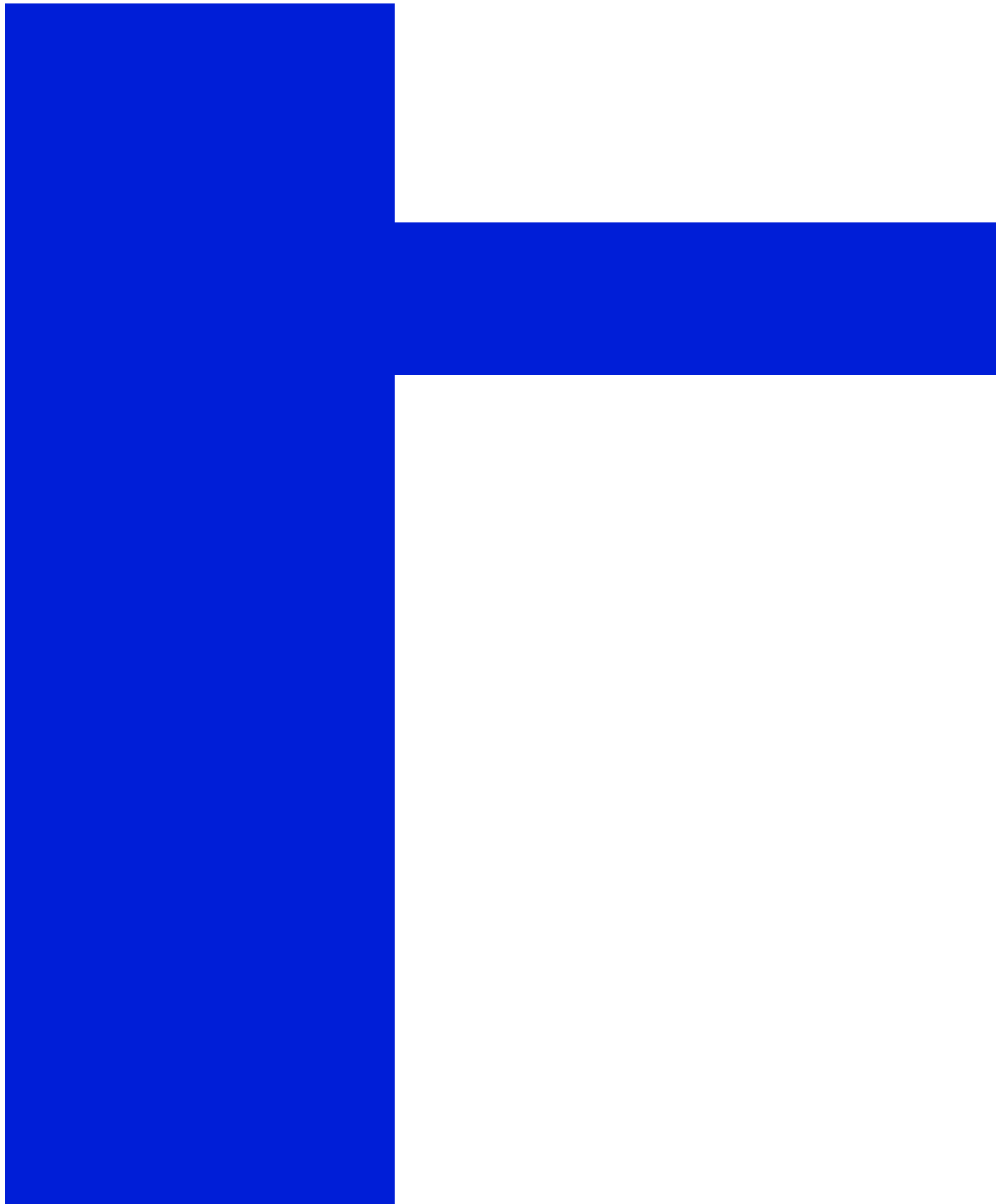
《万方数[illegible]数字化期刊群》全文收录



IDS

1 1 1 2 3 4 2 3

4

IDS

TP274 A 1001-9006 2022 01-0001-05

The Overview of Industrial Data Space (IDS) and Practice of the Testbench Deployment

ZHOU Honglin[1], *PU Xiaomin*[1], *LI Yong*[1], *ZHAO Zhihai*[2], *LI Rong*[3], *YANG Zhiwei*[4] *LIU Ying*[2] *PAN Yifan*[3]

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3. China Telecom Research Institute, 102200, Beijing, China;

4. Dongfang Electrical Machinery Co.,Ltd, 618000, Deyang, Sichuan, China)

Abstract: Under the background of the active development of industrial data space (IDS) research in major countries in the world, this paper first introduces the concept of industrial data space and four typical application scenarios. Based on the application and demand, this paper introduces the overall architecture of industrial data space, and then expounds the reference architecture model of industrial data space from the technical aspects of business, data and services, software and security. Finally, based on the scene of data model transmission in Dongfang Electric Corporation, a testbench is built to verify the feasibility of system deployment.

Key words: international data space (IDS); testbench; data asset; shared data; data sovereignty

36%

33%

80%

58%

2020 3

86%

2021-05-03

2020YFG0315

(1984) 5G

5G+

industrial data Space, IDS

[1]

1.1

OPC-UA

IT

1.2

GPS

1.3

1.4

IT

IDS

1

1

IDS IDS

IDS IDS

, IDS

IDS

IDS IDS

IDS

IDS

IDS

IDS

IDS ,

IDS

2

3.1

Data governance Collaborative data management Business model

3.2

e

EXIC

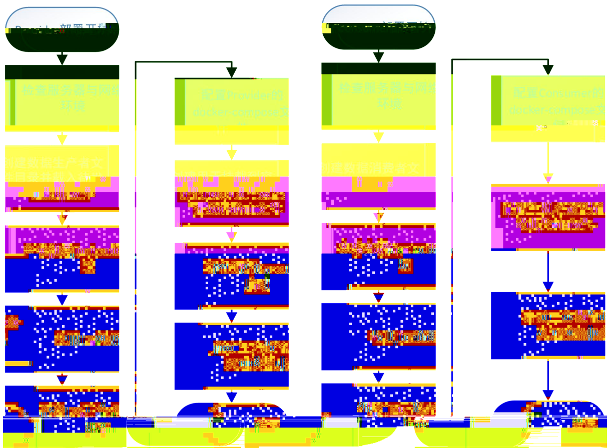
INIC

3.4

2

3

4



4

4.4

DECP1000

5

Trusted Connector consumer-core

5

6

provider-core

6

7

7

[1] . [J].
2020(6):52-54

[2] International Data Spaces Association. Reference Architecture Model[R/OL](2019-4) [2021-04-01].https://www.fraunhofer.de/en/research/lighthouse-projects-fraunhofer-initiatives/international-data-spaces.html

1,2 1,2* 1,2 1,2

- - 1.4~1.5 V
3 -
3
900 250 450

TM911.4 A 1001-9006 2022 01-0006-05

The Effect of Catalyst Supports on the Dynamic Durability of PEMFC Membrane Electrode Assembly

XIE Guangyou[1,2], *LI Ting*[1,2*], *YAO Minxuan*[1,2], *LIU Peng*[1,2]

(1. Dongfang Electric Fuel Cell Technology Co., Ltd., 611731, Chengdu, China;

2.Sichuan Key Laboratory of Long-life Fuel Cells, 611731, Chengdu, China)

Abstract: The start-up and shut-down (SU/SD) play an important role in the degradation of proton exchange membrane fuel cell (PEMFC) for automobile applications. During the SU/SD process, because of the coexist of H_2 and O_2 in the anode, the cathode reaches a high potentials 1.4~1.5 V and results in severe corrosion of the carbon support. In this paper, three types of cathode catalyst layers are manufactured with three catalysts based different carbon supports, and the EIS, ECSA and polarization curves are evaluated as the increasing of SUSD cycles. The result shows that the more stable the carbon support is, the better durability the catalyst layer shows. The catalyst layer based graphitized carbon runs 900 SUSD cycles, the catalyst layer based semi-crystalline carbon tolerates 450 SUSD cycles but the one based amorphous carbon only tolerates 250 SUSD cycles.

Key words: catalyst; carbon supports; membrane electrode assembly; start-up and shut-down cycles; durability

Proton-exchange membrane fuel cell PEMFC [1-3]

PEMFC

2021-06-23

2019ZDZX0002

1983 2011

1985 2010

liting@dongfang.com

PEMFC

[4-6]

PEMFC

30% [5,7-8]

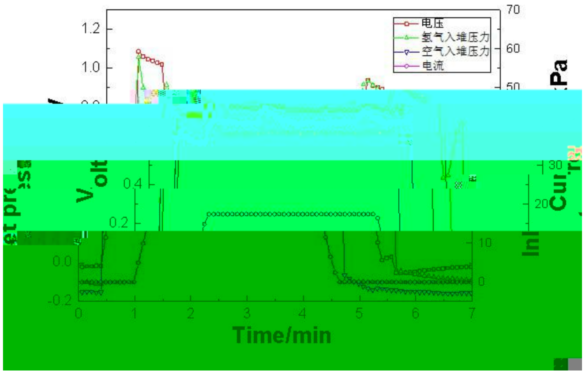
-

1.4~1.5 V

70 /

2.2/1.6 100%RH 100%RH

0 kPa 50



1

1.4

Gamery Reference 3000

70

0.1 slpm 0.2 slpm

100%RH 0 kPa 0~1.2

V 20 mV/s

1 *ECSA*

HC-CCM

SC ECSA GC-CCM

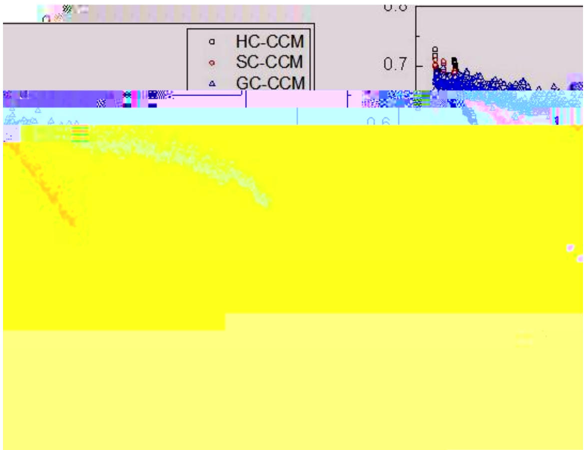
HC GC SC-CCM 1

ECSA

HC-CCM ECSA

GC-CCM 2 SC-CCM ECSA

GC-CCM 70% HC-CCM 15%



2 3 CCM

1 3 CCM 0.7 A/cm²

Sample		HC-CCM	SC-CCM	GC-CCM
ECSA Degradation Rate /%	50 cycles	-0.58	-1.31	+2.09
	150 cycles	-19.42	-5.40	-0.15
	250 cycles	-56.83	-13.28	-3.28
	350 cycles	——	-22.04	-2.09
	450 cycles	——	-63.36	-5.81
	550 cycles	——	——	-7.15
	750 cycles	——	——	-15.35
	950 cycles	——	——	-35.71

2.2

3

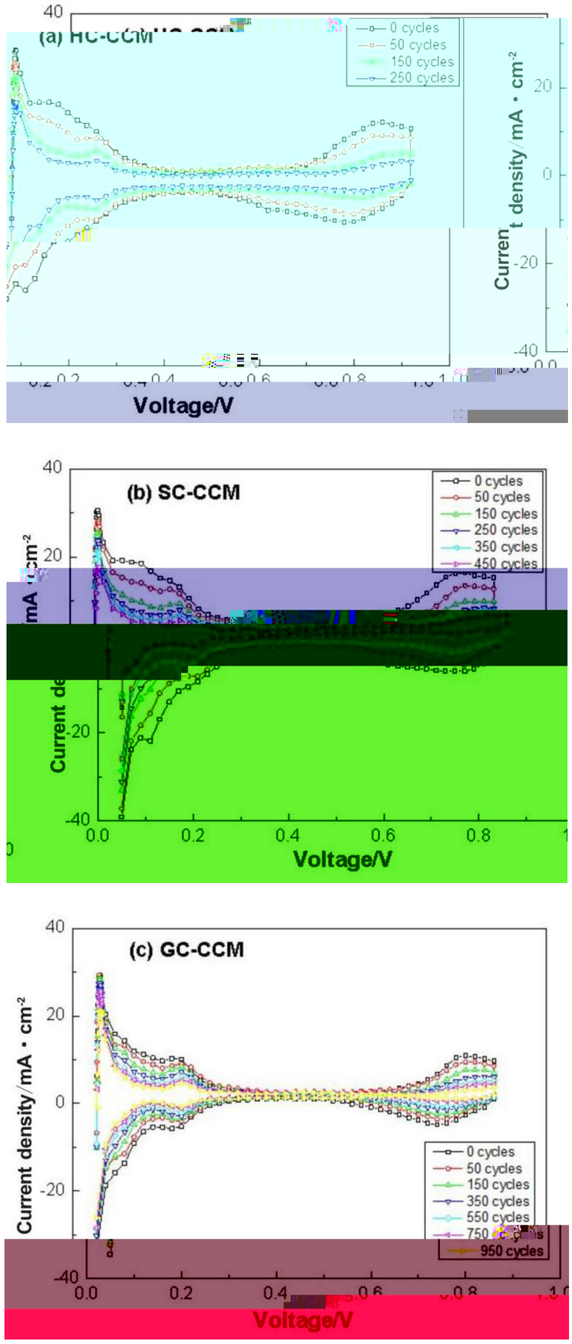
2.2.1

3

3

2

ECSA



3 CCM

2 3 CCM

Sample		HC-CCM	SC-CCM	GC-CCM
ECSA Degradation Rate /%	50 cycles	-26.03	-23.85	-12.83
	150 cycles	-52.74	-48.18	-23.21
	250 cycles	-64.86	-55.25	-32.53
	350 cycles	——	-64.39	-37.45
	450 cycles	——	-72.27	-43.80
	550 cycles	——	——	-47.40
	750 cycles	——	——	-56.63
	950 cycles	——	——	-66.09

