An Introduction to Tensioning

Presented by:

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Bolting Methods

Torque

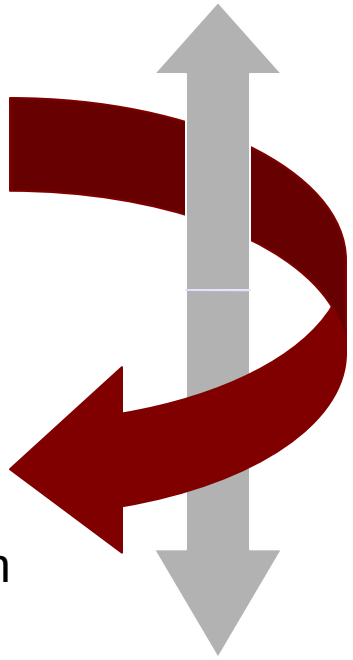
Manual

Crane

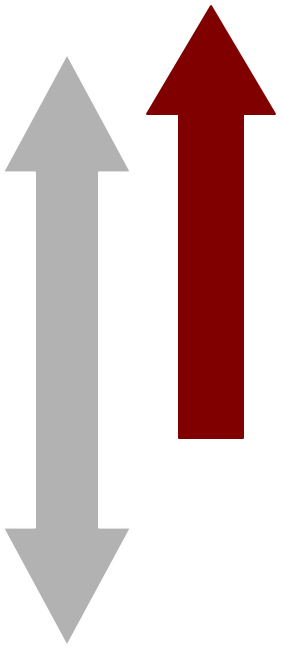
Torque Multiplier

Impact Wrench

Hydraulic Wrench



Tension



Bolt Heat

Mechanical Tensioner

Hydraulic Tensioner

Hydraulic Nut

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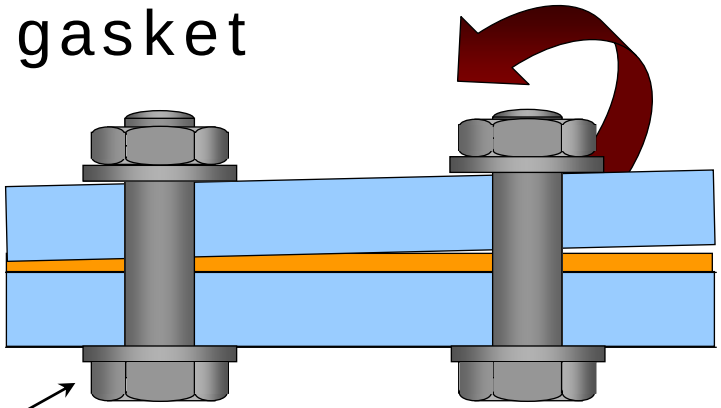
Insufficient Bolt Load

- Insufficient load on fastener
- Insufficient clamping force on joint
- Insufficient compression of gasket
- Resulting in
  - Misalignment
  - Joint Leakage

JOINT LEAKAGE



CORRECT LOAD

UNDER-LOAD

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Best Way to Loosen or Tighten Your Fasteners

Depends on application & accuracy of Residual Load Required

Primary Choices include:

- Torque
- Tension
- Heat
- Turn of the Nut

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Factors in Determining a Solution

- Time
- Safety
- Productivity Savings
- Accuracy Needed
- Accessibility
- Configuration
- Total Cost of Ownership

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A Look at Tensioning

- Modular Tensioners
- Dedicated Tensioners
- Hydraulic Nuts
- Hydraulic Bolts
- Engineered Tensioning Custom Solutions

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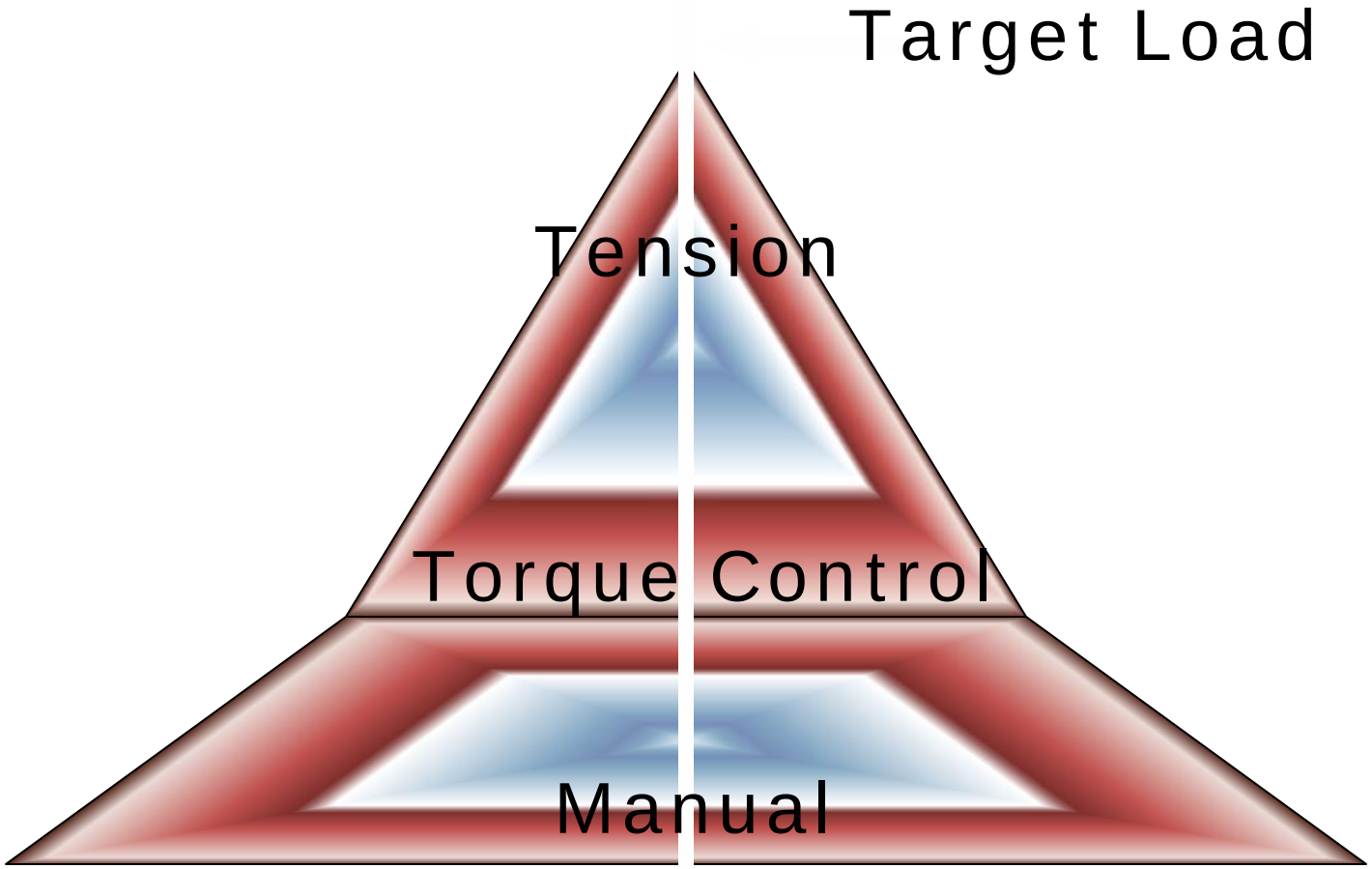
Accuracy



