

Radici Engineering Plastic

---- A Key Partner in Auto Market

兰蒂奇工程塑料

---- 汽车工业重要合作伙伴

许晓东

市场开发经理

2014.3.27 上海

Contents

主要内容



- ❑ **RadiciGroup Introduction**
兰蒂奇集团简介
- ❑ **Case Histories in Auto Market**
兰蒂奇工程塑料在汽车行业的应用
- ❑ **Product Innovation and Technical Support**
产品创新与技术支持

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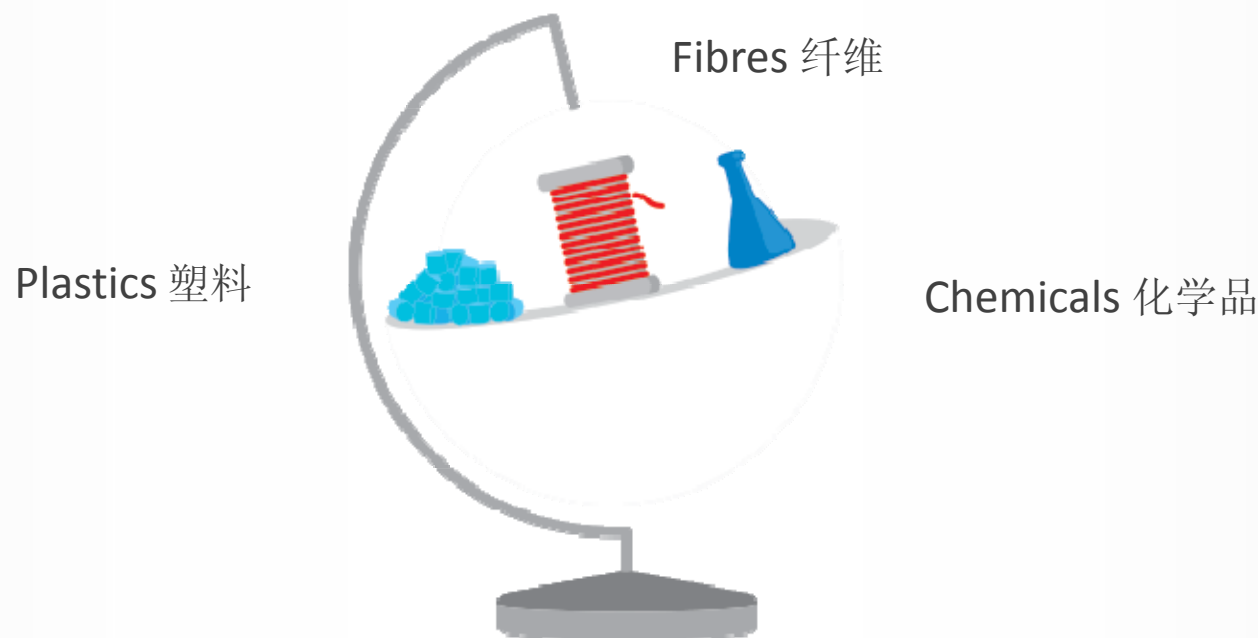
RadiciGroup World

兰蒂奇集团



RadiciGroup is based in Europe and operates globally in diversified businesses focusing on:

兰蒂奇集团总部设在欧洲，多元化业务遍及全球，主要集中在以下几个领域：



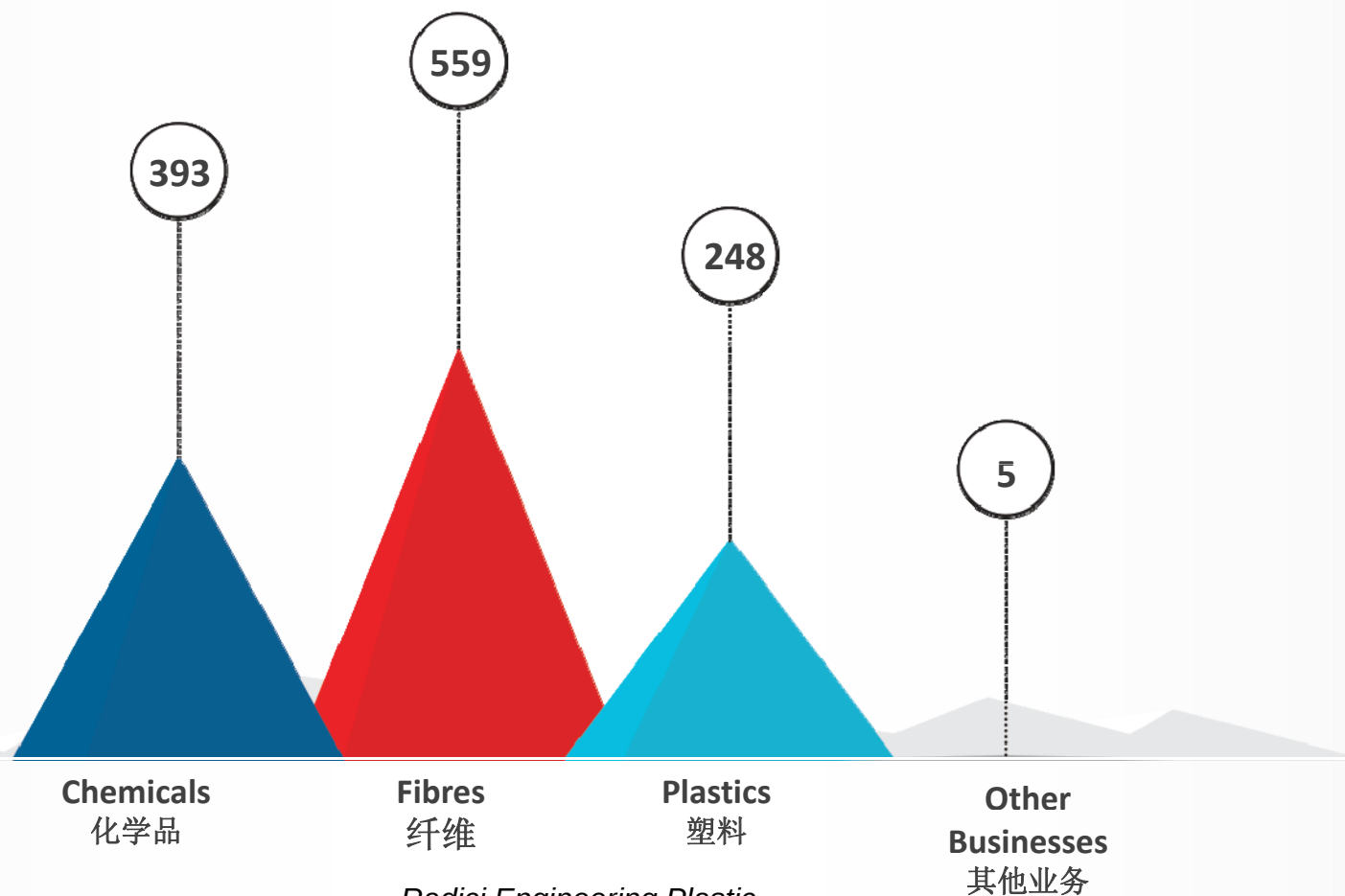
Key RadiciGroup Numbers

兰蒂奇集团关键数据



Personnel: 3,200 employees
员工总数: 3200人

2012 Aggregated Sales (millions of euros)
2012年销售总额 (百万欧元)



March 27, 2014

Radici Engineering Plastic

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RadicGroup Worldwide Presence

兰蒂奇集团全球布局

RADICI
GROUP

AMERICAS 美洲

Argentina 阿根廷

Buenos Aires

Rio Grande

Brazil 巴西

Araçariguama

São José dos

Campos

USA 美国

Wadsworth

ASIA 亚洲

China 中国

Shanghai

Suzhou

India 印度

Noida

EUROPE 欧洲

Czech Republic 捷克

Podborany

France 法国

Saint Priest

Germany 德国

Hamburg

Lüneburg

Overath

Reutlingen

Selbitz

Tröglitz

Viernheim

Hungary 匈牙利

Szentgotthard

Italy 意大利

Andalo

Valtellino

Ardesio

Casnigo

Chignolo

d'Isola

Gandino

Novara

Trivero

Villa d'Ogna

Romania 罗马尼亚

Savinesti

Spain 西班牙

La Carolina

Switzerland 瑞士

Mendrisio

Stabio

United Kingdom 英国

London



March 27, 2014

Radici Engineering Plastic

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Synergy & Integration: Production Units

聚酰胺上下游一体化：生产基地



PA66, ADIPIC ACID 己二酸,
NITRIC ACID 硝酸, SALT 66,
HEXAMETHYLENE DIAMINE 己二胺

PA6

ADIPIC ACID 己二酸,
NITRIC ACID 硝酸,
CYCLOHEXANOL 环己醇,
CYCLOHEXANONE 环己酮



Radici Chimica SpA
Novara - IT



Radici Fil
Casnigo – IT

Radici Yarn
Villa d'Ogna - IT



Radici Chimica
Deutschland GMBH
Zeitz - DE

Synergy & Integration: Production Capacity

聚酰胺上下游一体化：生产能力



195
KTons

ADIPIC ACID 己二酸
Radici Chimica SpA
Novara – IT

**Radici Chimica
Deutschland**
GMBH, Zeitz – DE

90
KTons

PA66
Radici Chimica SpA
Novara – IT

45
KTons

HMDA 己二胺
Radici Chimica SpA
Novara – IT

110
KTons

PA6
Radici Yarn,
Villa d'Ogna – IT

Radici Fil
Casnigo - IT

RadiciPlastics Worldwide Presence

兰蒂奇塑料全球布局



EUROPE 欧洲

France 法国

Radici Plastics France SA

Germany 德国

Radici Plastics GmbH

Italy 意大利

Radici Novacips SpA
Villa d'Ogna

Radici Novacips SpA
Chignolo d'Isola

United Kingdom 英国

Radici Plastics UK Ltd-

ASIA 亚洲

China 中国

Radici Plastics (Suzhou) Co., Ltd.

India 印度

Radici Plastics Modi P. Ltd.

AMERICAS 美洲

Brazil 巴西

Radici Plastics USA
Ltda.

USA 美国

Radici Plastics USA Inc.

Global Manufacturing Presence

全球改性工厂分布



AMERICAS 美洲



Radici Plastics USA Inc.
USA



Radici Plastics Ltda
BRAZIL

EUROPE 欧洲



Radici Novacips SpA
Villa d'Ogna – ITALY



Radici Novacips SpA
Chignolo d'Isola– ITALY



Radici Plastics GmbH -
GERMANY

ASIA 亚洲



Radici Plastics (Suzhou) Co.,
Ltd.
CHINA

Investment in fast-growing regions. Application development support worldwide.

在经济高速增长地区追加投资，支持全球应用开发

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Automotive sectors

汽车各组成部分

Under the bonnet

发动机罩内部件

- Cooling & Heating system 冷却&热系统
- Air Intake system 进气系统
- Fuel System 燃油系统
- Oil Circuit 润滑油路
- Valve & Beauty Covers 气门&引擎装饰盖
- Fan/Shrouds 风扇/护罩

