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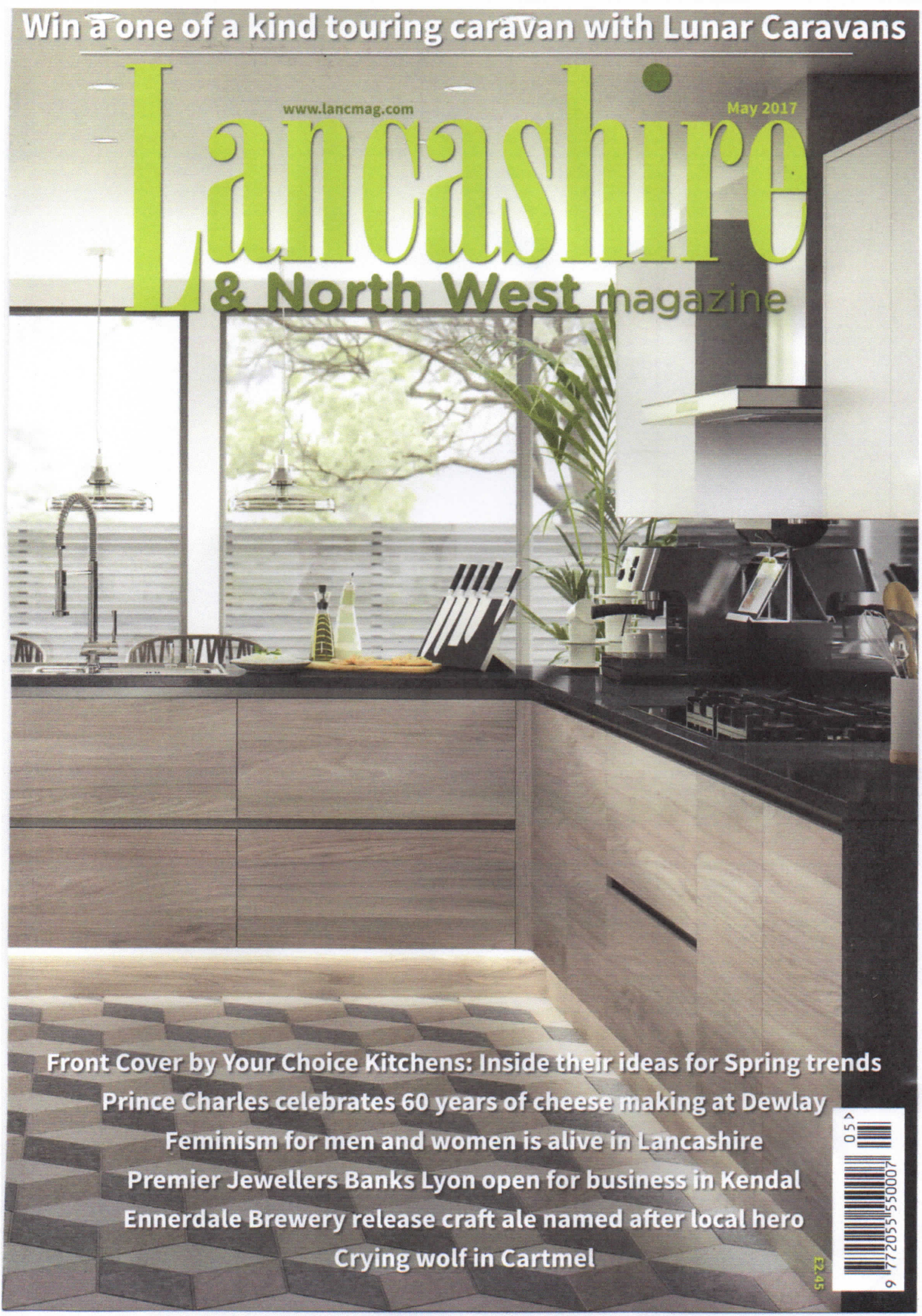

