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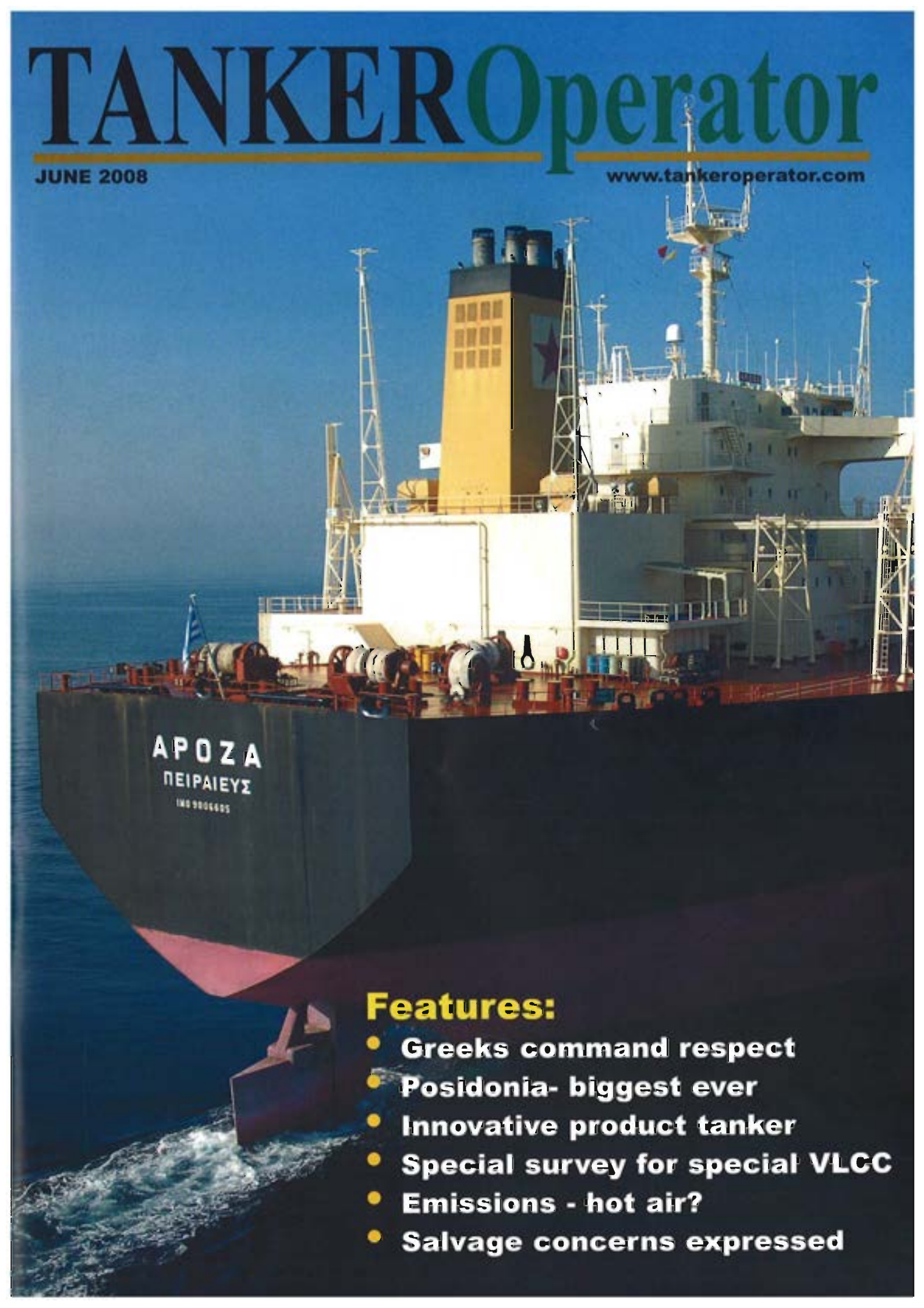


Features:

- Greeks command respect
- Posidonia- biggest ever
- Innovative product tanker
- Special survey for special VLCC
- Emissions - hot air?
- Salvage concerns expressed

A week in the life of a special VLCC

The world's first double hull VLCC recently completed her third special survey, following 15 years in service.*

On 28th February, the VLCC *Arosa* entered the No 1 drydock at Drydocks World- Dubai to embark on her third special survey under the watchful eye of Lloyd's Register's surveyors.

