FOTON EV BUSINESS & BATTERY SWAP TRUCK INTRODUCTION
福田新能源业务及换电重卡介绍

Date: June, 2022
日期：2022年6月

CONTENTS
目录

Part 1
第一部分
FOTON GROUP OVERVIEW
福田汽车集团概述

Part 2
第二部分
FOTON NEW ENERGY OVERVIEW
福田汽车新能源业务概述

Part 3
第三部分
BATTERY SWAP TRUCK INTRODUCTION
换电重卡介绍

Part 1 第一部分

FOTON GROUP OVERVIEW
福田汽车集团概述

Leading Manufacturer of Commercial Vehicles in China
中国商用车领军者

NO.1
第一

China's ***1st commercial vehicle brand*** ,1st vehicle export ranking

福田汽车是中国***商用车第一品牌***，位居中国商用车出口第一

10million
1000万

Global accumulative sales volume of ***>10,000,000*** vehicles

全球累计销量突破***1000万***辆

26

26 BILLION USD

260亿美元

Brand Value

品牌价值

110

Export more than ***110*** countries

720,000 vehicles

产品出口覆盖全球***110多***个国家和地区累计出口***72万***辆

Foton Motor Group was founded in ***1996*** and listed in Shanghai Stock Exchange in 1998.

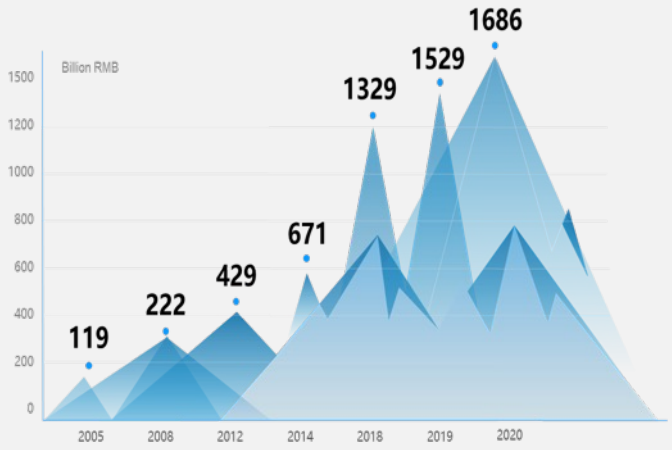
福田汽车集团于***1996***年成立，1998年在上海证券交易所上市。

Brand value: China's **first commercial vehicle brand**
品牌价值：中国**首个商用车品牌**

1 Ranked the first place in China's commercial vehicle industry for ***17*** consecutive years
连续**17**年蝉联中国商用车行业第一位

34th
第34位

Top 500 brands in China
中国500强品牌



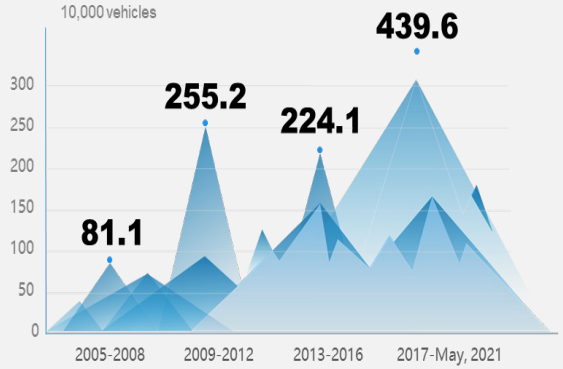
* Source: List of China's 500 Most Valuable Brands released by World Brand Lab (WBL).

