PROVEN. CAPABLE. ADAPTABLE.

babcockteam31.com / arrowhead140.com

Arrowhead™ 140

Babcock Team 31 is committed to delivering a proven, capable and adaptable frigate for global navies.

Benefiting from the best of British, utilising cost and schedule benefits from a tried and tested distributed build strategy and capitalising upon a mature and proven design, Arrowhead 140 will deliver an assured frigate capability which is best placed to serve the adaptable demands of warfighting nations globally.

Proven

Developed from the proven OMT Iver Huitfeldt frigate, Arrowhead 140 builds on previous real-world NATO and coalition operational experience, providing an efficient design with an optimal layout.

Its clever design enables improved capability whilst retaining its proven strengths

Capable

Arrowhead 140 is capable of fulfilling and supporting your global maritime security requirements and representing your defence interests world-wide.

The design can accommodate a range of mission system configurations to meet your operational and capability needs.

Based on an open system, the mission system manages a suite of sensors and associated communications to provide essential situational awareness, the ability to operate organic or offboard assets and the ability to conduct offensive and defensive operations.

Designed to provide maximum capability and value for money, Arrowhead 140 uses modular construction and proven and commercially available systems and equipment.

Furthermore, Arrowhead employs Babcock's iFrigate™ technology to reduce through life support costs.

Adaptable

Arrowhead 140's architecture can be configured to meet your specific requirements.

This general purpose frigate has in-built design margins to accommodate a variety of equipment choices for a broad range of roles, from low-threat security operations to task force deployments, ensuring it will remain a credible and capable option within an evolving multi-threat maritime environment.

Flexibility is a core element of the Arrowhead 140 design philosophy.

Anti Submarine Warfare can be easily incorporated either during build or through life.

Large re-configurable mission and payload areas onboard can provide flexibility across a range of operational roles, from HADRO (Humanitarian Aid and Disaster Relief Operations) to unmanned systems deployment and operation.

babcock™ TEAM31

Babcock's Team 31 offers a holistic breadth and depth of expertise to deliver a proven, capable and adaptable design, build and support solution for modern, global navies.

- **Babcock** – prime; ship design, build, assembly, platform integration and commissioning at Rosyth
- **Thales** – Combat Systems Integrator; combat management system and equipment design, build and integration
- **OMT** – platform design for our proven, in service baseline design
- **BMT** – ship design and technical support
- **Harland and Wolff** – block build capability with shipbuilding expertise and versatile facilities
- **Ferguson Marine** – block build capability with commercial ship build expertise and versatile facilities.

Team 31 is a fully integrated project team head-quartered in Bristol, at the heart of a pan-UK based ship design, build and support capability.

Team 31 brings together a unique combination of:

- naval and commercial vessel design, with extensive experience of compliance with both naval and commercial design standards
- naval and commercial vessel build with modern, robust delivery practices
- an established, proven and exportable combat management system
- trusted combat systems design, build and integration experience
- extensive naval engineering capability and highly skilled workforces
- proven and efficient naval customer requirements and acceptance management processes
- comprehensive safety and environmental management processes and compliance
- world leading experience in naval platform in-service support with a deep understanding of support cost drivers

Effective whatever the task

Arrowhead 140 is configurable to meet your current and future requirements and flexible in design and capability to meet a range of roles.

The baseline Arrowhead 140 design can be configured to meet the broad range of operational requirements and profiles a general purpose frigate will be called upon to undertake.

Operational roles will change through the life of the ship, from mission to mission and for each customer. Arrowhead 140 provides sufficient flexibility and adaptability for a multi-role capability to meet changing operational needs.

