

\$US1m Q-Sub proves planing and portability are possible



'Hugh Fulton designed and built the Q-Sub for recreational, scientific, search and salvage uses.'

Visitors to the Hutchwilco New Zealand Boat Show will marvel at an Auckland inventor's ingenious creation, the Q-Sub, which will be unveiled for the first time at the show in mid-May.

Hailed as a 'revolutionary recreational submarine', Hugh Fulton's Q-Sub will have a surface speed of around 20 knots, dive to a depth of more than 120m and will weigh less than 3.5 tonnes, including its trailer.

Those aboard will be able to take in the sea views through large acrylic windows. And for the queasy, never fear – the Q-Sub has been specially designed to reduce the likelihood of seasickness and will be easy to drive. Above all, it will be safe, with 72 hours of capacity, even after eight hours dive time and several ways to reach the surface, just in case . . .

Designer and inventor Hugh Fulton had long been fascinated by the world of submarines. As the owner of a business manufacturing high-pressure gas compressors, he would day dream about using the company's high-precision equipment and his know-how to 'knock up a submarine'.

After selling his business he had the time to pursue this flight of fancy. He travelled extensively, talking to submarine manufacturers, sellers and captains.

To successfully produce a commercially viable submarine it would have to tick all the boxes: cost, design, comfort, performance, safety, desirability.

'The design had to be appealing. It had to be easy to launch and retrieve and be trailerable,' says Hugh. 'The batteries had to be able to be recharged easily and often and safety was obviously paramount.'

Hugh designed the craft himself, consulting a naval architect for the hull. Many part of the Q-Sub had to be created specially, including the stern legs, which are Mercruiser parts, but had to be adjusted so they would rotate 180 degrees.

'Various bits were made in New Zealand, the fibreglass was done in Kerikeri and Pressure hole in New Plymouth,' Hugh explains. 'Some parts I machined personally, the valves were brought in, the windows were made in England – they are a critical part of the design. Some of the forgings we sourced from Korea.'

It was during the sourcing of each component for the build that it dawned on Hugh the reason nobody had ever invented something similar.

'The logistical and cost barriers to taking a concept like this to fruition are enormous,' he says. 'For example, the windows are acrylic, have to be 50mm thick and alone cost over \$60,000. The rotating stern legs with their associated hydraulic steering, trim cylinders and pressure compensation posed many headaches.'

'Pumps, valves, manifolds, pressure tanks, controls and instrumentation have had thousands of hours of drawings and design put into them. Battery management systems, akin to those found on electric vehicles, all had to be sourced or designed and all the electric motors and battery systems had to be made completely pressure proof.'

To ensure the submarine's steel hull would be able to handle the pressure of repeated dives, a large, 1.8 metre-diameter

pressure vessel was specially manufactured abroad and brought to New Zealand. The hull was then placed inside and pressurised to 1 times the maximum depth for two consecutive 'dives'.

'It passed with flying colours,' says Hugh.

Fulton was adamant the design and construction of the submarine meet strict ABS (American Bureau of Shipping) standards. The sub's controls are logical, easy to learn and similar to an aircraft. An onboard computer controls the 11 electric motors and the two 150hp surface engines. There is also manual override that ensures the sub is able to surface and radio for assistance.

Another major challenge was the logistics of launching and retrieving the sub from other vessels. It was also apparent that once the sub was back onboard, moving a suitable mother ship from dive site to dive site was no quick or easy task.'

In response, Hugh ensured his design could plane on its own bottom at an impressive 20 knots and ensured it was able to be launched and retrieved using a normal boat ramp.

'It's convenient and compact and can just be backed in to any boat ramp. US Subs said you can't have a planing sub, but we beg to differ. We are yet to prove it, but we're well on the way.'

Fulton believes he can market the Q-Sub internationally for less than US\$1m. 'We haven't managed that yet, but we are aiming to get it under. Once it's manufactured on a production basis the costs will be reduced, of course.'

Hugh's nifty little Q-Sub has also piqued the interest of Warwick Yacht Design in Auckland, who have come up with an 18m (60') catamaran designed to drive in and lift it up between hulls using its own hydraulically operated 'garage'.

Fulton says combining his design with Warwick's means New Zealand can offer a luxury, 18m launch with a world-first planing submarine on board as a second tender for under US\$5 million.

Visitors to the Hutchwilco New Zealand Boat Show will be the first to see it. After that, Hugh would like to take it to the Sydney International Boat Show, Auckland and Monaco Yacht Shows to garner interest.

The name has a range of origins: the sub-hunting Q-Ships in both world wars; a shortening of Quick-Sub; and homage to Hugh's nephews who as children, could not pronounce Hugh, called him 'Uncle Q'.

Along with the leisure market who wish to view reefs and sealife and 'just see what's down there', Hugh sees the market for the Q-Sub as diverse. 'Police and Navy search and recovery missions and training, fisheries and scientists for observation, data gathering and water sampling. The applications are endless.'

The Q-Sub website will launch in time for the Hutchwilco NZ Boat Show at www.q-sub.com

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