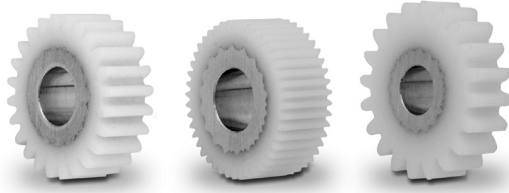
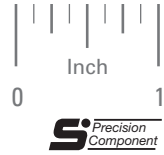


Cast Nylon (Polyamide-12) used on Power-Core™ gears, reduces the dimensional and physical property variations found on other nonmetallic materials. Its low moisture absorption characteristics limits its swelling or expansion to less than 0.3%. Cast Nylon 12 is generally used for precision engineered components, needing properties such as dimensional stability, high temperature and toughness. Gravity casting process is developed especially to provide Nylon 12's crystallization structure.



**Selecting Nonmetallic Gear Materials**

Benefits	Power-Core™	Metal	Delrin®	Nylon 6	Phenolic Fiber
Noise Reduction	>6dB	0	>3dB	>3dB	>3dB
Shock Absorption	○		○	○	Some
Vibration Damping	○		○	○	Some
Corrosion Resistance	○		○	○	Some
Nonhygroscopic, No Swelling	○	○	○		
Light Weight	○		○	○	○
Wear Resistance	○		○	○	Some
Self-Lubricating	○		○	○	Lubr. Recomm.
Free of Internal Stresses	○	○			
Homogeneous Crystalline Structure	○	○			
Metal Core – Part of Gear Blank	○	N/A			
Keyway in Metal if Needed	○	○			
Large Size Gear Blanks	○	○			
High AGMA Class Achievable	○	○			
Physical Properties and Dimensions Stable in Varying Conditions	○	○			

**NOTES:** 1. The data has been determined empirically. For details on other materials, please contact the manufacturer.

2. Delrin® is a registered trademark of DuPont.

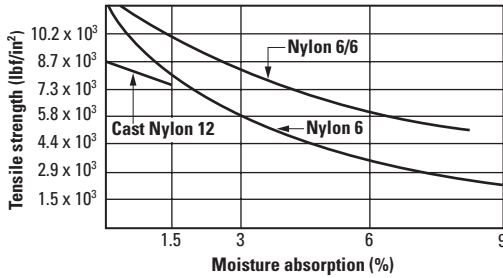
Stock gears using INTECH Power-Core™ material are shown on pages 1-101, 1-124, 1-144 and 1-146.

Power-Core™ gears are made by integrally casting a Polyamide 12 Nylon outer ring with a metal knurled hub. After cooling, the gear blank is virtually stress-free and can be precision machined to provide gear teeth.

The metal hub used on this gear reduces thermal expansion. Gear calculation for Power-Core™ gears does not require backlash compensation because of swelling, due to very small moisture absorption.

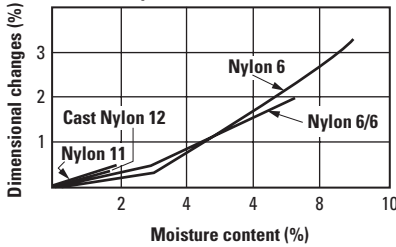


**Moisture absorption versus tensile strength**



With moisture absorption, tensile strength of Nylon 6 can drop to below 20%, while for cast Nylon 12 it remains stable within 90% of its original value.

**Dimensional Change Polyamides versus moisture**



**Physical Properties Table**

Physical Characteristics	
Density	0.037 lb./in. <sup>3</sup>
Coefficient of Friction	0.304 (Static)
Melting Point	358°F
Hardness	108 Rockwell R
Water Absorption	0.047%

Mechanical Characteristics	
Compressive Stress at 0.1% compr.	6,500 PSI
Extension Stress	8,500 PSI
Tensile Strength (ultimate)	8,400 PSI
Elasticity Modulus	2.95 x 10 <sup>5</sup> PSI
Flexural Modulus	3.04 x 10 <sup>5</sup> PSI
Elongation	16%

**NOTE:** It is important to understand that testing procedures permit manufacturers to measure tensile strength directly after extrusion, or in a dry state and before submersion. Therefore, the values used in the "Physical Properties Table" are only theoretical and may be misleading for two reasons:

- After production, most Nylons are submerged in water to relieve internal tension.
- Operating environments may present still different and varying degrees for moisture.

This information is for reference only; to supply actual durability information, we will be glad to perform a durability calculation for your specific application.

**Knurled Metal Core Advantages Over Hexagonal and Notched Metal Core**

The knurled core provides better torque transmission and even heat dissipation from the shaft through the metal to the gear teeth. The knurled core has replaced the hexagonal and notched metal cores in manufacturing procedures. The knurled core also allows a more uniform wall thickness in relation to both bore and root diameter, especially in borderline cases.

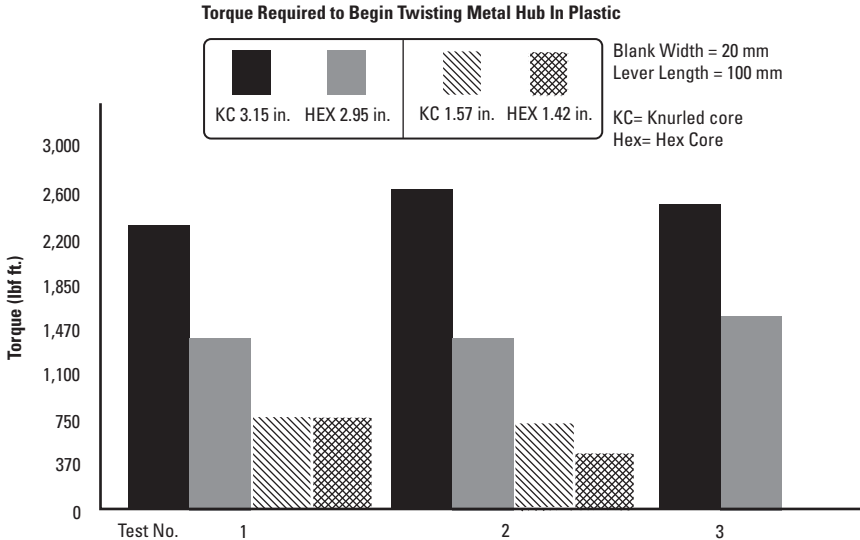
As shown in Figure 1 and 2, tests performed on comparable core sizes determined that the knurled core can withstand up to 80% higher torque than the hexagonal core. Breakaway torque is defined as the maximum torque value at which the metal core begins to twist out of the plastic.



**Figure 1**

Determination of Breakaway Torque						
Test No:	Axial Force (lbf)			Breakaway Torque (lbf ft.)		
	1	2	3	1	2	3
<b>Knurled Core 3.15 in.</b>	7014	8003	7464	2301	2626	2449
<b>Hexagonal Core 2.95 in.</b>	4361	4316	4856	1431	1416	1593
<b>Knurled Core 1.57 in.</b>	2248	2158	—	737.5	708	—
<b>Hexagonal Core 1.42 in.</b>	2248	1349	—	737.5	443	—

**Figure 2**



- I
- R
- T
- 1**
- 2
- 3
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- 15
- 16