



Lead Screw Nut Material Comparison

Nut materials can be compared based on 3 important measures:

1. Wear Factor
2. Coefficient of Friction
3. Tensile Strength



Wear Factor

Wear Factor ($\text{in}^3 \cdot \text{min}/\text{lb}/\text{hr} \cdot 10^{-10}$) is the measure of the relative wear (in^3) of a material at a specific force (lb), speed (ft/min), and length of time (hr).

- *A smaller number represents better wear resistance*

Coefficient of Friction

Coefficient of Friction is the dimensionless ratio of the force required to keep something moving versus the force pressing it against a surface (the measure of the drag a material exhibits when sliding against another material).

- *A smaller number means less drag*

Wear Factor and Coefficient of Friction

Each material will vary based on:

Force Applied

- *Typically reported as Surface Pressure in terms of pounds per square inch of surface area*

Speed at which it is moving

- *Typically reported as Surface Velocity in terms of feet per minute*

Can be measured using a standard test (ASTM D3702 – 94) and are reported at specific combinations of:

- Pressure (P)
- Velocity (V)

Known as PV (where $PV = P \cdot V$)

Tensile Strength

Tensile Strength (lbs·in²) is the measure of the force (lbs) required to damage a sample of material of a specific size (in²).

- *A larger number represents stronger material*

It is measured using a different test (ASTM D638 – 10) and is reported in terms of pounds per square inch (psi) of sample cross-sectional area



Comparison Charts

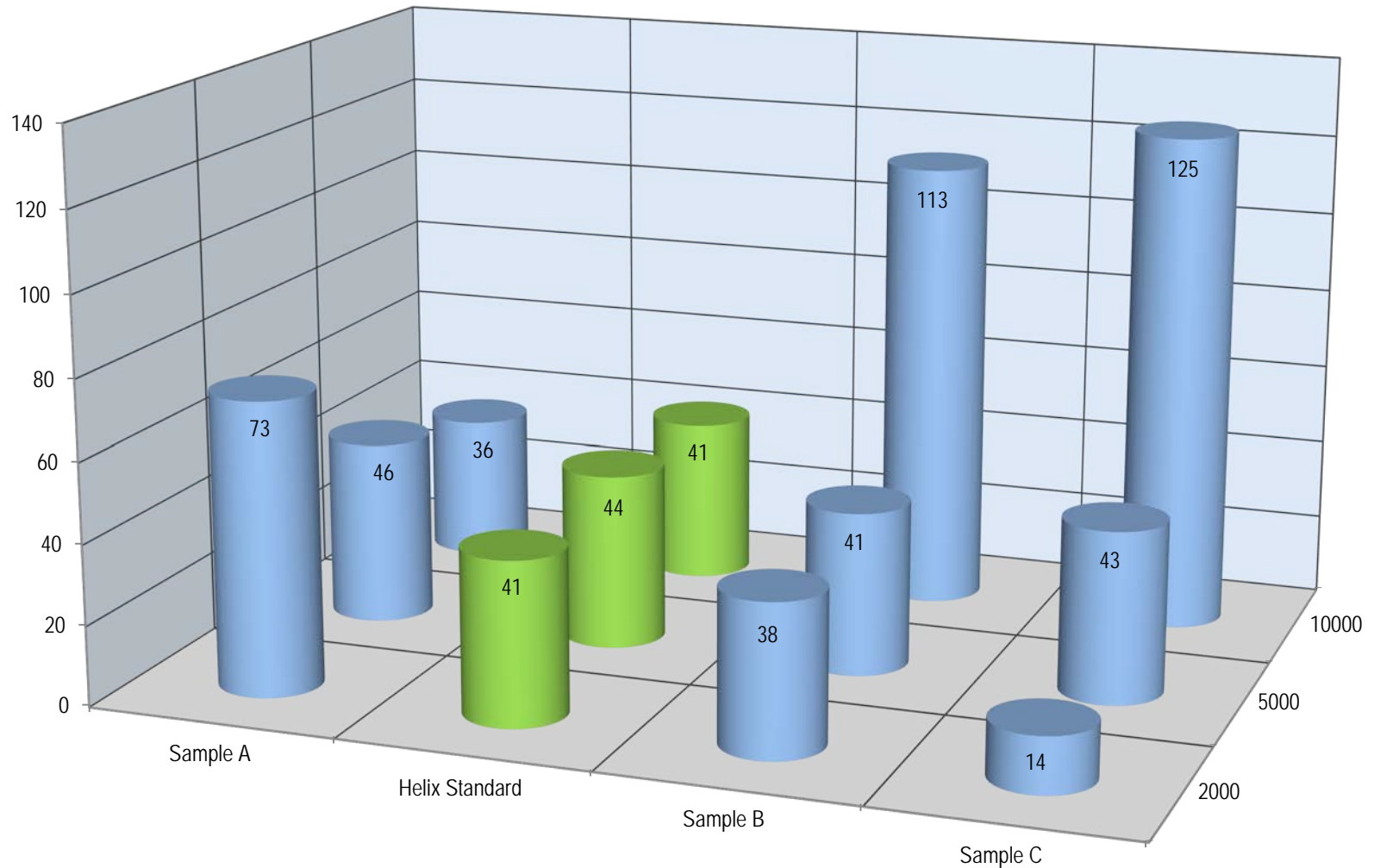
The following charts show how Helix's proprietary nut material compare to other Teflon® loaded Acetal materials commonly used for lead-screw nuts.

