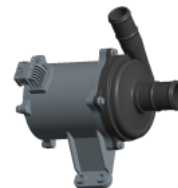


# POWERING FOR GLOBAL ENGINE!





Honesty

Be honest,  
Integrate



Implementation

Fast response,  
Persistent effort



Innovation

Technology leading,  
keep pace with times



Improvement

Continuous improvement  
and perseverance



- 1 Overall Description
- 2 Research & Development Capability
- 3 Manufacturing
- 4 Quality Control
- 5 Logistics
- 6 Future Plan

# HOP INTRODUCTION

## WHOLLY OWNED SUBSIDIARIES



### Hengshan Gear (2003)

Precision gears and reducers



### Jiali Machinery (2011)

Aluminum casting and machining



### Tengzhi Electromechanical (2018)

Vacuum pump

## HEADQUARTER



### Hunan Oil Pump Co., Ltd.

Oil Pump, Transmission OP, Electronic

Pump, Water Pump, Fuel Lifting Pump

Global Suppliers  
of Powertrain and Drivetrain  
Pump Products

## HOLDING SUBSIDIARIES



### Dongchuang Intelligent Equipment (2018)

Smart equipment and factory solutions



### Dongxingchang Technology (Shenzhen) (1996)

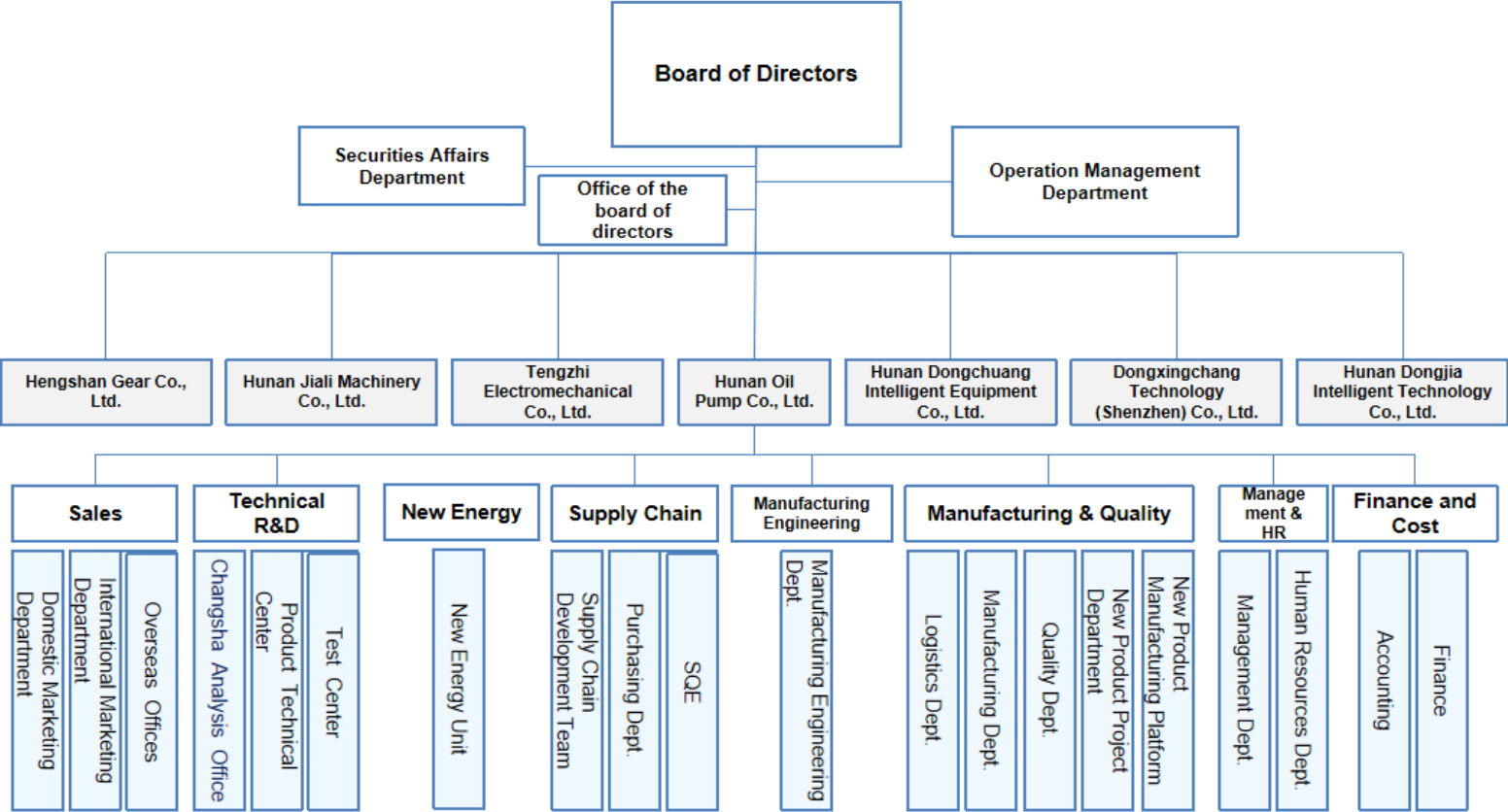
Motors and driving system

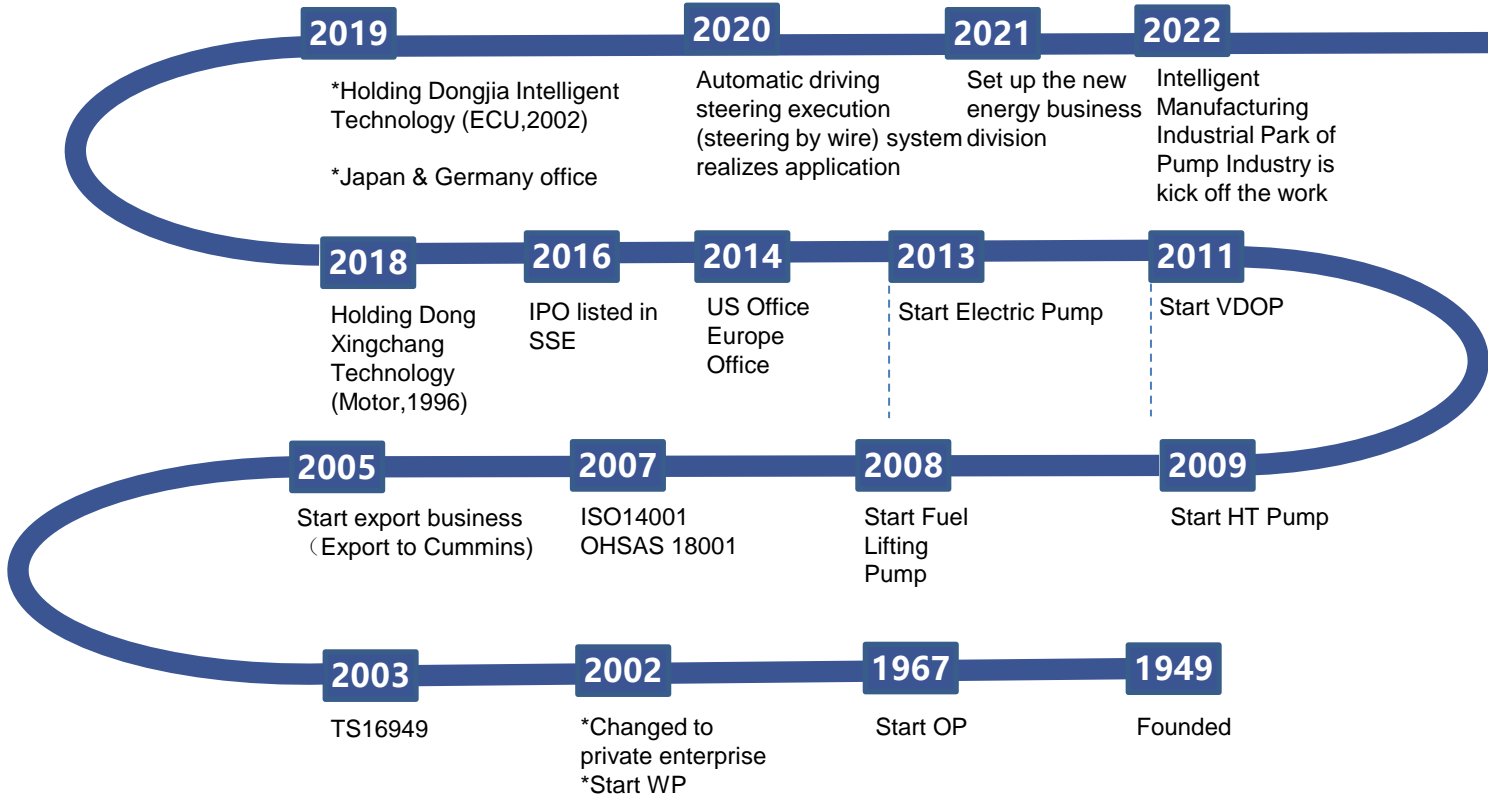


### Dongjia Intelligent (2002)

Electric controller and intelligent system

# ORGANIZATION







# ACHIEVEMENTS



National Manufacturing Individual Champion Enterprise



High-Tech Enterprise



National Green Factory



National Enterprise with Intellectual Property



Excellent Member in WEICHAI R&D Community



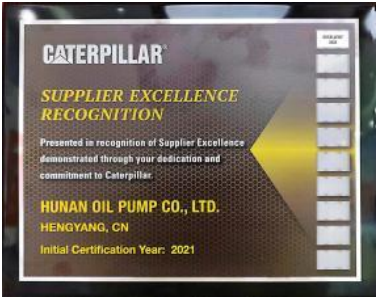
National Enterprise Technical Center



National Technology Innovation Enterprise



Prize from Caterpillar



Supplier Excellence from Caterpillar

CONFIDENTIAL



Customer Support Award from GCIC



5S/SOP Award from TMCAP



Quality Support Award from GIC



Excellent Supplier Award from BYD

## ■ International Customers

SOP & Prototype





# KEY CUSTOMERS

## Domestic Customers

### SOP & Prototype

#### COMMERCIAL VEHICLE



#### TRANSMISSION

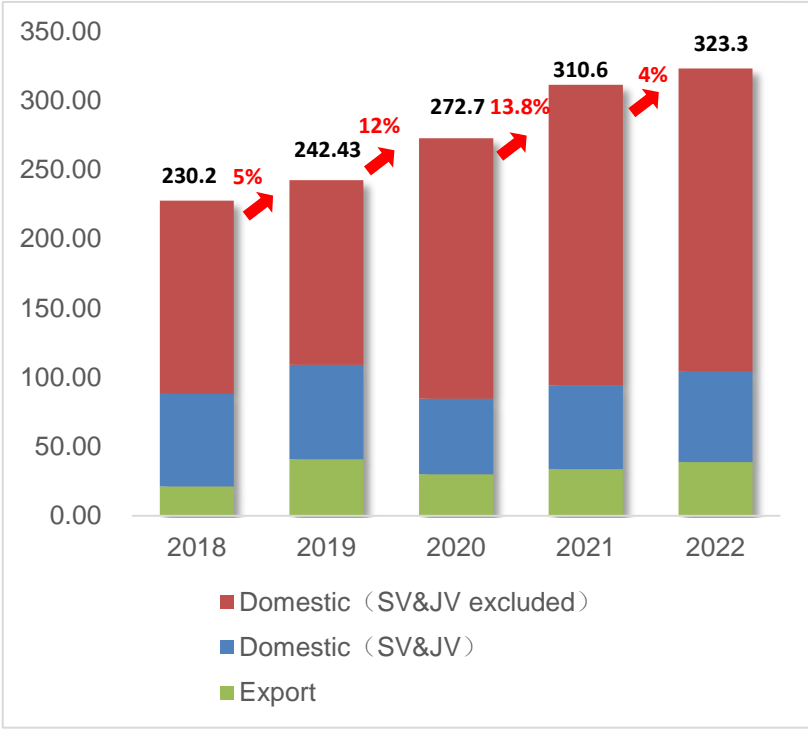