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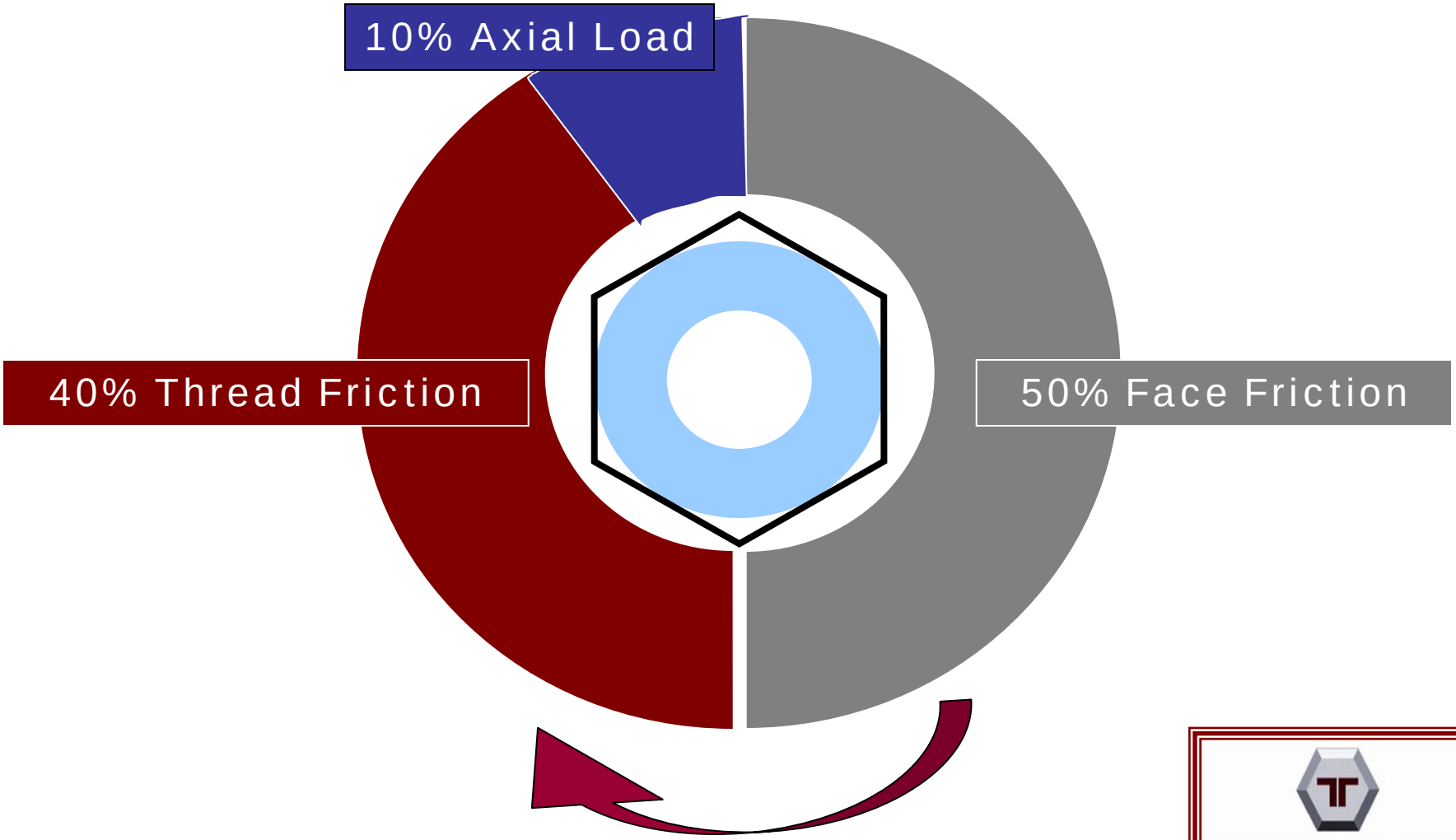
Torque Losses



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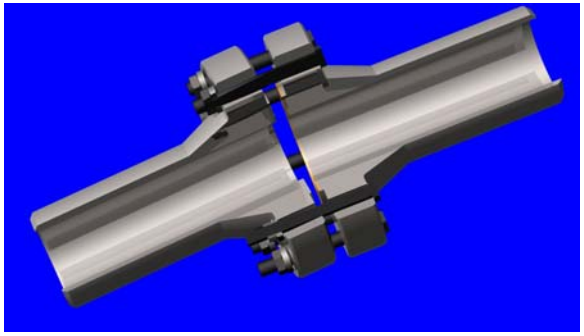
Titan SUPERIOR Bolting Solutions

Things to consider when choosing a tightening method

- How Long and what diameter bolt are we dealing with ?
- Is Galling a problem?
- Is time a strong concern?
- What is the Gasket type?
- Are there Safety Concerns with present method?
- What type of residual Load Accuracy is required?



