

# SHIPPAXCFI

FERRY, CRUISE, RO-RO AND HIGH-SPEED INFORMATION FOR PROFESSIONALS

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51 YEARS  
1965 - 2016



**TEXELSTROOM  
KONINGS DAM  
SPITSBERGEN  
IHM MANAGEMENT**

**FERRY ON ORDER**



# THEME TEXELSTROOM

THE EPITOME OF THE HYBRID FERRY WITH A WOW

TEXT: PHILIPPE HOLTHOF

PHOTOS: MIKE LOUAGIE

The double-ended Wadden Island ferry TEXELSTROOM is cleaner, more sustainable and more cost-efficient than any other ferry that operates in this part of the world. The ship's eco credentials together with its signature exterior lines and stunning interior design undoubtedly makes it one of the revelations of the year!





**T**ESO, the Royal Texels Eigen Stoomboot Onderneming, is a fairly atypical ferry operator for it is a non-profit organisation that is largely controlled by the inhabitants of the isle of Texel, the westernmost, largest and most populated island of all the Wadden Islands. Primarily acting for the benefit of the island residents, offering an efficient, reliable, affordable and high-quality lifeline service is what the TESO philosophy is all about. Not to mention the company's commitment to environmental sustainability as the Wadden Sea, the largest unbroken system of intertidal sand and mud flats in the world, is a very sensitive area and a UNESCO World Heritage site.

The TESO mantra is also deeply inbred in the DNA of the brand new **TEXELSTROOM** which has just been introduced on the 15 to 20-minute crossing between 't Horntje on the isle of Texel and the Dutch mainland port of Den Helder, a distance of 4.2 km.

Barely five years after the introduction of its 2005-built **DOKTER WAGEMAKER**, TESO already started to think about a successor, the capacity of which was driven by a long-term traffic forecast which DTV Consultants had

prepared in 2008 on behalf of TESO. Although still a relatively under-the-radar destination, the isle of Texel has increasingly grown in popularity, ranking in Lonely Planet's latest top ten list of places to visit in Europe. The only way to reach Texel is by ferry with TESO, obviously, taking full advantage of this situation. However, with tourist numbers increasing more rapidly than forecast in 2008, the unspoiled isle that is famous and beloved for its magnificent dunescapes, deserted white-sand beaches and pine forests risks to become a victim of its own success. In order to avoid this, the number of tourist beds on the island is limited to 45,000 – a figure that has almost been reached.

### ENVIRONMENTAL SUSTAINABILITY AND RELIABILITY ARE KEY

As TESO feels responsible for preserving the area's natural richness, it has put eco-friendliness at the forefront of **TEXELSTROOM**'s design. All possible 'green solutions' were considered from both a sustainable and economic perspective. The bottom line was to reduce energy consumption and the dependence on fossil fuels by at least 25 per cent. The objective was twofold: improving the ecological footprint on the one hand and reaping significant savings meant to keep tariffs as low as possible on the other. On top of that, reliability also played an important role in the design of the ship and its propulsion systems. Since there are no hospitals on the island, patients rely on the ferry to bring them by ambulance to a mainland hospital. This is an altogether cheaper and more reliable solution than using a helicopter on which the other Wadden Islands rely due to the much longer sailing distances. During the night, the TESO ferry is tied up in the port of 't Horntje, but remains stand-by. Last year,

there were about 140 so-called 'ambulance' trips, i.e. one every 2.5 nights.

Initially, TESO envisaged an improved and green version of its Damen-built **DOKTER WAGEMAKER**. However, instead of building a 'DOKTER WAGEMAKER 2.0', an entirely new design was developed from scratch by Dutch naval architecture consultancy C-Job Naval Architects in conjunction with compatriot Vripack who was responsible for the exterior styling and the refreshing interior design. Thus far, TESO's ships had been designed by 'Bureau voor Scheepsbouw' (BvS), a company that no longer had the manpower to do so. A total of seven renowned national and international naval architecture firms were asked to tender but C-Job was selected on the basis of its innovative ideas, pro-active thinking and talent to put the customer first.

