How a Recoil® Insert Works

Recoil® inserts are formed from high quality stainless steel wire with a diamond shaped cross section, wound to the shape of a spring thread. Once the wire is wound into a helical coil and installed into a tapped hole, it provides a permanent and wear resistant thread in the parent material that is generally stronger than the original thread. The inserts are designed to be greater in diameter than the tapped hole and compress as they are installed. This allows maximum surface contact area with the tapped thread, safely and permanently anchoring the inserts into place. The insert's compensatory action shares the load over the entire bolt and hole, increasing pull out and torque out strength. With a Recoil® insert in place, load and stress are more evenly distributed over the assembly.

Where to Use Recoil® Inserts

Original Equipment Manufacture

Recoil® offers innovative manufacturers the opportunity to design high quality product using lighter weight materials such as aluminum and magnesium alloys while still achieving high strength and reliability in the threaded fastener assembly. Recoil® brand inserts are widely used by manufacturers in:

- Automotive
- Consumer Electronics
- Ship Building
- Power Generation
- Manufacturing Equipment
- Industrial Electronics
- Aerospace – Avionics, Engines, Airframe
- Defense
- Transport

Repair

When you encounter a damaged thread Recoil® offers:

- Quickest and simplest method of repair to stripped or damaged threads
- A superior thread with great holding power
- Most cost-effective method of repair
- Returns thread to the original size
- Generally stronger than the original female thread

Insert Material

Recoil® inserts are generally manufactured from Type 304 stainless steel (18-8),however inserts are available in a range of materials for special applications:

- Stainless Steel Grade 304 (AS7245) Austenitic Corrosion Resistant Steel For normal applications up to 425°C (800°F)
- Stainless Steel Grade 316 (AISI316) Austenitic Corrosion Resistant Steel For Marine applications up to 425°C (800°F)
- Inconel X - 750 (AS7246) Nickel Alloy. For high temperature applications 425°C - 550°C (800°F - 1020°F) or where low permeability is required.
- Phosphor Bronze (DIN17677 or BS2783 PB 102) (300°C) For electrical bonding joints or low permeability
- Nimonic 90 (HR 503) for high temperature applications. (650°C/1200°F)
- Nitronic 60 (UNS S21800) Austenitic antigalling alloy

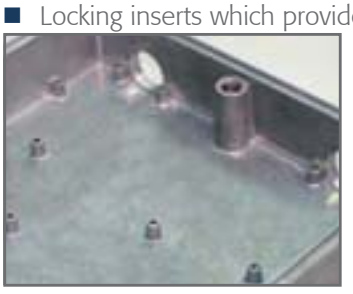
Special Purpose

- Materials such as Inconel 625 and Spring Steel Grade are also available to special order

Type

There are two basic types of Recoil® inserts available:

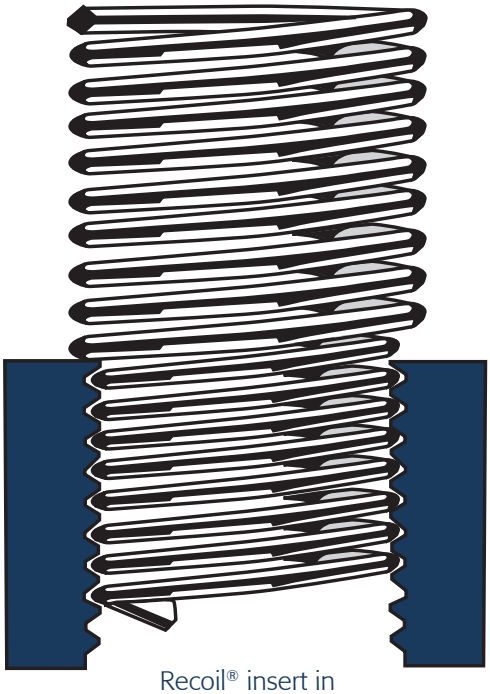
- Free running inserts which provide a standard female thread
- Locking inserts which provide a locking function for the female thread when the fasteners installed




How a Recoil® Insert Works

Insert installation and retention

Uninstalled, Recoil® inserts are greater in diameter than the tapped hole in the parent material into which they are to be installed. During the assembly operation the diameter of the leading coil is reduced thereby permitting entry of the insert into the tapped hole. When the insert is installed at the correct depth, the coils expand and permanently retains the insert in place. Unlike many 'solid' insert types, it is not necessary to use locking, swaging or keying operations to locate and retain Recoil® inserts. Stress concentration problems which typically occur in the parent material when using solid inserts are therefore eliminated. A Recoil® insert will dimensionally adjust both radially and axially, to any expansion or contraction within the parent material.



