

Over the course of history, tension members of wire rope, chain and various cordage products have been continually improved through material engineering and design to achieve higher strength. Today we have extra improved plow steel wire rope, grade 120 chain and cordage products made from high tenacity synthetic materials. Now Slingmax® Rigging Solutions has patented a method to increase the strength of roundslings by 15% or more using the same amount and type of material.

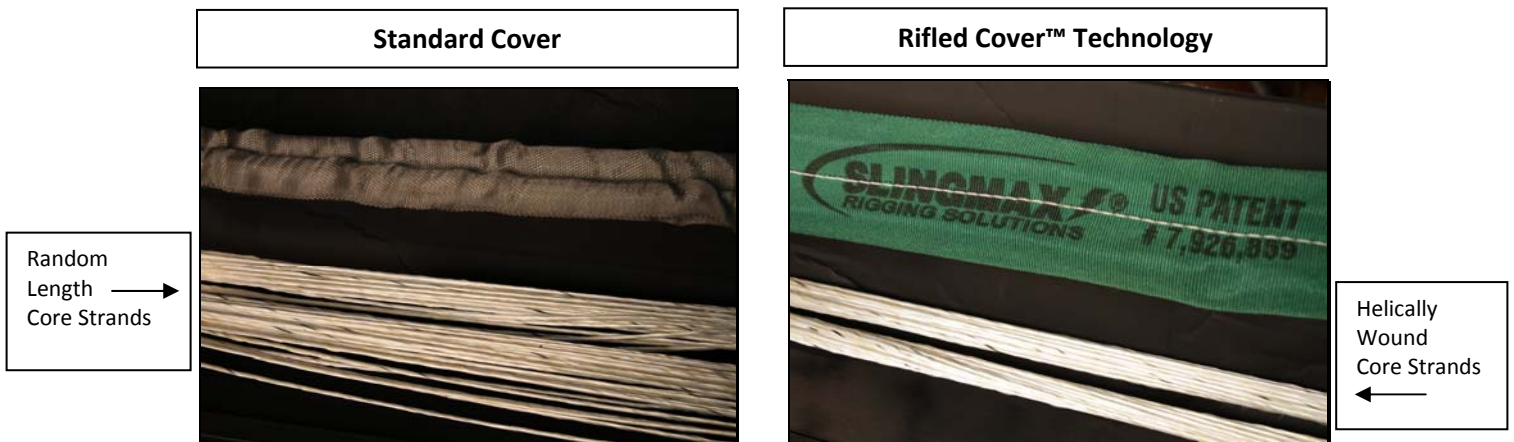
The process for manufacturing natural, synthetic and wire ropes has been known for hundreds of years and essentially consists of taking parallel yarns or wires and helically winding them into larger strands, then helically winding the strands together into finished ropes. By making helically wound strands from smaller yarns or wires, the efficiency of the finished product is enhanced and tension is equalized resulting in a much higher breaking strength.

Since the invention of the roundsling, engineers have tried to invent a method to helically form the core bundle inside the protective covers or tubes. Every process that was tried used some form of machinery attached or in conjunction with the roundsling machine itself. Typically, cones of core yarn were arranged on a turn table that rotated to form a larger strand as it was wound inside the cover on a roundsling machine. There were two significant problems with this method to form a helically wound core. The first was the rotation of the turntable had to be synchronized with the speed of the roundsling machine. The second problem; it only worked when there were several cones of core yarn utilized, meaning it only performed well when making higher capacity roundslings. For smaller capacity roundslings that used only one or two cones of core yarn, it was not effective.

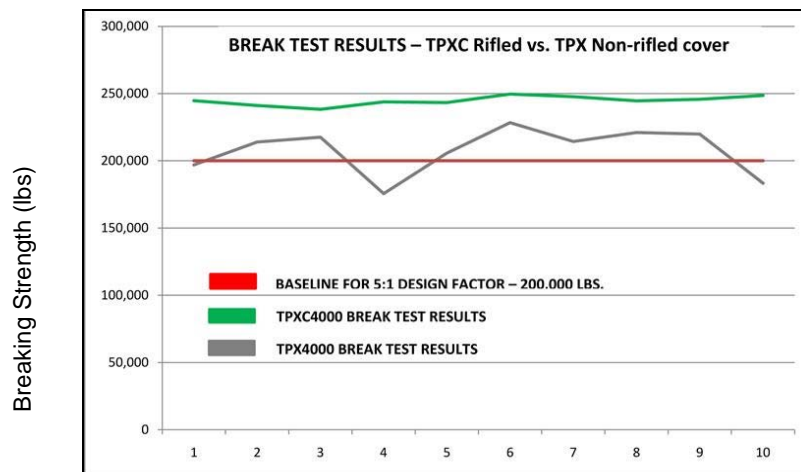
Initially, the Twin-Path® sling was made using standard tubes or covers and all of the strands inserted via the Slingmax® roundsling machine were basically run parallel and at random inside the tube. This was and is true of all other known roundslings manufactured today. Roundslings made with parallel or random length strands do not develop the efficiency or breaking strength per pound of core fiber as roundslings made with our Slingmax® patented rifled tube. It is also true that roundslings made with parallel strands will not last as long in cycling tests.

