



Offen Bulkers



Fuel Saving on Bulk Carriers

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SCORPIO

- **Scorpio Ship Management s.a.m is the technical arm of Scorpio Group**
- **200 Nbs ordered from 2011; tankers, bulkers, gas carriers, containers**
- **75 bulkers ordered ranging from Ultramax through Kamsarmax up to Capes**
- **All NB vessels have enhanced fuel efficiency design/features**



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Ship opportunities: Eco Ship

→ Fuel Efficiency

Hull form

Propeller

Main engine

Hull roughness

Fuel efficiency devices



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Fuel efficiency devices

- Reconsideration of main dimensions and service profile
- Service speed, block coefficient, bulbous bow
- LCB position/form factor, wave resistance, wake fraction

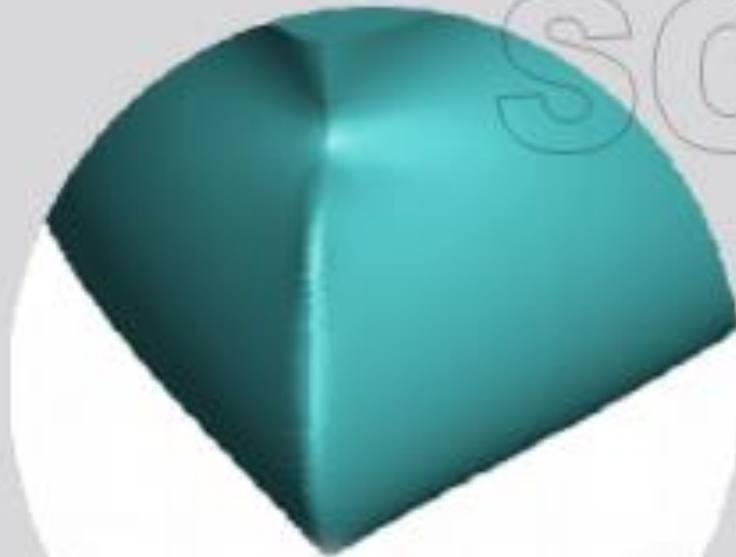


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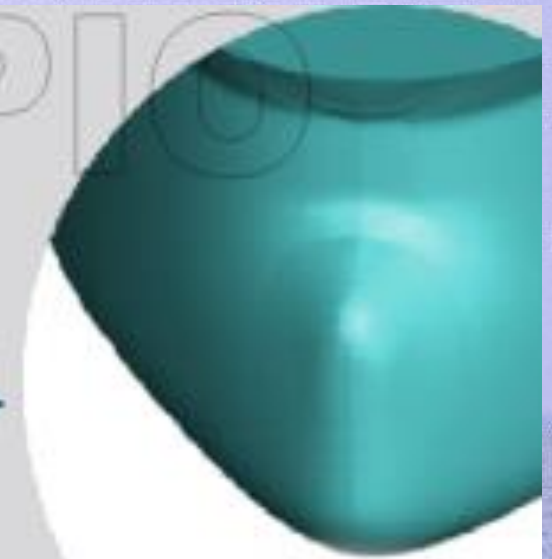
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Hull form

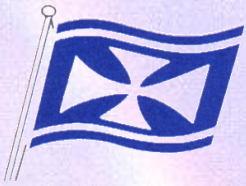
Rw/Rt % decreases → entrance angle increases, bow volume increases, Lcb moves forward, lower friction resistance, better wake field aft



