



Chinese Technology Makes Sky Bluer



股票代码：300912



凯龙高科技股份有限公司
Kailong High Technology Co., Ltd.



KaiLong Product Introduction

Dec, 2023

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- Comprehensive ability introduction

- Main product section display

- I .Kailong Euro VI urea pump

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- V.Kailong Euro VI ATS canning





Provide products throughout the industry chain
Canning, substrate, catalyst, sensor, urea injection system calibration

service advantage

- 15 accessories centers
- 218 after-sales service centers
- 24/7 response mechanism

Advantaged customer groups

The company's core customers include major domestic OEMs and vehicle manufacturers. Currently, there are 38 Euro VI projects and 42 off-road projects.

Intellectual Property and Cost Advantages

Kailong has completely independent intellectual property rights and a complete industrial chain.

01



Euro VI production line layout

- Euro VI light and heavy can
- Urea pump and tank assembly
- Catalyst and substrate production
- Control unit production line
- Quality sensors, wiring harness, etc.

02



Core Competitiveness

03

Super R&D and product verification capabilities

It has a fully independent Euro VI electronic control system.

National Enterprise Technology Center, CNAS Test Center

Engine comprehensive test bench

Full range of CAE simulation resources and analysis capabilities

05

04

06



Comprehensive R&D capability

Team Resources

- ▣ More than 1,500 employees.
- ▣ There are more than 320 R&D engineering personnel, including 13 PhD and 46 masters.

Comprehensive Experimental Resources

- ▣ It has more than 20 test rooms, including engine test room and 15 engine comprehensive test benches.
- ▣ Has CVS (full flow emission) testing capability, complete vehicle drum test. The laboratory is equipped with a fully functional high and low temperature environment chamber and vehicle PEMS testing ability.



Comprehensive R&D capability

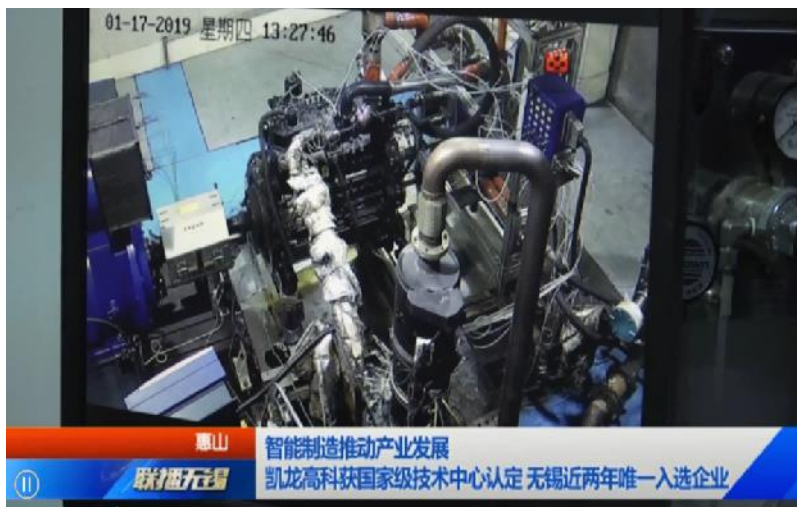
- ✓ The 25th Batch of National Enterprise Technology Centers
- ✓ National Accreditation Service CNAS Experimental Center
- ✓ Forward Technology R&D Center

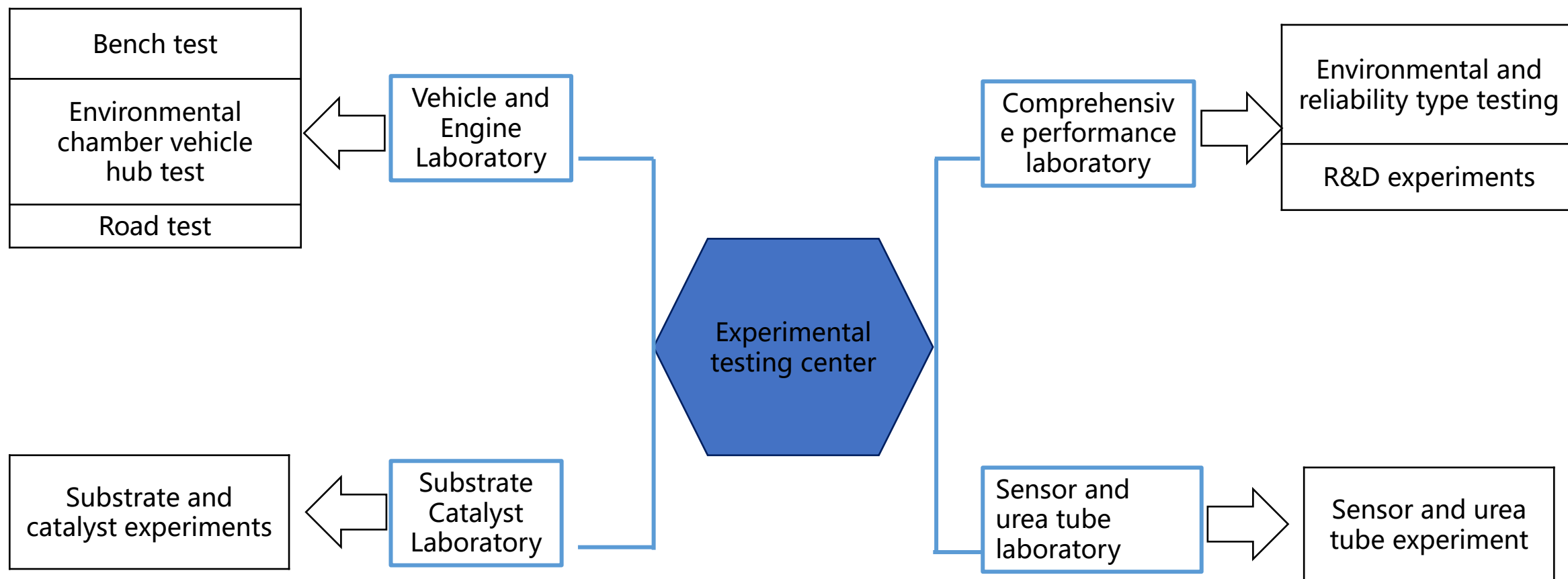


凯龙高科获国家级技术中心认定 无锡近两年唯一入选企业

2019-02-21 09:02:21 米源 无锡

不久前，从凯龙高科技股份有限公司传来好消息，这家企业成功入选2018年度国家企业技术中心名单，成为无锡两年来唯一入选企业。





Comprehensive R&D capability

National Science and Technology Progress Award

First Prize of China Automotive Industry Science and Technology Award

First Prize of China Machinery Industry Federation Science and Technology Award

Postdoctoral research workstation, a well-known trademark in China

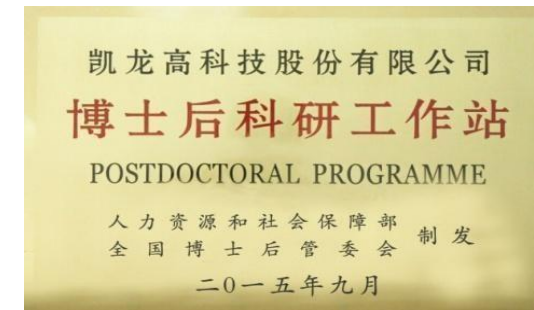
The SCR system won the first prize of China Machinery Industry Federation Science and Technology Award

