



THREAD LOCKING on Miniature Screws

November 2019

Thread-Locking fasteners have a common criteria which is to achieve a high break-loose torque (vibration resistant) after assembly by eliminating the spaces between the external and internal threads. Whether it is a simple additive to the thread region or a custom-designed solution, Unisteel's thread locking technology delivers reliability of product performance that customers can count on.

Benefits of using thread locking

- Cost saving due to no additional locking elements such as lock washers, adhesives
- Does not harm the surface of the assembled components
- Does not cause corrosion
- Sealing function, friction enhancement, thread protection
- Reliable locking against accidental release
- Resistant to oil and grease after it has cured

Chemical non-reactive – Uni-Patch®

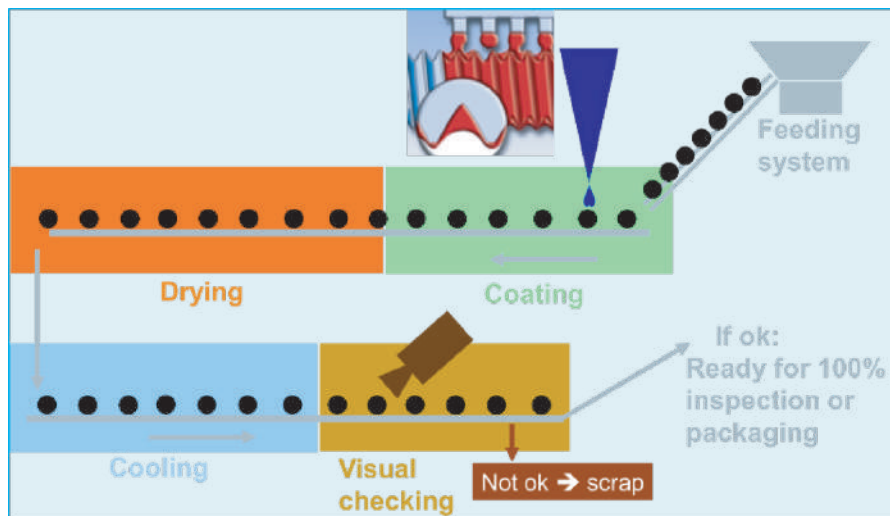


- Non-reactive coating
- Effective in metals and plastics
- Reusable coating (Up to 5 times)
- Spot or all-round coating
- Colour as distinguishing mark
- Effective immediately after assembly
- Dry application allows fast handling, no cure time after installation is required

Fastener with the patching on the threads require a higher installation and removal torque, because they rely on the thread jamming for their thread-locking properties. If frequent in-service disassemble is expected, a design with a slower drop off of its prevailing off torque capacity might be considered.

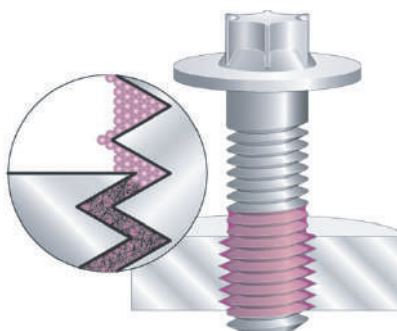
The biggest advantage of preapplying thread-lockers is that it can be certain that fastener is applied with the correct amount of adhesive and in the correct location to ensure a good lead-in and provide a gradual development of locking torque to pre-determined specifications.

Application Schema of the Non-reactive Coating



1. During the pre-applied process, fasteners are heated up to 425F
2. Heated screw are sprayed with a custom polymer powder which adheres to the threads.
3. The polymer fused screws will go through drying and cooling processes for curing.
4. The dried patched screws will then go through visual checking to separate out the NG parts and the good parts will proceed for packaging.

Chemical reactive - Micro Encapsulated Thread locker



- Room temperature curing adhesive
- High loosening resistance
- High shelf life
- 2-component liquid adhesive, epoxy resin coupled with a hardening agent
- Pre-applied locking adhesive for threaded parts

During installation, torque is necessary to rupture the capsules/the pressure between the mating thread flanks will burst the microcapsules. The adhesive and curing agent contained in the capsules are released, mixed and form an adhesive bond.