Based on the transportation forecasting that should take the new ferry to 2040, TESO called for a ship with a 10 per cent higher car intake within the same windage area as **DOKTER WAGEMAKER**, a requirement imposed by the government. Also the ship's displacement had to remain unchanged, whereas the berths dictated a moulded beam similar to that of **DOKTER WAGEMAKER**. All these limitations proved to be challenging with several possibilities to increase the car capacity being examined, including the addition of a lower hold similar to that found on a typical Norwegian ferry. This concept, however, was discarded since the ten-minute turnarounds could no longer be guaranteed.

Cleverly, C-Job proposed a T-shaped cross section with a cantilevered superstructure, a shape that could be achieved thanks to the fairly low mooring posts in either port, although some minor modifications were required. This T-shape effectively means a lateral

### Some facts and figures about TESO

- 13,677 crossings were performed in 2015
- Over 3,100 shareholders, the majority of whom are Texel residents.
- 70 per cent of the passengers are tourists - 30 per cent are islanders or commuters
- TESO will celebrate 110 years next year.
- **TEXELSTROOM** is TESO's second ship to bear this name. The first **TEXELSTROOM** was introduced in 1966, exactly 50 years ago.





extension of the upper car deck and the saloon deck without affecting the moulded beam on the waterline. The increased width corresponds to an extra car lane on either side of the upper car deck. These two extra car lanes in combination with a hull that is five metres longer, equals to a 14 per cent higher car intake. Notwithstanding the hull being stretched, the windage area has not been increased. This is mainly attributed to major improvements that have been made to the arrangement of the uppermost deck. The position of the wheelhouses has been lowered. They are no longer towering above the technical areas, but have rather been placed in front of them. DOKTER WAGEMAKER had four fairly tall funnels which have been replaced by a pair of small funnels whilst the rotunda-shaped sky lounge has disappeared.

### A BIG SAY IN THE DESIGN FROM EVERYDAY USERS

From an early stage, passengers, crew and staff as well as TESO's shareholders and stakeholders were asked for their input based on the following question: "What would you improve or change when designing a new DOKTER WAGEMAKER?". Roughly 600 answers were collected and since they mostly made sense, over 400 recommendations have been implemented with some minor suggestions really standing for a big improvement.

CFD analyses of wind behaviour were carried out by Van Oossanen Naval Architects to determine the lateral wind



force. Thanks to the design change by C-Job, based on this CFD, the drag coefficient could be reduced by at least two per cent.

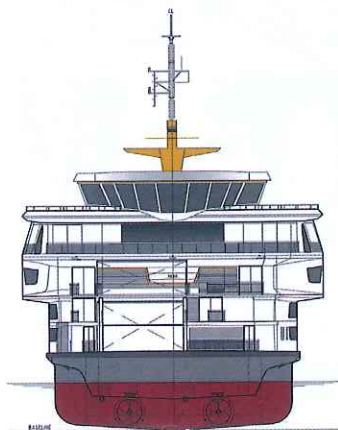
The hydrodynamically optimised hull form was tank tested by Vienna Model Basin, one of the oldest and most experienced institutes that provides services in ship design and maritime operations.

### EVERY INCH A GREEN VESSEL

Given TESO's genuine care for nature, the implementation of green ▶

*TEXELSTROOM's T-shaped cross section that resulted in a cantilevered superstructure - an idea from C-Job Naval Architects - is shown to full advantage. It effectively created two extra car lanes on the upper car deck. DOKTER WAGEMAKER (in the background) has just one car lane on either side of the casings.*

*The 'old' and the 'new': unlike DOKTER WAGEMAKER, TEXELSTROOM has no sky lounge on the uppermost deck. To further optimise the windage area, the latter ship has also two fairly small funnels as opposed to four taller funnels on DOKTER WAGEMAKER.*



C. VRIJPACK





## TEXELSTROOM's sustainable credentials in a nutshell:

- CNG/diesel electric propulsion
- 1.6 MWh lithium polymer batteries
- 700 m<sup>2</sup> of solar panels
- Heat recovery
- Low energy consumption in the public and crew spaces
- Auto-mooring in Den Helder

▶ technologies hitherto not found on DOKTER WAGEMAKER was beyond dispute.