Key Platform Characteristics

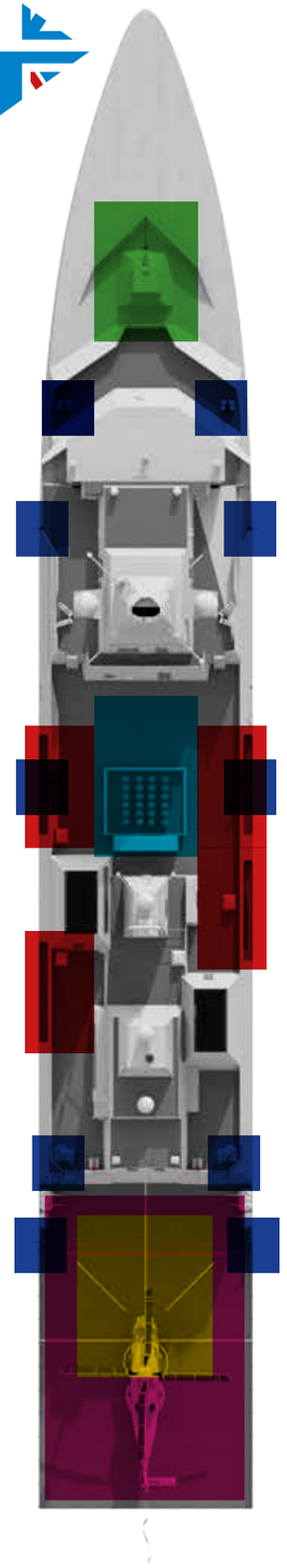
LENGTH OVERALL	138.7m
BEAM, MAXIMUM	19.8m
DESIGN DRAFT	4.8m
DISPLACEMENT	5,700te
MAIN ENGINE POWER	32.8 MW
SPEED	28+ Knots

Adaptable and established systems

Incorporating Thales' TACTICOS system with fully open architecture sets Team 31's combat systems solution apart. Currently in service for 25 years and exported to 24 navies globally, this established system and equipment in-service support package is flexible to customers' needs over the lifetime of the platform and will maximise the combat system capability for customers. Innovative designs and equipment also reduce through life costs and will negate the need for upgrade through replacement.

Certified openness and scalability of the underlying architecture is at the core of TACTICOS. A new software release every six months provides continuous evolution and functionality growth. This reduces through-life costs and keeps the system operationally relevant even if requirements change. Thanks to its modularity, the Combat Management System can easily be expanded to include additional mission profiles such as Anti Air Warfare (AAW) or Anti Submarine Warfare (ASW). This is achieved through installing the necessary subsystems and the software modules.

Arrowhead™ 140



Medium Calibre Guns

› Design provision for MCG up to 5" (127mm) with associated infrastructure.

Missile Options

› Deck space for up to 8 SSGWs.

› Flexible space for VLS– up to 32 variable length cells.

Aviation

Flight Deck sized for AW-101 Merlin / MH-60 Seahawk.

Hangar capable of accommodating an organic naval helicopter including a AW-101 Merlin, or a lighter helicopter such as the AW-159 Wildcat plus unmanned air vehicles.

Design can accommodate a wide range of future customer naval air systems.

Aircraft	Flight Deck	Hangar
AW101 Merlin	**Yes**	**Yes**
NH90	**Yes**	**Yes**
MH-60 Seahawk	**Yes**	**Yes**
AW159 Wildcat Together	**Yes**	
UAV	**Yes**	**Yes**

Small Calibre Guns

› Design provision made for Force Protection weapons and SCGs up to 40mm with associated EO sensors and magazine arrangements.

› Weapons can be fitted at a number of upper deck positions.

Boat Bays

4 large dedicated Boat Bays with flexible launch & recovery arrangement to cater for varying operational roles, incl. deployment of RHIBs, USVs & UUVs.

Mission Space

Significant operational flexibility allows for numerous TEU (Twenty Foot Equivalent Unit) containers, extended stores, or personnel accommodation space.

Flexible delivery of maritime security

Multi-role capability

Proven multi-mission reconfigurable space able to host a number of TEU containers for capability including anti-piracy detention facilities, disaster relief stores or additional accommodation.

Spaces can be rapidly and simply used for HADRO through to war fighting operations, with volume spaces able to accommodate role-specific equipment in a modular form.

