



KONGSBERG

Kongsberg Maritime

K-Bridge Integrated Navigation System

Navigation products

Mission statement

The Full Picture

We are dedicated to providing innovative and reliable marine electronics that ensure optimal operation at sea. With our unique technology and experience – in positioning, hydroacoustics, communication, vessel control, navigation, simulation, and automation – we aim to give customers The Full Picture. The Full Picture yields professional solutions and global services that make a critical difference to vessel performance, enabling our customers to stay ahead of the competition.

Our philosophy

Our success depends on the success of our customers.

Actively listening to customers and truly understanding their needs – then translating these needs into successful products and solutions – is central to the achievement of our goal.

Our commitment

Our people are key to our success and we empower them to achieve.

Kongsberg people collaborate globally – guided by shared values and sharing their expertise – to achieve world-class performance every day. Every day they think a little differently, because every client is unique. Our aspiration is to translate the imagination and dedication of our staff into successful technologies and solutions. Our commitment is to add value to your operations by providing you with The Full Picture.

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Kongsberg **Integrated** Navigation System

Integration promotes operational awareness and safer navigation: K-Bridge INS provides a single user interface to multiple connected systems. This enables crew to focus on primary navigation tasks without having to switch their attention between different instruments.

Developed by users and human factor specialists, K-Bridge INS is an advanced platform that is optimized to support critical decision making by professional navigators.

Voyage planning, collision avoidance, and route monitoring are the main areas of critical decision making. But K-Bridge INS takes the concept of functional integration further by regarding other functions as also integral to the responsibility of the navigator. These include: the autopilot / track pilot, Bridge Navigational Watch Alarm System, BAM (Bridge Alarm Management) system, and bridge auxiliaries. In K-Bridge INS these functions are optionally available through the same user interface as the primary radar / ARPA and ECDIS functions.

Local Area Network and sensor concentration

K-Bridge INS is designed as a contemporary, distributed system for reliable control applications. A dual redundant local area network connects the operator stations to a central sensor interface unit (SINT), ensuring common and consistent own-ship data on all stations. In addition to collecting data from the sensors (such as the GPS, speedlog, gyrocompass and echo sounder) and distributing it to the K-Bridge display units, the SINT performs critical system-wide calculations. (It is equipped with a redundant processing unit for this and for its sensor multiplexing function.) The role of the SINT in the K-Bridge system means that cabling to each display unit is greatly reduced, and that therefore more flexibility is possible in the planning and installation of bridge equipment.

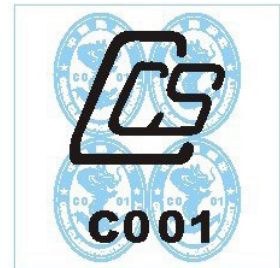
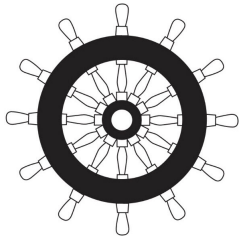
Radar signal distribution

K-Bridge INS uses a high-speed dual network for collecting radar signals at the transceiver and distributing them to the radar display units. A radar interface (RIN) unit converts analog radar signals to digital signals at the antenna location. All display units can access the raw data from any antenna over the network and then process it to provide the radar picture desired by the operator. This architecture ensures fault tolerance across the bridge with respect to signal processing. It also (optionally) allows video streams from multiple radars to be combined at the display units.

Cyber-security

The international standard that safeguards vessel communication systems from cyber attack – in the form, for example, of malware, hacking or data tampering – is called IEC 61162-460 (2024). This standard defines a network architecture for vessel systems that enforces cyber-security, system integrity, and resilience. For example, it requires a system (such as the navigation system) to be organised into a network segment in which all equipment (not just networked equipment) is approved as 460-compliant, and within which all data communication is protected by 460-compliant switches. In addition, it requires communication with other systems (such as DP or automation) to be protected by a 460-compliant forwarder, and communication with shore-based services by a 460-compliant gateway. Other protections in the standard include rigorous access control and continuous real-time safeguarding of USB ports against malware threats.

K-Bridge is certified according to this standard.

