TAPTITE 2000® BOLTS

“THE FORD FASTENER SOLUTION” FOR THE F-SERIES PICKUP TRUCKS

PR-171
March 31, 2005

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The Ford F-Series Pickup Trucks

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1. **TAPTITE 2000® Box Bolts and F-Series Pickup Trucks**

   **A True “Win-Win” Development between REMINC Products and Ford Motor Company**

**What is a box bolt?**

A “box bolt” (also referred to as a carriage bolt or bed box bolt) is a large diameter bolt, which holds the bed box component of a pickup truck to the automotive frame. The bolts for the Ford F-Series Pickup trucks are either M12 (12mm diameter) or M14 (14mm diameter) in size depending on the size of the pickup truck. The F-150 and F-250 Pick-up trucks use six M12 diameter box bolts, while the F-350 Pick-up truck use eight M14 diameter bolts.

![Figure 1: TAPTITE 2000® Box Bolts for the Ford F-Series Pickup Trucks](image-url)
What was the problem?

Like many other truck manufacturers, Ford considered assembling the truck bed to the truck frame (see Figure 2) from below. This assembly method led to physical access problems, line-of-sight problems, increased assembly times, cross-threading, non-starting bolts, and INCREASED costs!

![F-150 Pickup Truck Frame](image)

*Figure 2: F-150 Pickup Truck Frame*

The traditional assembly method resulted in Ford seeking a unique solution. The desired solution was to be able to assemble the truck bed from the top, which would allow the operator to easily align and insert the bolt and attach it to the frame. This solution was tried and found to be even more beneficial than expected.
Any component assembly from beneath the truck frame can be a tedious and difficult task (see Figure 3). Imagine the difficulty associated with attempting to attach 6 or 8 box bolts to the truck chassis from underneath; and, at the same time, the difficulty in locating a nut and tightening the joint into place. Trying to accomplish this feat within the prescribed time for an assembly line station must create a stressful burden for the operators responsible.
What was the ultimate solution?

This assembly from under the vehicle solution also posed some problems. How could Ford consistently insure the bolt would enter the nut member properly to prevent costly cross-threading problems? The answer was the TAPTITE 2000® box bolt with a special dog point to completely eliminate the cross-threading potential.

Because, the TAPTITE 2000® bolt forms its own threads (see Figure 4) in the nut member there can never be a cross-threaded joint. The special dog point allowed the operator to insure that the bolt would “find” the hole of the nut member and properly drive the bolt into the frame.

![Figure 4: Threads Created with a TAPTITE 2000® Bolt](image)

This solution resulted in the use of the REMINC TAPTITE 2000® box bolt, which inherently provided a better joint assembly due to the TRILOBULAR™ design of this patented fastener. The TAPTITE 2000® bolt has intimate contact with the nut member, creating excellent and beneficial prevailing torque, which provides improved overall joint integrity and superior vibration resistance. This vibration resistance is one of the reasons why Ford also utilizes TAPTITE 2000® bolts as their official standard for the safety critical seat belt bolt for all vehicles.
With respect to vehicle assembly, the TAPTITE 2000® box bolt (see figure 5) allowed Ford to assemble the truck bed from above (see Figure 6), which eliminated all the previously mentioned assembly problems. In addition, the TAPTITE 2000® box bolt saved Ford considerable assembly costs!

(A brief explanation of the many and various cost-savings benefits of TRILOBULAR™ products is summarized in the “Benefits” section of this report. Also, attached in the appendix of this report is the “How many of these 54 TAPTITE 2000® screw savings can you make?” cost-savings check list.)

And, because TAPTITE 2000® bolts are manufactured to REMINC engineering specifications, Ford is guaranteed a bolt with proper dimensions and consistent performance – independent of the authorized fastener supplier. Another positive aspect is that should Ford desire to
procure this bolt globally, REMINC’s authorized manufacturers are located worldwide and can either supply product to the USA or locally supply product to any Ford manufacturing location.

*Figure 6: F-150 Pickup Truck Bed Assembly Schematic Diagram*

With the REMINC TAPTITE 2000® box bolt, the line worker in the assembly plant at Ford does not have to reach, stretch and “fish” for the location of the bolt hole. From the top position, the bolt is easily placed into the hole and then driven into place using standard pneumatic and/or electric tools.
What were the benefits?

The resultant benefits of the TAPTITE 2000® joint design centered around two major areas – cost reduction and improved joint characteristics. Either one in itself is a valuable benefit, but the combined benefit provides a truly exceptional project conclusion.

The TAPTITE 2000® bolt:

- Eliminates cross-threading – reducing repair costs!
- Eliminates the need for a pre-tapped nut member – reducing component costs!
- Eliminates the need for locking concerns and devices – insures a proper joint!
- Reduces the downtime on production lines – improves line rates and efficiencies!
- Reduces service claims for improper joints – reducing service costs!
- Reduces assembly operator fatigue – reduces insurance costs!

These are just some of the benefits obtained by using a TAPTITE 2000® product in the box bolt application – or any application.

What is the current status of this project?

Today, depending on the truck size and style, there are 6 or 8 TAPTITE 2000® box bolts attaching the F-Series Pickup truck bed to the truck frame. The original box bolt was actually a TAPTITE II® product, but Ford has since converted to the next generation TAPTITE® product – the TAPTITE 2000® box bolt – and has immediately reaped additional benefits. The use of TAPTITE 2000® bolts has allowed Ford to further improve assembly conditions and further increase cost savings. TAPTITE 2000® bolts have a lower drive torque and an improved joint assembly. These improved characteristics reduce potential assembly fatigue for the workers, and allow for more consistent assembly parameters, which potentially improve assembly times. In addition, Ford is guaranteed the supply of a globally consistent fastener product independent of the authorized manufacturer.
As previously stated, the original box bolt was designed as a TAPTITE II® bolt, since this assembly problem was actually solved in 1982! Thus, 2005 is the 23rd consecutive year of production when Ford has utilized a REMINC TRILOBULAR™ TAPTITE® bolt design as the solution to this assembly problem. And after 23 years, there have been no issues in the field with the TAPTITE® bolts nor has a better or more cost effective method been found - other than the improvement of the TAPTITE® product itself. Therefore, TAPTITE 2000® box bolts are a LIFETIME solution for the Ford bed box assembly problem!
II. The Ford F-150 Pickup Truck Promotion Campaign

Ford has been so impressed with the success of the TAPTITE 2000® box bolt, that in late 2004 Ford featured the TAPTITE 2000® box bolt in an extensive F-150 Pickup truck advertising and promotion campaign.

The campaign focused on several of the truck’s structural components, but for the TAPTITE 2000® box bolt Ford created the following advertising materials.

- A television commercial (see figure 7) suspending the F-150 Pickup truck by one TAPTITE 2000® box bolt and having an actor walk beneath the vehicle.

Figure 7: Ford TAPTITE 2000® Box Bolt Commercial
- A promotion package (see figure 8) with a TAPTITE 2000® bolt and a video of the commercial was created and sent to Ford dealers.

Figure 8: Ford TAPTITE 2000® Box Bolt Video Package
- A large scale display showing the competitive advantages of the F-150 Pickup truck was created and included the TAPTITE 2000® box bolt. This display (see figures 9 & 10) was sent to Ford dealers for their showrooms.

Figure 9: Ford TAPTITE 2000® Box Bolt Showroom Display Close-up
Figure 10: Ford TAPTITE 2000® F-150 Pickup Truck Showroom Display
III. TAPTITE 2000® Bolts – Some Additional F-150 Applications

A. TAPTITE 2000® Seat Belt Bolts

TAPTITE 2000® box bolts are not the only applications on the Ford F-Series Pickup trucks utilizing TAPTITE 2000® products. Some additional examples include the safety critical seat belt assemblies and the safety critical heat shield assemblies.

The TAPTITE 2000® seat belt bolts are used to insure that there are no malfunctions caused by the bolt joint in the event of an automotive accident. The seat belt bolts (see figures 11 & 12) are driven into untapped nut members, which allow the TAPTITE 2000® bolts to form their own threads and provide an unsurpassed mechanical joint. This joint has an extremely high resistance to vibrational loosening and even saves assembly costs as previously mentioned in Section I of this report.

Figure 11: TAPTITE 2000® Seat Belt Bolt Protruding through the Weld Nut
Ford also utilizes TAPTITE 2000® bolts (see pictures 13, 14 & 15) for attachment of the exhaust system heat shields on the F-Series Pickup trucks. These bolts must resist high vibration and drastic temperature variation environments. Again, the TAPTITE 2000® bolts were selected for their durability, quality consistency and performance repeatability for these severe and dynamic applications.

Ford utilizes TAPTITE 2000® heat shield bolts to attach all the heat shields under the F-Series Pickup trucks. These bolts also utilize a special washer to insure proper load distribution, which helps prevent the heat shield material from buckling in application.
Figure 13: Typical TAPTITE 2000® Heat Shield Bolts

Figure 14: TAPTITE 2000® Heat Shield Bolt in Application – Close-up
Figure 15: TAPTITE 2000® Heat Shield Bolts in Application
C. TAPTITE II® Bolts for the Borg-Warner 4WD Transfer Case

Ford purchases their 4-wheel drive transfer cases for the F-Series Pickup trucks from the tier supplier Borg-Warner. Borg-Warner has been utilizing TAPTITE® bolts since 1989 to assemble their transfer cases. There are 28 TAPTITE II® screws in the typical transfer case. Again, similar to the heat shield application, this transmission case application is an example of the TAPTITE® bolt’s ability to handle extreme vibration and temperature environments. Please also see REMINC’s Application Booklet #PR-166 for further details on this application.

Figure 16: Borg-Warner Transfer Case on the F-150 Pickup Truck utilizing TAPTITE® Screws
Figure 17: Borg-Warner Label on Transfer Case

Figure 18: Borg-Warner Transfer Case Model #4406 (same model number as in PR-166)
IV. Appendix – Additional Cost Savings Materials

Several types of brochures, booklets and presentations are available which detail the cost-savings and performance advantages of TAPTITE 2000® bolts and screws. Please contact us for additional information.

A. “How many of these 54 TAPTITE 2000® screw savings can you make?” Check List

![TAPTITE 2000® Fastener Cost Savings Check List](image1)

**Figure 19: TAPTITE 2000® Fastener Cost Savings Check List**

B. IPC - the “Money Maker by Carl Dock

![In-Place Cost Savings Booklet](image2)

**Figure 20: In-Place Cost Savings Booklet**
C. Application Brochures

Figure 21: Catalogs and Various Brochures