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News from the Aircraft Carrier Alliance Issue 7 Summer 2012

carrierwaves



Progress on the block to date

She's taking shape

HMS QUEEN ELIZABETH

HMS Queen Elizabeth, the first of two aircraft carriers under construction for the Royal Navy, is rapidly taking shape. The last few months has seen a tremendous amount of activity in and around Babcock's number 1 dock. Thousands of tonnes of precision-crafted sections and components have made their way from shipyards across the country to Fife, where teams have been moving them into place and accelerating the construction of the first of the Queen Elizabeth Class.

Programme Director Ian Booth said: "There has been a real increase in pace in and around the dock at the Rosyth assembly site. We have taken delivery of thousands of tonnes of HMS

Queen Elizabeth. Now the task to link the sections together swiftly, surely but, above all, safely is well in hand."

Recent highlights include the arrival of LB05 and, shortly afterwards, LB02 from Portsmouth. The two huge sections both attracted a lot of attention from the media and curious onlookers on both sides of the river as they passed under the Forth Bridge.

The flight deck sections which make up CB02 also made their way from Merseyside, providing a stunning view as they passed by the famous Royal Liver Building. After a smooth journey around the north coast of Scotland, the sections were successfully moved into place on the dockside at Rosyth.

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To request further copies or to submit a story for the next issue, please contact John Fyall, ACA Communications Manager, at john.fyall@baesystems.com

Carrier Waves is now being made available online as an interactive PDF. If you would like more information on the new format, or would like to request **Carrier Waves** as a standard PDF, please contact John Fyall, ACA Communications Manager, at john.fyall@baesystems.com

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From the Programme Director

IAN BOOTH

One team will deliver two ships

TEAMWORK

Taking over the role of programme director for the Queen Elizabeth Class aircraft carriers is a great honour. The team I have inherited is skilled, experienced and extremely capable and, for me, the teamwork within the Aircraft Carrier Alliance is what will make the difference on this programme. One team, drawn from across the industry charged with delivering two world-class aircraft carriers.

Working as one team means sharing the successes and sharing the pride, but it also means sharing the challenges. And there are plenty! Although we have seen some tremendous build progress recently – and you can read more about that in this issue of **Carrier Waves** – the focus for HMS Queen Elizabeth will soon move from construction to systems, integration, testing and commissioning. These are the processes which will bring



“I’m looking forward to playing a part in helping the Aircraft Carrier Alliance bring this historic programme to fruition”

Ian Booth, Programme Director

the ships to life and transform them into capable military resources.

To deliver these world-class ships will take everything the Aircraft Carrier Alliance has to offer. The alliance is a unique arrangement and as one team it provides a very broad range of capabilities. I intend to make the very most of this to the benefit of the programme.

I’m looking forward to playing a part in helping the Aircraft Carrier Alliance bring this historic programme to fruition.

We will keep you updated through **Carrier Waves**, but the programme is moving fast, so keep an eye on our website, Twitter, Flickr and YouTube sites and we will keep you informed every step of the way.

Apprentice pushes button to begin Lower Block 04



The first steel cut for Lower Block 04 of HMS Prince of Wales was made by third-year BAE Systems apprentice, Lindsay Gray.

Lindsay, 27, pressed the button on the plasma cutting machine at the business’ fabrication facility and officially started work on the huge section.

“I felt honoured to be asked to make the first cut of the block. It felt special to contribute to the build of the carrier in this way,” she said.

When complete, Lower Block 04 will weigh more than 11,000 tonnes.

It will house the two main engine rooms, a medical area and accommodation for some of the ship’s crew. It will be the largest block of the ship, standing over 23 metres tall, 86 metres long and 40 metres wide.

As Lindsay made the first cut for LB04 for HMS Prince of Wales, workers elsewhere in the yard were continuing the work on the same block for HMS Queen Elizabeth.

Have a closer look at what QEC apprentices get up to [see pages 04-05](#)

Planning is the key to moving blocks safely, says Gordon Burnley

'Transport has no margin for error'



INTERVIEW



How do you prepare for a job that no-one has ever done before? It's Gordon Burnley's task to co-ordinate the transport of sections of the carriers from the yards where they were built to Babcock's facility in Rosyth, where they are being put together.

