BRODOSPLIT
Member of DIV GROUP

GREEN FEEDER

DUAL FUEL CONTAINER VESSEL 2000 - ECOSMART VESSEL

The first Green vessel with high added value built to the highest EU environmental regulations which globally achieve the largest fuel savings

www.brodosplit.hr

Taking inspiration from **NATURE**

Inspired by nature's constant struggle to keep our planet clean and safe, we devoted ourselves to develop container vessel powered by LNG dual fuelled two stroke diesel engine and the world's the most efficient safe and environmentally friendly vessel.

Green Feeder Cont. 2000 is a 24.650 MT new generation eco-friendly Feeder Container vessel.

ENVIRONMENTALLY FRIENDLY

and more fuel efficient

The Vessel design is developed targeting environmentally friendly worldwide transportation through a set of focus areas that helped us to build a green future.

- Low resistance; achieved by the optimization of a hull using extensive CFD analysis and model testing
- Optimized fuel saving; achieved by optimized hull, rudder, controllable pitch propeller with large diametre, optimized propeller speed and PTO/shaft generator as a part of power generating plant
- The Vessel has a better fuel consumption than other similar vessels because of the embedded “ultra-long stroke” main engine and optimised propulsion, consequently also better fuel consumption of main engine as prime mover for PTO (SG) as source of electrical energy
- Optimized wake distribution
- Considerable fuel consumption savings of dual fuel engine Compared to standard diesel engine
- Reduced light ship weight through 3D FEM structural analysis
- Maximum cargo capacity
- Good sea-keeping characteristics
- Functionality of the bridge
- Social education impact; academic role in student and future Employees training with LNG expertise
- Functionality of communication and navigation equipment
- Reduced noise and vibration conditions for crew

ECOLOGICAL FEATURES

- Dual fuel powered propulsion with LNG as primary fuel supply
- LNG dual-fueled main and auxiliary engines
- LNG is a potential solution to the shipping challenges, and there is already a commercially viable option for smaller vessels. LNG will in future play an increasingly important role in the shipping industry's efforts to reduce their environmental impact
- The first green vessel with high added value built to the highest EU environmental regulations, which globally achieve the largest fuel savings
- Two-stroke low consumption engine with controllable pitch propeller
- Efficient and safe handling of dangerous goods
- Consumption saving (g/kWh) is about 18% on the side of LNG compared with MGO
- Sewage and garbage treatment plant
- Ballast water treatment
- Extensive use of LED lighting will provide energy savings during operation of the Vessel
- Extensive waste heat recovery
- Remarkably reduced fuel consumption and cost
- Remarkably reduced emissions of greenhouse gas CO_2 (for 25%)
- Remarkably reduced emissions of NO_x
- Eliminated emission of SO_x and solid particles (for >99%).
- Complete control of harmful substances emission to water and air
- Compliance with the relevant environmental regulations

PROVEN DESIGN SOLUTION

& quality engineering

Brodosplit developed design of container vessel for transport of various container sizes. The shipyard decided to develop a new project of dual fuel feeder container vessel, emphasizing ecologically friendly approach and fuel efficiency, simultaneously aiming to achieve EEDI (energy efficiency design index) lower than IMO required for year 2025.

The world's key ports have committed themselves to reduce greenhouse gas emissions (GHG) while continuing their role as transportation and economic centres. The Environmental Ship Index (ESI) identifies seagoing ships that perform better in reducing air emissions than required by the current emission standards of the International Maritime Organization, the Environmental Ship Index.

The Vessel and its equipment will be suitable for the transportation of various container sizes, including reefer containers and containers with dangerous goods. Cargo holds will have movable cell guides for alternate loading of 40/45 FT containers. All slots in holds will be usable for Euro pallet wide containers, as well as certain number on hatch covers.

SHIP NAME
PORT OF AUTHORITY

MAIN PARTICULARS

LOA:	184.43 M
LBP:	173.20 M
B (MLD):	27.50m
D:	15.80 m
DESIGN DRAUGHT:	9.00 m
SCANTLING DRAUGHT:	10.30 m
DEADWEIGHT ON DESIGN DRAUGHT	19300 t
DEADWEIGHT ON SCANTLING DRAUGHT	24650 t

CLASSIFICATION:
GERMANISCHER LLOYD
Hull: + 100 A5 E3 BWM (D1, D2) IW LC DG CONTAINER SHIP
Machinery: + MC E3 AUT GF

RULES AND REGULATIONS

The latest rules and regulations that are in force, will be applicable.

