

Submarine Supply Chain Support Services

Frazer-Nash Consultancy supports the submarine supply chain to meet the rigorous requirements that the Royal Navy demands from its platforms and equipment. We offer a range of high value services – built on our intimate knowledge of the Royal Navy's needs – that de-risk and add value to your programme activities.

OFFERING IN-DEPTH PLATFORM KNOWLEDGE

Our in-depth platform knowledge is continually expanding, through key contracts with DE&S and the Submarine Delivery Agency. We have been involved at all stages of the submarine design lifecycle ranging from; technology research with Dstl, requirements development with the MoD, delivery with industry and operational support with the Royal Navy. We also have over 50 former submarine operators who understand the challenges of operating these complex systems.

TRUSTED BY THE MOD AND PRIMES

With our recognised naval experience and expertise, we are currently involved in all of the UK's naval programmes. We have supported the MOD to define its requirements and technical standards and have helped industry to meet them. Working at all levels of the supply chain, we maintain our independence and impartiality, carefully managing potential conflicts of interest.

INTEGRATED TECHNICAL SUPPORT

At Frazer-Nash, we aim to deliver our services in a flexible manner that best suits the needs of our client. Depending on the preferred approach, we can complete projects off-site on a fixed price basis or embed fully integrated teams/ individuals onto the client's site; in effect providing an extension to their in-house teams. Amongst the support services we offer are:

Bid and programme management

We have experts in the development of bids for defence programmes, who are able to produce winning proposals and structure bid processes to be successful in competitive tenders. Our project and programme management teams also support submarine suppliers in the delivery phase of programmes, balancing the many competing challenges to ensure risks are managed appropriately and delivery is successful.

Safety and environmental management

We provide safety and environmental management services across the UK naval enterprise, including operational considerations of equipment, the analysis of safety critical electronic systems and cyber assurance. Using our market-leading expertise, we help the submarine supply chain develop fully compliant safety and environmental management solutions. We are also able to support and guide suppliers with the relatively new guidance from the Naval Authority Group (NAG) that mandates all suppliers must consider software and hardware safety in their design and development processes.

Systems Modelling

With our specialist mathematical modelling engineers, we are able to offer dedicated software that simulates the performance and behaviours of a supplier's product. Easy to configure inputs allows for 'tweaks to the design' to be made, reducing the need for prototyping and testing. This



lowers the cost of R&D and allows suppliers to bring their product to market in a shorter period of time.

Cyber security and information assurance

Our team of approved security consultants have successfully helped the submarine supply chain gain assessor acceptance of their data systems. Practising a risk-based methodology, we can assist suppliers in identifying cyber and information threats and countering these through both design and operator/ maintainer training.

ILS and supportability engineering

We have successfully worked with the submarine supply chain to develop fully compliant supportability solutions relevant to their equipment. We provide a wide-ranging supportability capability including reliability analysis, technical documentation and training needs analyses.

Shock engineering

Naval systems for complex submarines need to consider the impact of large shock events to their mounting and functionality. Our structural analysis specialists have considerable experience of applying formal methodologies to de-risk equipment design and development.

Noise and vibration (N&V) engineering

Shipbuilding primes take a whole-ship approach to minimising the signatures of a vessel. This holistic approach considers both mechanical and fluid transmitted noise. Our N&V specialists can help the submarine supply chain through the design and development process including supporting Factory Acceptance Tests (FATS) and sea trials.

Human factors integration

Human factors is the study of how humans work and function within systems and environments, and with technology. Across naval programmes we have helped clients ensure that human factors are considered when designing and developing their equipment and Human Machine Interfaces (HMI).

Engineering analysis

Also available to our clients is a comprehensive engineering analysis capability which includes:

- Computational fluid dynamics.
- Electromagnetic compatibility.
- Finite element analysis.
- Thermal modelling.
- Corrosion protection.
- Fire and dispersion modelling.
- Hydrodynamic simulation.

For more information about Frazer-Nash please visit our website.

www.fnc.co.uk

www.fncaustralia.com.au

Offices throughout the UK and Australia

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HOW WE HAVE HELPED SIMILAR CLIENTS:

Shock Calculations for a Hydraulic Equipment Supplier

THE CHALLENGE:

Our client required engineering support for de-risking their design against shock for a next generation UK submarine.

HOW WE SOLVED IT:

- ▶ Calculations were completed using the pseudo static procedure, utilising classical hand calculations throughout.
- ▶ Captivity and Fight shock levels were considered with the minimum Reserve Factor (RF) being determined.
- ▶ Recommendations for design refinement were provided to the client.

This allowed our client to confidently deliver their product knowing that they comply with their customer's shock requirements.



Human Factors for an Integrated Systems Supplier

THE CHALLENGE:

Our client required on-site Human Factors support and advice throughout a large and complex design and build project.

HOW WE SOLVED IT:

- ▶ A Human Factors specialist flexibly embedded themselves within our client's team, offering expert advice and assessment throughout the project.

Our flexible approach allowed our client to meet their extensive Human Factors requirements without having to recruit a permanent employee.



System Modelling for a Subsea Equipment Supplier

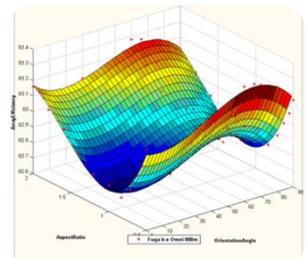
THE CHALLENGE:

Our client required a more expedient and cost effective method of refining a design to improve system performance.

HOW WE SOLVED IT:

- ▶ A mathematical model of our client's system was produced to simulate real-life performance.
- ▶ A user friendly interface with intuitive variable inputs was incorporated, allowing the system to be tweaked to represent different design modifications.
- ▶ The model was successfully validated against actual equipment performance data.

This allowed our client to improve their equipment design without having to continuously prototype and test; resulting in significant R&D cost savings and an accelerated design process.



Safety Critical Software for Tier I Supplier

THE CHALLENGE:

Our client was challenged, following the release of new guidance from the Naval Authority Group (NAG), to consider the safety criticality of all platform control systems and build a body of evidence to meet safety critical standards.

HOW WE SOLVED IT:

- ▶ Safety critical software engineering and assurance specialists undertook risk and failure analysis of the control system.
- ▶ OEMs were then engaged to evaluate systems and software development practices, plus system and software reliability data.
- ▶ A safety argument against the IEC61508 standard was then produced.

Our client was able to comprehensively develop a fully compliant system that satisfied the new NAG guidance.



Please contact us for more examples including; Integrated Logistics Support (ILS), Fluid Analysis, Structural Assessments, Acoustic/ Signature Assessments, Materials, Vibration Analysis, Fatigue Assessments and Safety & Reliability.

For more information about Frazer-Nash please visit our website.

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