2.2.2

4 HC-CCM

SC-CCM GC-CCM 3

HC-CCM 200

40% SC-CCM 400

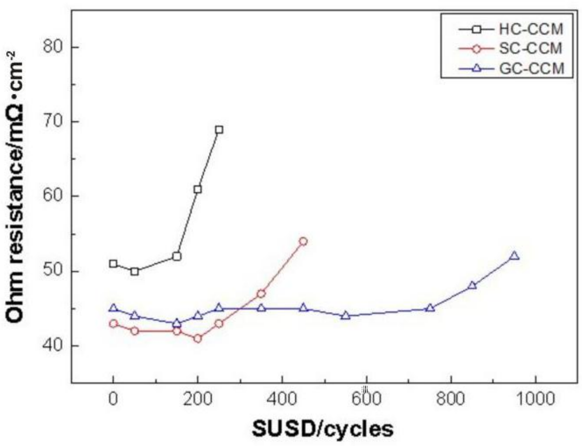
25% GC-CCM

800 15%

GC-CCM

HC-CCM SC-CCM 2.2.1

ECSA



4 3 CCM

2.3

SEM 5 SEM

3

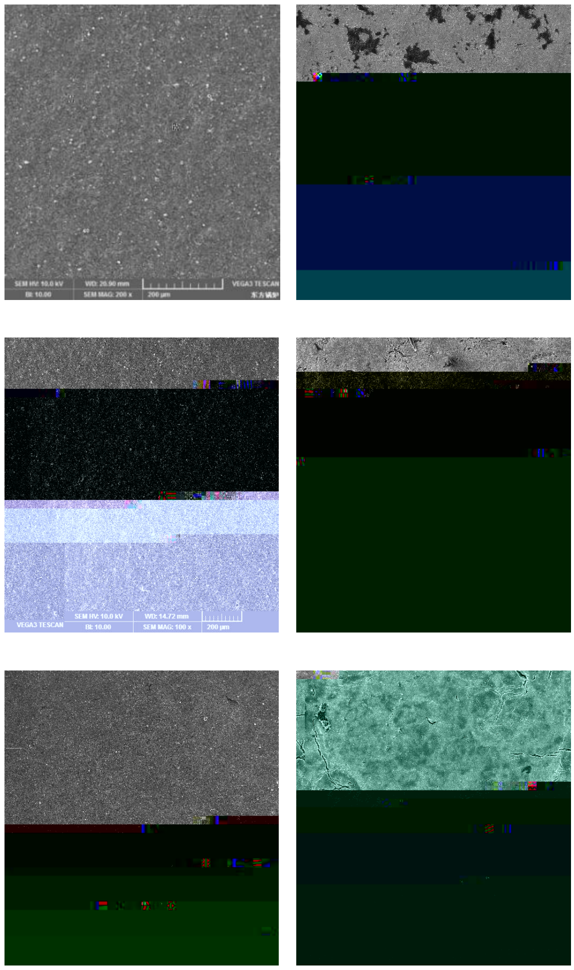
HC-CCM

250

SC-CCM 450

HC-CCM

GC-CCM 950



5 3

-

21

PID

PID

PID

Simulink PID PID

PID

PID PID Matlab

TM911 : A : 1001-9006（2022）01-0011-07

Application of Fuzzy PID Control in Hydrogen Fuel System

TANG Gang , LIAN Yong, YU Qi, ZHENG Xidong, PU Wei

Dongfang Electric Fuel Cell Technology Co., Ltd., 611731, Chengdu, China

Abstract: The application of hydrogen fuel cell in the field of new energy is increasing, and the corresponding control system has been widely studied. In order to improve the pressure control precision of hydrogen loop in hydrogen fuel cell system, a control strategy based on fuzzy PID in hydrogen loop is proposed in this paper . The control of hydrogen supply module in hydrogen

[1] 1973

J.J.Ostergoard

[2]

[3]

PID

PID PID

PID PID

P I D P

I D

P I D

PID

E Ec P I D

E Ec

E Ec

P I D

1.1

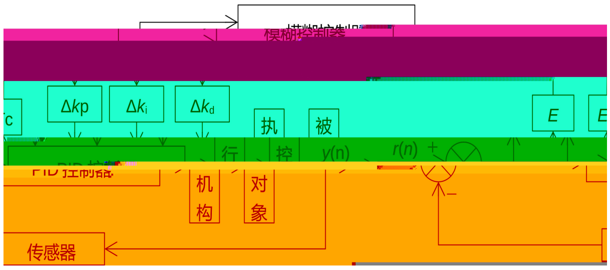
[4]

PC

PID E Ec

PID k_p k_i k_d PID

PID 1



1 PID

r E Ec

Δk_p Δk_i Δk_d

y E

Ec P I D E

Ec

E Ec P I D

1

[5]

7 {NB NM NS

ZO PS PM PB}

2

49

IF-THEN ELSE

ALSO OR

3

[6] [7]

[8]

1.2

1

E Ec E Ec

Δk_p Δk_i Δk_d

E

Ec E

Ec k_p k_i k_d

[9]

1 $|E|$ k_p

k_d

k_i 0

2 E Ec

$|E|$

k_p k_i k_d

$|E|$ k_p k_i k_d

3 E Ec

$|E|$

k_p k_i k_d

$|E|$ k_p k_i k_d

P I D PID k_p k_i k_d

PID

PID 49

IF E is NB and Ec is NB THEN Δk_p is PB and Δk_i is NB and Δk_d is PS;

IF E is NM and Ec is NB THEN Δk_p is PB and Δk_i is NB and Δk_d is PS;

IF E is NS and Ec is NB THEN Δk_p is PM and Δk_i is NB and Δk_d is ZO;

IF E is ZO and Ec is NB THEN Δk_p is PM and Δk_i is NM and Δk_d is ZO;

……

1 2 3 Δk_p Δk_i Δk_d

E Ec

2.1 PID

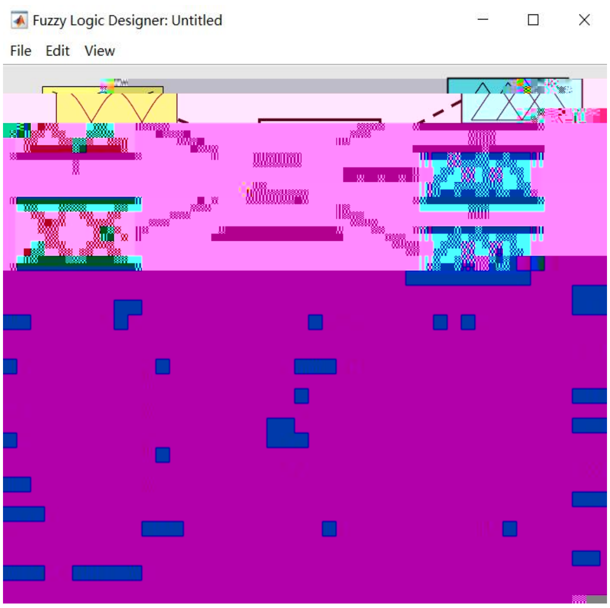
2.1.1

Matlab “fuzzy”

[10]

E Ec Δk_p Δk_i Δk_d

2



2

2.1.2

49

{NB NM NS ZO PS PM PB} [-6 6] NB PB

Matlab Member Function Edit

3

1 Δk_p

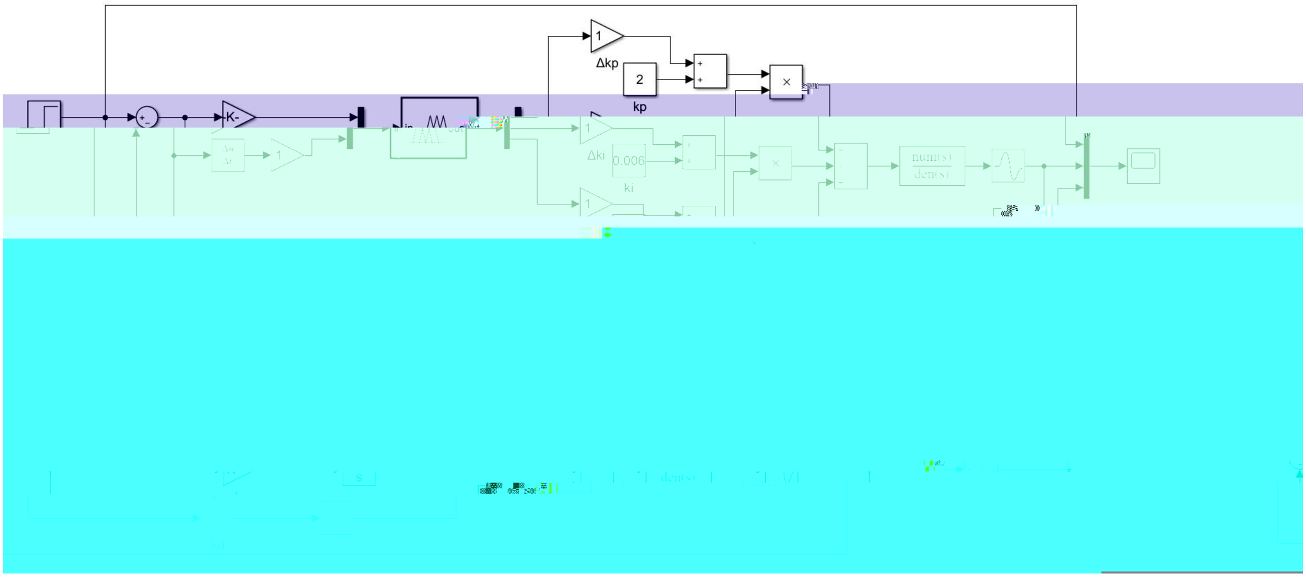
		Ec						
		NB	NM	NS	ZO	PS	PM	PB
	NB	PB	PB	PM	PM	PS	ZO	ZO
	NM	PB	PB	PM	PS	PS	ZO	NS
	NS	PM	PM	PM	PS	ZO	NS	NS
E	ZO	PM	PM	PS	ZO	NS	NM	NM
	PS	PS	PS	ZO	NS	NS	NM	NM
	PM	PS	ZO	NS	NM	NM	NM	NB
	PB	ZO	ZO	NM	NM	NM	NB	NB

2 Δk_i

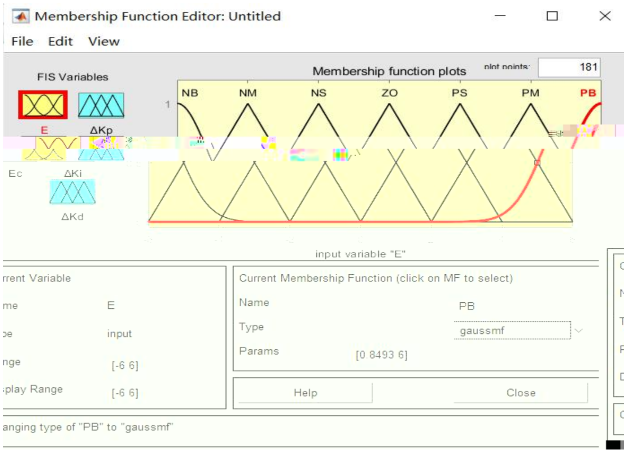
		*E*c						
		NB	NM	NS	ZO	PS	PM	PB
	NB	NB	NB	NM	NM	NS	ZO	ZO
	NM	NB	NB	NM	NS	NS	ZO	ZO
	NS	NB	NM	NS	NS	ZO	PS	PS
E	ZO	NM	NM	PS	ZO	PS	PM	PM
	PS	NM	NS	ZO	PS	PS	PM	PB
	PM	ZO	ZO	PS	PS	PM	PB	PB
	PB	ZO	ZO	PS	PM	PM	PB	PB

3 Δkd

		*E*c						
		NB	NM	NS	ZO	PS	PM	PB
	NB	PS	NS	NB	NB	NB	NM	PS
	NM	PS	NS	NB	NM	NM	NS	ZO
	NS	ZO	NS	NM	NM	NS	NS	ZO
E	ZO	ZO	NS	NS	NS	NS	NS	ZO
	PS	ZO	ZO	ZO	ZO	ZO	ZO	ZO
	PM	PB	NS	PS	PS	PS	PS	PB
	PB	PB	PM	PM	PM	PS	PS	PB



