



 **ZEETUG**[®]
Zero Emission Electric Tug Boat

Designer & Builder

NAVTEK
NAVTEK NAVAL TECHNOLOGIES INC.

THE WORLD'S FIRST ALL ELECTRIC TUGBOAT



Designer & Builder
NAVTEK
NAVTEK NAVAL TECHNOLOGIES INC.

NAVTEK NAVAL TECHNOLOGIES

**Our extensive know-how is based on our experience,
since 1977...**

A proud history for more than 40 years in service and is among the highest reputable companies in Turkish shipbuilding industry. NAVTEK focus on delivering innovative unique designs and engineering solutions with the best available technologies and know-how.

NAVTEK is not only a design and engineering company, but a technology firm with innovative R&D activities and cooperates with respected Universities and high-technology institutions.

By a legacy of more than four decades of design and engineering experience, we offer a large design portfolio, each tailored specifically to the defined needs of our clients. Our know-how covers the simplest barge to sophisticated ships.

Designer & Builder
NAVTEK
NAVTEK NAVAL TECHNOLOGIES INC.

SELECTED PROJECTS PORTFOLIO

POWER PLANTS



Designer of the first Self-Propelled Floating Power

LANDING SHIP TANK



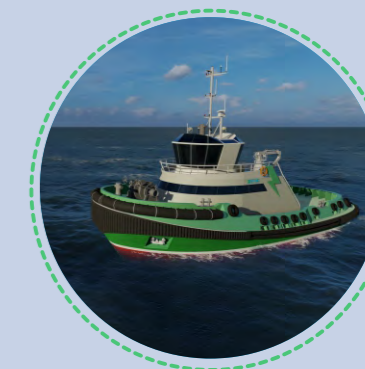
Designer of Turkey's biggest Landing Ship

VIRAZON II



Designer and Builder of the world's most advanced underwater archaeological research ship for INA (Institute of Nautical Archeology)

ZEETUG



Designer and Builder of the world's first zero emission rechargeable and all-electric harbor



ZEETUG SUCCESSFULLY
FULFILLS HER DAILY **HEAVY - DUTY**
OPERATIONS IN LINE WITH **NOT HARMING**
THE ENVIRONMENT





 ZEETUG VIDEO

ZEETUG represents the new generation green and high technology by being re-chargeable and all electric with zero emission and no noise. This innovative design allows the vessels to operate powerful with higher efficiency in line with not harming the environment.

With the aid of the modular system ZEETUG can be custom build from 5T BP up to 75T BP.

ZEETUG is also a smart tugboat; a power efficient electric tugboat, capable of managing its energy and reach on longer distances.

ADVANTAGES

ECO FRIENDLY
NO NOISE-NO EMISSION



BUDGET FRIENDLY
UP TO 85% LOWER OPEX



SMART
MANAGING ITS ENERGY



POWERFUL
HIGHER MANEUVERING ABILITY



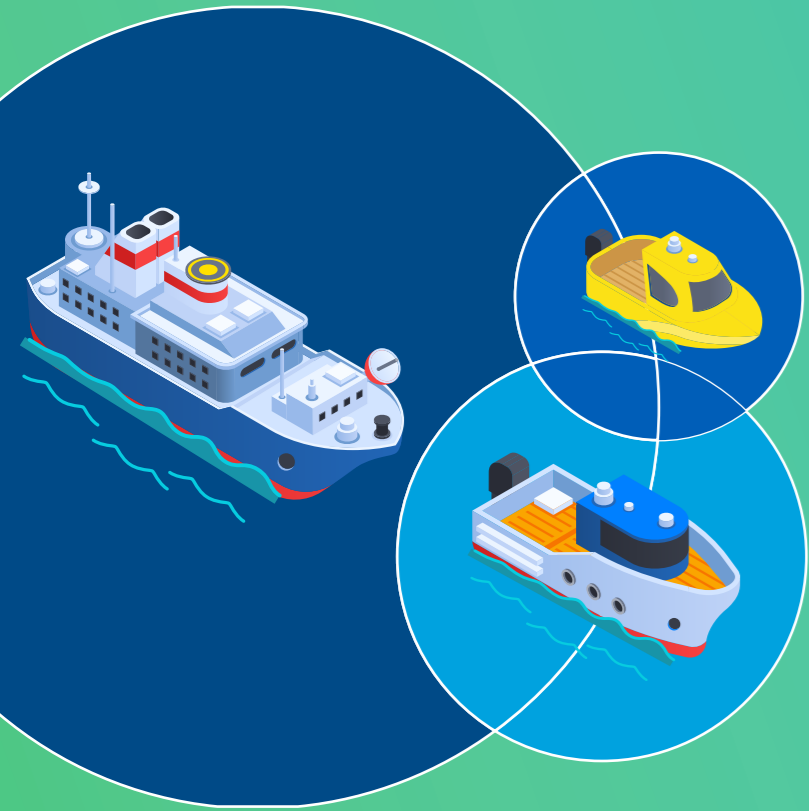
SAFE
MEETS ANY IACS MEMBERS VALID
RULES AND REGULATIONS