Base
Hull



Optimized
Hull

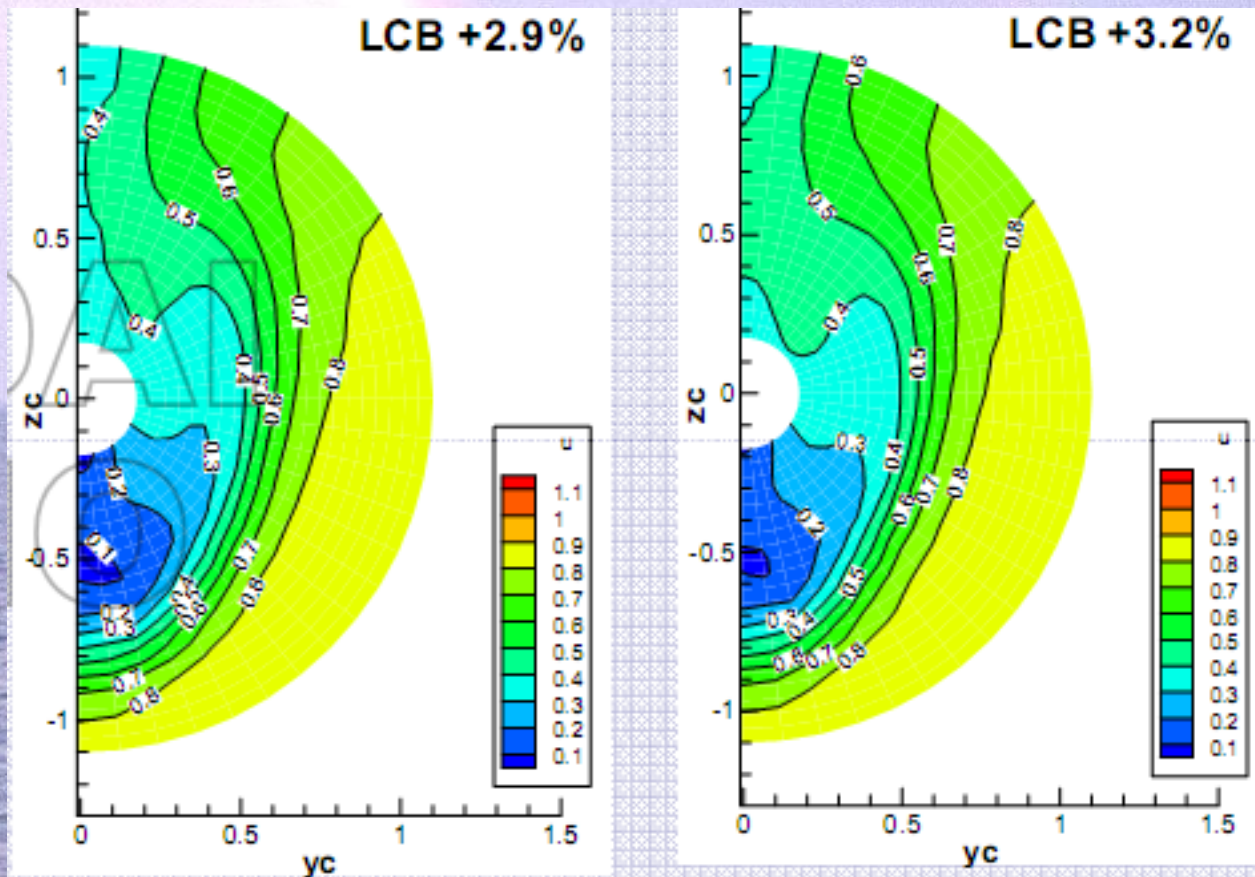


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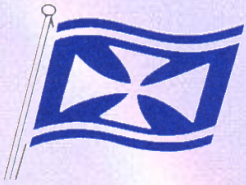
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Hull form

