



New connection on: : 25-09-2020 : 21:37:33 - Last disconnection on: : 25-09-2020 : 21:37:20

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[EPODOC: SS 1] deformable and measuring and device and (stress or strain) and concrete and /IC (G041M)

Results in EPODOC 0

EPODOC: term 'G041M' not found in index 'IC'. WARNING(1)

[SS 2] deformable and measuring and device and (stress or strain) and concrete and /IC (G04M)

Results in EPODOC 0

[SS 3] stress and gauge and concrete and G01M/IC

Results in EPODOC 6

[SS 4] ..li



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PN - [CN209841322U](#) U 20191224

PR - CN201920965139U 20190625

AP - CN201920965139U 20190625

DT - I

PA - HUNAN XIANGXI HIGHWAY BRIDGE CONSTRUCTION CO LTD

TI - Road bridge **concrete** structure real-time detection device

AB - The utility model discloses a road bridge **concrete** structure real-time detection device which comprises a bridge floor and a bridge, and the bridge is arranged on the bottom surface of the bridge floor. According to the utility model, a data acquisition module arranged in the detection mechanism is used for inlaying a static leveling instrument on the surface of the upstream face of the bridge; real-time data acquisition, the acquired data is transmitted to an acquired data processor for data analysis and processing; the information is transmitted to a monitoring room through a wireless transmission module; meanwhile, the data acquisition module detects the vertical angle data of the abutment slope surface in real time through a single-point displacement meter; the flatness of the bridge floor is detected in real time through the surface strain **gauge**; the **stress** of reinforcing steel bars in the abutment is detected in real time through the reinforcing steel bar meter, the **concrete** abutment is detected in real time through the **concrete** strain meter, detected data are transmitted to the data acquisition module, and the data acquisition module transmits the acquired information to the acquired data

processor to analyze and process the acquired data.

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- PN - [JP2017096801](#) A 20170601
- PNFP - JP6546075B B2 20190717
- PR - JP20150229772 20151125
- AP - JP20150229772 20151125
- DT - I
- CT - || STSE (A)  
[JP2013040774](#) A 20130228 [A] (NTT DATA CORP)  
[A] -  
\* Whole Document \*;  
[JP2007113991](#) A 20070510 [A] (SHIMIZU CONSTRUCTION CO LTD)  
[A] -  
\* Whole Document \*;  
[JP2001091313](#) A 20010406 [A] (KOWA CO, et al)  
[A] -  
\* Whole Document \*;  
[US2011219883](#) A1 20110915 [A] (ROLLS ROYCE PLC [GB])  
[A] -  
\* Whole Document \*
- FI - G01B21/32; G01B7/16&R; G01M99/00&Z
- FT - 2F063/AA25; 2F063/BA14; 2F063/BB10; 2F063/DA02; 2F063/DA05; 2F063/DD06;  
2F063/EC02; 2F063/EC03; 2F063/EC05; 2F063/EC06; 2F063/EC16; 2F063/EC22;  
2F069/AA68; 2F069/BB40; 2F069/GG01; 2F069/GG06; 2F069/GG58; 2F069/GG66;  
2G024/AD34; 2G024/BA21; 2G024/CA04; 2G024/FA02
- PA - (A)  
NIPPON TELEGR & TELEPH CORP <NTT>
- TI - (A)  
DETECTION METHOD
- AB - (A)  
PROBLEM TO BE SOLVED: To easily and highly accurately perform the detection of a wide range of cracks generated on the surface of a reinforced **concrete** structure.  
SOLUTION: A detection method includes the steps of: measuring a strain of an adhesion position of each strain **gauge** by using a strain **gauge** adhered on a plurality of places on a straight line which is applied with a tensile **stress** of a **concrete** of the surface of a reinforced **concrete** structure (step S1); and determining that the cracks are generated when the behavior of any change from among the cracks of the plurality of measured places is different (steps S2 to S4). Further, the detection method determines that the cracks are generated immediately below a setting position of a displacement measuring meter where the measured displacement in a region different in the behavior of the change is increased (steps S5 to S6).SELECTED DRAWING: Figure 1

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- PN - [CN104296980](#) A 20150121
- PR - CN201410536218 20141011
- AP - CN201410536218 20141011
- DT - I

PA - UNIV BEIJING TECHNOLOGY

TI - Device and method for testing normal static stiffness characteristics of joint surfaces of shim plate, foundation and foundation bolt of heavy-duty machine tool

AB - The invention provides a device and method for testing normal static stiffness characteristics of joint surfaces of a shim plate, a foundation and a foundation bolt of a heavy-duty machine tool and belongs to the field of heavy-duty machine tool foundation experimentation. The device comprises a material testing machine, a screw rod, a slotted iron block, the foundation bolt, the **concrete** foundation, a material testing machine base, a force sensor, wood blocks, displacement sensors, a shim plate test piece, a dynamic strain indicator, a data acquisition system and a computer. After a secondary grouting process, the shim plate test piece is connected with the **concrete** foundation through the foundation bolt, and definite pre-tightening force is applied; a blind hole is formed in the foundation bolt and used for pre-burying of a strain **gauge**; the displacement sensors are used for measuring normal displacement quantities of the joint surfaces; the **concrete** foundation is placed on the force sensor of the material testing machine base, the slotted iron block is connected with the material testing machine through the screw rod, and the slotted iron block is attached to the shim plate test piece accordingly; the material testing machine applies static pressure to a **stress** application part in the longitudinal direction. A direct measurement method is adopted for the device and method, the number of tested physical quantities is reduced, and the deformation situation of a system is reflected really.

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PN - [CN101532918](#) A 20090916

PNFP - CN101532918B B 20110126

PR - CN20091068632 20090427

AP - CN20091068632 20090427

DT - I

PA - (A)  
TIANJIN INST CHINA ACADEMY OF

- (B)  
TIANJIN RES INST OF BUILDING SCIENCE

TI - (A B)  
Calibration system of core-through type prestressed tensioning hoisting jack

AB - (A B)  
The invention discloses a calibration system of core-through type prestressed tensioning hoisting jacks. The system comprises a **stress** sensor and a reaction device, wherein the **stress** sensor is a core-through type sensor; at least one prestressed tendon is at the position of the central pore canal of calibrated core-through hoisting jack; the core-through sensor is sleeved on the prestressed tendon, and is tightly contacted with one end of the core-through type hoisting jack; the outer ends of both the core-through type sensor and the core-through type hoisting jack are provided with clamps with self-locking anchors sleeved on the prestressed tendon; and the reaction device is composed of the prestressed tendon and the self-locking anchors. The invention can completely simulate the tension operating condition of prestressed **concrete** structure member, can detect the corresponding value of oil pressure **gauge** under certain tensioning force, and further can eliminate the interference of stranded steel wire or anchor clamp and the like in tension working process to a great extent, thereby being capable of improving calibration precision.

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PN - [JPS6416941](#) A 19890120  
PR - JP19870173713 19870711  
AP - JP19870173713 19870711  
DT - I  
CT - || STSE (A)  
[JPS4823035](#) A 00000000 [ ]  
FI - G01L1/00&A; G01M19/00&Z; G01M99/00&Z; G01N25/72&Z; G01N3/00;  
G01N3/00&M  
FT - 2G024/AD34; 2G024/BA13; 2G024/CA11; 2G024/CA30; 2G024/DA16; 2G024/FA01;  
2G040/AB19; 2G040/BA14; 2G040/BA25; 2G040/CA05; 2G040/CA18; 2G040/CA22;  
2G040/EA02; 2G040/EA04; 2G040/EA06; 2G040/EA13; 2G040/EB02; 2G040/HA06;  
2G040/ZA00; 2G061/AA02; 2G061/BA01; 2G061/BA20; 2G061/CA01; 2G061/CA08;  
2G061/CB02; 2G061/CB03; 2G061/CB20; 2G061/DA10; 2G061/EA04; 2G061/EB04  
PA - TSUSHIN DOBOKU CONSULTANT KK; NAKANE HIROSHI  
TI - METHOD FOR DETECTING LATENT **STRESS** OF STRUCTURE  
AB - PURPOSE: To detect the latent **stress** of a structure without any destruction while using surface strain generated by heating without any destruction as a medium only by heating the surface of the structure. CONSTITUTION: An upper load P is supported on the structure 1, e.g. a **concrete** column, so unknown latent **stress** is accumulated as its reaction and surface **stress**  $\epsilon_{sx}$  corresponding to the latent **stress** is generated. The latent **stress** can be detected nondestructively by using the surface strain generated as a medium without any destruction only by heating the surface of the structure 1. Further, the measuring instrument consisting of a heating device, a surface strain **gauge** 3, a display meter operated by the strain **gauge** 3, etc., is prepared to detect the latent **stress** of an optional selective position at an actual site according to the situation.

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PN - [CN2869849Y](#) Y 20070214  
PR - CN20062019236U 20060123  
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DT - I  
PA - YIN CHAO [CN]  
TI - Steel-string type sensor strain element  
AB - The utility model discloses a string wire type sensor strain **gauge** element which comprises a strain **gauge** (4), a string wire tube (3) and a string wire (2). The string wire tube (3) is fixed to the strain **gauge** (4) parallelly and tightly. The string wire (2) penetrates and is fixed to the inner of the string wire tube (3). The 2 ends of the string wire are prestressed to anchor on the string wire head (1). The utility model has a good consistency with the temperature coefficient and inflation rate of the steel products to be measured, unnecessary to be amended. Furthermore, utility model is widely used in adverse circumstances, in particular in such items as metallic material strain test in moistness and water, and observation instrument embedded in the reinforcement **concrete** of buildings with an underwater survey scope of up to 400 meter and a **stress** as high as 4 Mpa.

[SS 4] (strain w gauge) and concrete and stress and G01M/IC

Results in EPODOC 5

[SS 5] ..li



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[JP2013040774](#) A 20130228 [A] (NTT DATA CORP)  
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[A] -  
\* Whole Document \*

FI - G01B21/32; G01B7/16&R; G01M99/00&Z

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PA - (A)  
NIPPON TELEGR & TELEPH CORP <NTT>

TI - (A)  
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PR - CN201410536218 20141011

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[SS 5] (strain w gauge) and (concrete or mortar or cement) and stress and G01M/IC

Results in EPODOC 5

[SS 6] ..li



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FI - G01B21/32; G01B7/16&R; G01M99/00&Z

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PA - (A)  
NIPPON TELEGR & TELEPH CORP <NTT>

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2G040/EA02; 2G040/EA04; 2G040/EA06; 2G040/EA13; 2G040/EB02; 2G040/HA06;  
2G040/ZA00; 2G061/AA02; 2G061/BA01; 2G061/BA20; 2G061/CA01; 2G061/CA08;  
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[SS 6] (strain w gauge) and (concrete or mortar or cement) and stress

Results in EPODOC 198

[SS 7] ..li 1-50



1/198 © EPODOC / EPO

PN - [WO2020134576](#) A1 20200702

PR - CN201811602413 20181226

AP - WO2019CN115477 20191105

DT - \*; Rep

CT - [CN] ISR (A1)  
[CN109406313](#) A 20190301  
 [PX] (UNIV SHENZHEN)  
 [PX] 1-8  
 \* claims 1-8, and figures 1-6 \*;  
[CN205719826U](#) U 20161123  
 [Y] (UNIV SCIENCE & TECH CHINA)  
 [Y] 1, 8  
 \* description, paragraphs [0029]-[0046], and figures 1-4b \*;  
[CN106198227](#) A 20161207  
 [A] (UNIV LIAONING TECHNICAL)  
 [A] 1-8  
 \* entire document \*;  
[CN104535409](#) A 20150422  
 [A] (UNIV CHINA MINING)  
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[CN107014690](#) A 20170804  
 [A] (UNIV NORTHEASTERN)  
 [A] 1-8  
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[US10481057](#) B1 20191119  
 [A] (SONG BO [US], et al)  
 [A] 1-8  
 \* entire document \*

CTNP - [CN] ISR (A1)  
 [Y] - NIE, Hailiang et al.,  
 "Data Processing Method for Bidirectional-load Split Hopkinson Compression Bar",  
 Explosion and Shock Waves,  
 (20180531), vol. 38, no. 3,  
 ISSN 1001-1455  
 [Y] 1, 8  
 \* page 517, paragraph 1 to  
 page 518, paragraph 1, and

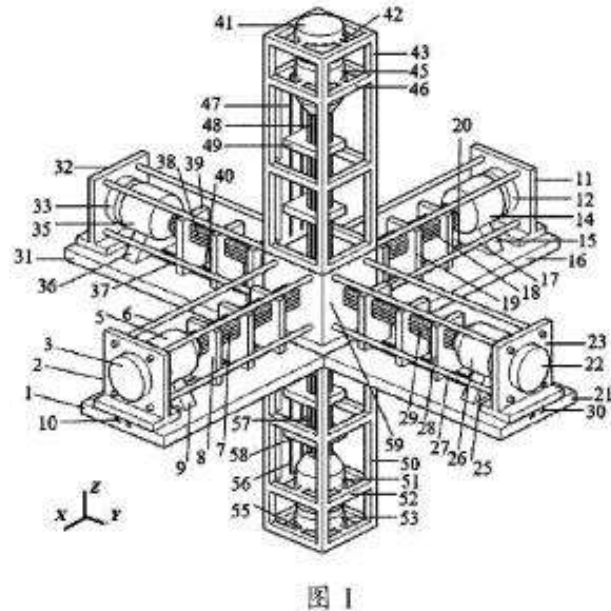


figure 1 \*

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | <ul style="list-style-type: none"><li>- G01N3/02 (CN)</li><li>- G01N3/06 (CN)</li><li>- G01N3/307 (CN)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| CA | <ul style="list-style-type: none"><li>- G01N2203/0048 (CN)</li><li>- G01N2203/0075 (CN)</li><li>- G01N2203/0256 (CN)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| PA | <ul style="list-style-type: none"><li>- UNIVSHENZHEN [CN]</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| TI | <ul style="list-style-type: none"><li>- HOPKINSON BEAM BAR<br/>DYNAMIC TESTING SYSTEM</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| AB | <ul style="list-style-type: none"><li>- A Hopkinson beam bar dynamic testing system, comprising a horizontal cross supporting platform, a central cube square box (59), beam bars (7, 18, 29, 38, 48, 57), and beam bar fixing and supporting frames (8, 19, 28, 39, 49, 58). The beam bars (7, 18) in an X direction and the beam bars (29, 38) in a Y direction are all horizontally placed, the beam bars (48, 57) in a Z direction are vertically placed, and small-sized single bars are symmetrically and neatly bundled by means of the beam bar fixing and supporting frames (8, 19, 28, 39, 49, 58) to form large-sized square beam bars (7, 18, 29, 38, 48, 57); a gap of 1 mm to 2 mm is reserved between the single bars, a resistance <b>strain gauge</b> is attached to each single bar, the cross-sectional areas and lengths of the beam bars (7, 18, 29, 38, 48, 57) in all the directions are the same, and the internal dynamic <b>stress</b> wave propagation laws and the dynamic response signal monitoring modes of the beam bars (7, 18, 29, 38, 48, 57) are the same. The system overcomes the defect that an existing Hopkinson bar cannot be used for performing dynamic mechanical property testing</li></ul> |

of materials such as large-sized rocks or **concrete**, and makes up for the shortcoming that a local dynamic **stress-strain** response characteristic of a testing sample cannot be effectively obtained in the testing process of the existing Hopkinson bar.

## 2/198 © EPODOC / EPO

- PN - [CN111140013](#) A 20200512
- PR - CN20201083265 20200208
- AP - CN20201083265 20200208
- DT - I
- CI - E04C3/34 (CN)  
- E04G21/00 (CN)  
- E04G21/02 (CN)  
- E04G21/14 (CN)
- PA - WANGYONGQUAN
- TI - High-rise frame column **concrete** replacement method based on active control technology
- AB - The present invention relates to a high-rise frame column **concrete** replacement method based on active control technology. The method comprises the following steps: inserting steel pins in holes in a to-be-replaced **concrete** frame column; securing one end of steel diagonal braces to the steel pins and the other end to beam plates and making the steel diagonal braces able to slide horizontally; setting pulling pre- **stress** tendons at connection nodes II on both sides of the **concrete** frame column; installing vertical steel braces on the floor of the to-be-replaced **concrete** frame column at positions corresponding to the steel diagonal braces; installing a **strain gauge** and a displacement monitoring point to monitor real-time force change and structure deformation; actively controlling shaft force of the steel braces through the pulling of the pre-**stress** tendons and monitoring data to unload the shaft force of the **concrete** frame column; removing the **concrete** in blocks and re-pouring and burying the **concrete strain gauge**; and removing the steel braces and rotating for use when the strength of the **concrete** meets requirements, thereby achieving the replacement of the **concrete** of the high-rise frame column. According to the invention, the active control of the unloading of the **concrete** frame column shaft force is achieved through real-time monitoring of the construction.

## 3/198 © EPODOC / EPO

- PN - [CN111141616](#) A 20200512
- PR - CN20201019666 20200108
- AP - CN20201019666 20200108
- DT - I
- CI - G01B21/32 (CN)  
- G01N1/28 (CN)  
- G01N3/12 (CN)

PA - UNIVNORTHEASTPETROLEUM

TI - Experimental device and experimental method for simulating fracture network transformation stratum casing pipe deformation

AB - The invention relates to an experimental device and an experimental method for simulating fracture network transformation stratum casing pipe deformation. The experimental device for simulating fracture network transformation stratum casing deformation comprises an external force loading system, a casing pipe, a **cement** block and a detection system, the external force loading system comprises a boxbody, loading oil cylinder assemblies, a sealing plate and a hydraulic system; a seam net structure is preset in the **cement** block in advance; according to a simulated fracture network reconstructionstratum, **stress**-strain gauges are uniformly attached to an outer wall of the casing pipe; the casing pipe is inserted into a through hole, the **cement** block is arranged in the box body, a plurality of loading oil cylinder assemblies are installed on a top surface of the box body, vertical loads are applied to the casing pipe, a plurality of loading oil cylinder assemblies are installed on a left side surface of the box body, horizontal loads are applied to the casing pipe, a loading oil cylinder assembly is installed on the front end surface of the box body, and axial loads are applied to the casing pipe; the detection system comprises a **stress-strain gauge**, a signal converter and a computer. According to the invention, the actual casing pipe **stress** condition under a fracture network reconstruction condition can be effectively simulated, and the casing pipe deformation failure process can be accurately monitored and detected in real time.

4/198 © EPODOC / EPO

PN - [CN210487563U](#) U 20200508

PR - CN201920934122U 20190620

AP - CN201920934122U 20190620

DT - I

PA - UNIVDALIAN TECH

TI - Measuring sensor for measuring bonding slippage at interface of profile steel and **concrete**

AB - The utility model relates to a measuring sensor for measuring the bonding slip at the interface of profile steel and **concrete**, which belongs to the field of civil engineering and can conveniently and accurately measure the bonding slip between the profile steel and the **concrete** to obtain the bonding **stress** and the bonding slip at the interface of the profile steel and the **concrete**. The measurement sensor is mainly composed of a specially-made spring steel sheet, a **strain gauge**, a force transmission clamp, a flat head fillet limiting rod, an n-shaped, rectangular and inverted-T-shaped metal outer cover and a wire. Two resistance strain gauges are respectively adhered to the front side and the rear side of the specially-made spring steel sheet, and a thin wire is welded on each resistance **strain gauge**; two force transmission clamps are fixed to the front side and the rear side of a specially-made spring steel sheet through rivets to form a core measuring element, then the core measuring element is inserted into a measuring box formed by assembling three metal outer covers, then the inverted-T-shaped metal outer cover is fixed through screws and installed on a drilled interface to be measured provided with a flat-head rounded-corner limiting rod, and the measuring sensor is formed. The device is clear in principle, high in sensitivity, good in linearity, reasonable and adjustable in measuring range, simple to process and manufacture, convenient to install and easy to operate, and effectively solves the problem that the bonding slip at the interface of the profile steel and the concrete is difficult to measure.

**5/198** © EPODOC / EPO

PN - [CN210400674U](#) U 20200424  
PR - CN201920893422U 20190614  
AP - CN201920893422U 20190614  
DT - I  
PA - ZHEJIANG HUADONG ENGINEERING SAFETY TECH CO LTD  
TI - 45-degree right-angle strain rosette  
AB - The utility model relates to a 45-degree right-angle strain rosette. The utility model aims to provide a 45-degree right-angle strain rosette so as to accurately and effectively obtain principal **stress** information of a **concrete** cushion of an inspection well. The technical scheme of the utility model is as follows: the nursing bed comprises a bed body, the utility model discloses a 45-degree right-angle strain rosette. The method is characterized in that the method is characterized by comprising the following steps; the device is provided with a base, three connecting rods and three strain gauges, the three connecting rods are jointly connected to the base. Wherein the connecting rods are distributed at intervals of 45 degrees, one end of each connecting rod is connected with the base, the other end of each connecting rod is correspondingly connected with one **strain gauge**, and the three strain gauges are connected in series through optical fiber cables.

**6/198** © EPODOC / EPO

PN - [CN111077030](#) A 20200428  
PR - CN201911280469 20191213  
AP - CN201911280469 20191213  
DT - I  
CI - G01N3/02 (CN)  
- G01N3/066 (CN)  
- G01N3/307 (CN)  
CA - G01N2203/001 (CN)  
- G01N2203/0044 (CN)  
- G01N2203/0623 (CN)  
PA - UNIV HOHAI  
TI - Device and method for testing dynamic mechanical properties of **concrete** under high strain rate  
AB - The invention discloses a device and method for testing dynamic mechanical properties of **concrete** under a high strain rate. A piezoelectric quartz crystal sensor is used for replacing a traditional **strain gauge** and a rubber shaping piece is additionally arranged, so that problems existing in a dynamic mechanical test method are solved. Specifically, piezoelectric quartz crystal sensors are additionally arranged at the rod ends of an incident rod and a transmission rod; with the piezoelectric quartz crystal sensors, the precision of a test result can be ensured; compared with a sensitivity degree of a **strain gauge**, the sensitivity degree of the device is increased by 2-3 orders of magnitudes; the rubber shaping piece is additionally arranged at the position, close to the center of a bulletrod end, of the incident rod, dispersion of **stress** waves is better reduced through the arrangement of the rubber shaping piece and thus the test result is more accurate. Therefore, the test method for the **concrete** dynamic mechanical property under the high strain rate is relatively simple in experiment and relatively accurate in result.

**7/198** © EPODOC / EPO

- PN - [CN210375983U](#) U 20200421
- PR - CN201920638447U 20190506
- AP - CN201920638447U 20190506
- DT - I
- PA - CHINA RAILWAY BRIDGE SCIENCE RES INST LTD; CHINA RAILWAY MAJOR BRIDGE ENGINEERING GROUP CO LTD
- TI - Device for measuring uniaxial compression constitutive relation of ultra-high performance **concrete**
- AB - A device for measuring uniaxial compression constitutive relation of ultra-high performance **concrete** relates to the field of structural engineering tests, and comprises a rigid support, which comprises an upper pressing plate, a lower pressing plate and a plurality of screw rods which are arranged in parallel and opposite to each other; the axial pressure test piece is located between the upper pressing plate and the lower pressing plate, and the axis of the axial pressure test piece coincides with the center of the regular polygon hole; the measuring device comprises a pressure ring, a measuring frame, a plurality of extensometers and a plurality of strain gauges; the pressure ring is installed between the axial pressure test piece and the upper pressing plate, the upper surface of the pressure ring and the upper surface of the nut are located on the same horizontal plane, and the axis of the pressure ring coincides with the axial pressure test piece. A plurality of extensometers are uniformly fixed at the periphery of the axial pressure test piece by a measuring frame; and the **strain gauge** is adhered to the middle of the screw. According to the utility model, when the axial pressure test piece reaches the limit **stress** and begins to descend, the damage speed of the test piece is slowed down, and the data of the **stress**-strain curve descending section is acquired.

