

Mooring Line Solutions made with Dyneema® Fiber

Samson AmSteel® Blue Crosses the Chasm

New Mooring Line Technology Boosts Speed, Safety and Savings for Oil Tankers

Fitting out a fleet of 11 tankers, each 76,600 DWT, with synthetic mooring line is more than a remarkable story leading to increases in safety, savings and handling speed for BW Shipping Managers Pte. Ltd., its deck-hands and longshoremen. It's also a signal that mooring line, made by Samson Rope Technologies, Inc. using DSM Dyneema's super-strong, high-modulus polyethylene fiber, Dyneema®, has advanced from a high-tech innovation to being the sought-after material for mooring mid-sized tankers in the fast-growing global petroleum market. Dyneema® fiber technology has crossed the chasm from early users into the mainstream mooring market.

New Technology and Mooring Lines

For many years, most mooring line was made of wire rope, which presented some significant safety challenges. For example, wire rope will snap back if it breaks under a load and the snapback can cause serious injuries. Fishhook-like tips from frayed wire can bring on severe hand injuries. And the list goes on. Safety, not cost, was the issue. "When you're working with a cut wire, it's virtually uncontrollable. You can't steer it, can't kick it or move it," says John Morton, Samson's regional manager for international sales.

The first uses of high-strength Dyneema® fiber were the result of an urgent search for mooring lines that would be



BW Columbia, one of eleven 76,000 DWT oil tankers of BW Shipping Managers Pte.Ltd., equipped with AmSteel® Blue mooring ropes with Dyneema®

safer than conventional steel wire. More than a decade ago, Samson and DSM joined forces as partners developing high-strength polyethylene lines. This collaboration resulted in today's Samson AmSteel® Blue Mooring Lines – the same product adopted by BW Shipping for its tanker fleet.

AmSteel® Blue is the brand name for Samson's premium non-jacketed mooring lines, made with Dyneema® SK75 fiber. The result is a torque-free, 12-strand braided rope which, size-for-size, has comparable strength to wire rope, but only 1/7th the weight. The blue color is created by a proprietary "Samthane coating" that enhances wear life and snag resistance.

John Morton (left) of Samson Rope instructing crew members of BW Shipping Managers Pte.Ltd.



Today, a growing number of other customers include liquid natural gas (LNG) tankers and container ships. Samson lines with Dyneema® fiber are also being used at giant floating production storage offloading vessels (FPSO) for lifting buoyed rigging attached to feeder lines that tankers use to connect to the floating FPSO reservoirs, and they are used as anchor lines for the FPSO vessels.

BW Shipping's order was a pennant signaling that mooring line made with Dyneema® fiber has crossed the chasm from a product that appeals to early adopters on to large-scale acceptance. By the first quarter of 2007, sales

Why? Early sales were predicated on resolving safety issues. Now, the increasing recognition of the total system value of HMPE, as well as the safety benefits, has moved this category "across the chasm." "There were three basic reasons for choosing this type of mooring line: (1) safety of the crew onboard – reduced risk of personal accidents (mainly strain injuries) that can occur when working with heavy wires; (2) more efficient mooring operations – reduced time handling lines, since with wires the lines are handled individually whereas with the AmSteel® Blue allows multiple lines to be handled at the same time; and (3) reduced costs based on an anti-cipated 10-year life span – there can be significant savings in maintenance, greasing and crew time since there is almost no work to be done with the AmSteel® Blue ropes versus that required for wires," says Captain Paul S. Jones, General Manager Marine Dept., BW Shipping. The safety issue ranked highest with BW Shipping. "With ships of all types and sizes," says Capt. Jones, "there is one common factor – the crew involved. We feel that we need to look at how we can make life both easier and safer for them when mooring. All feedback to date has been very positive and the crew can see the benefits of deploying AmSteel® Blue ropes in terms of time saved and ease of handling."

