

Locking is the answer

The locking feature was developed to maintain the joint at its tightened position to prevent loosening and attendant fatigue. A secondary function was to prevent complete disassembly of the joint, thereby allowing the operator some notice of the deteriorating attachments through shaking, noise, etc.

There are two basic types of locking features, based upon functioning. The first are features which maintain the joint at its tightened position. They are "free spinning" during the installation and, via the action of its feature, "lock" the joint at the point of installation. Typical of this type of locking element are the deflection slotted nuts, various coned washers, ridged bearing faces, numerous patented thread form modifications which interfere with the tightening by jamming thread flanks together, and dozens of special multi-piece assemblies which rotate, etc., to lock the elements into rigidity. While all of these features have a use somewhere or sometime they all fail to resist vibration loosening.



Mechanical locking nuts

This means they all become free spinning and can walk off easily once the preload has been lost. Preload, if properly designed, is capable of maintaining the joint integrity; however, its loss is also the loss of the locking fastener. No value is added when using this type of locking element beyond a few special cases where the service load is near the preload limit and repeatedly cycled.

The second type of locking features adds resistance to the free turning installation of the fasteners while also holding their final assembled position. Resistance Element Prevailing Torque (REPT) fasteners all possess an interference feature that retards free spinning of the fastener into its mating thread.

Deflected threads on bolts and crimped threads on nuts have been used since their official invention during the 1940's. The idea goes back into the misty past when nicks and other damage to threads offered resistance to assembly. The torque values were completely arbitrary and generally not reproducible. All metal types of locking features, usually the mainstay for modern industry's locking needs, are beginning to fade from use today. Modern technology and customer driven product improvements now require easier to drive, more trouble free and serviceable attaching methods.

Increased demand for corrosion resistance on parts has led to the use of thicker platings and coatings which cause jamming, galling and premature tool turnoffs as the installation torque is used in overcoming the interference of the coating rather than in tightening the attachment. Metal to metal contact causes galling and tearing of the metal when the deflected threads contact each other and spin on, especially with today's very fast tooling (hydraulic pulse tools spin at 3000+ RPM's).

Service is almost impossible when the metal to metal features have "welded" themselves together in long run down, high speed joints. Reusability, sensitivity to hole and other dimensional variations, as well as mass and length thickness considerations have all led to the decline in acceptability of this type of locking feature. The deflected thread, after one or two uses, begins to open up and reform its original thread shape, losing its interfering/locking ability. Some types of metal crimped nuts cause interference between the socket and the nut due to the out-of-roundness of the squeezed nut, a situation which causes lost assembly time as the drive socket stays stuck on the nut rather than on the drive gun.



Resistance element prevailing torque nuts