1. Malta national Rules.
2. International Convention on Load Lines 1966, as amended.
3. International Convention for Safety of Life at Sea (SOLAS) 1974, Protocol 1978, as amended.
4. International Convention for the Prevention of Pollution from Ships (MARPOL) 1973 and Protocol 1978, including Annex I, IV and V, and VI.
5. International Regulations for Preventing Collisions at Sea 1972, 1981 and 1987 Amendments.
6. International Convention on the Tonnage Measurement of Ships 1969 and Amendments July 1982, in force as from July 18th, 1994.
7. International Telecommunication Union Radio Conference 1973, Radio Regulations 1976, as revised 1983, 1990 and 1997.
8. US Coast Guard (USCG) Rules and Regulations for Foreign Vessels operating in the Navigable Waters of the United States, (CFR Title 33 – Navigation and Navigable Waters, Part 155, 156, 159, and 164, with letter of compliance, without certificate nor inspection).
9. Suez Canal Tonnage Measurement Regulations.
10. Suez Canal Authority, Rules of Navigation.
11. Panama Canal Tonnage Measurement Regulations.
12. Panama Canal Authority, Rules of Navigation.
13. Kiel Canal regulations.
14. Standard Specification of the International Maritime Satellite Communication System for Ships and INMARSAT Regulations.
15. SOLAS Amendments 1988 (GMDSS).
16. International Labour Organization ILO, Maritime Labour Convention 2006 (MLC, 2006).
17. IMO Resolutions for Navigation Equipment, A.224(VII), A.422(XI), A.424(XI), A477(XII), A.478(XII), A.665(16)".
18. IEC Publication 92, Electrical Installation on Board Ships.
19. Code on intact stability for all types of ships covered by IMO Instruments, Resolution A.749 (18).
20. SOLAS 74 Chapter II-1. Subdivision and damage stability of cargo ships.
21. IMO Regulations and Recommendation on the carriage of dangerous cargoes and Amendments.
22. ISO 6954 "Guidelines for Evaluating the Vertical and Horizontal Vibration of Merchant Ships"
23. IMO Resolution A 468(XII), Noise levels on board ships.
24. OSHA Rules for container lashing equipment.
25. Code of Safe Practise for Cargo Stowage and Securing
26. Code on Alerts and Indicators 2009 Edition
27. The International Ship and Port Facility Security Code (ISPS Code).
28. Resolution MSC.215 (82), Performance Standard for Protective Coatings for dedicated seawater ballast tanks in all types of Ships and doubleside space of Bulk Carriers.
29. European Union Marine Equipment Directive (MED).
30. International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF Code) as effective after 1 January, 2017, including DNV GL Rules 2015 Part 5, Chapter 7, Section 16.

BRODOSPLIT

CARGO AREA

COMPARISION TABLE

CHARACTERISTICS	P1296A	ABH 1600	TOEPFER TRANSPORT	BALTIC MAX
LOA (m)	184.43	177.75	184.43	189.50
Breadth (m)	27.50	26.60	28.20	30.90
Depth (m)	15.80	14.90	15.80	15.00
Draught (m)	9.00	9.50	8.50	8.50
Main Engine	MAN-B&W DF 8G50ME-C9.5-GI-TII	Diesel engine	MAN 8S50ME-B9	MAN DF 7S60ME-C
Speed (knots)	18.00	18.80	19,10	18.75
Container capacity	1944	1703	1753	2349
Reefer containers	375 (ref. plugs)	381	231	450
Classification	GL	GL	GL	GL

Main Engine	M.A.N.-B&W 8G50ME-C9.5-GI-TII Tier II dual fuel marine engine two stroke, crosshead type, slow speed, super long stroke, non-reversible, constant pressure turbocharged, with part load exhaust gas baypass (EGB) tuning SMCR 11060 kW at 100 rpm.
Propeller	One (1) x CPP, 4-bladed, Ni-Al bronze, diameter: abt. 6400 mm
Gearbox/PTO	One (1) shaft tunnel gearbox constant gear ratio execution (BW IV/GCR), based on an engine range of abt. 70-100 rpm, vertical offset with secondary PTO. Secondary PTO is foreseen for the shaft generator power abt. 1900 kWe (2375 kVA) at 70% of 1800 rpm. The power take-off from ME to the reduction gear for shaft generator is approx. 2050 kW.
Gensets	Three (3) diesel engines x abt 1000 kW of which one (1) is DF Tier II, Three (3) generators x abt. 950 kWe (1187 kVA), Four-stroke Dual Fuel diesel engine driven, Alternators 440 V AC, 3 phase, 60 Hz,
Emergency Genset	One (1) x abt. 190 kWe (237,5 kVA) 1800 rpm MGO. Four-stroke diesel engine driven, alternator 440 V AC, 3 phase, 60 Hz
Shaft generator	One (1) x 1900 kWe (2375 kVA) at 70% of 1800 RPM, 440 V AC, 3 phase, 60 Hz FC controlled.
Tunnel thruster	One (1) electrically driven controllable pitch transverse thruster, 1200 kW, with el. motor as the prime mover, will be provided in the fore part. Propeller diameter abt.: 2000 mm.

