THE COMPANY

Integrated Solution In Naval Architecture

Delta Marine Engineering Co. has been providing services on engineering, architectural, consulting and design concept to the maritime industry in Turkey and world wide for more than 10 years.

We combine the experience accumulated from the design process and by supervising numerous of vessels using the latest computer technology to provide solutions in highest quality.

To be able to provide state-of-the art solutions, we keep informed about the latest developments within all aspects of shipping through a constant dialogue with suppliers, operators, ship owners, authorities and classification societies.

More than 40 naval architects, marine engineers, architects and mechanical engineers are employed in the company offering design services for:

- complete new buildings,
- advanced engineering,
- conversions,
- shore facilities and installations,
- feasibility studies,
- inspection activities,
- comprising new building supervision and surveys of existing ship and
- preparation of tenders and shipbuilding contracts.

Key Personnel :

Chairman	: Bülent ŞENER
Technical Director	: Yaşar GÜL
Section Manager	: Cemal ŞAHİN
Section Manager	: Tamer ÇAKMAK
Section Manager	: Levent KAYDIHAN

Contact :

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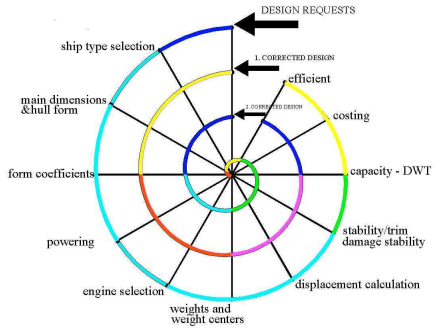
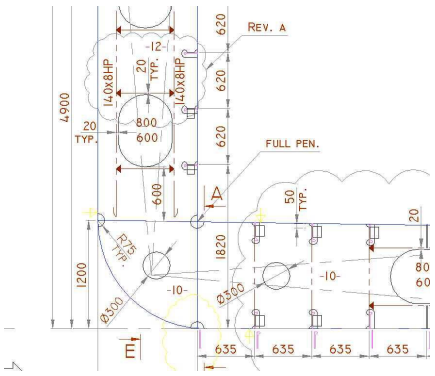
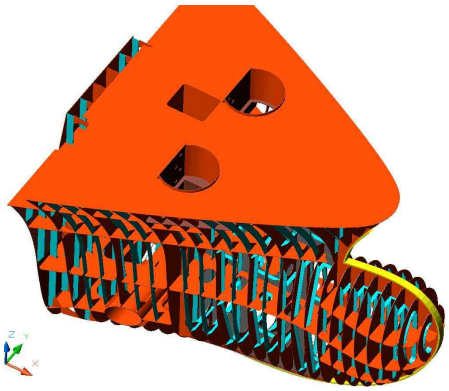
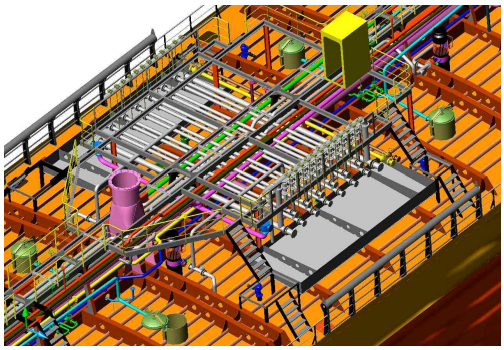
DELTAMARINE

LIST OF SERVICES









CONCEPTUAL DESIGN

Delta Marine at the early stages of design process determines the parameters that will form the basis for optimum ship dimensions, hull form and the selection of propulsion system's type and power and auxiliary systems, according to the customer's requirements (for example, speed, DWT, number of passengers, number of vehicles etc.), and prepares G/A and lines plan, preliminary, intact and damaged stability files, capacity calculations, speed - resistance analysis and finally creates the conceptual design.

