



ASTANDER

SCRUBBERS

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SCRUBBER RETROFITS

Astander has carried out five scrubber retrofit projects from 2014 until 2016, involving a total of 23 scrubbers installed.

PASSENGER/RO-RO SHIP NORMANDIE

Type: Open loop, 7-off in line scrubbers
Scrubber maker: Yara Marine (Greentech)
Retrofit completed on December 2014
Completion time: less than two months



PASSENGER/RO-RO SHIP CAP FINISTERE

Type: Open loop, 7-off in line scrubbers
Scrubber maker: Yara Marine (Greentech)
Retrofit completed on March 2015
Completion time: less than two months.



PASSENGER/RO-RO SHIP BARFLEUR

Type: Open loop, 7-off in line scrubbers
Scrubber maker: Yara Marine (Greentech)
Retrofit completed on May 2015
Completion time: less than two months.





PASSENGER/RO-RO SHIP MONT ST MICHEL

Type: Hybrid system (Open and closed loop), 1 off line scrubber

Scrubber maker: LAB

Retrofit completed on December 2015

Completion time: less than two months.



PASSENGER/RO-RO SHIP ARMORIQUE

Type: Hybrid system (Open and closed loop), 1 off line scrubber

Scrubber maker: LAB

Retrofit completed on March 2016

Completion time: less than two months.



1st TYPE OF RETROFIT: OPEN LOOP – IN LINE SCRUBBERS

Installation of In-line Scrubbers in vessels:

- M/V Normandie (2014)
- M/V Cap Finistere (2015)
- M/V Barfleur (2015).

The design of the retrofit for these vessels involved seven in-line separate scrubbers installed in total per ferry, one for each of the four main engines and three for the auxiliary ones.

The design of the system was carried out by the new building shipyard STX France (located in St-Nazaire) and the scrubbers were designed and built by Green Tech, now Yara Marine.

The conversion projects also included the fabrication of a new pump room to provide water to the scrubbers. This meant that a void space had to be converted into a machinery room, with the required modifications, like installation of new ventilation, fire detection systems, automatic doors, etc.

The casing had to be emptied, from the E/R to the funnel, removing the silencers and a large amount of piping, insulation and structures had to be modified or re-routed. That was the critical part of the job, due to the space constraints and the interferences between systems.

The particular conditions of the water in the scrubbing system required specialized material for the piping, like Superduplex steel, GRE and Polyethylene. The new water systems passed through different areas of the vessel, from the new pump room through the car decks and into the casing.

The modifications also affected the external shape of the Aluminium funnels, which had to be redesigned and enlarged, or even in some cases totally rebuilt to host the new equipment.

At the same time, extensive maintenance jobs were carried out, practically on all the equipment and systems onboard, so only an accurate planning and the correct management of the resources needed, made possible to achieve the tight delivery time.

NORMANDIE

Customer: Brittany Ferries

Type: Passenger / Roro

Machinery: 4 oil engines geared to screw shafts driving 2 CP propellers

Total Power: Mcr 24,152hp

Main engines: 4-off Wärtsilä 12V32E (6,038 hp each)

Total number of scrubber installed: 7 (4 for the main engines, 3 for the auxiliary engines)

Length: 161.40 m

Breadth: 26.00 m

DWT: 2.229 t

GT: 27.541 t



CAP FINISTERE

Customer: Brittany Ferries

Type: Passenger / Roro

Machinery: 4 oil engines geared to screw shafts driving 2 CP propellers

Total Power: Mcr 65.260 hp

Main engines: 4 Sulzer 16ZAV40S (16.315 hp each)