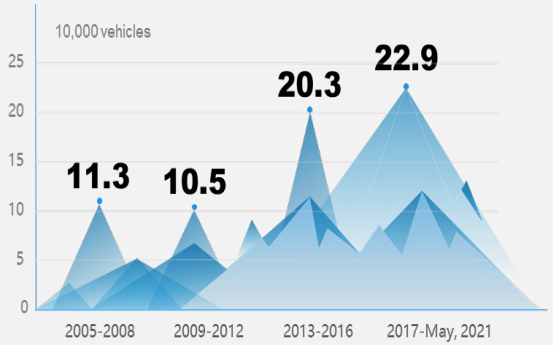
168.6

Billion (USD)
十亿（单位：美元）

Brand value
品牌价值

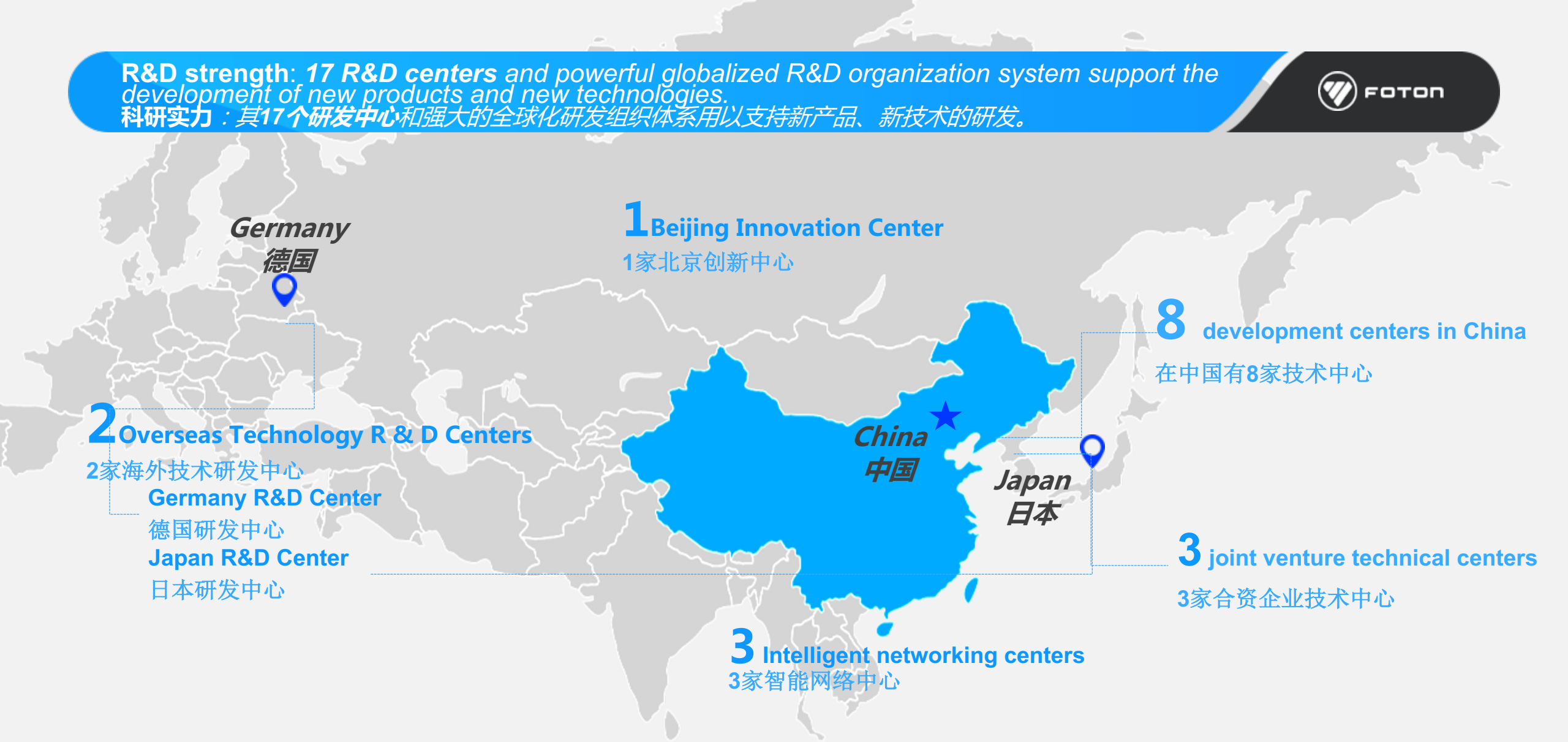
Foton: China's first commercial vehicle brand with production/sales volume of >10,000,000 vehicles and 1st place in commercial vehicle export ranking for 10 consecutive years
福田汽车：中国首个商用车品牌，总销量突破1000万辆，连续10年蝉联商用车出口第一





* It takes 41 years to achieve China's vehicle sales volume of >10,000,000 vehicles;
* It takes 45 years to achieve China's commercial vehicle sales volume of >10,000,000 vehicles;
* Foton only takes 25 years to achieve sales volume of >10,000,000 vehicles.

R&D strength: ***17 R&D centers*** *and powerful globalized R&D organization system support the development of new products and new technologies.*
科研实力：*其**17个研发中心**和强大的全球化研发组织体系用以支持新产品、新技术的研发。*



1 Beijing Innovation Center
1家北京创新中心

8 development centers in China
在中国有8家技术中心

2 Overseas Technology R & D Centers
2家海外技术研发中心
Germany R&D Center
德国研发中心
Japan R&D Center
日本研发中心

3 joint venture technical centers
3家合资企业技术中心

3 Intelligent networking centers
3家智能网络中心

Global Partners: *Global cooperation has made Foton today*
全球合作伙伴：*全球合作共铸今日福田*

Foton has been creating world-class high-quality products by cooperating with the word's top suppliers and partners, which contributed to the position domestically and globally.

