



重庆凯测试验设备股份有限公司

CHONGQING CTEST EQUIPMENT CO.,LTD

风电版  
[www.cqcartest.com](http://www.cqcartest.com)

聚势·诚信·合作·共赢  
Convergence · Integrity · Cooperation · Win-Win

## 公司简介

### INTRODUCTION OF COMPANY

重庆凯测试验设备股份有限公司位于重庆市两江新区水土国际工业园。

公司是以风电传动系统检测设备、新能源汽车整车及零部件试验设备的研发制造为主营业务的高新技术企业，具备完整的机械设计与制造能力，电气自动化系统设计与制造能力，自动化软件开发设计及仿真与建模设计能力。

公司产品定位为风电、新能源汽车、航空航天领域试验设备的进口替代。业务包括风电齿轮箱试验台、风电传动链试验台、风电整机试验台、滑动轴承试验台、智能网联整车在环试验台、整车试验台、动力总成试验台、高速电机试验台，以及电驱动总成下线试验台等。承担包括工程设计与制造、安装、调试及售后等全周期测试服务。

公司一直致力于风电和新能源汽车测试技术研发与实践，实现测控系统平台自主化，掌握多项独有技术，已成为国内风电和新能源汽车测试领域知名品牌。

公司创始人及管理层均来自世界 500 强企业。研发和工程技术人员，包括电气工程、机械工程、软件工程、工艺等专业，均具备 10 年以上，大部分 15 年以上从业经验和行业技术沉淀。

Chongqing Ctest Equipment Co.Ltd is located in ShuiTu International Industrial Park,Liangjiang New District,Chongqing.

Our main products and service are: Development and production of Drive-line test system for wind-turbine, indoor test bed system for NEV and parts. We are a technology-driven company with capacity of mechanical design and assembly, electrical system design and assembly, automation control software design, total mechanical simulation, and control simulation.

We are focusing on being the local superior supplier of the test system for wind-turbine, NEV and aerospace. And our products include: turbine gear-box test bed, turbine drive-line test bed, wind turbine test bed, sleeve bearing test bed, VIL test bed for ICV, VIL test bed for Vehicle Energy management analysis, Power-train test bed, High speed E-mobility test bed, and EOL test bed for E-drive system. We can supply the tun-key solution for these products and service for development, engineering, production, installation, commissioning and training, the total life-cycle service is available from us.

During the testing solution for NEV and Wind-turbine, we believe and insist on that the technical development and practice is the basis of growing-up. So, we have already built our own automation control system with many patents technology, and get many good comments from our customers.

We have an experienced team, whose professional working experience are more than 15 years during the testing solution for NEV and Wind-turbine, especially for the technical position such as, electrical engineering, mechanical engineering, software engineering and manufacture process and so on.

**核心价值观**  
Core values

聚势 · 诚信  
合作 · 共赢  
Convergence · Integrity  
Cooperation · Win-Win

**愿景**  
Vision

做世界顶级测试  
设备提供商。  
To be the world's top test  
equipment provider.

**使命**  
Mission

匠心测试，传动未来。  
Ingenuity for test, drive the future.

# 发展历程

## DEVELOPMENT HISTORY

不断创新，为用户持续创造价值！  
Continuously innovate and create value for customers!

2017

交付国内首套完全自主开发的16000rpm新能源高速电驱系统测试台  
Delivered the first fully self-developed 16000rpm new energy high-speed electric drive system test bench in China

2018

交付4套国内最早投入使用的新能源电驱系统全自动EOL测试台  
Delivered four sets of automatic EOL test bench for new energy electric drive systems that were first put into use in China

2020

交付国内首套带转向模拟功能的自动驾驶整车在环测试系统  
Delivered the first set of autonomous vehicle in loop simulation test system in China

2021

交付国内第一套24MW风电齿轮箱测试系统  
Delivered the first 24MW wind power gearbox test system in China

2022

交付国内首套传动设备轴承多自由度加载试验台  
Delivered the first set of bearing multi-freedom loading test bench in China  
交付国内第一套24MW风电一体化传动链(发电机+齿轮箱+主轴)测试台  
Delivered the first 24MW wind power integrated transmission-chain (generator + gearbox + spindle) test bench in China

2023

交付国内第一套20MW风电发电机测试台  
Delivered the first 20MW wind turbine test bench in China  
交付国内第一套28MW风电齿轮箱测试系统  
Delivered the first 28MW wind power gearbox test system in China

2024

交付国内第一套300KNM动态液压扭矩加载器  
Delivered the first set of 300 knm dynamic hydraulic torque loader

