ZIPPTORK
Bolting Technology
Torque Control、Bolt Load Control

BLMS
Bolt Load Monitoring System
&
Competitive Products Analysis

Passion for Innovation

Your Problem ～ Our Inspiration

PREFACE

ZIPPTORK Bolting Technology

ZIPPTORK **is one of the few companies in the industry capable of developing thread fastener tightening-associated torque controllers and transducers.**

ZIPPTORK has been working for decades on the development of various assembly technologies, such as the bolting of thread fasteners, the riveting or squeezing of solid or hollow rivets, the blind riveting of blind rivets or rivet nuts and HUCK type bolts, etc., with an emphasis on the intelligence of the related products.

The bolting control technology is an important development target for ***ZIPPTORK***, mainly for torque control of thread fasteners, bolt load (clamping force) control, and monitoring of bolted joint status. The portfolio brings together key equipment such as wireless torque transducers, torque testers for the calibration, verification, and simulation of tool torque capability before assembly, monitoring or controlling the tightening torque and bolt load (clamping force) during assembly, and residual torque detection after bolted, and continuous monitoring of the bolted joint status, either immediately or periodically, to ensure the highest reliability of the assembled equipment, all under one system with a complete patented layout. Such as thread fastener bolting, riveting or squeezing solid or hollow rivets, blind riveting blind rivets or rivet nuts and HUCK type bolts, etc.,

With the advent of the smart factory, ***ZIPPTORK*** is an essential source of technological and engineering information to help you make Industry 4.0 a reality.

Intelligent Bolting Technology

ZIPPTORK Bolting Technology

ZIPPTORK Intelligent Bolting Technology

ZIPPTORK Bolting Technology

As technology continues to transform the world of bolting threaded fasteners, more and more industries are exploring the benefits of intelligent bolting over manual or traditional torque tools. With promises of enhanced productivity, increased reliability、controllability, and traceability, ZIPPTORK provides bolting technologies with extraordinary patented designs、control algorithms, and devices that not only make impact wrenches torque controllable but also make the bolted joint conditions such as bolt load, ambient temperature, and vibration detection possible for remote monitoring periodically or continuously.

ZIPPTORK Bolting Technologies includes two categories, i.e.

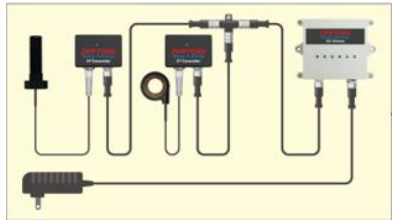
1. **Torque Control System** consists of
   a. **Torque Controller ~** For controlling the torque of air or DC powered impact wrenches and pulse wrenches
   b. Anti-vibration **Wireless Torque Transducer ~** For monitoring static or dynamic bolting torque wirelessly.
   c. Wireless **Swing Type Torque Transducer ~** For monitoring bolting torque of interchangeable head torque wrench
   d. **Torque Tester**～For test, calibrate torque tool output torque capability
   e. **Torque Tension Tester**～For measuring or simulating the bolt load induced with its equivalent residual torque while tightening specific thread fasteners to form a bolted joint under predetermined operation conditions.
2. **Bolt Load Control System** consists of
   a. Anti-vibration **Sensing Washer** ~ For sensing and controlling the bolt load induced on the bolted joint throughout the process and monitoring the bolted joint status remotely, periodically, or continuously。
   b. Anti-vibration **Bolt Load Transducer** ~ For sensing and controlling the bolt load induced on the threaded fasteners throughout the bolting process. It's an evolution of torque tool to measure the bolt load instantly during the process。

Torque Control & Bolt Load Control System

ZIPTORK Bolting Technology

Bolt Load Control System

Granted Patents
Anti-vibration wireless Bolt Load Transducer
Anti-vibration Sensing Washer
Bolting Sequence Control Method



SWC
Sensing Washer

DR-Dongle

Laptop/Cell/Tablet

WTT
Wireless Tension Transducer

BLT
Bolt Load Transducer

Cloud Server

SG-IoT Gateway

1 to 10

Patented Control Algorithm & Device

TCA/TCB/TCC
Torque Controller

Cordless Wrenches
With Built-in ECB Controller

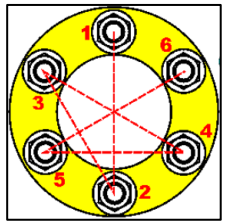
The ONLY Torque Controller capable to control
Air or Cordless impact & pulse wrenches in the field

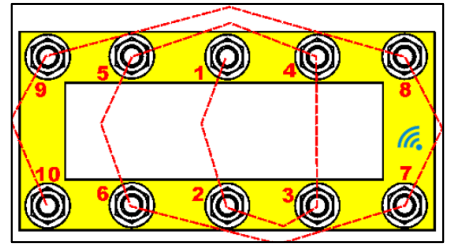
Can be fastened by **any type** of manual & air or DC driven impact or pulse wrench of **ANY BRAND** with **ANY TORQUE MECHANISM**

Applicable to **any type** of air & cordless impact or pulse wrench of **ANY BRAND** with **ANY TORQUE MECHANISM**

Torque Control System

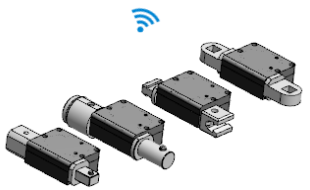
Patented & the ONLY wireless anti-vibration Torque Transducer in the field





DR-Dongle

Laptop/Cell/Tablet



STA
Swing Type Torque Transducer

TTAS/TTES/TTEH/TTEB
Rotary Type Torque Transducer

Torque Control & Bolt Load Control System

ZIPPTORK Bolting Technology

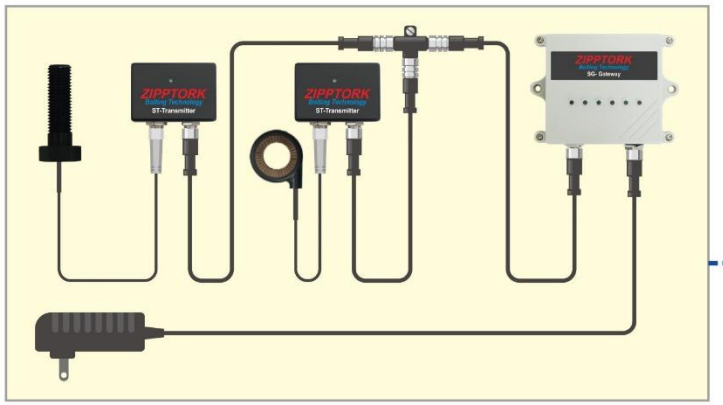
Bolt Load Control System

Applicable To

Control Bolt Load / Control Bolting Sequence

Monitor bolted Joint Status / Bolting Work Record and Uploading

The Ultimate Solution of Bolting Technology



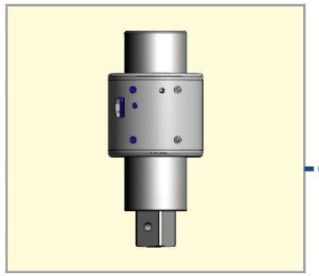
SWC Sensing Bolt / **SBC** Sensing Washer

Granted Patents Anti-vibration wireless Bolt Load Transducer

Anti-vibration Sensing Washer Bolting Sequence Control Method

WTT

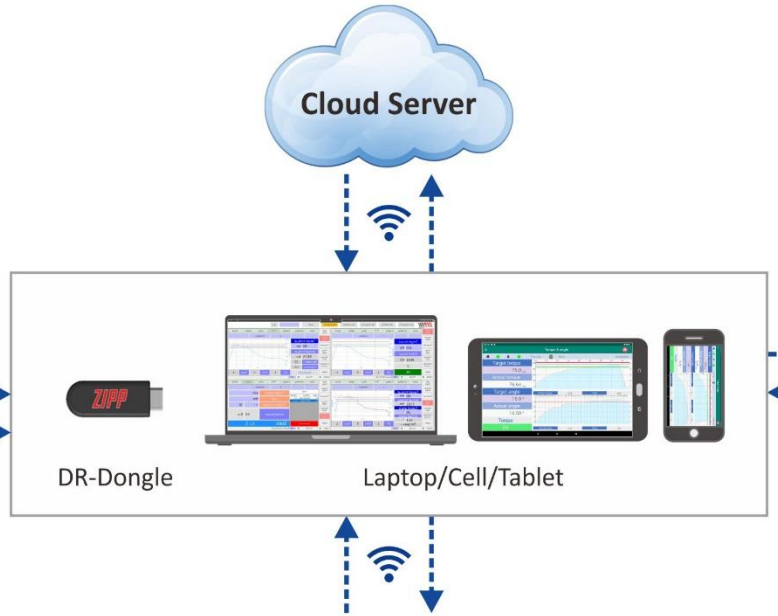
Wireless Tension Transducer



BLT

Bolt Load Transducer

Can be fastened by any type of manual & air or DC driven impact or pulse wrench of ANY BRAND with ANY TORQUE MECHANISM



The ONLY Torque Controller capable to control

Air or Cordless impact & pulse wrenches in the field

Cordless Wrench with

built-In **ECB Controller**

Torque Control System

Applicable To

Calibrate tool Torque ~ Prior to Work

Monitor/Control Bolting Torque ~ During the Process

Verify Residual Torque ~ After Bolted

With great control accuracy, durability

and complete process record for traceability

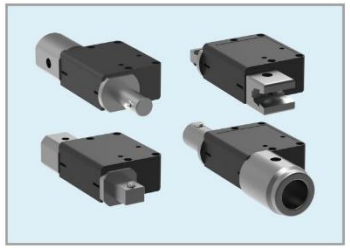
TCA/**TCB**/**TCC** Torque Controller

Unique Bolting Torque Controllability

+

Patented & the ONLY wireless anti-vibration

Torque Transducer in the field



STA

Swing Type Torque Transducer

TTAS/**TTES**/**TTEH**/**TTEB**

Rotary Type Torque Transducer

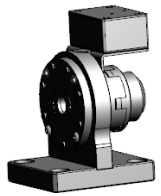
Applicable to any type of air & cordless impact or pulse wrench of ANY BRAND with ANY TORQUE MECHANISM

Bolting Control Series Products

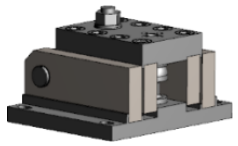
ZIPPTORK Bolting Technology

TCA / TCB / TCC
Torque Controller

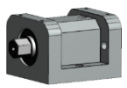
ECBI / ECBP
Built-In Controller



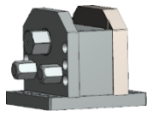
TTT
Torque Tension Tester



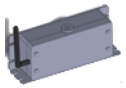
LTT
Torque Tension Tester



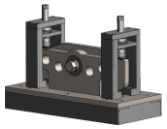
TTS
Torque Tester



TTL
Torque Tester



LTS
Torque Tester



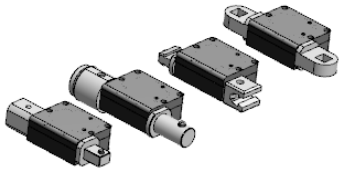
LTL
Torque Tester

TTAS/TTES
Torque Transducer

TTEB
Torque Transducer With bits

TTEH
Torque Transducer
With Socket

TTEH
Torque Transducer
with Reader



STA
Swing Type Torque Transducer

BLT
Bolt Load Transducer

WTT
Wireless Tensioner

SWB
Sensing Washer

SWC
Sensing Washer

SBC
Sensing Bolt

ST
Transmitter

DL-LoRa
Dongle

DR
RF Dongle

SG
SW/SB-Gateway

Type No.	Description	Functions
TCA/TCB/TCC	Torque Controller	For any type of air torque tools torque control regardless of type and brand
ECB/ECC	Cordless Controller	For torque control of any type of DC Cordless torque tools with built-in Control Board
TTT/LTT	Torque Tension Tester	For measuring or simulating the bolt load induced with its equivalent residual torque while tightening specific thread fasteners to formed a bolted joint under predetermined operation condition.
TTS/TTL	Torque Tester	For test, calibrate torque tool output torque capability TTS - 10 ~ 500NM, - TTL-1,000 ~ 5,000NM
LTS/LTL	Torque Tester	For test, calibrate torque tool output torque capability ; LTS - 1 ~ 50NM, - LTL - 100 ~ 50,000NM
TTAS	Static Transducer	For manual torque tool calibration and residual torque verification with torque and angle.
TF	Test Fixture	Used with TTAS for static torque calibration or measurement.
TTES	Dynamic Transducer	Attached to tool anvil for dynamic torque control or torque monitoring during the bolting process.
TTEH	Dynamic Transducer with Socket in One	TTES built with Socket at output end instead of the square anvil
TTER	Dynamic Transducer with Reader	TTEH with built-In Reader for reading ID of Tagged Bolt or Tag Cell on the bolt end and transmitting to Torque Controller for bolting sequence control
BLT	Bolt Load Transducer	For sensing and controlling the bolt load induced during bolting process with pre-calibrated parameter for each type of specific thread fastener
WTT	Wireless Tensioner	For sensing the tension (load) of the crane, hoist or winch and transmitting wirelessly with functions of overload alert and data collection or uploading
SWB	Sensing Washer One Piece Type	Designed for fastener size over M20 或 3/4" for bolt load sensing and bolted joint remote monitoring
SWC	Sensing Washer split Type	Designed for small size under M20 或 3/4" for bolt load sensing and bolted joint remote monitoring
ZG-SW	Gateway-SW	For collecting data and transmitting to peripheral device or cloud server and functions for monitoring bolted joint status
BP	Bolt Positioner	For bolt positioning and pair with Controller during the bolting sequence control
TB	Tagged Bolt	Bolt with RFID Tag embedded on bolt end for identification during bolting sequence control and read by Transducer with Reader
TC	Tag Cell	To be adhered to bolt end for bolt identification during bolting sequence control and read by Transducer with Reader
ZD	Dongle	For transferring sensed torque or bolt load or tension data to cellphone, tablet or laptop

Patents & ISO Certification

ZIPTORK
Bolting Technology

Bolt Load Control & Monitor Technology

ZIPPTORK
Bolting Technology

Bolt Load Control Technology

ZIPPTORK Bolting Technology

ZIPPTORK not only provides a full range of intelligent solutions for bolting operations in various industries, but also provides control of bolt load (clamping force) during the bolting process for applications that require precise control of the clamping force of thread fasteners and monitoring the bolted joint status for abnormalities, such as high-pressure vessels, precision transmission or transportation facilities, or high-risk equipment for nuclear power and wind power. It also provides remote monitoring of the bolted joint status after bolting and the collection and uploading of relevant data.

It is the best alternative to the ultrasonic bolting technology commonly used in the industry, as it can be used with any brand and different structural designs of torque tools. Through this cost-effective solution, we can help the industry realize the Industry 4.0 plan and further improve its productivity and competitiveness.

The Ultimate Solution of Bolting Technology

ZIPPTORK
Bolting Technology

Sensing Washer with functions of anti-loosening

for controlling bolt load and monitoring the bolted joint status

1. What is different from the past products or current market products?
   Currently, following methods are commonly used to test the clamping force in the market:
   a. Ultrasonic inspection method - This inspection method is time-consuming, labor-intensive and expensive.
   b. Wired sensor bolt - This test method is wired, difficult to achieve wirelessly, and expensive.
   c. Load cell-This inspection method is wired, difficult to achieve wirelessly, and expensive.

   The clamping force control is only for the sensor to connect to the PLC or other display device by wired, the layout of the bolt load sensor of these methods are laborious and time-consuming, and the clamping force sensor does not have any anti - loosening design, and does not have the bolting sequence control function.

2. Our company has been in the field of pneumatic tools for more than 40 years, and has been dedicated to the research and development of bolting technology for decades.
   However, in the field of bolting operation, torque control is not the most accurate technology, but bolt load (clamping force) control is the ultimate and most accurate method; since the bolt load sensor is more expensive than the torque sensor, the market is still dominated by torque control. In recent years, customers' demand for bolting work and data recording is getting higher and higher, and there is an urgent demand for clamping force control in the market, therefore, our company has spared no effort to innovate and breakthrough in research and development in order to make the best and ultimate clamping force control and monitoring for thread fasteners.

Sensing Washer with functions of anti-loosening

for controlling bolt load and monitoring the bolted joint status

3. Due to the difficulty in mass production of the wireless bolt load sensor, the Sensing Bolt developed by our company at the beginning is hard to improve the yield rate and reduce the cost. With our efforts, we have finally developed a new generation of Sensing Washers to replace the Sensing Bolts, which have the following advantages:
    a. Sensing Washer is suitable for both wireless communication and wired connection. The wireless Sensing Washer is suitable for small magnetic field interference fields , such as those in the automotive industry, oil mining industry, etc.; the wired induction spacer is suitable for large magnetic field interference fields, such as those in the construction and bridge industry, aerospace industry, etc.
    b. Low production cost and high yield rate.
    c. Anti-loosening design (the sensing bolt itself does not have an anti-loosening design) - this anti-loosening design is patented. In practice, it is easy to carry, easy to install and easy to operate.
    d. Higher accuracy and stability than sensing bolts, with dynamic bolt load control accuracy of ±10% and static bolt load control accuracy of±5%.

The Ultimate Solution of Bolting Technology

Sensing Washer with functions of anti-loosening

for controlling bolt load and monitoring the bolted joint status

e. No need to use special or custom-made bolts, just use general bolts and sensing washers to achieve the following functions:

During bolting process:

1) The bolting sequence can be controlled with our innovative controller and tag.
2) Bolt load control
3) Torque equivalent for reference

After bolted, combined with Industry 4.0-IoT:

1) Bolted joint (bolt load-clamping force) monitoring
2) Torque equivalent display
3) Clamping force, torque equivalent abnormal alarm

f. Applicable tools: Any brand of manual, pneumatic and electric torque tools (static, impact, hydraulic pulse)

g. Application: Construction, oil, mining, automotive, aerospace, etc., where clamping force monitoring is required.

h. Applicable environment: High magnetic field interference environment, lightning strike environment...etc.

i. The application can be used not only with our self-developed controller to achieve the clamping force and bolting sequence control but also as a stand-alone device. The detailed application structure is attached.

ZIPPTORK Intelligent Bolting Solutions

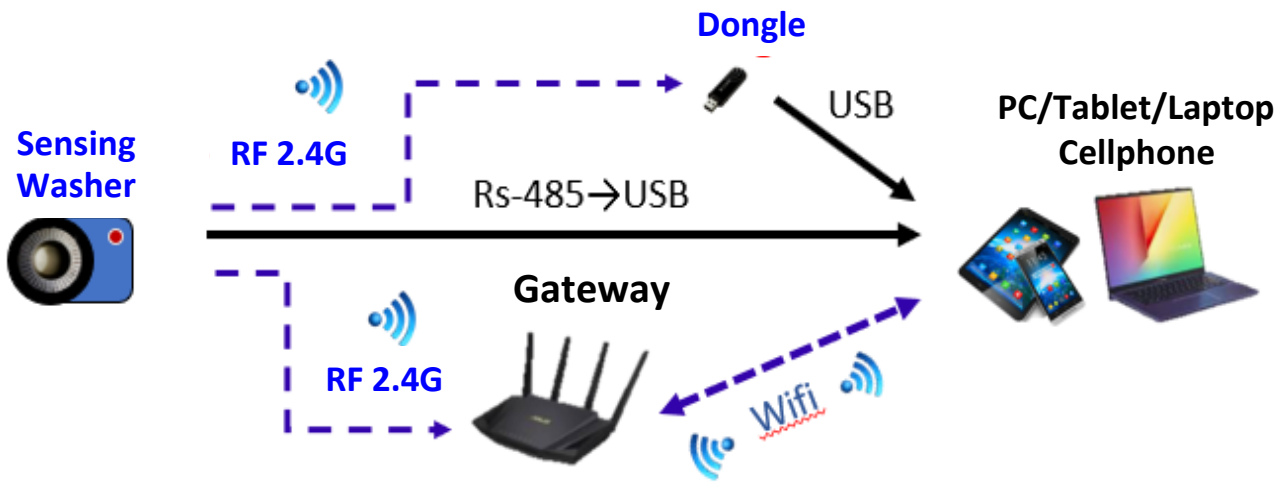
ZIPPTORK Bolting Technology

The Ultimate ~ Achieving the Excellence of Bolted Joint

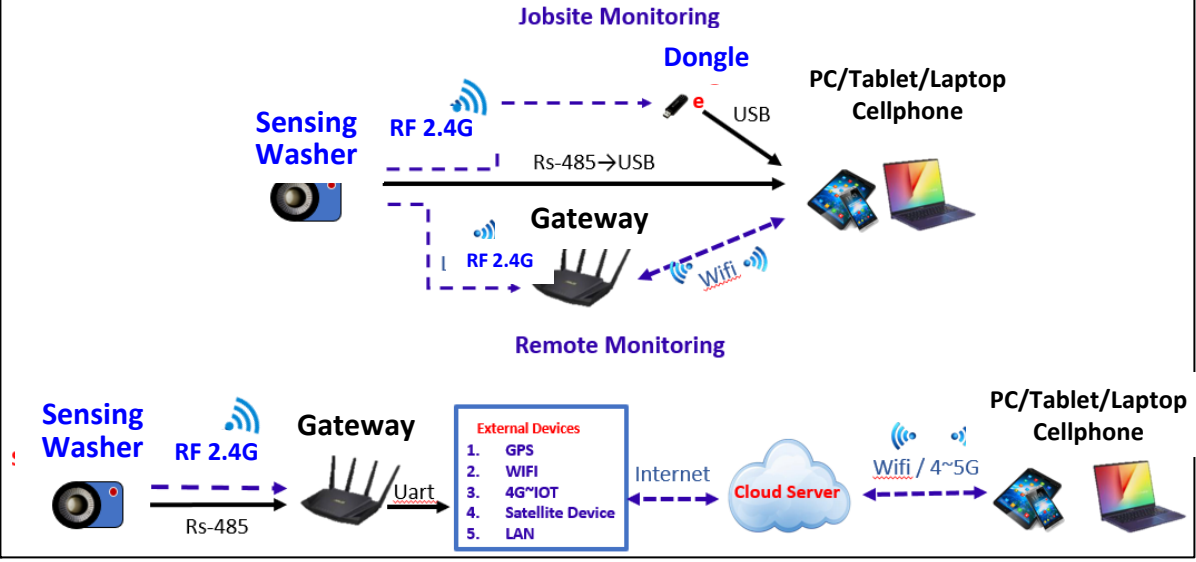
Bolted Joint Clamping Force Control & Joint Status Remote Monitoring

Using **Anti-vibration Sensing Washer /Transmitter/ Gateway** for loose-proof bolted joint works with excellent clamping force control and functions of remote monitoring the bolted joint status instantly、periodically or continuously, wired or wirelessly

SW Sensing Washer (Bolting)



SW Sensing Washer (Monitoring)



Bolt Load Control of Threaded Fasteners

ZIPPTORK
Bolting Technology

To meet the industrial development trend of Industry 4.0, ***ZIPPTORK*** has introduced a full range of patented products related to bolt-tightening technology, which provides a cost-effective solution for the industry. Bolting of threaded fasteners is affected by many factors, such as the softness of the material of the fasteners (bolts, nuts and washers) and the surface roughness of the fasteners to be tightened, the influence of bruises or oil contamination on the threads during the process, and the difference in the structure and quality of the tools used, all of which make it difficult to control accurately and effectively.

