Ro-Pax Ferry B145-I
Operating parameters

LANE LENGTH – min. 3000 m

PASSENGERS – min. 400 PERSONS

CREW – 71 PERSONS

LORRIES - min. 165 pcs
CARS - min. 50 pcs
AREA OF OPERATION

BALTIC SEA – EMISSION CONTROL AREA UNDER IMO/MARPOL:

- SOx-ECA (since 2005) - MARPOL, ANNEX VI, Reg. 14,
- NOx-ECA (since 2021) - MARPOL, ANNEX VI, Reg. 13.

CURRENT CONNECTIONS OPERATED BY PŻB S.A.:

- Świnoujście – Ystad,
- Gdańsk – Nynäshamn.
WHY THE NEW RO-PAX?

TRANSPORTATION CORRIDOR
„BALTIC-ADRIATIC” – BAC, AN IMPORTANT PILLAR OF THE TRANS-EUROPEAN TRANSPORT NETWORK – TEN-T:

„SZCZECIN CORRIDOR” – AXIS SZCZECIN / ŚWINOUJŚCIE-POZNAŃ - WROCŁAW - OSTRAWA – IS A PART OF THE BAC.

(Source: http://regionybac.pl/)
TYPE OF FERRY TRANSPORTATION

- PASSENGERS
- CARS
- BUSES
- LORRIES
LOADING AND UNLOADING OF THE FERRY (1/5)

RO-RO CARGO (1/4)

➢ **LAND RAMP**
  WIDTH abt 4.0 m
  ENTRY/DEPARTURE TO/FROM DK NO. 3 FROM THE AFT SIDE

➢ **STERN DOOR-RAMP**
  WIDTH abt 15 m
  ENTRY/DEPARTURE TO/FROM DK NO. 2 FROM/TO LAND
  2 LORRIES SIMULTANEOUSLY
LOADING AND UNLOADING OF THE FERRY (2/5)

RO-RO CARGO (2/4)

➢ BOW UPPER DOOR + RAMP/FLAP + LAND RAMP

  WIDTH abt 4.0 m

  ENTRY/DEPARTURE TO/FROM DK NO. 3 FROM/TO LAND

➢ BOW LOWER DOOR + DOOR-RAMP

  WIDTH abt 6.0 m

  ENTRY/DEPARTURE TO/FROM DK NO. 2 FROM/TO LAND
LOADING AND UNLOADING OF THE FERRY (3/5)

RO-RO CARGO (3/4)

➢ TWO-WAY TILTABLE RAMP

WIDTH abt 3.6 m
ENTRY FROM CAR DK NO. 2 TO DK NO. 3 / DEPARTURE FROM DK NO. 3 TO DK NO. 2

➢ TRAILER LIFT

LENGTH X WIDTH : 18 m x 3.5 m
TRANSPORT BETWEEN CAR DK NO. 1 AND DK NO. 2
LOADING AND UNLOADING OF THE FERRY (4/5)

RO-RO CARGO (4/4)

➢ SIDE DOOR – SB + LAND RAMP

WIDTH abt 5.0 m

ENTRY/DEPARTURE FROM DK NO. 3 FROM/TO LAND – ŚWINOUJŚCIE, STAND NO. 1
LOADING AND UNLOADING OF THE FERRY (5/5)

PASSENGERS

- PASSENGER DOOR - PS
  WIDTH abt 2.2 m
  ENTRANCE/EXIT TO/FROM PASSENGER DK (DK NO. 4) FROM/TO COMMUNICATION BRIDGES

- PASSENGER DOOR - SB
  WIDTH abt 2.2 m
  ENTRANCE/EXIT TO/FROM PASSENGER DK (DK NO. 4) FROM/TO COMMUNICATION BRIDGES
OPERATING SPEED OF THE FERRY

NIGHT CRUISE, WITH SPEED 14 kn

DAY CRUISE, WITH SPEED 18 kn
# ENDURANCE OF THE FERRY

## AMOUNTS OF CONSUMABLES FOR 3 DAYS ENDURANCE OF THE VESSEL

<table>
<thead>
<tr>
<th>Consumable</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS MDO (LOW SULPHUR MARINE DIESEL OIL)</td>
<td>200 m³</td>
</tr>
<tr>
<td>LNG (LIQUEFIED NATURAL GAS)</td>
<td>2 x 140 m³</td>
</tr>
<tr>
<td>LO (LUBRICATING OIL)</td>
<td>18.0 m³</td>
</tr>
<tr>
<td>TECHNICAL WATER</td>
<td>300 m³</td>
</tr>
<tr>
<td>GREY WATER</td>
<td>340 m³</td>
</tr>
<tr>
<td>SEWAGE</td>
<td>230 m³</td>
</tr>
<tr>
<td>POTABLE WATER</td>
<td>500 m³</td>
</tr>
</tbody>
</table>
MAIN DIMENSIONS