Lower and stable wake fraction positively influences propeller efficiency and reduce noise and vibration



$$V_a = V_s \times (1-w)$$



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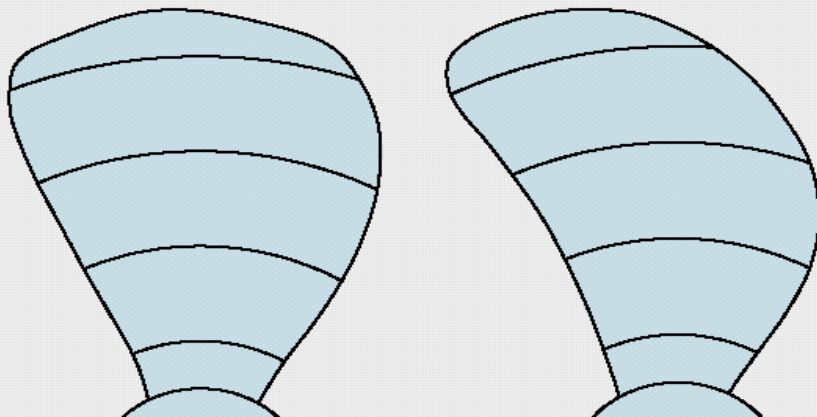
- Higher diameter → higher efficiency
- A_e/A_o , improved cavitation design moving out from standard wing profiles
- Tip rake or winglet for limiting the tip vortex effect
- Modification of radial pitch/area distribution (skew, 3 blades)



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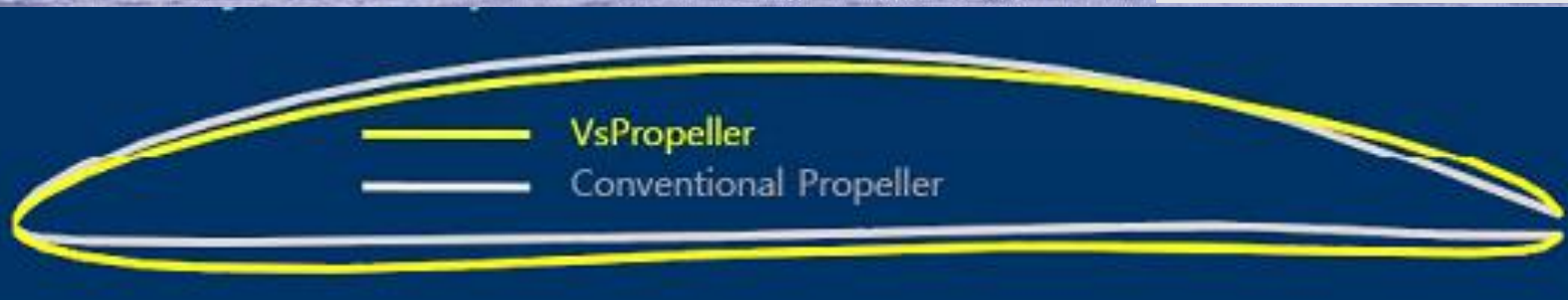
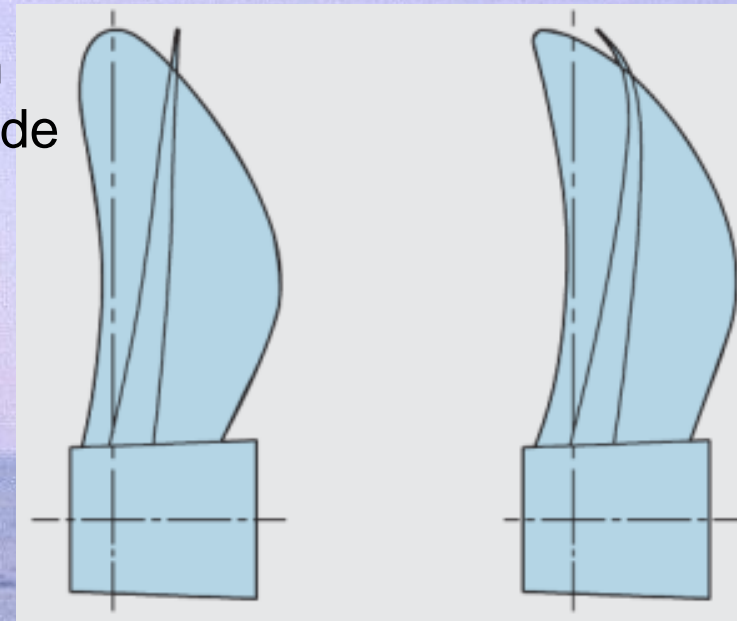


