ISSN 1001-
CN 51-133

第三十六卷 第四期
2016年八月

东方电气评论

611731

40 wt.%Ag

40 wt.%Ag 9 1 25 Hz/30 Hz

1 4 μm

TB383.1 A 1001-9006 2022 04-0001-04

Preparation of Flake Silver Powder for Photovoltaic Solar Cells by Wet Ball Milling

*ZHU Jian, LUO Heng, LIU Ping, LIAO Yaqing**

(DEC Academy of Science and Technology Co., Ltd., 611731,Chengdu,China)

Abstract: Micro nano spherical ball milling. The effects of anhydrous ethanol dosage, ball material ratio and ball milling frequency on the morphology and diameter distribution of flake silver powder were investigated. It is found that when 40 wt.% Ag is used without water, it can absorb the heat generated in the process of ball milling, reduce cold welding and lamination, and the particle size distribution is narrow and controllable; The flake efficiency of spherical silver powder can be enhanced with the increase of ball material ratio and ball milling frequency; When the amount of anhydrous ethanol is 40 wt.% Ag, the ball material ratio is 9:1, and the ball milling frequency is 25 hz/30 hz, the higher fragmentation rate can be guaranteed. The particle size is controllable and the distribution is narrow; which is concentrated in 1 to 4 μ m

Key words: flake silver powder; wet ball milling; alcohol consumption; ball material ratio; ball milling frequency

[2]

[1]

2022-07-12

1983

1982 lianyq@dongfang.com

[3]

[4-5]

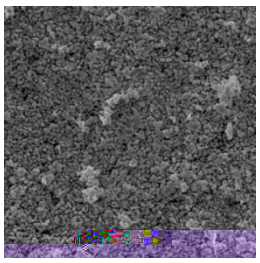
[6]

[7]

1

1.1

D50 0.88 μm 1.42 m^2/g



1 SEM

QM-QX

Vega3 Tescan

Tescan Malvern-Mastersizer 2000E Nano Measurer

1.2

*D*2 mm

PTF QM-QX

50 12 h

1

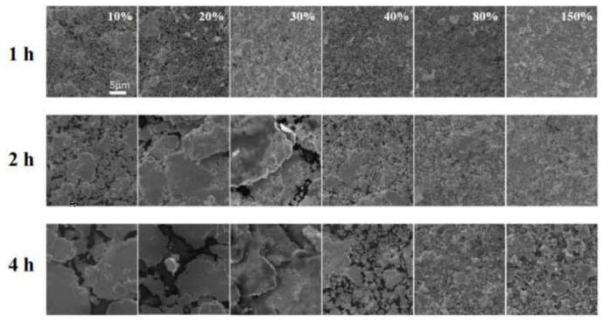
		(wt.%Ag)	Hz	(h)
1#	9:1	10	25	1,2,4
2#		20		
3#		30		
4#		40		
5#		80		
6#		150		
7#	5:1	40	25	1,2,4
8#	9:1			
9#	14:1			
10#	9:1	40	15	1,2,4
11#			20	
12#			30	
13#			35	

2

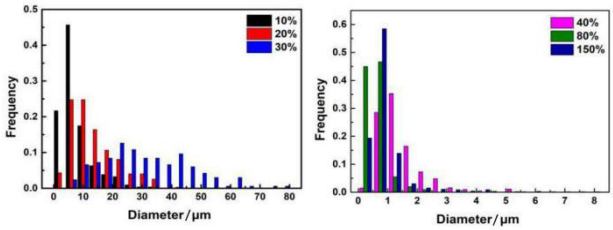
2.1

[8]

[9]



2 1 h 2 h 4 h 10kx SEM



a 10 % 30 % b 40 % 150 %

3

2 3 10 % 20 % 30 %
2 h

4 h 2~10 μm 6~18 μm
10~46 μm 40 % 80 % 150 %
4 h
4 h 0.75~2.25 μm
0.25~1.25 μm 0.25~1.25 μm

[10]

[11]

[12]

[13]

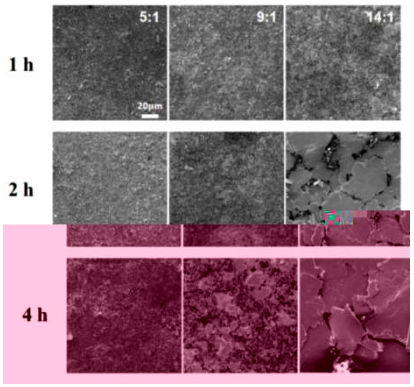
40 %
6 μm

2.2

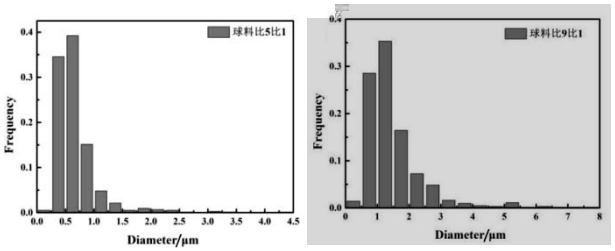
4 5 5 1
4 h
14 1 1 h
2 h

[15]

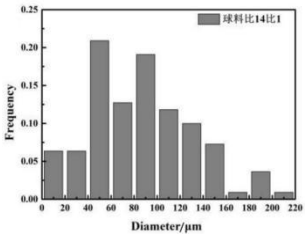
[12]



4 1 h 2 h 4 h 2kx SEM



a 5 1 b 9 1



c 14 1

5 4 h

2.3

[16]

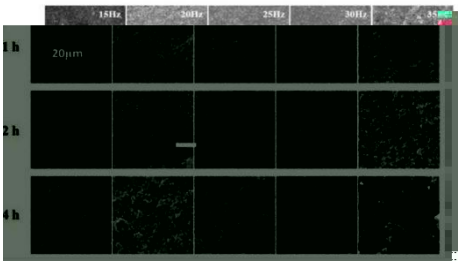
6 7
4 h 25 Hz 30 Hz

4 h

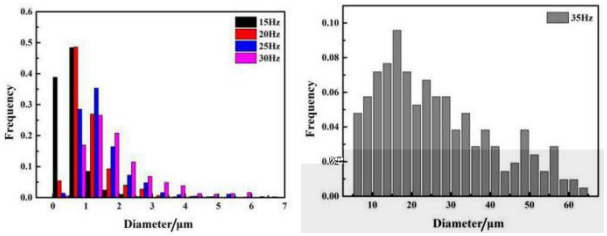
60 μm 3

4 40 wt%Ag 9 1

25 Hz/30 Hz



6 1 h 2 h 4 h 2kx SEM



a 15 Hz 30 Hz b 30 Hz

7 4 h

3 3ÿA

1

40 wt.%Ag

2

[1] , , .
[J]. , 2015, 21(4):31-35
[2] , , .
[J]. , 2021, 35(S02):428-432
[3] , , .
[J]. , 2017, 46(5):850-854
[4] , , .
: CN 104475754 A[P]
[5] , , .
[J]. , 2009, 60(6):1351-1356
[6] , , .
: CN105817647A[P]
[7] , , . [J].
, 2018, 46(21):12-13+28
[8] , , . [J]. ,
2015,36(2):29-32
[9] , , .
[J]. , 2018, 39(1):86-93
[10] , , .
[J]. , 2016, 22(6):46-49
[11] , , . [J].
, 2015, 36(2):33-37+43
[12] , , . [J].
, 2012,33(2):30-35
[13] , , . :
CN109822106A[P]. 2019
[14] , , . [C].
. , 2010:1-6
[15] , . [J].
, 2015, 25(8):15-17
[16] , , .
: CN110586959A[P]. 2019

1 000 MW

0 2

The Stress Testing and Debugging Technologies of Stator Spring Plate on 1 000 MW Turbine Generator

JIANG Haiyong

Abstract: In view of the special assembly structure of 1 000 MW steam generator stator and the company's technological requirements, the strain test technology is adopted to monitor the force of the spring plate under the force of the inner stator by laying the strain gauge on the 14 spring plates of the steam generator's outer stator. And as the basis for guiding stress regulation, finally the result of uniform force of all spring plates is achieved.

