深蓝汽车

深蓝汽车对车身用钢的低碳战略

The low-carbon strategy of Deepal Automobile for the steel used in the vehicle body

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深蓝汽车

目录

CONTENTS

深蓝汽车

01、深蓝汽车简介

Introduction to Deepal Automobiles

DEEPAL

DEEP+AL

DEEP-LEARNING ALGORITHM深度学习算法，人工智能技术DEEP+PAL

与用户共创共成长

深　　蓝
Deep Blue

“十三五”国家科技创新规划中提出“深空、深海、深地、深蓝”四大战略。其中，深蓝战略代表信息技术、人工智能领域，人工智能也将成为汽车产业创新突破的重要方向。深蓝象征探索宇宙的深邃，探索大海的深奥，象征着对未知领域、认知边界的持续探索，意味着在智能新能源领域的探索和求新。

In the "13th Five - Year Plan" for National Scientific and Technological Innovation, four major strategies were put forward: "deep space, deep sea, deep earth, and deep blue". Among them, the deep blue strategy represents the fields of information technology and artificial intelligence. Artificial intelligence will also become an important direction for innovation and breakthroughs in the automotive industry. Deep blue symbolizes the exploration of the profoundness of the universe and the ocean, representing the continuous exploration of uncharted territories and the boundaries of cognition, and signifying the exploration and pursuit of novelty in the field of intelligent new energy.

深蓝汽车

愿景使命

让出行生活的精彩无处不在 探索未来科技，突破出行想象

Make the pleasures of travel ubiquitous,Explore future technologies, break through the boundaries of travel imagination.

在百年汽车工业转入新赛道的关键节点，汽车产业已被重新定义，科技和制造美妙结合，软件定义汽车变成现实，“汽车机器人”已悄然来临。深蓝坚信中国必将诞生世界级的中国品牌，并以不断突破挑战的姿态，探索数字科技、能源科技，致力于在快速渗透的主流市场，让出行生活的精彩无处不在，探索未来科技，突破出行想象，让更多人享受纯电驱动的魅力体验，先达未来。

At this critical juncture when the century - old automotive industry is shifting to a new track, the automotive industry has been redefined. The wonderful combination of technology and manufacturing has made software - defined vehicles a reality, and "automotive robots" have quietly arrived. Deep Blue firmly believes that world - class Chinese brands are bound to emerge in China. With a posture of constantly breaking through challenges, it explores digital technology and energy technology. It is committed to making the wonders of travel omnipresent in the mainstream market with rapid penetration, exploring future technologies, breaking through the boundaries of travel imagination, enabling more people to enjoy the charming experience of pure electric drive, and reaching the future ahead of others.

深蓝汽车

最早进入新能源领域的汽车企业之一

One of the automotive enterprises that entered the new energy field earliest

超20年的产业积淀，构建了成体系的新能源竞争能力

With over 20 years of industrial accumulation, a systematic new energy competitiveness has been built.

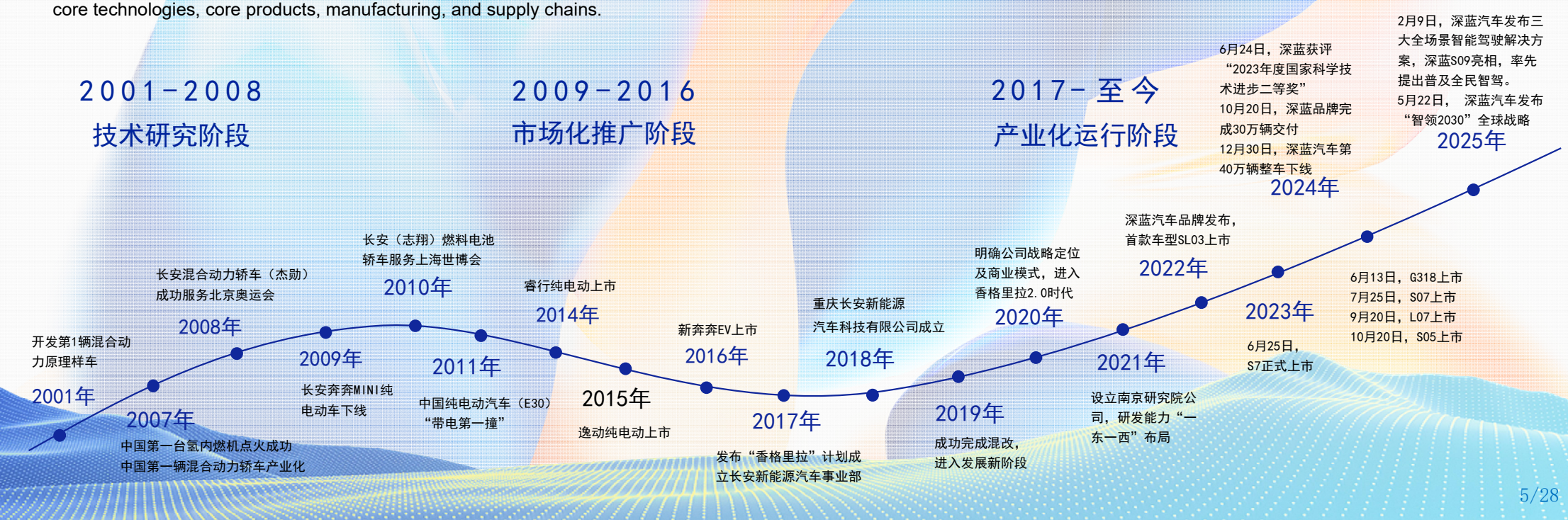
长安汽车2001年进入新能源领域，是中国最早进入新能源汽车领域的企业之一，具备丰富的技术研发经验积累。先后经历技术研究、市场化推广和产业化运行三个阶段，完成了从样车到产品的正向开发历程，构建了从开发流程、核心技术、核心产品，到生产制造、供应链等成体系的市场竞争能力。

Changan Automobile entered the new energy sector in 2001, making it one of the earliest Chinese enterprises to venture into new energy vehicles. It has accumulated rich experience in technological research and development. The company has gone through three stages: technological research, market promotion, and industrialized operation, completing the forward development process from prototype vehicles to mass-produced products. It has built a systematic market competitiveness covering development processes, core technologies, core products, manufacturing, and supply chains.

