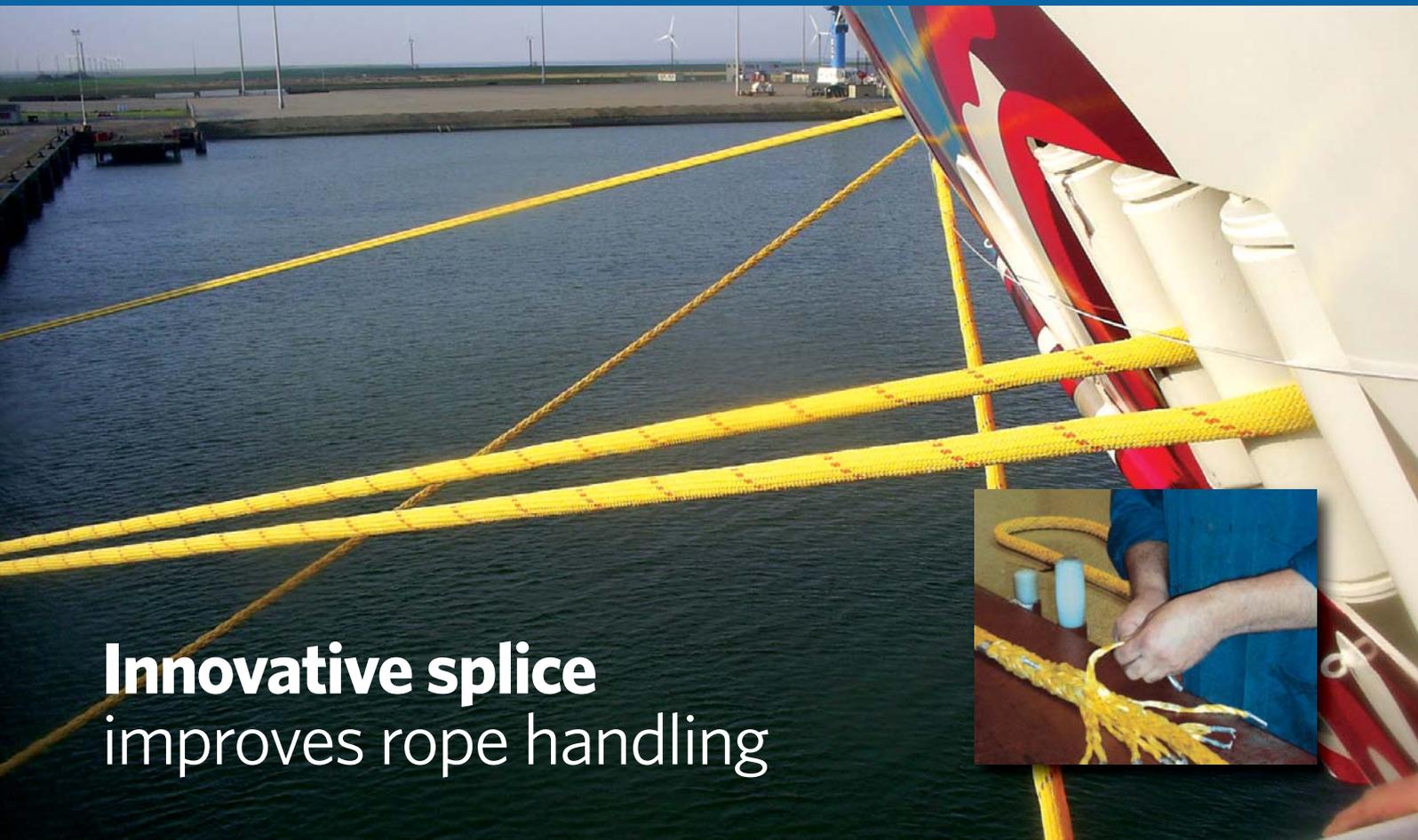




## Maritime Ropes Briefing 4/2010

In this newsletter we introduce the revolutionary A3® rope splice developed by Lankhorst Ropes for Strongline and Tipto-Winchline ropes. By splicing the rope within the soft 'eye', the size and weight of the eye is reduced significantly, making it easier to handle and requiring less crew. And all this has been achieved without loss in rope strength.

