



samson

THE STRONGEST NAME IN ROPE

Optimizing your Design and Use of High Performance Synthetic Lifting Slings

Justin Smoak September 28, 2017

Outline



- **Introduction to Samson**
- **Why High Performance Synthetic Rope Slings**
- **Factors that Affect Sling Selection**
 - Sling configuration
 - Hardware selection
 - Design/Safety Factor
 - Risk Assurance
 - Re-use
- **Summary**

About Samson



- **Founded in 1878 in Boston**
- **History based on innovation**
- **Largest high performance rope producer in the world**
- **Headquarters in Ferndale, WA**
- **Manufacturing locations in Ferndale & Lafayette, LA**
- **320 employees world-wide**
- **Global distribution network**
- **Products sold in 50+ countries**



Why High Performance Synthetic Lifting Slings?



Polyester Round Sling – 200 lbs



Wire Rope – 400 lbs.



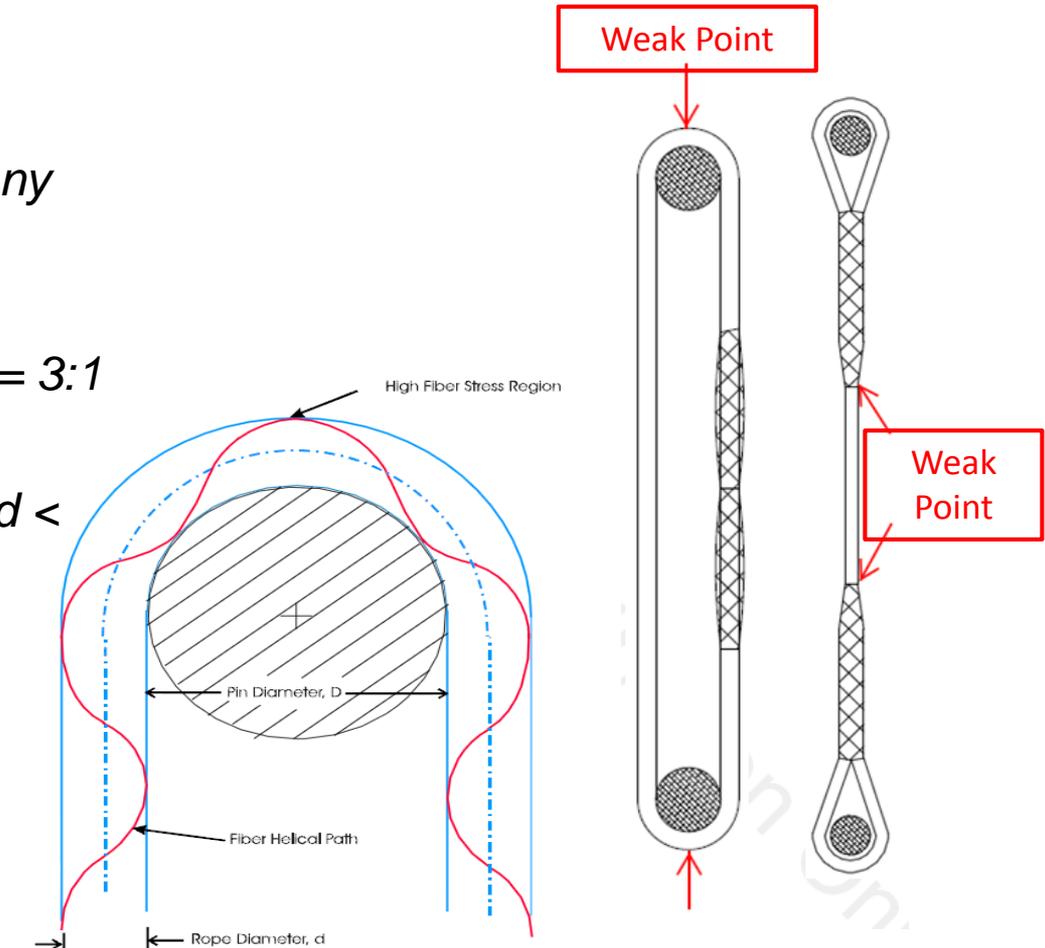
Dyneema Round sling – 44 lbs.

