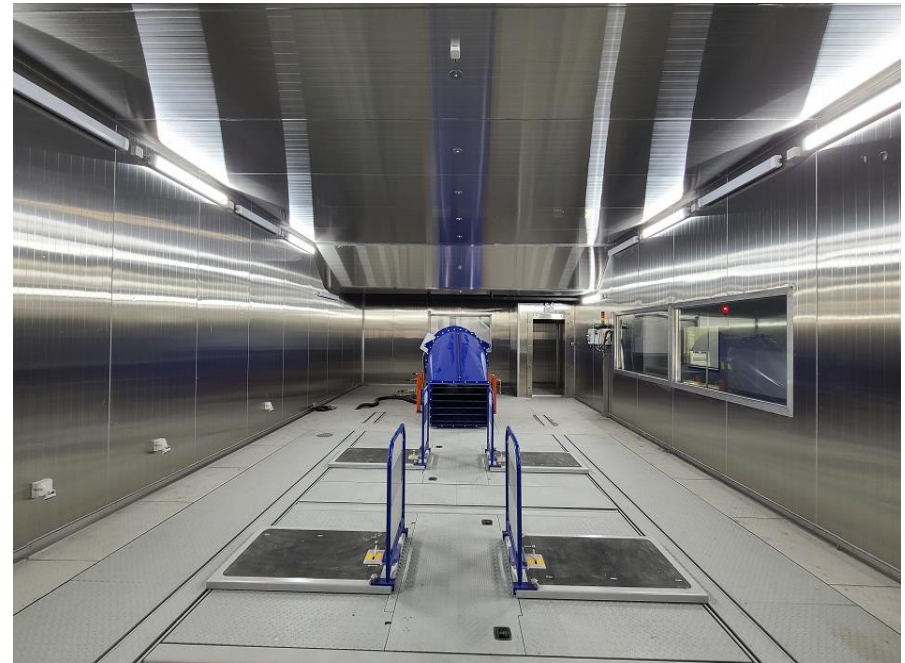


- Awarded the accreditation certificate issued by CNAS

- Certificated by quality system IATF 16949:2016 LOC

# Functional, DV, AND PV Testing Facilities



# Environmental reliability

**Environmental reliability lab** has comprehensive reliability testing equipment can conduct comprehensive environmental reliability verification on different auto parts, systems and assemblies.

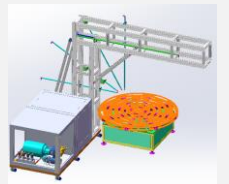
## Technical parameters (temperature, humidity, vibration)

Classification	Parameters
Three comprehensive	<ul style="list-style-type: none"> <li>• 18T shaker ( 2m*2m+1m*1m )</li> <li>• Thermostat Volume : 2000L</li> </ul>
rapid temperature change	<ul style="list-style-type: none"> <li>• 15°C/min、 -70~150°C、 1000L</li> </ul>
temperature shock	<ul style="list-style-type: none"> <li>• Low temperature :-55~-10°C、 High temperature:60~150°C</li> <li>• Volume:976L ( three-box )</li> </ul>
	<ul style="list-style-type: none"> <li>• Low temperature :-65~-10°C、 High temperature :60~150°C</li> <li>• Volume:300L ( Basket )</li> </ul>
low pressure	<ul style="list-style-type: none"> <li>• Pressure:101.3~0.5kPa、 Volume:1000L</li> </ul>



## Technical parameters ( Protection )

Classification	Parameters
salt spray	<ul style="list-style-type: none"> <li>• RT : ~65°C、 12000L ( Neutral salt spray )</li> </ul>
dust-proof	<ul style="list-style-type: none"> <li>• IP5X、 IP6X、 12000L</li> </ul>
water proof	<ul style="list-style-type: none"> <li>• IPX7、 IPX9K、 9000L</li> </ul>
ice water shock	<ul style="list-style-type: none"> <li>• temperature : 0~+4°C、 1360L</li> </ul>