The system catalytic material won the second prize of the National Science and Technology Progress Award

The key technology and application of diesel vehicle exhaust purification won the first prize of Shanghai Science and Technology Progress Award in 2014

Special financial support for the transformation of major achievements in Jiangsu Province

A leading enterprise in China's internal combustion engine parts industry



Formulated 19 industry standards

<p>GB 17733-2017 柴油发动机选择催化还原第1部分：透氧式催化剂</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17734-2017 柴油发动机选择催化还原第2部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17735-2017 柴油发动机选择催化还原第3部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17736-2017 柴油发动机选择催化还原第4部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17737-2017 柴油发动机选择催化还原第5部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17738-2017 柴油发动机选择催化还原第6部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17739-2017 柴油发动机选择催化还原第7部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17740-2017 柴油发动机选择催化还原第8部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>GB 17741-2017 柴油发动机选择催化还原第9部分：尿素溶液</p> <p>中华人民共和国工业和信息化部</p> <p>2017-07-01 实施</p>	<p>JB/T 11980-2014 柴油发动机选择催化还原(SCR)系统第8部分：选择催化还原(SCR)转化器</p> <p>中华人民共和国机械行业标准</p> <p>2014-07-01 实施</p>
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Diesel particulate capture system part I: General technical conditions
Diesel particulate capture system part II: HC Injection system technical conditions
Diesel particulate capture system part III: Particle sensor technical conditions
Diesel particulate capture system part IV: Particle trap technical conditions
Diesel particulate capture system part V: Burner technical conditions

Diesel engine exhaust purification catalyst substrate part I ceramic substrate
Diesel engine exhaust purification catalyst substrate part II metal substrate
Diesel engine SCR system part IX catalyst
Diesel engine SCR system urea solution dosing device

After years of Euro V and VI system development, we have complete core components and integrated supply capabilities.

✓ Development and verification matching of key components that meet Euro VI and above emission standards:

- ◆ Full range of substrate (cordierite/silicon carbide; thin wall; asymmetric, etc.)
- ◆ Catalyst coating (molecular sieve catalyst, coating process, automated production line, etc.)
- ◆ Injection system – urea pump
- ◆ Injection system – electronically controlled dosing module
- ◆ GBD and comprehensive package development (mixer, thermodynamic analysis, durability verification, etc.)
- ◆ Urea quality level and temperature sensor





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I Kailong Euro VI Urea Pump

1.Kailong Urea Pump Introduction



N6.5 urea pump

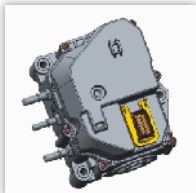




N2.2B urea pump
N2.2C urea pump

For Euro VI urea pump products, three types have been formed based on market demand.

- Split type, urea pump and urea tank are assembled separately and connected through pipelines
- Tank top type, urea pump is installed directly on the top of the urea tank
- Tank bottom type, urea pump is installed directly inside the urea tank (bottom)

➤ Urea Pump Specification



Model	N6.5	N2.2B	N2.2C
Appearance			
Effective life	B10 15000 h	B10 15000 h	B10 15000 h
System pressure	5 bar	9 bar	9 bar
Heating method	electric	电electric	electric
Injection range	8L/h	12L/h	12L/h
Voltage	DC 12V/24V	DC 24V	DC 24V
Protection grade	IP69K	IP69K	IP69K
Working temperature	-40~85℃	-40~85℃	-40~85℃
Self-priming height	1.5 m	1.5 m	1.5 m
Pressure building time	≤60s	≤60s	≤60s
Counter draw time	45s	45s	45s
Heating time	≤30min	≤30min	≤30min
Dust holding capacity	12g max	12g max	12g max



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II Kailong Euro VI Urea Dosing Module

Type	KUI1.1(6 hole flange)	KUI1.2(6 hole big flow)
		
Flow	7.2Kg/h@9bar	12kg/h@9bar
Angle	25±5°	28±5°
Shape	Flange type dosing module	Flange type dosing module
Application	Euro VI road/off road T4	Euro VI road/off road T4

➤ In order to meet the Euro VI emission requirements, Kailong developed urea dosing module KUI 1.1 and KUI1.2 that similar in performance to company B's 2.2 and reliable. It can directly replace company B's 2.2 urea dosing module.

Benchmarking results of urea dosing module performance and competing product



Valve core



Dosing module assembly

Specification		
	<u>KaiLong dosing module (6 hole)</u>	B company dosing module (6 hole)
Static flow	<u>7.2kg/h@9bar</u>	<u>7.2kg/h@9bar</u>
Pressure range	5/7/9bar	5bar/9 bar
Voltage	12V/24V	12V/24V
Flow accuracy	static flow $\pm 3\%$	static flow $\pm 3\%$
Cooling method	water cooling	water cooling
Injection cone angle	$25\pm 5^\circ$	$25\pm 5^\circ$
SMD	65 μ m @ 9bar, 24mm at point	65 μ m @ 9bar, 24mm at point
Air tightness	<1 ml/min @ 500kPa	<1 ml/min @ 500kPa
Working environment temperature	-40 $^\circ$ C - 125 $^\circ$ C	-40 $^\circ$ C - 125 $^\circ$ C
Interface		
Install flange	3 bolt	3 bolt
Connector type	TE 936059-1	TE 936059-1
Urea interface	7.89mm [5/16"] SAE J2044	7.89mm [5/16"] SAE J2044
Cooling interface	9.49mm [3/8"] SAE J2044	9.49mm [3/8"] SAE J2044