Key words: 1 000 MW turbine generator; spring plate; stress testing; debugging

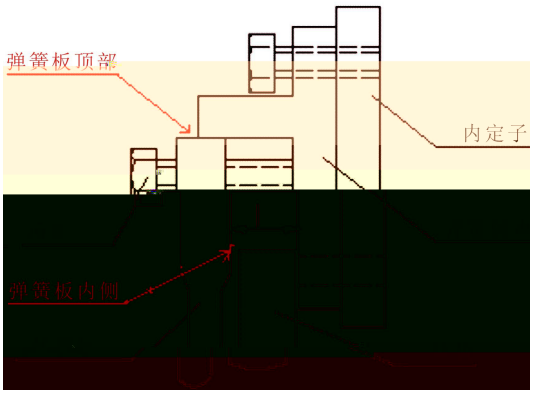
σ $E\varepsilon$

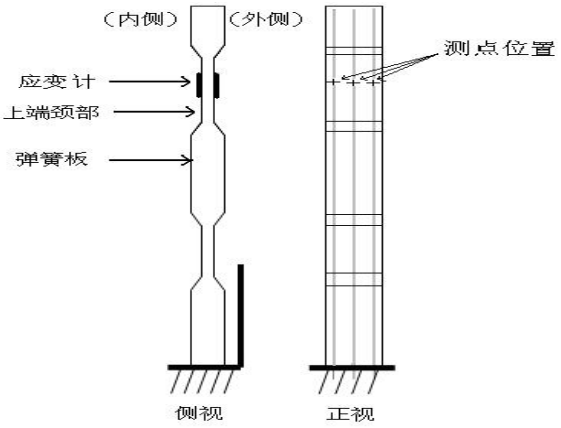
σ

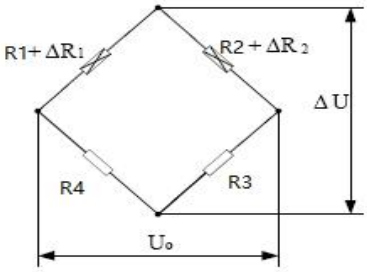
E

ε

1







$$\Delta U = \frac{U}{}\left[\frac{\Delta R}{R} - \frac{\Delta R}{R} + \frac{\Delta R}{R} - \frac{\Delta R}{R}\right]$$

U

U

R

R

R

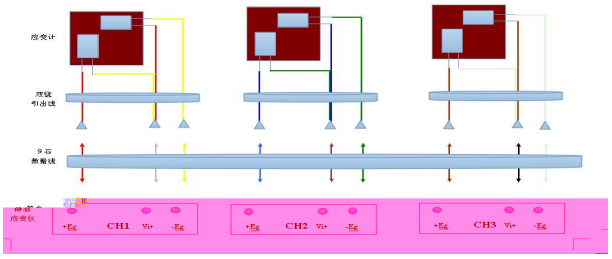
R

R R

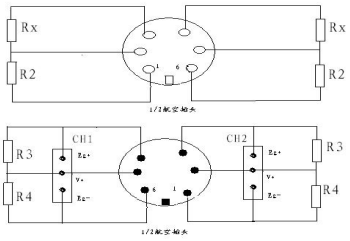
R R R R

R R

3



2

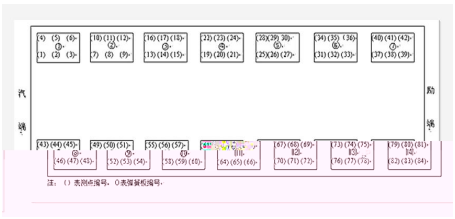


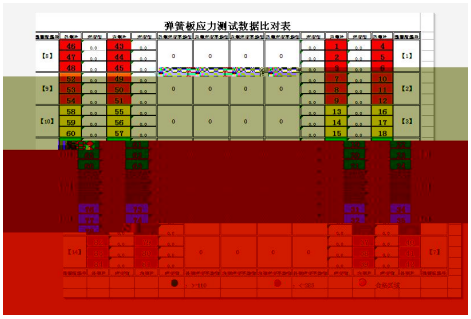
5

ضبط كد



4





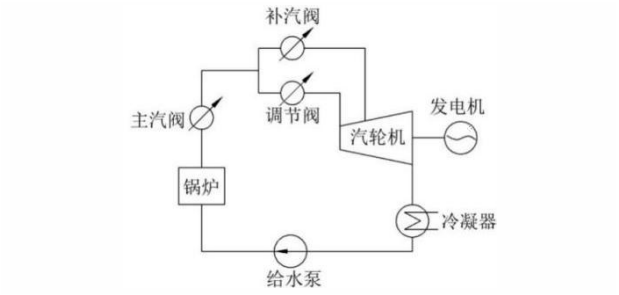
4

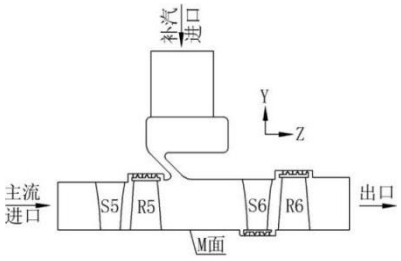
618000

Numerical Investigation for Effect of Supplementary Steam Quantity and Structure on Steam Turbine

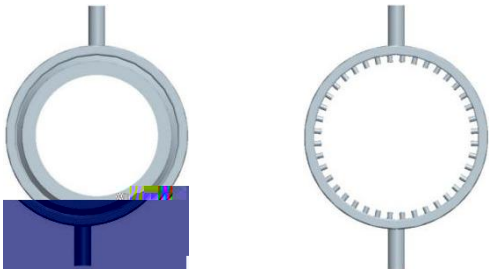
BAI Kunlun, PING Yan, ZHONG Zhuhai,JIANG Shengke,TAO Zhijian

Abstract: Based on a 1 000 MW steam turbine, the effect of supplementary steam quantity on stage efficiency and rotor operational stability is investigated by using numerical simulation. Two different kinds of supplementary steam structures are compared. The results show that, with the increase of supplementary steam quantity, the upstream stage efficiency almost unchanged , while the downstream stage efficiency reduces significantly, the effect of supplementary steam on the rotor operational stability becomes more serious. From the

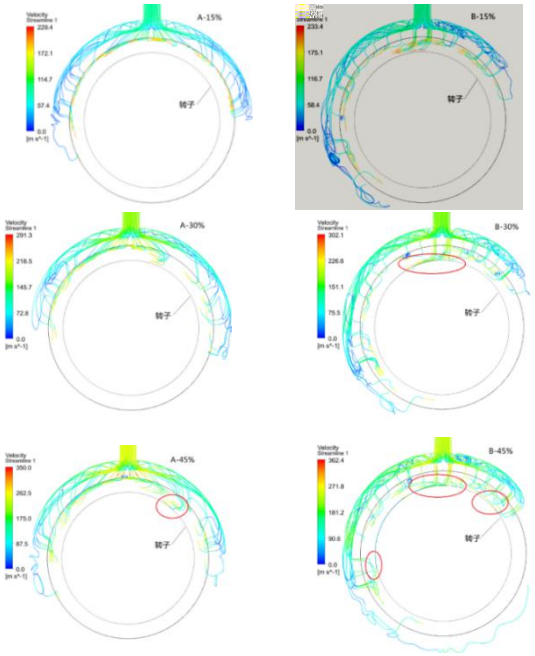


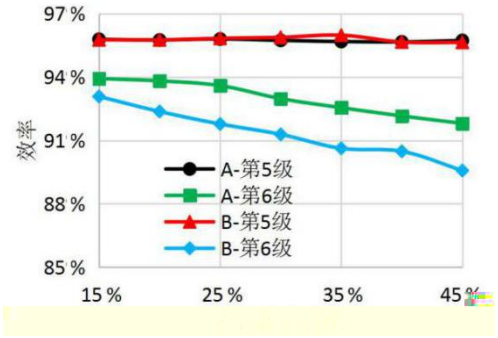


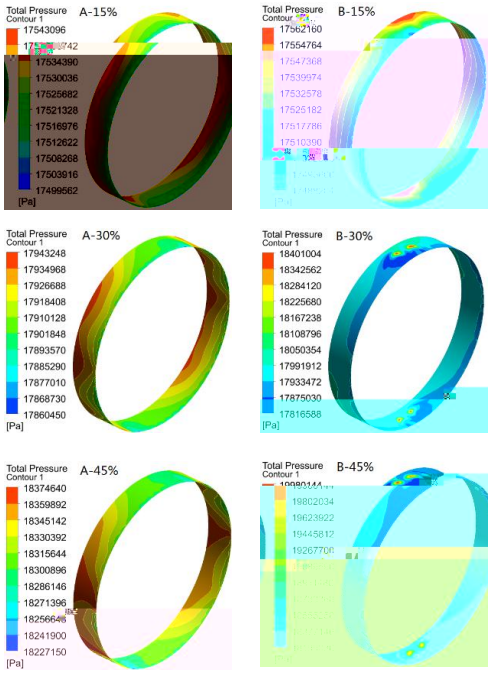
1

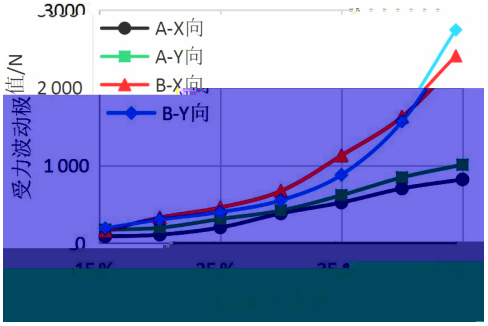


2

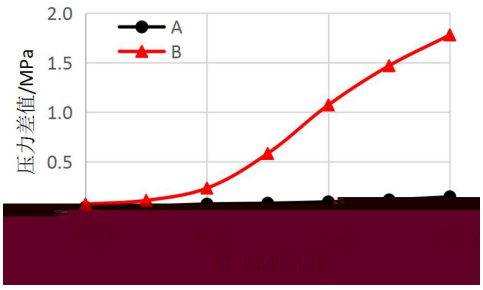

A-15%
B-15%
A-30%
B-30%
A-45%
B-45%
转子


97 %
94 %
91 %
88 %
85 %
效率
15 %
25 %
35 %
45 %
A-第5级
A-第6级
B-第5级
B-第6级


Total Pressure
Contour 1
A-15%
B-15%
A-30%
B-30%
A-45%
B-45%
[Pa]