2001-2008
技术研究阶段

2009-2016
市场化推广阶段

2017- 至今
产业化运行阶段



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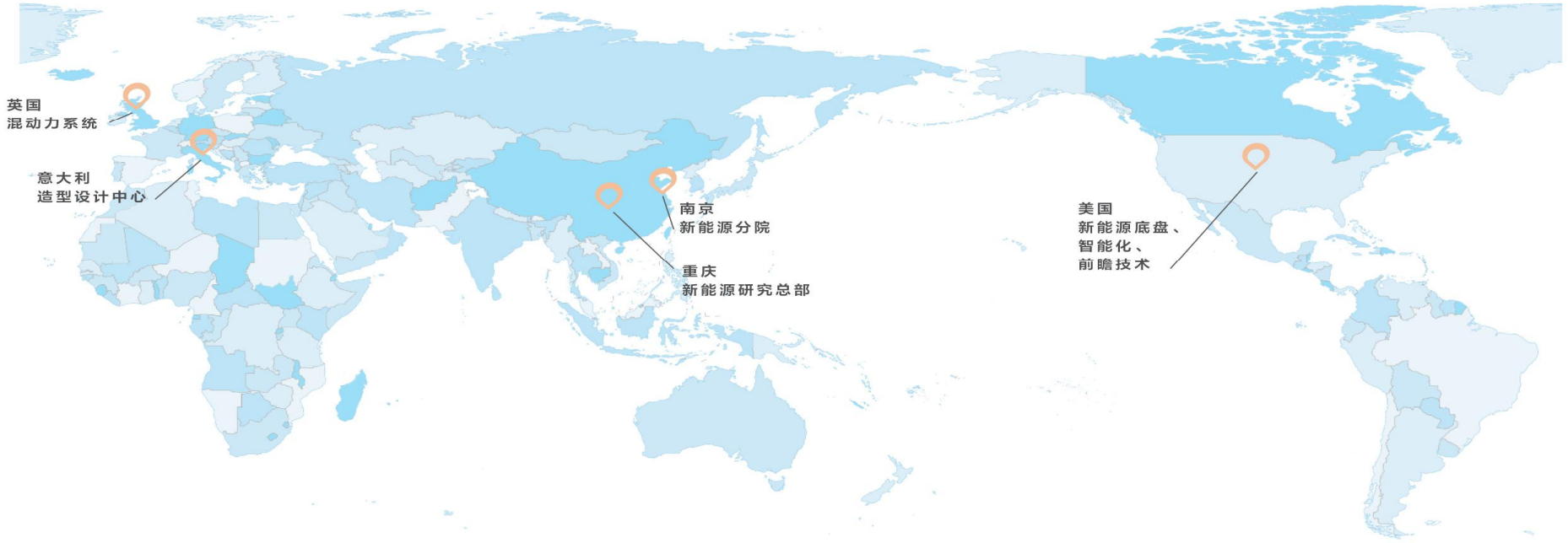
全球研发布局
Global R&D layout

在**重庆、南京、意大利都灵、英国伯明翰和美国底特律，**建立起各有侧重的全球协同研发格局，加速构建新能源电动系统核心技术全栈自研能力，实现集成与控制技术领先、关键零部件自主可控。

With a globally collaborative R&D structure focusing on different priorities established in Chongqing, Nanjing, Turin (Italy), Birmingham (UK) and Detroit (USA), it is accelerating the building of full-stack independent R&D capabilities for core technologies of new energy electric systems, so as to achieve leadership in integration and control technologies and ensure independent control over key components.



深蓝汽车

科技时尚　年轻活力
Technological Fashion Youthful Vitality

超50万深蓝用户，95后年轻用户占比72%

用户对深蓝品牌年轻时尚的认知在汽车品牌中显著领先，超过其他品牌10%以上

Over 500,000 Deep Blue users, with post-1995 young users accounting for 72%.

Users' perception of Deep Blue as a young and fashionable brand is significantly ahead of other automotive brands, surpassing them by more than 10%.

年轻就去深蓝

带有主流前沿，勇于探索的、持续突破的时尚科技，、

是深蓝的品牌基因和体验感知；

积极的、尝新的、新锐的年轻，是乐观且洒脱的、自信进取、

保持活力的心态和具有敢于突破挑战的精神。

*本图文/视频所涉及的外观、功能和配置，并不代表实车搭载承诺，车辆实际配置、功能以官方正式发布的产品配置表为准。

深蓝汽车

2025年**50万**全球年销量

500,000 global annual sales in 2025

力争2026年上半年最快速度达成全球**100万**

Strive to reach 1 million global sales at the fastest speed in the first half of 2026

深蓝汽车

02、车身用钢低碳战略的背景

The background of the low-carbon strategy for automotive steel

1、国际碳排放法规：《巴黎协定》设定了全球温控目标，欧盟碳边境调节机制（CBAM）将于2026年全面实施，要求进口钢材披露碳排放数据。

International carbon emission regulations: The Paris Agreement has set global temperature control goals. The EU's Carbon Border Adjustment Mechanism (CBAM) will be fully implemented in 2026, requiring imported steel to disclose carbon emission data.

2、中国双碳目标：要求钢铁行业2025年前实现碳达峰，2035年碳排放量较峰值下降30%。《钢铁行业碳达峰方案》明确限制高炉-转炉长流程产能，鼓励电炉短流程工艺。车身用钢采购将受重点行业阶梯电价政策直接影响。

China's dual-carbon goals: The steel industry is required to achieve carbon peak by 2025 and reduce carbon emissions by 30% from the peak by 2035. The "Steel Industry Carbon Peak Plan" clearly restricts the production capacity of the long process (blast furnace-converter) and encourages the short process (electric arc furnace). The procurement of automotive body steel will be directly affected by the tiered electricity price policy for key industries.

