NAVIGATION SYSTEMS
FOR MEGA YACHTS
Raytheon Anschütz has the expertise and experience from over one hundred large mega yacht projects, which makes us one of the leading mega yacht navigation system integrators. When deciding for Raytheon Anschütz navigation systems, our customers decide for a professional solution, proven day by day. Advanced features ensure a safe and most comfortable cruise, whereby standardized user interfaces, harmonized product design and state-of-the-art technologies enable the realization within very individual bridge designs.

Thanks to dedicated support throughout the whole project and a close relationship with leading shipyards for mega yachts, almost any individual owner requirements can be implemented.
“Having our own hands on the core navigation products enables us to provide excellence in navigation”
Leading expertise
in navigation system integration

Raytheon Anschütz has stood for leading marine technologies for more than 100 years. After inventing the well-known gyro compass, Dr. Hermann Anschütz founded the company in 1905 under the name of Anschütz & Co. in Kiel, Germany. Over the past decades the products have proven their reliable performance and supported the crews in their safe navigation, in any situation, around the world. In this moment, about 35,000 ships and their crews onboard rely on Raytheon Anschütz navigation and communication systems.

Customers from all over the world trust in Raytheon Anschütz as one of the most experienced and capable navigation system integrators. Raytheon Anschütz is committed to designing advanced, safe and optimized system solutions for the respective customer. This includes individual advice and technical support for the customer, both during project stage and after sales. To ensure a high level of quality and sustainability, all important processes are monitored within an Integrated Management System which complies with international standards such as ISO 9001 and ISO 14001.
Cutting-edge navigation technology
made in Germany
Synapsis NX
Integrated Navigation System

Raytheon Anschütz has further innovated the Synapsis Intelligent Bridge Control series. With Synapsis NX the Integrated Navigation System (INS) enters the next level with regard to flexibility and scalability, integration capability and data exchange, functionality and operation.

The Synapsis NX INS covers a new generation of task-oriented multifunctional workstations, advanced data management, various sensors for target detection, heading, position and further navigation data, and steering control systems. The workstations integrate (chart-) radar, ECDIS and conning in any desired combination, allowing access to any function at any workplace on the bridge. Solutions for enhanced situational awareness and security, including the integration of camera systems, can be seamlessly added.

Synapsis NX is type-approved according to IMO performance and IEC test standards MSC.252(83)/IEC 61924-2 for integrated navigation systems. Compliance with these standards means higher safety as well as clear operational advantages over non-compliant systems.

The INS automatically observes the “health status” of all connected workstations and sensors and informs the operator on a central display at a glance. The consistent common reference system (CCRS) continuously monitors sensor quality to provide the entire navigation system with a best set of sensor data. The central target management associates tracked targets from individual radar and AIS sensors to create new system-level targets, which are further processed throughout the navigation network to appear consistently on any radar or ECDIS display.

Furthermore, the intelligent handling and presentation of bridge alarms reduces operating stress but also directs attention to critical alerts and thus significantly increases safety.

Synapsis NX uses state-of-the-art standardized hardware components and modular software to allow the design of very individual and future-proof bridge systems. This includes unsurpassed flexibility for integration of third party applications as specified by the owner (e.g. automation, engine remote control or DP system).
Example: Integrated bridge and navigation system in a modular configuration, combining navigation workstations and further ship operations with a seamless "look and feel".
Synapsis comes with a smart “next generation” system architecture – this is what the “NX” stands for. Synapsis NX Workstations can be easily configured according to customer’s individual requirements.

The workstations share data and information via Ethernet (LAN). By utilizing standardized hardware components through the entire bridge navigation system and the LAN-based radar transceivers, and by having all sensor information enabled to LAN, the architecture increases redundancy, flexibility and scalability. Furthermore, the new system architecture reduces complexity of the system for easier installation, higher reliability and better resistance to failures. With regard to safety, the system concept is designed so that a failure of a component is compensated by the redundancy concept - without loss of functionality.

ULTRA-COMPACT PCS

All Synapsis NX Workstations are based on the ultra-compact, powerful Small Marine Computer (SMC). The SMC features a solid-state disk and passive cooling to increase reliability and lifetime.