A-X向
A-Y向
B-X向
B-Y向
受力波动极值/N
3000
2 000
1 000
0

3


A
B
压力差值/MPa
2.0
1.5
1.0
0.5

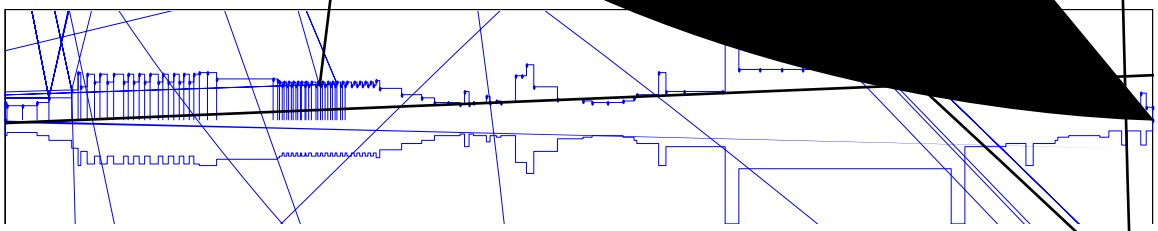
Dynamic Analysis of Shafting System of Salt Cavern Air Energy Storage Turbine

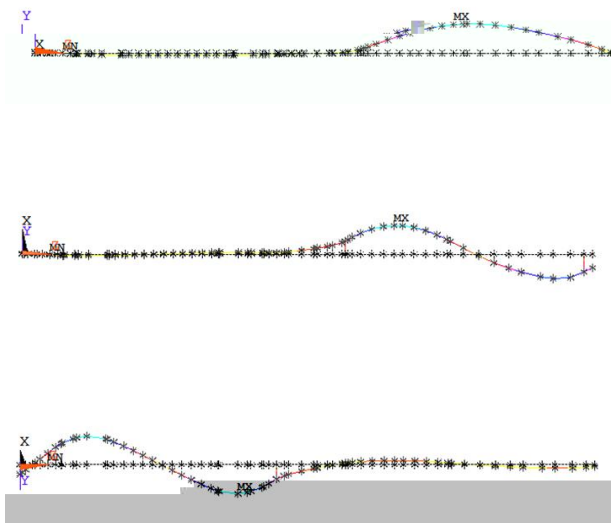
CAO Han QI Naibin YANG Peiping JIANG Fudong YANG Ling

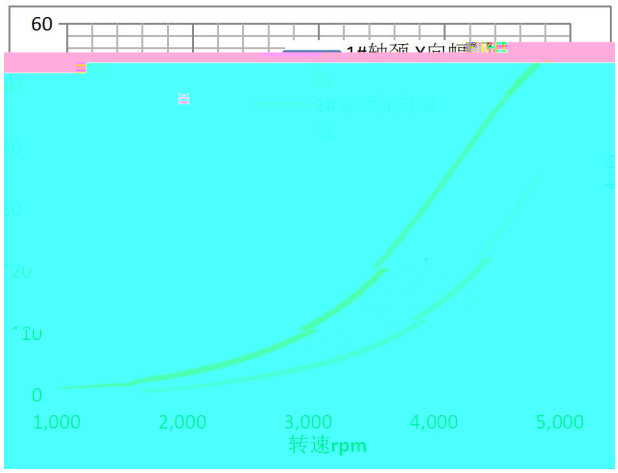
Abstract: This paper introduces the application of energy storage technology and the principle of air energy storage technology, and takes the shafting of salt cavern air energy storage turbine unit as the research object.Firstly,the shafting rotor is modeled,and then the finite element method is used to calculate the undamped critical speed,unbalance response and stability of the shafting in transverse bending.The natural frequencies of torsional vibration of the shafting system are calculated by using the transfer matrix method of continuous mass.The calculated results show that the surface turbine unit can meet the requirements of safe operation.

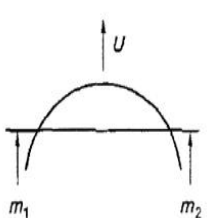
Key words:air energy storage; shafting; dynamic analysis

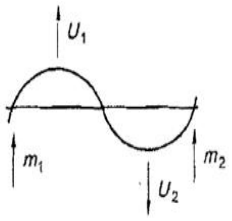

压缩机

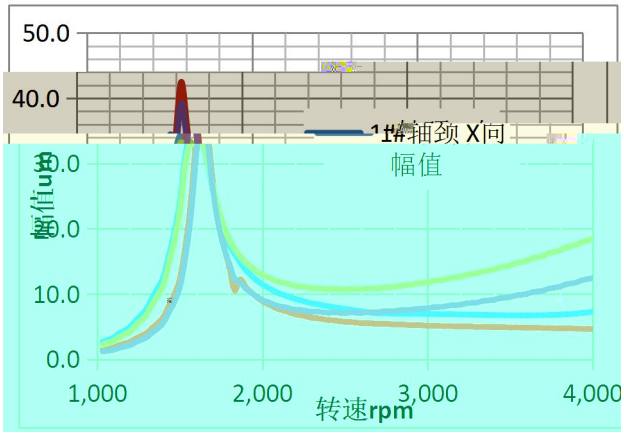


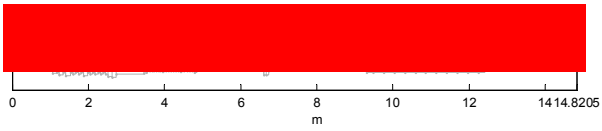



60
0
1,000
2,000
3,000
4,000
5,000
转速rpm


U
m1
m2


U1
m1
m2
U2


50.0
40.0
1#轴颈 X向
幅值
30.0
20.0
10.0
0.0
1,000
2,000
3,000
4,000
转速rpm



δ Q Q

δ

面向发电设备制造企业的车间数据采集与应用

Г نم ۏ Г نم ھئ لح ٧ Ö Φ ۏ ٨ ' 507///

TP2 A 1001-9006 2022 04-0030-05

Data Acquisition and Application for Power Generation Equipment Manufacturing

XIE Hongmei, YANG Tao, LIU Boxing

(Dongfang Electric Machinery Co., Ltd., 618000, Deyang, Sichuan, China)

Abstract: In order to reduce the operation cost of power generation equipment manufacturing enterprises, improve manufacturing efficiency, optimize energy utilization, realize production refinement and transparent management, carry out the research on the key technologies of data acquisition and interconnection in the core workshop, build a unified data acquisition and management platform, and successfully apply it to the real-time data-driven intelligent monitoring system. The data acquisition standards and specifications established in this paper provide a certain reference value for manufacturing enterprises to carry out equipment data acquisition, production process control and big data platform.

Key words: data acquisition; data Integration; monitoring system

“ 2025 ”

2022-04-02

1989

1996

1976

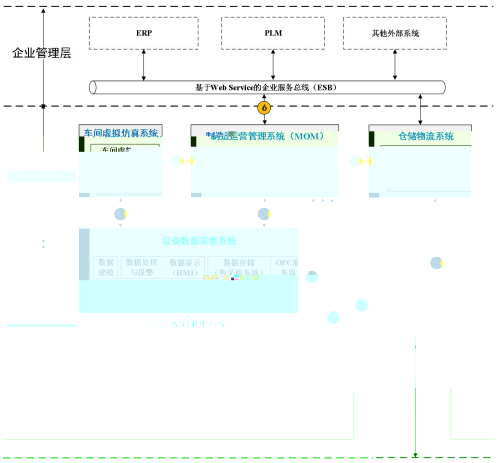
CAM

1

1

3

MOM


企业管理层
ERP
PLM
其他外部系统
基于Web Service的企业服务总线（ESB）
车间虚拟仿真系统
生产运营管理系统（MOM）
仓储物流系统
设备数据采集系统

1

2.2.1

SQL

MOM

6

2.3

2.3.1



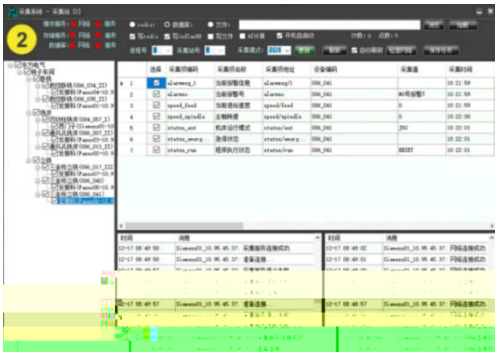
6

5

3

[4]