STRUCTURAL DESIGN

Structural Engineers in Delta Marine, which are experts on their subjects, prepare optimum structural configuration of ship dimensions with reference to the type of cargo and type of the ship. Their aim is, to use minimum material, to comply the rules of Classification Society, to develop special details in the critical areas of fatigue and corrosion, to develop the most suitable structural configuration for workmanship and vibration. They utilise acknowledge computer software for all these purposes, such as, Classification Society Software (for example, Poseidon, Safe HulL , Mars etc.) and Finite Element Analysis Software.

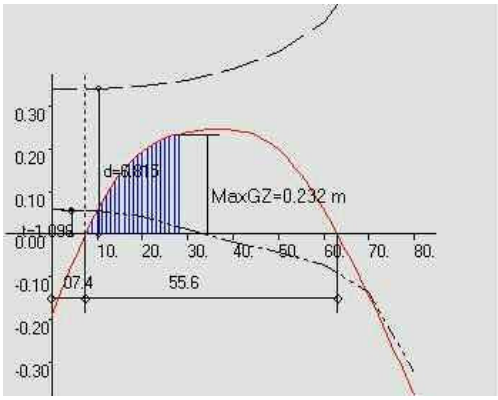
CAD / CAM

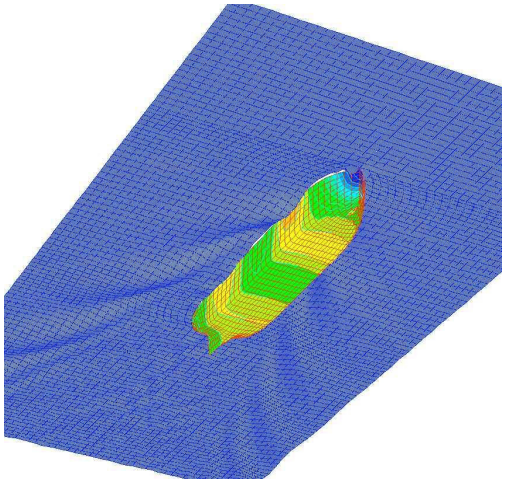
CAD/CAM Engineers and Draftsmen in Delta Marine build 3D structural computer model of steel structure of the ship for production, prepare workshop drawings, pose the parts of the structure for assembling and produce NC codes.

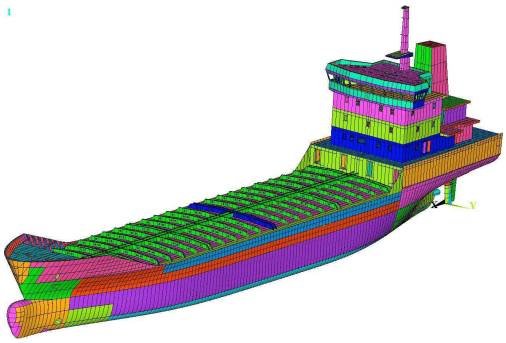
OUTFITING & PIPING

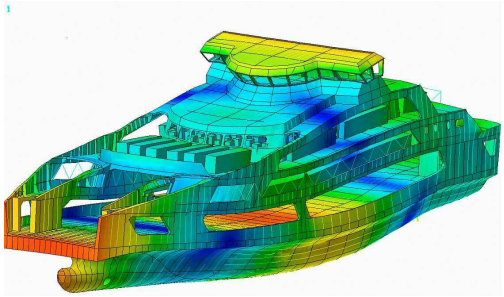
Outfitting and Marine Engineers who have worked in ships for many years and have a long onboard experience, develop projects on arrangement, outfitting and one-line diagrams of the main and auxiliary engines of the ship. During this arrangement process, their main aim is the safety, ergonomic and environment. 3D model of piping layout and isometric drawings are among their experience.

LIST OF SERVICES









SOFTWARE DEVELOPMENT

Delta Marine develops own software in solving Naval Architectural problems. Among them, **B_surf, DeltaLoad, DeltaFlow.** A new software is now being developed on ship structure model ing and production planning.