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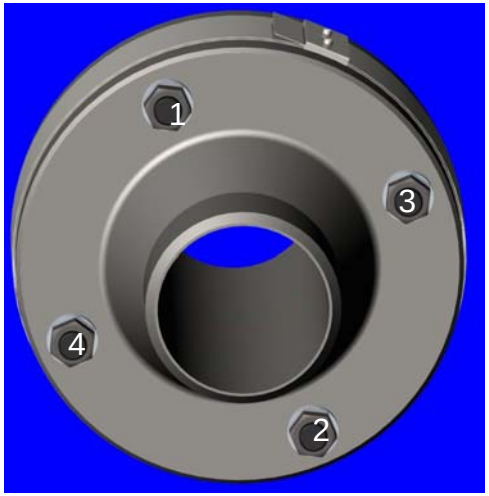
Chasing the Tail Syndrome



4 BOLTS

8 BOLTS

16 BOLTS

1 - 30% of Maximum Torque
3 - 100% Torque

2 - 60% - 70% of Max Torque
4 - Consecutively at 100%

4 passes required = TIME CONSUMING

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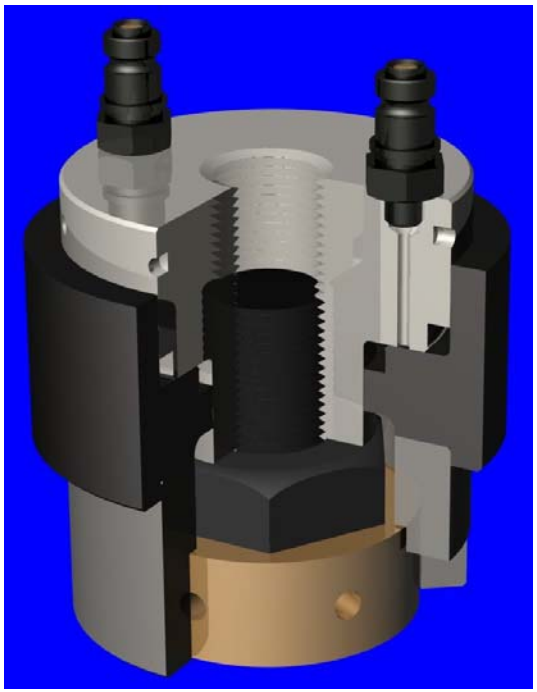
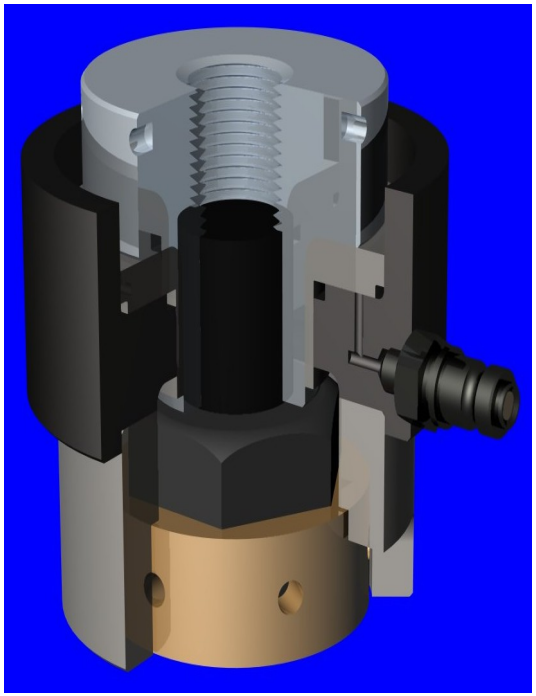
Bolt Tensioner



Dedicated



Modular

IMPORTANT:

Requires thread extension of 1 bolt diameter above nut

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The Tensioner

- Hydraulic means of loading bolt
- Loads bolt in same direction as final load - Stretch
- Very predictable and precise – few friction losses
- Very fast
- Possibility to do multi tightening – up

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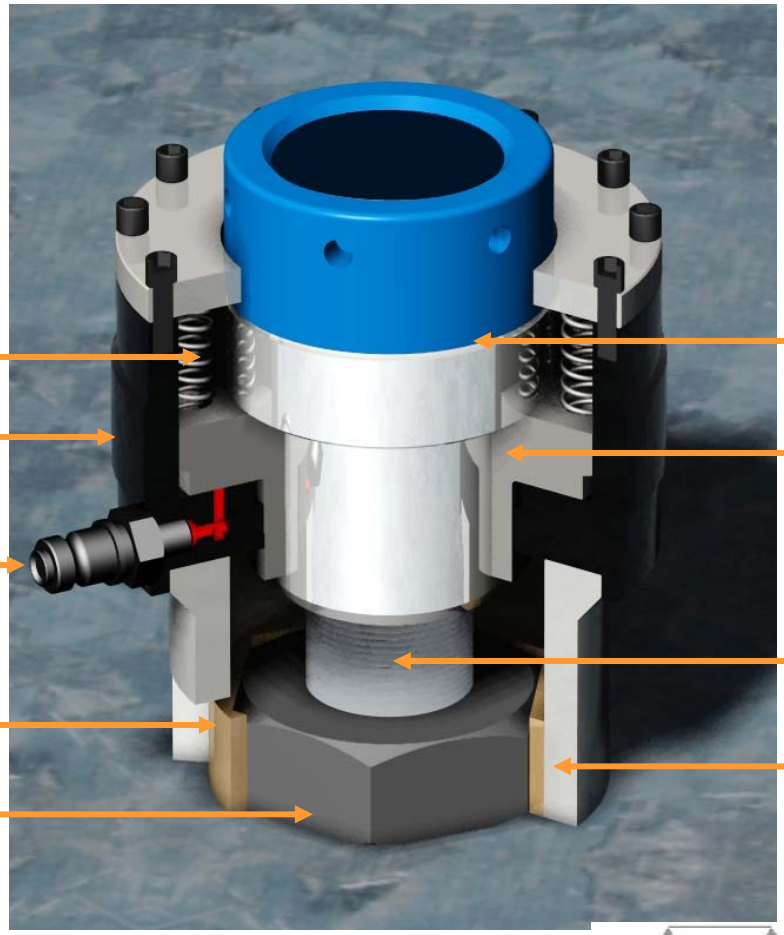
Bolt Tensioner



