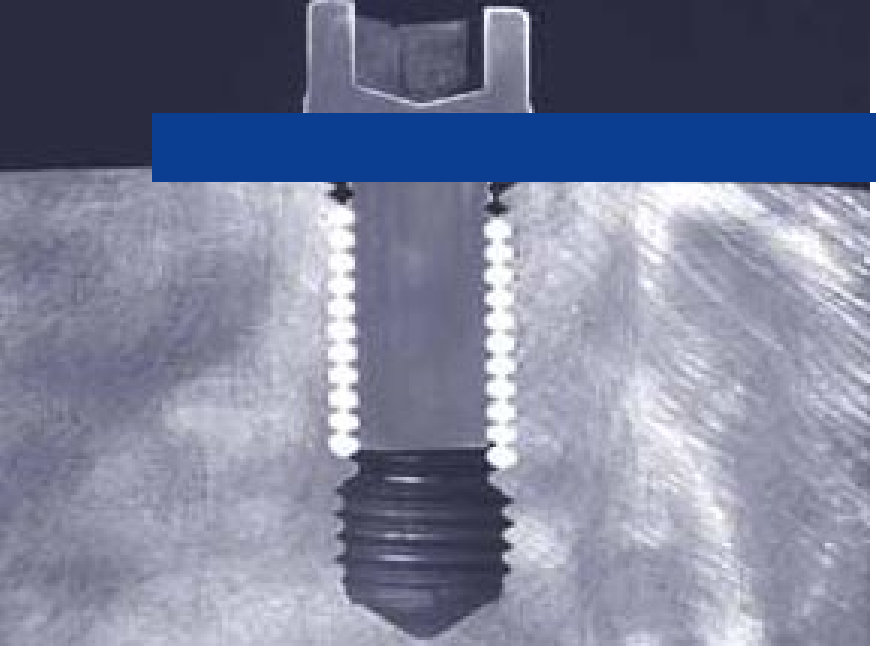


# Recoil Inserts

## How Does a Recoil Insert Work

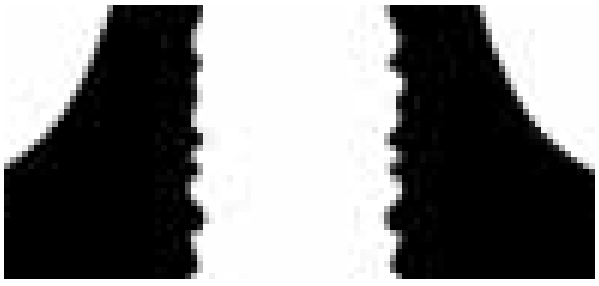
Recoil inserts are rolled from high quality stainless steel wire with a diamond shaped cross section, wound to the shape of a spring thread. Once the wire is wound into a helical coil and installed into a tapped hole, it provides a permanent and wear resistant thread in the parent material that is generally 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 inserts compensatory action shares the load over the entire bolt and hole increasing holding or pull out strength. With a Recoil insert in place, load and stress are more evenly distributed.

## Where to use Recoil Inserts

**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



**Damaged Thread**

## Original Equipment Manufacture

Recoil offers innovative manufacturer's the opportunity to design high quality product using lighter weight materials such as Aluminum and Magnesium alloys as well as carbon fibre materials while still achieving high strength and reliability in the threaded fastener assembly. Recoil inserts are widely used by manufacturers in:

- Automotive
- Electronic
- Aerospace
- Ship Building
- Defence
- Power Generation
- Transport
- Manufacturing Equipment

**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** (AS7254) Austenitic Corrosion Resistant Steel. For normal applications up to 425°C (800°F)
- **Stainless Steel Grade 316** (AISI 316) 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 - 1000°F) or where low permeability is required.
- **Phosphor Bronze** (DIN 17677 or BS2783 PB 102) (300°C). For electrical bonding joints or low permeability
- **Nimonic 90** (HR 503) for high temperature applications. (650°C)
- **Special purpose**

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

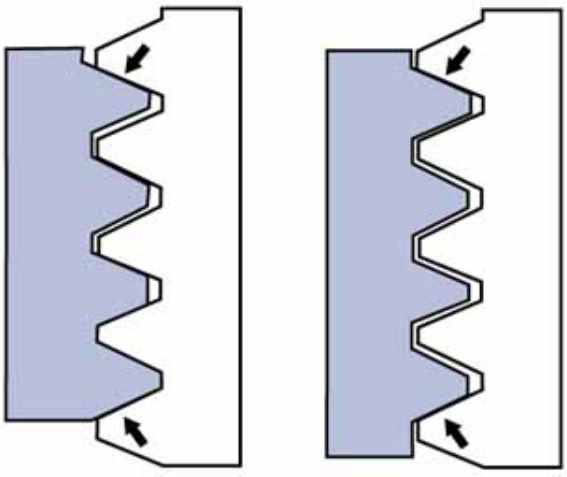
**Type**

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 fastener is installed.

