Wärtsilä Electrical & Automation - Part of Marine Solutions
MARINE SOLUTIONS

We are the leading provider of innovative products and integrated solutions in the marine and oil & gas industries. As a leader in our fields, we need to continuously develop and transform ourselves to meet changing customer needs. We have a passion to do right for our customers and the environment.
MARINE SOLUTIONS THE MOST COMPLETE MARINE OFFERING ON EARTH
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<td>• The most competitive products and delivery process for the marine industry</td>
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Wärtsilä Electrical & Automation - Part of Marine Solutions
Who we are

Wärtsilä Electrical & Automation is a leading systems partner to the marine industry. We provide electric propulsion and drives, power generation and distribution systems, navigation, automation and communication systems, dynamic positioning, safety and security solutions, entertainment systems, as well as sonar and sensor technology for vessels of all types and sizes. Our products and solutions are state-of-the-art, efficient, reliable and cost effective, and are supported by 24/7 customer service around the world.
We deliver innovative and reliable system solutions and products designed to meet the most precise requirements for ships of all types and sizes.
## WÄRTSILÄ E&A – OUR CORE PRODUCTS AND SOLUTIONS

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WÄRTSILÄ NACOS PLATINUM

Most of all cruise ships world-wide are equipped with Wärtsilä NACOS Platinum – the leading navigation automation control system

- One common software platform for navigation and automation applications for all kind of ships
- Common HMI for navigation, automation and DP, based on a user centred design (usability)
- Maximum of flexibility, scalability and modularity on hardware and software side for the optimum customer approach
DIESEL-ELECTRIC PROPULSION SYSTEMS

Our innovative diesel-electric propulsion systems providing up to 28 MW of power for a wide variety of vessels with special requirements. With more than 200 installations worldwide, our propulsion systems deliver power for cruise liners and ferries, cable laying vessels, heavy-lift jack-up vessels, research and offshore vessels and mega yachts – with a combined total of more than 3.000 MW.

- Particulary economic, environmentally-friendly and reliable
- Simple to operate and control while facilitating good positioning properties as well as low noise and vibration levels
SHAFT GENERATOR SYSTEMS

Using shaft generators is a particularly economical and environment-friendly method of generating electrical power. Wärtsilä E&A has been delivering shaft generator systems with frequency converters since 1967. More than 450 ships have been equipped with them to date.

- Lowering of fuel costs
- Reduction of maintenance and lubricant costs
- Return on investment in 3 to 4 years
- Safety for ship and crew
- Saving in operating personnel
- Low noise level power generation
- Smaller and/or fewer diesel generator sets
WÄRTSILÄ HYBRID

Since 2007 Wärtsilä has developed, manufactured and delivered sophisticated battery/hybrid systems. These systems includes energy management control, power electronics and battery integrations.

- Fuel saving and reduced emissions
- Optimized engine operation
- Reduced engine transients
- Increased redundancy and efficient operations
- Reduced maintenance
- Increased performance
One particular solution for reducing emissions during port docking is the use of high voltage on-shore power supply systems (HVSC). Since 2004, Wärtsilä has been engaged in developing a series of modular high voltage shore connection systems.

- Up to 7.2 MVA transferable power at 6600 V/60 Hz and 45 °C
- Maintenance-friendly container design meets IEC 80005-1 and includes CSC certificate
- Usable on port and starboard sides, with electric cable reel drive that includes tension control
WÄRTSILÄ ENTERTAINMENT AND NETWORK SYSTEMS

Wärtsilä provides complete integrated entertainment solutions to enhance the passengers’ experience, whilst using the latest technologies that benefit both the owner and the environment.

- **Ship Wide Systems**
  Infotainment, SAT TV, digital signage, data networks, wireless network, cabin control, dimming systems

- **Local Entertainment Systems**
  High end - audio systems, effect lighting systems, video projection and media control systems, broadcast studios, architectural lighting solutions, stage rigging
HYDROACOUSTIC SYSTEMS

Since 1926, Wärtsilä has been a market leader in the niche of underwater acoustics for naval applications as well as for hydrographic survey and navigation applications.

- Digital Underwater Communication
- Active and Passive Sonar Arrays
- Flank Arrays
- Pinger Locator and Sonar Beacon
- Multibeam Systems
- Navigation Echo Sounder
- Mine and Obstacle Avoidance Sonars
- Customer-specific Solutions
- Integrated Solutions
Extract of References

- Automation installed on more than **12,000 ships**
- Navigation / Communication installed on approx. **5,000 ships**
- More than **100 Entertainment systems** installed
- More than **500 Drives** and Shaft Generators installed.