The rifled cover from Slingmax® Rigging Solutions conforms to US Patent #7,926,859 and works like the inside of a rifle barrel where the bullet spins as it leaves the muzzle of the gun. This spinning or helical winding of the core yarn significantly improves the breaking strength of the Twin-Path® roundsling and fortifies the slings fatigue resistance, adding to the slings longevity. A significant feature of the patented Slingmax® roundsling machine is the non-rotating tail stock which also improves the helical winding process of the core and rifled cover. All three features, the K-Spec® core yarn, rifled cover and Slingmax® roundsling machine work together to make the strongest and lightest roundsling available today.

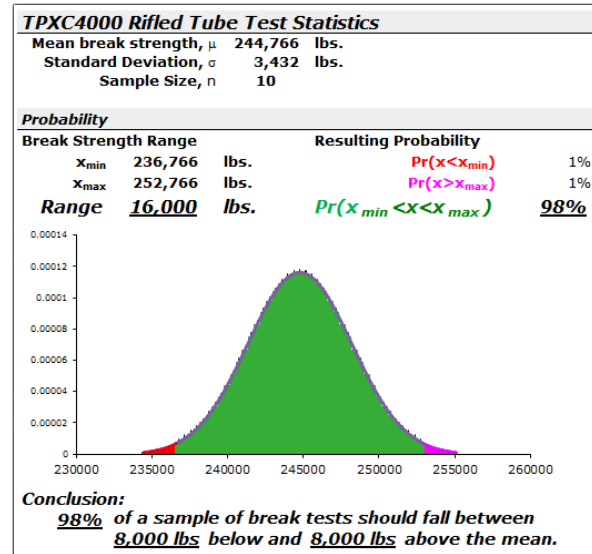
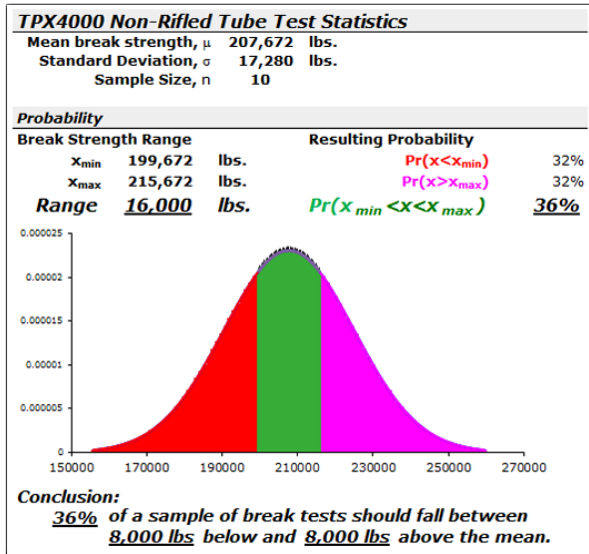
We first tested this new technology by making identical Rifled Cover™ roundslings side by side. The only difference was the cover. One sling was made using a Covermax® rifled cover and the other with a standard cover. Both were quality products but only the Covermax® conformed to our new patent. The resultant breaking strength of the two slings differed by 15%, a significant disparity. The rifled Covermax® sling broke at 139,000 lbs while the standard cover sling failed at 118,000 lbs. The helically wound core strands added an extra 21,000 lbs of strength vs. the exact same number of core strands run parallel or random length. It should be noted that a chief engineer of a textile company was witness to the entire fabrication and testing process described above. He commented: “If I had not seen it with my own eyes I would not have believed it.”



On May 23, 2011, additional testing was performed at our Greensboro, North Carolina facility which further substantiated the benefits of rifling technology. We made twenty slings with a catalog breaking strength of 200,000 lbs – ten slings used standard covers and ten slings used rifled Covermax® covers. The standard cover slings broke at an average of 208,000 lbs, a 5.2 Design Factor. The rifled cover slings broke at an average of 244,000 lbs or a 6.1 Design Factor. This is an increase in strength of +17% or +36,000 lbs per sling. And keep in mind; the material and labor are identical for all slings.



Another advantage of this astounding new technology is the consistency of sling breaking strength. The ten slings made with standard covers had a deviation between high and low failure points of 50,000 lbs, from 178,000 to 228,000 lbs. The rifled Covermax® slings had a deviation between high and low of only 11,000 lbs. or from 239,000 to 250,000 lbs. Furthermore, the weakest rifled cover sling still broke 11,000 lbs higher than the strongest standard cover sling. Keep in mind; all 20 slings had an identical amount of strength bearing core yarn and all weighed exactly the same.



### CONCLUSIONS FROM TESTING:

*Twin-Path® High-Performance roundslings with patented Covermax® tubes yield three major advantages:*

1. Increased strength to weight ratio. 17% higher breaking strength with same amount of core yarn.
2. More consistent and predictable breaking strength. (Peace of mind)
3. Repeatability in manufacturing no matter how large the capacity.

Rifled cover technology is a major breakthrough for roundslings and is available through all Slingmax® locations worldwide. Slingmax® currently has 37 Dealers in 11 countries with a total of 42 fabrication, repair and testing centers. We are proud to be celebrating our 25<sup>th</sup> anniversary in 2011. Besides rifled cover technology for roundslings, Slingmax® has also developed patents for the following; multi-part wire rope slings, high performance roundslings, chain sling connectors, synthetic sling connectors, overload inspection devices for roundslings, cut protection pads and numerous others.

Dennis H. Steinman