SHIP THEORY

Delta Marine has a vast experience on ship stability (intact and damaged) calculations and engineering. An independent department has been established for this subject in Delta Marine. In strict contact with the changing and developing rules, Ship Theory Department provides perfect compatibility with new projects as well as existing one's. There is an ongoing research and development for new software on this subject.

ADVANCED ENGINEERING

In a very close relation with the advanced engineering tools and designing ships with art-style perfection are among the objects of Delta Marine Engineers. To achieve this goal the following engineering tools are in use:

Finite Element Based Analysis

- Statical stress analysis
- Linear and non-linear buckling analysis
- Fatigue analysis
- Thermal stress analysis
- Dynamic analysis
  Vibration analysis (free and forced vibrations)
  Transient dynamic analysis (crushed, earthquake etc.)

Boundary Element Based Analysis

- Form Optimisations
- Wave analysis around the hull
- Stream lines analysis

Finite Volume Based Analysis

- Viscous flow (Navier-Stokes) Solutions
- Prediction of ship friction and viscous pressure resistance
- Wake flow analysis and optimisation
- Propeller analysis and solving propeller-hull interaction problems
- Design and analysis of equipment for propulsion efficiency
- Noise induced by flow analysis
- Exhaust gas analysis
- HVAC system analysis
- Mass and heat transfer analysis.

RESOURCES

HUMAN RESOURCES

Naval Architects	20
Marine Engineers	4
Mechanical Engineers	5
Architects	3
Aeronautical Engineers	1
Draftsmen	6
Software Engineers	2
Total	41

HARDWARE AND SOFTWARE RESOURCES

Delta Marine deploys of most advanced software and hardware which can be summarised as follows

MICROSTATION V8
Basic graphics for the whole design, furnishing engineering and architectural design

AUTOCAD
Basic graphics for the whole design

AUTO PLANT
Design of piping system and coordination plans of machineries and decks

B_SURF
Hull modelling, fairing and ship theory calculations (in-house software)

Delta_Load®
Ship loading condition calculation, information booklet preparation (in-house software)

DeltaFlow
Potential flow solution with panel method, around the hull (in-house software)

RESOURCES

HARDWARE AND SOFTWARE RESOURCES

ANSYS
General Purpose finite element software

FLUENT
General purpose Computational Fluid Dynamic software

POSEIDON
Germanischer Lloyd rule and ship structure FEM software

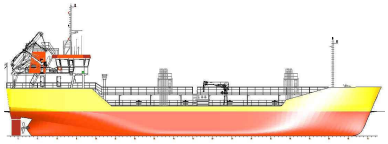
SAFE HULL
American Bureau of Shipping rule and ship structure FEM software

MARS
Bureu Veritas Rule Software

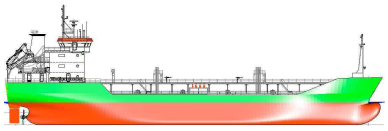
MICROSOFT PROJECT
Project scheduling and management software.