# Battery test

Cell module lab has 10 environmental boxes (tomilo, Zenda), 44 channel high-precision cell (Arbin, chroma) and 16 channel module (chroma) test equipment, which can verify the performance and life of various types cells (soft package, square, cylindrical, solid)

## Cell technical parameters:

Equipment	Parameters
Cell Charge Discharge ( 124CH )	<ul style="list-style-type: none"> <li>5V 100A : 12CH+12CH+32CH+32CH</li> <li>response time : 1ms , accuracy : <math>\pm 0.02\%</math>FS</li> </ul>
	<ul style="list-style-type: none"> <li>5V 200A : 12CH+16CH</li> <li>response time : 1ms , accuracy : <math>\pm 0.02\%</math>FS</li> </ul>
	<ul style="list-style-type: none"> <li>5V 300A : 8CH</li> <li>response time : 10ms , accuracy : <math>\pm 0.05\%</math>FS</li> </ul>
Chamber	<ul style="list-style-type: none"> <li>Temperature : <math>-70\sim+120^{\circ}\text{C}</math> volume : <math>1\text{m}^3</math></li> </ul>



## Module technical parameters:

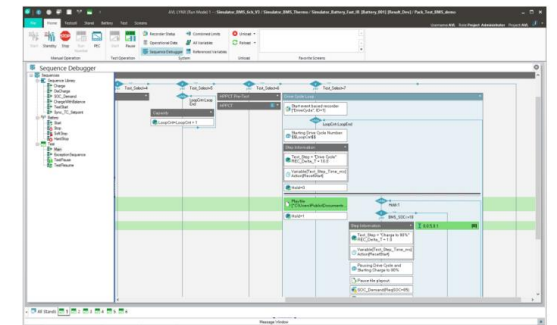
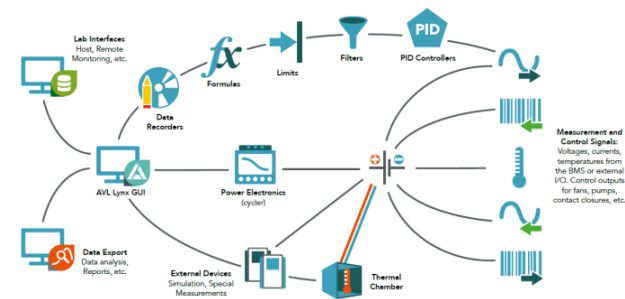
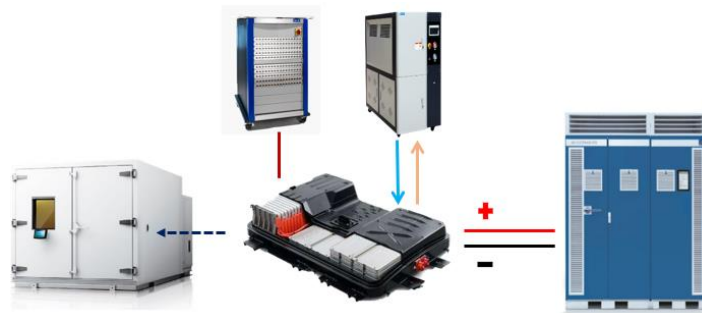
Equipment	Parameters
Module charge Discharge ( 16CH )	<ul style="list-style-type: none"> <li>100V 200A : 8CH</li> <li>response time : 10ms , accuracy : <math>\pm 0.1\%</math>FS</li> </ul>
	<ul style="list-style-type: none"> <li>100V 300A : 8CH</li> <li>response time : 10ms , accuracy : <math>\pm 0.1\%</math>FS</li> </ul>
CAN	<ul style="list-style-type: none"> <li>High speed can card : 4</li> </ul>
Chamber	<ul style="list-style-type: none"> <li>Temperature : <math>-70\sim+120^{\circ}\text{C}</math> volume : <math>1\text{m}^3</math></li> </ul>



