



CASE STUDY

HIGH-PERFORMANCE SYNTHETICS IN NAVAL APPLICATIONS

Faster, safer mooring and towing evolutions requiring less personnel—proven advantages and a unique value for military maritime applications.



Over the past several years, the proven benefits of high-performance synthetics used in commercial mooring and towing applications have dominated discussions of using these ‘game-changing’ products in military applications. Their use in replacing steel wire rope and class I fiber ropes in maritime applications has expanded as the benefits of strength, reduced weight, and increased longevity in typical uses have been well documented and utilized.

However, one portion of the maritime community hasn’t universally followed suit—the military maritime/defence segment. There is, to date, only one of the world’s navies that has, for the past decade, whole-heartedly adopted high-performance synthetic fiber ropes for mooring and towing applications—the UK’s Royal Navy.

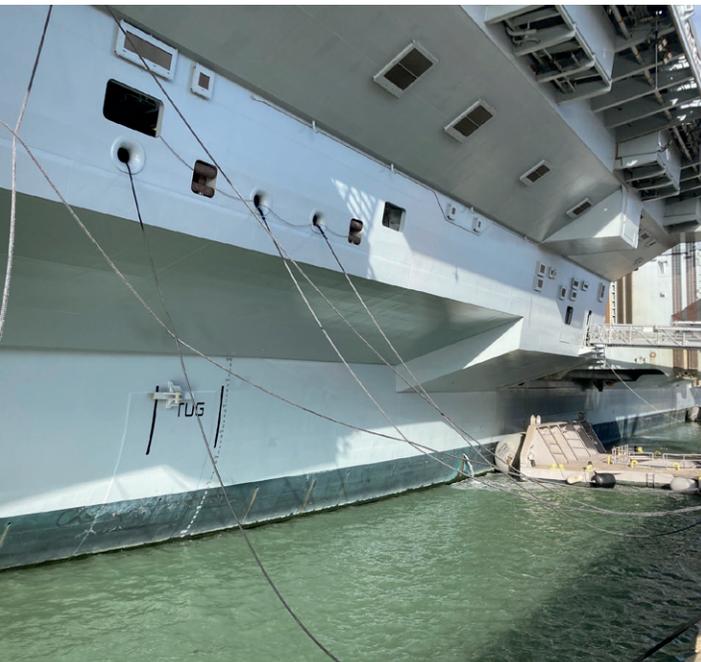
Recently, Samson hosted a visit by members of the Royal Navy, the UK Ministry of Defence, Mainbrace Marine Limited (a Samson distributor specializing in defence applications headquartered in the UK), and the Samson representative located in the United Kingdom. While they were here, we took the opportunity to learn more about the Royal Navy’s experience in adopting Samson’s innovative products into their operations and the benefits they’ve found in their use.



Legacy polyamide lines weigh an average of 75% more than Samson's equivalent strength high-performance synthetic lines.

"Unlike many other commercial marine applications, military seamanship evolutions are, with a few exceptions, largely conducted without the use of winches. Deck hardware arrangements utilize standing fittings (bollards) to deploy and secure lines. Previously, large heavy Class 1 or steel wire ropes required large numbers of personnel to operate safely."

DAVE ELCOCK, MAINBRACE MARINE LIMITED



Lightweight AmSteel®-Blue requires fewer personnel during mooring evolutions.

"...this means that personnel are often pulled from their duties around the ship, many of which are manning weapons, radar stations or other critical activities while the mooring evolution is completed."

JOHN "RONNIE" BIGGS—FLEET SEAMANSHIP WARRANT OFFICER, ROYAL NAVY UK

WHY NAVAL APPLICATIONS ARE DIFFERENT

Dave Elcock, Mainbrace Marine Limited Seamanship and Operations Manager, describes some differences between Naval and commercial marine applications. *“Unlike many other commercial marine applications, military mooring evolutions are, with a few exceptions, largely conducted without the use of winches. Deck hardware and layout are designed to accommodate personnel to deploy and secure mooring lines. Large, heavy class I fiber ropes or steel wire ropes are utilized and can require dozens of people to move.”*

John “Ronnie” Biggs—Fleet Seamanship Warrant Officer, Royal Navy UK adds, *“this means that personnel are often pulled from their duties around the ship, many of which are manning weapons, radar stations or other critical activities while the mooring evolution is completed.”* In the kind of threat situations in which these vessels are required to operate, this can compromise the safety of the entire vessel.

Naval vessels are designed to operate in the worst of situations—not only heavy weather but offensive and defensive threat situations as well. Being able to deploy from a mooring quickly can mean the difference between success and failure. Keeping critical operations manned and functioning while mooring, getting underway, or securing a tow for a disabled vessel can be lifesaving. In a hostile environment, the last thing needed is a requirement for added personnel or extended time of operations. Both mooring and towing evolutions benefit substantially from reduced personnel requirements—high-performance synthetic ropes provide just that.