序号	专利名称	类别	申请号	申请日	授权日	备注
1	一种旋流式多孔喷射及雾化装置	发明	202011482078.3	2020/12/15	在审	公开日：2021.03.12
2	一种旋流式多孔喷射及雾化装置	实用	202023038441.0	2020/12/15	2021/9/21	
3	一种液体喷射器	实用	202022980507.1	2020/12/10	2021/11/16	
4	一种喷孔板	实用	202022481512.8	2020/10/30	2021/7/27	
5	一种尿素溶液雾化器	实用	202022483282.9	2020/10/30	2021/7/27	
6	一种尿素溶液雾化器及尿素溶液喷射装置	发明	202010478718.7	2020/5/29	在审	公开日：2020.08.14
7	一种尿素溶液雾化器及尿素溶液喷射装置	实用	202020962791.7	2020/5/29	2021/3/9	
8	一种液体喷射器冷却水套	发明	202111613737.7	2021/12/27	在审	公开日：2022.03.22
9	一种旋流式喷射阀	实用	202022483085.7	2020/10/30	2021/7/27	
10	一种尿素溶液喷射器	实用	202022483166.7	2020/10/30	2021/7/27	暨原申报文件名称：一种多孔式尿素溶液喷射器
11	一种尿素溶液雾化器	实用	202022483282.9	2020/10/30	2021/7/27	
12	一种法兰式尿素喷嘴	外观	国专局受理中			



Assembly line



EOL test bench (Detect
resistance/inductance/leakage/dynamic
flow/static flow)



Finished product





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III. Kailong Euro VI urea pump tank integration

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Product description

02

Core parts

03

Manufacture





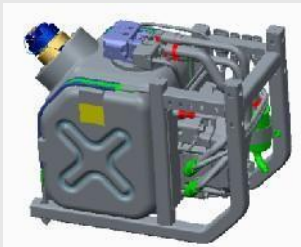
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Market supporting



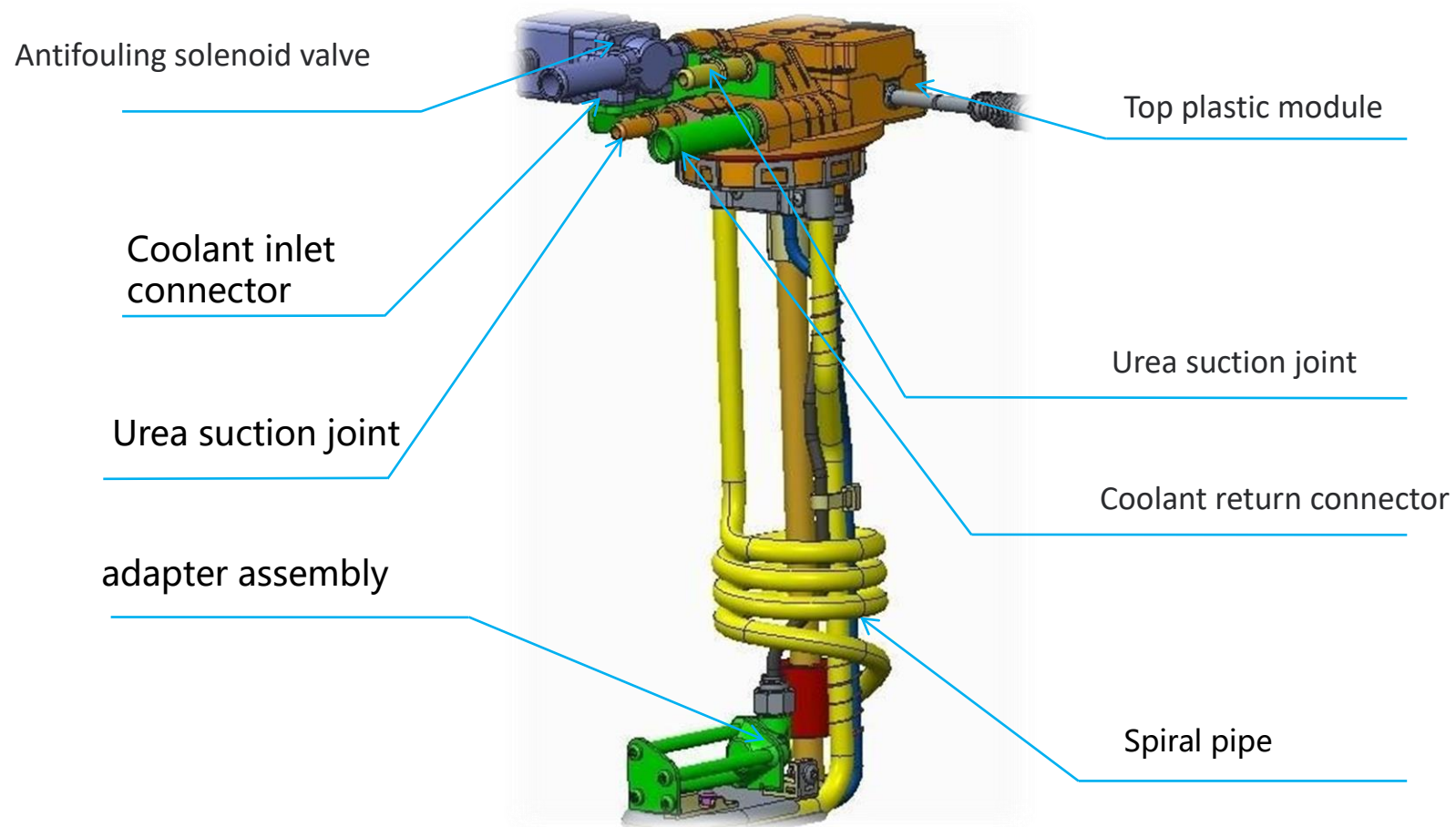
Urea pump tank integration

Mainly carry out corresponding integration according to customer requirements

Type	Tank+ bracket	Tank+pump (Ontank)	Tank+pump(Intank)	Tank+bracket +pump (Ontank)	Tank + bracket + pump(independent)	...
Shape						...
Integrated content	Urea tank	urea tank+N2.0 pump	Urea tank+ N7.0 pump	Urea tank+ N2.0 pump	Urea tank+N3.5+urea pipe+Heating solenoid valve, etc.	...