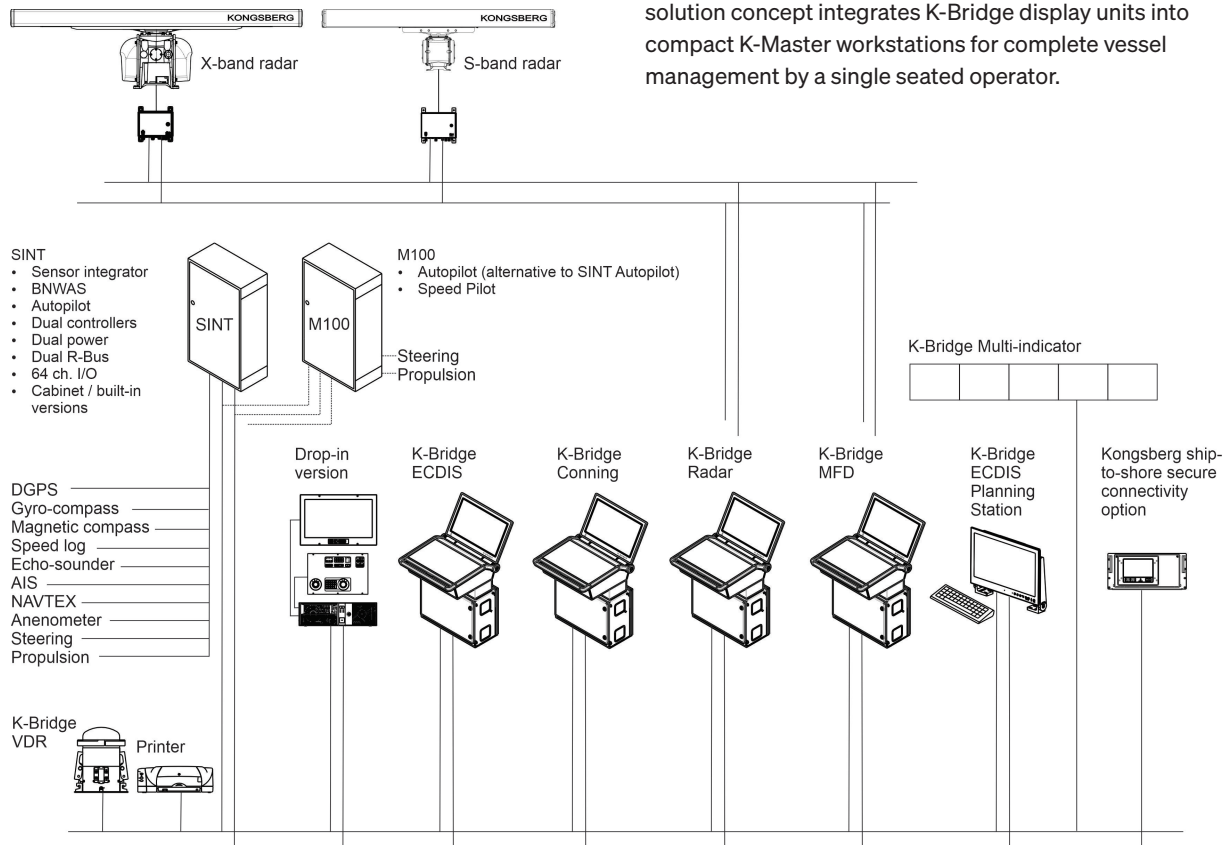


A complete working environment

K-Bridge INS supports all primary navigation functions. In common with all consoles in the Kongsberg range, the bridge workstations are built to comply with the highest nautical safety standards of classification societies and flag state authorities.

K-Bridge operator stations are ergonomically designed for ease and comfort of operation, and they provide excellent additional space for installation of third-party equipment.

For offshore service vessels and yachts, Kongsberg offers a unique range of equipment solutions tailored for seated operators on a busy bridge. The K-Master bridge solution concept integrates K-Bridge display units into compact K-Master workstations for complete vessel management by a single seated operator.



Radar features

K-Bridge Radar

The radar display unit is a type-approved radar/ARPA on which approved nautical charts can be displayed as an underlay to the radar video.

Raw data from the radar antenna is processed separately by each display unit, which means that filtering is applied locally according to each operator's requirements.

K-Bridge Radar display units display their own targets as well as targets from each other and from AIS. For this reason a target management function assigns a unique identifier to every active target on the bridge, enabling operators to see immediately that target X on one display unit is also target X on another display unit.

If targets from different sources duplicate each other, they are "associated": the INS replaces them with a single new target (and identifier). This ensures that the operator cannot mistake a single ship detected by multiple radar / AIS sources for multiple vessels.