LOD



5

MOM

1

7

MOM



7

2.3.2

MOM

2



8

8

4

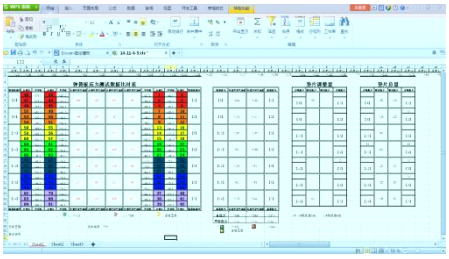
[1] , , , . Modbus/TCP FINS/TCP [J]. , 2017(1):88-91

[2] , , . MES [J]. , 2018, 40(2):219-223

[3] . [D]. , 2020

[4] , , . Modbus TCP DCS [J]. , 2021, 34(8):16-17+22

21



9

5 [illegible]

10



10

6

1 000 MW

50 MVar

618000

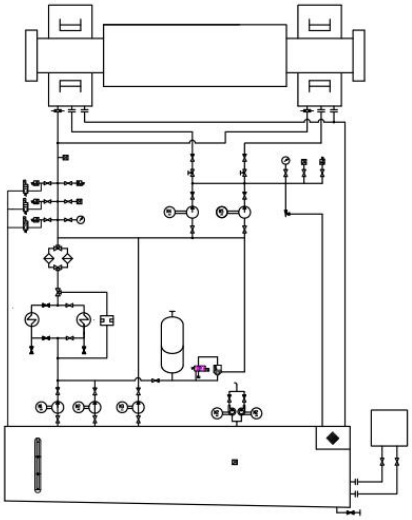
Selection and Oil Temperature Calibration for Lubricating Oil System of 50 MVar Synchronous Compensator

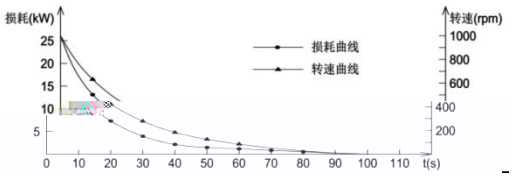
JIA Xiaoping, XIA Yuting XI Bo CHENG Jingpeng

Abstract According to the technical requirements of 50 MVar synchronous compensator, the main equipment is selected and the oil temperature is checked, which ensures the safe operation of the unit and makes the equipment have better economy and environmental adaptability.

Key words synchronous compensator; lubricating oil system; air cooler; loss

1




损耗(kW)
转速(rpm)
损耗曲线
转速曲线
25
20
15
10
5
1000
800
600
400
200
0
10
20
30
40
50
60
70
80
90
100
110
t(s)

P

	Q
	V
	T
	V
	ρ
	C

2

Design of 80 kW Permanent-magnet Synchronous Traction Motor

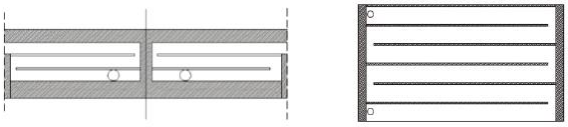
WU Haijun

Summary: Permanent magnet synchronous traction motor is widely used in the field of railway transmission system because of its advantages such as high power density, high power factor and strong overload capacity. In this paper, the main technology of 80 kW permanent magnet synchronous traction motor is analyzed and studied, the main parameters and structure of the motor are introduced, and the experimental verification is carried out at the same time. The test results show that the permanent magnet traction motor has excellent performance and can meet the requirements of user's technical specifications.

Key words: permanent magnet synchronous traction motor; rail transit; cooling structure; insulated bearing; test

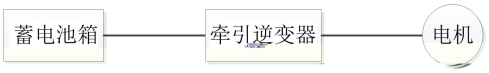
1 80 kW

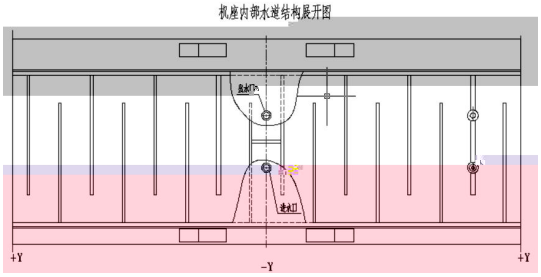
2

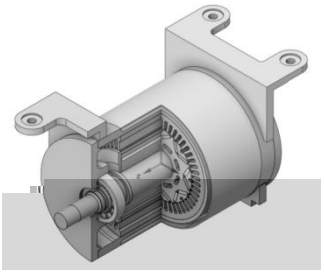




D





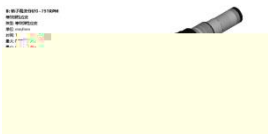


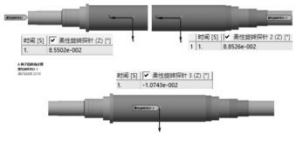
3 CAE

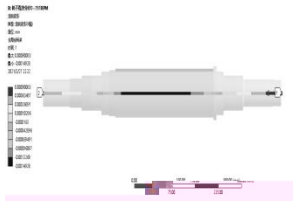


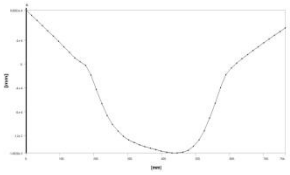


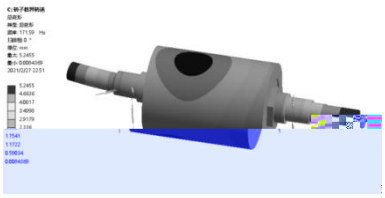


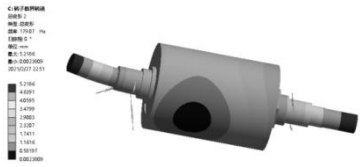


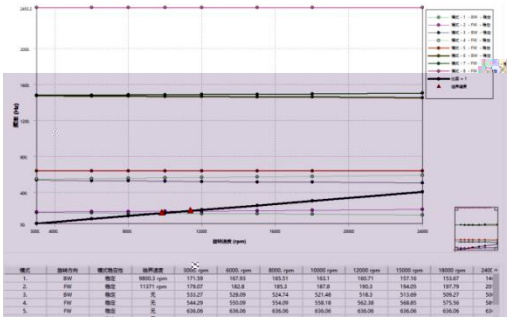


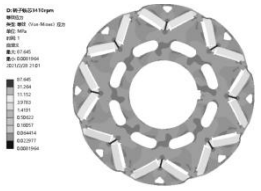


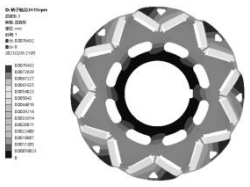


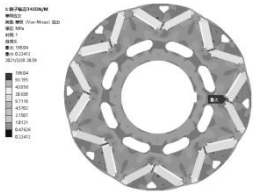


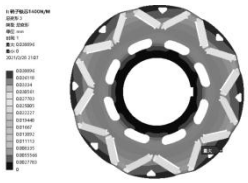


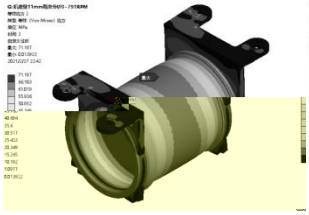


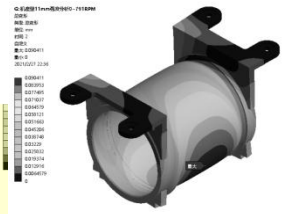












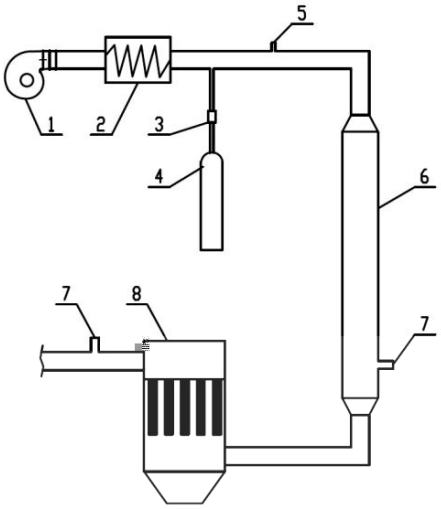
1. 643001 2. 611731
3. 455000

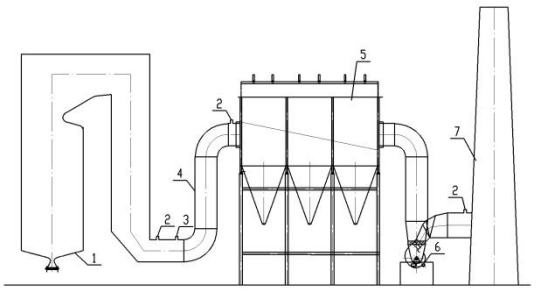
Engineering Application and Performance Study on Dry Desulfurization of Sodium Bicarbonate

DU Wentao WANG Weimin YIN Dengguo ZHUANG Yuanfa JIN Huang LI Lingjun CHEN Zhuo

Abstract: Flue gas desulfurization is usually used to reduce SO_2 emission in industrial enterprises. Dry desulfurization of sodium bicarbonate is a low-cost and high-efficiency system, which is more suitable for projects with small amount of flue gas and low SO_2 concentration in flue gas. In this paper, the engineering application for a 220 t/h Gas-fired Boiler in an Iron & Steel Group using dry desulfurization of sodium bicarbonate is introduced, and the test was carried out in the project. The test shows that how the factors of the system such as temperature, the stoichiometric ratio of sodium bicarbonate to sulfur (NSR) and bag filter affect the desulfurization efficiency. According to the results, in the range of 120~165 , the removal efficiency approached more than 98 % and the SO_2 emission concentration maintained less than 10 mg/Nm^3. During the test, the desulfurization efficiency became higher when the NSR got higher and when the desulfurization efficiency exceeded 95 %, the average NSR was 2.41. In long-term operation, the actual amount of desulfurizer (sodium bicarbonate) was 11.5 % more than the theoretical amount. The test also shows that the SO_2 removal efficiency of bag filter was equivalent or even higher than the desulfurization tower, which means bag filter is a promoter for deep removal of SO_2 in flue gas.