For the main propulsion system, TESO opted for dual-fuel engines and therefore initially looked at LNG. The company gained first-hand experience from visits to VIKING GRACE and the double-ended BOKNAFJORD. Closer study revealed that from a logistics point of view, LNG was not the best solution. In addition to the supply problem, the ambulance crossings would be in jeopardy as TESO understandably planned the complex LNG bunkering operations during the night whilst alongside in 't Horntje. Even so, TESO remained convinced about the advantages of natural gas as it is a no sulphur fuel that emits zero particulates. CO<sub>2</sub> and NO<sub>x</sub> emissions are reduced by up to 20 and 90 per cent respectively, with little or no smoke and smell. An alternative for LNG was found in the form of CNG which in the TESO business case comes at a cheaper cost per MW of power than either diesel or LNG. Although less complex than the bunkering of LNG, TESO carefully studied the operation of CNG powered local buses in nearby Velsen-Zuid. An on-shore compressor station was built next to the ferry port of 't Horntje with the gas being delivered by PitPoint directly from the local gas network. It has a pressure of 8 bar and is compressed to 200 bar before being delivered on board where it is stored in cylinder banks stowed in two fixed 40 foot containers that are permanently mounted aft of the wheelhouses. The banks have a total capacity of 68 m<sup>3</sup> and through an on-deck decompression installation the gas is transported to the engine room at 6 bar to finally be injected at zero pressure.

One of the advantages of LNG versus CNG is that you need less storage capacity as it occupies only one-six hundredth the volume of natural gas as opposed to one-two hundredth the volume in a compressed state at 200 bar. CNG, on the other hand, is more cost effective than LNG since the latter fuel has a high

transportation cost.

Since TEXELSTROOM only makes short crossings between 6 AM and 10 PM, the cylinder banks provide more than enough energy to give the ship 1.5 days of autonomy to run on CNG only. Bunkering of the CNG takes between four and five hours, but it can easily be interrupted in case of an unexpected ambulance trip.

As part of the hybrid package, TEXELSTROOM has 462 solar panels - equivalent to 700 m<sup>2</sup> - fitted on the uppermost deck. Charging batteries that supplement the other energy sources, the solar panels have a fixed inclination of 15° and are all facing Den Helder which is the southern side. A single crossing requires 1,900 kWh, 350 kWh ▶

*Corvus Energy supplied the energy storage system which comprises a total of 252 x 6.5 kWh lithium polymer AT6500-48V batteries installed on either end of the engine deck.*



TEXELSTROOM boasts 462 solar panels - equivalent to 700 m<sup>2</sup> - the energy of which is stored in batteries.





► of which for the hotel load. Under optimum conditions, the photovoltaic panels provide some 150 kWh, equivalent to 40 to 45 per cent of the hotel load or 8 per cent of the total energy consumption. TESO has gone to great lengths to reduce the onboard energy consumption after a study made by the Technical University of Eindhoven revealed that over 30 per cent of the total energy consumption on DOKTER WAGEMAKER came from the hotel side. Intelligent lighting sensors have been installed throughout TEXELSTROOM together with over 2,400 ultra-energy efficient LED lamps.

Canadian energy storage specialists Corvus Energy supplied the energy storage system which comprises a total of 252 x 6.5 kWh lithium polymer AT6500-48V batteries installed on either end of the engine deck. With a total capacity of 1.6 MWh, the battery banks increase one of the corvuspropulsion efficiency and made the installation of smaller generators possible while acting as a powerful backup which enables the entire ferry to operate solely on battery power in case of an emergency.

The electricity required at night

when on stand-by, is renewable energy supplied by the local grid of Texel with some of the electricity being stored in the battery banks.

