

(a) Before assembly.
(b) Assembled.
(c) After withdrawal.

Figure 3.—Deformed-thread locknut.

Deformed thread.—The deformed-thread locknut (fig. 3) is a common locknut, particularly in the aerospace industry. Its advantages are as follows:

- (1) The nut can be formed in one operation.
- (2) The temperature range is limited only by the parent metal, its plating, or both.
- (3) The nut can be reused approximately 10 times before it has to be discarded for loss of locking capability.

Nylok pellet.—The Nylok⁸ pellet (of nylon) is usually installed in the nut threads as shown in figure 4. A pellet or patch projects from the threads. When mating threads engage, compression creates a counterforce that results in locking contact. The main drawback of this pellet is that its maximum operating temperature is approximately 250 °F. The nylon pellet will also be damaged quickly by reassembly.

Locking collar and seal.—A fiber or nylon washer is mounted in the top of the nut as shown in figure 5. The collar has an interference fit such that it binds on the bolt threads. It also provides some sealing action from gas and moisture leakage. Once again the limiting feature of this nut is the approximate 250 °F temperature limit of the locking collar.

A cost-saving method sometimes used instead of a collar or nylon pellet is to bond a nylon patch on the threads of either the nut or the bolt to get some locking action. This method is also used on short thread lengths, where a drilled hole for a locking pellet could cause severe stress concentration.

Castellated nut.—The castellated nut normally has six slots as shown in figure 6(a). The bolt has a single hole through its threaded end. The nut is torqued to its desired torque value. It is then rotated forward or backward (depending on the user's

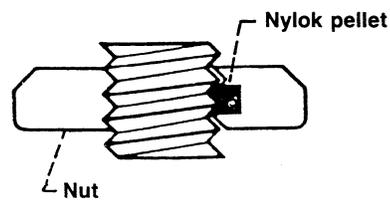


Figure 4.—Nylok pellet locknut.

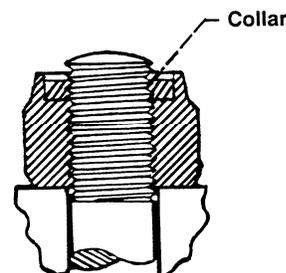
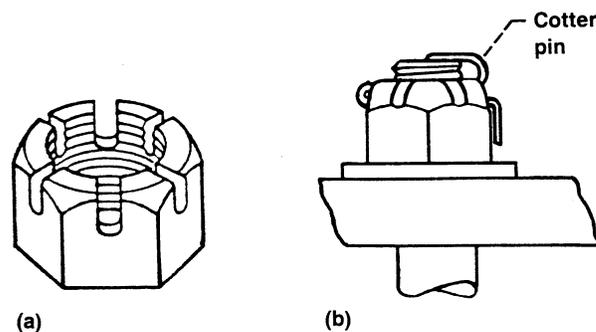


Figure 5.—Locking collar.



(a) Slots.

(b) Cotter pin locking.

Figure 6.—Castellated nut.

preference) to the nearest slot that aligns with the drilled hole in the bolt. A cotter pin is then installed to lock the nut in place as shown in figure 6(b). This nut works extremely well for low-torque applications such as holding a wheel bearing in place.

Jam nuts.—These nuts are normally “jammed” together as shown in figure 7, although the “experts” cannot agree on which nut should be on the bottom. However, this type of assembly is too unpredictable to be reliable. If the inner nut is torqued tighter than the outer nut, the inner nut will yield before the outer nut can pick up its full load. On the other hand, if the outer nut is tightened more than the inner nut, the inner nut unloads. Then the outer nut will yield before the inner nut can pick up its full load. It would be rare to get the correct amount of torque on each nut. A locknut is a much more practical choice than a regular nut and a jam nut. However, a jam nut can be used on a turnbuckle, where it does not carry any of the tension load.

⁸Nylok Fastener Corporation, Rochester, Michigan.