Following installation, fasteners are difficult to remove and advisable only for permanent one-time applications. Other than that, application errors and contamination of other assembly parts are all inherent risks with in-place application of chemical additive fasteners.

Testing Terminology

Unisteel's fastener laboratory provides technical testing (prevailing torque test and vibration test) on the thread locking fastener and recommend according to your requirements. Testing will reveal whether the thread locker is strong enough and helps to determine how many threads should be coated.



Prevailing Torque test

- Assemble a fastener relative to its mating component with the torque being measured while the fastener is in motion, and with zero axial load in assembly.
- The screw shall be advanced until its bearing surface is seated against the test washer
- The lowest prevailing-torque developed by the screws during the fifth removal should not be zero

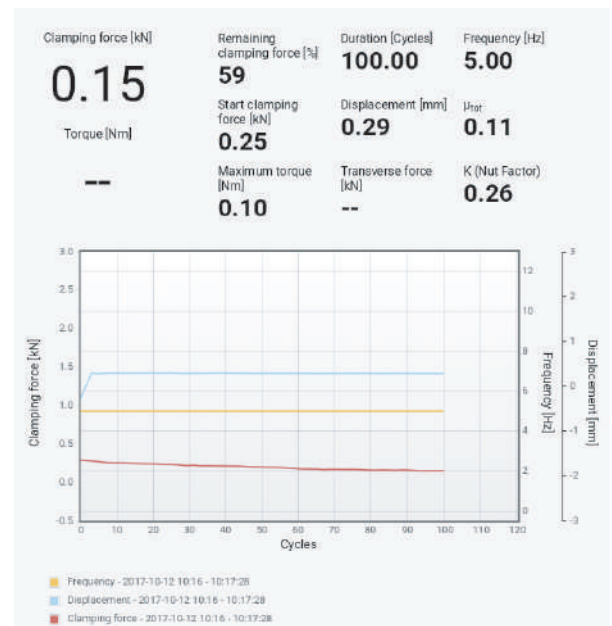
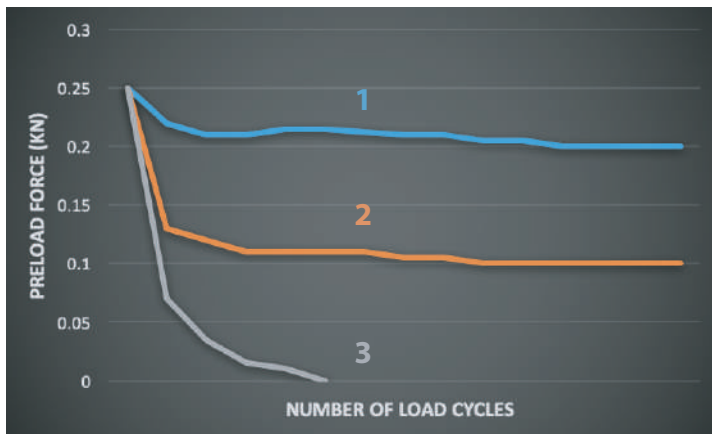
Break-loose Torque test

- Torque applied in a removal direction
- Start the fastener in motion from its



Vibration Resistant test

- Two plates clamped with a screw with or without thread locking are subjected to lateral cyclic loads (vibrations).
- Set the frequency to 5Hz and duration of 100seconds.
- Max Applied Force – (0.20 – 0.30kN)
- Under this condition, screws that are not using a locking element quickly become loose.



1. Adhesive patched screw – Show initial preload loss due to relaxation of the joint but then maintain a high preload.
2. Nylon patched – Lose some of the initial preload. However, a complete unwinding is prevented with the locking element.
3. Raw screw – Initial preload dropped quickly and a complete unwinding happened.

Installation

- Screws with pre-applied adhesive may be installed with manual or power tools.
- Additional installation torque is required to assemble the thread locking fastener and it should always be lower than the maximum torque of the power tool.
- Internal threads must be free of dust, debris, oil, grease.
- Internal threads must meet relevant thread tolerance specifications for best performance.

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