深蓝汽车

02、车身用钢低碳战略的背景

The background of the low-carbon strategy for automotive steel

3、汽车行业减排压力：欧盟2035年禁售燃油车政策倒逼全产业链减排，中国乘用车企业平均燃料消耗量（CAFC）要求2025年降至4L/100km。车身占整车质量30%左右，其材料碳排放影响企业双积分达标，轻量化与低碳化需协同推进。

Emission reduction pressure on the automotive industry: The EU's policy of banning the sale of fuel-powered vehicles by 2035 has forced the entire industrial chain to reduce emissions. China's Corporate Average Fuel Consumption (CAFC) requirements for passenger vehicle enterprises stipulate that fuel consumption should drop to 4L/100km by 2025. The body accounts for about 30% of the total vehicle weight, and the carbon emissions of its materials affect enterprises' compliance with the dual credits policy. Therefore, lightweighting and low-carbonization need to be promoted in a coordinated manner.

4、钢铁产业链降低碳足迹：高强钢生产CO_2 排放约2.1吨/吨钢，其中铁前工序占70%。宝武集团LCA研究显示，热成形钢从矿石到车间的碳排放达3.8kg CO_2 /kg，短流程工艺可使吨钢碳排放降低60%，循环利用需要更充分。

Reducing the carbon footprint of the steel industry chain: The CO_2 emission from high-strength steel production is about 2.1 tons per ton of steel, with the ironmaking process accounting for 70%. According to the LCA research by Baowu Group, the carbon emission of hot-formed steel from ore to the workshop reaches 3.8kg CO_2 /kg. The short process can reduce carbon emissions per ton of steel by 60%, and more sufficient recycling is needed.

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03、车身用钢低碳战略的目标：

The goal of the low-carbon strategy for automotive steel

在给定的技术和成本边界条件下，以最小碳排放，实现汽车用钢从矿石到终端产品，并在整个产品生命周期内，实现系统碳排放最低。

Under the given technological and cost constraints, achieve the lowest carbon emissions for automotive steel from raw ore to the final product, and minimize the system's carbon emissions throughout the entire product life cycle.

这不仅可以减少碳排放，还可以提高整个系统的经济型和轻量化。是一个涉及到多学科的战略需求，即钢材的制造、钢材的应用、车身的结构设计、以及整车结构布置和造型等领域，这既取决于技术水平，也与经济和社会环境条件相关。

This not only reduces carbon emissions, but also enhances the economy and lightweight of the entire system. It is a strategic requirement involving multiple disciplines, namely the manufacturing of steel plates, the application of steel, the structural design of the vehicle body, as well as the layout and styling of the entire vehicle. This depends not only on technical level but also on economic and social environmental conditions.

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04、低碳战略的达成途径

Paths to achieve the low-carbon strategy

- 低碳战略的达成途径
  - 优化钢板制造工艺
    - 降低制造钢板环节的碳排放
    - 缩短钢板制造流程
    - 提升钢板的性能
  - 推进车身结构轻量化
    - 推进零件的结构集成
    - 合理布局材料
    - 合理布局结构
    - 研究结构精益
    - 实施拓扑优化
  - 减少汽车用钢的坯料
    - 提升坯料利用率
    - 合理排布冲压件坯料
  - 降低汽车生产中的碳排放

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04、低碳战略的达成途径

Approaches to achieving a low-carbon strategy

1、优化钢板制造工艺（以河钢为例）

Optimizing the steel plate manufacturing process (taking HBIS as an example)

1）降低钢板制造的各个环节的碳排放（太阳能、风电、氢能；氢冶金、电炉炼钢）

Reduce carbon emissions in all links of steel plate manufacturing (solar energy, wind energy, hydrogen energy; hydrogen metallurgy, electric arc furnace steelmaking)

建设唐钢新区

打造打造为绿色化、智能化、品牌化的新一代流程钢厂

区位调整

建设石钢新基地

打造新一代绿色低碳全废钢-电炉短流程钢厂

流程变革

建设张宣科技基地

依托氢冶金示范工程，打造高端装备核心零部件制作基地

转型升级

建设邯钢新区

打造智能、绿色钢铁联合制造基地

区位调整

以绿色智能为中心，推进区位结构调整

深蓝汽车

04、低碳战略的达成途径

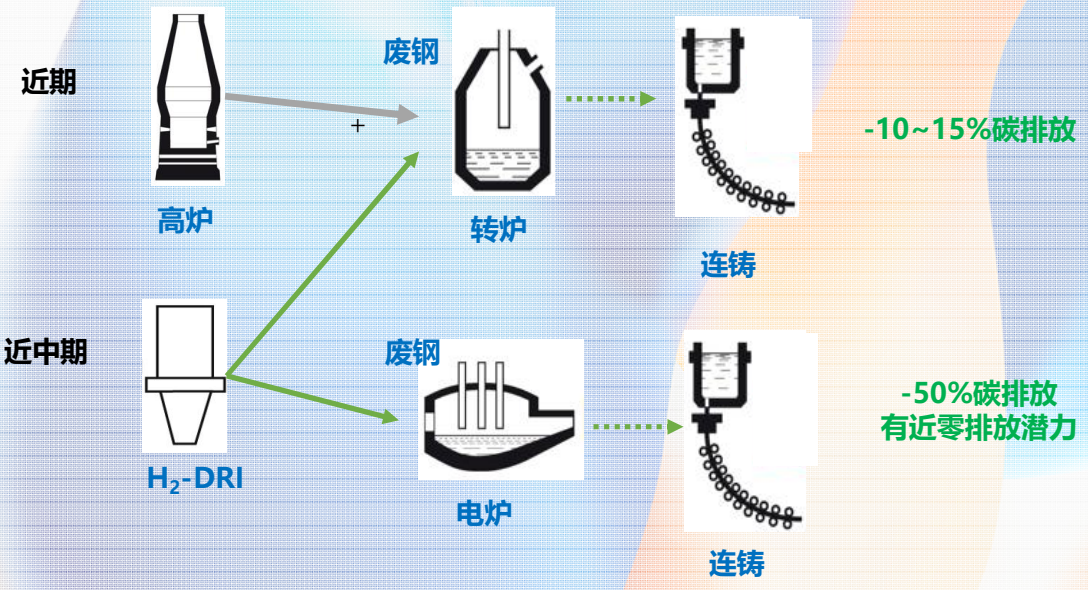
Approaches to achieving the low-carbon strategy

1、优化钢板制造工艺（以河钢为例）

Optimizing the steel plate manufacturing process (taking HBIS as an example)

2）从冶炼工艺开始，开展低碳绿色设计

Initiate low - carbon and green design from the smelting process.