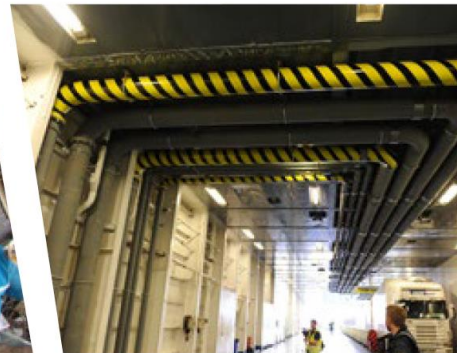
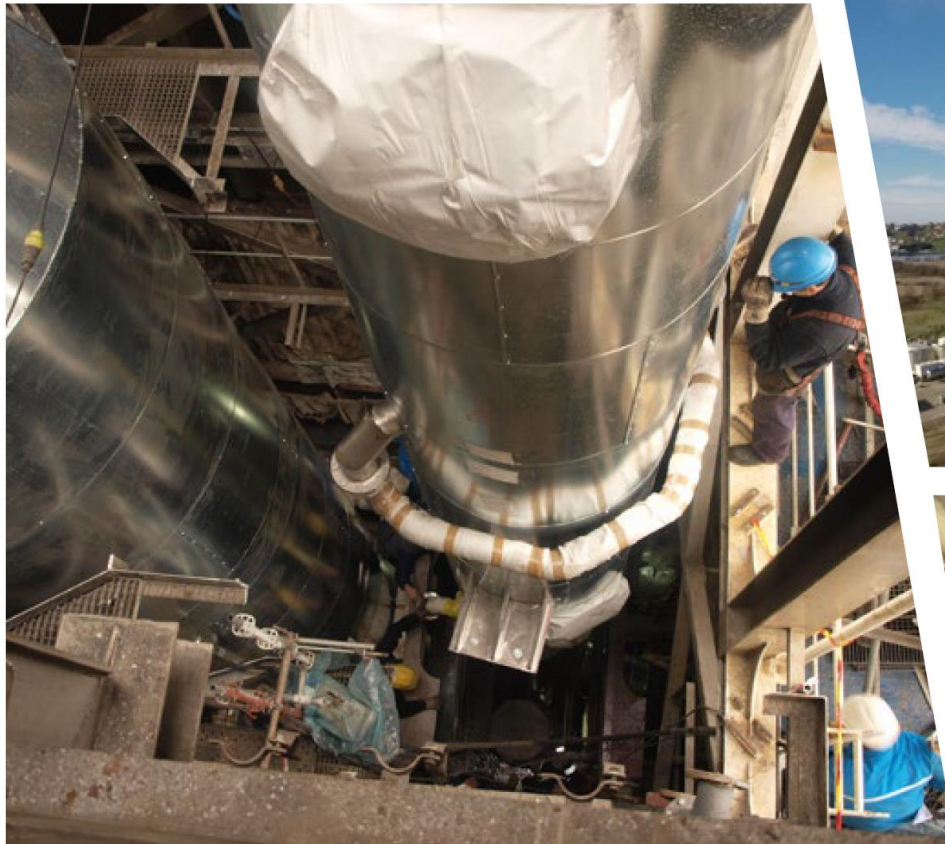
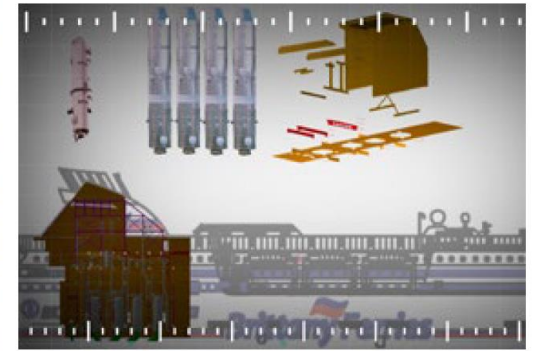
Total number of scrubber installed: 7 (4 for the main engines, 3 for the auxiliary engines)

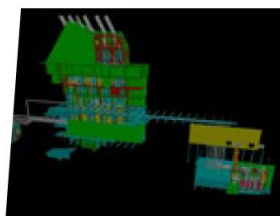
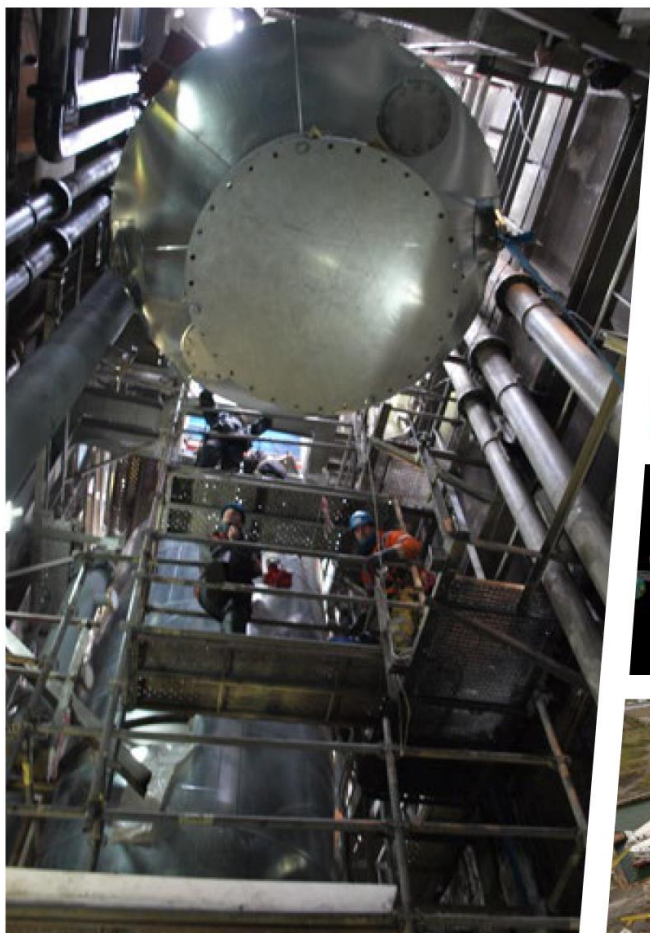
Length: 203.90 m