Managed by Neda Maritime Agency (Lykiardopulo), *Arosa* was somewhat unique as she was the first double hull VLCC to be built when handed over by Hitachi Zosen in February 1993. She had a carrying capacity of 291,000 tonnes when delivered.

The latest drydocking was the culmination of a rolling survey programme, which started in 2007 and was carried out at sea, in Singapore where her cargo tanks were surveyed and in Fujairah where her ballast tanks were examined.

At the time of her construction, in the aftermath of OPA 90, the IMO was still undecided on a standard for double hull construction and the concept was being met with considerable resistance from some quarters.

For example, cracks had been experienced in single hull tankers and it was assumed that any cracks appearing in double hull tankers would result in a leakage of oil from the cargo tanks to the ballast tanks with the risk of pollution and even explosion. There was also the question as to how the confined double hull spaces would be maintained or properly inspected.

Against this background, Neda placed an order for a single hull tanker with Hitachi in 1989 with an option attached to change her to a double hull tanker. The IMO had set itself a deadline of 1991 to resolve the double hull debate and so the managers had to double

guess the outcome, in the end opting for a double hull design based upon noises coming out of the US.

Neda claimed that it enjoyed excellent co-operation with LR and Hitachi on the project. To meet the challenge of operating the world's first double hull VLCC, Neda subjected *Arosa* to a strict maintenance schedule and standards. This was underpinned by the vessel's manning levels, which at the time could have been as low as 12 to look after the bridge, engine room, perform deck duties, oversee cargo control and staff the galley. *Arosa* was fitted with a fully automated engine room and a well instrumented bridge layout to comply with 12-crew regulations.

However, Neda insisted on employing 35 persons on board. She carried an additional electrician and pump man and to keep on top of the hull, tank and machinery maintenance, the managers put a five strong coating and maintenance riding crew on board, which were permanently assigned to the inspection and maintenance of the coating system.

Neda's naval architect, Gerry Vagliano, who was mainly responsible for the VLCC's design said that he had assured the managers that *Arosa* would reach her fourth special survey without the need of one kilo of replacement steel. On completion of her third special survey, Vagliano's forecast was still on target, it was claimed.

He explained that the design team made several unilateral decisions. For example, the double bottom would be 3 m and the width of the side spaces 2.44 m, which later became an industry standard. Stringers in the ballast tanks were arranged in three levels, which could also be used as inspection and maintenance platforms. Also calculated was the number of tanks that could be damaged before the tanker's stability would be compromised.

LNGC experience

The inner hull was also built to the same strength as the outer one and the ship was specified with a raking damage over 75% of her length, which was in excess of previous class requirements. Problems, such as how to detect cracking in the cargo containment area, which would allow oil to seep into the ballast tanks was solved by following the example seen in double hull LNGCs. Dipping of the cargo tanks on a ship of this size would have been totally impractical, so Vagliano adapted the gas carrier system for testing a ballast tank's atmosphere for leaks, by adjusting it to be sensitive to crude oil gases.

At the time, detractors were saying that cracking would occur between the inner and outer hulls. However, Vagliano explained that the team had the history of chemical tankers as a precedent and there were no cracks appearing in their double hull configuration.

The design team also examined the theoretical arguments, which said that a tanker's integrity depended on the loads and stresses being continuous. Single hull tankers were always subject to the effects of

discontinuous load, purely by virtue of their design.

On a single hull vessel, the run of the cargo wing tanks is broken twice on each side by four ballast tanks. When the cargo tanks are full, the ballast tanks are empty and vice versa. This causes undue stress on the hull plates especially in heavy weather as the plates covering the empty tanks flex causing cracking along the bulkheads that divide the full tanks from the empty ones.

However, on a double hull tanker, this problem would not arise as the run of the outer ballast tanks are either continuously full or empty.

Importance of coatings

Vagliano also stressed the importance of looking after the coatings. He explained that six months after delivery, the coating systems fitters continuously worked on board *Arosa*, looking for blisters and upgrading an maintaining the coating. It was the chief officer's responsibility to monitor the inspections, which proved to be a never ending job.