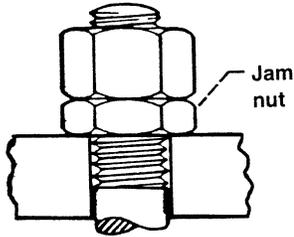


Figure 7.—Jam nut.

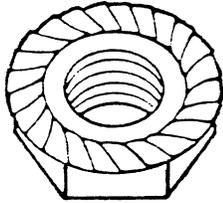
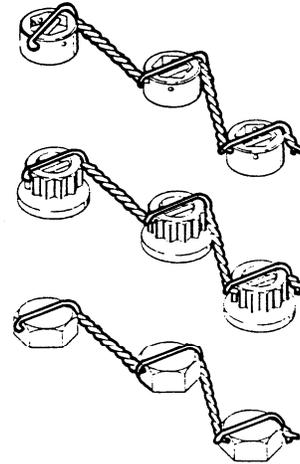


Figure 8.—Durlock nut.

Serrated-face nut (or bolthead).—The serrated face of this nut (shown in fig. 8) digs into the bearing surface during final tightening. This means that it cannot be used with a washer or on surfaces where scratches or corrosion could be a problem.

According to sps Technologies, their serrated-face bolts (Durlock 180) require 110 percent of tightening torque to loosen them. Their tests on these bolts have shown them to have excellent vibration resistance.

Lockwiring.—Although lockwiring is a laborious method of preventing bolt or nut rotation, it is still used in critical applications, particularly in the aerospace field. The nuts usually have drilled corners, and the bolts either have throughholes in the head or drilled corners to thread the lockwire through. A typical bolthead lockwiring assembly is shown in figure 9(a), and a typical nut lockwiring assembly is shown in figure 9(b).



(a)



(b)

- (a) Multiple fastener application (double-twist method, single hole).
 (b) Castellated nuts on undrilled studs (double-twist method).

Figure 9.—Lockwiring.

Direct interfering thread.—A direct interfering thread has an oversized root diameter that gives a slight interference fit between the mating threads. It is commonly used on threaded studs for semipermanent installations, rather than on bolts and nuts, since the interference fit does damage the threads.

Tapered thread.—The tapered thread is a variation of the direct interfering thread, but the difference is that the minor diameter is tapered to interfere on the last three or four threads of a nut or bolt as shown in figure 10.

Nutplates.—A nutplate (fig. 11) is normally used as a blind nut. They can be fixed or floating. In addition, they can have

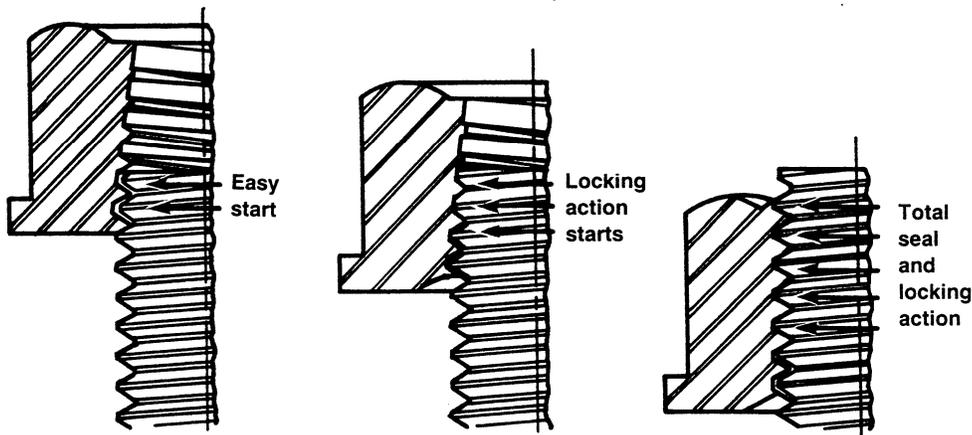


Figure 10.—Tapered thread.