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NDT Makes A Better Life

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Commit to Bolt Stress Measurement and Digital Maintenance

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**EMAT Dual-wave
Bolt Stress Gauge ST100**

Instrument/Service/Bolt Cloud

About Us

PHASERISE

Suzhou Phaserise Technology Co., Ltd. is a leading manufacturer of high power ultrasonic electronics in China, especially in area of electromagnetic acoustic transducer (EMAT) and air coupled ultrasonic. The vision of the company is “NDT makes a better life” . The whole ethos of the company is delivering satisfactions and values to our customers by innovation and quality. We provide electronic instruments and technical solutions of EMAT, air coupled ultrasonic and resonance ultrasonic spectroscopy.

GOINSPEC

Goinspec Technology (Wuhan) Co., Ltd. has committed to bolt stress inspection and bolt cloud maintenance services for customers from industries of wind power, hydro-power, thermal power, motor industry, bridge and railroad. The company is a leading bolt stress maintenance service provider in China, which provides bolt stress patrol inspection service and maintenance service for lots of wind farms.

EMAT Dual-wave Stress Gauge ST100 Development History

Phase 1

2013-2018

Phaserise Technology Co., Ltd. was founded in 2013. The company has been devoting itself to high power UT system research and development. Phaserise filed the world's first dual-wave EMAT patent.

Phase 2

2018-2022

In 2018 Phaserise Tech sold the first EMAT dual-wave stress gauge in the word.
In 2019 Phaserise Tech sold the first portable EMAT dual-wave stress gauge in the word.
In 2021 Phaserise participated in drafting the state standard GB/T 43232-2023 Fasteners--Measurement method of axial stress by ultrasonic
From 2018 to 2022 , Field experimental verification of EMAT dual-wave stress gauge from Phaserise Tech had been carried out in several top wind turbine companies.

Phase 3

2023-Now

In 2023 Phaserise Tech achieved the technical breakthrough to calibrate bolt stress ultrasonic measurement parameters merely from its bolt cloud server, instead of from a classic tensile machine.
In 2023 Phaserise started up and held the controlling interest of **Goinspec technology (Wuhan) Co., Ltd.**,who offers the customers all-in-one bolt stress patrol inspection and cloud data maintenance.
Up to now, EMAT dual-wave stress gauge ST100 from Phaserise Tech has measured stress values of more than 700 million bolts without knowing the original lengths.

10+

Years of experience in research, instruments, services

7 millions+

Bolts measured for stress status over the world by EMAT bolt stress gauge model ST100 without knowing the original lengths

30+

Patents authorized or applied

40+

Customers over the world served by EMAT bolt stress gauge model ST100

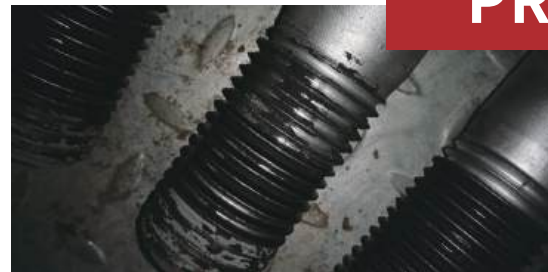
➤ Loss Of Preload Leads To Fatigue Failure



