



We drive profitable compliance

Port & Shipping Tech
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PureSO_x

How does it work?

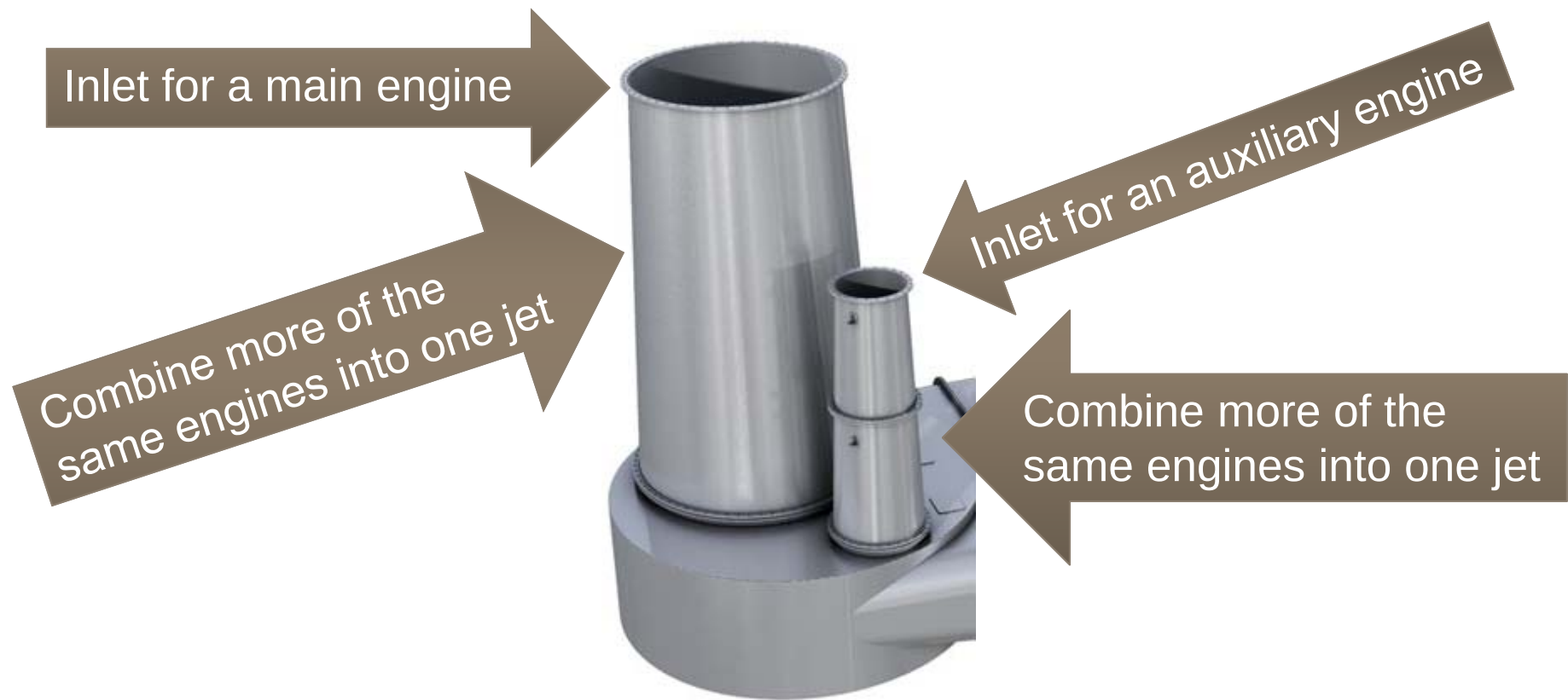
Benefits PureSO_x Hybrid



- Running in Sea Water mode whenever possible
- Zero discharge whenever required
- Ability to cope with low alkalinity waters
- Lowest possible NaOH consumption
- No switching between MGO/HFO
- Most proven and reliable system

Multiple inlet systems

Combine main engines and auxiliary engines in one scrubber



PureSO_x Water Cleaning

- Alfa Laval core technology
- Minimized sludge generation
- Effective removal of particles
- Small footprint of 2.5 x 2.5 m
- Easy installation; delivered on one skid



References

References

Total power connected to PureSO _x	PureSO _x type	New build or retrofit
20 MW	1 Hybrid, Single inlet	Retrofit 
28 MW	1 Hybrid, Multiple inlet	Retrofit 
20 MW	1 Hybrid, Single inlet	Retrofit 
20 MW	1 Hybrid, Single inlet	Retrofit 
21.6 MW	2 Hybrid, Single inlet	Retrofit 
23.5 MW	2 Freshwater, Multiple inlet	New build 
23.5 MW	2 Freshwater, Multiple inlet	New build 
28.8 MW	1 Hybrid, Multiple inlet	Retrofit 
20 MW	1 Hybrid, Single inlet	Retrofit 
20 MW	1 Hybrid, Single inlet	Retrofit 
20 MW	1 Hybrid, Single inlet	Retrofit 
21.6 MW	2 Hybrid, Single inlet	Retrofit 
21.6 MW	2 Hybrid, Single inlet	Retrofit 
24 MW	1 Hybrid, Multiple inlet	Retrofit 
18.9 MW	1 Hybrid, Multiple inlet	Retrofit 

