Technical Talk 9: Twin-Path® Sling vs Wire Rope Sling Cut Testing

A common misconception of wire rope or other steel slings is that it is safer to rig over an edge compared to a synthetic sling. Despite supposedly being "common knowledge" this has never been scientifically proven. Slingmax® Rigging Solutions completed testing on wire rope slings over a steel edge to determine when steel slings would cut and how they compare to synthetic roundslings.

Test Set-up

All cut tests were performed on a 5" steel block constructed of 4140 steel as shown in Figure 1. Between each test the edges were grinded to maintain a consistent 90° edge.

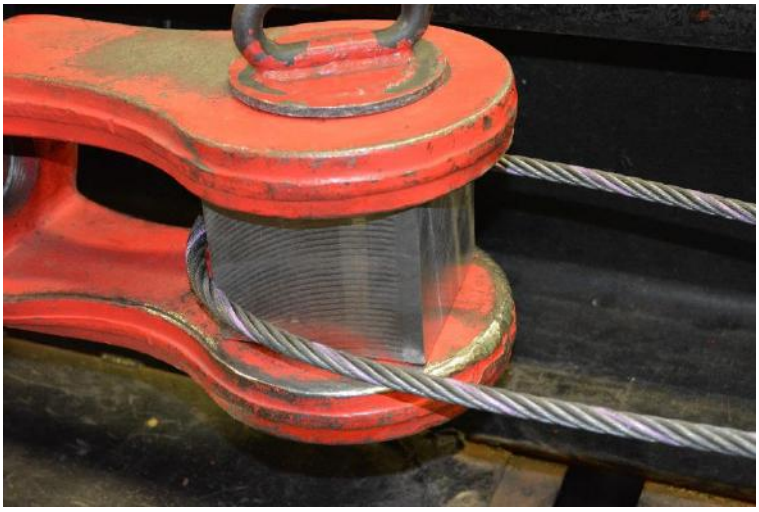

Figure 1 - Steel Block Setup

Testing

Wire Rope

Three ½" x 10ft Flemish Eye Slings were constructed. All slings were tested in a basket configuration with a working load limit of 5.1 tons or 10,200 lb. The three wire rope slings were tested around the steel block as shown in Figure 2 below.

See Table 1 for the individual test results, the average design factor achieved was 3.19:1.

Table 1 – Wire Rope Test Results

Type of Test	Sling	Length	WLL (lb)	Break (lbf)	Design Factor
Cut Test	½" FE	10ft	10,200	32,380	3.17
Cut Test	½" FE	10ft	10,200	34,410	3.37
Cut Test	½" FE	10ft	10,200	30,750	3.01
Average for FE cut tests				32,513	3.19

