

Abrasion & Cut Protection for Synthetic Slings
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Any material can be cut when exposed to enough pressure and a sharp edge. Diamonds, the hardest substance known, can be split into smaller parts by skilled diamond cutters. Steel is known to be a hard substance, but there are many methods and tools used to cut steel into nearly any shape. Materials used for the fabrication of slings include steel wire rope, chain, and synthetics such as nylon and polyester. All of these materials are candidates for premature wear and cutting if protection proves inadequate.

The protection of slings used in overhead rigging to prevent cutting and premature failure is a subject that has enormous safety implications. It is imperative that only the very best means be used to keep slings from abrasion and cutting by contact with an unprotected edge.

This subject has been studied by many people with a corresponding number of solutions. Various types of animal, synthetic, steel and aluminum configurations have been tried with limited degrees of success. Cow hide, shark skin, nylon, polyester and Kevlar® pads are popular choices. Steel protection that forms to the load and aluminum shapes that fit the application can be made to keep the sling from shearing.

A recently concluded study of various types of synthetic sling wear and the appropriate protection available to prevent abrasion and cutting was conducted at the I&I Sling Inc. facility in Kernersville, North Carolina. During the course of this study, two separate and distinct areas were isolated as the main culprits in synthetic sling damage.

1. Sling damage from contact with rough surfaces such as concrete beams and structures referred to as abrasion damage.
2. Sling damage from contact with sharp corners such as concrete and steel beams. This is referred to as cutting damage.

A considerable amount of time and effort was expended to develop a wear pad that would protect slings against both abrasion and cutting. Actually, these are two very different and mutually exclusive injuries that require different solutions. Since there is a difference in the requirements, a single pad material will not fix both problems. In fact, the solution calls for different materials and shapes as will be disclosed.

Abrasion protection necessitates a pad that is large enough to protect the sling area in contact with the load. Exposure of the sling to a corner or edge requires a pad that is not susceptible to cutting because of inherent toughness or zero contact.

After isolating the difference in possible sling injury it was apparent a pad that was adequate for protection in abrasive situations may lack the ability to withstand damage from edges or corners. The latter contact the sling in a small defined area concentrating the pressure and enhancing the chance of penetration or cutting.

Steel protection in the form of half-pipes or wire mesh inserted into nylon tubes prevented cutting and allowed synthetic slings to reach their full breaking strength. However, these heavy cumbersome devices could fall on a job-site creating other hazards for the workers.

Another method that precluded penetration of the sling by exposure to edges was the change in geometric shape of the edge itself. This was accomplished by riggers when they would place a wooden 2" x 4" on either side of the edge thus causing the sling to pass by the edge without making contact.

Newer devices such as the CornerMax® pad change the geometric shape of the load edge and actually prevent sling contact up to 25,000 lbs per inch of width.

Testing of all types of material on a steel edge showed that the best could withstand cutting only to 11,400 lbs. This is short of the required 25,000 lbs per inch of width and falls short of minimum requirements of 12,500 lbs per inch of width.

It is up to individual sling suppliers to verify protection for abrasion and edge protection. This is one area where field trials are not a good idea. In fact, if you do not have tests to show that your methods of cut protection actually meet the requirements of your synthetic slings you could be in real trouble in a product liability lawsuit.

An EN2-901 nylon web endless sling has a rated capacity of 12,200 lbs in a vertical basket hitch. If the customer asks for edge protection and you supply anything other than CornerMax® pads or a steel protector, you will lose a law suit if the sling fails from cutting. Every material we have tested exposed to an edge will fail below 12,200 lbs per inch of width except the CornerMax® pad or some form of steel protection.

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