How to Set Up a Torque Wrench Control & Error Proofing System with Tohnichi Products
Bolt Tightening for Assembly

- Torque wrench critical component in producing high product quality.

- Hand Torque Tools
  - Highly Accurate
  - Cost Effective
  - Easy to maintain and repair

Your Torque Partner
TOHNICHI
## Tool Type Test Comparison

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>% Capability (Six Sigma Scatter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque Wrench</td>
<td>9%</td>
</tr>
<tr>
<td>Adjustable Shut Off Nut runner</td>
<td>25%</td>
</tr>
<tr>
<td>Cordless Impact Tool with control</td>
<td>19%</td>
</tr>
<tr>
<td>Transducerized Pulse Tool</td>
<td>20%</td>
</tr>
<tr>
<td>Shut Off Pulse Tool</td>
<td>34%</td>
</tr>
<tr>
<td>Stall Pulse Tool</td>
<td>43%</td>
</tr>
</tbody>
</table>
Sources of Bolt Tightening Defects

- Man
  - Human Error
  - Missed Tightening
  - Improper Tool
- Method
  - Improper Tightening
  - Wrong Specification
  - Wrong fastening procedure
  - Wrong Tool Selection
  - Improper Equipment
  - Inaccuracy
  - Mechanical Failure
- Machine
  - Improper Materials
  - Out of Tolerance
  - Defective Materials
  - Insufficient lubricant
- Materials

Your Torque Partner
TOHNICHI
How to Insure Proper Torque

- Use Correct Tool
- Confirmation of “Click”
- Actual Tightening Torque Data
- Confirm Tightening with Quality Torque Inspections
- Confirm Tool Function & Accuracy
- Proper Tool Usage
Poka-yoke="Error Proofing"

Simple Effective Method to Avoid Errors.
- Behavior shaping constraints or methods preventing human errors

OPPS! What if I didn’t torque that bolt??!??!
Torque Error Proofing Methods

- Use Correct Tool
  - QSP/CSP with Colored Grips
- “Click” Confirmation
  - MPQL/CMQSP Ink Marking
  - LS Limit Switch Wrenches
  - FH Wireless Version
QSP/CSP with Colored Grips

- Identify Preset Values
- Identify Correct Tool Type
- Set up for specific product production

Use Correct Tool

Your Torque Partner
TOHNICHI
Ink marks top of bolt only when torque setting is achieved.

No mark without torque tightening

Confirmation of “Click”
LS Limit Switch Wrenches

- Micro switch sends relay signal to PLC or CNA-4mk2 when torque value is achieved
  - Cord connection
    - Controls area where tool can be used
    - Keeps tools secured in area

Confirmation of “Click”
FH256MC Wireless Torque Wrench and Receiver System

FH Type Torque Wrench
Available on various “click” type torque wrenches

Model, R-FH256 Receiver Box

Use Correct Tool
Confirmation of “Click”
“Click”
Torque Set Achieved!

PLC or CNA-4mk2

Counts
4
3
2
...X

Recheck Work!

Your Torque Partner
TOHNICHI
Torque Wrench “Error Proofing” System

1) Wrench Style Selection
   - Radio Frequency Transmission Style
     - Model FH256Mc
     - Radio Signal Receiver Box, Model R-FH256
     - OR

2) Cable Connection Style (LS)
   - Model QL1.5

Example of Work Piece
- Bolt 1
- Bolt 2
- Bolt 3
- Bolt 4

Visually Counts Number of “Clicks”

Once torque is achieved, wrench “clicks” and sends a signal to equipment that counts and tracks the process.