Urea Leavel Sensor

Structure



02. Core parts

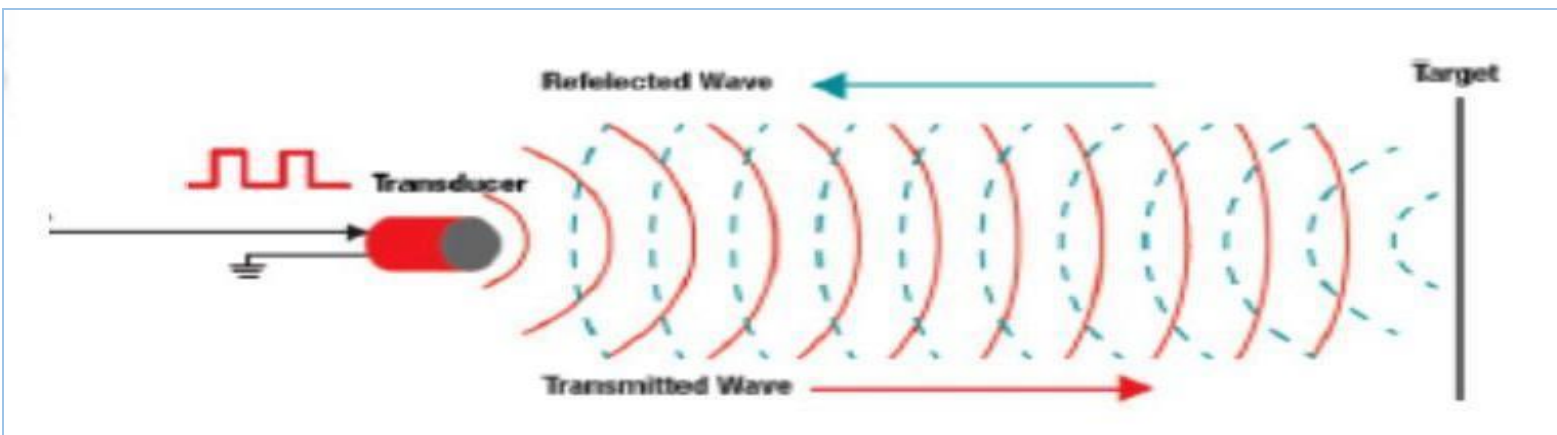
Function of urea quality sensor

Function of urea quality sensor

Monitor whether the urea solution in the urea tank meets the 32.5%(±0,7%) concentration of the ISO 22241 standard; Prevent manufacturers of automotive urea solution from supplying unqualified urea;- Prevent the driver from adding water to dilute in the process of use to reduce the amount of urea, if the concentration is detected not up to standard, the engine torque limit through OBD; Alarm in advance after mistakenly adding other liquids (engine coolant, diesel, etc.) to prevent damage to post-processing and the vehicle;

Principle of urea quality sensorUltrasonic principle:

The use of ultrasonic waves in different media in different propagation speed, so as to measure urea concentration.

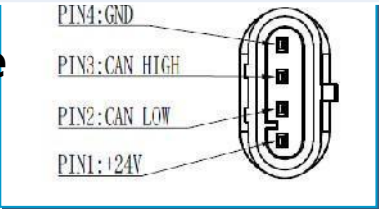


Urea quality sensor

Technical parameters of urea quality sensor

peculiarity	No.	parameter	Range	Unit	Note
application environment	1	Application tem	-40 ~ 85	℃	
Sensor signal	1	Detection concentration range	0 ~ 62.5	m%	
	2	Detection concentration range	-40 ~ 85	℃	
		resolution	0.25	m%	
		precision	±1	m%	- 6℃ ~ 55℃
		precision	±2	m%	- 6℃ below and 55℃ above
Function	1	Operating voltage	7.5 ~ 32	V	
communicate	1	SAEJ1939			

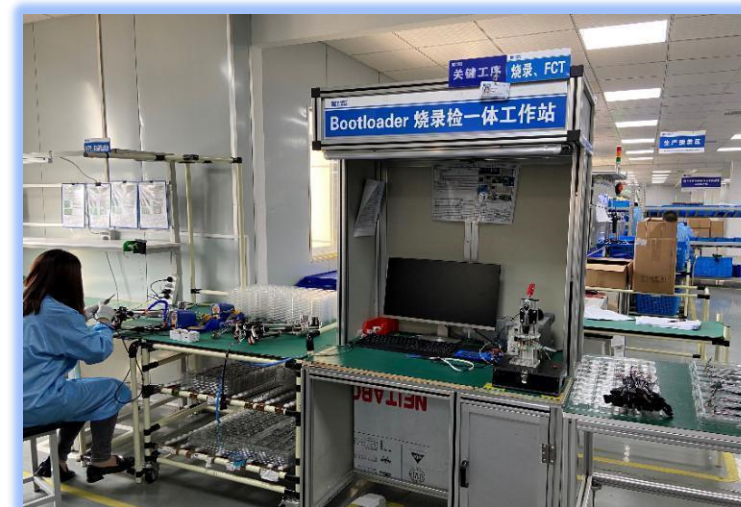
Electrical interface mode and pin definition



02.Core parts

Urea quality sensor

Manufacturing shop



Urea quality sensor

By the end of 2021, the total supply of about 160,000 sets

序号	客户名称	项目进展	市场用量 (件)
1	全柴动力	批量供货阶段	60000
2	南京依维柯	批量供货阶段	30000
3	福田汽车	批量供货阶段	20000
4	三一重卡	批量供货阶段	30000
5	上柴动力	批量供货阶段	5000
6	朝柴	批量供货阶段	1000
7	江淮轻卡	批量供货阶段	8000
8	玉柴动力	批量供货阶段	2000
9	庆铃	批量供货阶段	3000
10	中国一拖	小批量供货阶段	200
11	上依红	小批量供货阶段	130
12	一汽发动机事业部 (锡柴)	开发阶段	10
13	中国重汽	已通过重汽PPAP审核, 需补充道路耐久试验后进行小批量供货	200
14	四川南骏	开发阶段: 通过寒区试验与DVP试验, 正在道路试验	100
15	潍柴	开发阶段: 已完成寒区试验, 正在进行DV试验	50
16	上汽大通	开发阶段: 方案对接	0
总计			约16万