EARLY TESTING AND ULTIMATE ACCEPTANCE: MORE THAN A DECADE OF EXPERIENCE

Mooring and Towing are perfect applications for Samson’s high-performance, high modulus fiber ropes. This was recognized by the UK Ministry of Defence and the Royal Navy in 2009 when a trial was permitted on an operational naval vessel. Mainbrace Marine Limited equipped a single destroyer with Samson high-performance synthetic ropes replacing the ship’s mooring system. The result—today, the entire fleet has been outfitted with *Quantum-12™* mooring lines fitted with custom pendants and *AmSteel®Blue* emergency towlines. *Quantum-12* was selected because it is a unique lightweight, high-strength, floating rope that grips well on a capstan or bollard. The patented *DPX™* fiber technology provides superior abrasion and cut resistance but



“...having the actual in-use history of reduced personnel requirements and reduced time of operations was key to being able to justify the changeover to high-performance synthetics.”

TOM FIELDING, MHL OPERATIONS MANAGER, MINISTRY OF DEFENCE UK (MECHANICAL HANDLING & LIFTING)



Lighter, stronger, smaller diameter HMPE lines significantly reduce crew requirements.

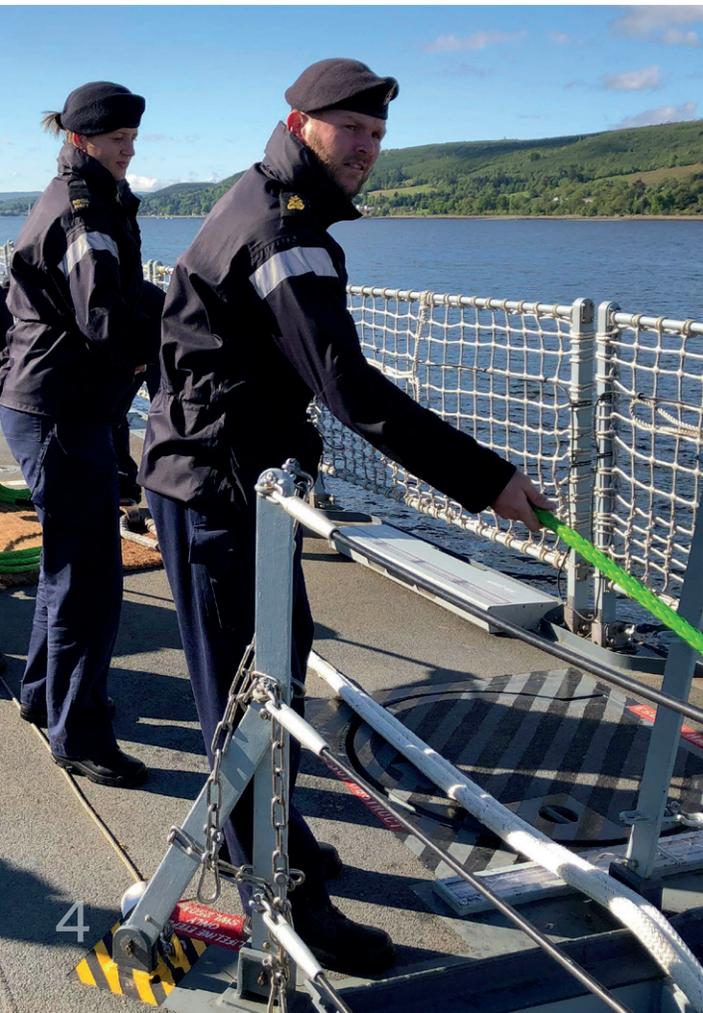
“A substantially longer service life further adds to the overall value of using high-performance synthetic ropes in these applications.”

DAVE ELCOCK, MAINBRACE MARINE LIMITED



“...training happens from the top down. The commanding officer needs to have confidence in their mooring and towing systems, as do those deploying the ropes. In the first stages of changing to the new systems, questions on whether a 36mm line could actually take the place of lines so heavy they required a dozen people to move.”

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with a higher coefficient of friction than other high modulus polyethylene ropes. *AmSteel®-Blue* was chosen for use as emergency towlines because of its long, proven history of use in critical maritime applications. Both ropes offer as much as 85% reduction in weight over steel wire ropes of the same strength, yet they float. Ease of handling combined with ease of maintenance and splicing adds real value as well as added benefits of resistance to abrasion and deterioration from most chemicals.

Often, the Royal Navy ships moor to a buoy. The legacy mooring systems required hardware shackles to be placed when using steel wire rope or the ship's anchor cable. This is a dangerous evolution that requires personnel to be deployed to the buoy, the vessel to maneuver close in and the deployed crew to install heavy hardware on a pitching buoy. Using Samson *Quantum-12* mooring lines and specially designed synthetic mooring strops the mooring process that used to take 2 hours plus is now typically accomplished in about 20 minutes.

