



# Naval Vessel Medical Treatment Facility Solutions

# Capability Summary

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# Saab in Naval Healthcare

This whitepaper discusses Saab's capability in the design and provisioning of specialised medical treatment facilities on board maritime vessels.

### Saab globally

Saab serves the global market with world-leading products, services and solutions from military defence in all domains to civil security. Saab's market offering is broad and consists of complex systems involving extensive research, development, and services with a high degree of repetition. With operations on every continent, Saab continuously develops, adapts and improves new technology to meet customers' changing needs.



### Saab India

Saab is a trusted supplier for Indian defence & security, aerospace and coastal security since the 1970s. Today, Saab works with Indian companies and partners in R&D, aerospace technologies, and defence systems across all domains to develop cutting-edge products and solutions that will serve India and the rest of the world for generations. Saab is wholly aligned with the Make in India policy of the Indian Government and is ready to build products and solutions here in India, by Indians, for India and export. Saab's maritime portfolio offers air, surface, sub-surface and maritime surveillance solutions, thus



providing Naval and Coast Guard Forces with a complete command over the sea.

### Saab's experience in the naval domain

Saab has decades of experience developing highly advanced vessels and platforms for the maritime domain. Through evolutionary design, the offer includes confident solutions giving capabilities to navies for surface combat, mine countermeasure and patrol, and design and material technology such as superstructures and through life support. Saab understands the complexity of naval vessel design and manufacturing and the attention to detail required to



deliver specialised solutions that provide specific strategic and operational objectives in defence. An example is the INS Kavaratti and the earlier inducted INS Kiltan, built with composite superstructures delivered by Saab. Apart from significantly lowering the top weight, the Saab superstructure of carbon fibre composite material integrated with the ship's metallic main hull comes with improved stealth features and lower maintenance costs. Saab looks forward to partnering with the Indian Navy and Indian shipbuilders who truly exemplify the approach of 'Make in India', combining the skills and technologies from the best of the world.



### Saab's experience in deployable healthcare

With over 30 years of experience in deployable Healthcare, Saab has accumulated a wealth of capability in providing solutions that support the rapid delivery of healthcare into remote and austere environments. Saab's deployable healthcare solutions are custom designed to suit the deployment environment, mission type and health facility role. Our solution range provides the healthcare capability for medical evacuation (MEDEVAC), rapid frontline care, mobile and stationary field hospitals and other specialised capabilities, including naval vessel



hospitals. Our deployable healthcare market presence is primarily in Western Europe and Australia. However, our solutions have been used worldwide in various military missions.

### Saab's experience in naval healthcare

Saab's experience in naval vessel design and construction supports our capability in designing and commissioning medical treatment facilities on board defence naval vessels. For example, Saab has developed and commissioned an advanced medical treatment facility on board Norway's KNM Maud support ship. KNM Maud is the largest ship in the Royal Norwegian Navy. It carries state-of-the-art hospital facilities, trauma and intensive care units and a pressure chamber. Saab was responsible for the



complete design process, services integration, medical device integration and sea acceptance testing (SAT) of the medical facility. This project has equipped Saab with the skills and experience in this specialised area. We are currently designing customised medical treatment facilities for other defence forces in the APAC region.

### Saab naval healthcare design process

Deployed healthcare facilities incorporate multiple components, including complex medical devices, diagnostic equipment and essential services, with all elements needing to integrate efficiently as one operational system. Saab is known in the defence industry for its capability in complex systems integration. Our engineering capability in naval and deployable healthcare includes systems integration, biomedical, electric power, EMC and mechanical engineers. This ecosystem of design capability allows



Saab to share knowledge with engineers and external consultants utilising the same tools and processes embedded into Saab's design process.



### Design phases

#### **Concept Design Phase**

The initial phase starts with assessing the clinical requirements, vessel layout, and business and mission requisites. From the initial information, a conceptual design is developed and presented to the client for comment.

#### **Preliminary Design Phase**

Consultation with clinical users and management to optimise facility layout. Assessment of essential services available on the vessel and preliminary design of medical services and device integration.

#### **Detailed Design Phase**

In-depth design of facility using computer-aided design (CAD) and other modelling tools. This phase finalises the essential services and medical device integration plan. An itemised bill of materials is produced to allow for budgeting and product lead times.

#### **Critical Design Phase**

Final design phase to produce architectural drawings and project plan. A focus on compliance with required maritime and medical regulations ensures that the facility will meet local and international maritime standards.

#### Sea Acceptance Testing

A series of tests performed on medical facilities and medical equipment to ensure performance under various sea states and conditions. Modifications to the installation can be made at this time.