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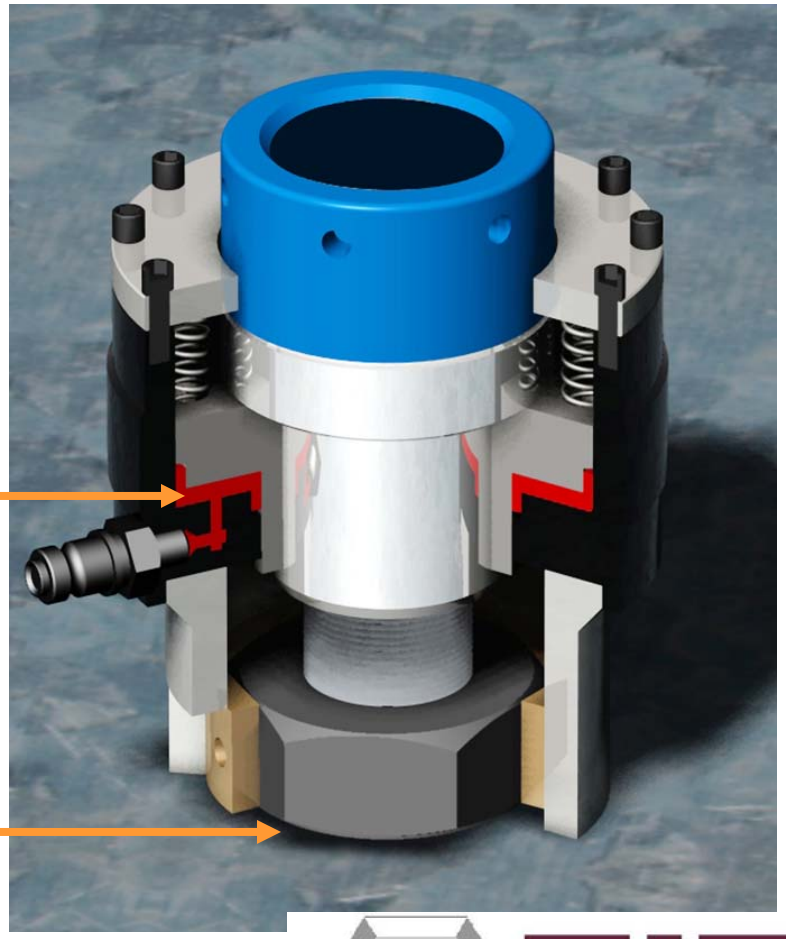
Bolt Tensioner

Oil introduced into load cell pushes piston upwards and stretches bolt

Gap created under nut



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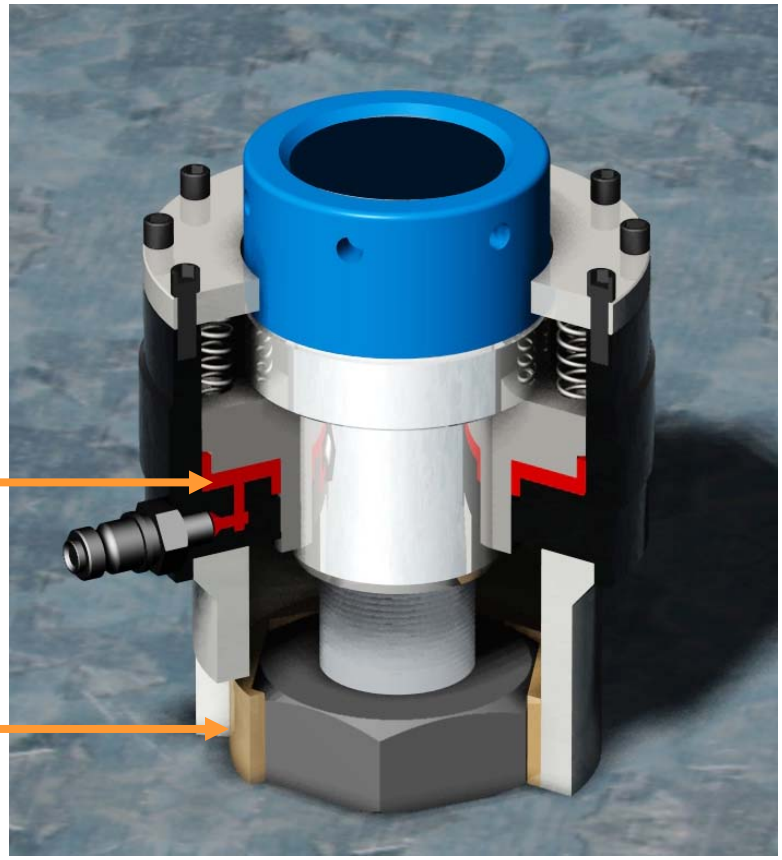
Bolt Tensioner