Single Configurations



Impact of Bend

- **Single Leg**
 - $Min D/d = 1:1$
 - *No Strength Impact for any $D/d > 1:1$*
- **Grommet**
 - *Recommended $Min D/d = 3:1$*
 - $Min D/d = 1:1$
 - *Strength de-rating for $D/d < 1:1$*



Hardware Selection

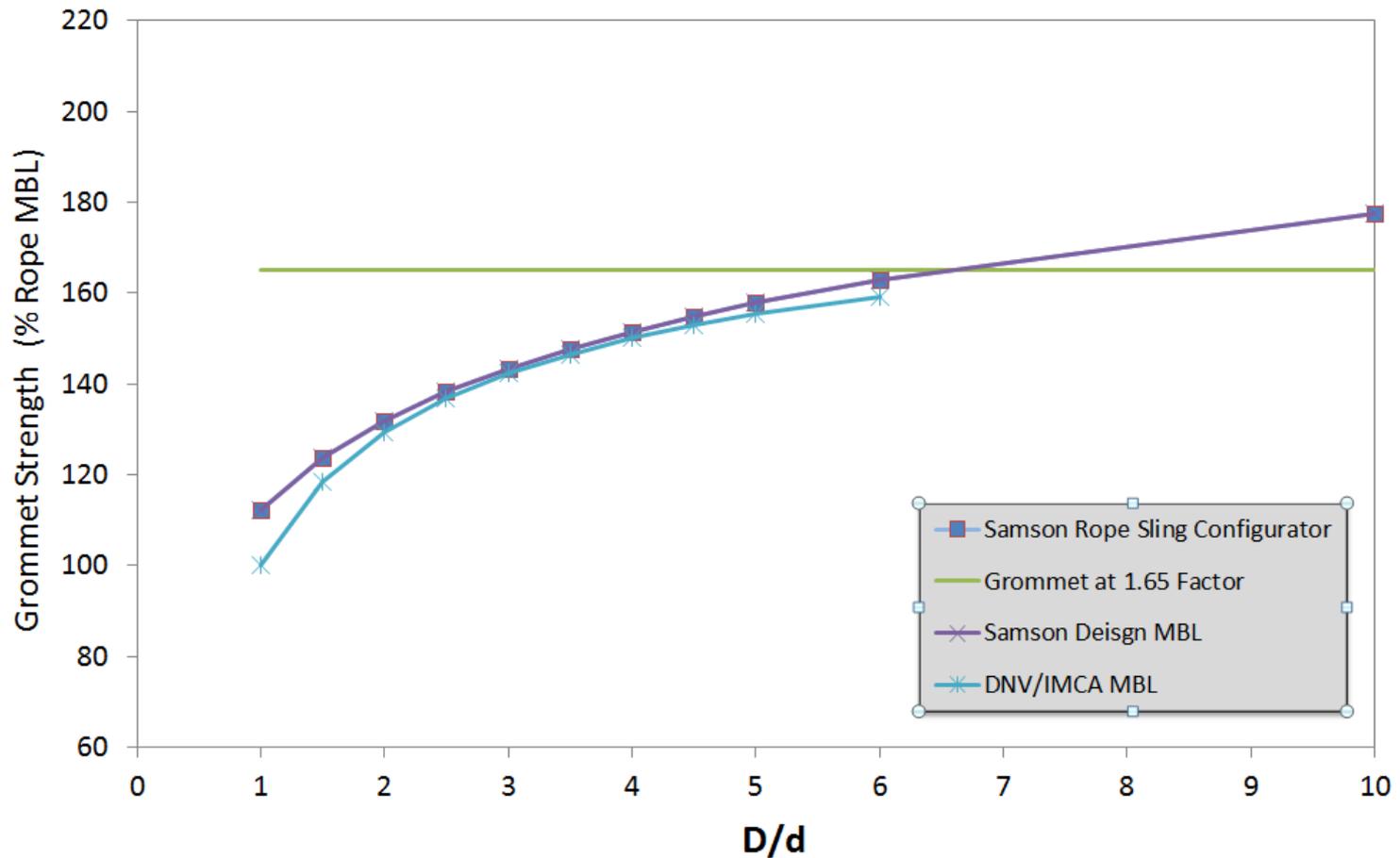


- **When in doubt, use a wide body!**
- **Upsizing from a regular shackle to a wide body may increase hardware costs, however the larger hardware could reduce sling cost by up to 40%**
- **If placing sling on the shackle pin is required, a bobbin/insert should be placed over the pin to improve the D/d ratio**
- **Also be mindful of width on trunnions and lifting lugs, as the latest heavy lift innovations are flatter and wider than single rope slings**

