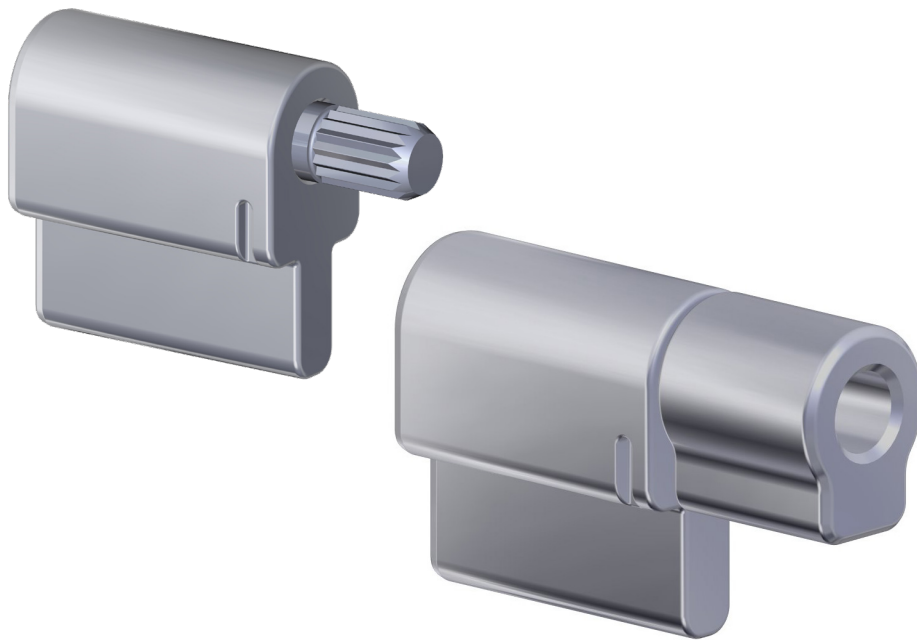




# TI-C5M Series Torque Insert Application and Installation Guide



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Reell torque inserts are hinge position control devices that are concealed within an application and support a cosmetically attractive design.

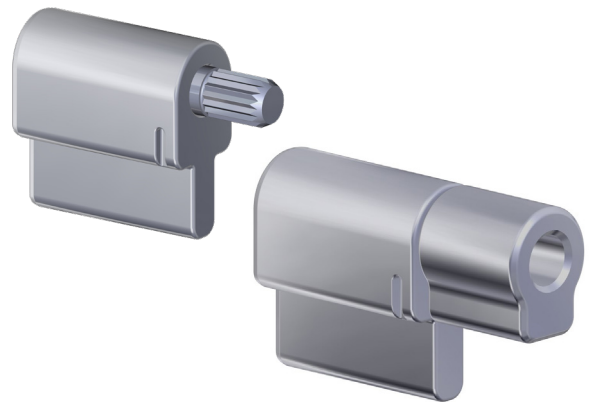
Friction from within the torque insert controls the infinite positioning of two pieces linked together and is capable of 360° of rotation. Without the visible appearance of a hinge, applications can be designed with great style and seem somewhat magical as to how components are infinitely positioned for the best user experience.

TI-C5M Series Torque Inserts serve as advanced positioning and pivoting technology solutions uniquely developed to outmaneuver conventional hinges.

They enable reliable, precise, and controlled positioning of equipment and components for a wide range of hinging applications in consumer electronics, automotive, aircraft interior, medical technology, and many other commercial and industrial markets.

## Advantages of TI-C5M Series Torque Inserts

- Quick and easy press-fit installation
- Cost efficient requiring no mounting accessories
- Installs using any forming press
- Easily concealed
- Stable performance up to 30K life
- Compatible with hot or cold environments (-20° to 80° C)
- Symmetrical torque



# ReellTorq® Technology

Reell's patented clip technology provides a long-life, cost-effective solution for applications requiring constant frictional torque from 0.15 to 0.30 Nm. Constant torque is generated by the controlled interference fit between clips and shaft.

Precision clips and shaft components, a proprietary lubricant, and a proprietary manufacturing process form the basis for Reell's technology for providing consistent torque over life. Torque increments are achieved through the addition of clips and allow custom torque specifications with standard components.

Clip technology allows a close and predictable relationship between static and dynamic torque and specification of higher torques without compromising torque tolerance or life.

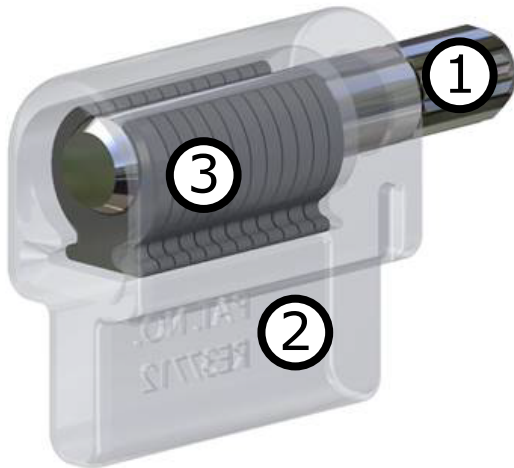


Figure 1: TI-C5M Torque Insert Features

## **LIFE**

Standard life for ReellTorq® clip products is specified up to 30K cycles. Cycle rates of up to 10/min are possible within these specifications.