Propeller



Better distribution of areas where \uparrow efficiency increases

Tip rake on pressure side



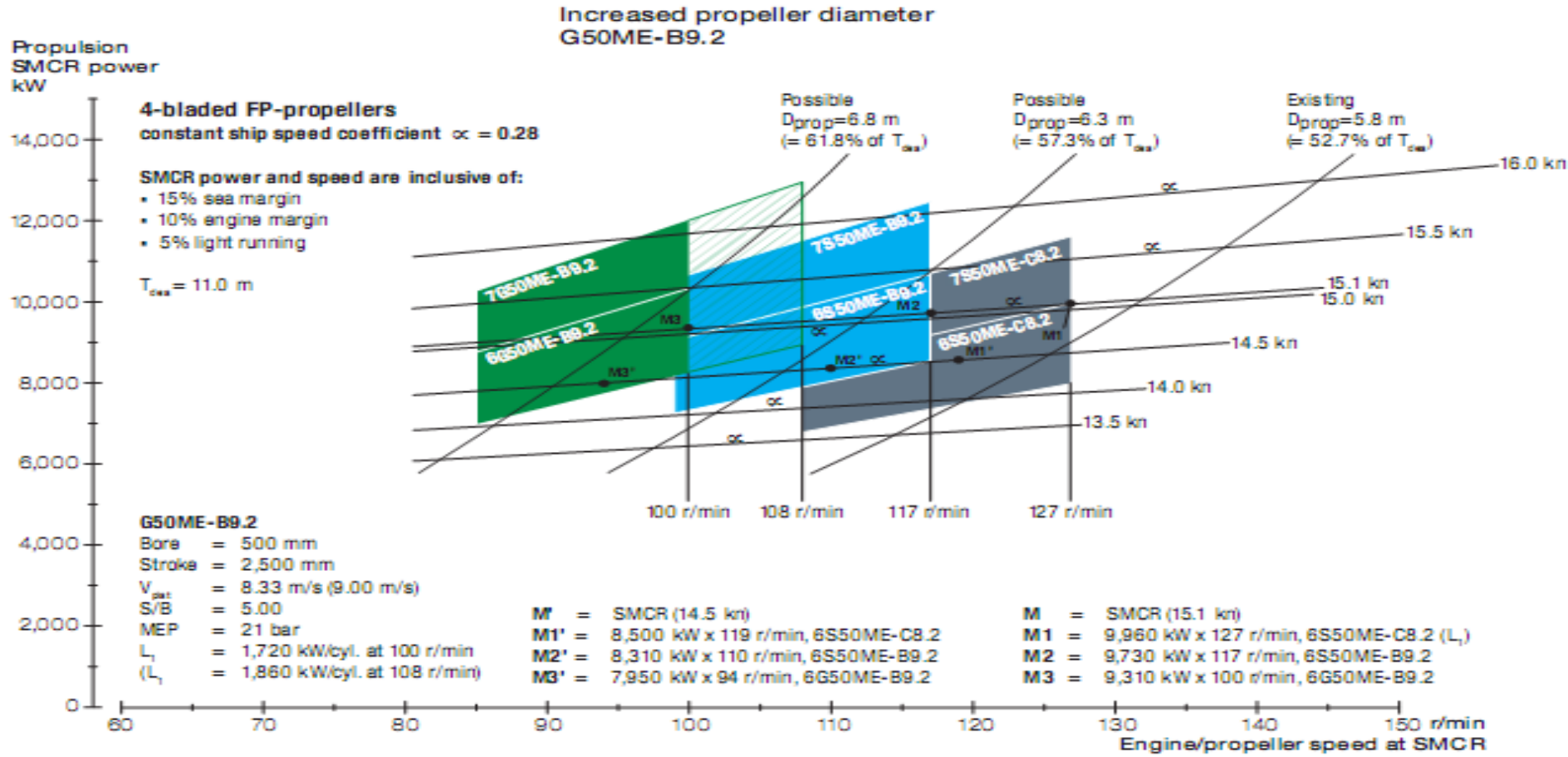
— VsPropeller
— Conventional Propeller

Wing profile fine tuned for improved \leftarrow cavitation



Moving along constant ship speed curve toward lower revs/higher propeller D, power req. decreases due to overall higher efficiency of the propulsion system

