

# Simple containment solution diversifies market

LNT Marine's new innovative cargo containment system will enable more shipyards to build LNG carriers and fill a need for mid-size vessels

In 1964, the world's first purpose-built LNG carrier entered service, paving the way for commercial LNG carriers. The *Methane Princess*, a 27,000m<sup>3</sup> vessel, featured nine Conch independent cargo tanks insulated with a balsa wood insulation system attached to the inner hull. Although the vessel was a bold testament of the advancements in ship technology, other more popular cargo containment designs evolved to suit ever larger LNG carriers.

Today's global fleet is composed of two main containment systems: Moss and membrane. Moss-type tanks make up 33% of the global LNG fleet while membrane-type containment systems account for 67%, according to data published by IHS Markit. Of the LNG vessels on order, 91% are lined up for the installation of a membrane type system.

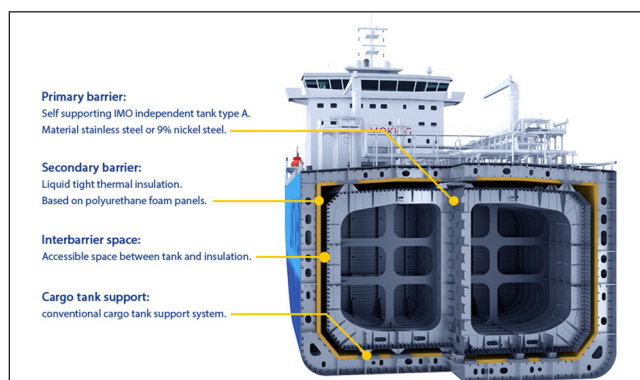
Traditionally, LNG has been transported around the world by large ocean-going LNG carriers, but heightened demand has prompted a rise in smaller terminals, more LNG ports and new trading patterns. This means that the distances between exporter and importer are shrinking rather than increasing in length, as was once expected.

With that, opportunities for new types of containment systems have emerged. One company on course to fill that market gap is Singapore-headquartered LNT Marine, with the introduction of its new patented system based on IMO independent type A tank – the LNT A-Box.

“There is a growing need for local and regional distribution of LNG, which requires a wide range of different ship sizes, as opposed to before where it used to only be large ships sailing from A to B”, says Kjetil Sjølie Strand, CEO of LNT Marine. “When you have smaller users and small terminals you cannot accommodate the large ships everywhere in the world.”

## Historic solutions and new tech

By the end of 2017, there were 28 LNG vessels with a capacity of less than 25,000m<sup>3</sup>, 464 vessels with over 90,000m<sup>3</sup> of hold volume,



The LNT A-Box is based on IMO independent type A tank design, the simplest configuration according to the IGC Code

and only 19 vessels with a capacity between 25,000m<sup>3</sup>-90,000m<sup>3</sup>. Moss and membrane tanks dominate the large vessel segment whereas type C tanks are the preferred choice for small ships. None of these options, however, have proven to be very efficient nor adaptable for mid-sized LNG carriers.

LNT Marine, created following a merger between LNG New Technologies and MGI Thermo, began development on the LNT A-Box around 10 years ago. The prismatic containment system is based on similar design principles as the *Methane Princess*' Conch tanks but are arranged in a new patented-protected configuration. Classified under the IMO IGC Code as an independent type A tank, the self-supporting LNT A-Box is situated within an insulated cargo hold with a full liquid tight secondary barrier. It does not form a part of the ship's hull, but instead depends on bulkheads and internal structures for strength.

“This structure also acts as swash bulkheads,” explains Strand. “That means you don't have any issues with sloshing in this type of tank and no loading limitations.” Membrane tanks, on the other hand, are prone to sloshing because they lack any internal sub-divisions to break up the liquid movements.

The system, which has been granted approval from DNV GL, ABS, BV and CCS, also provides improved volume utilisation due to its flexible shape and geometry. Additionally, a cold inter-barrier

space located between the tank and the full secondary barrier offers access for visual inspections and maintenance.