What does your job involve?

I make sure each section of the ship is brought to Fife safely and on time. My team works with specialist contractors, including Henry Abrams and ALE, to move sections safely by land and by sea, bringing them from build sheds to barges, shipping them for hundreds of miles then transferring them into place in Rosyth.

So, no pressure then?

Not much! It's all about planning and teamwork. When we're co-ordinating the movement of thousands of tonnes of steel, representing years of work and millions of pounds of investment, there's no margin for error.

So you do things as slowly as possible?

As *safely* as possible. The overriding priority is always safety, so we organise everything with that in mind. But we have one absolute deadline – the tide. To float the large sections off the barges into the River Forth and bring them into dock at Rosyth, means hitting the tide just right. If we miss it we could delay the entire programme by weeks!

What takes up most of your time?

Logistics. Getting everything in the right place at the right time is crucial, so it's all about the planning. I'm lucky to work with a great

team and to have some hugely skilled contractors to help make it all happen as it should – Henry Abrams and ALE are world-class at what they do and their role just can't be underestimated.

Best moment in your job?

So far, it was watching the 6,000 tonne LB02 section float off the barge and take to the water for the first time (pictured above). It could have been a nerve-wracking moment, but all the planning and preparation paid off and it went flawlessly.

Biggest challenge?

Yet to come. This winter, the 11,000 tonne LB04 will move from Govan to Rosyth. This is the biggest section of the entire ship. It will be a hugely complex operation and at that time of year the weather in Scotland is seldom kind – that will add an extra dimension, but we're already well into the planning stages and are covering every angle, where possible.

massive LB02 section into the dock was a huge operation. It was too heavy to be lifted by the Goliath crane, so it had to be floated in. But first, the resident 13,000 tonne superblock had to be floated out.

"Careful planning meant that both operations went smoothly, and the task of integrating the sections is now under way.

"More recently, the heavy lift team has been using Goliath to position the CB02 sections into place, as well as lowering the bulbous bow into position.

"All the teams in Rosyth and across the Aircraft Carrier Alliance who were part of these complex operations should feel proud of the way they have performed."

News
in brief

F-35B accepted



The UK became the first international customer to receive an F-35 Joint Strike Fighter when Defence Secretary Philip Hammond formally accepted the short take-off and vertical landing (STOVL) test aircraft BK-1.

The milestone was achieved at Lockheed's Fort Worth site in Texas, where F-35B BK-1 flew for the first time. Following its acceptance, the aircraft flew to Eglin Air Force Base in Florida, where it joined a US-led initial operational test and evaluation programme for the F-35.

A second UK aircraft has recently undergone preparations to conduct engine runs ahead of flight tests.

Generators arrive in Portsmouth



A key milestone was passed on the build of HMS Prince of Wales when the two 160 tonne diesel generators arrived at the shipyard.

HMS Prince of Wales will have four diesel generators. Each can generate 11,600kW and are more than 14 metres long. Portsmouth project leader Paul Bowsher said: "This is an important stage for us as we will essentially be building the ship around these diesel generators."

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Two of the most challenging operations involved moving LB02 into place in the dock and then skidding SB03 more than 90 metres along the dock to join the massive sections together.

Sean Donaldson, Babcock QEC Director, said: "Getting the

A legacy of skills

The Queen Elizabeth Class programme's use of apprentices and graduates is creating a legacy of skilled workers that will serve the UK manufacturing sector for decades to come

TRAINING AND DEVELOPMENT

There's never been a programme quite like the Queen Elizabeth Class.

It employs more than 10,000 people, has seen billions of pounds invested into local economies across the UK and it is showcasing some of the country's most talented companies and individuals.