The ability to fit the existing systems and equipment from the parent design is retained to provide flexibility in the capability supplied at build and through the life of the platform. For example, this retained capability means that the 32 cell Mk41 Strike Length silo can be fitted to incorporate a combination of a larger number of anti-air missiles, vertical launch anti-surface missiles, precision land strike missiles or ASW weapons such as ASROC. This particular adaptability feature, alongside the ability to install a 127mm (5") medium calibre gun, host an organic helicopter such as AW-101 Merlin, install sensors such as a towed array/variable depth sonar and re-introduce a magazine-launched torpedo system, amongst other proven features, will allow the platform to be tailored on build and through-life to suit operational requirements from low-threat maritime security to warfighting in task group operations.

Accommodation

The platform will operate in all states and conditions with a Ship's Company of less than 100 personnel. With dedicated accommodation for 160+ personnel and additional temporary accommodation, the platform can carry a significant number of Embarked Military Force, including Special Forces, littoral manoeuvre troops or additional command and control personnel.

Armament

Medium Calibre Gun options up to 5" (127mm) for maritime interdiction, self-protection and engagement of surface and land targets.

Small Calibre Guns up to 40mm calibre can be located in pre-designated upper-deck weapon positions.

Capability options:

- Provision for up to 8 canister-launched SSGW
- VL missiles (SAM/SSGW/Land Strike/ASW) up to 32 cells
- Close-In Weapons Systems

Intelligent layout

The layout of the design benefits from the experience of several years of real-world NATO and coalition operations, including integration within US Navy Carrier Strike Groups as an escort platform. These lessons learnt from the base-line design lead to key operational and mission areas within the Arrowhead 140 design that are situated to provide an optimal layout for operations in both peacetime and high threat operations.

The key mission areas benefit from proximity to each other and protection through the relative location within the ship.

Supportability of major equipment identified through shipping routes and space envelopes.

Mission systems

An integrated communications suite for interoperability with own and coalition forces and civilian agencies.

Medium and Short Range Radars for situational awareness, safe navigation, fire control and helicopter control.

Radar ESM and Defensive Aids Suite to provide self-protection. EW capability upgrades available.

Electro Optical trackers for surveillance and gun fire control.

Hull-mounted sonar for submarine detection/mine avoidance with capability options for towed array and torpedo defence.

Thales TACTICOS™ Combat Management System utilising open architecture networks and computing environments to provide a scalable and upgradeable mission/combat management capability suitable for a wide range of mission profiles and scenarios.

Efficient propulsion plant

The propulsion arrangement is a proven and efficient CODAD architecture, already in service. This is demonstrated to provide a flexible speed range with 28+ knot maximum and 18 knot efficient cruising speeds, in a package with a low maintenance burden and consideration towards underwater radiated noise (URN) signature. The size of the platform allows sufficient fuel for long-range independent global operations.

Space and systems configured for compliance with IMO Tier III regulations for ECAs.

Mission flexibility

Significant operational flexibility is inherent in a platform with the capacity of Arrowhead 140. Based on a proven NATO frigate design, with flexible spaces able to host disaster relief stores or civilians during evacuation operations amongst other roles; a demonstrated capability already employed within the in-service design.

Four large dedicated Boat Bays with flexible launch and recovery capability to operate a variety of different offboard assets, such as RHIBs, Unmanned Underwater Vehicles (UUVs) and Unmanned Surface Vehicles (USVs); able to deliver a range of roles from interdiction missions to Special Forces operations and littoral manoeuvre exploitation.

Arrowhead 140 delivers a proven flexibility and rapid ability to rerole/reconfigure to a changing operational environment.

Aviation facilities

The Flight Deck is designed for a wide range of naval aircraft and air systems, with a hangar that can accommodate an organic medium naval helicopter or lighter helicopter combined with unmanned air systems. Dedicated aviation magazine facilities to store and prepare air-launched weapons including ASW torpedoes and Anti-Surface missiles are provided. In addition a fuelling system to provide HIFR capability from a proven NATO flight deck is incorporated.