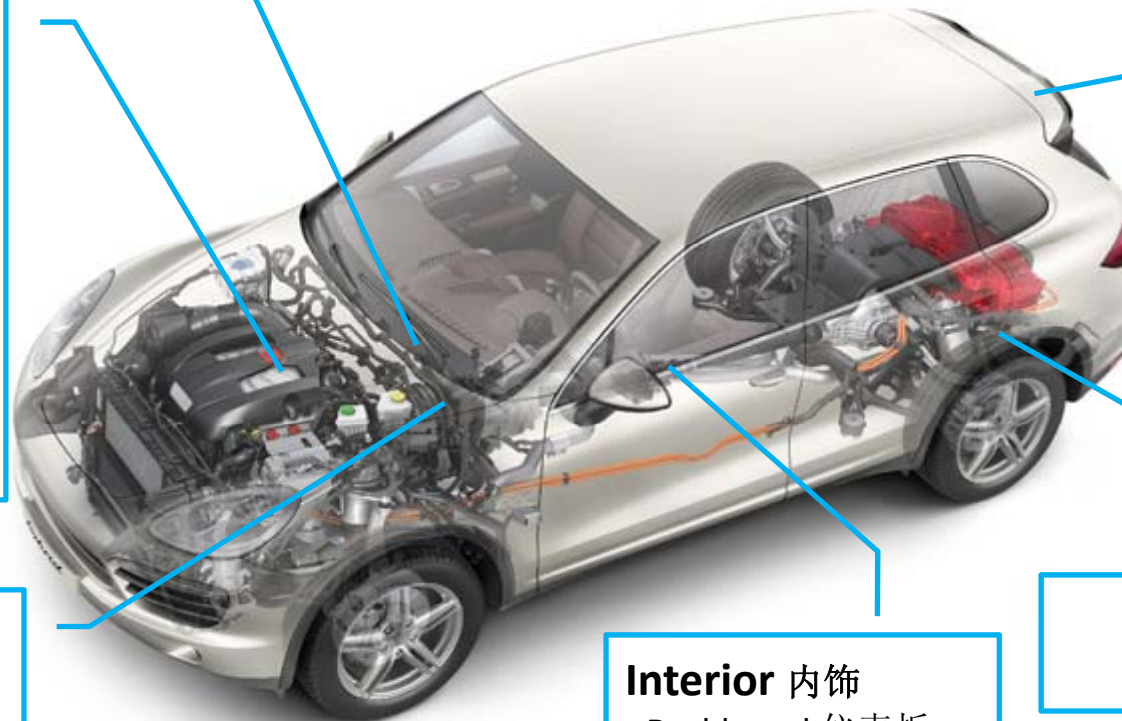
Electric / Electronic parts
电子电器

Exterior
外饰

Transmission and Gearshift
传动和变速系统

Interior 内饰
• Dashboard 仪表板
• Other 其他

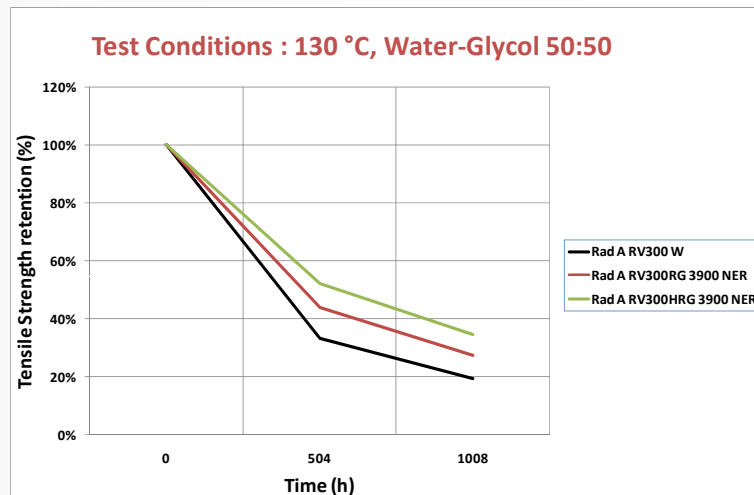
Fuel System
燃油系统



Under bonnet – C&H system

发动机罩内部件 – 冷却&热系统

- **Cooling pipes and connections** 冷却管路及接头
- **RADILON A RV300RG Black**
RADILON A RCV3015RKC
- WIT / GIT technology 水辅/气辅技术
- Superior hydrolysis resistance 优异的耐水解性能



Under bonnet – Air Intake system

发动机罩内部件 – 进气系统



- **Air Intake Manifold 进气歧管**
- **RADILON S RV(300÷350)W Black (PA6)**
RADILON A RV(300÷350)W Black (PA66)
- **Process: Injection Molding + Vibration Welding**
工艺: 注塑成型+振动摩擦焊接
- **Heat stabilization 热稳定性**

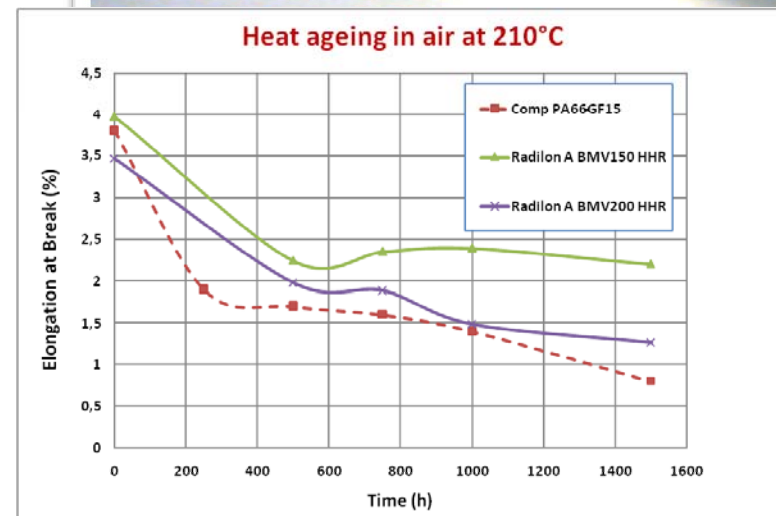


Under bonnet – Air Intake system

发动机罩内部件 – 进气系统

- **Hot side Turbo Air Ducts**
涡轮增压管热端
- **RADILON A BMV150HHR**
Black
- Process: 3D Suction Blow Molding 工艺: 3D抽吸吹塑
- Superior Heat Stabilization (HHR), maintains good mechanical properties until 210°C of CUT.

