

Call for Evidence: Skills for Transport Manufacturing

Society of Maritime Industries – Submission to the Transport Select Committee

Summary

The **Society of Maritime Industries** (SMI) represents the UK’s maritime engineering, science and technology industry and the broader **maritime supply chain**. Our evidence highlights that skills needs across transport manufacturing are being reshaped by two major transitions: **decarbonisation** and **automation**, underpinned by continuing demand for strong mechanical and electrical foundations.

Maritime shares many skills challenges with automotive, aerospace, defence, rail and energy – particularly in digital engineering, systems assurance, and alternative fuels. At the same time, maritime faces **distinct domain-specific requirements**: sea-keeping, COLREGs¹ compliance, Remote Operations Centre (ROC) procedures, offshore launch and recovery, and integrating autonomy and net zero systems in small craft and harsh marine environments.

Current skills pipelines are uneven. Universities and apprenticeships provide strong foundations but lack scale and alignment with autonomy and net zero roles, while mid-career conversion opportunities remain underdeveloped. Acute shortages are emerging in embedded software, maritime cyber, high-voltage systems, hydrography, payload integration, and Remote Operations Centre supervision.

Upskilling is constrained by time and cost pressures on SMEs, fragmented training provision, and a lack of recognised micro-credentials. Where progress has been made (for instance through **cluster-based “learning factories”** pairing test ranges, ROC labs and colleges with industry) outcomes are strong, but provision is patchy and difficult to scale without sustained support.

Government policy has not yet achieved coherent cross-departmental delivery. Responsibilities are split between DfT, DfE, DESNZ, MoD and local authorities, leaving SMEs to navigate complexity. A **single, funded national programme** that ties skills, testbeds and operator certification together, explicitly inclusive of maritime manufacturing, would give firms the confidence to invest in people.

To grow employment in transport manufacturing, the UK must:

- Provide demand certainty through long-term procurement pipelines and fairer contracting.
- Define new job families and occupational standards for autonomy and alternative fuels.
- Modernise apprenticeships and HTQs with modular, stackable pathways.
- Fund mid-career conversion routes from related sectors.
- Strengthen regional expertise clusters that serve multiple markets.
- Simplify and harmonise qualifications to enable cross-sector mobility.

The UK’s maritime industries are world-leading in innovation and exports. With the right skills framework — one that recognises both cross-sector overlap and maritime-specific demands — the sector can grow jobs, accelerate decarbonisation, and secure sovereign capability in transport manufacturing.

¹ Convention on the International Regulations for Preventing Collisions at Sea

Response

What are the main skills needs facing transport manufacturers?

Skills needs facing the UK's maritime engineering, science and technology industry – along with the wider maritime supply chain – are being driven by the twin transformations of decarbonisation and automation, underpinned by a requirement for strong mechanical and electrical foundations.

While there is overlap with other transport sectors, maritime manufacturing brings its own layer of complexity with the demands of sea-keeping, COLREGs compliance, and the integration of autonomy and alternative fuels in small craft and offshore environments.

Addressing these needs and complexities requires targeted training and qualifications, along with an industrial strategy that gives employers the commercial certainty to invest in developing the workforce.

Specialist Maritime Skills

- **Autonomy & remote operations:** Certified remote operators, ROC supervisors, and engineers versed in COLREGs interpretation, abnormal-situation management, and remote launch and recovery.
- **Systems engineering & assurance:** Model-based systems engineering, safety case preparation for autonomy, verification and validation (V&V), configuration control, and systems integration across mechanical, electrical, and software domains.
- **Software & data skills:** Embedded systems, perception and sensor fusion, simulation and hardware-in-the-loop testing, maritime cyber security.
- **Net zero integration:** Electrical engineering for high-voltage battery systems, hydrogen, methanol, and hybrid propulsion, including fuel safety and integration with vessel systems.
- **Maritime domain expertise:** Navigation, hydrography, spectrum management, payload integration, and understanding of the unique operating environment at sea.

Foundational and Cross-Sector Capabilities

- **Mechanical and electrical engineering** remain core, but increasingly need to be adapted for maritime-specific contexts and alternative fuel systems.
- **Multi-domain career mobility:** Many roles can draw on transferable expertise from defence, offshore energy, automotive and aerospace, provided there are funded, short conversion courses and portable qualifications.
- **Discipline, reliability and commitment** are critical attributes sought by employers, especially in safety-critical operational contexts.

Supply Chain and Business Model Enablers

- **Skills growth depends on certainty of work.** Companies will invest in training and apprenticeships when there is a visible pipeline of sales, stable contracting arrangements, and fair payment terms extending into the deeper tiers of the supply chain – not just the primes.
- **Expertise clusters** – where multiple companies with overlapping but distinct capabilities operate across more than one market (e.g. defence, offshore wind, oil and gas) – **are more sustainable than location-based clusters** alone.