The large flight deck provides the flexibility to launch and recover non-organic aircraft up to 15t in weight.

- Maritime surveillance and interdiction
- Counter piracy
- Military presence and deterrence
- Humanitarian Aid and Disaster Relief
- Task Group support
- Consort protection
- Anti Submarine Warfare

A distributed build strategy

Team 31's build strategy harnesses the experience of Babcock's and Thales' role within the Aircraft Carrier Alliance, where the assembly of Queen Elizabeth Class aircraft carriers is being undertaken at Rosyth.

The flexibility and resilience within our build sites at Babcock Appledore, Harland & Wolff in Belfast and Ferguson Marine on the Clyde, and our integration site at Babcock Rosyth, significantly de-risks the build schedule while maximising UK regional prosperity. We are utilising a proven modular build and outfit process that could potentially accelerate the T31e programme and crucially provide additional capacity to deliver concurrent international orders and pipeline demands.

The T31e distributed build strategy has the benefits of:

- a competitive and sustainable naval warship build capability
- potential to accelerate the build programme
- additional capacity to deliver parallel (international) orders/pipeline demands
- underpinning the National Shipbuilding Strategy, delivering economic benefit to communities across the UK
- maximising a workforce in excess of 3500 skilled and experienced employees
- creating 150+ technical apprenticeships and training programme opportunities
- driving a pan-shipyard innovation and improvement programme, pushing British shipbuilding expertise to match the Royal Navy's pedigree as a world leader in naval platforms

Supply chain

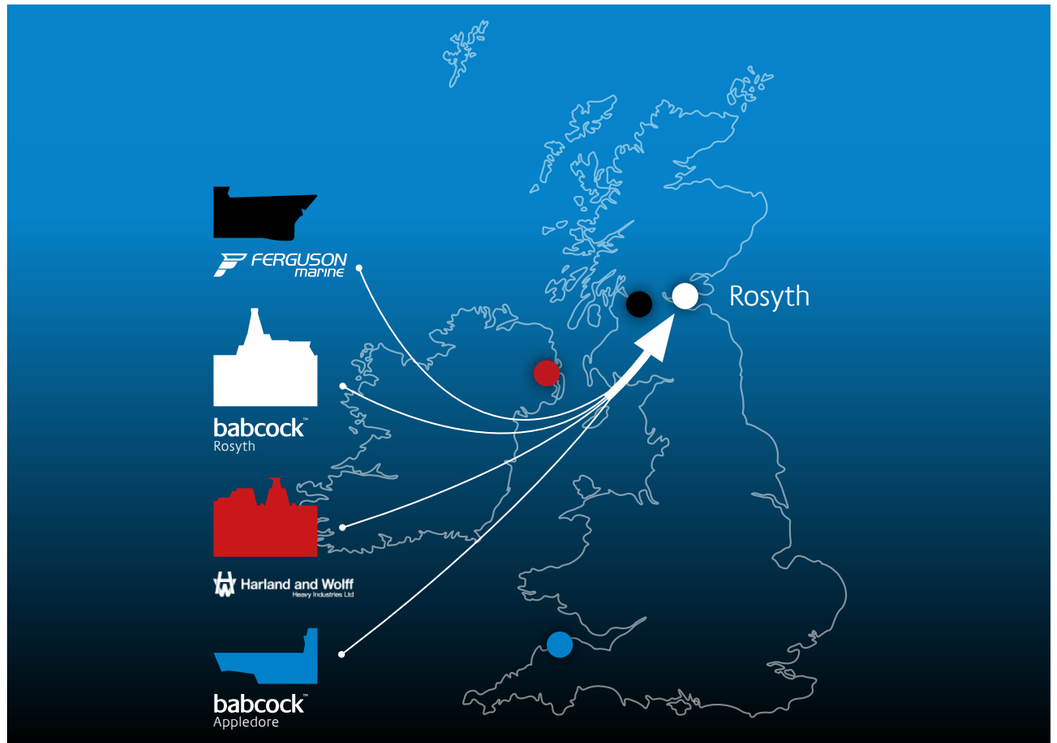
As an established project team spanning several regions of the UK, Babcock Team 31 offers the dual advantage of distributing revenue across the UK and benefiting from existing relationships with a broad range of local supply chains.