## **COST**

ReellTorq® clip technology offers excellent performance at an attractive cost through standard components such as clips and shafts, automated assembly of clips and shafts, and available standard hinge designs.

## **ENVIRONMENT**

ReellTorq® clip technology may be applied in hot or cold environments from -20° to 80° C.

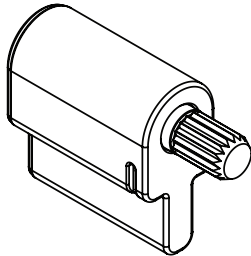
## **PATENTED TECHNOLOGY**

Patents can be found at [pat.reell.com](http://pat.reell.com).

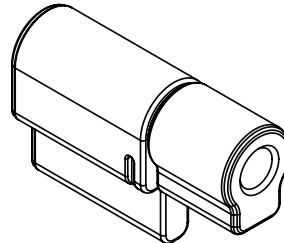
- 1. Shaft**
- 2. Housing**
- 3. Clips**

# Overview & Features

Reell TI-C5M Series Torque Inserts feature a die-cast zinc package designed to be press-fit into profiled holes for quick and easy installation. The TI-C5M Series is available in two shaft end options as displayed below.



**Knurled Shaft for Press-fit into Metals**



**Single Fin for Press-fit into Plastics**

All TI-C5M Series Torque Inserts feature Reell's patented ReellTorq® technology, which ensures consistent smooth long-life position control without adjustment. Torque values are available from 0.15 to 0.30 Nm.

## Models

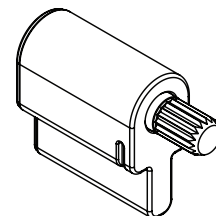
The TI-C5M Series uses the following model naming convention:

### TI-C5M-[Torque]-[Shaft End]

<b>Torque (Nm)</b>	0.15 Nm
	0.25 Nm
	0.30 Nm
<b>Shaft End</b>	01 - Knurled Shaft
	02 - Single Fin

**Example:** TI-C5M-0.30-01

Specifies a TI-C5M torque insert with a knurled shaft end which has 0.30 Nm of torque.



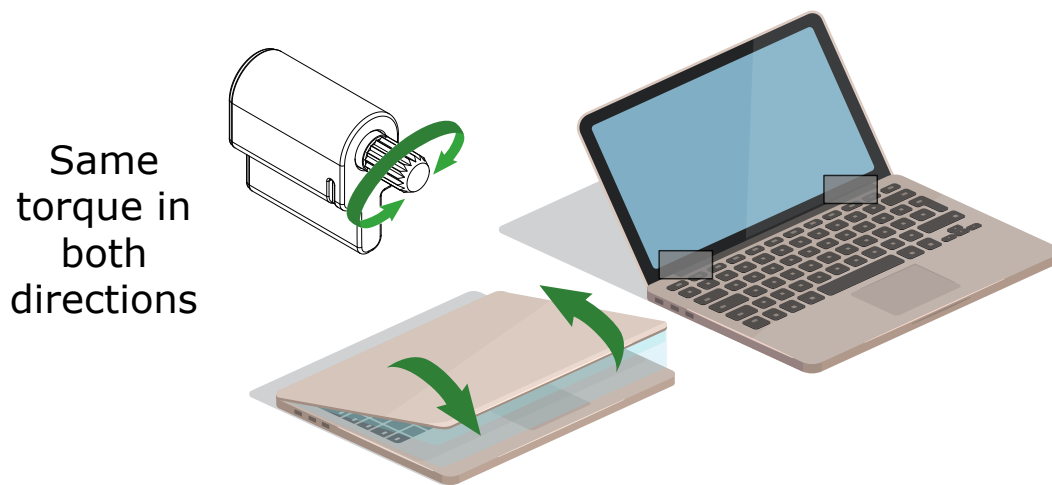
# Application Designs

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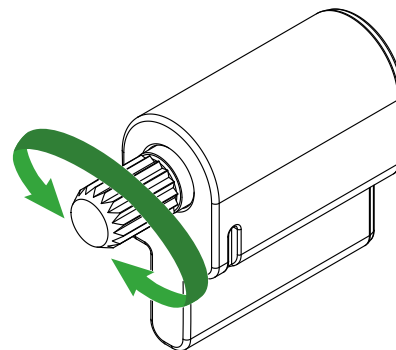
Torque inserts give smooth torque control of hinged mechanisms in office equipment, medical devices, automotive interiors, computer peripherals, flat-panel monitors, access panels, industrial enclosures, equipment guards, and many more applications.

## Symmetric Application

Symmetric torque inserts enable the rotation of a laptop screen in both directions with the same torque.