Key words: sodium bicarbonate; dry desulfurization; engineering application; desulfurization performance



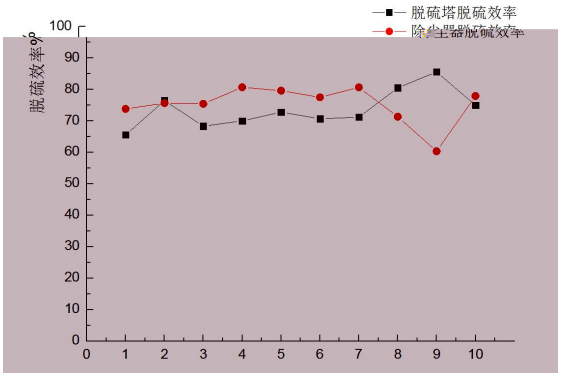


2

3

，

2 4 .


脱硫塔脱硫效率
除尘器脱硫效率
脱硫效率/%
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10

618000

4.23 010 100 02 220 00 40-5

Analysis and Application of Inclined Transportation Loading Scheme for Large Equipment

XU Tiejun

(. . . 1000 , , ,)

Abstract: In recent years, the emergence and application of inclined loading method for transportation of ultra wide and large parts has solved the transportation problems of large-scale key equipment in many projects, which is of great positive significance for the construction planning of engineering projects. However, from the actual situation, most of them are designed based on experience or simple estimation. Although they basically meet the use needs, there are also some problems. This paper summarizes this kind of loading mode from a theoretical point of view, analyzes the problems needing attention in the application of the scheme, and provides ideas for the equipment transportation that needs to adopt the inclined loading scheme in the future.

Key words:large cargo transportation; inclined loading; safety and stability; key links

02 20-1-1

1 5 020




1

1

2

. 2 1

$D_{0\ 0\ 0\ \ 0\ 20}$

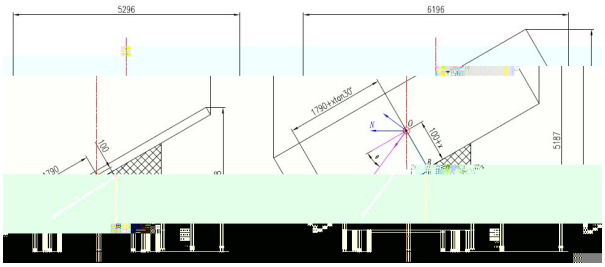
0 10

0 3

1 0 2

x

2



2

N

T

$T \quad \cdot N \cdot \ _{0\ 3}{}^{o}{}_{+}\ \theta \qquad \cdot N \cdot \ _{0\ 3}{}^{o} \quad \theta_{+\ 0\ 3}{}^{o}$

θ 1

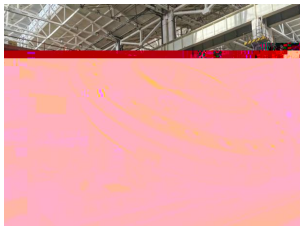
$\theta \ \frac{10 \quad + x}{} \qquad \theta \ \frac{1\ 0 \quad + x \quad 0\ 3}{}^{o}$

1

$T \ N_{(1\ \ 1\ 5\ x_{+}\ \ 1\ )}$

0 3

3





3

. 2 2

1

2

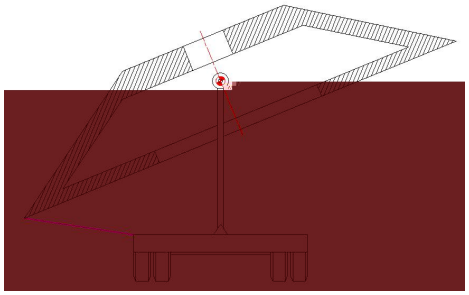
3

4

3

. 3 1

4

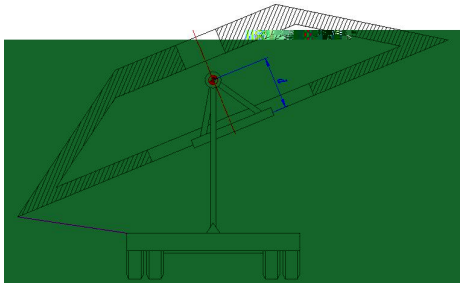


4

( )

. 3 2

5

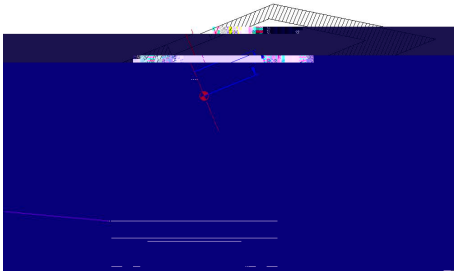


5

( )

. 3 3

d



5

d

. 3 4

3

01



. 3 1



(3 2)

. 3 4

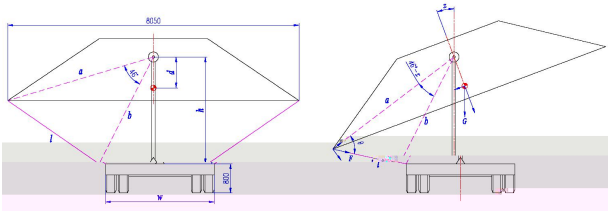
D . 0 5

G 010

x

a . 4 2 b . 3 3

d . 5 W 3



1

F

x

G $x \cdot d$ F $\theta \cdot a$

$$F \frac{G \quad x \cdot d}{a \quad \theta}$$ 2

$$l=\sqrt{a^2+b^2-2ab\cos(46^\circ - x)}$$

$$\sin\theta=\frac{b\sin(46^\circ - x)}{1}=\frac{b\sin(46^\circ - x)}{\sqrt{a^2+b^2-2ab\cos(46^\circ - x)}}$$

2

$$F=\frac{G\sin x\cdot d\cdot\sqrt{a^2+b^2-2ab\cos(46^\circ - x)}}{db\sin(46^\circ - x)}$$ 3

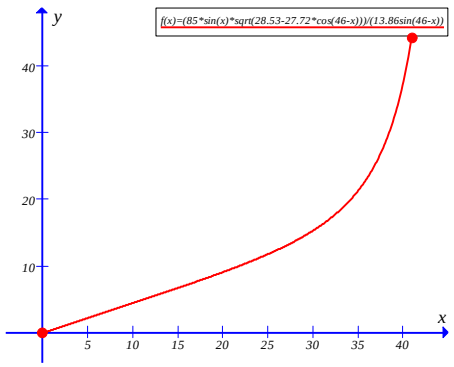
h b

b . 3 3 F x



4 1

0 $\leq x \leq$ 4 1



01

$F(x)$ 01. 1 1 (x 2 2)

$F(x)$ 1. 3 (x 3 4)

$F(x)$ 4 4 1 (x 04)

2 2 01

2

4

. 3 5

4 1 χ 4 1 3

$$F=\frac{85\sin 41^{\circ}\cdot\sqrt{4.2^2+b^2-2\times 4.2\times b\cos 5^{\circ}}}{4.2b\sin 5^{\circ}}$$