While the vessel is in service, no uncoated areas are permitted. Every rusty edge is touched up as soon as it appears. This not only applied to the deck and deck fixtures, but also to the ballast and cargo tanks. When in a laden condition, the ballast tanks are regularly maintained.

The access to all the tank areas was made possible by the addition of the stringers. Removable aluminium ladders had rubber covered ends fitted to protect them from damage. The main ladders between the stringers are of a strong construction and their coatings are strictly monitored for possible corrosion.

This penchant for cleanliness is also extended to the pump room where on most tankers, a build up of oil residue is common as is sludge in the bilges. However, the rules on the *Arosa* require that the pump room be totally clean and being painted entirely in white, any contamination can clearly be seen.

A similar regime applies to the engine room where clean deck plates are required and the bilges devoid of leakages. Discarded rags are not allowed, neither are temporary solutions as everything has to be repaired promptly.

On deck, all the VLCCs hawsers and wires on the drums have to be covered with a canvas to protect them from the sun and spray. All the pipelines are marked with the last test and inspection dates and all valves and flanged joints are fitted with Denso wrapping for protection against corrosion, which is expensive but efficient, the company claimed.

The Dubai repair complex with Dubai Maritime City in the background.

The *Arosa's* coatings were well maintained.

For movement on deck, safe lines are marked by white lines and are coated with anti-slip paint, while all the obstacles are highlighted in bright yellow. The entire deck area around the anchor windlasses and mooring equipment on the forepeak are also similarly covered.

During the drydocking, the propeller was removed and the tail shaft tested. In the engine room, the main engine fuel oil pumps, turbochargers and air coolers were all stripped down. The bilge water discharge system was also inspected.

Arosa was scheduled to remain in Dubai for just seven days. The speed of the operation was helped by pre-survey planning co-ordinated by LR EMEA from its Asia offices in Singapore and in Dubai, which enabled much of the survey work to be undertaken while the tanker was still operating. The vessel also benefited from LR's condition assessment programme (CAP) service.

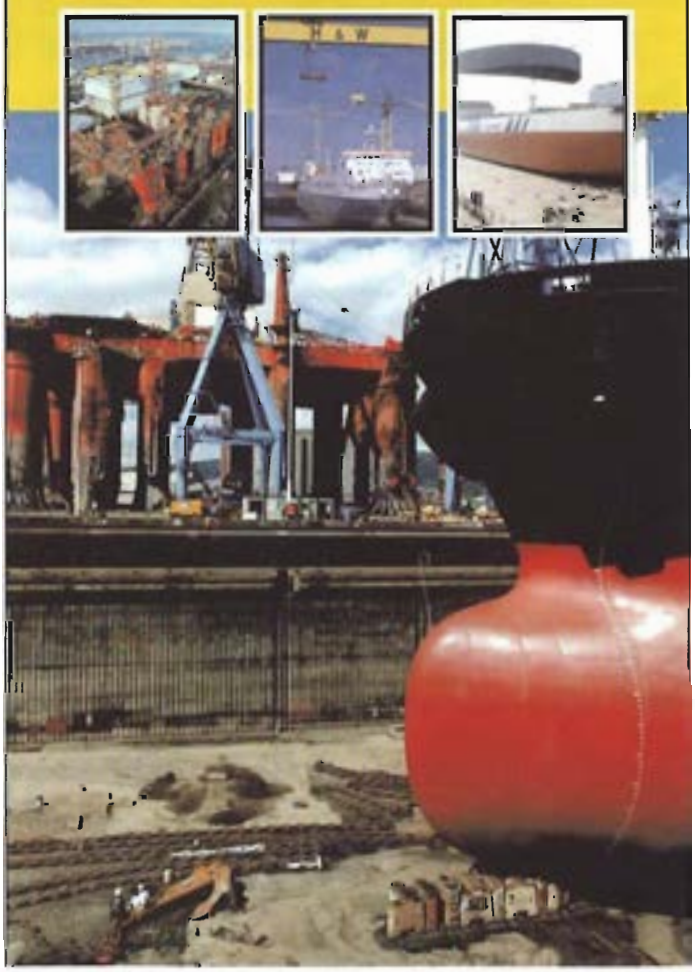
As tankers get older, they have to have a CAP certificate and also have to satisfy MARPOL, SOLAS and major oil charterers' requirements and in the *Arosa's* case, the Greek flag regulations. LR's CAP includes the assessment of the hull structure, machinery and cargo systems.