Furthermore, for the most crucial purpose of bolting works ~ the clamping force applied to the bolted joint, most of the industry can only control the clamping pressure of the bolt load by ultrasonic sensing & bolting technology. Some applications even require monitoring the bolted joint status after bolted and real-time notification when abnormal conditions occur. For this purpose, ***ZIPPTORK*** has developed a series of bolt load control technologies to provide the ultimate solution for threaded fastener tightening works, fully meeting the requirements of the Industrial Internet of Things(**IIoT**) applications.

Sensing Bolt & patented anti-vibration Sensing Washer for bolt load control & monitoring

It is ideal for all bolt-tightening operations requiring precise clamping force control and monitoring of the bolted joint status at any time. The patented anti-loosening design and ease of use make it more advantageous than the conventional ultrasonic sensing & bolting technology in mainstream applications as a great cost-effective alternative.

Patented Bolt Load Transducer

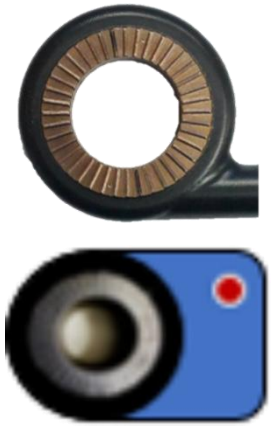
It can be used with any brand, type, or design of manual, pneumatic or electric torque tools to directly control and display the corresponding clamping force generated on the bolted joint by the applied torque at the time and can collect relevant data. It overturns the traditional method of controlling the bolting torque with torque tools. It directly measures the clamping force induced in the bolted joint instead, effectively improving the quality of bolting operations. A new era of **"Bolt Load Wrench"** is to come! For more product-related information and operation videos, please visit the following website – **www.zipptork.com**

Bolt Load Control Series Products

ZIPPTORK Bolting Technology

Ideal for critical bolted joints where bolt load control is important & bolted joint status monitoring is required

Precision bolt load control / Patented anti-vibration design / ideal for transmission equipment
Remote monitoring after bolted / The ultimate solution of bolting technology
The most economic & effective alternative of ultrasonic bolting technology



SWB / SWC
Sensing Washer

ST
Transmitter

SG
Gateway

BLT
Wireless
Bolt Load Transducer

Introduction of Sensing Washer

ZIPPTORK
Bolting Technology

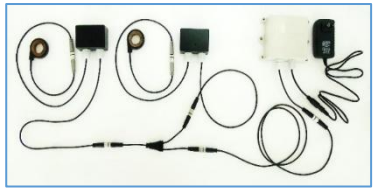
The Most Accurate Bolting Solution

- This patented anti-loosening sensing washer gives the industry a major advantage in precision bolting operations. Especially for assembly operations that require control of uniform bolt clamping force, in addition to excellent control of bolt clamping accuracy, its excellent anti-vibration and anti-loosening characteristics and real-time monitoring of its clamping status after clamping far exceed ultrasonic and other clamping technologies to ensure the quality and safety of structures.
- Its excellent anti-vibration and anti-loosening characteristics comply with the DIN 65151 standard for vibration resistance. With the specially developed application software, the user can also control the torque applied and the clamping force acting on the thread fasteners.
- This product can completely replace ultrasonic applications and is much easier to operate. It is an economical and effective alternative. Outdoor applications can also be added for lightning protection, GPS positioning, and the safety and convenience of monitoring and management.
- Its IP66 protection level and automatic temperature compensation range of -50oC to +120oC make it suitable for use in most latitude temperature environments.
- Available for thread fasteners with a bolt diameter of 12mm or more. Clamping force ranges from 10KN to 2,000KN and can be customized.
- All sensing washers are shipped with calibration reports traceable to NIST.
- The body is made of stainless steel, and the top and bottom are equipped with ultra-high hardness spacers to make it more accurate in biting the bolt nut or the locking mechanism to be locked. It can also be reused. The cover design and injection molding are anti-vibration and waterproof up to IP66 grade.

Anti-vibration Sensing Washer

ZIPPTORK
Bolting Technology

Features



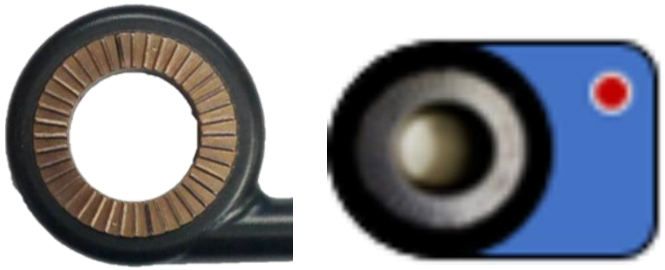
SWCN / SWCR Sensing Washer

SWBN / SWBR Sensing Washer

1. Patented anti-vibration design to ensure the best stability of the bolted joint.
2. Bolt axial load control during the bolting process by any torque tool.
3. Bolt joint status includes bolt load, temperature, and vibration variation remote monitoring.
4. The best alternative for transmission equipment preventive maintenance work.
5. Applicable to any axial load joint status monitoring including HUCK lockbolt.
6. Sensing Washers for metric bolts M10 or imperial bolts 3/8" or larger sizes can be ordered.
7. With both temperature and vibration detection functions, it is especially suitable for bolting and monitoring of transmission equipment.
8. The Sensing Washers are equipped with calibration software for customers to perform their own calibration.
9. Remote monitoring bolted joint periodically or continuously and alert as soon as reach the preset threshold.
10. The most economical yet effective alternative of ultrasonic bolting technologies.
11. **SWBN/SWBR** should be custom-made. Please contact Sales personnel.

Anti-vibration Sensing Washer

ZIPPTORK
Bolting Technology

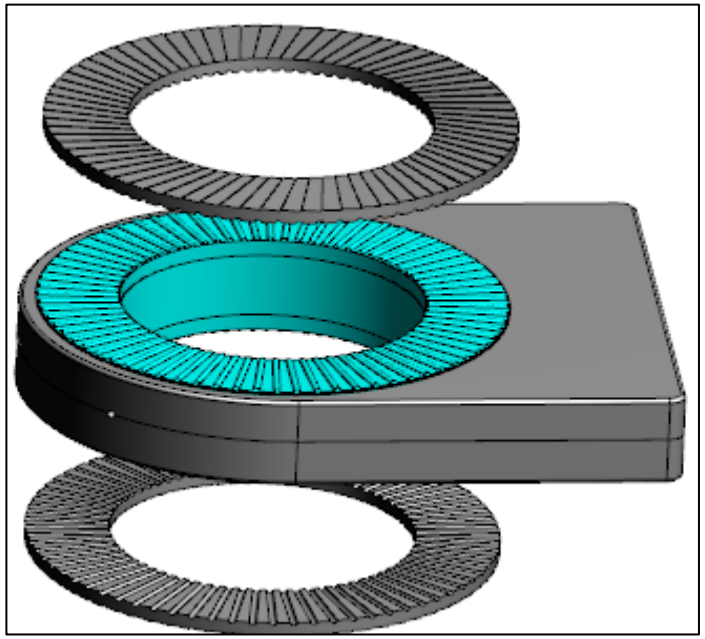


data link

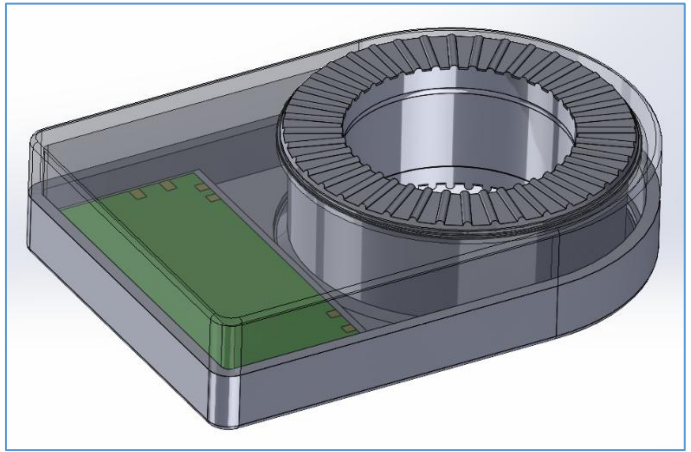
1. Patented anti-vibration design to ensure the best stability of the bolted joint.
2. Bolt axial load control during the bolting process by any torque tool.
3. Bolt joint status includes bolt load, temperature, and vibration variation remote monitoring.
4. The best alternative for transmission equipment preventive maintenance work.
5. Applicable to any axial load joint status monitoring, including HUCK lockbolt.
6. Remote monitoring bolted joint periodically or continuously and alert as soon as it reaches the preset threshold.
7. The most economical yet effective alternative of ultrasonic bolting technologies.
8. SWBN/SWBR should be custom-made. Please contact Sales personnel.

End Surface Structure Examples of Sensing Washer

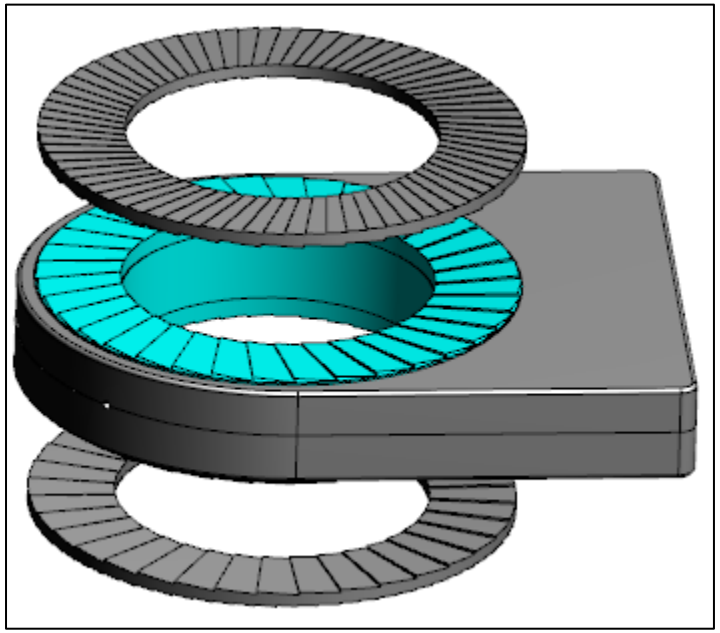
ZIPPTORK Bolting Technology



Both ends designed with **RIPPLOCK** type ribs，it should be paired with special washers in assembly, i.e. the serrated profile faces to bolt or nut and the female recessed towards the **Sensing Washer**.



Transparent Structure Diagram of **Sensing Washer**

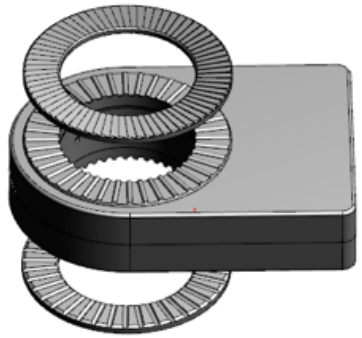


Both ends designed with **Nord Lock** type cam faces，it should be paired with **Nord Lock** washers in assembly, i.e. the serrated profile faces to bolt or nut and the cam face end towards the **Sensing Washer.**

Schematic diagram of Sensing Washer

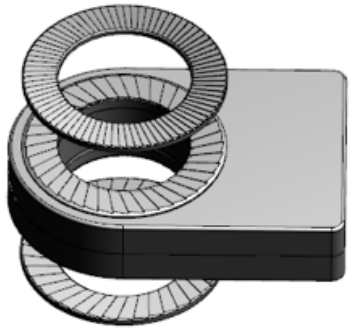
ZIPPTORK Bolting Technology

SWBR Sensing Washer



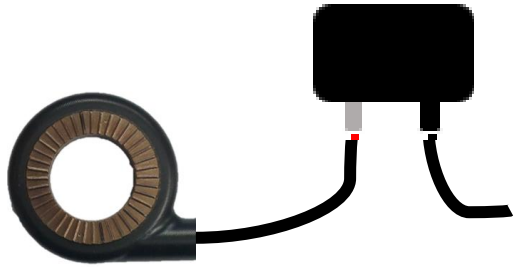
Sensing Washer SWR with RIPPLOCK type face on both ends + A pair of hardened washer (HV 650) with serrated face toward opposite side of the Sensing Washer and concave radial ribs to match radial ribs of RIPPLOCK face on both end of the Sensing Washer.

SWBN Sensing Washer



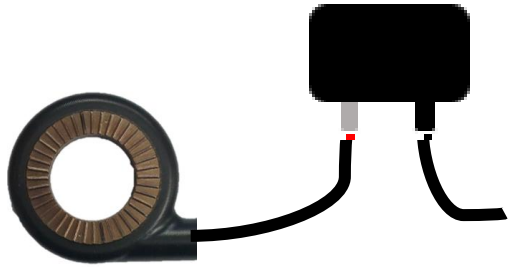
Sensing Washer SWN with NORDLOCK type face on both ends + A pair of NORDLOCK type lock washer with serrated face toward opposite side of the Sensing Washer and wedge face to match NORDLOCK wedge locking face on both end of the Sensing Washer

SWCR Sensing Washer



Sensing Washer SWR with RIPPLOCK type face on both ends + A pair of hardened washer (HV 650) with serrated face toward opposite side of the Sensing Washer and concave radial ribs to match radial ribs of RIPPLOCK face on both end of the Sensing Washer.

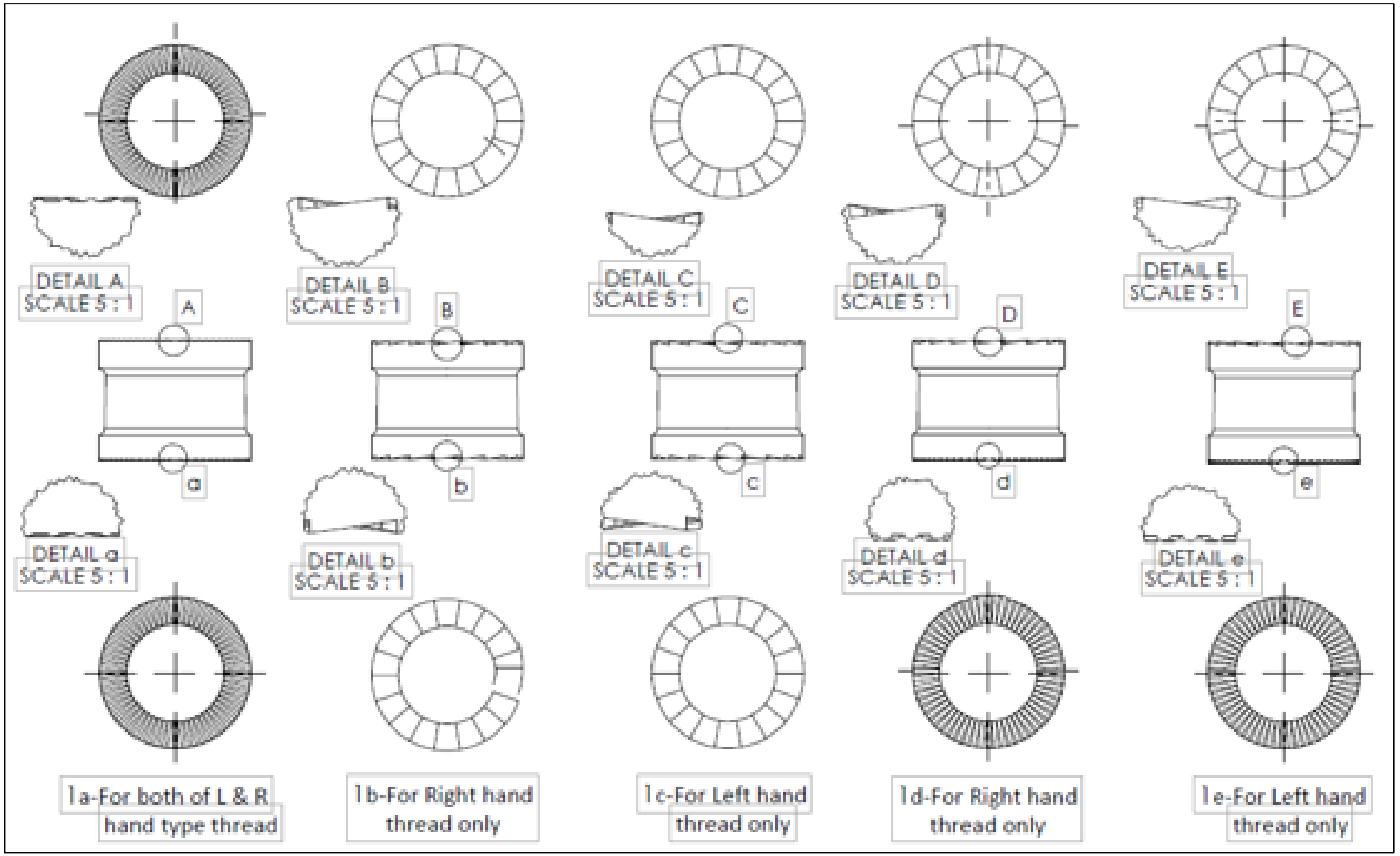
SWCN Sensing Washer



Sensing Washer SWN with NORDLOCK type face on both ends + A pair of NORDLOCK type lock washer with serrated face toward opposite side of the Sensing Washer and wedge face to match NORDLOCK wedge locking face on both end of the Sensing Washer

Sensing Washer Face Structure

ZIPPTORK
Bolting Technology



Sensing Washer Technical Data

ZIPPTORK Bolting Technology

項目	ITEM	Specification
適用螺栓/螺帽尺寸	Sizes available for Bolt/Nut	M12～M64
額定容量	Bolt Load Capacity	66～2,140 KN
輸出靈敏度	Rated output	2.0 ± 20 % mV / V
零點輸出	Zero balance	± 5%mV / V
非線性	Non-linearity	1% F.S.
滯後	Hysteresis	0.5% F.S.
重複性	Repeatability	0.2% F.S.
蠕變(30min)	Creep(30min)	0.2% F.S.
溫度靈敏度漂移	Temp. effect on output	0.05% F.S./10℃
零點溫度漂移	Temp. effect on zero	0.05% F.S./10℃
輸入電阻	Input impedance Resistor	1000± 20 Ω
輸出電阻	Output impedance Resistor	1000 ± 10 Ω
絕緣電阻	Insulation Resistor	≥5000MΩ / 100VDC
激勵電壓	Recommended excitation	5～ 9 V
最大激勵電壓	Maximum excitation	9 V
溫度補償範圍	Compensated temp range	-10 ～ 40 ℃
工作溫度範圍	Operation temp range	-20 ～ 90 ℃
安全超載	Safe overload	150% F.S.
極限超載	Ultimate overload	200% F.S.
電纜線尺寸	Cable size	φ3 × 1000 mm
材料	Material	Stainless steel
防護等級	IP Class	IP66

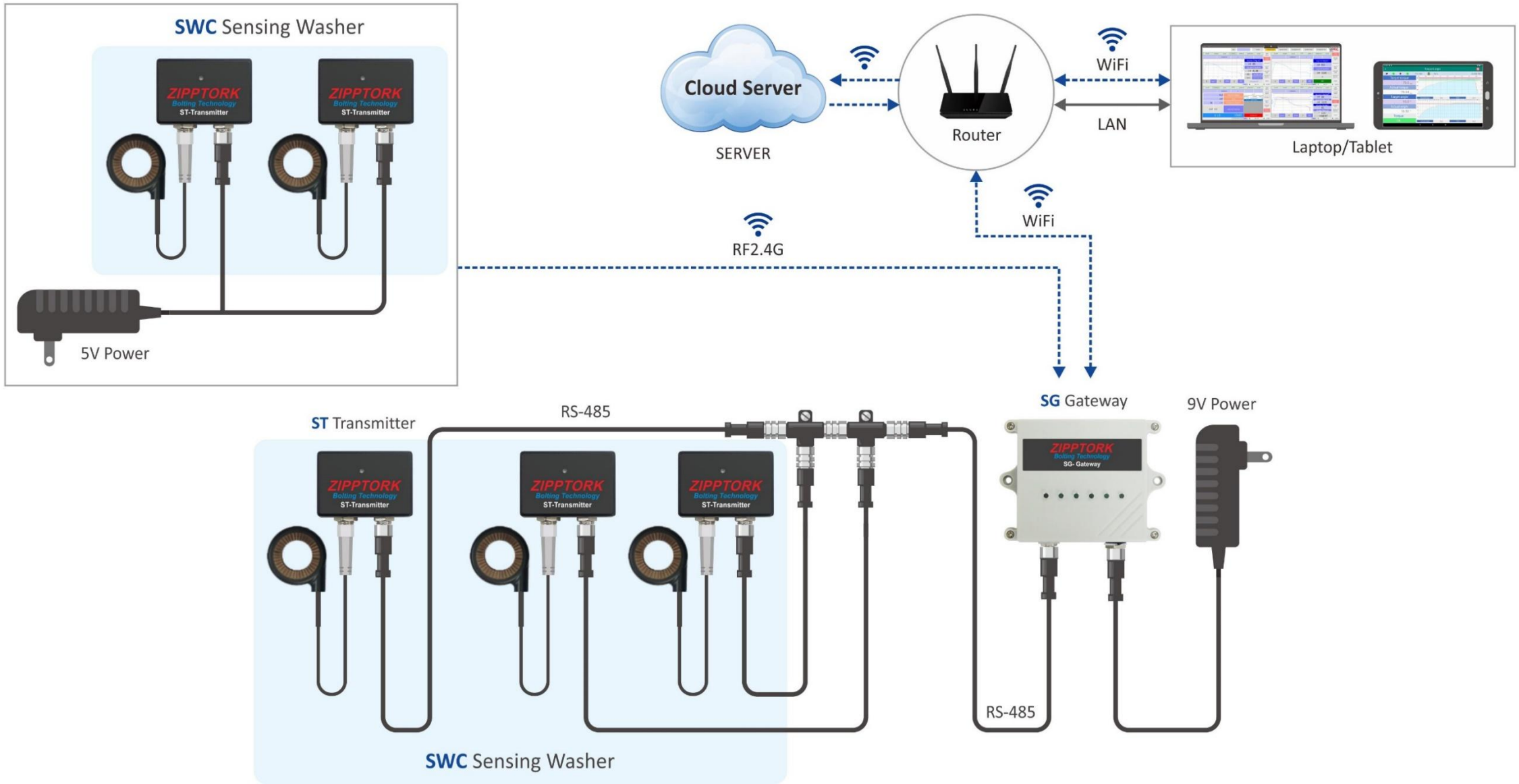
Inch sizes or special application conditions can be customized with a lead time of 3 months after confirmation of specifications

Why Use Sensing Washers

ZIPPTORK
Bolting Technology

- High accuracy for bolt load control.
- Easy installation with any type of torque tools.
- Wired or wireless remote monitoring the status of bolted joints.
- Added functions for monitoring temperature & vibration around the vicinity of bolted joint.
- Patented anti-loosening design for greatest safety and durability.
- **An effective yet economical alternative to Smart Bolts and ultrasonic bolting technologies.**
- It can do all that Smart Bolts and ultrasonic bolting technologies can do and more with great controllability, accuracy, reliability, traceability, and monitorability.
- Ideal complementary fasteners for hydraulic tensioning and torque multiplying and ultrasonic bolting technology.
- **Sensing Washer** provides the ultimate solution for all bolting operations.