Front Cover by Your Choice Kitchens: Inside their ideas for Spring trends

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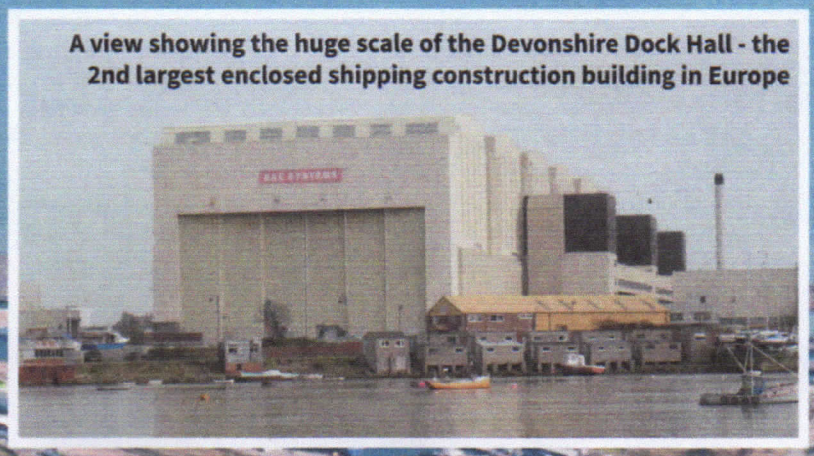
BAE Systems at Barrow - The Ultimate Challenge

The BAE Systems Submarines facility at Barrow-in-Furness with the Devonshire Dock Hall in the foreground



A view showing the huge scale of the Devonshire Dock Hall - the 2nd largest enclosed shipping construction building in Europe

Andrew Harris concludes his trilogy about the work of BAE Systems in our region

BAE Systems Submarines at Barrow dominate the economy and skyline of the town but face three massive challenges –

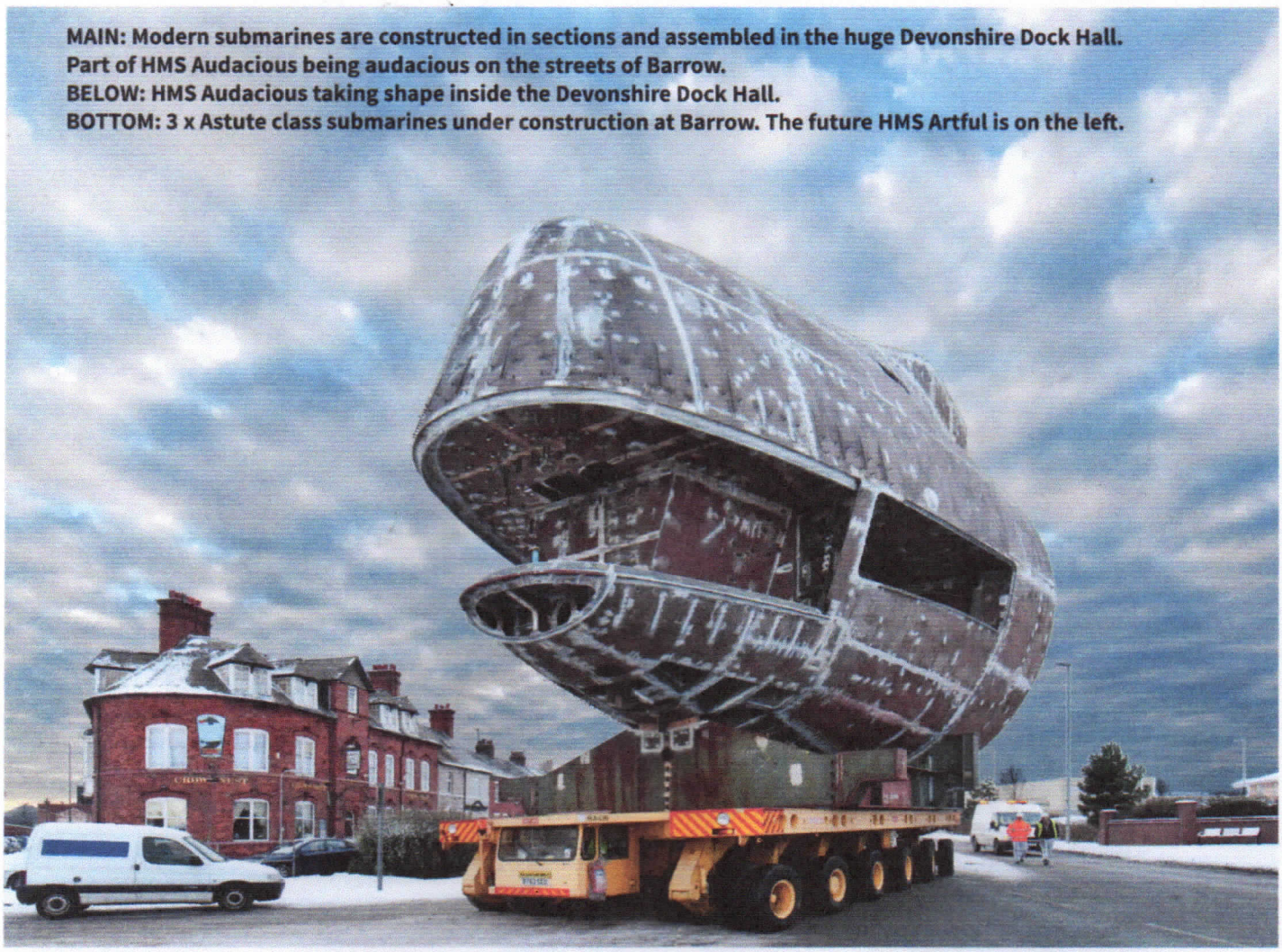
• Designing and building nuclear submarines is said to be as complex as the space programme of NASA. It involves sub-sea, nuclear and weapons technology for vessels that must be fast and safe yet silent-running and robust. They must be capable of circumnavigating the world without surfacing during which time they must produce their own oxygen and desalinate sea water for consumption by a crew of 100 or more. Electric systems of all sorts require 240 kilometres of cabling – more than enough to stretch from Carlisle to Stoke-on-Trent!