LAN-BASED RADARS

The NautoScan NX radar transceivers use state-of-the-art network technology. Key benefits are the redundant Gigabit LAN video distribution and the raw data processing on workstation level for high flexibility and optimized performance of an individual end-user application.

SEAMLESS DATA DISTRIBUTION

With the NautoPlex Serial to LAN converters, all serial sensor data as well as status information is collected and distributed via LAN to every workstation. The result: reduced cabling, enhanced flexibility.

REMOTE DIAGNOSIS OPTION

Synapsis Remote Diagnosis is a new service which allows Raytheon Anschütz’ shore-based service experts to check actual system status and error logs via a secured connection. This ensures optimized service actions with predictable results and avoids unnecessary attendance.
Radar transceiver 1

Switch 1

Sensors 1
e.g.: GPS 1, GPS 2, Log,
AIS, Echosounder,
Navtex, Wind, RPM

Nautoplex 1

Distributor unit

Voyage data recorder (VDR)

Gateway

Steering repeater

Gyro

Gyro

Operator unit

Rudder

FU tiller

NFU tiller

NP 5000

Mode selector

NFU tiller direct

Radar transceiver 2

Switch 2

Sensors 2
e.g.: GPS 1, GPS 2, Log,
AIS, Echosounder,
Navtex, Wind, RPM

Nautoplex 2

FU amplifier

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With the new generation of Synapsis NX, Raytheon Anschütz offers an efficient approach contributing to a seamless and clear bridge system design whilst providing an advanced level of integration with other bridge systems.

Multifunctional workstations allow operation of a variety of sensors and navigation aids directly on the screen, from any bridge workplace. Thanks to the merits of modern network infrastructure and components, operators can also access further computers and applications directly on the screen – our solutions offer virtually unlimited flexibility in enhancing the functionality of the system with additional and individually selected applications. Thus, neither the workstation hardware nor further computers or the operation devices of various navigation aids need to be installed on the bridge but can be located in a 19” rack off the wheelhouse in a separate technical room.

DIGITAL KVM MATRIX

Advanced bridge system solutions including the integration of virtually any third party software or workstation can also be realized through the use of a digital KVM systems.

Computers as well as displays and operation controls are connected to a digital matrix system, which can be operated on the screen of the Synapsis NX Multifunctional Workstation or the 12” Synapsis NX Touch Panels. A fingertip enables the remote display of virtually any application / PC at a dedicated workplace – a true “any function, any place” principle, including a hard wired fallback to primary connections as redundancy for the matrix itself. This means a highly flexible and ergonomic integration of the navigation and further bridge systems according to owner’s choice, and also with regard to interior design.

Highest flexibility for advanced systems
19" Rack

Computers, data collectors and switches, as well as further boxes can be installed in a standard 19" rack, delivered in a customized configuration, fully wired and tested.

**HARDWARE SEPARATED FROM THE BRIDGE**
Thanks to its capable network infrastructure and smart system components, Synapsis NX allows moving hardware off the bridge and enables an appealing interior design for the entire wheelhouse. Further, this contributes to a flexible and ergonomic console design.

**ALL DATA ON ETHERNET**
All data of navigational sensors, radar, ECDIS and other systems is distributed and made available within a redundant LAN. Each connected PC receives relevant data automatically. Data is bundled, shared, processed, and presented by the end user applications - as needed by the operator.

**RACK INSTALLATION ANYWHERE ON BOARD**
Computers, data collectors and switches, as well as further boxes can be installed in a standard 19" rack, delivered in a customized configuration, fully wired and tested. Through integration of capable DVI extenders, the distances between hardware and displays can range up to 140 meters.
Get the full benefit of a professional integrated navigation system

FLEXIBILITY AND DESIGN

- State-of-the-art and ultra-compact hardware design
- Lean console design with separated hardware possible
- Superior hardware lifetime performance
- Easier spares logistics for fast and low-key servicing
- Flexibility in system design through smart system architecture
- Functions moved from panels to displays
- Integration of automation, DP and other systems (owner’s choice)
- Simplified installation, great flexibility for updates, upgrades and extensions

SAFETY AND PERFORMANCE

- IMO-certified integrated navigation system
- “Any function, any place“ increases awareness and capability
- Built-in redundancy and maximum data availability
- INS functions such as CCRS, central target management and central alert management
- Advanced features of the navigational applications
- Modern HMI with user-centered design and intuitive workflows
- Precise, state-of-the-art sensors
“Our job is to engineer and support the most advanced bridge and navigation systems”
Synapsis NX is based on multifunctional workstations, which can be easily configured according to customer’s individual requirements. The navigational software applications of (chart-) radar, ECDIS, conning run in parallel on one computer. As an option, SynGuard can be added to the system to improve security and situation awareness. Third-party applications can be integrated in accordance with hardware requirements or alternatively a digital KVM matrix can be used.