# Battery test

## Technical parameters:

Equipment	Parameters:	Supplier
Battery system Charge discharge	<ul style="list-style-type: none"> <li>1200V 800A : 2CH</li> <li>response time : 1ms , accuracy : <math>\pm 0.01\%FS</math></li> </ul>	AVL
	<ul style="list-style-type: none"> <li>800V 600A : 2CH</li> <li>response time : 1ms , accuracy : <math>\pm 0.1\%FS</math></li> </ul>	AVL
Temperature acquisition	<ul style="list-style-type: none"> <li>Channel : 68CH Sampling time : 10ms</li> </ul>	AVL
CAN	<ul style="list-style-type: none"> <li>High speed can card : 4</li> </ul>	Vector
Cooling system	<ul style="list-style-type: none"> <li>Temperature : <math>-40\sim 85^{\circ}C</math> flow : 3~50L/min</li> </ul>	凌工
Chamber	<ul style="list-style-type: none"> <li>Temperature : <math>-70\sim 120^{\circ}C</math> volume : 12m<sup>3</sup></li> </ul>	增达、拓米洛

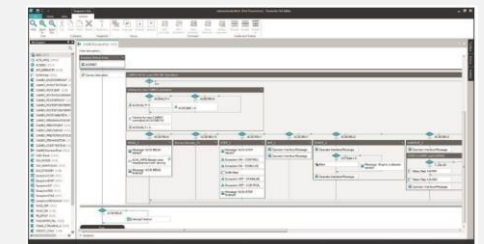


# E-Powertrain test

1E motor lab has 20000rpm high-performance motor bench (AVL) and 16000rpm motor bench, which can meet the motor system test requirements of different power levels and different torque and speed ranges

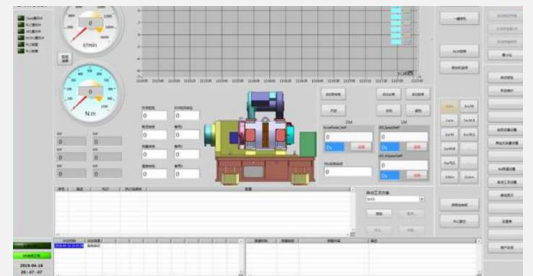
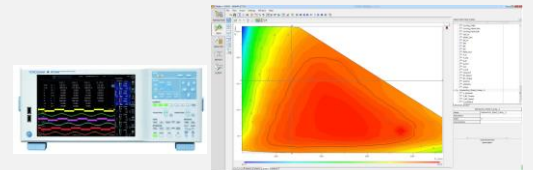
## Technical parameters:

- Supplier: AVL
- Dynamometer: 20000rpm/625Nm/312kW
- Battery simulator: 1200V/1600A/500kW
- Water cooling system: -40 ~ 120°C ( Dual channel )
- Water cooling system flow: 1~ 30L/min
- Ambient chamber temperature: -40~ 150°C ( 7K/min)
- Ambient humidity: 10%~95%RH



## Technical parameters:

- Supplier : 凯测
- Dynamometer: 16000rpm/500Nm/250kW
- Battery simulator: 1000V/700A/250kW
- Water cooling system : -40 ~ 120°C ( Dual channel )
- Water cooling system flow : 2~ 30L/min
- Ambient chamber temperature: -40~ 150°C ( 7K/min)
- Ambient humidity: 10%~95%RH