**8/198** © EPODOC / EPO

- PN - [KR20200031854](#) A 20200325
- PNFP - KR102129975B B1 20200703
- PR - KR20180110849 20180917
- AP - KR20180110849 20180917
- DT - I
- CT - || STSE (A)  
[CN106124313](#) A 20161116 [ ] (UNIV NORTH CHINA WATER RESOURCES & ELECTRIC POWER);  
[CN1932512](#) A 20070321 [ ] (UNIV FUZHOU [CN]);  
[KR20130058629](#) A 20130604 [ ] (KOREA CONFORMITY LAB [KR]);  
[KR20120131006](#) A 20121204 [ ];  
[KR20080101620](#) A 20081121 [ ] (KOREA INST OF CONSTRUCTION MAT [KR])
- CI - G01B5/30 (KR)  
- G01N3/40 (KR)  
- G01N33/383 (KR)
- PA - (A)  
UNIV GACHON IND ACAD COOP FOUND [KR]
- TI - (A B1)  
AUTOMATIC MEASUREMENT APPARATUS OF **CONCRETE** MIXTURE SETTING TIME
- AB - (A)

The present invention relates to an apparatus for automatically measuring a **concrete** setting time, which calculates a melting time, which is a time point at which **concrete** is hardened, by using shrinkage characteristics at early ages of **concrete**. The apparatus for automatically measuring the **concrete** setting time of the present invention pours **concrete** in a space formed between two circular molds having different diameters. The apparatus for automatically measuring the **concrete** setting time can calculate the setting time by automatically measuring the time point when **stress** occurs due to a volume change of **concrete** at the early ages through a **strain gauge** installed at the inner circular mold. Furthermore, a test body containing coarse aggregate is also applicable due to the apparatus for automatically measuring the **concrete** setting time of the present invention, and it is possible to accurately measure the time point when the **stress** of the **concrete** can occur in real time.

9/198 © EPODOC / EPO

- PN - [CN110940439](#) A 20200331
- PR - CN201911235766 20191205
- AP - CN201911235766 20191205
- DT - I
- CT - || STSE (A)  
[US4858472](#) A 19890822 [A] (HERGET GERHARD H [CA], et al)  
 [A] 1-8  
 \* 全文 \*;  
[CN2269431Y](#) Y 19971203 [A] (LIN XIASEN [CN])  
 [A] 1-8  
 \* 全文 \*;  
[CN1368585](#) A 20020911 [A] (ZHU QICONG [CN])  
 [A] 1-8  
 \* 全文 \*;  
[CN2885974Y](#) Y 20070404 [Y] (ZHANG JINMING [CN])  
 [Y] 1-8  
 \* 说明书第2页第1-3段, 附图1 \*;  
[CN109029338](#) A 20181218 [Y] (CHANGJIANG INST SURVEY PLANNING DESIGN & RES CO LTD)  
 [Y] 1-8  
 \* 说明书第5-27段, 附图1 \*
- CI - E01D21/00 (CN)  
 - G01L1/00 (CN)
- CA - E01D2101/24 (CN)
- PA - UNIV WUHAN TECH
- TI - Improved embedded **concrete strain gauge**
- AB - The invention discloses an improved embedded **concrete strain gauge**. The **strain gauge** comprises a **strain gauge** body and a mounting seat part, wherein the **strain gauge** body comprises a protective sleeve, a wire and an electronic assembly, the electronic assembly is sleeved on the protective sleeve, and the wire is arranged outside the protective sleeve and connected with the electronic assembly; two ends of the protective sleeve are respectively provided with a mounting seat part, each mounting seat part sequentially comprises an end seat and a **stress** handle, the end part of each **stress** handle, which is in contact with a ribbed steel bar, is provided with an arc-shaped groove which is matched with a steel bar column body, and the surface of each arc-shaped groove is provided with a plurality of grooves which are

meshed with straight ribs. The invention provides an improved embedded **concrete strain gauge**. The shape of the ribbed steel bar, the inclination angle of the inclined rib, the existence of the straight rib and the direction of the steel bar are considered, and the installation and fixation in the process of installing the **concrete strain gauge** are also considered, so that errors caused by installation problems are reduced to a great extent, and meanwhile, the installation difficulty in construction monitoring is reduced.

**10/198** © EPODOC / EPO

- PN - [CN110887959](#) A 20200317
- PR - CN201911382245 20191227
- AP - CN201911382245 20191227
- DT - I
- CI - G01L5/00 (CN)  
- G01N33/383 (CN)
- PA - HARBIN INST TECHNOLOGY
- TI - Device and method for detecting deformation **stress** of on-site **cement**-based material
- AB - The invention discloses a device and method for detecting deformation **stress** of an on-site **cement**-based material. Due to the fact that detection of shrinkage or expansion **stress** generated by concrete deformation is high in precision requirement, large in difficulty, low in efficiency and poor in accuracy, a test device and method for rapidly evaluating the shrinkage or expansion **stress** of concrete on a construction site are deficient. The two ends of a sleeve are detachably connected with the two end covers; an arched plate is arranged in the sleeve; an upper **strain gauge** and a lower **strain gauge** are arranged on the top surface and the bottom surface of the arched plate respectively; a first slender rod and a second slender rod are arranged at two ends of the arched plate respectively; one end of the first slender rod is fixedly connected with the arched plate, and the other end of the first slender rod penetrates through the end cover close to the first slender rod; one end of the second slender rod is fixedly connected with the arched plate, and the other end of the second slender rod penetrates through the end cover close to the second slender rod and then is detachably connected with a movable outer cover; and a hanging opening is machined in the end, matched with the movable outer cover, of the second slender rod. The detection method is realized on the basis of the detection device. The method is used for detecting the shrinkage or expansion **stress** of the **cement**-based material.

**11/198** © EPODOC / EPO

- PN - [CN110849527](#) A 20200228
- PR - CN201911188727 20191118
- AP - CN201911188727 20191118
- DT - I
- CI - G01L5/161 (CN)
- PA - SHANGHAI SHEN YUAN GEOTECHNICAL CO LTD
- TI - Real-time detection method for **concrete** supporting axial force
- AB - The invention belongs to the technical field of civil engineering, and discloses a real-time detection method for **concrete** supporting axial force. According to the technical scheme, the position of a sampling test block is determined on the outer

surface of a **concrete** support in a stressed state, a **strain gauge** is pasted to the surface of the sampling test block, the telescopic pasting direction of the **strain gauge** is consistent with the axis direction of the **concrete** support, and the **strain gauge** is connected with a wire; the wire is connected with a test instrument; a **stress** state strain value is read; a sampling test block with the **strain gauge** is cut out from the side wall of the **concrete** support in the stressed state; after standing, the strain value of the non-stressed state on the test instrument connected with the wire is read again until a numerical value is stable; a strain difference value between the **stress** state strain value and the non-**stress** state strain value is calculated; and the axial force value of the **concrete** support in the stressed state is calculated through the strain difference value. The method is convenient to implement, real-time detection can be achieved, and a **strain gauge** does not need to be embedded for detection.

#### 12/198 © EPODOC / EPO

- PN - [CN110823426](#) A 20200221
- PR - CN201911108012 20191113
- AP - CN201911108012 20191113
- DT - I
- CI - G01L1/2287 (CN)
- PA - CHINA COAL TECHNOLOGY ENG GROUP CHONGQING RES INST
- TI - Dynamic monitoring device and dynamic monitoring method for mining-induced **stress** of coal face in hard rock environment
- AB - The invention belongs to the technical field of geotechnical engineering, and relates to a dynamic monitoring device and a dynamic monitoring method for a mining-induced **stress** of a coal face in a hard rock environment, wherein the dynamic monitoring device comprises a monitoring pipe with a hollow structure, a plurality of film resistance strain gauges are arranged at intervals along two side surfaces of the monitoring pipe in the length direction, a sealing plug is arranged on the monitoring pipe beside each film resistance **strain gauge**, each film resistance **strain gauge** is fixedly connected with a lead in a matching way, and a free end of the lead, which is far away from the film resistance **strain gauge**, passes through the sealing plug and is led into the monitoring pipe; the leads are connected with a main lead wire in a gathering way, and the main lead wire is sequentially connected with a data acquisition instrument and a data processing and analyzing system outside the monitoring pipe. According to the dynamic monitoring device of the invention, the monitoring pipe with the film resistance strain gauges is fed into a monitoring drill hole along an included angle of 40-60 degrees with the horizontal direction, then **cement** slurry is injected, and dynamic real-time monitoring is performed on the mining-induced **stress** of overlying strata on the coal face after the **cement** slurry is completely hardened, thus the accuracy of monitoring data is high, and timeliness is high.

#### 13/198 © EPODOC / EPO

- PN - [CN110824150](#) A 20200221
- PR - CN201911195681 20191129
- AP - CN201911195681 20191129
- DT - I
- CI - G01N33/383 (CN)
- PA - GUANGXI ROAD AND BRIDGE ENG GROUP CO LTD; GUANGXI ROAD DETECTION CO LTD
- TI - Automatic monitoring and early warning system for debonding of **concrete**-filled

steel tube arch ribs

- AB - The invention relates to the technical field of bridge monitoring, in particular to an automatic monitoring and early warning system for debonding of **concrete**-filled steel tubular arch ribs. The system comprises arch ribs, sensor modules, a data processing and analysis module, an early warning value setting module, and a monitoring module. The arch ribs include steel pipes and **concrete**. The sensormodules are disposed on the monitoring section in each arch rib. The sensor module of each monitoring section comprises **concrete** strain gauges, a steel pipe **strain gauge** and a temperature sensor. Thefive **concrete** strain gauges are embedded in the **concrete**. The only one steel pipe **strain gauge** and the only one temperature sensor are respectively fixed on the outer wall of the steel pipe. The dataprocessing and analysis module is used for the calculating the radial bonding **stress** between the inner wall of the steel tube and the **concrete**. The method provided by the invention enables real-timemonitoring of the radial bonding **stress** between the steel pipe and the **concrete** inside the pipe, and the debonding situation between the steel pipe and the **concrete** is timely determined.

14/198 © EPODOC / EPO

- PN - [CN209961162U](#) U 20200117
- PR - CN201920522474U 20190417
- AP - CN201920522474U 20190417
- DT - I
- PA - CHANGJIANG SPATIAL INFORMATION TECH ENGINEERING CO LTD WUHAN
- TI - Large-volume low-heat **concrete** internal moisture-proof **stress**-free meter testing device
- AB - The utility model discloses a large-volume low-heat **concrete** internal moisture-proof **stress**-free meter testing device, and relates to a testing device. The device comprises a vertically-arranged sleeve, a **strain gauge** located in the sleeve, a sleeve top cover plate located at a sleeve opening of the sleeve, a rubber pad located on the sleeve top cover plate and a sealing cover plate located on therubber pad. The sleeve is of a double-layer cylindrical structure, filling materials are arranged between an inner sleeve and an outer sleeve, and an asphalt layer is arranged on the inner sleeve wall. The **strain gauge** is suspended at the middle lower part in the sleeve, and the axis of the **strain gauge** coincides with the axis of the sleeve; a first wire outlet hole is formed in the center of therubber pad, a second wire outlet hole is formed in the center of the sealing cover plate, a sealing bolt is arranged on the second wire outlet hole, and a cable on the **strain gauge** sequentially penetrates through the first wire outlet hole, the second wire outlet hole and the sealing bolt. The device has the advantages of being simple in structure, convenient to machine, convenient to install andoperate, capable of achieving batch unified production and machining and capable of effectively reducing production cost.

15/198 © EPODOC / EPO

- PN - [CN209913745U](#) U 20200107
- PR - CN201821719132U 20181023
- AP - CN201821719132U 20181023
- DT - I
- CCA - [Y02E10/50](#)
- CA - Y02E10/50 (EP)
- PA - BEIJING BOYANG DINGRONG PV TECH CO LTD

- TI - **Stress** detection C-shaped steel and **stress** detection supporting device
- AB - The utility model provides **stress** detection C-shaped steel. A **strain gauge** is arranged on the C-shaped steel; the device further comprises a signal processing unit electrically connected with the strain gauges, and the signal processing unit can monitor the **stress** condition of the C-shaped steel in real time. The wind power borne by the solar panel is monitored, whether manual intervention maintenance needs to be carried out or not is judged, it is quite necessary for application scenes such as large-area centralized power stations and distributed power stations arranged at the top of a high-rise building, the manual maintenance cost is reduced, and meanwhile data can be updated in real time. The utility model further provides a **stress** detection supporting device. Characterized in that it is characterized in that it comprises, the fixing device comprises an embedded part arranged in the **cement** pier, a keel fixing plate is connected to the top of the embedded part, a stand column is fixedly connected to the keel fixing plate, a horizontal keel is fixedly connected to the upper side of the stand column, C-shaped steel used for being connected with a supported object is arranged on the upper side of the horizontal keel, and a clamping device is arranged above the C-shaped steel.

**16/198** © EPODOC / EPO

- PN - [JP2019215366](#) A 20191219
- PR - JP20190149739 20190819
- AP - JP20190149739 20190819
- DT - I
- FI - G01N3/00&M
- FT - 2G061/AA02; 2G061/AB01; 2G061/BA03; 2G061/CA08; 2G061/CB02; 2G061/CC11; 2G061/EA01; 2G061/EA04; 2G061/EB04
- PA - TAIHEIYO CEMENT CORP
- TI - MEASUREMENT METHOD OF CRACK GENERATION INTENSITY OF ULTRA-HIGH STRENGTH FIBER-REINFORCED **CONCRETE** AND SPECIMEN OF ULTRA-HIGH STRENGTH FIBER-REINFORCED **CONCRETE** FOR USE IN THE MEASUREMENT METHOD
- AB - To provide a method or the like for accurately and efficiently measuring the crack generation intensity of ultra-high strength fiber-reinforced **concrete**. SOLUTION: A measurement method of the crack generation intensity of ultra-high strength fiber-reinforced **concrete** acquires a relationship of a load and strain by placing the load on a columnar specimen which has passed (A) a polishing process of the columnar specimen, (B) a selection process of a measurement object, (C) a pasting process of a **strain gauge**, and (D) a placing process of the columnar specimen, and measures tensile **stress** corresponding to a load at a point in which linear elasticity is not established in the relationship of the load and the strain as the crack generation intensity. Here, when one of the following cases occurs within a load range up to 50 kN, that is, (i) when strains of two end faces are inverted (asymmetric) with respect to each other in a positive strain and a negative strain, (ii) when the strain is not generated at one end face, and (iii) when the strain of one end face reaches 1.5 times or higher of the strain of the other end face, the measurement method performs the processes (B) to (D) once again after interrupting the placement and removing the load, and places the load once again. SELECTED DRAWING: Figure 1

**17/198** © EPODOC / EPO

- PN - [CN209841322U](#) U 20191224
- PR - CN201920965139U 20190625

AP - CN201920965139U 20190625

DT - I

PA - HUNAN XIANGXI HIGHWAY BRIDGE CONSTRUCTION CO LTD

TI - Road bridge **concrete** structure real-time detection device

AB - The utility model discloses a road bridge **concrete** structure real-time detection device which comprises a bridge floor and a bridge, and the bridge is arranged on the bottom surface of the bridge floor. According to the utility model, a data acquisition module arranged in the detection mechanism is used for inlaying a static leveling instrument on the surface of the upstream face of the bridge; real-time data acquisition, the acquired data is transmitted to an acquired data processor for data analysis and processing; the information is transmitted to a monitoring room through a wireless transmission module; meanwhile, the data acquisition module detects the vertical angle data of the abutment slope surface in real time through a single-point displacement meter; the flatness of the bridge floor is detected in real time through the surface **strain gauge**; the **stress** of reinforcing steel bars in the abutment is detected in real time through the reinforcing steel bar meter, the **concrete** abutment is detected in real time through the **concrete** strain meter, detected data are transmitted to the data acquisition module, and the data acquisition module transmits the acquired information to the acquired data processor to analyze and process the acquired data.

**18/198** © EPODOC / EPO

PN - [CN209745467U](#) U 20191206

PR - CN201920670667U 20190510

AP - CN201920670667U 20190510

DT - I

PA - ANHUI TRANSP HOLDING GROUP CO LTD

TI - Embedding system of **stress-strain gauge** for pavement monitoring

AB - The utility model discloses an embedding system of a **stress-strain gauge** for pavement monitoring. The roadbed structure comprises a lime soil roadbed, a low-dose **cement** stabilized macadam subbase layer paved at the upper part of the lime soil roadbed, a **cement** stabilized macadam lower base layer paved on the low-dose **cement** stabilized macadam subbase layer, and a graded macadam base layer paved at the upper part of the **cement** stabilized macadam lower base layer, the transverse embedding system is positioned at the top of the graded broken stone base layer, comprises a transverse groove, a **stress-strain gauge**, a protective sleeve and a filling material, and is flush with the upper surface of the graded broken stone base layer; the asphalt **concrete** surface layer is positioned at the upper parts of the graded broken stone base layer and the transverse embedded system; and the asphalt **concrete** surface layer comprises coarse-grained asphalt **concrete**, medium-grained asphalt **concrete** and fine-grained asphalt **concrete**.

**19/198** © EPODOC / EPO

PN - [CN209703582U](#) U 20191129

PR - CN201920354181U 20190320

AP - CN201920354181U 20190320

DT - I

PA - SICHUAN ROAD AND BRIDGE HUADONG CONSTRUCTION CO LTD

TI - Model test system for high slope and anchorage foundation pit excavation mutual

influence mechanism

- AB - The utility model discloses a model test system for a high slope and anchorage foundation pit excavation mutual influence mechanism. A method comprises the following steps: manufacturing a test model, unloading the model, loading the system and monitoring the model. The model manufacturing system comprises a high slope, a foundation pit, an anchorage **concrete** similar material and a test model box. The unloading and loading system of the model test comprises a foundation pit model excavation unloading and anchorage pouring loading sequence, and the model **stress** strain and displacement monitoring system comprises a **strain gauge**, a soil pressure box and a laser displacement sensor which are used for monitoring **stress** strain and displacement change characteristics of a high slope and a foundation pit in the unloading and loading process. The device has the characteristics that the interaction between the adjacent high slope and the foundation pit in the foundation pit excavation and anchorage pouring process can be objectively and effectively reflected.

20/198 © EPODOC / EPO

PN - [CN110441145](#) A 20191112

PR - CN201910794465 20190827

AP - CN201910794465 20190827

DT - I

CI - G01N3/02 (CN)

- G01N3/066 (CN)

- G01N3/08 (CN)

- G01N17/00 (CN)

CA - G01N2203/0017 (CN)

- G01N2203/0019 (CN)

- G01N2203/024 (CN)

- G01N2203/0617 (CN)

PA - UNIV QINGDAO TECHNOLOGY

TI - Durability test method of tunnel lining **concrete**

- AB - The present invention belongs to the technical field of **concrete** durability test methods, and relates to a durability test method of tunnel lining **concrete**. The process includes four steps of preparing a **concrete** specimen, installing and connecting components, applying a load and testing. A rotating handle is operated so that a sleeve rotates to drive a lower connecting rod and an upper connecting rod to move towards or backwards and then the lower connecting rod and the upper connecting rod are compressed or stretched. **Stress** is transferred to the **concrete** specimen through an upper part of the upper connecting rod and a steel plate; a continuous and stable load is applied to the **concrete** specimen; and the magnitude of the applied **stress** is determined by reading on an electronic **strain gauge**. The magnitude of the load applied on the **concrete** specimen is calculated according to the material parameters and displacement of the lower and upper connecting rods. The magnitude of the applied **stress** is adjusted through the rotating sleeve of the rotating handle; and the magnitude of the applied **stress** is monitored in real time according to the strain reading of a resistance **strain gauge**. When the **stress** loss is more than 5%, the original **stress** value is restored through the rotating sleeve of the rotating handle, and then the **stress** relaxation can be reduced.

21/198 © EPODOC / EPO

PN - [CN209606236U](#) U 20191108

PR - CN201920100905U 20190122

AP - CN201920100905U 20190122

DT - I

PA - UNIV SHANDONG SCIENCE & TECH

TI - Anchoring and shotcreting supporting effect testing device for combined simulated surrounding rock

AB - The utility model provides an anchoring and shotcreting support effect testing device for simulating surrounding rock by an assembly, which relates to the technical field of shotcreting **concrete** testsand comprises a surrounding rock support, a hydraulic cylinder, a simulated surrounding rock assembly, an anchor rod and a **concrete** shotcreting layer. Hydraulic cylinders are uniformly distributed and fixed on the surrounding rock bracket, the simulated surrounding rock assembly is arranged close to the hydraulic cylinders, the anchor rod is arranged in the simulated surrounding rock assembly, and the **concrete** spraying layer is arranged on the surface of one side of the exposed end of the anchor rod of the simulated surrounding rock assembly; wherein the simulated surrounding rock assembly comprises a plurality of surrounding rock blocks, a **strain gauge** is further arranged between the **concrete** spraying layer and the simulated surrounding rock assembly, and a **stress** sensor is further arranged between the hydraulic cylinder and the simulated surrounding rock assembly. The device provided by the utility model realizes the function of testing the supporting effect of the bolting-shotcreting support through an indoor test, and further has the advantages of simplicity and convenience in operation, good control effect and the like.

**22/198** © EPODOC / EPO

PN - [CN110411832](#) A 20191105

PR - CN201910697899 20190731

AP - CN201910697899 20190731

DT - I

CI - G01L1/04 (CN)  
- G01N3/08 (CN)

PA - NINGDE PINGGU HIGHWAY CO LTD

TI - Tunnel secondary lining strain measurement and load back calculation method based on **stress** relieving method

AB - The invention relates to a tunnel secondary lining strain measurement and load back calculation method based on a **stress** relieving method. A **strain gauge** is attached to a position to be detected, and an initial strain value is read by the **strain gauge**; then, scribing is conducted on a selected part of the surface of a tunnel in the length direction of the tunnel, and afterwards, a cutting machine is used for cutting and slotting **concrete** along the scribing part; 15 minutes after slotting is completed, secondary number reading is conducted through the **strain gauge** to obtain a secondary lining surface strain value; then the load bearing value of a secondary lining is marked according to the secondary lining surface strain value of each reference point in a theoretically-calculated load-surface strain curve; each reference point is separately compared to remove failure data, and effective data is averaged to obtain a final load value to serve as the secondary lining load bearing value. The method is easy to implement and high in efficiency, the load bearing state of the secondary lining of the tunnel can be determined, and a basis is provided for evaluating the safety of the tunnel.