5 PID PID

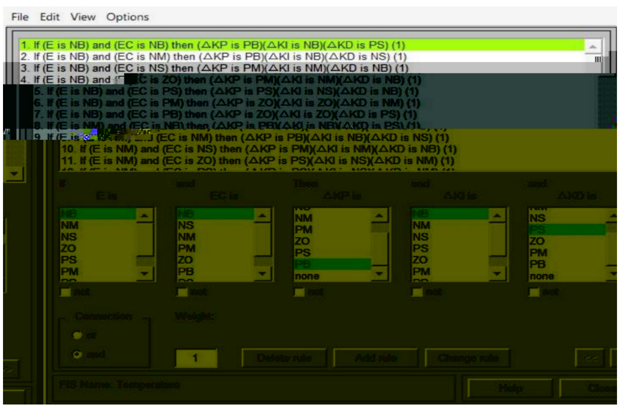


3

2.1.3

49

4



4

2.2

Simulink

Simulink 5 PID

PID k_p k_i k_d PID

Δk_p Δk_i Δk_d

k_p 2 k_i 0.06 k_d 1

$$G(s)=\frac{1.8}{318s+1}e^{-3s} \tag{1}$$

PID

PID PID

5

6

6

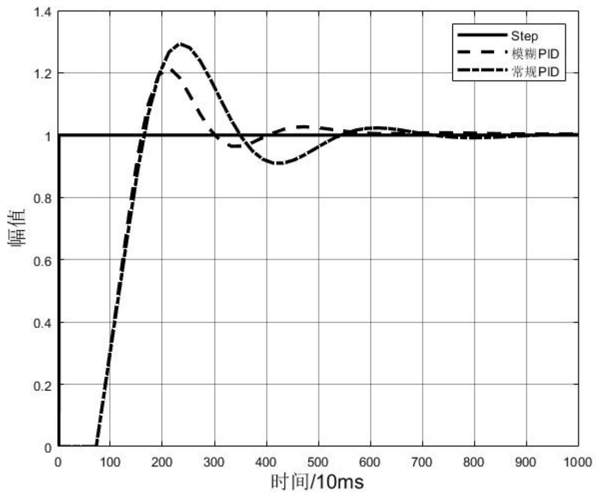
PID 20% PID 30% PID

PID 10%

PID

PID PID

PID



6 PID PID

3.1

35 MPa 0.8
MPa 1.5 MPa

PID

PID

PID PID

PID

3.2

PID

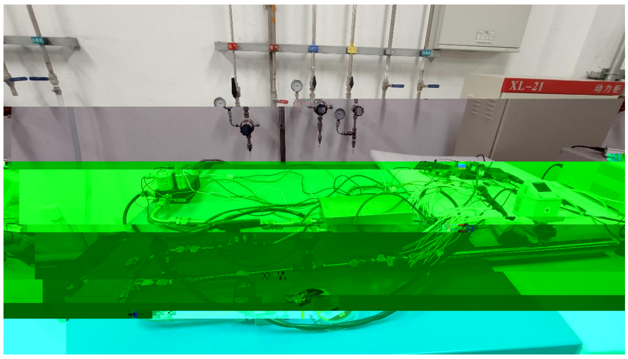
4

4

	1	
	1	
	2	
	1	24 V 5 V
	1	
	1	

7

PID PID



7

PID PID

0.5 V~4.5
V
CAN PC PC
LabVIEW
8
8 Æ — p ɑ

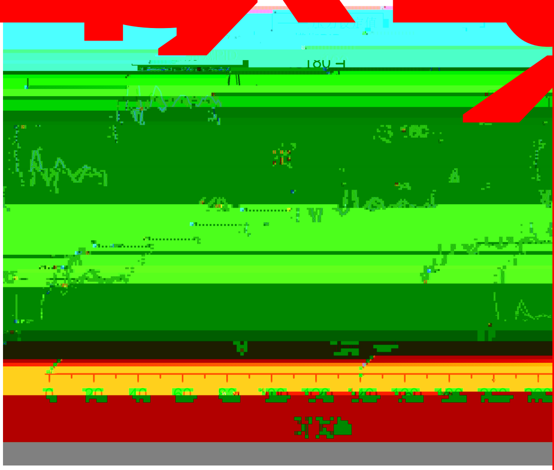


图8 PID PID

4

E

Ec PID

P I D

Matlab

PID PID

P ю

TK91 U473.8 A 1001-9006 2022 01-0018-04

Study on Optimal Ratio of Equal Mass Filling o 9

[1]

[3-5]

0.895 m^3 6 9
6 5.37 m^3 9
8.05 m^3
35 MPa
2
20 MPa
45 MPa
“
”
45 MPa
“
”
“ ” 20
MPa 45 MPa
45 MPa
“ ”
“ ”
9
“3:3:3” “2:3:4” “1:3:5”

2.1
1 7.5 MPa
5 kg 35 MPa
20 kg 0.87 m^3
15 kg

2 9
0.895 m^3 45 MPa

3

25 MPa
30 MPa
35 MPa
4 “ ”
Pcr 25 MPa
30 MPa
35 MPa

2.2

1

$PV=ZmRT$ 1

P- (Pa) V- (m^3) m- (kg) R- 4 214 J/ kg·K
T- (K) Z- $=1+\alpha P/T$
$\alpha=1.9155\times10^{-6}$ K/Pa

m_x- kg
m_y- kg
m_z- kg
m_u- kg
m_{cr}- kg n-
% P_0- Pa P_1-
Pa P_2-
Pa P_3- Pa
P_{cr}- Pa V_0-
m^3 V_1- m^3
V_2- m^3 V_3-
m^3 V_c- m^3
Z_1- Z_2-
Z_3- Z_c-
N-

m_c

$$m_c=P_cV_c/Z_cRT \quad (2)$$

$$=P_{cr}V_c/Z_{cr}RT$$

m_u

(3)

4 - 6

p

5 2 2

“ ”

“ ”

“

” “ ”

[1] , , . 35 MPa/70 MPa [J]. , 2020, 9(3): 702-706

[2] . 70 MPa [D]. , 2019

[3] , , . [J]. , 2020, 36(3): 97-101

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[5] . [R]. , 2019

10

microporous

[1] . — [M]. 2003

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東方電氣評論 2022.3.25 第36卷Vol.36总第141期
DONGFANG ELECTRIC REVIEW

TK172 TM623 A 1001-9006 2022 01-0022-04

Research on Heat Transfer Property of Stainless Steel Rolling Fin Tube

YANG Yang

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Abstract: In this paper, through the experimental study on heat transfer performance of stainless steel rolling fin tube, the relationship curve and formula of heat transfer coefficient are obtained, which effectively verifies the heat-transfer capability of stainless steel rolling fin tube.

Key words: stainless steel rolling fin tube; experimental study; effective verification; heat transfer capability

1.1

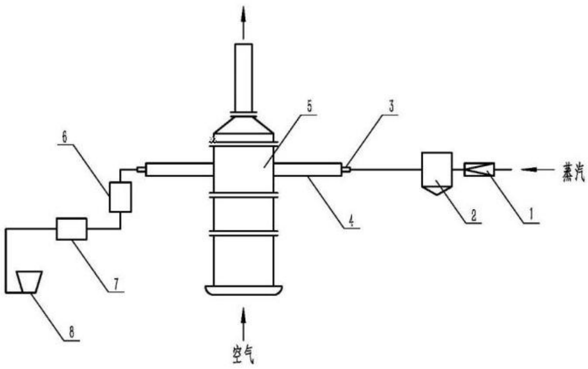
4

A1 A2 B1 B2

*D*25×2.5 mm *D*50.15 mm 2.3 mm 0.5 mm

*D*27 mm 300 mm

1.2



1- 2- 3- 4-
5- 6- 7- 8-

1

1

2021-10-18

1984 2008

110

2 kg/m^2.s~12 kg/m^2.s

±5%

15 min

2.1

K K

1

$\Phi_a = q_{ma} C_{pa} (t_{a2} - t_{al})$ (1)

q_{ma}: kg/s C_{pa}:

J/kg·K t_{a1}: t_{a2}:

2

$\Phi_s = q_{ms} (h_s - h_l)$ (2)

:

$$q_{ms} = \frac{\rho_1 V_1}{\tau}$$

q_{ms}: kg/s h_s:

J/kg h_l: J/kg ρ_l:

kg/m^3 V_l: m^3 τ:

s t_s: t_l:

A

kg·m^{-2}·s^{-1}

3

(3)

4

$$\Delta t_m = \frac{\left[(t_s - t_{a2}) - (t_l - t_{a1})\right]}{\ln\left[(t_s - t_{a2}) / (t_l - t_{a1})\right]} \quad (4)$$

K 5

$$K = \frac{\Phi_m}{A \Delta t_m} \quad (5)$$

A1 A2 B1 B2

K 1~ 4

±0.5

±1% ±0.5

0.5 ±1%

1 A1

	1	2	3	4	5	6
/	29.9	29.8	30.0	29.7	29.8	29.8
/	61.28	59.3	56.65	54.54	51.97	49.8
/ MPa	0.16	0.16	0.16	0.16	0.16	0.16
/	114.0	113.9	114.2	114.6	113.7	119.0
/	110.1	109.8	109.9	110.5	109.3	114.6
/kg·h^{-1}	1.461	1.595	1.712	1.852	1.949	2.301
/ W	901.5	984.2	1 056.4	1 142.8	1 202.6	1 419.8
/ kg·s^{-1}	0.029 6	0.034 2	0.041 5	0.047 2	0.056 6	0.070 3
/ kg·m^{-2}·s^{-1}	4.62	5.34	6.48	7.37	8.84	10.98
/ W	933.5	1 013.9	1 111.5	1 178.3	1 261.1	1 413.0
/ %	-3.43	-2.93	-4.96	-3.01	-4.64	0.48
/	65.5	66.49	68.11	69.92	70.24	76.74
/ w·m^{-2}·K^{-1}	598.6	642.1	680.1	709.3	749.5	788.8

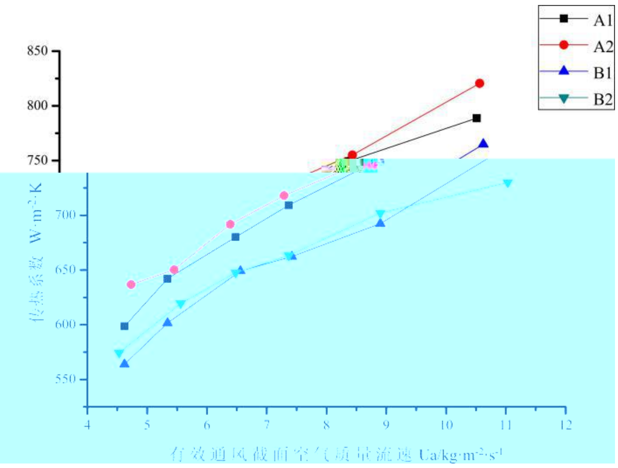
2

	1	2	3	4	5	6
/	29.3	29.5	29.2	29.0	28.9	28.7
/	61.78	59.1	56.95	54.37	51.23	48.52
/ MPa	0.16	0.16	0.16	0.16	0.16	0.16
/	113.9	113.7	114.6	113.7	114.1	113.8
/	110.1	109.6	110.4	109.6	109.8	109.3
/ $kg \cdot h^{-1}$	1.556	1.599	1.759	1.851	2.022	2.244
/ W	960.1	986.7	1 085.4	1 142.2	1 247.7	1 384.7
/ $kg \cdot s^{-1}$	0.030 3	0.034 9	0.040 9	0.046 7	0.057 0	0.070 6
/ $kg \cdot m^{-2} \cdot s^{-1}$	4.73	5.45	6.39	[illegible]	8.90	11.03
/ W	989.1	1 038.2	1 140.6	1 190.7	1 279.2	1 406.3
/ %	-2.92	-4.96	-4.84	-4.08	-2.46	-1.54
/	65.42	66.54	68.75	69.42	71.51	72.67

/ $w \cdot m^{-2} \cdot K^{-1}$

4 B2

	1	2	3	4	5	6
/	28.4	28.5	28.3	28.3	28.05	27.8
/	59.47	56.03	53.51	51.39	48.69	46.17
/ MPa	0.16	0.16	0.16	0.16	0.16	0.16
/	114.2	113.9	114.6	113.8	114.2	115.5
/	110.3	109.9	110.4	109.6	109.9	110.9
/ kg·h^{-1}	1.468	1.644	1.787	1.819	1.991	2.096
/ W	905.8	1 014.4	1 102.7	1 122.4	1 228.6	1 293.3
/ kg·s^{-1}	0.029	0.035 6	0.041 5	0.047 2	0.057 0	0.070 6
/ kg·m^{-2}·s^{-1}	4.53	5.56	6.48	7.37	8.90	11.03
/ W	905.5	985.0	1 051.4	1 095.3	1 182.4	1 303.4
/ %	0.03	2.99	4.87	2.48	3.91	-0.77
/	67.38	68.97	71.08	71.44	73.38	76.01
/ w·m^{-2}·K^{-1}	574.5	619.5	647.6	663.3	702.1	730.0



2 *K-U*

K-U A1 A2 B1 B2 6

	K-U		U=6 kg·m^{-2}·s^{-1} K
A1	K=375.8$U^{0.314}$	0.4%	659.6 W·m^{-2}·K
A2	K=394.0$U^{0.302}$	0.34%	676.9 W·m^{-2}·K
B1	K=344.8$U^{0.328}$	0.5%	620.6 W·m^{-2}·K
B2	K=389.2$U^{0.267}$	0.38%	628.0 W·m^{-2}·K

6

NB/T 47007-2010

7

$$\frac{1}{K^*}=\frac{1}{K}-\frac{\delta}{\lambda}+\frac{\delta}{\lambda^*} \qquad (7)$$

K^*

K:

λ^*

λ

Delta

delta
delta delta
/ delta 7 200
kW delta
delta

TM311 A 1001-9006 2022 01-0026-03

Application of Stator Delta Connection in Large Motor

FENG Deyang

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

Abstract Delta connection of stator is easy to produce the third harmonic circulating current in stator winding, increase the loss and cause heating. The classical theory of electrical machinery does not recommend delta connection in high-power motor. However, delta connection can effectively reduce the power supply voltage on the premise of keeping the motor phase voltage unchanged. Also, by changing the star / delta connection, the same motor can adapt to different voltage levels. It can be seen that delta connection still has application prospect in high-power motor. In this paper, taking 7 200 kW motor as an example, we demonstrates the focus of delta connection application, and proves its feasibility in high-power motor application through industrial application.

