雷迪特

湖北雷迪特冷却系统股份有限公司

HUBEI RADIATECH AUTO COOLING SYSTEM CO.,LTD

东峻集团成员企业

Content

HBR company profile

- HBR located in economic technical development area known as “Auto City”.
- Covers an area of 100 acres, building area of 35,000 ㎡ .
- It is the subsidiary of Dongjun Group, which was built in 2005.
- Sales revenue over 250M in 2019, Total fixed assets over 98M.
- About 273 employees, specializing in producing AL cooling System production， design, sales. Such as CAC/Rad./ cooling module.
- PSA supplier code: A003IX01, low temperature radiator for Ecmp platform for PSA

I、Project Introduction BTP

项目 Program

OEM: DF Scenery　Pack：LISHEN

Capacity:60kWh

Volume：20000pcs in 3 years

Place of Origin：Wuhan

技术 Technology

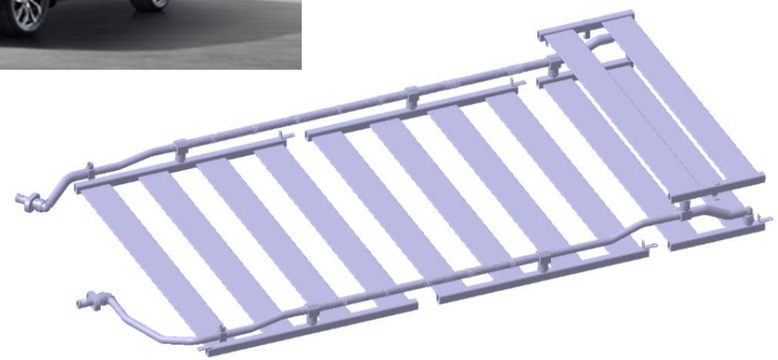
Technics：Harmonica tube is extruded and brazed in one whole piece

Weight:：Pipeline and flange integrated liquid cooling system, lightweight

Function: flow distribution on demand, cell temperature difference ＜5℃

产品 Products

DF Scenery E3



日程 Time Schedule

I、Project Introduction BTP

项目 Program

OEM:ZZNISSAN　Pack：DF Era

Capacity: 69kWh

Volume：40000pcs in 5year

Place of Origin：Wuhan

技术 Technology

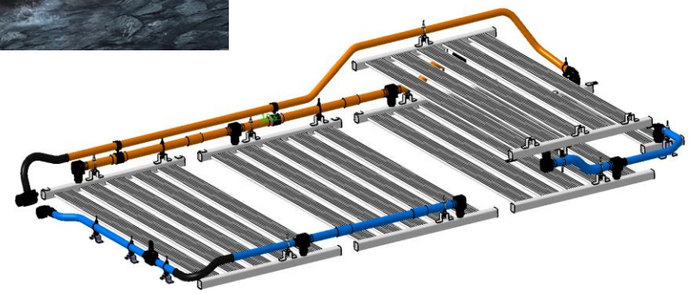
Technics：Harmonica tube is extruded and brazed in one whole piece

Weight:：Pipeline and flange integrated liquid cooling system, lightweight

Function: flow distribution on demand, cell temperature difference ＜5℃

产品 Products

ZZNISSAN 锐骐



日程 Time Schedule

I、Project Introduction BTP

项目 Program

OEM:ZZNISSAN　Pack：DF Era

Capacity:69kWh

Volume：40000pcs in 5years

Place of Origin：Wuhan

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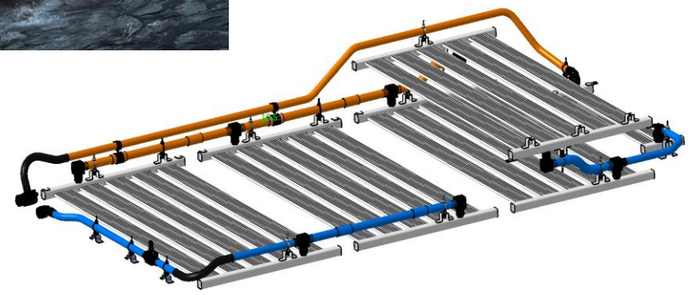
产品 Products

ZZNISSAN 锐骐



日程 Time Schedule

I、Project Introduction BTP

项目 Program

OEM: A high end passenger car in China

SOP: Year 2021

Status: Norminated in year 2020

(1400 * 1900 Big size plate)

Volume: 56000pcs in 7 years

Place of Origin: Wuhan

技术 Technology

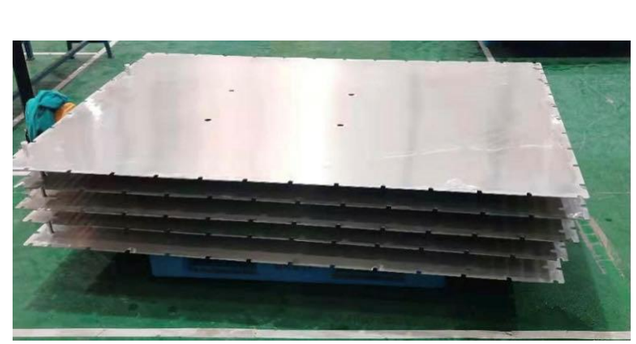
Technics: Flat plate stamping and brazed in one whole piece

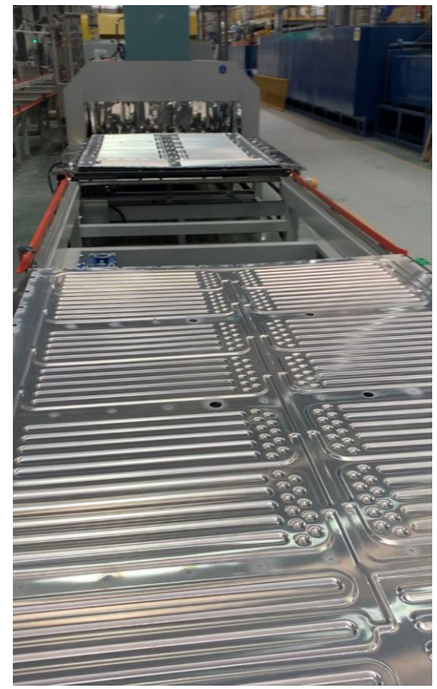
Weight: adopt high strength, high corrosion resistance and lightweight design.

Function: high efficiency uniform temperature design, cell temperature difference ＜5℃

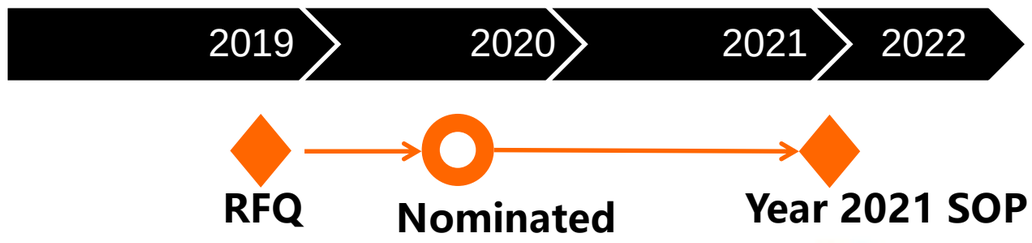
产品 Products

EV Vehicle





日程 Time Schedule



I、Project Introduction BTP

项目 Program

OEM:A domestic vehicle customer

SOP: Year 2021

Status：Norminated in year 2020

（1400 * 1800 big size plate）

Volume：50000pcs in 5years

Place of Origin：Wuhan

技术 Technology

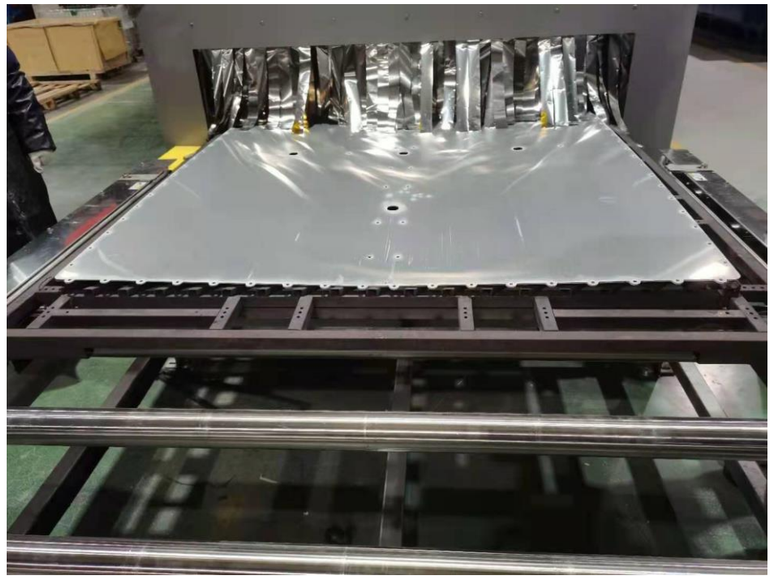
Technics： Flat plate stamping and brazed in one whole piece

Weight: adopt high strength, high corrosion resistance and lightweight design.