Another advantage of the self-supporting LNT A-BOX is that it does not have any impact on the insulation during normal operations. Therefore, the insulation doesn't need to be designed for dynamic loads from the cargo. “You can select relatively low-density foam for the insulation system, which is giving better thermal performance than if we had to use a foam with higher compressive strength, and this in the end translates into low boil-off rates. So, for the same thickness of insulation we can have lower boil-off rates than our key competitors,” says Strand.

Type A tanks are based on classical ship structural design and construction methods, making them the simplest to design and build in comparison to other IMO IGC Code tanks. “It's relatively straightforward for most shipbuilders to build a type A tank,” says Strand. “Thus, it differs from other containment systems in regards to construction friendliness.” Though he adds that shipyards, or tank builders, must have the competence to work with stainless steel, nickel steel or other low temperature steel grades.

One of LNT's primary aims with the LNT A-Box system is to enable a greater range of shipyards to enter the LNG sector. Thanks to the tank's easy fabrication and simple insulation system, it's expected that even

shipyards without previous experience of gas carrier construction will be able to build LNG carriers at a reasonable cost with this containment system.

*Saga Dawn* is the first vessel to feature an LNT A-box



### The next saga of LNG carriers

LNT Marine recently tested this claim with the construction of Saga LNG Shipping's newbuild, *Saga Dawn*. Ordered from China Merchants Heavy Industry, the 45,000m<sup>3</sup> capacity vessel is the first ship to feature the LNT A-Box and marks the first time the yard has constructed an LNG carrier.

"Of course, there's been a lot of learning for the shipyard and us on things that can be optimised. In principle though, its proven to be simple and without much need for special competence, equipment or tools," says Strand.

*Saga Dawn* is based upon the LNT45 ship design concept developed by LNT Marine in cooperation with Saga LNG Shipping – whose owner is a major shareholder of LNT Marine – and Swedish engineering group

FKAB. The ABS-classed vessel successfully underwent gas trials in June and at the time of writing, was about to be delivered to Saga LNG Shipping.

LNT Marine is currently in talks to design and construct a second 80,000m<sup>3</sup> vessel with Saga LNG Shipping as well as possible

floating units for other unnamed clients. Additionally, Strand notes that although the company's focus with the LNT A-Box initially has been mid-sized LNG carriers, the containment system could be scaled up or down for to suit other vessel size segments, as well as LNG fuel tank applications. **NA**

## RINA - Lloyd's Register Maritime Safety Award

The safety of the seafarer and protection of the maritime environment begins with good design, followed by sound construction and efficient operation. Naval architects and engineers involved in the design, construction and operation of maritime vessels and structures can make a significant contribution to safety and the Royal Institution of Naval Architects, with the support of Lloyd's Register, wishes to recognise the achievement of engineers in improving safety at sea and the protection of the maritime environment. Such recognition serves to raise awareness and promote further improvements.

The Maritime Safety Award is presented annually to an individual, company or organisation that in the opinion of the Institution and Lloyd's Register, is judged to have made an outstanding contribution to the improvement of maritime safety or the protection of the maritime environment. Such contribution may have been made by a specific activity or over a period of time. Individuals may not nominate themselves. Nominations are now invited for the 2019 Maritime Safety Award.

Nominations of up to **750 words** should describe the nominee's contribution to:

- safety of life or protection of the marine environment, through novel or improved design, construction or operational procedures of ships or maritime structures
- the advancement of maritime safety through management, regulation, legislation or development of standards, codes of practice or guidance
- research, learned papers or publications in the field of maritime safety
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The closing date for nominations is **31st December 2019**.

The Award will be announced at the Institution's 2020 Annual Dinner.

**Nominations** may be made by any member of the global maritime community and should be forwarded online at: [www.rina.org.uk/maritimesafetyaward](http://www.rina.org.uk/maritimesafetyaward)

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Queries about the Award should be forwarded to the Chief Executive at: [hq@rina.org.uk](mailto:hq@rina.org.uk)