

Preview of Safe Bolting Principles and Practices

Aarron Large

Safe Bolting: Principles and Practices

Agenda

- Safe Bolting Principles and Practices Course Description
- Overview of Training and safety in the course
- *Torque and Torque Tools*
- The Joint as a System
- Bolting safety and hazards
- Conclusion
- Questions and Answers

Safe Bolting: Principles and Practices

TARGET AUDIENCE: ANYONE AND EVERYONE INVOLVED IN BOLTING
COURSE CONTENT: SAFETY AND QUALITY AT THE OPERATOR LEVEL
TIME-COST-PLACE: 8-HOURS, \$200 PER STUDENT, CUSTOMER SITES

- ***“Safe Bolting: Principles and Practices”***
- ***Joint sponsor (Texas Engineering Extension Service – TEEX) and 25 U.S. Wind Schools and Colleges use this course for Wind Energy Training***
- ***Certificate of Training for each graduate from HYTORC and our OSHA Training Institute Partner TEEX***
- ***3 optional tracks***
 - *Pressure vessels and piping*
 - *Mechanical Joints*
 - *Structural Connections*



Safe Bolting: Principles and Practices



TRAINING IMPROVES BOTH THE JOB AND PEOPLE!

**WORKPLACE
SAFETY**



**PLANNING
&
PREPARATION**

**PROCEDURAL
SAFETY**



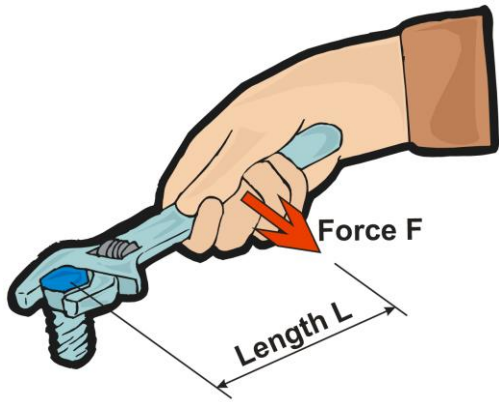
**TRAINING
&
PRACTICE**

**TOOL
SAFETY**



**DESIGN
&
HANDLING**

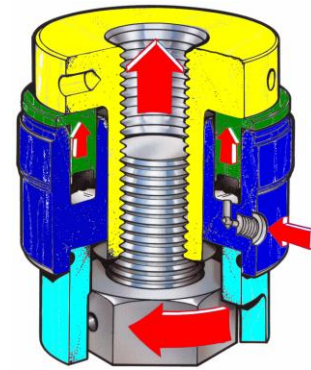
Safe Bolting: Principles and Practices



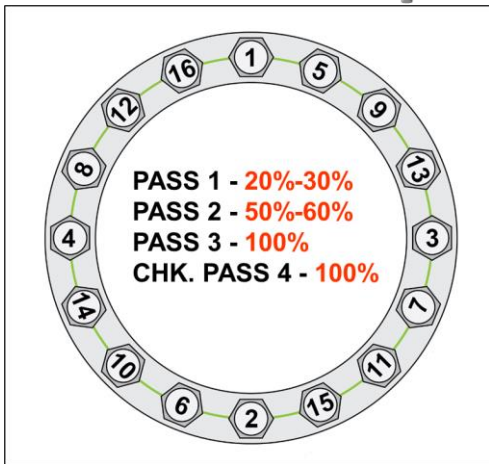
Manual Torque



Powered Torque



Tensioning



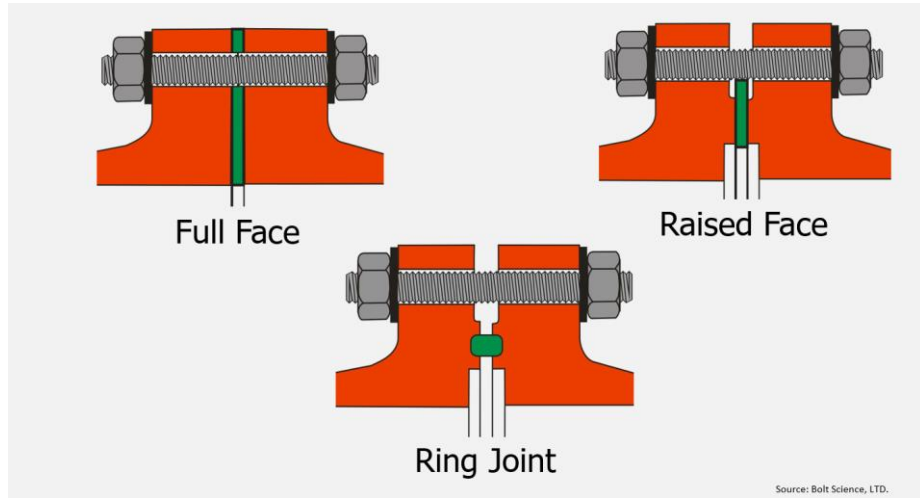
PASS 1 - 20%-30%
PASS 2 - 50%-60%
PASS 3 - 100%
CHK. PASS 4 - 100%

Bolting Patterns



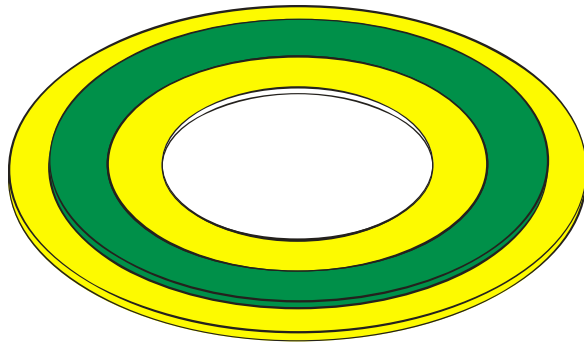
Advanced Solutions

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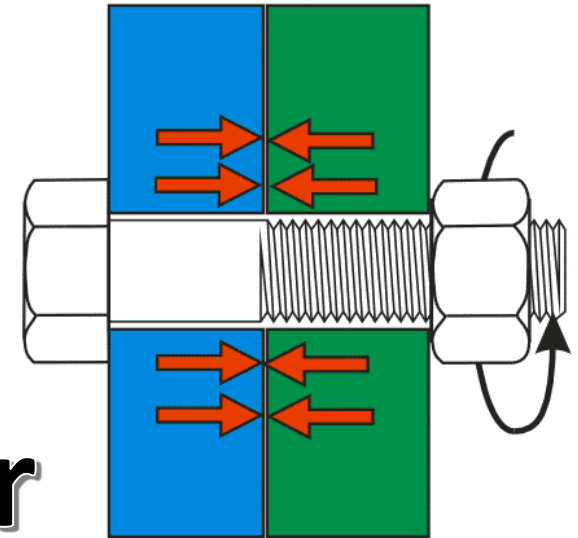
Flanges

Fasteners



Gaskets

All coming together

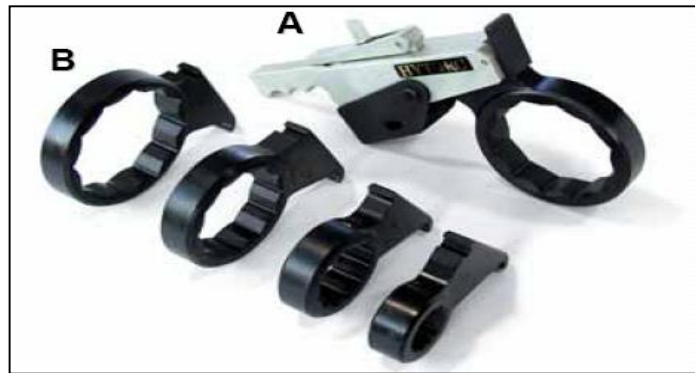
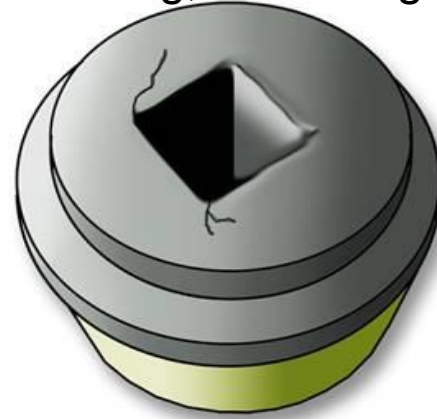