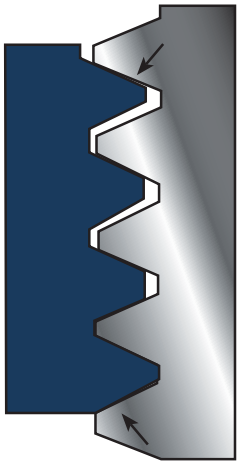
Recoil® insert in semi-installed position

Typical thread and angle errors may cause:

- Limited contact point
- Poor flank contact between bolt to parent thread
- Unequal distribution of bolt load over engaged threads
- Failure of threaded components when loaded

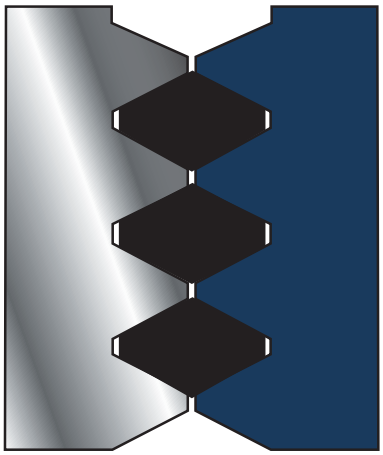
Recoil® inserts reduce thread pitch and angle errors to provide:

- Greater fastener strength
- Greater contact area
- Equally distributed load over all tapped threads
- Reduced stress concentration thereby extending fatigue life



Angle error

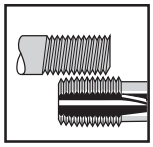
Pitch error



Recoil® compensation effect

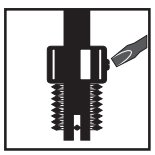
How to install Recoil® inserts.

1. DRILL: Drill to clear out the damaged thread with drill size as specified on kit (if necessary).



2. CHECK: Ensure tap thread matches bolt.

3. TAP: Place tap into tap wrench or use the square drive in the installation tool if provided. (Square drive tool only suitable for tapping non-ferrous alloys.)



3a. TAP HOLE: Tap hole to the required depth using correct procedures (if unsure contact your dealer).

4. SET TOOL: Place insert on installation tool, positioning the adjustable top so that the insert tang is centered in the tang slot.

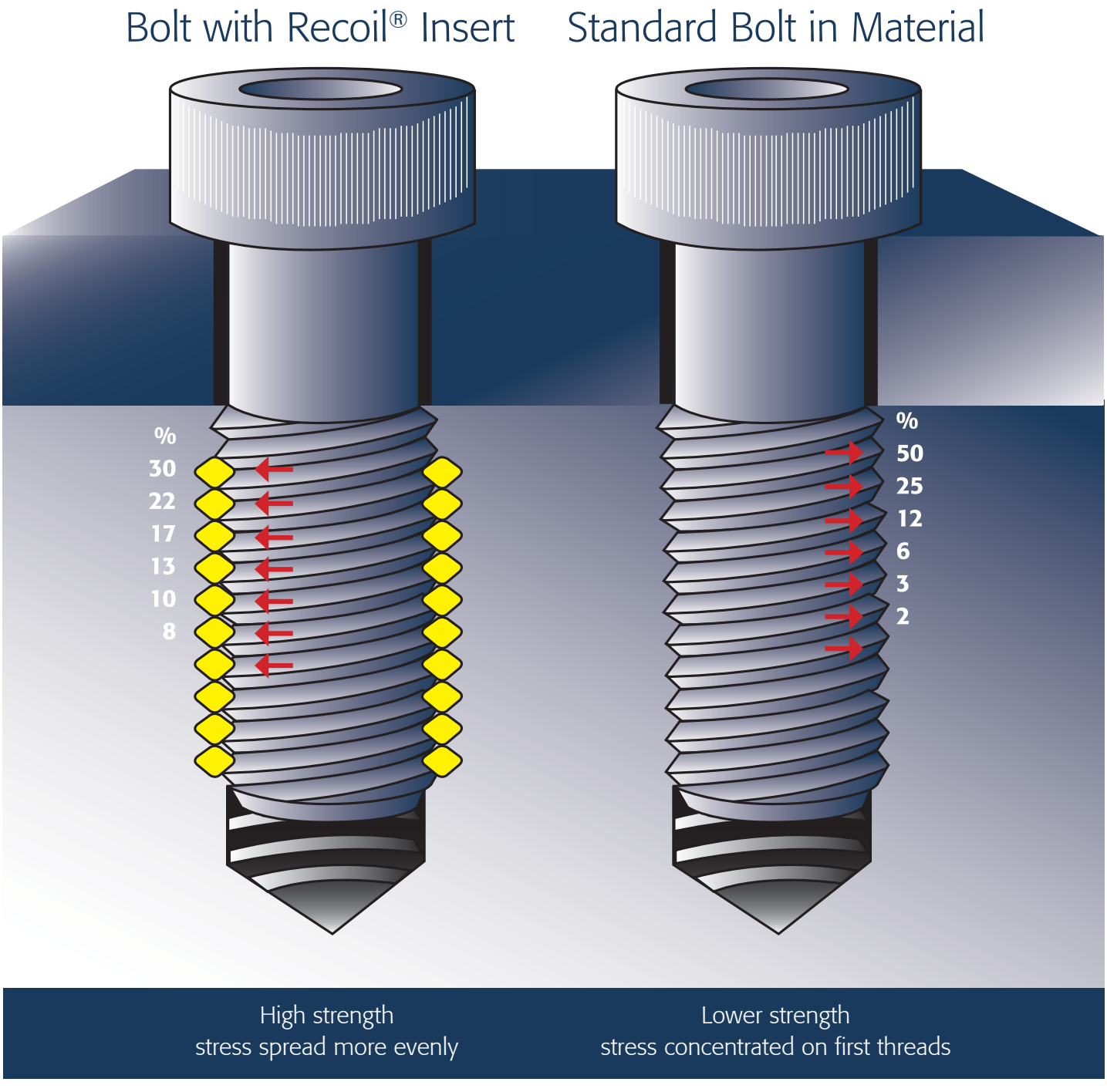
5. INSTALL: Wind insert in with light downward pressure until 1/4 to 1/2 turn below the surface.

