on demand, can de-ballast down to around-6 to-8m.

This immediately cuts out the weather-affected zone during harsh weather conditions. The lack of a weather window, therefore, improve the economics of the project.

The small waterplane area of these gantry tubulars means that they are virtually unaffected by high-energy waves,while allowing over-the-horizon communications and the ability to make real time decisions

HULLS

One of the major drawbacks of uncrewed vessels is in the event of failure. There is no crew available to repair the system and in response to any debilitating failure, the entire vessel and vehicle has to return to port immediately.

AUTONOMOUS UNDERWATER VEHICLES

With its robust redundancy, the Ocean Aurora is capable of handling single-point failures and can navigate to a safe zone even in emergency situation.

To minimise the ramifications of offshore failure, therefore, the designers promulgated the idea of twin hulls to provide redundancy for all major systems ensuring.

"It is a very stable platform to operate from and is very much designed in the concept of what a submarine is meant to do, whether it's a military or a civil submarine design.

"Each submersible hull has a dry and wet compartment. The dry compartment houses the power facilities, fuel globe etc.
It is based on a diesel electric system with an engine in each compartment. The air intake and the exhaust feeds through the gantry tubulars to the surface.

REMOTE CENTRE

In parallel, to the Ocean Aurora vessel, we have developed a remote onshore centre which connects to the offshore facilities via satellite.

The centre is fully equipped with state-of-the-art software. Through satellite and 4G communication systems, it can carry out monitoring, data delivery and real-time execution of tasks. This enables fast decision making, mitigate risks and reduce costs while allowing our experienced personnel to manage projects from start to finish.

"There is also a battery system on board for emergency backup. This gives a 24 hours of capacity to take the Ocean aurora from point A to B in an emergency situation.

"There are also a number of pumps within the body to control the ballast and allow the vessel to submerge or return to the surface."

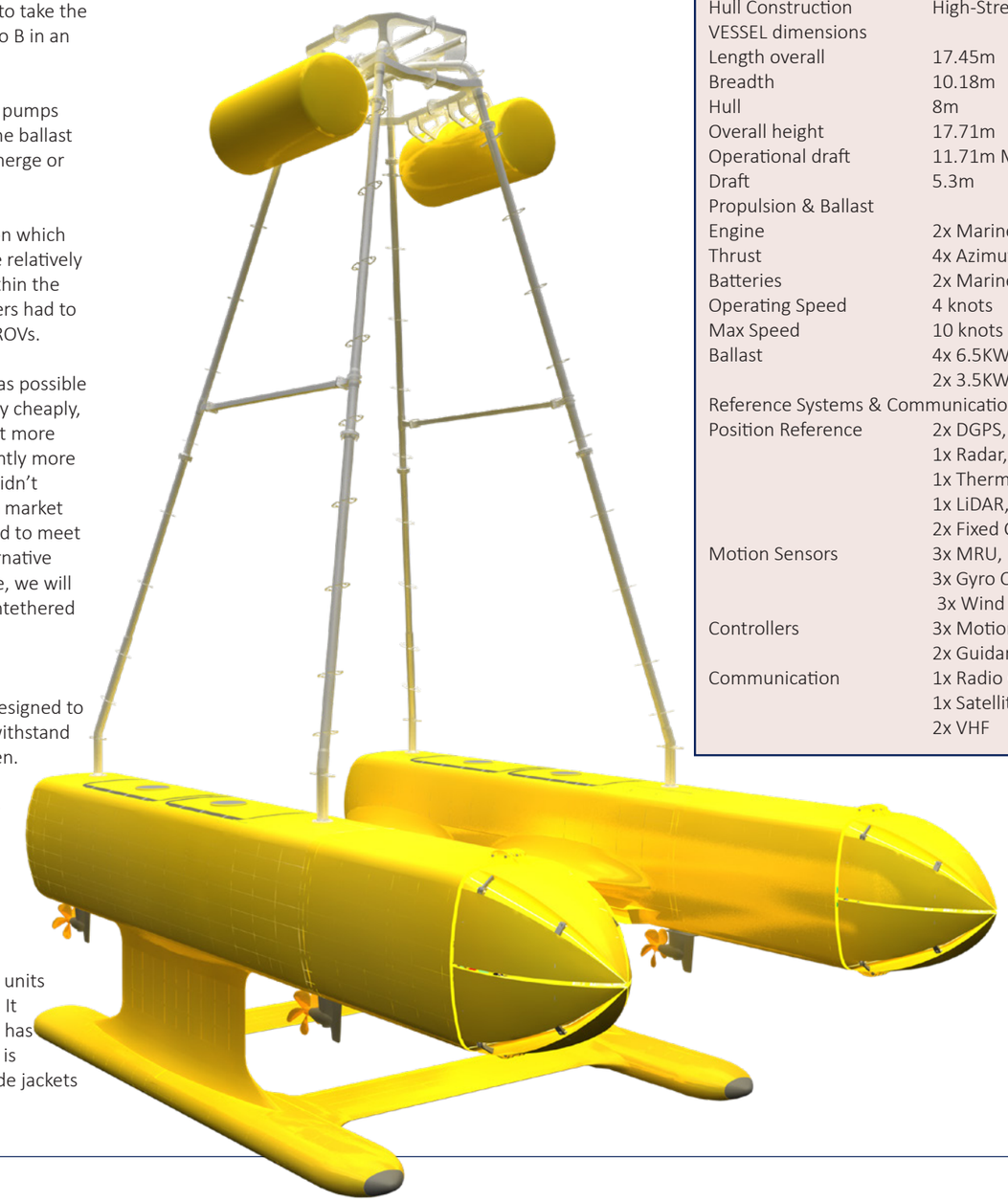
At the front is the wet section which contains an ROV or AUV. The relatively small underwater garage within the hulls means that the designers had to look at reducing the size of ROVs.