#### PASSENGER CAR

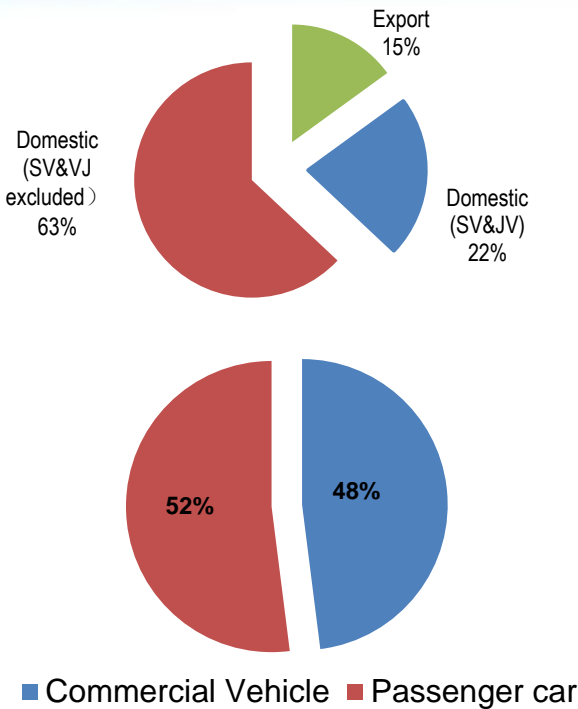


#### NEW ENERGY

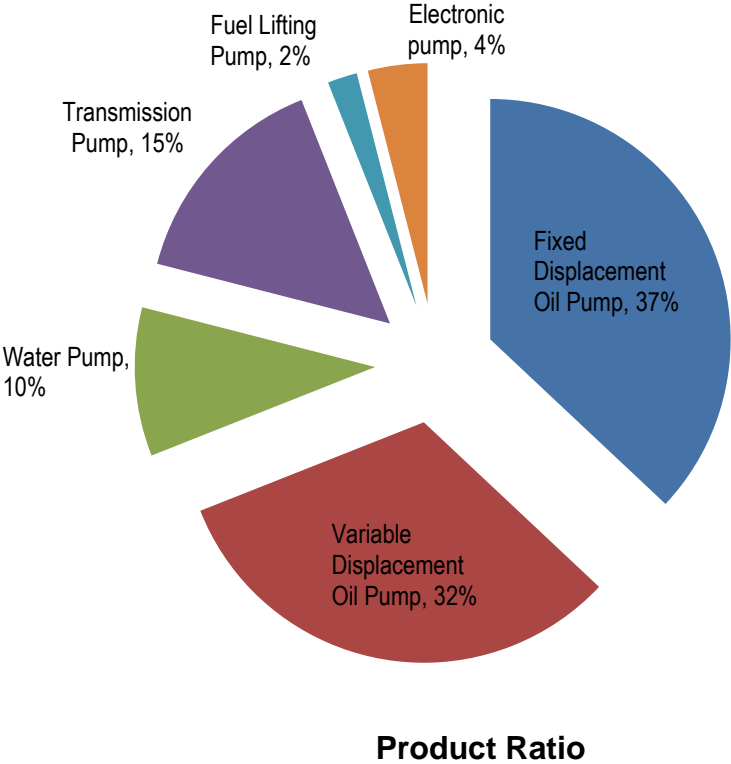




Sales Revenue 2018-2022 (\$M)



Sales Ratio (%)



## Applications

Car

Light/ Medium Vehicle

Heavy Duty Truck









Bus

Agriculture

Marine

Generating Sets

Locomotive





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**Dongjia Intelligent Technology  
Co., Ltd.**

**R&D team:** 39 people

(2 Doctors, 1 professor-level senior engineer, all with more than 10 years of work experience)



Headquarter

**Hunan Oil Pump Co., Ltd.**

**R&D team:** 248 people (8 Doctors)

**Main products:** oil pump, transmission

OP, water pump, fuel lifting pump,

electronic pump

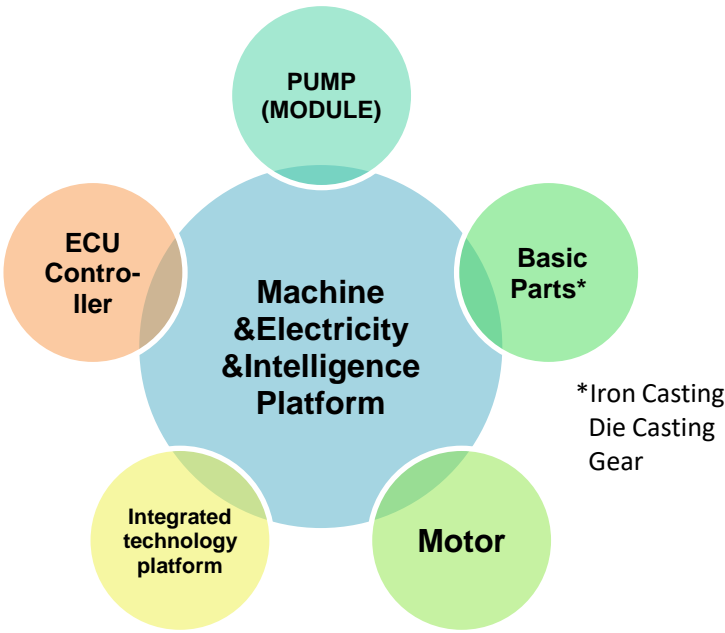


**Dongxingchang Technology  
(Shenzhen) Co., Ltd.**

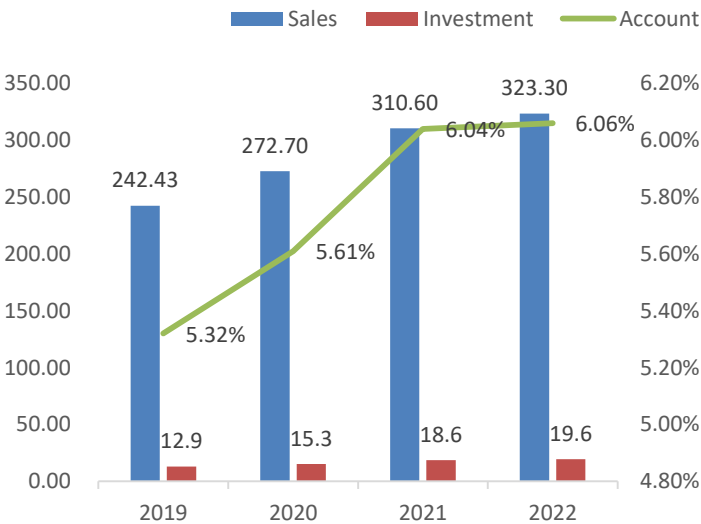
**R&D team:** 43 people

(2 Doctors, with more than 10 years of work experience)