优异的热稳定性(HHR), 长期工作温度210°C下仍能保持良好的机械性能。



Under bonnet – Air Intake system

发动机罩内部件 – 进气系统



- **Air Resonator Box**
空气谐振腔
- **RADILON A N66MG19HSL Black**
ALSO SUITABLE (FOR HIGHER T)
RADILON A RV350HHR Black
- **Process: Injection Molding + Welding**
工艺：注塑成型+焊接



Under bonnet – Fuel system

发动机罩内部件 – 燃油系统



- **Fuel Rail 油轨**
- **RADILON A RV350W Black**
- Process: Injection Molding
工艺：注塑成型
- Heat stabilized 热稳定性



- **Quick Connectors for Fuel lines**
燃油管路快速接头

- **RADILON D RV300W Black**
RADILON D CF150W Black
- This application requires good properties retention after heat ageing, good chemical resistance and dimensional stability. 该应用要求良好的热老化后性能保持率，良好的耐化学腐蚀性能，以及尺寸稳定性



Under bonnet – Fuel system

发动机罩内部件 – 燃油系统



- **Fuel Filler Pipe** 加油管
- **RADILON S BMX200K 333 BK**
- Blow molding grade, heat stabilized
吹塑级材料，热稳定性
- Excellent fuel resistance and low permeation
优异的耐燃油性能及低渗透率



- **Fuel Filters Media**
燃油过滤器介质
- **RADILON A 24E**
- **RADILON S 24E**
- Filament extrusion
grades 长丝挤出级

Under bonnet – Fuel system

发动机罩内部件 – 燃油系统



- **Fuel Vapour Corrugated Pipes**
燃油蒸汽波纹管
- **RADILON D 40EP25ZW Blue**
RADILON D EP25ZW
- New renewably-sourced Radilon® D PA610 based grades
可再生Radilon® D PA610基材料
- Barrier effect (permeability) 良好的燃油阻隔性
- Chemical resistance 耐化学腐蚀
- Heat ageing prop. Retention 良好的热老化性能保持率
- Cold impact 耐低温冲击



Under bonnet – Oil circuit 发动机罩内部件 – 润滑油路



- **Oil Filter Support Assembly**

机油滤清器总成

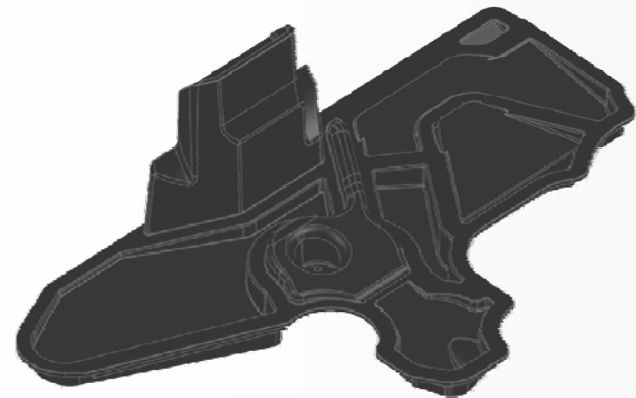
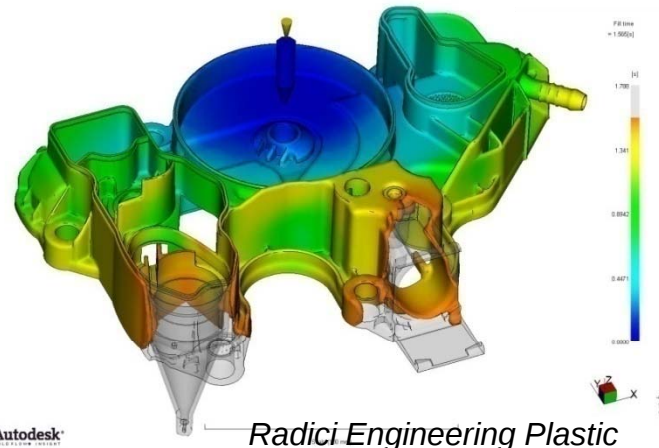
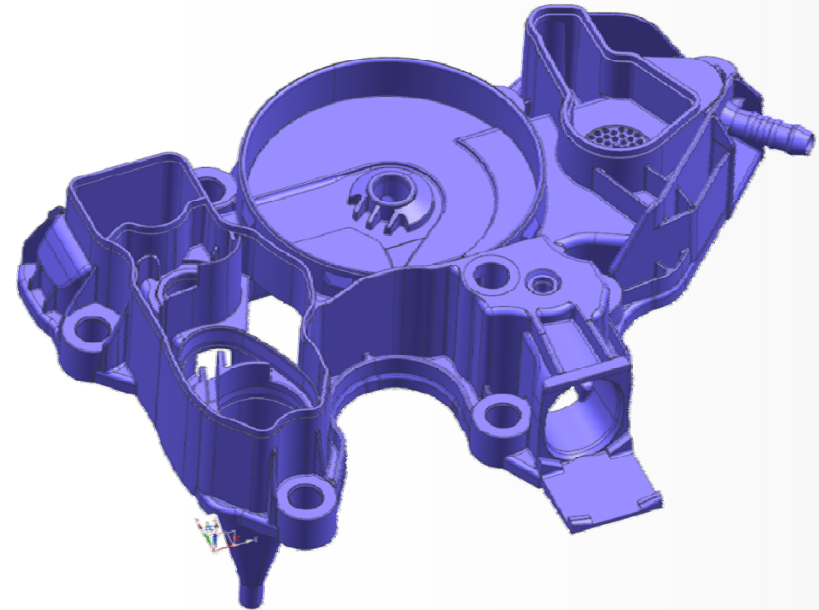
- **RADILON S RV300W Black**

- Process: Injection Molding 工艺: 注塑

- Heat stabilized 热稳定性

- CAE MoldFlow® support for optimizing mold due to complex shapes

应用Moldflow优化模具结构



March 27, 2014

Autodesk

Radici Engineering Plastic

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Under bonnet – Oil circuit

发动机罩内部件 – 润滑油路



- **Oil Pipe Components** 油管零件
- **RADILON S RV350W Black**
- Process: Injection Molding of parts, assembly by Hot riveting and Vibration Welding
工艺：注塑成型，热铆及振动摩擦焊装配
- Pressurized oil at high temperature, Fatigue loads
高温油压等疲劳载荷
- CAE support for ensuring structural suitability for the application
CAE分析用于确保产品结构满足要求

