



# TORQUE VERIFICATION PROCESS OF POWER TOOLS

---

AUTHORED BY

Damian Valdiviezo  
Product Manager, Mountz Torque

# WHITE PAPER SYNOPSIS

Manufacturing companies globally that use fasteners, bolts, and nuts need to ensure their torque process and quality standards are complying with international standards, like ISO. Establishing quality guidelines comes down to developing a detailed manufacturing process control, and executing it with quality assembly torque tools capable of meeting specifications, along with verifying the tools, the process and results.

## Table of contents

Types of assembly power tools.....	page 3
How to preset a power tool.....	page 3
Torque verification plan and schedule.....	page 6
Torque verification with EZ-TorQ III.....	page 7
Key claims of EZ-TorQ III.....	page 8

## Types of assembly power tools

For moderate- to high-volume fastening applications assembly power tools are often the tool of choice to meet the pressing production demands. There are various types of quality power tool options to select and some brands and tool types are better than others. It is key to educate yourself and test a power tool to confirm how it performs on your fastening application. The tool you select will have an important impact on the fastening quality of the products being produced.

Torque-controlled power assembly tools are available in different categories:

- Pneumatic shut-off clutch tools
- Electric shut-off clutch tools
- Battery shut-off clutch tools
- DC current control tools
- DC transducerized control tools
- Pneumatic pulse tools
- Battery pulse tools

All these type of power tools must be preset to a target torque value, as specified by the assembly process. These types of tools must be verified frequently to ensure that the correct torque is being delivered every time it is operated.

## How to preset a power tool

There are three ways a power tool can be preset to a select torque value:

### 1. Manually setting a power tool:

Some assembly power tools can be set mechanically. The tool has a reference scale that can be adjusted manually, along with a

torque reference chart in the manual. Other power tools offer programming software that allows you enter the preset torque value for the fastening application.

Either option for setting the torque value for a power tool doesn't mean that torque value will be transferred 100% of the time to the fastening joint. These must be set using a reference or master torque measuring device.

### 2. Using a Static / Reaction Torque Analyzer or Torque Sensor

There are two types:

- a. Torque analyzer with built-in torque sensor
- b. A stand alone torque sensor that connects externally to a torque analyzer

Both types of equipment fulfill the same torque measurement needs. A torque analyzer or sensor is a finely tuned instrument designed for calibrating and verifying torque tools.

There are many brands in the market to select from, and some test equipment is more sophisticated than others. To select the proper torque analyzer or torque sensor, consider the needs of your tool, quality of the measurement equipment, the features of the analyzer or sensor, safety certifications, and, most importantly, ISO 17025 Standards.

The torque analyzer or sensor have a rated torque range capacity. The power tool's torque capacity must fall in between the torque range capacity of the torque analyzer or sensor. Mountz recommends the power tool's maximum torque capacity fall in between 20% to 80% capacity of the torque analyzer or sensor.

## How to measure power tool torque output with a static / reaction torque analyzer or torque sensor

1. Adjust the torque of power tool to the minimum torque setting.
2. Adjust the torque analyzer to the desired type of unit of torque measurement. The torque analyzer or sensor should be properly secured on a solid surface or a test bench.
3. Always use a quality joint rate simulator (run down adapter or RDA\*) with a torque analyzer when testing power tools.
4. The run down adapter (RDA) is mounted in-line between the tool's drive and torque analyzer or sensor.
5. When the power tool applies torque the RDA engages the static or reaction torque sensor, creating a torsion movement. The RDA runs down creating compression and the sensor will detect a maximum peak applied and the torque reading will be displayed.
6. The power tool is then adjusted up or down of its torque capacity and retested until achieving the desired torque value for the application.
7. Once the desired torque is set, several torque readings need be taken to evaluate the tool's repeatability. The lower percentage value of repeatability, confirms accuracy and reliability of the tool's fastening cycles for the fastening process. Mountz recommends a CmK test study to preset a power tool, taking in consideration the tool's speed, accuracy, and the target torque with low and high torque limits, to perform the test. The result will be based on tool's performance for the intended fastening application for the manufacturing process. Tool accuracy can't be based on a tool's performance alone.
8. A good quality assembly process requires all torque tools to be verified with a torque measuring device on a daily basis.

\*Note: RDA is not needed for pulse tools.

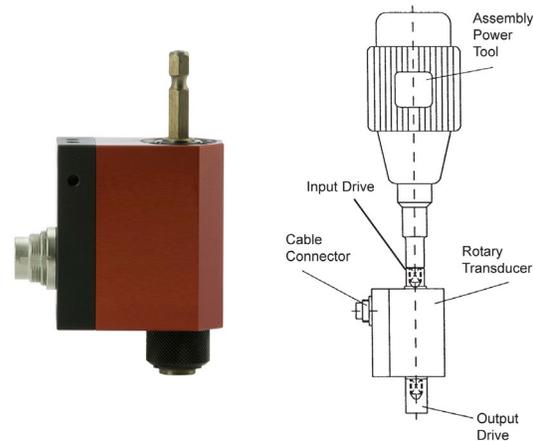
3. **Using a rotary torque sensor:** These sensors are ideal for dynamic torque measurement application. The sensor plugs into a torque tester or torque analyzer.