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, overall</td>
<td>202.50 m</td>
</tr>
<tr>
<td>Length, b. p.</td>
<td>189.00 m</td>
</tr>
<tr>
<td>Breadth, moulded</td>
<td>30.20 m</td>
</tr>
<tr>
<td>Breadth, max.</td>
<td>30.80 m</td>
</tr>
<tr>
<td>Draught, design</td>
<td>6.30 m</td>
</tr>
<tr>
<td>Depth to Main Deck</td>
<td>9.20 m</td>
</tr>
<tr>
<td>Lane length</td>
<td>abt 3000 m</td>
</tr>
</tbody>
</table>
PROPULSION SYSTEM (1/5)

DIESEL-ELECTRIC (D-E) TYPE PROPULSION SYSTEM (1/2)

(Dielectric propulsion system diagram)

- Diesel-electric (D-E) type propulsion system
- Azimuth thrusters complete with PM E-motor
- Supply transformers
- Alternators
- Frequency converters
- Main SWBDS
- MDG 1
- MDG 2
- MDG 3
- MDG 4
- DIESEL ENGINES
- HDG

(Source: MAN)
PROPULSION SYSTEM (2/5)

D-E PROPULSION SYSTEM (2/2)

➢ POSSIBILITY TO OPTIMIZE LOADING OF DIESEL ENGINES – OPERATION WITH MAX. EFFICIENCY => LOWER FUEL CONSUMPTION AND POLLUTANT EMISSIONS

➢ HIGH RELIABILITY – MULTIPLE ENGINE REDUNDANCY (EVEN AN ENGINE MULFUNCTION, THERE WILL STILL BE SUFFICIENT POWER TO OPERATE THE VESSEL SAFELY

➢ D-E SYSTEM TAKES LESS SPACE COMPARE TO DIESEL-MECHANIC TYPE SYSTEM

➢ FLEXIBILITY IN LOCATION OF PROPULSORS – SUPPLIED WITH ELECTRIC POWER THROUGH CABLES, THEY DO NOT NEED TO BE ADJACENT TO THE PRIME MOVER

➢ LOWER PROPULSION NOISE AND REDUCED VIBRATIONS (NO REDUCTION GEARS)

➢ EFFECTIVE PERFORMANCE IN ICY CONDITIONS – THE SYSTEM CAN PROVIDE MAX. TORQUE AT LOW SPEED
PROPULSION SYSTEM (3/5)

MAIN PROPULSORS (1/2)

AZIMUTH THRUSTERS – 2 PCS

- COMPLETE WITH PM (PERMANENT MAGNET) TYPE E-MOTOR LOCATED IN UNDERWATER PART OF THRUSTER
- NO TRANSMISSION GEAR BETWEEN E-MOTOR AND FIXED PITCH PROPELLER
- HEAT LOSSES DIRECTLY TO OUTSIDE COOLING SEAWATER
- MAX. STEERING RATE – 6 deg/s

(Source: ABB)
**PROPULSION SYSTEM** (4/5)

**MAIN PROPULSORS** (2/2)

**EXCELLENT MANEUVERABILITY** ≡ **SAFETY & TIME/FUEL SAVINGS**

*Azimuth Thruster vs Shaftline-Rudder*

(2 x 10.5 MW)

(Time saving for Azimuth propulsion is abt 35% (6 min.) for the example port approach and berthing)

(Source: ABB / Ship Simulator)
PROPULSION SYSTEM (5/5)

BOW THRUSTERS – PROVIDED FOR MANOEUVRING SERVICES

TRANSVERSE TUNNEL THRUSTERS – 2 PCS

- COMPLETE WITH ASYNCHRONOUS TYPE E-MOTOR, FW COOLED
- COMPLETE WITH LV-PWM-CONVERTER DRIVE, FW COOLED
- COMPLETE WITH CONVERTER TRANSFORMER, FW COOLED
- FIXED PITCH PROPELLER, NiAl BRONZE
- DIRECTION OF ROTATION OF INPUT SHAFT: BI-DIRECTIONAL
- COMPLETE WITH AN HOLDING BRAKE

(Source: www.ksb.com)
POWER GENERATION SYSTEM (1/2)

SHIP PROPULSION POWER AND ELECTRIC POWER FOR GENERAL DEMANDS OF THE VESSEL

- **MAIN DIESEL GENERATORS (MDG)** - 4 PCS
  Consists of: Dual Fuel, 4-stroke, medium-speed, non-reversible, turbocharged and inter-cooled diesel engine with direct injection of liquid fuel and indirect injection of gas fuel, an alternator; the engine can be operated in gas mode or in diesel mode

- **HARBOUR DIESEL GENERATOR (HDG)** - 1 PCE
  Consists of: Dual Fuel, 4-stroke, medium-speed, non-reversible, turbocharged and inter-cooled diesel engine with direct injection of liquid fuel and indirect injection of gas fuel, an alternator; the engine can be operated in gas mode or in diesel mode

(Source: www.wartsila.com)
POWER GENERATION SYSTEM (2/2)