Platform

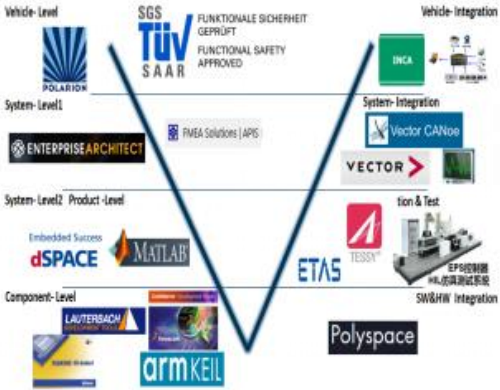
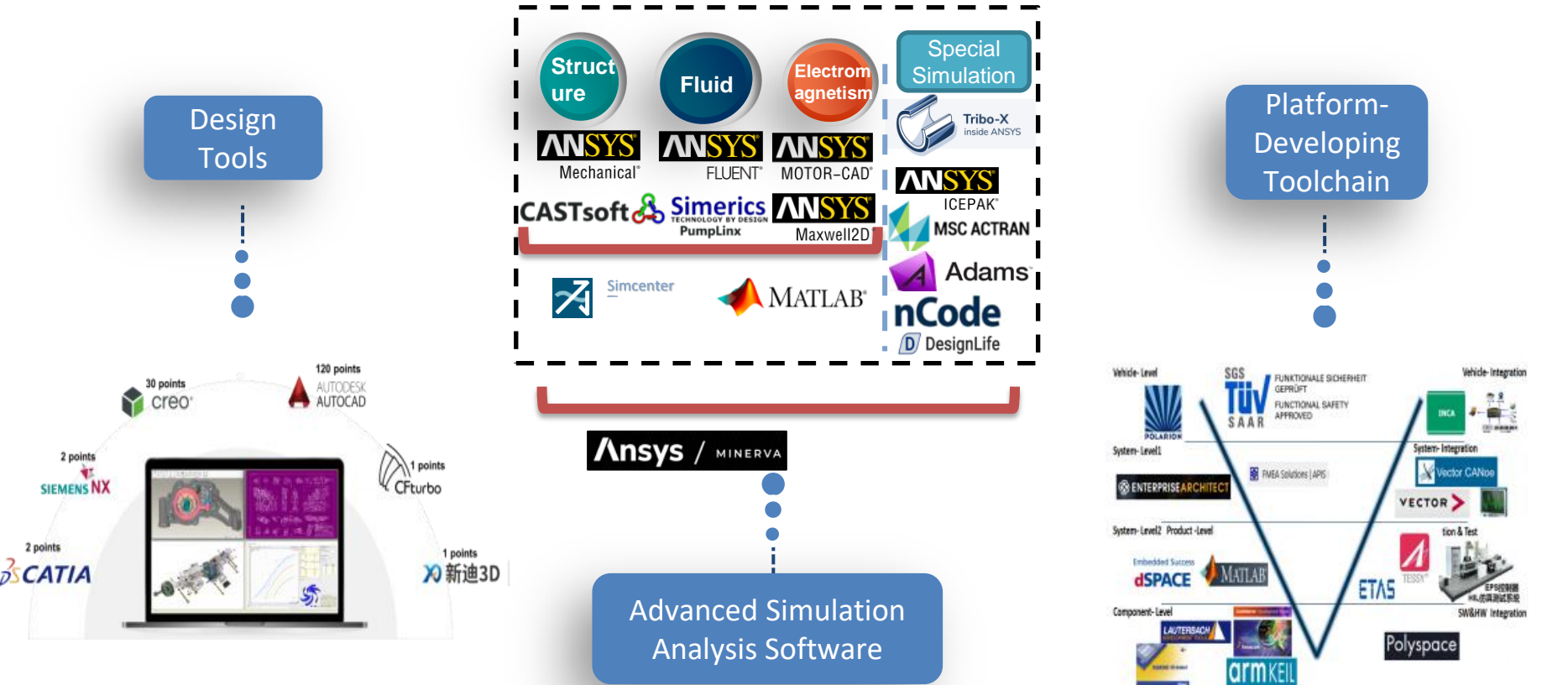


R&D Investment(\$M)

Standard	Standard Content	Time	HOP Responsibility
JB/T 8413.1-2010	Internal combustion engine-Oil pumps- Part 1: Assemblies-Specification	Promulgated in 2010	First drafter
JB/T 8413.2-2010	Internal combustion engine-Oil pumps- Part 2: Assemblies-Methods for test	Promulgated in 2010	First drafter
JB/T 8413.7-2015	Internal combustion engine-Oil pumps- Part 7: Assemblies-Reliability test rig assessment	Promulgated in 2015	Participant
JB/T 8126.8-2017	Internal combustion engine-Water pumps- Part 8: -Variable water pumps	Promulgated in 2017	Participant
JB/T 8126.9-2017	Internal combustion engine-Water pumps- Part 9: -Electronically controlled water pumps	Promulgated in 2017	Participant
JB/T 13326-2018	Remanufacturing internal combustion engine-Oil pump process specification.	Promulgated in 2018	Participant
JB/T 8413.8-2019	Internal combustion engine-Oil pumps- Part 8: -Variable displacement oil pumps	Promulgated in 2019	First drafter
JB/T 8413.9-2019	Internal combustion engine-Oil pumps- Part 9: -Electronically controlled oil pumps	Promulgated in 2019	First drafter
JB/T 8413.10-2019	Internal combustion engine-Oil pumps- Part 10: -Electric oil pumps	Promulgated in 2019	First drafter
JB/T 8413.11-2019	Internal combustion engine-Oil pumps- Part 11: -Transmission oil pumps	Promulgated in 2019	First drafter
Q/CBBC002-2015	Automotive electric power steering controller	Implemented in 2015	Participant
Q/CBBC001-2015	Automotive electric power steering string assembly	Implemented in 2015	First drafter
Q/CBBC003-2015	Pinion type electric power steering assembly	Implemented in 2015	First drafter