To enhance radar performance and avoid blind sectors, video from up to four radars can be displayed simultaneously in a composite radar picture. In such a composite picture, targets are automatically tracked across the boundaries between the sectors from each radar.



Standard features

- Range scales: 11 (0.125 - 96nm)
- Manual/automatic clutter reduction
- Stern indicator
- Electronic Bearing Lines (EBL): 2
- Variable Range Makers (VRM): 2
- Parallel index lines
- Square picture: 27% larger radar area
- Choice of square or round bearing scale
- Chart underlay available
- Target tracking: Up to 100 targets at once
- Target acquisition: manual or automatic
- Trails (afterglow)
- Maximum target speed: 100 kn relative
- Target tracking range: 24 nm
- AIS targets and information

Radar scanners

The following radar scanners are available:

X-band

- 3 cm scanner, antenna and turning unit
- Antenna sizes: 6 ft or 9 ft (1.8 m or 2.75 m)
- Scanner configurations: upmast
- Power: 10 kW, 25 kW, or 600 W (solid state)
- 10 kW or 600 W High Speed option available

X-band

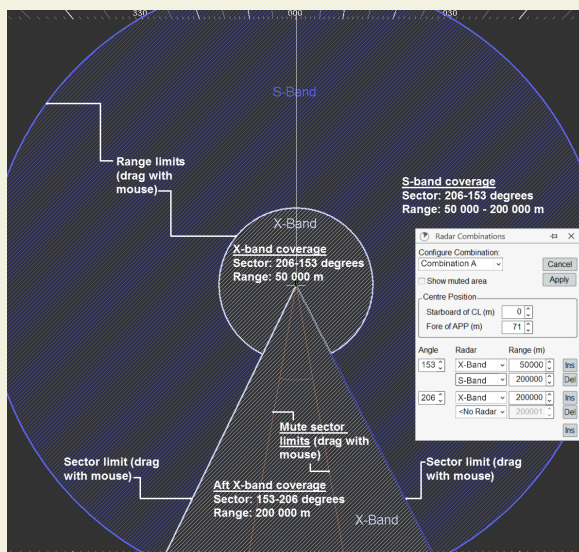
- 10 cm scanner, antenna and turning unit
- Antenna sizes: 8 ft or 12 ft (2.4 m or 3.6 m)
- Scanner configurations: upmast
- Power: 30 kW, or 250 W (solid state)
- 250 W High Speed option available



Radar CP360

The Radar Composite Picture CP360 option combines radar images from multiple scanners into a single 360° radar picture. This means that if part of one scanner's view around the vessel is blocked by a physical obstruction (such as part of the vessel's super-structure), the missing radar input is supplied by another scanner located elsewhere on the vessel. Several scanners can be combined in this way, eliminating blind sectors and achieving a true 360° radar picture.

A combination is defined by sector lines and range circles



The area covered by each scanner in a CP360 combination is defined by radial lines (called sector limits) and range circles. These lines and circles are dragged with the mouse/trackball to define or modify the combination.

Time-lapse Replay

This option for K-Bridge Radar helps radar operators see echoes that are otherwise hard to detect. It is ideal for navigating in coastal waters, for performing search and rescue operations, or for any situation that requires detection of small or moving targets.

The Time-lapse Replay option incorporates two features:

- The Time-lapse Replay feature provides continuous replay of compressed radar video from the last 1 minute or 15 minutes (the period is selectable). This feature helps the radar operator either to detect high-speed moving targets (1-minute replay) or to detect the movement of slowly drifting objects (15-minute replay).
- The Relief Underlay feature provides an additional image layer behind the normal echoes on the radar display. This layer replaces the normal radar background and allows weak echoes - that would otherwise be hidden in clutter - to be presented in clear relief.

K-Bridge ECDIS

The K-Bridge ECDIS continuously monitors the ship's position against the voyage plan.

The plan can be defined at a Navtor NavStation, an ECDIS Planning Station or a K-Bridge ECDIS operator station.

K-Bridge ECDIS can show radar video from selected radars as a chart overlay. It can also show AIS targets.

NAVTEX messages referring to specific positions appear when the ship is in the area relevant to them.

K-Bridge ECDIS accepts all chart formats required by the IHO.