# 生产基地

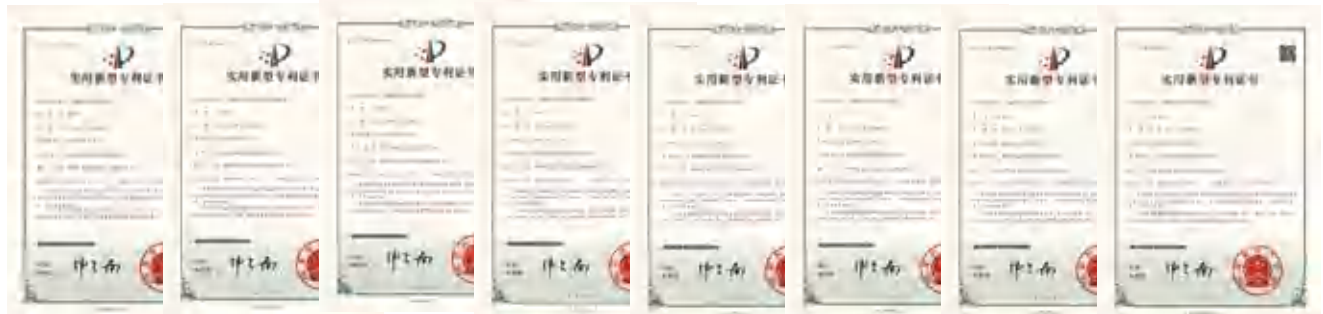
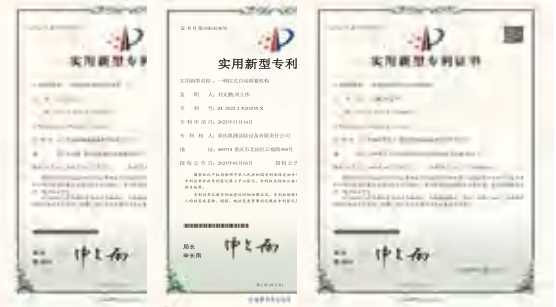
## PRODUCTION WORKSHOP





# 公司资质

QUALIFICATION OF COMPANY



# 主要伙伴

MAIN PARTNER



# 公司业务

## BUSINESS OF COMPANY

### 公司主要业务范围：

风电齿轮箱试验台、风电传动链试验台、风电整机试验台、滑动轴承试验台、智能网联整车在环试验系统，整车试验台，高速电机试验台，动力总成试验台等试验台研发、制造；测试咨询与服务；试验台售后服务维护保养服务；产品销售等。

### Our business scope:

Research, development and manufacturing of wind power gearbox test bench, wind power transmission chain test bench, wind power machine test bench, plain bearing test bench, intelligent connected vehicle environmental testing system, vehicle test bed, high speed E-motor test bed, powertrain test bed, etc. test consulting and service; after-sales service and maintenance service of test bed; products sales, etc.

### 风电齿轮箱试验台

Wind Power Gearbox Test Bench



- 16MW及以上MW级风电齿轮箱加载测试
  - 最大交付能力高至36MW
  - 可靠的实时控制系统和控制策略
  - 高动态控制和快速的响应
  - 与NVH测量系统的集成
  - 风能模拟扩展试验项目
  - ▶ 成熟的机械+电气整体解决方案
  - ▶ 强大的系统设计与集成能力
- 16MW and above wind power gearbox loading test
  - Maximum delivery capacity up to 36MW
  - Reliable real-time control system and control strategy
  - High dynamic control and fast response
  - Integration with NVH measurement system
  - Wind power simulation extension testing project
  - ▶ Proven mechanical&electrical solutions
  - ▶ Powerful system design and integration capabilities

### 风电传动链试验台

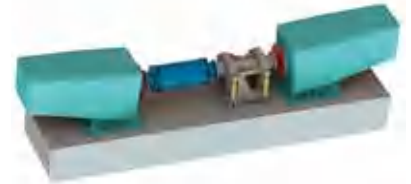
Wind Power Transmission Chain Test Bench



- 20MW及以上MW级风电传动链加载测试
  - 可靠的实时控制系统和控制策略
  - 高动态控制和快速的响应
  - 与NVH测量系统的集成
  - 风能模拟扩展试验项目
  - ▶ 成熟的机械+电气整体解决方案
  - ▶ 强大的系统设计与集成能力
- 20MW and above wind power transmission chain loading test
  - Reliable real-time control system and control strategy
  - High dynamic control and fast response
  - Integration with NVH measurement system
  - Wind power simulation extension testing project
  - ▶ Proven mechanical&electrical solutions
  - ▶ Powerful system design and integration capabilities