But more than that, the programme to construct the nation's flagships is helping retain important manufacturing capabilities while developing a whole new generation of skilled workers. Through hundreds of apprenticeships and graduate schemes, it is giving men and women of all ages the opportunity to develop new and important skills. They are learning on the job and contributing to the development of the ships while under the guidance of mentors with years

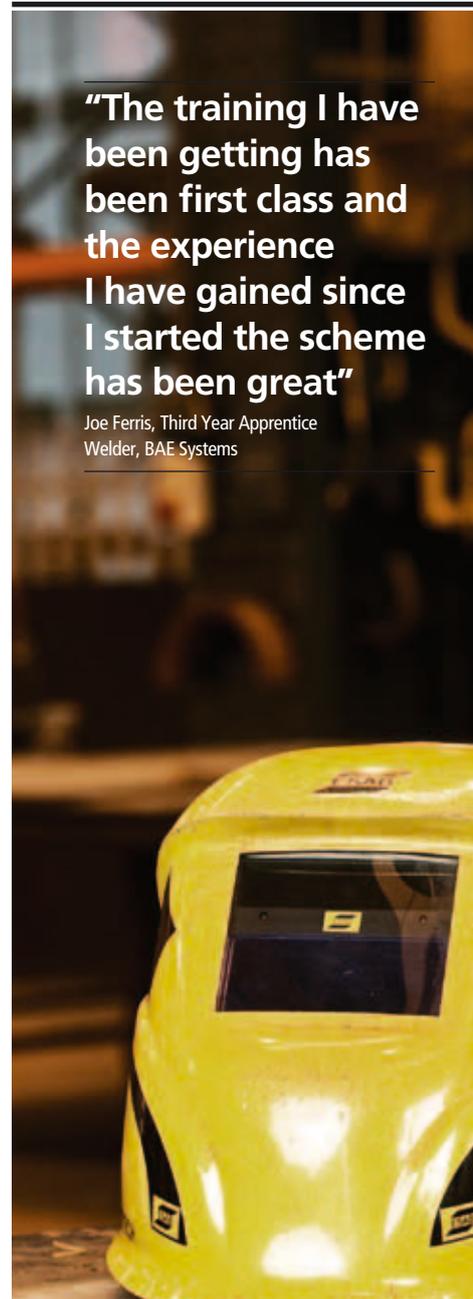
of experience. These training schemes mean the Queen Elizabeth Class is creating a legacy that will serve UK manufacturing for decades to come.

Programme director, Ian Booth, said: "Across the Aircraft Carrier Alliance, there are hundreds of people who are learning their trade as they work. We have apprentices and graduates gaining key skills, from welding to plumbing and electrics to marine engineering. They are not only contributing to the success of this programme, they are also the very people who will form a crucial part of the UK's highly skilled workforce of the future.

"These apprentices and graduates are necessary not only for the continued success of this programme, but also to the UK's ability to stand proud on a world stage when it comes to manufacturing the highest-quality products. Making sure we deliver not just two world-class ships, but also a valuable and lasting legacy is a fundamental part of this programme."

"The training I have been getting has been first class and the experience I have gained since I started the scheme has been great"

Joe Ferris, Third Year Apprentice
Welder, BAE Systems



THALES

GRADUATES SUPPORTED BY EXPERTS

Thales employs more than 67,000 people worldwide and its graduate scheme attracts talented young men and women, from engineers to finance and physicists to business management.

The four-year course puts graduates under the guidance of experienced colleagues where they learn skills on the job.

James McKelvie (25) joined the Thales graduate scheme in June 2010 and is currently working as part of a team with responsibility for delivering a damage surveillance and control system for the Queen Elizabeth Class.

"It's a demanding task," said James. "There are lots of different systems to take into account, such as doors and hatches and high pressure seawater systems.

"The highlights of working for the Aircraft Carrier Alliance are the importance and sheer enormity of the programme. I've been especially fortunate, as I've gone straight from my theoretical studies to finding myself working alongside experts from across UK industry."

THALES





BAE SYSTEMS

CHANCE TO LEARN IS 'UNMISSABLE'

BAE Systems has one of the largest apprenticeship programmes in the country, and while the scheme will often see apprentices working on a number of different programmes, at any one time there are up to 300 working on the Queen Elizabeth Class.

Third Year Apprentice Welder Joe Ferris (22) said: "Getting the chance to learn skills on such a historic programme is unmissable. Not only have I had the chance to work on the nation's flagships, the training I have been getting has been first class and the experience I have gained since I started the scheme has been great. The best thing about BAE System's apprenticeship programme has been the first-class training, meeting different people and gaining experience on and off the job."

BAE SYSTEMS



BABCOCK

'TRAINING AND EXPERIENCE HAS BEEN EXCEPTIONAL'

Babcock is the largest private sector provider of vocational training in the UK, currently managing the training of more than 22,000 learners.