K-Bridge Autopilot

The K-Bridge Autopilot provides heading and track control along planned routes without requiring any additional hardware. The controller unit is integrated into the redundant sensor interface (SINT) unit, and the user interface is integrated into the K-Bridge ECDIS and Radar HMIs. This is a high-availability solution, because the user interface is available from multiple displays and because a hot-standby backup controller is provided by the SINT.

Kongsberg Autopilot M100

The Autopilot M100 is an optional alternative to the K-Bridge Autopilot. It is an automated vessel control system that provides optimal automated or semi-automated steering and manoeuvring control in any sailing conditions. The Autopilot M100 makes fully automated steering, positioning and manoeuvring functions available as different options from a single vessel control system. This reduces infrastructure footprint and installation costs.

K-Bridge Speed Pilot

The Speed Pilot is a software add-on for K-Bridge ECDIS and Radar operator stations that are connected to the Autopilot M100. It issues speed orders to a speed controller (running in the M100 cabinet) which converts them to RPM or pitch set-points for the vessel's propulsion system.

If the ECDIS or Radar operator specifies a desired final ETA (or desired waypoint ETAs) for the active route the Speed Pilot will control the vessel's speed according to the specified ETA or ETAs.

Alternatively the Speed Pilot can take speed set-points directly from the plan of the active route. Or, finally, the operator can specify set-points manually on a dedicated touch-control panel or heading wheel panel.

K-Bridge ECDIS Planning Station

The K-Bridge ECDIS Planning Station is a "back-office" station designed for chart maintenance and route planning. It provides standard ECDIS functionality, including route planning and validation, but on a table-top Panel PC. Validation of the planned route is performed against the vector chart database. If the route crosses the safety contour or the border of a restricted access area, warnings are issued. Video from a selected radar display is presented as an overlay on the chart, and radar and/or AIS targets can be displayed.

Navtor NavStation

For customers who require full weather routing and passage planning capabilities, the Navtor NavStation is available from Kongsberg Maritime as an optional alternative to the K-Bridge Planning Station.

Simple to use, and integrating seamlessly with K-Bridge ECDIS, the NavStation enables you to plan and execute voyages with all the information you need – for example, wind, wave and current data – available at your fingertips.

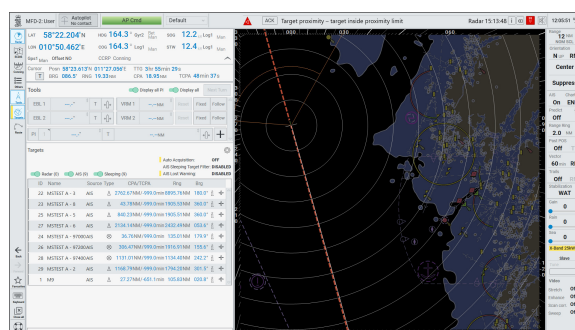
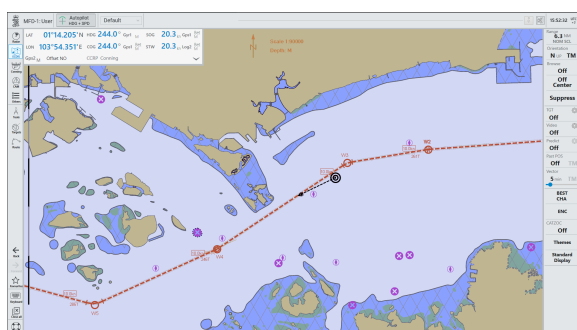
The NavStation's weather routing capabilities are powered by Weather News International (WNI), the world's leading private weather service.

K-Bridge BAM

With K-Bridge BAM, the K-Bridge INS provides a harmonized alert system that handles the prioritization, classification, distribution and presentation of alerts from all equipment on the bridge. A separate user interface (CAM-HMI), provided in accordance with IMO rules, supports the bridge team in its decisions concerning action in response to alerts.

K-Bridge BNWAS

The user interface to the Bridge Navigational Watch Alarm System is provided by K-Bridge Conning. The BNWAS alarm timer is reset every time the operator uses a K-Bridge station or presses a dedicated alarm reset button.



Failure to reset the timer within its countdown period causes the backup navigators to be called. (Optional motion sensors automatically reset the timer whenever they detect activity on the bridge.)

For vessels with fore- and aft- workstations, a two-zone BNWAS solution with commando control is available. When the aft-bridge is in use, the operator switches the BNWAS to the aft-bridge: the BNWAS timer cannot then be reset from the fore-bridge. When the fore-bridge is in use again, the operator switches the BNWAS back to it (and the timer cannot then be reset from the aft-bridge).