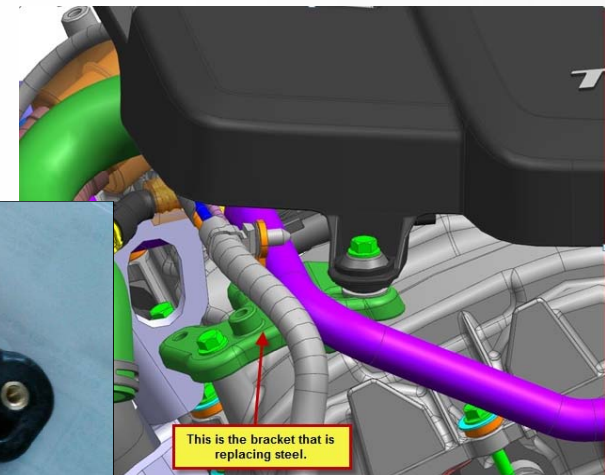
Under bonnet – Various

发动机罩内部件 – 发动机周边部件

- **Cam Covers** 气缸罩盖
- **RADILON A RV350W 333 BK**
- Resistance to motor oil 耐机油
- Good surface aspect 外观良好



- **Engine Support Bracket**
引擎支架
- **RADILON A RV500RW 339 Black**
- Metal Replacement grade 金属替代材料
- High mechanical resistance 良好的力学机械性能



Under bonnet – Engine beauty covers

发动机罩内部件 – 引擎装饰盖



- **Engine Cover** 引擎装饰盖
- **RADILON S RCP3010LW Black**
- Very good moldability and surface aspect 良好的加工性能及外观
- Good dimensional stability 良好的尺寸稳定性
- Paintability 良好的喷涂性能



Under bonnet – Engine beauty covers flame retardant 发动机罩内部件 – 阻燃级引擎装饰盖



- **Engine cover Flame Retardant (V-0)**

V0阻燃级引擎装饰盖

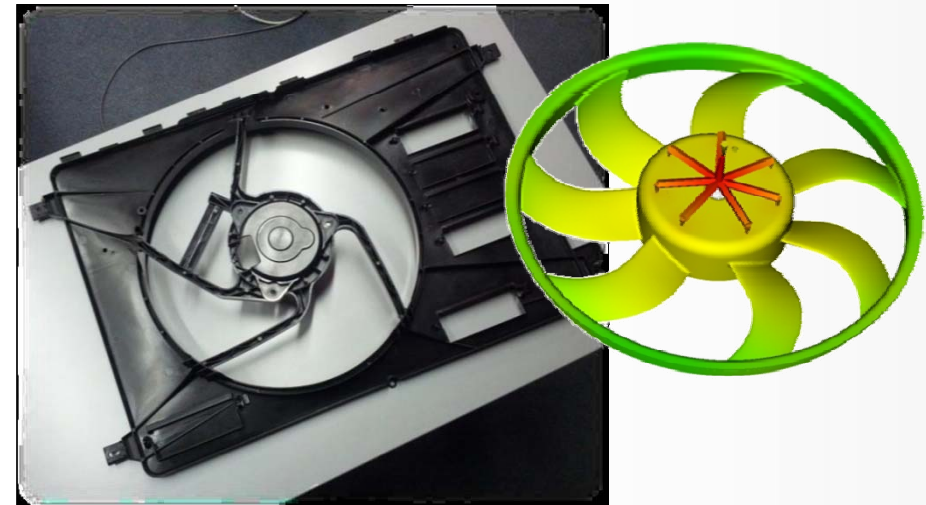
- **RADIFLAM A RV150 AF Black**
- For Turbo engines, the High Temp version:
RADIFLAM A RV150HHR AF Black
- Very good moldability and surface aspect - deep black
良好的加工性能及外观 - 深黑
- Good dimensional stability
良好的尺寸稳定性
- Flame retardant (V-0), does not propagate fire
V0阻燃, 防止明火蔓延



Under bonnet – Fan/Shroud 发动机罩内部件 – 风扇/护罩



- **Fan / shroud** 风扇/护罩
- **HERAMID A GF030/1K BK**
- Industrial recycled PA66 30% GF material, heat stabilized
工业级PA66 30%GF回料，热稳定性
- **Or also:**
RADILON A GF250W / GF300W
- PA66 25-30% GF, heat stabilized, automotive grade 车用热稳定性材料
- Good moldability and dimensional stability 良好的加工性能及尺寸稳定性
- Mechanical and fatigue performance 良好的机械疲劳性能



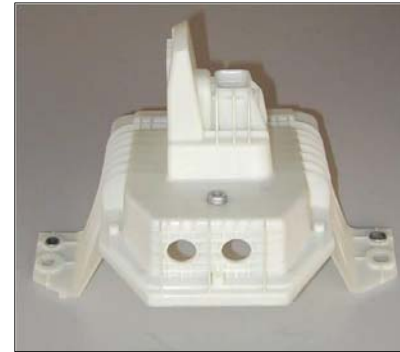
Transmission and gearshift 传动和变速系统

- **Gear Shift Housing** 换挡器壳体

- **RADILON A RV350W**

- High mechanical strength and wear and fatigue resistance

高机械强度及耐磨耐疲劳性能

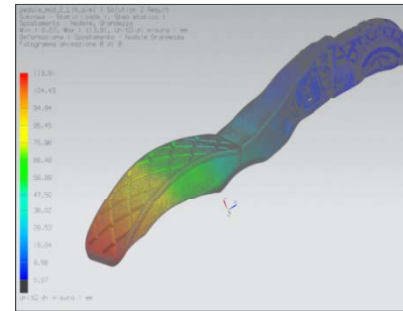


- **Gas and Clutch Pedal**

油门和离合器踏板

- **RADILON A RV400K**

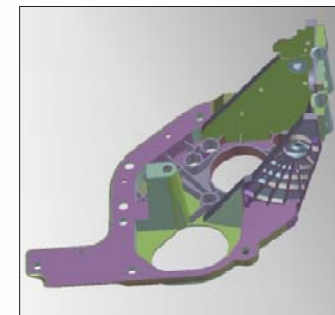
- High mechanical strength and fatigue resistance 高机械强度及耐疲劳性能