But, did committing to such a major purchase with "different" technology raise any questions or doubt at BW Shipping? Says Capt. Jones, "The initial doubts were about the higher costs involved and the actual quality of the product, as we were unfamiliar with this type of rope. The price issues were covered by an indepth cost-benefit analysis that looked at all the costs involved with mooring wires, which we had not previously considered in detail, and compared them with the AmSteel® Blue ropes.

"Ship owners are renowned for not being too free with

their cash. Now people are starting to look at some of the things which have not been examined too closely. When you look at the whole picture and look at the actual cost involved over time and couple that with the personal safety issue, it makes it worthwhile,” says Capt. Jones.

“The quality concerns were resolved by meeting with another customer with whom we have a good working relationship and we were able to obtain a great deal of feedback from them based on several years of experience,” Jones continues. That customer, one of the earliest to adopt Samson mooring lines with Dyneema® fiber, has served as a reliable reference for the next round of shipping companies interested in switching away from wire rope.

How successful are the AmSteel® Blue mooring lines made with Dyneema® fiber? “The projected benefits alone were powerful enough to trigger the full-fleet buying decision; however, we propose to compare actual costs with anticipated costs and savings after the new ships have completed 12 months in service,” says Capt. Jones.

Also important to BW’s decision were the more efficient mooring operations, and reduced costs based on an anticipated 10-year life span. Capt. Alasdair Wallace, site manager at Dalian Shipyards for BW Shipping had the opportunity to witness, for the first time, “a mooring of one of our ships using the AmSteel® Blue mooring lines. The mooring was fast and efficient and the most notable thing about it was comments from the longshoremen and the line boat personnel stating that they wished every ship coming to:

- When broken, it does not snap-back like steel wire
- Does not have the dangerous “fish hooks” that occur with worn steel line
- Has two to three times the life span of wire rope
- Has a pay-back time of 3½ years in most cases
- Does not need refurbishing every 2½ years like wire, saving \$20,000 to \$50,000 (USD) per vessel
- Cuts mooring time in half – from an hour and 20 minutes to 40 minutes for the BW Shipping vessels
- Does not wear equipment and damage ships like wire rope
- Does not require the lubrication and maintenance attention that wire line does
- Causes fewer environmental compliance problems from oil leaks – a fact that is increasingly important to corporate customers
- Is easily serviced and repaired on board

The Samson Advantage

Beyond the product advantages, Samson has introduced a three-step program the rope maker offers customers. Called The Samson Advantage, this includes (1) a detailed analysis of deck hardware during the ships’ construction phase, helping to identify any potential equipment issues; (2) training, including a cover-to-cover review of a manual detailing handling, inspecting and even retiring AmSteel® Blue lines; and (3) a full annual inspection and review.

A Bright Future Ahead

BW Shipping’s Capt. Jones believes future adoption of Samson’s AmSteel® Blue mooring line with Dyneema® fiber will be considerable “with the smaller ships – maybe the 100,000 ton range down to 60,000 tons, possibly down to 40,000 tons.”

“Based on our experience, I foresee a wide variety of ships, including oil and LNG tankers, switching to these lines,” says Capt. Jones.

Regarding AmSteel® Blue lines, Samson’s Craig Kelly notes that “Our mission is to provide customers with products that provide solutions to specific needs, and this product does that. It provides something that is safer to use, easier to maintain and, provides better long-term economic value.”

The future of Dyneema® fiber in maritime ropes is also bright, says Edwin Grootendorst, global market segment manager heavy marine for DSM Dyneema. New regulations covering HMPE lines for oil and LNG tankers, as well as the exceptional systems value, point to especially strong growth.

“When I look at various sub-segments of the shipping market, I see that ropes with Dyneema® will be taking an increasingly important position.” In addition to oil tankers, Grootendorst projects that three of every four new LNG tankers will be fitted with mooring lines with Dyneema® fiber. “Use of lines with Dyneema® on bulk carriers and container ships is just in the beginning phase”, he said. “We expect strong growth in the market for the next few years.”

“Once someone has used ropes with Dyneema® fiber, they never want to go back to steel wire rope.”

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