What does Samson Data Say About Grommets



Rope Sling Bend Loss Comparison



Safety Factor



- **How low can you go?**

- **DNV guidance for safety factors:**
 - **Lower material factor for HMPE (1.65 vs. 2) usually requires some sort of 3rd party certification for fibers and construction**
 - **Adding a jacket or some ability to inspect can reduce wear factor from 1.1 to 1.0**

Why is This So Important



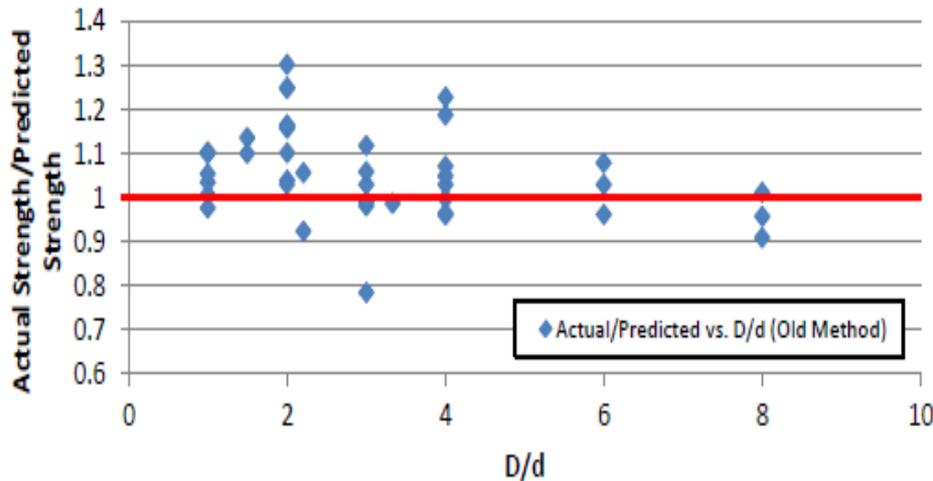
- In almost all cases, especially one-off engineered lifts, you may never notice the difference between 2.1, 3.72 and 5 for your factor of safety.
- This is because as long as sling passes your proof load (which is usually 2x WLL but in some cases as low as 1.3x the WLL) and you do not load the sling over it's working load limit in operation, it will not fail.
- However, we operate in a world that requires assurance and risk engineering
- Rather than applying a large FoS and assuming it will all work out in the end, Samson believes in creating data driven sling strength models that provide the necessary assurance to correctly operate at a factor of safety to provide an economically optimal solution that will also satisfy customer risk tolerance requirements.

Samson Grommet Testing Results

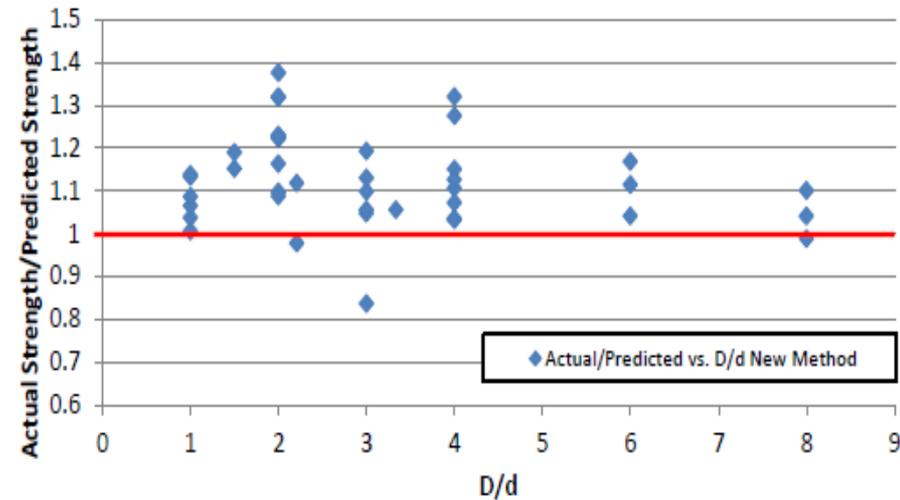


- After initial model, further Samson data indicated that approximately 28% of grommets would break below their predicted strength when de-rating ISO strength (as opposed to rope MBL) for bend loss