As a standard, Raytheon Anschütz provides the workstations with the following applications in any desired combination:

- Synapsis Chartaradar NX
- Synapsis Radar NX
- Synapsis ECDIS NX
- Synapsis Conning NX

Raytheon Anschütz’ applications use a standardized HMI, provide central and local change of colors and dimming and share individual and situation-specific user settings. The workstations also integrate data and operation of other systems such as autopilot, AIS or NAVTEX.

The Bridge Integration Platform (BIP) is an innovative, service-oriented infrastructure software framework, which is the heart of each workstation. It concentrates and processes all central services of the navigation system, such as consistent data handling and data distribution (CCRS and central target management), system and sensor health status monitoring, redundancy and backup management, intelligent alert management, and settings.

Depending on the required tasks at a dedicated workstation, the data is bundled, shared throughout the network, locally stored and presented by an end user application (such as radar or ECDIS). This not only ensures unsurpassed availability of data and function, but also grants great flexibility for future modifications or upgrades of a respective workstation functionality.

LARGER SYSTEM SOLUTIONS

Raytheon Anschütz can offer customers larger bridge system solutions by integrating software and workstations of OEM’s. This includes but is not limited to ship automation systems, sonars, dynamic positioning systems or camera systems. Raytheon Anschütz teams with various OEM’s to offer a harmonized and fully functional integration and to ensure smooth operation and professional maintenance services.
Synapsis Radar NX

THE NEXT GENERATION RADAR SOFTWARE FOR EFFICIENT COLLISION AVOIDANCE

Synapsis (Chart-) Radar NX represents the next generation radar software. Consistent with the human centered software design, a team of experienced marine radar users, UI experts and skilled SW developers created a remarkably intuitive user interface. Optimized grouping of data and current settings allow a superior overview and instant determination of the situation and interpretation of the radar picture. The quick access bar makes the most often used operations and functions available at a fingertip, including touch operation.

The Synapsis Radar NX features an advanced tracker. Together with the lossless digital video distribution of the NautoScan NX radar transceivers this results in an optimized performance in tracking and anti-clutter processing. Combining multiple radar transceivers via the optional radar video merging function provides a single, unobstructed radar video to the users (also available as a merged radar video overlay on ECDIS NX). Radar NX supports a wide range of advanced functions.

High performance Synapsis Radar NX
FEATURES AT A GLANCE:

- Fully type approved according to IEC 622388 Ed. 2.0
- Advanced tracker and raw video processing for high radar performance
- New and efficient UI based on Synapsis NX human centered design principles
- Little or no training needed, proved by users such as masters, pilots and trainers
- Touch screen support with mandatory radar functions at a single touch
- Support of user profiles; each user is able to store their favorite settings
- High-fidelity lossless radar video via LAN (NautoScan NX radars)
- Support of radar video merging of multiple radar sensors and distribution to ECDIS
- Compliant to the highest integrated navigation system (INS) standard supporting centralized
  - Sensor management
  - Alarm management
  - Target management
  - System status information
Synapsis ECDIS NX

ADVANCED ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) IN A MODERN, STATE OF THE ART DESIGN

Synapsis ECDIS NX incorporates latest software technologies and an intuitive user interface based on customer feedback and user experience.

It provides intelligent and easy to use wizard based voyage planning and chart handling functions to reduce daily workload to a minimum, with mandatory ECDIS functions at a single touch.

User and task oriented profile settings support safety and usability. Being fully compliant to rules and regulations, having support of Admiralty Information Overlay (AIO by AVCS) and being prepared for S-100 charts make the Synapsis ECDIS NX the first choice for a modern, future proof bridge design.