Designer & Builder



ZÆETUG MEANS;
AN ALL ELECTRIC
NEW CONCEPT FOR
TUG OPERATORS





THE ZEE TECHNOLOGY

Lithium-ion battery packs are used to power up ZEETUG, manufactured by our solid solution partner green craft tech specialist CORVUS ENERGY.

By the powerful electrically charged battery packs ZEETUG successfully fulfills her daily heavy-duty operations, in line with not harming the environment and enables the tugboat to operate even at nighttime with almost no noise.

With the aid of the modular system ZEETUG can be custom build from 5TBP up to 75TBP.

This technology can be adapted to any existing short distance watercraft. Our expertise also includes Conversion and Refit.

- ✓ Ferry / Landing Craft
- ✓ Coastal Fishery Boat
- ✓ Leisure Boat
- ✓ Workboat
- ✓ Sea-taxi
- ✓ Any other special short distance watercraft

Designer & Builder

NAVTEK
NAVTEK NAVAL TECHNOLOGIES INC.

WHY CUSTOM MADE?

Due to the variability of the weather conditions and operation times of the regions where the ports are located, we examine the profiles of our clients in order to obtain maximum efficiency.

We adjust the technical characteristics of ZEETUG according to the existing/requested operation profile of our clients. Thus, we ensure maximum protection of battery health and guarantee successful operations together with the NAVTEKSTEMS software.

NEEDED INFORMATION TO BUILD YOUR ZEETUG



How often the Tugs operate?



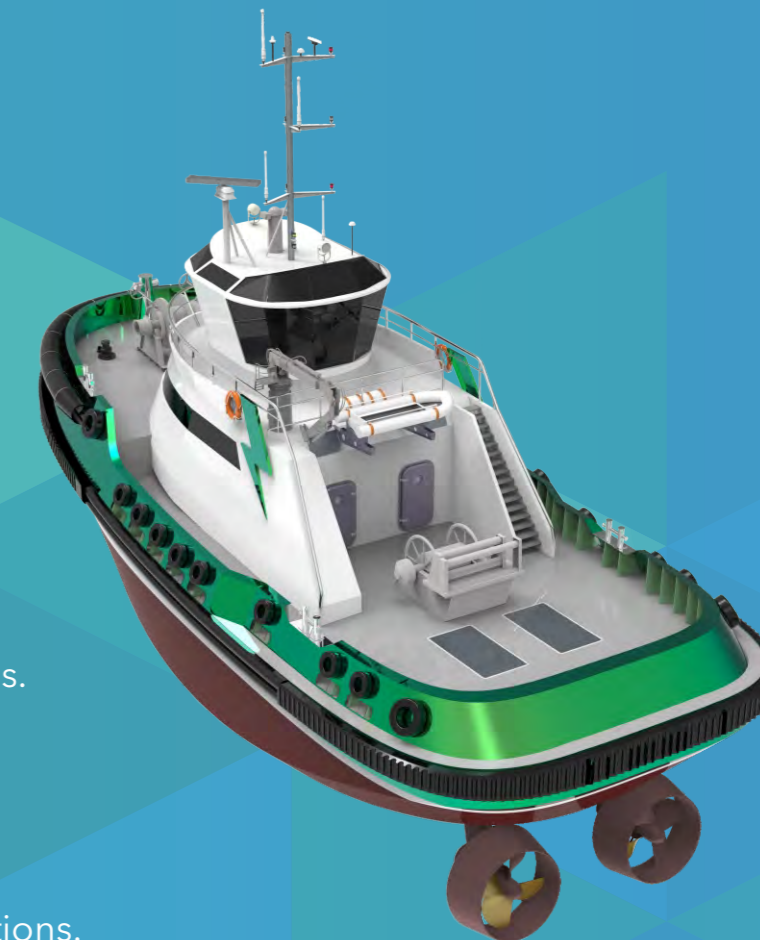
How long an operation takes?