基于产线特点，开展低碳工艺设计

- **河钢发挥氢冶金首发优势**，设计基于氢冶金原料的低碳工艺路线，充分利用现有长流程产线优势，在近期可为汽车、家电下游行业提供降碳产品
- HBIS takes advantage of its leading position in hydrogen metallurgy to design a low - carbon process route based on hydrogen - metallurgy raw materials. By making full use of the advantages of existing long - process production lines, it can provide carbon - reduced products for downstream industries such as automobiles and home appliances in the near term.
- **开展“近零排放”短流程产线规划布局**，在中远期可为下游用户提供极低碳排放产品
- It also carries out the planning and layout of "near - zero emission" short - process production lines, which can provide extremely low - carbon - emission products for downstream users in the medium and long term.

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04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

1、优化钢板制造工艺

Optimizing the steel plate manufacturing process

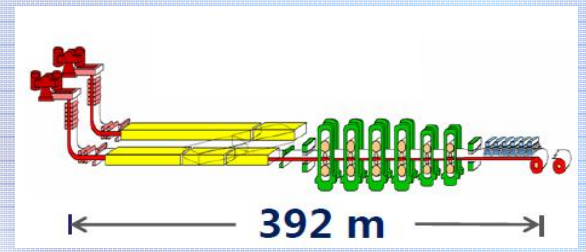
3）缩短钢板的制造流程

Shorten the Steel Plate Manufacturing Process

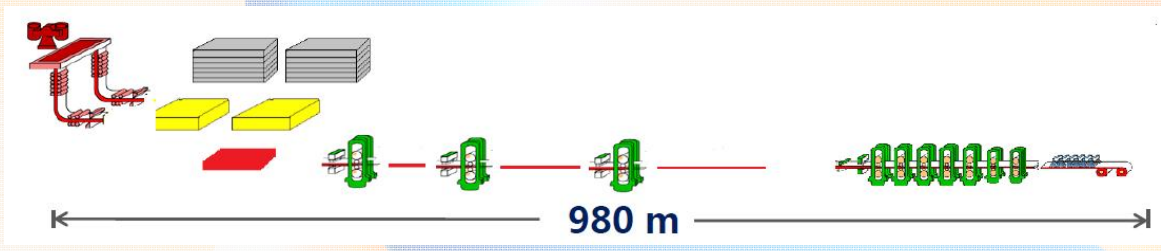
短流程钢是在薄板坯连铸后将板坯剪切成定尺寸单坯，然后采用不同方法进行单坯或半连续轧制，在经过冷却后直接卷取而成的热轧薄板钢。现阶段热轧工艺可稳定生产最低0.8mm的带钢，性能可以媲美正常流程的冷轧钢板。深蓝汽车已完成某项目发动机舱边梁前部外板试制和验证。

Short - process steel is hot - rolled thin - plate steel. After thin - slab continuous casting, the slabs are cut into single slabs of fixed size, and then single - slab or semi - continuous rolling is carried out by different methods. After cooling, it is directly coiled. At present, the hot - rolling process can stably produce strip steel with a minimum thickness of 0.8mm, and its performance can be comparable to that of cold - rolled steel plates produced by the normal process. Deep Blue Automobile has completed the trial production and verification of the front outer panel of the engine compartment side member for a certain project.

优势	成本	应用零件	应用情况	供应商
1.短流程材料节能减排； 2.助力整车绿色制造，为整车全生命周期评估加分	比常规流程的钢材降本20~25%	A柱下加强件内板、B柱内板、发动机舱边梁前部外板、发动机舱边梁前段	主机厂目前在应用开发阶段，北汽、长城有小批量应用	宝武钢铁 日照钢铁



短流程工艺流程



正常流程工艺流程

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04、低碳战略的达成途径
The approaches to achieving the low-carbon strategy

1、优化钢板制造工艺
Optimizing the steel plate manufacturing process

4）提升钢板的性能Improve the properties of steel plates

- 提高强度；

  Increase strength

- 提高韧性；

  Enhance toughness.

- 降低密度

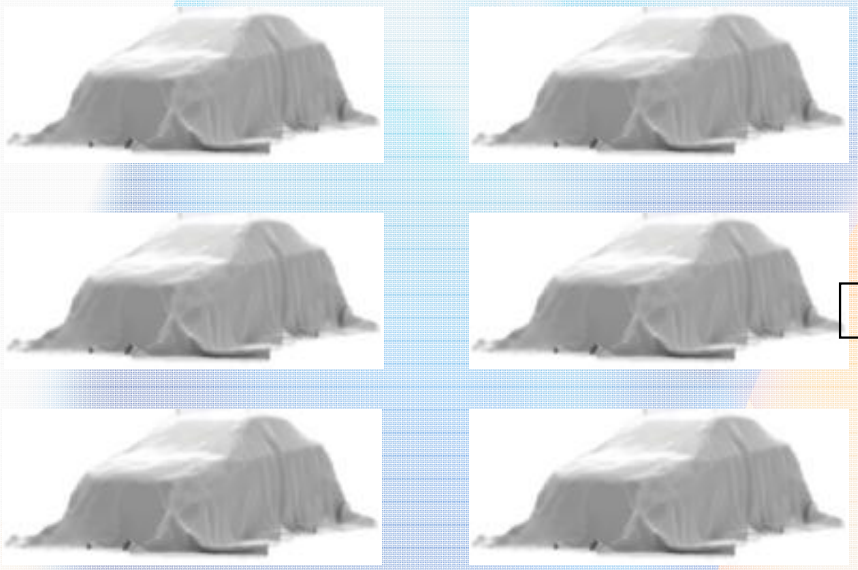
  Reduce density

深蓝汽车

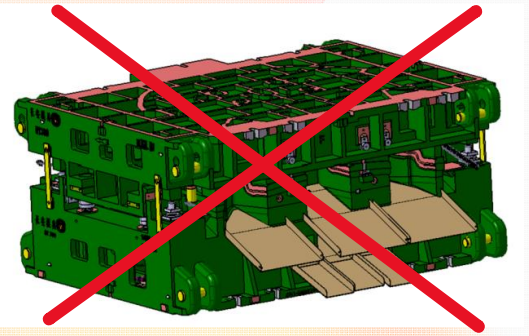
04、低碳战略的达成途径
The approaches to achieving the low-carbon strategy