NOTE: Other materials tend to break down at one extreme or the other:

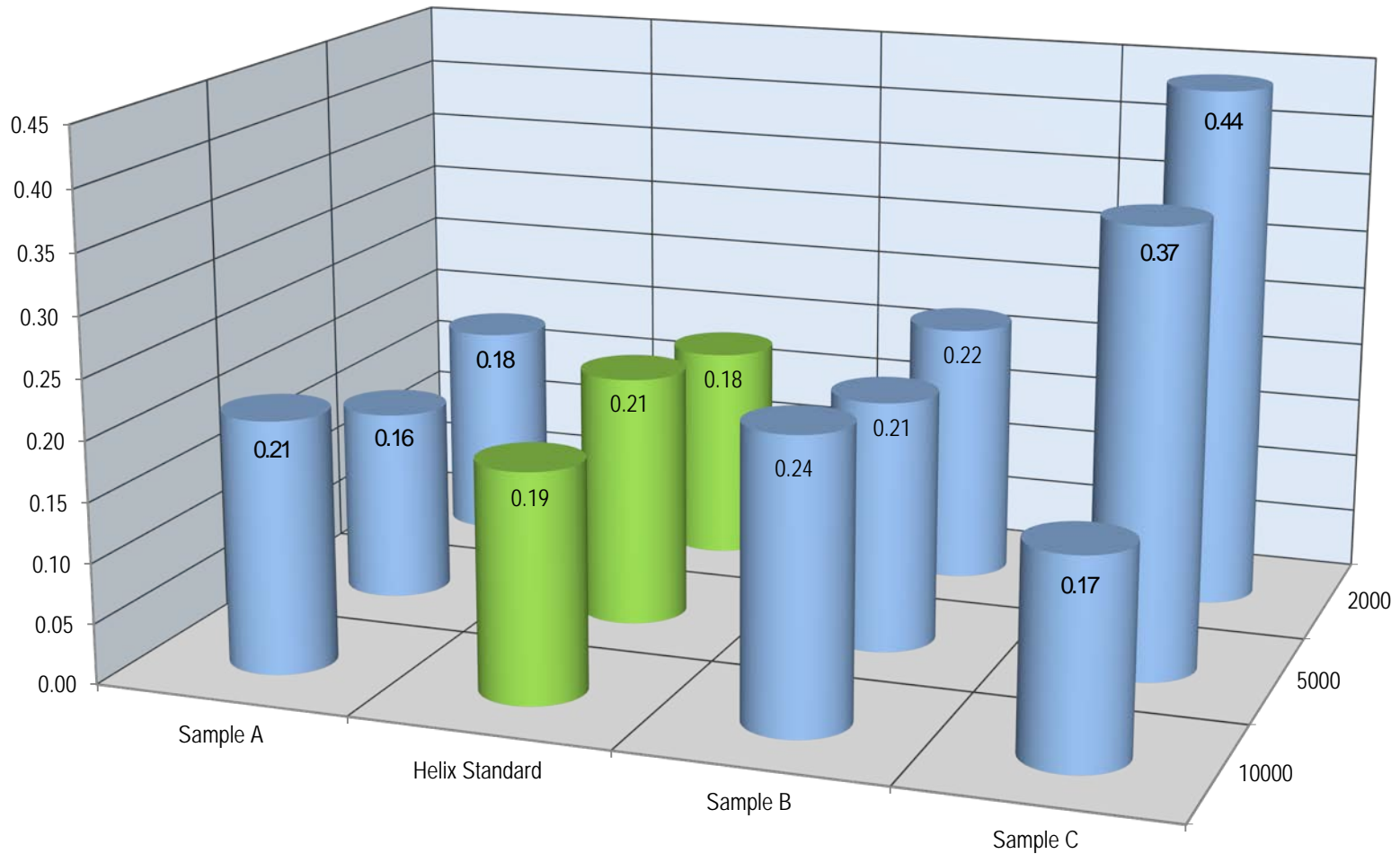
- High speed, high load
- Low speed, low load



