Cold-Drawn versus Hot-Rolled Steel and Carbon Content

Lancaster Threaded Products, Inc. produces all of its rod products from cold-drawn steel, which provides more consistent, accurately-formed threads and superior yield and tensile strength ratings compared to hot-rolled steel. Combining this finish with the consistency of C1008-1018 carbon steel which LTP uses for all rod products, and LTP produces a superior product to many of its competitors.

Below is a table of some key sizes of rod products, which show the dramatic differences between cold-drawn and hot-rolled steel. ***This table is for estimating and comparison purposes only (LTP can provide a specification sheet on request). These numbers are averages only, based on LTP's materials and the amount of cold-drawing size reduction in the process!***

Threaded Rod Size	***C1018 Cold-Drawn Tensile (lbs.) from LTP***	**1018 Hot-Rolled Tensile Prior to Forming**	**C1008 Cold-Drawn Tensile (lbs.)**	**1008 Hot-Rolled Tensile Prior to Forming**
3/8-16	***83,570***	73,380	68,580	58,390
1/2-13	***91,860***	70,360	76,870	55,370
5/8-11	***85,740***	73,350	67,340	54,950
3/4-10	***77,070***	69,810	65,560	58,300
2-4 1/2*	***70,000-72,000***	62,000	62,000-65,000	55,000

* averages per Columbia Steel per standard practice (Martin Koppelman 3/20/02)

Thread Rolling versus Thread Cutting

Lancaster Threaded Products forms the majority of its threaded rod and bar products using the thread rolling process. Cold forming is the best description of this process. LTP feeds a cylindrical steel blank, of diameter between the minor and major diameter of the finished thread size, into hardened steel dies bearing the reverse thread form to the finished parts. LTP "matches" the dies to produce the correct thread form. The rotating die threads penetrate the blank surface, forming the thread roots and displacing material radially outward to form the thread crests. There is no material removal or waste.

This technology produces as significantly stronger thread than possible when the material is cut away in conventional cut-thread die methods. More specifically, the thread rolling (cold forming) process strengthens the thread in three ways: tension, shear, and fatigue resistance.

1. Static tensile tests have reported increases in the ultimate strength of the parts of approximately 30 percent.
2. Unlike thread cutting which severs the grain structure in the steel, thread rolling reforms the grain structure in a continuous line along the thread form. Rolled threads then have increased resistance to stripping under heavy stresses as the material "closed-up" from work hardening along the root, flanks and crest. Rolled threads compel failures to take place across the grain flow, rather than with the grain flow in weaker cut threads.
3. Thread rolling improves fatigue resistance:
   - The process results in "burnished" roots and flanks with consistent surface finish. Surface imperfections from thread cutting can become the starting points for fatigue failure.
   - Surface layers of the rolled thread, particularly those in the roots, are under compression stress. Tightening and other forces must overcome compression stresses before tensile stresses that cause failure can build up. Thread rolling improves a thread's capacity to resist these fatigue stresses.

In summary, rolled threads have many advantages to offer versus cut threads:

1. economical to produce at high rates
2. strength
3. accuracy of threads
4. lower material cost and extended die life