Source: Bolt Science, LTD.

Safe Bolting: Principles and Practices



No Visible Cracks,
Rounding, or Damage



Safe Bolting: Principles and Practices

It must be opened with a key!



Source: Carpenter International Training Fund

- Training in the workplace improves both the job and the people.
- Quality, efficiency, safety, and worker satisfaction all improve.

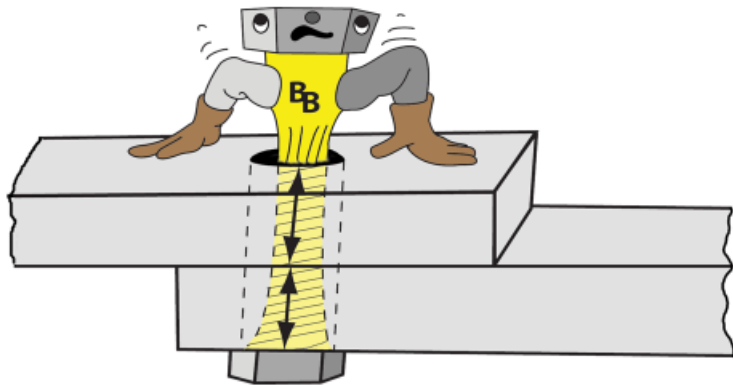
Education benefits everything it touches.

Safe Bolting: Principles and Practices

Introduction to Bolting Safety



The Key Is: - Enough Spring Action To Hold The Joint Together - But Not Too Much Stretch So That That The Bolt Yields And Longer Springs Back



WE WANT TO HIT THE SWEET SPOT!

Introduction and Course Objectives

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For example: **A bolt is a spring!**

When we tighten bolts, the reason we turn the nut is to stretch the bolt.

What the bolt naturally wants to do, is return back to it's **original** shape.

Since the nut holds the bolt in it's stretched position, the bolt then pushes down on the nut and the joint

This allows the bolt to hold the joint together!

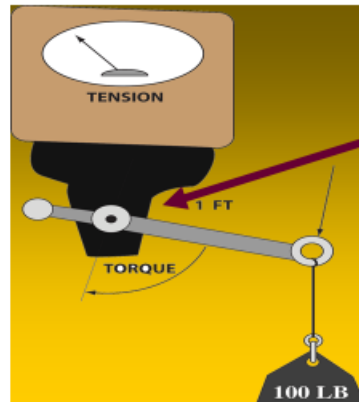
Safe Bolting: Principles and Practices

Introduction to Bolting Safety



In Bolting We Are Interested In

LOAD NOT **TORQUE**



NOTE!

INSIDE THE VISE IS
A SCREW, JUST LIKE
A BOLT IN A
FLANGE

**(But Since Load Is Difficult To Measure
We Measure Torque As Away To Approximate Load)**

Tightening Methods

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Because of this, the goal in bolting is load, not torque.

Although we generally focus on torque in the field, all we are trying to do is supply a sufficient load to hold the joint together

This works, because torque is an easy way to achieve load, and load is generally too difficult to measure directly

In order to ensure you have the correct load, it is imperative that you know the difference between torque and load, but also that you understand the factors in the relationship between the two.

Thank you



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