■ Contaminants



■ Surface Corrosion

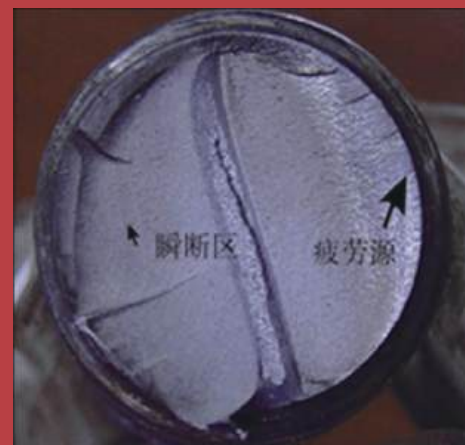


■ Insufficient lubrication



■ Insufficient Torque Construction

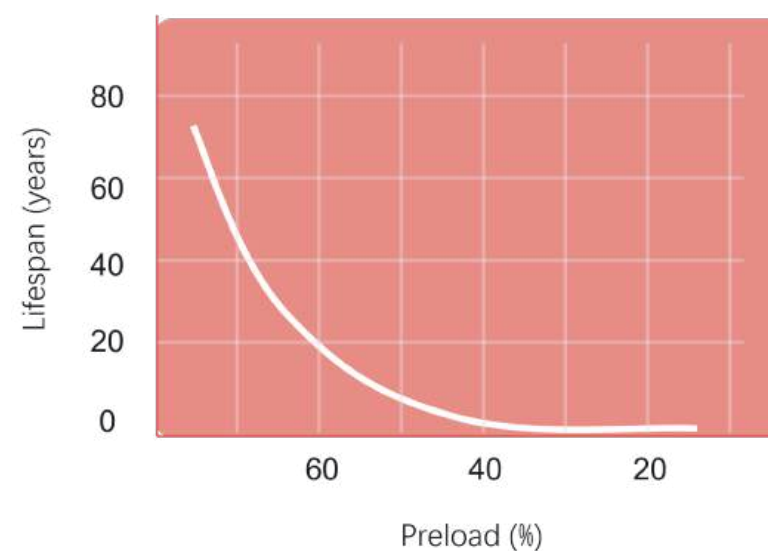
LOSS OF PRELOAD



Fatigue failure contributes about **80%** of bolt failure mechanism



Typical relationship between bolt preload force and fatigue failure



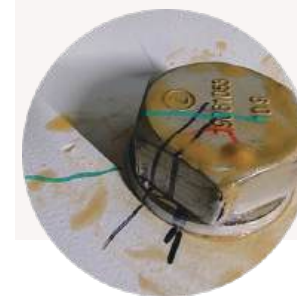
➤ Complex And Expensive Traditional Technical Solutions



Traditional technical solutions are complex, expensive, without continuous tracking or prediction

Marking-on

Observing shift of marking-on. No quantification. Multi-marking-ons make confusion



Attaching Strain Gauges

Harsh requirements, cost expensive and non-reusable, subject to affection of temperature and external disturbance

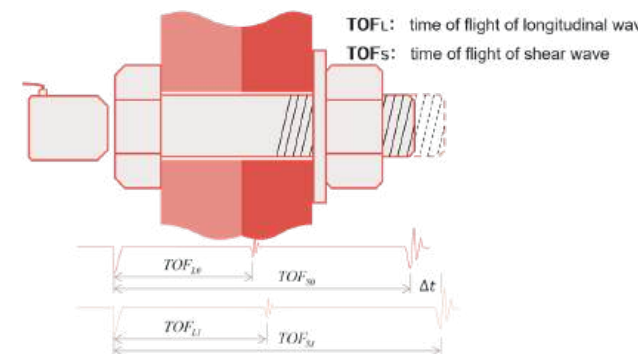


Pressure Washers

Affecting bolt clamping length and cost expensive



➤ EMAT dual-wave bolt stress gauge ST100 Perfect technical solution for bolt stress



First patent of dual-wave EMAT in the world for bolt stress measurement

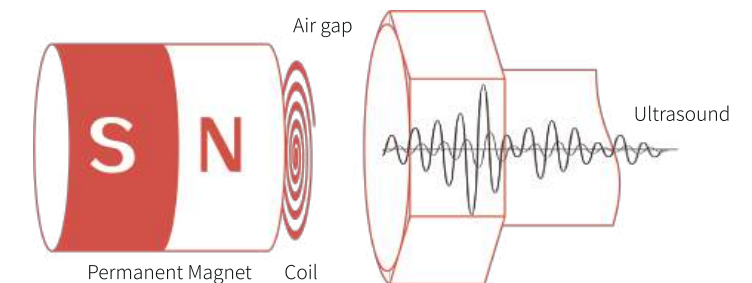
R0 and k are constants and can be calibrated

$$R_1 = \text{TOFS}_1 / \text{TOFL}_1$$

$$R_0 = \text{TOFS}_0 / \text{TOFL}_0$$

Bolt axial force is derived from:

$$F = (R_1 - R_0) * K$$



EMAT mechanism is perfect for high accurate stress measurement

The accuracy of EMAT stress gauge model ST100 is better than +3% of yield strength with repetitive accuracy of ±1%.