One of the keys to adoption of the new systems was being able to fully justify the increased expense of converting using best business practices. Tom Fielding—MHL Operations Manager, Ministry of Defence UK (Mechanical Handling & Lifting), explains—“*having the actual in-use history of reduced personnel requirements and reduced time of operations was key to being able to justify the changeover to high-performance synthetics.*”

LONGER SERVICE LIFE ADDS SIGNIFICANT VALUE

Dave Elcock of Mainbrace Marine Limited points out that the lines deployed in one of the original test applications on the Royal Fleet Auxiliary Landing Ship (dock) after ten years in service are still in use. “*A substantially longer service life further adds to the overall value of using high-performance synthetic ropes in these applications.*”

TRAINING HAPPENS FROM THE TOP DOWN – IT IS CRITICAL TO MAXIMIZING THE BENEFITS OF HIGH STRENGTH AND EASE OF USE.

Also key to successful adoption is education and training. All participants and stakeholders need to understand both the benefits and the requirements of changing to new materials. Biggs points out that, “*with proper handling, lines do last longer in service, but crews need to be aware that dragging them across non-skid decks can abrade the rope, and that twist needs to be avoided and corrected. Both degrade the strength of the rope.*”

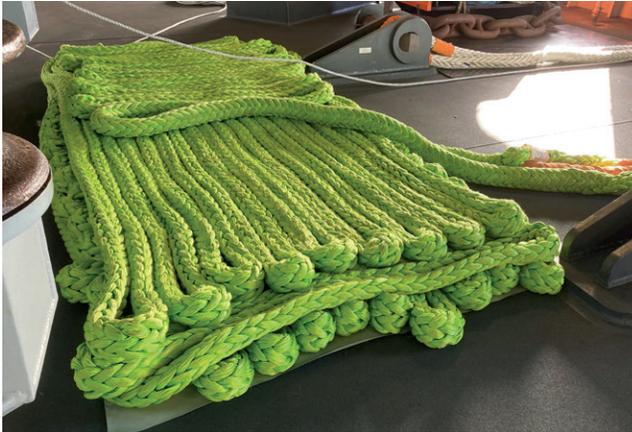
Biggs continues, "training happens from the top down. The captain needs to have confidence in their mooring and towing systems, as do those deploying the ropes. In the first stages of changing to the new systems, questions on whether a 36mm line could actually take the place of lines so heavy they required a dozen people to move." With a little experience in use and the strength and ease of handling benefits better understood, these objections were easily overcome. Today, use of high-performance mooring and towing lines and their maintenance are fully included in the Admiralty Manual of Seamanship. This publication is among the world's most used and referenced documents for learning the proper, accepted practices within the maritime community.

Mainbrace and Samson provide in-person and remote training to crew and other stakeholders. Samson's educational materials like the *Samson Inspection and Retirement Pocket Guide* and the accompanying Samson App make learning to inspect your lines a straightforward process. The Samson website offers a full library of written and video materials to get the most from your ropes.

INCORPORATING HIGH-PERFORMANCE SYNTHETICS: THE FUTURE IS BRIGHT

The acceptance of high-performance synthetics for mooring and emergency towing has led to other applications being adopted for synthetic ropes on vessels of the Royal Navy. Mainbrace Marine has fabricated new flight deck netting for the British Royal Navy's new aircraft carrier, HMS Queen Elizabeth from Samson's *Tech-12™* heat-resistant high modulus rope. The dress flag halyards have also been replaced with synthetics.

Samson engineers have helped develop "Fast" ropes for troop deployment and collection from helicopters, vehicle recovery ropes, and many other applications that make working under duress a little easier and much faster. Additional applications being considered to take advantage of the unique benefits and capabilities of Samson high modulus ropes include mine clearance and avoidance, amphibious landing craft apps, replenishment at sea, target towing, heat-resistant cargo netting, steel shackle replacement, and others.



LEGACY TOWING SYSTEM COMPARISON

Example from the Royal Navy's Emergency Differential Towing System, (EDWarTS) after switching to an AmSteel®-Blue main tow line.

LEGACY SYSTEM

265

KILOGRAMS/100 m

HMPE SYSTEM

62

KILOGRAMS/100 m

Frigate main tow line system weight reduced by 76.6%





SAMSON—WE BRING A HISTORY OF ENGINEERING AND EXPERTISE TO EVERY APPLICATION

From its inception nearly a century and a half ago, Samson has been at the forefront of fiber technology. Developing new products and using new fibers and coatings in unique ways has been a consistent hallmark of our brand. Working with customers to find new ways to improve their experience is what we do every day.

Contact your Samson representative if you'd like to see how Samson high-performance synthetic ropes can benefit your operations.

FOR ADDITIONAL INFORMATION:

For more information on Samson's complete line of high-performance ropes, visit our website, **[SamsonRope.com](https://www.SamsonRope.com)**, or contact our customer service department at CustServ@SamsonRope.com



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