Key word: delta connection; third harmonic; circulating current

delta
delta
delta delta

Y/
Y delta

delta 7200kW

1.1

$E_{\varphi v}$

$$E_{\varphi v}=4.44 f_v N k_{wv} \Phi_v \quad (1)$$

f_v $f_v = v f_1$
v N

2021-05-03
1989 2014

k_{wv} v

v Φ_v

v

$$\Phi_v=\frac{2}{\pi}B_v\tau_v l \quad (2)$$

B_v v τ_v

v l/v l

delta Y

v $v\alpha$

1

Y

delta

delta

1 2

$I_{3\Delta}$

$$I_{3\Delta}=\frac{3E_{\phi 3}}{3Z_3} \quad (3)$$

$3E_{\varphi 3}$ delta

$3Z_3$

1.2

1.1 delta

delta

2.1

q

7 200 kW

1 500 mm

120 4

10

2.2

7 200 kW

4 5

5

2.3

delta

4 120/101 96/77

7 200 kW

FFT 120/101

0.57%

120/101

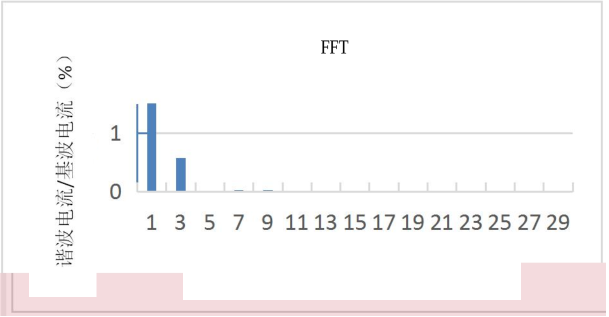
1

1 96/77

1.21%

96/77 2

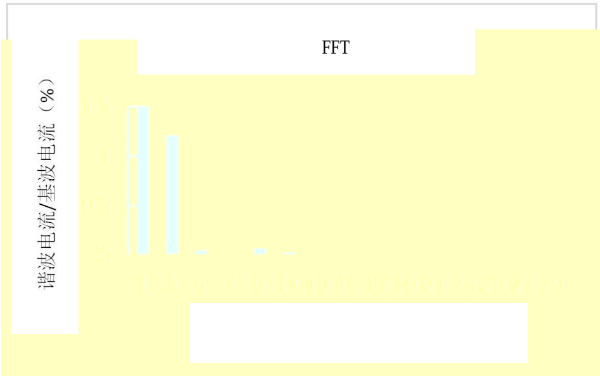
2



1 120/101

1 120/101

	A			A	
1	1 263.03	100.00%	11	0.09	0.01%
3	7.2	0.57%	13	0.05	0.00%
5	0.08	0.01%	15	0.05	0.00%
7	0.35	0.03%	27	0.17	0.01%
9	0.32	0.03%	29	0.13	0.01%



2 96/77

2 96/77

	A			A	
1	1 245.15	100.00%	11	0.34	0.03%
3	15.01	1.21%	13	0.07	0.01%
5	0.67	0.05%	15	0.12	0.01%
7	0.06	0.00%	27	0.15	0.01%
9	0.81	0.07%	29	0.14	0.01%

120/101

0.57%

120/101

0.57%

2.4

45

0.01 mm

7 200 kW

3

2018 12

5 400 kW

3

BPY7200-4	7 200 kW	3	4	2 900 V
33.52Hz	1 000 rpm	delta	S1	

1,2 1,2 1,2 1,2 2

Waters

TQ055.8 A 1001-9006 2022 01-0029-05

Discussion about Design of Nonstandard Flange Connection

LIU Weidong[1,2], *JI Mindong*[1,2], *FU Tao*[1,2], *ZHANG Yonglu*[1,2], *ZHANG Qiangqiang*[2]

1. Clean Combustion and Flue Gas Purification Key Laboratory of Sichuan Province, 611731,Chengdu ,China;

2. Dongfang Boiler Group Co., Ltd., 643001, Zigong,Sichuan,China

Abstract: Based on large pressure vessel with nonstandard flange connection of one project, local sealing failure occurs during hydro-static test twice. Firstly check and verify strength and stiffness of structure as per standard and code whose result meet the requirement. Then according to the basic principle and method of flange design, analyze the probable reasons and preclude, the conclusion is that flange sealing design is unreasonable. To achieve economical solution, utilize the Waters method, theory of circular plate and numerical simulation to analyze and calculate based on mechanism of sealing failure and the flange structure is changed slightly to solve the problem. This method can be utilized to verify sealing design in conjunction with flange design method during nonstandard flange design

Key words: nonstandard; structure of flange connection; sealing design; discussion

GB/T 150.3 Waters

[1]

D_G D_G

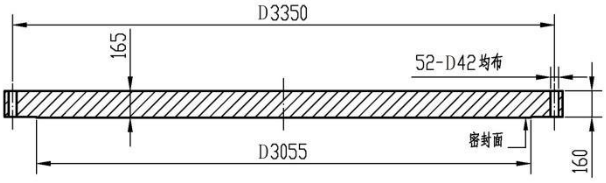
2021-04-12

1984 2006

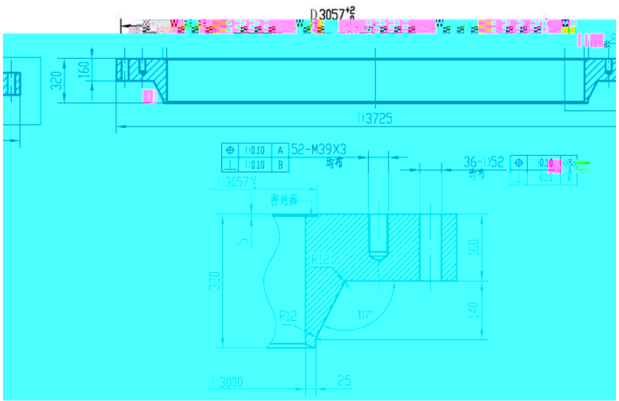
GB/T150.3

1.1

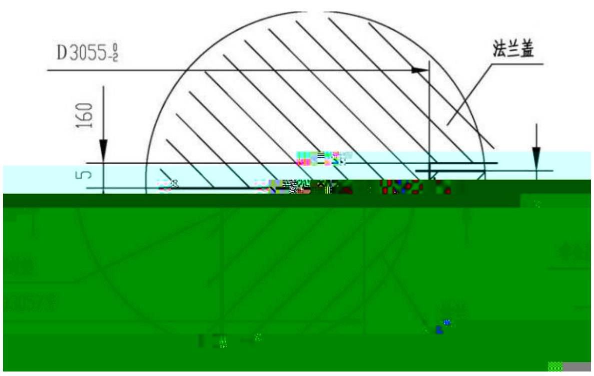
165 mm 160 mm 1
D3000 160 mm 2
D3350 M39 52
δ3 D3055/ D3005
3
1 1.13 MPa



1



2



3

1

		(MPa)
	SA-965 F316	130.41
	SA-965 F316	130.41
	SA-193 B7	172
	304+	m=2 y=22.8MPa

1.2

NB/T 47024-2012
DN3000 D3055/D3005 PN
0.25 MPa 1.15 MPa

HG/T 20592-2009
DN2000 PN1.6 MPa
D2230 NB/T 47024-2012 DN2000
PN1.6 MPa D2089/D2029
70.5 mm,
b_0=15 mm
GB/T150-2011
D_G= $-2b=2\,089-2\times2.53\times\sqrt{15}$
=2 069.4 mm D_G 80.3 mm
b_0=12.5 mm
$D_G=3\,055-2\times2.53\times\sqrt{\quad}$ <

[2]

Waters

1

[3]

$$Q=\frac{9.8\quad h^3\quad p}{13.9\quad \log_{10}(r2/r1)}\times 10^5\quad cm^3/s \qquad 1$$

h- cm

p- MPa r_1- cm

r_2- cm *η*- Pa·s

1 *p* ,*η*

r_2/r_1 1 *h*

2 *m* *y*

$/4\times D_G^2 p_c$

$2\pi D_G bmp$

3 *m* *y*

$2\pi D_G bmp$

4

D_G

D_G

1.2

3.1

3.2 m y

0.9

K 0.24

K 0.13

4*y* $F=2\pi D_G bmp$

3.3 D_G

MFM

“ ” [4] GB 150-1989

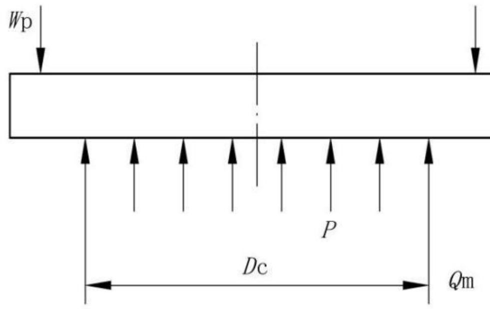
$D_C=2R_C$, h_G,

p W_p 4

1 p

2 W_p

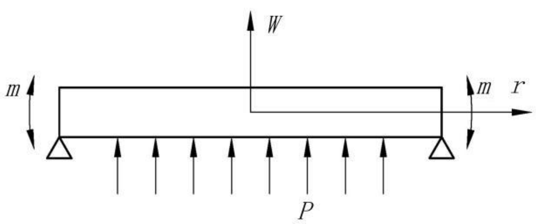
3 Q_m



4

Q_m

5 m



5

2

$$w=\frac{p(R^2-r^2)}{64D}\left(\frac{5+\mu}{1+\mu}R^2-r^2\right)+\frac{m}{2(1+\mu)D}(R^2-r^2) \quad (2)$$

p- MPa R-

mm r- mm

D- $D=\frac{E\delta^3}{12(1-\mu^3)}$ δ-

mm E- μ— m-

$$m=\frac{M}{D_c}$$

4.1

Waters

Waters

8 567 754 N m 143 678 N·mm, 1.13 MPa 2

D_G 1.35 mm

3.5 mm 42%

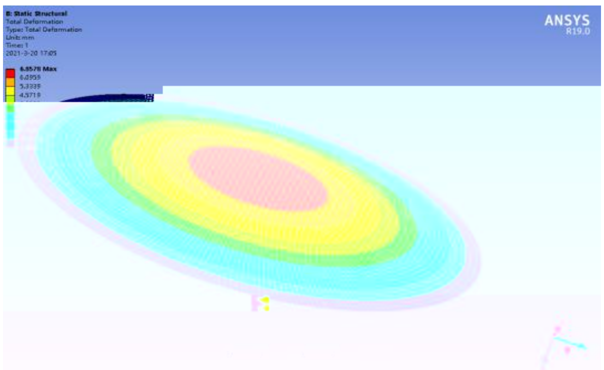
12% 3.5×0.42×0.12=0.176 mm 2

4.2

6

7

6



7

1.245 mm

7% 0.176

mm

D_G

1

2

2

2

2

3 D_G

5

mm D3250/D3300 b

2

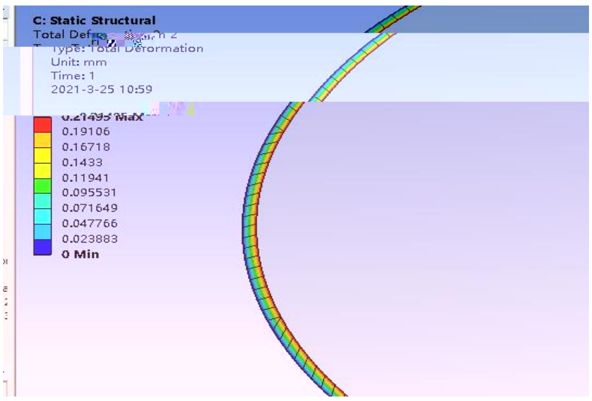
0.235 mm

9 972 196 N m 32 884 N·mm

0.214 mm 8

5×0.42×0.12=0.252mm

3



8

1

D_G

Waters

2

3

4

[1] .

[J]. 2013(10): 1468-1471

[2] . [J].

2014 35(2): 57-61+8

[3] . [J].

, 2008 29(2), 63-66+24

[4] GB150-89 [S]

[5] . WATERS [J].