The accuracy of 4-wave patrol inspection is ±1%

ST100 is the mainstream instrument for bolt stress database management in the market

One Investment For Lifelong Benefit



► Technical Features Of Bolt Stress Gauge ST100





EMAT Dual-wave Bolt Stress Gauge ST100

- Single one-hand operation
- Complete measurement in 10 sec
- Device weights 1.2kg
- Able to record data
- NDT Non-destructive testing
- Mobile tablet connection, remote operation

VS



Traditional Hydraulic Tool

- Require multi people collaborating
- More than 120 sec merely for clamping
- Device weights more than 30kg
- Limited access to confined space
- No digital data recorded on site

NO.1 No surface polishing required

Tolerate to contaminants, lift-off, corrosion, steel stamp and coating



NO.3 Able to measure extra long bolts

Able to measure anchor bolt up to 6 meter long. In application of anchor bolt stress measurement of wind turbine, large machinery equipment and hydrogen energy storage.



-40°C

Bolt axial force measurement under extreme cold environment

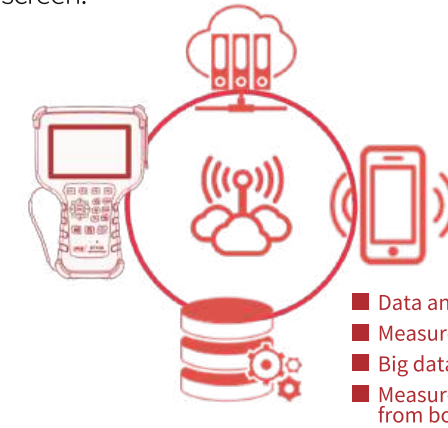


50°C

Bolt axial force measurement under extreme hot environment

NO.2 Portable for patrol inspection

Only weights 1.2kg, single hand operation, all-in-one system, physical panel, extended mobile or pad screen.



- Data analysis and report generation
- Measurement database management
- Big data mining supporting data quality
- Measurement parameters calibration from bolt cloud

NO.4 Bolt cloud database

Complete technical solution for bolt stress evaluation including patrol inspection and database management.

NO.5 Applicable to large temperature range

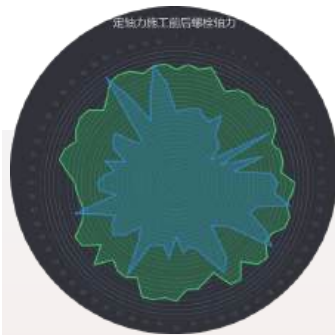
Tolerate ambient temperature from -40°C to 50°C

► Advantages of bolt stress gauge ST100 in application

Able To Measure Stress Of Blade Bolt On Wind Turbine



Customized probe for inner hexagonal hole bolt



Data analysis and report for blade bolt



Fixed axial force construction for blade bolt

Able To Measure Stress Of Tower Bolt



Fast Measurement

Evaluating bolt stress during lifting construction of tower



Patrol Inspection

Traceable database

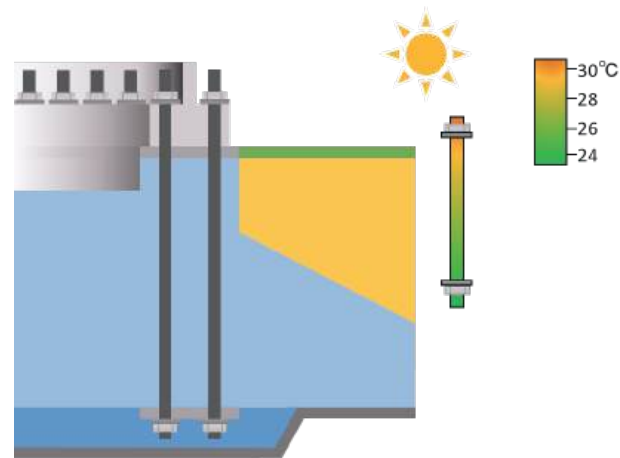


Accurate Measurement

conveniently locate bolts with abnormal stress

➤ Advantages of bolt stress gauge ST100 in application

III Able to measure stress of anchor bolt of wind turbine



Ultra long measurement range of bolt length up to 6 meters

Patent technique tolerating to temperature unevenness.

IV Workshop quality management



Bolt construction quality confirm

measurement and confirmation of bolt stress after bolt construction for quality control



Verification of construction tools

V Patrol inspection of bridge bolts



Revolutionary technical solution for bridge bolt patrol inspection instead of traditional hydraulic wrench

VI Bolt stress measurement within confined space



ST100 is perfect for patrol stress status evaluation for some important bolts which are served within a confined space and difficult for traditional maintenance.