## Symmetric



**NOTE:** Consider system stiffness to prevent racking or a twisting effect in your application.

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# Application Considerations

Torque inserts provide an advanced positioning and pivoting solution uniquely developed to outmaneuver conventional hinges. They enable reliable, precise, and controlled positioning of equipment and components for a wide range of hinging applications while eliminating any need for mounting hardware.

## Successful press-in installation depends on the following:

### Material

TI-C5M Series Torque Inserts are designed to be press-fit into a variety of materials. The following materials have been tested.

- Metals (Knurled Shaft)
  - ◇ Die Cast Zinc
  - ◇ Die Cast Aluminum
  - ◇ Mild Steel
  - ◇ Wrought Aluminum
- Plastics (Single Fin)
  - ◇ Delrin (Polyoxymethylene)
- Avoid using in brittle plastics, softwoods, and hardened metals

If using a material not included on this list, please perform proper testing to ensure your specific application needs. For complete information on material specifications, please refer to the appropriate TI-C5M Series Torque Insert Sales Drawing at [www.reell.com](http://www.reell.com).

### Environmental Factors

TI-C5M Series Torque Inserts are intended for enclosed environments. Considerations must be taken to isolate torque inserts from environmental elements such as moisture, salt, cleaner and solvents. Torque is specified at room temperature and will vary as temperature moves from 20° C. Contact Reell if your application is intended to operate in extreme temperatures.

Operating temperature: -20° C to 80° C

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## Installation Profile

Mounting profiles may be drilled, punched, or cast.

- Measure the profile where the torque insert will be installed. The profile opening must be within Reell specifications.
  - ◇ If the profile is too large, the torque insert will not properly grip the material
  - ◇ If the profile is too small, installation may be difficult and unsafe
  - ◇ If draft is present, measure the profile at the midpoint of the depth of the profile
  - ◇ 2° maximum draft
  - ◇ Ensure interference pressure points are appropriate for your application

For more information, refer to the Sales Drawings at [www.reell.com](http://www.reell.com).

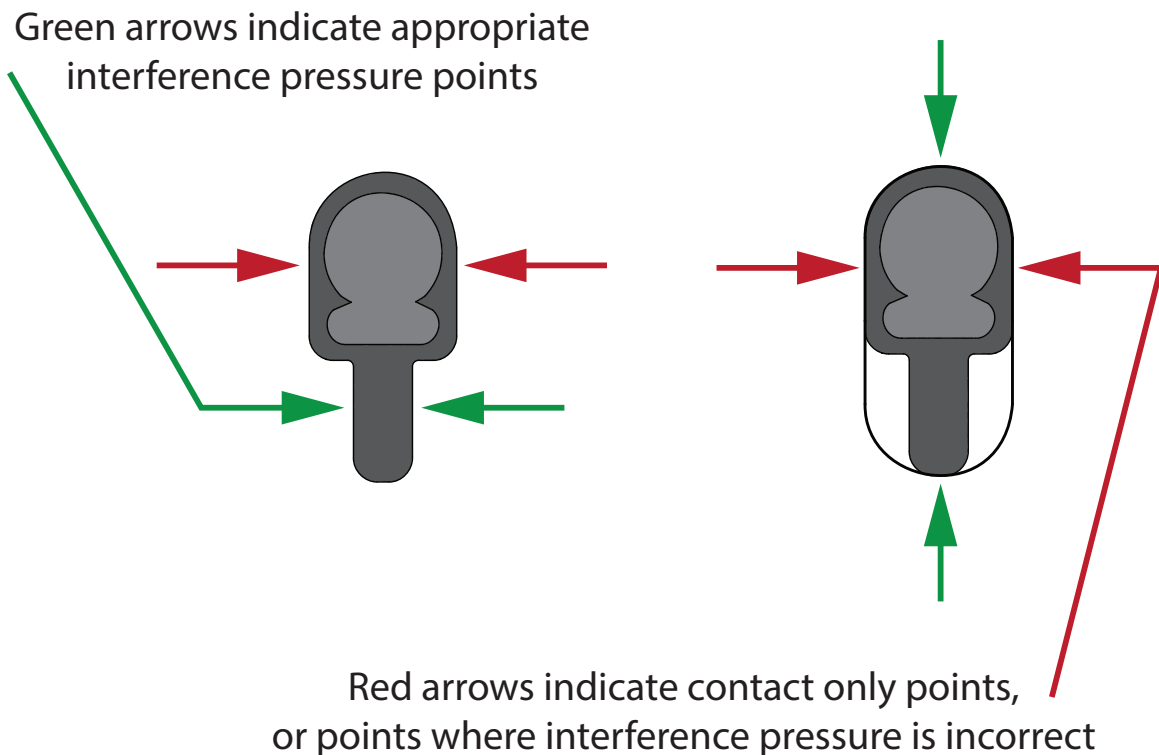


Figure 2: TI-C5M Interference Pressure Points



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## **Alternative Mounting Geometries**

If manufacturing capabilities or space requirements are limited, alternative mounting profiles can be used. It should be understood that the customer assumes all risk in using these alternative profiles that differ from the sales drawing. Every application should be tested to ensure it functions as expected.