Count Checker CNA-4mk2 or

PC or PLC

Go To Next Process

Alert and Check Buzzer Light Stop line

Hard Wired
How to Insure Proper Torque

- Use Correct Tool
- Confirmation of “Click”
- Save Actual Tightening Torque Data
- Confirm Tightening with Quality Torque Inspections
- Tool Calibrated and Set Correctly
- Proper Tool Usage
Torque Data Products

- ACLSD/ CSPD “Click” with CD42 Display
- FHD “Click” with data confirmation
- CEM3 Measuring/Tightening
- ST2, Spot Checks & Automated Tool Confirmation
CSPD Torque with Data

- ACLSD and CSPD
  - Wrench calibrated to display
  - Click and torque valued confirmed

- Confirmation of “Click”
- Save Actual Tightening Torque Data
FHD with Torque Data

- Torque value confirmed by user
- Judgment Lights
- Compact and Wireless

Use Correct Tool
Confirmation of “Click”
Save Actual Tightening Torque Data

Your Torque Partner
TOHNICHI
CEM3 Digital Torque Wrench

- CEM3
  - Quality Inspections
    - Verify original tightened torque
  - Tightening Mode
    - Light and Buzzer when Lo setting reached

Save Actual Tightening Torque Data
Confirm Tightening with Quality Torque Inspections
ST2, Spin Tork

Compact Rotary Peak Torque Meter

- Inspection of Nut runner Output
- Tightening Data Confirmation

Save Actual Tightening Torque Data
Confirm Tightening with Quality Torque Inspections
How to Insure Proper Torque

- Use Correct Tool
- Confirmation of “Click”
- Save Actual Tightening Torque Data
- Confirm Tightening with Quality Torque Inspections
- Tool Calibrated and Set Correctly
- Proper Tool Usage
Traceability & Accuracy

- Torque Wrench: +/-3%
- Torque Tester: +/-1%
- Calibration Kit: Lever and Dead Weights: +/-0.3%
- (NIST) Traceability to Length and Mass Standards

Higher Accuracy

Calibration Intervals:
- Daily/Weekly/Monthly
- Yearly
- 3 Years
- Longer Calibration Intervals
Tester vs. Checker

- **DOTE3/TCC/TF Torque Wrench Testers**
  - Loading Mechanism
  - Consistent Force
  - Stable Testing especially for reading scales
  - Bi-directional

- **LC2 Line Checker**
  - Quick Test Method
  - Ideal for “Click” Wrenches
  - Captures Peak
  - Replicates application pull

*Your Torque Partner TOHNICHI*
LC2 Line Checker

- Daily Inspection Prior to Use
- Tracks Tool Performance
- Involves User and Confirms Proper Usage with Accurate Torque Values
- Easy to determine if tool is set properly and functioning correctly

Tool calibrated and set properly
Proper Tool Usage

Your Torque Partner
TOHNICHI
Torque Basics

Torque = Force x Distance

\[ T = F \times L \]

so that:

\[ T_1 = F_1 \times L_1 = 10 \text{ lbs} \times 2 \text{ ft} = 20 \text{ ft-lbs} \]

\[ T_2 = F_2 \times L_2 = 20 \text{ lbs} \times 1 \text{ ft} = 20 \text{ ft-lbs} \]

T1 = T2
Proper Use of Torque Wrench

- Error (%)
- Grip position (mm)
- Effective Length $L_0$
- Pin, Head
- Effective length Line
- $F_0$
Proper pulling with hand centered on grip
Give consistent smooth pulling motion
Tester will capture peak torque
Tohnichi Torque Testers

- Loading Bar
- Tool Management

DOTE3

TF

TCC

Tool calibrated and set properly
Torque Wrench Management System

Daily Check
Tightening “Click” Type Tools
- Model QSP, Preset Type
- Model FH256MC
- Model AC

Torque Check
- Quick & Easy Inspection by User
  - Torque Wrench Checker
    Model LC
  Usage: OK → Use on the Assembly line.
  NG → Send to Calibration Lab.

Periodic Calibration
Tightening and Inspection Tools
- Model CEM3 Digital Type
- Model DB, Dial Type
- Model QLLS, Adjustable Type

Calibration and Adjustment
- Precise Inspection by Trained Calibration Person.
  Calibration: OK → Calibration
  NG → Repair or Replace

Torque Wrench Tester
Model DOTE3
Verify with Periodic Calibration

Utilize Error Proofing Techniques

Confirm with Torque Data

Produce High Quality Product

Track with Quality Inspections

Utilize Error Proofing Techniques

Your Torque Partner
TOHNICHI