福田汽车链合世界顶级供应商与合作伙伴，共同打造一流高品质产品，共铸其国内外行业地位。

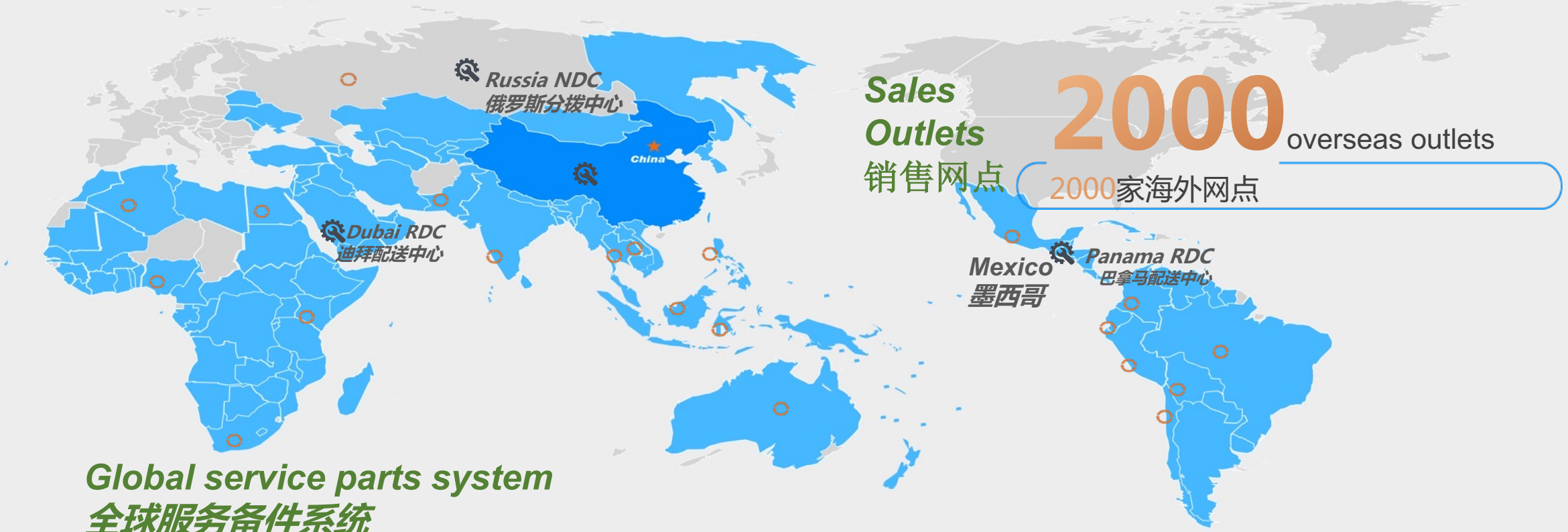
Cummins FOTON 福田康明斯 — Join Venture

FOTON DAIMLER AUTOMOTIVE 福田戴姆勒汽车 — Join Venture

ZF FOTON 福田采埃孚 — Join Venture

Vietnam 越南	Thailand 泰国	Philippines 菲律宾	Mexico 墨西	Russia 俄罗斯	Italy 意大利	Switzerland 瑞士
THACO TRUONG HAI AUTO		UAAGI	CEMEX	GAZ	PIAGGIO	Holcim
THACO GROUP	CP GROUP	UAAGI	CEMEX	GAZ	PIAGGIO	Holcim

FOTON Global Network 福田汽车全球网络



Sales Outlets
销售网点

2000 overseas outlets

2000家海外网点

Global service parts system
全球服务备件系统

1400 service networks

1400家服务网点

7 parts distribution center

7家零部件配送中心

13 regional service training centers ▶▶▶ Etc.

13家区域服务培训中心

Vehicle category: Offering customers with full-series solutions, with full-coverage of commercial vehicle models
车型：为客户提供**全系列解决方案**，全覆盖商用车型

FOTON

Heavy truck 重卡
- Tractor 
- Platform lorry 
- Dumper 

Medium truck 中卡
- Inter-city 

Light-duty truck 轻卡
- Intra-city 
- Subu-rban 

Mini truck 微卡
- Flat head mini truck 
- Short head mini truck 

Vans 货车
- Large Van 
- Medium-sized Van 

Pickup 皮卡
- Commercial 
- Passenger 
- Off-road 

BUS 客车
- Coach 
- City bus 
- School bus 

Part 2 第二部分

FOTON NEW ENERGY OVERVIEW

福田新能源业务概述

Glorious Journey 辉煌历程

In 2003,the first hybrid bus launched, step by step accumulation, which makes Foton EV Business be larger and comprehensive. Foton has sold more than 30,000 EV vehicles, more than 9000 EV vehicles in 2021.

福田汽车的第一辆混合动力客车于2003年上市，自此其电动汽车业务逐步发展得规模更大、车型更全面。福田汽车已售出3万多辆电动汽车，其中2021年售出9千余辆。

The **1st** EV buses fleet in China served Beijing Olympic Games
中国**第一批电动客车车队**为北京奥运会服务

1000 units EV buses was put into operation in Beijing
1千辆电动客车在北京投入运营

2790 units of EV buses were delivered to Beijing Public Transport Group
2790辆电动客车已交付北京公交集团

500 units EV truck were delivered to JD Logistic, served for the e-commerce giant
500辆电动卡车已交付给电子商务巨头京东物流并开始服役

2003

Started to build the 1st hybrid bus in China开始生产制造中国第一辆混合动力客车

2008

2009

The **1st** EV truck launched
第一辆电动卡车上市

2012

2018

49 units of fuel cell city buses, the biggest order in the world at that time, were delivered
49辆燃料电池城市客车已交付，这是当时全球最大的电动汽车订单

2019

The 1st liquid hydrogen fuel truck was launched, with driving range over1,000km
首辆液氢燃料卡车上市，行驶里程可达1千公里

2021

2022

1223 units of NEV including **511 units** fuel cell EV served Beijing Winter Olympics 2022
1223辆新能源汽车（包括**511辆**燃料电池电动汽车）为2022年北京冬奥会提供服务

Foton EV 福田汽车新能源

Foton has Independent R&D abilities in power train integration, battery packing, electric motor control, and vehicle software development, the self-developed 32-bit vehicle control units, battery management system and motor control system are used in electric buses, trucks, and other product platforms.