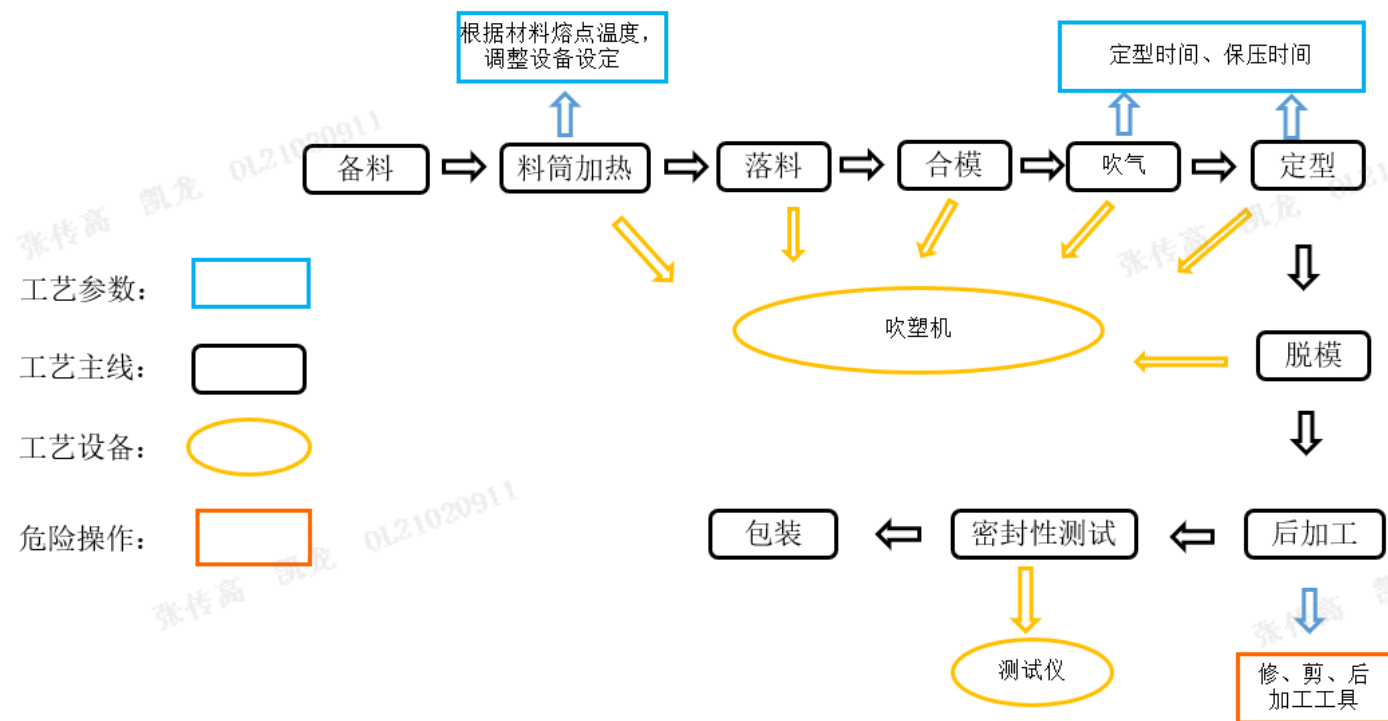
03. Manufacturing

Blow molding equipment : TVA-120L 2 sets



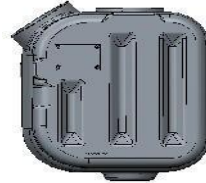

TVA-160L 2 sets

Urea tank capacity: 400,000 / year



Blow molding process :



◆ Urea tank assembly profile -- individual tank

NO.	Code	Size	Materail	L	W	H	Customer	Schematic drawing
1	120514294110	NSG-10	H	260	255	307	FOTON QUAN CHAI	
2	120514258110	NSG-16	H	400	220	305	SDEC	
3	120514600210	NSG-20	H	320	240	380	SDEC	
4	120514410310	NSG-40	H	450	180	807	SANY SDEC YTO	

◆ Urea tank assembly profile -- individual tank

NO.	Code	Size	Mater ail	L	W	H	Customer	Schematic drawing
5	120514270310	NSG-12	L	400	281	251	FOTON QUAN CAHI	
6	120514350210	NSG-60	H	760	250	550	SANY	



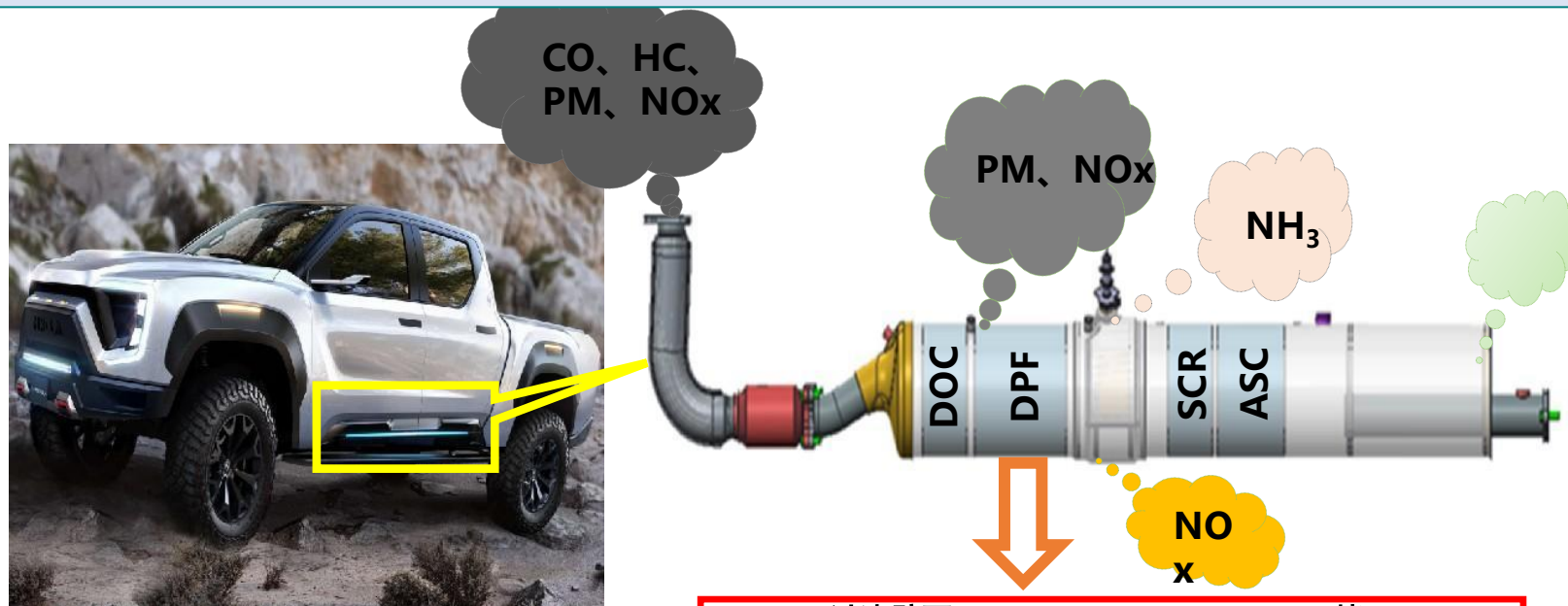
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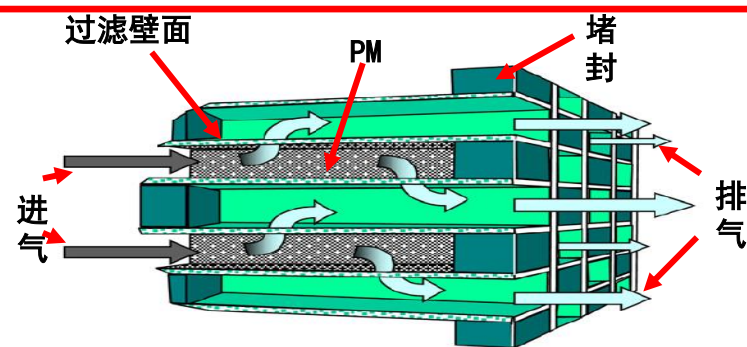
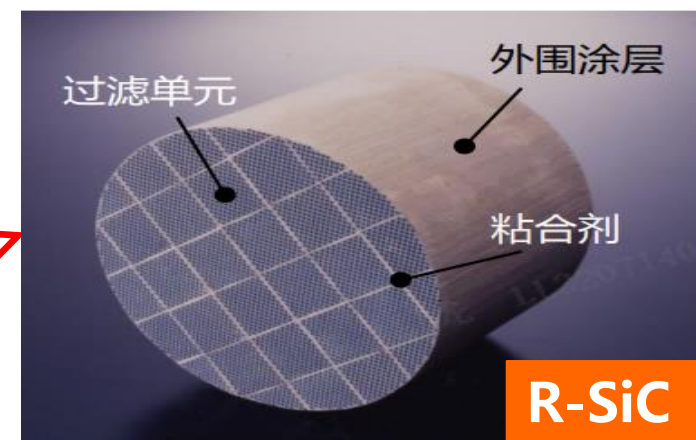
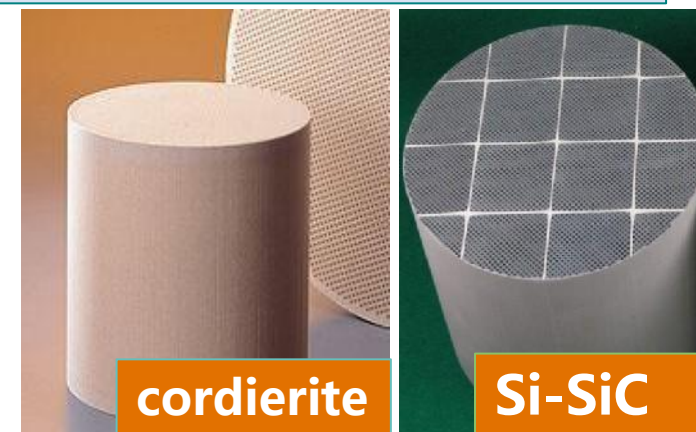
Recrystallized silicon carbide product introduction

