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NAUTIC TWIN

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The river Paraná has virtually no width or height restrictions, which leads to different ship designs

Audacious **ultra-wide** river container vessel for South America

The huge inland shipping potential in South America has long been on the radar of Concordia Group. There are wide navigable rivers, landlocked countries with large transportation needs and the competition of road transport is much less present, mainly due to customs formalities when crossing borders. Dutch ship owner Concordia Group saw this potential and - partly inspired by the downturn in Europe - shipped two of its China-built hulls for inland cargo vessels to Brazil. The plan was to finish the vessels locally and set up a container shipping line on the Amazon River in the North of Brazil.

Bureaucracy

Brazilian protectionism, and the impossibility to obtain the necessary approvals made Concordia decided differently. After almost two years of fighting bureaucracy with the hulls laying idle in Brazil, Concordia Group found a different purpose for the two vessels.

Bert Duijzer, co-owner and project manager of Concordia Group: “Paraguay is landlocked, but connected to the sea by the wide and shallow Paraná River. The food export and import of goods has been growing steadily, but the infrastructure between Paraguay and the seaport in Montevideo, Uruguay, hasn’t kept up. We ran different exploitation scenarios and found out that running the two vessels separately was not economically feasible. The best business case was what we realised as: *Nautic Twin*.

By joining both hulls together into a single wide ship, the running costs were lowered, while the payload was increased. To avoid pilotage costs on the Río de la Plata, all vessels try to remain below 120 metres length-over-all. The question is then how to maximize carrying capacity within a shallow draught, and *Nautic Twin* is one possible answer. As the river is very wide, there is no restriction on beam. And while the name *Nautic Twin* seems to imply a catamaran shape, it is actually a very wide monohull, built by joining two hulls together with a connecting structure. There was an additional capital investment to join both hulls, but some initial costs were also saved by installing only two main engines and rudders instead of four. The biggest challenge was to outfit the vessels locally.

Marine airbags

The shipyard where two empty hulls arrived in September 2015 and *Nautic Twin* emerged in February 2017 had no previous experience in the construction of such a complicated vessel. They had built mainly barges without propulsion. Called ‘La Barca del Pescador’ (Spanish for ‘the fishing boat’) and located close to Asunción, the capital of Paraguay, along the Paraná River, the shipyard built a new slipway wide enough to accommodate this project. Both hulls were hauled out of the water using marine airbags, which consist of large inflatable rollers, a method which was also used during the launching of the vessel. When both hulls were joined, the air pressure in the airbags was adjusted, bringing each halve of the vessel to the right position within twelve millimetres tolerance.

ECONOMIC FEASIBILITY

Challenges

Another challenge was to build to the safety rules of the Argentinian Coastguard. There is not a dedicated set of rules for inland shipping such as the Rhine rules. In many cases, the requirements are stricter, as they correspond with SOLAS rules with some extra’s added on top. This led to a larger number of gensets than strictly needed and an independent steering gear for each rudder (which can be electronically coupled).

The hulls were first separated by twenty metres, while the crossbeam structure was welded to one of the ships. This structure was thoroughly calculated for strength with a Finite Element Analysis by Technical & Maritime Services (Werkendam). This took into account not only various loading conditions, but also the maximum significant wave height of two metres, which can be encountered in the estuary of the Río de la Plata. To cope with the torsional forces, two torsion beams were created in each cargo hold. The hydrodynamic performance was calculated with CFD by SIP Marine (Drunen). As a result, the inboard propeller tunnels were removed and the shape of the cross connection in the bow was determined to guide the water efficiently towards the bottom. Because the weather can be very volatile on the Rio Plata, the river mouth near ocean, both the bulwark on the bow and the cargo hold

Nautic Twin is not a catamaran, but was built by joining two hulls together over their full depth

coamings were raised. These coamings also contribute to the strength of the vessel, and allow the vessel to sail without cargo hatches (open top notation). While ballast is not needed for stability or propeller immersion, some ballast capacity is provided to allow the vessel to be trimmed accurately. A connection was made between both engine rooms to create easy passage from side to side.

Paraná river

While the *Nautic Twin* sails on marine diesel oil, the quality of this fuel can definitely vary in different places. That's why all fuel passes through the bunker tanks, a settling tank, a separator and a daytank before going to the engines' filter systems. On the foredeck, a large genset, rated at 600 kW, provides the power for up to 70 reefer containers, which are often used to transport meat from inland to the coast.

LATERAL THINKING

Construction of the vessel far on the Paraná river required Concordia to use the infrastructure they will eventually improve with this ship. Most of the equipment onboard was purchased in the Netherlands, and then sent by container to the outfitting yard. In total more than twenty containers were shipped, each with a transit time of about six weeks, which proved a logistical challenge in its own right. Project manager Bert Duijzer was on site during the entire build process and was regularly joined by the commissioning teams of the subcontractors, such as Holland Ship Electric, De Waal, Yerseke Engine Service, Alphatron and many others. Certain parts, such as the sections between the hulls and the wheelhouse, were built locally.

The ship's large stainless steel galley was prefabricated in China, then shipped to Paraguay and assembled locally. The air conditioning in the accommodation is with local units in every space, which makes it easy to replace defective equipment.