Anti-vibration Sensing Washer Application System Architecture



BLMS
Blot Load Monitoring System

ZIPPTORK
Bolting Technology

Applicable to
Bolt Load Control
Bolted Joint Status Remote Monitoring
Record & Transmit Relevant data of bolting

Any type of torque tool can be used

Achieve the excellence of bolted joint

Ensure the highest safety of bolted joint

The best alternative to ultrasonic bolting technology

Embodiment of System Architecture

Patented anti-loosening design

1. **SWC Anti-loosening Sensing Washer**， Made to bolt size and used like a normal washer. Various sizes can be customized. A 5-pole signal cable to be connected to the **ST transmitter**.
2. **The ST transmitter** is to be connected to the **SWC** with a 5-pole cable and then paired and calibrated before delivery. Applicable to all sizes of **SWC**s, **RS-485** serial connection of up to **24** units of **ST signal processors** to the **SG gateway** with a 4-pole signal cable.
3. **SG Gateway**: Connect an external power supply, a solar module, a lightning protection device, etc., and use **LoRa** or **WiFi** to transmit signals to a display device, peripheral server, or cloud database.

Relevant Information on Sensing Washer

ZIPPTORK Bolting Technology

Product-related Invention Patent

- Taiwan I 754533 / USA (JO) Patent No. US 11,396,899 B2 / Germany Patents Nr. 10 2020 113 980
- China、Japan Pending

BLMS Introduction & Operation Video

Please click on the "Control" button and then click on the link below

https://youtu.be/31kgtLoJwLI

Anti-Loosening Test Video and Test Report of Sensing Washer

Please click on the "Control" button and then click on the link below to see a video of a test according to DIN 65151

https://airtools.com.tw/owncloud/index.php/s/Nc1ZeaA8UkmxE1o

Please click on the "Control" button and then click on the link below to see a test report according to DIN 65151

https://airtools.com.tw/owncloud/index.php/s/9uT6zNGFXmBJq5k

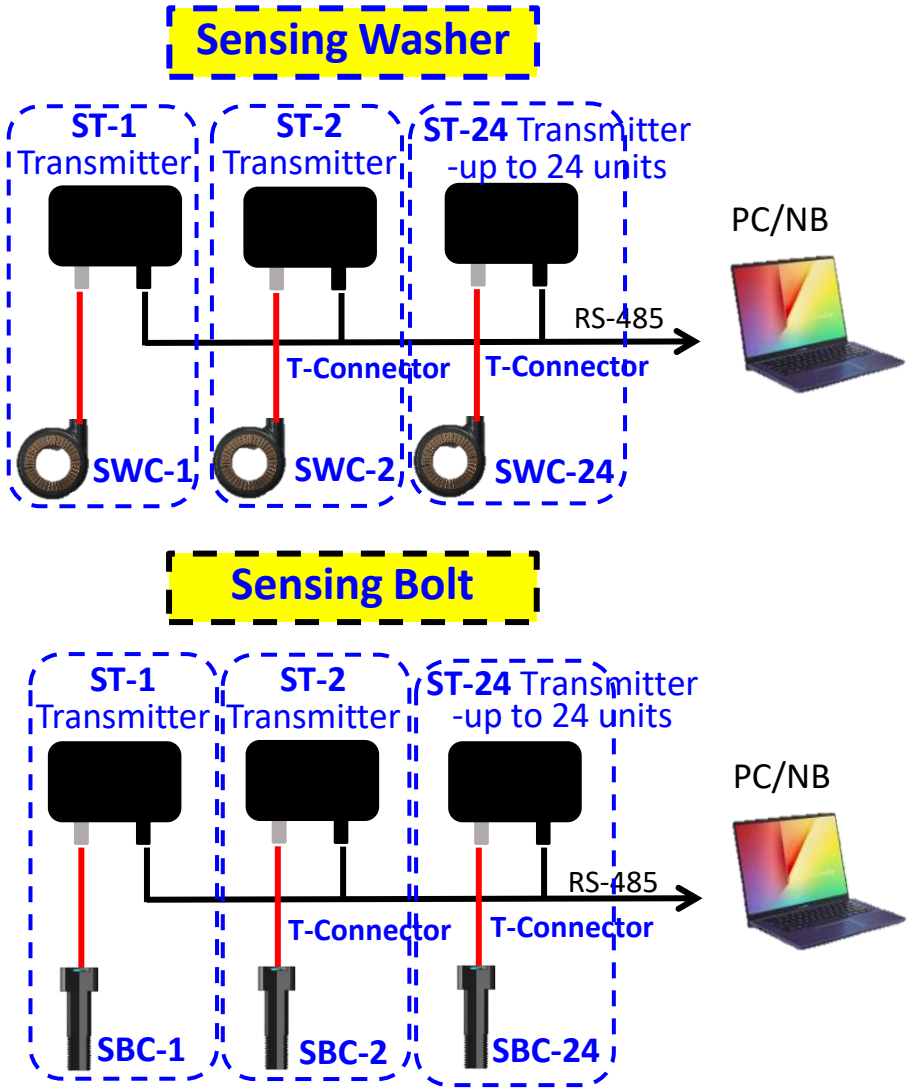
Bolt Load Control During the Process

ZIPPTORK Bolting Technology

Application System Architecture - wired bolting～P.29
Application System Architecture - wireless bolting～P.30
Application System Architecture - wireless bolting via Torque Controller～P.31

Application System Architecture - wired bolting

ZIPPTORK Bolting Technology



Manual Torque wrench | Electric Torque Wrench | Air Torque Wrench

Wired Bolting

System Architecture

- SWC Sensing Washer
- SBC Sensing Bolt
- RS-485
- ST ~ Transmitter
- APP
- PC/NB

Software-APP

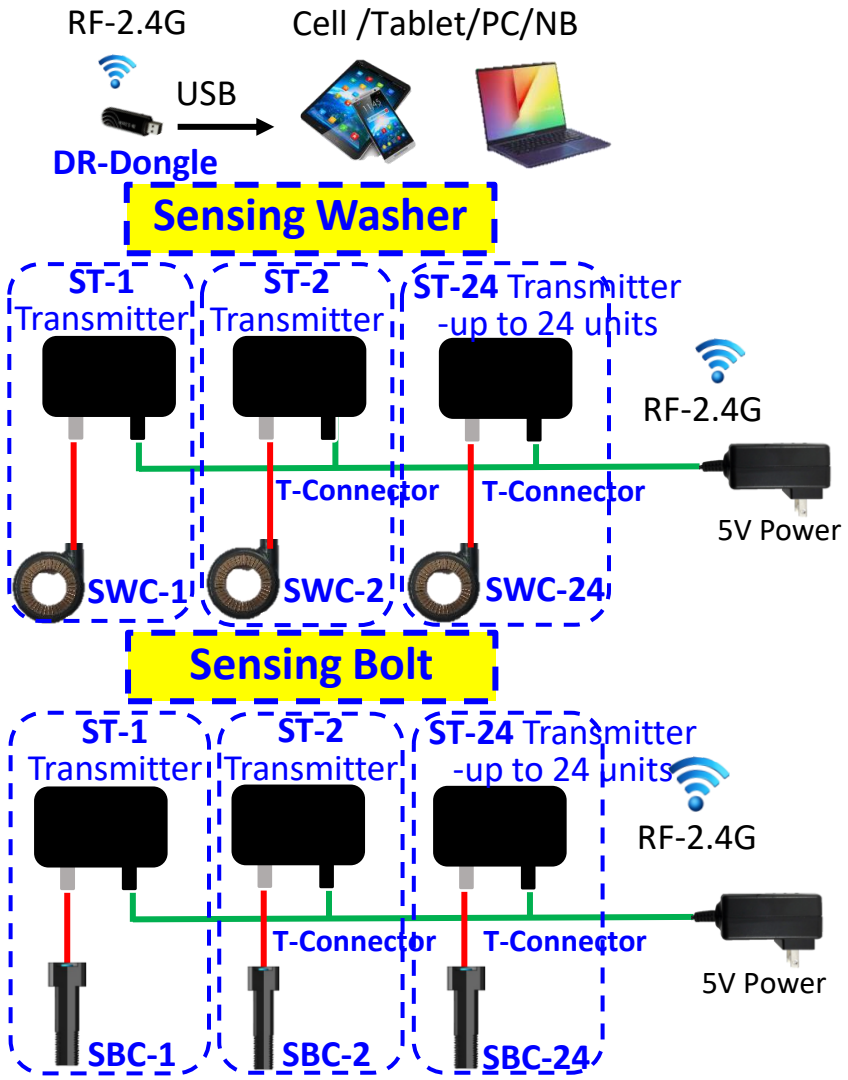
- Operator ID
- Multiple Units
- Multiple Language
- Scan Pairing
- Target Bolt Load Setting
- Reach Target Alert
- Tolerance Setting
- QC judgement
- Job Record
- Data Uploading

Features & How it works

1. Wired bolting and 1~24 Sensing Units via RS-485 connection and software setting.
2. Support scan pairing with the most simple matching mode.
3. Support multi-language interface and support multiple clamping force unit conversion.
4. Different tools (manual, pneumatic, electric, etc.) can be used for bolting.
5. Supports the editing of bolting works and switching to monitoring operations directly after the bolting process is completed.
6. The system will alert When the bolting is close to the target clamping force.
7. After bolting is completed, the system will automatically record the target clamping force, final clamping force, bolting time, personnel ID, position, tolerance conditions, and QC status.
8. Supports uploading and bolting work records to the cloud database.

Application System Architecture - wireless bolting

ZIPTORK Bolting Technology



Manual Torque wrench ▶ Electric Torque Wrench ▶ Air Torque Wrench ▶

Wireless Bolting

System Architecture

- SWC Sensing Washer
- SBC Sensing Bolt
- DR-RF Dongle
- ST-Transmitter
- APP
- PC/NB

Software-APP

- Operator ID
- Multiple Units
- Multiple Language
- Scan Pairing
- Target Bolt Load Setting
- Reach Target Alert
- Tolerance Setting
- QC judgement
- Job Record
- Data Uploading

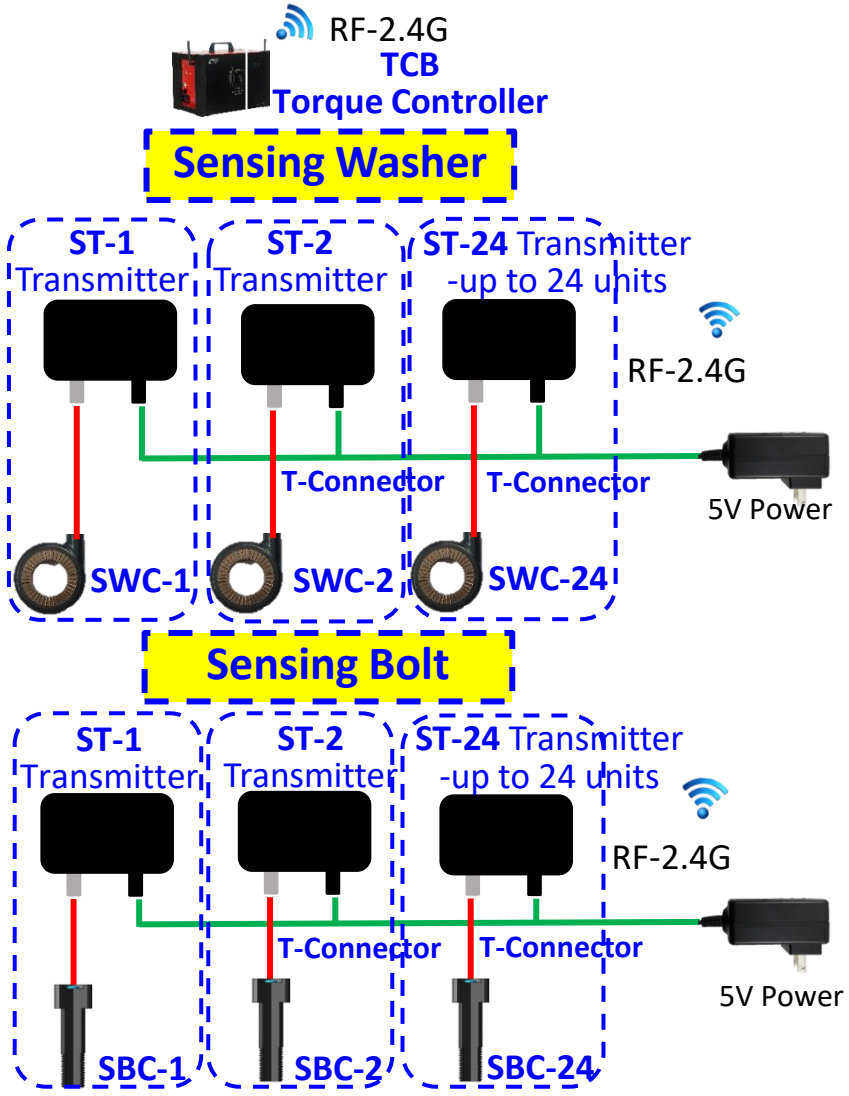
Features & How it works

By connecting the DR-Dongle and ST Transmitter through the RF communication interface and software setting, 1～24 sensing units can be installed.

1. Support scan pairing with the most simple matching mode.
2. Support multi-language interface and support multiple clamping force unit conversion.
3. Different tools (manual, pneumatic, electric, etc.) can be used for bolting.
4. Supports the editing of bolting works and switching to monitoring operations directly after the bolting process is completed.
5. The system will alert When the bolting is close to the target clamping force.
6. After bolting is completed, the system will automatically record the target clamping force, final clamping force, bolting time, personnel ID, position, tolerance conditions, and QC status.
7. Supports uploading and bolting work records to the cloud database.

Application System Architecture - wireless bolting via Torque Controller

ZIPTORK Bolting Technology



Air Torque Wrench

Wireless Bolting

System Architecture

- SWC Sensing Washer
- SBC Sensing Bolt
- TCB-Controller
- ST-Transmitter
- APP

Software-APP

- Operator ID
- Multiple Units
- Multiple Language
- Scan Pairing
- Target Bolt Load Setting
- Reach Target Alert
- Tolerance Setting
- QC judgement
- Job Record
- Data Uploading

Features & How it works

Through the RF communication interface, connecting the TCB-Torque Controller, ST Transmitter, and software setting, 1～24 sensing units can be installed.

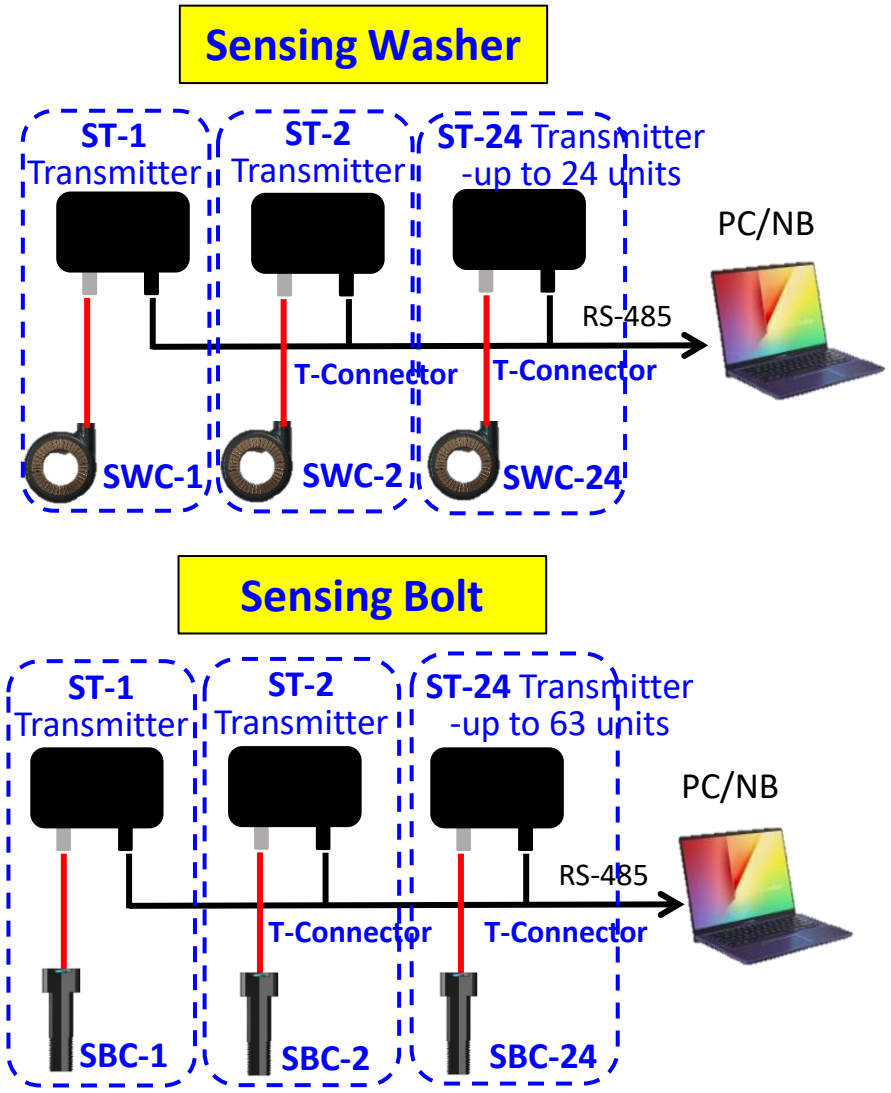
1. Support scan pairing with the most simple matching mode.
2. Support multi-language interface and support multiple clamping force unit conversion.
3. Different tools (manual, pneumatic, electric, etc.) can be used for bolting.
4. Supports the editing of bolting works and switching to monitoring operations directly after the bolting process is completed.
5. The Controller trains the bolt load, and the clamping force of the bolted joint can be precisely controlled.
6. After bolting is completed, the system will automatically record the target clamping force, final clamping force, bolting time, personnel ID, position, tolerance conditions, and QC status.
7. Supports uploading and bolting work records to the cloud database.