- ❖ Authorized national patents: **741**, incl. National Invention patents: **105**
- ❖ Intl. Invention patents: **2**
- ❖ National Industry STD: **16**

Item	Invention Patents	Utility Model Patents
FDOP	24	147
VDOP	24	125
Water Pump	4	78
Transmission OP	5	43
Gear Reducer	5	12
Motor	16	89
EPS, Controller	27	142
Total		741



- Area: 4,600 Square meters
- Test bench: 86 sets
- Staff: 15



CNAS Certificate



Performance Test Room



Durability Test Room

# TEST - CAPABILITY



Temperature & Humidity  
& Vibration Combined Tester



Salt Spray Test  
Device



Durability Test  
Device



Water-Proof and dust-proof  
Test device



Temperature &  
Humidity Test Device



Internal & External Magnetic  
Field Intensity



Counter Electromotive  
Force

S/N	Items	S/N	Items	S/N	Items	S/N	Items	S/N	Items
1	Appearance Quality Check	12	Anti-Vibration Performance	23	Signal Circuit and Power/LTG Short Circuit	34	Conduction Disturbance Test	45	Dust-Proof Test
2	Conforming Testing	13	Mechanical Shock Test	24	Power output circuit and Power /LTG Short Circuit	35	Radiation Disturbance Test	46	Water-Proof Test
3	Pressure Feedback Test	14	Chemical Resistant Test	25	Superimposed AC voltage	36	Transient Conducted Immunity Test	47	Long Overvoltage
4	Sealing Test	15	Salt spray test	26	Instant Voltage Drop	37	Transient Coupling Immunity Test	48	Instant Overvoltage
5	Insulation Resistance	16	High Temperature Durability Test	27	Voltage Drop	38	Electrostatic Discharge anti-interference test	49	Backward Voltage
6	Performance testing	17	Low Temperature Working Test	28	Single Wire Interruption Test	39	Low Frequency Magnetic Field Disturbance Test	50	Overload Test
7	Noise Testing	18	Constant humidity and heat resistance test	29	Multiple Wire interruption Test	40	Working Current Test	51	Life Test
8	Lock-rotor Test	19	Humidity Thermal Cycle Test	30	Electrical fast transient pulse anti-interference test	41	Quiescent Current Test		
9	Cold Start Test	20	Cold&Thermal Shock	31	Radio-frequency Current Injection anti-interference test	42	Endurance Test		
10	Pressure Fluctuation Test	21	Temperature Variation	32	Surge (Shock) anti-interference test	43	Cleanliness Inspection		
11	No-load Noise Test	22	The voltage gradient	33	Radio-frequency radiation anti-interference test	44	Anti-drop Performance		





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# INFORMATIZATION & INTELLECTUALIZATION CONSTRUCTION

## Informatization Automation Intellectualization



Industrial Robot



Automatic Machining Line

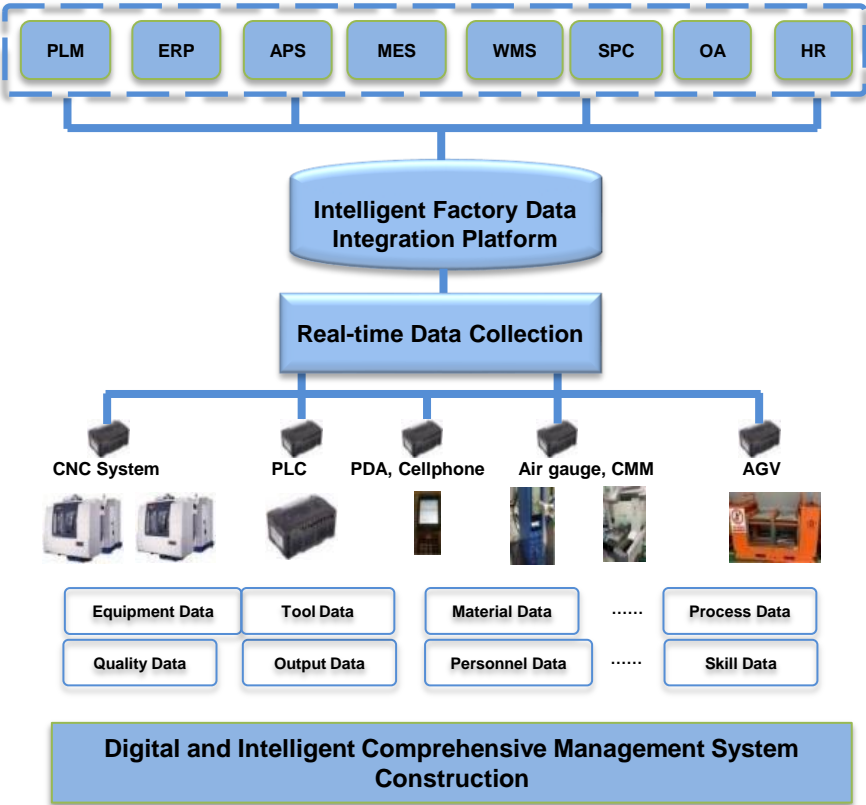


Automatic Assembly Line



AGV Automatic Delivery

CONFIDENTIAL



Control through the whole process of the system

# OIL PUMP/WATER PUMP/ TRANSMISSION PUMP - PROCESS



Iron&Aluminum  
Casting Blank

Heat  
Treatment

Machining

Assembly



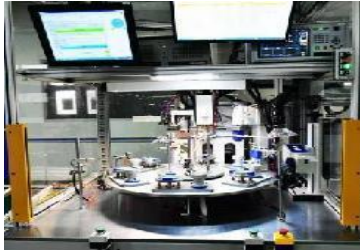
Transportation

Packaging

Inspection

Performance  
Test

# ELECTRIC OIL PUMP / WATER PUMP-ASSEMBLY FLOW



Stator performance test



Assembly



Controller installation,  
tin soldering



Packaging



Assembly air test



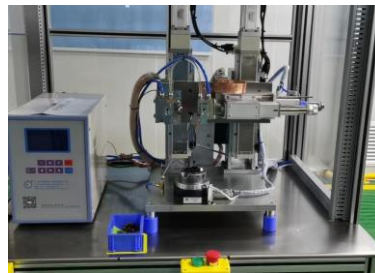
Assembly performance  
test



# MOTOR STATOR AND ROTOR- MACHINING FLOW



Stator winding



Stator dipping lacquer



Stator performance test



Rotor chip punching



Rotor magnetization



Rotor flux  
measurement





**Iron Casting**

- 3 Xindong FBO-III fully automated molding lines imported from Japan, with annual production capacity of 12,000 tons;
- Shanghai Xinyan's 3-ton intermediate frequency electric furnace;
- Fadirk fully automatic recycling 60 tons/hour sand processing system;
- Japanese Shinto automatic pouring machine, the ladle capacity is 500 kg;
- DISA continuous online shot blasting machine;
- The size of the sand box is 508mm×610m, maximum molding casting size is 350\*450\*200 mm and maximum molding casting weight is 35kg;
- Spare capacity: about 66%.