**23/198** © EPODOC / EPO

- PN - [CN110398429](#) A 20191101
- PNFP - CN110398429B B 20200609
- PR - CN201910550686 20190624
- AP - CN201910550686 20190624
- DT - I
- CT - || STSE (A)  
[JP2011185620](#) A 20110922 [A] (TOKYO KEISOKU KK)  
[A] 1-8  
\* 1-8 \*;  
[CN103398908](#) A 20131120 [Y] (UNIV TSINGHUA)  
[Y] 1-6  
\* 说明书第[0020]-[0038]段、图1-5 \*;  
[CN105259043](#) A 20160120 [A] (UNIV WUHAN)  
[A] 1-8  
\* 1-8 \*;  
[CN105780770](#) A 20160720 [A] (JIANGSU DONGPU PIPE CO LTD)  
[A] 1-8  
\* 1-8 \*;  
[CN207540913U](#) U 20180626 [A] (UNIV EAST CHINA JIAOTONG)  
[A] 1-8  
\* 1-8 \*
- CTNP - || STSE (A)  
[Y] - 张伟杰, "“考虑初应力影响的钢管混凝土叠合柱在长期荷载作用下的力学性能研究”", 《中国优秀硕士学位论文全文数据库工程科技 II 辑》  
[Y] 1-6  
\* 第30, 53, 62页 \*  
[A] - 黄世娟 等, "“初应力对钢管混凝土轴压构件承载力影响的实验研究”", 《哈尔滨建筑大学学报》  
[A] 1-8  
\* 第44-50页 \*
- CI - G01N3/02 (CN)  
- G01N3/062 (CN)  
- G01N3/08 (CN)  
- G01N3/32 (CN)
- CA - G01N2203/0003 (CN)  
- G01N2203/0005 (CN)  
- G01N2203/0019 (CN)  
- G01N2203/0274 (CN)  
- G01N2203/0676 (CN)
- PA - (A)  
UNIV WUHAN
- TI - (A)  
Steel pipe **concrete** anti-seismic property experiment device and experiment method considering influence during construction process
- AB - (A)  
The invention discloses a steel pipe **concrete** anti-seismic property experiment device and experiment method considering influence during construction process. The steel pipe **concrete** anti-seismic property experiment device comprises a

counterforce rack, a sliding support, a jack, a servo actuator, a bottom steel support and a steel pull rod, wherein the sliding support, the jack and a spherical hinge support are hung on a cross beam of the counterforce rack, the servo actuator is fixedly arranged on a vertical post of the counterforce rack, the two-layer bottom steel support is designed, a steel pipe can be connected to a bolt hole in an upper layer of the steel support by a lower end plate bolt, disassembly and assembly of the steel pull rod also can be facilitated by a U-shaped hole in the upper layer of the steel support, initial **stress** is applied by combination of the steel pull rod, a pressure sensor and a vibration wire **strain gauge**, and a lower layer of the steel support can be connected with a ground anchor bolt by the bolt hole. By the device, the initial **stress** caused by the construction process can be considered and can be rapidly applied, the steel support has the characteristics of accurate and rapid loading, low cost, environmental friendliness and the like and is convenient and rapid to hang.

**24/198** © EPODOC / EPO

- PN - [CN209432829U](#) U 20190924
- PR - CN201822227666U 20181227
- AP - CN201822227666U 20181227
- DT - I
- PA - CCCC WUHAN HARBOUR ENG DESIGN & RES INST CO LTD
- TI - Device for evaluating repairing performance of **cement**-based self-repairing material
- AB - The utility model discloses a device for evaluating the repairing performance of a **cement**-based self-repairing material. The device comprises a base for placing a **cement**-based self-repairing material sample, a loading device, an ultrasonic generator, a **stress-strain gauge**, an electronic scanning microscope and an automatic analyzer, wherein data output ends of the ultrasonic generator, the **stress-strain gauge** and the electronic scanning microscope are respectively connected with a data input end of the automatic analyzer, and a control signal output end of the automatic analyzer is connected with a control signal input end of the loading device. According to the utility model, the **stress**-strain change condition of the cracks on the surface of the **cement**-based sample can be observed in real time, the **stress**-strain change process in the **cement**-based material repairing process can be visually reflected, the change process of the cracks along with the growth of the age can also be observed in real time, and the self-repairing performance of the **cement**-based material is evaluated by observing the dynamic change of the cracks.

**25/198** © EPODOC / EPO

- PN - [CN209356110U](#) U 20190906
- PR - CN201920355611U 20190320
- AP - CN201920355611U 20190320
- DT - I
- PA - UNIV JIUJIANG
- TI - Sleeve joint type adjustable foundation bolt **stress** detection device
- AB - The utility model discloses a sleeve joint type adjustable foundation bolt **stress** detection device. The foundation comprises a **concrete** base, foundation bolts, internal thread sleeves, lengthened screw rods, partition plates and tower foot plates. The foundation bolts are uniformly distributed on the surface of the **concrete** base; the bottoms of the foundation bolts are embedded into the **concrete** base; the

surface of the extending end of the foundation bolt is fixedly connected with a **strain gauge**; a lengthened screw rod is arranged at the upper end of the foundation bolt; internal threaded sleeves in threaded connection are arranged between the foundation bolts and the lengthened screws, tower foot plates are fixedly connected to the tops of the lengthened screws, mounting holes are formed in the surfaces of the tower foot plates and correspond to the lengthened screws in a one-to-one mode, and partition plates are arranged between the tower foot plates and the internal threaded sleeves and fixedly connected to the surfaces of the lengthened screws. According to the utility model, the strain gauges are uniformly distributed on the surface of the foundation bolt, so that the horizontal **stress** condition of the foundation bolt can be conveniently analyzed, and the bearing capacity of the sleeve joint type adjustable foundation bolt in use is improved.

**26/198** © EPODOC / EPO

- PN - [CN110208182](#) A 20190906
- PR - CN201910537439 20190620
- AP - CN201910537439 20190620
- DT - I
- CI - G01N19/04 (CN)
- PA - UNIV DALIAN TECH
- TI - Measuring sensor for measuring bond slip at interface between structural steel and **concrete** and measuring method thereof
- AB - The invention, which belongs to the field of civil engineering, relates to a measuring sensor for measuring the bond slip at an interface between a structural steel and **concrete** and a measuring method thereof. With the measuring sensor, the bond slip between the structural steel and the **concrete** can be measured conveniently and accurately and the bonding **stress** and bond slip at the interface can be obtained. The measuring sensor is mainly composed of a special spring steel disc, a **strain gauge**, force transmission fixtures, a flatheaded rounded limit rod, an inverted-U-shaped metal housing, a rectangular metal housing, a metal housing in a shape like a Chinese character "tu" and wires. Two resistance strain gauges are pasted to the front side and the rear side of the special spring steel disc respectively; and a thin wire is welded to each of resistance **strain gauge**. The two force transmission fixtures are fixed at the front side and the rear side of the special spring steel disc by rivets to form a core measuring element; the core measuring element is inserted into a measuring box formed by three metal housings; the metal housing in a shape like a Chinese character "tu" is fixed by a screw and is installed at a to-be-measured interface that has been drilled and is provided with the flatheaded rounded limit rod to form a measuring sensor. The measuring sensor and the measuring method have advantages of clear principle, high flexibility, linearity, reasonable and adjustable measuring range, simple processing and manufacturing, great convenience in mounting; and great easiness in operation; and a problem that the bond slip at the interface between the structural steel and the **concrete** is difficult to measure is solved.

**27/198** © EPODOC / EPO

- PN - [CN110146378](#) A 20190820
- PR - CN201910472276 20190531
- AP - CN201910472276 20190531
- DT - I

CI - G01L1/22 (CN)  
 - G01N3/08 (CN)

PA - CHINA RAILWAY BRIDGE SCIENCE RES INST LTD; CHINA RAILWAY MAJOR BRIDGE  
 ENGINEERING GROUP CO LTD

TI - **Cement**-based material uniaxial tension measuring device and method

AB - The invention discloses a **cement**-based material uniaxial tension measuring device. The measuring device comprises a bearing screw rod and a **strain gauge**; the bearing screw rod comprises a first section and two second sections which are respectively connected to two ends of the first section; the diameter of the first section is smaller than that of the second sections; the surface of the first section is smooth; the **strain gauge** is arranged on the first section; and the **strain gauge** is used for measuring the strain value of the first section. The invention also discloses a **cement**-based material uniaxial tension measuring method. With the **cement**-based material uniaxial tension measuring device of the invention adopted, the **stress**-strain relation of a **cement**-based test piece in the whole process of a uniaxial tensile test can be accurately measured.

**28/198** © EPODOC / EPO

PN - [CN209230837U](#) U 20190809

PR - CN201821160177U 20180721

AP - CN201821160177U 20180721

DT - I

PA - CHINA RAILWAY 18TH BUREAU GROUP CO LTD

TI - **Stress**-strain real-time monitoring system for arch bridge stiff skeleton encased **concrete**

AB - The utility model discloses a real-time monitoring system for **stress** and strain of outer wrapped **concrete** of an arch bridge stiff skeleton. The real-time monitoring system comprises an arch bridge stiff skeleton upper chord pipe, strain gauges, **strain gauge** sliding frames, hollowed-out hard protection pipes, hollowed-out holes, cables and **concrete**. The system reflects, displays and monitors the **stress**-strain change of the early-warning arch bridge stiff skeleton outer wrapped **concrete** member after pouring forming in real time; the problem of **stress**-strain measurement in the arch bridge stiff skeleton outer wrapped **concrete** is solved; and the problem that the positioning of the **stress** sensor is influenced by the flowing of **concrete** during **concrete** pouring is solved, so that the **stress** and **stress** distribution of the outer wrapped **concrete** are accurately measured, a large amount of manpower and time cost is saved, personnel does not need to follow in the whole process, and the visualization degree and accuracy are high.

**29/198** © EPODOC / EPO

PN - [CN209217314U](#) U 20190806

PR - CN20192023836U 20190108

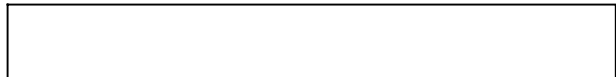
AP - CN20192023836U 20190108

DT - I

PA - UNIVXIANGTAN

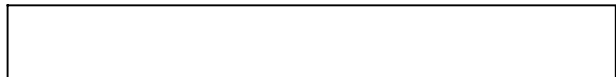
TI - Protection device of strainometer USB connector

AB - The utility model discloses a protection device for a USB



joint of a **strain gauge**. Including a seal cap, one end of the sealing cover is fixedly connected with the upper end of the USB connector shell through an elastic band. A layer of rubber film is attached to the inner wall of the sealing cover, a T-shaped connector is arranged at the other end of the sealing cover, the lower end of the T-shaped connector is cylindrical, a cylindrical groove matched with the T-shaped connector is formed in the lower end of the USB connector shell, an elastic assembly is arranged in the cylindrical groove, and a closing switch is arranged at a port of the cylindrical groove. According to the utility model, the USB joint of the **strain gauge** can be effectively prevented from being affected with damp or rusted, and the purposes of dust prevention and the like can be achieved, so that the situation that **stress-strain** data of the interior of a **concrete** structure or a stressed component cannot be accurately obtained is avoided, and the **strain gauge** is simple in structure, low in manufacturing cost and convenient to use.

**30/198** © EPODOC / EPO  
 PN - [CN110067267](#) A 20190730  
 PR - CN201910397990 20190514  
 AP - CN201910397990 20190514  
 DT - I  
 CT - || STSE (A)  
[KR101383234B](#) B1 20140410  
 [A] (KOREA INST  
 CONSTRUCTION TECH [KR], et  
 al)  
 [A] 1-8  
 \* 全文 \*;  
[CN106351267](#) A 20170125



|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | <p>[Y] (UNIV SHENYANG JIANZHU)</p> <p>[Y] 1,2,4,6-7</p> <p>* 说明书第[0020]-[0022]段及图1-3 *;</p> <p><a href="#">CN109403396</a> A 20190301</p>                                                                                                                                                                                                                                                                                                                                                                 |
|      | <p>[Y] (UNIV XIAN ARCHITECTUR &amp; TECH)</p> <p>[Y] 4,7</p> <p>* 说明书第[0041]-[0063]段及图1-10 *</p>                                                                                                                                                                                                                                                                                                                                                                                                          |
| CTNP | <p>-    STSE (A)</p> <p>[A] - 熊巨华等, "长短桩组合桩基础的模型实验", 《同济大学学报(自然科学版)》</p> <p>[A] 1-8</p> <p>* 全文 *</p> <p>[Y] - 任连伟等, "不同组合下高喷插芯组合桩抗拔承载特性试验研究", 《土木建筑与环境工程》</p> <p>[Y] 1,2,4,6-7</p> <p>* 第94-100页 *</p> <p>[Y] - 李锋利, "长短桩组合桩基础室内模型试验分析研究", 《工程科技 II 辑》</p> <p>[Y] 1,2,4,6-7</p> <p>* 第14页 *</p>                                                                                                                                                                                                          |
| CI   | - E02D33/00 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| PA   | - NINGBO INST TECH ZHEJIANG UNIV                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| TI   | - Experimental device and method for indoor simulation of rotary jet grouting steel pipe combined pile loaded with various modes                                                                                                                                                                                                                                                                                                                                                                          |
| AB   | - The invention discloses an experimental device and method for indoor simulation and loading of various load modes for a rotary jet grouting steel pipe combined pile. The experimental device includes a steel bar for simulating a micro-steel pipe pile, a <b>cement</b> -soil pile for simulating a rotary jet grouting pile and a shell body, and strain gauges are attached to the side faces of the steel bar and the <b>cement</b> -soil pile; a compression bar, a pressing block, a first pull |

cable, a counterweight, a guide force block, a transition bracket, a pressure sensor and a first transition steel plate constitute a vertical compression resistance loading assembly. According to the key points of the experimental method, the pressure sensor obtains the pressure load, a dialgauge obtains descending displacement, and then the pile top downward pressure load and a displacement curve are obtained; each **strain gauge** installed on the side face of the steel bar can obtain **stress**-strain values at different depths on the interface of the steel bar and the **cement**-soil pile; and each **strain gauge** installed on the side face of the **cement**-soil pile can obtain **stress**-strain values at different depths on the interface of the **cement**-soil pile and a soil body around the pile. The experimental device and method can simulate the **stress**-strain conditions of the two interfaces, the size is small, and placing indoors is convenient.

- 31/198**    © EPODOC / EPO
- PN        - [WO2019140874](#) A1 20190725
- PR        - CN20181050896 20180118
- AP        - WO2018CN95585 20180713
- DT        - \*\*
- CT        - [CN] ISR (A1)  
             [CN105134170](#) A 20151209  
             [A] (CHINESE ACAD INST ACOUSTICS)  
             [A] 1-3;  
             [CN103184866](#) A 20130703  
             [A] (UNIV XI AN SHIYOU)  
             [A] 1-3;  
             [CN105422080](#) A 20160323  
             [A] (PETROCHINA CO LTD)  
             [A] 1-3;

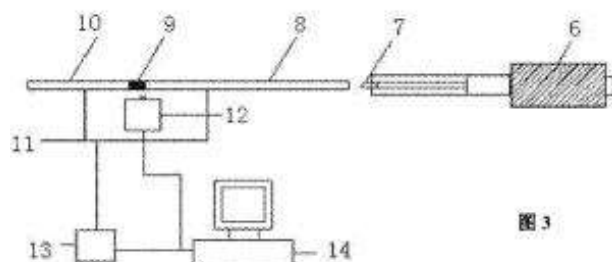


图 3

[CN102979505](#) A 20130320  
 [A] (CHINA NAT OFFSHORE OIL CORP, et al)  
 [A] 1-3;  
[CN202560206U](#) U 20121128  
 [A] (UNIV NORTHEAST PETROLEUM)  
 [A] 1-3;  
[US2010212892](#) A1 20100826  
 [A] (SANTRA ASHOK K [US], et al)  
 [A] 1-3

CCI - [G01N3/30](#) ; [G01N33/383](#)

CCA - [G01N2203/0067](#) ;  
[G01N2203/0266](#) ;  
[G01N2203/0298](#) ;  
[G01N2203/0647](#)

CI - E21B47/005 (EP, CN)  
 - G01N3/30 (EP)  
 - G01N3/34 (US)  
 - G01N33/383 (EP, US)  
 - G06Q50/02 (EP, CN)

CA - G01N2203/0067 (EP, US)  
 - G01N2203/0075 (US)  
 - G01N2203/0266 (EP)  
 - G01N2203/0298 (EP)  
 - G01N2203/0647 (EP)

PA - UNIVSOUTHWEST PETROLEUM [CN]

TI - METHOD FOR EVALUATING BREAKING STRENGTH OF FIRST AND SECOND CEMENTING FACES FOR WELL CEMENTING UNDER DYNAMIC LOAD

AB - Disclosed is a method for evaluating the breaking strength of first and second cementing faces for well cementing under a dynamic load. The method comprises: manufacturing a rock-set **cement**-casing composite structure sample; clamping a sample (9) horizontally between an incident rod (8) and an output rod (10) of a Hopkinson rod, a conical punch (7) striking the incident rod (8) to generate an incident wave, the incident wave passing through the sample

(9) to generate a reflected wave and a projected wave, and a **strain gauge** (13) recording dynamic strain signals of the incident wave, the reflected wave and the projected wave, converting same into electrical signals and transmitting same to a computer (14); using a high-speed camera (12) to record the process of first and second cementing faces from beginning to break to final complete breaking and a corresponding time point; and using the computer (14) to obtain a strain rate time-course curve and a **stress-strain** curve, and obtaining the corresponding breaking strength by means of analyzing peak value points of the curves. The method can actually simulate the impact of a formation perforation and a subsequent operation, such as acid fracturing, on a **cement** sheath and a casing, and at the same time evaluate the breaking strength that first and second cementing faces can bear under a dynamic load.

**32/198**    © EPODOC / EPO

PN        - [CN110017171](#) A 20190716

PR        - CN201910286749 20190410

AP        - CN201910286749 20190410

DT        - I

CT        - || STSE (A)

[CN103397910](#) A 20131120

            [A] (CHINA RAILWAY FIRST SURVEY & DESIGN INST GROUP LTD)

            [A] 1-6

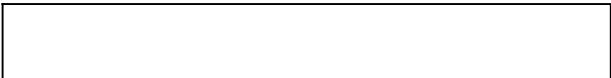
            \* 全文 \*;

[CN104950782](#) A 20150930

            [Y] (XINJIANG BEIXIN ROAD & BRIDGE GROUP CO LTD)

            [Y] 1-6

            \* 说明书第[0002]-[0022]段，图1-2 \*;



[CN205013048U](#) U 20160203

[A] (CHINA RAILWAY  
CONSTRUCTION BRIDGE  
ENGINEERING BUREAU GROUP 1ST  
ENGINEERING CO LTD, et al)

[A] 1-6

\* 全文 \*;

[CN205593565U](#) U 20160921

[Y] (INTELLECTUAL FIBER  
COMPOSITE REINFORCEMENT  
NANTONG CO LTD)

[Y] 1-6

\* 说明书第[0002]-[0039]段, 图1

\*;

[CN206115674U](#) U 20170419

[Y] (NANJING HYDRAULIC RES INST)

[Y] 2-4

\* 说明书第[0002]-[0028]段, 图1

\*;

[CN206987892U](#) U 20180209

[A] (CCCC SHEC DONG MENG ENG  
CO LTD)

[A] 1-6

\* 全文 \*;

[CN207675232U](#) U 20180731

[A] (SHIJIAZHANG INSTITUTE OF  
RAILWAY TECH)

[A] 1-6

\* 全文 \*;

[CN109139112](#) A 20190104

[A] (GUANGZHOU ENG CO LTD OF  
THE SIXTH ENG BUREAU CREC)

[A] 1-6

\* 全文 \*

- CI - E21F17/18 (CN)
- PA - WUXI SINOKING COMM XINTONG  
TECH CO LTD
- TI - Tunnel structure health full-life-  
cycle real-time monitoring system
- AB - The invention discloses a tunnel  
structure health full-life-cycle  
real-time monitoring system, and  
belongs to the technical field of  
tunnel monitoring. The system  
comprises a static force level  
gauge, a bed rock displacement  
meter, a steel bar meter,  
a **concrete strain gauge**, an  
anchor cable meter, a multi-point  
displacement meter, a soil  
pressure meter, an osmometer  
and an anchor rod **stress**

meterwhich are all in signal connection with communication equipment, the communication equipment is in signal connection with a tunnel structure health monitoring platform, the tunnel structure health monitoring platform comprises a central database system, a tunnel structure health monitoring standard expert database and a user interface system, the user interface system is in signal connection withthe central database system and the tunnel structure health monitoring standard expert database. By combining the Internet of Things and wireless communication, a set of informatization, automation and intellectualization integrated online safety Internet of Things monitoring platform is established for the actual condition of tunnel structure construction, the tunnel construction process stage and the operation stage are covered, and full-life-cycle real-time monitoring of tunnel structure health is achieved.

**33/198** © EPODOC / EPO

PN - [CN110006329](#) A 20190712

PR - CN201910309564 20190417

AP - CN201910309564 20190417

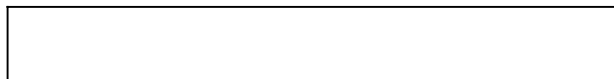
DT - I

CI - G01B7/16 (CN)

PA - CHANGJIANG SPATIAL  
INFORMATION TECH  
ENGINEERING CO LTD WUHAN

TI - Large-volume low-  
heat **concrete** internal  
insulation **stress**-free meter  
testing device and  
installation method

AB - The invention discloses a  
large-volume low-  
heat **concrete** internal  
insulation **stress**-free meter



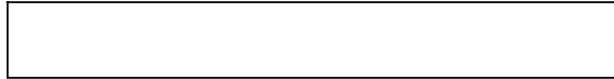
testing device, and relates to a testing device. The device comprises a vertically arranged sleeve, a **strain gauge** positioned in the sleeve, a sleeve top cover plate positioned at the opening of the sleeve, a rubber pad positioned on the sleeve top cover plate, and a sealing cover plate positioned on the rubber pad, the sleeve is of a double-layer cylinder structure, a filling material is arranged between the inner sleeve and the outer sleeve, and an asphalt layer is arranged on the inner sleeve wall of the sleeve. The **strain gauge** is hung at the middle lower part in the sleeve; the axis of the **strain gauge** is overlapped with that of the sleeve; a first wire outlet hole is formed in the center of the rubber pad, a second wire outlet hole is formed in the center of the sealing cover plate, a sealing bolt is arranged on the second wire outlet hole, and a cable on the **strain gauge** sequentially penetrates through the first wire outlet hole, the second wire outlet hole and the sealing bolt. The device has the advantages of being simple in structure, convenient to machine, convenient to install and operate and capable of achieving batch unified production and machining and effectively reducing the production cost. The invention relates to an installation method of a test device for an internal insulation **stress**-free meter of large-volume low-heat **concrete**.

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| PN | - <a href="#">CN209069475U</a> U 20190705                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| PR | - CN201821164406U 20180721                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| AP | - CN201821164406U 20180721                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| DT | - I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| PA | - CHINA RAILWAY 18TH BUREAU<br>GROUP CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
| TI | - Real-time distributed<br>monitoring system for <b>stress</b><br>and strain of arch bridge stiff<br>skeleton encased <b>concrete</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| AB | - The utility model discloses a<br>real-time distributed<br>monitoring system for <b>stress</b><br>and strain of outer<br>wrapped <b>concrete</b> of an arch<br>bridge stiff skeleton. The<br>system comprises an arch<br>bridge stiff skeleton upper<br>chord pipe, a <b>strain gauge</b> ,<br>a <b>strain gauge</b> sliding frame, a<br>hollowed-out hard protection<br>pipe, hollowed-out holes, a<br>cable and <b>concrete</b> . And the<br>hollow hard protection tubes<br>are respectively arranged at<br>the sections of a left arch<br>foot, a 1/8 arch, a 1/4 arch, a<br>3/8 arch, a vault, a 5/8 arch,<br>a 3/4 arch, a 7/8 arch and a<br>right arch foot of the main<br>arch ring. The system can<br>reflect, display and monitor<br>changes of <b>stress</b> and strain<br>of the early-warning arch<br>bridge stiff skeleton outer<br>wrapped <b>concrete</b> member<br>after pouring forming in real<br>time; the problem of <b>stress</b> -<br>strain measurement inside<br>the arch bridge stiff skeleton<br>wrapped <b>concrete</b> is solved,<br>the problem that the<br>positioning of the <b>stress</b><br>sensor is influenced by the<br>flowing of the <b>concrete</b> when<br>the <b>concrete</b> is poured is<br>also solved, the <b>stress</b><br>and <b>stress</b> distribution of the<br>main arch ring<br>wrapped <b>concrete</b> are further<br>accurately measured, and a<br>large amount of manpower |  |

and time costs are saved. And the distributed design is adopted, so that the mechanical calculation of the metering main arch ring outer wrapped **concrete** can be simplified.