4 . 3 . 5 1

$$=\frac{55.76\sqrt{17.64+b^2-8.366b}}{0.366b}$$

h . 3 . 5 2

W 3

1

$$b=\sqrt{h^2+\left(\frac{W}{2}\right)^2}=\sqrt{h^2+1.5^2}=\sqrt{h^2+2.25}$$

4

$$F=152.35\sqrt{19.89+h^2-8.366\sqrt{h^2+2.25}}$$

2

F h

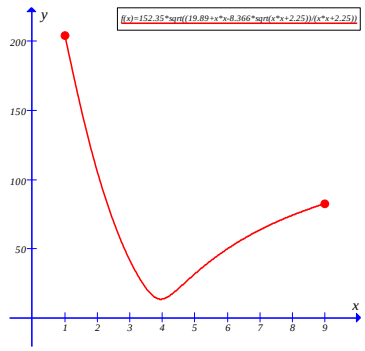
$$F(h)=152.35\sqrt{\frac{19.89+h^2-8.366\sqrt{h^2+2.25}}{h^2+2.25}}\ ,\ (1\leqslant h\leqslant 9)$$

h h

1

2

5 h 1



d

1 1

4 1 4 4

. 3 . 5 3

1

4

4 1

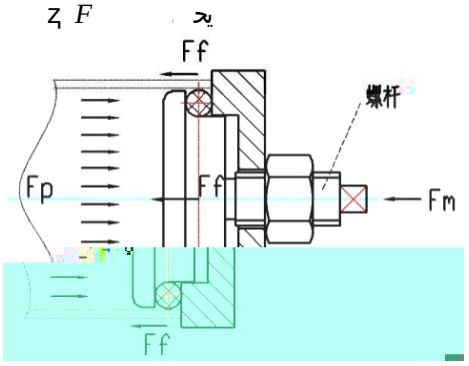
O

A Calculation Method for Sealing Strength of O-ring

ZHANG Bo, YAN Huan, JI Mindong, PAN Shaocheng

Abstract: In order to avoid internal corrosion, tanks such as boiler auxiliaries, chemical vessels, gasifiers, solar energy, hydrogen energy, etc. are required to be protected by nitrogen charging during transportation and storage, and the pipe orifices welded on site need to be sealed. Mechanical seal is generally required for nuclear power equipment. In this paper, a theoretical calculation and check method of the sealing strength of O-ring is proposed, and the theoretical

Key words: O-ring; Nitrogen filling protection; transportation and storage; low pressure and static pressure; calculation of sealing strength



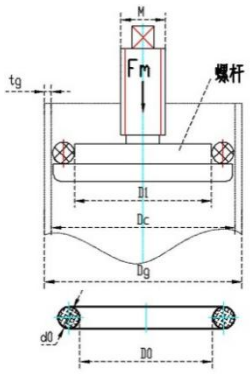
$$\varepsilon = \frac{d_0 - 2b}{d_0} \tag{3}$$

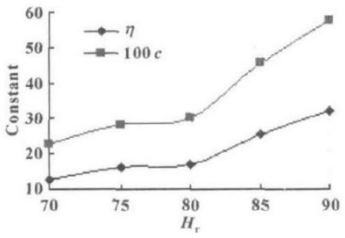
$$a = \frac{d_0 + D_1}{d_0 + D_0} \tag{4}$$

$$P_m = \eta\varepsilon + c \tag{5}$$

$$F_f > \frac{F_p \times s_0}{n_0} \tag{1}$$

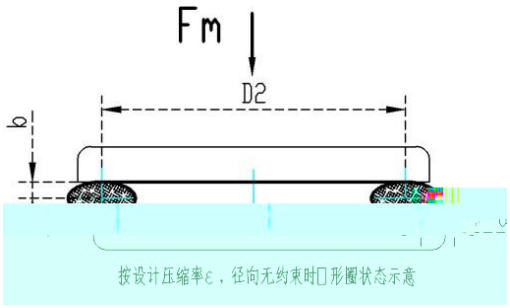
$$\sigma_R < [\sigma_\pi]$$

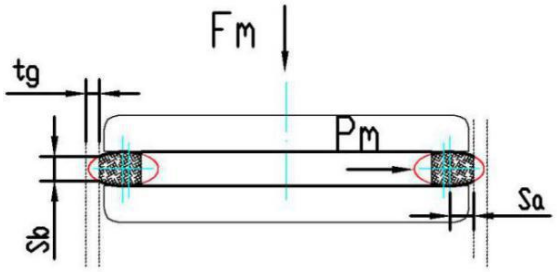


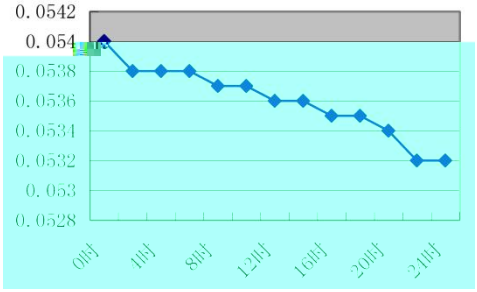


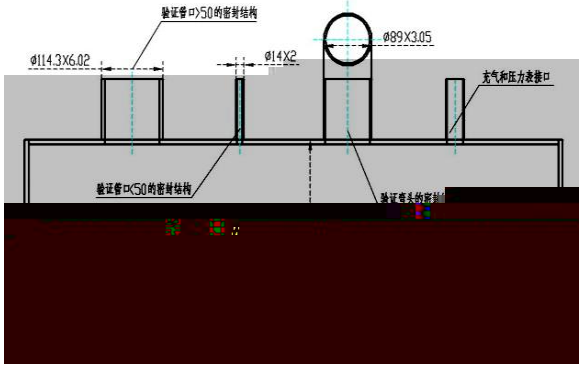
$$A_s = \pi \times D_c \times S_b \quad (6)$$

$$\sigma_R = \frac{F_M}{2\pi \times S_a \times (D_c - 2S_a) \times n_0} \quad (8)$$






0.0542
0.054
0.0538
0.0536
0.0534
0.0532
0.053
0.0528
0时
4时
8时
12时
16时
20时
24时


Ø114.3X6.02
Ø14X2
Ø89X3.05
充气和压力表接口

CFDC F D

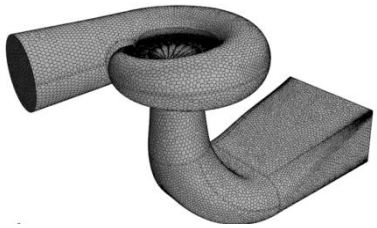
CFD Analysis of Full Flow Channel and Strength Calculation of Fluid Solid Coupling of Runner in ULOG Power Station

ZHANG Wenbin ZHU Huanlin

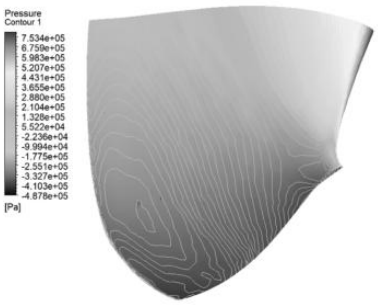
Abstract: In this paper, CFD analysis software is used to simulate the full channel of ULOG Hydropower Station under three operating conditions: maximum head, rated head and minimum head. Through the analysis, the pressure distribution, velocity distribution, blade torque and blade surface stress distribution of the full channel under three working conditions are obtained. Then, the fluid solid coupling calculation is carried out, and the stress distribution on the blade surface is loaded onto the blade surface of the runner to realize the stiffness and strength analysis of the runner. The results of full channel CFD analysis and runner stiffness and strength calculation show that under the three working conditions, the pressure and speed distribution of the channel are reasonable, the turbine output meets the design value of rated power, and the runner strength is sufficient to meet the safe and stable operation of ULOG Hydropower Station.

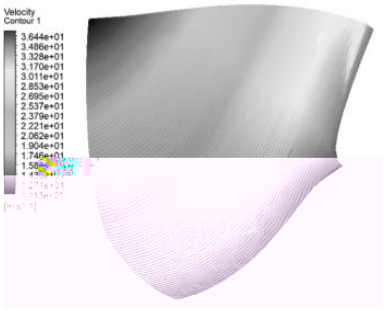
Key words: turbine; CFD analysis; output power; strength of the runner

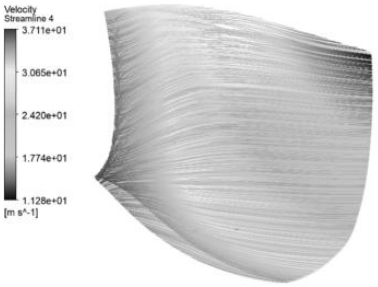
k ε

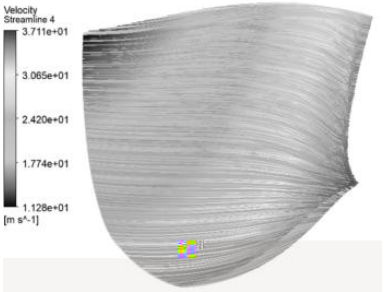


k ε



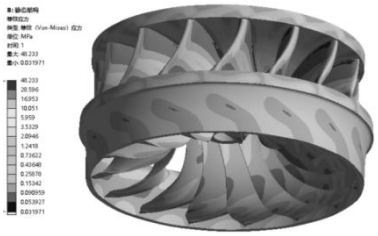


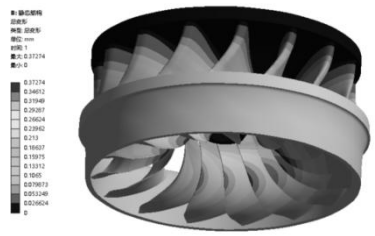




k ε

δ





1.1

TM31 A 1001-9006 2022 04-0062-02

Design of the Overturn Device for Nuclear Pressurizer

LI Ting, WANG Gang, LI Dongming, MA Qiongwei, FENG Hao

ˆ Dongfang (Guangzhou) Heavy Machinery Co., Ltd., 511455, Guangzhou, China˜

Abstract: Pressurizer is a large vertical equipment, which shall be erected when transported to nuclear plant site. This paper designs an overturn device to assistant erecting the pressurizer on site. A safety analysis and evaluation are performed for the most dangerous conditions, and an erect experiment is performed which simulates the whole process of the erecting operation under 1.1 times loads. The result shows that the overturn device designed is capable of bearing the erecting loads and assisting the erecting operation.