Recrystallized silicon carbide product introduction

- At present, the main commercial DPF materials are Cord.(Cordierite), Si-SiC (silicon-based) and R-SiC (recrystallization).

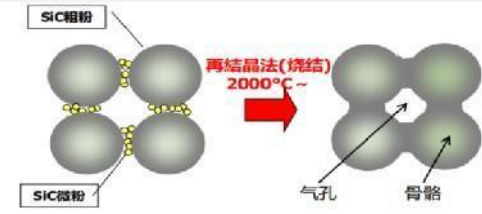
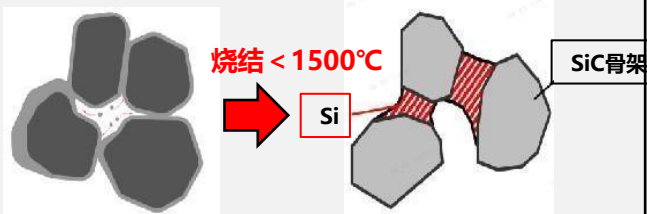
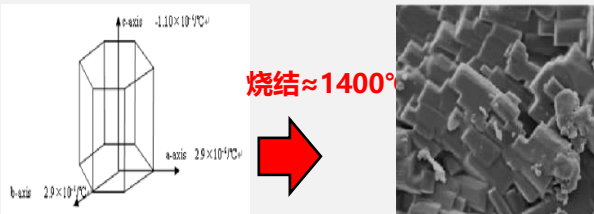
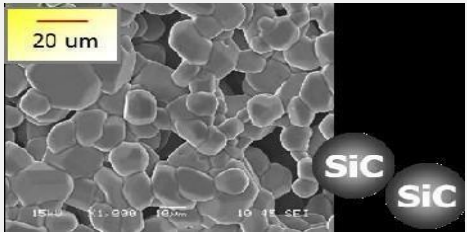
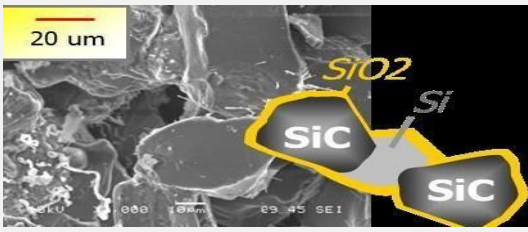
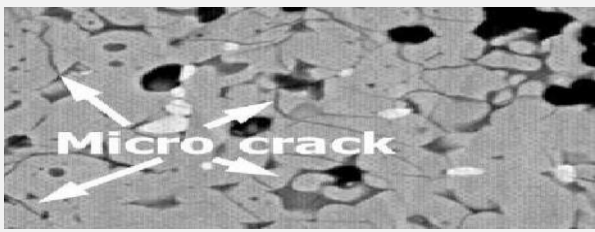


Market mainstream diesel vehicle VI post-processing system



Recrystallized silicon carbide product introduction

- **R-SiC** the advantages of high pore concentration, high thermal conductivity, high mechanical strength, high carbon load, high heat resistance and corrosion resistance.

Material	R-SiC	Si-SiC	Cord.
Formation			
Structure			
Stomatal distribution	d90-d10: 4.9 (均匀)	d90-d10: 10.6	d90-d10: 28.1
heat conductivity W/mk	35.6 (H)	17.5	0.3
mechanical strength MPa	22.3 (H)	16.8	8.2
Carbon loading capacity	H	M	L

Recrystallized silicon carbide product introduction



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The development of R-SiC

2015 Kick off R&D



2022 Sic Mass production

2019 State V Mass production





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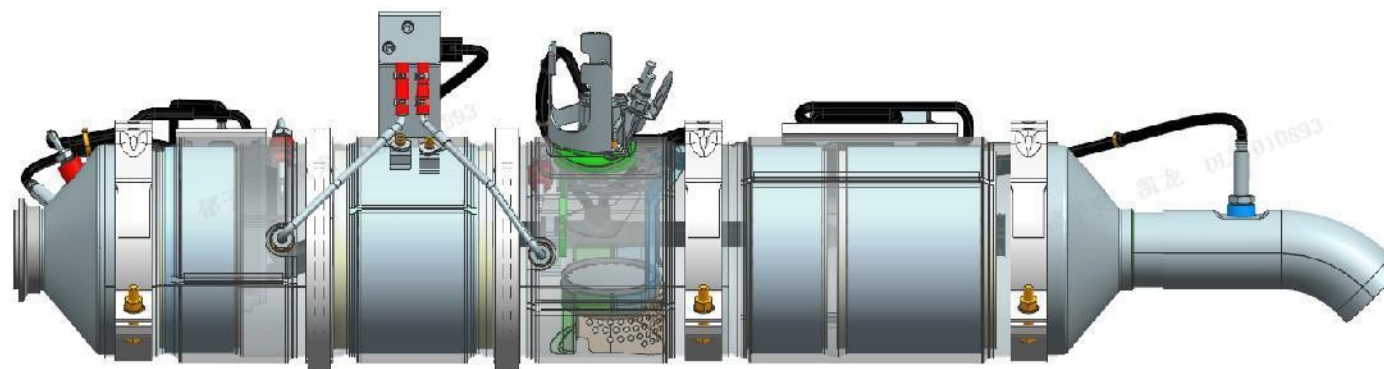