**35/198** © EPODOC / EPO

- PN - [CN109975120](#) A 20190705
- PR - CN201910311601 20190418
- AP - CN201910311601 20190418
- DT - I
- PA - CHINA BUILDING MAT  
ACADEMY
- TI - **Concrete** constraint **stress**  
and deformation **stress**  
measuring device and  
measuring method
- AB - The invention provides  
a **concrete** constraint **stress**  
and deformation **stress**  
measuring device and  
measuring method. The  
measuring device comprises  
a constraint system and a  
measuring system; the  
constraint system comprises  
a constraint system body and  
a constraint system chassis;  
the constraint system body is  
of a hollow column structure  
and is connected with the  
constraint system chassis to  
form a cavity; the constraint  
system further comprises a  
fixed baffle and a constraint  
pull rod; the constraint pull  
rod is positioned through a  
positioning hole formed in  
the constraint system body,  
one end of the constraint pull  
rod penetrates through the  
positioning hole and extends  
into the constraint system  
body to constrain expansion  
and deformation of **concrete**,  
and the other end of the  
constraint pull rod is  
connected to the fixed baffle;  
the measuring system  
comprises a strain meter pull



rod and/or a strain foil arranged on the constraint system body, the measuring system further comprises a strain gauge, and the strain meter and the strain foil are both connected with the **strain gauge** for data transmission. According to the measuring device and the measuring method, the constraint stress of the constraint-state **concrete** and the degree of deformation of the **concrete** under the coupling action of the environmental factors can be accurately measured. The method is low in cost, easy to implement and more practical.

**36/198**    © EPODOC / EPO

PN        - [CN109900393](#) A 20190618

PR        - CN201910207984 20190319

AP        - CN201910207984 20190319

DT        - I

CT        - || STSE (A)

[US6351998](#) B1 20020305

            [A] (HOHNSTADT FREDERICK P

            [US], et al)

            [A] 1-3

            \* 全文 \*;

[CN102255959](#) A 20111123

            [A] (HUAIYIN TEACHERS

            COLLEGE)

            [A] 1-3

            \* 全文 \*;

[CN102296750](#) A 20111228 [A]

            [A] 1-3

            \* 全文 \*;

[CN103674589](#) A 20140326

            [Y] (GUANGDONG LIUJIAN

            GROUP CO LTD)

            [Y] 1-3

            \* 说明书第[0001]-[0107]段,

            图1-4 \*;

[CN109307504](#) A 20190205

            [Y] (CHINA SHANXI SIJIAN

            GROUP CO)

            [Y] 1-3

            \* 说明书第[0002]-[0022]段,



图1-2 \*;

[CN109323791](#) A 20190212

[Y] (UNIV DALIAN TECH)

[Y] 1-3

\* 说明书第[0004]-[0036]段 \*;

[CN109372268](#) A 20190222

[A] (CHINA THIRD

METALLURGICAL GROUP CO LTD)

[A] 1-3

\* 全文 \*

- PA - CHINA MCC17 GROUP CO LTD
- TI - Safety monitoring method of profile steel **concrete** corridor and steel truss reinforcement structure
- AB - The invention discloses a safety monitoring method of a profile steel **concrete** corridor and a steel truss reinforcement structure and belongs to the monitoring technology field of the corridor and the steel truss reinforcement structure. Through analyzing a **stress** condition of each structure, finite element analysis is performed on a main stressed structure or a structural node through using a unidirectional **strain gauge** and MIDAS software. Discontinuous **stress** monitoring can be performed on each component and the structure through software, which can greatly reduce the risk of hidden danger of **stress** deformation during a construction process, and greatly improve construction efficiency. A reflector and a total station are adopted to carry out Jining strain monitoring on various components so that input cost is reduced to a minimum and reuse can be achieved. Strain monitoring can be performed simply by monitoring the position changes of the reflector on each component through the total station.

Operation is simple, and simultaneously, a structure deformation scale can be effectively amplified so that the structure deformation is distinct, which is good for observation of a constructor and realization of an early warning function.

**37/198** © EPODOC / EPO

PN - [CN109829201](#) A 20190531

PR - CN20191002085 20190102

AP - CN20191002085 20190102

DT - I

CT - || STSE (A)  
[CN102930103](#) A 20130213  
 [A] (UNIV WUHAN)  
 [A] 1-6  
 \* 全文 \*

CTNP - || STSE (A)  
 [Y] - 王建慧 等, "基于三维有限元的永定河倒虹吸工程安全分析", 《北京水务》  
 [Y] 1-6  
 \* 23-26 \*  
 [A] - 李新 等, "严寒地区不同材质大型倒虹吸管道应力分析及运行安全性评价", 《水电与抽水蓄能》  
 [A] 1-6  
 \* 107-113 \*  
 [Y] - 牛津 等, "箱形倒虹吸结构分析", 《甘肃水利水电技术》  
 [Y] 1-6  
 \* 26-28 \*  
 [A] - 孙明权 等, "基于ANSYS的倒虹吸有限元分析", 《黑龙江水利学报》  
 [A] 1-6  
 \* 8-11 \*

PA - UNIV BEIJING SCIENCE & TECH

TI - An inverted siphon structure strain monitoring and early warning method based on mechanical analysis

AB - The invention provides an inverted siphon structure strain monitoring and early warning method based on



mechanical analysis, and belongs to the technical field of hydraulic structure monitoring. The method includes: establishing an inverted siphon three-dimensional simulation model according to an inverted siphon structure; Simulating all possible mechanical loads of the inverted siphon in the operation process, and carrying out finite element mechanical solution; According to the obtained simulation result, obtaining a section generated by the maximum inverted siphon **stress** and strain value, namely a weak section; Installing a soil pressure gauge and a **concrete strain gauge** on the weak section of the inverted siphon structure; Comparing the simulation result with actual monitoring data, optimizing a finite element model, and carrying out more accurate finite element solution on the weak section; And according to the simulation result and in combination with the constitutive relation of the **concrete**, making an early warning index. The method is suitable for the inverted siphon structure, the weak section of the inverted siphon structure can be positioned by adopting the method, and the failure of the inverted siphon structure can be effectively monitored and early warned.

**38/198** © EPODOC / EPO  
 PN - [CN208984265U](#) U 20190614  
 PR - CN201821605225U 20180929  
 AP - CN201821808059U 20181102  
 DT - I

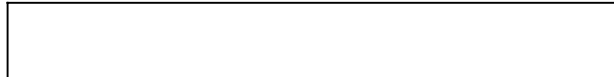


|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PA | - CHINA RAILWAY DESIGN CORP;<br>LIUZHOU OVM MACHINERY CO<br>LTD; NINGBO AIEN<br>ELECTRONICS CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| TI | - Spoke type sensor for<br>measuring tensioning force of<br>prestressed tendons of<br>prestressed <b>concrete</b> bridge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| AB | - The utility model discloses a<br>spoke type sensor for<br>measuring the tensioning<br>force of prestressed tendons<br>of a prestressed <b>concrete</b><br>bridge. The spoke type sensor<br>comprises an elastic body,<br>a <b>strain gauge</b> , a cable, a<br>pressure head and a base,<br>wherein the <b>strain gauge</b> is<br>arranged on the elastic body<br>to form a Wheatstone bridge;<br>the elastic body is of a spoke<br>type structure formed through<br>machining, the number of the<br>spokes is 6-12, the spokes are<br>evenly distributed at<br>intervals, the two sides of<br>each spoke are in a<br>symmetrical inwards-concave<br>arc shape, and a strain hole<br>of the strain area is of a<br>kidney-shaped hole structure.<br>The strain gauges are<br>arranged on the strain areas<br>on the left side and the right<br>side of the spoke in a sticking<br>manner; the upper surface of<br>the pressure head serves as<br>a <b>stress</b> surface of the spoke<br>type sensor and is provided<br>with a groove and a screw<br>hole III, and the bottom<br>surface of the pressure head<br>is installed on the upper<br>surface of the elastic body<br>and fixedly connected with the<br>elastic body through a<br>connecting screw I; two screw<br>holes are formed in the base,<br>the lower end face of the<br>elastic body is installed on<br>the base, and the spoke type<br>sensor is integrally installed<br>on a positioning nut of the |

jack through the screw holes  
 II by means of the connecting  
 screws II. The spoke type  
 sensor is reasonable in  
 structure, high in  
 measurement precision, good  
 in repeatability and high in  
 unbalance loading resistance.

**39/198** © EPODOC / EPO

PN - [CN208917889U](#) U 20190531  
 PR - CN201821608258U 20180930  
 AP - CN201821608258U 20180930  
 DT - I  
 PA - INST ROCK & SOIL MECH CAS  
 TI - Test device for simulating  
 bearing characteristics of  
 rock-socketed pile in  
 composite rock stratum  
 AB - The utility model discloses a  
 test device for simulating the  
 bearing characteristic of a  
 rock-socketed pile in a  
 composite rock stratum, and  
 relates to the geotechnical  
 pile foundation engineering  
 technology. The structure of  
 the device is that a screw, a  
 steel beam and a base form  
 an external counter-force  
 frame through a nut; wherein  
 a model box is arranged on  
 the base, a **mortar** bottom  
 layer is arranged at the  
 bottom in the model box and  
 serves as a pile end  
 supporting layer, a rock core  
 column is arranged on  
 the **mortar** bottom layer,  
 and **mortar** is poured into the  
 rock core column; the rock  
 core column, the cementing  
 agent and the **mortar** form a  
 composite rock stratum of the  
 system; the center of the  
 bottom surface of the steel  
 beam, the load sensor, the  
 double-acting jack, the  
 pressure head and the top  
 end of the model pile are  
 sequentially connected from  
 top to bottom; the load sensor



and the **strain gauge** are respectively connected with the **stress-strain** acquisition instrument through transmission lines, and the pile top load and the pile body **stress** distribution of the model pile can be obtained in real time. The device can simulate the bearing characteristics of the socketed pile in the composite rock stratum; the pile top load and pile body **stress** distribution can be collected in real time through the load sensors and the strain gauges, and the pile body load transmission rule of the rock-socketed pile in the composite rock stratum is obtained.

**40/198**    © EPODOC / EPO

PN        - [CN109811809](#) A 20190528

PR        - CN201910211734 20190320

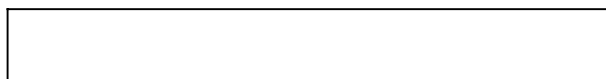
AP        - CN201910211734 20190320

DT        - I

PA        - SICHUAN ROAD AND BRIDGE  
             HUADONG CONSTRUCTION CO  
             LTD

TI        - Model test system and  
             method of high slope and  
             anchoring foundation pit  
             excavation interaction  
             mechanism

AB        - The invention discloses a  
             model test system and  
             method of a high slope and  
             anchoring foundation pit  
             excavation interaction  
             mechanism. The method  
             comprises the following  
             steps: manufacturing of a  
             testmodel, model unloading  
             and loading system, and  
             model monitoring system. A  
             model manufacturing system  
             comprises high slope,  
             foundation pit and  
             anchoring **concrete** similar  
             materials and a test model



box;the model test unloading and loading system comprises foundation pit model excavation unloading, anchoring pouring loading order; a model **stress**-strain and displacement monitoring system comprises monitoring the **stress**-strain and displacement change characteristics of the high slop and foundation pit in the unloading and loading process by using a **strain gauge**, a soil pressure box and a laser displacement sensor. The system and method disclosed by the invention has the features that the interaction of the adjacent high slop and foundation pit in the foundation pit excavation and anchoring pouring process can be objectively and effectively reflected.

**41/198** © EPODOC / EPO

PN - [CN208860679U](#) U 20190514

PR - CN201821562918U 20180925

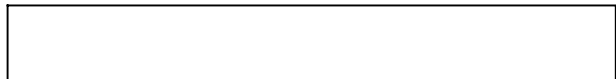
AP - CN201821562918U 20180925

DT - I

PA - GUIZHOU SHUNKANG ROAD AND BRIDGE CONSULTING CO LTD

TI - **Concrete** compressive strength and shrinkage creep test equipment

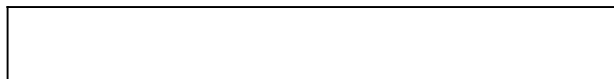
AB - The utility model relates to **concrete** compressive strength and shrinkage creep test equipment. The **concrete** compressive strength and shrinkage creep test equipment comprises a test working platform and a data input/output terminal, the test working platform comprises a base, a jack, a stand column, a top plate, an adjusting threaded column, a **concrete** test block and



a **stress-strain gauge**; and the jack is fixedly arranged in the center of the top surface of the base, adopts an electric hydraulic jack and is electrically connected with the data input/output terminal. The device is convenient to operate and use; the test working platform is reasonable in structural layout, does not occupy space and is convenient to operate and adjust; data is input and output in real time through the data input/output terminal to perform test data input and output; and the data is fed back and displayed in a data form through a data real-time display screen of the data input/output terminal, so that the result is more visual, analysis and comparison are facilitated, the test accuracy is high, the defects of a traditional test instrument in performance tests of two **concrete** materials can be effectively avoided, the actual performance of the test block is accurately reflected, and the cost is relatively low.

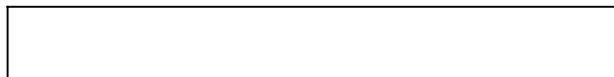
**42/198** © EPODOC / EPO

PN - [CN109696263](#) A 20190430  
 PR - CN201910129458 20190221  
 AP - CN201910129458 20190221  
 DT - I  
 CI - G01L1/22 (CN)  
 - G01L1/246 (CN)  
 PA - UNIV GUANGXI  
 TI - Device for testing existing **stress of concrete** and testing method  
 AB - The invention discloses a device for testing the existing **stress of concrete** and a testing method. The device is characterized in that



a base is connected with a vertical column and stabilizing bolts thereon, the body is connected with the vertical column through a vertical column lifting rack, a motor, a drill cylinder and a protective casing are all arranged on the body, an engine is connected with a driving wheel, the driving wheel drives a driven wheel to rotate through a belt, the driven wheel drives the drill cylinder to rotate, the body is provided with a lifting handle which controls the lifting of the body, displacement sensors such as a resistance **strain gauge** and a fiber grating are located on the **concrete** surface of the core to be drilled at the front of the drill cylinder, and data lines of the sensors are led out from a fiber grating line protection sleeve and connected to a matched signal demodulation reader. The device can continuously measure the strain changes in a **concrete** member test area in real time through the **strain gauge** attached to the surface of a core sample while the drill cylinder drills the core sample, the **stress** of the area can be accurately obtained through an elastic modulus when the strain is stabilized at a certain value, and the existing **stress** of the **concrete** of the tested member is accurately measured.

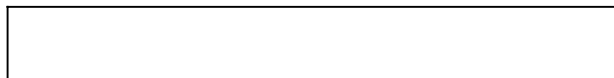
**43/198** © EPODOC / EPO  
 PN - [CN208766812U](#) U 20190419  
 PR - CN201821378461U 20180815  
 AP - CN201821378461U 20180815  
 DT - I  
 PA - WENZHOU CITY RESOURCES  
 DEVELOPMENT ENG CO LTD



- TI - Well structure of parking between secret deep space of long -range wired management and control construction
- AB - The utility model provides a well structure of parking between secret deep space of long -range wired management and control construction is the same with current soft soil area foundation ditch technique all to have above excavation depth 5- 10m's **cement** stirring stake is done the stagnant water and is enclosed the curtain, is there the excavation depth 8 of exceeding- 30m's a drilling bored **concrete** pile conduct fender pile, there is the reinforced **concrete** interior wall in a fender pile inboard, a serial communication port, soil body lateral **stress**'s silicon film **strain gauge** sensor weld the test hole on a fender pile outside reinforcing bar outside, and be connected to the outer data acquisition processor of well through the wire, the rethread wire is connected to computer terminal at a distance. Compared with the prior art, have and can be in real time change at wired monitoring civil engineering structure outside soil **stress** at a distance, in case **stress** exceeds the early warning immediately of warning data, the well structure of avoiding parking major accident such as collapse.

44/198 © EPODOC / EPO

- PN - [CN109635447](#) A 20190416
- PR - CN201811536281 20181214
- AP - CN201811536281 20181214
- DT - I



|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G06F30/20 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| CA | - G06F2119/06 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| PA | - UNIV CHINA PETROLEUM<br>BEIJING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| TI | - A fault solution <b>stress</b><br>simulation analysis method<br>and a <b>stress</b> analysis model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| AB | - The invention discloses a<br>fault solution <b>stress</b><br>simulation analysis method.<br>A <b>concrete</b> model is<br>manufactured according to<br>the actual stratum condition;<br>A <b>strain gauge</b> group is placed<br>at a measuring point in<br>the <b>concrete</b> model and is<br>positioned in the <b>concrete</b><br>model, so that the <b>stress</b><br>condition of the measuring<br>point in the <b>concrete</b> model<br>can be accurately measured;<br>Each strain gage group at<br>least comprises three strain<br>gages; applying external force<br>to the <b>concrete</b> model; values<br>of all the strain gages are<br>measured in the same plane<br>in the strain gage group;<br>According to the method,<br>the <b>stress</b> condition of a<br>measuring point can be<br>obtained by reasonably<br>arranging the positions of the<br>strain gauges, the <b>stress</b><br>condition of the <b>concrete</b><br>model can be accurately and<br>comprehensively obtained,<br>and the <b>stress</b> distribution<br>condition in the actual<br>stratum of the fault solution<br>is further obtained. |

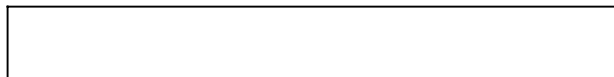
45/198 © EPODOC / EPO

|    |                                                                  |
|----|------------------------------------------------------------------|
| PN | - <a href="#">CN208736338U</a> U 20190412                        |
| PR | - CN201821497076U 20180913                                       |
| AP | - CN201821497076U 20180913                                       |
| DT | - I                                                              |
| PA | - UNIV WUHAN POLYTECHNIC                                         |
| TI | - Crack extesion detector                                        |
| AB | - The utility model discloses a<br>crack extesion detector, this |



crack extension detector includes: the casing, the object space is put to inside being provided with of casing, is provided with on the bottom surface of casing and stretches out the mouth, and it has current induction ware, signal transmitter, flexible resistance **strain gauge** and the control unit to set up in the casing, wherein, single electric connection in current induction ware and signal transmitter are controlled to flexible resistance **strain gauge** electric connection in current induction ware, and flexible resistance **strain gauge** can establish in the **concrete** building crackle through stretching out mouthful to stretch out to insert, and wherein signal transmitter sends server realization electric connection 0 with flexible resistance **strain gauge** to the change of crackle internal **stress** value through the basic station. The utility model discloses can long - range harmful crackle to repairing carry out real time monitoring on the **concrete** building, can carry out timely processing to the danger that harmful crackle caused, reduce the site work volume simultaneously, security that can at utmost guarantee **concrete** building.

**46/198** © EPODOC / EPO  
 PN - [CN208578243U](#) U 20190305  
 PR - CN20182104376U 20180627  
 AP - CN20182104376U 20180627  
 DT - I  
 PA - JIANGSUDONGSHANG  
 DWELLING HOUSE IND CO LTD  
 TI - Pre -buried **stress** measuring  
 element's prefabricated plate



AB - The utility model discloses a pre -buried **stress** measuring element's prefabricated plate, including the reinforcing bar layer be provided with paper tinsel formula metal **strain gauge** on the reinforcing bar layer to and the pouring covers the **concrete** layer on surface about the reinforcing bar layer, the reinforcing bar layer is multilayer steel mesh reinforcement structure, set up paper tinsel formula metal **strain gauge** respectively at the top layer in reinforcing bar layer, intermediate level and the bottom, it is outside that paper tinsel formula metal **strain gauge**'s lead wire extends to the prefabricated plate edge along with the reinforcing bar, and paper tinsel formula metal **strain gauge**'s lead wire extends to the detection wiring port that strain force was installed respectively to prefabricated plate each outer port, detect the wiring port be located the prefabricated plate go up with or the lower surface. The utility model provides a conveniently survey strain force's prefabricated plate, guarantee that prefabricated plate be stressed in the prescribed limit, prevents that the prefabricated plate from excessively deforming, improve the life of prefabricated plate.

47/198 © EPODOC / EPO  
PN - [CN109406313](#) A 20190301  
PR - CN201811602413 20181226  
AP - CN201811602413 20181226  
DT - I  
CT - || STSE (A)  
[CN104535409](#) A 20150422  
[A] (UNIV CHINA MINING)



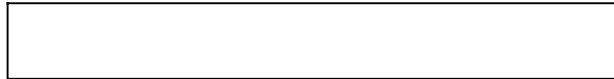
[A] 1-8  
 \* 全文 \*;  
[CN105716957](#) A 20160629  
 [A] (UNIV PLA AIR FORCE  
 ENGINEERING)  
 [A] 1-8  
 \* 全文 \*;  
[CN205719826U](#) U 20161123  
 [X] (UNIV SCIENCE & TECH  
 CHINA)  
 [X] 1-8  
 \* 说明书第29-46段、图1-4 \*

- CI
  - G01N3/02 (CN)
  - G01N3/06 (CN)
  - G01N3/307 (CN)
- CA
  - G01N2203/0048 (CN)
  - G01N2203/0075 (CN)
  - G01N2203/0256 (CN)
- PA
  - UNIVSHENZHEN
- TI
  - Hopkinson beam rod dynamic testing system
- AB
  - The invention provides a Hopkinson beam rod dynamic testing system which comprises a horizontal cross support platform, a central cube square box, beam rods and a beam rod fixing and support frame. The beam rods in the X direction and the Y direction beam rod are horizontally placed, the beam rods in the Z direction are vertically placed, and the small single rods are symmetrically and neatly bundled by the beam fixing and support frame to form large square beam rods. The gap of 1 mm to 2 mm is reserved between the single rods, a resistance **strain gauge** is attached to each single rod, the cross-sectional area and the length of the beam rods in all the directions are the same, and the dynamic **stress** wave propagation law and the dynamic response signal monitoring mode of each beam rod are the same. The

system overcomes the shortcoming that the existing Hopkinson rods cannot be used for performing dynamic mechanical property testing of large-sized rock or **concrete** materials, and makes up for the defect that the local dynamic **stress-strain** response characteristics of a testing sample cannot be obtained effectively in the Hopkinson rod testing process.