Key words: pressurizer; overturn device; loading test

ч 15 700 mm×3 900 mm×4 100 mm Â ۱ כ ï

˘ ۱ ŭ ˘ ∫ شي U ≠ Ғ

ĺ ↑ Â ۱ כ □ قمم ۹۹

ج AP1000 ĭ ۱ ز כ J قمم

↑ [2-3]ץ ₩ Ȝ ˜ ↑˘ ɜ ₩

۱ כ ۷ כ ĭ ¬ ĭ

Â ă AP1000 ŭ כ [4]ץ

ĺ ضي ۱ כ ˘

۱ כ ; Â ч Ḃ ɢ شي ƀ˘

ĺ Ь ´ ĭ ₩ ˘ ĺ

ˈl ĺ ĭ № w ’ ŭ

ĺ ₩ ŭ ˘ ⋮ ϶ شي Â

ĺ ىح 1 Â

۱ כ ; ˘

۷ כ ĭ ¬ ’ Ь

1 ۱ כ قمم ˘ شي U ɾ

∫ Â AP1000

شي ≠ 3˜ ۱ כ˘ ѽ

3˜ ۱ כ ضر ˘ ˈP ĭ Ţ 2˜

δ ƀ ч ˘ ɜ ₩˜ ʟ ¬ ʐ

ضي Ţ Â ≠ ˜

˘ ɢ ضي Ţ Ą

¬ ˘ ĭ ∫ ˜ ң ۱ ĭ

à ¬ ‖ Ɗ [1]ץ

ƀ 2 ˘ ƀ ŋ Ȝ

Â ىخ ч ۱ כ Ғ ĺ˘ ˜ شي

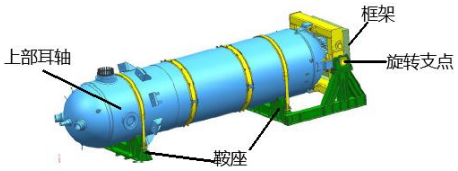
ƀ ŋ ė Â

۱ כ 127 Ư˜ ´ U

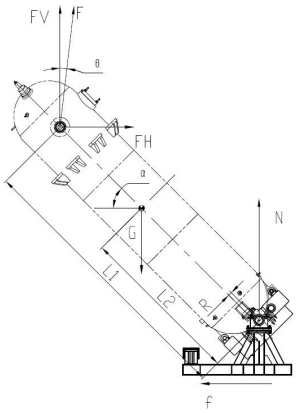
' 2021-05-31

ˆ 1983ʒ ˜˜ ˘ 2007 ʂ ɢ ۱ Ь Ғ ʒ˘ ˘ Â ض ƙ ˆ ˜ قمم כ

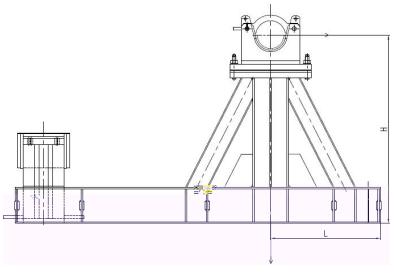
ˈE˜ ɦ ɾ ɦ ŋ ŭ ƀ Â



1



2



3

$$F_V = G\times\frac{L2\times\cos\alpha + R\times\sin\alpha}{L1\times\cos\alpha + R\times\sin\alpha} = G\times\frac{L2 + R\times\tan\alpha}{L1 + R\times\tan\alpha} \quad (2)$$

$$N = G - F_V = G\times\frac{L1-L2}{L1 + R\times\tan\alpha} \quad (3)$$

$$F_H = F_V\times\cot 5^\circ \quad (4)$$

$$M_H = F_H \cdot H \quad (5)$$

$$M_N = N \cdot L \quad (6)$$

618000

T-TIG

TG444 A 1001-9006 2022 04-0064-05

YU Xiongjun, SU Bin

Framatome-Dongfang Nuclear Pumps Co., Ltd., 618000, Deyang, Sichuan, China

1

1998

IHI Yamada Kobayashi [2-3]

[1]

2022-04-18

1982 2006

Ni 9%

2006

304

50 g/min

34.8 g/min 20

X 40°

15

[12-13] [14]

Marc

[15]

Fluent

[16-17] CFD FLUENT

[18]

FLUENT

[19]

[20-23]

2

[24] Cr-Mo

ER309L

ER347L

[25]

Q235

2.25Cr1Mo0.25V ER309l+ER347l

ضي

غج شخ

لشي قمم

تم

SA508.Gr3

309L+308L

2~3

2~3mm 0.5~1

3%~10%

PT

[38]

+

“ ”

RCC-M - -

TIG

[1] , . [M]. : , 2003

[2] Yamada. Development of high efficiency TIG welding method[J]. JWS, 1998, 63:24-27

[3] K. Kobayashi, M. Yamada Fujishima. Welding of 9% Ni steel LNG storage tank TIG welding method[J]. JWS, 1999, 65:302-303

[4] . [D]. , 2006

[5] , , . [J]. , 2007(2):21-24+114

[6] , , . [J]. , 2006, 28(1):34-36

[7] Leng Xuesong, Zhang Guangjun, Gao Hongming, et al. A study on twin tungsten TIG welding method 2006[J]. China Welding,

2006, 15(1):49-52
[8] . [D]. , 2008
[9] , , . [J]. , 2006(9):13-16+113
[10] , , . [J]. , 2019(6):120-121
[11] . [J]. , 2019(3):140-141
[12] ZHANG Guangjun, LENG Xuesong, WU Lin. Physics characteristic of coupling arc of twin tungsten TIG welding[J].Trans. Nonferrous Met. Soc. China., 2006, 16(4): 813-817
[13] , , . [J]. , 2008(8): 29-31+114
[14] . [D]. , 2007
[15] , , . [J]. , 2013, 43(12):89-93
[16] , , . [J]. , 2013, 62(22):228101
[17] , , . TIG - [J]. , 2015, 51(2):178-190
[18] , , Y Cressault . TIG [J]. , 2017, 47(7):1-5
[19] . [D]. , 2009
[20] , , . [J]. , 2018, 39(9):117-121+128+134
[21] , , . [J]. , 2019, 49(5):87-91
[22] , , . [J]. , 2019, 49(6):83-88
[23] , , . [J]. , 2018, 39(10):20-24+129-130
[24] , . [J]. , 2012(5):35-38
[25] , , . TIG [J]. , 2016(1):58-63
[26] , , . TIG [J]. , 2017(2):51-56
[27] , , . TIG [C]. 2018 : 758-763
[28] . [J]. , 2018(17):83
[29] , , . [J]. , 2020, 50(3):86-91+144
[30] , , . DeviceNet [J]. , 2020, 50(4):41-46+137
[31] , , . [J]. , 2019, 49(4):168-172
[32] , , . [J]. , 1999(4):49-54
[33] Stijn Lambrechts, Ronny Demuzere, . [R]. , , 2005
[34] , , . [J]. , 2008(2):61-63+66
[35] , , . [J]. , 2011, 31(11):93+ 96
[36] , , . [J]. , 2020, 37(1):74-78
[37] , , . [J]. , 2021(5):1-5+27

53

270 kN

2

;

TK11.4 A 1001-9006 2022 04-0069-05

Technical Analysis of PWR Nuclear Power Plant Steam Transfer System

QIN Shuli, DENG Ke, WANG Qiang

Dongfang Boiler Group Co.,Ltd., 611731,Chengdu, China

Abstract: By using the steam heat source of the secondary circuit of PWR nuclear power plant and the heat transfer of industrial water supply,the industrial steam can be obtained,and the application of industrial steam supply to the external of nuclear power plant can be realized.In the nuclear heating system,the steam conversion system is the core system to transfer heat energy from secondary circuit steam to water and steam.Its operation reliability and heat exchange performance have an important impact on the safety and efficiency of the whole system.In this paper,the system structure,working fluid flow design,system layout and the key equipment in detail of the steam conversion system are introduced systematically.