Actual/Predicted vs. D/d (Old Method)



Actual/Predicted vs. D/d (New Method)



Repurposing and Re-use



- **Characteristics of engineered lifts**
 - **Limited use (sometimes only once!)**
 - **Custom sizes**
 - **Expensive**
 - **HMPE slings likely stronger after first use than when brand new**

- **Re-use requires a robust, data driven inspection and retirement criteria**

- **Repurposing requires a unique product, adjustable for both length and strength**

Retirement Considerations



Abrasion damage can be a leading wear mechanism for high performance synthetic ropes

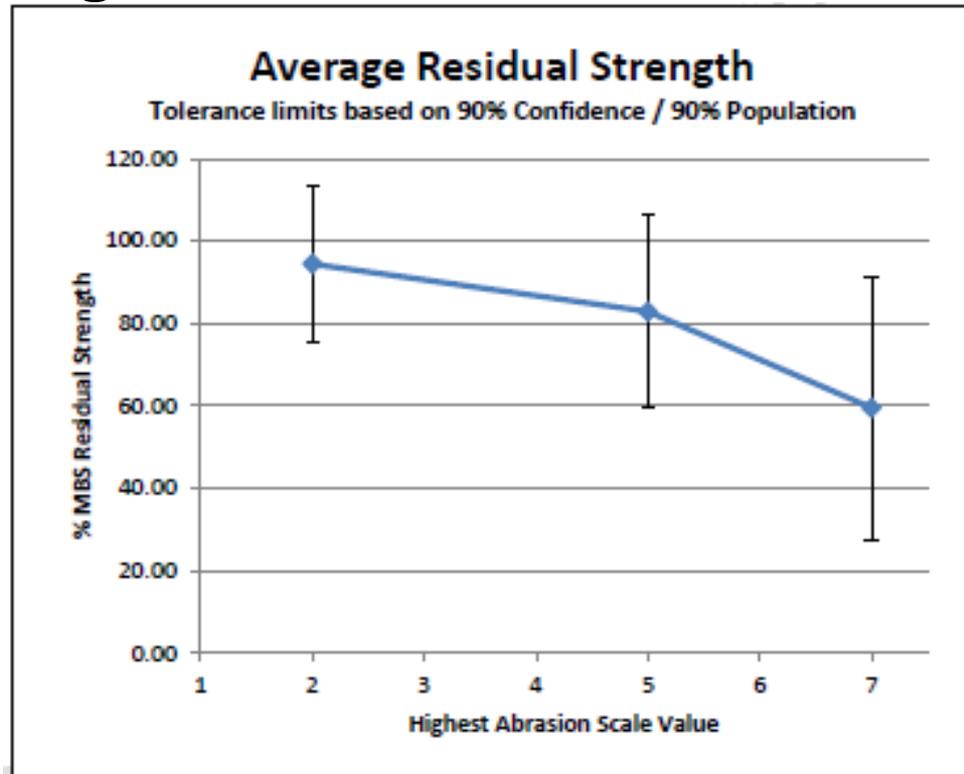
With this in mind, Samson developed a data driven visual retirement guide



Retirement Criteria Model



51 individual breaks used to validate comparator ratings
7 “bins” created for both external and internal visual abrasion readings



Summary



- **It is possible to reduce your rigging costs with your lift design in the following ways**
 - Engage rope/sling manufacturer early in the process
 - Maximize D:d and width of hardware
 - Optimize factor of safety by choosing products where risk and uncertainty are engineered out of the system
 - Think beyond the next lift (repurposing)
- **High performance heavy lift slings are an investment that pays it's return in crew safety, enhanced operational capability, and reduced project timelines. Maximize your returns by investing wisely!**



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Thank you!