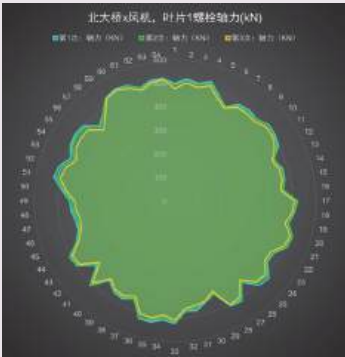
VII Pipeline flange bolt stress measurement



Prevent pipeline flange bolt failure in terms of bolt stress evaluation by ST100. Flange bolt failure can lead to fange leakage.

► Bolt stress gauge creates values to customers

Case 1

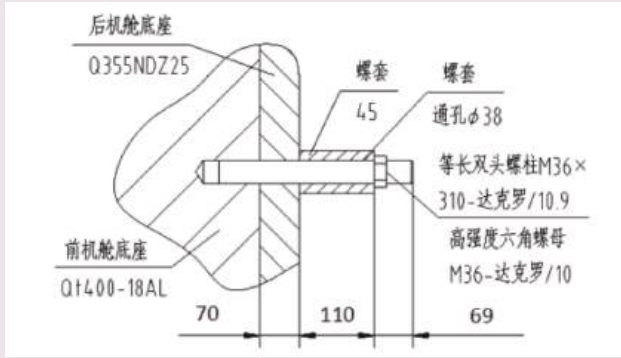


Blade bolts frequently broke in a wind farm. After employing bolt stress gauge ST100 in Feb 2023,

the wind farm controlled the bolt stress even based on the measured values and has never had broken bolts since then. This is an important evidence that uneven stress status of a flange is the key for bolt failures

Case 3

One of our customers employs stretching method to construct bolts with specifications of M36x310. The aimed preload is 510KN with stretching force of 580KN. After employed bolt stress gauge ST100, the customer changed the stretching force to 682KN for the same aimed preload.



Case 2

Wind turbine bolts in a wind farm were patrolled inspected for stress values by bolt stress gauge ST100. Bolts with low preload were loosened for further examinations. Insufficient lubrication during construction were found to bear the responsibility of low preload.



Case 4

During the process of tracking bolt stress status in a few of patrol inspections, One of our customers noticed that one bolt loses its preload much faster than those of its neighbors. Particular attentions were paid to this bolt and an abnormal flange liftoff was found around the bolt.



► Some technical specifications of bolt stress gauge ST100

No.	Name	Specifications
1	Detection method	EMAT dual-wave method; EMAT single-wave method; EMAT dual-wave patrol inspection method.
2	Bolt specification	Diameter: M8~M72;Length: 80mm~6000mm
3	Axial force measurement accuracy	±1~5% of preload force according to GB/T 19568
4	Inspection speed	4s~10s per bolt.
5	Probe Type	EMAT dual-wave probe(No couplant).
6	Standalone Measurement	Supported (chip-level function development, independent of operating systems such as tablets, computers, etc.).
7	Calibration Function	Supports various calibration modes: standard tensile machine calibration, no-load calibration, load calibration, cloud database calibration.
8	Bolt Cloud Data	Support cloud storage, cloud analysis and cloud sharing.
9	Power Supply Mode	Portable replaceable lithium battery
10	Operating Ambient Temperature	-40~50°C
11	Bolt Temperature Range	-40~80°C (offer customized temperature range, i.e. -200~600°C)
12	Android Mobile App	Supported
13	Android Pad App	Supported
14	Communication Methods	Wi-Fi, USB, etc.
15	Data Storage Capacity	128GB (expandable to 512GB)
16	Data Storage and Playback	Supports multi-terminal data synchronization: instrument, cloud, mobile phone, tablet and PC.
17	Automatic Report Generation	Supports multi-terminal report generation, browsing and sharing
18	Photo and Video Capture	Bolt records can include images and videos synced to bolt cloud
19	Weight (including battery and display)	1200g (including acquisition terminal)
20	Instrument Size (including battery and display)	Approximately 270mm x 170mm x 50mm;
21	IP Rating	IP51

► Some of our customers

