

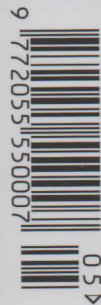
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'Our' Supercarrier HMS Prince of Wales

by Andrew Harris

This is the story of an amazing new warship which is, with her sister ship HMS Queen Elizabeth, the biggest ever constructed for the Royal Navy. It is, however, only the beginning as HMS Prince of Wales is expected to be in service for 50 years or more. We are likely to be interested in her exploits as she is linked with our region by affiliation to Liverpool.

Figures are revealing. HMS Prince of Wales is 65,000 tonnes which is more than our previous three carriers – Ark Royal, Illustrious and Invincible – combined. She is 920 feet long – a

mere 172 feet less than the massive Nimitz class of carriers of the US Navy. Her flight deck is more than 4.8 acres and could accommodate 3 football pitches if it wasn't for aircraft taking off and landing all the time! Even the ship's hangar is 1.28 acres. She is complex with 17 million parts and 226 miles of piping. Due to automation and multi-tasking the ship's crew will be less than 700 but with up to a further 900 when some permutation of air and land forces are embarked. She is a formidable ship but is she needed?

All 194 countries in the world have

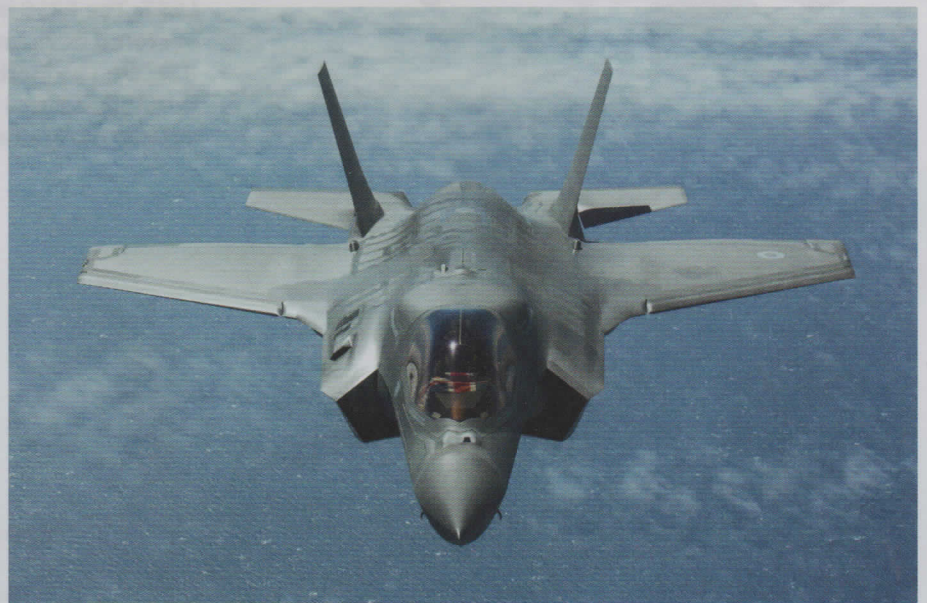
ABOVE: The naming ceremony for HMS Prince of Wales prior to her departing the dry dock. **TOP RIGHT:** A stern view of HMS Prince of Wales alongside the fitting-out berth. **RIGHT:** The F35B Joint Strike Fighter in flight. It is the most advanced multirole combat plane in the world.

some military capability but only a handful are able to project power well beyond their borders without the constraints of host countries. Only 6 countries are currently able to do this using large and modern aircraft carriers – with China and India keen to catch up. As Britain is a permanent member of the UN Security Council, member of NATO and close ally of the US we have a role as a maritime policeman whether we like it or not. We also need to safeguard the sea lanes as more than 90% of our trade by volume goes by sea and we hope to increase this trade with the wider world as we leave the



European Union. If we expect this we must give the Royal Navy the tools to do the job. HMS Prince of Wales meets this need in three ways -

- **STRIKE CARRIER** – The ship will be able to embark up to three squadrons of the new F35B aircraft capable of short take-offs and vertical landings. It is the most advanced multi-role combat aircraft in the world with 15% made in the UK - the rear portion produced by BAE Systems at Samlesbury and specialist parts from elsewhere. HMS Prince of Wales – like her sister ship – is designed to operate the F35B hence the ski ramp to assist take off. The ship will normally embark Merlin helicopters which can provide airborne warning support and use sonar to detect submarines. With long range radar and the Artisan medium range radar the ship combines cutting edge technology and weapons systems. Other innovations include a forward island for conning the ship and an aft island for



controlling air movements – although each can replace the other if necessary. Massive lifts can transport aircraft from hangar to flight deck in just 60 seconds.