Bolted Joint Status Monitoring

ZIPPTORK
Bolting Technology

Application System Architecture –Wired Local Monitoring

ZIPPTORK Bolting Technology



Video

Wired Local Monitoring		
Application System Architecture		
● SWC-Sensing Washer ● SBC –Sensing Bolt	● RS-485 Communication Line ● ST-Transmitter	● APP ● PC/NB/Tablet
Software-APP		
● Multiple Units ● Multiple Languages ● Abnormal Record	● Bolt Load Limit Setting ● Temperature Upper Limit Setting ● Power Lower Limit Setting ● Position Setting	● Abnormal Data Alert
Features & How it works		

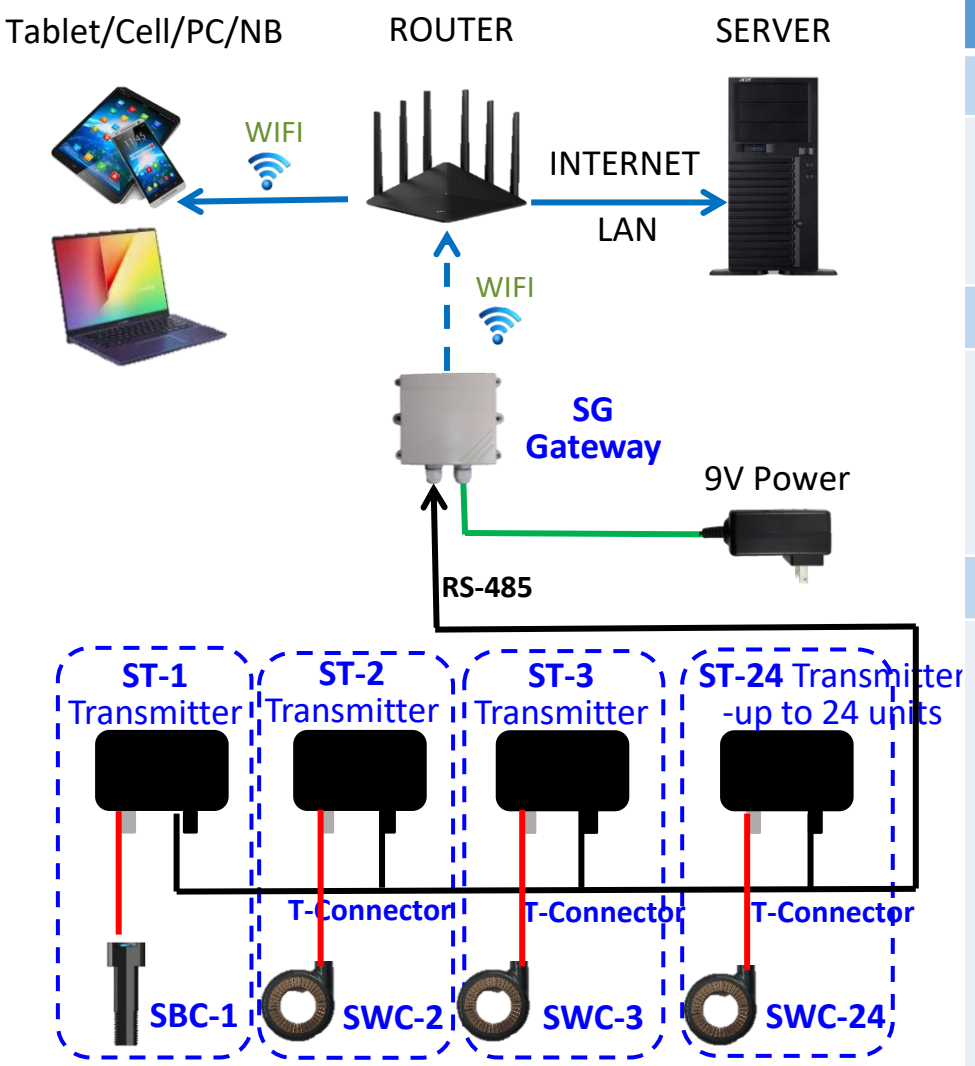
Up to 24 SWC Sensing Washers/ SBC Sensing Bolts can be monitored via RS-485 connection and software configuration

1. Convert the bolting work order into a monitoring list.
2. Set the upper and lower limits of each monitored data (clamping force, temperature, vibration, power, location of SWC Sensing Washers/SBC Sensing bolts) and update the information.
3. When the system finds that the monitored data exceeds the set upper and lower limits, the system will display NOK on the UI until the data is improved.
4. The system will record each abnormal data and time of occurrence.

Application System Architecture –Wired Remote Monitoring

ZIPPTORK Bolting Technology

Video



Wired Remote Monitoring

Application System Architecture

- SWC-Sensing Washer
- SBC-Sensing Bolt
- ST-Transmitter
- SG-Gateway
- Router
- APP
- PC/NB/Tablet
- Server

Software-APP

- Multiple Units
- Multiple Languages
- Abnormal Record
- Bolt Load Limit Setting
- Temperature Upper Limit Setting
- Power Lower Limit Setting
- Position Setting
- Notification Mailbox Settings
- Notification SMS Settings
- Update Time Setting

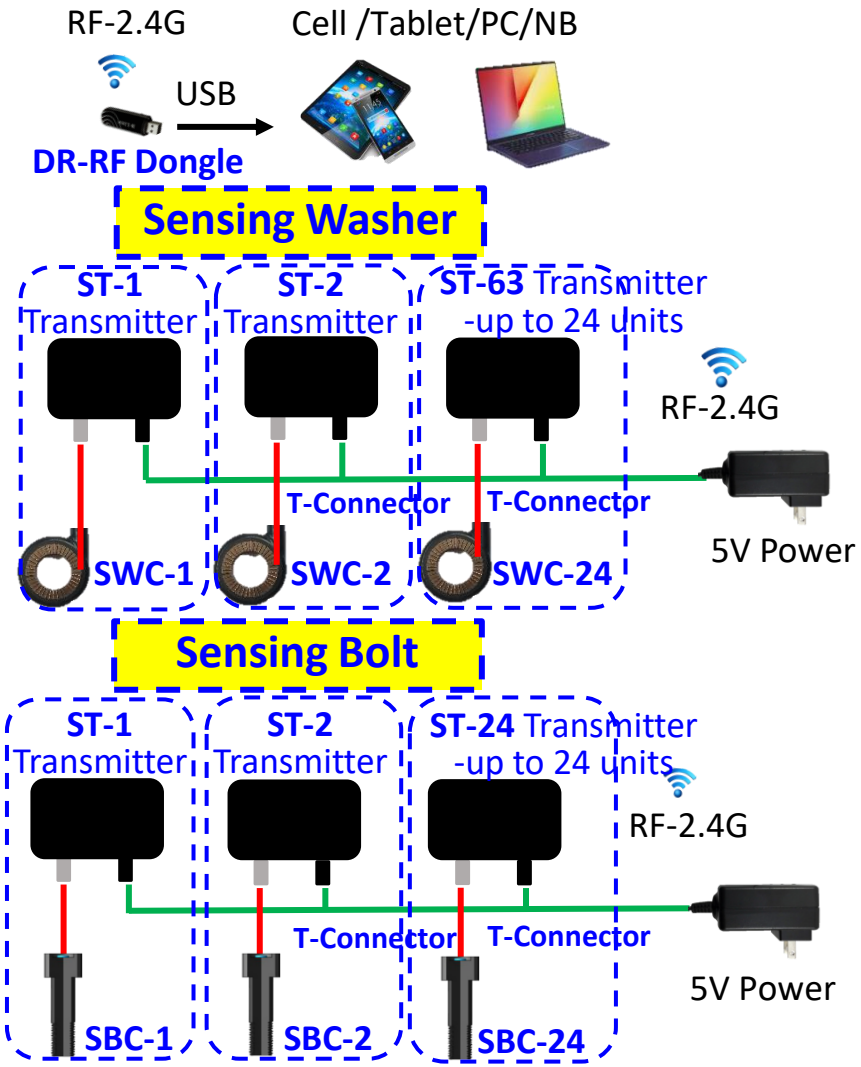
Features & How it Works

The software can be set up to monitor 24 SWC Sensing Washers/SBC Sensing Bolts by connecting the **ST Transmitter** and the **SG gateway** via RS-485.

1. After connecting to the **SG-Gateway** with the software, all the SWC Sensing Washers/SBC Sensing Bolts to be monitored are set up with the serial number and information update method (how often to update).
2. Then connect to the nearest wireless router via a WIFI connection.
3. Log in to the MQTT server and set the upper and lower limits of each monitored data (clamping force, temperature, vibration, power, and location of SWC /SBC
4. When the system finds that the monitored data exceeds the set upper and lower limits, the system will display **NOK** on the UI interface until the data is improved.
5. When the system finds data abnormal, it will notify the contact person through Email or SMS.
6. The system will record each abnormal data and the time of occurrence.

Application System Architecture –Wireless Local Monitoring

ZIPPTORK Bolting Technology



Video

Wireless Local Monitoring		
Application System Architecture		
● SWC-Sensing Washer ● SBC-Sensing Bolt	● DR-RF Dongle ● ST-Transmitter	● APP ● PC/NB/Tablet
Software-APP		
● Multiple Units ● Multiple Languages ● Abnormal Record	● Bolt Load Limit Setting ● Temperature Upper Limit Setting ● Power Lower Limit Setting ● Position Setting	
Features & How it works		

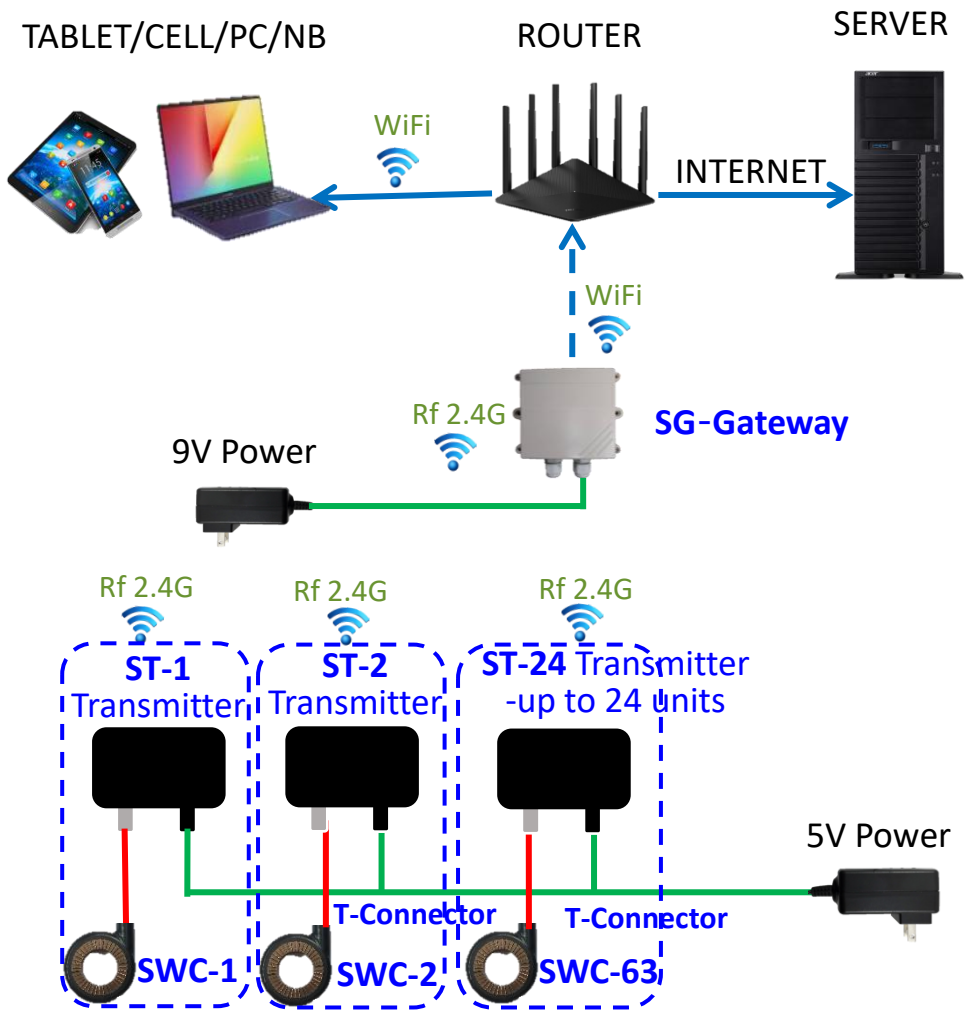
Connect **DR-RF Dongle** and **ST Transmitter** through RF communication interface and software setting, and 1～24 SWC Sensing Washers/SBC Sensing Bolts can be monitored.

1. Convert bolting work order to the monitoring list
2. Set the upper and lower limits of each SWC Sensing Washers/SBC Sensing Bolt, the data to be monitored (clamping force, temperature, vibration, power, location of SWC Sensing Washers/SBC Sensing Bolts) and the information update method.
3. When the system finds that the monitored data exceeds the set upper and lower limits, the system will display **NOK** on the UI until the data is improved.
4. The system will record each abnormal data and the time of occurrence.

Application System Architecture – Wireless Remote Monitoring

ZIPPTORK Bolting Technology

Video



Wireless Remote Monitoring

System Architecture

- SWC-Sensing Washer
- SBC-Sensing Bolt
- ST-Transmitter
- SG-Gateway
- Router
- Server
- APP
- PC/NB/Tablet

Software-APP

- Multiple Units
- Multiple Languages
- Abnormal Record
- Bolt Load Limit Setting
- Temperature Upper Limit Setting
- Power Lower Limit Setting
- Position Setting
- Notification Mailbox Settings
- Notification SMS Settings
- Update Time Setting

Features & How it works

The software can be configured to monitor 24 SWC Sensing Washers/SBC Sensing Bolts by connecting the ST Transmitter and the SG-Gateway via RF wireless.

1. After connecting to the SG-Gateway with the software, all the SWC Sensing Washers/SBC Sensing Bolts to be monitored can be set up with the serial number and information update method (how often to update).
2. Connect to the nearest wireless router via a WiFi connection.
3. Login to the MQTT server and set the upper and lower limits of each monitored data (clamping force, temperature, vibration, power, SWC Sensing Washers/SBC Sensing Bolts location) for all SWC Sensing Washers/SBC Sensing Bolts.
4. When the system finds that the monitored data exceeds the set upper and lower limits, the system will display **NOK** on the UI interface until the data improves.
5. When the system finds data abnormal, it will notify the contact person through Email or SMS.
6. The system will record each abnormal data and time of occurrence.

Wireless Bolt Load Transducer

ZIPPTORK
Bolting Technology

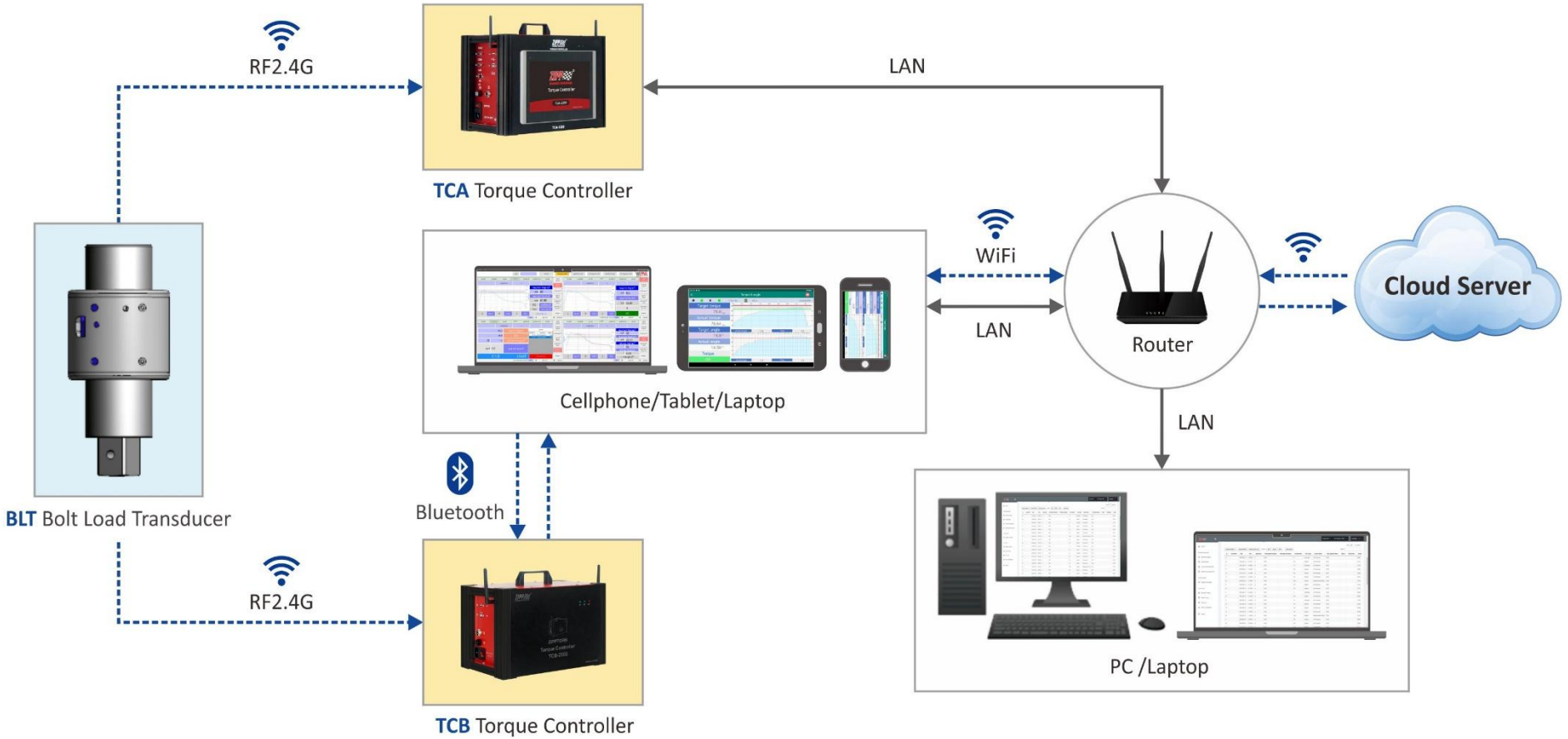
BLT
Bolt Load Transducer

data link

1. Patented design for direct sensing the bolt load induced on the joint during the bolting process.
2. With data logging functions and upload to a peripheral device or cloud server.
3. To be attached to the driving anvil of any torque tool

   for direct bolt load control.
4. Patented vibration-proof design, also suitable for impact torque tools.
5. RF2.4G wireless transmission and data collection.

Bolt Load Control
Application System Architecture



Competitive Products

ZIPPTORK Bolting Technology

Smart Washer - Smart Component Technologies - https://jpb-systeme.com/pdf/Program%20SMART%20EN.pdf
Smart Washer - Smart Component Technologies - https://smartcomptech.com/technology/smart-washer/
Bolt Load Sensor - Boltsafe - https://boltsafe.com/readout-methods/iot-node/
Smart Torque System- Cumulus- https://cumulusds.com/smart-torque-system/
Load Monitoring Fasteners- Copper State Bolt & Nut Co. - https://www.copperstate.com/about-us/
Load Washer – Omega - https://sea.omega.com/tw/about/
Smart Bolt - Industrial Indicators - http://www.smartbolts.com/the-smartbolts-advantage/how-does-it-work/
Maxbolt - Valley Forged - www.VFBOLTS.com
Rotabolt- Bertfelt - https://www.bertfelt.com/
I-Bolt – Erreka - http://www.errekafasteningsolutions.com/en/ibolt/
DTI - Applied Bolting Technology - https://www.appliedbolting.com/index-structural.php

Smart Washer

https://jpb-systeme.com/pdf/Program%20SMART%20EN.pdf

https://jpb-systeme.com/Company.php

https://www.bing.com/search?q=JPB+Syst%C3%A8me%E2%80%99s+smart+washer+technology&cvid=80f69573f49e4ba688a065be251163f2&aqs=edge..69i57j69i60l2.1673j0j4&FORM=ANAB01&PC=U531&ntref=1

JPB SYSTEME

SELF LOCKING INNOVATIVE SOLUTION SINCE 1955 • SAVE TIME, CUT COSTS & MAXIMIZE EFFICIENCY

SMART PROGRAM

Fasteners monitoring

INNOVATION TO **MONITOR** BOLT TENSION, GET YOUR ACTIVITY **SAFE** AND **PLAN** YOUR MAINTENANCE FOR **EFFICIENCY**

PATENTED TECHNOLOGY

OUR TECHNOLOGY : A SOLUTION TO MONITOR BOLTED ASSEMBLIES

CHALLENGES IN MANY INDUSTRIES

Some assemblies face **significant constraints**: vibrations, repeated stress, variations of temperature, shocks: it often generates **nut loosening.**

Industries use **solutions to lock bolts** or put in place **periodic maintenance** to avoid accidents and lethal injuries.
These solutions ***take time*** and ***cost a lot of money***.

Funded by the European Union

FRANCE RELANCE

dgac

SOLUTIONS TO MONITOR FASTENERS

JPB Système designed and manufactured a **specific sensor** which checks in real-time the tension in your assembly.

If you have critical fasteners with periodic torque checks, preventive maintenance, fasteners with difficult access... Our Smart Program solution will help you **to save time** & **money**, **automatically record the tension** and move to **predictive maintenance.**

STOP SYSTEMATIC CHECKS... TIGHTEN WHEN NECESSARY !

MADE IN FRANCE

HOW IT WORKS

JPB Système developed **specific strain gauges** that allow size reduction of the sensor. The installation of the sensor is easy in your assembly. Sensor is equipped with **smart electronics.** It processes and converts measurements **into a robust signal** that is not affected by distance of communication or variations of temperature. It ensures a **high level of accuracy** over the entire operating range.

JPB Système developed a **data acquisition system** and displays solutions according to your needs:

FAST

SAFE

RFiD Smart Washer & Reader for on-site check
. Manual control
. Suitable in safety-sensitive environment (not connected to the Internet)

Wired Smart Washer & App for remote check
. Automatic and remote control
. Data available at any time (IoT)

EASY

ACCURATE

BENEFITS

- **Secure** the monitoring of the tightening: check tension in the assembly when & where needed.
- **Quick** and **accurate** check in less than 2 seconds. No disassembly/reassembly; no torque wrench test.
- Reduce **maintenance time** and **cost.**
- **Easy access** in confined space with the RFiD reader extension.
- **Simple** and **intuitive** to use.
- Ensure **automatic traceability** of fasteners monitoring.
- **Easy installation** in your assembly: ultra-thin thickness (5 / 7,5mm).

RFiD SMART WASHER + READER

SMART WASHER

SMART READER

RFiD | No battery | Manual check | Data stored in the reader | On-site check

THE 2 SOLUTIONS ARE EASY TO USE

. Before assembly, **simply calibrate** the Smart Washer at "0%" with the reader (RFiD Smart Washer) or with the app (Wired Smart Washer).
. Put the Smart Washer on the **non rotating part** of the fastener (screw head or nut).
. **Tighten the bolt as usual** with your torque wrench. Don't change your torque process.
. When bolt is properly tightened, **define the "100%" level** with the reader or with the app.
. **At any time**, you can check the variation of **the tension in the fastener**: do a manual check with the reader (RFiD Smart Washer); manual or automatic check with the app (Wired Smart Washer).