Propeller





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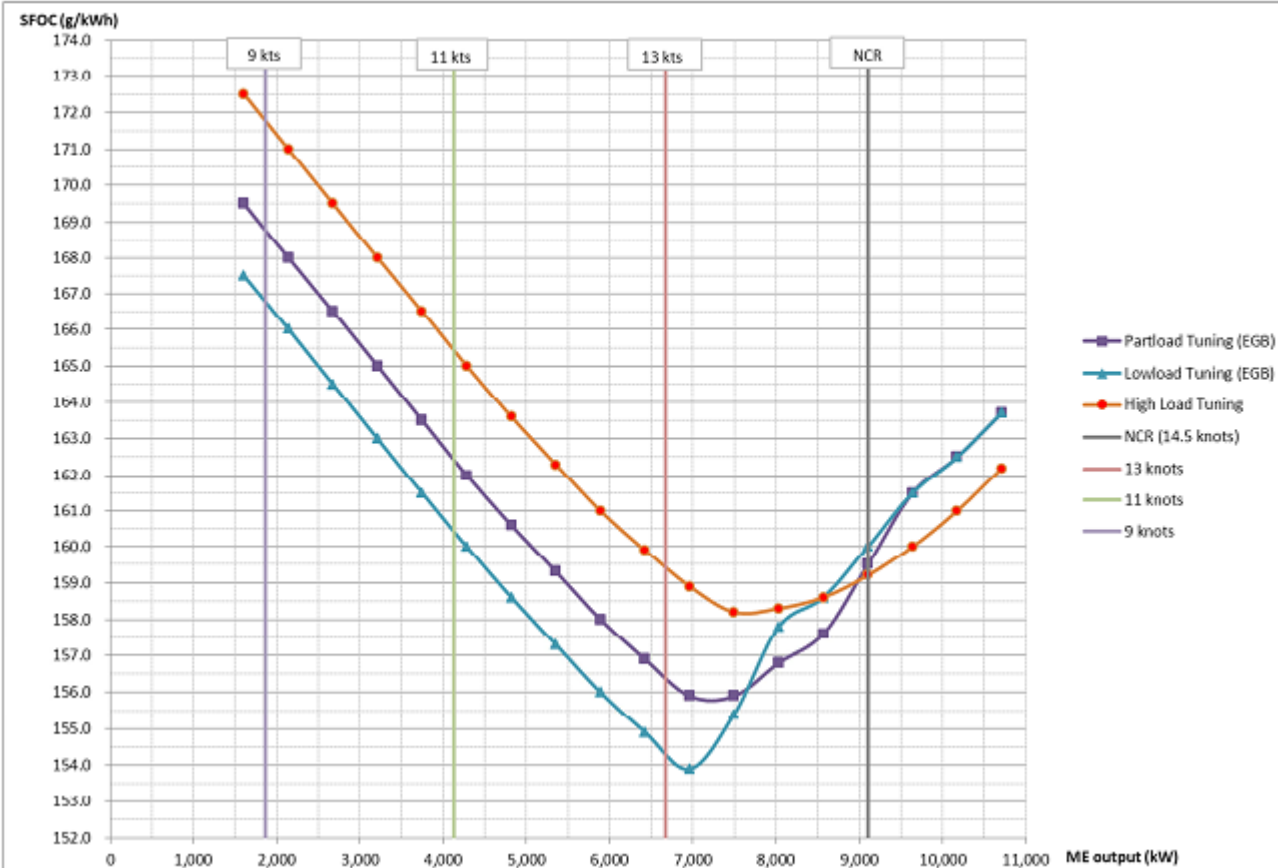
- Balance between lower SFOC and lower revs
- Electronic control (injection timing and injection profile)
- Engine tuning (ECT, EGB, VTA) and type (gas engine/scrubber) depending by service profile and percentage in ECA
- Super long stroke for better coupling with high dia propellers
- Challenges: matching of new propeller curve with engine load diagram