Breadth: 25.00 m

DWT: 6.515 t

GT: 32.728 t





BARFLEUR

Customer: Brittany Ferries

Type: Passenger / Roro

Machinery: 4 oil engines geared to screw shafts driving 2 CP propellers

Total Power: Mcr 16.860 hp

Main engines: 4 Wärtsilä 8R32E (4.215 hp each)

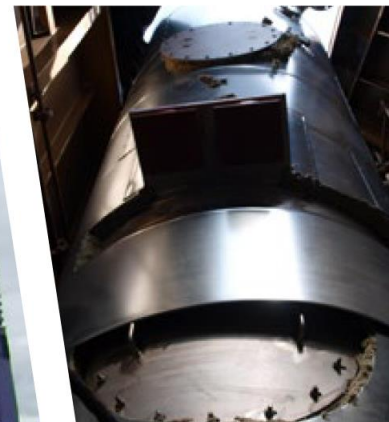
Total number of scrubber installed: 7 (4 for the main engines, 3 for the auxiliary engines)

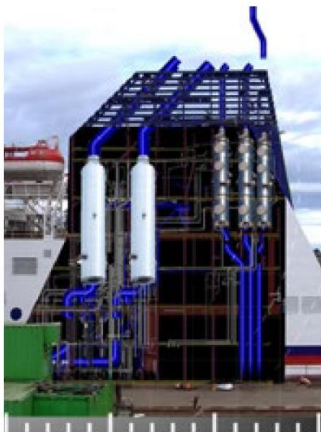
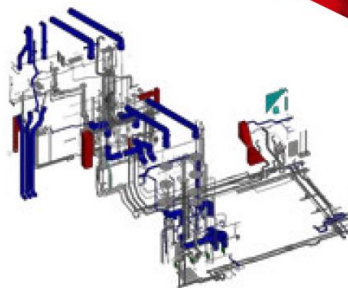
Length: 157.65 m

Breadth: 23.30 m

DWT: 5.175 t

GT: 20.133 t





2nd TYPE OF RETROFIT: HYBRID LOOPS - OFF LINE SCRUBBERS

Installation off-line Scrubbers in vessels:

- M/V Mont St Michel (2015)
- M/V Armorique (2016)

Same as with the open loop systems, the hybrid system (possibility of closed or open loop) for the last two retrofitted vessels was also designed by the new building shipyard STX France (located in St-Nazaire) and the scrubber was designed and built by LAB.

These two vessels, powered by four or two four-stroke Mak engines, had one single off-line scrubber designed to treat the exhaust gases of the main and auxiliary engines.

The conversion projects also included the fabrication of two pump rooms to provide water to the scrubbers and other systems, as a dilution tank, hydrocyclons, a sludge tank, a magnesia tank... to collect and treat the outlet water when operating as closed loop.

The new water systems were built in different areas, from the new pump room through the car decks and into the casing, using GRE and Polyethylene materials.

The modifications also affected to the external layout of the vessel, including the fabrication of a new room on deck to host the scrubber and a large new space for the exhaust fans.

The large single scrubber, the associated piping and the resulting scrubber room, required important reinforcements underneath, affecting to several accommodation areas. For instance, a large restaurant and several cabins had to be dismantled to install new pillars and beams, being those areas later fully rebuilt.

Same as in previous projects, at the same time the retrofit was being done, docking and maintenance jobs were carried out, maintaining also in these projects the tight delivery time.

At this moment, all the described vessel are in operation, with the new systems installed, making Brittany Ferries one the leading ferry companies with a modernized and environmental friendly fleet equipped with new systems to reduce the emissions.