**48/198** © EPODOC / EPO

PN - [CN208420246U](#) U 20190122  
 PR - CN201821162231U 20180721  
 AP - CN201821162231U 20180721  
 DT - I  
 PA - CHINA RAILWAY 18TH BUREAU GROUP CO LTD  
 TI - Intraductal **concrete stress** and strain monitoring system of **concrete** filled steel tube arch bridge  
 AB - The utility model discloses an intraductal **concrete stress** and strain monitoring system of **concrete** filled steel tube arch bridge, the installation cross carries on the support in the steel pipe, steel pipe and the intussuseption of cross lift -launch support are filled with the **concrete**, the cross carries on the horizontal installation **stress** of the going up meter of support, the cross carry on the support vertically on install wireless **strain gauge**. The cross is divided into the four layers on carrying the support edge direction of height of steel pipe altogether, staggered arrangement on taseometer and the wireless **strain gauge** edge direction of height, and the contained angle between adjacent taseometer and the



wireless **strain gauge** is 90.  
 The intraductal **concrete stress** strain test mode in traditional **concrete** filled steel tube arch bridge of comparing, taseometer, wireless **strain gauge** carry on the support with the help of the cross can lay the saturation of realization monitoring range with the monitoring point of intraductal **concrete** on the space, can effectively improve the intraductal **concrete** testing **stress** and strain's of **concrete** filled steel tube arch bridge accuracyand reliability.

**49/198**    © EPODOC / EPO

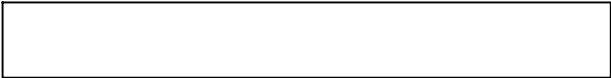
PN    - [CN109238376](#) A 20190118

PR    - CN201811331412 20181109

AP    - CN201811331412 20181109

DT    - I

CT    - || STSE (A)  
       [CN101482526](#) A 20090715  
       [A] (UNIV ZHEJIANG TECHNOLOGY [CN])  
       [A] 1-6  
       \* 全文 \*;  
       [CN101769916](#) A 20100707  
       [A] (JIANGSU SUBOTE MATERIAL CO LTD, et al)  
       [A] 1-6  
       \* 全文 \*;  
       [CN101865865](#) A 20101020  
       [Y] (NANJING HYDRAULIC RES INST THE MINISTRY OF WATER RESOURCES THE HIGHWAY MINISTRY OF COMMUNICATIONS AN)  
       [Y] 1-6  
       \* 说明书第1-44段, 图1-4 \*;  
       [CN103698238](#) A 20140402  
       [Y] (JIANGSU SUBOTE NEW MAT CO LTD)  
       [Y] 1-6  
       \* 说明书第2-45段, 图1-7 \*;  
       [CN107328922](#) A 20171107  
       [A] (HARBIN INST TECHNOLOGY)  
       [A] 1-6



\* 全文 \*

- CTNP - || STSE (A)  
[Y] - 李延波, "约束条件下外掺 MgO 混凝土的强度与膨胀应力", 《建筑材料学报》  
[Y] 1-6  
\* 第446-450页 \*
- CI - G01D21/02 (CN)
- PA - UNIVCENTRALSOUTH
- TI - Device and method for monitoring deformation and **stress of cement**-based material in steaming and maintaining process
- AB - The invention relates to a device and a method for monitoring deformation and **stress** of a **cement**-based material in a steaming and maintaining process and belongs to the technical field of test of civil engineering materials. The device comprises a water bath temperature control heating system, a steel ring restraint system, a swelling deformation test system and a **stress** test system; the water bath temperature control heating system is composed of a rectangular double-layer heat preservation box and a water temperature control system; the swelling deformation test system is composed of a laserdisplacement sensor and a displacement data acquisition instrument; the laser displacement sensor is fixed on a bracket and directly above a test piece; the internal **stress** test system is composed of a **strain gauge** and a strain data acquisition instrument; the **strain gauge** is attached to the middle of the outer side of a steel ring; and the **strain gauge** is connected with the strain acquisition system. According to the device and the method for monitoring deformation and **stress** of a **cement**-based

material in the steaming and maintaining process in the invention, based on volume deformation characteristic of the steamed **concrete** in the steaming and maintaining process, the swollen steamed **cement**-based material is restrained through the external steel ring; the internal **stress** of the concrete in the steaming and maintaining process is obtained through calculation by testing strain of the steel ring; and vertical strain is obtained by testing the change in vertical displacement.

50/198

© EPODOC / EPO

PN

- [CN109253833](#) A 20190122

PNFP

- CN109253833B B 20191101

PR

- CN201811178846 20181010

AP

- CN201811178846 20181010

DT

- I

CT

- || STSE (A)  
[JPH11258085](#) A 19990924  
[A] (TOSHIBA CORP)  
[A] 1-7  
\* 全文 \*;  
[CN101008565](#) A 20070801  
[A] (INST GEOLOGY & GEOPHYSICS CAS [CN])  
[A] 1-7  
\* 全文 \*;  
[US2008264183](#) A1 20081030  
[A] (GRAHAM MARK [GB], et al)  
[A] 1-7  
\* 全文 \*;  
[CN103175989](#) A 20130626  
[X] (UNIV CHINA WEST NORMAL)  
[X] 1  
\* 权利要求1, 附图4 \*;  
[CN104390733](#) A 20150304  
[A] (ANHUI HENGYUAN COAL ELECTRICITY GROUP CO LTD)  
[A] 1-7  
\* 全文 \*  
  
CTNP - || STSE (A)  
[A] - 于跟波等, "狮子山铜矿深部开采三维地应力实测及应力场分布研究", 《有色金属

（矿山部分）》

[A] 1-7

\* 全文 \*

[A] - 吴昊等, "基于区域性微震活动的深部采场稳定性分析", 《黄金科技学术》

[A] 1-7

\* 全文 \*

- |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CCI | - <a href="#">E21B1/00</a> ; <a href="#">G01L5/0004</a> ;<br><a href="#">G01L5/16</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| CCA | - <a href="#">G01V1/52</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CI  | - E21B1/00 (EP)<br>- E21F17/18 (US)<br>- G01L5/0004 (EP, US)<br>- G01L5/16 (EP, CN, US)<br>- G01V1/52 (US)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CA  | - G01V1/52 (EP)<br>- G01V2001/526 (US)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| PA  | - (A)<br>INST ROCK & SOIL MECH CAS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| TI  | - (A)<br>Dynamic evolution measuring device and method of three-dimensional disturbance <b>stress</b> under mining disturbance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| AB  | - (A)<br>The invention discloses a dynamic evolution measuring device of three-dimensional disturbance <b>stress</b> under mining disturbance. The dynamic evolution measuring device comprises an outer steel cylinder;three three-way sensing units are arranged on the outer steel cylinder; three <b>stress</b> measuring directions of each three-way sensing unit are vertical in pairs; and nine <b>stress</b> measuring directions ofthe three three-way sensing units are not same. The invention further discloses a dynamic evolution measuring method of three-dimensional disturbance <b>stress</b> under mining disturbance. <b>Stress</b> is measured by adoption of three incline vertical |

directions; the three-dimensional **stress** measurement problem in a drill hole is well solved; by adoption of the three three-way sensing units, a spatial stressvalue is obtained by measurement, so that the intensity and the direction of disturbance principal **stress** at the position of the drill hole are calculated; the curved section displacement of spring steel is derived by adoption of strain measured by a **strain gauge**, so that the push force on a transmission rod is obtained; therefore, the surrounding rock pressure is obtained; and errors due to inaccurate measurement of the elasticity modulus of **concrete** and surrounding rock are avoided.

[SS 7] ..hi

| EPODOC | SS Status | Results | Query                                                                                   |
|--------|-----------|---------|-----------------------------------------------------------------------------------------|
| 1      |           | 0       | DEFORMABLE AND MEASURING AND DEVICE AND (STRESS OR STRAIN) AND CONCRETE AND /IC (G041M) |
| 2      |           | 0       | DEFORMABLE AND MEASURING AND DEVICE AND (STRESS OR STRAIN) AND CONCRETE AND /IC (G04M)  |
| 3      |           | 6       | STRESS AND GAUGE AND CONCRETE AND G01M/IC                                               |
| 4      |           | 5       | (STRAIN W GAUGE) AND CONCRETE AND STRESS AND G01M/IC                                    |
| 5      |           | 5       | (STRAIN W GAUGE) AND (CONCRETE OR MORTAR OR CEMENT) AND STRESS AND G01M/IC              |
| 6      |           | 198     | (STRAIN W GAUGE) AND (CONCRETE OR MORTAR OR CEMENT) AND STRESS                          |

[SS 7] 6 and PD<2016

Results in EPODOC 104

[SS 8] ..li 1-50

1/104 © EPODOC / EPO

PN - [RU2571307](#) C1 20151220

PR - RU20140136215 20140908

AP - RU20140136215 20140908

DT - I

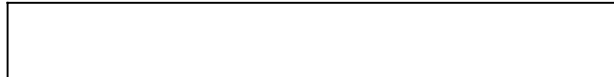


- PA - FEDERALNOEGBYUDZHETNOE  
OBRAZOVATELNOE  
UCHREZHDENIE VYSSHEGO  
PROFESSIONALNOGO  
OBRAZOVANIYA YUGO ZAP [RU]
- TI - METHOD OF EXPERIMENTAL  
DETECTION OF GRADIENT OF  
VARIATION OF LONG-TERM  
STRENGTH OF LOADED AND  
CORRODED **CONCRETE** AND  
DEVICE FOR ITS REALISATION
- AB - FIELD: construction.  
SUBSTANCE: difference is  
tracked between  
deformations generated as a  
result of sample testing for  
simultaneous power loading  
and aggressive medium  
impact, and previously  
calibrated data, produced by  
tests for long-term strength of  
samples under conditions of  
only power loading, control  
of the load at the sample is  
carried out, as well as its  
timely reduction so that  
stresses in the cross section  
of the sample remain  
permanent before start of  
sample damage. The device  
comprises a reservoir filled  
with an aggressive solution, a  
power installation frame,  
movable and fixed cross  
beams with cylindrical  
hinged joints for realisation  
of concentrated **stress** at a  
reinforced **concrete** sample.  
The loading device is a lever  
system using water filling the  
reservoir as the load,  
equipped with a bleeding tube  
with a valve, operation of  
which is regulated by  
variation of parameters  
of **strain gauge** instruments at  
the sample. EFFECT: possibility  
to experimentally detect  
gradient of variation of long-  
term strength in time from  
load application start and  
corrosive impact of medium  
to loaded and

corroded **concrete** test  
sample damage at the  
specified stable value of  
stresses in the sample cross  
section, using an improved  
model of a testing bench  
compared to the prototype.2  
cl, 2 dwg

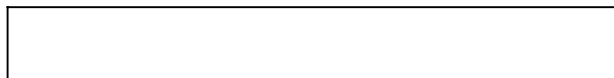
**2/104** © EPODOC / EPO

PN - [CN105157746](#) A 20151216  
PR - CN201510264953 20150522  
AP - CN201510264953 20150522  
DT - I  
PA - HEFEI HAOCHENG INDUSTRY  
AND TRADE CO LTD  
TI - Novel **strain gauge**  
AB - The invention discloses a  
novel **strain gauge**, and  
relates to a **stress** and strain  
measuring device in a civil  
structure. The novel **strain**  
**gauge** includes a housing, a  
temperature sensor, a strain  
force sensor and a cable. The  
housing is provided  
internally with the  
temperature sensor and the  
strain force sensor. The cable  
is disposed in the middle of  
the housing, and is connected  
with the temperature sensor  
and the strain force sensor.  
According to the invention,  
the temperature sensor is  
added into an  
ordinary **concrete strain**  
**gauge** so as to facilitate  
temperature compensation,  
the accuracy and reliability  
of the monitoring data are  
improved, and the occurrence  
of engineering accidents due  
to environmental temperature  
factors is avoided.



**3/104** © EPODOC / EPO

PN - [CN105157662](#) A 20151216  
PR - CN201510264895 20150522  
AP - CN201510264895 20150522



DT - I

PA - HEFEI HAOCHENG INDUSTRY  
AND TRADE CO LTD

TI - **Concrete strain gauge**

AB - The invention discloses  
a **concrete strain gauge**, and  
relates to a **stress**-strain  
measuring device in a civil  
structure. The **concrete strain  
gauge** includes a housing, a  
temperature sensor, a strain  
force sensor and a cable. The  
housing is provided  
internally with a temperature  
sensor and a strain force  
sensor. The middle of the  
housing is provided with the  
cable. The cable is connected  
with the temperature sensor  
and the strain force sensor.  
According to the invention,  
the temperature sensor is  
added into an  
ordinary **concrete strain  
gauge** to facilitate  
temperature compensation,  
the accuracy and reliability  
of the monitoring data are  
improved, and engineering  
accidents due to environment  
temperature factors are  
avoided.

4/104 © EPODOC / EPO

PN - [CN204855338U](#) U 20151209

PR - CN201520603054U 20150811

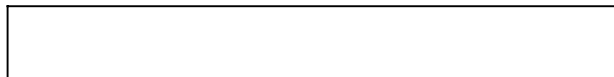
AP - CN201520603054U 20150811

DT - I

PA - UNIVPANZHIHUA

TI - Digital **concrete**  
reinforcement  
adhesion **stress** detection  
device

AB - The utility model belongs to  
the technical field of **concrete**  
reinforcement  
adhesion **stress** detection  
device and specifically  
relates to a thereby the  
processing  
reinforced **concrete** that



acquires that can be accurate  
draws the digital **concrete**  
reinforcement  
adhesion **stress** detection  
device of test parameter, the  
device includes draw the  
appearance, draw the  
appearance by last bearing  
plate, bearing plate and  
connection down the screw  
rod of going up bearing plate,  
lower bearing plate  
constitutes, go up on the  
bearing plate fixed being  
provided with and draw pull  
rod on the appearance, the  
displacement meter anchor  
clamps that still include  
centre gripping **concrete**  
piece with set up in  
displacement sensor on the  
displacement meter anchor  
clamps, be provided with the  
reinforcing bar down on the  
bearing plate face and  
perforate, be provided with  
pressure sensor on the lower  
bearing plate, displacement  
sensor and pressure sensor  
all communicate with static  
electric resistance **strain**  
**gauge**. Originally, the mode of  
drawing also is convenient  
for drawing the process of  
drawing that the in -process  
remained stable. The utility  
model is suitable for an  
among the detection  
of **concrete** reinforcement  
adhesion **stress**.

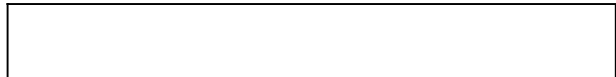
5/104 © EPODOC / EPO  
PN - [CN105091842](#) A 20151125  
PR - CN201510265370 20150522  
AP - CN201510265370 20150522  
DT - I  
CI - G01B21/32 (CN)  
PA - HEFEI HAOCHENG INDUSTRY  
AND TRADE CO LTD  
TI - **Strain gauge**  
AB - The invention provides



a **strain gauge** and relates to a **stress** strain measuring device in a civil structure. The **strain gauge** comprises a housing, a temperature sensor, a strain sensor and a cable, wherein the temperature sensor and the strain sensor are arranged in the housing; the cable is arranged in the middle part of the housing; and the cable is connected with the temperature sensor and the strain sensor. As the **strain gauge** adds the temperature sensor in a common **concrete strain gauge**, temperature compensation can be performed conveniently, and the **strain gauge** improves the accuracy and the reliability for monitoring data, and prevents occurrence of engineering accidents because of influence of ambient temperature factor.

6/104 © EPODOC / EPO

PN - [CN105091841](#) A 20151125  
 PR - CN201510264919 20150522  
 AP - CN201510264919 20150522  
 DT - I  
 CI - G01B21/32 (CN)  
 PA - HEFEI HAOCHENG INDUSTRY AND TRADE CO LTD  
 TI - Novel **concrete strain gauge**  
 AB - The invention provides a novel **concrete strain gauge** and relates to a **stress** strain measuring device in a civil structure. The novel **concrete strain gauge** comprises a housing, a temperature sensor, a strain sensor and a cable, wherein the temperature sensor and the strain sensor are arranged in the housing; the cable is arranged in the middle part of the housing; and the cable is



connected with the temperature sensor and the strain sensor. As the novel **concrete strain gauge** adds the temperature sensor in a common **concrete strain gauge**, temperature compensation can be performed conveniently, and the novel **concrete strain gauge** improves the accuracy and the reliability for monitoring data, and prevents occurrence of engineering accidents because of influence of ambient temperature factor.

**7/104** © EPODOC / EPO

PN - [CN105003115](#) A 20151028  
 PR - CN201410331785 20140712  
 AP - CN201410331785 20140712  
 DT - I  
 CT - || STSE (A)  
[JPS5228714](#) A 00000000 [A]  
 [A] 1  
 \* 全文 \*;  
[US4625680](#) A 00000000 [A]  
 [A] 1  
 \* 全文 \*;  
[DE3533070](#) A1 00000000 [A]  
 [A] 1  
 \* 全文 \*;  
[CN1067089](#) A 00000000 [A]  
 [A] 1  
 \* 全文 \*;  
[CN2216507Y](#) Y 00000000 [A]  
 [A] 1  
 \* 全文 \*;  
[CN1669383](#) A 00000000 [A]  
 [A] 1  
 \* 全文 \*;  
[CN101718148](#) A 00000000 [A]  
 [A] 1  
 \* 全文 \*;  
[CN101701461](#) A 00000000 [X]  
 [X] 1  
 \* 说明书第54-82、107-108段, 附图1-6 \*;  
[CN201679259U](#) U 00000000  
 [A]  
 [A] 1



\* 全文 \*

- CTNP - || STSE (A)  
[A] - 湖北省水利勘测设计院,《大型电力排灌站》,  
(19841231)  
[A] 1  
\* 第421页 \*
- PA - SHIZHONGTIAN
- TI - Special equipment for tubular  
barn body of underground  
temperature reduction barn
- AB - The invention provides  
special equipment for a  
tubular barn body of an  
underground temperature  
reduction barn. The special  
equipment comprises a steel  
rail foundation, a tower crane  
framework, a steel core grid  
frame manufacturing facility,  
and **concrete** casting  
equipment of the movable  
tubular barn body, wherein  
the tower crane framework,  
the steel core grid frame  
manufacturing facility, the  
movable tubular barn body  
and the **concrete** casting  
equipment are arranged on  
the steel rail foundation; and  
underground drilling and  
digging equipment comprises  
a plurality of rotary cutting  
tool soil digging facilities and  
a spoil transportation  
facility. The special  
equipment is characterized by  
comprising a high-position-  
mounted connecting rigid  
body connected with the  
tower crane framework; a  
plurality of digital control  
winches connected with steel  
core grid frames of the  
tubular barn body under  
construction and a plurality  
of winches connected with a  
casting formwork of the  
tubular barn body are  
uniformly distributed at the  
lower side of the connecting  
rigid body; each digital

control winch comprises a load sensor; each load sensor comprises not less than one **strain gauge** attached to a **stress** sensitive position of the corresponding digital control winch; the load sensor of each digital control winch and a motor are in signal connection with a main control computer of the control system through an interface circuit; and the motor is used as an executing component of the main control computer. The special equipment can be used for manufacturing a high-quality underground temperature reduction barn steel bar **concrete** tubular barn body in the field.

**8/104** © EPODOC / EPO

PN - [CN204679335U](#) U 20150930

PR - CN201520412692U 20150616

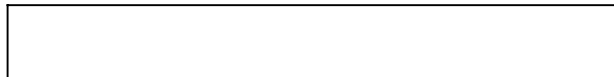
AP - CN201520412692U 20150616

DT - I

PA - SICHUANCHENG DENAN  
HIGHWAY CO LTD; UNIV  
CHONGQING JIAOTONG

TI - Bituminous mixture adds  
experimental test piece of  
layer antireflection crack  
ability of spreading

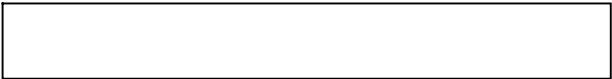
AB - The utility model discloses a  
bituminous mixture adds  
experimental test piece of  
layer antireflection crack  
ability of spreading,  
including steel sheet  
examination mould, set up  
the rubber sheet layer in the  
steel sheet examination  
mould, rubber sheet layer  
middle part is provided with  
the region of coming to  
nothing, sets up the  
asphalt **concrete** supercrust  
of haveing been friends in the  
past in rubber layer top, old  
asphalt **concrete** supercrust



is two and interval 0.5cm -1  
cm, old asphalt **concrete**  
supercrust top is provided  
with the **stress** absorbed  
layer, **stress** absorbed layer  
top is provided with  
bituminous mixture and with  
spreading the layer, has  
pasted resistance **strain**  
**gauge** at bituminous mixture  
with spreading layer bottom  
and top surface. The utility  
model discloses simple  
structure, waterproof  
performance well and the  
toothbrush trade the  
convenience first watch. This  
tests test piece simple  
structure, has guaranteed the  
validity and the reliability of  
test result, and the evaluation  
conclusion of making  
according to the test result is  
favorable to solving better the  
engineering practical  
problem.

9/104    © EPODOC / EPO

|    |   |                                                                                                                                                                                                                                                                                                                                                                                                         |
|----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PN | - | <a href="#">CN104897324</a> A 20150909                                                                                                                                                                                                                                                                                                                                                                  |
| PR | - | CN201410518711 20141005                                                                                                                                                                                                                                                                                                                                                                                 |
| AP | - | CN201410518711 20141005                                                                                                                                                                                                                                                                                                                                                                                 |
| DT | - | I                                                                                                                                                                                                                                                                                                                                                                                                       |
| CT | - | STSE (A)<br><a href="#">US2007251328</a> A1 00000000<br>[A]<br>[A] 1<br>* 全文 *;<br><a href="#">CN201340320Y</a> Y 00000000<br>[X]<br>[X] 1<br>* 说明书3-4页, 图1-3 *;<br><a href="#">CN201476933U</a> U 00000000<br>[X]<br>[X] 1<br>* 说明书第[0021]-[0031]段,<br>图1 *;<br><a href="#">CN202092821U</a> U 00000000<br>[X]<br>[X] 1<br>* 说明书第[0014]-[0021]段,<br>图1-2 *;<br><a href="#">CN202928556U</a> U 00000000 |



[X]  
[X] 1  
\* 说明书第[0008]-[0010]段，  
图1 \*;  
[CN203534737U](#) U 00000000  
[X]  
[X] 1  
\* 说明书第[0017]-[0025]段，  
图1-4 \*

PA - ANHUI BEILAI ELECTRONIC  
TECHNOLOGY CO LTD

TI - **Concrete strain gauge**

AB - The invention discloses  
a **concrete strain gauge**,  
relating to the **stress** strain  
measurement device inside  
the construction structure.  
The **concrete strain gauge**  
comprises a shell, a  
temperature sensor, a strain  
sensor, and a cable. A  
temperature sensor and a  
strain sensor are arranged  
inside the housing. The cable  
is arranged in the middle of  
the shell, and the cable is  
connected to the temperature  
sensor and the strain sensor.  
The **concrete strain gauge**  
adds the temperature sensor  
in the common **concrete**  
**strain gauge**, which is  
convenient for the  
temperature compensation,  
improves the accuracy and  
reliability of the monitored  
data and prevents the  
engineering accidents caused  
by the environment factors.