Current Shortages

The most acute gaps in maritime manufacturing include:

- Embedded software developers and autonomy systems engineers.
- Maritime cyber specialists.
- High-voltage battery and alternative fuel technicians.
- Hydrographic survey and payload integration specialists.
- ROC supervisors with both seagoing and autonomy experience.

How far is there overlap between the skills needs of manufacturers in different transport sectors?

There is significant overlap in manufacturing skills requirements between maritime and other transport sectors, particularly in regard to **digital engineering, autonomy, systems integration, and net zero technologies**.

- **Automotive and Aerospace:** Shared demand for software-defined systems, embedded electronics, perception and sensor fusion, simulation and hardware-in-the-loop testing, AI applications, and functional safety.
- **Defence, Rail and Energy:** Common needs in safety case development, secure communications, high-reliability electrical systems, and the integration of alternative fuels.

However, maritime manufacturing adds unique domain-specific requirements.

- **Sea-keeping and vessel stability** in design and testing.
- **Compliance with COLREGs** (International Regulations for Preventing Collisions at Sea).
- **Remote Operations Centre (ROC) procedures** and offshore launch/recovery capabilities.
- Integration of autonomy and net zero systems in **small craft, offshore, and harsh marine environments**, where corrosion, vibration, and spectrum constraints must be addressed.

The strongest skills overlap occurs in **cross-cutting technical disciplines** – systems engineering, electrical and mechanical design, software and cyber security – which can be supported by common occupational standards and modular training. The maritime sector's distinct operational environment means that **cross-sector conversion pathways** must also include targeted maritime knowledge, safety frameworks, and regulatory compliance to ensure skills transfer is effective.

How effective are the pipelines for new workers into transport manufacturing, including from schools and colleges, from universities and apprenticeships, and recruiting older workers returning to or changing jobs?

In maritime manufacturing, pipelines into the workforce are uneven and not yet aligned with emerging needs in autonomy, digital systems, and net zero technologies.

- **Schools & Further Education:** Patchy access to relevant T Levels and technician pathways; careers awareness for maritime engineering is low compared to other transport modes.
- **Universities:** Strong research and teaching hubs in marine engineering, autonomy and offshore energy exist, but capacity is small relative to projected demand.
- **Apprenticeships:** Well-established in shipbuilding and marine engineering, but frameworks do not yet reflect autonomy, remote operations, or alternative fuel integration.

- **Mid-career conversion:** Significant potential to retrain mariners, offshore technicians, defence engineers, and automotive software specialists, but this requires short, stackable modules leading to recognised qualifications.

The most effective local pipelines link **regional expertise clusters** (e.g. ports, shipyards, test ranges, and training providers) with sustained industrial demand. Without commercial certainty and targeted, portable qualifications, pipeline capacity will remain below what the maritime sector needs to meet both replacement demand and growth.

How have technology and net zero changed the skills mix that is needed, and how prepared are transport manufacturing industries for future changes?

In maritime manufacturing, technology change and net zero are reshaping skills demand across the full vessel lifecycle, from design & build through to operation & maintenance.

- **Digitalisation & autonomy:** Growing need for embedded software, sensor fusion, AI, simulation and hardware-in-the-loop testing, maritime cyber security, and model-based systems engineering.
- **Alternative fuels & electrification:** Skills in high-voltage electrical systems, hydrogen, methanol, battery safety, hybrid propulsion integration, and associated regulatory compliance.
- **Systems assurance:** Expanded capability in safety cases for autonomy and alternative fuels, verification and validation, and configuration control.

Preparedness is uneven. Regional maritime clusters with test ranges, training partnerships and innovation facilities are ahead; smaller firms, especially in lower supply chain tiers, lack the resources to re-skill at pace. The absence of maritime-specific occupational standards for autonomy and net zero roles slows both workforce readiness and cross-sector mobility.

To keep pace, the sector needs **flexible training modules**, portable qualifications, and industrial policies that link skills development directly to innovation funding and procurement programmes.

What are the main challenges in upskilling existing workforces?

For the maritime manufacturing and supply chain, the main barriers to upskilling are structural, financial, and capacity-related:

- **Time and cost for SMEs:** Smaller firms cannot easily release staff for extended training without jeopardising project delivery.
- **Fragmented provision:** Training in autonomy, alternative fuels, and maritime cyber is scattered, with limited access to facilities such as Remote Operations Centres (ROCs) or hardware-in-the-loop labs.
- **Lack of portable, recognised micro-credentials:** Few short courses can be “stacked” into higher technical qualifications or apprenticeships, slowing skills transfer.
- **Shortage of dual-experience trainers:** Instructors with both sea-time and expertise in emerging technologies (e.g. autonomy, net zero systems) are scarce.
- **Evolving standards and regulation:** Skills can quickly become obsolete, making employers cautious about investing in training without clear long-term frameworks.

Addressing these challenges requires SME-friendly funding, training provision embedded within regional maritime clusters, and qualification pathways designed for rapid, modular upskilling linked to recognised occupational standards.