Pressure x area = known load applied to bolt

Nut is screwed down accessing socket holes Through window in bridge



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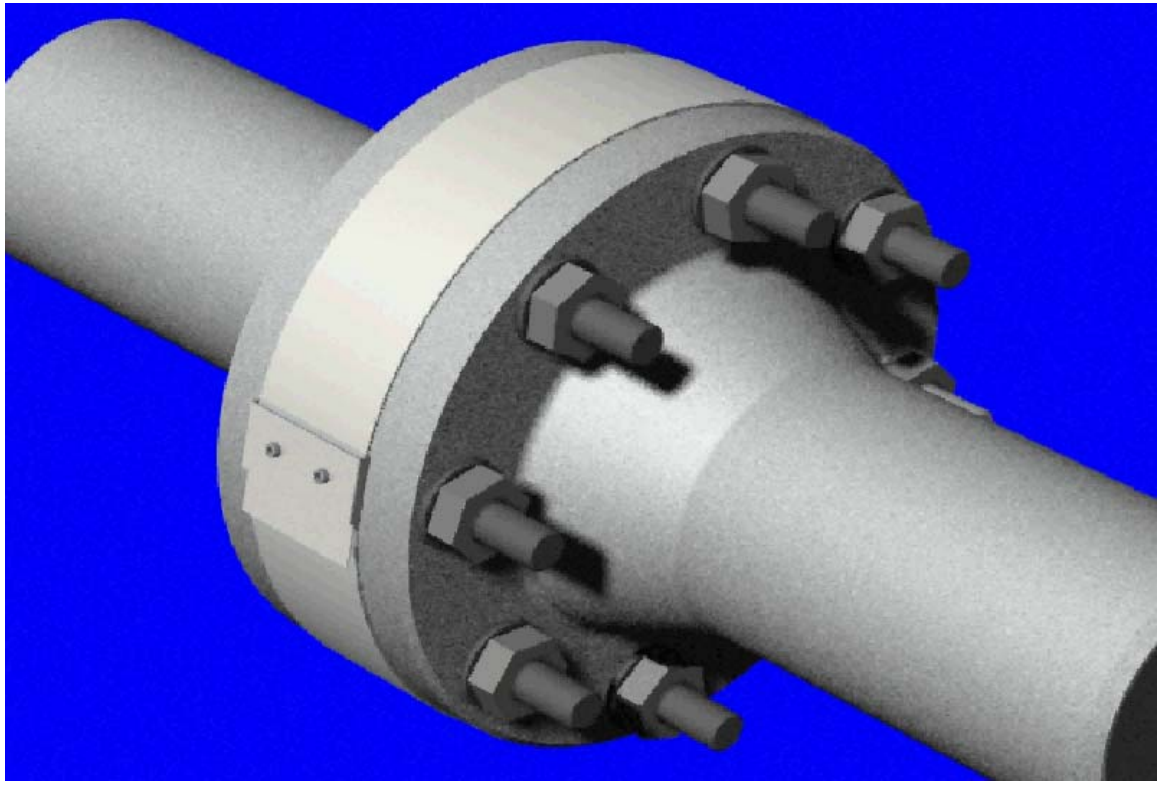
Bolt Tensioner



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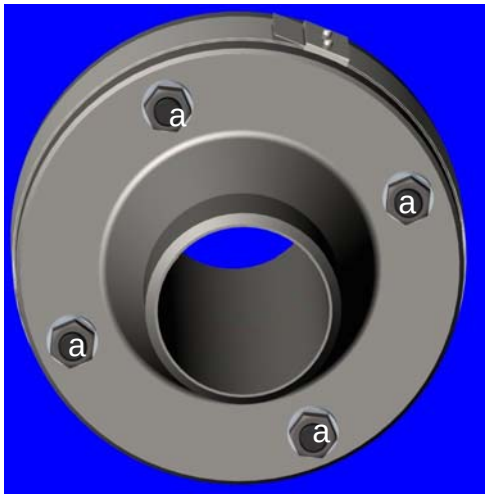
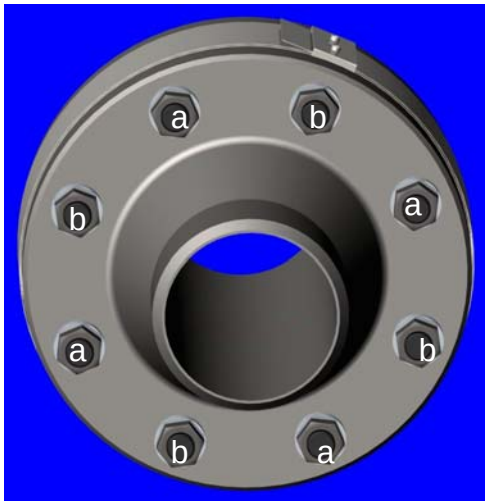
Pressures A + B

2 passes required = TIME SAVINGS



4 BOLTS



8 BOLTS

16 BOLTS

1st Pass:

Pressure A – higher than pressure B – allows for relaxation of load

2nd Pass:

Pressure B – gives correct residual load and relaxes ‘A’ bolts to same

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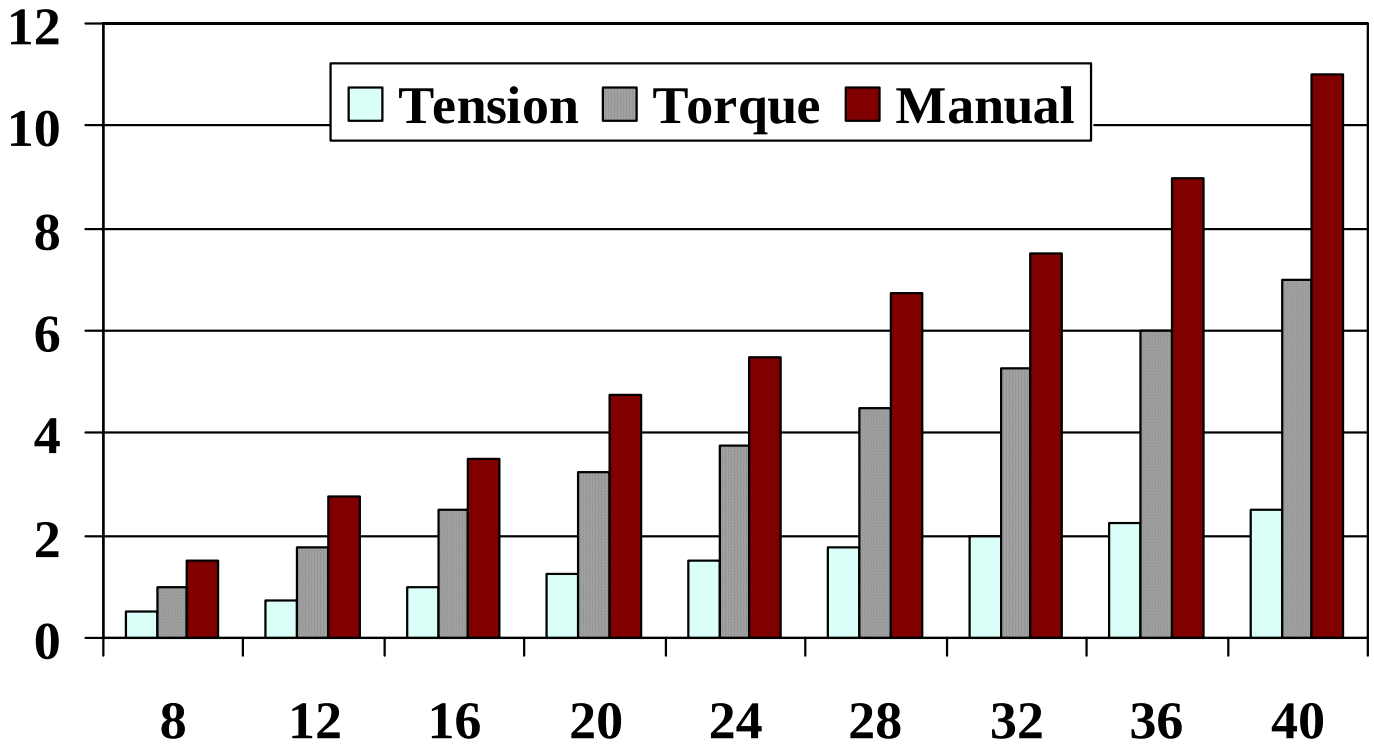
Bolt Tensioner