Distances to be sailed during the operations.



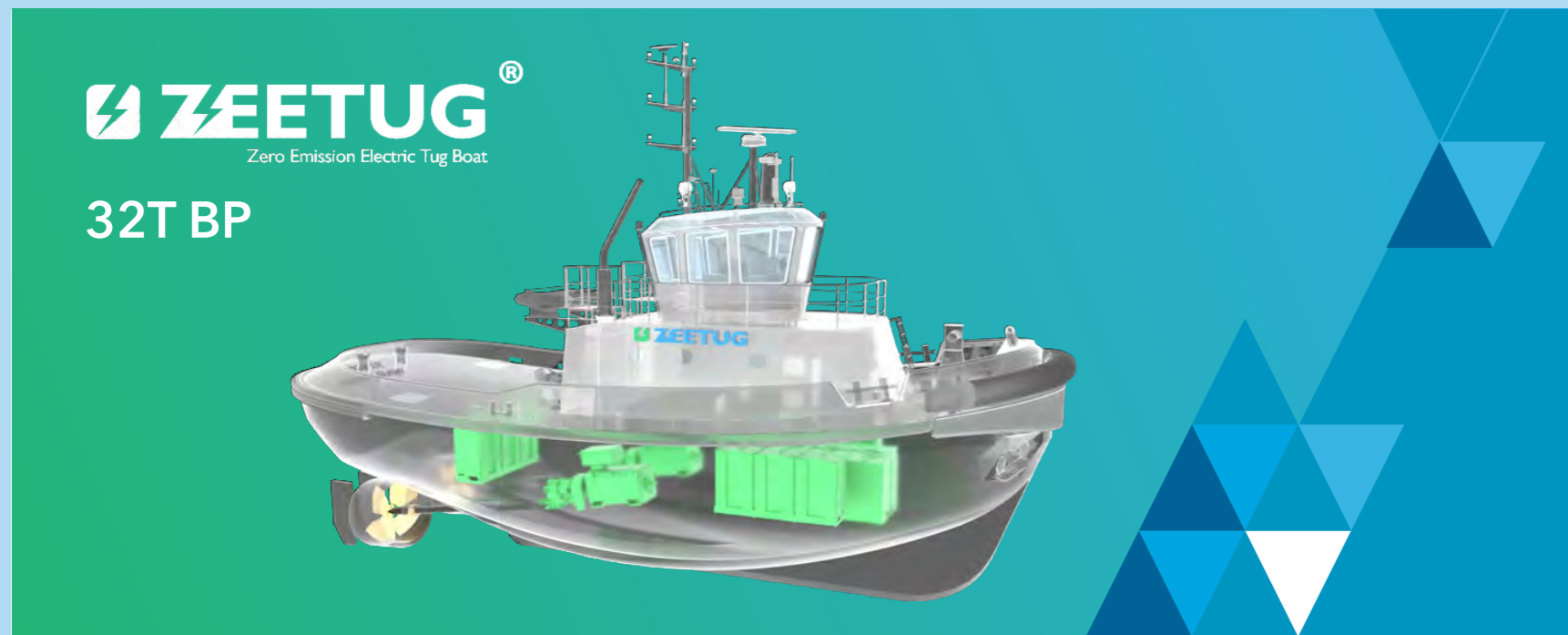
Power requirements for the different operations.



Designer & Builder

NAVTEK
NAVTEK NAVAL TECHNOLOGIES INC.

