Tech Tips - *a periodic newsletter*

SLING STRENGTH & DESIGN FACTORS

If you are not receiving your own copy of Tech Tips it's easy to register and receive all future issues.

Click Register for Tech Tips then just complete and submit the form. Your periodic Tech Tips will start to arrive soon.

Crane Tech respects your privacy. We will not distribute or sell your contact information and you can un-enroll at any time.

Enroll 2 & 3rd is Free

Did you know that when you enroll two students in select Crane Tech seminars the third student is free? Students attending the same class on same dates save 33% of tuition fees. Certain restrictions apply

CRANE TECH®
Est. 1977

Safety Through Education

Greater Tampa Area

6037 Winthrop Commerce Ave.
Riverview, FL 33578

Phone: 813.248.4800
800.521.7669
Fax: 813.248.4820
Web: www.cranetech.com

As many in the crane and rigging field are aware, all rigging gear is supplied with a Working Load Limit (WLL) that is based, in part, on a design factor. This Tech Tip is provided to explain "design factor" and "breaking strength" so that users better understand how these terms apply to everyday lifting safety.

The ASME B30.9 standard titled "Slings" defines design factor as "a ratio between nominal or minimum breaking strength and the rated capacity of the sling." Simply put, dividing the breaking strength of a sling by the designated design factor results in the WLL. Two important terms from the definition of design factor are "nominal strength" and "minimum breaking strength." Nominal is a term that relates to breaking strengths published by the Wire Rope Technical Board. This is the minimum breaking strength that a wire rope can have. A wire rope may break at a value greater than nominal, but never less.

So, design factor is a number that when divided into the least amount of force required to break a sling results in the WLL for that sling.

Now lets move to a subject of constant concern, sling failure. When and how does a sling fail? Cuts, crushing, heat, caustics, excess loading, are just a few of the more common ways to damage and/or cause a sling to fail. So then, how does a sling fail when the applied load is less than the WLL? It may seem obvious, but the answer rests in our knowledge of breaking strength and design factor.

It only stands to reason that any minor damage would naturally result in a reduction of the sling's WLL, right? Wrong! The WLL of a sling never changes, and the design factor never changes. What changes is the sling's breaking strength — reducing with each minor damaging incident.

It would be a major mistake to reduce a sling's WLL because of existing damage. So users must diligently inspect all rigging gear prior to use, making sure that no damage exceeds manufacturer's specifications or regulatory requirement.

The objective is to remove slings from service long before breaking strength is reduced to the amount of load applied during use.

Tech Tip Continued:

ASME B30.9 provides rejection criteria for slings, and one of the more easily interpreted criteria relates to broken wires in a wire rope sling; "for strand laid wire rope slings, when there are ten randomly distributed broken wires in one rope lay or five broken wires in one strand of a rope lay," meaning the rope has met rejection criteria and must be removed from service. However, a user's inspection finds only a few broken wires, minor crushing damage, minor kinks, and slight abrasion—what's the user to do? The question is more accurately asked, how much strength remains in the sling?

Some companies try to fend off sling failure by sending their slings out to be proof tested to make sure the slings are fit for service. Not that this is a bad practice, but testing is just one step in the quality assurance equation. A scenario may look like this; Your slings are delivered to the testing facility, placed in a test bed and pulled to two-times the vertical rating (in accordance with ASME B30.9 testing standards). Slings that don't fail are supplied back ready for service, right? We hope not! What if damage to the sling has reduced the breaking strength to a factor of 3:1, or 2.1:1? The pull test won't tell you that. What if existing damage is exacerbated by the actual pull test? How assured are you that future shock loads won't cause the sling to fail during use? Your only hope is that testing was preceded and followed by a thorough inspection by a knowledgeable inspector.

In a perfect world every sling that met rejection criteria would have exactly the right number of broken wires or other points of rejection as stated in ASME B30.9. But, all damage takes its toll and must be accounted for during inspection. Users must recognize where their knowledge ends and should remove suspect slings for a more thorough inspection by a qualified person. This is the only way to keep fingers, toes, arms, legs, and life intact.

Every sling is new only once. From that point forward it's a test of the user's knowledge and proper discretion of removing slings from service before they become a hazard.

Don't get caught thinking your slings have more strength than they actually have. An investment in rigging gear inspector training pays real dividends.