- Almost **600 sonars** installed on more than **300 vessels**
- Complete electrical packages for hundreds of vessels in all segments
- **400 Dynamic** positioning Systems.
Wärtsilä NACOS Platinum Integrated Navigation System

- Comprises workstations, IP radar, serial sensor interface, AIS transponder, VDR and network
- Platinum workstation provides SW package for radar, ECDIS, conning, automation, bridge alarm, VDR menu, AIS menu, chart maintenance
- Each workstation can support all bridge tasks
- Workstations are connected by redundant network
- All workstations support STM functions for AIS, route planning and monitoring
- Planning workstation has access to shore via separate Ethernet card and firewall for:
  - authorization of route optimization services
  - route exchange ship-shore and vice-versa
  - text messages and S-124 data presentation
The Workstation Comprises

- Display Electronics based on HP Compaq computer in the marine version
- 22 and 26 inch wide screen LED backlight monitors (ECDIS colour approved)
- Radar and Track control function keyboard
- Ethernet switch MOXA
- Fire Wall
- Navigation sensor interface with 5 serial NMEA inputs/outputs
- Platinum SW package
- STM functional package
The screenshot shows the own ship leaving the harbor of Trelleborg slightly off track.

This area is used in the following examples as an exercise area.

The STM functions are available based partly on AIS and partly on a data link to shore.

AIS based STM functions are executed automatically. A user interface is not required except of switching them off.

Data link based STM Functions are available after having selected a route and opened the list of route functions, one list is related to STM.
Sending Waypoints

- STM Ship are sending their next few waypoints to all other ships in the vicinity via AIS message 8 (function can be disabled)
- STM Ships are receiving next few waypoints from other ships, they are displayed as a black dashed line (display can be disabled)
- If a target deviates from its route more than a user set limit (i.e. 500 m), both are linked by a thin black line and the route is no more black but grey (not to be considered as important)
Trial Manoeuvre

- Own Ship and Target Ship are simulated on their planned route instead of a straight ahead line.
- Both are moving with actual speed or with planned speed individually for each leg of the route.
- Closest Point of Approach (CPA) is calculated with route geometry.
- In this example this new route-based CPA leads to a very small distance of 0.14 NM.
- It is called Route CPA or RCPA (straight ahead CPA would be 1.5 NM).
Ship-to-Cloud*  
Route Exchange

- Screenshot shows ECDIS with Waypoint List and STM Route Browser
- Route TRL-SVK is open and selected with right mouse button
  - TRL is Trelleborg
  - SVK is Svaneklubben
- Various functions are available for the open route, last line is STM
- The list of STM ship-to-maritime cloud functions comprises
  - Send voyage plan to shore
  - Withdraw voyage plan from shore
  - Control access of service providers
  - Use service for selected route
  - Send text message to service provider (also other ship, i.e. icebreaker)
  - Assign new voyage ID

* The cloud is also addressed as Rendezvous server.
Voyage Plan

- The voyage plan comprises the route layout with
  - Waypoints and turning radius
  - Leg distances
  - Leg speed and arrival time
- The voyage plan comprises further parameters like ship length, operating speed, load, GM, max. wave height, etc., they are added to the route before stored as a voyage plan
- The voyage plan is distributed as an XML file and stored in a redundant SQL database on-board
- Each part of the voyage plan can be read separately from the database
- Extension of voyage plan with text messages, freight details etc. is very easy
- Examples show RTZ version 1.0, now version 1.1 with STM extension is used
Send Voyage Plan

- Select a route in the route browser
- Right click to the route opens the list of route functions, one is STM
- Select Send to VIS where VIS is the cloud-based ship instance
- The route plus ship parameters, in short the voyage plan, is sent to the VIS and stored there
- Now various service providers can be authorized by the ship to have access to the voyage plan
- The voyage plan is automatically updated if changed by the ship
- Select Withdraw from VIS to delete the plan in the cloud
- Select Assign new voyage ID (UVID) to add an ID to the voyage plan, used as a reference for all communication
Control Access

- Select a route in the route browser
- Right click to the route opens the list of route functions, one is STM
- Select **Access**… to open the Authorize Identities menu, select an organization from this list
- Click to **Subscriptions**.
- Enable the desired services of the selected organization
- These services will receive automatically a new copy of this route if it has been updated
- Select **Use Service** to send the selected route as a message directly into the cloud with or without any authorization
Send Text Message

- Select a route in the route browser
- Right click to the route opens the list of route functions, one is STM
- Select Send Text Message… to open the message editor
- Enter mandatory entries for author, the receiver, the subject and body.
- Use the message browser to send a text message without relationship to a route
First Installation

- The first installation is planned on Ro-PAX ferry Nils Dacke end of September
- The challenge is not only to add another workstation to the bridge but to integrate the new STM functions into all six combined Radar/ECDIS workstations on-board
- In addition the system has to be approved by the class because it is used for main navigation purposes.
Remote Maintenance

- STM hardware can be used for remote maintenance as well
- In this case a special secured data link is applied:
  - 2-factor security (smartcards & PINs)
  - strong encryption
  - no direct connection (only via Rendezvous Server)
  - Secure File upload (virus scan during upload)
  - Session logging (video log of all actions)
- connection of the NACOS navigation system to the ship network via Firewall

Remote Service Platinum - Infrastructure on-board

Remote Service Platinum – General principle
THANK YOU FOR YOUR ATTENTION

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