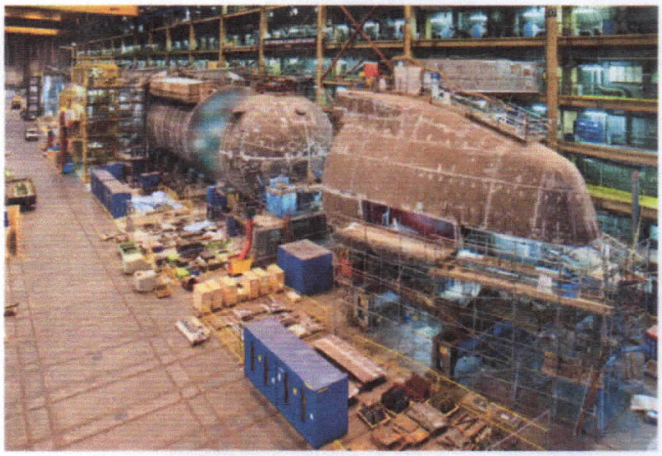
• Cost control is vital. Construction of the first Astute class submarine started in January 2001 with incomplete design drawings which contributed to dramatic cost increases resolved by the Ministry of Defence adding £430 million to the contract and BAE Systems accounting for £230 million of the cost overruns although it had to issue a profits warning due to this and problems with the Nimrod aircraft contract. Methods have improved for the further six boats – submarines are called boats not ships – in the class. The estimated cost of up to £1.64 billion each for the rest of the seven boats is dwarfed by the £31 billion cost – plus a contingency of £10 billion – for the four new missile carrying Successor boats now christened as the Dreadnought class. If the cost were to rise above £10 billion per boat it would be a huge problem for the government and BAE Systems.

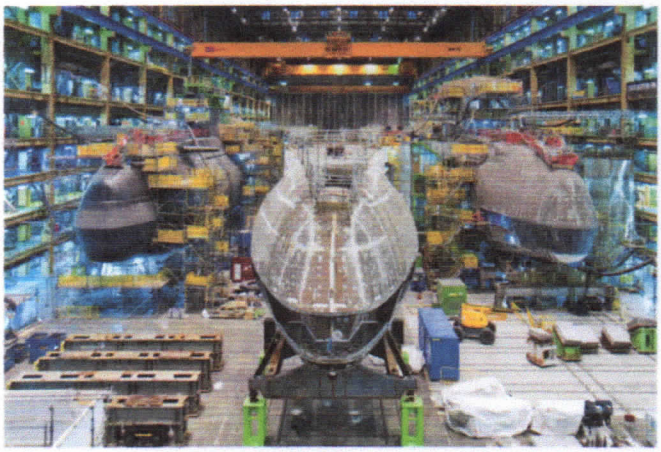
• The third challenge is the 'feast and famine' nature of the business. The Barrow shipyard used to employ 15,000 workers but reduced to 3,000 when orders dried up. It currently employs about 8,000 but something like an additional 3,000 skilled workers are needed for the programme to build the four Dreadnought class missile boats. Finding them and attracting them to Barrow will not be easy. For about 10-years before the Astute class the shipyard had not built any nuclear boats and many skilled people were lost to other careers and Australia where they were made welcome. The current 'feast' should last 20 years but future orders will be crucial to local employment in a town of 70,000 people who depend on the fortunes of one firm in one business.