The rotary torque sensor is the ideal torque-auditing tool for testing the actual torque being applied on the assembly application. It's an instrument that quickly attaches to a power tool's drive, without interfering with the tool's ability to fasten a screw or bolt. As the tool's operator, whether human or robotic, tightens the fastener, the rotary torque sensor detects how much torque is applied until the tool shuts off and torque is applied to the fastener. Rotary torque sensors measure torque under actual joint conditions, returning the most accurate results possible.

There are many brands in the market to select from, and some rotary torque sensors are more sophisticated than others. To select the proper rotary torque sensor, consider the needs of your power tool, quality of the

measurement equipment, the features of the sensor, safety certifications, and, most importantly, ISO 17025 Standards.

The rotary torque sensor has a rated torque range capacity. The power tool's torque capacity must fall in between the torque range capacity of the torque sensor. Mountz recommends the power tool's maximum torque capacity fall in between 20% to 80% capacity of the torque sensor.



## How to measure power tool torque output with a rotary torque sensor

1. Adjust the torque of power tool to the minimum torque setting.
2. Connect the power tool to the "input drive" side of the rotary sensor. Connect bit and/or adapter to "output drive" of the rotary sensor. Connect the sensor to a torque analyzer and follow the operating instructions for that analyzer.
3. As the power tool engages the fastening joint and torque is applied the rotary torque sensor will detect a maximum peak applied and the torque reading will be displayed.
4. The power tool is then adjusted up or down of its torque capacity and retested until achieving the desired torque value for the application.
5. Once the desired torque is set, several torque readings need be taken to evaluate the tool's repeatability. The lower percentage value of repeatability, confirms accuracy and reliability of the tool's fastening cycles for the fastening process. Mountz recommends a CmK test study to preset a power tool, taking in consideration the tool's speed, accuracy, and the target torque with low and high torque limits, to perform the test. The result will be based on tool's performance for the intended fastening application for the manufacturing process. Tool accuracy can't be based on a tool's performance alone.
6. A good quality assembly process requires all torque tools to be verified with a torque measuring device on a daily basis.

## Torque verification plan and schedule

Torque measurement is a key component for any quality control process. Simply tightening a fastener or bolt down until it's snug and tight, and assuming the torque control process is complete, is no longer sufficient. Measuring torque doesn't stop once the assembly process is complete. As part of the overall quality control process, manufacturers should include a Torque Verification Program, a method to detect loose fasteners or any signs of joint relaxation. Torque verification validates the fastening process, the torque tool, the product design, and the materials used for the application.

The precise control of torque is a key to quality assembly and can ensure that products perform as expected. A single fastener, inaccurately or incorrectly tightened, can lead to the failure of a product, which impacts the bottom line. In many cases, companies spend a great deal of time and money for disposal or repair of damaged parts during assembly, the result of improper torquing.

Key reasons for conducting a torque verification:

- Substantiates that assembly procedures reflect actual practice (what we say is what we do).
- Reveals the consistency with the assembly process (from person to person, or day to day).
- Uncovers inaccuracies with the assembly process so it can be quickly corrected.
- Promotes ongoing corrective actions.
- Encourages process improvement.

A quality manufacturing process must have a daily torque verification plan for any assembly power tools being used in the production area. Manufacturing processes have critical and non-critical assembly parts. An engineer should identify these in order to create a Torque Verification Program, selecting a power tool for a fastening application and establishing a maintenance program.

- Power tools used for critical assembly parts must be verified before the start of each manufacturing shift.
- Power tools used for non-critical assembly parts should be verified on daily basis.
- All power tools must be verified after being serviced or after being relocated to a new work station or new fastening application.
- A power tool that drifts out tolerance must be removed from the production area immediately.

Potential issues that cause the power tool to be out of tolerance:

- Routing maintenance is required for the power tool.
- Power tool is due recalibration based on usage.
- Poor quality fasteners used for the application impact tool's performance.
- Any changes to the joint components, such as humidity, lubrication, and/or change of materials.
- Torque measurement equipment has not been recalibrated as scheduled.

Note: All torque testing equipment in a quality manufacturing process environment must be recalibrated at least once a year per ISO17025.

## Torque verification with EZ-TorQ III

**AN EASY-TO-USE TORQUE VERIFICATION TOOL,  
PROVIDING TORQUE CONTROL AT YOUR FINGERTIPS**

For quality-minded assembly professionals that are wanting to ensure their small hand and non-impacting torque tools are accurate every time they are on the floor, meet the next generation of torque validation – the EZ-TorQ III.

The EZ-TorQ III is our third generation torque tester, that comes with various features to assist quality teams in performing different types of torque measuring routines. Torque verification and repeatability testing is a central part of this portable unit.