Already 2.5 years ago, two Cavotec MoorMaster 400A10 units were installed in the port of Den Helder which resulted in huge environmental and financial benefits as the engines, previously running the entire time to keep the ship at berth, could be idled. Besides saving over 150,000 litres of fuel, CO<sub>2</sub> and NO<sub>x</sub> emissions were reduced by 450 and 6.2 tonnes respectively, not to mention the curtailing of seabed erosion in the port.

Also TEXELSTROOM takes full advantage of the Cavotec automooring system as the engine keeps on running with the load being used to charge the batteries. Usually TEXELSTROOM operates on one CNG powered engine only that runs at a constant speed with the batteries having enough capacity to catch up the large fluctuations in energy requirements in the berthed, berthing, manoeuvring, accelerating and transit phases. Obviously, peak shaving through the use of battery power further reduces fuel consumption.

## BELGIAN ENGINES

Dutch domestic ferries together with the German and Danish ferries in the Wadden Sea area are not classified as seagoing vessels but rather as an inland vessel with the so-called 'salt ferry' designation. As per 'salt ferry' requirements, it is not allowed to have watertight doors in the bulkheads below the waterline. Consequently, it is only possible to go from one compartment to the other via the main deck which has split engine casings with stairways to the lower and upper decks.

As befits a double-ended ferry, TEXELSTROOM has a symmetrical configuration which is also largely reflected in the engine room. There are two separate main engine rooms that each boasts a pair of Anglo Belgian Corporation's (ABC) medium speed engines from the well-proven DZ family. ABC has a loyal following in inland shipping and as they were the sole manufacturer that offered a dual-fuel solution on a 2,000 kW engine, they were the obvious choice for TESO. The engine room on the 'Den Helder' side of the vessel holds the two ►

*The MOB boat comes in the form of a water scooter that is launched from the bicycle deck - Deck 4.*



*The two single fuel (diesel) engines are similar to the dual-fuel ones and have been installed for redundancy's sake. All four engines drive generators that provide electrical power to the four Rolls-Royce azimuth thrusters.*







The main vehicle deck's full-height central part between the engine casings with colour coded stairs has four truck lanes or alternatively five lanes for cars.



The outer car lanes on the main vehicle deck (one on either side of the casings) have a height of 2.6m with the upper level being occupied by the semi-open bicycle deck.



To connect with the existing linkspans, the access doors on the main and upper level are offset to the ship's Wadden Sea side.



Weather permitting, the upper part of the two-piece access doors can be opened for ventilation purposes during the crossing.

The upper car deck can accommodate 209 cars. On a clear day, it gets plenty of natural daylight through large windows, largely replacing more expensive artificial lighting.

There are also large windows on both sides of the main deck; it improves comfort and speeds up loading operations.





## One of the advantages of LNG versus CNG is that you need less storage capacity

► diesel/CNG dual-fuel Tier III engines of the 12DZD type, running at a maximum 1,000 rpm with an output of 2,000 kW. As CNG is used as the principal fuel, the two 12DZC Tier II single fuel (diesel) engines have been installed for redundancy's sake or when full power is required during an ambulance trip.

All four engines drive generators that were supplied by Indar. These provide electrical power to the twin Rolls-Royce azimuth thrusters at each end of the vessel. The 360 degree rotatable propulsors guarantee superior manoeuvrability and give the ship a service speed of 10.5 to 11 knots, the maximum speed being 15.4 knots.

Energy saving is further demonstrated through heat recovery from the cooling of the dual-fuel engines. A thermal water tank of 90 m<sup>3</sup> on the tank top deck is heated to around 85° C with the heated water ensuring overnight heating when the vessel is in stand-by mode.