2、推进车身结构轻量化
Promote the lightweighting of vehicle body structures

- 减少车型项目的开发
  Reduce the development of vehicle model projects



车型减少



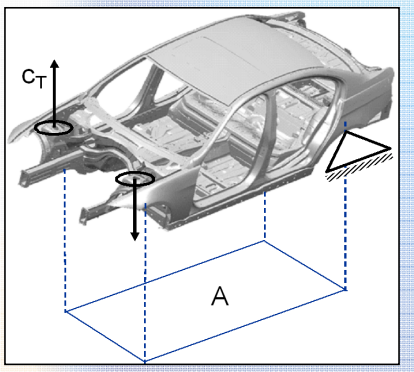
深蓝汽车

04、低碳战略的达成途径
The approaches to achieving the low-carbon strategy

2、推进车身结构轻量化
Promote the lightweighting of vehicle body structures

◆ 提升车身轻量化系数
Improve the vehicle body lightweight coefficient

深蓝汽车，目前最好的水平是2.31，在行业中处于领先水平。
For Deep Blue Automobile, the current best level is 2.31, which is in a leading position in the industry.



车身轻量化系数L

$$L = \frac{m_{Ger}}{C_t \times A}\left[\frac{Kg}{Nm/° \times m^2} \times 10^3\right]$$

M_{Ger}：白车身重量（不含四门两盖、含风挡）
C_t：静态扭转刚度（包含风挡）
A：脚印面积（轴距× 平均轮距）

- 车身轻量化系数越小，轻量化水平越高。

C385	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	仿真值
	317	1620	1620	2880	4.666	22251	3.05	
C673	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	仿真值
	362	1640	1640	2880	4.723	27486	2.79	
ID4	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	484.3	1570	1570	2765	4.341	22146	5.04	
Model 3	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	335	1580	1580	2880	4.55	17000	4.33	
Model Y	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	374	1640	1640	2890	4.74	21700	3.64	
理想 L9	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	480	1725	1725	3105	5.381	33158	2.69	
唐DMI	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	384	1650	1630	2820	4.625	23904	3.47	
SU7	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	
	294.5	1693	1699	3000	5.088	51000	1.13	官宣
理想One	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	403	1652	1672	2935	4.878	21750	3.8	
E12	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	359.5	1688	1702	3020	5.119	26265	2.67	
理想L8	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	试验值
	470	1725	1741	3005	5.208	30938	2.92	
某项目	重量	前轮距	后轮距	轴距	A	扭转刚度	轻量化系数	仿真值
	307.3	1625	1633	2880	4.692	28377	2.31	

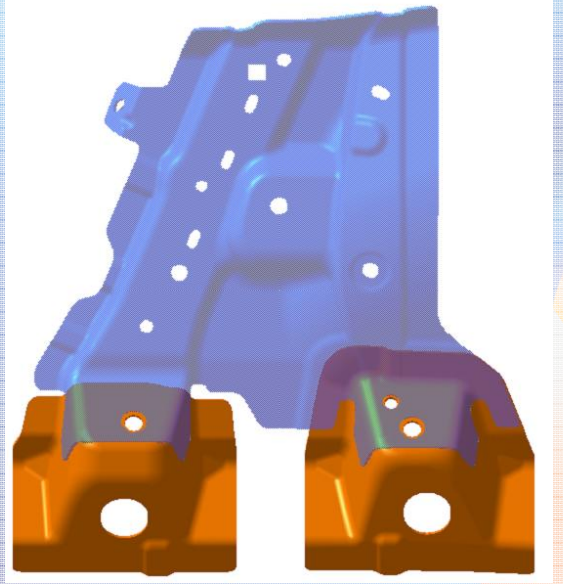
深蓝汽车

04、低碳战略的达成途径
The approaches to achieving the low-carbon strategy

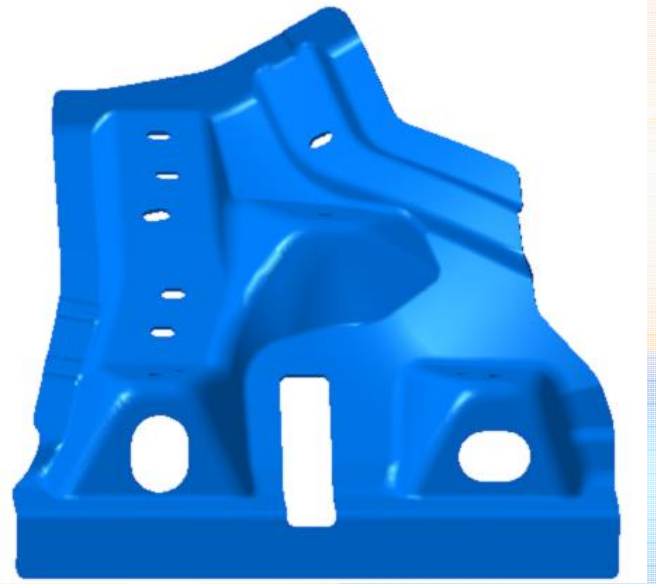
2、推进车身结构轻量化
Promote the lightweighting of vehicle body structures

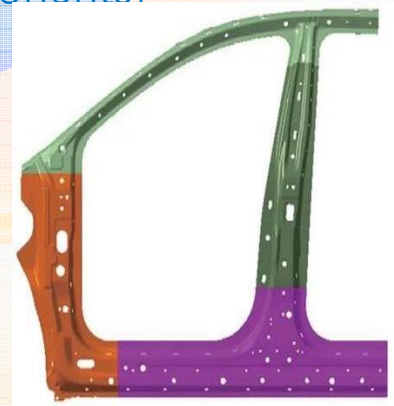
1）推进零件的结构集成（零件合理分块）
Promote structural integration of components (reasonable partitioning of components)