### 风电整机试验台

Wind Power Turbine Test Bench



- 风电整机加载测试
  - 可靠的实时控制系统和控制策略
  - 高动态控制和快速的响应
  - 与NVH测量系统的集成
  - 风能模拟扩展试验项目
  - ▶ 成熟的机械+电气整体解决方案
  - ▶ 强大的系统设计与集成能力
- Wind power turbine loading test
  - Reliable real-time control system and control strategy
  - High dynamic control and fast response
  - Integration with NVH measurement system
  - Wind power simulation extension testing project
  - ▶ Proven mechanical&electrical solutions
  - ▶ Powerful system design and integration capabilities

## 滑动轴承试验台 Plain Bearing Test Bench



- 具备径向、轴向、弯矩等三自由度加载能力
- 径向加载能力可达5000kN
- 具有径向、轴向、弯矩组合动态加载性能试验功能
- 加载频率可达3Hz
- 具有轴心轨迹、油膜压力、油膜厚度测试能力

### ▶ 自动化程度高，测试自动完成 ▶ 强大的系统设计与集成能力

- Three degrees of freedom loading capability with radial, axial, bending force etc.
- Radial loading capacity up to 5000 kN
- Dynamic combination loading performance test function with radial, axial, bending force
- Loading frequency up to 3Hz
- Axis trajectory, oil film pressure, oil film thickness test ability

### ▶ High class of automation, automatic testing ▶ Powerful system design and integration capabilities

## 动态液压扭矩加载器 Dynamic hydraulic torque loader



- 用于机械封闭台架的扭矩加载
- 采用串联式的液压扭矩加载方案，传动链更为紧凑
- 旋转接头通过液压轴承及非接触式密封技术实现液压流体的可靠传递
- 集成液压油源、伺服控制器及伺服阀组
- 最大加载扭矩可达300kNm，最大运行转速1000rpm
- 最大加载频率1Hz
- 规格参数可根据需求定制开发

- For torque loading of mechanically enclosed benches
- The series hydraulic torque loading solution makes the transmission chain more compact
- The rotary joint achieves reliable transfer of hydraulic fluid through hydraulic bearing and non-contact sealing technology
- Integrated hydraulic oil source, servo controller and servo valve group
- The max loading torque is 300kNm, and the max speed is 1000rpm
- Max loading frequency is 1Hz
- Specifications can be customized according to requirements

## 智能网联整车在环试验系统 Intelligent Connected Vehicle Environmental Testing System



- 四轮直接驱动
- 测试与仿真技术的结合
- 整车能量流分析
- 可分解为两个动力总成台架

### ▶ 仿真模型与物理台架的结合 ▶ 强大的系统设计与集成能力

- Four-wheel direct drive
- Combination of test and simulation technology
- Analysis of vehicle energy management
- Available to separate into two powertrain test beds

### ▶ Combination of model simulation and real test bed ▶ Powerful system design and integration capabilities

## 高速电机试验台

High speed motor test bench



- 高转速(最高至25,000 rpm)
- 低惯量测功机
- 用于电动车用驱动电机测试
- 提供整体交钥匙工程
- 经过验证的高速机械结构

- ▶ 高速机械传动Know-how
- ▶ 强大的系统设计与集成能力

- High speed (up to 25,000rpm)
- Low inertia dynamometer
- For testing of drive motors of electrical vehicles
- Proven overall turn-key project
- Proven high-speed mechanical structure

- ▶ Know-how of mechanical design with High-speed
- ▶ Powerful system design and integration capabilities

## 动力总成试验台

Powertrain test bed



- 用于动力总成测试
- 用于动力传动系测试
- 用于车桥测试
- 用于四驱传动系测试
- 用于混动总成测试

- ▶ 柔性的多传动结构
- ▶ 强大的系统设计与集成能力

- For testing of Electric drive assembly
- For testing of powertrain
- For testing of axle test
- For testing of four-wheel drive train
- For testing of hybrid powertrain.

- ▶ Flexible multi-drive structure
- ▶ Powerful system design and integration capabilities

## EOL下线试验台

EOL Test Bench



- 与电驱动总装输送线集成
- 下线带载测试
- 下线NVH测试
- 全自动的油、水、电气对接

- ▶ EOL自动测试解决方案
- ▶ 强大的系统设计与集成能力

- Integration with electric drive assembly conveyor line
- EOL load test
- EOL NVH test
- Automatic feeding of electrical, oil and coolant

- ▶ EOL automatic testing solution
- ▶ Powerful system design and integration capabilities