ZEETUG 32T BP (NV 712)



ZEETUG[®]
Zero Emission Electric Tug Boat

32T BP

EQUIPMENT

Main Engine (Electric Motors)

Gearboxes and Propulsion System

Batteries

Automation System

Drive System

Navigation Equipment

Bridge Navigation Alarm System

MANUFACTURER

SIEMENS (2x925kW)

REINTJESS

CORVUS Energy (1450 kWh of battery capacity)

BMA TECHNOLOGIES

ABB

NAVICO SIMRAD; COBHAM/SAILOR; LILLEY&GILLIE; SPERRY; NETWAVE

VEINLAND

OPERATIONAL FACTS

Avoiding apprx. 9 tons of Nox and 210 tons Co2 per year, compared to similar tugs with diesel engines

%10 Smaller than similar Tugs

Charging time less than 1 hour

Battery Packages' calculated for 10 years

MAIN PARTICULARS

Lenght (O.A) Abt. 18.70 m

Breadth (MLD) Abt. 6.70 m

Depth (MLD) Abt. 4.65 m


Draught (Design) Abt. 3.50 m

Speed at Design Draught 10 knots

Electric Motor 2x925 kW

Personel Number 4 Persons

This product's technical characteristic is designed in accordance with Gisaş Shipbuilding Industry's operation profile. The technical configuration of ZEETUG30T BP may vary according to project requirements / operation profile.

 For more (5T BP up to 75T BP) please contact info@navtek.net

Designer & Builder

NAVTEK
NAVTEK NAVAL TECHNOLOGIES INC.

STEMS SMART TUG ENERGY MANAGEMENT SYSTEM

STEMS (Smart Tug Energy Management System) software is developed by NAVTEK NAVAL TECHNOLOGIES with the objective of optimizing the electric power consumption of the electric watercraft and extending its driving range and operation cycles.

STEMS is both a browser-based and a mobile software, which has a lot of capabilities for fleet control center and tugboat operators. With its flexible structure, it can be adapted to a fleet.

STEMS collect all data coming from the devices and equipment in the tugboat and stores them in the Control Center's server.

- Tug speed,
- Motor speed,
- Power consumption,
- Battery motor temperature,
- Battery state of charge...
- Actual ambient condition's data
- Weather data

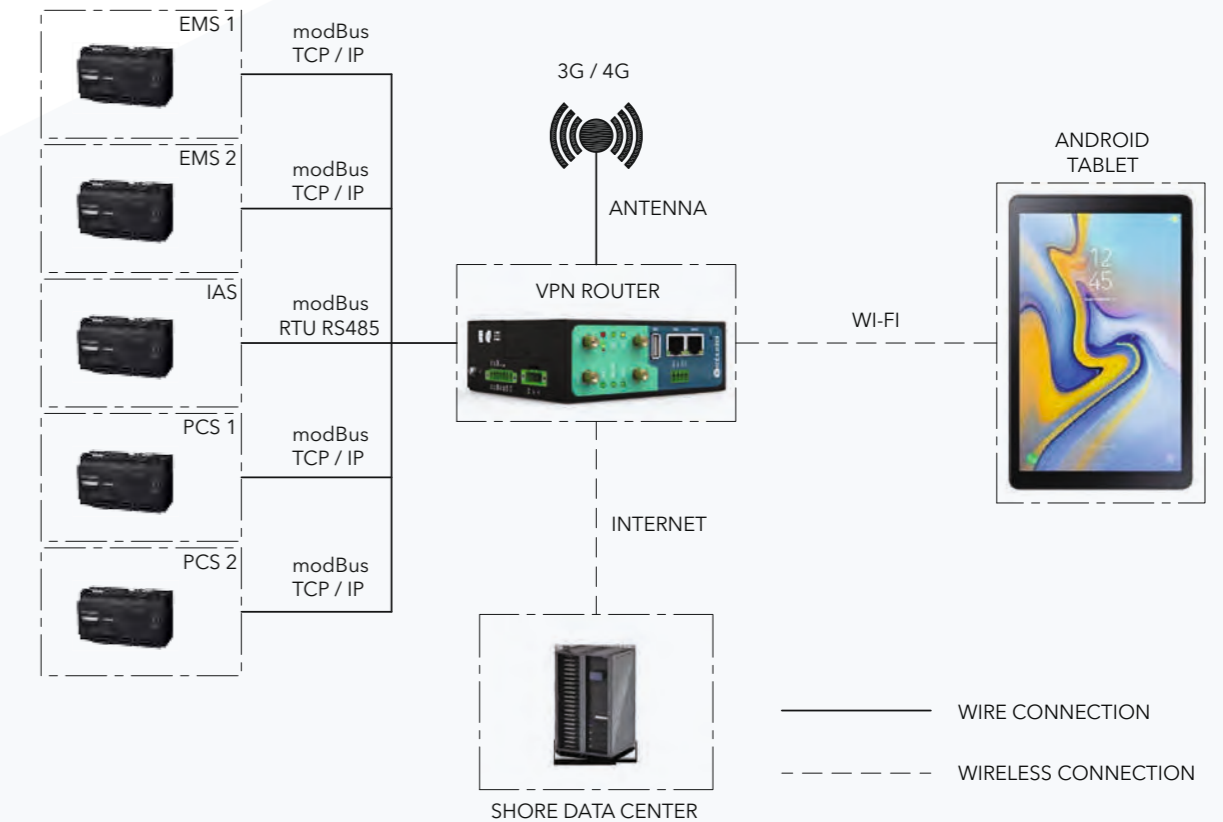
It uses the related data to performance, to optimize the electric power and gives feedback in terms of suggested actions to the Captain.