福田汽车在传动系统总成、电池封装、电机控制、车用软件开发等方面具有独立研发能力，自主研发的32位整车控制单元、电池管理系统和电机控制系统应用于电动客车、卡车等产品平台。

Self-developed 32-bit vehicle control unit, battery management system and motor control system

自主研发32位整车控制器、电池管理系统、电机控制系统

300KW motor test bench
300千瓦的电机测试台

Battery Test Lab
电池测试实验室

Prototype evaluation room
样车评测室

Hardware-in-the-loop test lab
硬件在环测试实验室

Foton Motor has invested about 1.25 billion USD to build its high-standard laboratories and test centers specially for EV.

福田汽车投资约12.5亿美元，用于建设电动汽车高水平实验室和测试中心。

Foton Autonomous Driving Technology 福田汽车自动驾驶技术

In 2016, Foton took the lead in releasing unmanned truck in China.Till now, it has put L3 automatic driving into use.
福田汽车已于2016年率先在中国推出无人驾驶卡车。目前，L3级别的自动驾驶技术已投入使用。

In November, 2016, FOTON first smart driving concept truck was launched in Shanghai, China
2016年11月，福田汽车第一辆智能驾驶概念卡车在上海发布

Ramp parking test
坡道停车测试

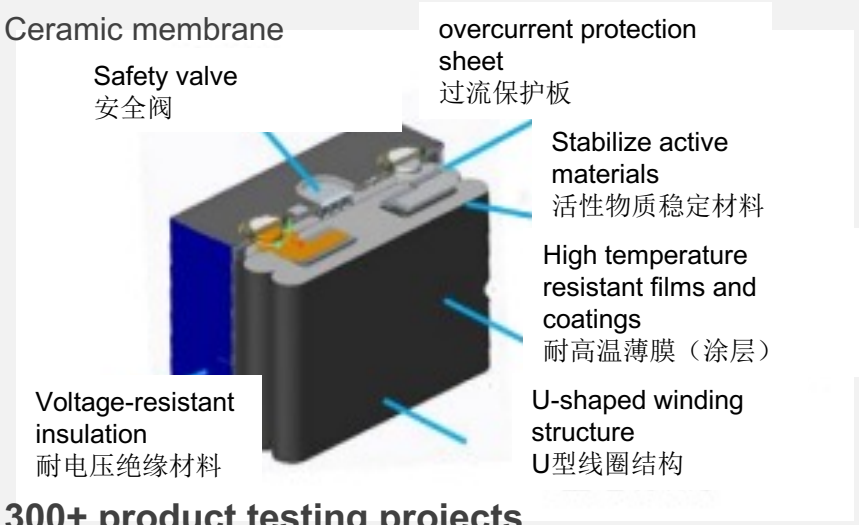
Lane changing test
变道测试

Car following test
车辆跟驰测试

Emergency braking test

Battery technology 电池技术

- **High reliability LFP square aluminum case cell**
- **高可靠性磷酸铁锂方形铝壳电池**
- Anti-explosion
- 防爆
- Overcurrent protection
- 过电流保护
- Ceramic membrane

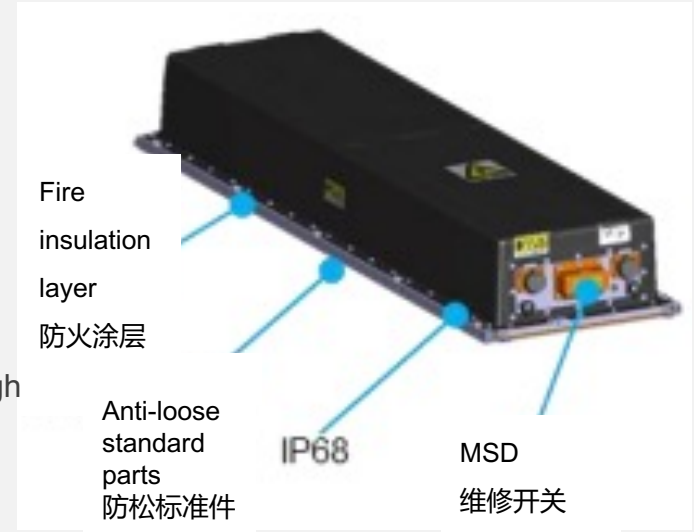


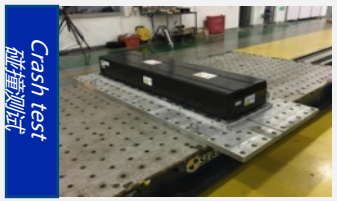
- **300+ product testing projects**
- **300多个产品测试项目**

Cover: GB, ISO, IEC, UN, ECE and other standards

涵盖：GB，ISO，IEC，UN，ECE等标准

- **CTP PACK technology**
- **CTP电池包PACK技术**
- Fire insulation layer
- 防火隔热层
- MSD
- 维修开关
- Anti-loose standard parts to prevent the high voltage wire connection
- 防松标准件可防止高压线接线
- IP68





Foton EV business covers all segments of commercial vehicles
福田汽车的电动汽车业务覆盖商用车的所有市场

Type 车型	Tractor 牵引车	Mixer 搅拌车	Dumper 自卸车	Medium Truck 中卡	Light Truck 轻卡	Big VAN 大型货车	Medium VAN 中型货车	Mini VAN 微型货车	Mini Truck 微卡	Pickup 皮卡
										
BEV 纯电动车	●	●	●	●	●	●	●	●	●	●
PHEV 插电式混合动力车	●	●	●	●	●					
HYD 油电混合动力车	●		●		●					

Part 3 第三部分

BATTERY SWAP TRUCK INTRODUCTION

换电重卡介绍

为什么要换电？
Why do we need battery swap ?