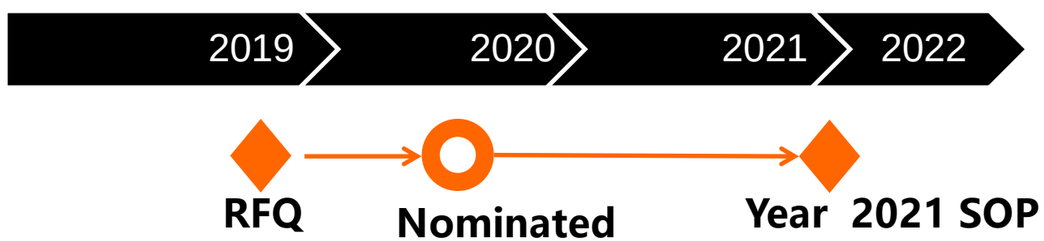
Function: high efficiency uniform temperature design, cell temperature difference ＜5℃

产品 Products

EV Vehicle



日程 Time Schedule



I、Project Introduction BTP

项目 Program

OEM: A domestic vehicle customer

SOP: Year 2021

Status：Norminated in year 2020

（1400 * 1800 big size plate）

Volume：80000pcs in 5years

Place of Origin：Wuhan

技术 Technology

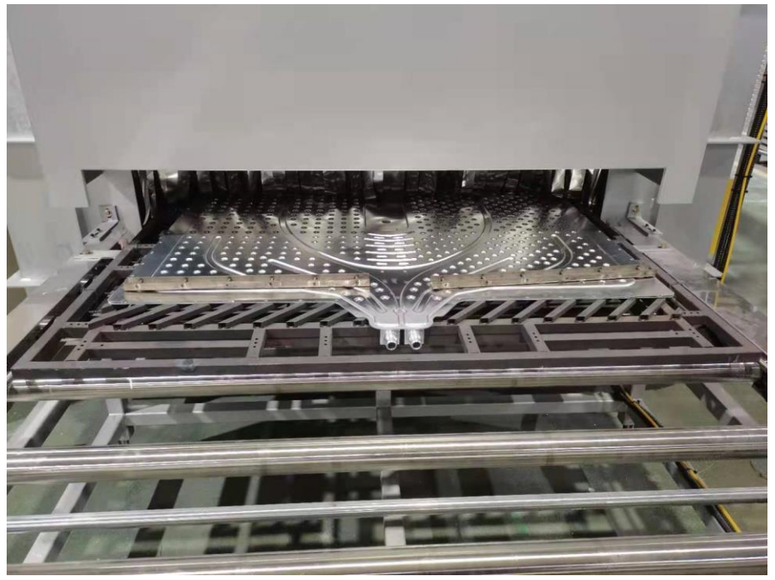
Technics： Flat plate stamping and brazed in one whole piece

Weight: adopt high strength, high corrosion resistance and lightweight design.

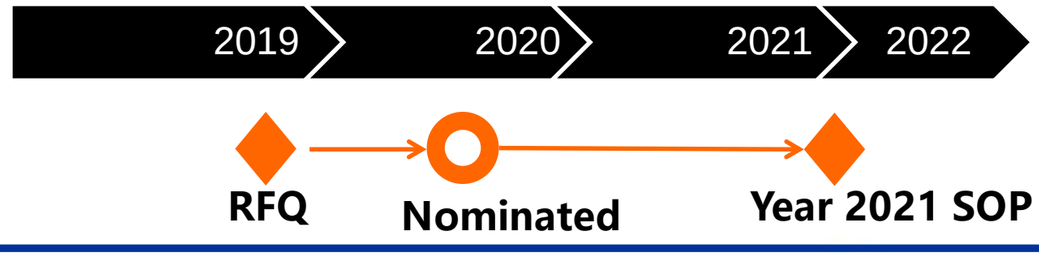
Function: high efficiency uniform temperature design, cell temperature difference ＜5℃

产品 Products

EV Vehicle



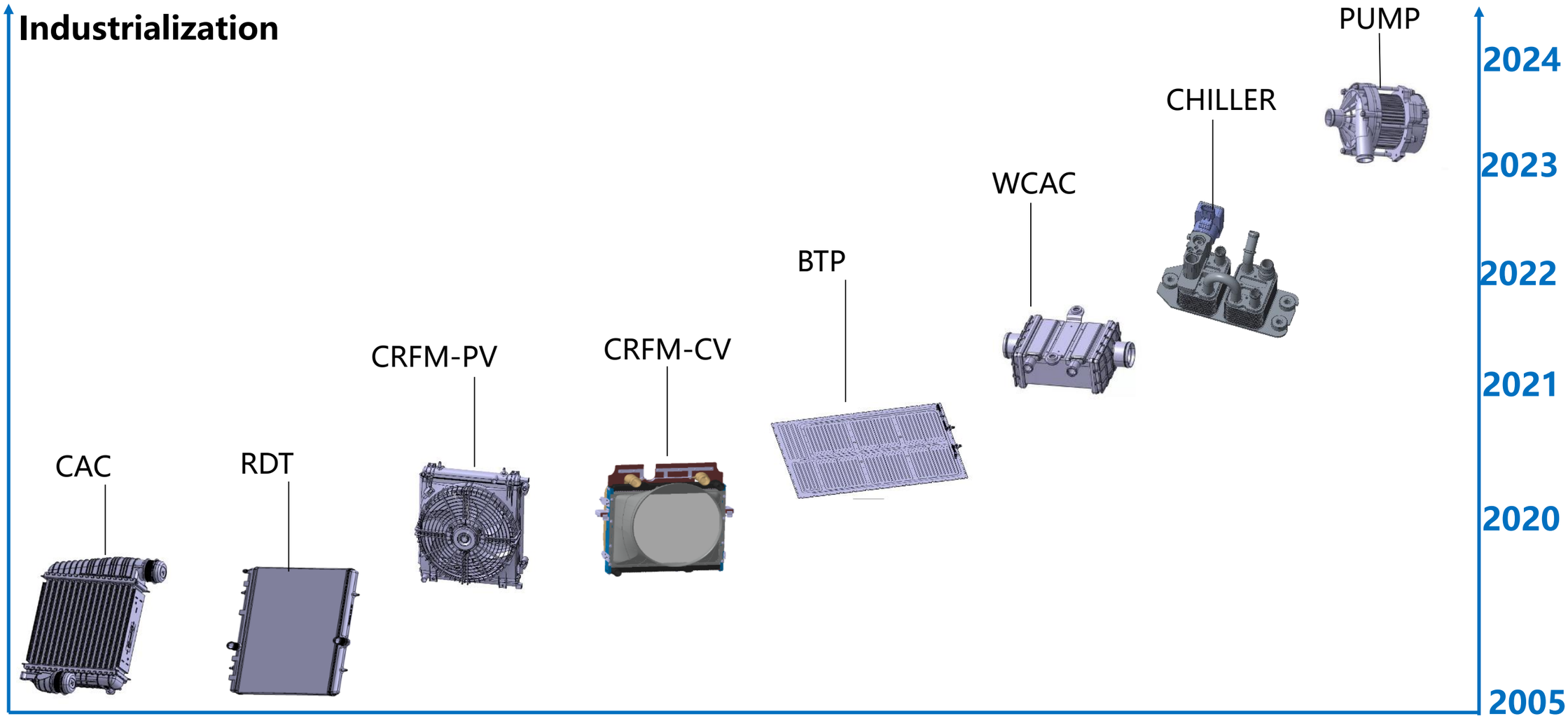
日程 Time Schedule



II、Product Development R&D

Component level:

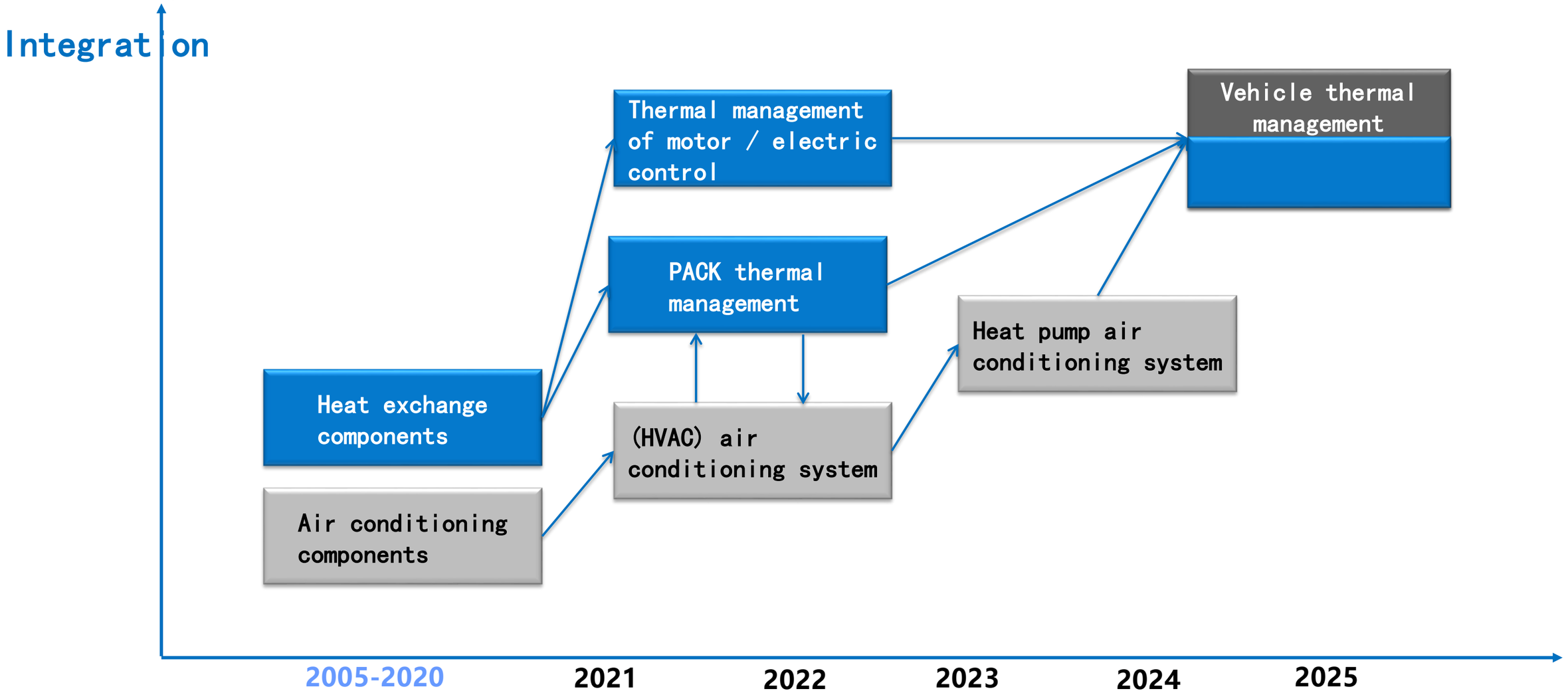
Industrialization



产品 production

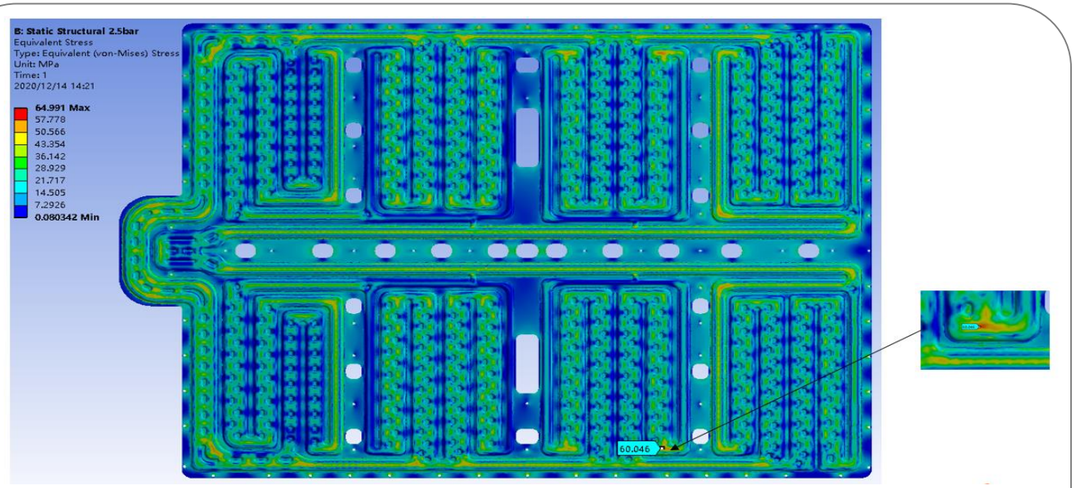
II、Product Development R&D

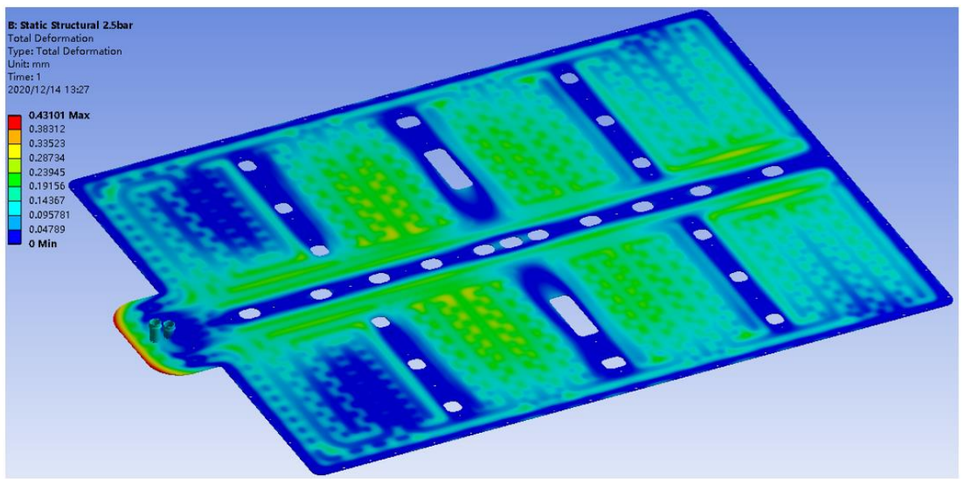
System level：



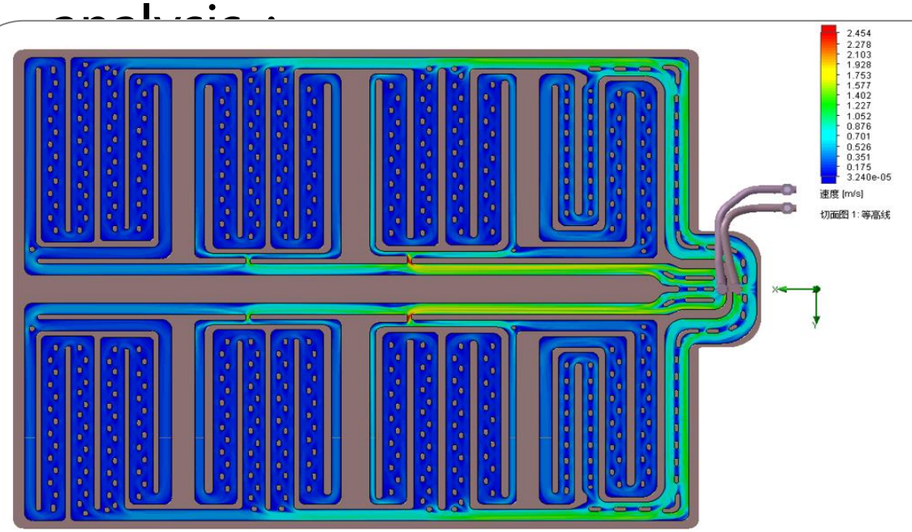
II、Product Development R&D

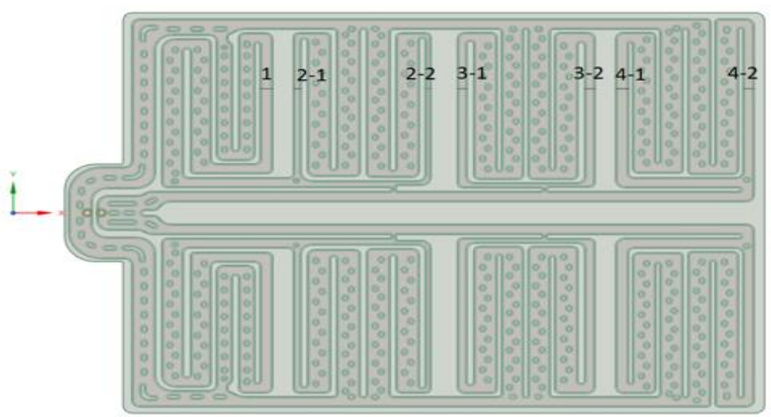
Simulation analysis of internal pressure strength：





Flow field simulation analysis：



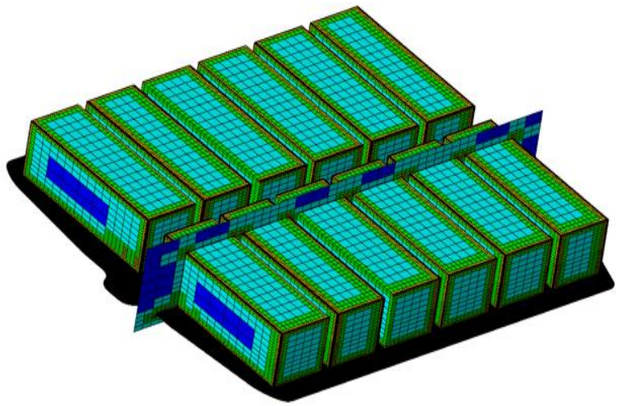


冷却结束后，各流道的流量分布

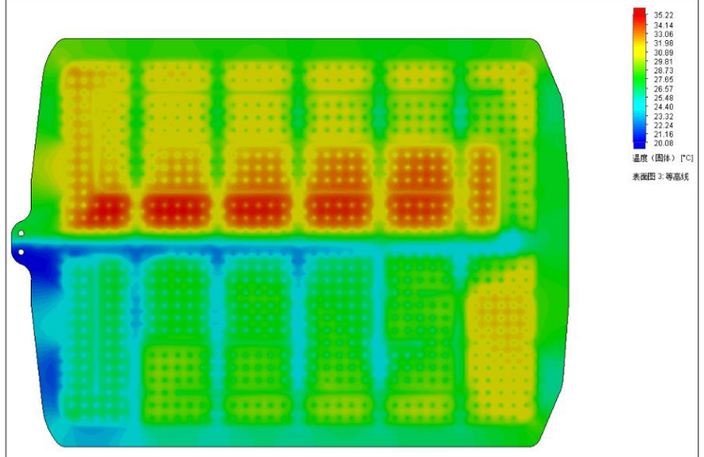
流道	体积流量（L/min）
1	1.49
2-1	1.01
2-2	1.00
3-1	1.01
3-2	1.03
4-1	0.95
4-2	0.99