The Barrow Shipyard has a distinguished past, present and future in building submarines for which it is well-experienced and equipped. Its first submarine was built for the Turkish Navy in 1886. 100 years later the Devonshire Dock Hall - known by all as DDH – was completed to protect submarines from the weather

MAIN: Modern submarines are constructed in sections and assembled in the huge Devonshire Dock Hall.
Part of HMS Audacious being audacious on the streets of Barrow.
BELOW: HMS Audacious taking shape inside the Devonshire Dock Hall.
BOTTOM: 3 x Astute class submarines under construction at Barrow. The future HMS Artful is on the left.





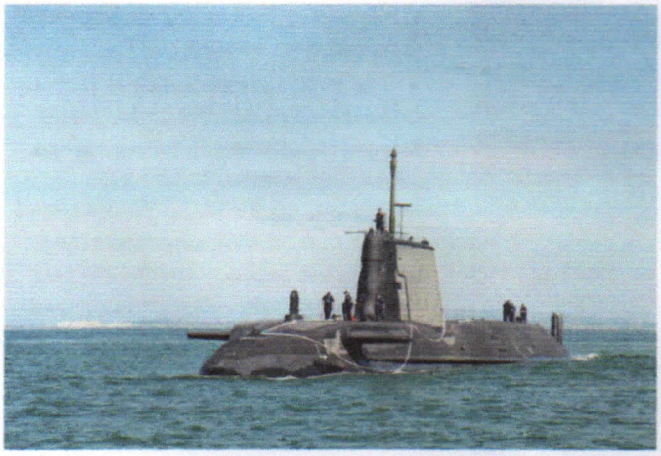


and prying eyes in the sky while they are being constructed. In 2003 the construction of surface ships in Barrow came to an end when BAE Systems Marine split into BAE Systems Naval Ships and BAE Systems Submarines –and Barrow's specialisation in submarines was complete. All but three of the Royal Navy's nuclear submarines had been built at Barrow but then came a period of 'famine' after the four Vanguard class boats – to be succeeded by the Dreadnoughts –were completed. Barrow is vulnerable to the maxim 'you are only as good as your latest order'. The order book looks good now but it is vital that defence orders enable the shipyard to avoid peak and troughs beyond the seven Astute and four Dreadnought boats.

The Astute class submarines are amazing. After a wobbly start, construction methods and the design were much-improved and - according to recent estimates - the average cost of the remaining four boats has stabilised at £1.49 billion increasing to £1.64 billion each. Astute, Ambush and Artful are in service now and should be joined by Audacious in 2018. Anson, Agamemnon and Ajax will follow to be commissioned in 2020, 2022 and 2024 respectively. Each boat can carry 38 weapons including Spearfish heavy torpedoes and the Tomahawk Block IV cruise missile capable of hitting a target 1,000 miles way with great precision. The Combat Management System receives data from sensors and displays it electronically whilst the search, attack and multiple arrays of the Sonar 2076 fitted to each boat are reputed to be the best in the world.

