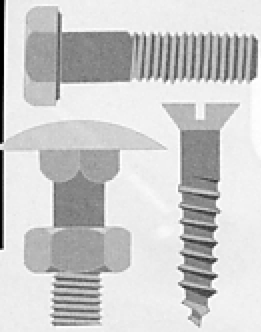


Coarse Threads are Generally Better for Assembly

by Joe Greenslade

"Is a coarse thread better than a fine thread or vice versa?" This is a recurring question heard in the fastener industry, and it is this author's general opinion that coarse threads have many assembly benefits over fine threads.

Five reasons for selecting coarse threads:

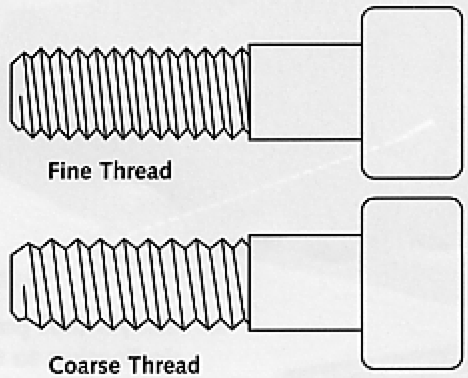
1. Parts with coarse threads assemble faster than parts with fine threads. A 3/8-16 part installs in 67% of the time it takes to install a 3/8-24 part. It takes 24 revolutions to advance a part having 24 threads per inch (TPI) one inch while it takes only 16 revolutions to advance a part one inch if it has 16 threads per inch.

2. Coarse threads have a greater resistance to stripping out than fine threads when the length of thread engagement is short. Coarse threads have a greater height than corresponding fine threads; therefore the coarse threads have a greater volume of material between each thread to resist stripping. The thread height of a 10-24 screw is 33% greater than a 10-32 screw. For this particular reason I believe all thread-cutting screws and thread-rolling screws should always have coarse threads.

3. Coarse threads are less affected by thread nicking. Since fine threads are shallower than coarse threads, fine threads are proportionally more distorted by a nick of a given size. The thread height on a 1/2-13 bolt is 53% greater than that on a 1/2-20 bolt. Thread gaging problems and thread interference during assembly due to thread nicking is a frequent problem on fine thread bolt diameters of 3/8 inch or M10 and larger.

4. Coarse threads are less affected by plating build-up. The plating allowance for fine threads is less than for coarse threads. The plating allowance for a 3/4-10 2A thread is 20% greater than that for a 3/4-16 2A thread. A given plating thickness consumes a greater percentage of the plating allowance on fine threads than it does on the corresponding coarse threads. Fine threads have more gaging and assembly problems than do coarse threads due to plating build-up.

5. In stainless steel threaded assemblies, coarse threads are much less likely to gall than are fine threads. Surface friction between mating stainless steel threads causes thread galling. The closer the fit between mating threads and the more rotations the threads have to experience, the greater the chances become for thread galling. The minimum clearance between the pitch diameters of a 3/8-16 2A external thread and a 3/8-16 2B internal thread is 18% greater than that between a 3/8-24 2A external thread and a 3/8-24 2B internal thread. Since fine threaded components have less pitch diameter clearance and they must rotate more times than coarse threaded components to make a fastening, the finely threaded products are more likely to experience galling.



ONE REASON FOR CONSIDERING FINE THREADS

The one point that usually motivates users to select fine-thread parts over coarse-thread parts is that parts with a fine-thread have a slightly larger tensile stress area and, therefore should have a higher tensile strength than do corresponding coarse-thread parts. This is a valid point only when both parts have the same hardness.

When the hardness range of a given performance grade of fastener is considered, half of all coarse-thread parts may have tensile strengths equal to or greater than fine-thread parts within the same performance grade. An example is shown on page 33.

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Mr. Greenslade holds twelve U.S. patents on various fastener related products. He has authored over 136 trade journal articles on fastener applications, manufacturing and quality issues. He is one of the fastener industry's most frequent speakers at trade association meetings and conferences. He is the youngest person ever inducted to the Fastener Industry Hall of Fame.

Mr. Greenslade is active in numerous fastener industry associations and societies holding office in several of them.

In addition to guiding the activities of Greenslade & Company, Mr. Greenslade works as a consultant with fastener suppliers and end users on product design, applications engineering, and quality issues. In this capacity he works to resolve fastener applications problems, to help select the best fastening approaches in new product designs, to assist in the standardization of fasteners used within an organization, and to provide training on various aspects of fastening technology and fastener quality assurance. He also serves as Expert Witness in litigation involving fastener related issues.

Grade 5 Hardness Range	PSI	Ultimate Tensile Strength (lbs.)	
		1/2-13	1/2-20
RC 25	120,000	17,028	19,188
RC 26	123,555	17,532	19,756
RC 27	127,110	18,037	20,325
RC 28	130,665	18,541	20,893
RC 29	134,220	19,046	21,462
RC 30	137,775	19,550	22,030
RC 31	141,330	20,055	22,599
RC 32	144,885	20,559	23,167
RC 33	148,440	21,064	23,736
RC 34	152,000	21,569	24,305
Tensile Stress Area (sq. in.)		0.1419	0.1599

The hardness range for SAE J429 Grade 5 is Rockwell C 25 to 34. This chart shows that a 1/2-13 bolt having a hardness of RC 30 to 34 will have an ultimate tensile strength greater than a 1/2-20 bolt having a hardness of RC 24 to 29. When this substantial overlap in strengths is recognized, the reason for selecting fine-thread parts over coarse-thread parts is not very compelling.

COARSE THREADS SHOULD GENERALLY BE SELECTED

For general industrial applications it appears there are five good reasons why coarse threads should be selected and one very marginal reason why fine threads might be selected. This analysis of benefits of coarse versus fine threads is the result of this author's thirty years of experience in both applications engineering and quality assurance. It is the author's opinion that coarse threads should always be selected for industrial applications unless there is a very compelling reason or application not covered by this article. ■