- **AMPHIBIOUS WARFARE** – For many years the Royal Navy has been able to deploy limited forces ashore from landing ships such as Albion,

Bulwark, Fearless and Intrepid. HMS Prince of Wales is a huge advance on this capability. As well as her own normally embarked Merlin helicopters she is able to carry large capacity RAF Chinook helicopters and the formidable Apache gunships operated by the Army Air Corps. The ship also carries four 13-metre Passenger Transfer

Boats which can be through-deck davit-launched and each transport 36 personnel ashore. With accommodation for 250 Royal Marines or other troops the ship is capable of rapidly deploying land and air forces to trouble spots anywhere in the world. There is much evidence that early interventions can prevent much greater trouble later as demonstrated by the British Operation Palliser in Sierra Leone in 2000.

• **DISASTER RELIEF** – It is a sad fact of life that natural disasters happen - and they seem to be happening more often. They can be earthquakes, volcanoes, hurricanes, forest fires or drought. Meaningful help depends upon our capacity and HMS Prince of Wales is – with her sister ship - a huge boost to what can be achieved. Your columnist understands that HMS Queen Elizabeth carries stores for disaster relief as a matter of course. The dominating need in all disaster relief situations is for helicopters which can deliver aid to otherwise inaccessible locations and evacuate casualties. HMS Prince of Wales has a hospital which includes an operating theatre, isolation ward, dental surgery and a 12-bed general purposes ward served by 11 medical staff. The sheer size of the ship enables her to provide massive assistance or just be a place of refuge: a huge contribution to a disaster prone world and Britain's reputation for helping those in need. A contribution from the UK Foreign Aid Budget should be considered.

It is not widely known that the twin propellers of HMS Prince of Wales are not directly driven by diesels or gas

turbines but by four 20 MW electric motors. All the ship's power needs are met by two Rolls-Royce 36 MW gas turbines and four 11.6 MW diesels which can generate 118.4 MW of which 80 MW – or just 68% - is needed for propulsion. This configuration provides major fuel savings of up to 50% and freedom to place generating units in the best locations rather than in line with the propeller shafts. The Royal Navy has, however, had trouble with its Type 45 Destroyers which also use electric motors for propulsion. The Type 45s use 85% of their 47 MW power for propulsion, have suffered some power failures and may need an additional generator. The Navy team at Rosyth confirm that the QE Class have incorporated a number of design improvements compared to the Type 45 Destroyers. The system has performed well during sea trials and there is no reason to anticipate similar issues to those experienced with the Type 45s.

The media seemed to enjoy reporting that HMS Queen Elizabeth was leaking. This sounds dramatic but a stern gland or stern seal surrounds the shaft at the point where it passes through the hull to the propeller outside. Its job is to prevent the ingress of water around the rotating shaft but all new stern glands have to bed in before becoming fully effective. An unlikely reassurance is that your columnist had the same short-lived concern about a stern gland on a previous sailing yacht – although the QE Class Carriers are 28 times longer!

The design and construction of the HMS Prince of Wales has involved 10,000 people mainly in the specially created Aircraft Carrier Alliance of the Ministry of Defence, BAE Systems, Babcock and Thales. She was laid down – started – on the 26th May 2011. Six UK shipyards constructed sections of the ship which were floated to Rosyth and combined. She was named on the 8th September 2017 then floated from her dry dock on the 21st December 2017 and moved alongside a berth for the long and complicated fitting out stage. All

LEFT: The F35B in vertical landing mode. Note the jet vectored down and the open bomb bay.

BELOW: The Merlin helicopter. HMS Prince of Wales will normally carry 4 for airborne early warning and anti-submarine operations.





ABOVE: The view from the top of the ski jump looking aft. It is still a building site. RIGHT: The ship's hangar is enormous. It will be able to accommodate F35s through to Merlins and giant Chinook helicopters. BOTTOM RIGHT: This is where bombs and ammunition are brought up from storage deep in the ship then moved by rail to be armed and fitted on aircraft.

work is supervised by the Senior Naval Officer Captain Ian Groom RN and his team of about 200 officers and ratings. After acknowledging the contributions of all Captain Groom explained "As the second of her class, HMS Prince of Wales is of strategic importance, ensuring a continuous carrier strike capability. Working as one team, we are delivering an unmistakable sign of commitment to the defence of our great nation and that of our allies."