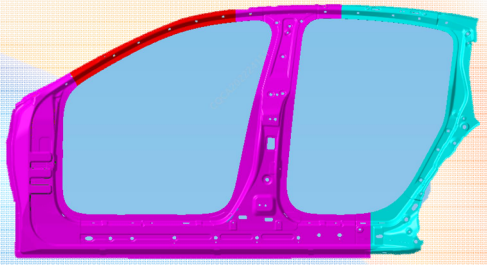
发动机悬置安装结构优化前



发动机悬置安装结构优化后







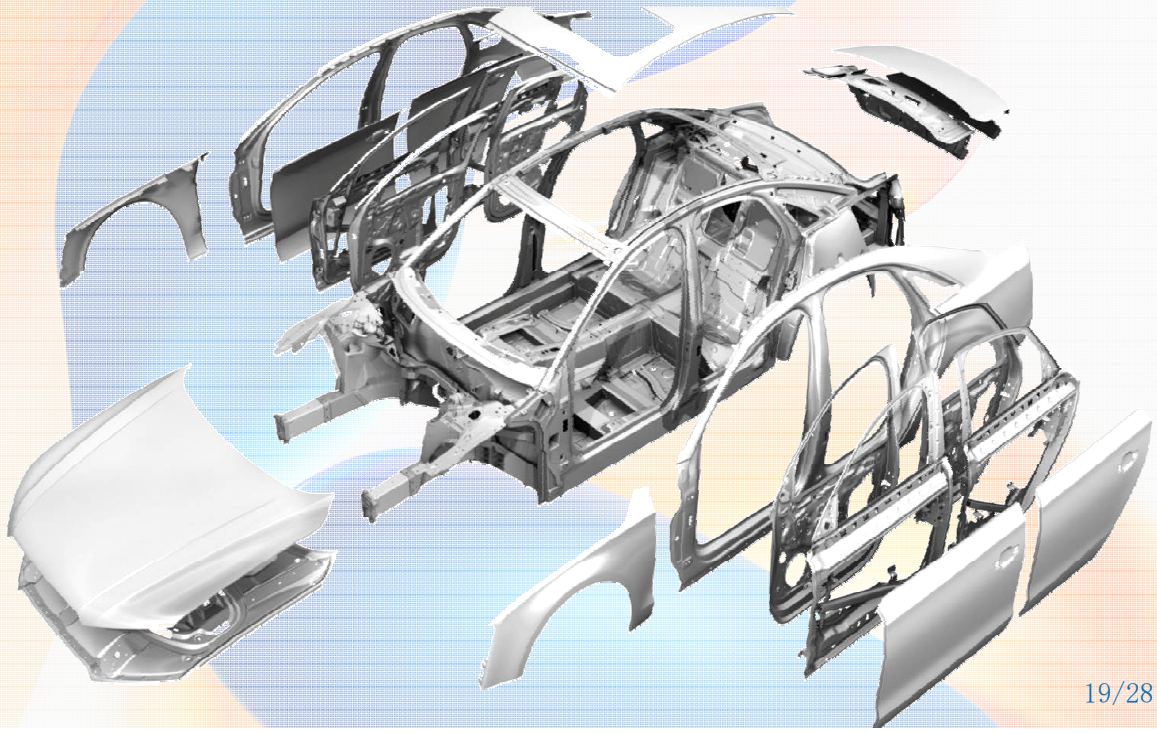
深蓝汽车

04、低碳战略的达成途径
The approaches to achieving the low-carbon strategy

2、推进车身结构轻量化
Promote the lightweighting of vehicle body structures

2）合理布局材料： 让合适的材料在合适的位置
Reasonable material arrangement: Place appropriate materials in appropriate positions

3）合理结构布局
Reasonable structural layout



深蓝汽车

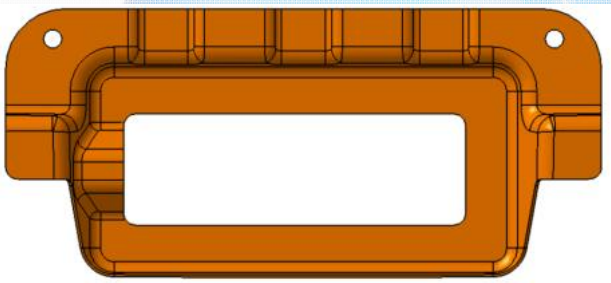
04、低碳战略的达成途径
The approaches to achieving the low-carbon strategy