### SEMI-GLAZED CAR DECKS

TEXELSTROOM follows the typical horizontal division that was first introduced by TESO on its 1980-built MOLENGAT, albeit on a much larger scale. The main vehicle deck has four truck lanes or alternatively five car lanes between the casings with a car lane on the outer sides. Due to the tight turnaround times, there are no hoistable car decks and the main deck has a total capacity of 171 cars or a combination of 34 12-metre trucks and 52 cars. With unisex toilet facilities on hand in the

casings, passengers are allowed to stay in their vehicles during the crossing. For their comfort, and in order to speed up loading operations, the single outer car lanes get natural daylight through large rectangular windows. Unlike the double-height central part of the main vehicle deck, the outer car lanes have the height of a single deck (2.6m) as the upper level is occupied by a bicycle deck on either side. There is direct access for both cyclists and foot passengers fore and aft with plenty of bicycle parking racks being at the passenger's disposal. The bicycle/foot passenger decks are partially open on the sides but are well-protected from the elements thanks to the cantilevered superstructure that contains the upper car deck with a capacity of 209 cars. This upper car deck has a clear height of 3.10m and thanks to its lateral extension, two extra car lanes could be created, resulting in two lanes on either side of the casings. These side garages come with large expanses of glass on the outer sides with natural daylight replacing artificial lighting. The energy consumption is further reduced thanks to a more efficient ventilation strategy. Weather permitting, the top hinged upper part of the access doors on the main deck remain open for natural ventilation purposes reducing sensor-activated forced ventilation to a minimum. To be compatible with the linkspan, the driveway with the access doors is offset to the Wadden Sea side of the ship.

Due to the nature of the crossing, no lashing points are required but the car

decks are nevertheless covered with an anti-slip coating from Bolidt, the Dutch deck covering specialist that also supplied the flooring in the accommodation and crew areas as well as the outer decks.

Both the crossing itself and the turnarounds are really short and for this reason, orientation of the passengers is paramount. To easily find the way back to the car, the stairs are colour-coded and show a number together with a seabird that can be spotted on the isle of Texel. In the accommodation, the backlit cutout bird signs together with the stair numbers are clearly displayed on decorative panels that are an integrated part of the decoration.

Large elevators can be found on either end of the vehicle decks with a smaller type in each casing.

### THE TEXEL EXPERIENCE STARTS ON BOARD

Both for the ship's exterior and interior design, Vripack was inspired by the vibrant Wadden area and the adjacent dune landscape. The ship's silhouette resembles the outlines of the little tern whereas the exceptionally large windows together with the contours of the lighting recesses in the ceiling take the shape of pinecone scales.

The island experience is also reflected in the colour palette with shades of green, beige, brown and blue much in evidence.

The open plan saloon deck has a fairly symmetrical layout with the 'Op de boot' restaurant's servery area ►



People no longer have to stand in line to purchase drinks and snacks. The 'Op de Boot' restaurant has a large free-flow servery that doubles as a souvenir shop.



The free-flow concept allows for a more flexible operation of the restaurant and shop.





Easy orientation is enhanced by coloured bird signs that come together with the stair number. The backlit cutout signs are clearly and attractively displayed on decorative panels.