**Aluminum Die Casting**

- 3 melting furnaces for annual 12,000 tons;
- 32 auto die-casting machines, maximum 2000 tons, annual capacity is 16 million pcs;
- Spare capacity: about 18%.

★ Remark: The aluminum die casting is completed in subsidiary Jiali Machinery Co., LTD.



- General CNC: over 600 sets
- 5-Axis CNC (DMG): 2 sets
- More than 150 machining lines (Above 40 auto-machining lines)
- Hydraulic tools with gas detection
- Cutting tools with self-cold function & automatic counting
- Machining capacity: over 19 million pcs/ year
- About 16% spare capacity

- Over 100 semi-auto assembly lines
- More than 10 automatic assembly lines
- Over 130 test devices
- 100% Flexibility (torque) test

## Assembly



## Online test

- 100% function test before delivery
- Scan to ensure assembly traceability process interlocking
- Capacity: 19 million pcs/year
- About 20% spare capacity





## ◆ Electric Pump Workshop

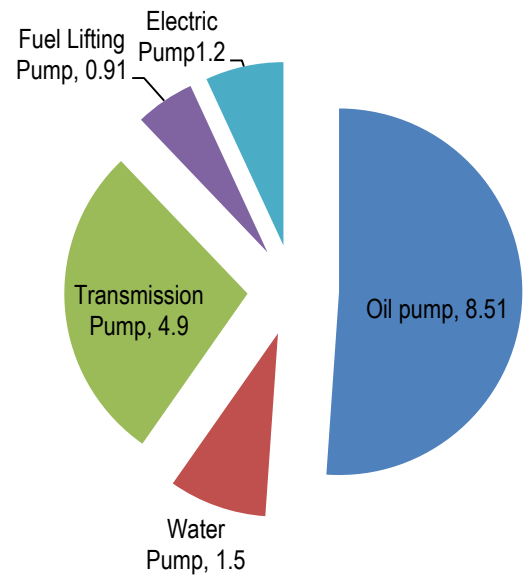
- 1 SMT line, annual capacity is 0.8 million pcs.
- 1 assembly line for motor and controller. annual capacity is 0.1m/pcs.
- 1 EPS assembly line, annual capacity is 0.3 million pcs.
- 1 motor assembly line, annual capacity is 0.3 million pcs.
- 4 semi-automatic lines for EOP and EWP.
- 1 EOP automatic assembly line.
- The assembly capacity of electric pump is 1.2 million.



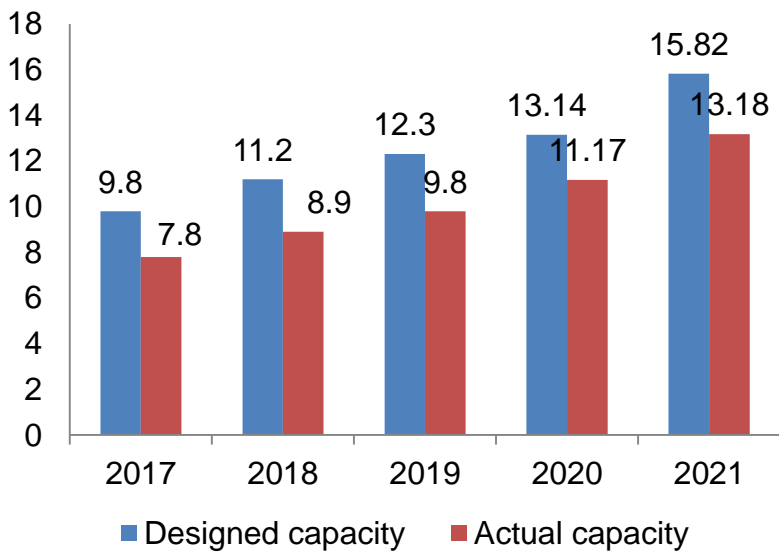
## ◆ New Energy Program (On going)

- Covers an area of 8000 m<sup>2</sup>
- Planned to build 2 floors with a total area of 17000 m<sup>2</sup>
- Annual capacity 3 million pcs.
- Annual output value of 500 million RMB.
- Expected to be put into production in June 2023.

- 500 sample orders are completed and delivered annually, including more than 100 kinds of new prototypes.
- Prototype delivery time is 4-12 weeks.



Capacity (Million PCS)



Capacity (Million PCS)





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IATF 16949:2016  
(Expiration Date  
2024/08/09 )



ISO 14001:2015  
(Expiration Date 2024/11/19)



ISO 45001:2018  
(Expiration Date 2023/11/19)

Internal audit

Audit type	Frequency	Auditing Standard	Remarks
System audit	Non-fixed: according to the monthly plan Fixed: once per year	IATF16949/ISO14001/ISO45001	15 management processes
Process audit	According to the monthly plan	VDA6.3	Covered all SOP products
Products audit	According to the monthly plan	VDA6.5	Covered all developing and trial-run products.