2014 35(2):1-2+5

R317
A307 12Cr1MoVG 1Cr20Ni14Si2

TG44 TM621.2 A 1001-9006 2022 01-0034-05

Study on Welding Technology of Dissimilar Steel for Pressure Bearing Pipe and Nnon Pressure Annex of Boiler

LI Wenhui, YIN Runbang, ZENG Hui, ZENG Huiqiang, PAN Yi

Dongfang Boiler Group Co., Ltd., 643001, Zigong,Sichuan,China

Abstract: In this test, the welding of pearlitic steel pressure parts and austenitic steel non pressure parts in boiler superheater and reheater components was studied. The joints of pearlitic steel (12Cr1MoVG) and iron-based austenitic stainless steel (1Cr20Ni14Si2) were welded with R317 electrode and A307 electrode respectively, and the microstructure and microhardness of the fusion zone formed by welding were studied and analyzed. It is concluded that the selection of pearlitic steel welding materials for dissimilar steel welds of pearlitic steel pressure parts + iron-based austenitic stainless steel non pressure parts is more conducive to ensure the safety of product operation.

Key word: pearlitic steel; austenitic steel; dissimilar steel; fusion zone; microstructure

12Cr1MoVG 15CrMoG
1Cr20Ni14Si2 1Cr18Ni9Ti

[1]

1.1

12Cr1MoVG *D*51×8
1Cr20Ni14Si2 δ6
1 2

2021-11-05

1968 1987

1 Wt%

	C	Si	Mn	Cr	Mo	V	Ni
12Cr1MoVG	0.12~0.15	0.20~0.25	0.60~0.70	1.0~1.2	0.28~0.30	0.20~0.25	/
1Cr20Ni14Si2	0.12~0.15	2.2~2.4	1.0~1.2	21.0~21.6	/	/	13.0~13.2

2 Wt%

	C	Si	Mn	P	S	Cr	Mo	V	Ni	Cu
R317	0.05-0.12	≤0.60	≤0.90	≤0.035	≤0.035	0.80~1.50	0.40~0.65	0.10~0.35		
A307	≤0.15	≤0.90	0.5~2.5	≤0.040	≤0.030	22.0~25.0	≤0.75		12.0~14.0	

1.2

1.2.1

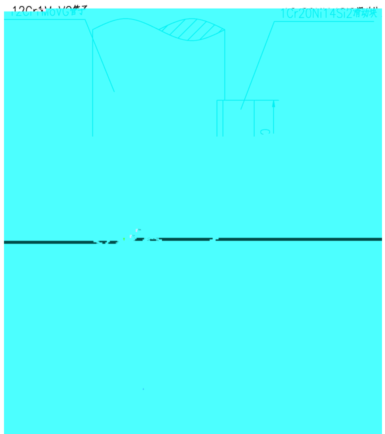
12Cr1MoVG 1Cr20Ni14Si2

1

A B C D, A B R317

C D A307

, 3



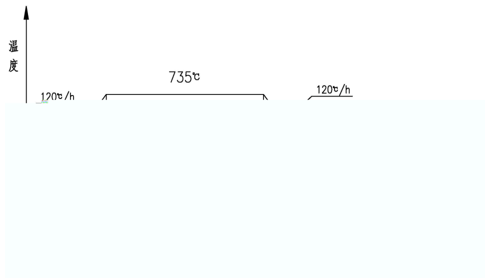
1

3

			(A)	(V)	(mm/s)
A	12Cr1MoVG+ 1Cr20Ni14Si2	R317, φ3.2	120~125	22	2.4~2.6 1.6~2.1
B	12Cr1MoVG+ 1Cr20Ni14Si2	R317, φ3.2	120~125	22	2.4~2.6 1.6~2.1
C	12Cr1MoVG+ 1Cr20Ni14Si2	A307, φ3.2	90~100	22	2.4~2.6 1.6~2.1
D	12Cr1MoVG+ 1Cr20Ni14Si2	A307, φ3.2	90~100	22	2.4~2.6 1.6~2.1

1.2.2

2



2

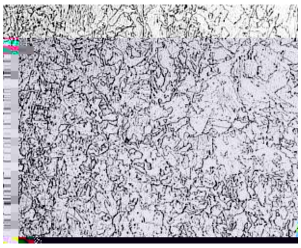
2.1

2.1.1

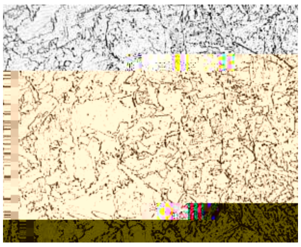
A B C D

3~ 6

R317 A307



3 A



4 B

4

	12Cr1MoVG HV(0.2/10S) c	a	HV(0.2/10S) b	1Cr20Ni14Si2 c
A	/	350~360	260~290	260~290
B	/	325~335	260~290	260~290
C	240~280	350~380	260~290	/
D	240~280	350~380	260~290	/

4 A B

C D

3.1

3.1.1

A307 Schaeffler

\+

“ ”

[2]

Cr Ni Cr Ni

Schaeffler

9 10

3.1.2

3.1.1

Cr

Ni

11~12

3.2

A B

C D

3.1

[3]

α-Fe γ-Fe

γ-Fe

α-Fe

Cr Mo V Ti

Nb ,

Si Al Ni

[4-5]

12Cr1MoVG R317

1Cr20Ni14Si2 A307 1 2

1 2 12Cr1MoVG R317

R317

α 1Cr20Ni14Si2

A307 A307

γ A B C

D

A B

C D

A B

C D B

B

3.3

[6]

[2] A B

C D

R317

3.4 12Cr1MoVG 1Cr20Ni14Si2

R317 A307

12Cr1MoVG

1Cr20Ni14Si2 R317

A307,

B

A,C,D

B A,C,D

R317 A307

A B

C D

R317

12Cr1MoVG 1Cr20Ni14Si2

R317 A307

R317 A307

R317 A307(

) A307

R317

1

2

[1] . [J].
( ) 2013 4 :17-22

[2] . : [M].
2006

[3] John C.Lippold, Damian J. Kotecki.
[M]. . 2008

[4] . [J].
( ) 2011 6 :10-13

[5] . Q345R S30408
[J]. 2016 11 :131-134

[6] . Q345/316L
[J]. ,2019 2 :138-144

1 1 2

1.2

1

Java Go C++ Python
TCP

2

[3]

3
UI CPU

3

Web

4

API

2.2

2.2.1

1 Kafka

2

3 Redis

4

5 /

6 MongoDB Web

2.2.2

1

6s, 5

Shell

2

HTTP

3 \

json

4

Web Redis

5

MongoDB

6

Web MongoDB Hbase Kylin

2.2.3

1

1

modelName
owner
collectionTime
setcode
dataInfo
calcResult
addtionalInfo

5G/VR/AR

55

1 1,2

$CaCO_3$ $MgCO_3$ $CaCO_3$ $MgCO_3$ SO_2 SO_3 HCl HF

$CaCO_3$ $MgCO_3$

X773 A 1001-9006 2022 01-0043-03

Chemical Behavior and Reaction Mechanism of Limestone Composition in Wet-FGD

LV Lidan[1], *YANG Zhizhong*[1,2]

1. Clean Combustion and Flue Gas Purification Key Laboratory of Sichuan Province, 611731, Chengdu, China;

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

Abstract: The chemical behavior ano i

Mg

MgCO Mg

CaMg 2

$MgCO_3$

1

HCl SO_4>HF HCl HF

HF $CaCO_3$ $MgCO_3$

CaF_2 MgF_2

SO_2 $CaCO_3$ [3]

$MgCO_3$

SO_2 HCl HF $CaCO_3$

$MgCO_3$

SO_2 SO_3

HCl HF

SO_2 $H_2O \rightarrow H_2SO_3$

H_2SO_3 H HSO_3

SO_3 $H_2O \rightarrow H_2SO_4$

$H_2SO_4 \rightarrow$ H HSO_4

HSO_4 H SO_4^{2}

$HCl \rightarrow$ H Cl

HF H F

HSO_3

HSO_3

HSO_3 $1/2O_2 \rightarrow HSO_4$

HSO_4 H SO_4^{2}

HCl

HF SO_2 SO_3 HCl H

Cl HF H F H_2SO_4 H SO_4^{2}

HF HCl H_2SO_4

1 HCl HF H_2SO_4 [4]

			K_a
1	HCl		
2	HF		3.53×10^{-4}
3	H_2SO_4		1.0×10^{3} K_{a1}
			1.2×10^{-2} K_{a2}

HCl HF

$CaCO_3$ $MgCO_3$ HF

HF $CaCO_3$ $MgCO_3$

SO_2 SO_3 SO_4^{2-}

$CaCO_3$ $CaSO_4\cdot2H_2O$

CaF_2 CaF_2 H_2SO_4 HF

HF $CaCO_3$

HF

$CaCO_3$ $MgCO_3$ HF

$CaCO_3$ $MgCO_3$ HCl H_2SO_4

HCl $CaCO_3$ $MgCO_3$

$CaSO_4$

$CaSO_4$

$$CaCO_3+2HCl \rightarrow CaCl_2+H_2O+CO_2\uparrow$$

$$MgCO_3+2HCl \rightarrow MgCl_2+H_2O+CO_2\uparrow$$

$$CaCO_3+H_2SO_4 \rightarrow CaSO_4\downarrow+H_2O+CO_2\uparrow$$

$$MgCO_3+H_2SO_4 \rightarrow MgSO_4+H_2O+CO_2\uparrow$$

$$MgSO_4+CaCl_2 \rightarrow CaSO_4\downarrow+MgCl_2$$ [5]

CaF_2 $MgF_2 \rightarrow CaSO_4 \rightarrow$ $CaCl_2$

$MgCl_2 \rightarrow MgSO_4$ HCl HF SO_2

$CaCO_3$ $HF \rightarrow SO_2 \rightarrow HCl$

HCl HF SO_2 $MgCO_3$

$HF \rightarrow HCl \rightarrow SO_2$

2 $CaCO_3$ $MgCO_3$ CaF_2 MgF_2

		(g/100mL H_2O)[6]	K_{sp}
1	$CaCO_3$	0.001 3	8.8×10^{-12}
2	$MgCO_3$	0.01	6.7×10^{-9}
3	CaF_2	0.001 5	2.8×10^{-11}
4	MgF_2	0.013	3.6×10^{-8}

$CaCO_3$

TM315 A 1001-9006 2022 01-0046-04

Discussion on Corrosion Protection for Long-term Transport and Storage of Offshore Wind Turbines

LIU Guilin

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

Abstract: Offshore wind turbines generally experience a long period of maritime transportation and storage, the marine weather is changeable, humidity is large, salt spray is heavy, and the metal and electrical components in the unit face a great risk of corrosion, so it is more important for the protection of the unit in the transportation and storage process. This paper puts forward some empirical suggestions for the protection measures in the transportation and storage of wind turbines for reference in the industry.

Key words: wind turbines; transport; storage; corrosion protect

≥90%

80%

3 6

25~35

2021-12-28

1983 2007

з ˘ Ⱶ Ţ Ͻ Ǖ
№˘ ǐ ɢ Ţ ২
Â

2.2

2.2.1

2.2.2

2.2.3

2.2.6

PE PVC

PVC

PE PVC

2 3

PVC

PVC

1

2 180

3

4

5 3

6 3

2015 11 :231

25

		K^*
A1	716.5	W/(m^2·K)
A2	737.0	W/(m^2·K)
B1	670.7	W/(m^2·K)
B2	679.4	W/(m^2·K)

8

NB/T 47007-2010

110

6 kg/m^2·s

D 25×2.5 mm 2.3 mm, 650 W/m^2·K

A1 A2 B1 B2

716.5 W/(m^2·K) 737.0 W/(m^2·K) 670.7 W/(m^2·K) 679.4 W/(m^2·K)

‰ 650 W/m^2·K

‰

1 2 2 1

200

BLADED

TM315 TK83 A 1001-9006 2022 01-0050-06

The Influence of Trailing Edge Serrations on Aerodynamic Performance of Wind Turbine

ZENG Mingwu[1], *YANG Junwei*[2], *SUN Zhenye*[2] , *WU Xinbo*[1]

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

2. Yangzhou University, 225127, Yangzhou, Jiangsu, China)

Abstract: With the transfer of wind farm from northwest, northeast, and north of china area to southwest mountainous area and coastal area in China, and the diameter of wind turbine exceedsd 200 meters, the noise problem of wind turbine is more and more serious. Trailing edge serration is the most commonly used passive noise reduction accessory of wind turbine blades, but it also leads to changes in the aerodynamic performance and load of wind turbine. Wind tunnel tests of lift, drag and surface pressure distribution of airfoil were carried out in Yangzhou University low-speed wind tunnel to verify the influence of different trailing edge serrations on the aerodynamic performance of airfoil. Using large-scale wind turbine design and analysis software BLADED, and the influence of trailing edge serrations on the aerodynamic performance of wind turbine is discussed, and evaluates the influence of serration on the steady-state load of the blade root. The results show that the trailing edge serrations can improve the aerodynamic performance of the wind turbine, but increase the steady-state load of the blade root.

