

Mampaey Offshore Industries *Dynamic Oval Towing : DOT system*

Synopsis

The DOT system is 360° around towing system that consists of a heavy oval-shaped deck rail and free running carriages with the towing system. The system can be integrated with various new and existing tug designs and extends the towing performance by matching the tow line forces with the hull forces both for sailing ahead and astern.



Fig. 1 : First DOT system in shop

1. Introduction

During ITS Mampaey Offshore Industries will launch the latest extension to their range of safe towing and mooring equipment. A recent trend in the design of tugboats is to enhance the performance and controllability of tugs by optimizing the attachment of the towline. The significant improvements of this approach confirmed that this is the way for the future. The DOT system meets the demand for 360° around towing systems and offers sufficient flexibility for the design of the tug.

2. The DOT system

The DOT system offers a new oval shaped radial support towline attachment and can be combined with a wide range of propulsion systems and hull shapes in order to improve the towing performance further. The oval shape offers a range of parameters to adapt flexible to the design requirements; not only the width, but also the length and specific curvature can be chosen to meet the owner's requests. This flexibility provides advantages not only for newbuildings but also for retrofitting on existing tugs. The DOT system has a large area inside the oval shape offering sufficient space for a full accommodation, machinery exhaust and vent piping, cranes and workboats.

The oval shape offers the solution to connect the distance between the towing points for sailing ahead and astern. The shape of the oval rail positions the pull force in the forward towing point when sailing ahead and in the aft towing point when sailing astern, see fig. 2.

The close match of the towline forces above the water and the hydrodynamic forces below enable an optimal manoeuvring performance with full control during towing operations, even at higher speeds.

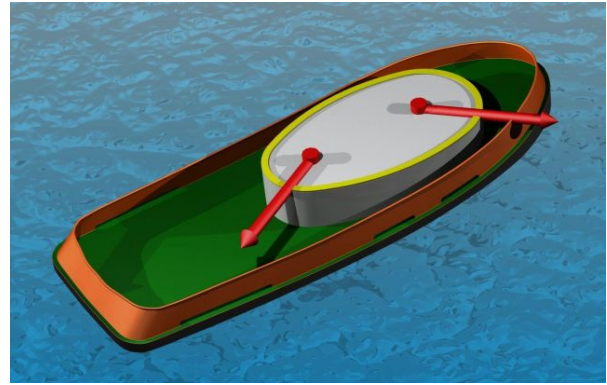


Fig. 2 : Tow points for stern and bow usage

The DOT-system can rotate freely all around without limitations. Towing operations can be freely changed from any direction; either from bow to stern use or vice versa. The radial support of towline attachment point minimizes the capsizing moment and prevents capsizing due to towline forces, see fig. 3.



Fig. 3 : Large stability sideward dragging

3. System components

The DOT system consists of a heavy deck mounted rail and the DOT system itself. The rail is an integral part of the ship's structure. The DOT system attaches the Mampaey Towing Hook to the rail; the tow forces are equally distributed to the rail by means of the spreader bar, the two carriages and the rollers, see fig. 4.

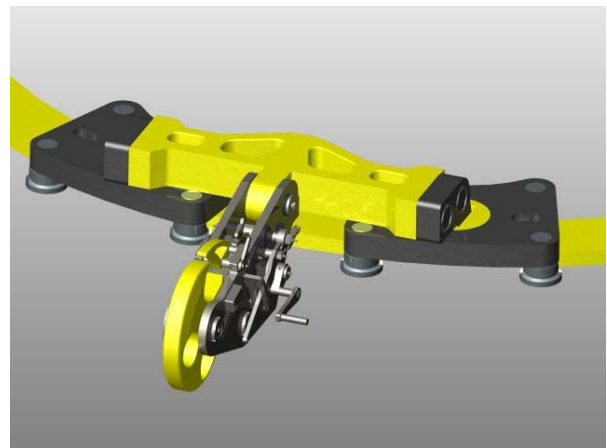


Fig. 4 : The DOT system

The whole structural design and integration with the ship design has been analyzed with Finite Element Calculations and optimized for strength and cost, see fig. 5.

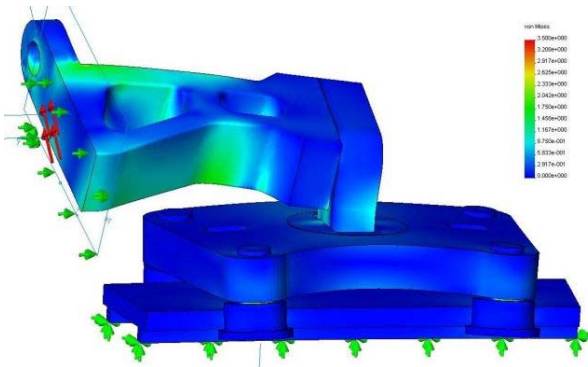


Fig. 5 : Finite Element analysis of DOT system

The DOT components are designed for a range of rail radii; they are connected by a double hinged construction and allow relative large building tolerance on the rail shape and alignment.

The design also allows increasing tolerances due to wear of the rail and rollers and guarantees proper rolling over a prolonged period of use.

All components are based on a modular approach and can be interchanged for both a hook and a winch version.

The DOT system can be integrated in various designs and a typical example is shown on a small harbor tug of 20 m length and 25 ton BP. In this oval shaped accommodation arrangement safe access on deck is achieved in combination with daylight accommodation space below, see fig. 6.



Fig. 6 : Overview oval shaped accommodation

4. DOT tested and ready-to-go

For meeting the high standards of Mampaey, the DOT system was tested thoroughly. After the detailed engineering, the DOT system was subjected to a number of real-life tests. First a scaled steel prototype was produced and the system was mounted on a scaled model tug to ensure realistic circumstances. The model successfully passed a series of tough testing in harsh operational conditions.

Second, the first DOT system was mounted on the deck of a pontoon and tested with a double workload of 60 ton. The excellent results from this test demonstrated that the design requirements were met successfully, see fig. 7. This initiated the official start of the delivery of the 30 ton SWL DOT

system equipped with a tow hook. Larger sized systems and a towing winch are currently under development.



Fig. 7 : Successful pontoon test

5. Conclusions

The DOT system meets the demand for 360° around towing systems and offers sufficient flexibility for the design of the tug. The 360° around towing principle significantly improves the safety and performance of tugs. The oval shape offers full control during towing operations in all directions, even at high speeds.

The oval shaped accommodation ensures that all deck operations can be performed safely. Immediately available is the 30 ton version of the system that can be applied on new tugs as well as existing tugs.

Extensive research and testing has resulted in a product that meets the high level of quality, as can be expected from Mampaey.

For more information and updates on the Dynamic Oval Towing system: www.mampaey.com



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