SETTING THE BENCHMARK

for efficiency and environmental performance

Highly optimized & competitive hull shape

V. KNOTS	ENGINE POWER KW	ENGINE LOAD %	DAILY GAS CONSUM. T/DAY	DAILY Pilot MGO CONSUM. T/DAY	DAILY MGO CONSUM. T/DAY
15.0	4390	40%	13,48	1,66	17,45
18.0	7700	70%	23,19	1,66	28,83

Consumption data according to SFOC/SGC at ISO ambient conditions and without 5% tolerance.

		TRIAL SPEED (KN)			SERVICE SPEED 15% SM (KN)			DAILY FOR CONS. (T/DAY)		
		Scantling	Design	Ballast	Scantling	Design	Ballast	LNG	Pilot MGO	MGO
100% SMCR without PTO	11060 kW	19.65	19.75	19.95	18.98	19.06	19.20	35,68	1,67	43,45
85% SMCR without PTO	9400 kW	18.82	18.94	19.08	18.3	18.22	18.34	29,22	1,67	35,87
85% SMCR with 1700 kW PTO	9400 kW	17.83	18.00	18.12	17.03	17.15	17.25	29,22	1,67	35,87
50% SMCR	5530 kW	15.99	16.21	16.35	15.22	15.38	15.54	16,78	1,69	21,31

Consumption data according to SFOC/SGC at ISO ambient conditions and without 5% tolerance

Cruising range:
Cruising range at 7700 kW for propulsion and 1700 kW PTO (at 85% SMCR)
LNG ~ 3000 n. miles
MGO - 4000 n. miles

OPERATIONAL FLEXIBILITY
and efficiency

The Vessel and her equipment will be suitable for world-wide service. The Vessel is an environmentally friendly sea-going container ship intended to carry containers in accordance with the Vessel's description. The vessel is strengthened and equipped for the ICE class.

A single screw diesel engine driven Container Vessel with a bulbous bow, transom stern and forecastle.

Living quarters including the navigation bridge and engine room located aft.
Double bottom/double side tanks and peak tanks intended for segregated ballast.

Heeling tanks located in the double side.
The cargo space is divided into four (4) cargo holds with pontoon type hatch covers. The operation of the hatch covers through a lift-on/lift-off procedure. Handling the hatch covers to be done using fittings for 20' and 40' container-spreader as well as for cargo operation.
Maximum weight per panel not to exceed 35t, including lashing material remaining on the panel.

The cargo holds will have cell guides. Socket outlets for reefer containers will be arranged on the deck and in Holds No.1, No.2 and No.3.

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LNG

INTENDED CARGO

ISO containers 20', 30', 40', 45' and 48'

All classes of dangerous goods according SOLAS II-2, Reg. 19 can be carried on the main deck hatch covers. Dangerous goods in closed freight containers of the classes 1-8 can be carried in cargo hold No.1 and classes 1.4S, 2, 3, 4, 5.1, 6.1 and 8 can be carried in cargo holds No.2 and 3. Above the engine room, Class 5, 6, 8 and 9 can be carried except for bay 38.

Container capacity based on the IMO visibility line, 8'6" high containers, for the vessel floating on scantling draught at an even keel:

- on deck 1304 TEU
- in holds 640 TEU
- total 1944 TEU

Including 375 reefer plugs with a monitoring system reefer containers.
40' container stacks in the holds are arranged for the mixed stowage of 20' and/or 40' containers.

The clear height of the cargo holds are 6 tiers of 8'6" high containers or 5 tiers of 9'6" high containers with any combination of layers of 8'6" and 9'6" high cube containers.
High cube containers may be carried in the holds and on deck.

Access for inspection is secured by the complete double hull configuration according the latest IMO requirements.

SAFETY

- Crew safety
- Free fall life boat
- Rescue boat
- Inflatable life raft
- Water mist and CO_2 firefighting system
- Bridge visibility 360
- Permanent thermal and immersion suits
- Fireman's outfit

Think
ECO-FRIENDLY

Low emission machinery:

- Minimized environmental impact
- Meeting existing & future emission control regulations
- MGO low sulphur is carried in side tanks located in the engine room
- LNG fuel is stored in 2 cylindrical vessels located with the accompanying fuel gas supply system below Hold No. 4
- Easy and safe water ballast exchange

BRODOSPLIT

SHIPBUILDING INDUSTRY SPLIT INC.
Put Supavla 21, P.O. Box 517, HR-21000 SPLIT
PHONE: +385 21 382 428
FAX: +385 21 382 648

www.brodosplit.hr