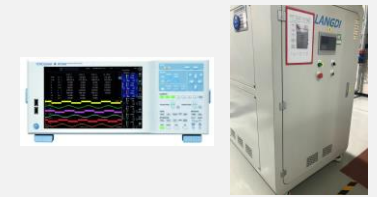
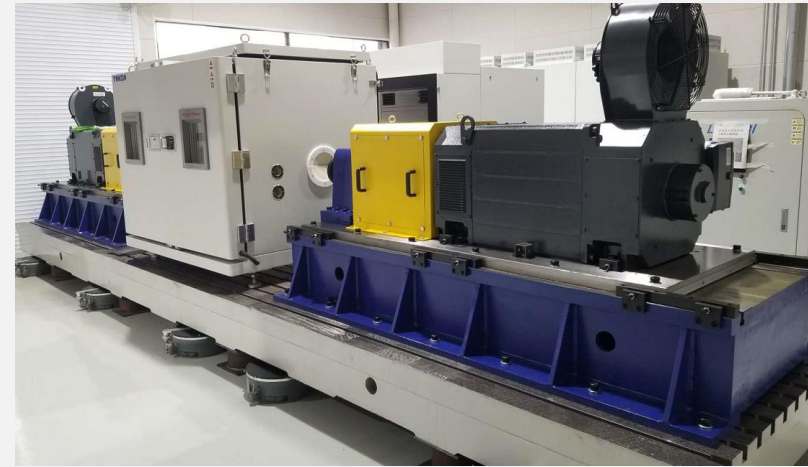


# E-Powertrain test

2E motor lab has 2 sets of two motor test bench and 1 set of hybrid assembly test bench, which can fully meet the development, calibration, strategy optimization and performance verification requirements of pure electric and hybrid powertrain systems

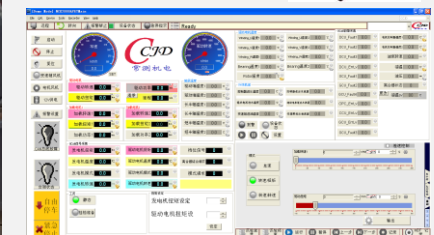
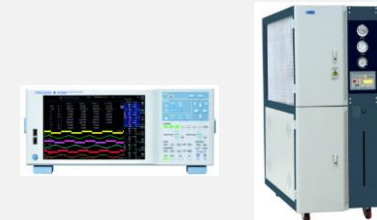
## Technical parameters:

- Supplier: 朗迪
- Load dynamometer: 3000rpm/2984Nm/250kW
- Battery simulator: 1000V/1200A/400kW
- Water cooling system : -40 ~ 100°C
- Water cooling system flow : 2~ 30L/min
- Ambient chamber temperature: -40~ 150°C ( 7K/min )
- Ambient humidity: 20%~95%RH



## Technical parameters:

- Supplier: 常测
- Load dynamometer: 3300rpm/3700Nm/310kW
- Battery simulator: 800V/700A/200kW
- Water (oil) cooling system temperature: -40 ~ 100°C
- Water (oil) cooling system flow: 2~ 30L/min
- Oil supply system: 200L



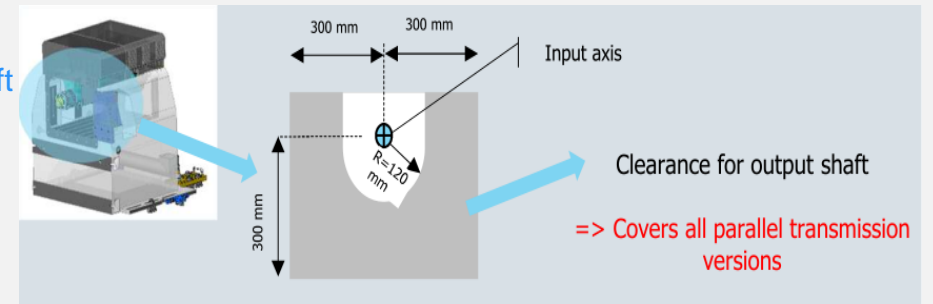
# E-Powertrain test

3E motor lab has a set of two drive three motor test bench, which can fully meet the development, calibration, strategy optimization and performance verification requirements of reducer, powertrain system and control system