As a result, we believe Team 31 can maximise the opportunity to deliver UK prosperity, delivering the National Shipbuilding Strategy's intent for delivering economic benefits across the UK.

By utilising a proven distributed build and single site assembly model, established suppliers surrounding existing facilities can be quickly mobilised. This offers potential speed and procurement advantages based on trusted relationships and familiar product and service specifications.

This contract has the potential not only to safeguard shipbuilding jobs but bring prosperity to several UK regions, through both earned income and additional revenue derived through the local supply chain.

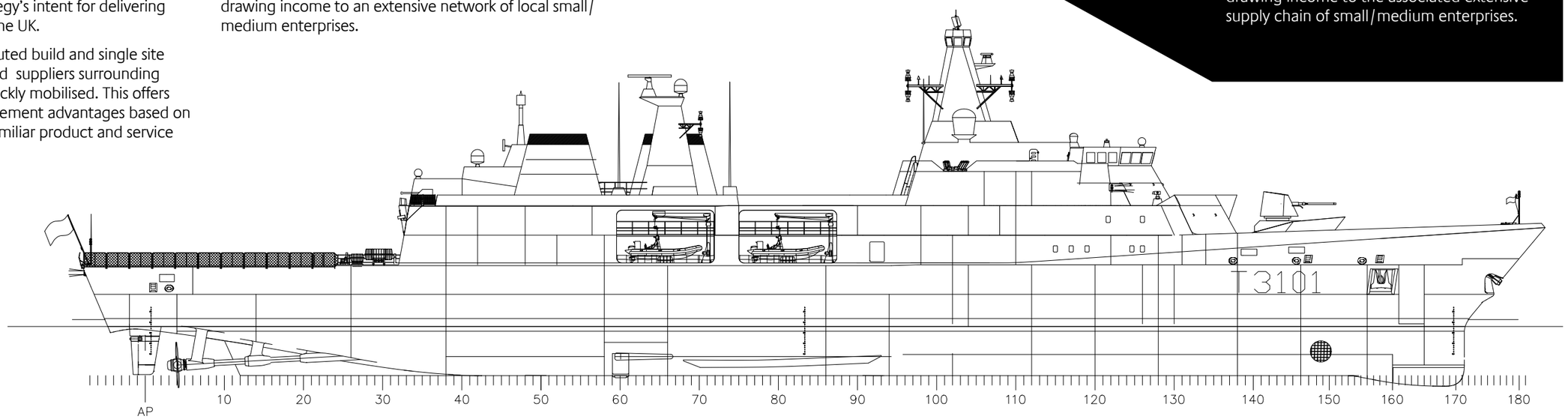
The extensive equipment procurement activity for the design and build contract will be predominantly locally sourced from UK based suppliers, with emphasis on drawing income to an extensive network of local small/medium enterprises.



Delivering prosperity through the UK

Team 31 will maximise the opportunity to deliver UK prosperity, supporting the National Shipbuilding Strategy.

Our distributed build strategy will bring revenue to our ship build and integration yards and support a UK based workforce. The extensive equipment procurement activity for the design and build contract will be locally sourced from UK based suppliers, drawing income to the associated extensive supply chain of small/medium enterprises.



Integrated, intelligent in-service support

Arrowhead 140 is designed as a build and support package, ensuring customers benefit from our unparalleled Through Life Support (TLS) expertise. Our embedded iFrigate™ technology will support delivery of in-service support efficiencies.

Team 31 is already established as a trusted service support partner to global navies and has access to a network of established, at reach facilities

Innovation

Babcock Team 31 is harnessing the power of innovative technology to advance through-life support opportunities and platform availability and readiness.