Keywords: wind turbine; trailing edge serrations; wind tunnel testing; aerodynamic performance

2~2.5

2021-03-03

2020CKC002

1983 2006

CFD

NACA63418

[1] NACA0018

[2] Fluent

[3]

NACA0018

[4]

[5] DU97-W-300

CFD

[6]

MW

BLADED

1.1

21%

600 mm 1.5 m

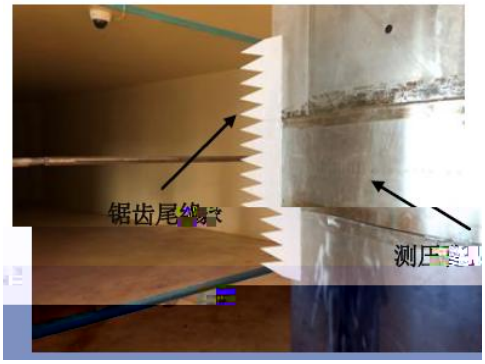
1

h *λ*

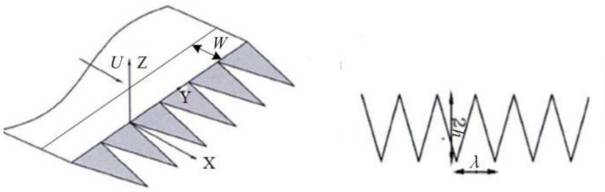
W

λ 2*h*

W 2 *U*



1



2

W

h *λ*

λ/*h*

λ/*h*

λ/*h*

[7] 3

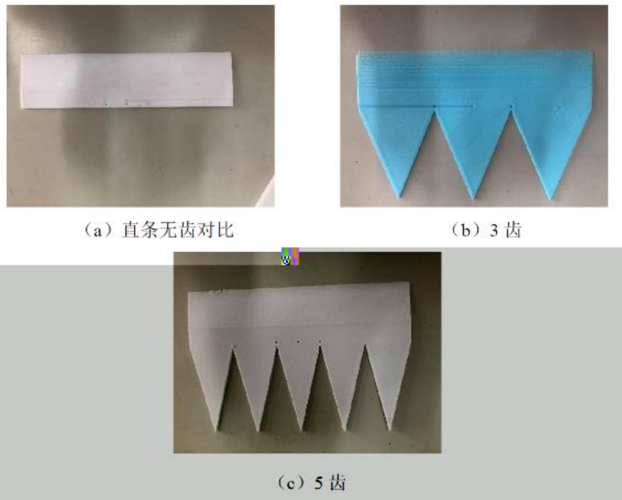
λ/*h* 5/6 1/2

1

h *λ*

1

		$2h$ (mm)	λ (mm)	λ/h	w(mm)
1	3	90	75	5/6	20
2	5	90	45	1/2	20
3		0	0	-	20



（a）直条无齿对比 （b）3 齿 （c）5 齿

3

1.2

№

№ №

PSI 64 256

333.3 Hz 15 000

4 0.7

102 1.2

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77

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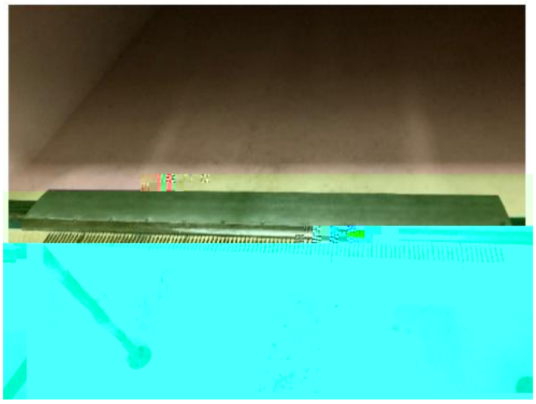

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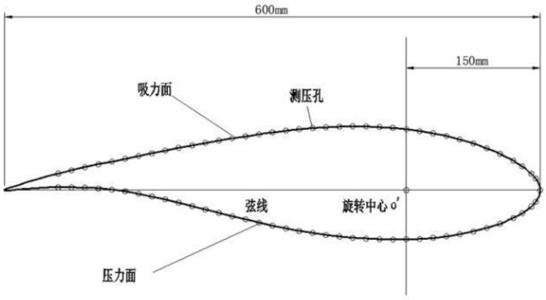


5

3 cm×3 cm

1.3

Re 8.0×10^{5}

6 6 a

6 b

-5°~10°

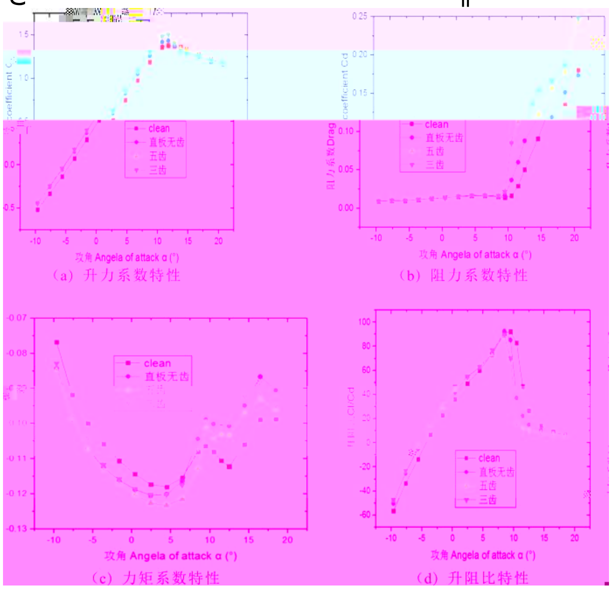
$Re=8.0\times10^5$ 0.19

7 7 a

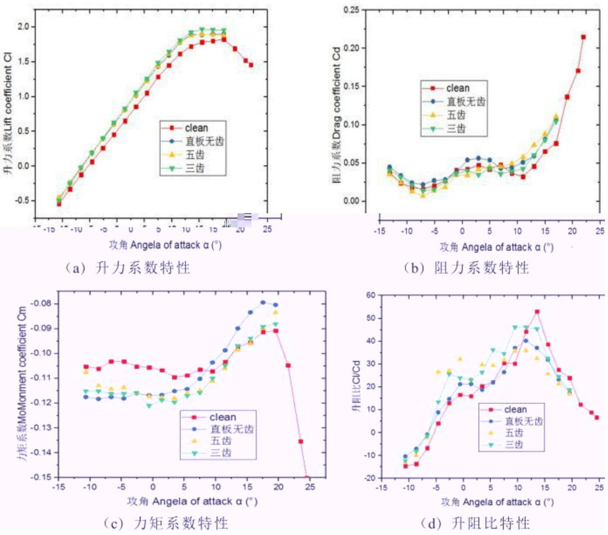
6 c 15°

6 d

0°~10°



6 $Re=8\times10^5$



7 $Re=8\times10^5$ 0.19

2.1 C_p

№≢ 2.5 MW ع 7 MW

╞ U ʍ C_p 2 ع 8

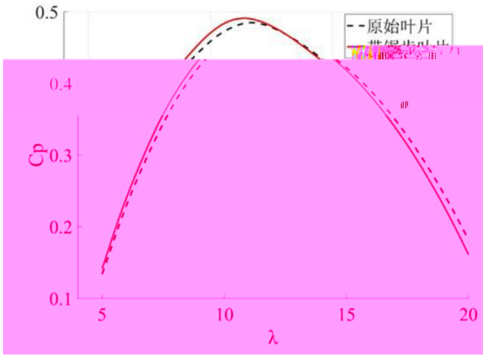
ᵔ ע U ʍ

▯ 2.5 MW 3%

7 MW 1.2%

2 C_p

	2.5MW	2.5 MW	7 MW	7 MW
	0	0.5	0	0.2
C_p	0.481	0.495	0.485	0.491



8 7 MW C_p~λ

2.2

№≢ 2.5 MW ع 7 MW

╞ U ʍ

ΰ 3 4

ΰ 1.225 kg/m³ ℗

ΰ 3 m/s ℗ ₮ ΰ 25 m/s ΰ 75%

k ΰ 2

U 2.5 MW ΰ 0.5%~2.5%

1.5% 7 MW ΰ

0.5%~1.5% 1%

3 2.5 MW

[m/s]	ΰ [MWh/a]	ΰ [MWh/a]	/ [-]
3	1 072	1 099	102.5%
4	2 634	2 693	102.2%
5	4 574	4 654	101.8%
6	6 477	6 564	101.4%
7	8 132	8 218	101.1%
8	9 490	9 570	100.8%
9	10 561	10 633	100.7%
10	11 360	11 427	100.6%

4 7 MW

[m/s]	ΰ [MWh/a]	ΰ [MWh/a]	/ [-]
3	2 133	2 165	101.5%
4	5 449	5 524	101.4%
5	10 000	10 126	101.3%
6	14 907	15 068	101.1%
7	19 490	19 666	100.9%
8	23 451	23 626	100.8%
9	26 698	26 866	100.6%
10	29 218	29 373	100.5%

2.3

№≢ 2.5 MW ع 7 MW

ΰ 0 5 6

ΰ 1.225 kg/m³ ΰ 3~25

m/s U

▯ 2.5 MW

h $M_{x\text{-min}}$ 2.8% 7 MW

$M_{xy\text{-max}}$ 3%

5 2.5 MW

№	-			/
Mx-max	[kNm]	—	—	—
Mx-min	[kNm]	-596	-613	102.80%
My-max	[kNm]	5 368	5 384	100.30%
Mxy-max	[kNm]	6 613	6 659	100.70%
Mz-max	[kNm]	21	21.3	101.50%

6 7 MW

№	-			/
Mx-max	[kNm]	—	—	—
Mx-min	[kNm]	-596	-613	102.80%
My-max	[kNm]	5 368	5 384	100.30%
Mxy-max	[kNm]	6 613	6 659	100.70%
Mz-max	[kNm]	21	21.3	101.50%

ㄱ ʐ ʐ ㄱ ʐ №

▯

ǯ BLADED

ع ǯ ₮

1 Re=8.0×10^5

0° 10°

2 Re=8.0×10^5

0.19

-5° 0°

3

C_p 1~3% 1~1.5%

4

[1] , , .

[J]. ,2013,34(5):870-873

[2] , , , .

[J]. ,2017,32(4) 900-907

[3] , , , .

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[4] .

[D],

[5] . [D].

[6] .

[D],

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[J]. ,2003,27(5):51- 54

[2] 东, 仲. [M].

,2020

[3] . 于 Storm 与 Kafka

与 [J]. 业 ,2021,34(5): 33-34+36

[4] , , 三, . 于 一

上 云 [J]. 与

,2021,19(4):64-69

[5] . 与 [M]. 京

,2020

[6] 亮. 于 云 与 [M]. 京 业

,2019

M701F4 APS

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M701F4 (APS) M701F4 APS

APS

TM611.31 A 1001-9006(2022)01-0056-06

Automatic Power Plant Start-up & Shut Down System Scheme Design of M701F4 Gas Turbine Combined Cycle Unit

*DONG Yihua, XU Bo**

(Dongfang Electric Co., Ltd., 611731, Chengdu, China)

Abstract In this paper, through the research on the one button auto start stop scheme of Dongfang Mitsubishi M701F4 gas turbine combined cycle unit, combined with the gas turbine sequence control and combined cycle configuration scheme, and referring to the actual engineering experience, the overall scheme and main control process of one key self start and stop of this type of gas turbine combined cycle single shaft unit are sorted out, A preliminary design scheme for APS of M701F4 one driven one single shaft combined cycle unit is proposed. By introducing the overall design, breakpoint setting and function grouping of one button auto start stop, the general idea and main difficulties of implementation are analyzed. The final purpose is to realize APS of the unit, reduce the manual intervention in the process of unit startup and shutdown, improve the level of automatic operation and control of the unit, and provide necessary conditions for the final realization of "unattended" unit.