Ratings from global customers in recent three years

2020

- Passed Paccar’s potential supplier audit
- Passed Toyota's potential supplier audit

2021

- Passed Daimler’s potential supplier audit

2022

- Passed BYD EP supplier audit
- Passed HUAWEI EP supplier audit

## ADVANCED PLANNING

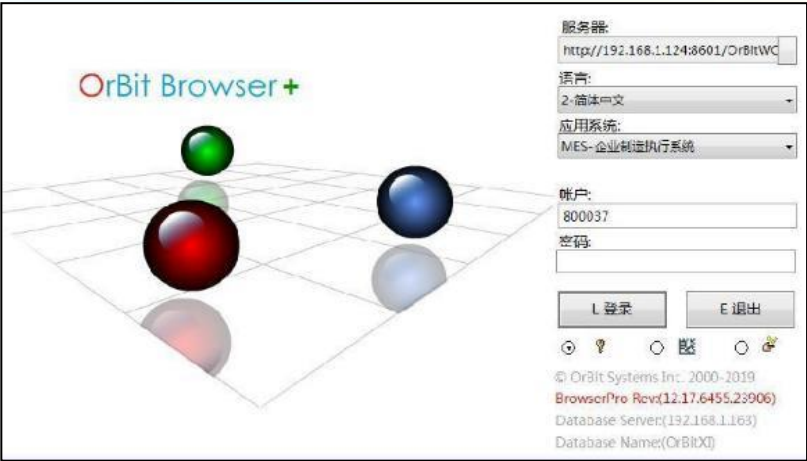
- APQP&PPAP&MSA
- Build up standard matrix, conduct analysis and training
- DFMEA database
- Multi-functional project team
- Multi-stage project review
- PFMEA&CP
- ZDM

## PROCESS CONTROL

- Visual check WI
- First and final piece 100% inspection
- Combine self-inspection and patrol inspection
- Equipment auto alarm when it is abnormal
- Auto alarm when the cutter life is due
- Regular inspection on fixtures and gauges, auto alarm when it is due
- On-line SPC supervision
- PCN management
- Key/risky process control
- LPA/process audit/product audit

## QUALITY ISSUE IMPROVEMENT

- Fast response, arrive production site within 10 min.
- Define interim containment action within 4h.
- Use 3P5WHY and FTA to find the root cause
- 7 steps and 8D
- 6 Sigma
- Actions follow-up validation
- Share to similar products
- Summarize and record into failure mode database

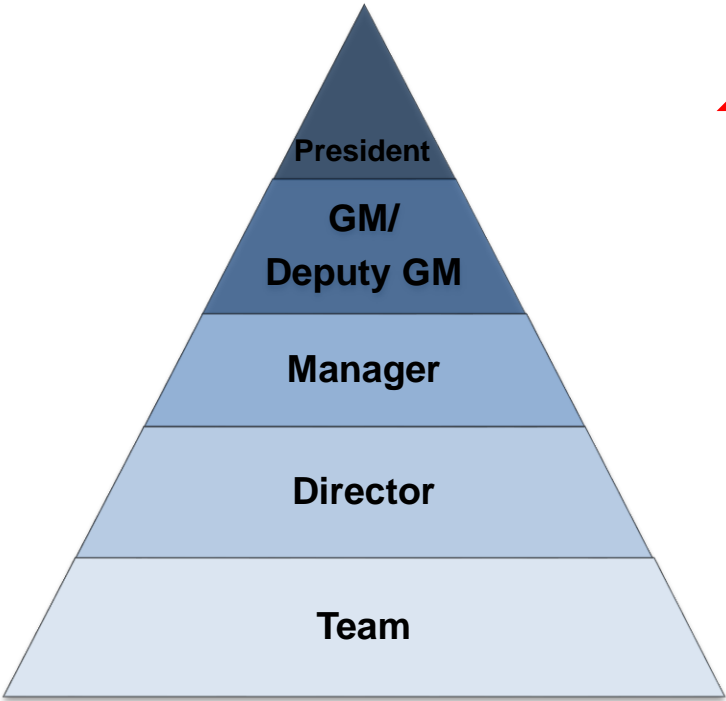


- Develop MES system to control process quality



**Functions:**






- Gauge management      Jig/mold/tooling management
- Device management      First/self/regular/final inspection
- Traceability management      NG goods management
- SPC management      4M change management








- Issue escalation system



# MAIN INSPECTION DEVICE AND CAPABILITY

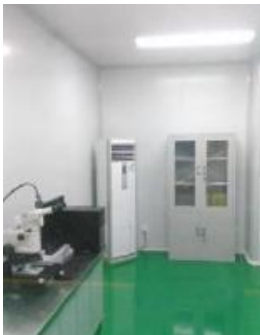
Device	Name	Item	Brand	QTY
	CMM	Part dimension and tolerance testing	ZEISS/HEXAGON/WEINZEL	7
	Roughness profiler		MITUTOYO	2
	Flatness measuring instrument		TROPEL	1
	Cylindricity tester		MITUTOYO	1
	Air gauge		ZY	160

Device	Name	Item	Brand	QTY
	Infrared spectrometric analyzer	Material composition, metallography, internal defect, mechanical testing	SPECTRO	2
	Infrared carbon sulphur instrument		BAOYING	1
	Material tester		SHIJIN	1
	Metalloscope		CAIKON	3
	X-ray real time imaging system		DNDT	1