" Around five years ago, it was possible to purchase an ROV relatively cheaply, but since then, they have got more sophisticated and consequently more expensive. We felt that we didn't want to be so dependent on market trends so we decided to build to meet our specifications as an alternative to larger ROVs. In due course, we will go from tethered ROVs to untethered autonomous ROVs.

MINISPECTOR

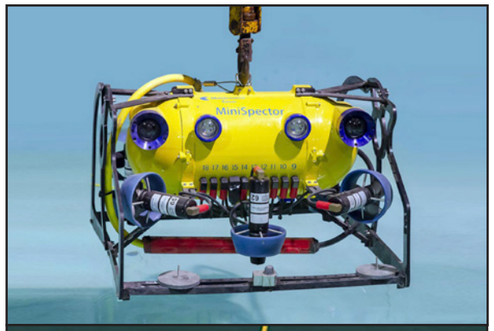
The MiniSpector has been designed to be small while also able to withstand currents up to sea state seven.
It can carry out inspection and 3D metrology, this mini-ROV is easy to deploy and can be used. It can work semi-autonomously with the capability to go fully autonomous in the future.

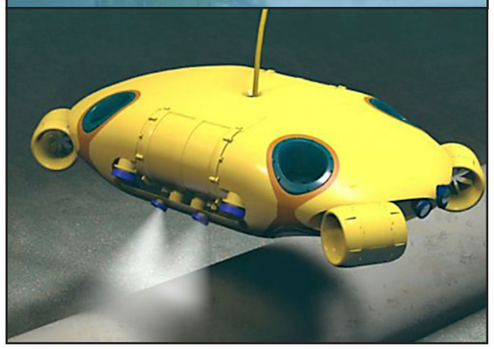
We have around 10 of these units in operation at the moment. It can work in up to 3kts and it has a depth limit of 300m which is normally ample to work inside jackets and other structures.



VESSEL SPECIFICATIONS

Design and Construction	
Design	Multi-Hull
Hull Construction	High-Strength Steel
VESSEL dimensions	
Length overall	17.45m
Breadth	10.18m
Hull	8m
Overall height	17.71m
Operational draft	11.71m Min.
Draft	5.3m
Propulsion & Ballast	
Engine	2x Marine diesel genset
Thrust	4x Azimuth thrusters
Batteries	2x Marine battery banks
Operating Speed	4 knots
Max Speed	10 knots
Ballast	4x 6.5KW Pumps, 2x 3.5KW Compressors
Reference Systems & Communications	
Position Reference	2x DGPS, 1x Radar, 1x Thermal PTZ Camera, 1x LiDAR, 2x Fixed Cameras
Motion Sensors	3x MRU, 3x Gyro Compass, 3x Wind Sensors
Controllers	3x Motion & DP 2x Guidance System
Communication	1x Radio Comm, 1x Satellite, 4G, 2x VHF





We believe we can cut costs to 50% or more depending on the type of operation.

MCS are also developing the Prospector, slightly larger than the MiniSpector, dedicated for pipeline cable inspection.It can be fitted with a manipulators to carry out specific tasks. It gives a very good speed of inspection, rate, economy, pipeline, or cable. It can travel in excess of 6 kts. to give a good inspection speed.

"It can work in 300 m water depth but is designed to be upgradable for going deeper in due course," said Cowie. "The first units are being developed in Egypt at present, one for Aurora and the other as a back up.

"Going forward, we are developing a fully autonomous battery-powered ROV."The challenge is to get enough battery power to make it work so we are currently appraising the technology but we see this being available in 2 months. We are looking at 500m water deopth and 24 hour range. We anticipate it being ready by 2025."