- **Pedal Brackets Housing** 踏板支架

- **RADILON S GF350W Black**

- High mechanical strength and fatigue resistance 高机械强度及耐疲劳性能

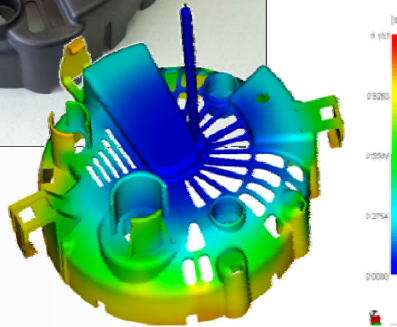


Electric / Electronic parts

车用电子电器



- **Alternator Cover 发电机盖**
- **RADILON A FR 308 BK**
- V-0 flame retardancy V0阻燃
- Halogen and phosphorus free 无卤无磷阻燃



- **Steering wheel encoder housing**
方向盘编码器外壳
- **HERAFORM AC90MC10L.BK TRW**



- **Head Lamp Bezels 前照灯装饰圈**
- **RADILON A VHS 338 M BK**
- Unfilled PA66 for light frame, low fogging and suitable for metal coating 无填充尼龙用于车灯边框, 低雾, 适合金属电镀

Electric / Electronic parts

车用电子电器

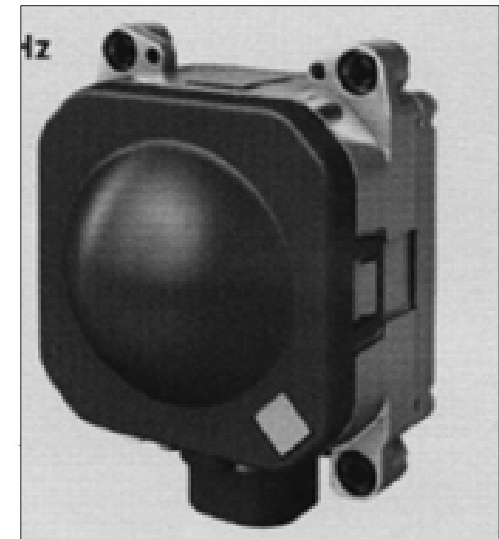
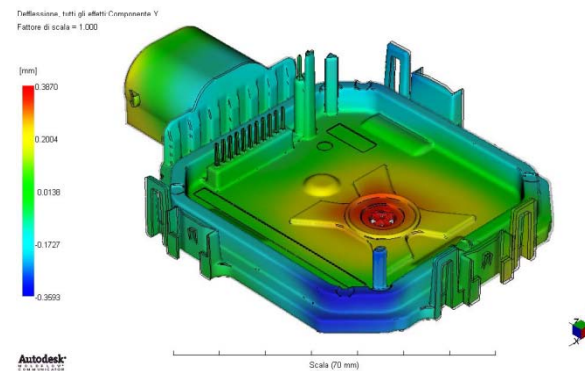


- **ABS / ESP Sensors Housing**

ABS/ESP传感器外壳

- **RADITER B**
ERV300TKB

- Toughened 增韧
- Good dimensional stability
良好的尺寸稳定性
- Hydrolysis resistant
耐水解性能
- Laser markable
良好的激光打标性能



- **Seat Tilt Levers**

座椅倾斜操纵杆

- **RADILON A RV350LW 339 BK**

- Excellent aesthetics 美观
- Good flowability 良好的流动性



- **Seat Back Component**

座椅靠背零件

- **RADILON A RV500RW 339 BK**

- Good aesthetics 美观
- High mechanical resistance 高机械性能



- **Central Fascia Cover**

中央仪表板

- **RADILON S LRV300LUK 9245 GY**

- Excellent aesthetics 美观
- Good flowability 良好的流动性
- UV - light stabilization 耐UV性能



- **Shift Lever** 变速杆

- **RADILON S RCP4015K 333 BK**

- Good aesthetics 美观
- High dimensional stability and good mechanics
良好尺寸稳定性及机械性能



Exterior 外饰

RADICI
GROUP

- **Fuel flap cover** 加油口盖
- **RADILON S CP400 333 BK**
- Good aesthetics/paintability 美观/可喷涂
- Dimensional stability 尺寸稳定性



- **Wheel covers** 车轮装饰盖
- **RADILON S ERCT2808UK 943 Grey**
- **HERAMID A ECP150TK 900 GY**
- Good aesthetics and dimensional stability
美观及尺寸稳定性好
- Paintability 可喷涂
- UV resistance 耐UV性能

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产品创新与技术支持

The Radici Plastics Brands

兰蒂奇塑料商品名



- **RADILON® A** (PA66)
- **RADILON® S** (PA6)
- **RADILON® D** (PA6.10)
- **RADILON® CA** (PA66/6 Copolymers)
- **RADILON® CS** (PA6/66 Copolymers)
- **RADIFLAM® A** (PA66 flame retardant)
- **RADIFLAM® S** (PA6 flame retardant)
- **RADIFLAM® B** (PBT flame retardant)
- **RADITER® B** (PBT & PET)
- **HERAFORM®** (POM)
- **HERAFLEX® A & E** (TPE's)
- **HERAMID® A** (PA66, re-compounded)
- **HERAMID® S** (PA6, re-compounded)



An Outstanding Offer for the Turbo Engines

为涡轮增压发动机提供性能优异的工程塑料



Hot side turbo air duct ($T > 160\text{ }^{\circ}\text{C}$)

- Radilon® A RV350HHR 3800 Ner
- Radilon® A BMV150HHR 3800 Ner
- Radilon® A BMV200HHR 3800 Ner

Hot side turbo air duct ($T < 160\text{ }^{\circ}\text{C}$)

- Radilon® A RV350W 333 Ner
- Radilon® S BMV150K 333 Ner

Charge Air Cooler

$T > 180\text{ }^{\circ}\text{C}$:

Radilon® A RV350HHR 3800 Ner

T up to $180\text{ }^{\circ}\text{C}$:

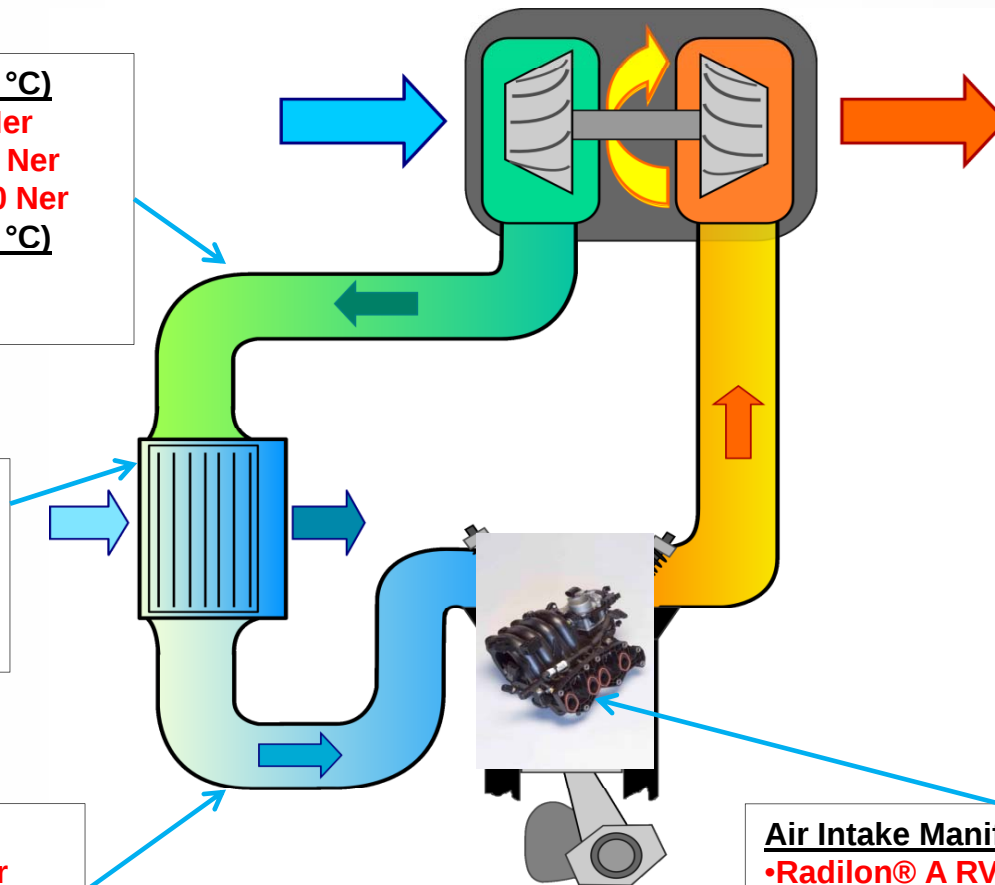
Radilon® A RV350W 333 Ner

Cold side turbo air duct

- Radilon® A RV300W 333 Ner
- Radilon® S BMX200K 333 Ner
- Radilon® S BMV150K 333 Ner