WIRED SMART WASHER + READER

LORA | 230V | Manual or automatic check | On-site or remote check | Data stored in computer/cloud

Smart Washer

Smart Component Technologies

ZIPTORK Bolting Technology

https://smartcomptech.com/technology/smart-washer/

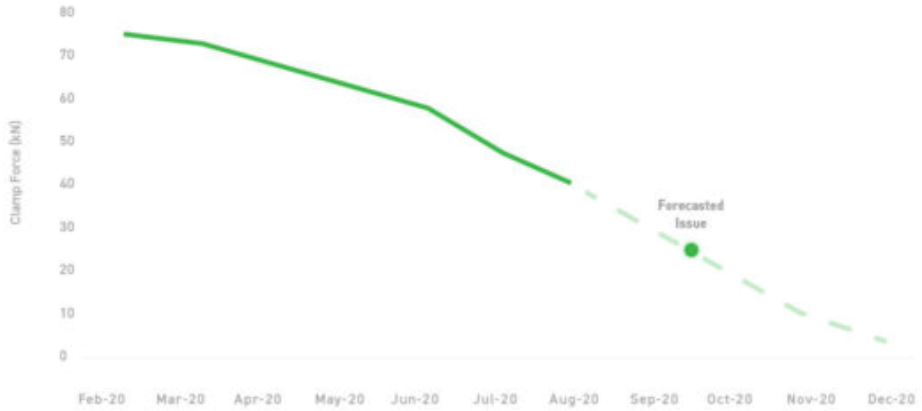
Smart Component Technologies Head Office,Cooper Buildings, Arundel Street, Sheffield, S1 2NS, T: +44 (0)114 360 0009 info@smartcomptech.com

Eliminate Manual Inspection of Bolts The Smart Washer monitors bolt preload at installation and during operation to reduce bolt failures and eliminate manual inspection.

Predicting Bolt Failure

In the cloud, real-time and historic data are combined to forecast bolt preload over the next 90 days. This provides Infrastructure Managers with sufficient forewarning of any impeding issues, enabling them to plan preventative maintenance several weeks in advance.

Through Predicting and Preventing bolt failure, your most critical assets can continue to operate reliably and safely.



Fasteners (Nuts and Bolts) are simple components but they are often safety and performance critical

Fasteners are prone to failure in operational environments where they are subjected to severe loading, vibration or temperature cycling. Failure can have a significant impact on the safety or performance of the asset. We only have to reminded of the 2007 derailment at Grayrigg which injured 80% of the passengers or the Sayona-Shushenskaya hydropower plant disaster in Russia which killed 75 and required the engine room to be rebuilt at a cost of $1.2 billion to see the impact these simplistic components can have on the world most critical assets.

100% Compliance at Installation

The Smart Washer provides clamp force data to installers enabling them to tighten fasteners to the clamp force specified in the manufacturer's standard, rather than the traditional and significantly less accurate method of using torque.

The Smart Washer features on-board LED indicators which illuminate red, amber or green for simple identification of bolt clamp force. The data can also be sent over a local wireless network to a handheld tablet, enabling electronic audit trials to be generated.

Smart Washer — Smart Component Technologies

ZIPPTORK Bolting Technology

https://smartcomptech.com/technology/smart-washer/

Smart Component Technologies Head Office,Cooper Buildings, Arundel Street, Sheffield, S1 2NS, T: +44 (0)114 360 0009 info@smartcomptech.com

Eliminate Manual Inspection of Bolts The Smart Washer monitors bolt preload at installation and during operation to reduce bolt failures and eliminate manual inspection.

Smart Washer to Predict & Prevent Bolt Failures

The Smart Washer is an end-to-end remote condition solution for predicting and preventing bolt failures.

The solution features a novel and proprietary clamp force sensing technology that is 30% thinner, an order of magnitude lower cost and two orders of magnitude lower power than traditional load monitoring technologies (e.g. strain gauge load cells). This technology is embedded onto an ultra-low power wireless platform, creating the first commercially available embedded clamp force sensor.

The technology will **reduce bolt failures** and **minimise the cost** and **downtime** associated with maintenance.

Remote Monitoring of Bolt Preload

The Smart Washer is integrated into an IoT network, whereby the data is wirelessly transmitted to a cloud server where it is stored, analysed and visualised. The cloud-based dashboard provides remote access to real-time bolt preload data, 24/7, 365 days a year.

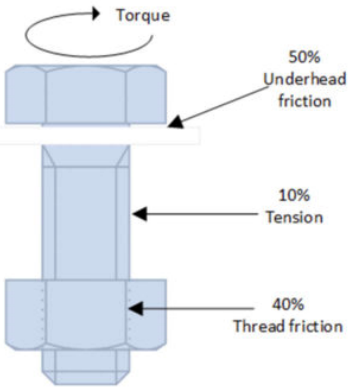
The cloud platform enables infrastructure managers to identify loose fasteners remotely in real-time, eliminating the need for manual, on-site inspection.

Any Bolt, Any application, Any Industry

The Smart Washer technology is available in all standard bolt sizes from M10 – M45.

Application specific versions of the technology have also been created to meet the requirements of a specific application, industry or customer. Modifications range from alterative wireless technologies to embedding the technology into existing asset components. The technology has been designed using a modular architecture so modifications to meet your requirements can be done in an extremely time and cost-efficient manner.

Get in contact to discuss your requirements.



Torque isn't tight

The Smart Washer measures clamp force and not torque.

Torque is a measurement of the twisting force applied to the bolt head or nut. Torque is a proxy measure of bolt tension and many factors can affect this relationship, such as surface texture, rust, oil, thread condition and material type. During testing in operational environments, we have seen errors of up to 70% when using torque-based installation procedures. Incorrectly tightened fasteners will have a significantly reduced operational life.

Using SCT's proprietary and patented clamp force sensing technology, the Smart Washer provides accurate clamp force measurements, ensuring bolts are tight.

Smart Washer Smart Component Technologies

ZIPTORK Bolting Technology

https://smartcomptech.com/case-studies/

Switch and Crossing Substructure Monitoring

SWIX operational field trials

Clamp Force Monitoring Slab Track

PreCast Advanced Track

DOWNLOAD

Switch and Crossing Monitoring

Accelerating Innovation in Rail, Round 5

Clamp Force Monitoring Stretcher Bars

DfT First of a Kind Competition

Clamp Force Monitoring Earth Bond Cables

TfL Victoria Line Rolling Stock

BoltSafe Load Measuring System

ZIPPTORK
Bolting Technology

Bolt Load Sensor

https://boltsafe.com/readout-methods/iot-node/

https://boltsafe.com/technical-data-sheets/

How is the IoT-node used?

Connect one BoltSafe CMS sensor to one IoT-node and it will send the bolt load data to a cloud network server continuously, a few times an hour. To read out this data, connect your internet-connected device to the server using a web portal. This portal offers historical data of the sensor in kN (Kilonewton) and lbf (Pound-force), comparisons of information from multiple sensors next to one another and shows the bolt load in graphs if desired. This data can be exported to other devices. You can also set (e-mail) notifications. The most important benefits of the IoT-node are that its data can be read out anywhere, anytime and that no extra cables or software are needed to acquire the bolt load data.

Contact us for more information

BoltSafe Load Measuring System

ZIPPTORK Bolting Technology

Bolt Load Sensor

BoltSafe bolt load cells can be used in various industries, where they can enhance safety in critical bolted connections. The most common reason for using a load sensor in any industry is when an incorrect bolt load poses a severe and critical risk. It could lead to dangerous situations, downtime or repairs that could have been prevented through the use of bolt load cells. With BoltSafe, it is possible to check and improve the tightening method and monitor the critical bolted connections regularly or continuously. Below are some of the most important industries where BoltSafe load sensors are used.

https://boltsafe.com/industries/

Mechanical engineering

Mechanical engineering is an engineering branch that combines engineering physics and mathematics principles with materials science to design, analyze, manufacture and maintain mechanical systems. BoltSafe sensors can be used within any field of mechanical engineering, even in aviation. The bolt load cells make sure that critical bolted connections in machines are secure, which prevents damage and decreases the maintenance interval.

Wind industry

Wind industry is the industry where wind power is gained to provide mechanical power through wind turbines to turn electric generators for electrical power. There are onshore and offshore wind farms for this cause. BoltSafe sensors can be used in both environments. In all elements of the wind turbine, including the foundation, the pole and the blades, critical bolted connections need to be secured and monitored in every wind direction.

Civil engineering

Civil engineering is a discipline that deals with the design, construction and maintenance of the built environment. This includes public works such as roads, bridges, canals, dams, railways, airports, pipelines, sewerage systems and other components of buildings. BoltSafe sensors can be used when these public works are built, for instance to permanently and remotely monitor the tension on clamps that secure the suspension cables of a bridge. Another application is the daily calibration of the tightening tools.

Petrochemical industry

The petrochemical industry is focused on the production and trade of petrochemicals. Petrochemicals are the chemical products obtained from petroleum by refining. BoltSafe sensors can be used in the petrochemical industry, both offshore and onshore. The load cells will make sure that critical bolted connections in machines and process pipes are secured. This prevents damage and decreases the maintenance interval.

Mining

Mining is the extraction of valuable minerals and other geological materials from the Earth, usually from an ore body, lode, vein, seam, reef or placer deposit. BoltSafe load cells are used in the mining industry to secure bolted connections in mining machines, which are usually in hard-to-reach places. Continuously monitoring the bolt load from a distance improves safety and ensures that it is possible to intervene in time when the bolted connection is no longer safe.

Power generation

Power generation (or electricity generation) is the process of generating electric power from sources of primary energy. This can be water, gas, steam or wind. BoltSafe sensors can be used in this industry, for instance in gas and wind turbines, (hydro) power plants, transmission towers and other locations where critical bolted connections are used. It prevents damage to the machinery and decreases the maintenance interval.

BCM Sensor

ZIPPTORK Bolting Technology

https://www.bcmsensor.com/products/iot/wms2000-wireless-monitoring-systems/

WMS2000 Wireless Monitoring Systems

Compare Products

Category: IoT

Number Of Sensor Connection	1, ..., 4
Communication Signal	RF 433MHz
Communication Distance	up to 300m through open space

Model WMS2000 Wireless Monitoring System is developed by BCM SENSOR to wirelessly monitor changes in force or pressure on site. The system consists of three blocks: four sensors, one wireless transceiver (model WTM2000) and one wireless receiver (model WRM2000). In this datasheet, model 1290 force sensor will be used as an example to explain how the system works to wirelessly monitor tightening of four bolts in distance.

In this example the 1290 compression force sensor functions as a washer for the bolt, in order to monitor the tightening status of the bolt. The four sensors are connected to the transceiver with cables, while the transceiver communicates with the receiver at 433MHz radio frequency (RF) which enables communication distance up to 300 meter in an open area.

The receiver, which can be installed in a control room, is integrated with a touch screen, by which the receiver can both store and indicate the tightening status of each of the four bolts monitored by the sensors. With the touch screen one can set both lower threshold (LT) and upper limit (UL) of the measuring range (MR) of each of the sensors. The backlight of the touch screen can be in three colors, respectively to indicate three statuses of the tightening of four bolts – a normal status (i.e., LT ≤ MR ≤UL), an unexpected status (i.e., MR < LT, or MR > UL), and an error status (e.g., low battery, disconnection, or damaged sensor). In case any of the bolts become loosened during the operation (i.e., MR < LT), the receiver will alert the operator in the control room by turning the backlight of the corresponding sensor from green to red and meanwhile having its alarm triggered. The WMS2000 system is operated as a plug-and-play force/pressure monitoring system without need of any computer. In fact, this system can work with any type of force and pressure sensors of either 4~20mA or millivolt (i.e., output from Wheatstone bridge circuit). In case of the sensor of millivolt output, an SSC (sensor signal conditioner) will be integrated in the cable between the sensor and the transceiver. For applications where more than four sensors are monitored, BCM SENSOR can further develop the WMS2000 system according to the number of sensors. In addition, this system can be turned into a Wireless Measuring System, model WMS3000, by which a specific force or pressure of interest can be measured remotely, for instance, in nuclear power plant or very harsh environment where human cannot access.

BCM Sensor

https://www.bcmsensor.com/products/iot/wsn1000-wireless-sensor-network-monitors/

WSN1000 Wireless Sensor Network Monitors

Compare Products

Category: IoT

The model WSN1000 is developed as a monitor for a wireless sensor network (WSN) system. 1 monitor WSN1000 can work with up to 16 wireless sensors to constitute an independent WSN system.

The monitor communicates with the wireless sensors via 2.4GHz RF signal. The communication distance can reach around 100m through open space.

In one WSN system, the monitor reads every wireless sensor at pre-defined signal reading rate, e.g., once per 15 seconds depending on the application.

On the WSN1000, there are 16 multi-color LED's. Every LED is assigned to a particular wireless sensor. The monitor uses both the LED lighting in three different colors (green, red, and orange) and the short beeping sounds at three different frequencies to demonstrate three statuses of the wireless senso – the green light and its corresponding beeping sound refer to fastened straps, the red light and its corresponding sound refer to loosened straps, and the orange light and its corresponding sound refer to an error status (e.g., low battery, disconnection, …).

The monitor has one press button to set thresholds of the sensors to define the load status of the sensor.

The WSN1000 is capable to have different customized modifications. For instance, it can connect to more wireless sensors on request.

Knowledge Prevents Bolt Failure - Nord-Lock Group

ZIPPTORK Bolting Technology

Anti-Loosening Washer

https://www.nord-lock.com/.../people/2012/knowledge-prevents-bolt-failure

S:t Johannesgatan 1D 211 46 Malmö Sweden

WASHERS KEEP AIRPLANES IN THE AIR

https://www.nord-lock.com/insights/customer-cases/2017/washers-keep-airplanes-in-the-air/

SPACEX COMPETITION WINNERS CHOSE WEDGE-LOCKING WASHERS

https://www.nord-lock.com/insights/customer-cases/2018/spacex-competition-winners-chose-wedge-locking-washers/

How to install Nord-Lock Wheel Nuts

ZIPTORK Bolting Technology

Anti-Loosening Washer

https://www.bing.com/videos/search?q=How+to+install+Nord-Lock+Wheel+Nuts+-+YouTube&view=detail&mid=E5FC89622A24D954AB6EE5FC89622A24D954AB6E&FORM=VIRE

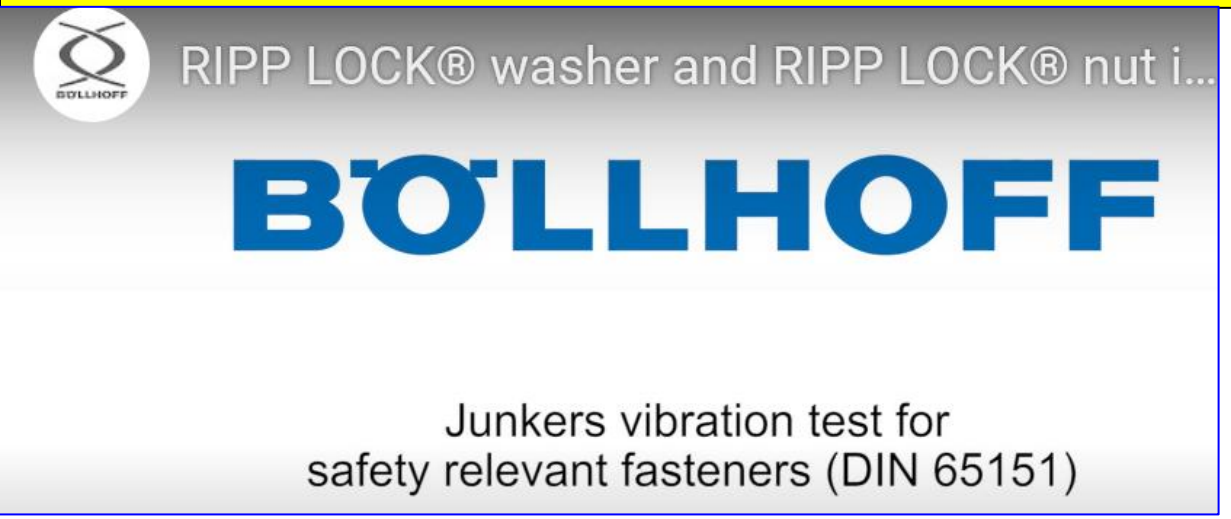
Anti-Loosening Washer

Böllhoff Group

ZIPTORK Bolting Technology

RIPP LOCK® washer and RIPP LOCK® nut in Junker vibration test according to DIN 65151

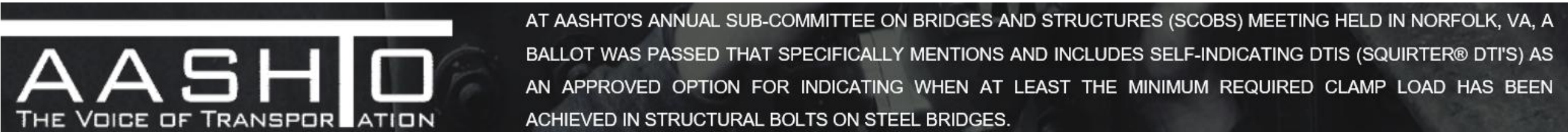
https://www.bing.com/videos/search?q=Wurth+Wedge+Lock+Washers+-+YouTube&&view=detail&mid=BA1892E1EB45BCA26F07BA1892E1EB45BCA26F07&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3DWurth%2BWedge%2BLock%2BWashers%2B-%2BYouTube%26qpvt%3DWurth%2BWedge%2BLock%2BWashers%2B-%2BYouTube%26FORM%3DVDRE



DTI Applied Bolting Technology-DTI

ZIPTORK Bolting Technology

https://www.appliedbolting.com/index-structural.php



Applied Bolting Technology Products, LLC

Applied Bolting Technology Products, established in 1994, is the only U.S. manufacturer of heat treated **Direct Tension Indicators (DTIs)** in accordance with ASTM, AISC, RCSC, and the United States Fastener Quality Act of 1999. Our DTIs are manufactured and tested to satisfy the compression requirements of all applicable specifications (ASTM, ASME, BS, EN, etc.) and are an acceptable bolt tensioning method by all modern structural standards.

Applied Bolting's DuraSquirt® DTIs are an integral part of structural fastening system that readily illustrates when structural bolts are properly tightened. Our DuraSquirt® DTIs are used throughout the construction industry by most of the world's largest and most successful engineering, procurement, and construction (EPC) firms, such as Bechtel, Fluor, CB&I, Samsung E&C, etc. These companies, and others like them, realize that large industrial construction projects can be halted completely by something as simple as tightening bolts so they routinely require our DuraSquirt® DTIs to be used on all their slip-critical/friction and pretensioned connections in order to ensure the structural integrity of their designs is not compromised.

Applied Bolting's DTIs are available in imperial sizes from 1/2" up to 1-1/2" and metric Sizes M12 to M36 as described by ASTM F959, BS 7644 and EN 14399 (the DuraSquirt® feature of our DuraSquirt® DTIs is covered by ASME 18.2.6). Our DTIs are manufactured for use with F3125, A325, A490, 8.8 and 10.9 bolts and available in several finishes such as Galvanized(Mechanical and Thermal), Fluorocote, Xylan, Type 3 steel, and plain finish.
Additional unique details regarding Applied Bolting Technology Products.:
We are the only DTI manufacturer with an ISO 9001 certified fastener testing laboratory.
We are the only DTI manufacturer that posts all material certifications on the internet for complete traceability instantly for every part we manufacture.
We are the only U.S. DTI manufacturer that hardens its DTIs per ASTM F959, B7644, EN14399, AASHTO, AISC and RCSC Specifications as well as the U.S. Fastener Quality Act of 1999.
We are the only U.S. DTI manufacturer with stock levels between 3 and 6 million pieces within our onsite 15000cf warehouse.
Our stock levels, available inventory, and constant production allow us to ship an order the same day it is received 90% of the time.
The results of our efforts to provide proactive education regarding structural bolting is routinely referenced by large EPC companies, structural organizations (AISC) and publications (Modern Steel, ENR, etc.).
Our company is permanently staffed by Applications Engineers, Expediting Specialists, Laboratory Personnel as well as all the required support personnel necessary to maintain a world class modern manufacturing facility. Construction Professionals can be confident that material specified and procured from Applied Bolting Technology Products is the highest quality available, delivered promptly, and supported completely.

DTI Applied Bolting Technology Products, LLC

ZIPPTORK Bolting Technology

https://www.appliedbolting.com/squirters

By squirt alone, you can tell which bolts are tight, which ones are not and why. All by eye without torque wrenches, match-marking or feeler gages.

Easier & Better than Turn-of Nut

- You don't have to remember to stop turning at 1/3, 1/2, or 2/3 turn.
- No matching-marking necessary.
- No need for a second set of hands to hold a spud wrench.

Better than a Twist-Off Bolt

- Tension control rather than torque control.
- No spline end to twist off and become a safety hazard.
- No problems caused by the splined end shearing off in torsion before the plies are together.

Easier & Better than Calibrated Wrench

- You don't have to establish and then check the torque resistance of bolts daily and for each lot and when your wrench condition changes.

Inspector Benefits

- Inspectors can easily see the orange Squirts™, they don't have to climb out to all the connections or lug around a torque wrench to know the connection has been completed.
- And instead of sampling only some of the DTI's with a feeler gage, Squirter® DTIs allow virtually 100% inspection.

https://turnasure.com/bolting-resources/ **SW should be a great complementary product for DTI**

Bolting information from the bolting experts!
TurnaSure is a globally recognized expert in bolting technology for structural steel, bridges, power plants, automotive, wind turbines and other applications. Our mission is to help our customers ensure the most reliably tensioned bolted connections while saving time and money. It is our pleasure to share these bolting resources with you.

Bolting Methods
•Bolting methods have evolved over the decades. At this point, the primary methods are: Turn of Nut
•Twist-Off Bolt
•Direct Tension Indicator
•Calibrated Wrench
•Visual Self-Indicator (ViewTite)
Click each link for more information about that bolting method.

Bolting Research Studies
Direct Tension Indicators (including the TurnaSure DTI) have been the subject of numerous American and international bolting research studies over the past three decades. We have gathered dozens of them here for you.

DTI Turnasure LLC- USA

ZIPTORK Bolting Technology

https://turnasure.com/

TurnaSure Sets the Bolting Technology Standard for Properly Tensioned Bolted Connections

https://turnasure.com/dti-patented-technology/

The world's most comprehensive product line of bolting technology

TurnaSure manufactures the world's largest variety of Direct Tension Indicator Washers (DTIs), including traditional DTIs and the exciting, new ViewTite Self-Indicators. These are used for achieving required tension loads on bolts in countless applications. These include Structural Steel Buildings and Bridges as well as DTI Washers for Studs used in the Petro-Chemical Industry, Anchor Bolts, and SAE Cap Screws for Automotive applications. TurnaSure also supplies special Direct Tension Indicators to customer's individual specifications in a variety of materials including Stainless Steel.