由于重卡对于电力能量高消耗的需要，这就务必使得我们考虑如何合理有效地解决能量的补给供应问题。

The need of heavy trucks for high power consumption makes it possible to reasonably and effectively solve the problem of energy supply.

VERY HUGE power consumption of HCV

Power consumption per day

1.2kwh/km * 500km = 600kwh

重型货车的耗电量**非常巨大**

每天用电量为1.2千瓦时/公里 * 500公里 = 600千瓦时

i.e.500km mileage per day

里程数：500公里/天

OPTION 1

选项一

- Big battery capacity, One charge per day in Depot;
- Capacity - 600kwh / 80% = 750kwh
- Weight – 4300 kg
- Charing time: 6-8 hours at night
- 电池容量大，每天充电1次；
- 容量-600千瓦时/80%=750千瓦时
- 重量-4300千克
- 充电时间：夜间6-8小时

- **High cost**
- **高成本More curb weight, less**
- **payload**
- **整备重量越大，装载量越小**

OPTION 2

选项二

- Small battery capacity, 3 charges per day;
- Capacity - 250kwh
- Weight – 1400 kg
- Charging time – 2 hours per charge * 3 = 6 hours,1 charge at night time and 2 charges at day time.
- 电池容量小，每天需充电3次；
- 容量-250千瓦时
- 重量–1400千克
- 充电时间–每次充电2小时*3=6小时 夜间充电1次，白天充电2次。

- **Less cost**
- **低成本**
- **Working hours occupied**
- **高耗时**

Dilemma of Depot Charge

车桩充电的困境

换电站产品介绍-适用场景特点
Introduction of battery swap station - Characteristics of applicable scenarios

换电站适用场景特点包括高工作强度、车辆保有量大、日出勤时长高、单程续航短等

The characteristics of the applicable battery swap station scenarios include high pressure in working, large vehicle population, long daily attendance hours, short one-way mileage endurance, etc

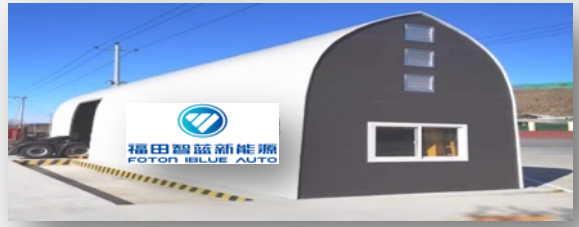
工作强度高
High pressure in working

日均运营时长16-24h
Operation duration average per day: 16-24h

Energy Capacity : 282kwh
电池容量：282千瓦时

日均里程300公里以上，单程在150公里以下
The mileage average per day is more than 300 km, the one-way mileage is less than 150 km.

车队规模>40台
Size of the fleet > 40 vehicles



参数配置
Parameters

服务车辆 **Service Vehicle**	新能源重卡 **EV High Truck**
换电时间 **Time of battery swap**	3-5分钟 3-5min
设计换电次数 **Designed Battery swap Station capability**	160-180次/24h **160-180 Times /24h**
换电模式 **Battery swap mode**	顶部吊装换电/侧部换电 **Top Lifting swap/Side swap Station**
充电功率 **Charging Power**	2000-3000KW 2000-3000千瓦

福田换电业务发展历程 History of Foton battery swap business

福田汽车在换电技术开发上起步于2008年，从客车到重卡，不断创新，取得了一系列市场验证的积极反馈和成果。

Foton started the development of battery swap technology in 2008. Foton has made innovations in buses and heavy trucks and achieved a series of positive feedback and results that can stand the verification of the market.

- 2008年，福田率先在青岛尝试推广换电公交车开展技术测试和验证
- In 2008, Foton took the lead in trying to carry out technical testing and verification for the promotion of EV buses in Qingdao.

- 2009年，福田在北京批量推广换电公交车40台车，至今仍在运营。
- In 2009, Foton promoted 40 EV buses in Beijing, which are still in operation.

- 2020年，福田交付公铁绿链首批20台换电重卡，开启我国第一个换电重卡商业化场景应用。
- In 2020, Foton delivered 20 heavy trucks with battery swap technology to Beijing Gongtie Lvlian Multimodal Transportion Co., Ltd., thus opening the first commercialized scenario application of heavy trucks with battery swap technology in China.

- 至今，福田换电重卡快速推广，涵盖港口、矿区、建筑、钢厂、电厂等多个物流场景，市场保有量近2000台。
- Now, Foton battery swap technology are rapidly promoted, and the application scenarios cover ports, mining areas, buildings, steel mills, power plants, etc. The accumlative sales almost reach 2000.