# 风电齿轮箱试验台

## Wind Power Gearbox Test Bench

凯测股份近年来一直致力于风电传动链领域测试技术研发与实践。公司具有强大的机械、电气、软件设计能力和项目整体规划能力，拥有强大的工程团队及丰富的项目管理和项目实施经验等，可为用户建设国际一流、行业领先的风电齿轮箱加载试验平台。

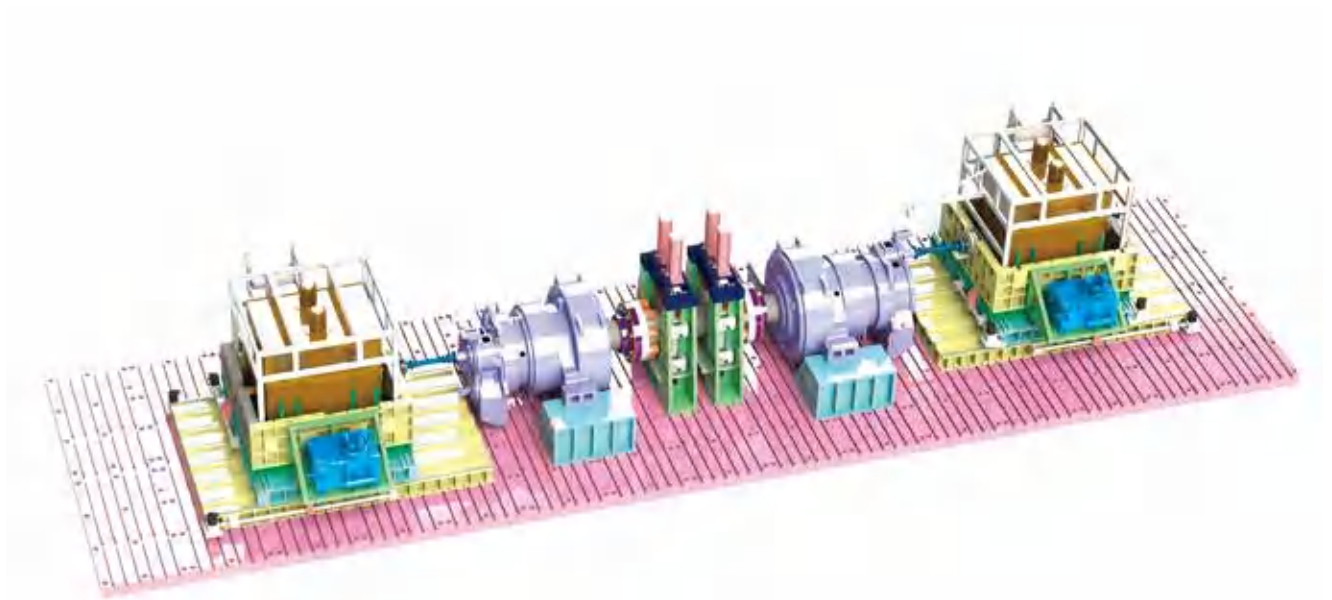
### 主要特点：

- 采用二层钢平台结构，变频器、控制系统放置在二层平台上，布局合理、美观；
- 采用中压变频器方案，可兼容带发电机的集成传动链的测试；
- 测功电机及工艺齿轮箱底座具有X、Y、Z自动调节功能；
- 齿轮箱低速轴具有自动调节夹紧功能；
- 具有测试工况自动完成、自动生成测试报告等功能。

For many years, Ctest has been committed to the field of wind power transmission chain test technology research&development and practice. The company has strong capabilities in mechanical, electrical, software design and overall project planning. The company has a strong engineering team and rich project management and implementation experience, we can construct a world-class, industry-leading wind power gearbox loading test bench for customers.

### Main features:

- The two-floor steel platform structure is constructed, the frequency converter and control system are placed on the second floor, the overall layout is reasonable and artistic.
- The MV converter is compatible for the testing of integrated drive chain with generator.
- Tables for motors and process gearbox have the X, Y, Z direction automatic adjustment function.
- Low-speed shaft of gearbox has the automatic adjustment clamping function.
- Has the functions of automatic testing for different conditions and automatic produce test reports.



## 智能网联整车在环试验系统

Vehicle in the Loop Test System of ICV

凯测股份具备智能驾驶汽车开发周期中的在环测试及验证评估能力，为客户提供HIL,VIL测试平台以及后期的验证评估。

### 测试项目：

- 自动驾驶控制策略与算法的整车在环测试；
- 转向与轮端机械耦合或机械解耦的转向阻力模拟测试；
- 电气/液压转向阻力模拟测试；
- 虚拟交通场景、虚拟感知传感器仿真系统，高精地图联合仿真测试；
- 汽车动力性与操控性极端场景联合测试：坑洼路面，冰雪路面，沙漠刷锅等；
- 动力总成在环与ECU HIL（ESP/EPS等）联合测试；

Chongqing Ctest Equipment Co.,Ltd has the capability of in-loop test and verification evaluation throughout the development cycle providing customers with HIL,VIL test platform and later verification evaluation.