Highly portable and user friendly, this battery powered torque validation hub can be easily carried around the assembly line to spot check tools, as part of a QA program, or used at assembly stations for quick and easy torque tool validation and calibration. The new smart phone-like touchscreen interface breaks down barriers and ensures quick and easy validation of different ranges, as needed.



### How to verify a power tool's repeatability\*\* performance with EZ-TorQ III

1. Make sure the power tool is within the torque range of the EZ-torQ III model.
2. Select the proper screw run down adapter that meets torque output of the power tool.
3. Perform at least five warm up run downs.
4. Then perform and 25 run downs. The torque readings will be captured and automatically saved on the EZ-TorQ III memory.
5. The lower percentage value of repeatability, confirms accuracy and reliability of the tool's fastening cycles for the fastening process.

\*\*Definition: The lack of variation amongst multiple measurements taken under the same conditions.

## Key claims of EZ-TorQ III

PRODUCT OVERVIEW		
FEATURE	ADVANTAGE	BENEFIT
Seven Units of Torque Measurement: ozf.in, lbf.in, lbf.ft, cN.m, N.m, kgf.m, kgf.cm	<ul style="list-style-type: none"> <li>Multiple options to choose from</li> </ul>	<ul style="list-style-type: none"> <li>Any global region will have the desired units of measurement</li> </ul>
Mountz EZ-TorQ III Data Streamer (Microsoft Office 365-based interface software)	<ul style="list-style-type: none"> <li>Capture torque readings</li> <li>Ability to download readings</li> <li>Flexibility and ease of use</li> <li>Interacts with Windows Excel</li> </ul>	<ul style="list-style-type: none"> <li>Ability to analyze data and calculate statistical data</li> <li>Creates a historical record of your torque readings</li> <li>Documentation solution</li> </ul>
Data Download and Memory	<ul style="list-style-type: none"> <li>Multiple data transfer options</li> <li>Compatible with 8 GB SD memory card</li> <li>Real-time data acquisition via mini USB</li> </ul>	<ul style="list-style-type: none"> <li>Built-in data storage</li> <li>Download data to external devices</li> <li>SD card is removable and portable</li> <li>Easy to store and transfer data</li> </ul>
Multi-language Operation	<ul style="list-style-type: none"> <li>Multiple language options to choose from: English, Spanish, French, German, Chinese, or Portuguese</li> </ul>	<ul style="list-style-type: none"> <li>Globally accepted</li> <li>Operator uses the language most comfortable with</li> </ul>
Digital Color Touchscreen Display	<ul style="list-style-type: none"> <li>Latest technology</li> <li>Vibrant colors to process information</li> <li>Easy-to-view color indicators for tolerance settings</li> </ul>	<ul style="list-style-type: none"> <li>Enhance user experience</li> </ul>
Intuitive User Interface	<ul style="list-style-type: none"> <li>Data displayed on color screen</li> <li>Digital color indicator for target torque and tolerance settings</li> <li>Display operational in two viewing options</li> <li>Data history option displays last 10 test results</li> <li>Graphing feature allows you to set a target zone and view torque-up curve</li> </ul>	<ul style="list-style-type: none"> <li>Innovative experience (first-in-class UX/UI)</li> <li>Easy-to-follow menu and user interface save set up and training time</li> <li>Enhanced visual display</li> <li>Easy and quick to setup</li> </ul>
Long Battery Life	<ul style="list-style-type: none"> <li>Rechargeable lithium-ion battery with capacity up to 11 hours of operation</li> </ul>	<ul style="list-style-type: none"> <li>Operates longer between battery charges</li> </ul>
Portability	<ul style="list-style-type: none"> <li>Compact and small size</li> </ul>	<ul style="list-style-type: none"> <li>Can be used in production floor or in calibration lab</li> <li>Test small hand screwdrivers, torque wrenches, and non-impacting power tools</li> </ul>
SPC On Screen	<ul style="list-style-type: none"> <li>View data in real time</li> </ul>	<ul style="list-style-type: none"> <li>Min, Max, STD DEV, Cm and CmK calculation on screen</li> <li>GO/NG data</li> <li>Data is easily accessible</li> </ul>



#### ABOUT MOUNTZ

Mountz, The Torque Tool Specialists®, has been a leader in the torque tool industry for more than 50 years. Engineered in the Silicon Valley and serving the globe, Mountz focuses on delivering high-quality torque products, services, and solutions to ensure customers can always proceed with confidence. We are committed to forging a safer world through precision and accuracy, and by innovating every day.



[mountztorque.com](http://mountztorque.com)

#### SILICON VALLEY HEADQUARTERS AND SERVICE CENTER

1080 N. 11th St., San Jose, CA 95112  
408-292-2214 / M-F 6am-5pm PST

#### ALABAMA DISTRIBUTION AND SERVICE CENTER

19051 Underwood Road, Foley, AL 36535