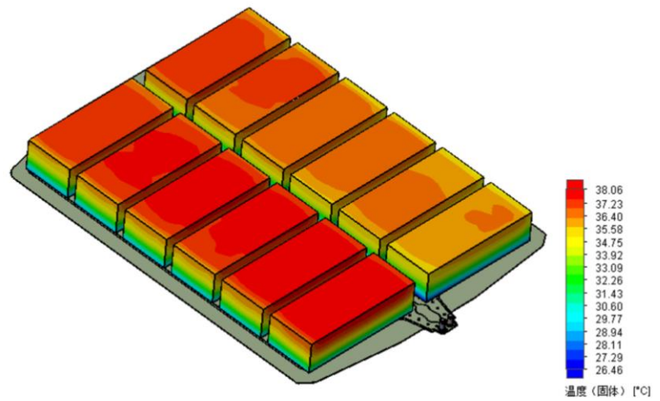
II、Product Development R&D

Simulation analysis of temperature field：



网格模型





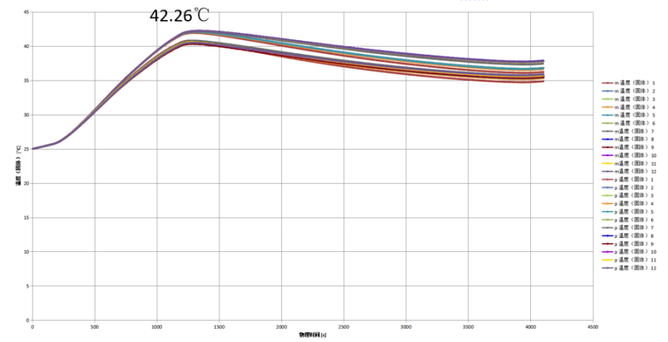
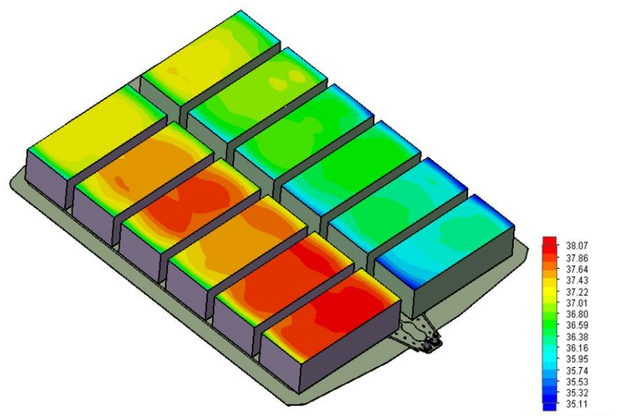


图 6 每个模组监测点的温度随时间变化的曲线



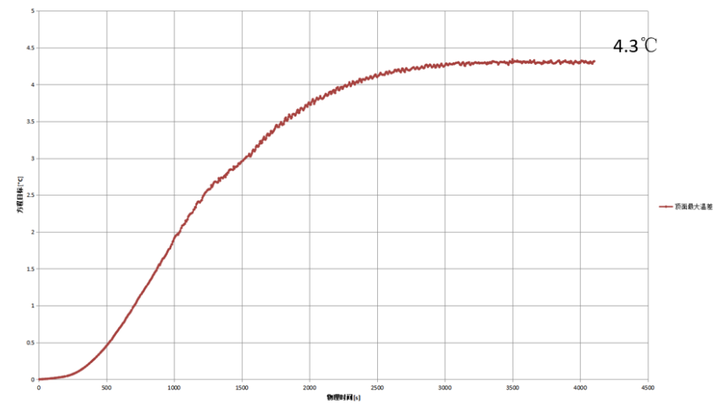
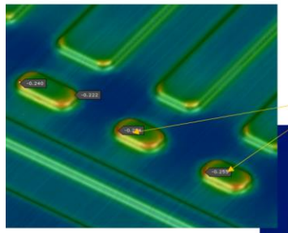


图 7 模组顶面最大温差随时间变化的曲线

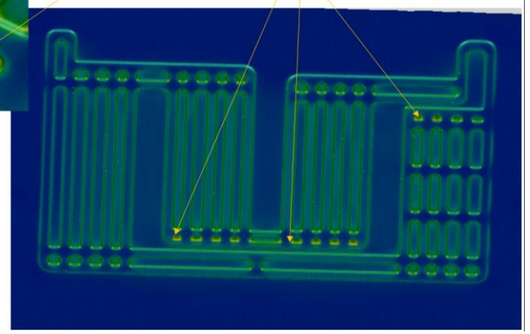
II、Product Development R&D

Stamping simulation：

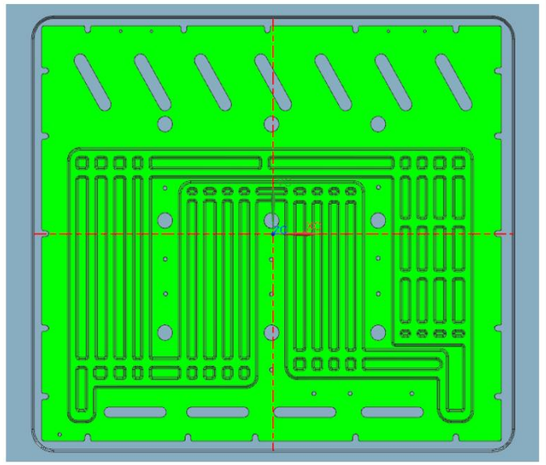
原方案分析



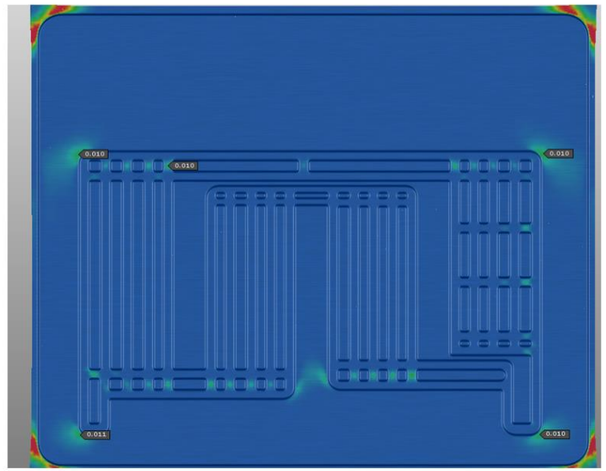
原始数模根部R角均为R2,通过CAE分析，均出现开裂或开裂风险问题,红色区域减薄率>25%，分析结果NG.



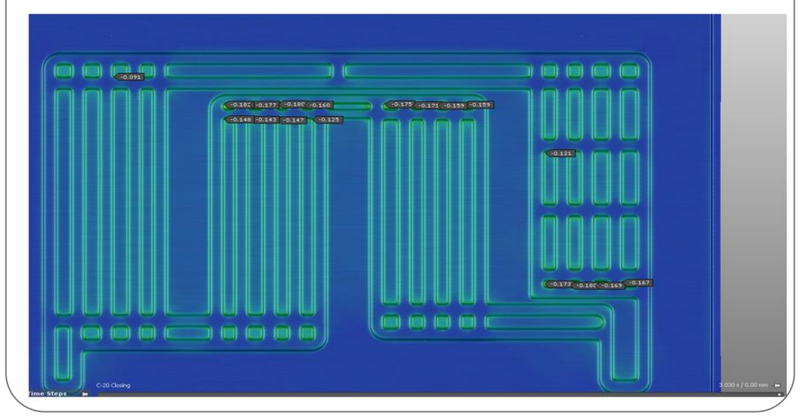
产品工艺补充形状



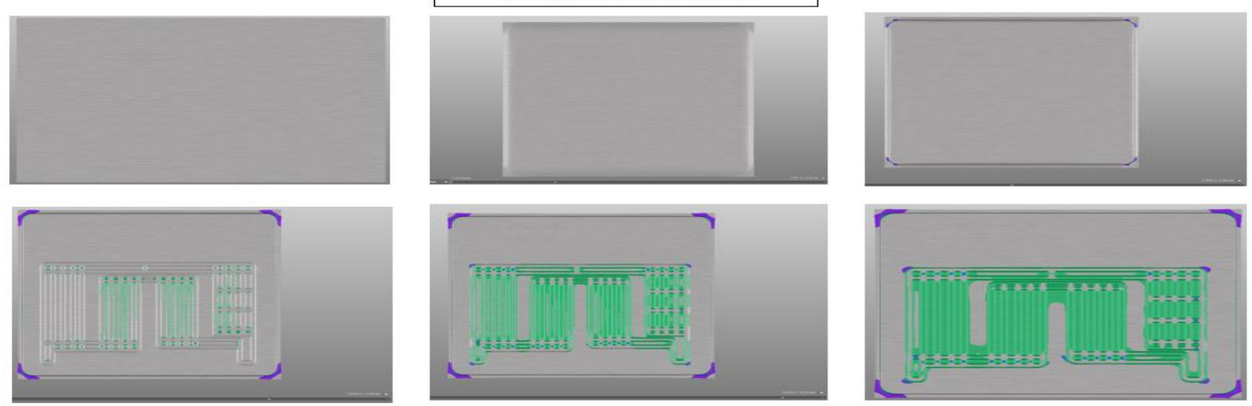
板料起皱变化显示云图



板料变薄率变化显示云图



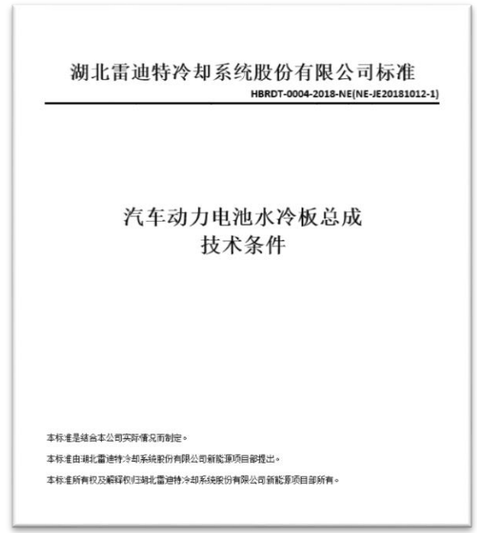
产品成形过程图



II、Product Development R&D

- CNAS approved laboratory;
- Gained two parties Laboratory approval by PSA in Jan.2016
- Cover 1600m2，own inspection and testing equipments over 30sets;
- integrated radiator performance test, intercooler performance test and cooling module test function ;
- Qualified by PSA B22、QC/T468、QC/T828、DFLCJ-1187、DFL-1231、GB/T 31467.3 standard requirements。