15 Vessels / 20 PureSO_x systems

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Retrofit on DFDS Ficaria Seaways

PureSOx for Ficaria Seaways

10.000 hours



Technical data:

• System type	Hybrid
• Ship owner	DFDS Seaways
• Engine	1 ME
• Total Power output	21 MW
• Height	10.5 Meters
• Length	8.2 Meters
• Diameter	4.6 Meters
• Weight empty	24T
• Weight with water	32T
• Exhaust gas	192,000 Kg/h
• Material	SS alloys
• In operation	10,000 hours

Multiple inlet system: Spliethoff Plyca

PureSOx for Plyca

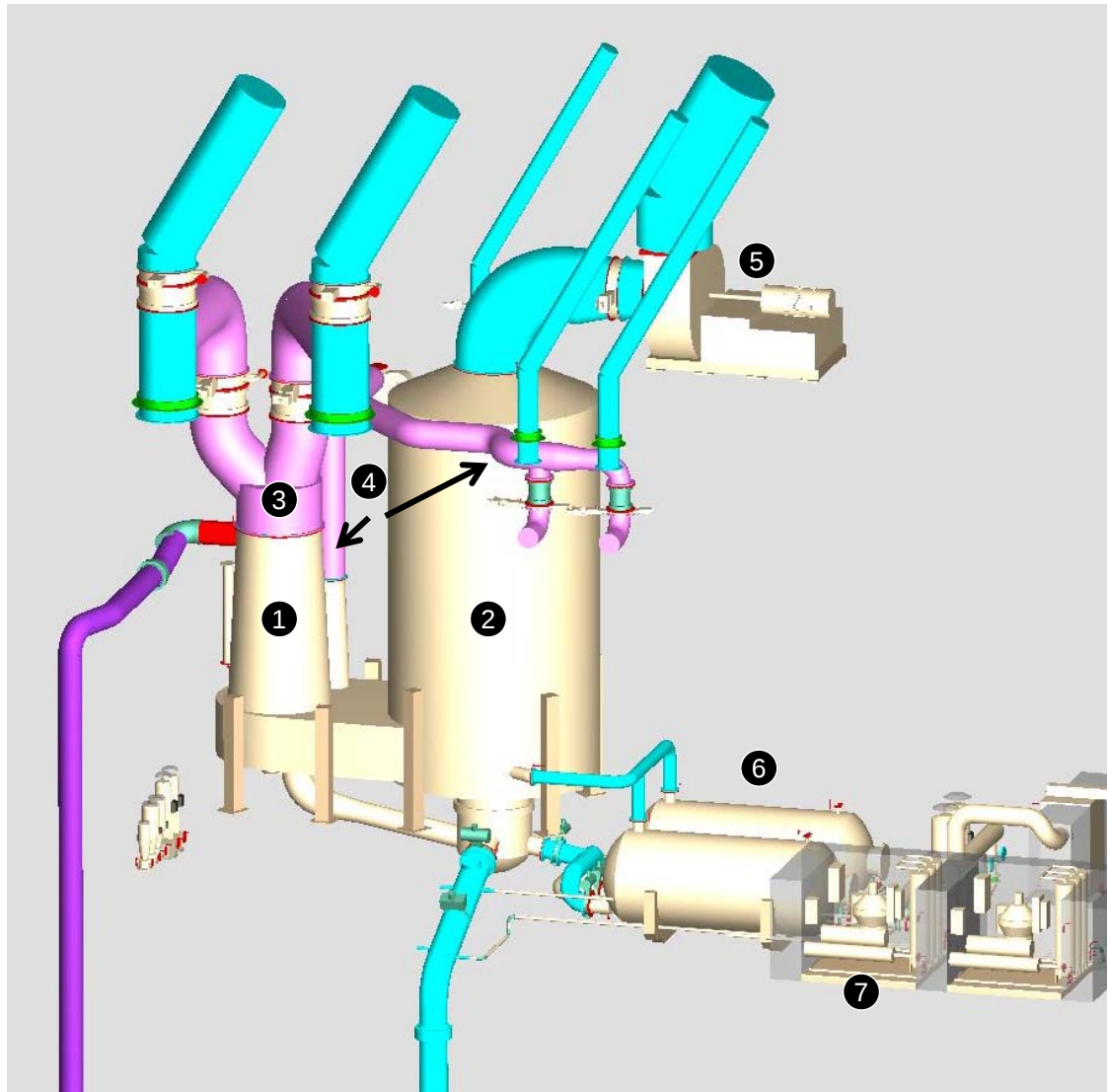
4000 hours, Multiple inlet system



Technical data:

- System type Hybrid
- Ship owner Spliethoff
- Innovation 2 ME + 2 AE and EGC fan
- Total Power output 28 MW
- Height 9.3 Meters
- Length 8.5 Meters
- Diameter 4.7 Meters
- Exhaust gas 216,000 Kg/h
- Weight 154 tons (complete system)
- Material SS alloys
- In operation 4,000 hours

PureSOx configuration Plyca



- ① Jet scrubbers
- ② Absorber
- ③ Inlet main engines
- ④ Inlet auxiliary engines
- ⑤ Exhaust gas fan
- ⑥ Circulation tanks
- ⑦ Water cleaning unit



Newbuild project: Fincantieri – Viking Ocean Cruises

2 cruise vessels



In consortium with MAN Diesel & Turbo

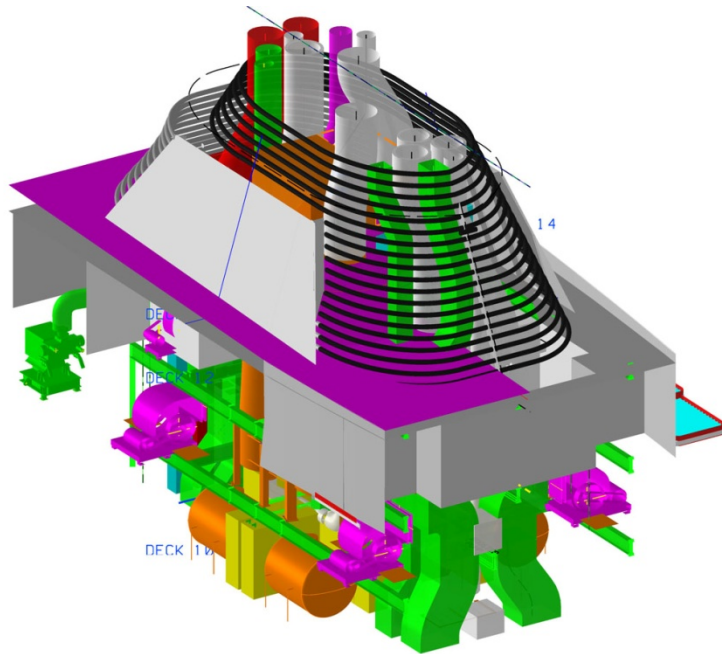


Technical data

- Vessel delivery: 2015/2016
- Diesel-electric
- 2x MAN 12V32/44CR
- 2x MAN 9L32/44CR
- Total output: 24 MW

2 PureSOx Multiple inlet systems per vessel

Technical data (per system):



• System type	Freshwater
• Installation	Newbuild
• Yard	Fincantieri
• Engines	2 GE
• Total Power output	12 MW
• Height	8.6 Meters
• Length	6.0 Meters
• Diameter	3.2 Meters
• Exhaust gas	80,000 Kg/h
• Weight empty	12T
• Weight with water	16T
• Material	SS alloys



In consortium with MAN Diesel & Turbo

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Retrofit project:

3 Ro-Ro vessels (DFDS)



Technical data

- Retrofit installation: July 2013
- Ship names: Petunia Seaways / Magnolia Seaways / Selandia Seaways
- Engines: 1 x MAN 9L60 MC-C/ 1 x MAN 9L60 MC-C / 2 x GMT Sulzer 9 ZA 50S
- Total output: 21 MW / 21 MW / 21.6 MW
- No of scrubbers: 4
- System type: Hybrid, single inlet

Retrofit project:

8 Ro-Ro and RoPAX vessels (DFDS)



Technical data

- Retrofit installation: Jan - Jul 2014
- Engines MAN 2 Strokes; Wartsila 4 Strokes
- Total output 20 – 30 MW
- No of scrubbers: 10
- System type: Hybrid, single inlet
Hybrid, multiple inlet

Conclusions PureSO_x

- Proven reliability, both Ficaria Seaways and Plyca are in compliance with 2015 IMO legislation and used on a daily basis.
- Core components (scrubber/water cleaning unit/Plate heat exchanger) are developed, engineered and manufactured by Alfa Laval
- Water Cleaning Unit:
 - o Meets strict MEPC washwater criteria
 - o Easy to operate and service
- Global sales & service network