Keywords: gas turbine combined cycle; automatic power plant start up & shut down wntrd System; APS; functional groups; breakpoint;

(APS automatic power plant start up&shut down system)

[1]

1.1

2021-12-28

1987 2013

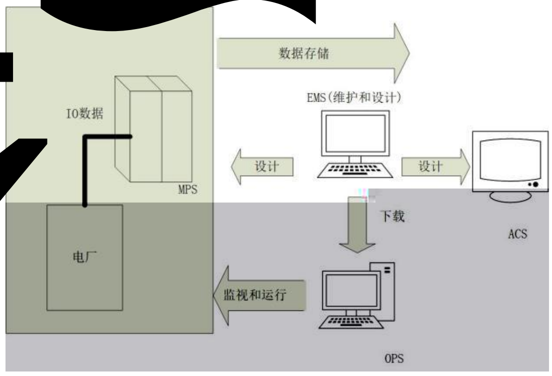
1982 2008

xubo@dongfang.com

[2]

1.2

1.3



1 DIASYS Netmation

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2.1 --DIASYS Netmation

DIASYS Netmation

DIASYS Netmation

1 MPS I/O

2 OPS

3 EMS DIASYS

MPS

OPS

ORCA

4 Browser OPS DIASYS Netmation

OPS

5 ACS ễ Š

6 CPS smart CPU

MPS

APS

M701F4 - APS

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APS APS

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3.1

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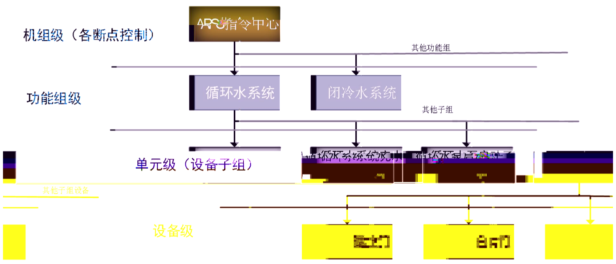

2 APS

2 APS

[3]

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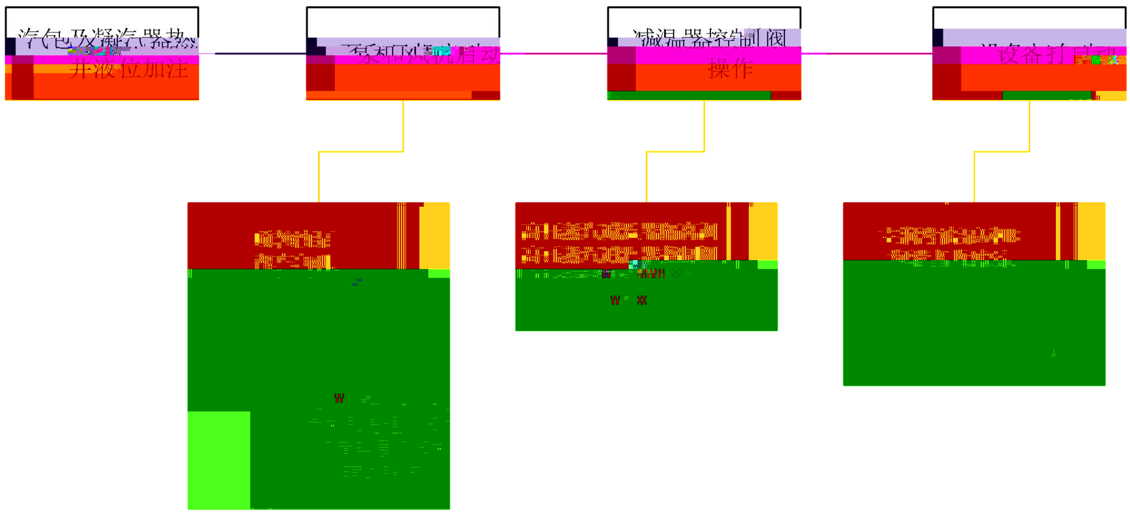

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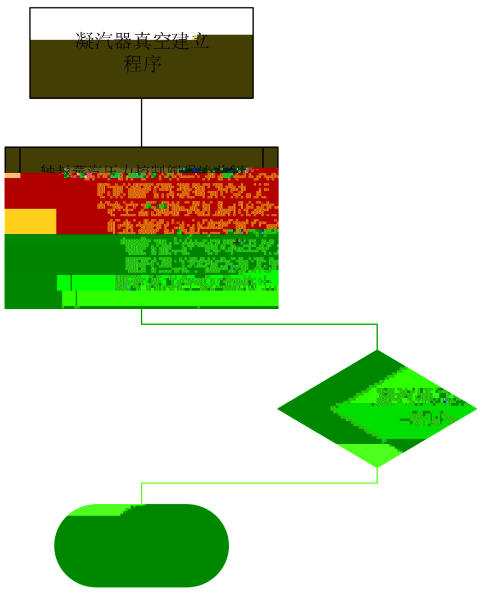

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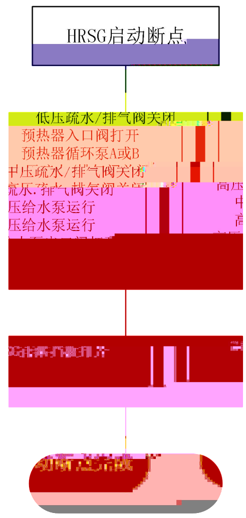


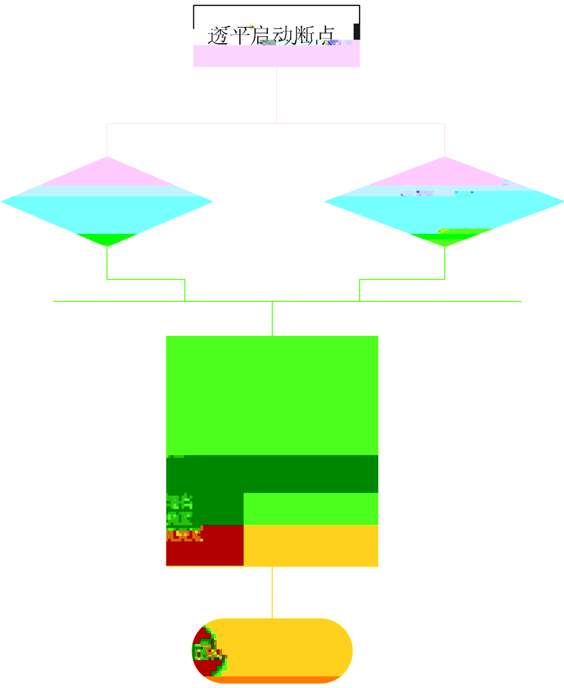
6 HRSG

3 HRSG

4

6

7



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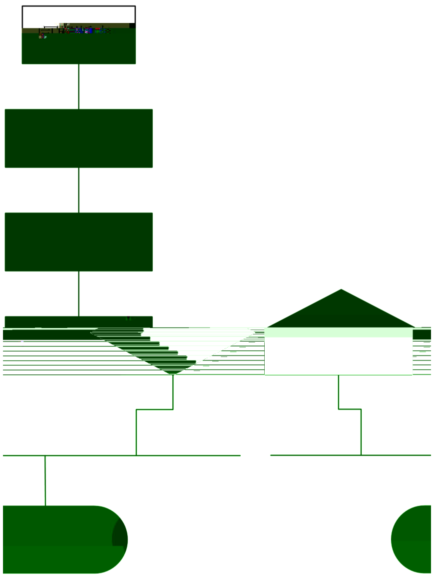

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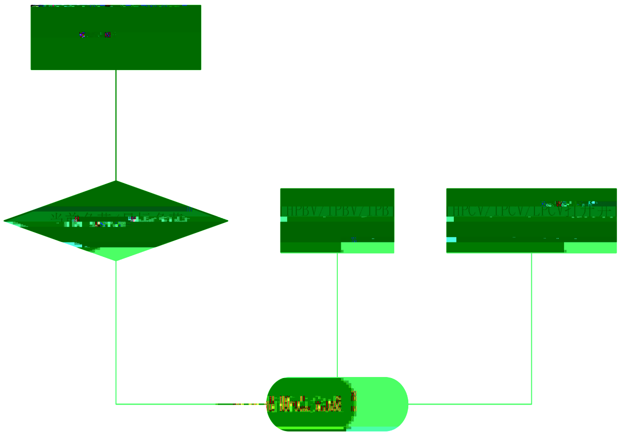


9

3.2

M701F4 3

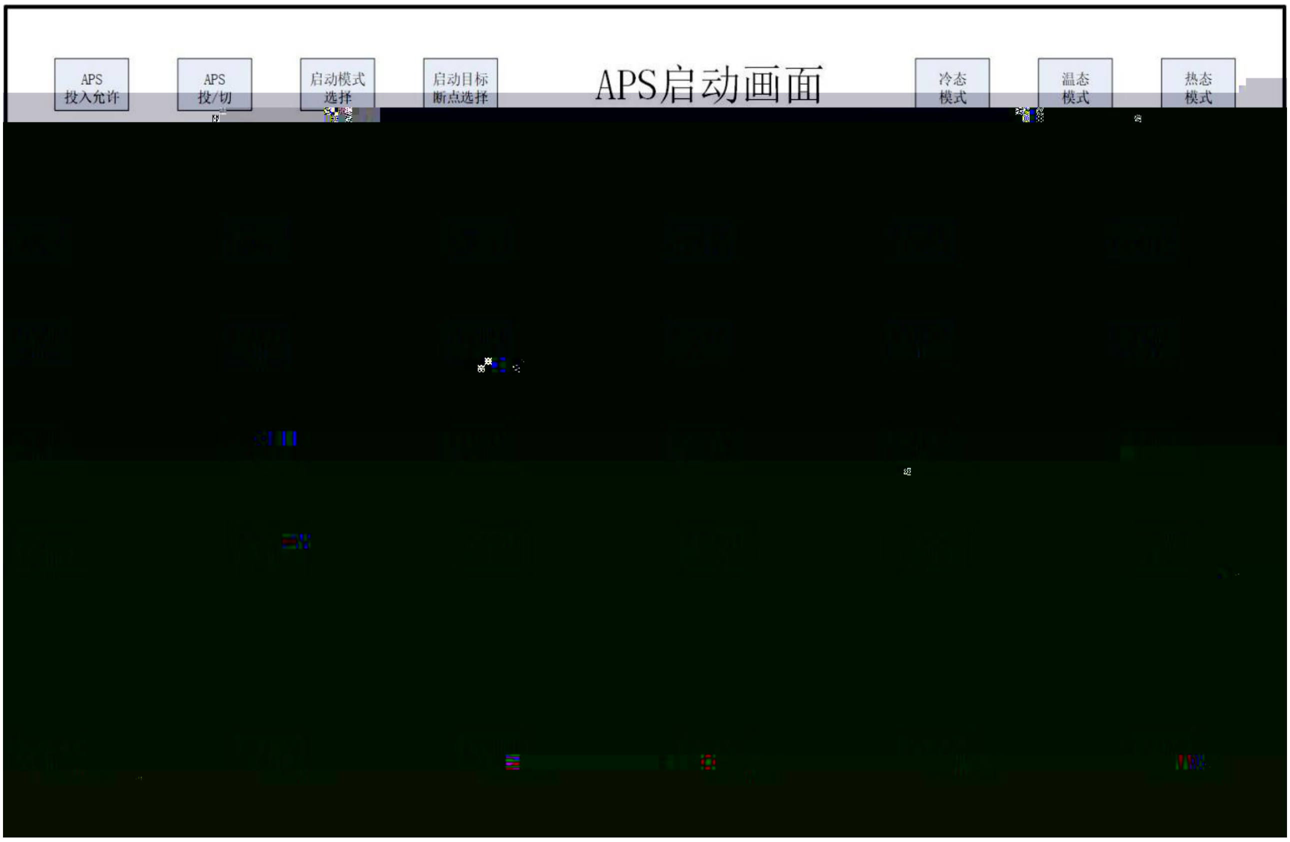
1. 2.HRSG

3.

3.3 APS

APS

APS 10



10 APS

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DCS DCS

3

[1] . APS [J]. ,2015,39(4):71-73

[2] , , .APS DCS [J]. ,2006,34(2):51-53

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HAF602

1 2

HAF602

HAF602
TL A 1001-9006 2022 01-0062-04

How to Manage the Transition Period Based on the Analysis of the Difference between the Old and New HAF602

WANG Xingxing[1] *LUO Wei*[2]

1.Dongfang Electric Co. Ltd., 611731, Chengdu, China

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

Abstract: In order to adapt and meet the requirements of the new regulations, ensure the smooth transition of the team construction of nuclear safety equipment nondestructive testing personnel in the reform, reduce the risks and impact brought by the changes of the old and new regulations, and improve the equipment manufacturing quality management ability, the author commits to analyze and discuss the coping strategies puts forward suggestions on how to manage the transition period of new and old qualifications through comparing the differences between the old and new HAF602, and the significance of regulatory amendments.

Key words: HAF602; nondestructive examination; comparison between the old and the new; qualification management; transition period

2020 12 Ð ῇ ⅧÐ

2021-11-15
1984 2013

HAF602 2019 6 13
,2020 1 1

2019 HAF602 2007

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HAF602 HAF602

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2020 1

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HAF602

HAF602

HAF602

6.9%

88.8% I 4.2%

RT 28.2% UT 25.6% PT 23.1% VT 12.8% MT 7.7% ET 2.5% LT

10%

LT-

10%

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HAF602

4.1

4.2 [redacted]

ET LT 2~3

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TSG Z8001

1 ¤ !P HAF602

HAF602

4.3 III

HAF602

[redacted]

某换热器承压边界传热系数计算

CFD

CFD

TM623 TK124 A 1001-9006 2022 01-0066-05

Calculation of Heat Transfer Coefficient at Pressure Boundary of A Heat Exchanger

LI Chao, WANG Bo, YANG Yang, GUO Zhengrong, CAO Xuefan, JIANG Fengming

Dongfang Electric Co., Ltd., 611731, Chengdu, China

Abstract Pressure boundary heat transfer coefficient is an important input condition for structural safety evaluation of nuclear heat exchanger. Through the demonstration of single tube model method, this paper determines the solution method of pressure boundary heat transfer coefficient suitable for engineering application. On this basis, the CFD simulation of a special-shaped structure with pressure boundary of a nuclear stage heat exchanger is carried out. The analysis shows that the distribution deviation of heat transfer coefficient in and out of the oral cavity of the heat exchanger is great, and the value method of heat transfer coefficient in and out of the oral cavity under different flow and temperature conditions is given. The data obtained in this paper can provide reference for the calculation of heat transfer coefficient at pressure boundary and provide key input reference for structural safety evaluation.