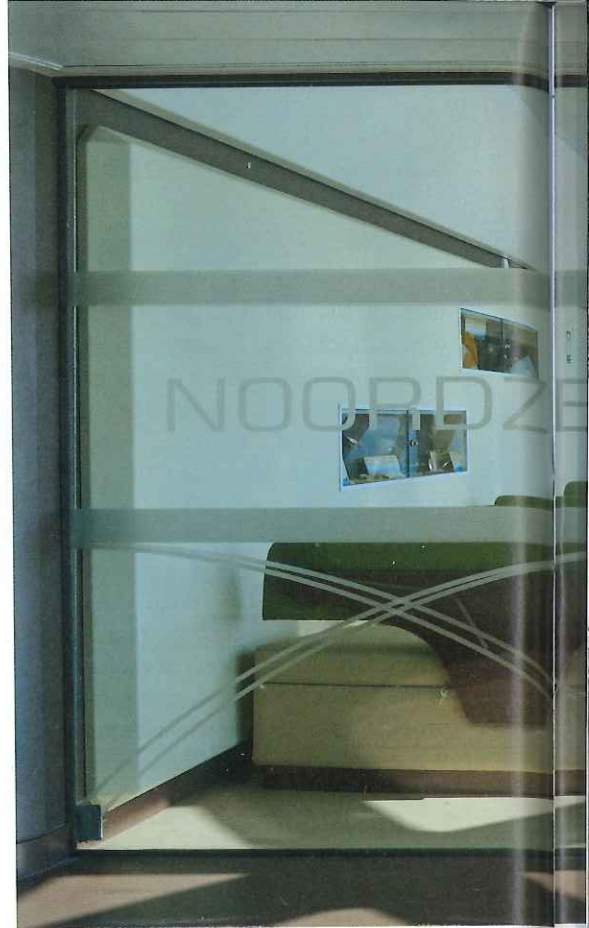
► surrounded by seating areas on both sides and both ends. Unlike the earlier generation, it feels extremely light, airy and extravert thanks to the large windows that offer great views onto the Wadden Sea. The tiered ceiling with a higher than normal ceiling for the aisle sides further enhances the feeling of spaciousness.

Lengthwise, the saloon deck is uninterrupted but two 8m by 2.5m fire curtains divide it into three fire zones.

The seamless flooring is a combination of browns and beiges. The former colour is used for the walkways, referring to the shoals or mudflats in the area

The capacious accommodation deck covers three zones: the central zone with the serving area, a more introvert part with leaning benches that are arranged around raised tables supported by wooden mooring poles and the extrovert outer ends.

A typical pine tree from Texel takes pride of place in the seating lounge on the Wadden Sea side of the vessel. It has a higher than normal ceiling and both the windows and the contours of the lighting recesses in the ceiling take the shape of pinecone scales.







whereas the lighter shade in the seating areas is that of a typical sand beach.

The custom-built ergonomic furniture was part of the turnkey package which, together with the complete outfitting, was in the hands of Oliver Design.

The central plaza with the servery area-cum-souvenir shop is the very 'heart' of the ship. On DOKTER WAGE-MAKER, people have to stand in line to purchase drinks and snacks. This has been replaced in favour of a large free-flow servery area, a 1:1 scale mock-up of which was first tried out on the beach in Texel. Likewise, Alphatron Marine made a 1:1 scale mock-up of the bridge(s) to optimise the views and the position of the various screens.

In addition to a hassle-free experience for the passengers, the free-flow principle allows for a more flexible operation of the restaurant and shop. Given the short crossing time, the menu is understandably limited to some hot and cold items that are nevertheless freshly prepared on board in front of the passengers.

The glass panels placed on top of the partitions between the servery area and the lounge part contain green strings that are reminiscent of the seaweed found on the bottom of the Wadden Sea. In the nearby seating area, a typical pine tree that can also be found on the island takes pride of place.

The appropriately named 'Noordzee' lounge on the North Sea side of the ship

is separated from the open plan main lounge by the longitudinal galley. It has glass dividers and access doors on either end and also functions as a private space for conferences, presentations or parties. The display cases in the bulkhead contain items from local museums and will be changed once a year. The seating consists of swivel chairs at the window and benches that double as lifejacket lockers.

The forward and aft seating areas are separated from the central plaza by more introvert zones that hold the toilet facilities together with leaning benches based on the famous Texel sheep. These are arranged around raised 'laptop tables' that are supported by wooden mooring poles with power outlets.

The forward seating lounge, i.e. the one on the Texel side, boasts an inter-

*The appropriately named 'Noordzee' lounge on the ship's North Sea side is separated from the open plan main lounge by the galley together with glass dividers and access doors.*

active children's playroom that was developed together with the 'Nationaal Park Duinen van Texel'. It contains both digital and analogue games in the typical green and orange colours used by this park.