换电重卡产品介绍 – 车

Battery swap truck products introduction - TRUCK

Tractor(EV)

牵引车（电动汽车）

Drive	**6×4**
驱动	6×4
Motor	**490ps**
动力	490马力
GCW	**49T**
车辆总重量	49吨
Battery Maker	**CATL，LFP**
电池厂商	宁德时代的磷酸铁锂电池
Rated Energy	**282kw·h**
额定功率	282千瓦/小时
Range	**200km**
里程数	200公里

Dump Truck (EV)

自卸车（电动汽车）

Drive	**8×4**
驱动	8×4
Motor	**490ps**
动力	490马力
GVW	**55T**
车辆总重量	55吨
Battery Maker	**CATL，LFP**
电池厂商	宁德时代的磷酸铁锂电池
Rated Energy	**282kw·h**
额定功率	282千瓦/小时
Range	**190km**
里程数	190公里

Mixer Truck(EV)

搅拌车（电动汽车）

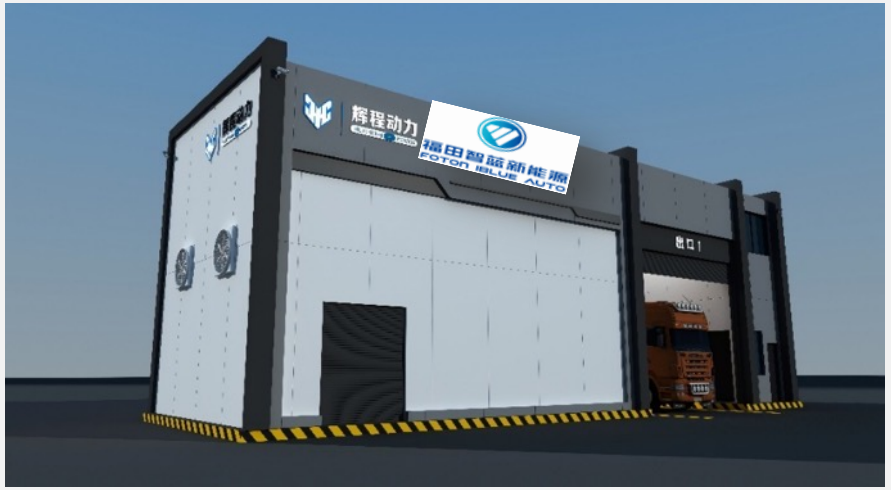
Drive	**8×4**
驱动	8×4
Motor	**490ps**
动力	490马力
GCW	**40T**
车辆总重量	40吨
Battery Maker	**CATL，LFP**
电池厂商	宁德时代的磷酸铁锂电池
Rated Energy	**282kw·h**
额定功率	282千瓦/小时
Range	**200km**
里程数	200公里

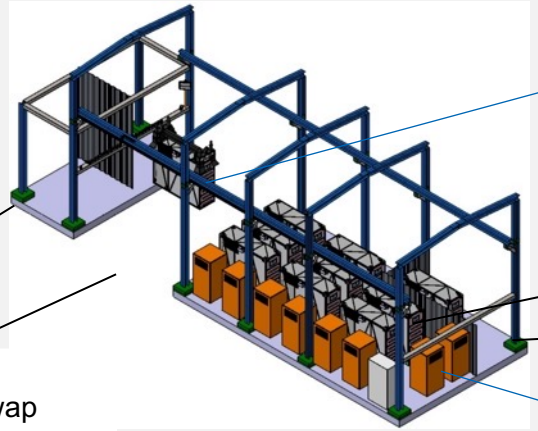
换电重卡产品介绍 - 换电站

Battery swap truck products introduction – BATTERY SWAP STATION

换电站由4部分组成，智能起重器、充电仓、监控室、维修室,可满足50台车的换电需求。

The battery swap station consists of 4 parts, including intelligent hoisting jack, swaping space, monitoring room and maintenance room, which can serve 50 vehicles.





换电站 Battery Swap Station

顶部吊装换电 Top Lifting Swaping Station

服务车辆数（标准站）：40辆车	Quantity of service vehicles (standard station): 40
换电站电池数量：7箱	Quantity of batteries: 7 boxes
配电容量： ≥2000KVA	Capacity of ower-supply-and-distribution-equipment: ≥ 2000kVA
换电电池容量： 456Ah	Capicity of batteries: 456Ah
换电站站体面积： ≤120m^2	Area of the statio: ≤ 120m^2
换电时间：3min	Time of battery swap: 3min
车辆端电池箱重量： ≤2700kg	Weight of battery box in the vehicle: ≤ 2700kg
换电连接器寿命：≥20000次	Service life of power exchange connector: ≥ 20000 times
应急处置：具有应急处置功能	Emergency disposal: Emergency disposal function
自动化水平：全自动化	Automatic level: Full automation

商业模式探索 Exploration of business model

商业生态模式规划：围绕客户在正常运营的场景化需求，整合整车销售、整车改装、融资租赁、经营性租赁、换电站、充电桩、电池租赁、电池梯次利用等资源，为客户提供一体化解决方案；