Depth sounding

The water level is crucial to the carrying capacity on the river. Due to the currents, sandbanks shift regularly. *Nautic Twin* is equipped with four depth sounders, but in shallow parts of the river that is not enough. A smaller boat is then launched, which monitors the depth in front of the vessel and indicates where the deepest channel is located. In spite of her huge size, *Nautic Twin* is said to be very maneuverable. This is partly due to the fact that there's such a large distance between both propellers, but it is also helped by two Veth Jet channel bowthrusters, powered by a 370 kW engine each. The propellers are in HR-type nozzles and the rudders are large Stuwa type fishtail rudders from De Waal.

Bruno Bouckaert

Sufficient E-power is provided for 70 reefer containers

The installation was done in Paraguay with mostly Dutch subcontractors

The gigantic Nautic Twin is powered by only two main engines

Specific needs

Nautic Twin is one of the first purpose-built - or should we say purpose-converted - vessel for transport on the River Paraná. Having a ship designer, project management office, ship owner and ship brokerage company all under the same roof allows the Concordia Group to look at the specific transport need, see which components are available and apply their lateral thinking to come up with the best solution. In this case, 'lateral' thinking is to be taken literally, resulting in a vessel with a length over beam ratio of four to one.

The exploitation of the vessel is done with a local partner. *Nautic Twin* will make about 15 roundtrips per year, with each trip taking about 23 to 24 days. The vessel was built under RINA Class. After their conversion of two coasters to ro-ro vessels for wind turbine components and this conversion of two stock-built inland bulk carriers to a unique wide-beam container vessel, it will be interesting to see the next project coming off the drawing boards at Concordia Group.

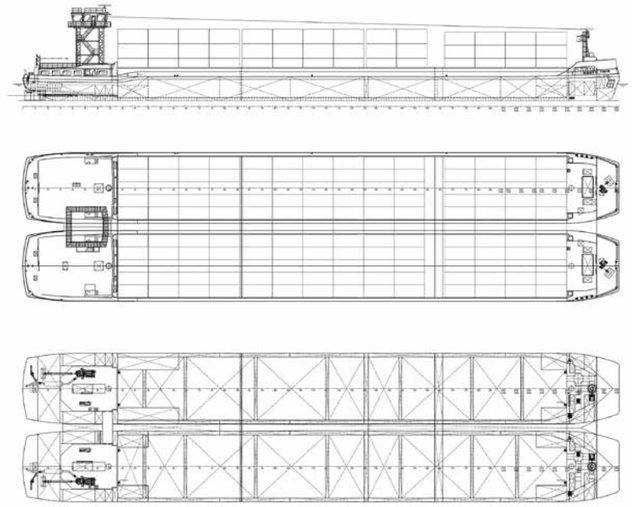
Principal particulars

Design
Concordia Group, Werkendam, The Netherlands

Conversion
Astillero La Barca del Pescador, Paraguay

Owner
Rio Paraná Navegación, Paraguay

Length o.a.	119.6 m
Beam mld.	29.8 m
Depth	4.5 m
Design draught	3.35 m
Deadweight	8,100 tons
Gross tonnage	6,855 GT
Container capacity	728 TEU
Main engines	2 x 1,139 kW
Generators	2 x 89 kWe
Design speed	7 kn
Crew	11+1
Fuel	395 m^3
Freshwater	70 m^3
Ballast water	325 m^3



Subcontractors and suppliers of equipment fitted on board the *Natic Twin*, YN 93470
Alphatron Marine, Rotterdam: navigation equipment; **Antwerpse Diesel Repair,** Antwerp Belgium: *Caterpillar* main engines and generator set, fuel separator, gearbox; **Blokland non-ferro,** Sliedrecht: box cooler; **CCM3,** Werkendam: small iron work; **ClimaLogic**, Dordrecht: engine room climate control and ventilation, ventilation grids; **Concordia del Paraguay,** Paraguay: pulling of *Nautic 10/11* and launching of *Nautic Twin*; **Concordia Shipbuilding,** Werkendam: quality control and management; **Coral Road,** Spain: sewage treatment system and oil separator; **De Waal,** Werkendam: propeller shaft, rudder and steering equipment; **Dijvler Materiaal,** Hardinxveld-Giessendam: windlass; **Discom,** Alblasserdam: silencer; **DJ Marine,** China: hull drawing works connection ; **Groenendijk & Soetermeer,** Dordrecht: drawing works wheelhouse; **Hoogendoorn,** Werkendam: bridge adjustments; **HSE (Holland Ship Electric),** Rotterdam: electrical engineering and installation, power management system, CCTV, lighting; **Integra Beveiliging,** Zwijndrecht: sprinkler system; CO_2 system; **Kieboom Werkendam,** Werkendam: material for navigation; **La Barca,** Paraguay: outfitting yard, steelworks etc.; **Loggers,** Dordrecht: flexible connections; **Rina Services,** Genova, Italia: class approval; **Rob Snel technische handelsonderneming,** Sliedrecht: steel doors (general); **SARC,** Bussum: loading computer; **Sincocross**, China: anchors, accommodation and installation; **SIP Marine,** Drunen: propellers and CFD computations; **T.M.S. Technical & Maritime Service,** werkendam: hull strength calculations; **Van Wijk Werkendam,** Werkendam: aluminium doors ; **Veth Propulsion,** Papendrecht: *Veth Jet* bow thrusters; **Villa Hayes Yard,** Paraguay: shortening hulls; **Yerseke Engine Service,** Yerseke: start up engine and materials; **Zwets pumps & supplies,** Werkendam: pumping systems.