液冷板企业标准



湖北雷迪特冷却系统股份有限公司标准

HBRDT-0004-2018-NE(NE-JE20181012-1)

汽车动力电池水冷板总成
技术条件

本标准是结合本公司实际情况而制定。

本标准由湖北雷迪特冷却系统股份有限公司新能源项目部提出。

本标准所有权及解释权归湖北雷迪特冷却系统股份有限公司新能源项目部所有。

中国合格评定国家认可委员会

实验室认可证书

（注册号：CNAS L5318）

兹证明：

湖北雷迪特冷却系统股份有限公司检测室

湖北省武汉经济技术开发区

军山街凤凰工业园凤宁南路2号，430119

符合 ISO/IEC 17025：2005《检测和校准实验室能力的通用要求》（CNAS-CL01《检测和校准实验室能力认可准则》）的要求，具备承担本证书附件所列服务能力，予以认可。

获认可的能力范围见标有相同认可注册号的证书附件，证书附件是本证书组成部分。

签发日期：2018-04-09

有效期至：2024-04-08

初次认可：2011-11-16

中国合格评定国家认可委员会授权人

II、Product Development R&D

Test and verify ability

Temperature cycle test chamber

Climatic &Vibration Test Chamber

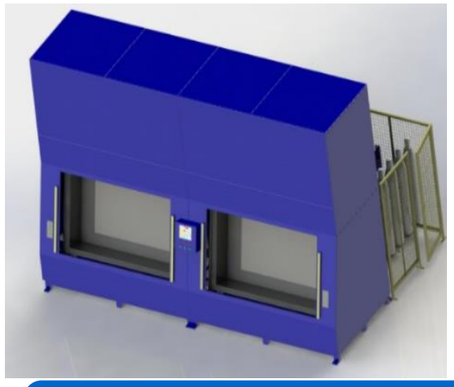
Thermal shock test bench for CAC

Pressure pulse test bench for CAC

CAC Pressure Pulse Bench

SWAAT
Salt Bench

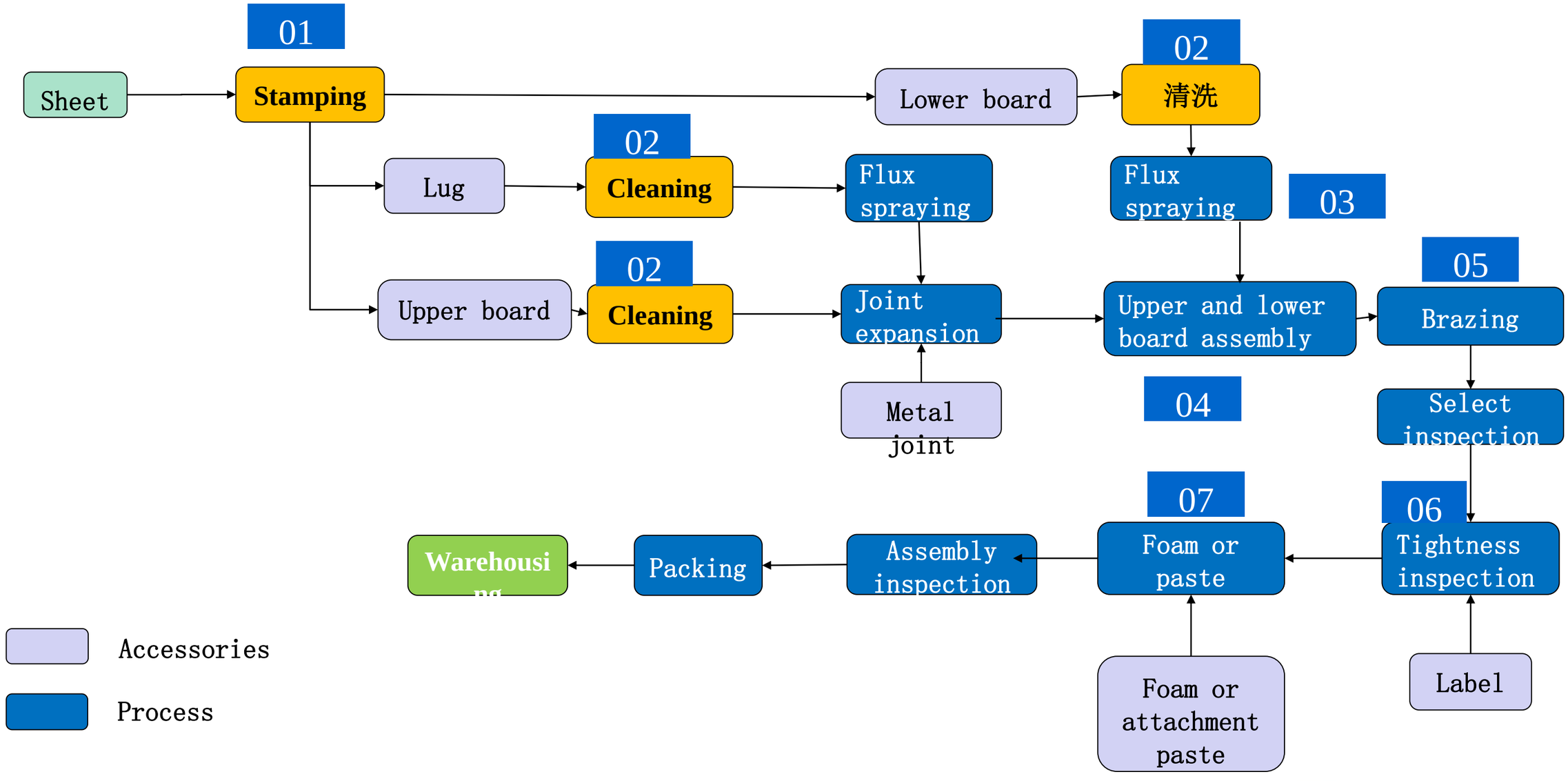
Internal Corrosion Bench



Air Tightness Bench

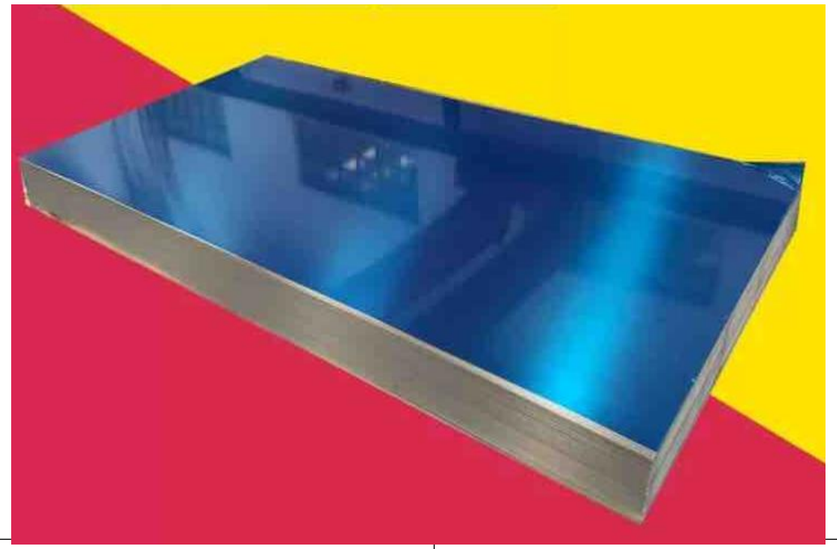
III、Process capacity

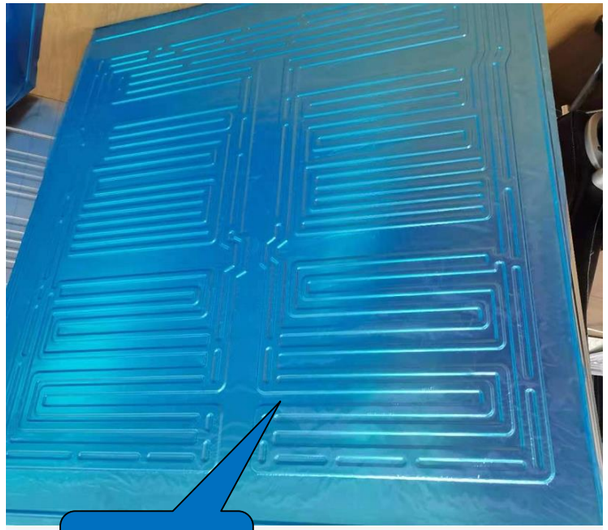
Process flow chart



III、Process Capacity—Key Process

01 Parts stamping (stamping supplier)

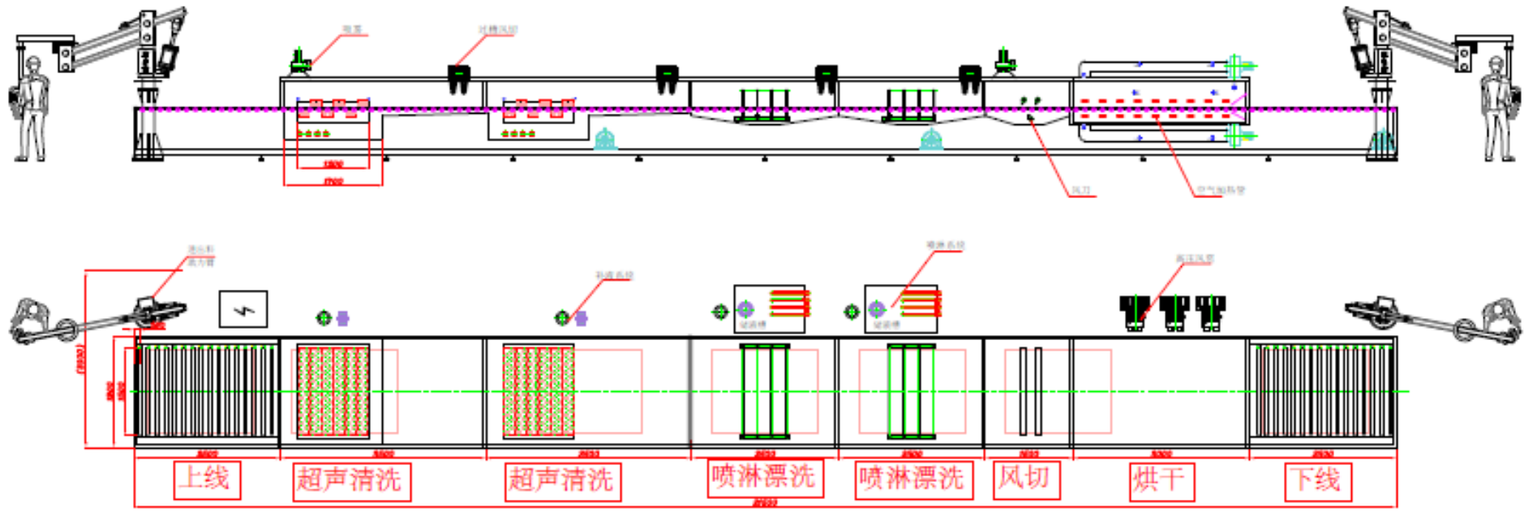




Process	Equiomen\tooling	Process scheme	Control point	Cont	Notes
Parts stamping and forming	Hydraulic Press \Stamping die	Upper board: punching and trimming forming	structure size	Mould solution	Mold specific plan confirmation
			Flatness of welding surface		
			No scratches or sharp corners in appearance	Film stamping	Trimming die to control burrs
		Lower board: forming, shaping, trimming	structure size	Mould solution	
			Flatness of welding surface and thinning of wall thickness		The shaping sequence to control flatness and thinning rate
			No scratches or sharp corners in appearance	Film stamping	Trimming die to control burrs

III、Process Capacity—Key Processs

02 Parts cleaning (pressing supplier)

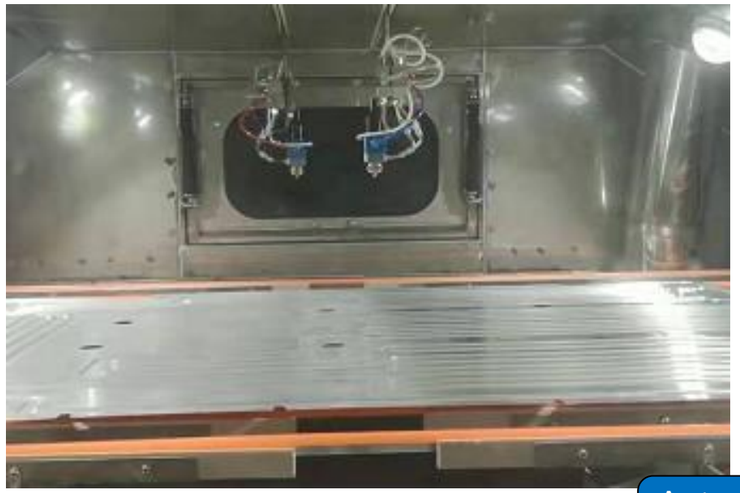


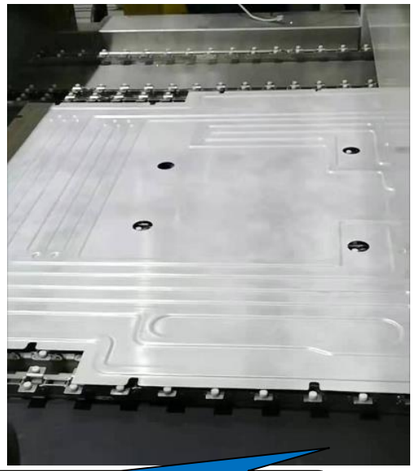
Process	Equipment\Tooling	Process schemes	Control Points	Control Plans	Notes
Parts Cleaning	Continuous cleaning equipment	On-line-ultrasonic cleaning-ultrasonic cleaning-spray rinsing-spray rinsing-wind cutting-drying-offline	Oil-free cleanliness	Cleaning agent selection, cleaning process parameter confirmation	Appearance imprint: water pretreatment of the equipment (purified water machine guarantees no imprint after drying)
			No cleaning agent, impurity adhesion cleanliness	Confirmation of spraying process parameters	
			No scratches or marks on appearance	Spray production line protection	
				no sharp corners and soft materials in the contact parts of equipment and parts	

III、Process Capacity—Key Process

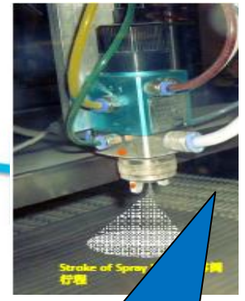
雷迪特

03 Flux Spray





Automatic cleaning of conveyor belt in spraying area



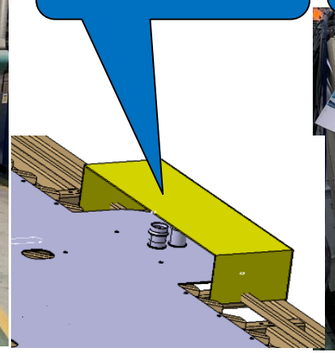