DELTAMARINE

TANKER PROJECTS

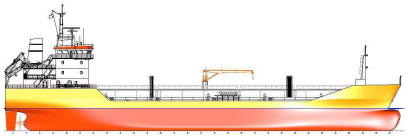


1100 DWT OIL PRODUCT TANKER

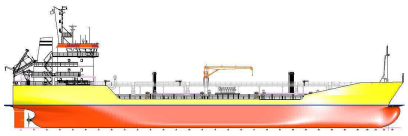


3500 DWT OIL CHEMICAL/PRODUCT TANKER

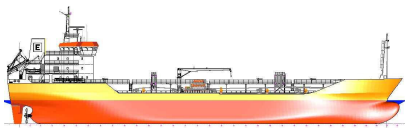
4450 DWT OIL PRODUCT TANKER



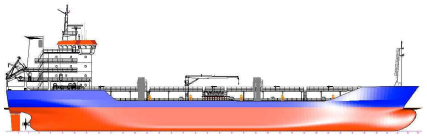
4750 DWT CHEMICAL/OIL PRODUCT TANKER



5850 DWT CHEMICAL/OIL PRODUCT TANKER

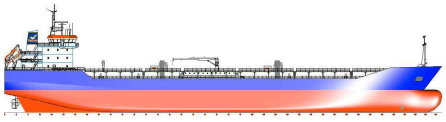


6750 DWT CHEMICAL/OIL PRODUCT TANKER



7100 DWT CHEMICAL/OIL PRODUCT TANKER

10.000 DWT CHEMICAL/OIL PRODUCT TANKER



13.000 DWT CHEMICAL/OIL PRODUCT TANKER

MILLENIUM II ASLI-S	DESAŞ A.Ş /TURKIYE ATS DENİZCİLİK A.Ş./ TURKIYE	IS IS
ORA-HOPE ALEV KAMAN ATLANTIS ARMONA ASTAŞ1 EBRU S VEYSEL BEY	P/R TUNA APS / DENMARK KAMAN DENİZCİLİK / TURKIYE GELİBOLU SHIPYARD /TURKIYE ASTAŞ AŞ. / TURKIYE ŞENER DENİZCİLİK AŞ / TÜRKİYE MASTER DENİZCİLİK AŞ / TÜRKİYE	UC UC UC UC UP UP
WHIT-CHALLENGER 1 WHIT-CHALLENGER 2	JOHN H.WHITAKER LTD / ENGLAND JOHN H.WHITAKER LTD / ENGLAND	UC UC
MAR-MARIA MAR-ISA	MAR-PETROL SA / SPAIN MAR-PETROL SA / SPAIN	UC UC
NİYAZİ-S BURÇE-S YARDIMCI NB 27	ŞENER PETROL A.Ş. / TURKIYE ATS DENİZCİLİK A.Ş. / TURKIYE YARDIMCI SHIPYARD A.Ş. / TURKIYE	IS UC UC
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FS MAUD FS DIANE YARDIMCI NB 26 YARDIMCI NB 30	FOUQUET SACOP MRTM / FRANCE FOUQUET SACOP MRTM / FRANCE CLIPPER / DENMARK YARDIMCI SHIPYARD / TURKIYE	IS IS UC UC
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DELTAMARINE

MAR CRISTINA

SATISFYING CHEMICAL /OIL TANKER FROM TURKEY FOR SPANISH OWNER

Designer : .....DELTA MARINE AS
..... Turkiye
Contractor :……..Atlantik Shipping AS
……..Turkiye
Shipbuilder : .....Selah Shipyard
.....Turkiye
Vessel name: .....Mar Cristina
Hull number:.....32
Owner/operator :.....Mar Petrol Sa
.....Spain
Flag :.....Spain
Total number of sister
ships already completed :.....3
Total number of sister
ships still on order :.....1