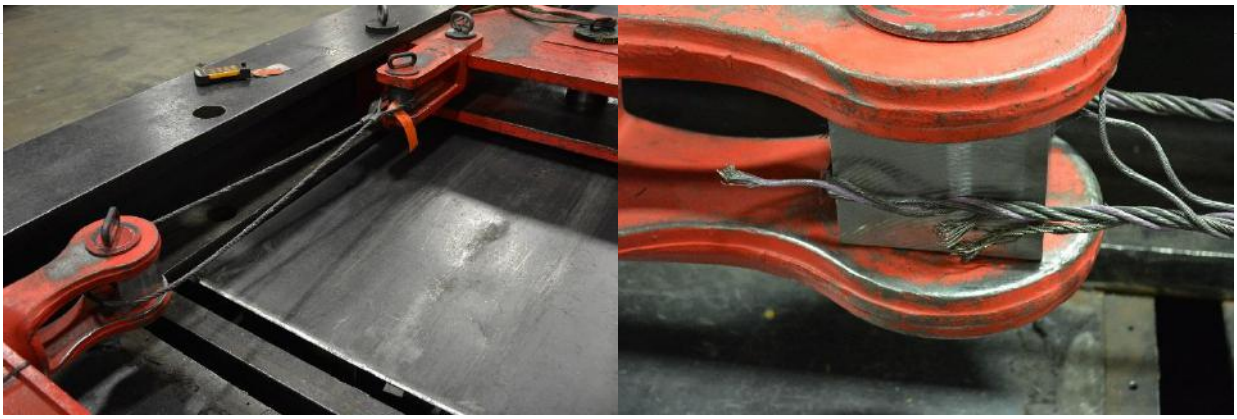

Figure 2 – Wire Rope Cut Test

Testing

Synthetic Roundslings

Two synthetic roundslings were tested in a basket configuration around the same steel block as shown in Figure 3. The first sling tested was a Twin-Path® Sling rated for 20,000 lb. This sling ultimately failed at 60,070 lbf – 3:1 Design Factor. The second roundsling tested was a standard single path polyester roundsling with a working load limit of 18,000 lb. This test setup is shown in Figure 4. The single path sling cut at 35,590 lbf – 1.98:1 Design Factor. The results of both roundsling tests are detailed in Table 2.

Table 2 - Synthetic Sling Test Results

Type of Test	Sling	Length	WLL (lb)	Break (lbf)	Design Factor
Cut Test – no protection	TPXCF1000	15ft	20,000	60,070	3.00
Cut Test – no protection	SP900	12ft	18,000	35,590	1.98

Figure 3 – Twin-Path® Cut Test

Figure 4 - Polyester Roundsling Cut Test

Testing

Cornermax® Sleeve Cut Protection

A Twin-Path® Sling (Figure 5) and a ½" wire rope sling (Figure 6) were tested with the Cornermax® Sleeve in a basket configuration around the steel block. The Twin-Path® sling with a working load limit of 20,000 lb, achieved a breaking strength of 92,800 lbf - 4.64:1 Design Factor. The wire rope sling cut at 41,170 lbf – 4.04:1 Design Factor. The results of the Conermax® Sleeve tests are detailed in Table 3.

Table 3 - Cornermax® Sleeve Test Results

Type of Test	Sling	Length	WLL (lb)	Break (lbf)	Design Factor
Cut Test – Cornermax® Sleeve	TPXCF1000	15ft	20,000	92,800	4.64
Cut Test – Cornermax® Sleeve	½" FE	10ft	10,200	41,170	4.04

Figure 5 - Twin-Path® Sling with Cornermax® Sleeve Cut Test

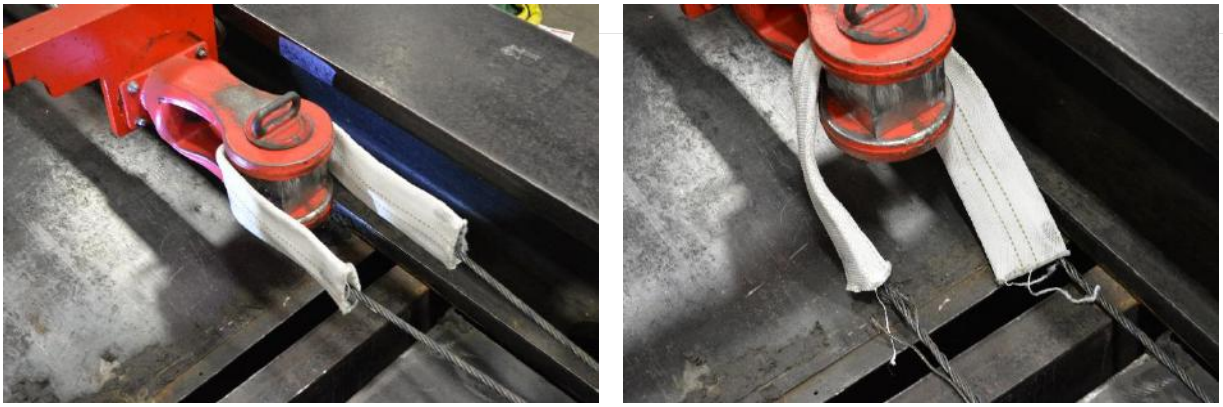

Figure 6 - Wire Rope Sling with Cornermax® Sleeve Cut Test

Summary

The test results prove that a wire rope sling can cut over a steel edge. Furthermore, a wire rope sling can cut and catastrophically fail at the same design factor as an unprotected Twin-Path® sling. Since no sling should ever be used on an edge without cut protection, there is no reason to use heavy wire rope slings that lack the exclusive features of a Slingmax® Twin-Path® Roundsling.