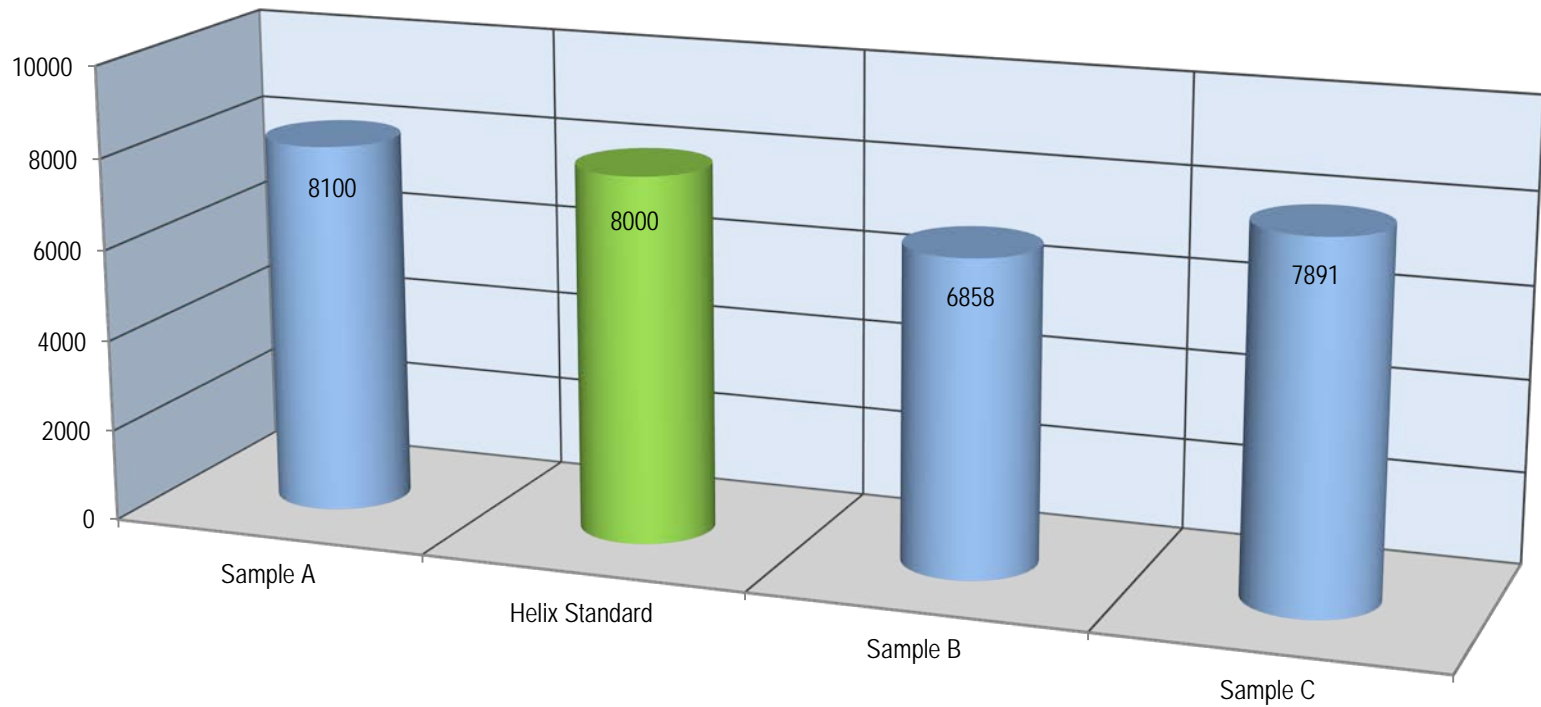
Wear Factor



Coefficient of Friction



Tensile Strength



Three reasons why Helix's Proprietary Nut Material beats the competition

1. Gives the best combination of Wear Factor and Coefficient of Friction available over a wide range of PV values
 - *Especially true at high loads ($P > 100\text{psi}$)*
2. Maintains its integrity over the full range of load (P) and speed (V)
3. One of the highest tensile strengths available
 - *Teflon[®] (or PTFE) loaded Acetal (or POM)*

Consult HELIX to Determine the Right Nut Material for your Application

To learn more about HELIX lead screw product options and capabilities, download a copy of our newest catalog.



We hope you found this presentation helpful.

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