Hours – 50% Tensioning



No of 2.5” bolts

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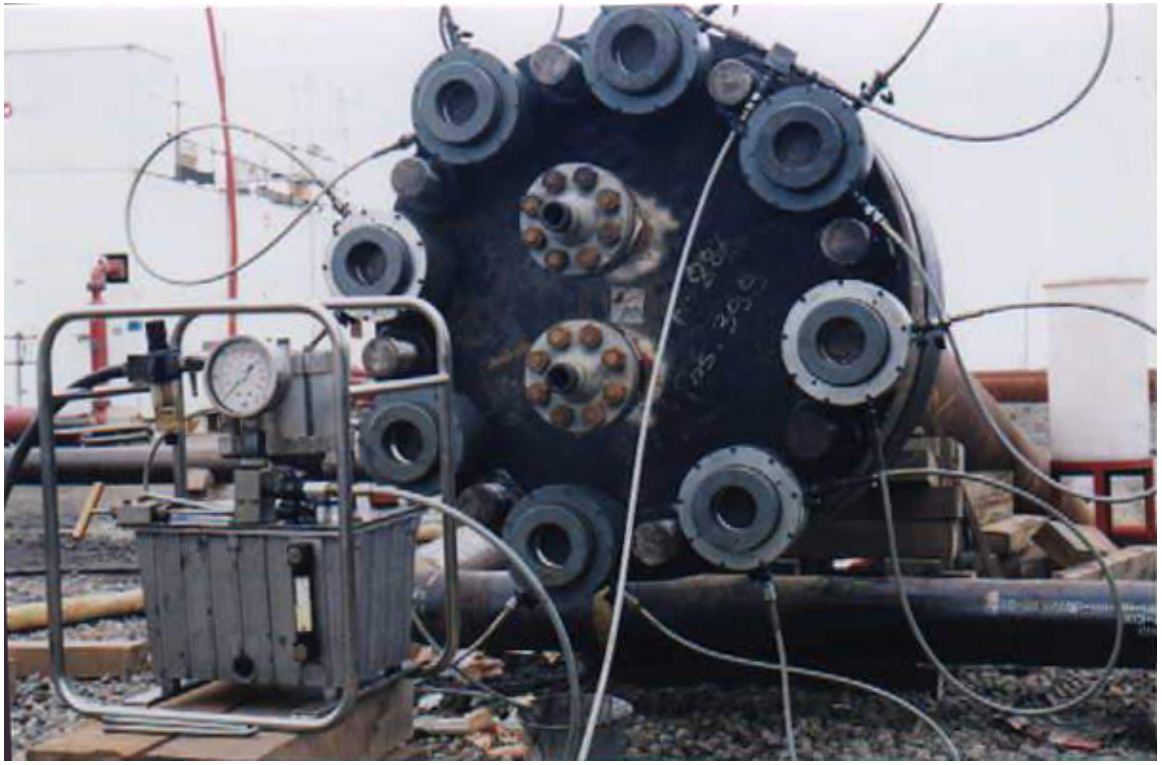
Simultaneous Tensioning



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Simultaneous Tensioning – ¾” – 5”

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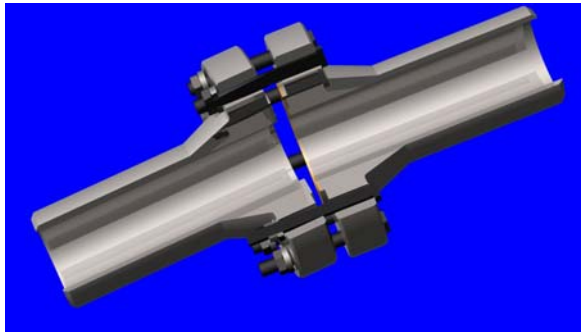
Tension Advantages

1. Accuracy of Load
2. Speed of Operation
3. Even Gasket compression
4. Safety
5. Leak free Start up
6. No Rework
7. Cost Reduction
8. Increased Production
9. Flange Reliability



RIGHT FIRST TIME!