Simple-to-use Cornermax® Sleeves can increase a Twin-Path® sling's cut resistance by 65%. This does not prove the same for a wire rope sling. Synthetic cut protection is not an effective way of increasing wire rope's cut resistance. The Twin-Path® Sling with a Cornermax® Sleeve used for protection outperformed all other cut tests.

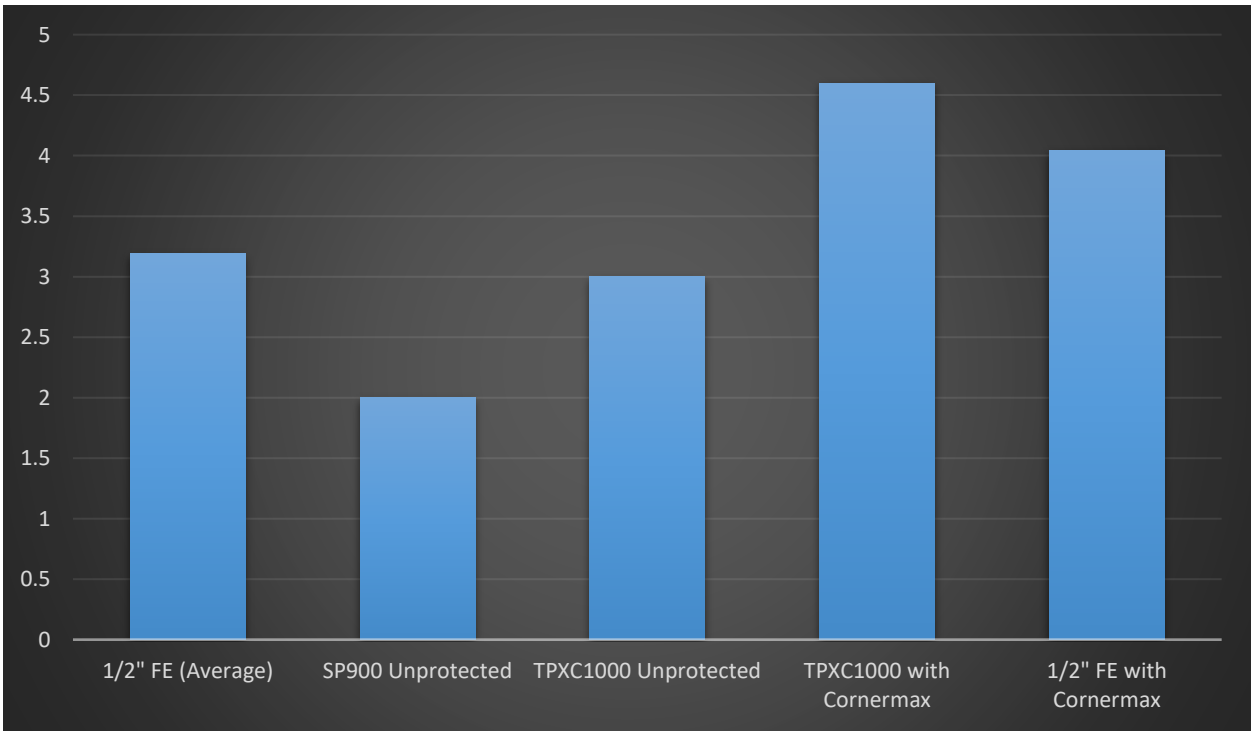

Figure 7 - Summary of Cut Test Results