A Preliminary Investigation into How Damage Affects the Potential of Climbing Slings to Withstand Loading.

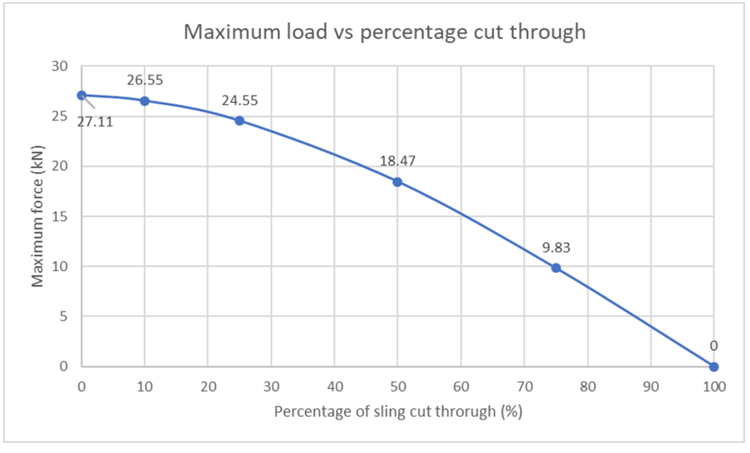
Overview

Within the sport of climbing, slings are an integral part to multiple systems, all of which are imperative to the safety of climbers and those around them. There are multiple instances where damaged slings, whether that be through cutting, abrasion, or aging, have failed with catastrophic consequences .

It is therefore the purpose of this investigation as to establish to what extent different modes of damage impact the slings ability to perform its primary function.

Findings

The knotting of slings showed that this relatively common practice had a profound impact on the UTS, reducing it by over 50% and thereby below the quoted minimum strength of 22kN. The type of knot and therefore fibre angle was significant. Observable morphological changes (above) were found in the broken ends close to the knot. It is inferred that this was caused by localised adiabatic heating resulting from the compression of angled fibres during the pull test.



Cutting part way through the sling was found to have a smaller effect on the UTS than slight to moderate abrasion and a cut of 35% left the UTS above 22kN, whilst all abraded slings failed to meet this standard.

Recommendations for future work

- Study the effect of UV degradation on thermally and chemically aged slings
- The effect on UTS of quantifiably abraded slings within multiple situations
- Using differential scanning calorimetry and thermal imaging to study localised heating phenomena on knotted slings
- SEM study on fracture sites of slings
- Study on pull rates greater than used in this study to find static/dynamic load transition

James Coomber:10540186
James.coomber@students.Plymouth.ac.uk
BSc Marine Composite Technology
UNIVERSITY OF PLYMOUTH