Main Engine

Selection of proper engine tuning basis service profile including percentage in ballast as opposed to laden might improve SFOC by 5 g*kW/hr (3%)

<SFOC comparison graph for each ME tuning method>





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Fuel efficiency devices

- Silyl acrylate, Biocide free, Low friction post silyl acrylate
- Friction resistance account for 65% of total resistance for large low speed tankers/bulkers
- Target reduction of hull roughness to below 50 microns and the maintenance of it through the 5 years service life



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Ship opportunities: Eco Ship

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Fuel efficiency devices

- Duct (Mewis or other) to ameliorate wake field
- Pre/post swirl device (fins, PCBF, twisted rudder) to recover rotational energy
- Full spade rudder to reduce hull resistance
- Rudder bulb to reduce losses due to propeller cap vortex



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Ship opportunities: Eco Ship

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Fuel efficiency devices

- Frequency controlled electric consumers
- Waste energy recovery (economizer for DDGG)
- Electric fuel/oil heater

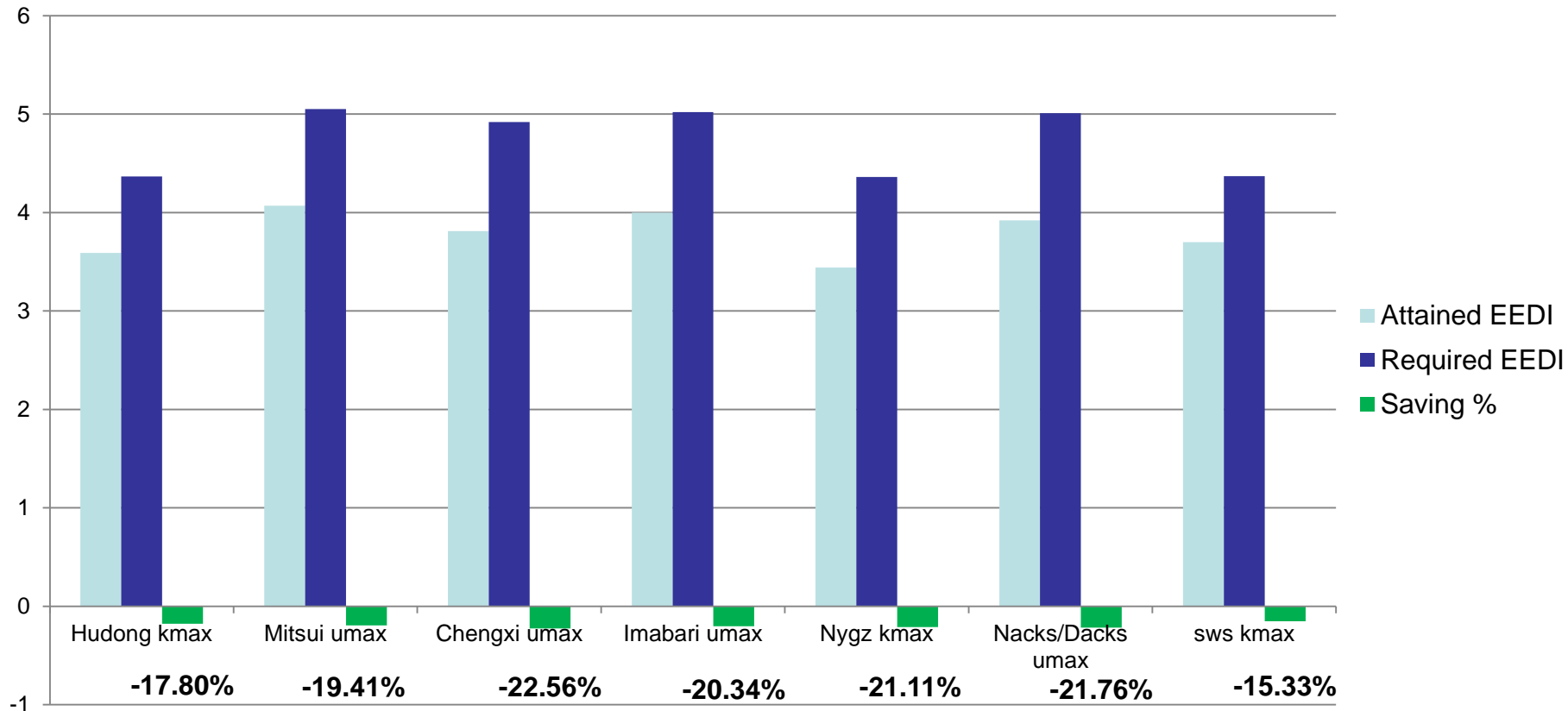


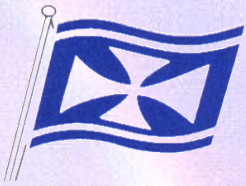
Overall Results and Conclusions: EEDI

Efficiency of
Transportation

CO2 Emission
Reduction

SBI prospective energy efficiency design index - IMO required





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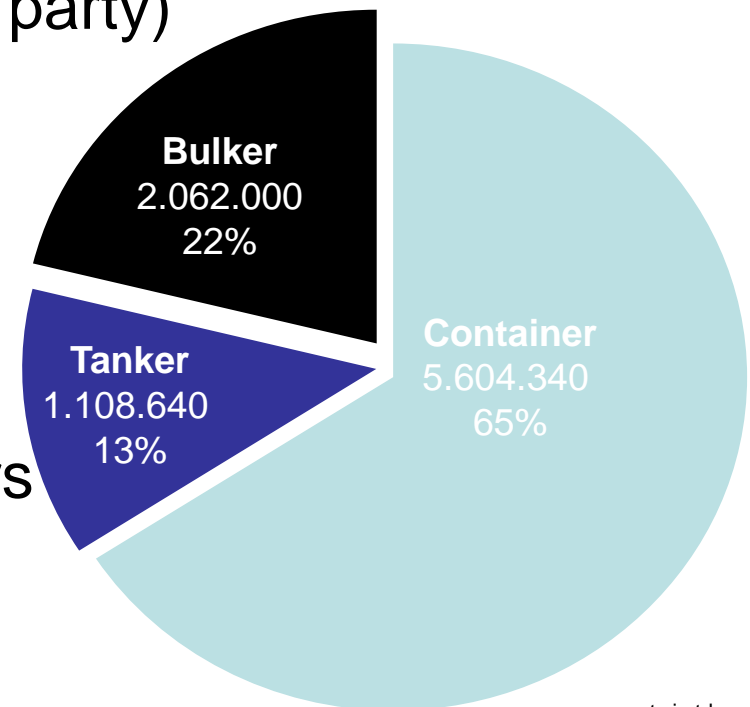


Offen Group

Offen Group is one of the leading ship managers/owners and providers of shipping services worldwide

Manager of 111 vessels (own & third party)

- 73 containerships (450,000 TEU)
- 26 product tankers
- 11 capesize bulkers, 1 Kamsarmax
- Overall 8.7 Mio. tdw.
- Average age of all vessels: 6.7 years
- Existing charter contracts until 2027
- Contracted Charter over USD 4 bn



amounts in tdw



Offen Bulkers



Offen Tankers/ Bulkers are dynamic growing, first class shipmanagers



26 tankers

- 16 Handymax (8 Scorpio)
 - 10 MR (2 Scorpio)
- Overall **1,108,600 tdw**
Average age : **3.8 years**