Optional upgrades in functionality beyond IMO-requirements include highly precise track control Cat. C, digital radar video overlay, weather data overlay, tender tracking, and additional chart formats such as ARCS and BSB.
Work and time can be saved by taking advantage of the online chart updating service. Connected to the broadband of the mega yacht, it only will take minutes to update all necessary charts for the voyage.

The integrated weather overlay combines sea chart and weather chart in one display to optimize route planning with regard to fuel efficiency, safety, on-time arrivals and travel comfort. A comprehensive set of weather parameters can be chosen and presented as values or symbols on a separate layer as needed. If individual weather forecast values exceed the preset limits, the values are shown graphically as weather warnings. Synapsis ECDIS NX imports the weather data via a standardized GRIB file from a weather data provider of owner’s choice.

The Synapsis ECDIS NX can be extended with a tender tracking module. Tender boats send encoded signals with navigational data (including depth, making it possible to explore narrow bays) which are processed and displayed on the screen. To ensure full privacy, those targets are only visible on the own ECDIS system.
Synapsis Conning NX

ENHANCED SITUATIONAL AWARENESS AND SIMPLIFIED WATCHKEEPING

Synapsis Conning NX is the centralized navigation data display for the ship’s command. It presents bridge navigation and further data easily at a glance and contributes to efficient and safe navigation.

Conning NX is a versatile and extremely capable software. It was developed on the valuable feedback from users and customers and focusses particularly on the flexible configuration of display pages.

Thanks to its modular and user-orientated structure, Conning NX can integrate various analogue and digital displays. Customer-specific, switchable elements can be created for dedicated functional pages and to actuate the respective hardware interfaces. Operators can switch between the pages with a single fingertip.
The Conning NX software features a capable editor mode which enables the creation of customized display pages with unsurpassed flexibility. The editor contains a stock of flexible graphical elements — just like widgets — which can be selected, adapted and combined as needed. Thus, the creation or modification of display pages requires neither a lot of time or great effort — it can be done by selected yacht service partners while berthing.

### FEATURES AT A GLANCE:

- Additional situation awareness, easily added to a system
- Not only a display: Conning allows operating various functions (depending on the individual configuration)
- Individually adapted to the specific type of equipment
- Pre-configured pages for different maneuvering situations
- Flexible application design allows creation of individual graphics, pages, and functions — including control of external hardware
- Central HMI for the advanced system functions provided within the integrated navigation system (INS)

### UNSURPASSED FLEXIBILITY

### CAPTAIN’S DISPLAY

The Captain’s Display is a customized navigation display, being linked to the navigation ethernet network with a single wire connection and combining selected navigational data on a flat-screen. It makes navigational information available in the captain’s cabin, but can also be installed at any other location on board of the mega yacht. Thanks to the individual — and almost unlimited — configurability of the display, a live experience of navigation can also be provided within crew areas and even to passengers and guests on board.
Raytheon Anschütz introduces a new 12.1” Panel-PC with touch display, which can serve as the hardware platform for a central alert management system on INS or bridge level, or alternatively as the hardware platform to control existing or even new functionalities. The functionality provided with these Synapsis Touch Panels (STP) includes but is not limited to window wipers, air horn, search lights, interior and exterior lightings, remote engine control, stern and bow thrusters, pumps, KVM switches, power management and dimming.

The GUI is built upon Raytheon Anschütz’ recently unveiled Conning NX software and is in line with all the other navigational applications. The flexible software elements will enable an easy adaptation or upgrade to changing requirements and new functionalities in future. The external hardware is interfaced “below the surface” — either with the PCs directly or via central data collectors within the bridge system.

The benefits are obvious: The actual number of devices on the bridge is significantly reduced, a direct contribution to complexity reduction and ease of use. The devices focus on providing a seamless graphical look and feel for all core control systems; furthermore the graphical HMI of the STP will be the same as of the navigational displays. Synapsis Touch Panels are the ideal complement to existing foil panel solutions for rudder steering, DP system or engine controls.
Human-centered software design

In times of ongoing digitalization and integration aboard, the design of new navigational software is concentrating on “user needs” and the “human element”. A “human-centered” software design improves right situational assessment and decision making, eases work of navigators, and altogether increases safety.