Closed flux storage tank

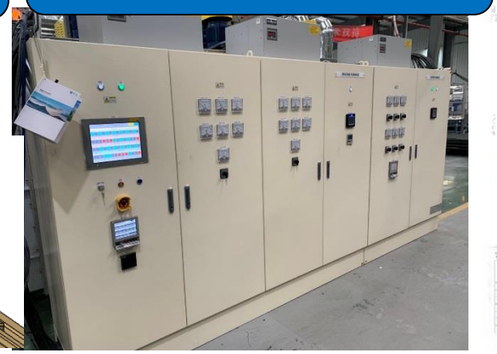
Flux pipeline flow rate, spray gun working pressure control adhesion amount

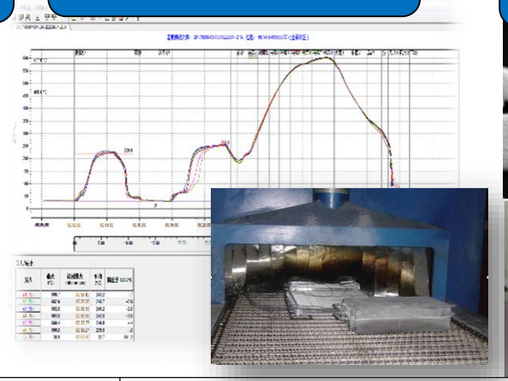
Process	Equipment\tooling	Process schemes	Control Points	Control Plan	Notes
Welder spraying(Lower board composite layer, lower board spraying)	Continuous spraying furnace	Online—(Degreasing and oilfress, cooling waste heat) Preheating—Flux spray—Drying—Air cooling—Offline	Adhesion amount, uniformity (no accumulation, no bottom exposed)	Flux ratio, flux pipeline flow, spray gun working pressure	
				Control of Degreasing temperature and amount of oil stains after degreasing	
			Flux impurity control	Flux delivery channel filter system to prevent dust and large particles from entering	Ensure internal cleanliness after welding
				The flux storage tank is airtight with a stirring mechanism, and the flux stirring storage tank is airtight and automatically refilled	

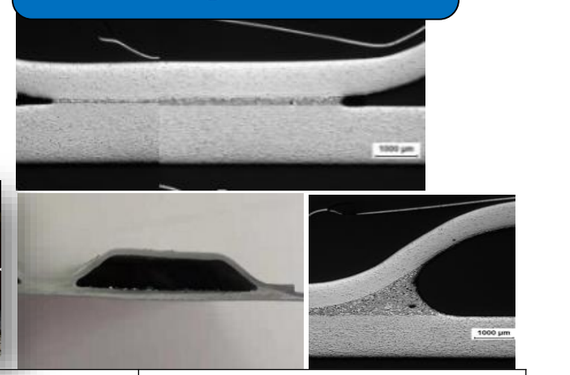
III、Process capacity— Key Process

05 Brazing









Processs	Equipment\Tooling	Process Schemes	Control Points	Control Plans	Notes
Brazing	Brazing furnace \Brazing fixture	1. Clamping of the lower support and upper pressure brazing tray of the flat water-cooled plate 2. Brazing temperature chain speed parameter monitoring, defined according to actual temperature measurement analysis(Setting temperature of the brazing furnace, definite the chain speed, and the temperature monitoring of the welding surface by the thermometer)	Welding surface welding quality	Key process parameter monitoring	Product dissection after welding, metallographic analysis of welding parts, determination of optimal brazing process parameters to ensure brazing reliability
				Special welding fixture design	
			Flatness	Welding fixture design	
			The appearance has no furnace ash, welding slag, yellowing and no big color difference	Regular furnace cleaning and fixture protection	
				Brazing atmosphere control	
			Cleanliness	Metal joint cover protection cover prevents impurities from entering	Cleanliness guarantee

III、Process Capacity—Key Process

06 Tightness inspection (helium inspection)

Helium inspection equipment:

-The maximum size of the detected workpiece can reach: length * width * height (2000*1400*150) mm;

-High leakage rate detection accuracy, detection leakage rate: 5*10-8Pa*m3/s, real-time display of working process, vacuum, pressure, leak rate, qualified or unqualified, and data statistics;

-The equipment has an outflow prevention device for unqualified parts. When the equipment detects unqualified parts, the unqualified parts must be placed in the outflow prevention unqualified area before the equipment can continue to detect the next one.

