Mike Riggs discusses how destructive a small area of damage can be to a sling.

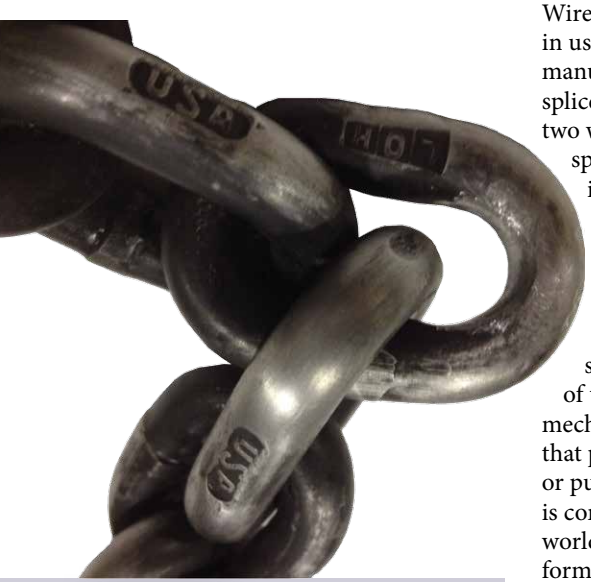
Bad is bad

"It's not that bad" is a common response for small damage on a sling. It is a response that I have given as a rigger and instructor and the same response I hear many of my peers using today. Too often sling users and inspectors do not realize how destructive a small area of damage can be to a sling. Let's review some inspection points that too often prompt the attitude, "it's not that bad."

Alloy chain slings

ASME B30.9-1.9.4 states that: "An alloy chain sling shall be removed from service if conditions such as the following are present: (c) excessive wear… Minimum thickness on chain links shall not be below the values listed in Table 9-1.9.4.1".

Wear normally happens at the side barrel of chain links and at interlink bearing points. Side barrel wear is quite obvious and easily identified. However, wear at interlink bearing points is more difficult to recognize and is often overlooked. If the chain links are not collapsed during inspection, wear at interlink bearing points is unable to be seen. When wear is detected, remove the sling from service until the amount of metal loss can be verified. To determine metal loss use calipers or no-go gauges. When using no-go gauges, make sure that the chain manufacturer's gauges are being used. It does not take much wear beyond the minimum wear dimension, to cause a severe reduction of the chain sling's ultimate strength.



Wire rope slings

Wire rope slings that are in use today are generally manufactured with a mechanical splice. This is accomplished in two ways. The most common splice in the United States is known as a flemished eye mechanical splice. In making a flemished eye splice, the wire rope is hand spliced into an eye before a steel or aluminum sleeve is slid over the end wires of the splice and then pressed with mechanical force to provide a finish that prevents the wire from unraveling or pulling apart. The second method is common throughout the rest of the world and is a turnback splice. When forming an eye by this method, the wire rope is simply folded over itself. Then a steel or aluminum sleeve is pulled over the wire connection and is mechanically pressed together forming the eye. Both flemished and turnback spliced slings have the same rating. However, if the sleeve of a flemished eye splice is damaged or improperly pressed, the user will still have protection from injury due to the 60 percent plus strength of the splice that remains without the presence of a properly functioning sleeve. However, if a turnback splice has a damaged or improperly pressed sleeve it will fail completely leaving no back up splice in the wire rope to protect the user from possible injury or death. Therefore, the user and/or inspector must closely and carefully inspect the turnback sleeve for damage and wire rope slippage before and after every use. For this reason the ASME B30.9-2 requires a 200 percent proof test of every newly fabricated turnback spliced sling.

Nylon web slings

The most common cause of a synthetic sling failure is due to cutting or UV degradation. ASME B30.9-5.9.4 Removal Criteria states: "A synthetic webbing sling shall be removed from service if conditions such as the following are present:…(d) holes, tears, cuts, or snags…(h) discoloration and brittle or stiff areas on any part of the sling, which may mean chemical or ultraviolet/sunlight damage".

Notice that the standard does not identify how large a hole, tear, snag or cut can be before removing a web sling from service. This is for a very good reason. It takes little damage to create a significant loss of strength in a Nylon Web Sling. The following is one of many tests I've conducted on cut webbing. For this test five new single ply 3 inch wide by 6 foot long nylon web slings were pulled to destruction. One sling had no damage – it represents the baseline for the

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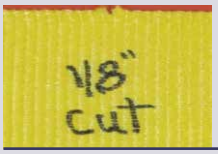
ultimate or actual strength of the sling versus the minimum breaking strength of the sling. Of the remaining four slings each were damaged by making a cut on one edge of the sling body. The cuts made measured ⅛ inch, ¼ inch, ⅜ inch and ½ inch. After the cuts were made in each sling, the slings were pulled to destruction. As you can see below, the results indicate a dramatic loss of ultimate strength. If you see a cut of any size in a web sling, remove the sling from service.

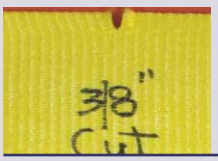
In the same way ultra-violet light easily causes a significant loss of strength to a Nylon Web Sling. The two nylon slings, EE2-602, were removed from service with no physical damage other than the slings being faded beyond color recognition and some fuzziness throughout the sling length. The results of these two break tests were very revealing. The age of the slings are not known, however, they are believed to have been purchased at the same time. Whether they were placed in service at the same time is also questionable. The known factor is that they both looked the same and had no other damage other than fading beyond color recognition. The test results were very different. Test 483 and 484 show a loss of minimum breaking strength of 37 percent for one sling and 70percent for the other. If your web slings are faded beyond color recognition, remove them from service. It is impossible to determine how much life is left in your sling.

No Cut – Strait Line Hitch (VRC):	4,800 pounds WLL
Minimum Breaking Strength:	24,000 pounds
Actual Break:	27,512 pounds



⅛ inch Cut Break:	21,910 pounds
Loss from Baseline Break:	20 percent
Loss from Min Break:	9 percent

¼ inch Cut Break:	17,670 pounds
Loss from Baseline Break:	36 percent
Loss from Min Break:	26 percent



⅜ inch Cut Break:	15,800 pounds
Loss from Baseline Break:	43 percent
Loss from Min Break:	34 percent

½ inch Cut Break:	14,000 pounds
Loss from Baseline Break:	49 percent
Loss from Min Break:	42 percent

Synthetic Roundslings

When inspecting roundslings one critical item that should be given attention to is not listed in ASME B30.9-6.9.4 Removal Criteria, "UV degradation." However, it does state in ASME B30.9-10.3 Effects of Environment, "(a) Slings should be stored in an area where they will not be subjected to mechanical, chemical, or ultraviolet damage or extreme temperatures. The key identification of UV degradation for the inspector is: when a roundsling's color is not identifiable to remove it from service as ultra violet light has had an opportunity to weaken the sling. Based on testing and information from three manufacturers, and the textile industry, the best protection from UV damage of sling fiber and your skin is dark, thick, tight knit material. Roundslings with light colored jackets can lose up to 40 percent of their ultimate strength over a six month period in the Florida, California or Tennessee sun. In the roundsling color spectrum, white, tan, gray and yellow are the least protective covers, while red, dark brown, dark green and black are your best protectors against UV damage. The more light that can shine through the sling's protective cover the more quickly UV damage is realized. ■