

Message from Julien Burdeau, GTT Chief Operating Officer



To be an "Expert in LNG" is a challenge.

You would expect an expert to be capable of addressing challenging, highly technical, sometimes completely new questions – and, of course, for the benefit of stakeholders. In this issue of GTT Inside, we have chosen to highlight some recent technical challenges, such as BOG or pressure management in emergency situations, or pump tower vibration behaviour. Solving these issues required an in-depth analysis and specific GTT developments. This is just an illustration of how our people strive to provide reliable and useful answers to our customers and partners, both during the construction phase and also at sea. In this context, obtaining a positive feedback from our customers, as we did through our annual satisfaction survey, is a matter of pride for all of us, and drives our commitment to merit in the future the role of "expert" you expect GTT to remain.

Julien Burdeau, Chief Operating Officer

INNOVATION / New GBS design for LNG bunkering supply chain

GTT has recently developed with its EPC partner ACCIONA Engineering, a LNG bunkering station based on a Gravity Base Structure (GBS) concept. This station comprises a concrete container equipped with all necessary equipment to ensure the different functions such as cargo handling, the boil off rate management and power generation.

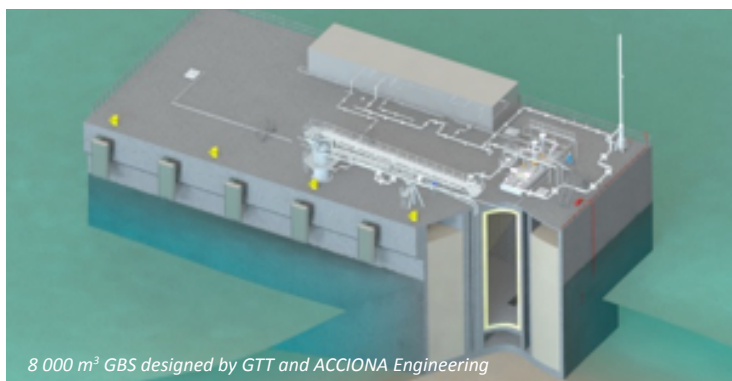
Typically designed for 8 000m³, GBS is a flexible solution suitable for all capacities.

The concrete container, made of one central tank is surrounded by hollow cells to achieve optimal conditions of buoyancy during its transportation. In its final location, these cells are filled with solid ballast or granular material to guarantee a global stability against external loads. The structure, equipped with mooring points ensures the jetty function, so that ships can berth directly alongside.

The installation of all necessary equipment on the GBS top side ensures maximum safety of the crew, with a safe area dedicated to ship crew access, and the nearby infrastructures. Furthermore, the loading arm REACH₄™ designed by GTT allows the loading and unloading of the station.

The construction process of the station is also optimised as the work is done outside the port up to its mechanical completion. The station is then transported and ballasted in its final location for its commissioning, which allows minimizing activities in the port, usually congested.

This solution fully developed and mature is now ready for application.



QUALITY / Shipyards satisfaction annual survey

GTT has received the 2016 International Trophy for Quality on May 9th. This trophy is awarded annually to recognize companies from all sectors, distinguished by the quality of their products or their services.

Since 2011, GTT has carried out an annual quality satisfaction survey with its licensed Shipyards. This survey is essential to better understand customers' expectations and further improve the quality of GTT deliverables.

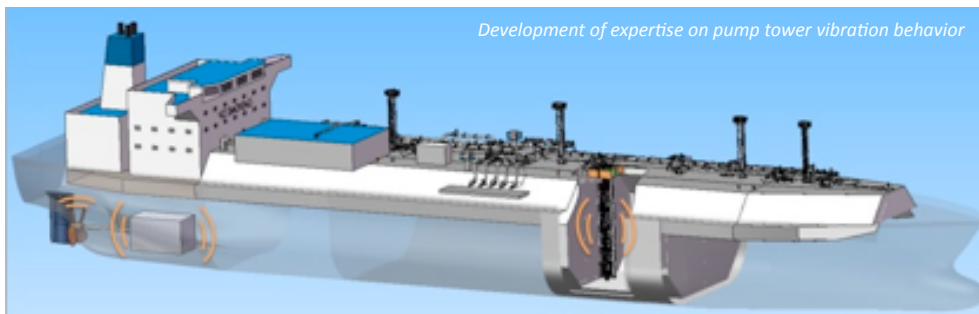
The survey assesses the project management efficiency, as well as the design improvements, the quality of the calculations notes and drawings and the technical assistance during a newbuilding. To get a broad view of the situation, several resources are involved in the shipyard during the survey: the cargo containment, cargo handling, commercial and quality management teams.

In 2015, the global score was 17.7/20, an increase of 5% compared to 2014, which confirms that GTT's constant commitment to improve the quality was appreciated. Customers' satisfaction is a priority for GTT and each employee is concerned by this global score and proud to keep it at the highest level.

The survey results can determine and define areas for improvement to enhance GTT activities and deliverables in the year to come. It has to be said that the evolution of the marks received from the shipyard is taken into account in the calculation of GTT employee incentive compensation.

GTT would like to thank all his clients who participate in this survey, thereby help in always improving the company industrial standards.

TECHNOLOGIES / Development of expertise on pump tower vibration behaviour



Change in LNGC motorization trends has brought new concerns about the behaviour of the pump tower under vibration. Issues related to these trends have led GTT to further develop its expertise in this domain, in cooperation with Shipyards.

For each project, the first step is to assess the pump tower resonance frequencies, and compare them with the excitation frequency range coming from the propeller and the ship engine. When those frequencies are close, further numerical analysis is required to confirm that the induced vibration on the pump tower will remain below acceptable levels. A forced vibration excitation study is therefore carried out.

By comparing its numerical model results with real measurements from Shipyards, GTT has achieved a high level of confidence in the calculation of the pump tower resonance frequencies. Further collaboration with Shipyards has led to vibration measurements on pump towers during sea trials to ensure the robustness of the forced vibration calculations.

Pump tower design can be tuned in order to shift resonance frequencies and thus avoid resonance or reduce the pump tower sensibility to vibrations. All these developments allow GTT to ensure a safe vibration behavior of the pump tower for any kind of project.

Save the dates

GTT will be at **Posidonia**,
Athens,
6-10 Juin 2016

Please come and visit us
at **Hall 3 - Booth 3.525**

GTT will be at **SMM**,
Hamburg,
6-9 September 2016

Please come and visit us
at **Hall A5 - Booth 405**

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NEWS / New achievements for SloShield™ monitoring system



Cryometrics has successfully performed the first installation of the SloShield™ monitoring system on the Engie Provalys. This installation was carried out in 4 days by Cryovision¹ under safe and controlled conditions thanks to the experience of the company in in-service operations.

Installation of this service at sea allows GTT to adapt to customer constraints and schedules. This project follows two other installations already successfully performed during dry dock, including the Gaslog Singapore. Further SloShield™ monitoring system projects are planned in 2016.

In addition to the first Approval In Principle (AIP) with respect to ABS rules and guidance, the IGC code and the IEC Standard, SloShield™ has received two new AIPs from the classification society ABS: one for the installation at sea, the second for the "SloShield™ ready" concept. The latter allows the ship-owner or operator to have cables installed at new build for subsequent installation of the monitoring system.

SloShield™ provides a solution to LNG carrier operators in order to constantly monitor the sloshing activity inside the tank. In addition, the monitoring system gives real-time visual indicators to the operator and offers a support to make critical decisions by minimizing operational risks.

1. Cryovision : GTT subsidiary which offers innovative services to Ship-owners and terminal operators