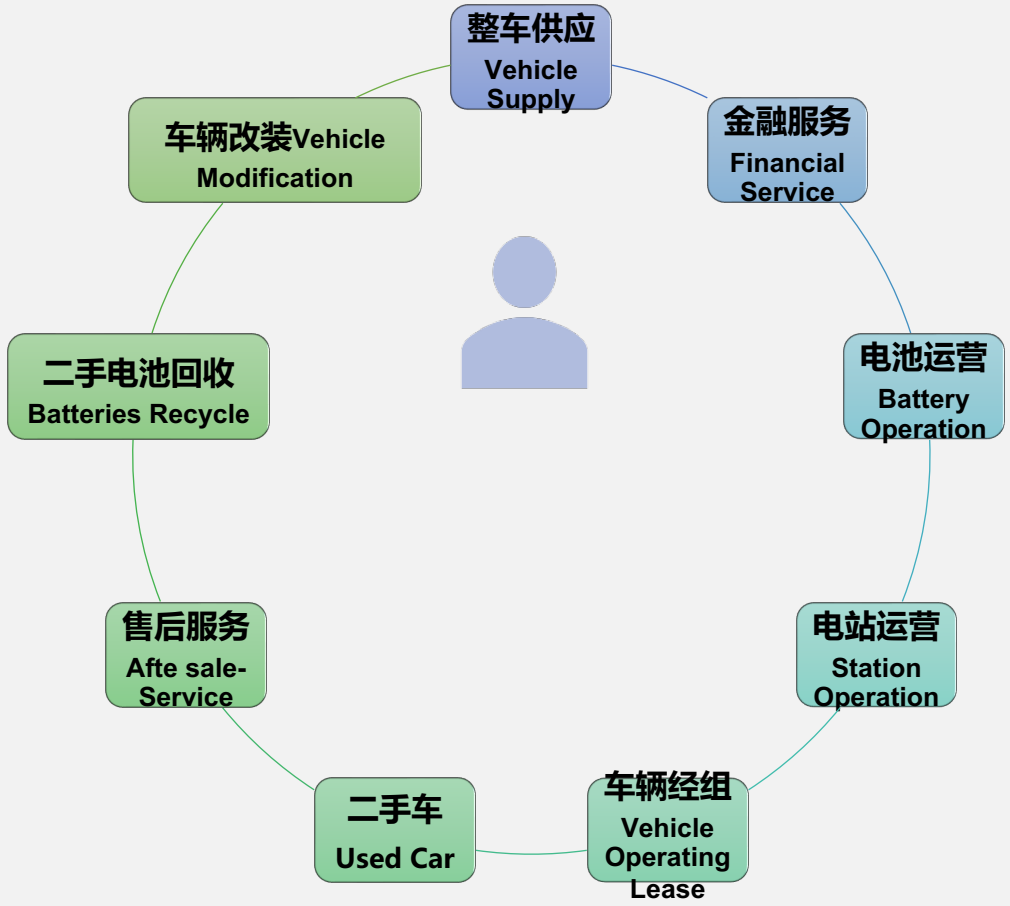
Business Eco-mode Planning: Based on the customers' needs in normal operation, providing customers with integrated solutions by integrating the resources of vehicle sales, vehicle modification, financial leasing, operational leasing, battery swap station, charging pile, battery leasing, battery echelon utilization, etc.

无动力车身
Unpowered Bodywork

随车电池及附件
Onboard Battery & Auto Parts

备用电池
Spare Battery

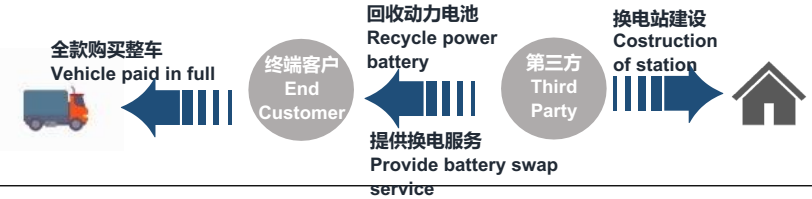
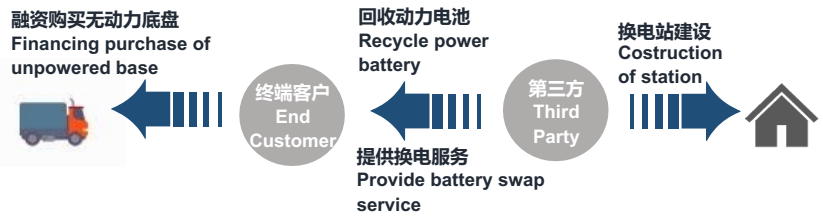
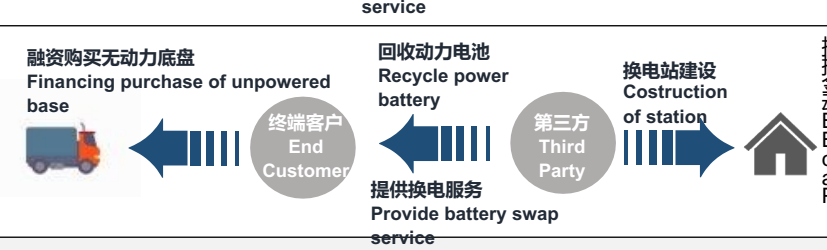
换电设施+改造费用
Battery Swap Facilities + Modification Cost



商业模式探索 Exploration of business model

根据客户对换电重卡的痛点、需求以及目前行业内成功的示范案例，设计出多种支撑换电重卡能够顺利运营的商业模式，按照运营模式的可行性和成本分析，选取了四种运营模式，目前以“车电分离”模式为主。

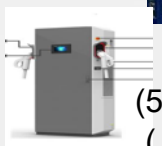
Based on the customer's sore points, needs and the successful exemplary cases of the industry in battery swap heavy trucks, a variety of business models are designed to support the successful operation. According to the feasibility and cost analysis of the operation models, four operation models are selected, among which "separation of vehicle and battery" is the main model.