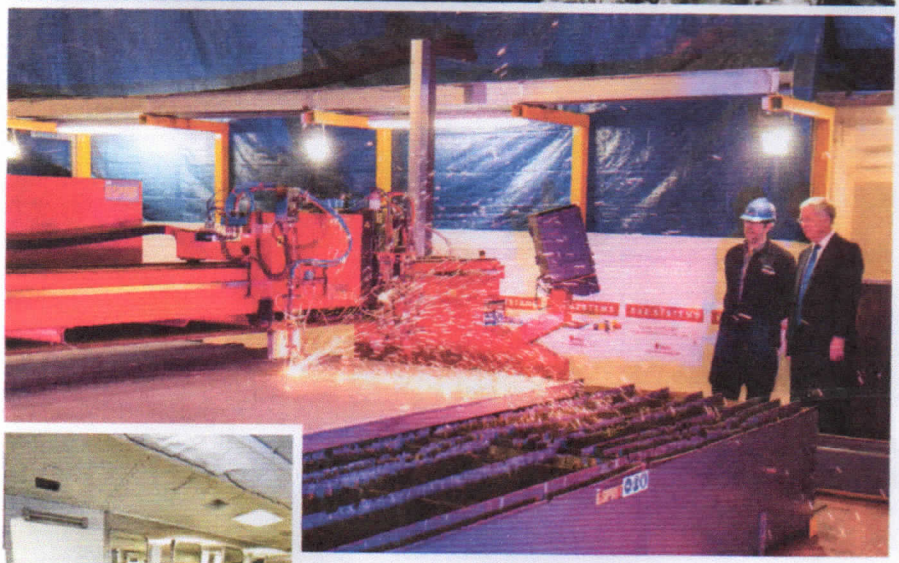
As the pictures show, the boats are built in sections which

MAIN: The naming ceremony for the now-complete HMS Audacious.
BELOW: The Barrow-built hunter-killer submarine HMS Artful at sea.
RIGHT: Astute-class submarines are impressive. HMS Ambush underway at sea. She can carry 38 torpedoes and/or cruise missiles.



are transported through the streets of Barrow to be put together and fitted out in the Devonshire Dock Hall. At 51 metres high, 260 metres long, 58 metres wide and with a floor area of 25,000 square metres the DDH is massive. It is the tallest building in Cumbria and can be seen from miles away. It is the second largest indoor shipbuilding complex in Europe after the facility of Meyer Werft in Germany!

After much soul-searching by the Government and Parliament, last October Defence Secretary Sir Michael Fallon pressed a button to start the cutting of steel for the first of four 'Dreadnought' class missile boats which commit the UK to maintaining a 'Continuous At Sea Deterrence' after the four current Vanguard class missile submarines start to retire. The first new boat will be HMS Dreadnought which should



TOP: A computer-generated image of the first Dreadnought-class submarine now building. It will displace 17,200 tons and carry 12 ballistic missiles carrying up to 96 warheads between them.
ABOVE: The UK Defence Secretary pressed a button to start the first cutting of steel for the Dreadnought-class submarines.
LEFT: The accommodation for sailors on Astute-class submarines is much-improved. The Senior Ratings Wash Space is shown

be commissioned in 2028 for a service life of 25 years. With a displacement of 17,200 tonnes – the big Astute class boats are 7,400 tonnes – it will be the largest submarine ever built for the Royal Navy. It is powered by a Rolls Royce PWR nuclear reactor, can achieve 30 knots submerged and be silent running to avoid detection. It has number of amazing features –

- It is 152.9 metres long – the approximate length of 3 Olympic swimming pools.
- There will be 42.5 kilometres of piping, nearly 13,000 electrical items, 20,000 cables with a total length of more than 347 kilometres plus lighting which can simulate day and night.
- The crew of 130 will have a modern gym - with exercise bikes, rowers, weights and a running machine – plus separate male and female crew quarters, toilets and washing facilities.

A grimmer feature of the new class is that each boat will have 12 ballistic missile tubes to accommodate 12 Lockheed Trident D5 Sea Launched Ballistic Missiles each carrying up to 8 warheads. The intention is to keep the peace by deterring aggression with up to 96 nuclear devices that we hope and pray will never be used.

The BAE Systems facility at Barrow is one of only a handful in the world that are capable of producing nuclear submarines whether hunter killers or – especially – missile boats. We are proud to have such 'cutting edge' technology based in our region – and the Barrow area depends upon their presence and their success. We wish them well.

Andrew Harris (www.andreweharris.co.uk) gratefully acknowledges the initial co-operation of BAE Systems Submarines in the preparation of this article although senior managers declined to answer any of our questions. The pictures are courtesy of BAE Systems Submarines except that of the Devonshire Dock Hall which is by your columnist.