Babcock's apprenticeship programme is a fundamental part of sustaining and securing skills and expertise for the future.

At Rosyth and Appledore alone, hundreds of men and women are receiving training, in everything from welding to designing and project management.

Over the last four years, more than 200 apprentices

have joined the company. Barry Wilson, 30, is one of them.

He said: "I count myself really lucky to be working on the Queen Elizabeth Class. I only joined the scheme in August, but the training is proving exceptional; I find it hard to imagine any other job where I would have a great team supporting me, challenging tasks every day, constant skills development and the privilege of watching the largest ever aircraft carriers built in the UK leave Babcock at Rosyth with a proud smile knowing I contributed to that."

babcock



New communications facility officially opened

New Thales facility will integrate essential communications systems into carriers

MISSION SYSTEMS

The new Communications System Integration Facility has been officially opened in a ceremony at Thales UK's site at Crawley.

Rear Admiral Steve Brunton, Deputy Director Ships and Director Ship Acquisition, Defence Equipment & Support, opened the new facility in front of guests from across the Aircraft Carrier Alliance, the Royal Navy and the Ministry of Defence.

The facility will serve to progressively integrate a number of major communications systems destined for the two new QE Class Aircraft Carriers, with the work being carried out on behalf of the ACA.

Rear Admiral Brunton said: "The opening of the Communications Integration Facility marks a significant milestone in the Queen Elizabeth Class programme. It is a reminder that we are bringing essential mission systems to life and not just welding large blocks of steel together, impressive as that is."

"The Communications Integration Facility is a great example of how alliancing and early integration activity can come together to deliver results that are best for the project, best for the



Phil Naybour, Vice President Defence Mission Systems Thales, (left) and Rear Admiral Steve Brunton open the facility

maritime industrial sector, best for defence and best for the UK."

Each communications system is being constructed as a stand alone to present for Factory Acceptance in the facility, before being integrated with the other sub systems.

Approximately 40 people are directly employed at the Crawley facility.

Once Integration is complete, the systems will be sent for installation, where Thales staff will assist with the commissioning, on-board integration and final acceptance of the equipment.

"The opening of the Communications Integration Facility marks a significant milestone in the programme"

Rear Admiral Steve Brunton, Deputy Director Ships and Director Ship Acquisition, Defence Equipment & Support



System repels all attacks

CYBER SECURITY

As part of the development of Combat Management Systems (CMS), specialist engineers have done their best to hack into the system.

For two weeks the CMS was subjected to a cyber assault by highly trained security engineering teams equipped with the latest software tools and specialist knowledge.

But the system held firm and proved that it was capable of keeping its secrets secure, even under sustained attack from experts.

Queen Elizabeth Class Security Manager, Richard Norris, said: "The combat management system is the command and control centre of the ship, where analysts gather real-time information and plan operations. Keeping this information secure is absolutely critical.

"To test the system we used a battery of the latest techniques and are pleased to say it lived up to expectations and delivered the required level of security."

All QEC systems that process, store or transmit information or data will have to go through a similar security accreditation process to make sure all systems delivered to the Royal Navy are protected against the latest electronic threats.



EPCAMS will manage the power for the carriers

Power and control

POWER AND PROPULSION

HMS Queen Elizabeth and HMS Prince of Wales will both generate a huge amount of power, but for the ships to reach their full potential this energy must be properly harnessed and controlled.

Ben Salter, QE Class Programme Manager at GE Energy, said: "There is enough power generated on board each of the ships to supply a small city.

"However, on a ship, power generation must be exactly matched to power consumption. This is an enormous challenge, particularly when 80 per cent of the total capacity of the system can be rapidly imposed or suddenly removed by the propulsion system. To make things more challenging, a third of the generation capacity can be removed at a stroke if a Gas Turbine Alternator were to trip out."

To manage this task, GE Energy is supplying a system called EPCAMS, the Electrical Power Control And Management System. EPCAMS forms a sub-system of the wider Integrated Platform Management System (IPMS). The control

Managing the carriers' power takes a special kind of system

software of EPCAMS is currently nearing completion. It is based on the power management system already proven on board the Type 45 destroyers and right now it is undergoing extensive integration testing at GE Energy's system test facility in Rugby.