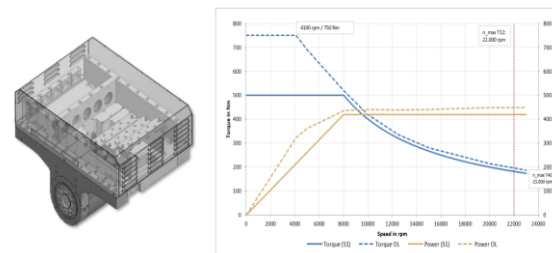
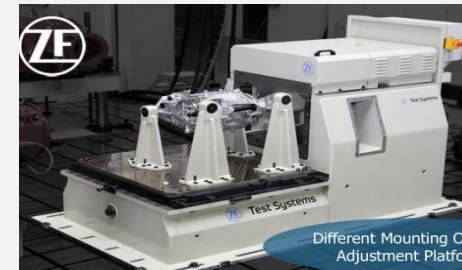
## Technical parameters:

- Supplier: ZF
- Input dynamometer: 23000rpm/500Nm/419kW
- Load dynamometer: 3000rpm/4200Nm/362kW
- Battery simulator: 1000V/1000A/350kW
- Water cooling system : -40 ~ 110°C、 flow : 2~ 20L/min
- Oil cooling system : 30 ~ 110°C、 flow : 2~ 20L/min
- Ambient chamber temperature: -40~ 150°C ( 7K/min )
- Ambient humidity: 10%~98%RH
- Power analyzer: WT5000
- Early fault diagnosis: delta ANALYSER v3

Advantage 1: Minimum shaft spacing up to 120mm



Advantage 2: The input dynamometer can be used independently, and the maximum transmission speed can reach 23000rpm



E-Dyno Electromotor Drive	Nominal Power	Nominal Torque	Overload Torque	Nominal Speed	Maximum Speed	Inertia	Cooling
High Speed motor	419 kW	500 Nm	750 Nm	8,000 rpm	23,000 rpm	0,041 kgm <sup>2</sup>	Water



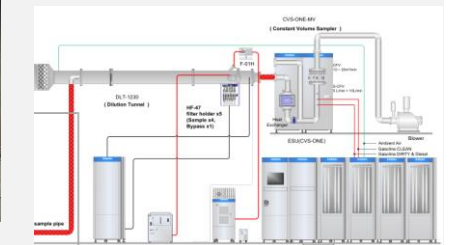


# Vehicle test

Vehicle emission lab has a set of vehicle emission environment chamber, 150kW AVL chassis dynamometer and AVL emission analyzer, which can realize vehicle CVS analysis, hybrid energy consumption, charge and discharge and other test capabilities

## Technical parameters:

- Supplier: AVL、久鼎
- Chassis dynamometer: max speed 200km/h、 max axle load 4500kg
- Driving type: four-wheel drive x two axes x two motors
- Maximum air volume: 104000m<sup>3</sup>/h
- Maximum wind speed: 160km/h
- Emission test system : Linearity:  $\leq \pm 1\%fs$  or  $\leq \pm 2\%rs$
- PN: measurement 23nm~2.5  $\mu m$
- PM: range: 0~2.1g, accuracy:  $\leq \pm 0.1 \mu g$
- Ambient chamber temperature: -20°C~+60°C
- Ambient chamber humidity: 10%~95%RH
- Soaking workshop temperature: -10°C~+40°C
- Auxiliary equipment: weighing box, power analyzer , AC charging pile, DC charging pile (maximum 1000V, 160kW)