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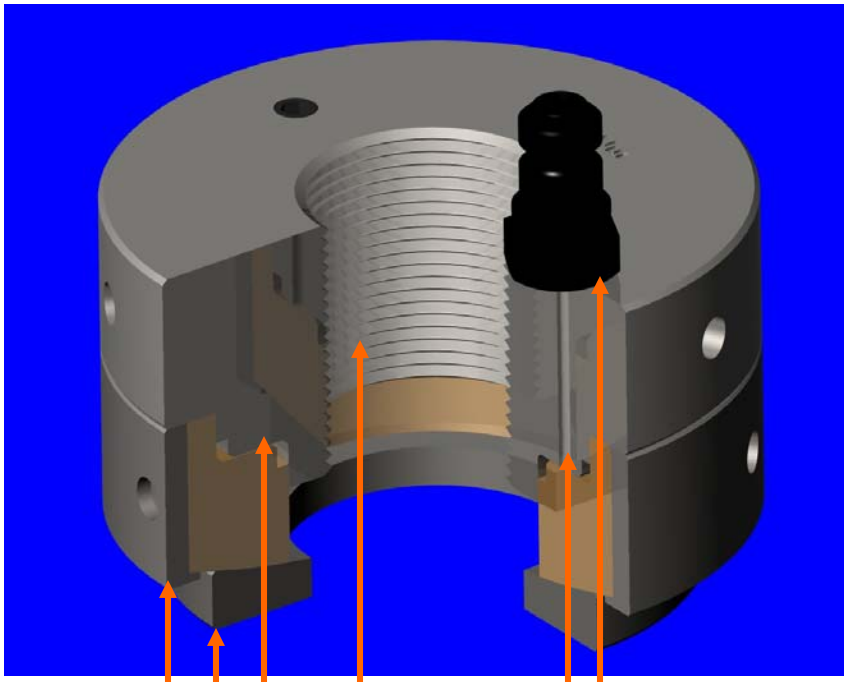
Titan Hydraulic Nut



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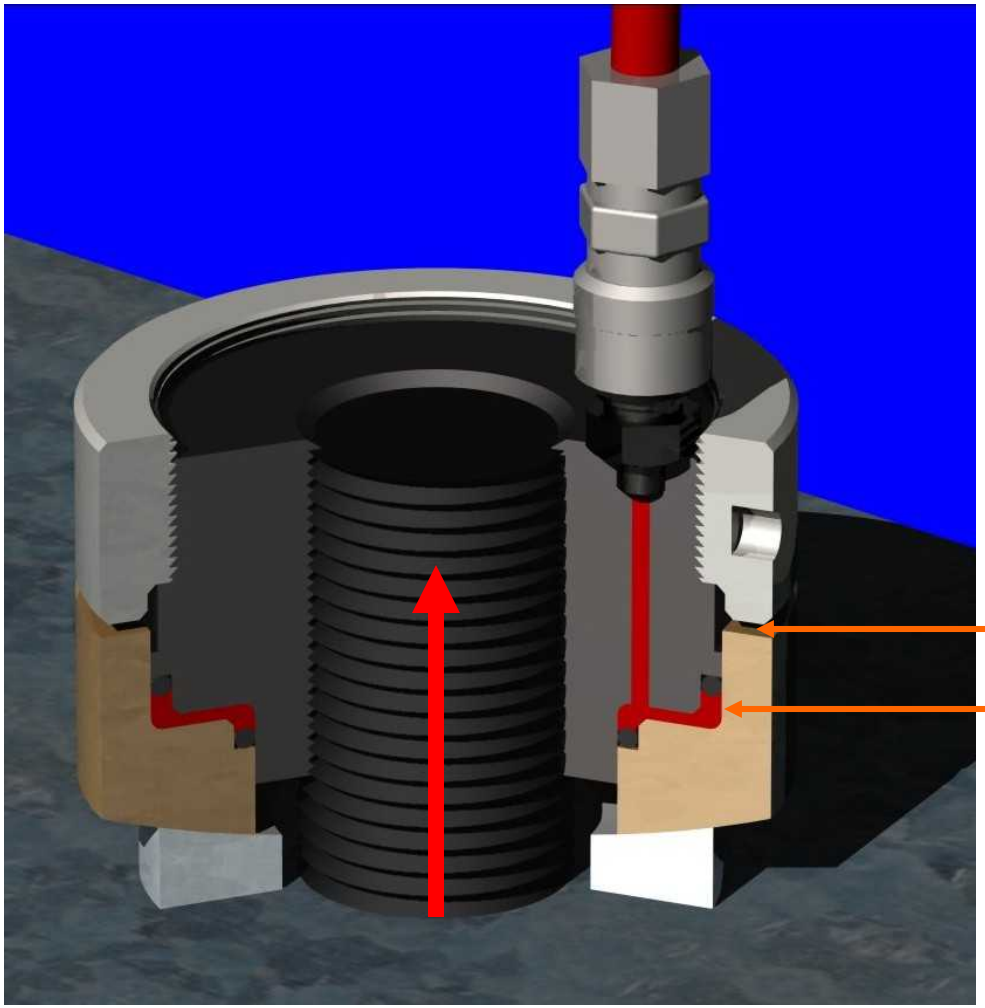
Titan Hydraulic Nut