ELECTRIC POWER FOR EMERGENCY PURPOSES

- EMERGENCY DIESEL GENERATOR (EDG) - 1 PCE
  Consists of: 4-stroke, high-speed, non-reversible, turbocharged and radiator air-cooled diesel engine, an alternator; the engine can be operated in diesel mode

(Source: www.cat.com)
SHORE POWER CONNECTION SYSTEM

THE ELECTRIC POWER FROM THE SHORE

≡

NO EXHAUST EMISSIONS OR NOISE POLLUTION FROM THE SHIP

SHORE CONNECTIONS – 2 SETS

- SC SWBD 10.7 kV / 60 Hz, 3-phases, Panel – 1 x Circuit Breaker, 1 x Connector Panel, short circuit current 16 kA/1s, rated power 2875 kVA, IP32
- Control Box for communication between shore side and MV SWBD

- THE WAY OF COMPLYING WITH PORT EMISSION REQUIREMENTS
- SHORE INTERFACE ACC. TO SPECIFICATION FOR YSTAD AND ŚWINOUJŚCIE PORTS
- FUTURE EU DIRECTIVES WILL OBLIGE MEMBER STATES TO IMPLEMENT ALTERNATIVE INFRASTRUCTURE NETWORKS, INCLUDING SHORE POWER, BY 2025
HEATING POWER GENERATION SYSTEM (1/2)

- LS MDO/GAS-FIRED THERMAL OIL HEATERS - 2 PCS

- ONE (1) HEATER IN EACH ENGINE ROOM
- HORIZONTAL EXECUTION
- THREE-PASS FLUE GAS CONFIGURATION RESULTING IN HIGH EFFICIENCY
- REMOVABLE PLATE PROVIDES ACCESS FOR INSPECTION AND CLEANING OF THE COILS
- LOW THERMAL OIL PRESSURE DROP
- HEAVY THERMAL INSULATION JACKET
- COMPLETE WITH BURNER

(Source: www.alfalaval.com)
HEATING POWER GENERATION SYSTEM (2/2)

HEAT RECOVERY FROM DIESEL ENGINES EXHAUST GASES

- EXHAUST GAS THERMAL OIL HEATERS / ECONOMISERS - 4 PCS
  - INSTALLED IN THE MDG EXHAUST GAS PIPELINES
  - FORCED CIRCULATION VERTICAL EXHAUST GAS HEATER FOR RECOVERING HEAT FROM EXHAUST GASES
  - DESIGNED SPECIFICALLY FOR PARTICULAR DIESEL ENGINE
  - DESIGNED WITH LOW PRESSURE LOSS
  - INTEGRATED NOZZLES AT INLET FOR SOOT CLEANING DURING OPERATION
  - TOP-MOUNTED NOZZLE SYSTEM FOR FIRE FIGHTING

(Source: www.alfalaval.com)
FUEL SYSTEM (1/2)

MAIN FUEL FOR THE VESSEL

- LNG (LIQUEFIED NATURAL GAS)

- NO PROBLEM WITH POLLUTANT EMISSIONS – CLEAN BURNING, SOx, PARTICULATE AND NOx LIMITS CAN BE ACHIEVED WITHOUT ANY ADDITIONAL EQUIPMENT

- EMISSIONS ARE COMPLIANT WITH CURRENT AND FUTURE ECA REGULATIONS

- LNG HAS LOWER PRICE TODAY THAN DIESEL FUEL
FUEL SYSTEM  (2/2)

ALTERNATIVE FUELS FOR THE VESSEL

- **LS MDO**
  (LOW-SULPHUR MARINE DIESEL OIL)

- **LS MGO**
  (LOW-SULPHUR MARINE GAS OIL)

- LS MDO / LS MGO – MARINE DISTILLATE FUELS OF CATEGORY ISO-F-DMA, DMZ OR DMB ACC. TO ISO 8217:2012(E) WITH SULPHUR CONTENT OF MAX. 0.1 % (m/m)

<table>
<thead>
<tr>
<th>FUEL SUPPLIED EQUIPMENT</th>
<th>FUEL TYPE</th>
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<tbody>
<tr>
<td>MAIN DIESEL GENERATORS</td>
<td>LNG + PILOT FUEL (LS MDO/MGO)</td>
</tr>
<tr>
<td>HARBOUR DIESEL GENERATOR</td>
<td>LS MDO</td>
</tr>
<tr>
<td>FUEL-FIRED THERMAL OIL HEATERS</td>
<td>LS MGO</td>
</tr>
<tr>
<td>EMERGENCY DIESEL GENERATORS</td>
<td>LS MDO</td>
</tr>
<tr>
<td></td>
<td>LS MGO</td>
</tr>
</tbody>
</table>
POWER PLANT EMISSIONS

Percentage comparison of pollutant emissions for engines of comparable power

(Source: www.wartsila.com/LNG)
FIN STABILIZERS

➢ SAFETY OF THE CARGO AND VESSEL
➢ COMFORT FOR PASSENGERS
Thank you!