Key words CFD; method demonstration; heat transfer coefficient; heteromorphic structure

CFD [1]

[2]

CFD

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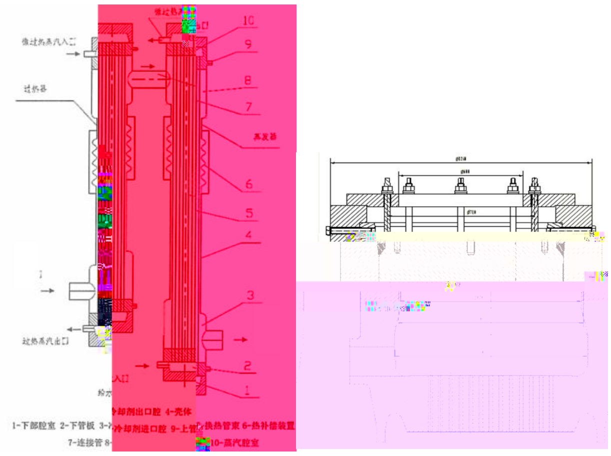
1

2021-11-10

1985 2021

lichao@dongfang.com



1

CFD

CFD

1.1

Re>2500

Dittus—Boelter

$$Nu=0.023Re^{0.8}Pr^{0.4} \quad (1)$$

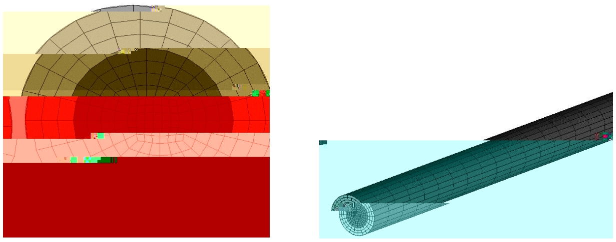
Re—— Pr——

1.2 CFD

ICEM

0.9

2



2

ANSYS FLUENT

k-ε scale

SST k-w

1

Dittus—Boelter

1 Dittus—Boelter

			k-ε scale				
	mm			Y+	W/m²·K	DB W/m²·K	
1	1	5	117 000	113.541	5 096.645	5 765.28	-11.60%
2	0.8	5	126 000	90.876	4 962.348	5 765.28	-13.93%
3	0.5	5	133 000	56.969	5 002.726	5 765.28	-13.23%
4	0.3	5	135 000	34.389	5 078.075	5 765.28	-11.92%
5	1.2	5	111 000	136.188	5 101.572	5 765.28	-11.51%
6	1.5	5	110 000	170.046	5 125.708	5 765.28	-11.09%
7	2	5	108 000	226.417	5 109.092	5 765.28	-11.38%
			SST k-w				
	mm			Y+	W/m²·K	DB W/m²·K	
1	0.3	5	346 000	33.7106	5 031.314	5 765.28	-12.73%
2	0.2	5	358 000	10.949	4 672.348	5 765.28	-18.96%
3	0.1	5	369 000	8.9324	4 513.348	5 765.28	-21.72%
4	0.05	5	382 000	5.320	4 319.776	5 765.28	-25.07%
5	0.04	5	432 000	1.530	4 210.186	5 765.28	-26.97%
6	0.03	5	461 000	1.320	4 103.545	5 765.28	-28.82%

1 SST k-w

$Y+$

k-ε scale

$Y+$

CFD DB

15%

/

$Y+$

k-ε scale

/

$Y+$

Wall_AveHFlux

W/m^2 Wall_AveTemp

QS_AveTemp

5 6 /

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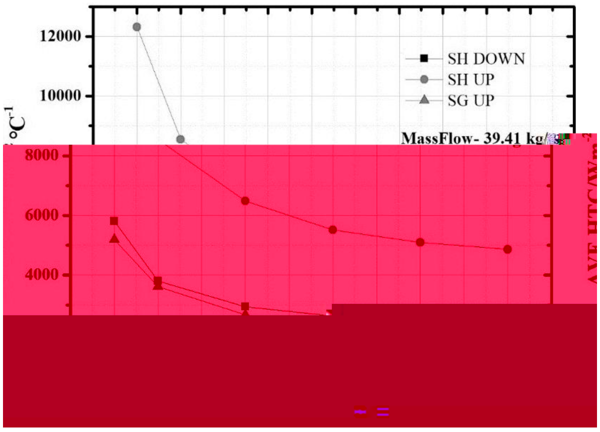
/

Re

Re



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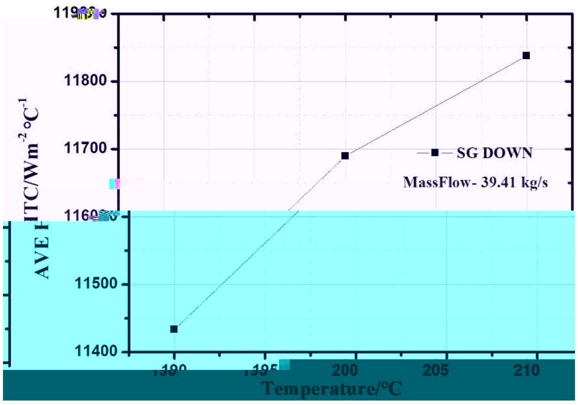

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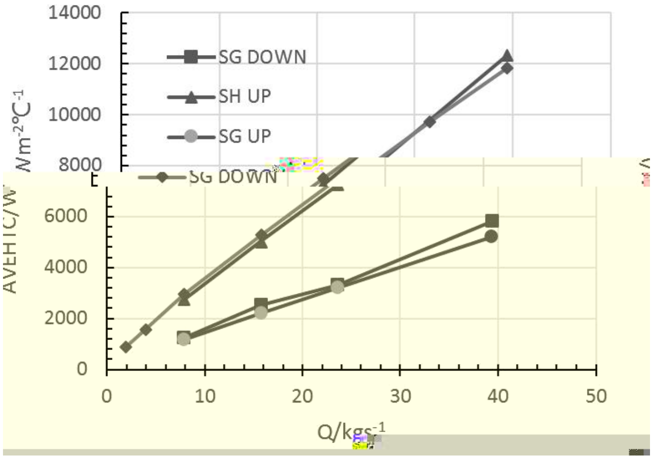
3.2

7 /

7

Re



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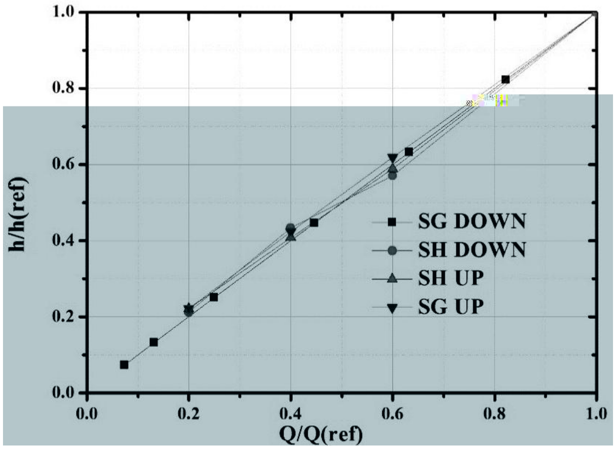

8

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4 7

$$h/h(ref)=(Q/Q(ref))^{0.9361} \quad (4)$$

$$h/h(ref)=(Q/Q(ref))^{0.867} \quad (5)$$

$$h/h(ref)=(Q/Q(ref))^{0.9319} \quad (6)$$

$$h/h(ref)=(Q/Q(ref))^{0.9472} \quad (7)$$

Q *ref* kg/s *Q*

kg/s *h* *ref* W/

m^2 *h* W/ m^2

3.3

1 3.1-3.2

2

2 W/ m²·

520	2 353.31	4 863.45	2 069.26	/
480	2 500.6	5 095.85	2 155.91	/
440	2 624.16	5 512.23	2 321.8	/
400	2 936.07	6 485.71	2 673.69	/
360	3 802.03	8 545.27	3 609.1	/
340	5 814.59	12 315.19	5 194.62	/
210	/	/	/	11 837.57
200	/	/	/	11 689.51
190	/	/	/	11 433.58

2 2

3 4

7

4 2

15%

ANSYS FLUENT

1 k-ε

scalable

2

3

2

4 4

7

5

15%

[1] , . [J].
, 2004(3):472-475
[2] , , . CFD
[J]. ( ), 2020, 34(11):87-93
[3] , , .
[J]. , 2021, 42(1):154-160
[4] . [M]. , 2001

3 14

360 MW

1

7.5 MW 7.0S MW

IEC S

10 MW

7.0S MW 10.0S MW

10 MW 2020 7 99% 2021

2021 7 MW 1.12 GW 43%

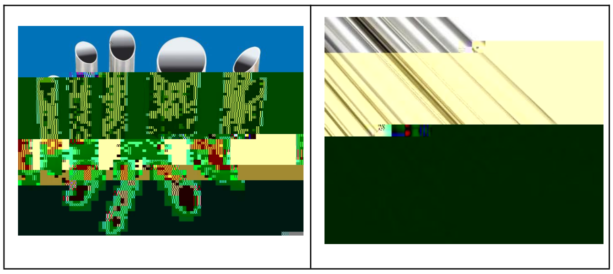
：东 微 公众号

TP304 TP316

20878-2007 06Crl9Nil0(
0Crl8Ni9) Cr-Ni
20 TP304 Cr Cr
12%

TP304
Cl- ( )

1



1

“TP316”(SUS316) ASTM
GB/T
20878-2007
022Cr17Ni12Mo2 (0Cr17Ni12Mo2)
Cr-Ni
TP304 TP316
Mo Mo

Mo

TP304 TP316
L TP316 TP316L
TP316 ≤ 0.08%
TP316L ≤ 0.035% 1

“TP304”(SUS304) ASTM
GB/T

1

%

	C	Si	Mn	P	S	Cr	Ni	Mo
TP304	0.04 0.10	≤ 1.00	≤ 2.0	≤ 0.04	≤ 0.03	18.0 20.0	8.0 11.0	
TP304L	≤ 0.03	≤ 1.00	≤ 2.0	≤ 0.035	≤ 0.03	18.0 20.0	8.0 11.0	
TP316	≤ 0.08	≤ 1.00	≤ 2.0	≤ 0.035	≤ 0.03	16.0 18.5	10.0 14.0	2.0 3.0
TP316L	≤ 0.035	≤ 0.75	≤ 2.0	≤ 0.04	≤ 0.03	16.0 18.0	10.0 14.0	2.0 3.0

2

	MPa	MPa	%	GPa	g/cm^2	W/m · K	10^{-6}
TP304	≥ 515	≥ 205	≥ 35	193	8.03	13.8	15.1
TP304L	≥ 485	≥ 170	≥ 35				
TP316	≥ 515	≥ 205	≥ 35	193	8.03	13.4	16.2
TP316L	≥ 485	≥ 170	≥ 35				

3

4

	mg/L		mg/L
K^+			985
Na^+			485
Ca^{2+}	245		500
Mg^{2+}	89.5		
Fe^{3+}	13.25		610
Cl^-	160	pH	6.5~9.8
SO_4^{2-}	880		
HCO_3^-	610	$COD_{Mn/Cr}$	
NO_3^-		(μS/cm)	
F^-			100

5

2007 1 2009 9 Cl^-

Cl^-

5 2007 1 -2009 9 Cl ¦ þ

	07/01/08	07/02/07	07/03/07	07/04/05	07/05/08	07/06/06	07/07/09
Cl^- mg/L	13.44	13.75	16.49	7.64	9.42	11.04	8.61
	07/08/07	07/09/13	07/10/10	07/11/03	07/12/05	08/01/04	08/02/15
Cl^- mg/L	8.58	8.58	12.03	12.77			

( )

5

5

DLT 712-2000

09/07/02 Cl^-

7.64mg/L 17.11mg/L 09/08/05

09/09/08 Cl^-

07 08

304 316 317

6

6

TP 304 L	900 MW 2 1 300 MW 2
TP 316L	440 MW 4 632 MW 1 965 MW 2 900 MW 10 1 300 MW 2 1 400 MW 4

TP304 TP304L TP316 TP316L

TP316 TP304 TP316 TP304

100 /m^2 TP316 1

100 000m^2

1 000

“

20

” 30~40

30

AP1000 60

TP316

TP304

Cl^-

TP316 TP304

TP316

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TL35 TM623 A 1001-9006 2022 01-0075-03

The Introduction and Analysis of Design Process of TS EPR Nuclear Island Auxiliary Component

LI Meng *m*

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

Abstract: The process of basic design and design review for TS EPR nuclear island auxiliary component is introduced. Including design input and interface design output detailed design and design review.

Key words: nucleamp

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A Case Study of Optimizing Supply Chain Collaboration

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

Abstract: In order to strengthen the management of the supply chain, the enterprise adopts the management idea of "horizontal integration" to break through the internal and external barriers through the systems such as product component network submission, raw materials delivery list, and drawings e-distribution to collaborators to establish an effective linkage between the enterprise and its suppliers. Thus an effective closed-loop management of the whole supply chain is constructed practically while a community of shared interests is built up systematically

Key words supply chain; product component network submission; raw materials delivery list; drawings e-distribution to collaborators

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Discussion about Risk Management in Nuclear

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Research on the Prevention of Seller's Contract Risk in Financial Leasing Business

TANG Hui

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

Abstract: Financial leasing is a new transaction system with the development of economy, which is significantly different from the traditional installment sales transaction mode. In the construction of power energy point projects, especially in the procurement of power generation equipment, financial leasing becomes a common financing means. From the perspective of power generation equipment seller, this paper analyzes and discusses the contract execution risks and preventive measures faced by power generation equipment seller based on the significance of financial leasing and the role of relevant parties, hoping to provide some reference for power generation equipment manufacturing industry.

Key words: financial leasing business; seller; contract; risks and risks' preventive measures

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