

# ADM

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ADM EXCLUSIVE



FROM THE  
SOURCE

New Nova  
Group CEO  
Greg Hume  
speaks to ADM  
this month

**Sustainment**  
Integrated Platform  
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on LHD support

## Underwater Technology

Unmanned and underwater: missions and technology

Developments in masts and periscopes • SME success in unmanned programs



The Ocius Bluebottle can stay at sea indefinitely, generating its own power from wind, wave and solar energy.



# Unmanned Bluebottles and Stingers from Ocius

**IN** 1997 he replaced a seven-metre Hobie Cat catamaran's conventional sail with a new "solar sail" of his own now-patented design, inspired by reading about an insect that used its wings for both flight and gathering solar energy. While the solar panels were shaped to catch wind like a normal sail, Dane also found that maintaining the optimum angle between sail and sun could produce as much as 20 per cent more electricity to drive the boat's propeller.

Competing in the 1997 Second International Solar and Advanced Technology Boat Race in Canberra, Dane won his race by five laps on a six-kilometre course. As a proof of concept, it was emphatic. Within two years the former doctor was full-time in his new business, Solar Sailor, designed to exploit the technology by building commercial ferries that would combine diesel engines with solar technology for fuel savings of up to 50 per cent. His ferries have since operated commercially on Sydney Harbour and in Hong Kong.

"We managed to build a ferry for the Olympics, for Sydney Harbour," he said. "That won the Australian Design Award of the Year in 2001 and then we sort of battled on for a number of years until 2008 when oil

## PHILIP SMART | ADELAIDE

The automotive industry has long held that racing is the best means of demonstrating or perfecting new technologies. Ocius Technology founder and CEO Robert Dane probably wouldn't argue.

hit \$140 a barrel and we got an order for five more ferries. And we built them and then the GFC hit and oil went to \$40 a barrel."

Little did he know at the time that international economics and a chance meeting at an overseas conference would see his company refocus on vessels even smaller than his jury-rigged Hobie Cat prototype.

"I was talking at a ferry conference in New York in 2008 and some guys from Washington came up and asked 'can you

build a self-sustaining platform that could go to sea forever?' I said 'How much power do you need?' They said 10 Watts (on board power) for seven days with no sun - minimum, 40 Watts average and 400 Watts maximum. I said, well me on a surfboard is 40 Watts, and me on a bicycle going flat out is 400 Watts - so yes we can do that."

Dane realised this wasn't an enquiry about fuel savings or the environment - it was about persistence. The enquirers were talking about a seaborne unmanned platform for ocean surveillance. The world's growing fixation with unmanned aerial vehicles is being shadowed by a similar realisation that there are just as many dull, dirty or dangerous tasks to be performed on or below the ocean surface.

Industry reports have estimated a US\$3.8 billion market for unmanned surface vessels (USVs) between 2013 and 2020, for tasks as varied as shallow water sea floor mapping to automated insertion and retrieval of special forces personnel in combat.

After doing his homework Dane found that USVs in the marketplace were generally or two sorts, either large conventional powered boats, with the attendant limitations on range, endurance and cost, or

persistent low-cost solar or wave-energy powered platforms, okay for oceanography, but too small and slow to perform many tasks for hydrography and defence. He set about creating a new category using his proven hybrid drive technology.

At the Pacific 2013 International Maritime Conference in Sydney, Solar Sailor teamed with Australian boat maker Steber International and featured two concept models of a new class of USV called 'Bluebottles' named after the Australian marine animal that uses its body as a sail. The BlueBottle USV concept attracted interest from hydrographic survey and mining industries, and defence.

**"Careful design of both the Bluebottle and its onboard systems have given it virtually unlimited endurance and range."**

With a new direction, Dane changed the name of the company to Ocius, the Latin word for 'fleet'. In 2015, Ocius teamed with aerospace and defence electronics company Thales to win a DST Group Capability Technology Demonstrator to develop a USV suitable for antisubmarine warfare.

### Bigger Bluebottle

The new 5.6m BlueBottle with a 105kg payload (winch, cable and towed array) called a Stinger is all Australian and under construction at Steber International now. Designed by the naval architects of famous Sydney to Hobart racing yacht *Wild Oats*, with a five to six knot hull speed, it can generate 40W minimum power for 10 days with no sun, 100W average power with four hours of sun per day and kilowatts for several hours.

Designed to be deployed from boat ramps anywhere or by naval vessels such as the Sea 5000 Future Frigate, it uses the energy at the surface of the ocean, solar, wind and wave power. It generates electrical power from 19 50-Watt solar panels to run all onboard electronic equipment and power its back up propulsion system. For routine propulsion at three to six knots it uses wind and wave energy or even the boat's movement.

To perform its intended submarine detection role its keel houses a 105kg winch with 85-metre reel cable used to deploy and retrieve a 24m Thales towed underwater "thin-line"



**The Hong Kong Jockey Club operates three Ocius Solar Sailor ferries to transport players, staff and supplies between the mainland and its island golf courses.**

array. In good sailing conditions or using its propeller the vessel can make five or six knots with the array deployed. As Dane explained, careful design of both the vessel and its onboard systems have given it virtually unlimited endurance and range.

"We can cover large areas or stay on station," he said. "We can use sail and wave power in patterns with the array deployed to do surveillance indefinitely with all the solar energy going to sensors and coms. "We're limited by biofouling but thanks to our Chairman Mark Bethwaite, world champion and Olympic sailor, we've developed methods to minimise that. We've tested the solar panels for more than six months with almost zero degradation and we're confident we'll be able to go out for up to a year and cover huge areas."

Like other unmanned vehicles, the vessel's role will be defined by its sensors and equipment. But Dane sees these operating autonomously in networks, "talking" to each other. He estimates a fleet of around 300 could cover virtually all of Australia's northern seaborne approaches, providing a cheap security net or 'tripwire' that could detect and transmit evidence of potential illegal activity, leaving higher-value human assets to investigate only where necessary.

"It's disruptive," he said. "Instead of 100 men controlling one ship, we can have one man controlling 100 ships, autonomous unmanned vessels of low capital cost and low operating costs. No fuel, no crew, no supplies, no one in harm's way; no one getting tired or bored. The analogy I use is that the highly qualified people, the 'firefighters' only

have to be out there when the 'alarm' goes off.

"We can hear under the water, we can see on the surface of the water and we see things on the horizon. We can take photos or acoustic signatures and send that back to whoever, in Canberra or Darwin or wherever they are and say that vessel is there. And if you had a fleet of these things and one of them was lost or broken you'd lose a pixel, you wouldn't lose everything."

New technology mean the vessel's own electrical output is measured in kilowatts rather than watts, and the equipment it may need to run sips electricity compared with systems of old.

"We did hydrography on Jervis Bay using a multi-beam echo sounder that five years ago would have been impossible because the unit would weigh more than the USV and would have needed kilowatts of power," Dane said. "But this thing weighed around 25 kilos and needed 200 watts."

It's early days yet, but Ocius's next move is now a matter of execution and business strategy. Bluebottles seem to be the marketer's ideal product, a game-changing, capable technology appearing at the beginning of the curve. Dane is confident that bigger things await because use of unmanned surface vessels just makes too much sense.

"All the major sort of megatrends are going in the right direction," he said. "Navy's and governments are having to do more with less money and to keep people safe with less people involved. Australia's a huge country; we have something like 12 per cent of the world's oceans to look after and we've got 21 million people. So how do we do that unless we get smart and do it with robots?" ■