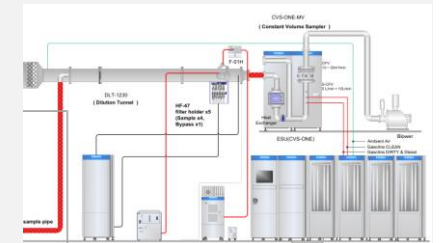
Main test items			Coverage standard
Type I Emission test	Type VI emission test	Normal temperature fuel consumption test	GB/T 18352.6-2016 Emission limits and measurement methods of light vehicle pollutants (China phase VI)
Low temperature fuel consumption test	Energy consumption test of hybrid vehicle	Dynamic performance test	GB/T 19233-2020 Test method for fuel consumption of light duty vehicles GB/T 19753-2021 Test method for energy consumption of light hybrid electric vehicles GB/T 19752-2005 Test method for dynamic performance of hybrid electric vehicles
Charge discharge test	Coastdown test	Quality parameter measurement	GBT 18385-2005 Test method for dynamic performance of electric vehicles GB/T 12674-1990 Method for determination of vehicle mass (weight) parameters

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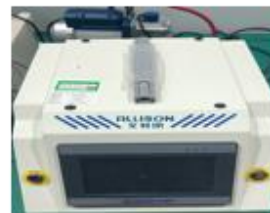


Main test items			Coverage standard
Type I Emission test	Type VI emission test	Normal temperature fuel consumption test	GB/T 18352.6-2016 Emission limits and measurement methods of light vehicle pollutants (China phase VI)
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Charge discharge test	Coastdown test	Quality parameter measurement	GBT 18385-2005 Test method for dynamic performance of electric vehicles GB/T 12674-1990 Method for determination of vehicle mass (weight) parameters

# Auxiliary Equipment

## Main Equipment

Project	Parameters
Negative pressure tester	<ul style="list-style-type: none"> <li>-70 kpa~0 kpa</li> </ul>
Pressure tester	<ul style="list-style-type: none"> <li>0~5000pa</li> </ul>
Micro resistance meter	<ul style="list-style-type: none"> <li>HIOKI-RM3548</li> </ul>
Safety gauge tester	<ul style="list-style-type: none"> <li>HIOKI-3153</li> </ul>
Power analyzer	<ul style="list-style-type: none"> <li>HIOKI-PW3390-01</li> </ul>
Data acquisition instrument	<ul style="list-style-type: none"> <li>HIOKI-LR8402-21 temperature humidity voltage current</li> </ul>
Insulation resistance meter	<ul style="list-style-type: none"> <li>fluke-1508</li> </ul>
Oscilloscope	<ul style="list-style-type: none"> <li>KEYSIGHT-DSOX3104T ; Sensors : 30A ; 150A ; 500A</li> </ul>



负压测试仪



气密测试仪



微电阻



安规测试仪



功率分析仪



数采仪



绝缘电阻仪



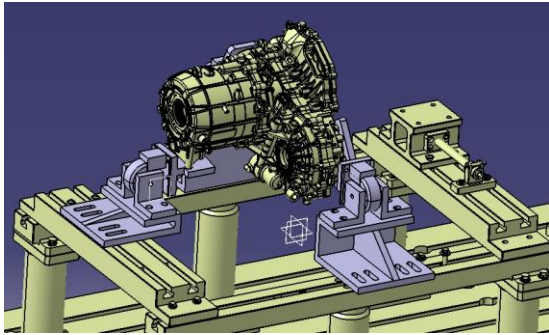
示波器

## Test Capability

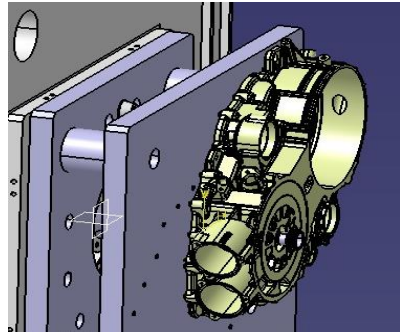
Main test items			Coverage standard
Insulation resistance	Power frequency withstand voltage	Micro resistance measurement	Cover test requirements for electric performance of battery, drive motor and E-powertrain
Voltage, current , power measurement	Data acquisition	Back EMF	
Pulse signal	Sealing performance	Temperature rise	