When designing this new “NX” generation of navigational software, Raytheon Anschütz adopted a new course of continuous user participation. The goal was to design intuitive and consistent user interfaces and operation concepts which meet or even exceed the expectations of the operators, and which support their common interaction patterns with regard to daily tasks and use cases.

The agile development process took more than 24 months and included various workshops with navigators and nautical experts. The process covered a detailed analysis of tasks and use cases, insights from international research projects on bridge ergonomics and operations, and a phase of prototyping with selected users.

Now Raytheon Anschütz has launched the new Synapsis NX series. Synapsis NX incorporates latest software technologies, and it is the world’s first navigation system with a user-defined interface design in order to offer an unparalleled intuitiveness in use.
NautoSteer®
advanced steering control

PROVEN ANSCHÜTZ STEERING PERFORMANCE WITH BUILT-IN RELIABILITY

NautoSteer AS is the latest generation of Anschütz steering control. All important components such as follow-up amplifiers, autopilots, interface units and alarm monitoring units are connected via redundant CAN-bus systems, providing most secure data communication throughout the whole system.

- Flexible system configurations in order to fulfil sophisticated requirements
- Built-in reliability with CAN-Bus technology
- Fail-to-safe principle with integrated steering failure and wire-break monitoring
- Clear operation in emergency situations helps the crew when time is crucial
- Comfortable operation with take-over or give-over of steering control positions
- Central alarm reset and central dimming
- Ease of installation with simplified wiring and computer-based commissioning

NautoSteer AS is available in customized configurations for single and double rudder with follow-up and non-follow-up controls.
Anschütz Autopilots

Anschütz autopilots are well known on the market for their excellent steering performance, accuracy and reliability. Together with ECDIS, a track control system can be offered.

Anschütz NautoPilot® 5000

The NP 5000 features a 5.7” TFT color display with touch screen operation. A selection of different day and night color palettes are available, which fit perfectly with the screen design of all the other bridge displays. Most advanced features for a safe and comfortable cruise are included. As an example, the new acceleration monitor will avoid damages during sharp turns at high speed, whereas new modes for course control and high precision steering allow most accurate navigation even in narrow waters.

Anschütz Gyro Compass System

The Anschütz Standard 22 gyro compass ensures highest accuracy in manuevering and position keeping. The gyro compass features a unique technical design with a gyro sphere that is completely surrounded by liquid. This results in a high resistance to shock and vibration and thus offers reliable and accurate heading information. For customers who decide upon a maintenance-free solution, the new Standard 30 MF hemispherical resonator gyro compass is available.
Common look and feel on the bridge

A well thought out bridge design contributes to fulfilling the demands of the owner and the interior designer regarding attractive wheelhouse surroundings, making the bridge a comfortable public area containing only indispensable devices for navigation and control. With more intelligent system functions and the new generation of multifunctional workstations, Raytheon Anschütz offers an efficient approach to a seamless and clear bridge system design.

Furthermore, Raytheon Anschütz can conduct individual design studies in close cooperation with shipyards, designers and 3D modelers. The merit of this cooperation is to offer various visualizations of individual bridge arrangements which take into account technical feasibility as well as ergonomics, spacial requirements and attractive design.

**SEAMLESS DESIGN OF HARDWARE CONTROLS**

BlackVelvet Advanced Design is a new, modular and customizable foil panel solution designed and manufactured by Raytheon Anschütz, which allows creation of an eye-catching, seamless bridge design with standardized HMI for various bridge control devices. The benefit is having a unified surface design, with common lighting, colors, and fonts, as well as foil-impressed push buttons for a common haptics.

The foil panels are based on reliable CAN-bus technology and feature newly engineered, flexibly programmable interfaces to connect with third-party operation devices, for example engine remote control, bow and stern thrusters or azimuth controls. Using the panel solution, formerly inhomogeneous control devices of different manufacturers can be adapted to the well accepted Anschütz design and haptics.

The new Synapsis NX Touch Panels are a perfect complement to this solution, focusing on a consistent look and feel, flexibility and the highest level of functionality.