The most precise and reliable bolting technology product design

TurnaSure produces the most precise Direct Tension Indicators available, assuring accurate clamping loads on bolts and Studs. In fact, we've been setting the standard, and developing and improving our patented unique bolting technology product designs for load-indicator washer technology since their introduction nearly a half a century ago!

Trusted across industries and around the world!

TurnaSure's DTIs have been used across the United States, Europe, Asia, Africa, the Middle East and Australia in everything ranging from small projects all the way up to some of the tallest buildings in the world. Whether it's a bridge, a building, a wind turbine, a construction vehicle or even a roller coaster, projects that require strong, precisely-tensioned bolted connections rely on TurnaSure.

A history of innovation in bolting!

For 25+ years TurnaSure has responded to the evolving needs of high-strength bolting with a series of innovations that have kept our products at the leading edge of the industry. Many of these innovations, designed to improve precision, reliability and efficiency, have been granted patents in both the United States and around the world.

Key innovations:

Protrusion Pockets - These patented indentations on the reverse of the DTIs assure consistency regardless of surface condition.

Curved Protrusions - Curved protrusions on the DTI offer a superior fit under bolt heads, and allows DTIs to be used without a hardened washer when tightened under the turned element.

Offset Protrusions - Offsetting the protrusions from the indentation pockets allows these DTIs to account for the new larger bolt hole sizes permitted by the AISC while maintaining the reliability and accuracy that TurnaSure is known for. (read more about this amazing innovation here)

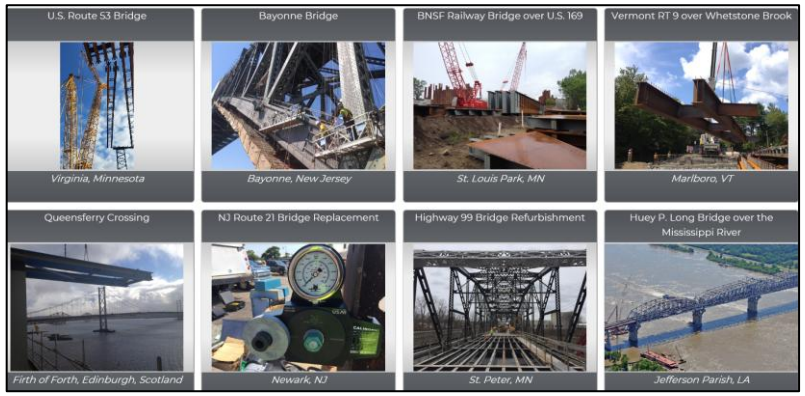
Some of TurnaSure's U.S. patents:

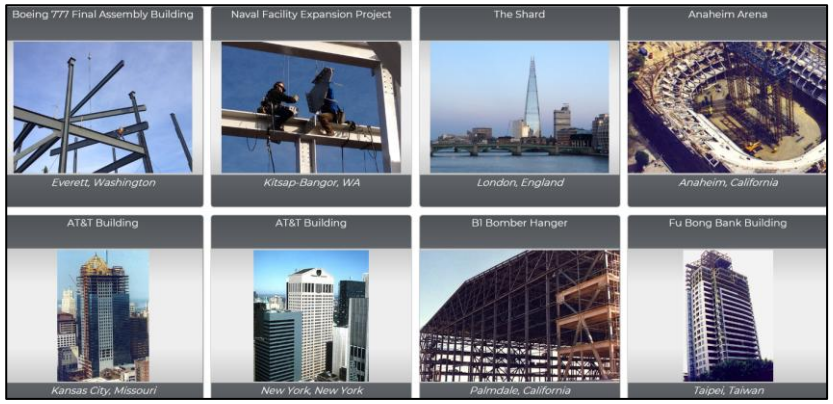
- US 5,370,483 - Direct tension indicator washer
- US 5,487,632 - Direct tension indicator washer
- US 5,667,346 - Direct tension indicator washer
- US 7,635,243 - Load indicating fastener and method of manufacture
- US 9,863,457 - Direct tension indicating washer with offset protuberances and indentations
- US Application #15/946/142 pending

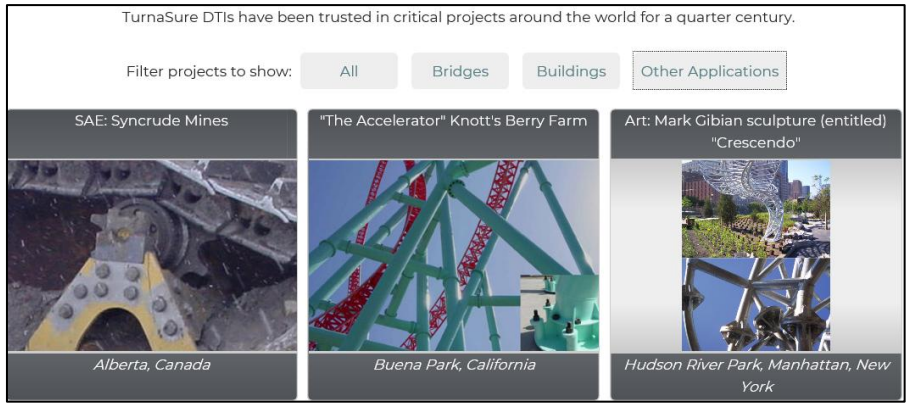
DTI Turnasure LLC- USA

ZIPTORK Bolting Technology

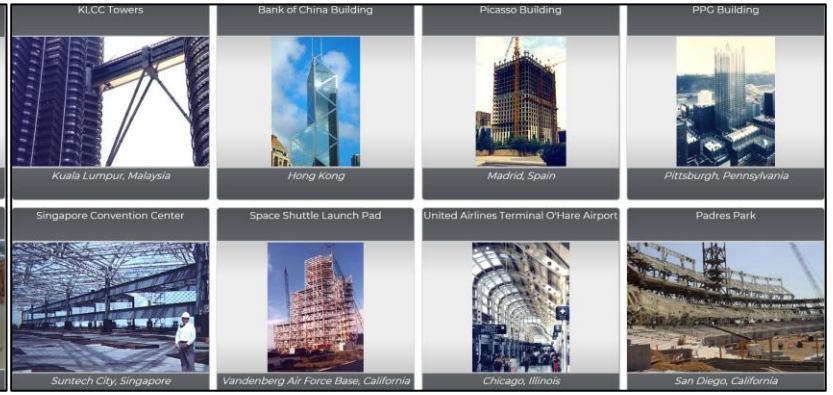
https://turnasure.com/projects/

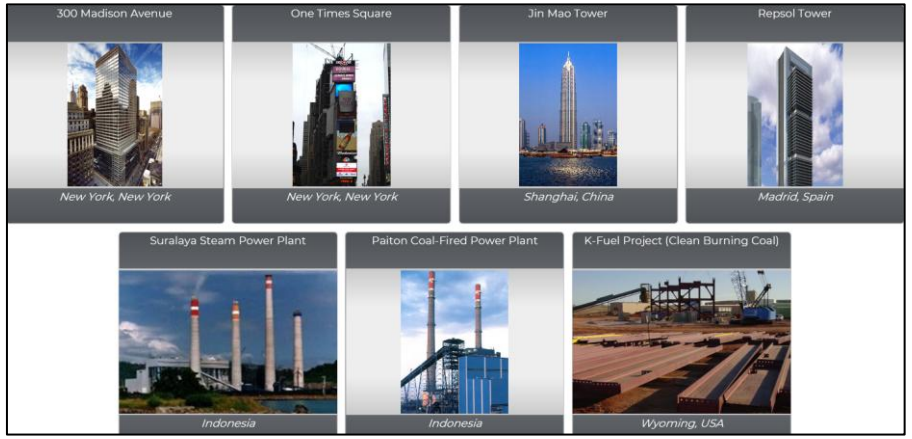






Projects Using TurnaSure DTIs





DTI TurnaSure vs Applied Bolting

ZIPPTORK Bolting Technology

https://www.bing.com/search?q=TurnaSure+vs+Applied+Bolting&src=IE-SearchBox&first=41&FORM=PERE3

DTI Washers and TC Bolts: Helping Ensure Torque and Tension -https://www.bhamfast.com/dti-washers-tc-bolts/

Direct Tension Indicators

Direct tension indicators (DTI) are washers manufactured by **Applied Bolting Technology** and **Turnasure**. These washers are used on a hex assembly and are designed to ensure proper tension on bolts. There are two types of DTIs, both resulting in the same outcome. Traditional DTIs have bumps around the washer that flatten once proper tension is achieved. This allows you to have a visual confirmation that tension is achieved.

The other type of DTI, also made by ABT, are DTI Squirters®. When properly tensioned, these washers will squirt out a colored silicone that gives you a visual confirmation that tension has been achieved. An extra advantage to this is that inspectors can easily see the bolts were installed properly, saving time on the jobsite.

TurnaSure products are proudly made in the United States of America!

https://turnasure.com/turnasure-made-in-the-usa/

Made in the U.S.A.

American Design Made in the U.S.A.

Our founder emigrated from England to the United States in the 1970s to pursue opportunity and unleash unbridled American innovation in the world of mechanical fastening of steel joints. **TurnaSure LLC is an American company based in suburban Philadelphia**, where we proudly design the most innovative and highest quality load indicating washers used all around the world.

American Steel Made in the U.S.A.

ALL of our products, including DTIs and ViewTite Nut-Side Self-Indicators are manufactured from steel which has been melted and manufactured in steel mills exclusively within the United States of America.

American Manufacturing Made in the U.S.A.

ALL of our products are manufactured in the United States of America. We are proud to partner with domestic companies which support domestic job creation, employee growth, economic opportunity, and social responsibility as we grow.

American Testing Made in the U.S.A.

We partner with a 3rd party independent testing laboratory in our home state of Pennsylvania to verify the quality and accuracy of our products and as a check on our factory testing and inspection protocols. Our products are also the subject of numerous completed and on-going bolting research studies performed by American universities as well as similar institutions elsewhere around the world.

American-Made Packaging Made in the U.S.A.

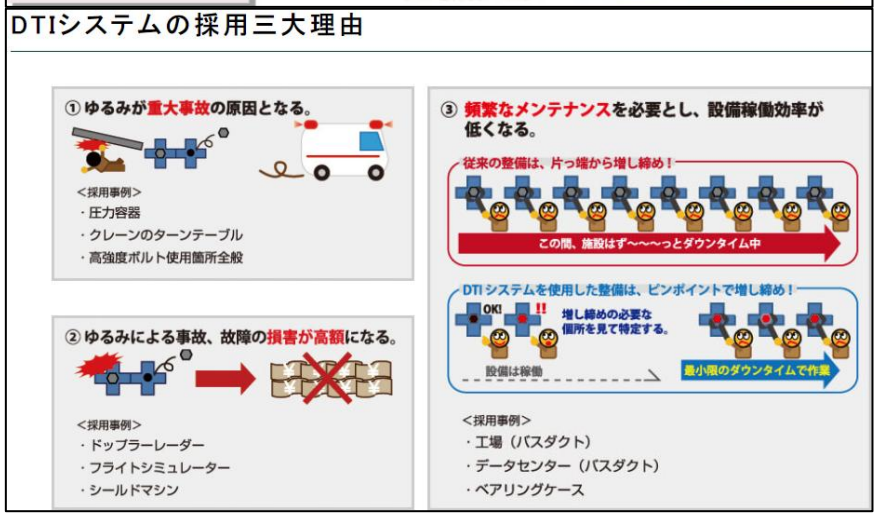
Our boxes, plastic pails, and all of our marketing materials are all produced right here in the U.S.A. It's the final touch and the best way to deliver an American-made product -------- proudly manufactured in the United States of America!

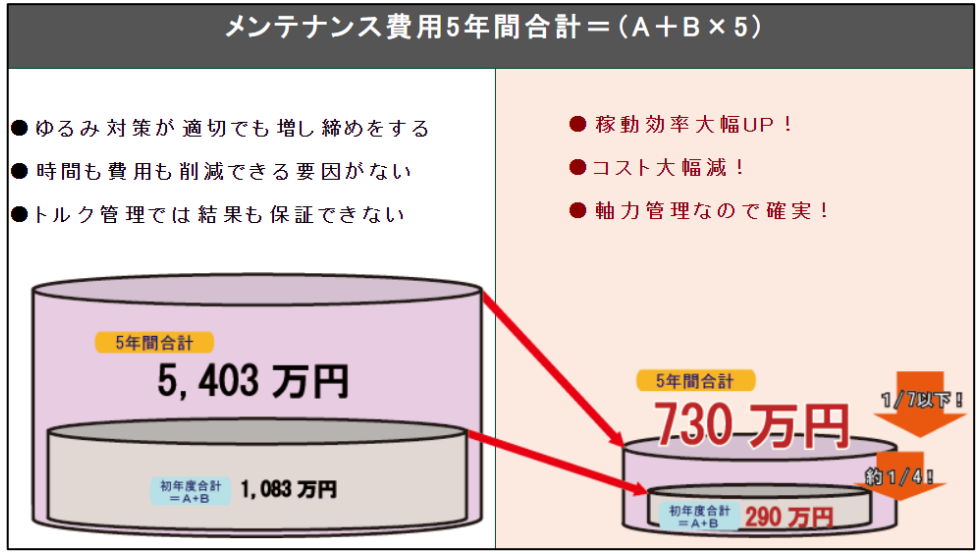
DTI-Agent Direct Tension Indicating Fastener System

ZIPTORK Bolting Technology

Japan Agent ~ http://www.ikekin.co.jp/contents/catalog/original/dti/index.html

DTIシステムの適正軸力は、使用対象にあわせて任意に設定可能です。（設定可能範囲：ボルトの保証荷重の40%-90%）
安　全　軸力管理なので確実　正　確　目視で正確な点検が可能 対応サイズ～ボルト径M10以上 対応材料～ 鉄（合金、炭素鋼）、ステンレスなど（特殊材料要相談）使用環境温度～ -20℃ - 75℃





DTI-Agent Surecon Fastening-DTI India Agent

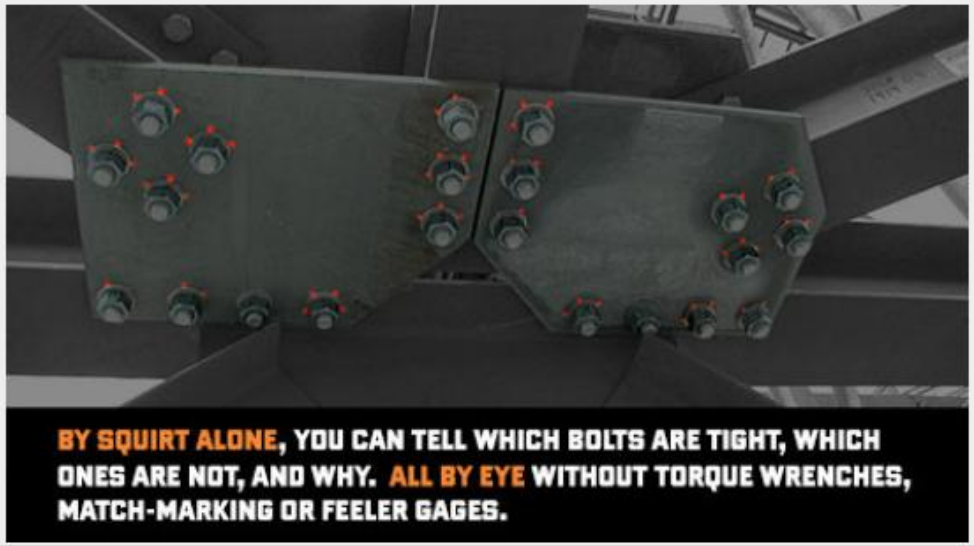
ZIPTORK Bolting Technology

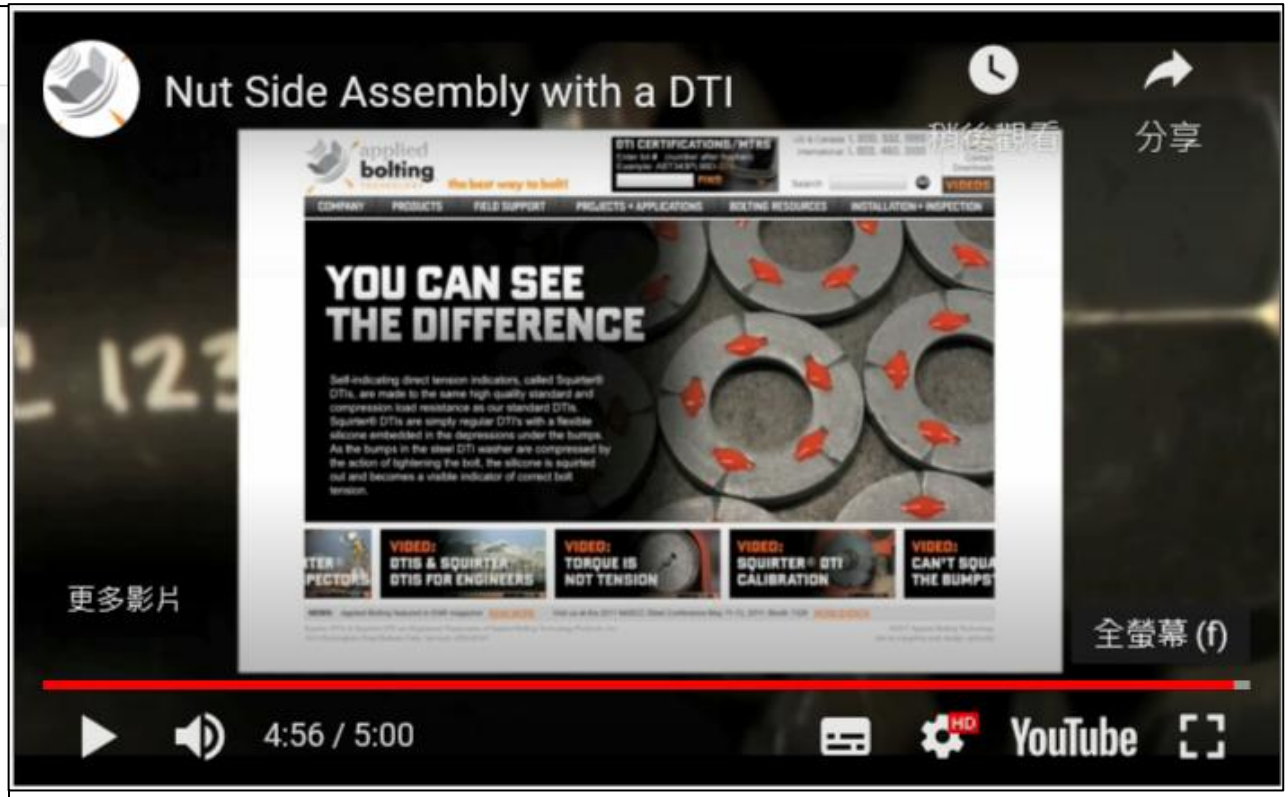
http://www.surecon.in/home/

Squirter DTIs For Easier and Better Fastening

SQUIRTER® DTIs are DTI's with a flexible silicone embedded in the depressions under the bumps. To use them, simply ... Tighten the bolt until the calibrated amount of orange silicone appears from under the DTI's squirt locations, then stop tightening. That's all there is to it.

Now you can see when you're done.





Load Monitoring Fasteners

Copper State Bolt & Nut Co.

ZIPTORK Bolting Technology

https://www.copperstate.com/about-us/

Copper State Bolt & Nut is committed to being the finest manufacturer and distributor of fasteners and related products in North America. We are dedicated to excellence in all phases of our business through a strong commitment to quality, customer service and return on equity. Our philosophy is aimed at creating an enriching and fulfilling environment for our employees and maintaining long term relationships with our customers and vendors. Our focus on the future is towards continuous improvement.

Letter from the Founder ~ **MARTIN CALFEE ~ FOUNDER / CHAIRMAN**
I have been peddling fasteners for over fifty years. My goal from the start has been to be the best distributor in the United States. I want to be known as providing the best customer service around town and I want my suppliers to think of me as their best customer. At Copper State Bolt & Nut Co., you won't find voice mail, long lines, back orders or rookies. You will find lots of inventory, same day service, and an extremely knowledgeable sales staff.

I often remind my employees "If we do business today, like we did yesterday, we won't be around tomorrow". We welcome change at every level of our business to improve customer service and operations. Unsatisfied customers are the only customers I don't like. I am the self appointed Chairman of Customer Complaints and I can be reached at 800-603-NUTS.

https://www.copperstate.com/lmf/

Video for Load Monitoring Fasteners

Do you want to be notified when a critical bolt comes loose?

BoltSense® fastener product family:

Load Monitoring Fastener+® (LMF+®) is a wireless, accurate, and automatic load monitoring fastener system. The LMF+® is extremely easy to use and will allow users to continually observe and record the true tension (tightness) of fasteners, both during installation and while equipment is in operation. Automated alerts will notify you if tension exceeds or falls below predetermined and updateable values or thresholds.

Load Indicating Fastener (LIF) includes the same base fastener as the LMF+® product, but without the continuous transmitting cap. Instead, the LIF has a stainless-steel dust cap, and readings can be taken anytime with a clip-on reader (both magnetic and screw on.)

The LMF+® and LIF has been proven in the field to be a superior alternative to conventional tension and elongation control methods such as direct measurement, ultrasonic equipment, load cells, SmartBolts, DTI washers and other products such as the MaxBolt and SPC4 product.

Applications include nearly all critical mining fasteners including ball and SAG mill flange and **liner bolts**, slew rings, foundation bolts for crushers and other large equipment, rock breakers, wind towers and turbines, as well as in many other industries such as structural, oil & gas, and pulp & paper.