# Tooling Design Capability

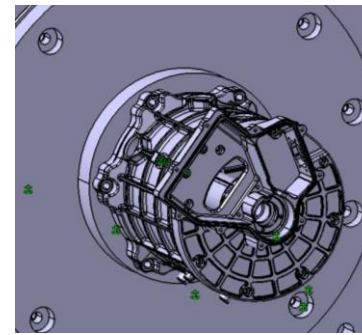
Design capability for 3D and 2D drawings, design tooling for E-powertrain, 2E-powertrain, 3E-powertrain etc., calculate the matching dimensions of dimension chain and spline parameters, select tooling materials according to test conditions, heat treatment, etc. For extreme working conditions such as high speed and high torque, dynamic balance, finite element simulation can be carried out according to the actual situation.



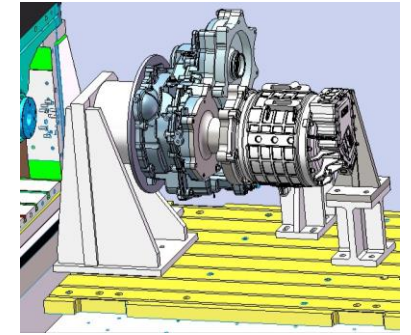
An EDS  
assembly tooling



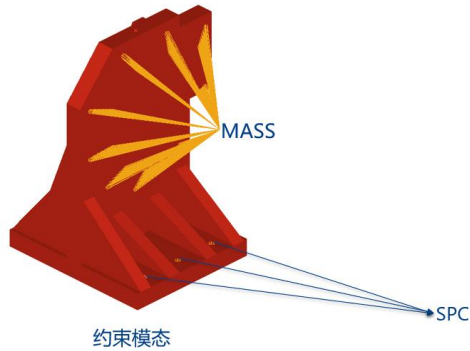
A double motor tooling



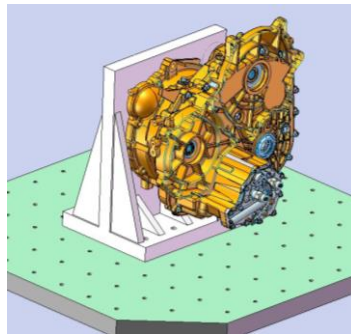
A single motor tooling