MONT ST MICHEL

Customer: Brittany Ferries

Type: Passenger / Roro

Machinery: 4 oil engines geared to screw shafts driving 2 CP propellers

Total Power: Mcr 29.368 hp

Main engines: 4 MaK 6M43 (7.342 hp each)

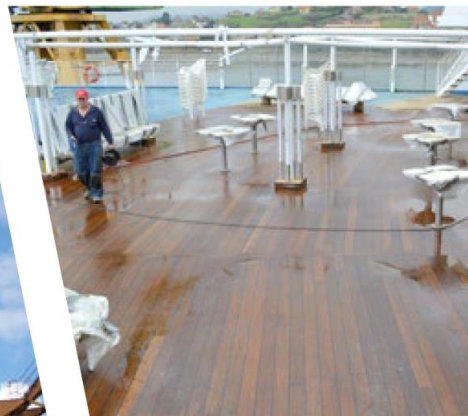
Total number of scrubber installed: 1

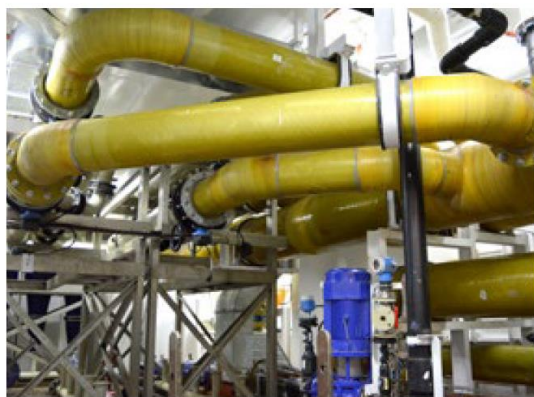
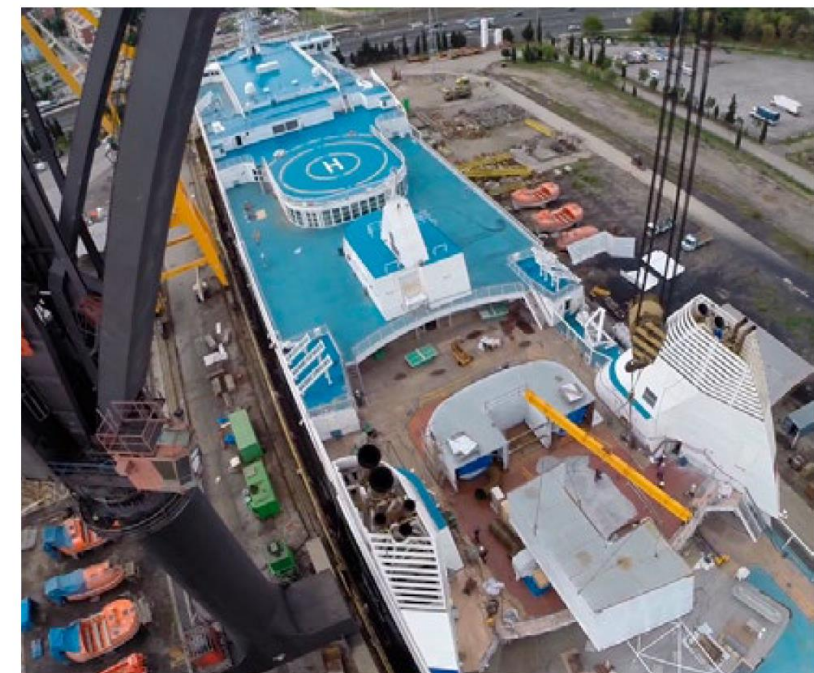
Length: 173.40 m

Breadth moulded: 28.50 m

DWT: 5.579 t

GT: 35.586 t





ARMORIQUE

Customer: Brittany Ferries

Type: Passenger / Roro

Machinery: 2 engines geared to screw shafts
driving 2 CP propellers

Total Power: Mcr 32.630 hp

Main engines: 2 Mak 12M43C (16.315 hp each)

Total number of scrubber installed: 1

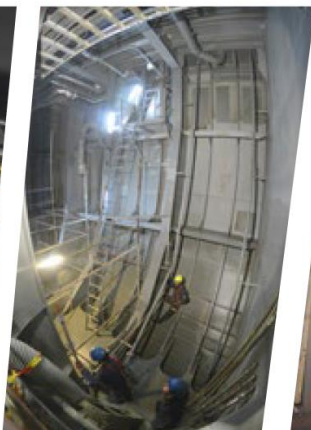
Length: 167.00 m

Breadth moulded: 26.80 m

DWT: 4.700 t

GT: 29.468 t







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