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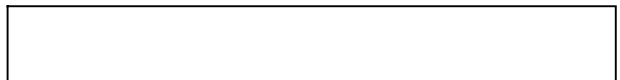
PN - [CN104897323](#) A 20150909

PR - CN201410518710 20141005

AP - CN201410518710 20141005

DT - I

CT - || STSE (A)  
[US2007251328](#) A1 00000000  
[A]  
[A] 1  
\* 全文 \*;  
[CN201340320Y](#) Y 00000000



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\* 说明书3-4页，图1-3 \*;  
[CN201476933U](#) U 00000000

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[X] 1  
\* 说明书第[0021]-[0031]段，  
图1 \*;  
[CN202092821U](#) U 00000000

[X]  
[X] 1  
\* 说明书第[0014]-[0021]段，  
图1-2 \*;  
[CN202928556U](#) U 00000000

[X]  
[X] 1  
\* 说明书第[0008]-[0010]段，  
图1 \*;  
[CN203534737U](#) U 00000000

[X]  
[X] 1  
\* 说明书第[0017]-[0025]段，  
图1-4 \*

- |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| TI | - Novel <b>strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| AB | - The invention provides a<br>novel <b>concrete strain gauge</b><br>and relates to a <b>stress</b> strain<br>measurement device in a civil<br>structure. The novel <b>concrete</b><br><b>strain gauge</b> comprises a<br>shell, a temperature sensor, a<br>strain force sensor and a<br>cable. The shell is internally<br>provided with the<br>temperature sensor and the<br>strain force sensor. The<br>middle part of the shell is<br>provided with the cable which<br>is connected with the<br>temperature sensor and the<br>strain force sensor. According<br>to the novel <b>concrete strain</b><br><b>gauge</b> , the temperature sensor<br>is added into a<br>common <b>concrete strain</b><br><b>gauge</b> , temperature<br>compensation is facilitated,<br>the accuracy and reliability<br>of monitoring data are raised,<br>and an engineering accident<br>caused by the influence of |

environmental temperature  
factors is avoided.

**11/104** © EPODOC / EPO

PN - [CN104897129](#) A 20150909  
PR - CN201410560450 20141018  
AP - CN201410560450 20141018  
DT - I  
CT - || STSE (A)  
[CN202928556U](#) U 00000000  
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\* 说明书第2-10段, 附图1 \*;  
[CN104897108](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN104897109](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN104897110](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN104897111](#) A 00000000 [E]  
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\* 说明书第1-10段, 附图1 \*;  
[CN104897112](#) A 00000000 [E]  
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\* 说明书第1-10段, 附图1 \*;  
[CN104897113](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN104897323](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN104897324](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509697](#) A 00000000 [E]  
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\* 说明书第1-10段, 附图1 \*;  
[CN105509698](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509699](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509700](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509941](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*



|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| TI | - Novel <b>concrete strain gauge</b><br>having temperature sensing<br>function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| AB | - The invention provides a<br>novel <b>concrete strain gauge</b><br>having a temperature sensing<br>function and relates to<br>a <b>stress</b> strain measurement<br>device in a civil structure. The<br>novel <b>concrete strain gauge</b><br>comprises a shell, a<br>temperature sensor, a strain<br>force sensor and a cable. The<br>shell is internally provided<br>with the temperature sensor<br>and the strain force sensor.<br>The middle part of the shell is<br>provided with the cable which<br>is connected with the<br>temperature sensor and the<br>strain force sensor. According<br>to the novel <b>concrete strain</b><br><b>gauge</b> , the temperature sensor<br>is added into a<br>common <b>concrete strain</b><br><b>gauge</b> , temperature<br>compensation is facilitated,<br>the accuracy and reliability<br>of monitoring data are raised,<br>and an engineering accident<br>caused by the influence of<br>environmental temperature<br>factors is avoided. |

|               |                                                                                                                                                                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>12/104</b> | © EPODOC / EPO                                                                                                                                                                                                              |
| PN            | - <a href="#">CN104897128</a> A 20150909                                                                                                                                                                                    |
| PR            | - CN201410560415 20141018                                                                                                                                                                                                   |
| AP            | - CN201410560415 20141018                                                                                                                                                                                                   |
| DT            | - I                                                                                                                                                                                                                         |
| CT            | -    STSE (A)<br><a href="#">CN202928556U</a> U 00000000<br>[X]<br>[X] 1<br>* 说明书第2-10段, 附图1 *;<br><a href="#">CN104897108</a> A 00000000 [E]<br>[E] 1<br>* 说明书第1-10段, 附图1 *;<br><a href="#">CN104897109</a> A 00000000 [E] |



[E] 1  
 \* 说明书第1-10段, 附图1 \*;  
[CN104897110](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*;  
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 \* 说明书第1-10段, 附图1 \*;  
[CN104897112](#) A 00000000 [E]  
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 \* 说明书第1-10段, 附图1 \*;  
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 \* 说明书第1-10段, 附图1 \*;  
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 \* 说明书第1-10段, 附图1 \*;  
[CN105509941](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                     |
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                       |
| TI | - Novel <b>concrete strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                 |
| AB | - The invention provides a<br>novel <b>concrete strain gauge</b><br>and relates to a <b>stress</b> strain<br>measurement device in a civil<br>structure. The novel <b>concrete</b><br><b>strain gauge</b> comprises a<br>shell, a temperature sensor, a<br>strain force sensor and a<br>cable. The shell is internally<br>provided with the<br>temperature sensor and the<br>strain force sensor. The<br>middle part of the shell is |

provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the novel **concrete strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

**13/104** © EPODOC / EPO

PN - [CN104897127](#) A 20150909

PR - CN201410560097 20141018

AP - CN201410560097 20141018

DT - I

CT - || STSE (A)  
[CN202928556U](#) U 00000000  
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\* 说明书第2-10段, 附图1 \*;  
[CN104897108](#) A 00000000 [E]  
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\* 说明书第1-10段, 附图1 \*;  
[CN104897109](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN104897113](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509697](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509698](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*

CI - G01B21/32 (CN)  
- G01L1/26 (CN)

PA - ANHUI BEILAI ELECTRONIC  
TECHNOLOGY CO LTD

TI - **Strain gauge**

AB - The invention provides a **strain gauge** and relates to a **stress** strain measurement device in a civil structure.



The **strain gauge** comprises a shell, a temperature sensor, a strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the **strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

**14/104**    © EPODOC / EPO

PN        - [CN104897126](#) A 20150909

PR        - CN201410559766 20141018

AP        - CN201410559766 20141018

DT        - I

CT        - || STSE (A)  
               [CN202928556U](#) U 00000000  
               [X]  
               [X] 1  
               \* 说明书第2-10段, 附图1 \*;  
               [CN105509699](#) A 00000000 [E]  
               [E] 1  
               \* 说明书第1-10段, 附图1 \*;  
               [CN104897108](#) A 00000000 [E]  
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               \* 说明书第1-10段, 附图1 \*;  
               [CN104897111](#) A 00000000 [E]  
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               \* 说明书第1-10段, 附图1 \*;  
               [CN105509697](#) A 00000000 [E]  
               [E] 1  
               \* 说明书第1-10段, 附图1 \*;  
               [CN105509698](#) A 00000000 [E]  
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               \* 说明书第1-10段, 附图1 \*

CI        - G01B21/32 (CN)

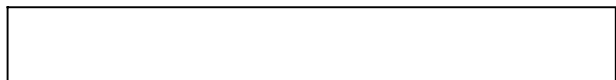
PA        - ANHUI BEILAI ELECTRONIC  
               TECHNOLOGY CO LTD



- TI - Novel embedded type **strain gauge**
- AB - The invention provides a novel embedded type **strain gauge** and relates to a **stress** strain measurement device in a civil structure. The novel embedded type **strain gauge** comprises a shell, a temperature sensor, a strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the novel embedded type **strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

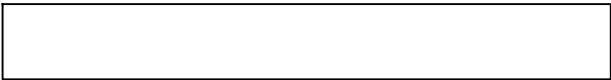
15/104 © EPODOC / EPO

- PN - [CN104897125](#) A 20150909
- PR - CN201410559132 20141018
- AP - CN201410559132 20141018
- DT - I
- CT - || STSE (A)  
[CN202928556U](#) U 00000000  
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\* 说明书第2-10段, 附图1 \*;  
[CN104897112](#) A 00000000 [E]  
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\* 说明书第1-10段, 附图1 \*;  
[CN105509697](#) A 00000000 [E]  
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\* 说明书第1-10段, 附图1 \*;  
[CN105509700](#) A 00000000 [E]  
[E] 1  
\* 说明书第1-10段, 附图1 \*



|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|    | - G01L1/00 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| PA | - ANHUI BEILAI ELECTRONIC TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| TI | - <b>Concrete strain gauge</b> having temperature sensing function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| AB | - The invention discloses a <b>concrete strain gauge</b> having a temperature sensing function, relating to the <b>stress</b> strain measurement device inside the construction structure. The <b>concrete strain gauge</b> having the temperature function comprises a shell, a temperature sensor, a strain sensor, and a cable. A temperature sensor and a strain sensor are arranged inside the shell. The cable is arranged in the middle of the shell, and the cable is connected to the temperature sensor and the strain sensor. The <b>concrete strain gauge</b> adds the temperature sensor in the common <b>concrete strain gauge</b> , which is convenient for the temperature compensation, improves the accuracy and reliability of the monitored data and prevents the engineering accidents caused by the environment factors. |

|               |                                            |
|---------------|--------------------------------------------|
| <b>16/104</b> | © EPODOC / EPO                             |
| PN            | - <a href="#">CN104897124</a> A 20150909   |
| PR            | - CN201410559131 20141018                  |
| AP            | - CN201410559131 20141018                  |
| DT            | - I                                        |
| CT            | -    STSE (A)                              |
|               | <a href="#">CN202928556U</a> U 00000000    |
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|               | * 说明书第2-10段, 附图1 *;                        |
|               | <a href="#">CN104897108</a> A 00000000 [E] |
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|               | * 说明书第1-10段, 附图1 *;                        |
|               | <a href="#">CN104897109</a> A 00000000 [E] |
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\* 说明书第1-10段，附图1 \*;  
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 \* 说明书第1-10段，附图1 \*;  
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 \* 说明书第1-10段，附图1 \*;  
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 \* 说明书第1-10段，附图1 \*;  
[CN105509941](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*

|    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)<br>- G01L1/00 (CN)<br>- G01L1/26 (CN)                                                                                                                                                                                                                                                                                                                                                |
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                        |
| TI | - Novel <b>strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                           |
| AB | - The invention provides a<br>novel <b>concrete strain gauge</b><br>and relates to a <b>stress</b> strain<br>measurement device in a civil<br>structure. The novel <b>concrete</b><br><b>strain gauge</b> comprises a<br>shell, a temperature sensor, a<br>strain force sensor and a<br>cable. The shell is internally<br>provided with the<br>temperature sensor and the<br>strain force sensor. The |

middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the novel **concrete strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

|        |                                                 |  |
|--------|-------------------------------------------------|--|
| 17/104 | © EPODOC / EPO                                  |  |
| PN     | - <a href="#">CN104897123</a> A 20150909        |  |
| PR     | - CN201410558958 20141018                       |  |
| AP     | - CN201410558958 20141018                       |  |
| DT     | - I                                             |  |
| CT     | -    STSE (A)                                   |  |
|        | <a href="#">CN202928556U</a> U 20130508         |  |
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|        | * 说明书第2-10段，图1 *;                               |  |
|        | <a href="#">CN104897108</a> A 20150909          |  |
|        | [E] (ANHUI JINPEIYIN TECHNOLOGY CO LTD)         |  |
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|        | * 说明书第1-10段，图1 *;                               |  |
|        | <a href="#">CN104897111</a> A 20150909          |  |
|        | [E] (ANHUI BEILAI ELECTRONIC TECHNOLOGY CO LTD) |  |
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|        | * 说明书第1-10段，图1 *;                               |  |
|        | <a href="#">CN104897112</a> A 20150909          |  |
|        | [E] (ANHUI BEILAI ELECTRONIC TECHNOLOGY CO LTD) |  |
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|        | * 说明书第1-10段，图1 *;                               |  |
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|        | [E] (ANHUI JINPEIYIN TECH CO LTD)               |  |
|        | [E] 1                                           |  |
|        | * 说明书第1-10段，图1 *;                               |  |
|        | <a href="#">CN105509699</a> A 20160420          |  |
|        | [E] (ANHUI JINPEIYIN TECH CO LTD)               |  |

[E] 1  
 \* 说明书第1-10段，图1 \*

CI - G01B21/32 (CN)  
 - G01L1/00 (CN)  
 - G01L1/26 (CN)

PA - HEFEI JIARUILIN ELECTRONIC  
 TECHNOLOGY CO LTD

TI - Novel embedded type **strain gauge**

AB - The invention provides a novel embedded type **strain gauge** and relates to a **stress** strain measurement device in a civil structure. The novel embedded type **strain gauge** comprises a shell, a temperature sensor, a strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the novel embedded type **strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

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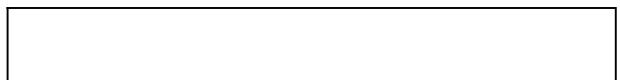
PN - [CN104897122](#) A 20150909

PR - CN201410558741 20141018

AP - CN201410558741 20141018

DT - I

CT - || STSE (A)  
[CN202928556U](#) U 00000000  
 [X]  
 [X] 1  
 \* 说明书第2-10段，附图1 \*;  
[CN104897111](#) A 00000000 [E]  
 [E] 1



\* 说明书第1-10段，附图1 \*;  
[CN105509698](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN105509699](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10，附图1 \*

CI - G01B21/32 (CN)  
 - G01L1/00 (CN)

PA - ANHUI BEILAI ELECTRONIC  
 TECHNOLOGY CO LTD

TI - Embedded type **strain gauge**

AB - The invention discloses an  
 embedded type **strain gauge**,  
 relating to the **stress** strain  
 measurement device inside  
 the construction structure.  
 The embedded type **strain**  
**gauge** comprises a shell, a  
 temperature sensor, a strain  
 sensor, and a cable. A  
 temperature sensor and a  
 strain sensor are arranged  
 inside the shell. The cable is  
 arranged in the middle of the  
 shell, and the cable is  
 connected to the temperature  
 sensor and the strain sensor.  
 The embedded type **strain**  
**gauge** adds the temperature  
 sensor in a common **concrete**  
**strain gauge**, which is  
 convenient for the  
 temperature compensation,  
 improves the accuracy and  
 reliability of the monitored  
 data and prevents the  
 engineering accidents caused  
 by the environment factors.

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PN - [CN104897121](#) A 20150909

PR - CN201410558664 20141018

AP - CN201410558664 20141018

DT - I

CT - || STSE (A)  
[CN104897108](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN104897111](#) A 00000000 [E]  
 [E] 1



\* 说明书第1-10段，附图1 \*;  
[CN105509699](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN202928556U](#) U 00000000  
 [X]  
 [X] 1  
 \* 说明书第2-10段，附图1 \*

CI - G01B21/32 (CN)  
 - G01L1/26 (CN)

PA - HEFEI JIARUILIN ELECTRONIC  
 TECHNOLOGY CO LTD

TI - Novel **strain gauge**

AB - The invention provides a  
 novel **concrete strain gauge**  
 and relates to a **stress** strain  
 measurement device in a civil  
 structure. The novel **concrete**  
**strain gauge** comprises a  
 shell, a temperature sensor, a  
 strain force sensor and a  
 cable. The shell is internally  
 provided with the  
 temperature sensor and the  
 strain force sensor. The  
 middle part of the shell is  
 provided with the cable which  
 is connected with the  
 temperature sensor and the  
 strain force sensor. According  
 to the novel **concrete strain**  
**gauge**, the temperature sensor  
 is added into a  
 common **concrete strain**  
**gauge**, temperature  
 compensation is facilitated,  
 the accuracy and reliability  
 of monitoring data are raised,  
 and an engineering accident  
 caused by the influence of  
 environmental temperature  
 factors is avoided.

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PN - [CN104897120](#) A 20150909

PR - CN201410558584 20141018

AP - CN201410558584 20141018

DT - I

CT - || STSE (A)  
[CN104897108](#) A 00000000 [E]  
 [E] 1



\* 说明书第1-10段，附图1 \*;  
[CN104897111](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN105509699](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN202928556U](#) U 00000000  
 [X]  
 [X] 1  
 \* 说明书第2-10段，附图1 \*

- CI - G01B21/32 (CN)  
 - G01L1/26 (CN)
- PA - HEFEI JIARUILIN ELECTRONIC  
 TECHNOLOGY CO LTD
- TI - **Concrete strain gauge** having  
 temperature sensing function
- AB - The invention discloses  
 a **concrete strain gauge**  
 having a temperature sensing  
 function, relating to the **stress**  
 strain measurement device  
 inside the construction  
 structure. The **concrete strain**  
**gauge** having the temperature  
 function comprises a shell, a  
 temperature sensor, a strain  
 sensor, and a cable. A  
 temperature sensor and a  
 strain sensor are arranged  
 inside the shell. The cable is  
 arranged in the middle of the  
 shell, and the cable is  
 connected to the temperature  
 sensor and the strain sensor.  
 The **concrete strain gauge**  
 adds the temperature sensor  
 in the common **concrete**  
**strain gauge**, which is  
 convenient for the  
 temperature compensation,  
 improves the accuracy and  
 reliability of the monitored  
 data and prevents the  
 engineering accidents caused  
 by the environment factors.

21/104 © EPODOC / EPO

- PN - [CN104897119](#) A 20150909
- PR - CN201410558553 20141018
- AP - CN201410558553 20141018



|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DT | - I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| CT | <ul style="list-style-type: none"> <li>-    STSE (A)</li> <li><a href="#">CN202928556U</a> U 00000000</li> <li>[X]</li> <li>[X] 1</li> <li>* 说明书第2-10段, 附图1 *;</li> <li><a href="#">CN104897108</a> A 00000000 [E]</li> <li>[E] 1</li> <li>* 说明书第1-10段, 附图1 *;</li> <li><a href="#">CN104897111</a> A 00000000 [E]</li> <li>[E] 1</li> <li>* 说明书第1-10段, 附图1 *;</li> <li><a href="#">CN105509699</a> A 00000000 [E]</li> <li>[E] 1</li> <li>* 说明书第1-10段, 附图1 *</li> </ul>                                                                                                                                                                                                                                                                                                                       |
| CI | <ul style="list-style-type: none"> <li>- G01B21/32 (CN)</li> <li>- G01L1/00 (CN)</li> <li>- G01L1/26 (CN)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| PA | - HEFEI JIARUILIN ELECTRONIC TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| TI | - Embedded type <b>strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| AB | <p>- The invention discloses an embedded type <b>strain gauge</b>, relating to the <b>stress</b> strain measurement device inside the construction structure. The embedded type <b>strain gauge</b> comprises a shell, a temperature sensor, a strain sensor, and a cable. A temperature sensor and a strain sensor are arranged inside the shell. The cable is arranged in the middle of the shell, and the cable is connected to the temperature sensor and the strain sensor. The embedded type <b>strain gauge</b> adds the temperature sensor in the common <b>concrete strain gauge</b>, which is convenient for the temperature compensation, improves the accuracy and reliability of the monitored data and prevents the engineering accidents caused by the environment factors.</p> |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| PN | - <a href="#">CN104897118</a> A 20150909                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| PR | - CN201410558465 20141018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| AP | - CN201410558465 20141018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| DT | - I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| CT | -    STSE (A)<br><a href="#">CN202928556U</a> U 20130508<br>[X] (ANHUI JINPEIYIN TECHNOLOGY CO LTD)<br>[X] 1<br>* 说明书第2-10段, 图1 *;<br><a href="#">CN104897109</a> A 20150909<br>[E] (ANHUI JINPEIYIN TECHNOLOGY CO LTD)<br>[E] 1<br>* 说明书第1-10段, 图 *;<br><a href="#">CN104897112</a> A 20150909<br>[E] (ANHUI BEILAI ELECTRONIC TECHNOLOGY CO LTD)<br>[E] 1<br>* 说明书第1-10段, 图1 *;<br><a href="#">CN104897113</a> A 20150909<br>[E] (ANHUI BEILAI ELECTRONIC TECHNOLOGY CO LTD)<br>[E] 1<br>* 说明书第1-10段, 图1 *;<br><a href="#">CN104897323</a> A 20150909<br>[E] (ANHUI BEILAI ELECTRONIC TECHNOLOGY CO LTD)<br>[E] 1<br>* 说明书第1-10段, 图1 *;<br><a href="#">CN105509697</a> A 20160420<br>[E] (ANHUI JINPEIYIN TECH CO LTD)<br>[E] 1<br>* 说明书第1-10段, 图1 *;<br><a href="#">CN105509698</a> A 20160420<br>[E] (ANHUI JINPEIYIN TECH CO LTD)<br>[E] 1<br>* 说明书第1-10段, 图1 * |  |
| CI | - G01B21/32 (CN)<br>- G01L1/26 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| PA | - HEFEI JIARUILIN ELECTRONIC TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| TI | - <b>Strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
| AB | - The invention provides a <b>strain gauge</b> and relates to a <b>stress</b> strain measurement device in a civil structure. The <b>strain gauge</b> comprises a shell, a temperature sensor, a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |

strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the **strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

**23/104** © EPODOC / EPO

PN - [CN104897117](#) A 20150909  
 PR - CN201410558416 20141018  
 AP - CN201410558416 20141018  
 DT - I  
 CT - || STSE (A)  
[CN202928556U](#) U 00000000  
 [X]  
 [X] 1  
 \* 说明书第2-10段, 附图1 \*;  
[CN104897108](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*;  
[CN104897109](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*;  
[CN104897110](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*;  
[CN104897111](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*;  
[CN104897112](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*;  
[CN104897113](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段, 附图1 \*;  
[CN104897323](#) A 00000000 [E]  
 [E] 1



\* 说明书第1-10段，附图1 \*;  
[CN104897324](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN105509697](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN105509698](#) A 00000000 [E]  
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 \* 说明书第1-10段，附图1 \*;  
[CN105509699](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN105509700](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*;  
[CN105509941](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第1-10段，附图1 \*

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)<br>- G01L1/00 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| TI | - <b>Concrete strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| AB | - The invention discloses<br>a <b>concrete strain gauge</b> ,<br>relating to the <b>stress</b> strain<br>measurement device inside<br>the construction structure.<br>The <b>concrete strain gauge</b><br>comprises a shell, a<br>temperature sensor, a strain<br>sensor, and a cable. A<br>temperature sensor and a<br>strain sensor are arranged<br>inside the shell. The cable is<br>arranged in the middle of the<br>shell, and the cable is<br>connected to the temperature<br>sensor and the strain sensor.<br>The <b>concrete strain gauge</b><br>adds the temperature sensor<br>in the common <b>concrete</b><br><b>strain gauge</b> , which is<br>convenient for the<br>temperature compensation,<br>improves the accuracy and<br>reliability of the monitored<br>data and prevents the<br>engineering accidents caused<br>by the environment factors. |

**24/104**    © EPODOC / EPO

PN        - [CN104897116](#) A 20150909

PR        - CN201410558279 20141018

AP        - CN201410558279 20141018

DT        - I

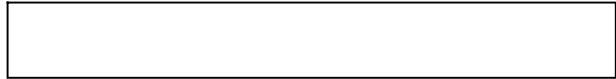
CT        - || STSE (A)

[CN104897108](#) A 20150909  
            [E] (ANHUI JINPEIYIN  
            TECHNOLOGY CO LTD)  
            [E] 1  
            \* 说明书第1-10段, 图1 \*;  
            [CN104897109](#) A 20150909  
            [E] (ANHUI JINPEIYIN  
            TECHNOLOGY CO LTD)  
            [E] 1  
            \* 说明书第1-10段, 图1 \*;  
            [CN104897111](#) A 20150909  
            [E] (ANHUI BEILAI ELECTRONIC  
            TECHNOLOGY CO LTD)  
            [E] 1  
            \* 说明书第1-10段, 图1 \*;  
            [CN104897112](#) A 20150909  
            [E] (ANHUI BEILAI ELECTRONIC  
            TECHNOLOGY CO LTD)  
            [E] 1  
            \* 说明书第1-10段, 图1 \*;  
            [CN202928556U](#) U 20130508  
            [X] (ANHUI JINPEIYIN  
            TECHNOLOGY CO LTD)  
            [X] 1  
            \* 说明书第2-10段, 图1 \*;  
            [CN105509697](#) A 20160420  
            [E] (ANHUI JINPEIYIN TECH CO  
            LTD)  
            [E] 1  
            \* 说明书第1-10段, 图1 \*;  
            [CN105509698](#) A 20160420  
            [E] (ANHUI JINPEIYIN TECH CO  
            LTD)  
            [E] 1  
            \* 说明书第1-10段, 图1 \*;  
            [CN105509700](#) A 20160420  
            [E] (ANHUI JINPEIYIN TECH CO  
            LTD)  
            [E] 1  
            \* 说明书第1-10段, 图1 \*

CI        - G01B21/32 (CN)  
            - G01L1/00 (CN)

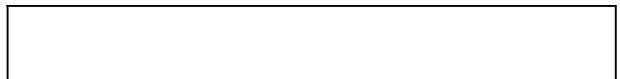
PA        - HEFEI JIARUILIN ELECTRONIC  
            TECHNOLOGY CO LTD

TI        - **Concrete strain gauge**



AB            - The invention discloses  
                  a **concrete strain gauge**,  
                  relating to the **stress** strain  
                  measurement device inside  
                  the construction structure.  
                  The **concrete strain gauge**  
                  comprises a shell, a  
                  temperature sensor, a strain  
                  sensor, and a cable. A  
                  temperature sensor and a  
                  strain sensor are arranged  
                  inside the shell. The cable is  
                  arranged in the middle of the  
                  shell, and the cable is  
                  connected to the temperature  
                  sensor and the strain sensor.  
                  The **concrete strain gauge**  
                  adds the temperature sensor  
                  in the common **concrete**  
                  **strain gauge**, which is  
                  convenient for the  
                  temperature compensation,  
                  improves the accuracy and  
                  reliability of the monitored  
                  data and prevents the  
                  engineering accidents caused  
                  by the environment factors.