■ Environment    Cleanliness level ISO 7



Washing Room



Inspection Room



Air Shower

■ Equipment



Washing Equipment

Supplier: Millipore



Particles Analysis Microscope

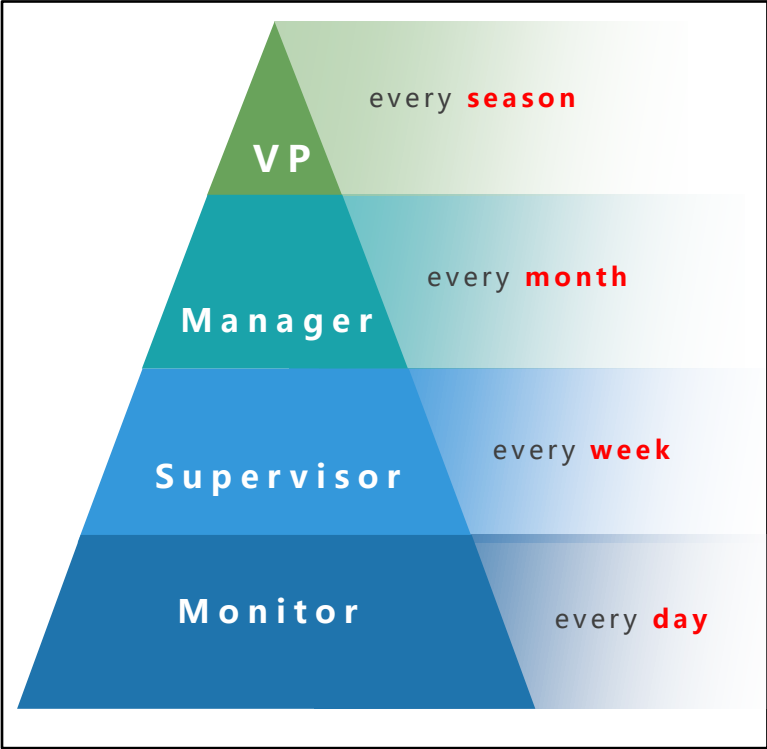
Supplier :Jomesa



Analytical Balance

Supplier: Mettler Toledo

## Layered Process Audit



CON

All staff participate in quality layered audit

## Lean Improvement



PDCA loop is adopted to improve projects, pursue zero defects



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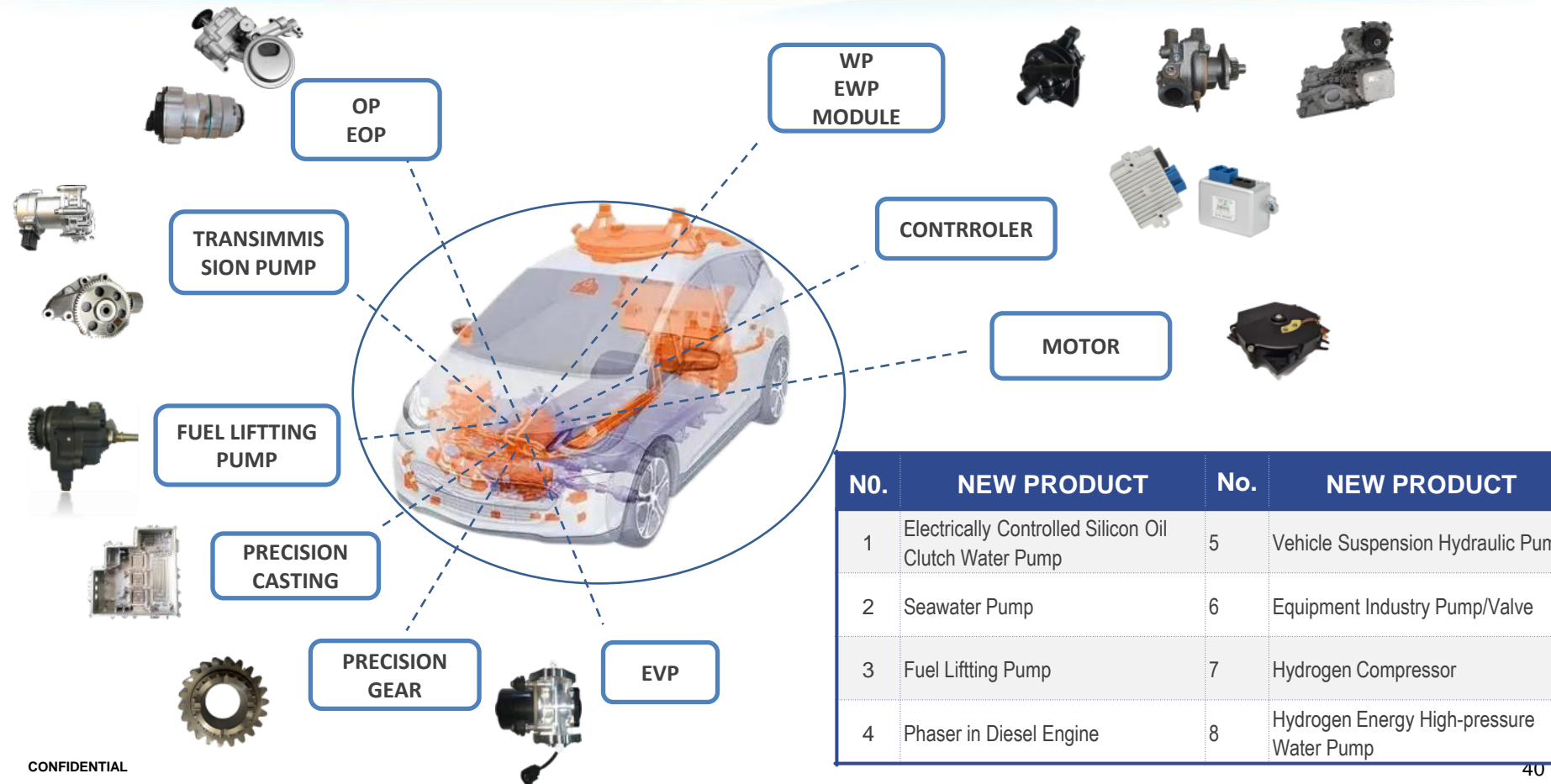
- Hunan Hengdong: Host location
- Changsha storage: Air Transportation
- VMI service in overseas countries
- Zhuzhou storage: Truck & Railway
- Shanghai & Shenzhen: Export by sea





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# PRODUCT STRATEGIES



N0.	NEW PRODUCT	No.	NEW PRODUCT
1	Electrically Controlled Silicon Oil Clutch Water Pump	5	Vehicle Suspension Hydraulic Pump
2	Seawater Pump	6	Equipment Industry Pump/Valve
3	Fuel Lifting Pump	7	Hydrogen Compressor
4	Phaser in Diesel Engine	8	Hydrogen Energy High-pressure Water Pump



## Three visions

- Century company
- Ten billion market value
- Ten billion sales revenue

## Five Strategies

- 1 Focus on pumps in power-train system, new type motor, ECU as the core business.
- 2 Increase investment in innovation, keep up with the pace of technological development, and strengthen the technology platform of machine-electricity-intelligence integration.
- 3 Insist on key components made in house, keep high precision process and special process as the company's manufacturing strengths.
- 4 Put the capital market into full play to ensure the capital needs of core business development.
- 5 Build a global talent team, accelerate the process of internationalization.



**湖南机油泵股份有限公司**  
**Hunan Oil Pump Co.,Ltd**

**POWERING FOR GLOBAL ENGINE!**