It was announced in September 2017 that the first seagoing commanding officer of HMS Prince of Wales will be Captain Steve Moorhouse RN who previously commanded the frigate HMS Lancaster - so he knows our region - and the helicopter carrier HMS Ocean. Captain Moorhouse said "Seeing our sister ship HMS Queen Elizabeth make her debut in Portsmouth was an amazing sight and I look forward to one day bringing HMS Prince of Wales to the same warm welcome. Until then the ship's company in Rosyth will continue to grow and they have much to be proud of in all the work they have done so far in working with our civilian industry partners to bring this ship to life."

Affiliations between RN ships and UK Cities are a well-established way of maintaining friendly links which can be civic or informal - and keeping the navy in the public eye.





HMS PRINCE OF WALES

TWO ISLANDS

The Queen Elizabeth Class is the first in the world to use an innovative twin-island design. The Aft Island is responsible for the ship's mission systems and acts as an aircraft control tower. The Forward Island contains the bridge and is primarily responsible for the command of the ship. While each island has a primary role, both are able to incorporate the other's role in an emergency, increasing the survivability of the ship.

LONG-RANGE RADAR

The ability to track up to 1,000 objects in the air or on the sea in a 250 mile radius.

FLIGHT DECK

The flight deck is coated with a unique metallic compound made up of aluminium and titanium which is melted and sprayed onto the carrier that can withstand temperatures of up to 1,500 degrees Celsius.

FLIGHT DECK RAMP

F35B Jets use the 13 degree ramp to aid take-off, reducing fuel usage and improving their mission range.

JUNIOR RATE'S CABINS

With ships staff away from home for long periods of time, the QE Class carriers will create a home from home experience. There are 1,600 bunks in 470 cabins, including accommodation for a detachment of 250 Royal Marines with wide assault routes up to the flight deck.

FORWARD AIRCRAFT LIFT

ARTISAN 3D RADAR

The ability to track a tennis ball sized object at 2,300mph.

FLYING CONTROL POSITION

AFT AIRCRAFT LIFT

DECK LANDING

The 280m flight deck will accommodate F-35B Lightning II and Merlin MK2 (CROWNSNEST) aircraft, along with Merlin MK4, Apache, Wildcat and Chinook in the carrier task group.

COMMANDING OFFICER'S SUITE

PROPELLERS

Two bronze propellers, each 22ft in diameter weighing 33 tonnes push the carrier to a top speed of 30mph.

HOSPITAL

Medical facilities include an operating theatre, an isolation ward, a dentist's surgery and a 12-bed general purpose ward, managed by 11 medical staff.

GALLEY

Six galleys and six large dining areas will be manned by 67 staff including 40 chefs. The largest dining room has the capacity to serve 960 people in one hour. The ship can carry enough food to last 1,600 people more than 45 days.

WATER TANKS

Water treatment plant onboard will produce more than 500 tonnes of fresh water from sea water daily.

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LEFT: When this room is completed it will monitor and control all the ship's systems. BOTTOM LEFT: Captain Ian Groom MBE RN. The engineering specialist who is the master of all he surveys until it goes to sea.

Captain Groom confirmed that a visit by HMS Prince of Wales to Liverpool in 2020 is an aspiration subject, of course, to operational requirements. The arrangements may need much thought because – if the ship's beam permits - the ideal berth would be the Liverpool Cruise Terminal which caters for a draft of 10 metres although the draft of HMS Prince of Wales is 11 metres.

Your columnist had the privilege of a prolonged tour of HMS Prince of Wales at Rosyth. As my images show she is huge and impressive but still a building site. That will all change in less than two years. Then 'our' HMS Prince of Wales will be on the world stage when we can follow her career knowing that she has the potential to make the world a better and safer place.

Andrew Harris gratefully acknowledges the help provided by Captain Ian Groom RN and his team at Rosyth in the preparation of this article. He is also grateful for the patient company of Sub Lieutenant Jacob (Jake) Cuddeford throughout. All images are courtesy of the MoD or by your columnist for which authority was granted. Our October 2016 article 'The Royal Navy in the North West' can be seen under 'Published Articles' at www.andrewharris.co.uk