## Pitch and Angle Error Compensation

**Problems**

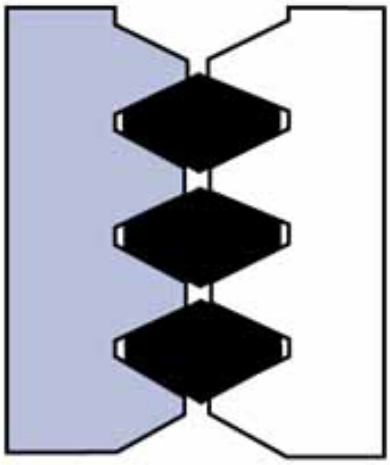


**Angle error** **Pitch error**

### 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

**Solution**



**Recoil compensation effect**

### 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

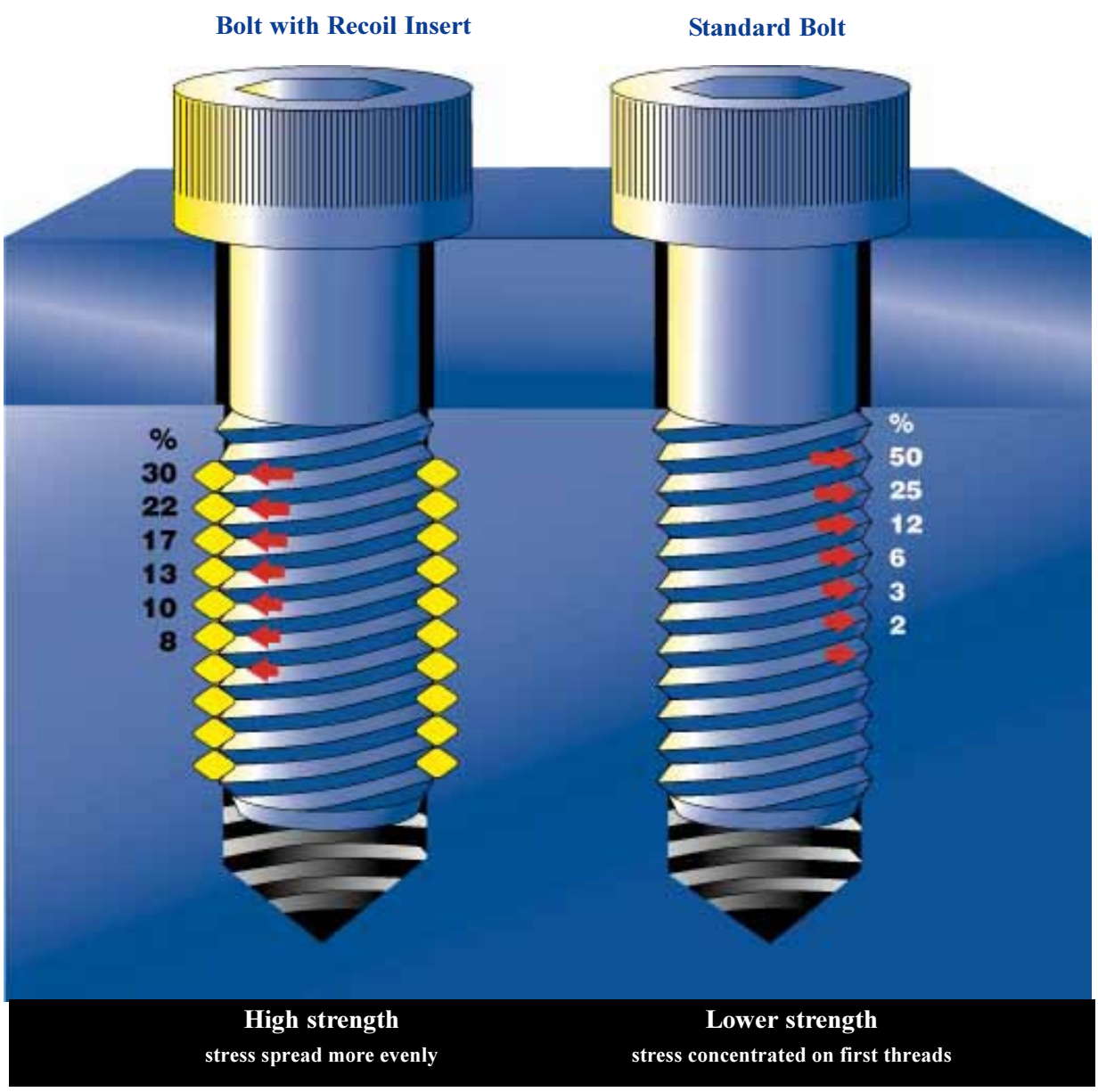
## Insert installation and retention

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.**




The diagram above 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 design considerations)