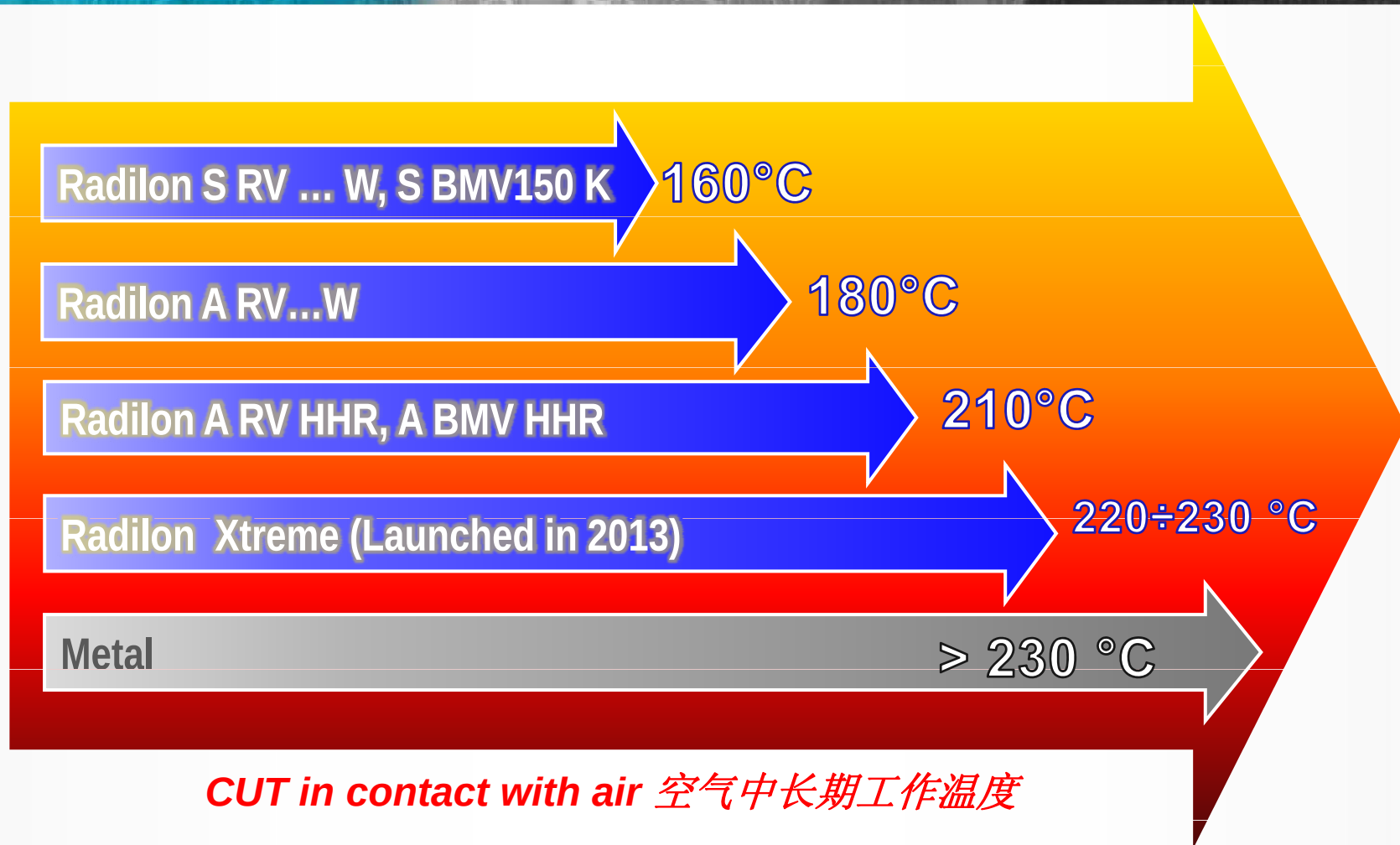
Air Intake Manifold

- Radilon® A RV300W 333 Ner
- Radilon® S RV300W 333 Ner
- Radilon® S NER GF350K
- Radilon® A NER GF350K



Radilon® Heat Resistant Materials Offer

Radilon® 耐热级尼龙材料



CUT in contact with air 空气中长期工作温度

FEA Support: Moldflow

有限元分析支持: 模流分析



- **Cooling analysis** 冷却分析
 - **Cooling time** 冷却时间
 - **Distortions** and effects of uneven cooling 冷却不均导致产品变形
 - Coolant liquid temperature loss 冷却液温度降
- **Shrinkage** and **warp**age foresight, considering (all together or one at a time) effect of: 预测收缩与翘曲, 同时考虑多种影响:
 - **Differential shrinkage** 收缩不均
 - **Differential cooling** 冷却不均
 - Fiber and material **orientation** 玻纤及分子取向
- **Clamping force** estimation 预估锁模力
- Simulation of special processes: 特殊成型工艺仿真:
 - Gas assisted injection moulding (**GAIM**) 气辅成型
 - **Co-injection molding** 共注成型
 - **Injection-compression** 注压成型

Autodesk®
Moldflow®

FEA Support: Structural

有限元分析支持: 结构分析



- **Static linear** analysis, at different temperatures
在不同温度下的线性静力学分析
 - Stress distribution and max stress location 应力分布及最大应力区域
 - Part deformation under load 受载荷下零件变形
- Analysis of **resonance frequencies** 共振频率计算
 - Modal shapes 模态振型
 - Harmonic response 谐响应分析
- **Non-linear analysis** are available for: 非线性分析可用于
 - Contacting parts 零件接触
 - Material nonlinearities 材料非线性
 - Large displacements and/or deformations 大位移 和/或 变形
- **Dynamic response** 动态响应
- **Thermal** analysis and thermal effects on mechanical behaviour
热分析, 以及热对机械性能的影响

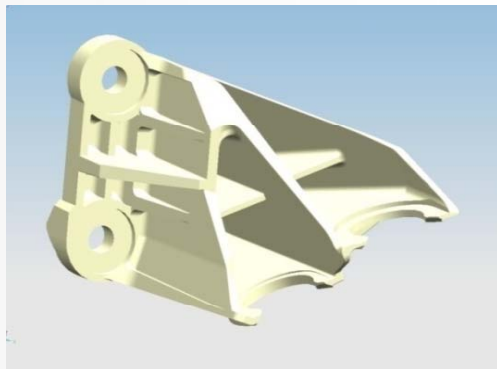


CAD Support for Metal Replacement

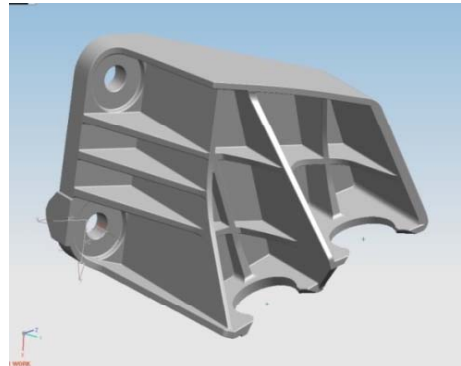
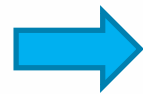
塑料替代金属CAD支持



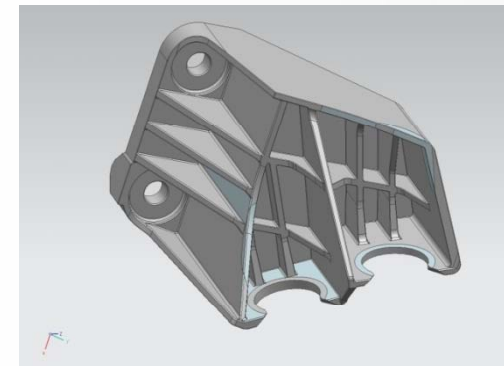
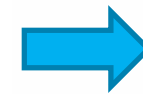
Radilon A RV500RW 339 BLK



Step 1



Step 2



Step 3

Step 1: The aluminum 3D model used without modification for the first calculation

未经修改铝件3D数模用于第一轮分析

Step 2: Redesign from metal to plastics. Thick parts modified and additional ribs in critical areas

从金属到塑料，零件需重新设计，壁厚修改以及关键区域增加加强筋

Step 3: Redesign from metal to plastics to reduce the Von Mises stress concentration

从金属到塑料，零件需重新设计，减少应力集中

Parts Testing 部件测试

- Leakage 泄漏测试
- Burst pressure 爆破压力测试
- Back fire 回火测试
- Pressure pulsation 脉冲压力测试
- Heat ageing, 热老化测试,
Temperature shock 温度冲击测试
- Ball-drop-tests 落球撞击测试
- Insert pull-out / torque 嵌件拔出力/扭矩测试
- Shaker tests 振动测试
- Acoustic measurement 噪声测试
- Customer specific tests 客户指定测试



THANK YOU FOR YOUR ATTENTION

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