Process	Equipment\ Tooling	Process Schemes	Control Points	Control Plans	Notes
Tightness inspection	Helium inspection machine\ Sealing plug	1. Effective verification of anti-misjudgment and non-conforming product anti-outflow device 2. Product put in and fixed, one joint sealed and ventilated, the other joint blocked and sealed 3. After passing the inspection, take out the QC seal and take out the unqualified parts after labeling and put them in the unqualified device	Testing requirements	Confirm inspection parameters and equipment parameters	Special sealing plugs for joints
			Unqualified anti-outflow	Effective verification of anti-misjudgment and anti-outflow devices for unqualified products	
				Label unqualified parts with unqualified label, then taken out and placed in the unqualified device	
			No bumps or bulges after inspection	Fixed tooling to prevent dumping and deformation	no bad stamping and welding protrusion after leak test

IV、Quality Management—Key Features

Input technical conditions in project development stage, combined with past experiences and lessons databases, use FMEA library to develop the preliminary design ideas. After engineering review in design output stage, a list of products special features will be output, with the aim to control during process design. The output process special characteristics list together with the product special characteristics list will be controlled by the characteristic control table matrix QA/QB table after passing the review in process design stage. (Refer to NISSAN ANPQP 4.3)

ANPQP - QA表A

适用车型/总成：风光580	**力神重要零部件** ☐ A ☑ B ☐ C ☐ OBD	**Renault - CSR** S ☑ 1 ☐ R ☐ 2 ☐	表单管理No./修改No.： 表单修改日： 初版表单编制日：
供应商名称：湖北雷迪特冷却系统股份有限公司 供应商工厂名称：武汉工厂		供应商编号： 编制：	E-mail： 电话号码：
零部件名称：水冷板总成 零部件编号/发行等级： 设计通知No./DEVO：		备注：	

构成零部件名称	附图No	部位 No	部位名称	特性名	设计中央值	公差	管理等级	超过公差时引起的不良
口琴管		1	口琴管	缩口宽度尺寸			P	1）造成水冷板装配工序挤管、装配不良及水冷板外观不良 2）造成后续钎焊工序水冷板整体偏斜等问题，焊接不良及外观不良
		1	口琴管	总长尺寸 缩口长度尺寸			P	1）造成水冷板芯高超差
		1	口琴管	长轴尺寸 短轴尺寸			P	1）造成水冷板装配工序挤管、装配不良及水冷板外观不良 2）造成后续钎焊工序焊接不良
		1	口琴管	孔数 孔宽尺寸			P	1）影响散热性能 2）影响水阻
集流管		2	集流管	冲孔长轴尺寸 冲孔短轴尺寸	短轴：5	2) （+0.03，+0.1）	P	1）造成水冷板装配工序挤管、装配不良及水冷板外观不良 2）造成后续钎焊工序焊接不良

IV、Quality Management—Key Features

Input technical conditions in project development stage, combined with past experiences and lessons databases, use FMEA library to develop the preliminary design ideas. After engineering review in design output stage, a list of products special features will be output, with the aim to control during process design. The output process special characteristics list together with the product special characteristics list will be controlled by the characteristic control table matrix QA/QB table after passing the review in process design stage. (Refer to NISSAN ANPQP 4.3)

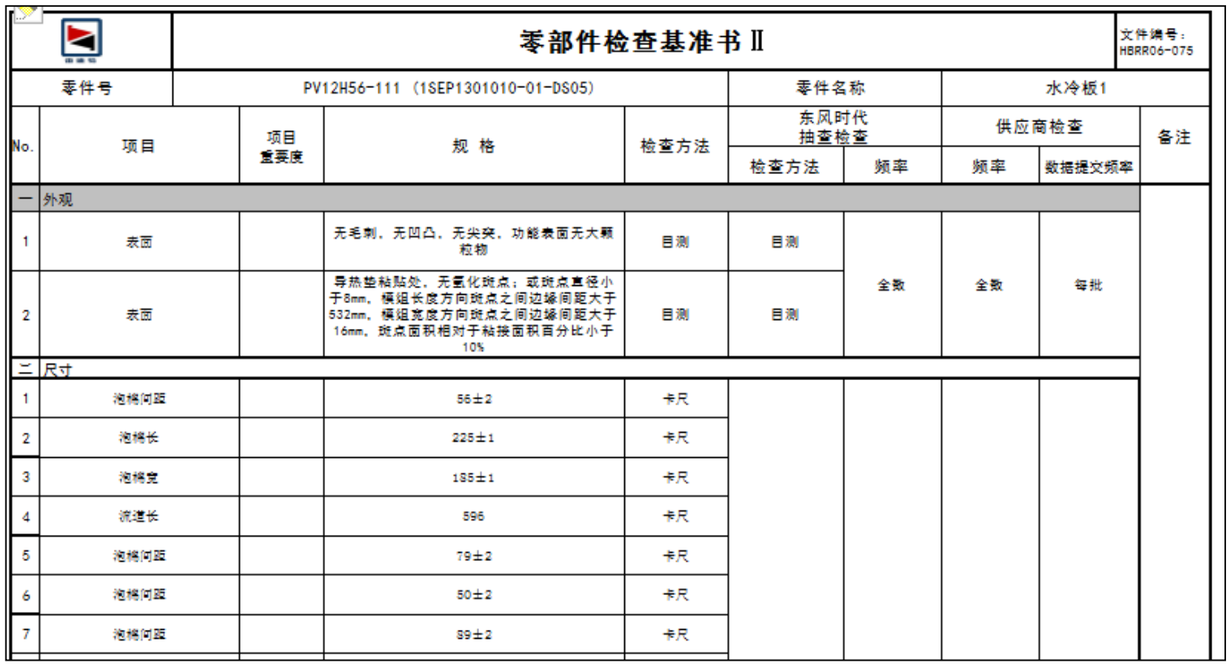
发生情况：
连:连续发生
突：突发

发生保证工程
〇发生工程
◎保证工程

区分	工程	工程名称	特定	发生地点	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	产品特性	工艺
				重要度	●	●	●	●	●	●	●	●	●	●	◑	●	●	●	◑
				编号															
				项目	缩口宽度尺寸	缩口长度尺寸	总长尺寸	长轴尺寸 短轴尺寸	孔宽尺寸 孔数	冲孔短轴尺寸 冲孔长轴尺寸	冲孔间距	圆孔尺寸	密封面外径尺寸	内径尺寸	长宽尺寸	芯高尺寸	安装尺寸	安装尺寸	口琴管装配尺寸	钎剂涂覆
本工程		进料检验			◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎					
		芯体装配														○	○	○	○	
		涂覆焊剂																		○
		金属接头装配																		
		水冷板钎焊																		
		水冷板挑选																		
		点焊支架															○	○		
		氦检																		
		水冷板总成打标																		
		终检															◎	◎		
		总成包装																		
		总成存储																		
		出货审核																		
		运输																		
		交付																		
	工程能力		VC-LOT		≥1	≥1				≥1	≥1									/
			PT		≥1.67	≥1.67				≥1.67	≥1.67									p<0.005
			量产CPK		≥1.33	≥1.33				≥1.33	≥1.33									p<0.002
	测量精度				0.01	0.01				0.01	0.001									/
	问题发生情况																			

