

When Is a Bolt Suitable for Reuse?

By Joe Greenslade

Frequently, when doing maintenance on an assembly the question arises as to whether the original bolts are suitable to be used again or not. The answer to this question is:

"When a bolt has not been stressed past its yield point it can be reused."

This answer brings to mind two more logical questions:

Question: What does it mean that a "bolt has been stressed past its yield point"?

Answer: A bolt's yield point has been exceeded when the bolt does not return to its original length when the assembly load is removed from it. A bolt is similar to a heavy duty tension coil spring. As long as it is not pulled or loaded beyond the yield point of the material it will return to its original length when the assembly load is removed from it. A bolt, like a spring, will take a permanent set if it is yielded and will be longer after the application load is removed than before it was loaded.

Question: How can one easily determine if a bolt has yielded?

Answer: Simply screw a nut on the previously used bolt's thread to the head on a fully threaded bolt or to the thread runout on a bolt with a full diameter body. If a nut will not screw on the entire bolt thread length, the bolt has yielded and it is not safe to be reused. A new bolt should be used when the application is reassembled.

A standard bolt thread's minor diameter is its smallest cross-sectional area. This is the point at which the bolt will first elongate and take a permanent set when loaded beyond its yield point. When a bolt stretches in its minor diameter and takes a permanent set, the distance between the threads (the thread's lead) becomes longer than it was originally and a nut will bind on the bolt thread before it can be screwed on the entire length of the bolt thread. This simple test indicates a bolt has permanently elongated as a result of its yield point having been exceeded. A bolt not passing this simple test should not be reused. □



Figure 1. Bolt and nut in a typical steel assembly.

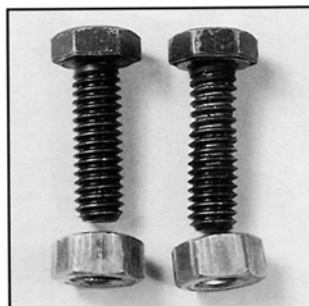


Figure 2. Used bolts and nuts removed from assembly.

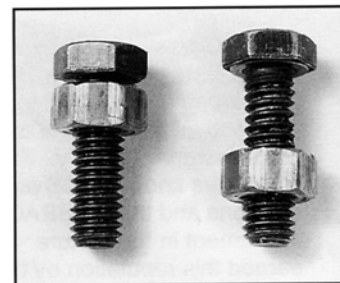


Figure 3. The bolt on the left has not been yielded, but the one on the right has, as indicated by the binding nut.



Joe Greenslade is President of Greenslade and Company, Inc. located in Rockford, Illinois. His firm specializes in providing manufacturing tooling and inspection equipment to suppliers of screws, bolts, rivets, and nuts throughout the world.

Joe is an inventor, author, and lecturer. He holds eleven U.S. Patents, has written over 80 technical articles for industrial trade journals, and has spoken frequently at trade association meetings and technical conferences on issues related to industrial quality for

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He is an Associate Member of the Industrial Fastener Institute and a member of the American Society of Mechanical Engineers B1 Thread Specification Committee. In 1992, Joe was recognized for his technical and innovative contributions to the fastener industry when, at age 44, he became the youngest person to be inducted into the National Industrial Fastener Show "Hall of Fame."