- Case Study - Rock Breaker
- Case Study - BoltSense, Levenmouth
- Case Study - Mill Liner Consultation
- Case Study - Mill Discharge End

https://www.copperstate.com/files/8616/3139/8984/LMF_Plus_Flyer_Rock_Breaker_Case_Study_low_res.pdf

LOAD MONITORING FASTENER plus

Copper State

Powered by Transmission Dynamics

"The Future of Critical Bolting"

Rock Breaker, Crusher
Copper Mine (July 2021)

- Load Monitoring Fastener+ installation on rock breaker head

Benefits Reported:

- Enabled an initial assembly that eliminated previously frequent bolt breakage problems
- Eliminated frequent need of unplanned downtime with this equipment due to bolt breakage
- When asked for a testimonial, Rick simply stated, "BADASS"!

Rick
Crusher Area Supervisor

LOAD MONITORING FASTENER plus

Copper State

Powered by Transmission Dynamics

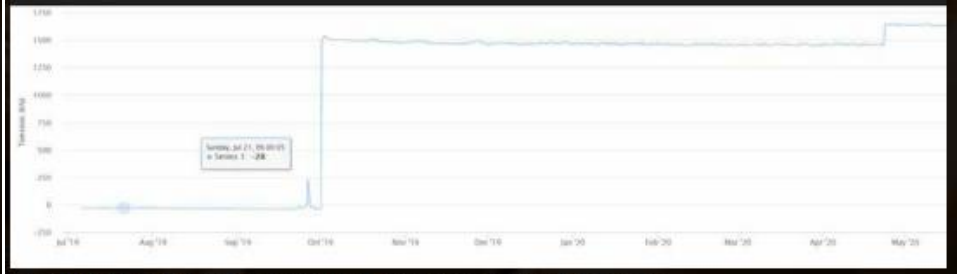
"The Future of Critical Bolting"

ORE Catapult's 7MW Levenmouth Demonstration Turbine
(Credit: ORE Catapult)

- 75MW Wind Turbine, Levenmouth (UK)
- 7 X instrumented M72 bolts installed on the wind turbine tower
- Measuring bolt tension and temperature since 2019
- Login now to check bolt tension live at https://gdn.jrdltd.co.uk/
  Username: orec
  Password: QJ5ANv4Xjg

"Our Levenmouth Demonstration Turbine allowed this technology to demonstrate how it sends instant alerts if bolt preload drops below a predefined level, allowing operations and maintenance teams to act instantly to re-tighten the bolt and address any underlying issues." - Chris Brown
Asset Manager, ORE Catapult

Tension Trend



c.1500 kN when bolts were installed, followed by light relaxation and subsequent re-torquing.

Wind Turbine Application: Foundations, Towers, and Blades

- Operations and maintenance costs account for >30% of Levelized Cost of Energy
- Up to 90% of expenditure results from manual inspections
- LMF+ provides continuous monitoring, reducing manual checks and associated costs

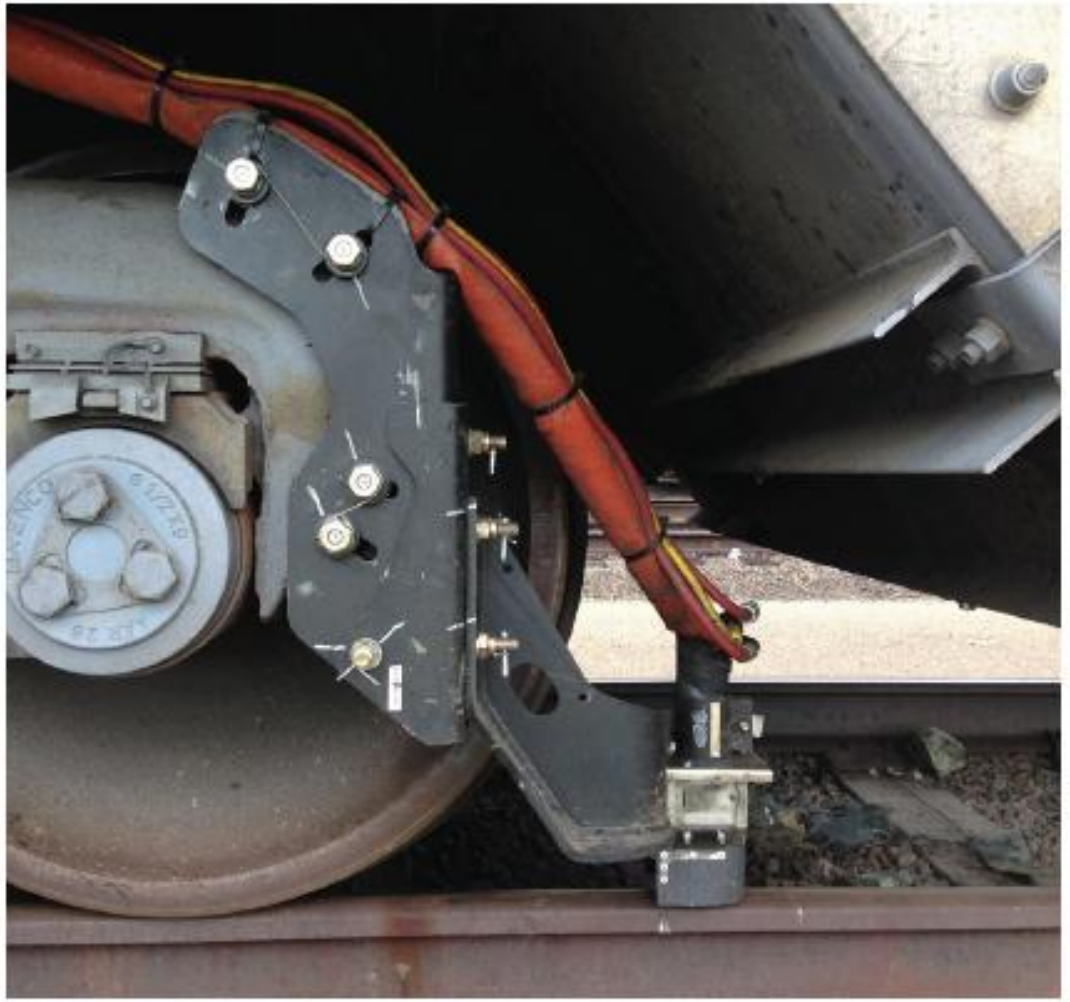
ZIPTORK Bolting Technology

https://www.copperstate.com/files/8416/3139/9023/LMF_Plus_Flyer_Bolt_Sense_-_Levenmouth_Case_Study_low_res.pdf

Maxbolt Valley Forged Application

ZIPPTORK
Bolting Technology

www.VFBOLTS.com



https://www.vfbolts.com/product/spc4-load-indicating-system/

The SPC4™ Load Indicating System allows users to install a bolted assembly with confidence. The user is able to constantly monitor the clamp load of any SPC4™ bolted joint, whether static or dynamic. By easily attaching a probe to the datum disc located on the end of the fastener, the user is able to read the value on a hand held battery powered digital monitor. Optional data gathering and storage of the bolted joint are also available.

MAXIMUM JOINT INTEGRITY & OPTIMUM PERFORMANCE

The integrity of a bolted joint is jeopardized when fasteners lose their tension. This loss of clamping force begins during assembly due to elastic interactions and joint relaxation. Self-loosening continues when the joint is put in service due to vibrations, shock, temperature changes, embedment, etc.

The SPC4™ joint allows the end-user to re-tighten only the bolts or studs that have lost their clamp load. This results in a tremendous saving of maintenance time, money and replacement parts. For a minimal investment, the SPC4™ offers maximum joint integrity with optimum performance.

https://www.vfbolts.com/product/spc4-load-indicating-system/

SPC4™ ADVANTAGES

- Safer Bolted Joint Assemblies
- Optimized bolted joint integrity
- More efficient and accurate installations
- Reduced downtime
- Reduced inspection time
- Reduced maintenance cost
- Inexperienced operators can install and monitor complex assemblies
- Any tightening tool can be used
- Electronic control of installation clamp load
- Tightens to +/- 5% of true clamp load
- Shut-off capability of installation tool at pre-determined clamp load
- Easily displays the amount of clamp load via an electronic hand held monitor.

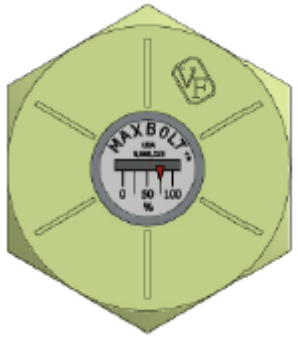
LOCATION: North Dakota, USA
SPECIFIC APPLICATION: Wheel and track sander nozzle bracket bolts.
BOLTING ISSUE: Constant loosening from vibration resulting in bolt breakage.
VALLEY FORGE SOLUTION: **Maxbolt** Load Indicating Fasteners
INSTALLATION:
A bracket was retrofitted to the railcar axle. The assembly consisted of four bolted bracket mounts retrofitted to the axle and the bracket then fastened to the mounts. The whole assembly used a quantity of twelve -- four 3/4" and eight 5/8" Maxbolt, load indicating fasteners. Field Tests were performed by OEM on the Maxbolt load indicating fasteners by gathering data from two brackets bolted on to a right and left, car axle. All twenty four Maxbolt load readings, against railcar miles travelled, were measured during a ten month period, at the time of printing.
OUTCOME:
Proved out bolt load loss during operation which required retorque. After multople retorques, Bolts settled, overcoming embedment and vibration loss resulting in no more loose or broken bolts.
CONCLUSION:
Specifically with this OEM's railroad bolting assemblies, safety is a first consideration.

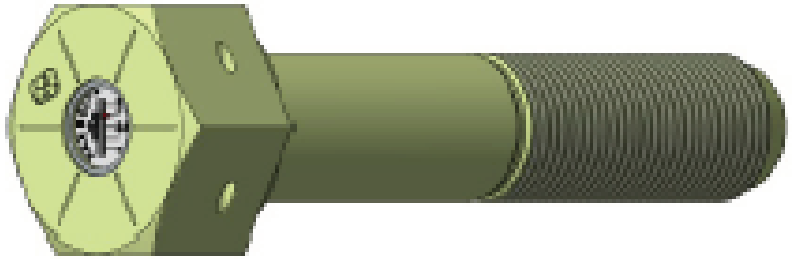
Maxbolt Valley Forged Application

ZIPPTORK Bolting Technology

www.VFBOLTS.com

For this application, Valley Forge's Load Indicator Technology not only assures this safety with an accurate and instantly readable assembly preload, but also ensures quick maintenance, with no further need for routine re-torquing, other than those individual bolts reading low on the Maxbolt dial. Load indicating bolts are not for all applications but their ability to read accurate bolt load at a glance or during tightening, makes it ideal for this critical bolted assembly. The quantitative clamp load readings displayed for this test, would have been by any other method, difficult and extremely expensive, if not impossible to obtain, without the Valley Forge Maxbolt™ Load Indicating System.





vfbolts

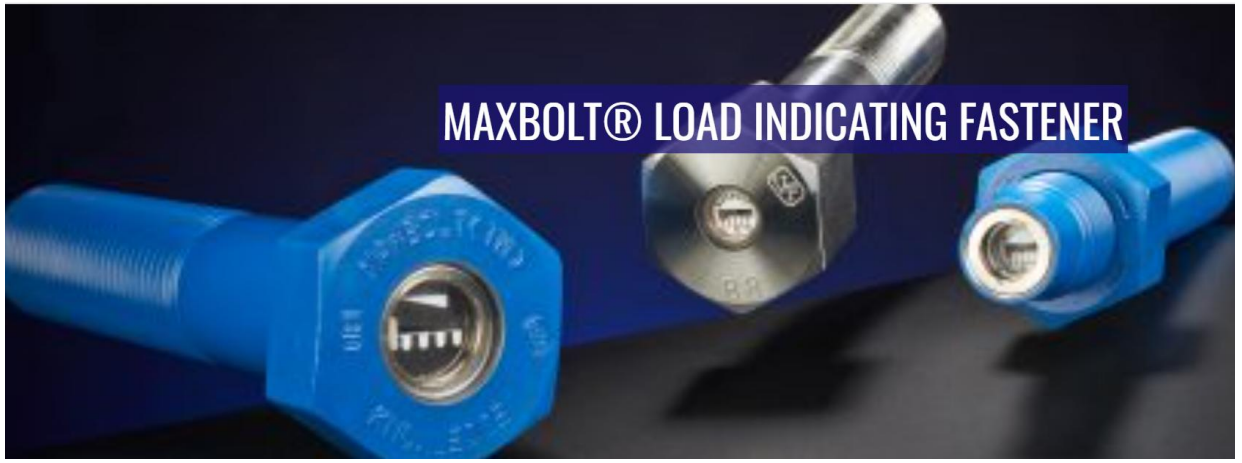
VALLEY FORGE & BOLT

4410 W JEFFERSON ST, PHOENIX, AZ 85043, TOLL FREE: (800) 832-6587 LOCAL: (602) 269-5748

https://www.vfbolts.com/product/maxbolt-load-indicating-fastener-system/

ZIPTORK Bolting Technology

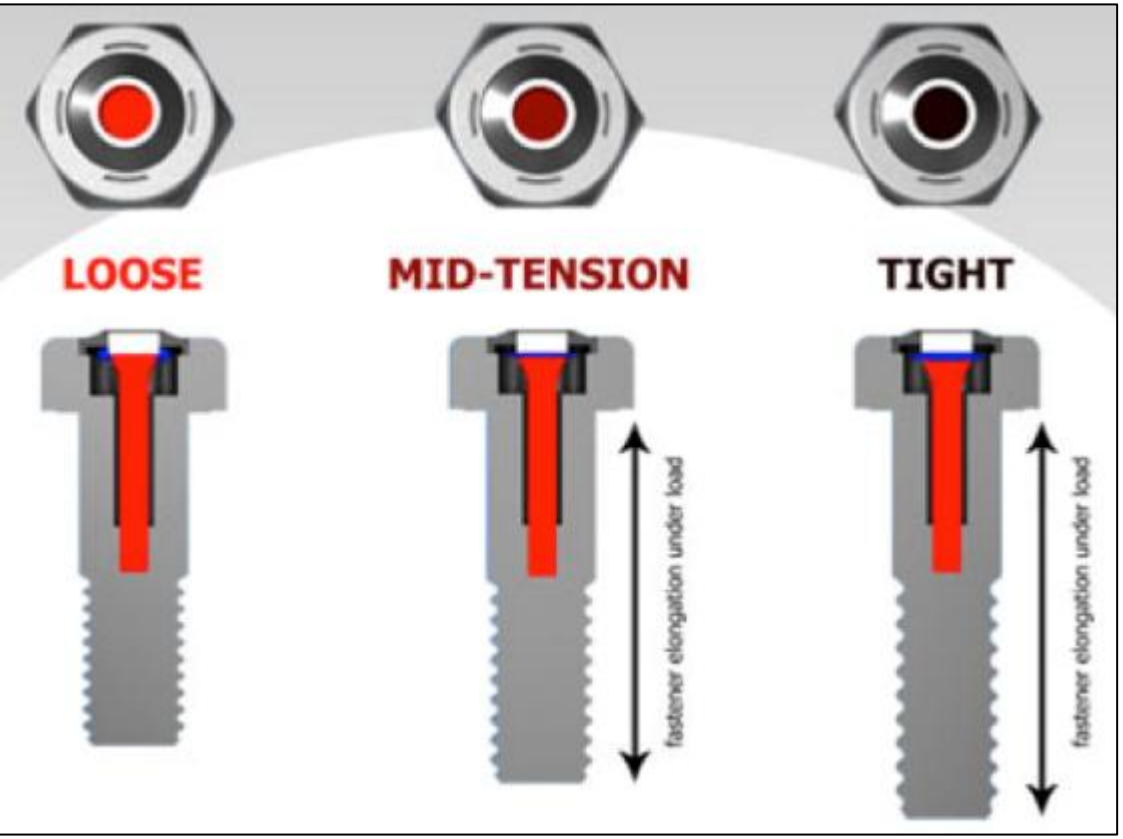
MAXBOLT LOAD INDICATING FASTENER SPC4 LOAD VERIFYING SYSTEM PRODUCTS COMPANY CAPABILITIES RESOURCES CONTACT COVID UPDATE



SmartBolt Industrial Indicators

ZIPTORK Bolting Technology

http://www.smartbolts.com/the-smartbolts-advantage/how-does-it-work/



Industrial Indicators' suite of bolted joint condition monitoring technologies enable greater safety, reliability, and efficiency for your operations.
Devices with Chromaulic™ or Microindicator™ technology can measure minute dimensional displacements and indicate when bolts are loosened and tightened. We invite you to visit SmartBolts.com to learn more about how these technologies are used to monitor bolted joints in industries around the world.

Chromaulic™ Technology

Digital Sensor | Visual Indicator | Closed Loop Control

Chromaulic™ technology measures minute relative displacements that are indicated **digitally and visually** via a change in intensity or color of an **indicator** and by means of an **electronic device**.

Coming Soon

Microindicator™ Technology

Visual Indicator

Microindicator™ technology measures minute relative displacements that are indicated **visually** via a change in intensity or color of an **indicator**.

SmartBolt Industrial Indicators

ZIPPTORK Bolting Technology

https://industrialindicators.com/smartbolts/

SmartBolts®

Chroma Series

The Chroma Series is a line of SmartBolts® products that utilize Chromaulic technology for **visual load indication, digital remote load monitoring, and closed-loop tension control**.

Coming Soon

Microindicator Series

The Microindicator Series is a line of SmartBolts® products that utilize Microindicator technology for **vibrant visual load indication**.

Products: DTI™

http://www.smartbolts.com/find-your-smartbolt/

Call us:
+1 (240) 631-7246
Fax:
+1 (240) 750-6025

Mailing Address:
Industrial Indicators
3951 Dartmouth Court, Suite 8
Frederick, MD 21703

Rotabolt

Bertfelt
Brilliant solutions for the Industry

https://www.bertfelt.com/

ZIPPTORK
Bolting Technology

• **Rotabolt**, screws bolts with a torque load tension indicator, also called bolts screws with built-in load control. Used by customers who demand reliable screw bolted joints. Rotabolt is sold in Sweden and Finland.

Industrial | Water Treatment | Water Authorities | Irrigation & Farming | Mining | Pump Protection

Industrial

- Dosing equipment
- Mixture systems
- Control of fluids in cooling applications
- Fire-fighting – Control flow to hydrants and foaming agents to ensure correct ratio
- Moisturizing equipment
- Dust Suppression – minimise dust and erosion
- Safety showers & eye-wash equipment – ensure safe operation

Bolts with load tension indicator — Rotabolt

Rotabolt is a brilliant patented solution that ensures that a bolt is tightened to the required load tension effectively, reliably and economically while facilitating easy control of the load tension during operation.

In nine cases out of ten, when a leak occurs in a flange or a screw loosens or breaks due to fatigue, it depends on the bolts having been installed with incorrect load tension, usually too low. Even the best torque wrenches are unreliable up to +/- 40%. Hydraulic wrenches are very unpredictable as well. When the wrench is removed, the system settles, which affects washers, threads and gaskets and results in the final load tension being much lower than required. Using RotaBolt, all bolts can be easily checked for the correct load tension during tightening. This check is also possible during operation when the bolt is in place and does not require the use of tools. Each Rotabolt is equipped with a load tension indicator (rotor). Check that the rotor is fixed using your forefinger and thumb. If it is loose, tighten the bolt until the rotor is fixed.

Rotabolt reduces installation and inspection costs as well as the the risk of a breakdown. RotaBolt ensures that each bolt is installed correctly, which means that the dimension and the number of bolts can be more precisely specified in the design stage. Rotabolt is used in a range of critical applications. Customers are found in the vehicle, construction, power and processing industries, offshore as well as in the armed forces.

Rotabolt ensures a correct load tension to an accuracy of +/- 5%. It is the bolts elongation that is measured, not the torque at assembly or other extraneous factors. The elongation is a direct measurement of the load tension. Rotabolt is used wherever there is a need for a quick, simple and reliable check during operations that bolts have the specified load tension. This is especially applicable when stress occurs through temperature and pressure changes, and vibrations.

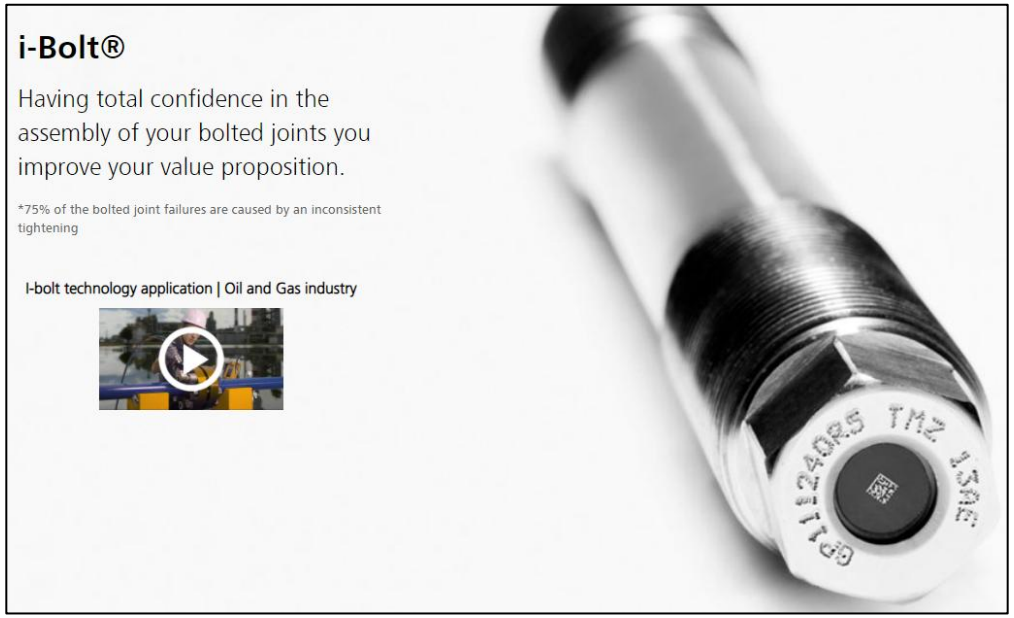
Rotabolt can also be used in demanding, damp and dirty environments and has been used successfully in temperatures up to 630°C. Rotabolt is manufactured by Rotabolt Ltd, a part of the global James Walker Group.