Kongsberg ship-to-shore connectivity

Automatic chart updates and other services are optionally available via an interface to Kongsberg's ship-to-shore secure connectivity solution. The solution includes a Malware Protection System (with rugged touch-control display), a Cisco router, and a type-approved marine computer.

K-Bridge MFDs

The operator stations in K-Bridge INS can all be configured as multi-functional display (MFD) units. Each has a default function – Radar, ECDIS, Conning or CAM-HMI – but the operator can switch freely between multiple functions.

An important safety feature of K-Bridge INS is that the functions on the MFDs remain active – and able to indicate danger – even when they are not displayed. When ECDIS for example is displayed, the Radar function continues to operate and will alert the operator of a category A alarm by turning the Radar function button on the top bar red: the operator can then switch instantly to Radar and handle the alarm situation.

ECDIS behaves the same way: while Radar or another function is displayed, ECDIS will alert the operator of any grounding or other category A alarms by turning the ECDIS function button red.

The use of MFDs enhances the availability of the primary bridge functions, since losing a display unit (through isolated equipment failure) is not critical if all functions are available on all display units. It also means that operators are no longer forced to perform particular tasks from fixed locations but can instead select the most convenient location at the time.

K-Bridge Conning

K-Bridge Conning combines key information from the navigation sensors and other vessel systems to provide a comprehensive conning overview. Navigators can use it to see data from the weather sensors, autopilot, rudders, thrusters, and propulsion system in addition to the own-ship sensor data. K-Bridge Conning can also be used to view CCTV from different cameras mounted around the vessel. Finally K-Bridge Conning provides the user interface to the BNWAS and off-course alarm functions.

K-Bridge Multi-indicator

K-Bridge Multi-indicator is a 13" display that is MED-certified for use as any one of the following:

- Rudder angle indicator (ISO 20673-compliant)
- Rate of turn (RoT) indicator (ISO 20672-compliant)
- Propeller shaft RPM indicator (ISO 22554-compliant)
- Propeller pitch indicator (ISO 22555-compliant)

The Multi-indicator can be installed individually or in groups. In addition to its MED-certified applications, it can display other types of digital instrumentation (for example, speed, depth, thruster usage, fuel consumption, and much else), depending on customer requirements. A Multi-indicator can also be used, for example, to display CCTV from outside deck (or other) cameras.



ECDIS features

Standard features

- Route planning and validation
- Route monitoring
- Radar video overlay
- "Active lights" support
- Displays up to 100 ARPA tracked targets
- AIS targets and information
- EBL / VRM
- Echo-sounder monitoring and recording
- Voyage recording and replay
- Navtex interface
- IMO-defined functions
- Type approved

Docking Assistance

The Docking Assistance option provides key data for performing docking manoeuvres. The data is displayed on the chart and on an adjacent panel. It includes: speed alongships, transverse speed at bow and stern, heading, and (if required) past and predicted ship positions.

For reliable operation the module requires an EPFS, a dual-axis sea-bottom tracking speed sensor, and a rate-of-turn gyro sensor.

The Docking Assistance module interfaces with SeaAware AR enhanced visualization systems from Kongsberg Discovery. This means that you can perform docking manoeuvres secure in the knowledge that the data shown on the Docking Assistance screen is the same as the data underpinning the Augmented Reality display on which you are monitoring manoeuvres. In addition the same visual aid lines appear on the AR display and the Docking Assistance display.

Quayside aid line



Tender Tracker

The Tender Tracking option enables the operator to track all tenders operating from the yacht – including jet skis and other watercraft – in real time on the chart.

The tenders appear in ECDIS in their respective positions, each with a speed vector and optionally the tender's name and past position marks. The tenders constantly transmit their position, speed and COG to the yacht. If equipped with an optional echo-sounder and wind sensor, they can also transmit depth and wind data.

Radio equipment – including a base unit on the yacht and individual units on each tender – keeps the yacht in constant data communication with its tenders.

All tender tracking communication between the yacht and its tenders is securely encrypted.

Site Maps

This option allows user-defined maps or graphical data to be overlaid on the chart.

Site maps can represent any object at a particular location. Such objects might include submerged or semi-submerged constructions, cabling or pipelines, wind farms, or any other potential obstacles to shipping.