State VI Canning

1.1DOC+DPF+SCR 国VI一字型封装

Overview

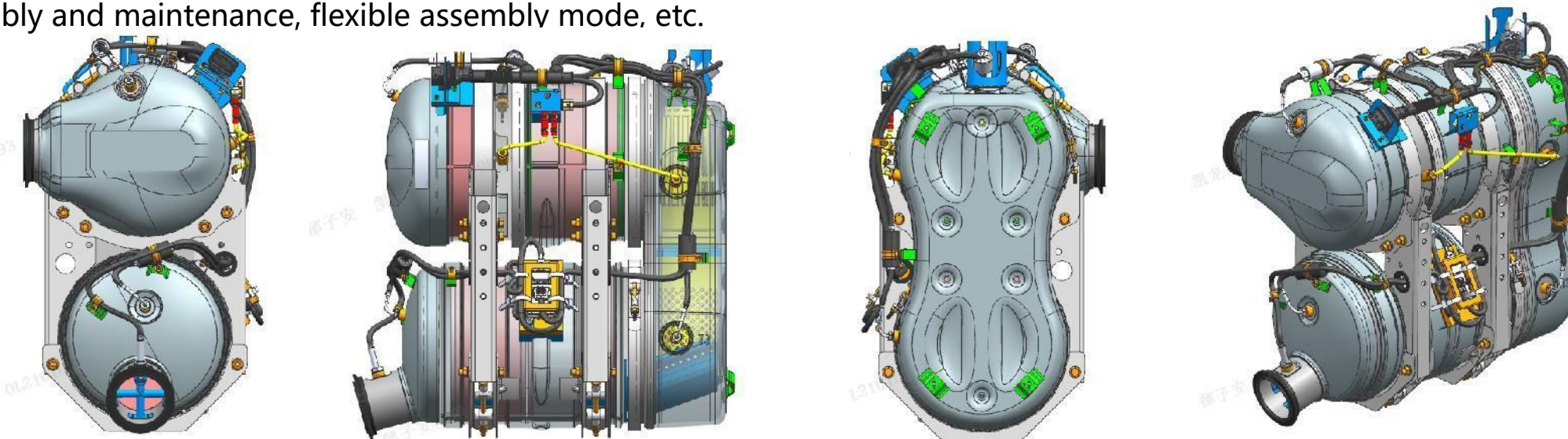
- ◆ The overall shape of the series catalytic muffler for light and medium commercial vehicles is one-shaped, which mainly includes DOC components, DPF components, compact mixers, SCR components, integrated wiring harness components and thermal insulation components. The components are connected in the form of hump tubes and V-hoop. The device has the advantages of compact structure, high conversion efficiency, low back pressure, high wiring harness integration, convenient disassembly and maintenance, etc. Supporting manufacturers: Weichai, Shangchai, Dachai, Futian, Dongfeng, Qingling, Chaochai, etc.



Item	DOC	DPF	SCR
Specification of catalyst	5.66、6.77、7.5、9、10.5	5.66、6.77、7.5、9、10.5	5.66、6.77、7.5、9、10.5

◆ Overview

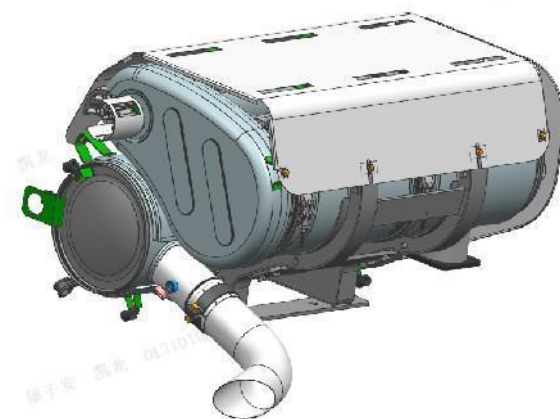
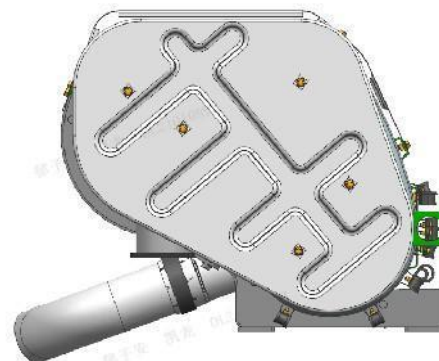
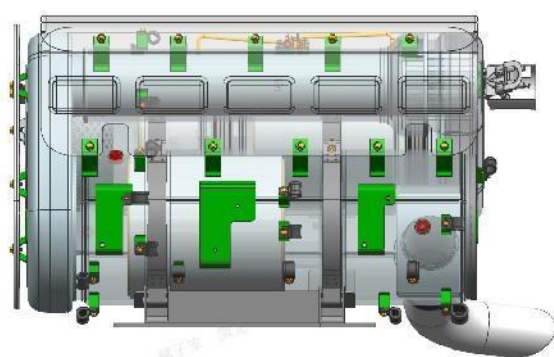
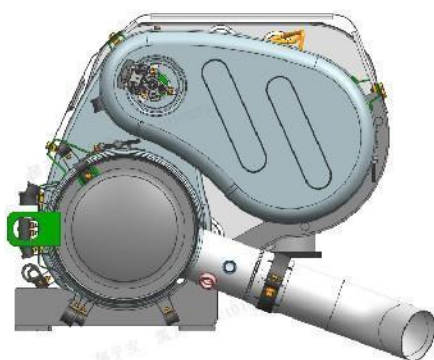
The U-type catalytic muffler for medium and heavy commercial vehicles mainly includes DOC parts, DPF parts, transition section (mixer), SCR parts, high-strength mounting brackets, thermal insulation parts;The device has the advantages of low cost, compact structure, beautiful appearance, high conversion efficiency, low back pressure, excellent thermal insulation effect, convenient disassembly and maintenance, flexible assembly mode, etc.