12 bulkers

- 11 Capaesize (7 Scorpio)
 - 1 Kamsarmax (1 Scorpio)
- Overall **2.062.000 tdw**
Average age : **1.9 years**



Work Safety

Wages

Working Hours

Carbon Footprint

NO_x, CO₂, SO_x
Emissions

EEOI

Tier III

SEEMP

Environmental issues

ECAs

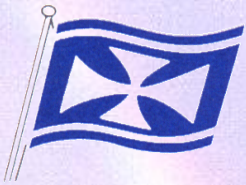


Offen Bulk

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Energy saving – What to do?

- **Identify Potentials**
- **Smart Data Collection**
- **Link to existing Data**
- **New Hardware, like Flowmeters**
- **Data Transmission, Software**
- **KPIs**
- **Crew Training**



Voyage Manager

Voyage Information

Vessel: Voyage Number: Voyage Leg:

Departure Info

Departure Date: LT GMT
Departure Port:
Dep. Country:

Arrival Info

Arrival Date: LT GMT
Arrival Port:
Arr. Country:

Charterer Info

Charterer:
Agent:
 TC VC

Agreed Consumptions: HFO LSFO GO LSGO
Agreed Speed (Knots):

Cargo Info

Cargo:
Quant: Mts
State:

Crew Info

Master:
Chief Eng.:

Remarks

Exit



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Abstract Log
- □ ×

Abstract Log

General

Vessel: Report: Voyage Nr.: Date:

Operation: Hours: Miles Run: Speed (Kn.): ECO Speed

Course: Wind (Bft/dir): Sea/Swell (Dg/dir): Current (Kn/dir):

Latitude: ° ' Longitude: ° ' Draft:

Distance to Go: ETA: Arrival Port: Disch. Cargo (Mt)

Main Engine Data

System Oil Cons. (Ltrs.)	Cylinder Oil Cons. (Ltrs.)	ME Load (Kw)	Fuel PP Max	
<input type="text" value="0"/>	<input type="text" value="10"/>	<input type="text" value="3700"/>	<input type="text" value="58"/>	
Rev. Per Day	RPM	TC RPM	Avg. for Period Shaft P. M. (Kw)	Scav Air Pressure [bar]
<input type="text" value="7380"/>	<input type="text" value="70"/>	<input type="text" value="13500"/>	<input type="text" value="3650"/>	<input type="text" value="1.4"/>

Aux. Engine Data

	Sys. Oil Cons. (Ltrs.)	Load (Kw)	TC RPM
A/E 1	<input type="text" value="0"/>	<input type="text" value="250"/>	<input type="text" value="32000"/>
A/E 2	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
A/E 3	<input type="text" value="0"/>	<input type="text" value="250"/>	<input type="text" value="32000"/>

Boilers

R.H. for Cargo Heat.:

Calculations

Propeller Slip:

Cyl.Oil Feed Rate (g/KW):

Fuel Oil

	Sulph. Cont (%)
HFO RMG380	<input type="text" value="3.08"/>
LSHFO	<input type="text" value="0"/>
GO	<input type="text" value="0"/>
LSGO (<=0.1%)	<input type="text" value="0.03"/>

Consumptions (in Mt.)

M/E	D/G #1	D/G #2	D/G #3	Inert Gas	Boiler	Incinerator	Cargo Heat	Tank Clean.	H.P. Unit Cargo	Discharged Cargo	FRAMO	TOTAL	ROB (Mt.)
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="922.3"/>
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
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<input type="text" value="1"/>	<input type="text" value="0.2"/>	<input type="text" value="0"/>	<input type="text" value="0.2"/>	<input type="text" value="0"/>	<input type="text" value="0.1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1.5"/>	<input type="text" value="348"/>

ROB (Mt.)

Remarks