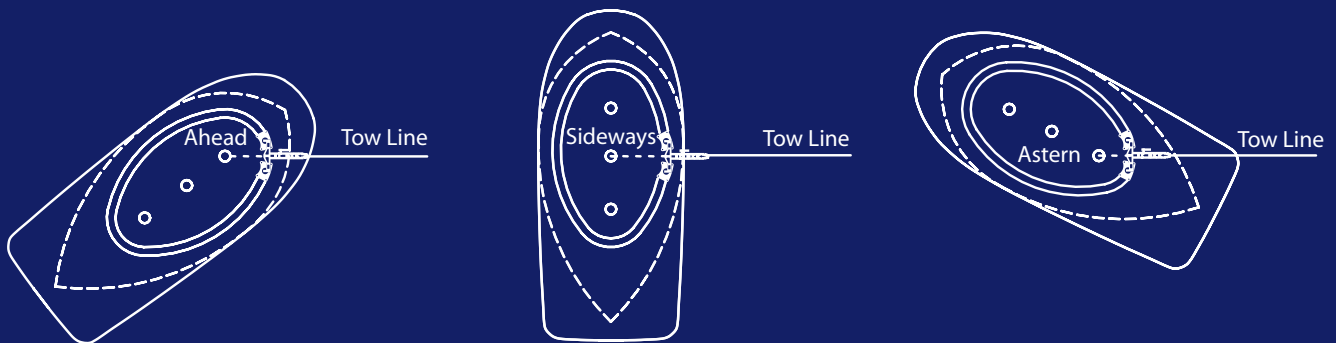


Dynamic Oval Towing System (DOT®)

Mampaey Offshore Industries, The Netherlands

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



All towing points integrated into one Dynamic Oval Towing System

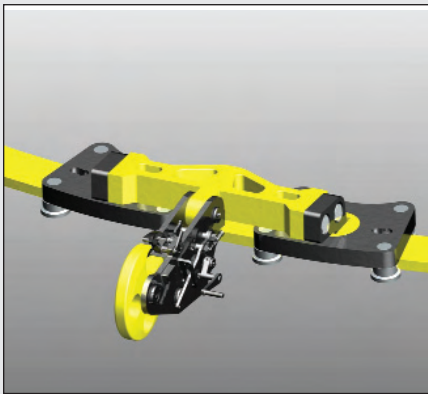
During ITS 2006 in Rotterdam Mampaey Offshore Industries has launched the latest extension to their range of safe towing and mooring equipment, the "dynamic oval towing" (DOT) system. A recent demand is identified in improving the towing performance and controllability of tugs by focussing upon the towline attachment.

The DOT system is a clear demonstration of the advantages this focus offers. The DOT system improves the safety, efficiency, flexibility and controllability of any tug. The DOT system meets the demand for 360° around towing systems and offers sufficient flexibility for the design of the tug.

The DOT system

The system consists of a 360° heavy oval deck mounted rail with free running carriages on which the towing hook is fitted. The oval shape offers a range of flexible parameters to adapt to most tug designs allowing the width, length and specific curvature to be chosen to meet the owner's requirements. This flexibility provides advantages not only for new-buildings 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 for-

ward towing point when sailing ahead and in the aft towing point when sailing astern. 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 assisting higher speeds. Towing operations can be freely changed from any direction; either from bow to stern use or vice versa with one integrated towing system. The main advantage of this is that the tug operator can be flexible in deciding what mode to assist the ship and maintain the connection to the tow at all times. The radial support of the towline attachment prevents the tug from capsizing due to towline forces, an effective safety measure.



The DOT Carriage

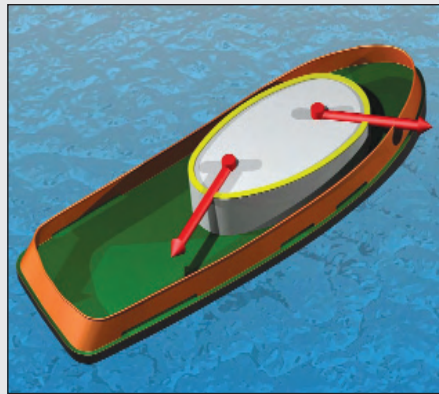
System components

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 Disc Type 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. The whole structural design and integration with the ship design has been analyzed with Finite Element Calculations and optimized for strength and costs.

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 vari-



The optimal balance of an oval...

ous designs and a typical example of a conversion is shown below on a small harbour tug of 20 m length and a bollard pull of 25 ton. In this oval shaped accommodation arrangement safe access on deck is achieved in combination with daylight accommodation space below.

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. This initiated the official start of the delivery of the 30 ton SWL DOT system



Succesfull pontoon test

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

Conclusions

The main advantage of a tug fitted with a DOT system lies in the fact that it has a different towing point when towing over the stern and when towing over the bow. Only an oval shape is able to integrate both towing points into one towing system, which can not be achieved by any other existing tug boat. This enables a tug with a DOT system to assist ships at higher speeds in all directions safely. The DOT system meets the demand for 360° around towing systems and offers sufficient flexibility for the design of the tug. The oval shaped accommodation ensures that all deck operations can be performed safely. Immediately available for delivery is the version with a safe working load of 30 ton and 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.



First DOT system in workshop



Large stability sideward dragging



The DOT system on a small harbor tug

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