Are there particular skill shortages, or examples of success in developing skills, at different points in the supply chain?

The main **shortages** in maritime manufacturing and supply chain include:

- Embedded software developers and autonomy systems engineers.
- Maritime cyber security specialists.
- High-voltage battery and alternative fuel technicians.
- Hydrographic survey and payload integration specialists.
- Remote Operations Centre (ROC) supervisors with seagoing experience.

Examples of **success** consist of:

- **Cluster-based “learning factories”**: Partnerships between FE/HE providers, maritime SMEs, and test facilities (including ROCs, simulation labs, and sea ranges) have created effective pipelines for specialist skills.
- **Cross-sector conversion**: Targeted programmes retraining offshore energy technicians and defence engineers into maritime autonomy roles.
- **Integrated apprenticeships**: Shipbuilding apprenticeships incorporating modules on alternative fuels and digital systems, developed in collaboration with regional industry groups.

These successes show that when training is embedded in operational settings and linked directly to live projects, uptake and retention improve — particularly for SMEs. Scaling such models nationally would address both acute shortages and future growth needs.

How effectively are different government departments working together, and with local/combined authorities, to ensure transport manufacturers have the right incentives and support for maintaining a skilled workforce?

From a maritime manufacturing perspective, there is some progress in cross-departmental engagement, but delivery is fragmented. Responsibilities for skills, innovation, net zero, and regulation are spread across multiple departments (DfT, DfE, DESNZ, MoD) and local bodies, with limited coordination.

Effective regional initiatives such as maritime cluster-led training linked to ports, shipyards, and test facilities tend to succeed despite, rather than because of, central coordination. SMEs in particular face a complex and time-consuming process to access funding or align with multiple departmental priorities.

A **single, funded national programme** that integrates skills, testbeds, and operator certification — and is explicitly inclusive of maritime manufacturing — would improve consistency. This should be SME-accessible, support cross-sector conversion, and tie qualification pathways to both innovation funding and procurement requirements.

How effectively will the Government's Modern Industrial Strategy and sector plans support skills in transport manufacturing? What is missing?

If fully implemented, the Modern Industrial Strategy could support maritime manufacturing skills by:

- Endorsing **operator and competency frameworks** for autonomy (e.g. MCA-style standards for Remote Operators and ROC Supervisors).
- Funding **regional testbeds and training facilities**, particularly for alternative fuels and autonomy.
- Allowing **apprenticeship levy flexibility** to support SMEs and short, stackable modules.
- Aligning net zero skills policy with **small craft, offshore, and unmanned surface vessel** contexts.

At present, however, the Strategy is missing:

- Clear occupational standards for emerging maritime roles in autonomy, digital systems, and alternative fuels.
- SME-friendly funding mechanisms that address cost and release-time barriers.
- Explicit inclusion of **maritime** within transport manufacturing priorities to ensure the sector's needs are represented alongside road, rail, aerospace, and defence.

Without these elements, maritime risks being under-served by generic transport skills policy, despite its critical role in the UK's industrial and export base.

How can the UK grow employment in transport manufacturing?

From a maritime engineering, science and technology perspective, growth in jobs follows demand certainty, portable skills, and SME access.

- **Create demand certainty:** publish multi-year procurement pipelines, require prompt payment through supply chains, and include skills KPIs in contracts so firms can hire and train with confidence.
- **Define new job families:** establish national standards for Remote Operator, ROC Supervisor and Autonomy Systems Engineer, alongside competency frameworks for small-craft alternative fuels and high-voltage systems.
- **Modernise apprenticeships and HTQs:** add autonomy, digital and alternative-fuel modules, allow levy pooling and credit transfer for SMEs, and make micro-credentials stack into recognised qualifications.
- **Back conversion pathways:** fund short, employer-led upskilling from seafaring, offshore energy, defence and automotive software into maritime autonomy and electrification roles, with recognition of prior experience.
- **Invest in regional expertise clusters:** co-locate test ranges, ROC labs, shipyards, ports and FE/HE providers; prioritise clusters that serve multiple markets such as defence, offshore wind and oil and gas.
- **Support SMEs directly:** offer wage subsidies or day-release vouchers for training time, simplify grant access, and extend support to deeper supply-chain tiers, not just primes.
- **Grow trainer capacity:** fund train-the-trainer schemes for practitioners with sea time and digital or alternative-fuel expertise, plus industry secondments into colleges and universities.

- **Align course funding with jobs:** tie public funding to employer demand and job outcomes, co-design curricula with industry, keep mechanical and electrical foundations central rather than narrow “renewables-only” labelling.
- **Simplify and harmonise qualifications:** improve portability across transport modes for systems engineering, software, safety and fuels, with maritime add-ons for COLREGs, sea-keeping and offshore operations.
- **Link skills to exports:** back internationally portable standards and qualifications so UK maritime skills become an export in their own right.

These actions will unlock hiring throughout the maritime supply chain, making skills investment a rational business decision rather than a cost centre.