### **Medical Device Integration**

A modern healthcare facility requires a wide range of medical equipment to meet the clinical requirements of the service. When medical equipment is integrated into a naval vessel in active use, additional levels of compliance need to be considered. Saab's experience in the maritime domain and deployable healthcare provides us with the knowledge and expertise to perform this function. The following factors are evaluated for each piece of medical equipment to integrate the device into the ship's medical facility appropriately:

- Clinical suitability and performance
- Power requirements
- Consumables and spare parts (supply chain)
- Mounting and securing devices for various sea states
- Interoperability with other systems
- Ongoing support

Saab has experience in integrating the following medical equipment

- Nurse call systems
- Surgical and procedural lighting
- Patient monitoring and central surveillance systems
- Ventilators and anaesthetic machines
- Infusion and syringe pumps
- Advanced life support systems (including IABP, ECMO, Defibrillation & Dialysis)
- Radiography diagnostic devices (X-Ray & CT) and Ultrasound
- Medical laboratory (including point-of-care devices)
- Hyperbaric chamber

Saab is vendor-neutral in the selection of medical devices and will work with the client and end user to understand clinical preferences and suitability.



### **Services Integration**

Similarly to medical device integration, a medical treatment facility requires integrating many essential services to provide advanced medical care. These services can be sourced from the ship's central supply or specific to the medical facility. Consideration of the clinical requirements is essential when designing the service integration for the medical facility. Services sourced from central ship supply include:

- Electrical supply (including general facility lighting)
- Communications (including integrated communications solutions)
- Potable and wastewater
- General and medical waste management
- Environmental controls (HVAC)
- Services specific to the medical treatment facility
- Medical electrical supply and electrical circuits for patient isolation
- Medical lighting
- Medical gasses
- Medical HVAC air filtration and airflow control (including under and over-pressurisation)
- Protection (including radiation)
- Refrigeration

### **Clinical Areas**

Saab has experience in designing and implementing clinical capability for the following areas

- Triage area (can be located close to the operational areas to allow for rapid assessment)
- Emergency room (resuscitation and trauma)
- Operating theatre and post-operative recovery
- Specialist procedural areas (labour unit, burns unit, treatment clinics)
- Intensive Care Unit / High Dependency Unit
- Wards (including isolation ward, burns ward and general wards)
- Allied health
- Dental Surgery
- Radiology investigations area (Mobile and Fixed X-Ray, CT, Ultrasound)
- Laboratory
- Hyperbaric chamber
- Central sterilisation department and central storage
- Medical department administration and reception

Many medical centre areas can be multi-use, with the ability to transition between clinical functions depending on the requirements. For example, the ward area can transition into an isolation ward to manage infection containment.

### Integrated Logistics Support

Saab has expertise in providing Integrated Logistics Support (ILS) for defence-based medical facilities. This process ensures that the medical treatment facility is ready for use and has an established supply chain to replenish stock. Our design process focuses on providing solutions that enable defence forces to respond rapidly to healthcare needs. The ILS process includes designing well-organised clinical spaces that ensure efficient patient and clinician workflow. In addition, we address potential issues with kitting, storage, replenishment and supply chain that can affect the smooth operation of the healthcare facility. Saab's ILS process secures supply by managing product life cycle, obsolescence management, spare parts management, technical user documentation, and compliance with standards.



### Saab's expertise and potential contribution to this project

Saab's experience in deployed medical solutions ranges from initial conceptual design and clinical workflow analysis to solution delivery and long-term support. Our expertise includes systems engineering, biomedical engineering, force infrastructure, mission operations and Healthcare workflow. In addition, Saab has commercial relationships with multiple medical device manufacturers and infrastructure suppliers, ensuring access to their specialised expertise and class-leading products. We also use medical and engineering subject matter experts to assist in our design to ensure that the solutions are clinically appropriate and technically achievable.

Saab India has access to local suppliers and contractors that will contribute to this program. It is Saab's policy to include local content wherever possible. For this project, we envision that the local content includes locally sourced medical equipment with a preference for "Made in India" products. We would also use local subject matter experts to consult on regulatory and compliance matters. Local project managers and engineers would manage the project.

This project is an opportunity for experienced and capable defence industry suppliers to collaborate. We envision that Saab would partner with Indian shipyards to provide the following expertise

- All phases of the design of the medical treatment facility on board the naval vessel
- Consultation with the client and clinical staff on the requirements and design
- Optimisation of clinician and patient flow on board the NHS
- Medical systems integration
- Procurement and installation of medical equipment
- Ongoing support

### Next steps

Saab is interested in being part of the National Hospital Ship (NHS) program to design and implement the on-board medical treatment facility.

We would like to meet key representatives from the Warship Design Bureau and discuss our design capability for the NHS.

We envision that a teaming agreement is formed between Saab and a selected Indian Shipyard. Saab would utilise additional resources and relationships to assist with the proposal, including expertise in our Saab Sweden and global Saab teams. Having Saab as a partner will augment the submission to the prime contractor.







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