ADVANTAGES

- STEMS can be used on more than one ZEETUG® (a whole fleet)
- Towage operations can be scheduled on considering the availability of the charged (ready to operate) ZEETUG®.
- The final charge of batteries can be estimated.
- Both the control center operator and the tugboat operator can change predefined route on chart.
- Any type of Android mobile tablet (personnel or industrial type) can be used.
- All data coming from the ZEETUG® are being stored in the control center servers.
- STEMS can prepare reports of all operational output.
- Due to the possible operational profile changes the software can be revised...

FEATURES

- A single platform to control the entire ZEETUG® fleet.
- Integration with Marine Traffic charts.
- Collecting data coming from all devices and equipment of the electric tugboats and storing them in the server.
- Displaying real-time wind data from ground stations.
- Monitoring all relevant data related to performance of the tugboats and giving feedbacks.
- Charging time estimation by considering the battery' state of health.
- Reporting tools for operation and personnel performance...

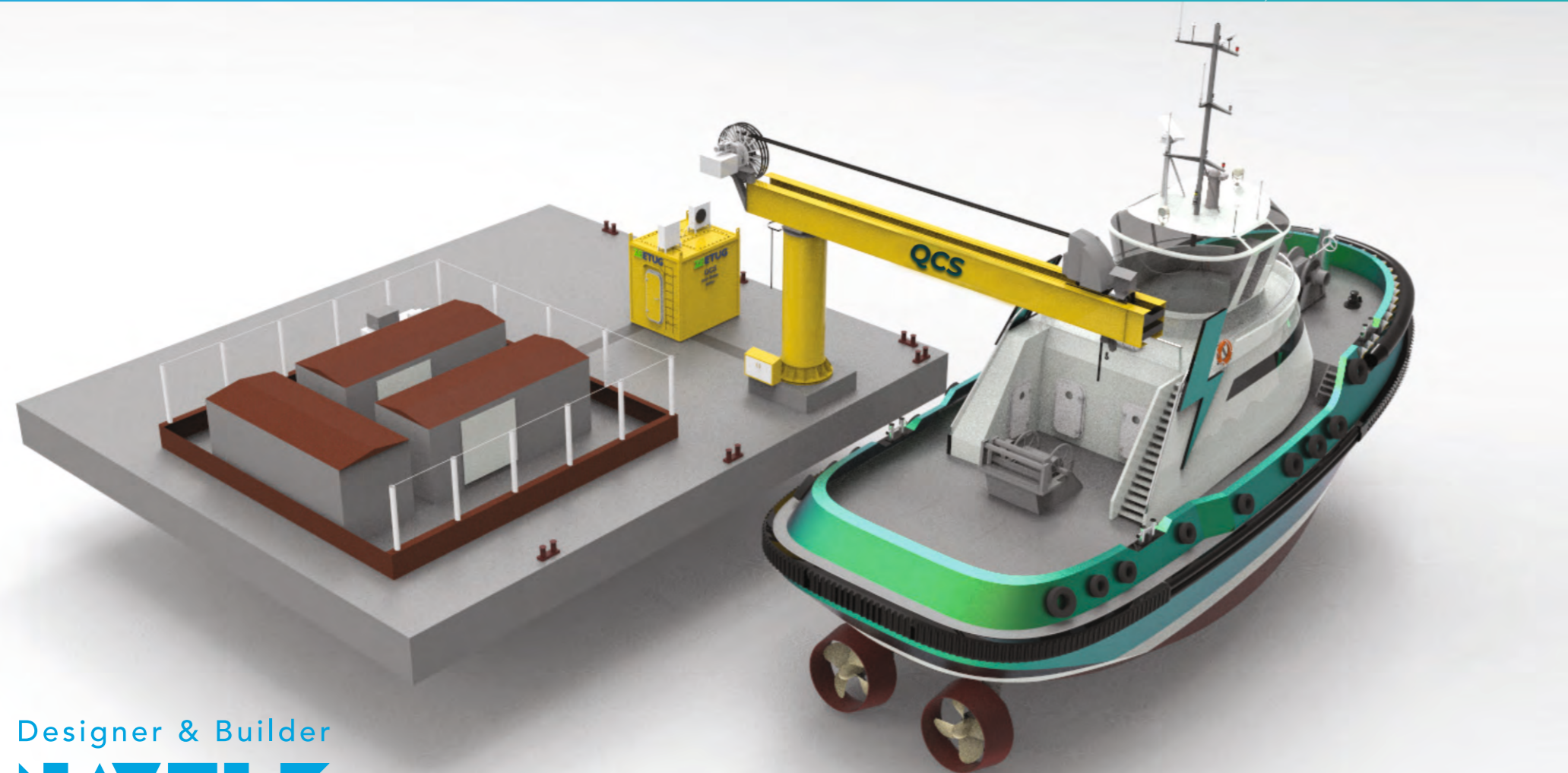


QUICK CHARGE STATION



This product is developed in accordance with the infrastructure of Tuzla Harbor, Turkey and ZEETUG-30T BP (NV712).

* The technical configuration of QCS may vary according to project requirements and to the port infrastructure. The Quick Charge Station is designed (tailor-made) for ZEETUG® by NAVTEK NAVAL TECHNOLOGIES INC.



Designer & Builder
NAVTEK
NAVTEK NAVAL TECHNOLOGIES INC.

www.zeetug.com

GENERAL SPECIFICATIONS

Input	3- phase 500VAC $\pm 10\%$; 50-60Hz $\pm 5\%$
Output	750Vdc
Efficiency	>96%
Power factor	0.99
Output power up to	2x500 KW
Protection degree	IP54 Cabinets for indoor use
Ambient temperature	0°C to 40°C
Ambient humidity	0% to 95%
Heating/Cooling is controlled	by A/C inside container
Dimensions (W x D x H)	1500 x 650 x 2250 mm