Key words: nuclear power plant unit; nuclear heating; steam conversion system; industrial steam

[1]

[2]

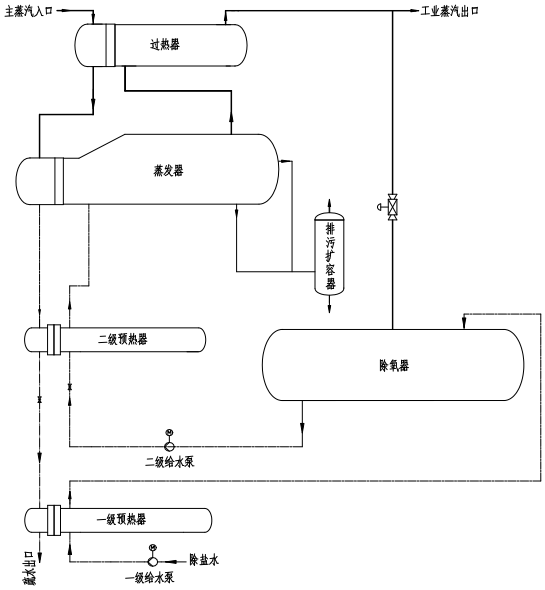
6.02 MPa

275.8

2022-07-15

1981—

1



1

1.1

1.2

50~60

1.3

1.4

1

1 1 1 1

1

1

2.1

108

120

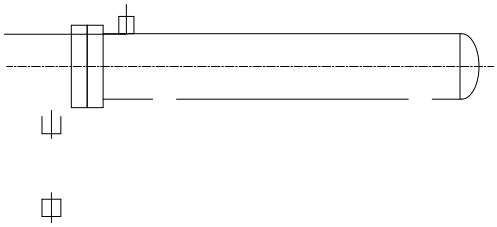
U

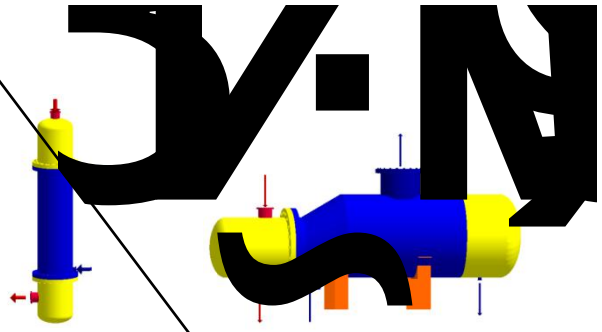
U

BFU [3] [4]

2.1.1 BFU

BFU





5 6

2.3.2 U

1

2

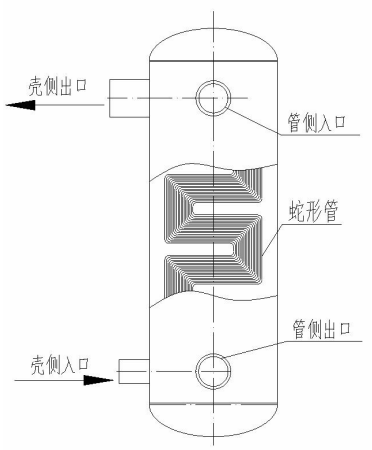
30 s

3

60 70

U U 8

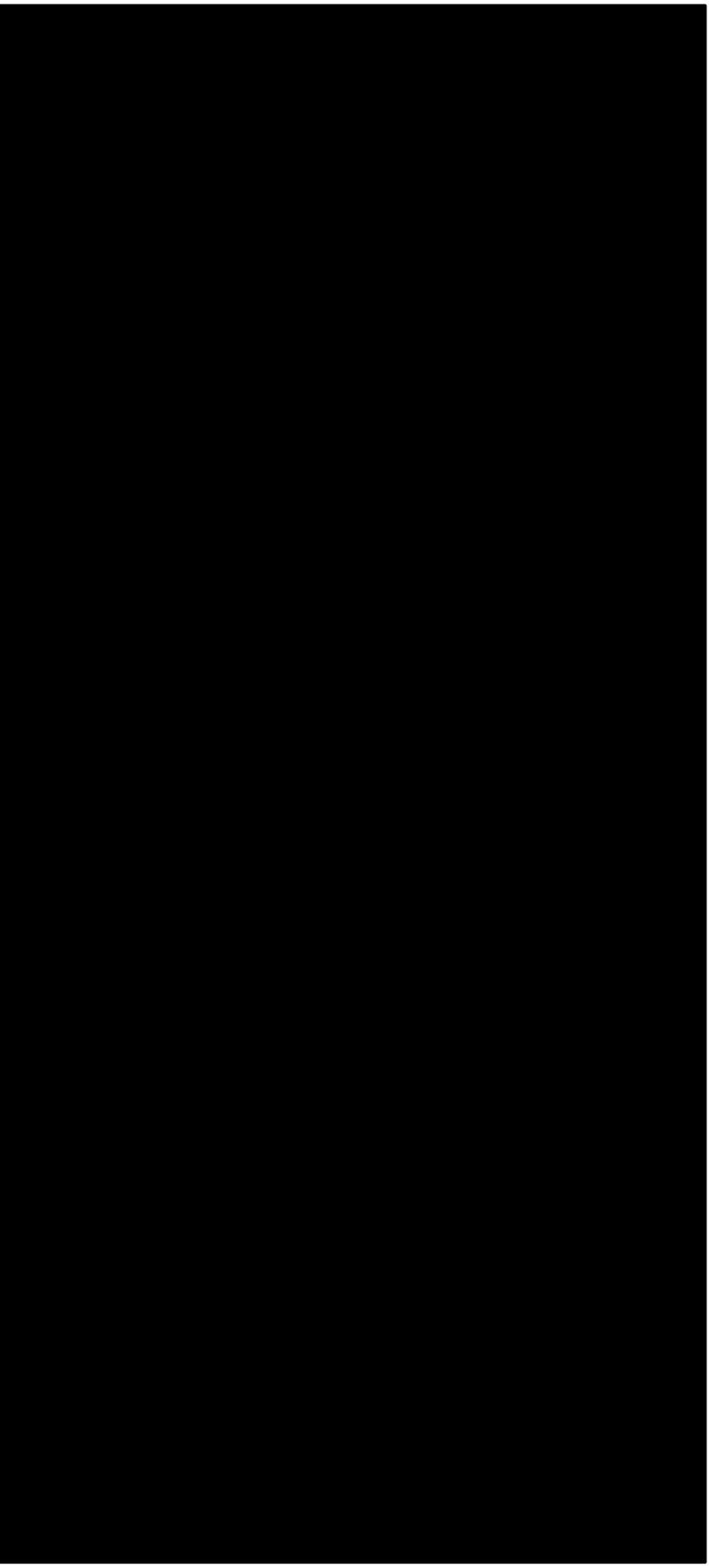
300 mm



7

U

/



1* 2 1 2 3

1. ( ) 610000 2. 618000

3. 350000

TM614 A 1001-9006 2022 04-0074-03

Experimental Research of A Electric Turning Gear for Wind Turbines Single-blade Hoisting

GUO Wang[1], *QIANG Xichen*[2], *WANG Qi*[1], *LIANG Chen*[2], *WANG Yuekun*[3]

(1.China Three Gorges Construction Engineering Corporation, 610000, Chengdu, China;

2. Dongfang Electric Wind Power Co., Ltd., 618000, Deyang, Sichuan, China;

3. Haixia Electricity Generation Fuzhou Co., Ltd, 350000, Fuzhou, China)

Abstract: This paper introduces the test plan and test conclusion of the direct drive unit using the electric turning device, and the control index of the device is verified by the test..

Key words: single blade hoisting; electrical turning gear; testing

5

1 360°

2

3

1

1.1

12 MW

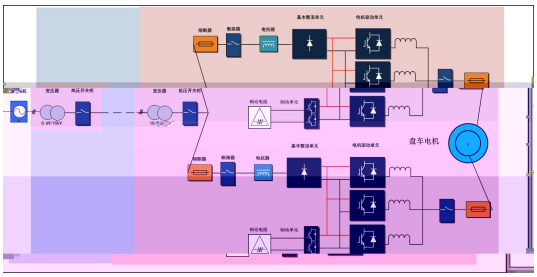
10 MW

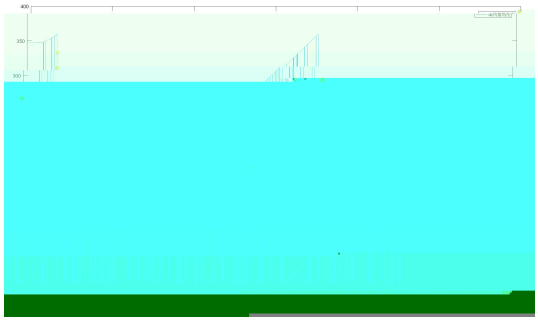
1

2022-09-26

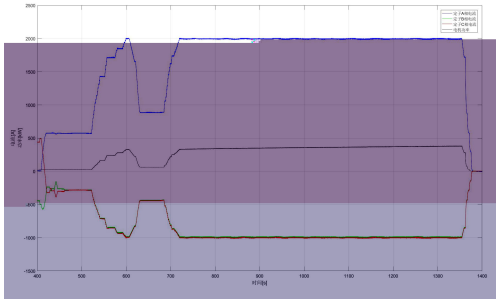
1993 2015

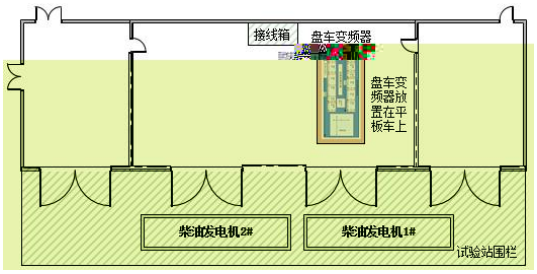
guo_wang@ctg.com.cn


盘车电机








接线箱
盘车变频器
盘车变频器放置在平板车上
柴油发电机2#
柴油发电机1#
试验站围栏