模式 Model	模式介绍 Introduction	优势 Advantages	劣势 Disadvantages
（融资租赁）购买整车+自建自营 (Financial leasing) Purchase of vehicle + Self-construction & Self-operation	 换电站及电池：用户自持； 换电服务（运营）：自主运营仅支付电费；委托第三方运营支付管理费、电费 动力电池回收：用户或委托第三方 Battery swap station & battery : User owned; Battery swap station service (Operation): If autonomous operation, only pay electricity bill; If entrust a third party to operate, pay management fee and electricity bill Power battery recycling: By user or entrusted third party	用户生命周期收益较高 High benefits in users' lifecycle	用户初期成本高 High cost at the start by users
（融资租赁）购买整车+第三方建站、运营 (Financial leasing) Purchase of vehicle + Station construction & operation by third party	 换电站及电池：第三方持有； 换电服务（运营）：第三方以度电服务费方式向用户收取。 动力电池回收：第三方负责 Battery swap station& battery: The third party owned; Battery swap Station service (Operation): The third party charges the electricity service fees from users. Power battery recycling: By the third party		
（融资租赁）购买无动力底盘+换电模式+第三方运营 (Financial leasing) Purchase of unpowered base + Mode of battery swap + Operation by third-party	 换电站及电池：第三方持有； 换电服务（运营）：第三方以度电服务费方式向用户收取。 动力电池回收：第三方负责 Battery swap station & battery : The third party owned; Battery swap station service (Operation): The third party charges the electricity service fees from users. Power battery recycling: By the third party	第三方推广速度快，可迅速占领市场；用户初期投入成本底。 Promotion speed of the third party is fast, which can quickly occupy the market; Low cost at the start by users	第三方投资成本及风险高 High cost and risk by the third-party
（融资租赁）购买无动力底盘+电池经营性租赁+第三方运营 (Financial leasing) Purchase of unpowered base + Business leasing of battery + Operation by third-party	 换电站及电池：第三方持有； 换电服务（运营）：第三方经营性租赁方式向用户收取租金，用户支付度电服务费。 动力电池回收：第三方负责 Battery swap station & battery : The third party owned; Battery swap station service (Operation): The third party charges the rent from the user through operating lease, and the user pays the electricity service fee. Power battery recycling: By the third party		

Concrete Industry cases in China 中国混凝土行业案例

Beijing – The first Zero-Emission Transportation Project in concrete industry
北京——混凝土行业首个零排放运输项目

Cargo 运输货物	Transport 交通工具	Volume 容量
aggregate 集料	Tractor/trailer 牵引车/挂车	1800 Tons 1800吨
concrete 混凝土	Mixer truck 搅拌车	7000 m³/day 7000立方米/天



(5 EV /200 units)
（5辆电动/200辆）

10-20km
10-20公里

（20 EV units)
（20辆电动）

60km
60公里

179km
179公里

Mining Industry cases in China 中国矿业案例

Mine(Area Closed)
矿山（封闭区域）

Qinghai Lithium Mine
青海锂矿

Cargo 运输货物	Transport 运输工具	Volume 容量	EV quantity 电动车数量	Operating distance（km） 运营里程（公里）
Salt mine 盐矿	Tractor/trailer/Dumper 牵引车/挂车/搅拌车	19500 Tons/day 19500吨/天	150 units 150辆	200km/day 200公里/天

Mines（Salt precipitation）
矿井（盐析沉淀）

12km
12公里

Inside
内部

Mine yard
矿山工业场地

90km
90公里

45km
45公里

Outside
外部

Qinghai Lianyu Potash Fertilizer Plant
青海联宇钾肥有限公司

Dubson Train Station
杜布森火车站

Port Transportation cases in China 中国港口运输案例

Port Handling(Area Closed)
港口装卸（封闭区域）

Guangzhou Port（One of the largest ports in China）
广州港（中国最大的港口之一）

Cargo 运输货物	Transport 运输工具	Volume 容量	EV quantity 电动车数量	Operating distance（km） 运营里程（公里）
Grain, coal, containers 谷物、煤炭、集装箱	Tractor/trailer/Dumper 牵引车/挂车/搅拌车	1.74 million Tons/day 174万吨/天	50 units 50辆	80-150km/day 80-150公里/天

Inside port
港内

shipping dock
装卸码头

15km
15公里

5km
5公里

10km
10公里

freight station
货运站

transtainer
移动式集装箱吊运场

storage yard
堆场

40km
40公里

freight depot
货运站

Outside Port
港外

100-120km
100-120公里

destination of delivery
交货地点

Case Video 案例视频

■ Video 1
■ 视频一

■ Video 2
■ 视频二

Future
未来
To meet the future
放眼未来

Seek smarter solutions and redefine the relationship between people and cars.
寻求更明智的解决方案，重新定义人车关系。

Originality
创意
Originality innovation
创意革新

Integrate global resources and promote the growth and reform of the automotive industry.
整合全球资源，促进汽车行业的增长与变革。

Technology
技术
Breakthroughs technology
技术突破

Provide the optimal product solutions with scientific and technological genes.
提供具备科技性的最佳产品解决方案。

Open
开放
The open heart
敞开心扉

Focus on users' value demands and integrate into the world with an open mind.
关注消费者的价值诉求，敞开心扉融入世界。

Now
当下
Focus on the present
着眼当下

Focus on the present, stand on solid ground, look far ahead from a high plane, and move on unremittingly.
着眼当下，脚踏实地，高瞻远瞩，持续发展。