The single-screw tanker series of design originated within DELTA MARINE, suitable for carriage IBC type II chemicals of sg 1.54 t/m^3, support her owner's manufacturing interests. The hull form has been optimizated in co-operation with the İstanbul Technical University ship model basin. The hull and necessary equipment is ice-strengthened to class 1D, northern Baltic-Finnish-Swedish standarts.
Structually, the double hull encloses a centrally divided cargo space which is subdivided to 12 cargo tanks and one slop tank. All have smooth interiors, with upper deck stiffening fitted above deck, and are coated phenolic epoxy. The double hull structure contains six pair of segregrated ballast tanks.
Electric driven deepwell pump is installed to each tank and 6 converter control these pumps. The cargo system is so designed that gives complete segregration.
Designation of cargo midship manifold allow to load thirteen grades of cargo simultaneously, have the ability to load/unload unique cargo as well. The ship has also stern line connected to midship manifold.
Unloading rate is 6 tanks, 1200 m^3/h totally, loading rate 400 m^3/h to each tank. Pipes, valves, fittings intented for cargo is stainless steel 316L. Cargo valves except manifold valves and ballast valves are hydraulic remote operated controllable from cargo control room by using mimic diagrams.
A controlled tank venting system is provided, connected to a vapour line, and a nitrogen blanket obtained from storage bottles is maintained in the ullage space above the cargo at sea.
Tank cleaning is carried by means of two fixed programmable machines in each tank and their locations are determined so that all tank areas can be direct hit (100%). 6 machines can be operated simultaneously at 60 ^{0}C water temperature. Unfired steam generator is also installed for cargo tank final cleaning.
Cargo heating is achieved secondary closed thermal oil system by heating coils which heated primary thermal oil system. System is cabaple of keeping the worst cargo (HFO) temperature at 57^{0}C, and heating up rate 0.25^{0}C/h while sea water +5^{0}C and ambition air 0^{0}C. Cargo monitoring system has radar type level gauge, 2 point temperature sensor, inert gas pressure sensor, separate overfill alarms in each tank and pressure transmitter on manifold lines. Pressure type level transmitter is also installed in ballast and engine room storage and service tanks.
A medium-speed four stroke main engine developing 3840 kW at 600 rpm is fitted, for a trial speed approximately 15 knots at summer draft is achieved. Engine driving CP propeller is running 140 rpm, is by way of gearbox with 600 kW 1500 rpm alternator. Three 400 kW diesel alternator sets are also fitted.
Engine control systems allow to operate the propulsion package steering gear and from machinery control room and wheel-house. Central alarm system is also installed to compartments of related personnel.
The results of vibration calculations which is done by DELTA MARINE take into consideration the design of accomodation, engine room and rudder.
The accomodation is separated from engine room and funnel casing equipped to serve 8 officers and 6 crew in single berths and 4 crew for double-berth cabins.

PRINCIPLE PARTICULARS

Lenght oa ..... 114.00 m
Lenght bp ..... 106.00 m
Breadth, moulded ..... 16.90 m
Depth moulded to main deck .....8.40 m
Width of double skin side ..... 1.06 m
'' '' '' '' bottom ..... 1.20 m
Gross 4401
Displacement ..... .9242.6 tonnes
Deadweight design .....6671.9 tonnes
'' scantling ..... 6671.9 tonnes
Speed service (85 %MCR).....15 knots
Cargo capacity liquid volume (100%).....7436 m^3
Bunkers
Heavy oil.....383 m^3
Diesel oil.....81 m^3
Water ballast.....2493 m^3
Classification..... ..Bureau Veritas 13/3E Oil Tanker, ...Chemical Tanker ESP Deep Sea Aut-MS, Ice 1D

Main engine
Design.....MaK
Model.....8M32
Manufacturer.....MaK
Output.....3840 kW, 600 rpm
Gearbox
Make.....
Model.....
Number.....1
Propeller
Material.....Nickel-aluminium-bronze
Manufacturer.....Scana Volda
Number.....1
Pitch.....Controllable
Diameter.....4200 mm
Speed.....140 rpm
Main engine driven alternator
Number.....1
Make.....Lorey Somer
Output.....600 kW 1500 rpm, 50 Hz

Diesel driven alternators
Number.....3
Engine make/type.....MAN / D2842LE
Alternator make/type.....Stamford / HCM 534F
Output.....3x400 kW, 1500 rpm, 50 Hz

Thermal oil heaters
Number.....3
Make/type.....2 x Aalborg / 25-XO-13S main
.....1 x Aalborg EXV economiser
Output.....2 x 2000 kW, 1 x 500 kW
Unfired steam generator
Make/type.....1 x Aalborg
Output.....2000 kg/h

Hose Handling Crane
Number.....1
Make/type.....Gürdesan / hydraulic
Capacity.....5 t at 13 m 2 m outreach