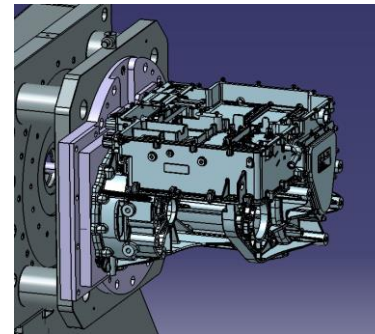
A gearbox tooling



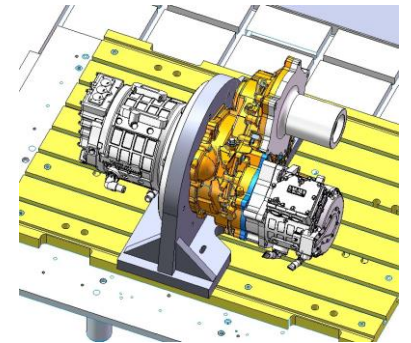
Finite element simulation



Vibration tooling design



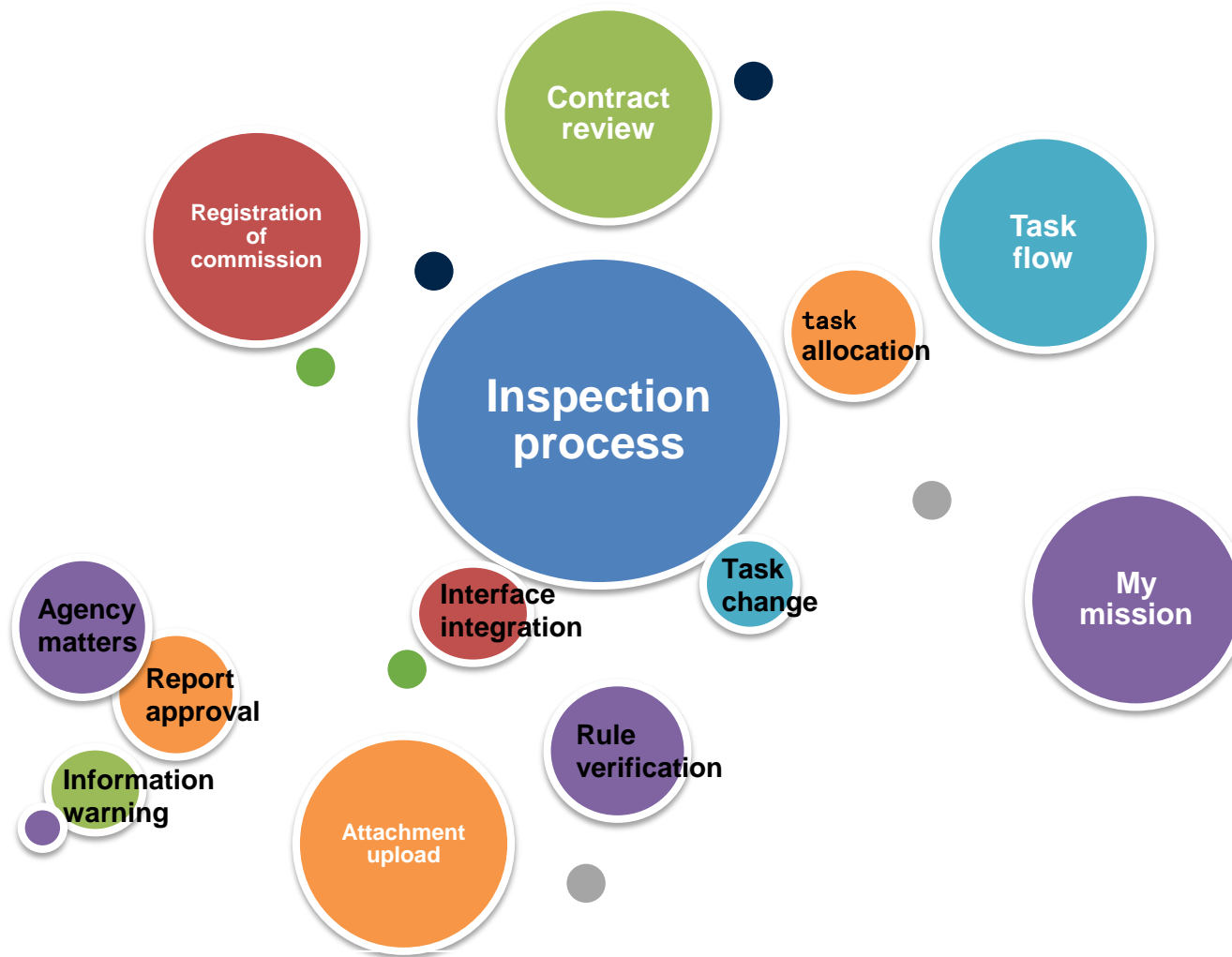
A single motor tooling



A gearbox tooling

# Core Advantage

LIMS: Based on ISO 17025 and the design concept throughout the entire life cycle of the test , built to provide diverse data indicators for personnel at different levels according to different roles.



## Major Clients

GEELY

KIA

  
HiPhi  
高合

 摩登汽车  
MODERN AUTO

CATL

  
捷威动力

 丰盈科技  
FOWING ENERGY

 联动  
LDGROUP

 蜂巢易创

OSWELL

LOONGSON  
龙芯动力

  
HUAWEI



TGS

 AERI logo with the text "AERI" and "睿睿" in Chinese.

GRGTEST 广电计量  
GRG METROLOGY & TEST