CHARGING TECHNOLOGY

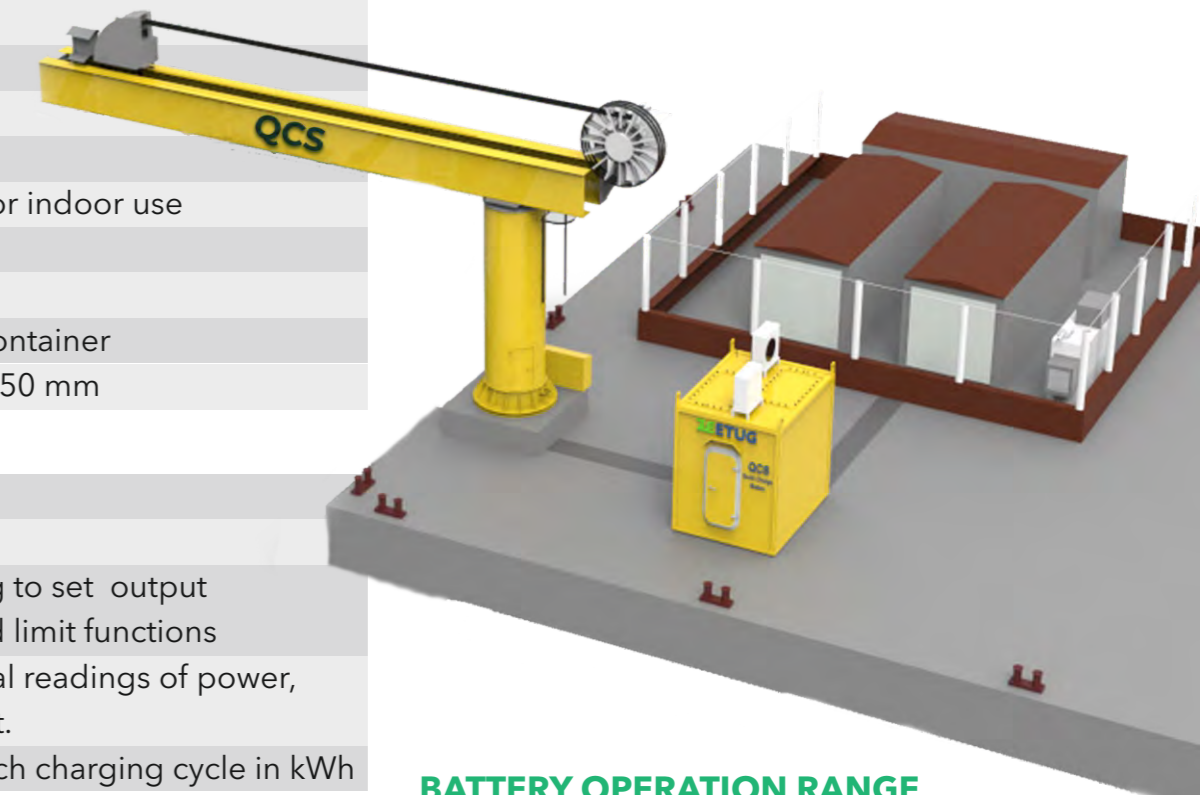
Switch board	ABB
Cooling system	Air cooling
Optimizing	Boosting input voltage according to set output voltage, active power control and limit functions
Human machine interface	Hand terminal used as HMI, actual readings of power, voltage, current, temperature, ect.
Energy import	Energy import is recorded for each charging cycle in kWh

CONNECTORS

Connectors	Cavotec 1100 V push & pull connectors
------------	---------------------------------------



Safety first! ISU is designed to not starting up before the charging plug is connected properly !



BATTERY OPERATION RANGE

%20-%90 SOC for Zeetug NV712 :
995 KWH, 55-65min

BE A PART OF
THE SOLUTION,
NOT A PART OF
THE POLLUTION



LET'S MOVE
TOWARDS
GREEN TO KEEP
THE PLANET
CLEAN

THERE IS
NO PLANET
" B "





**NOT ONLY DESIGN,
BUT ALSO BUILD
AND DELIVER
TURNKEY!**

subsidiary of



Together with our parent company TK Tuzla Shipyard (located in the Tuzla suburb of Istanbul, north east of the Sea of Marmara at the entrance to the Bosphorus), NAVTEK also has shipbuilding identity. This allows us to provide a complete service to our clients. TK Tuzla Shipyard is one of the largest shipyards in Turkey and has been recognized for its remarkable naval works throughout its history. Also ensures high quality and punctual delivery times and focuses on orders of specialized vessels.

www.tktuzlashipyard.com

Designer & Builder



NAVTEK NAVAL TECHNOLOGIES INC.



**FOR HELPING THE ENVIRONMENT
WINNER**

2020



Designer & Builder



NAVTEK NAVAL TECHNOLOGIES INC.

CONTACT

Address: Sanayi Mah. Teknopark Bulvarı No:1/2A İç Kapı No: 108-109 Pendik / İstanbul

Tel: +90 216 290 33 78 - +90 216 290 35 54

E-mail: info@navtek.net - **Web:** www.navtek.net