Mooring equipment
Number.....2 combined mooring winches/windlass
.....2 mooring winch
Make/type.....Rolls-Royce / hydraulic
Capacity.....10.6 t at 14 m /min, brake load 22 t
Cargo tanks
Number.....12 + 1 slop
Grades.....13
Product range.....IMO II-III chemicals, oil products
Coated tanks / type.....Yes / phenolic epoxy
Stainless steel.pipes,valves,fittings intented for cargo
Cargo pumps
Number.....13
Type.....electric driven deepwell
Make.....Marflex
Capacity.....12 x 200 m^3/h, 1 x 120 m^3/h
Cargo control system
Make.....Siemens/Danfoss/Auxitrol
Ballast control system.....Danfoss/Auxitrol
Complement
Officers.....8
Crew.....10

Bridge control system
Make / type.....Lyngso Marine UMS 2100
One man operation.....Yes
Fire detection systems
Make.....Minimax
Type.....analogue
Fire extingushing systems
Cargo space.....Foam and sea water
Engine room.....CO2 and sea water
Cabins and public spaces.....sea water
Radars
Number.....2
Make.....Sait Marine
Contract date.....1 November 2000
Launch/float-out date.....15 June 2001
Delivery date.....22 October 2001

DELTAMARINE

NİYAZİ -S

NEW TRUNKED DESIGN CHEMICAL / OIL TANKER FROM DELTA MARINE

Designer : .....DELTA MARINE AS
..... Turkiye
Shipbuilder : .....Şahin Çelik Shipyard
.....Turkiye
Vessel name: .....NIYAZI S
Hull number:.....18
Owner/operator :.....Şener Petrol Denizcilik
.....Türkiye
Flag :.....Turkish
Total number of sister
ships already completed :.....0
Total number of sister
ships still on order :.....1

Another chemical/oil tanker design by Delta Marine to the developing Turkish shipping industry, having trunk to increase the cargo volume satisfies the owner's demands. The tanker is suitable for carriage of IBC type II chemicals. The hull form has been optimized by Delta Marine B_surf program. The hull and necessary equipment is ice-strengthened to class III.

Structurally, the cargo space is divided to 10 cargo tanks and 1 slop tank at aft. There is a longitudinal bulkhead that centrally divides the cargo space. All cargo tanks have smooth interiors, with upper deck stiffening fitted above deck, and are coated Interline 904. All inner cargo bulkheads are corrugated and strengthened for a sg of 1.54 t/m^3. The cargo area is enclosed within a double-hull structure. The double bottom is divided into 12 tanks; 10 ballast tanks and 2 technical fresh water tanks.

Each cargo tank has an electric driven deepwell pump and 4 converter that is located in converter room on main deck control these pumps. The design feature of cargo system is giving complete segregation, that provides the ability to load/unload unique cargo as well. This concept of design allows cargo midship manifold to load eleven grades of cargo simultaneously. The cargo discharge system is capable of discharging 4 tanks at the same time. Each cargo tank is connected to the main tank cleaning line and main nitrogen line by means of flexible hoses to prevent mixing of substances. Pipes, valves, fittings intended for cargo is stainless steel 316Ti. Each cargo filling and discharge lines have manually operated butterfly valves. Cargo system can be controlled from cargo control room by means of the cargo monitoring system, converters and valve remote control system.

A vapour line is connected to each tank ventilation pipes by means of the spectacle flange and manifold lines. Also the nitrogen system is designed so that to fill 95% ullage volume of all cargo tanks and slop tank at the same time.

Tank cleaning is carried by means of two fixed machines in each tank and their locations are determined according to shadow plan. Besides each cargo/slop tank have portable tank cleaning hatches from where the portable tank cleaning machines are operated. The system's tank cleaning tube heater working with thermal oil has a capacity of 2120 kW heating 28 m^3/h of water from 10^{o}C to 80^{o}C.

All cargo tanks and slop tank are fitted total 2004 m DN40 x 2.11 stainless steel 316L pipe. Heating medium is thermal oil, 160-110^{o}C, 7 bar. The maintaining capacity is keeping HFO temperature 57^{o}C while sea water temperature is 0^{o}C and ambient air temperature is –10^{o}C.