## **Lubrication Compatibility**

TI-C5M Series Torque Inserts are made with mineral oil-based lubricants. To ensure proper function, check compatibility of Reell lubricants when inserting torque insert into materials such as plastics. Inserts are maintenance free and do not require additional lubrication over life of use.

## **Painting and Plating Considerations**

TI-C5M Series Torque Inserts can be installed before or after any plating or painting is done to the product. If your application includes painting or plating, consider the following:

- When installing a torque insert after plating or painting has been applied to the installation site, do not include the coating thickness when taking measurements
- Do not submerge torque inserts in painting or plating bath
- Limit torque inserts to as little chemical exposure as possible
- If powder coating after install, do not expose torque insert to temperatures exceeding 80° C

## Axial Force Direction

TI-C5M Series Torque Inserts are not designed to support axial force between the shaft and clips. Considerations must be taken to ensure that the application supports the insert so that it does not pull apart.

### Proper Axial Force Direction

Materials will contact each other if load is applied as shown in Figure 3.

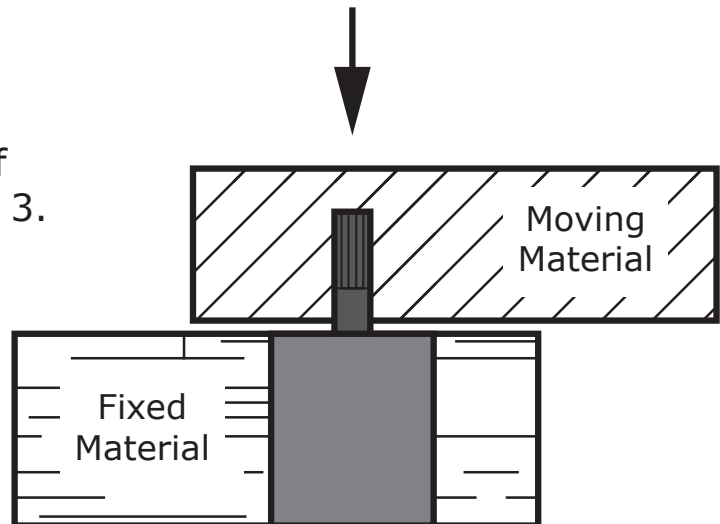


Figure 3: Proper Axial Force Direction

### Improper Axial Force Direction

Torque insert does not provide axial retention. If there is no external retention of components the shaft and clips will move axially apart as shown in Figures 4 and 5.

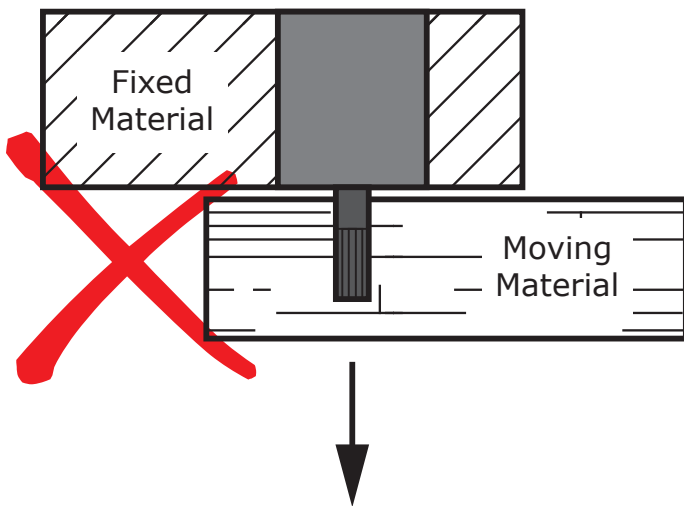


Figure 4. Improper Axial Force Direction

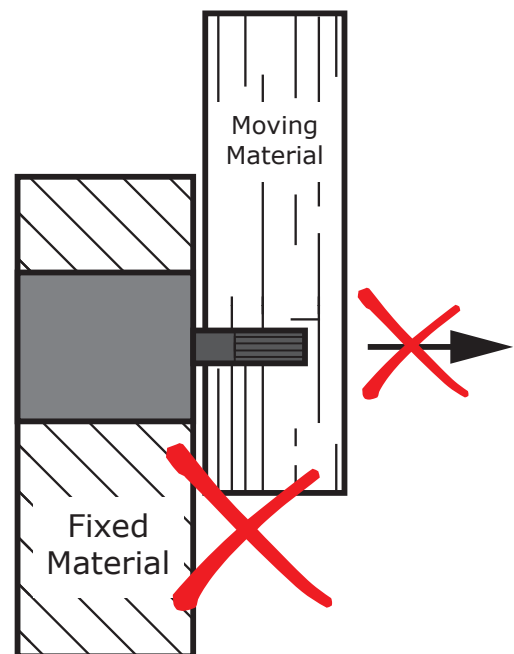


Figure 5. Improper Axial Retention

## Specifications

	<b>TI-C5M</b>
<b>Torque</b>	0.15-0.30 Nm
<b>Torque Type</b>	Symmetric
<b>Life</b>	30,000 cycles
<b>Finish</b>	Non-cosmetic plain
<b>Ambient Temperature</b>	-20° to 80° C
<b>Environmental Rating</b>	Designed for enclosed environments
<b>Springback</b>	< 1°
<b>Free Play</b>	Minimal
<b>Housing</b>	Die-cast Zinc
<b>Shaft</b>	Hardened Steel
<b>Clips</b>	Hardened Steel
<b>Lubricant</b>	Mineral Oil Based

## Weight

Part weight will vary slightly based on the number of clips required to generate specified torque. Below are approximate weights.

<b>Model</b>	<b>Weight</b>
TI-C5M Knurled Shaft	3.2g
TI-C5M Single Fin	4.1g

# Radial Load Ratings

## Abuse/Overload (Rare/Infrequent Events)

Product	Configuration	Moment at Knurl (Nm)	Force at Knurl (N)
TI-C5M	Knurled Shaft	1.0	380 N @ 2.6 mm
	Single Fin		

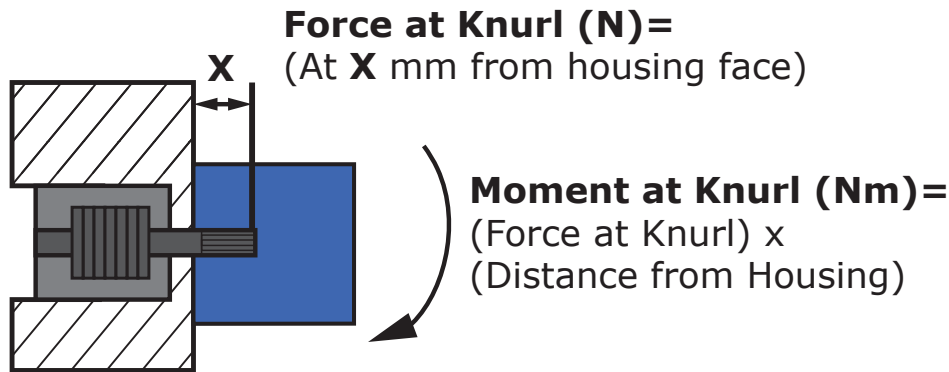


Figure 6: Radial Loads

## Cyclical/Constant Load (Load on Every Cycle)

Product	Configuration	Moment at Knurl (Nm)	Force at Knurl (N)
TI-C5M	Knurled Shaft	0.1	38 N @ 2.6 mm
	Single Fin		

## Dimensions

For complete information on dimensions, refer to the Sales Drawings located on the TI-C5M Series Torque Inserts page at [www.reell.com](http://www.reell.com).

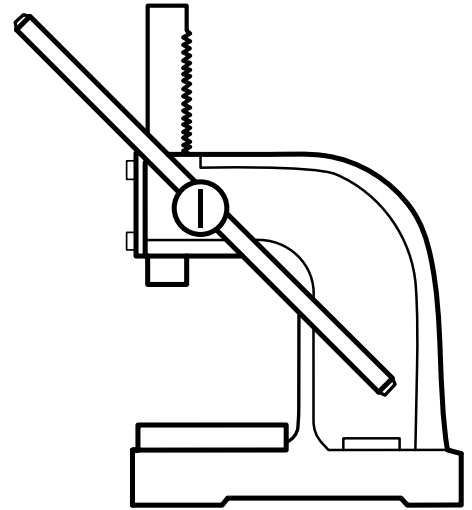
## High Radial Load (Shear Force) or Abuse Load Applications

- Torque inserts were designed to provide torque only
- Customer material should account for axial and radial loads
- For force-moment ratings see the Radial Load Ratings tables

# Installation Considerations

## Installation Tools

- Forming press
  - ◇ Use any forming press to install the insert
  - ◇ Mechanical lever press (e.g., Arbor press)
  - ◇ Pneumatic press for high volume
- Ram or punch
  - ◇ Used to align and apply press force to the insert
  - ◇ **Important:** The ram or punch used must have a diameter larger than the housing to ensure that both the torque housing and shaft are in contact
- Base or clamp
  - ◇ Use to align and support mating materials for the press force
- A shim or tool stop can be used to ensure proper spacing during installation



*Example: Arbor Press*

## Installation Force

Proper installation requires an even distribution of adequate force.

- Reell does not recommend using a hammer. An impact force does not provide an even distribution of force.
- Installation force varies from application to application, depending on hole size and mounting material
  - ◇ A smaller hole size means more interference and more press force
  - ◇ A stiffer material means more press force
- Reell recommends a 1-ton press capacity

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## Part Alignment

Part alignment is important for good press-fit assembly.

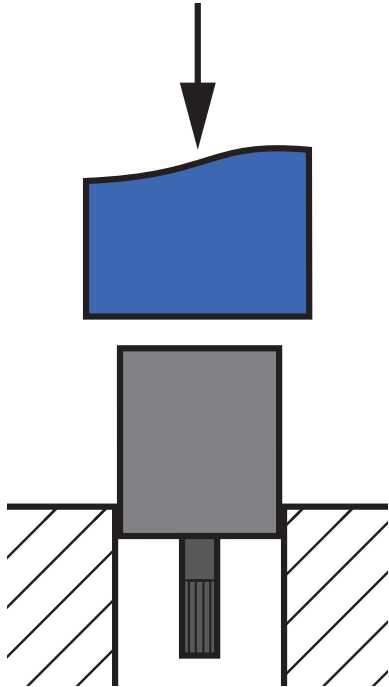


Figure 7: Proper Part Alignment

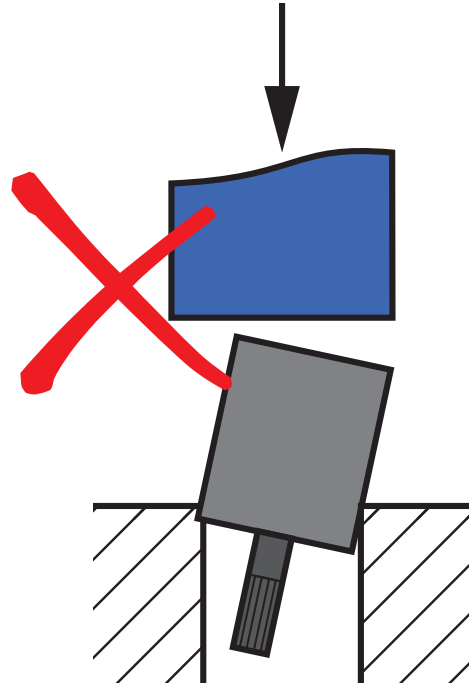


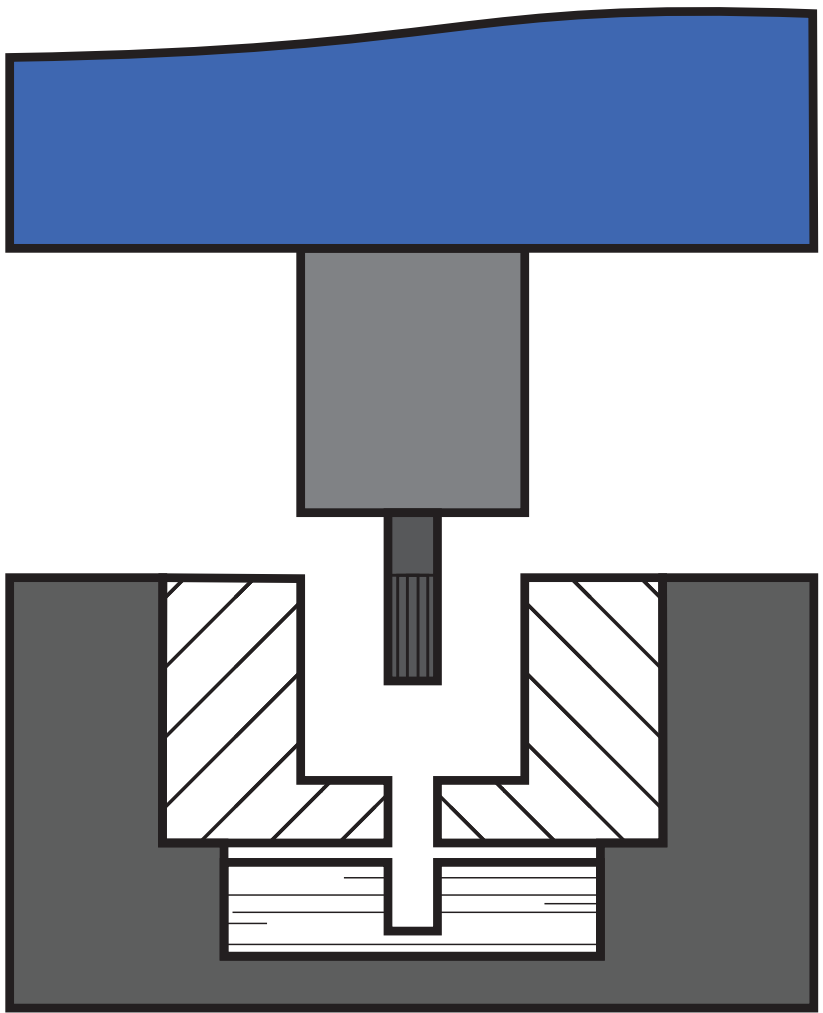
Figure 8: Improper Part Alignment

## Material Containment

During proper installation of the torque insert, a very small amount of material will be shaved from the customer's mating material as the knurls need to bite into the mating material tightly to avoid free play in the system. Extra care should be taken if the presence of this material will affect the performance of the application.

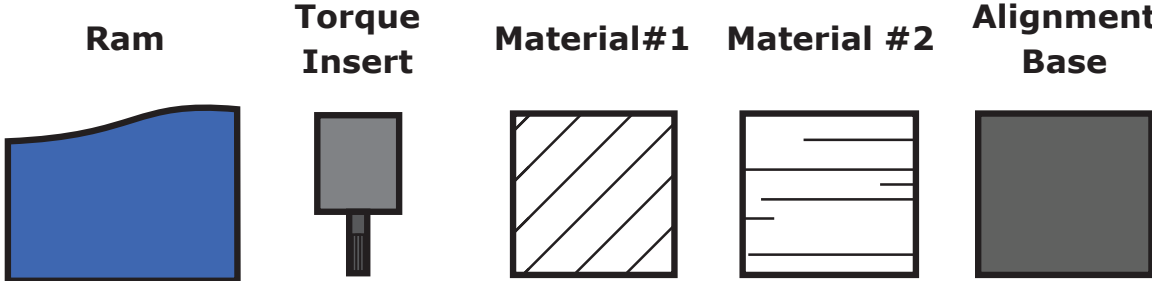
## Material Support

Some applications require additional support surrounding the installation site of the torque insert to ensure proper installation. See Figure 9.



The alignment base (grey) shown here supports both materials independently while controlling the gap.

Figure 9: Proper Material Support Example



# Installation

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Installation order can affect product concealment or contain sheared material as a result of the installation press. The examples shown below highlight effective ways to conceal torque inserts within an application. Assembly order may need to change if concealment is paramount.

## One-Step Installation

One-step installation is quick and easy by press fitting the torque insert into a round hole without the use of any mounting hardware. An arbor or pneumatic press ram contacts the entire area of the large housing end of the torque insert. With both the housing and shaft pressed simultaneously, the torque is inserted into both materials in one stroke.

To hide the torque insert completely, recess into material #1 and add a cap to conceal.

**WARNING:** Do not push on the shaft alone. Pushing on the shaft alone may result in damage to the torque insert. See Figure 11.

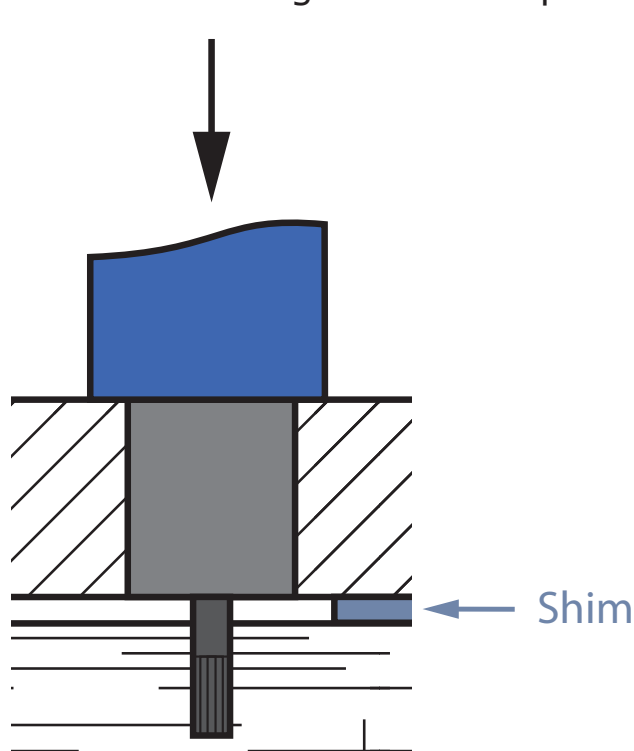


Figure 10: Proper One Step Application Installation

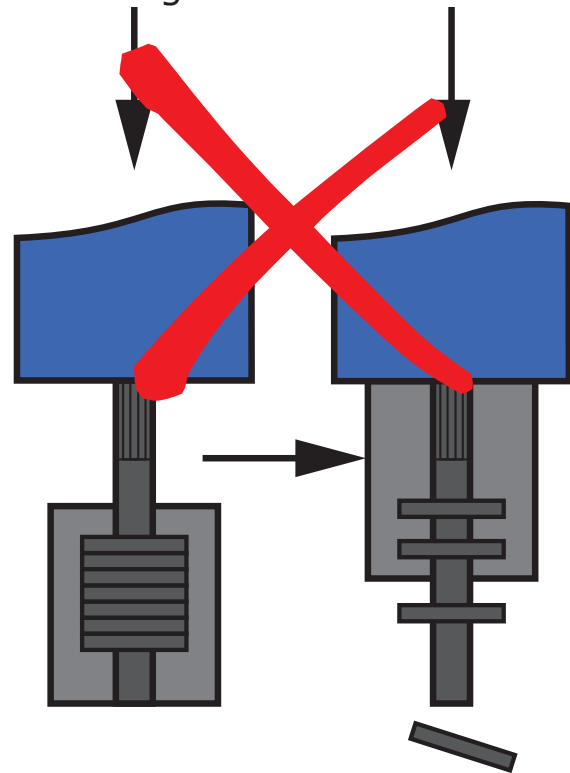


Figure 11: Improper One Step Application Installation



## Two-Step Installation

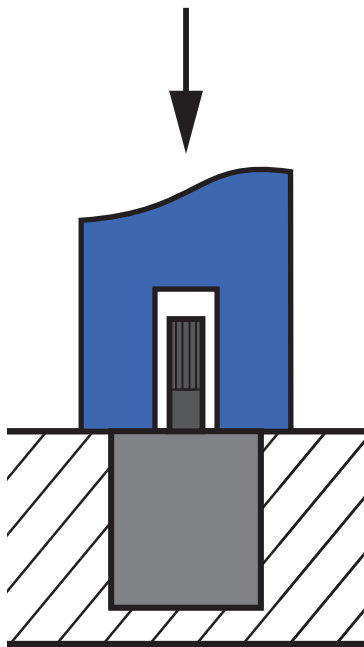
When utilizing a two-step installation, the torque insert is completely concealed.

If your application requires the torque insert housing to be installed into a material first, the press ram must contact housing while avoiding contact with the shaft. Do not press on shaft alone as this may shift the clips and shaft outside of the housing.

**NOTE:** If a gap is needed between materials, use a shim or external ram stop.

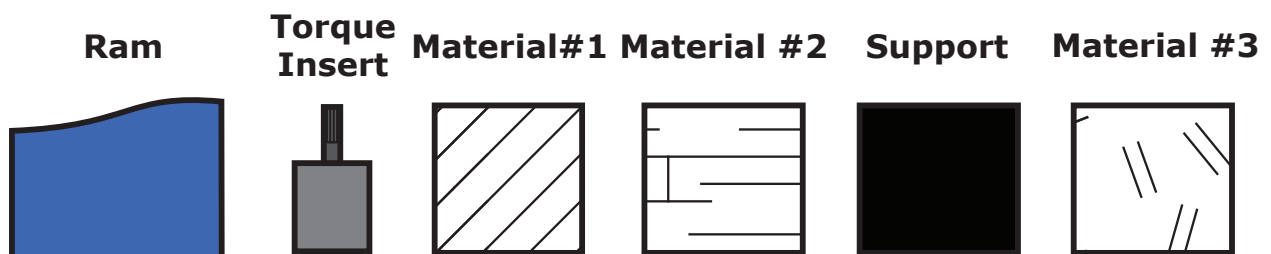
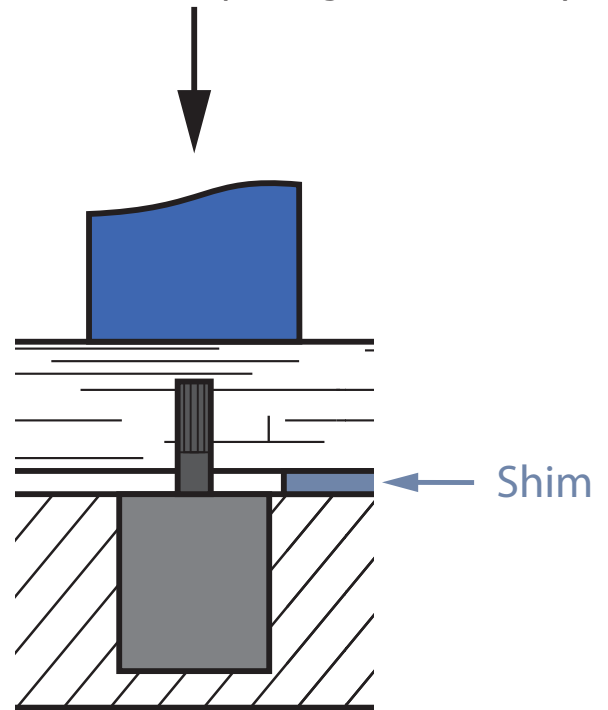
### Step 1

Press the housing into the first material



### Step 2

Press the second material onto the shaft using a shim to ensure spacing if necessary



# About Reell

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Reell provides high-quality, innovative solutions to transmit torque, control angular position and protect delicate components from excessive force. Combining the world's most precisely controlled torque technology with the industry's most experienced engineering team provides a perfect product fit in customer applications.

When Reell was established in 1970, the founders wanted to build a company that viewed success as more than return on investment. They wanted to provide exceptional products and services to customers while creating a work environment that fostered a balanced life for its co-workers. They named the company "Reell" (ray-EL'); a German word meaning honest, trustworthy and good, to reflect these values.

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## Product Support

Not sure if a Reell motion control product will work for your application? Let a Reell engineer help you define your application needs.

Contact Reell customer support for consultation:

- Technical information
- Product specifications
- Sales drawings and datasheet documents
- Pricing, quotations, and lead-time
- Ordering
- Delivery
- RMA

## Additional Resources

The following resources can be found on the Reell website:

### [Hinge Selection Guide](#)

An interactive tool to explore Reell's Hinge and Torque Insert catalog and find products suited to your application.

### [Torque Calculator](#)

A tool to compute the amount of torque needed to securely position a component.

### [Torque Units Converter](#)

## Certifications and Compliance

Reell USA and Reell Europe are registered to ISO 9001:2008. All Reell standard catalog products are fully EU RoHS, REACH, SVHC and California Proposition 65 compliant.

## Warranty and Patent Information

Visit [reell.com](http://reell.com) for full Warranty and Patent information.