

## Technical Bulletin 30: Sling Twisting

When rigging, slings can twist while being used. This can be due to necessity because the two connection points may not be in plane with each other, and a partial twist is needed in order to make the connection. It can also be due to user error, where the rigger does not realize that the sling has been twisted before the connection is made.

In the case of wire and fiber rope slings, this twist can easily go unnoticed. It can also lead to significant strength loss in the rope which can cause catastrophic failure. In the case of a braided fiber rope, this strength loss can be particularly large. A braided rope consists of an equal number of strands that are twisted in each direction. When the rope is straight, the strands all share an equal load. As the level of twist is increased, half the strands tighten while the other half loosen. If a rope is twisted enough, it can end up in a situation where it has lost **50%** of its original breaking strength! It can often be difficult to notice that a braided rope is twisted, especially if it has seen extensive use and begins to accumulate dirt and contamination.

In the case of a roundsling, such as a Twin-Path<sup>®</sup> high performance roundsling, it is simple to see if the sling has been twisted. Since a Twin-Path sling is constructed with two independent core paths, the sling lays flat, and any twisting is obvious from a distance. To increase knowledge about the use of Twin-Path slings, a testing program was undertaken to determine the effects that twisting would have on the slings. The test program consisted of six TPXC 1000 roundslings, rated for a working load limit of 10,000 lb with a minimum breaking strength of 50,000 lb. Each sling was 5 feet long.

Table 1 - Sling Twist Test Results

Sample	Twist Level	Twist / Ft	Breaking Strength (lbf)
<b>Control</b>	0 (control)	0	58,093
<b>A</b>	2	0.4	59,504
<b>B1</b>	4	0.8	70,821
<b>B2</b>	4	0.8	71,357
<b>C</b>	5	1.0	63,089
<b>D</b>	6	1.2	59,300

The testing proved not only that Twin-Path slings can withstand twisting at least to a level of 1.2 twists per foot of length (3.9 twists per meter) without the breaking strength going below the control, but also that a moderate amount of twist *increased* the breaking strength. This is because some twist in fiber will cause the fibers to work together better and equalize tensions. This principal is applied to the Rifled Cover® Technology, a Slingmax® innovation, which increases the strength of Twin-Path Slings by over 15%.