EPCAMS is being integrated with the breaker control relays, pump motor interfaces, valves and other systems that are needed to support the power and propulsion.

It is also being brought together with the propulsion drive computers and the hardwired propulsion control system to test and prove their interoperability. This includes the propulsion levers and telegraphs that are used to command the system from the bridge.

Later in the year, engine management computer simulators from Rolls-Royce and Wartsila will

be included to further de-risk the wider system.

Ben Salter said: "Once complete, the EPCAMS integrated testing will feed into the larger System Integration Facility in Bristol which is being used by L-3 Communications to integrate and de-risk the whole IPMS system."

Facts

- Each ship has two propellers which together will output 80MW of power – enough to run 1,000 family cars or 50 high-speed trains.
- The distribution network on board will supply enough energy to power 300,000 kettles or a large town the size of Swindon
- Each ship will have four propulsion motors, weighing 110 tonnes apiece.
- The ships' two largest diesel generators generate 11,600kW each, weigh 220 tonnes and are more than 14 metres long.

INEC exhibition

Naval engineers from around the world got the chance to view the QEClass first hand when the Aircraft Carrier Alliance hosted the final day of the prestigious International Naval Engineering Conference. More than 70 delegates got an introduction to the innovative working practices of the ACA and a tour of the block under construction.

Follow our progress

The Aircraft Carrier Alliance has created two new ways for people to follow the progress of the ships' creation.

Now, as well as the regular Twitter feed, all the latest images and video are being made available on You Tube and Flickr. The sites have already clocked up more than 60,000 views.



Communications Manager John Fyall said: "People all over the world are watching the development of these ships and we're always looking for new ways to demonstrate just how rapidly this programme is developing."

See for yourself by searching for QEClasscarriers on Youtube.com or Flickr.com



Forward island revealed

The scaffolding came off the forward island in Portsmouth for the first time as the iconic section was carefully moved to a different part of the BAE Systems yard. The Queen Elizabeth Class aircraft carriers are unique in having two islands – one for ship navigation and one for flight control. The forward island will house the ship's bridge as well as some cabins, a mess and mission systems equipment rooms. The aft island, where the flight control operations will be based, is being constructed at BAE Systems' yard in Scotstoun. The twin island design also means the flight control staff can set up operations in the fore island, should the aft be disabled.

The cyclists Beat the Block by a whole two hours



BEAT THE BLOCK 2

How do you follow an event like last year's Beat the Block? With Beat the Block 2 of course!

This time, instead of racing a section of aircraft carrier all the way around Scotland, a group of intrepid Aircraft Carrier Alliance cyclists chased Lower Block 2 almost the entire length of the country – from Portsmouth to Rosyth.

On May 25, following the departure of Lower Block 2 from

“The team members had their mental and physical endurance put to the test”

Kirsty Noble, event organiser

BAE Systems' yard in Portsmouth, the cyclists set off for Babcock's Rosyth facility with two goals in mind – to complete the journey in a faster time than the block and to raise thousands of pounds for charity.

And to complete the challenge, the 50 cyclists had to cover 500 miles in just five days!

However, some of the team clearly

They've beaten the block... again!

Cyclists race from Portsmouth to Rosyth for charity



The race would see participants suffer temperatures as high as 35 degrees

thought 500 miles wasn't quite challenging enough. On one day two heroic cyclists clocked up more than 150 miles thanks to an 'unplanned detour', and two BAE Systems employees decided to make the

entire event particularly difficult by equipping themselves with a tandem – for the princely sum of £60!

Organiser Kirsty Noble said: “The tandem needed more than £150 in repairs, but in the end it was the first

across the finish line in Rosyth, a fantastic effort!

“But the whole team had their mental and physical endurance put to the test as temperatures soared up to 35 degrees. The support crews were kept busy throughout the epic journey making sure cold drinks, sun cream, rehydration sachets and encouragement were in ready supply.

“Still, the aches, pains and sunburn were all worth it, because on May 29, the cyclists and support crew arrived into Rosyth to a cheering crowd. And what's more they beat the block by a whole two hours!”

All the money raised will be going to the Royal Navy and Royal Marines Charity. Together, both Beat the Block events have raised almost £60,000 for the charity.