2、推进车身结构轻量化
Promote the lightweighting of vehicle body structures

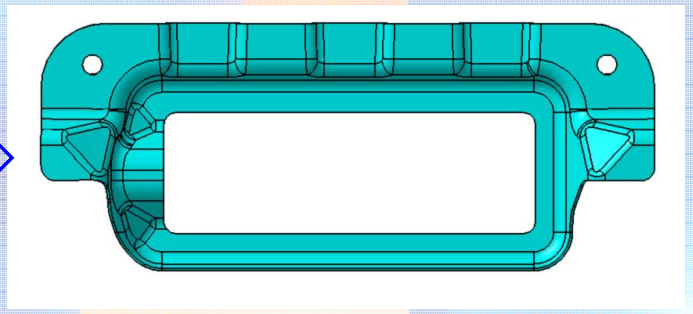
4）结构精益设计

Structural lean design

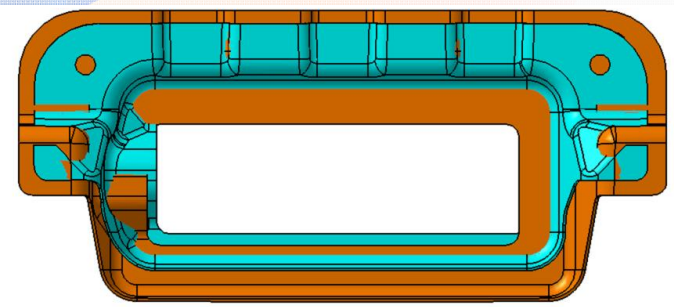
优化后降重82g



优化前



优化后



优化前后对比图

XXX项目--后顶灯安装支架

深蓝汽车

04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

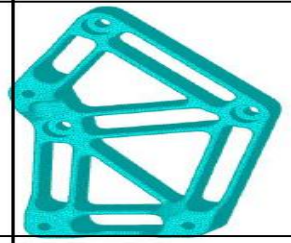
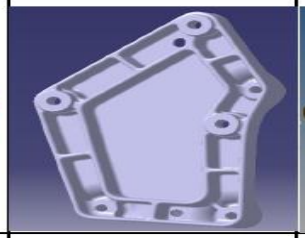
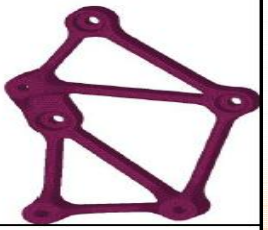
2、推进车身结构轻量化

Promote the lightweighting of vehicle body structures

5）拓扑优化：确定负载、约束和性能指标，优化材料分布

Topology optimization: Determine loads, constraints and performance indicators, and optimize material distribution.

某项目压缩机支架，利用拓扑优化，减重25.37%。

			原方案	方案一	方案二	方案三	方案四
				2020年3月26日供应商修改的第一版方案；	2020年3月26日供应商修改的第二版方案	2020年3月31日根据CAE轻量化报告修改的模型	2020年4月1日供应商在方案三的基础上修改的方案
模型图							
重量			0.67kg	0.61kg	0.57kg	0.48kg	0.50kg
减重率			/	8.9%	14.9%	28.36%	25.37%
仿真随机振动性能	最大应力	X向	41.5 MPa	未验证	38.9MPa	32.7 MPa	70.8 MPa
		Y向	27.8 MPa		29 MPa	14.8 MPa	39.7 MPa
		Z向	33.5 MPa		13.2 MPa	17.8 MPa	15.1 MPa
	对应性能提升率	X向	/		6.26%	21.2%	-70.6%
		Y向			-4%	46.76%	-42.8%
		Z向			60.6%	46.86%	54.9%

深蓝汽车

04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

3、减少汽车用钢的坯料

Reduce the billets of steel used in automobiles

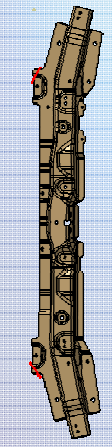
1）提升材料利用率

Improve material utilization rate

优化产品结构

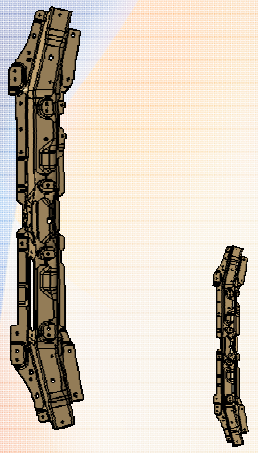
例1：优化前上构件产品分块

优化前： 46.45%



优化产品**分块**

优化后： 48.41%

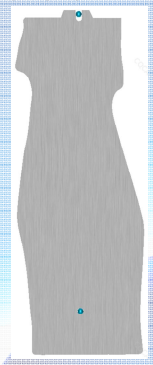


节约材料：0.15kg

优化产品结构

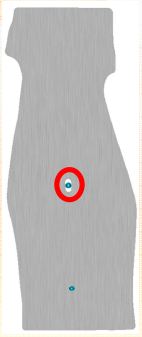
例2： 优化B立柱内板产品工艺定位孔

优化前：69.9%



产品区增加工艺**定位孔**

优化后： 72.1%



节约材料：0.14kg

深蓝汽车

04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

3、减少汽车用钢的坯料

Reduce the billets of steel used in automobiles

1）提升材料利用率

Improve material utilization rate

例3：**优化零部件结构材料**

优化前：46.3%

冷冲结构改热成形结构

节约材料：2.62kg

优化后： 63.69%

例3：后地板边梁前段

深蓝汽车

04、低碳战略的达成途径

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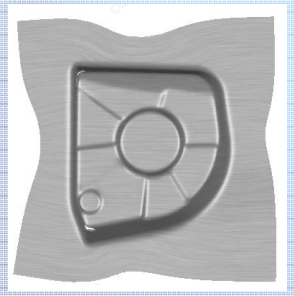
1）提升材料利用率

Improve material utilization rate

优化工艺方案

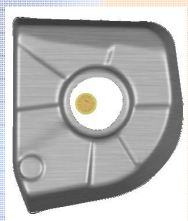
例4：前减震器支柱安装板

优化前： 50.49%

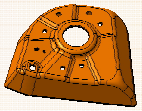


拉延改夹料成形

优化后： 71.5%



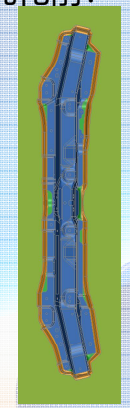
节约材料：1.07kg



优化工艺方案

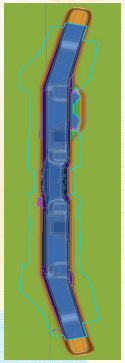
例5：前上构件拉延分模线内置

优化前： 48.41%



分模线**内置**

优化后： 60.02%



节约材料：0.71kg

深蓝汽车

04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

3、减少汽车用钢的坯料

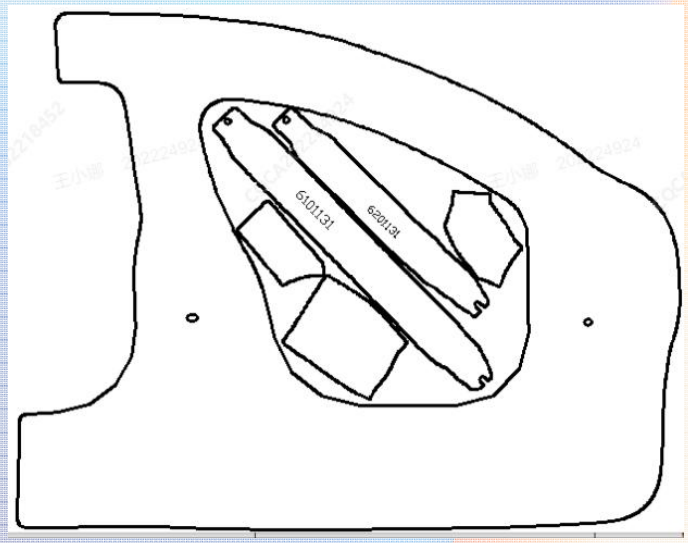
Reduce the billets of steel for automobile use