25/104    © EPODOC / EPO  
 PN            - [CN104897115](#) A 20150909  
 PR            - CN201410558277 20141018  
 AP            - CN201410558277 20141018  
 DT            - I  
 CT            - || STSE (A)  
                  [CN202928556U](#) U 20130508  
                  [X] (ANHUI JINPEIYIN  
                  TECHNOLOGY CO LTD)  
                  [X] 1  
                  \* 说明书第2-10段, 图1 \*;  
                  [CN104897110](#) A 20150909  
                  [E] (ANHUI JINPEIYIN  
                  TECHNOLOGY CO LTD)  
                  [E] 1  
                  \* 说明书第1-10段, 图1 \*;  
                  [CN104897112](#) A 20150909  
                  [E] (ANHUI BEILAI ELECTRONIC  
                  TECHNOLOGY CO LTD)  
                  [E] 1  
                  \* 说明书第1-10段, 图1 \*;  
                  [CN104897324](#) A 20150909  
                  [E] (ANHUI BEILAI ELECTRONIC  
                  TECHNOLOGY CO LTD)



[E] 1  
 \* 说明书第1-10段，图1 \*;  
[CN105509697](#) A 20160420  
 [E] (ANHUI JINPEIYIN TECH CO LTD)  
 [E] 1  
 \* 说明书第1-10段，图1 \*;  
[CN105509698](#) A 20160420  
 [E] (ANHUI JINPEIYIN TECH CO LTD)  
 [E] 1  
 \* 说明书第1-10段，图1 \*;  
[CN105509700](#) A 20160420  
 [E] (ANHUI JINPEIYIN TECH CO LTD)  
 [E] 1  
 \* 说明书第1-10段，图1 \*;  
[CN105509941](#) A 20160420  
 [E] (ANHUI JINPEIYIN TECH CO LTD)  
 [E] 1  
 \* 说明书第1-10段，图1 \*

- |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)<br>- G01D3/028 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| PA | - HEFEI JIARUILIN ELECTRONIC TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| TI | - Novel <b>concrete strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| AB | - The invention provides a novel <b>concrete strain gauge</b> and relates to a <b>stress</b> strain measurement device in a civil structure. The novel <b>concrete strain gauge</b> comprises a shell, a temperature sensor, a strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the novel <b>concrete strain gauge</b> , the temperature sensor is added into a common <b>concrete strain gauge</b> , temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, |

and an engineering accident caused by the influence of environmental temperature factors is avoided.

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PN - [CN104897114](#) A 20150909

PR - CN201410558269 20141018

AP - CN201410558269 20141018

DT - I

CT - || STSE (A)  
[CN104897108](#) A 00000000 [A]  
[A] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN104897111](#) A 00000000 [A]  
[A] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509698](#) A 00000000 [A]  
[A] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN105509699](#) A 00000000 [A]  
[A] 1  
\* 说明书第1-10段, 附图1 \*;  
[CN202928556U](#) U 00000000  
[X]  
[X] 1  
\* 说明书第2-10段, 附图1 \*

CI - G01B21/32 (CN)  
- G01L1/00 (CN)

PA - HEFEI JIARUILIN ELECTRONIC TECHNOLOGY CO LTD

TI - Novel **concrete strain gauge** having temperature sensing function

AB - The invention provides a novel **concrete strain gauge** having a temperature sensing function and relates to a **stress** strain measurement device in a civil structure. The novel **concrete strain gauge** comprises a shell, a temperature sensor, a strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the



strain force sensor. According to the novel **concrete strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

27/104    © EPODOC / EPO

PN        - [CN104897113](#) A 20150909

PR        - CN201410518705 20141005

AP        - CN201410518705 20141005

DT        - I

CT        - || STSE (A)

[US2007251328](#) A1 00000000

            [A]

            [A] 1

            \* 全文 \*;

[CN201340320Y](#) Y 00000000

            [X]

            [X] 1

            \* 说明书3-4页, 图1-3 \*;

[CN201476933U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0021]-[0031]段, 图1 \*;

[CN202092821U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0014]-[0021]段, 图1-2 \*;

[CN202928556U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0002]-[0010]段, 图1 \*;

[CN203534737U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0017]-[0025]段, 图1-4 \*;

[CN104897108](#) A 00000000 [E]

            [E] 1

            \* 说明书第[0002]-[0010]段, 图1 \*;



[CN104897109](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN104897110](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509697](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509698](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509699](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509700](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509941](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*

- |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)<br>- G01L1/26 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TI | - <b>Strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| AB | - The invention provides<br>a <b>strain gauge</b> and relates to<br>a <b>stress</b> strain measurement<br>device in a civil structure.<br>The <b>strain gauge</b> comprises a<br>shell, a temperature sensor, a<br>strain force sensor and a<br>cable. The shell is internally<br>provided with the<br>temperature sensor and the<br>strain force sensor. The<br>middle part of the shell is<br>provided with the cable which<br>is connected with the<br>temperature sensor and the<br>strain force sensor. According<br>to the <b>strain gauge</b> , the<br>temperature sensor is added<br>into a common <b>concrete</b> |

strain gauge, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

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PN        - [CN104897112](#) A 20150909

PR        - CN201410518704 20141005

AP        - CN201410518704 20141005

DT        - I

CT        - || STSE (A)

[US2007251328](#) A1 00000000

            [A]

            [A] 1

            \* 全文 \*;

[CN201340320Y](#) Y 00000000

            [X]

            [X] 1

            \* 说明书3-4页, 图1-3 \*;

[CN201476933U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0021]-[0031]段, 图1 \*;

[CN202092821U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0014]-[0021]段, 图1-2 \*;

[CN202928556U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0002]-[0010]段, 图1 \*;

[CN203534737U](#) U 00000000

            [X]

            [X] 1

            \* 说明书第[0017]-[0025]段, 图1-4 \*;

[CN104897108](#) A 00000000 [E]

            [E] 1

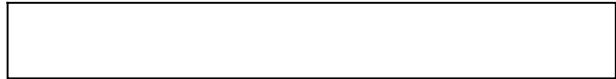
            \* 说明书第[0002]-[0010]段, 图1 \*;

[CN104897109](#) A 00000000 [E]

            [E] 1

            \* 说明书第[0002]-[0010]段, 图1 \*;

[CN104897110](#) A 00000000 [E]



[E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509697](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509698](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509699](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509700](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*；  
[CN105509941](#) A 00000000 [E]  
 [E] 1  
 \* 说明书第[0002]-[0010]段，  
 图1 \*

- |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)<br>- G01L1/00 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| TI | - Novel <b>concrete strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| AB | - The invention provides a<br>novel <b>concrete strain gauge</b><br>and relates to a <b>stress</b> strain<br>measurement device in a civil<br>structure. The novel <b>concrete</b><br><b>strain gauge</b> comprises a<br>shell, a temperature sensor, a<br>strain force sensor and a<br>cable. The shell is internally<br>provided with the<br>temperature sensor and the<br>strain force sensor. The<br>middle part of the shell is<br>provided with the cable which<br>is connected with the<br>temperature sensor and the<br>strain force sensor. According<br>to the novel <b>concrete strain</b><br><b>gauge</b> , the temperature sensor<br>is added into a<br>common <b>concrete strain</b><br><b>gauge</b> , temperature<br>compensation is facilitated,<br>the accuracy and reliability |

of monitoring data are raised,  
and an engineering accident  
caused by the influence of  
environmental temperature  
factors is avoided.

**29/104**    © EPODOC / EPO

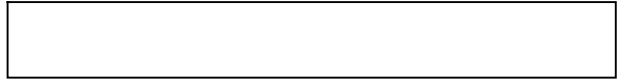
PN        - [CN104897111](#) A 20150909

PR        - CN201410518700 20141005

AP        - CN201410518700 20141005

DT        - I

CT        - || STSE (A)  
[US2007251328](#) A1 00000000  
[A]  
[A] 1  
\* 全文 \*;  
[CN201340320Y](#) Y 00000000  
[X]  
[X] 1  
\* 说明书3-4页, 图1-3 \*;  
[CN201476933U](#) U 00000000  
[X]  
[X] 1  
\* 说明书第[0021]-[0031]段,  
图1 \*;  
[CN202092821U](#) U 00000000  
[X]  
[X] 1  
\* 说明书第[0014]-[0021]段,  
图1-2 \*;  
[CN202928556U](#) U 00000000  
[X]  
[X] 1  
\* 说明书第[0002]-[0010]段,  
图1 \*;  
[CN203534737U](#) U 00000000  
[X]  
[X] 1  
\* 说明书第[0017]-[0025]段,  
图1-4 \*;  
[CN104897108](#) A 00000000 [E]  
[E] 1  
\* 说明书第[0002]-[0010]段,  
图1 \*;  
[CN104897109](#) A 00000000 [E]  
[E] 1  
\* 说明书第[0002]-[0010]段,  
图1 \*;  
[CN104897110](#) A 00000000 [E]  
[E] 1  
\* 说明书第[0002]-[0010]段,  
图1 \*;



[CN105509697](#) A 00000000 [E]  
[E] 1

\* 说明书第[0002]-[0010]段，  
图1 \*;

[CN105509698](#) A 00000000 [E]  
[E] 1

\* 说明书第[0002]-[0010]段，  
图1 \*;

[CN105509699](#) A 00000000 [E]  
[E] 1

\* 说明书第[0002]-[0010]段，  
图1 \*;

[CN105509700](#) A 00000000 [E]  
[E] 1

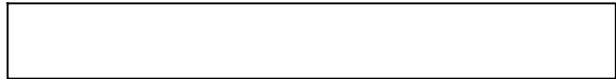
\* 说明书第[0002]-[0010]段，  
图1 \*;

[CN105509941](#) A 00000000 [E]  
[E] 1

\* 说明书第[0002]-[0010]段，  
图1 \*

- |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CI | - G01B21/32 (CN)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| PA | - ANHUI BEILAI ELECTRONIC<br>TECHNOLOGY CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| TI | - Embedded type <b>strain gauge</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| AB | - The invention discloses an<br>embedded type <b>strain gauge</b> ,<br>relating to the <b>stress</b> strain<br>measurement device inside<br>the construction structure.<br>The embedded type <b>strain<br/>gauge</b> comprises a shell, a<br>temperature sensor, a strain<br>sensor, and a cable. A<br>temperature sensor and a<br>strain sensor are arranged<br>inside the shell. The cable is<br>arranged in the middle of the<br>shell, and the cable is<br>connected to the temperature<br>sensor and the strain sensor.<br>The embedded type <b>strain<br/>gauge</b> adds the temperature<br>sensor in the<br>common <b>concrete strain<br/>gauge</b> , which is convenient<br>for the temperature<br>compensation, improves the<br>accuracy and reliability of<br>the monitored data and<br>prevents the engineering<br>accidents caused by the<br>environment factors. |

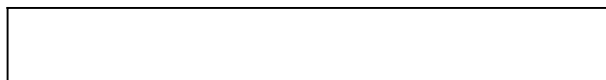
**30/104**    © EPODOC / EPO  
 PN        - [CN104897110](#) A 20150909  
 PR        - CN201410500939 20140926  
 AP        - CN201410500939 20140926  
 DT        - I  
 CT        - || STSE (A)  
             [CN202928556U](#) U 00000000  
             [X]  
             [X] 1  
             \* 说明书第8-10段、附图1 \*;  
             [CN105509697](#) A 00000000 [R]  
             [R] 1  
             \* 权利要求1 \*;  
             [CN105509700](#) A 00000000 [R]  
             [R] 1  
             \* 权利要求1 \*;  
             [CN105509941](#) A 00000000 [R]  
             [R] 1  
             \* 权利要求1 \*  
 CI        - G01B21/32 (CN)  
             - G01L1/00 (CN)  
 PA        - ANHUI JINPEIYIN TECHNOLOGY  
             CO LTD  
 TI        - Novel **concrete strain gauge**  
 AB        - The invention provides a  
             novel **concrete strain gauge**  
             and relates to a **stress** strain  
             measurement device in a civil  
             structure. The novel **concrete**  
             **strain gauge** comprises a  
             shell, a temperature sensor, a  
             strain force sensor and a  
             cable. The shell is internally  
             provided with the  
             temperature sensor and the  
             strain force sensor. The  
             middle part of the shell is  
             provided with the cable which  
             is connected with the  
             temperature sensor and the  
             strain force sensor. According  
             to the novel **concrete strain**  
             **gauge**, the temperature sensor  
             is added into a  
             common **concrete strain**  
             **gauge**, temperature  
             compensation is facilitated,  
             the accuracy and reliability  
             of monitoring data are raised,  
             and an engineering accident



caused by the influence of environmental temperature factors is avoided.

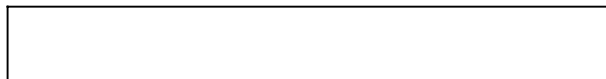
**31/104** © EPODOC / EPO

PN - [CN104897109](#) A 20150909  
PR - CN201410500811 20140926  
AP - CN201410500811 20140926  
DT - I  
CT - || STSE (A)  
[CN202928556U](#) U 00000000 [ ];  
[CN104897108](#) A 00000000 [ ]  
CI - G01B21/32 (CN)  
- G01L1/26 (CN)  
PA - ANHUI JINPEIYIN TECHNOLOGY CO LTD  
TI - **Strain gauge**  
AB - The invention provides a **strain gauge** and relates to a **stress** strain measurement device in a civil structure. The **strain gauge** comprises a shell, a temperature sensor, a strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the **strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.



**32/104** © EPODOC / EPO

PN - [CN104897108](#) A 20150909  
PR - CN201410500787 20140926  
AP - CN201410500787 20140926



DT - I

CT - || STSE (A)  
[CN202928556U](#) U 00000000 [  
 ];  
[CN104897109](#) A 00000000 [ ]

CI - G01B21/32 (CN)

PA - ANHUIJINPEIYIN TECHNOLOGY  
 CO LTD

TI - Novel **strain gauge**

AB - The invention provides a novel **concrete strain gauge** and relates to a **stress** strain measurement device in a civil structure. The novel **concrete strain gauge** comprises a shell, a temperature sensor, a strain force sensor and a cable. The shell is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the novel **concrete strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature factors is avoided.

**33/104** © EPODOC / EPO

PN - [CN204439254U](#) U 20150701

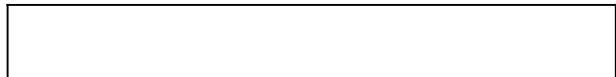
PR - CN201520149072U 20150316

AP - CN201520149072U 20150316

DT - I

PA - SHANXI PROVINCIAL RES INST  
 COMM; SHANXI TRANSP  
 SCIENCE HIGHWAY SURVEY &  
 DESIGN INST

TI - System for reducing  
 measuring error of  
 existing **stress** of steel bar of



- prestressed **concrete** bridge
- AB - The utility model belongs to the technical field of bridge structure engineering, especially to a system for reducing the measuring error of the existing **stress** of a steel bar of a prestressed **concrete** bridge. The system comprises a steel bar, a flame cutting machine, a high-temperature **strain gauge**, a cooling apparatus, a **concrete** protective layer chiseling-off area, a data acquisition instrument and a **stress** releasing point, wherein the steel bar is wrapped in the **concrete** protective layer chiseling-off area, the high-temperature **strain gauge** is pasted to one end of the steel bar along the axis direction of the steel bar, the **stress** release point is at the other end of the steel bar, the cooling apparatus is arranged between the high-temperature **strain gauge** and the **stress** release point and situated at 5cm away from the **stress** release point, the data acquisition instrument is connected with the high-temperature **strain gauge**, and the flame cutting machine is used for cutting the steel bar at the **stress** release point. Compared with the prior art, the system is simple in operation, high in accuracy and reliable in result, and is applicable to selective examination, detection and evaluation of existing **stress** states of steel bars at prestressed **concrete** control interfaces.

34/104 © EPODOC / EPO

PN - [KR20150061189](#) A 20150604

PR - KR20130144976 20131127



|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AP | - KR20130144976 20131127                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| DT | - I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| CI | - G01B7/16 (KR)<br>- G01M7/08 (KR)<br>- G01N3/02 (KR)<br>- G01N3/307 (KR)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| CA | - G01N2203/001 (KR)<br>- G01N2203/0044 (KR)<br>- G01N2203/0098 (KR)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| PA | - NAT UNIV CHONBUK IND<br>COOP FOUND [KR]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TI | - APPARATUS FOR GENERATING<br>AND CONTROLLING SHOCK<br>WAVE AND DYNAMIC<br>PROPERTY MEASURING<br>SYSTEM USING THE<br>APPARATUS AND SEMI-<br>CONDUCTOR STRAIN GAUGES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| AB | - The present invention relates<br>to an apparatus for<br>controlling generation of a<br>shock wave form, which can<br>control a form of a shock<br>wave by using a launch speed<br>of a shock rod, a length of a<br>shock rod, and a shock wave<br>form controller and a<br>dynamic property measuring<br>system using the same.<br>According to the present<br>invention, an apparatus for<br>controlling generation of a<br>shock wave form can control<br>a shock wave form in a wide<br>range as launching the<br>number of kilograms of an<br>impact rod at a speed of 3 to<br>50 m/s. A<br>semiconductor <b>strain gauge</b><br>measuring system is used to<br>measure a dynamic strain<br>signal due to an impact of<br>low speed and high speed.<br>According to the present<br>invention, an apparatus for<br>controlling generation of a<br>shock wave form can<br>accurately measure breaking<br>strength and strain of a<br>material by effectively<br>causing <b>stress</b> in a quasi- |

static state which is uniform  
to a non-uniform brittle  
material such as  
rock, **mortar**, **concrete**.

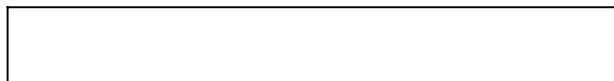
**35/104** © EPODOC / EPO

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PN | - <a href="#">CN204346637U</a> U 20150520                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| PR | - CN20152032408U 20150117                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| AP | - CN20152032408U 20150117                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DT | - I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| PA | - UNIVCHANGAN; UNIVTAIYUAN<br>SCIENCE & TECH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| TI | - Calibration apparatus for<br>testing pre- <b>stress</b> of steel<br>strand                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| AB | - The utility model discloses a<br>calibration apparatus for<br>testing the pre- <b>stress</b> of a<br>steel strand. The calibration<br>apparatus includes a static<br>state strain tester, an<br>ultrasonic detector, two<br>ultrasonic probes both<br>connected to the ultrasonic<br>detector, a horizontally-<br>arranged tensioning bench,<br>two supporting stands<br>supported under the front end<br>and the back end of the<br>tensioning bench<br>respectively, a steel strand<br>passing through the<br>tensioning bench, a<br>tensioning jack for tensioning<br>the steel strand, and a data<br>reception terminal connected<br>to the ultrasonic detector.<br>One end of the steel strand is<br>an anchoring end, the other<br>end of the steel strand is a<br>tensioning end, and the<br>tensioning jack is connected<br>to the tensioning end of the<br>steel strand. The tensioning<br>end of the steel strand is<br>provided with a tensioning<br>force detection unit, a <b>strain<br/>gauge</b> is attached to the<br>middle of the steel strand,<br>and the tensioning force<br>detection unit and the <b>strain<br/>gauge</b> are both connected to |

the static state strain tester.  
 The tensioning bench is a reinforced **concrete** bench.  
 The calibration apparatus is simple in structure and reasonable in design, is simple to use and operate, have good use effects, provides an effective basis for calibration of ultrasonic detection equipment, and helps to ensure the detection efficiency of the pre-**stress** of a steel strand.

**36/104** © EPODOC / EPO

- PN - [CN204115673U](#) U 20150121
- PR - CN201420412086U 20140724
- AP - CN201420412086U 20140724
- DT - I
- PA - UNIV HOHAI
- TI - Ultrathin miniature steel bar **strain gauge**
- AB - The utility model provides an ultrathin miniature steel bar **strain gauge**. Two ends of an arc-shaped metal connection plate with two grooves and two arc-shaped metal sheets are fixed respectively, and the two bare fiber bragg gratings are adhered to the inside of the two grooves forming a small angle to form a main body of the rebar strainometer. The arc-shaped metal sheets at two ends of the steel bar **strain gauge** are fixed on the surface of a steel bar to be measured so as to perform **stress** measurement of the steel bar. The ultrathin miniature steel bar **strain gauge** is high in accuracy, small in size, resistant to electromagnetic interference, and capable of providing a reinforced **concrete** structure test with great convenience.



**37/104**    © EPODOC / EPO

PN        - [CN104296980](#) A 20150121

PR        - CN201410536218 20141011

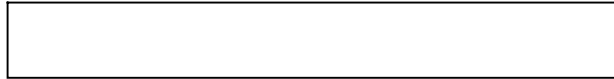
AP        - CN201410536218 20141011

DT        - I

PA        - UNIV BEIJING TECHNOLOGY

TI        - Device and method for testing  
normal static stiffness  
characteristics of joint  
surfaces of shim plate,  
foundation and foundation  
bolt of heavy-duty machine  
tool

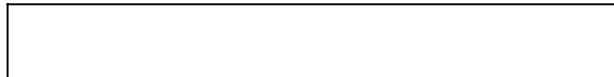
AB        - The invention provides a  
device and method for testing  
normal static stiffness  
characteristics of joint  
surfaces of a shim plate, a  
foundation and a foundation  
bolt of a heavy-duty machine  
tool and belongs to the field  
of heavy-duty machine tool  
foundation experimentation.  
The device comprises a  
material testing machine, a  
screw rod, a slotted iron  
block, the foundation bolt,  
the **concrete** foundation, a  
material testing machine  
base, a force sensor, wood  
blocks, displacement sensors,  
a shim plate test piece, a  
dynamic strain indicator, a  
data acquisition system and  
a computer. After a secondary  
grouting process, the shim  
plate test piece is connected  
with the **concrete** foundation  
through the foundation bolt,  
and definite pre-tightening  
force is applied; a blind hole  
is formed in the foundation  
bolt and used for pre-burying  
of a **strain gauge**; the  
displacement sensors are  
used for measuring normal  
displacement quantities of  
the joint surfaces;  
the **concrete** foundation is  
placed on the force sensor of  
the material testing machine  
base, the slotted iron block is



connected with the material testing machine through the screw rod, and the slotted iron block is attached to the shim plate test piece accordingly; the material testing machine applies static pressure to a **stress** application part in the longitudinal direction. A direct measurement method is adopted for the device and method, the number of tested physical quantities is reduced, and the deformation situation of a system is reflected really.