Survey

This ECDIS and ECDIS Planning Station option enables you to create survey lines to cover a specified sea area and then monitor survey operations along the survey lines created. The option can be interfaced to a wide range of sonars and echo-sounders from Kongsberg Maritime.



Searchlight

This Searchlight option enables you to control the vessel's searchlights from an ECDIS or Radar operator station. You can change the range, bearing, and concentration. And you can fix the beam on a location, target or mariner's note.

ECA zone

This option enables operators to create zones on the chart whose borders, when crossed by the vessel, will trigger an Emission Control Area alarm. This alerts crew to the need for immediate action to reduce emissions (for example, by reducing speed).

Sensors and external communication

K-Bridge INS manages the navigation sensors so that the best available source of a given input is always in use. All sensor input is constantly monitored and sensor statuses are clearly displayed on all operator stations.

Sensor interface

K-Bridge INS interfaces to the navigation sensors by means of a sensor interface (SINT) unit. Kongsberg offers a selection of field-tested sensors and indicators (gyrocompass with distribution and repeaters, speed log with repeaters, echo-sounder with repeaters, AIS, NAVTEX, and satellite navigation system receivers). But the system's use of standard protocols means that it is compatible with sensors from a wide variety of alternative manufacturers as well.

If a navigation sensor fails and no alternative is available, fallback mechanisms ensure the continued operation of the system.

K-Bridge INS also enforces the principle that all displays units use the same sensor data at all times.

If "black box" sensors are in use, the user interface to them is provided by K-Bridge ECDIS and / or Radar.



K-Bridge VDR

The K-Bridge VDR is a cost-effective way to meet mandatory SOLAS requirements for voyage data recording. Most of the data required by the VDR is available anyway on the local area network provided for K-Bridge INS, and because the VDR is connected to the same network, hardly any additional cabling is normally required to install it.

For investigating incidents – or, more routinely, for checking the operation of the VDR or reviewing voyage history – a VDR replay tool is available for use on the Planning Station.

Control of bridge auxiliaries

To save panel space and for mariners' convenience, on-screen panels for operating subsystems can be provided on display units. Options include on-screen controls for window wiper / washer systems and for bridge illumination lights, deck lights, and navigation lights.

Radio and satellite communication

For a complete K-Bridge INS installation, Kongsberg delivers GMDSS communication solutions for different areas of vessel operation. Basic systems can be extended to include a Ship Security Alert System and / or UHF, VHF and SATCOM equipment (according to ship owners' preferences for ship-to-ship and ship-to-shore communication).

Life-cycle support

Purpose built, maintained to last. Our life-cycle management service assists customers through all phases of their system's life-time – including design and commissioning – as well as during the system's operational life.

Solid in-house expertise in system design and user requirements enables us to provide solutions that are both fit-for-purpose and operationally efficient.

A common base technology ensures a robust system design based on few - and reliable - parts. It provides an excellent and economical foundation for the design of diverse vessel systems.

Our systems also have a distributed, modular, and open architecture. They employ industry-standard communications networks, and – combined with the use of the same standard hardware components for multiple applications – this results in:

- Increased reliability
- Competitive life-cycle support
- Easy up-grade solutions

Frequent updates

We offer continuous hardware and software upgrades to keep your vessel operating at maximum efficiency. Our modular designs make it easy to add new functionality to systems without replacing existing equipment. We can therefore offer frequent upgrades to keep your system evergreen.

Training

Qualified personnel are a major asset. We offer training courses so that you can help your employees to keep their skills and qualifications up to date.

Residential, onboard, or remote/online courses and workshops are available covering all major aspects of vessel operation using Kongsberg systems. Training can also be customized to your requirements.

PLANNING, DESIGN & DEVELOPMENT	PROJECT ENGINEERING & DEVELOPMENT	INSTALLATION & COMMISSIONING	OPERATION & MAINTENANCE	MODERNISATION
		Technical	support »	
Technical consulting »				
	Design and	software engineering »		
		Field service »		
			Repairs and	spare parts »
			Optimization and	modernization »

Global support: 24/7

We are always there when you need us. Our customer service organization is designed to provide high-quality, global support whenever and wherever it's needed.

Service contracts are available from KM that offer global support from a network of local service and support facilities. These facilities are placed at strategic locations world-wide, and each is equipped with its own inventory of spare parts. Together they form an extensive support network that helps shield you from the cost of service visits from engineers who must travel long distances to reach your vessel.