The use of iFrigate™ architecture optimises engineering support. The introduction of a suite of technology, equipment and system sensors into the build means that a wide range of operational data can be fused, modelled, transformed and visualised, improving proactive maintenance decision support and optimising planning.

An on-board analytics suite allows informed risk-based maintenance decisions to be made and aids defect diagnosis, whilst shore-side data analysis helps forward deployed support, optimising the next maintenance period and de-risking Class support.

Existing data from the proven in-service platform will also be used to optimise support.

Global reach

Babcock has a presence in mature and emerging nations aligned with UK and NATO allegiances and strategies meaning we can react swiftly to meet operational demands and deliver timely and flexible support world-wide.

Keeping warships safe, capable and available requires a collaborative joint approach between the operator and the support partner. From the day your ship enters service, we can work with you to provide continuous and consistent support around the world.

We understand platforms, systems, and how they operate and can take a holistic view of your through-life support requirements; helping you to reduce costs and ensure capability.

Training

Babcock is the leading supplier of personnel training to the UK's Ministry of Defence and has over 20 years experience of delivering these services to the Royal Navy, Royal Air Force, Army and many international military organisations.

Delivering TLS at our DUQM support base in Oman

Adaptable export options

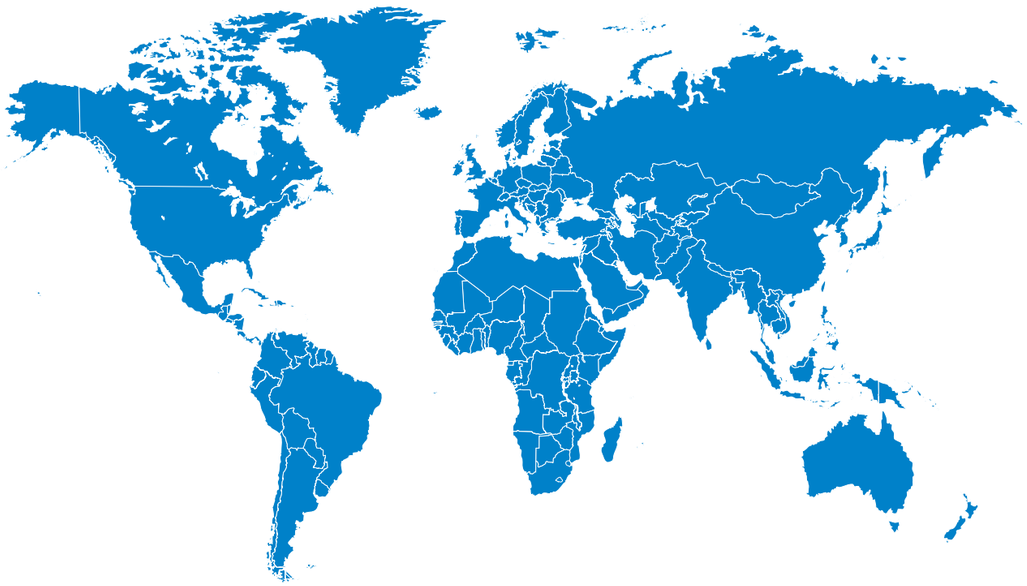
Babcock Team 31 brings together established, global know-how and existing relationships with a wide range of customers.

Analysis by Team 31 has shown the export market for General Purpose Frigates is growing. Countries are already seeking to enhance their respective 'utility frigate' capability as they seek to address multi-various threats within their maritime domains.

Our Arrowhead 140 design is inherently flexible and adaptable to meet a diverse range of international requirements and customisations.

We recognise each customer has different needs driven by budget, capability and adaptability requirements, and we have the design and build flexibility and capacity to offer a wide range of design variants to the export market in terms of the platform, combat system and internal specifications.

Through our proposed flexible and modular design, each customer will be able to select the features that best meet their requirement and budget.



LÉ William Butler Yeats one of four Offshore Patrol Vessels delivered to the Irish Naval Service.

babcock™
TEAM31

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