Disruption to *Arosa's* operating schedule was avoided by carrying out machinery inspections during a single voyage that ended with a cargo discharge. LR explained; "Participation in our CAP ultimately results in your ship acquiring an LR CAP rating. A ship which has been through the programme and achieves a high CAP rating is easily identifiable as being well maintained with many benefits for the owner and charterer."

Inspection programme

In 2006, *Arosa* was put through an advanced hull measurement and close up inspection programme conducted by LR. No diminution of steel, fractures or weaknesses were found, which earned her a CAP1 rating, which is the equivalent of a newbuild vessel for hull machinery and cargo systems.

The method of close up cargo tank inspection involved a basic process by which the surveyor accesses every corner of the tanks' structures, which is called 'rafting' and not allowed while a vessel is in drydock.



Pre-survey planning was co-ordinated by LR EMEA from its Singapore and Dubai offices.

John Etherington, LR EMEA's senior surveyor at Dubai explained; "The procedure involves filling the tank with water, launching a dinghy into it and paddling around in it (to carry out the survey requirements).

"You then have to climb out of the tank. The water is lowered, you go back in and do the next level down. No one stays in the raft in the tank when they are moving water," he concluded.

This practice saves the expense and time of erecting staging inside the tank. However, it does carry all the attendant risks of operating in dark spaces surrounded by obstacles that at any time could tip a less than vigilant surveyor into heavily oiled and very deep water.

Structurally, the ballast tank poses less of a challenge. Integral stringers running along the length of the ship and under the cargo tanks to the centreline provide safe companion ways down to the double bottom, which has a clearance of 3 m making inspection easy.

However, the weather can play its part as the operation is relatively easy in temperatures of around 19 deg C when the *Arosa* was drydocked. But during the summer months, the heat normally varies between 45 deg and 55 deg C in Dubai. In the vessel's tanks this can rise to 65 deg C plus, meaning that after about 30 mins, a surveyor can become like a wet rag and heat exhaustion can set in.

While in dock, apart from the new hull anti-fouling preparation and application, the other major job below the waterline is the removal of the propeller. The single cast bronze propeller is jacked off and then tested for edge damage, cavitation damage and cracks. The blade roots are inspected visually and by using ultra sound testing.

Mike Darley, one of LR's surveyors in Dubai said; "Minor wear and tear can simply be ground clear, but there are limits to which you can grind edge damage smooth. Beyond that, with a single casting bronze propeller, you need to get a new prop. And that is not cheap, or easy to come by. A ship can be out of service for a long time if it has to wait for a new prop to be cast."

This is followed by the tailshaft inspection. To accomplish this Dubai uses a technique called Magnetic Particle Inspection, which involves passing a current through the tailshaft, which for a VLCC can be anything from 800 cm to 1 m in diameter. It is then sprayed with iron filings, which are immediately magnetically trapped in any crack and show up as a dark line.

Even relatively small cracks in a tailshaft will be aggravated by the torque created by the direction of drive from the engine and the force of water acting against the propeller. Naturally, any tailshaft failure would be catastrophic.

Other new requirements were adhered to during the drydocking, including an oil

major edict that for the vetting process, special chocks have to secure new vapour emissions collection system (VECS). The system will contain all the vapours from the cargo tanks and then discharge them ashore or into another vessel, instead of allowing the vapours to vent into the atmosphere.

Meanwhile, *Arosa's* master Captain Costas Koulouris said that the activity going on around him at Dubai was like that of a factory floor. Apart from the general safety and environmental responsibilities, the ship is in the hands of the drydock superintendents. "Even to do the smallest job, we have to ask the drydock's ship manager for permission," he said.

Arosa's management company Neda Maritime makes frequent visits to all of the 21 vessels - eight tankers and 13 bulkers. Each superintendent has no more than three to four vessels under his responsibility. All the ships' officers are Greek and employed directly by the company.

Neda claimed to be first company to introduce e-mail access to all the crew members. The crew can SMS and e-mail their families and friends and this approach also gives the vessels more contact with the shore office.

Following her stint in drydock, *Arosa* was fixed to load a cargo at Kharg Island for discharge in China. ■

***Arosa's* Captain Costas Koulouris likened the activity in Dubai to that of a factory floor.**

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