TESO's ships do research on behalf of NIOZ, the Royal Netherlands Institute for Sea Research with large TV screens informing the passengers in real time about the temperature of the water, ►

## LaNaval poised to enter the ro-pax market

TESO granted the contract for TEXELSTROOM to LaNaval on the basis of price, relevant experience, technical capabilities and yard facilities. Initially, TESO asked 16 shipyards to quote and save for one South-Korean shipyard, all were located in Europe with 11 yards making an offer. Besides LaNaval, two other yards were eventually shortlisted: another Spanish yard and a Dutch one.

With over 100 years of history, LaNaval is specialised in ships with a high added value and the order for TEXELSTROOM has whetted the yard's appetite to further tap into the ro-pax niche market.

Early this year a contract worth EUR 175 million was signed with Baleària for the construction of an innovative energy-efficient cruise-ferry that will have a length of 232.2m, a beam of 30.4m together with a capacity of 3,300 lanemetres for trucks, 331 cars and 1,600 passengers - 75 per cent of them in cabins. LNG will be the ship's principal fuel, but like TEXELSTROOM, the Baleària newbuild will be equipped with solar panels which will provide power for the onboard services. Delivery of this so-called 24-knot 'smart' ship is slated for 2019.





Cees de Waal, managing director of TESO, is rightly proud of TEXELSTROOM. TESO is a fairly atypical ferry operator that is largely controlled by the inhabitants of the isle of Texel.



operations and has proved to be a cost-effective maritime rescue system.

## BRIGHT FUTURE

TEXELSTROOM represents another big step forward for TESO. Now the mainstay on the Texel service, she will only get assistance from DOKTER WAGEMAKER - the company's new spare ship - when demand is high. The TEXELSTROOM-DOKTER WAGEMAKER tandem will further reduce waiting times during the peak periods offering around 640 car spaces (\*) per hour, i.e. almost 20 per cent more than the combined capacity of DOKTER WAGEMAKER and the diminutive 1990-built SCHULPENGAT which has been put up for sale.

DOKTER WAGEMAKER will be repainted in the new livery that actually reflects the company's house colours of yellow with green and black bands which represent the flag of Texel. With TEXELSTROOM now in full operation, money is already being put aside to finance the next newbuilding which will probably come on stream in 2031. ■

► the salt content and the current, etc.

The wrap-around promenade has been abandoned on TEXELSTROOM but there is still ample open deck space with benches, the shape and colours of which are similar to the furniture inside the vessel.

TEXELSTROOM's safety equipment consists of four MES stations that were supplied by Viking together with a water scooter that serves as an MoB. Mounted in a cradle that is nestled on the bicycle deck, this Safe at Sea Rescuerunner is typically used for SAR

## Main particulars TEXELSTROOM

IMO	9741918
Length o.a.	135.4m
Breadth max	27.9m
Breadth hull	23.0m
Draft max	4.4m
Gross Tonnage	15,483
Net Tonnage	5,566
Deadweight	1,451 t
Main engines	2 x ABC dual-fuel 12DZC 2 x ABC diesel 12DZD
Output	4 x 2,000 kW
Speed max	15.4 knots
Pax capacity	1,750
Freight & car capacity	34 trucks + 261 cars or 380 cars (*)
Class	Lloyd's Register

(\*) TEXELSTROOM has a nominal capacity of 380 cars. To guarantee swift turnarounds, TESO has deliberately limited the number to 340 cars. Similarly, the 640 car slots per hour as described above are not based on the nominal capacities of the ships but rather on the ships' actual capacities to respect the time spent in port.

SHIPPAXDATABASE



## Design your own vessel the C-Job way

Starting out in 2007 with just three partners, C-Job Naval Architects employs over 50 people today, making it the largest truly independent naval architecture company in north west Europe. Headquartered in Hoofddorp nearby Schiphol airport, it designs almost everything that floats: from mega-yacht to jack-up vessels. With only limited experience in the domain of ferries, TEXELSTROOM proved to be a welcome change as C-Job was responsible for both the conceptual and basic design. Rather uniquely, many projects are created from scratch in close cooperation with the customer which C-Job regards as a unique selling point as the customer can eventually claim the design.





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