**38/104** © EPODOC / EPO

PN - [CN204027740U](#) U 20141217  
 PR - CN201420181515U 20140415  
 AP - CN201420181515U 20140415  
 DT - I  
 PA - SHANXI PROVINCIAL RES INST  
 COMM; SHANXI TRANSP  
 SCIENCE HIGHWAY SURVEY &  
 DESIGN INST  
 TI - System for testing **concrete**  
 existing compressive pre-  
**stress** of beam bridge cracked  
 cross section tensile region  
 AB - The utility model discloses a  
 system for testing  
 the **concrete** existing  
 compressive pre- **stress** of a  
 beam bridge cracked cross  
 section tensile region and  
 belongs to the technical field  
 of bridge structural  
 engineering. The system  
 comprises a vertical load  
 applying device, a  
 surface **strain gauge** and a  
 data acquisition instrument;  
 the vertical load applying  
 device is disposed on a  
 caring cross section of a  
 bridge; the surface  
 acquisition instrument is  
 installed on the **concrete** edge  
 or outer edge rebar surface at  
 a side of a bridge caring



cross section tensile region;  
the data acquisition  
instrument is connected onto  
the surface **strain gauge**  
through a conductor; the  
surface **strain gauge** is a  
rebar surface **strain gauge**;  
and the vertical load applying  
device is a jack. Compared  
with the prior art, the system  
is simple to operate, accurate  
and reliable in result, easy  
for engineering and technical  
staff to grasp, and suitable  
for detection and assessment  
of the pressure eliminating  
bending moment and effective  
compressive pre- **stress** of a  
pre-stressing **concrete** bridge  
cross section.

**39/104**    © EPODOC / EPO

PN            - [CN104181102](#) A 20141203

PNFP        - CN104181102B B 20160420

PR            - CN201410387345 20140808

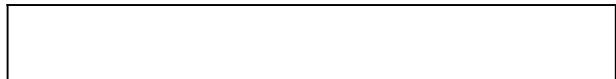
AP            - CN201410387345 20140808

DT            - I

CT            - || STSE (A)  
[CN102890035](#) A 00000000  
[A];  
[CN102998186](#) A 00000000  
[A];  
[CN103558098](#) A 00000000  
[A];  
[CN202903606U](#) U 00000000  
[A];  
[US3664182](#) A 00000000 [A];  
[CN102279127](#) A 00000000  
[A];  
[CN103134750](#) A 00000000  
[A];  
[CN103217343](#) A 00000000  
[A];  
[JPH07134085](#) A 00000000 [A];  
[CN102401764](#) A 00000000 [A]

PA            - (A)  
UNIVTAIYUANETECHNOLOGY

TI            - (A)  
Experimental device and  
experimental method of  
impact drawing-twisting load



AB

- (A)

The invention discloses an experimental device and an experimental method of impact drawing-twisting load, belonging to the field of impact dynamics experiments. The experimental device comprises a drop hammer, a test piece, an impact force transfer device, a loading disc, a measuring device and a test piece fixing device; the drop hammer drops down to impact a transmission target, the transmission target moves on a track after being impacted, a base is provided with a prestress loading device, the prestress is applied to an impact target through an adjusting threaded rod, two sides of the impact target are respectively connected to the loading disc through steel wire ropes, each steel wire rope is provided with a force sensor, the disc transfers the drawing force and twisting force to a reinforcing steel bar of the test piece, and a metal **strain gauge** is attached inside the reinforcing steel bar of the test piece and used for measuring the **stress** distribution along the anchoring length of the reinforcing steel bar. According to the experimental device and the experimental method, the bond **stress** distribution of a reinforcing steel bar **concrete** anchoring reinforcing steel bar under the drawing and twisting load effects of the impact is researched, and a powerful foundation is set for researching a constitutive relation of anchoring bond slip under the effect of

complicated **stress**.

40/104 © EPODOC / EPO

PN - [CN203811306U](#) U 20140903  
PR - CN201420241817U 20140513  
AP - CN201420241817U 20140513  
DT - I  
CI - G01L1/22 (EP)  
- G01L1/26 (EP)  
PA - HUBEI GEZHOUBA TESTING CO  
LTD  
TI - **Concrete strain gauge**  
assembly device  
AB - The utility model provides  
a **concrete strain gauge**  
assembly device, which  
comprises a rectangular  
pyramid-shaped bracket  
composed of a plurality of  
supporting rods. The five  
vertices and the central point  
of the bottom quadrangle of  
the rectangular pyramid-  
shaped bracket are provided  
with a bearer. The plurality of  
supporting rods are  
composed of a plurality of  
first **strain gauge** supporting  
rods and a plurality of  
second **strain gauge**  
supporting rods, wherein the  
first **strain gauge** supporting  
rods are provided with a  
connection supporting rod  
and the second **strain gauge**  
supporting rods are provided  
with a **strain gauge**. One end  
of each second **strain gauge**  
supporting rod is threadedly  
connected with the bearer,  
and the other end of the  
second **strain gauge**  
supporting rod is connected  
with the bottom flange of  
the **strain gauge** through a  
bolt. One end of each  
first **strain gauge** supporting  
rod is connected with the  
connection supporting rod  
through a bolt, and the other  
end of the first **strain gauge**



supporting rod is threadedly connected with the bearer. The cable leading-out end of the **strain gauge** is provided with a reverse joint and the reverse joint is connected with the bearer through a screw. According to the technical scheme of the utility model, by means of the **concrete strain gauge** assembly device, the influence problem of a steel bar bracket on the local **concrete stress** can be solved. Meanwhile, the interference and the influence of the **concrete stress** of the **strain gauge** assembly device within a test region can be relieved or even eliminated, while the survival rate of embedded instruments is improved.

- 41/104** © EPODOC / EPO
- PN - [CN104020064](#) A 20140903
- PNFP - CN104020064B B 20160615
- PR - CN201410270622 20140617
- AP - CN201410270622 20140617
- DT - I
- CT - || STSE (A)  
[CN2938075Y](#) Y 00000000 [A]  
 [A] 1-10  
 \* 全文 \*;  
[JP3714413B](#) B2 00000000 [A]  
 [A] 1-10  
 \* 全文 \*;  
[CN103743587](#) A 00000000 [A]  
 [A] 1-10  
 \* 全文 \*;  
[KR101237204B](#) B1 00000000  
 [A]  
 [A] 1-10  
 \* 全文 \*;  
[CN101275899](#) A 00000000 [A]  
 [A] 1-10  
 \* 全文 \*;  
[XP011251066](#) A[A]
- CTNP - || STSE (A)  
 [A] - 刘成臣等, "不同材料在海洋大气环境下的加速环境



谱研究",《装备环境工程》,  
(20130430), vol. 10, no. 2  
[A] 1-10  
\* 第18-24页 \*

[A] - LARRY W. MASTERS et  
al., "Systematic methodology  
for service life prediction of  
building materials and  
components",《Materials  
and Structures/Materiaux et  
Constructions》,(19891231)  
[A] 1-10  
\* 第385-392页 \*

[A] - Nagi Gebraeel et al.,  
"Residual Life Predictions in  
the Absence of Prior  
Degradation Knowledge",  
《IEEE TRANSACTIONS ON  
RELIABILITY》,(20090331),  
vol. 58, no. 1, XP011251066  
[A] 1-10  
\* 第106-117页 \*

[A] - Shamsad Ahmad,  
"Reinforcement corrosion in  
concrete structures, its  
monitoring and service life  
prediction-a review",  
《Cement & Concrete  
Composites》,(20031231),  
vol. 25  
[A] 1-10  
\* 第459-471页 \*

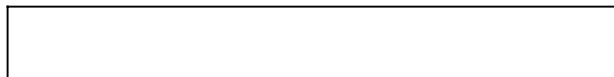
[A] - 贺小帆等, "基于  
Weibull分布的疲劳加速腐蚀  
因子分析",《北京航空航天大  
学学报》,(20070228), vol.  
33, no. 2  
[A] 1-10  
\* 第154-158页 \*

[A] - 陈君等, "低碳钢在浪花  
飞溅区的腐蚀防护研究进展",  
《腐蚀科学与防护技术》,  
(20120731), vol. 24, no. 4  
[A] 1-10  
\* 第342-344页 \*

- |    |                                                                                                                                     |
|----|-------------------------------------------------------------------------------------------------------------------------------------|
| PA | - (A)<br>UNIVNANTONG                                                                                                                |
| TI | - (A)<br>Method for on-line detecting<br>service life of metal materials<br>for ocean engineering under<br>actual working condition |
| AB | - (A)                                                                                                                               |

The invention relates to a method for on-line detecting the service life of metal materials for ocean engineering under an actual working condition. The method utilizes a **stress** corrosion change rule under alternate strain, different corrosion stages of metal materials have specific vibration frequency and amplitude under water steam impact, therefore a strain capacity-time curve chart is obtained through a **strain gauge**, and further a corresponding library file is built. During **concrete** detection, t water steam impact and detection can be carried out on a sample to be detected through one flow velocity or various flow velocities, so that the curve chart is obtained and match is carried out in the library file, and finally the reliable residual service life can be obtained. The method can detect products in any one corrosion stage on line, and the detection process is simple and can be completely within a few seconds. The method really realizes the on-line detection for the residual service life of the metal materials for the ocean engineering, and experiments prove that the detection precision is high.

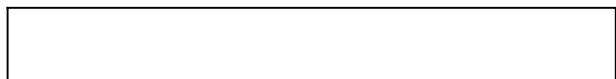
**42/104** © EPODOC / EPO  
 PN - [CN203785700U](#) U 20140820  
 PR - CN201420100444U 20140306  
 AP - CN201420100444U 20140306  
 DT - I  
 PA - CHONGQING CONSTRUCTION  
 RESIDENTIAL ENGINEERING CO  
 LTD; CHONGQING CONSTR ENG  
 GROUP



- TI - Oversized **concrete** floor construction period temperature and contraction monitoring device
- AB - The utility model discloses an oversized **concrete** floor construction period temperature and contraction monitoring device. The monitoring device aims to overcome problems that the conventional **concrete** structure detection device has information delay. The monitoring device comprises a temperature sensor, a data collection device, a data storage device, a data transmission device, a power supply, a central processing unit, a **concrete strain gauge**, a **concrete** temperature test element, a steel bar **stress** detector and a steel bar strain test element. The monitoring device has the characteristics of being accurate and timely in data collection, high in environment applicability and low in implementation cost.

**43/104** © EPODOC / EPO

- PN - [CN103698218](#) A 20140402
- PNFP - CN103698218B B 20160413
- PR - CN201310673554 20131212
- AP - CN201310673554 20131212
- DT - I
- CT - || STSE (A)  
[CN103383325](#) A 20131106  
 [A] (UNIV HOHAI)  
 [A] 1-5  
 \* 全文 \*;  
[CN103389247](#) A 20131113  
 [X] (UNIV HOHAI)  
 [X] 1-5  
 \* 说明书第4-11、16段以及图2、3、4、5、6 \*;  
[ZA9711191](#) B 19980623  
 [A] (BIRAM BRIAN EDGAR)



|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | <p>LUND, et al)</p> <p>[A] 1-5</p> <p>* 全文 *;</p> <p><a href="#">CN102053036</a> A 20110511</p> <p>[A] (CN INST WATER<br/>RESOURCES &amp; HYDR)</p> <p>[A] 1-5</p> <p>* 全文 *</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| CTNP | <p>-    STSE (A)</p> <p>[A] - 李宗利 等, "岩石混凝土<br/>类材料单裂纹水力劈裂研究<br/>述评", 《水利水电工程学<br/>报》, (20050331), no. 01,<br/>pages 67 - 74</p> <p>[A] 1-5</p> <p>* pp.67-74 *</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| PA   | <p>- (A)</p> <p>UNIV HOHAI</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| TI   | <p>- (A)</p> <p>Simulated testing device for<br/>hydraulic fracture of <b>concrete</b><br/>member under different <b>stress</b><br/>conditions</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| AB   | <p>- (A)</p> <p>The invention discloses a<br/>simulated testing device for<br/>the hydraulic fracture of<br/>a <b>concrete</b> member under<br/>different <b>stress</b> conditions,<br/>relating to the technical field<br/>of testing devices for the<br/>hydraulic fractures<br/>of <b>concrete</b> members. The<br/>simulated testing device<br/>comprises a cuboid die with<br/>an opening on one surface,<br/>wherein the die is filled<br/>with <b>concrete</b> to obtain<br/>the <b>concrete</b> member,<br/>the <b>concrete</b> member is<br/>internally provided with eight<br/>high-pressure-resistant water<br/>elbows in advance, and the<br/>tail end of each high-pressure-<br/>resistant water elbow is<br/>provided with a water<br/>pressure sensor connector; a<br/>steel sheet is pulled out of<br/>the <b>concrete</b> member to<br/>prefabricate an initial crack,<br/>a groove defined within a<br/>certain range is polished at</p> |

the periphery of the crack, a **strain gauge** and a clip extensometer are arranged, and the groove is filled with waterproof insulating **cement** and ground to be flush; and the member is provided with a water seal steel sheet on which a water inlet and an exhaust port with a sealing cap are arranged. Based on the simulated testing device, the testing research for the hydraulic fracture of the **concrete** member can be realized under a different **stress** condition and different initial crack inclination angle condition combined condition.

**44/104** © EPODOC / EPO

PN - [JP2013217840](#) A 20131024

PNFP - JP5945442B B2 20160705

PR - JP20120090159 20120411

AP - JP20120090159 20120411

DT - I

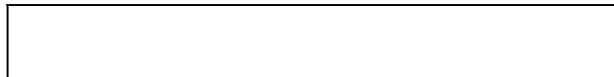
CT - || STSE (A)  
[JP2005291957](#) A 00000000 [ ];  
[JPH03189527](#) A 00000000 [ ];  
[JPS6259824](#) A 00000000 [ ]

FI - G01L1/00&D

PA - (A)  
TOKYO ELECTRIC POWER CO;  
TOKYO DENSETSU SERVICE KK

TI - (A)  
METHOD FOR  
MEASURING **STRESS** OF  
REINFORCEMENT

AB - (A)  
PROBLEM TO BE SOLVED: To provide a technique capable of accurately determining an original **stress** state caused by adhesion between **concrete** and a reinforcement. SOLUTION: A method for measuring a **stress** of reinforcements in a reinforced **concrete** structure includes: an



installation step of exposing a part of a reinforcement subject to a measurement of the reinforced **concrete** structure and installing a **strain gauge**; a cutting step of cutting the reinforcement; a removal step of gradually removing adhesion between the reinforcement and the **concrete**; and a measurement step of measuring, with the **strain gauge**, a strain of the reinforcement under a process where the adhesion is gradually removed in the removal step.

**45/104** © EPODOC / EPO

PN - [CN203287131U](#) U 20131113

PR - CN201320216289U 20130425

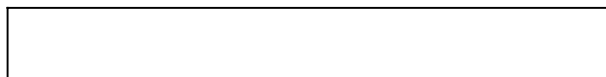
AP - CN201320216289U 20130425

DT - I

PA - CHONGQING ZHONGJIAN  
CONSTRUCTION QUALITY  
INSPECTION CO LTD

TI - Detection device used for  
detecting tensile **stress** of  
steel bar

AB - The utility model discloses a  
detection device used for  
detecting tensile **stress** of a  
steel bar. The detection device  
comprises a steel plate (1) of  
which one surface is pasted  
with two strain gauges (2),  
wherein one **strain gauge** (2)  
is arranged transversely, the  
other **strain gauge** (2) is  
arranged longitudinally, and  
the two strain gauges (2) are  
perpendicular to each other.  
The detection device can be  
prefabricated in advance,  
a **concrete** structure does not  
need to be destroyed in the  
practical process, operation  
is more convenient, and a  
measured structure is more  
accurate.



**46/104** © EPODOC / EPO

- PN - [CN103226013](#) A 20130731
- PR - CN201310121871 20130410
- AP - CN201310121871 20130410
- DT - I
- PA - UNIVSHENYANGJIANZHU
- TI - Protector for **concrete strain gauge**
- AB - The invention relates to a protector of a sensor, in particular to a protector of a vibrating wire **strain gauge** for monitoring internal strain of a **concrete** structure. The protector comprises steel bars; the longitudinal section of the protector is a quadrilateral, circular or elliptic columnar net rack; two support frames are arranged at an adaptive position of the longitudinal section in the net rack in parallel, and fixing ribs are arranged at two diagonals in each support frame in a crossed manner. The protector is small in size, light in weight and high in strength, can exert good protection and positioning effects on the sensor, and does not influence whole **stress** properties of a structure. The protector solves the problems that once contacted with the **strain gauge**, a vibrating needle results in the displacement of the sensor or damages the sensor during concreting. The protector ensures that the **strain gauge** has a monitoring effect in different buildings.

|  |
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|  |
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**47/104** © EPODOC / EPO

- PN - [CN203035188U](#) U 20130703
- PR - CN20132053056U 20130131
- AP - CN20132053056U 20130131

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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DT | - I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| PA | - UNIVNORTHEASTPETROLEUM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| TI | - Test experimental device for adhering sand casing pipe <b>cement</b> bond strength                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| AB | - The utility model relates to a test experimental device for adhering sand casing pipe <b>cement</b> bond strength. A ring-shaped confining pressure cavity is formed outside a <b>cement</b> sheath of the test experimental device for the adhering sand casing pipe <b>cement</b> bond strength, an adhering sand casing pipe is placed inside the <b>cement</b> sheath, the outer wall of a smooth casing pipe and sand grains are adhered together to form the adhering sand casing pipe, the confining pressure cavity is connected with a confining pressure loading system through pipelines, a hydraulic main pipe extends into the adhering casing pipe and is connected with a liquid separating pipe, an outlet of the liquid separating pipe is located between the adhering casing pipe and the <b>cement</b> sheath, the other end of the hydraulic main pipe is connected with a hydraulic loading system, a resistance-type <b>strain gauge</b> is arranged at the top end of the <b>cement</b> sheath and is connected with a signal conversion device, and the signal conversion device is connected with a computer. The test experimental device for the adhering sand casing pipe <b>cement</b> bond strength is capable of achieving the applying of dynamic and continuous external applied loads, drawing a <b>stress-strain</b> curve of casing pipe-binder-sand grain- <b>cement</b> sheath |

cross section, measuring the  
adhering sand casing  
pipe **cement** bond strength,  
and is high in detection  
accuracy.

**48/104** © EPODOC / EPO

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                          |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| PN | - <a href="#">CN202928732U</a> U 20130508                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <div style="border: 1px solid black; width: 380px; height: 30px;"></div> |
| PR | - CN201220557007U 20121026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                          |
| AP | - CN201220557007U 20121026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                          |
| DT | - I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                          |
| PA | - UNIV BEIJING TECHNOLOGY;<br>RES INST HIGHWAY MINI<br>TRANSP; BEIJING HENG TIAN<br>YONGSHENG ELECTRICAL<br>EQUIPMENT CO LTD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                          |
| TI | - Prestressed <b>concrete</b> bridge<br>absolute <b>stress</b> monitoring<br>device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                          |
| AB | - The utility model discloses a<br>prestressed <b>concrete</b> bridge<br>absolute <b>stress</b> monitoring<br>device. The<br>prestressed <b>concrete</b> bridge<br>absolute <b>stress</b> monitoring<br>device comprises a collection<br>instrument which is<br>connected with a <b>strain gauge</b><br>which is attached to the<br>surface of a to-be-<br>monitored <b>concrete</b> bridge<br>body, an analyzing device and<br>an elasticity modulus<br>acquisition device. The<br>elasticity modulus<br>acquisition device acquires<br>elasticity modulus according<br>to collected absolute <b>stress</b><br>and strain in collection. The<br>data output ends of the<br>collection instrument and the<br>elasticity modulus<br>acquisition device are<br>connected with the data input<br>end of the analyzing device.<br>The analyzing device acquires<br>monitoring data according to<br>the elasticity modulus value<br>output by the elasticity<br>modulus acquisition device<br>and strain regularly received<br>by the collection instrument. |                                                                          |

The prestressed **concrete** bridge absolute **stress** monitoring device provided by the utility model has the advantages that the measurement precision of absolute **stress** is improved; by regularly monitoring the surface strain change, absolute **stress** monitoring is realized; monitoring data are credible; the safety of the bridge structure can be ensured; and early warning is realized.

49/104 © EPODOC / EPO

PN - [CN202928556U](#) U 20130508  
 PR - CN201220723449U 20121126  
 AP - CN201220723449U 20121126  
 DT - I  
 PA - ANHUI JINPEIYIN TECHNOLOGY CO LTD  
 TI - Novel **concrete strain gauge**  
 AB - The utility model provides a novel **concrete strain gauge** and relates to a **stress** strain measurement device in a civil structure. The novel **concrete strain gauge** comprises a shell, a temperature sensor, a strain force sensor and a cable. The cable is internally provided with the temperature sensor and the strain force sensor. The middle part of the shell is provided with the cable which is connected with the temperature sensor and the strain force sensor. According to the novel **concrete strain gauge**, the temperature sensor is added into a common **concrete strain gauge**, temperature compensation is facilitated, the accuracy and reliability of monitoring data are raised, and an engineering accident caused by the influence of environmental temperature



factors is avoided.

50/104 © EPODOC / EPO

PN - [CN202869717U](#) U 20130410

PR - CN201220557037U 20121026

AP - CN201220557037U 20121026

DT - I

PA - RES INST HIGHWAY MINI  
TRANSP; UNIV BEIJING  
TECHNOLOGY; BEIJING  
HENGTIANYONGSHENG  
MECHANICALEQUIPMENT CO  
LTD

TI - Absolute **stress** detection  
apparatus for  
prestressed **concrete** bridge

AB - The utility model discloses an  
absolute **stress** detection  
apparatus for a  
prestressed **concrete** bridge.  
A **strain gauge** is attached to  
the surface of a **concrete**  
bridge body to be detected; a  
force measurement device is  
connected with a force  
application surface of a force  
application device and then  
the force measurement device  
and the force application  
device are placed inside a  
groove on the surface of  
the **concrete** bridge body so  
as to detect the **stress** applied  
inside the opening by the  
force application device; a  
control device is connected  
with an acquisition  
instrument, the force  
measurement device, and the  
force application device to  
send force application  
signals to a control end of the  
force application device; and  
when the strain of an output  
end of the acquisition  
instrument returns to an  
initial value, the **stress** of an  
output terminal of the force  
measurement device is  
acquired as the  
absolute **stress**. The  
absolute **stress** detection



apparatus for the prestressed **concrete** bridge is mainly used for the **stress** detection in the bridge **concrete** structure field; the apparatus is capable of directly measuring out the magnitude and the direction of the absolute **stress** of the bridge body without being influenced by the temperature change generated during the grooving or the difficulty of the determination of the **concrete** elastic modulus; and the apparatus is advantaged by accurate measurement results and simple measurement processes.