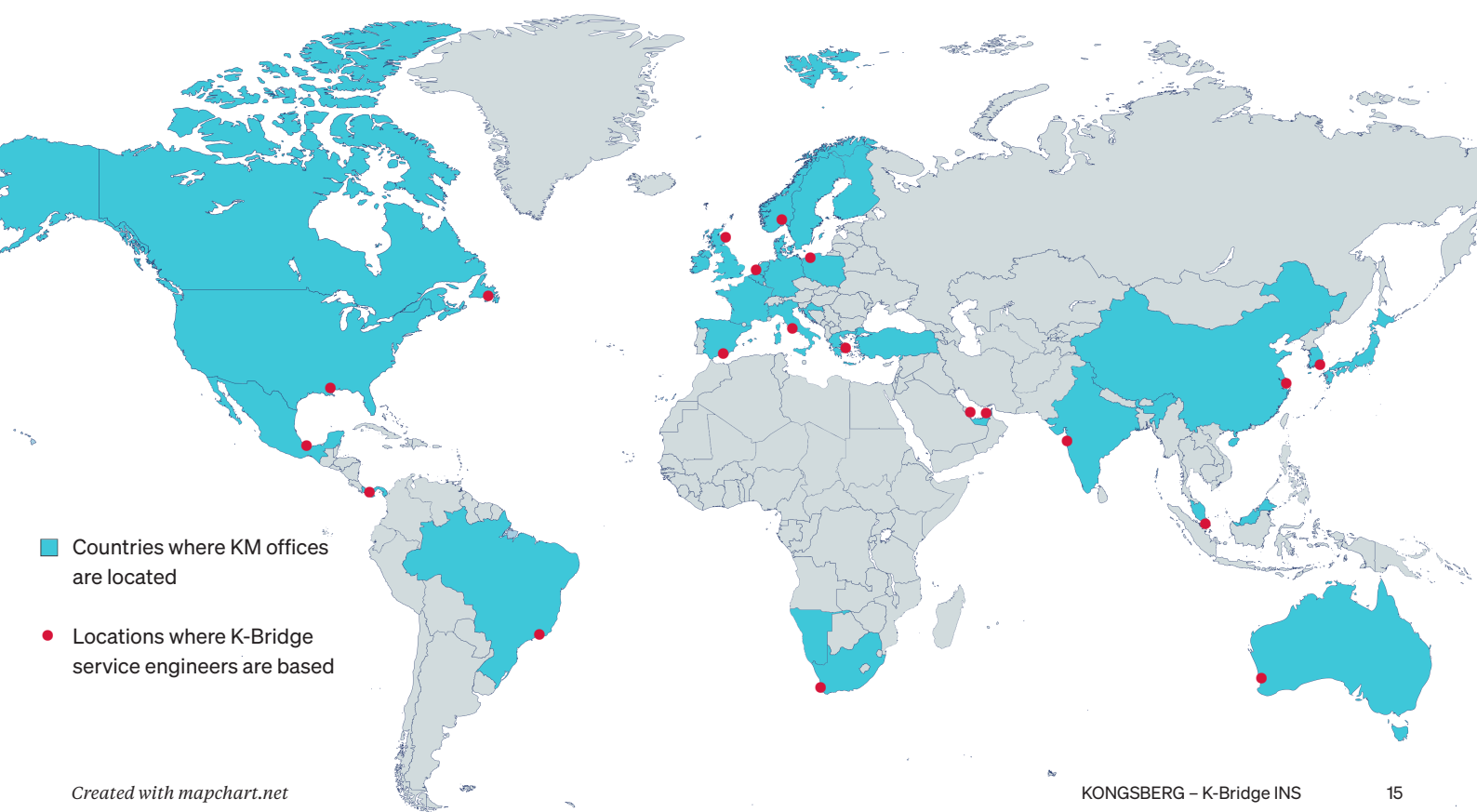
Maintenance work is carried out by expert field-service engineers under the direction of a dedicated technical account manager.

The technical account manager works closely with your personnel to maximise system up-time and performance.

This involves anticipating necessary maintenance work and scheduling it at the optimal time in the operating life of the system.

As well as maximising system up-time, a service contract gives you improved cost control by allowing you to plan (and budget) for maintenance ahead of need. It also enables KM to serve you better by developing a detailed understanding of your needs.

For customers who like to keep their KM navigation systems in use for longer than the normal operating and commercial lifetime of the equipment, specially extended service contracts are also available.





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