1）提升材料利用率

Improve material utilization rate

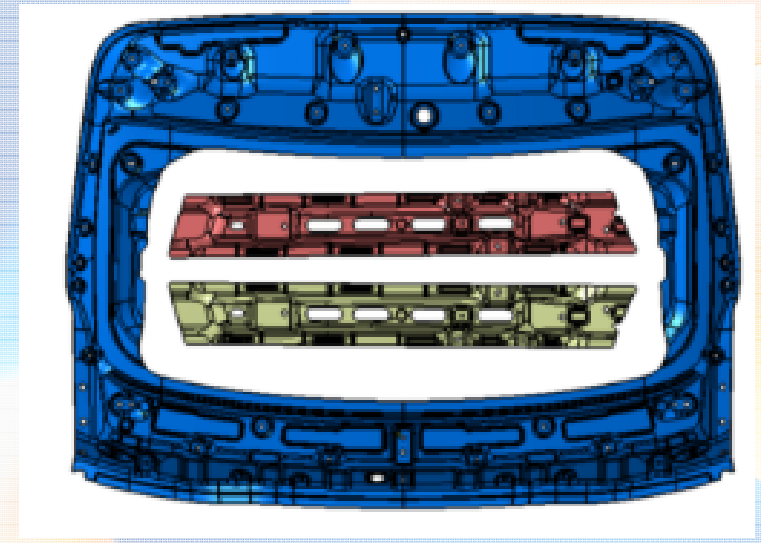
利用废料

例6：非激光拼焊一体式门环毛坯套材



利用废料

例7：背门窗框废料区套件



深蓝汽车

04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

3、减少汽车用钢的坯料

Reduce the billets of steel used in automobiles

2）合理排布冲压件坯料

Arrange the blanks of stamping parts reasonably

优化异形料排样

例8：前门上三角板单排改对排

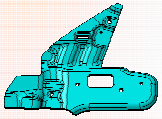
Example 8: Change the front door upper triangle plate from single row to double row

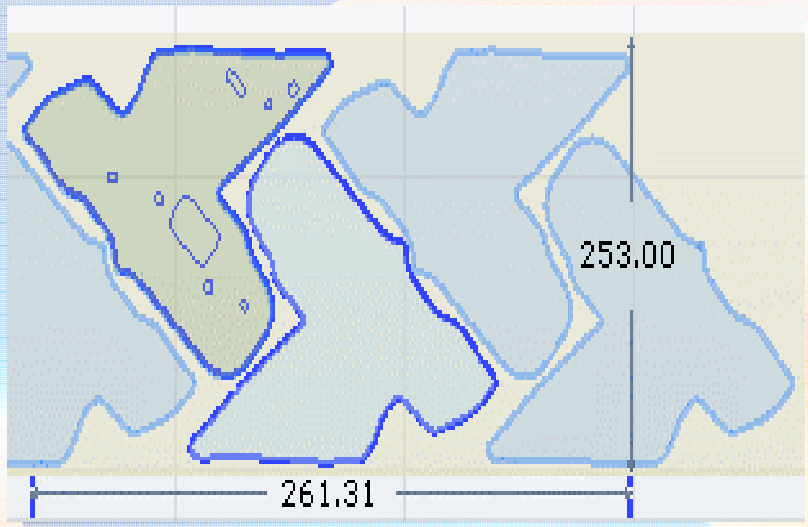
优化前 44.42%

单排改对排

节约材料0.24kg

优化后 71.18%





深蓝汽车

04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

3、减少汽车用钢的坯料

Reduce the billets of steel for automobiles

2）合理排布冲压件坯料

（可以同钢厂一起开展EVI活动）

Arrange the blanks of stamping parts reasonably (EVI activities can be carried out together with steel mills)

例9：前壁板加强横梁

Example 9: Front Wall Panel Reinforcement Crossbeam

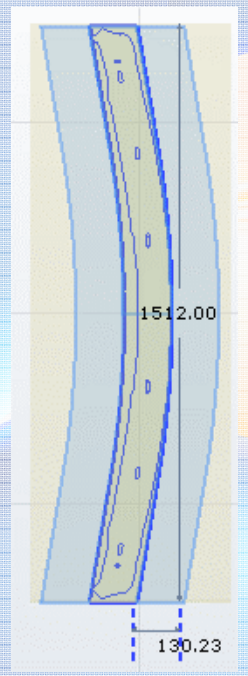
优化异形料排样

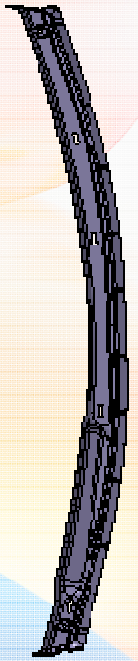
优化前： 27.1%

方料改弧形料

节约材料：1.15kg

优化后： 43.1%





深蓝汽车

04、低碳战略的达成途径

The approaches to achieving the low-carbon strategy

4、降低汽车生产过程中的碳排放

Reduce carbon emissions in the automobile production process

在钢板制成零部件，零部件再焊装、涂装、总装成汽车产品的过程中，实现绿色低碳。

我们公司已经累计用太阳能发电6.2亿度电，用于生产制造；每年发电2.15亿度电。

In the process of transforming steel plates into components and then welding, painting, and assembling them into automotive products, we aim to achieve green and low-carbon production.

Our company has generated 620 million kWh of solar power for manufacturing purposes and currently produces 215 million kWh of solar electricity annually.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新汽车
深蓝S05 多彩生
DEEPAL S05 Be Vibrant Life
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