Gap created under Lockring

Known load applied to bolt

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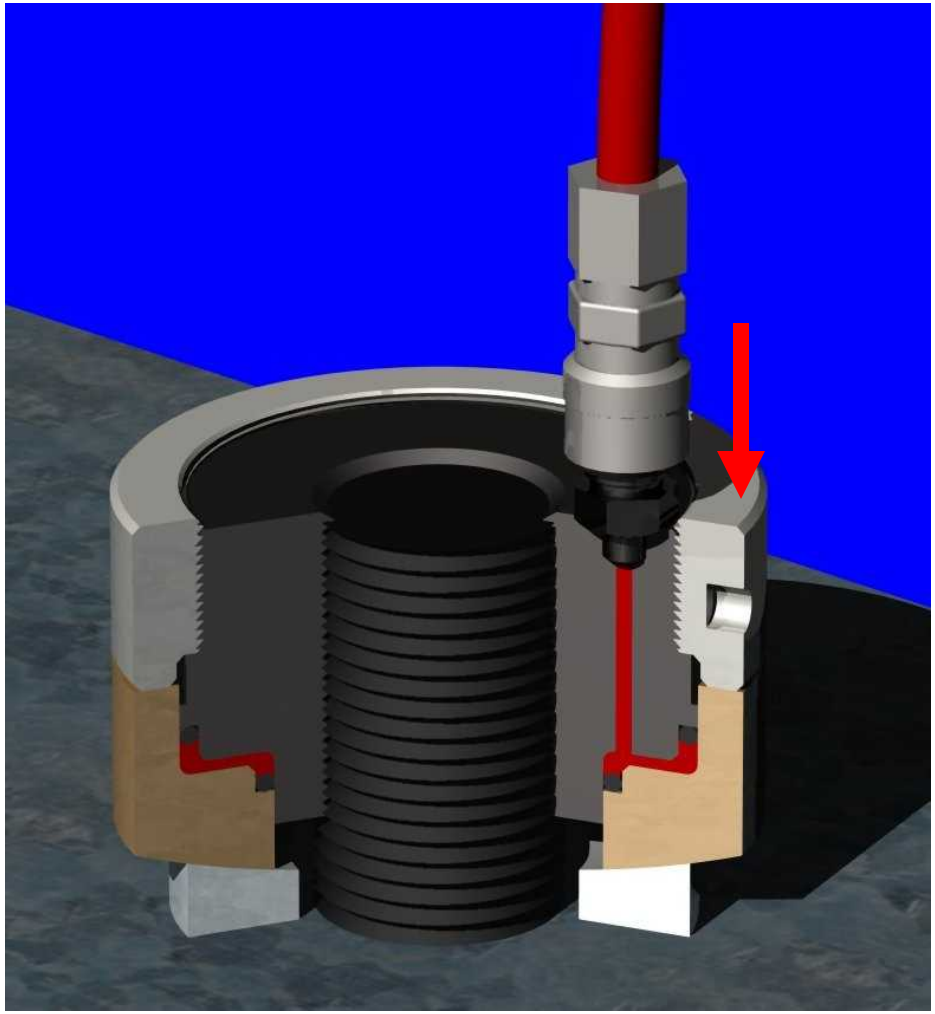
Titan Hydraulic Nut



Gap closed by rotating lockring down onto piston

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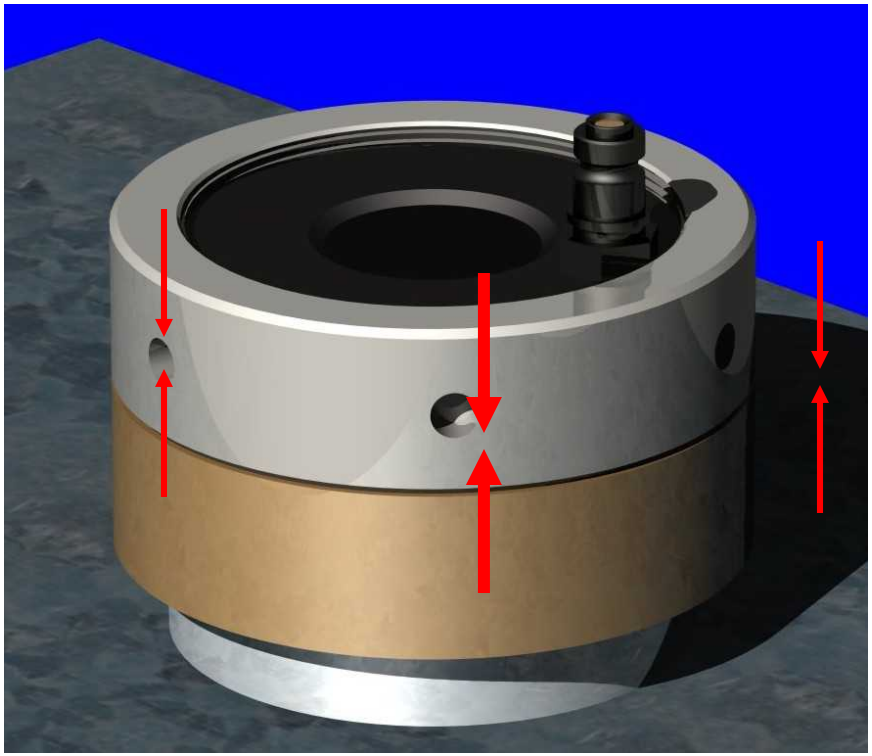
Titan Hydraulic Nut

Hydraulic pressure released,
load retained by lockring



BENEFITS:

Fast

Simple

Safe

Accurate

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Titan Hydraulic Nut

Valve Cover

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Titan Hydraulic Nut

100% simultaneous loading of the flange bolts

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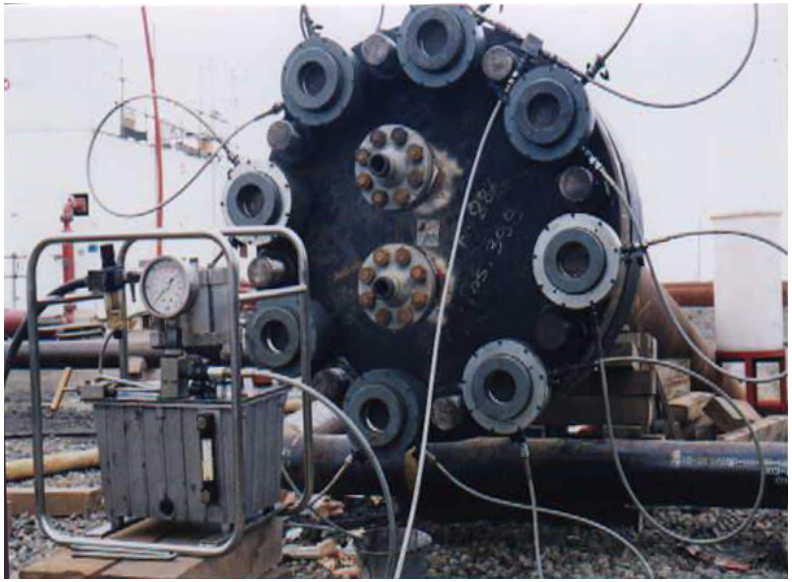
Timings

50% Tensioning:



16 x 3.1/2” bolts
- 2 Hours

100% Hydraulic Nut:

32 x 1.7/8” bolts
- 1 Hour

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Conclusions

Tensioning:

Reduces Environmental Impact

Improves Safety

Reduces Costs

Improves Reliability

Assists in Maximizing Revenue

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Benefits

FAST

SIMPLE

SAFE

ACCURATE

TIME SAVING

COST REDUCTION

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Precision Engineered Solutions

Thank You

Any Questions?

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