6. TANG REMOVAL: Do not attempt to twist tang off with tool. Lift tool from tang, turn tool 90° and tap down sharply. Use Tang Break Tool where supplied. For sparkplug and large fine thread inserts, use long nose pliers to pull tang out.

How a Recoil® Insert Works

The diagram below depicts graphically the advantages a Recoil® insert has over a conventional thread. In conventional threaded joints over 75% of the load is placed on the first three threads of the assembly. The Recoil® insert on the left shows how the spring-like design of the insert allows the shear loading to be transformed into a preferable "hoop stress" or radial loading over the entire length of the insert. This provides a much stronger thread than can be obtained by conventional drilling or tapping.

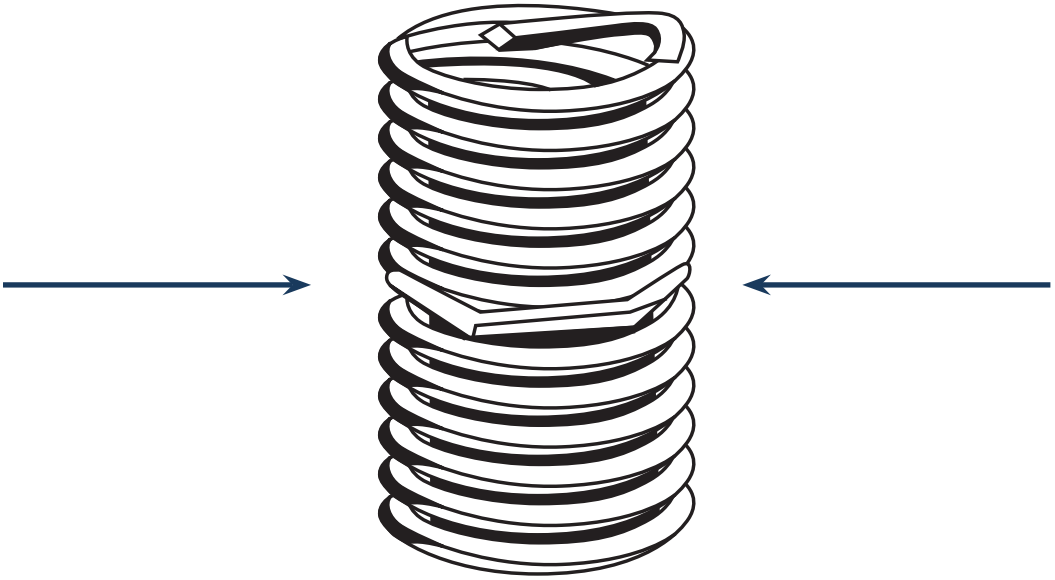
This improved strength allows designers to select a fastener based on the minimum strength of the bolt, also allowing them to select smaller diameters and shorter thread lengths confidently even in low strength materials such as magnesium or aluminium alloys. (Refer to page 62 - Design Considerations)



How a Locking Insert Works

The Recoil® screw-locking insert is designed to provide a screw-locking feature which will retain screws or bolts under the most severe vibration or varying temperature conditions. The insert locking configuration comprises a series of uniquely designed locking chords which, upon the engagement of a screw or bolt, deflect radially to permit the installation of the bolt. Upon bolt entry, these straight segments are flexed outwardly, creating pressure on the bolt. This pressure is applied between the flanks of the bolt thread so that contact area is maximized. Locking inserts retain locking torque over numerous assembly cycles. Refer to relevant specifications for insert life. Each Recoil® screw-locking insert type has a specifically designed locking configuration. This ensures that the insert meets its design specification requirements. Therefore the shape, depth, and number of locking chords will inevitably vary for differing thread types and sizes.

Note: It is recommended that a cadmium plated or dry-film lubricated screw/bolt is used for screw-locking inserts applications. (See Lubricants and Coatings page)



Locking Insert Design

Should a specific locking torque or function be required, Recoil® engineers can develop parts to suit customers' needs. As the bolt is wound through the locking chords of the insert it deflects the wire as shown by the internal arrows (A).This deflection causes the insert to push against the bolt resulting in a repeatable locking function from the insert.

Note: Installation of Recoil® screw-locking inserts requires use of the Recoil® Prewinder tooling.