**SPACE CLEAN DESK DESIGN**

Multifunctional workstations allow operation of a variety of common sensors and bridge systems — including navigational aids such as AIS or NAVTEX — directly on the screen, from any bridge workplace. Thus, operation devices of the respective equipment no longer need to be installed on the bridge but can be located in a rack offsite the wheelhouse.

The reduction of displays and operation devices on the main control bridge contributes to a clean, lean and flexible bridge design.

The smart system architecture also makes it possible to separate and locate the workstation PC’s and other hardware in a 19” rack in a technical room, away from the bridge and the consoles.
We support your dreams
Demanding retrofit solutions for mega yachts

The Raytheon Anschütz expertise in tailoring professional navigation solutions to customer-specific needs is not limited to mega yacht newbuild projects. Having deep knowledge in all core navigation systems concentrated at one location makes possible the seamless development of customer-specific solutions even for demanding retrofit purposes.

Thanks to many years of experience with upgrades, updates and replacements of navigation equipment from various generations, Raytheon Anschütz has gained an international reputation in retrofitting any kind of navigation systems on board of mega yachts.

Our retrofit solutions allow replacing virtually any existing systems on board, keeping the focus on longer lifetime and more advanced functionalities compared with the replaced equipment. All of our products are backward compatible and well suited for retrofit purposes. In addition, the system architecture of our current generation of navigation systems offers highest scalability for future upgrades, expansions or modernizations.

Since retrofitting always requires dedicated planning, our specialists from project management and service provide all capabilities to develop and realize customized retrofit solutions within the shortest period of time. The benefit is always to have latest technology on board of a mega yacht whereas running, non-matured systems can remain with full functionality. We offer retrofit solutions for single products and subsystems but also for full integrated bridge and navigation systems.
Demanding retrofit solutions for mega yachts
Wherever you navigate.
We are with you.

Mega yacht customers can expect dedicated support from our experienced competence team consisting of highly qualified engineers, salesmen, project planners, service coordinators and service technicians.
Raytheon Anschütz is renowned for flexible handling of customer needs, reliability and continuity in customer relations and excellence in customer service. At Raytheon Anschütz, a competence team has the mission to further enhance the dedicated care for customers of mega yacht projects, starting with early consultancy and design suggestions through customer requirement engineering to setting in operation and after sales service.

The competence team is an experienced and specialized point of contact for all mega yacht customers, offering competent and immediate support with regard to the special characteristics and needs which may arise during a mega yacht project and later on, during operation.

**CUSTOMER CARE AND SERVICES**

**PROJECT MANAGEMENT**

We offer extensive know-how and personal support for newbuilding programs and retrofit solutions. Experienced engineers guide each mega yacht project from the first outline and specification of systems through realization and on-time delivery to setting in operation. Our customers benefit from having one dedicated point of contact, reachable at any time.

As a professional navigation system integrator our solutions fulfill class requirements without compromises.

The Raytheon Anschütz project management includes:

- Coordination and project planning in project-specific engineering teams
- Competent and individual advice regarding technical feasibility
- Professional order processing
- Technical support with the know-how of a manufacturer
- Requirement engineering and integration of customer-specific equipment
- Total system design including wiring, circuit and connection diagrams
- Approvals, factory acceptance test, setting to work
Specialized service for mega yachts

We service all delivered equipment wherever cruise is taking place – mega yacht owners can count on reliable operation and maximum cruise time around all the world’s top yachting spots. Our experience in mega yacht business has grown from more than one hundred large projects.

Being well-known as one of the largest maritime service providers, we offer maintenance and repair as well as refit for the whole life cycle of a ship – our customers get the full benefit of the know-how and experience of our highly skilled coordinators and supporters, available 24 / 7 / 365.

Our central service coordination team is the dedicated point of contact for mega yacht service around the world. Depending on the needs on board, our team clarifies the situation and sends out trained and well-suited technicians to solve any problem within the shortest possible reaction time. Recognizing the importance of excellent, reliable and diligent service attendance, Raytheon Anschütz has established a program to ensure that only specially trained technicians are sent out to services on board of mega yachts. All technicians are selected on the criteria of being highly qualified to deal with cutting-edge ship borne technologies, being familiar with the characteristics of mega yachts and their environment, and being of trustworthy appearance.
Worldwide first-in-class customer service
We are proud
to work with some of the world’s most prestigious shipyards: