

About the Author/WAYNE WALLACE

Wayne Wallace is the president of Applied Bolting Technology Products. The company provides bolting consulting services and manufactures direct tension indicating washers from its base in Ludlow, Vermont. Wallace is a member of the Research Council on Structural Connections, a director of the Bolting Technology Council, and author of numerous papers on the practical aspects of quality assurance in structural bolting. He can be reached by fax at 802-228-7204, or e-mail at wallace@appliedbolting.com.



Florida Finds Squirters To Die For

“Squirter” DTI Tension Indicator Trial Project by the Fla. Dept. of Transportation

In March and April of 2001, in response to industry claims of substantial contractor benefits arising from the use of Squirter DTIs, Florida DOT decided to test the claims once and for all. Kind of a showdown. Put up or shut up. Let’s see where the rubber meets the road. That kind of stuff.

So, they hired an independent consultant, Keith & Schnars, of Jacksonville, Florida, a consulting bridge engineering firm that had done lots of Florida projects, and told them to go out and design an independent, unbiased test. Compare Squirter bolt installation with Florida’s turn-of-nut. They were instructed to take everything into account — the hardware cost, the bolting labor cost, the inspection labor cost — everything.

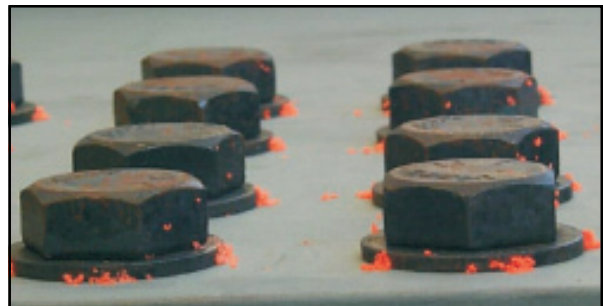
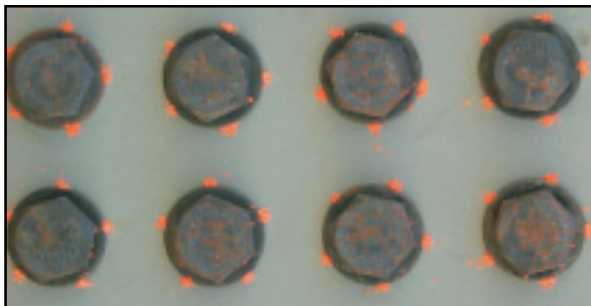
Together with the state of Florida, Keith & Schnars

chose a bridge called “Beaver Street - US 90,” near Jacksonville, which consisted of several parallel lines of girders. They told the contractor and steel erector, Wood Hopkins, to tighten the bolts using Squirter DTIs on the other lines. Keith & Schnars timed all the work of both methods, assessed the costs of all the labor and bolting hardware needed for both methods, and published the comparison. Applied Bolting made the Squirter DTIs of course, but played no part in the economic comparison between the two bolting methods.

Here’s what they compared.

1. Turn-of-Nut Method

- Wrenches calibrated for each bolt lot, each day, and bolts “snugged” using torque.



When enough silicone appears, stop tightening!

The silicone allows for easy visual inspection; and is a granular powder which blows away.



- Inspectors test 10% of the bolts at the “snug” point.
- Inspectors match mark the bolt and nut prior to final tightening.
- Erectors turn the nut relative to the bolt according to the RCSC prescribed rotation.
- Inspectors witness the turn being made to confirm proper installation.

2. DTI Method

- DTI lots checked on a Skidmore to make sure they read proper tension.
- Bolts tightened to “snug tight.”
- Final tightening of the bolts commenced and stopped when the orange silicone squirted out.
- Inspectors check the DTI compression with a feeler gage.

Here’s THEIR Trial Project Observations

1. Skidmore verification is necessary with both methods, but when DTIs are used, a Skidmore is needed only on the first day of bolting.
2. DTIs eliminate the need for a torque wrench and cheater bar.
3. DTIs at snug don’t require torque wrench checking.
4. Less fatigue for installers when DTIs are used.
5. Safer working conditions when DTIs are used.
6. Squirter DTIs allowed immediate verification of proper bolt tension.
7. After checking with a feeler gage, it was found

that only 0.35% of the bolts (4 out of 1,134) needed additional tension as evidenced by inadequate DTI bump compression.

Here are THEIR Squirter DTI vs. Turn-of-Nut Cost Comparisons

1. The cost of the Squirter DTI is extra to all the other bolting hardware.
2. Squirter DTIs for this bridge cost about \$.50 to \$.60 each.
3. The time savings by using Squirter DTIs on the ground added up to 50%, and in the air this improved to 75%.
4. Using DTIs reduced the bolting crew from three persons to two.

Taking all these cost advantages into account, this study concluded that the overall savings which were attributed to the Squirter DTIs amounted to a little more than one dollar per bolt. And that’s after taking into account the added cost of Squirter DTIs.

So, they concluded, when you use Squirters, even after you pay for the Squirters, you put in your pocket MORE than the cost of the bolts themselves. And, we might point out, you get all the bolts tight, no matter what their length, condition, how long they’ve been stuffed but not tightened, no matter what the condition of the wrenches. And, you get to leave your torque wrench at home.

Is this a great country or what? 