Cargo monitoring system has radar type level transmitter, 3 temperature and one inert gas pressure transmitter, separate 95%, 98% overfill alarms for each cargo tank and 11 pressure transmitter on manifold lines. In addition, a computer installed in engine control room and works parallel with cargo control room monitor.

Propulsive power is obtained from Mak 8M25 main engine developing 2400 kW at 750 rpm. The engine drives a CP propeller running 150 rpm, is by way of gearbox with 500 kW at 1500 rpm alternator. Two 405 kW diesel alternator sets are also fitted. Main engine, propulsion unit, rudder and bow thruster can also be remote controlled from wheel-house. Central alarm system is also installed to compartments of related personnel.

A crew of 8 officers and 12 crew are accommodated in a four-tier deckhouse aft, provided with ample heat, noise and fire insulation, including separation of the living quarters from funnel and engine casings.

PRINCIPLE PARTICULARS

Length oa.....105.50 m
Length bp.....99.35 m
Breadth, moulded.....16.80 m
Depth moulded to main deck.....7.40 m
Width of double skin side.....1.05 m
'' '' '' '' bottom.....1.15 m
Gross 374
Displacement.....7947.7 tonnes
Deadweight design .....5841 tonnes
'' scantling .....5841 tonnes
Speed service (85 %MCR) ..... 13.7 knots
Cargo capacity liquid volume (100%) .....6430 m^3
Bunkers
Heavy oil..... 272 m^3
Diesel oil.....101 m^3
Water ballast.....2343 m^3
Classification.BV, I 3/3 E +Chemical Tanker IMO II
..... Oil Tanker, ESP, Deep Sea, AUT – MS
.....ICE III
Main engine
Design.....MaK
Model.....8M25
Manufacturer.....
Output.....2400 kW, 750 rpm
Gearbox
Make.....
Model.....
Propeller
Material.....Nickel-aluminium-bronze
Manufacturer.....SCANA VOLDA
Number.....1

Pitch.....Controllable
Diameter.....3900 mm
Speed.....150 rpm
Main engine driven alternator
Number.....1
Make.....LEROY SOMER
Output.....500 Kw, 1500 rpm, 50 Hz
Diesel driven alternators
Number.....2
Engine make/type.....Caterpillar / CAT3412 DITA
Alternator make/type.....Caterpillar / SR4
Output.....2x405 kW, 1500 rpm, 50 Hz
Thermal fluid heaters
Number.....2
Make/type..... 2x AALBORG
.....1 x AALBORG economiser
Output.....2 x 1800 kW, 1 x 500 kW
Unfired steam generator
Make/type.....1 x Aalborg
Output.....2000 kg/h
Hose Handling Crane
Number.....1
Make/type.....Gürdesan / hydraulic
Capacity.....5 t at 13 m 4.8 m outreach
Mooring equipment
Number.....2 combined mooring winches/windlass
.....2 mooring winch
Make/type.....Gürdesan / hydraulic
Capacity.....8.5 t at 14 m /min, brake load 25 t
Cargo tanks
Number.....10 + 1 slop
Grades.....11
Product range.....IMO II – III chemicals, oil products
Coated tanks / type.....Yes / Interline 904
Stainless steelpipes,valves,fittings intended for cargo
Cargo pumps
Number.....11
Type.....electric driven deepwell
Make.....Swanehøj
Capacity.....11 x 300 m^3/h, 1 x 70 m^3/h
Cargo control system
Make.....Vacon Cubic/Autronica
Complement
Officers.....8
Crew.....12
Bridge control system
Make / type.....Lyngso Marine UMS 2100
One man operation.....Yes
Fire detection systems
Make.....SIEMENS
Type.....analogue
Fire extingushing systems
Cargo space.....Foam and sea water
Engine room.....CO2 and sea water
Cabins and public spaces.....sea water
Radars
Number.....2
Make.....JRC Marine
Contract date.....1 November 2000
Launch/float-out date.....15 June 2001
Delivery date..... 2001