Redefining the Limits of Synthetic Cordage

How Yale's Fortis^{2}® Sling Made Heavy-Lifts Safer, Easier, & Cost-Effective for this American Shipyard

PROBLEM

A large American shipyard was frustrated with the status quo — their productivity was weighed down by massive steel slings. The shipyard's assembly areas were strewn with enormous, heavy slings composed of steel wire and chain. As they built bigger, better, and higher-tech vessels, the lifting slings brought workers ever-present frustrations that they were ready to leave in the past.

Frustration #1: Ergonomics and Employee Safety

When large, heavy pieces of a vessel arrived at the assembly building, riggers hoisted them onto the hull with cranes and steel-wire slings. When moving from one piece to the next, the lifting slings — which weighed upwards of 300 pounds — needed to move too. Although cranes and forklifts were able to help, it was often faster for workers on the ground to drag the heavy hardware to the next spot. Over time, the bodily stress involved presented a very real threat to the workers' ergonomic health.

Frustration #2: Efficiency

In the outdoor yard, even heavier lifts took place. While the indoor slings handled loads up to 30 tons, slings in the yard were rated for 60-, 80- and 100-ton picks. The weight of these slings was beyond the capacity of the strongest workers — they depended on the slow strength of cranes to move the hardware from spot to spot. The weight wasn't just an ergonomic issue; it also slowed down productivity.

Frustration #3: The Elements

Naturally, everything outside on a shipyard is vulnerable to salty ocean air, rain, sleet, snow, and more. Inspections before each lift showed that wire slings were often compromised when exposed to the effects of rust, ice, and corrosion — wire slings that failed inspection were retired and replaced in order to prevent accidents or failure. This presented safety threats and further impaired efficiency.

A synthetic solution that alleviated all of their concerns had never existed as an option — until Yale Cordage took on the challenge to redefine the limits of synthetic slings.

SOLUTION

The solution was clear — replace their wire rope with synthetic slings. Synthetic cordage was, in fact, not completely foreign to the shipyard. They already used synthetic round slings for certain jobs and enjoyed the lighter weight and strength that synthetic products brought to their processes. But before they could switch from steel to synthetic for their very heaviest lifts, they needed a guarantee that the material would alleviate three main concerns:

Abrasion

The shipyard workers knew to pay attention to abrasive conditions on synthetic slings. Under a heavy load, bunching on the shackle or pick point or a slight movement of the pick could, and often does, tear a sling's sleeve. The shipyard needed to know that this would not be a factor with the new synthetic slings.

Stiffness

Traditional rope slings lack the stiffness needed to set up very large lifts. To rig massive ship pieces, workers often needed to push a round sling underneath the object and hook it on the other side. They couldn't push a rope sling underneath a load like they could a stiff wire one, so in those cases the typical round sling was a nonstarter.

Stretch

Because some lifts would take place under ceiling-height constraints, the slings used needed to exhibit low and predictable stretch levels. The shipyard needed assurance that any constructional elongation took place in the manufacturing stage, and that they would ultimately receive a product with very low stretch and a load curve as predictable as that of steel.

While they knew what they needed from a heavy-lift sling, a synthetic solution that alleviated all of their concerns had never existed as an option — until Yale Cordage took on the challenge to redefine the limits of synthetic slings.

An investment in Fortis[2®] multi-part slings can pay off in time savings, equipment costs, and worker safety.

INNOVATION

The task was challenging — create a synthetic lifting sling with the same reliable lifting capacity, the same low elongation and, crucially, similar stiffness of steel. The shipyard needed a sling that eliminated all of their frustrations while putting their concerns with synthetics to rest.

After much thought and more than a year of development tests, Yale Cordage had the product: a synthetic multi-part sling of the same length, stretch characteristics and stiffness as the ones they were using. And despite matching capacities, the multi-part synthetic slings are 85% lighter than wire.

The product is called Fortis[2®]: a multi-part sling made of Unitrex XS™ Max Wear synthetic cable, which has a core of UHMPE fiber from DSM Protective Materials encased with a neoprene coating and overbraided with a tough high-tenacity polyester jacket. Because the core fiber in Unitrex is parallel laid to eliminate torque and then sealed in place with the neoprene layer, the fiber retains its optimal strength and exhibits stiffness comparable to wire.

Safer, easier, and more ergonomic indoor lifts

Fortis[2®] slings quickly became the first choice for the indoor rigging team. Instead of involving multiple workers and possibly multiple machines, one person could lift the sling, carry it over to the jobsite, slide it under the hook and complete the job. More than two years later, the original Fortis[2®] slings have proven their durability — as old wire slings are retired, they're replaced with Fortis[2®].

Efficiency, durability, and cost savings multiply

Out in the yard, they have begun using 55-foot Fortis[2®] slings, which are rated for 100 tons and can be lifted and moved around without a crane or forklift. Compared with their 1,100-pound wire counterparts, these slings weigh just 160 pounds. Because even the heaviest-lifting sling is still such a manageable weight, there's no real need to have 60s, 80s and 100s out in the yard. Instead, a set of 100s can handle all of the yard's picks. This also eliminates the risk of overloading by grabbing the wrong sling for the job. And in stark contrast with steel, the synthetic Fortis[2®] slings don't rust, freeze, or corrode — eliminating a major maintenance concern and a lot of headaches.

From seafaring vessels to airplanes, bridges and beyond: Fortis[2®] slings are up for the lifting task

While every construction site has its own set of considerations and variables, the same Fortis[2®] technology used in major shipyards can bring efficiency to any large project. If bodily strain is a risk factor, time and/or money is spent on machinery to move slings, or slings need be left outdoors, an investment in Fortis[2®] multi-part slings can pay off in time savings, equipment costs, and worker safety.

U.S. Patent No. 9,296,593 B2 | Singapore Patent No. 11201507689 | China Patent No. CN 105209368
Australia Patent No. 2014239887 AU | South Africa Patent No. 2015/07153 | Saudi Arabia Patent No. 7209