I-Bolt -Ultrasonic

ERREKA FASTENING SOLUTIONS

ZIPTORK Bolting Technology

http://www.errekafasteningsolutions.com/en/ibolt/



Applicable Sales Channel

TORQ-COMM

ZIPTORK Bolting Technology

https://www.torq-comm.com/products/

Patented Joint Quality Process Control System

Commander XT1000

Best in Class, Patented, Joint Integrity Process Control Handheld

Exodys Cloud Control Center

Digitalize Your Joint Integrity Quality Control Process with Revolutionary Industrial Bolting Data Collection Technology

Commander XT2000

Patented Remote Pump Control for Digitalized Joint Integrity Process Control

Tohnichi Torque Wrench

Digital Torque Wrench with Wireless Data Transfer via Bluetooth

TorqTag Set

Tighten Every Bolt In Sequence, Without Fail.

Hydraulic Tensioning +
Bolting Sequence Control

TORQ-COMM

ZIPPTORK
Bolting Technology

https://www.torq-comm.com/products/

Patented Joint Quality Process Control System

Flexible options will meet all your data capture and control needs.

Hardware

- 1D / 2D Barcode Readers
- RFID Reader
- Hi-Resolution Camera
- Text Messaging / Cellular Communication

Data Storage

- Collects data and sends the results for each bolt to a Cloud server or local PC
- Data can be managed and sorted as required by the supervisor
- Data can then be viewed, distributed or printed in a variety of formats

Control

- Ability to remotely adjust the pressure on the pump through the Commander XT2000 add-on
- Adjust either wirelessly or tethered

Cumulus DIGITAL SYSTEMS

https://cumulusds.com/smart-torque-system/

ZIPTORK Bolting Technology

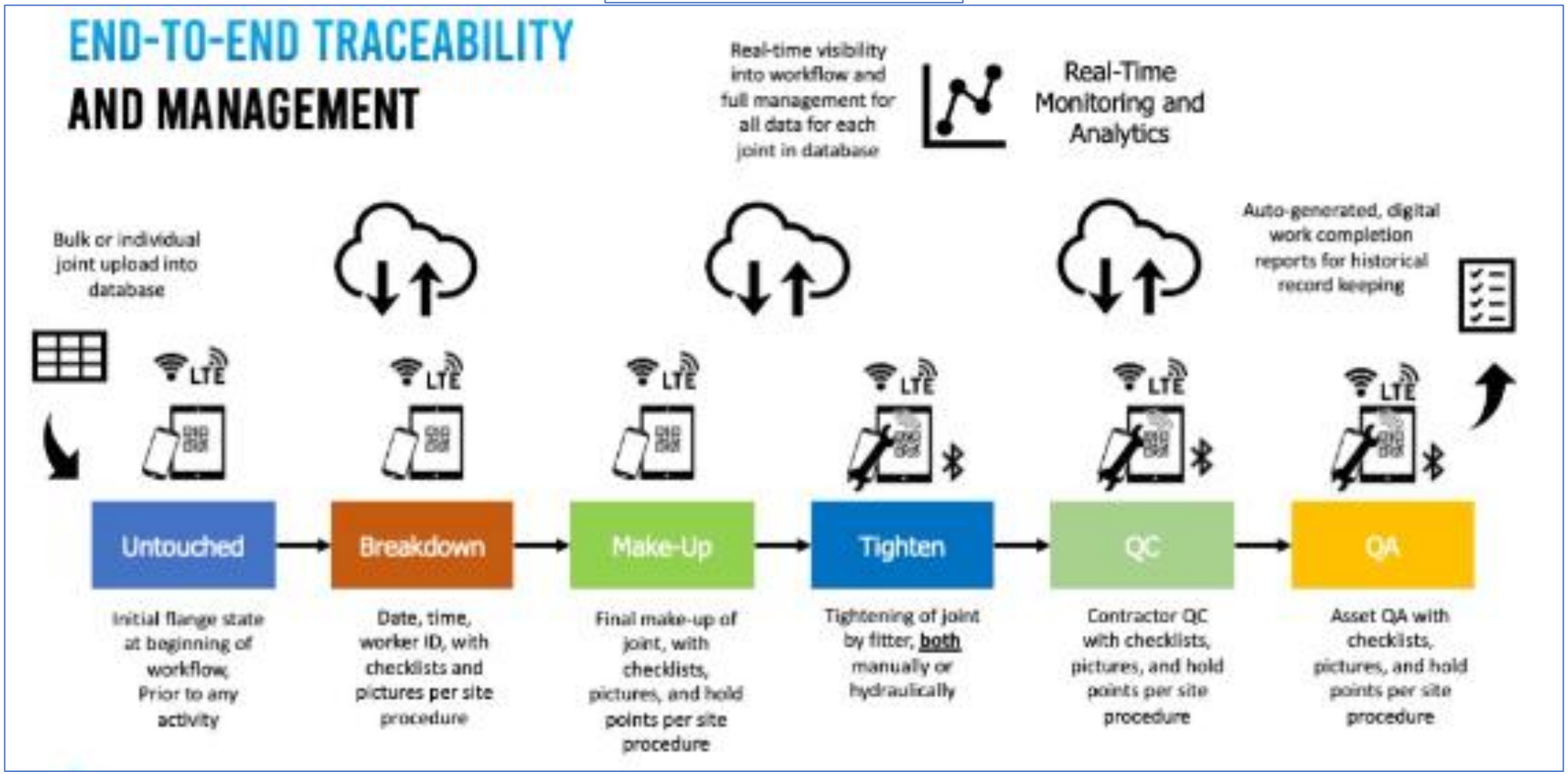
https://www.google.com/search?q=cumulus+smart+torque+system&oq=cumulus+smart+torque+system&aqs=chrome.0.69i59j69i60l2.13005j0j4&sourceid=chrome&ie=UTF-8

https://www.bing.com/search?q=cumulus+smart+torque+system&cvid=899abcef70114d38a95c657a181b05a3&aqs=edge.0.0j69i60l2j69i61.16921j0j4&FORM=ANAB01&PC=U531

https://www.youtube.com/watch?v=zFjeJqCXPzE&ab_channel=CumulusDigitalSystems

應拍可取代STS介紹的影片

END-TO-END TRACEABILITY AND MANAGEMENT



A SOLUTION FOR THE INDUSTRY, BY THE INDUSTRY, THAT WORKS

PATENTED

- Deployed at **15facilities**, managing **>600,000** work completions
- Reduced 5-10% leak rate to **ZERO LEAKS** on start-up
- **60% reduction** in data review and QC costs
- Eliminates **~2 hours of paperwork** per worker per day

CNBC UPSTART100

IoT IoT

"My foremen and their fitters have so much more time to do the tasks that have to be done, instead of crossing t's and dotting i's."

- General Foreman, **USA**

"For me, this is the gold standard in ensuring **ZERO LEAKS.**"

- Plant Projects and Eng. Manager, **Singapore**

"With the conventional approach, we observe on average 5% leaks during leak testing and facility restart. With the use of STS there were ZERO LEAKS upon start-up, resulting in an avoidance of 330 million standard cubic feet per day of lost production."

- Maint., Reliability & Turnaround Mgr., **Trinidad**

"I was skeptical at first, but honestly Smart Torque is great! There's no more wasted time of setting the torque wrench or filling out torque sheets. It makes the job far easier and faster."

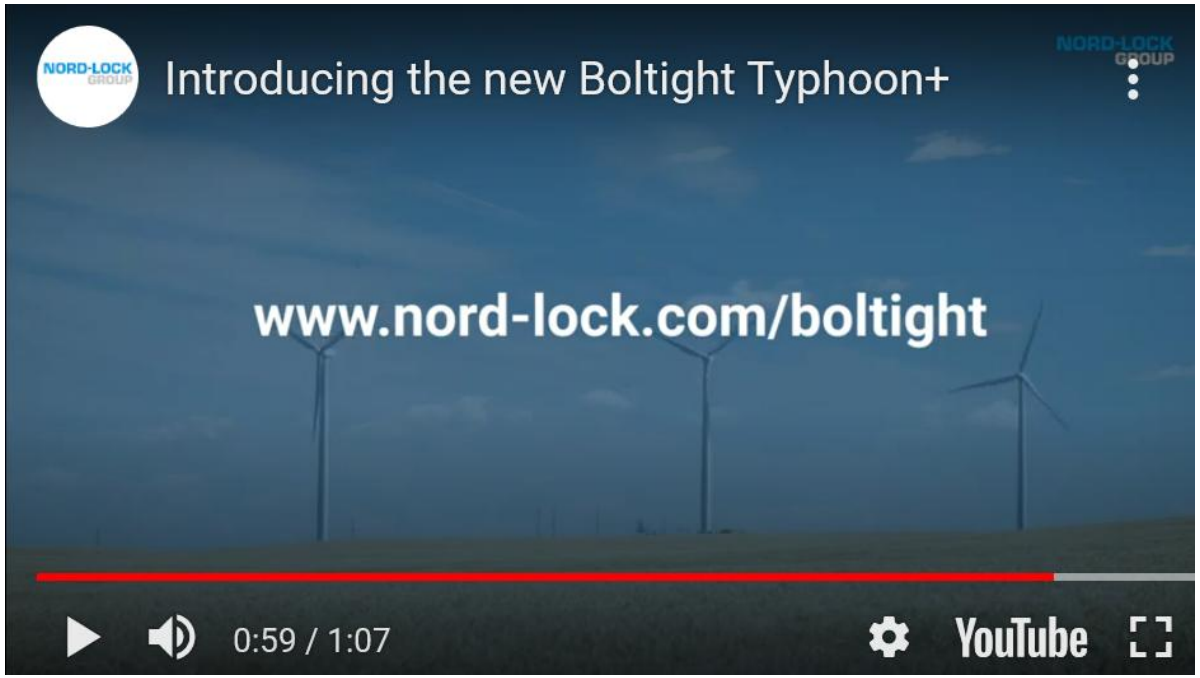
- Journeyman Pipe Fitter, **USA**

Introducing the new Boltight Typhoon+

ZIPPTORK Bolting Technology

https://www.bing.com/videos/search?q=Wurth+Wedge+Lock+Washers+-+YouTube&&view=detail&mid=C7A5640FDB9D8183D065C7A5640FDB9D8183D065&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3DWurth%2BWedge%2BLock%2BWashers%2B-%2BYouTube%26qpvt%3DWurth%2BWedge%2BLock%2BWashers%2B-%2BYouTube%26FORM%3DVDRE

Hydraulic Tensioning



Hydratight Ultrasonic Load Monitoring

ZIPPTORK Bolting Technology

Hydraulic Tensioning + Ultrasonic Technology

Because ensuring a leak-free solution is critical. It has to be Hydratight.

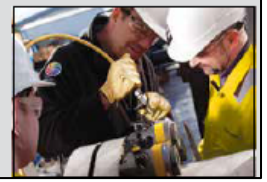
For more than 100 years, Hydratight has provided world-class bolted joint solutions, assessing and managing joints to ensure leak-free start-ups. Today, we continue to set international standards in joint integrity—but we're so much more than just a bolting and on-site machining company.

Because even the tiniest leak can be costly and time consuming to repair, we manage every joint on a project for leak-free start-ups and production, which in turn removes the threat of environmental impact caused by unsafe joints. Safety continues to be the most important aspect of our business. We are a global organization making a real difference to the industries and communities we work in, committed to improving safety, operational efficiency and uptime.

Because you require the support of an innovative partner committed to your success, we not only offer unrivalled service on a global scale, including customer training and software development; but also design and manufacture quality tools and equipment for bolted joint solutions to the highest standards. Our certified teams are dedicated to working closely with you, assessing and managing every joint on your project to prevent leaks from ever occurring, year in, year out.

Because you value safety and reliability, we work to ISO 9001, ISO 14001 and OHSAS 18001 standards in everything we produce, from manufacturing torque and tension bolting equipment to mechanical connectors, from on-site service to creating custom solutions in line with client specifications.

It means that whenever you need a complete joint integrity solution, whichever industry sector you're in, you can rely on us to get it 100% right first time, every time. **This is why it has to be Hydratight.**

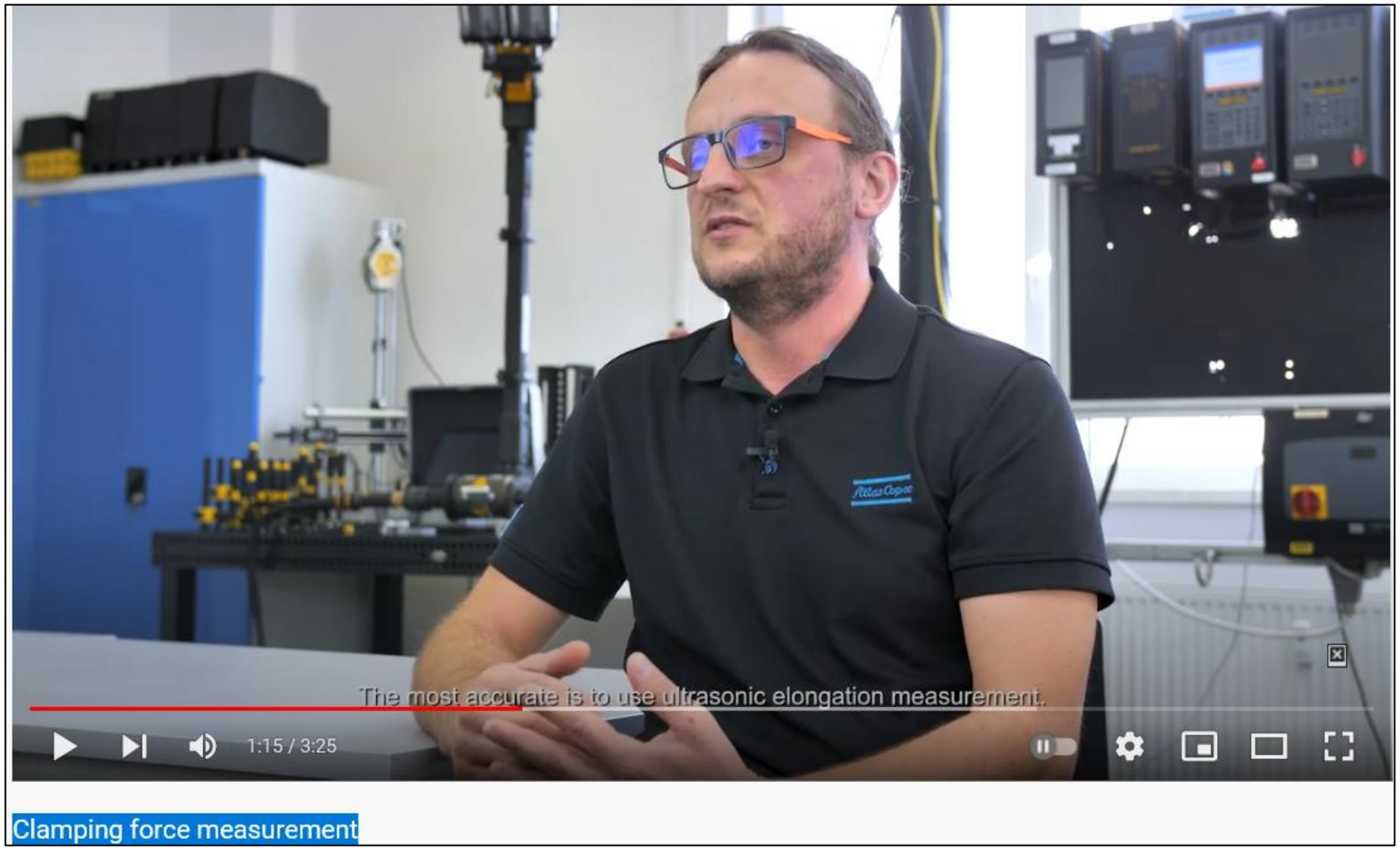


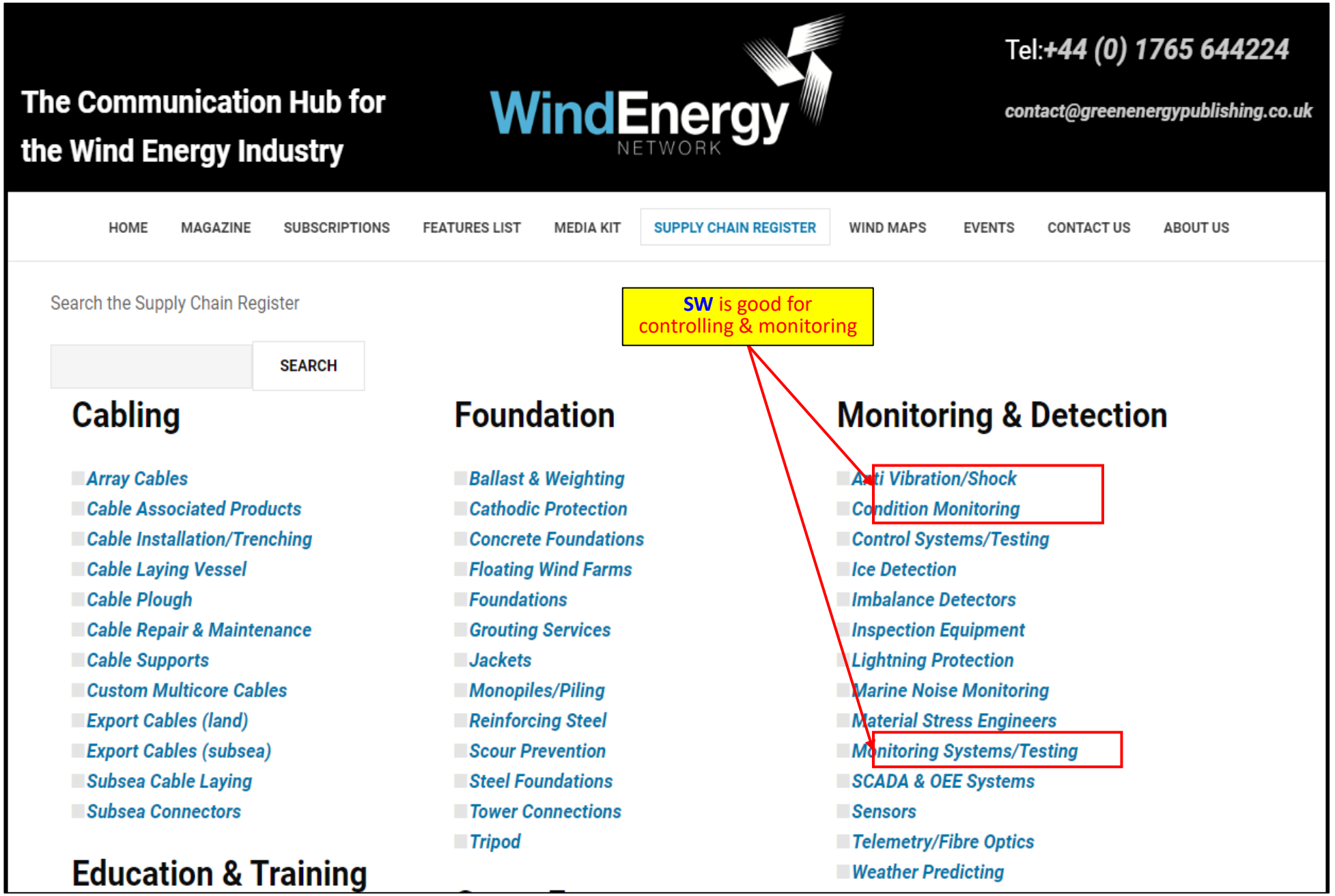
Bolt Load measurement
~ Ultrasonic

Clamping Force Measurement

ZIPPTORK
Bolting Technology

https://www.youtube.com/watch?v=Se68336Jf88




The Communication Hub for the Wind Energy Industry
WindEnergy NETWORK
Tel:+44 (0) 1765 644224
contact@greenenergypublishing.co.uk
HOME
MAGAZINE
SUBSCRIPTIONS
FEATURES LIST
MEDIA KIT
SUPPLY CHAIN REGISTER
WIND MAPS
EVENTS
CONTACT US
ABOUT US
Search the Supply Chain Register
SEARCH
SW is good for controlling & monitoring
Cabling
Array Cables
Cable Associated Products
Cable Installation/Trenching
Cable Laying Vessel
Cable Plough
Cable Repair & Maintenance
Cable Supports
Custom Multicore Cables
Export Cables (land)
Export Cables (subsea)
Subsea Cable Laying
Subsea Connectors
Foundation
Ballast & Weighting
Cathodic Protection
Concrete Foundations
Floating Wind Farms
Foundations
Grouting Services
Jackets
Monopiles/Piling
Reinforcing Steel
Scour Prevention
Steel Foundations
Tower Connections
Tripod
Monitoring & Detection
Anti Vibration/Shock
Condition Monitoring
Control Systems/Testing
Ice Detection
Imbalance Detectors
Inspection Equipment
Lightning Protection
Marine Noise Monitoring
Material Stress Engineers
Monitoring Systems/Testing
SCADA & OEE Systems
Sensors
Telemetry/Fibre Optics
Weather Predicting
Education & Training

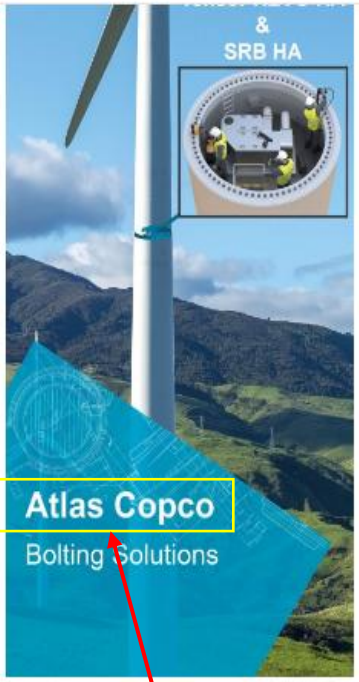
The Communication Hub for the Wind Energy Industry

WindEnergy NETWORK

Tel:+44 (0) 1765 644224

contact@greenenergypublishing.co.uk

HOME | MAGAZINE | SUBSCRIPTIONS | FEATURES LIST | MEDIA KIT | SUPPLY CHAIN REGISTER | WIND MAPS | EVENTS | CONTACT US | ABOUT US



Use SW for ensuring the highest quality , reliability Safety and traceability