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## Innovative splice improves rope handling



Developments in maritime rope over the past 50 years have focused on new synthetic yarns to produce stronger and lighter ropes. Meanwhile the construction of the soft 'eye' splice at the end of the rope for mooring and towing operations has remained largely unchanged, until now. Lankhorst Ropes has drawn on over 200 years experience in maritime ropes to develop new rope splice technology.

*continued overleaf*





## Innovative splice improves rope handling *continued*

### Rope Splicing: engineering integrity

The engineering integrity of the eye splice is the determining factor in the overall strength of the rope. Splices are stronger than a knotted rope, a knot reduces rope strength by up to 40% while splices can retain at least 90% of the line strength. Therefore, the quality of the splice is vital to maritime rope mooring and towing performance.

All rope eye splices are made by hand. A maritime rope may contain between 8 and 12 strands and can take half an hour to complete an eye splice. This compares with a Lankhorst deepwater mooring rope with up to 12 sub-ropes each made up of 8 strands, to produce a rope weighing 43kg/m and a diameter of 250mm, can take one and half days.



### Easier Rope Handling

The development of lighter and stronger ropes together with improved rope management has made rope handling easier, optimised in-service rope life and increased rope safety. However it has done little to assist ship and tug operator crews during towing and mooring operations. The eye splice is still heavy, and difficult to physically handle; moreover it's also a good deal stiffer than the rest of the rope. The larger the diameter of the mooring rope, the greater the handling problem. For example, during towing the forerunner (pennant), a short length of rope with an eye spliced at both ends, is used. The length of the splices is such that they consume most of the length of this relatively short length of rope. In effect the splice doubles the rope weight and the increased stiffness makes the rope much more difficult to handle by the deck crew.



Reducing the size and weight of the eye splice has until now remained technically difficult, and early attempts to do so significantly reduced rope strength. However by drawing on insights from deepwater rope yarn-to-yarn abrasion resistance within the spliced eye, combined with experience of the inherent mechanical properties of synthetic polyester yarns in maritime ropes, Lankhorst Ropes has created a new type of maritime rope splice.

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### New A3® Smaller and Lighter Splice

Instead of the rope being spliced back into the body of the rope to form the eye, the new splice is made within the eye itself. This reduces the size and weight of the eye significantly, making it easier to handle and requiring less crew. Interestingly the splice within the eye has been shown to have 100% efficiency, which means there is no loss in rope strength due to splicing.



Top 'Traditional splice', bottom 'A3® Splice'.

### A3® Splice Retains Rope Strength

Recent testing witnessed by Lloyds Register of a traditional splice and the new splice with a Lankhorst Strongline braided polyester mooring rope showed the traditional spliced rope had a breaking force of 925 kN (broken in splice) compared with 1,140 kN (broken in splice) for the new splice; demonstrating a 23% increase in breaking force with the new splice. In addition, the splice design is less prone to the effect of abrasion on vulnerable areas of the splice covering, thus providing a longer lasting rope.



The Tipto-Winch Line with a breaking force of 682 kN showed a breaking force of 785 kN for the A3® splice. Further development of the new splice with other synthetic yarns is now in progress.

The new, smaller maritime rope splice is an important development for ship and tug operators. For the first time they have a rope that is easier to handle with none of the excessive weight and rigidity of traditional rope splices. The new splice is also stronger and therefore provides greater safety in rope handling, as well as creating the opportunity for operators to use less crew should they wish to do so.

### A3® Splice Strength Test

Rope	MBF (unspliced)	Test 1 A3® splice	Test 2 A3® splice
Tipto-Winch Line, 7 strand, 58mm	682 kN	777 kN	785 kN
Strongline, 3 strand parallel, 56mm	995 kN	1171 kN	1140 kN

### Exhibition Diary

30 November - 2 December, visit Deep Offshore Technology (DOT), Amsterdam, booth no. 525; to see the new LankorFirst fibre rope mooring connector and latest developments in offshore flotation products.