IV、Quality Management—Key Features

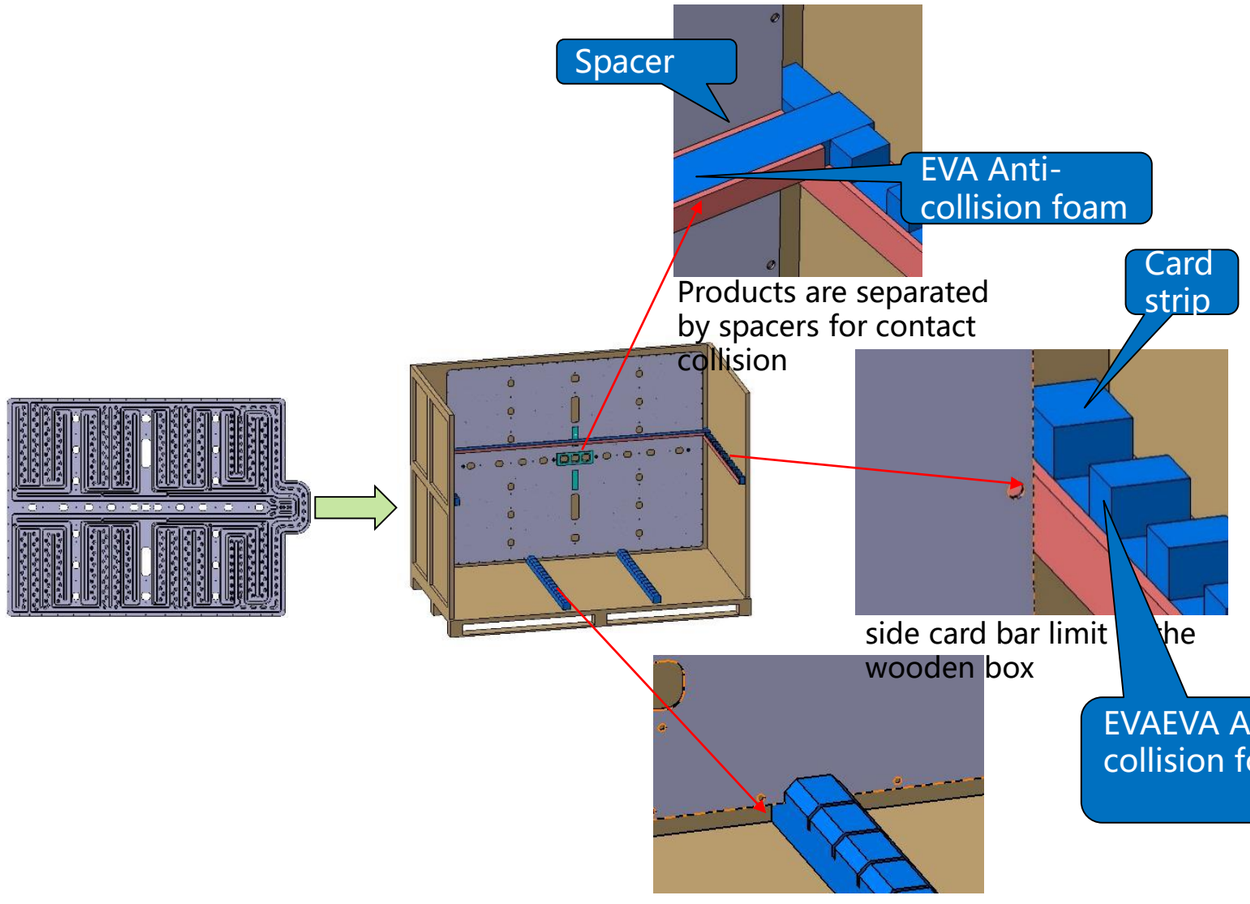
Assembly inspection



零部件检查基准书Ⅱ									文件编号：HBRR06-075
零件号		PV12H56-111 （1SEP1301010-01-DS05）			零件名称		水冷板1		
No.	项目	项目重要度	规 格	检查方法	东风时代抽查检查		供应商检查		备注
					检查方法	频率	频率	数据提交频率	
一	外观								
1	表面		无毛刺，无凹凸，无尖突，功能表面无大颗粒物	目测	目测	全数	全数	每批	
2	表面		导热垫粘贴处，无氧化斑点；或斑点直径小于8mm，横组长度方向斑点之间边缘间距大于532mm，横组宽度方向斑点之间边缘间距大于16mm，斑点面积相对于粘接面积百分比小于10%	目测	目测				
二	尺寸								
1	泡棉间距		56±2	卡尺					
2	泡棉长		225±1	卡尺					
3	泡棉宽		185±1	卡尺					
4	流道长		596	卡尺					
5	泡棉间距		79±2	卡尺					
6	泡棉间距		50±2	卡尺					
7	泡棉间距		89±2	卡尺					

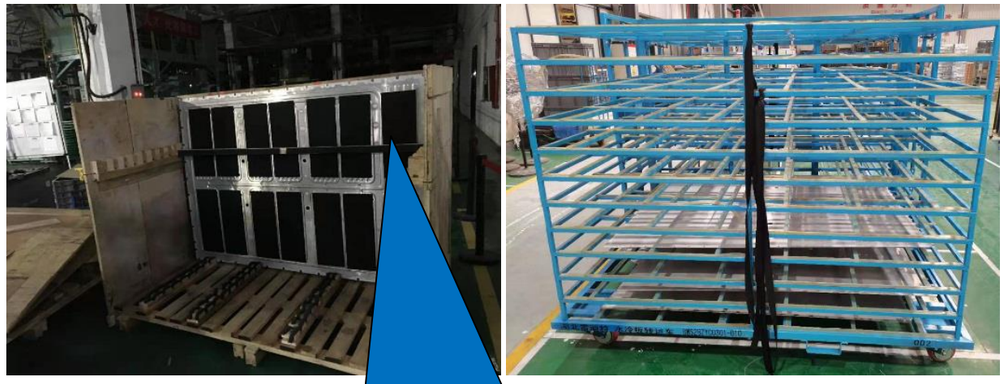
Process	Equipment\ Tooling	Process Schemes	Control Points	Control Plans	Notes
Assembly inspection	\	1. Visual inspection 2. Sealing inspection mark 3. Size of structure ,mounting hole, connection joint 4. Flatness	Inspection of key dimensions (size, appearance, tightness)	Inspection records according to inspection standards	
			Flatness	Three-coordinate detection	

V、Packing and Delivery



Packing	Size	Qty of packing	N.W.	G.W.
Wooden Box	1945*1080*1500	15PCS	237KG	362KG

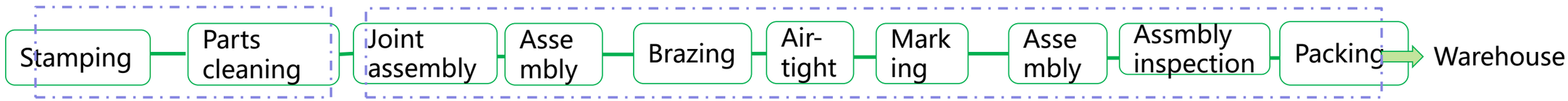
Similar product packaging case

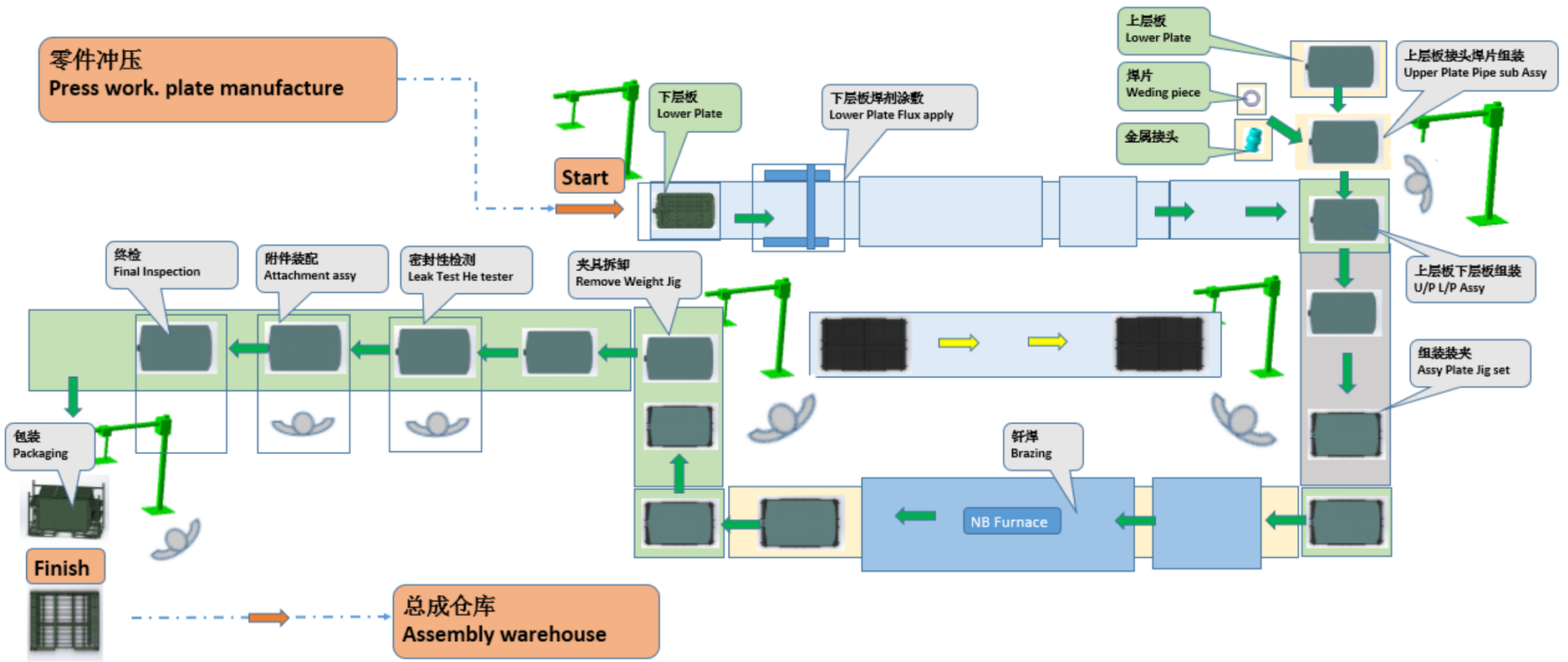


Packing	Size	Qty of Packing	N.W.	G.W.
Wooden Box	1940*1080*1500	18PCS	343KG	468KG

VI、Capacity Foresee

Production line layout drawing





Planned to build a production line in the same period with capacity up to 300,000 units/year at the end of 2021, reserve production sites and bring in automated equipment, with a production capacity up to 500,000 units/year at the same time.