Item	DOC	DPF	SCR
Specification of catalyst	10.5、 12	10.5、 12	10.5、 12

◆ Overview

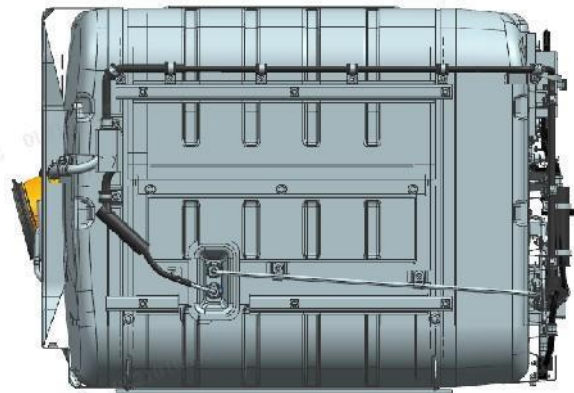
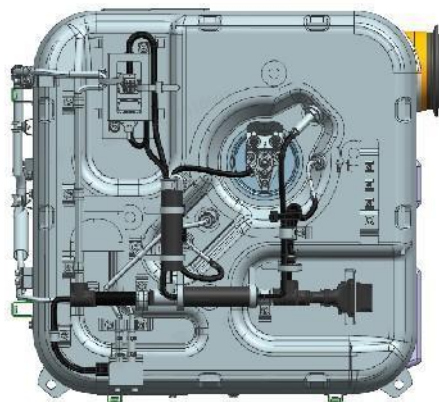
The S-type catalytic muffler for medium and heavy commercial vehicles mainly includes DOC parts, DPF parts, mixers, SCR parts, high-strength mounting brackets, thermal insulation parts and decorative covers;The device has the advantages of compact structure, beautiful appearance, high conversion efficiency, low back pressure, excellent thermal insulation effect, convenient disassembly and maintenance, etc.



Item	DOC	DPF	SCR
Specification of catalyst	10.5、 12	10.5、 12	10.5、 12

◆ Overview

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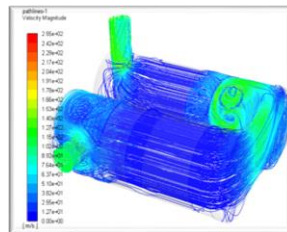
Item	DOC	DPF	SCR
Specification of catalyst	10.5、 12	10.5、 12	10.5

1.5 国六封装能力展示-设计分析



FEA

- Static strength
- mode
- Bellows displacement
- Hook static displacement
- Dynamic stiffness of the hook
- Hook dynamic transmission force
- Thermal fatigue of inlet and outlet trachea
- Random vibration
- Thermo-mechanical coupling
- Harmonic response
- Vibration fatigue
- Strain fatigue



CFD

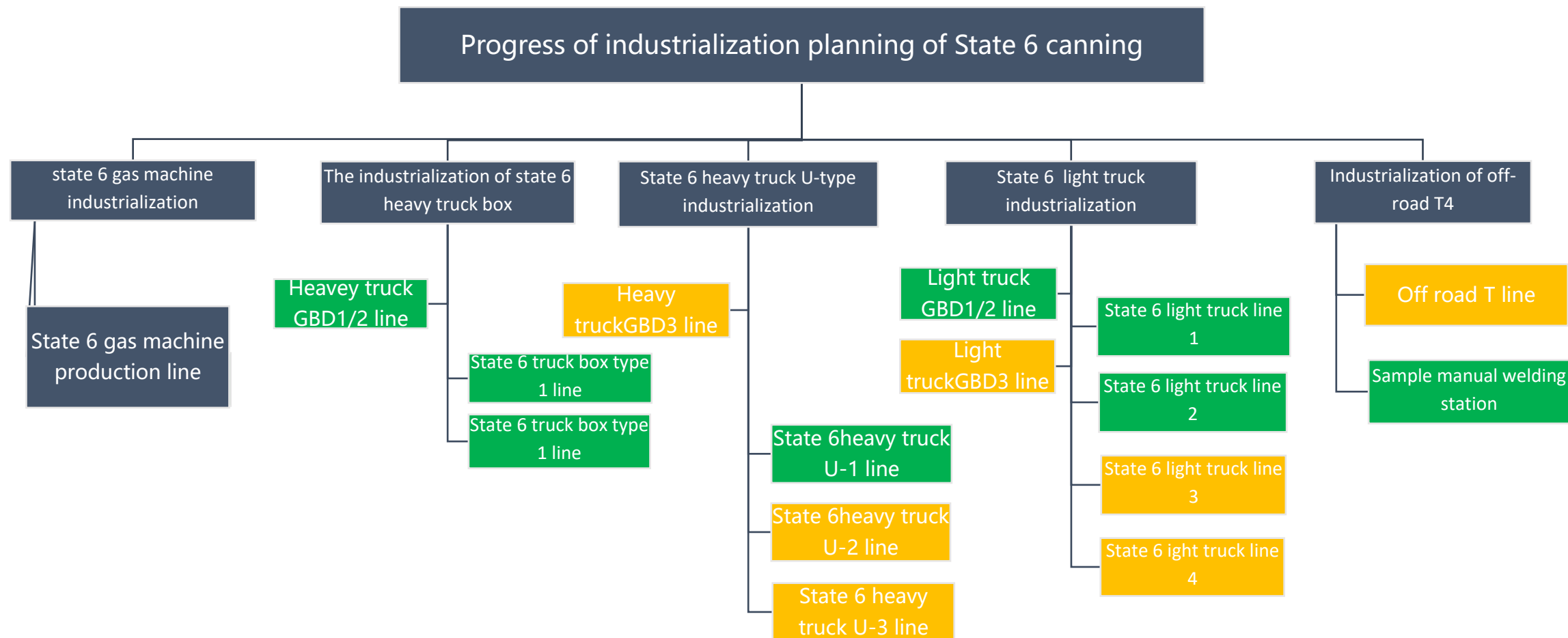
- Back pressure
- Velocity uniformity coefficient
- eccentricity
- Temperature loss at inlet and outlet
- Ammonia uniformity coefficient
- Ammonia gradient
- Crystallization risk
- Sensor position rationality
- Carrier temperature distribution
- Radiation field temperature
- Urea solution filling
- Urea solution thawing



NVH

- Noise measurement
- Temperature test
- Pressure test
- Vibration test
- Dynamic stiffness test
- Free modal testing
- Constrained modal testing
- Vibration path spectrum acquisition
- Strain path spectrum acquisition

2.1 国六封装产线概况





用中国技术 让天空更蓝



Thank you