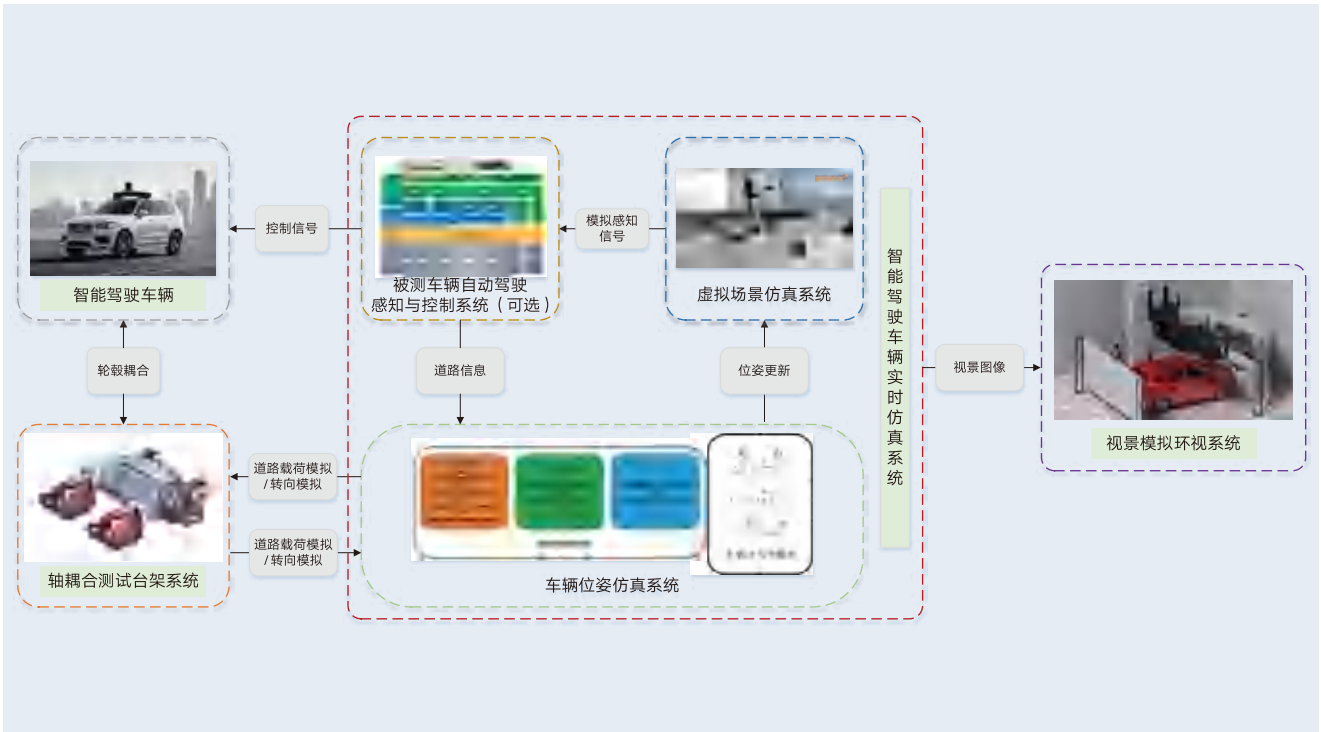
### TEST ITEM:

- Vehicle-in-loop testing of autonomous driving control strategies and algorithms.
- Steering resistance simulation test of mechanical coupling or mechanical decoupling of steering and wheel end.
- Electrical/hydraulic steering resistance simulation test.
- Virtual traffic scene, virtual perception sensor simulation system, high-precision map co-simulation test.
- Extreme scenarios of vehicle dynamic and handling: pothole road surface, snow and ice road surface, desert brush pot, etc.
- Powertrain in loop and ECU HIL (ESP/EPS, etc.) combined testing.



# 智能网联整车在环试验系统

Vehicle in the Loop Test System of ICV



场景模拟是以物理模型为基础的汽车ADAS和自动驾驶仿真软件，支持基于摄像头、雷达、激光雷达、GPS、V2V车车通讯等多种ADAS和自动驾驶的开发和测试。

The scene simulation is based on the physical model of automobile ADAS and automatic driving simulation software, supporting the development and testing of various ADAS and automatic driving based on camera, radar, lidar, GPS, V2V communication.

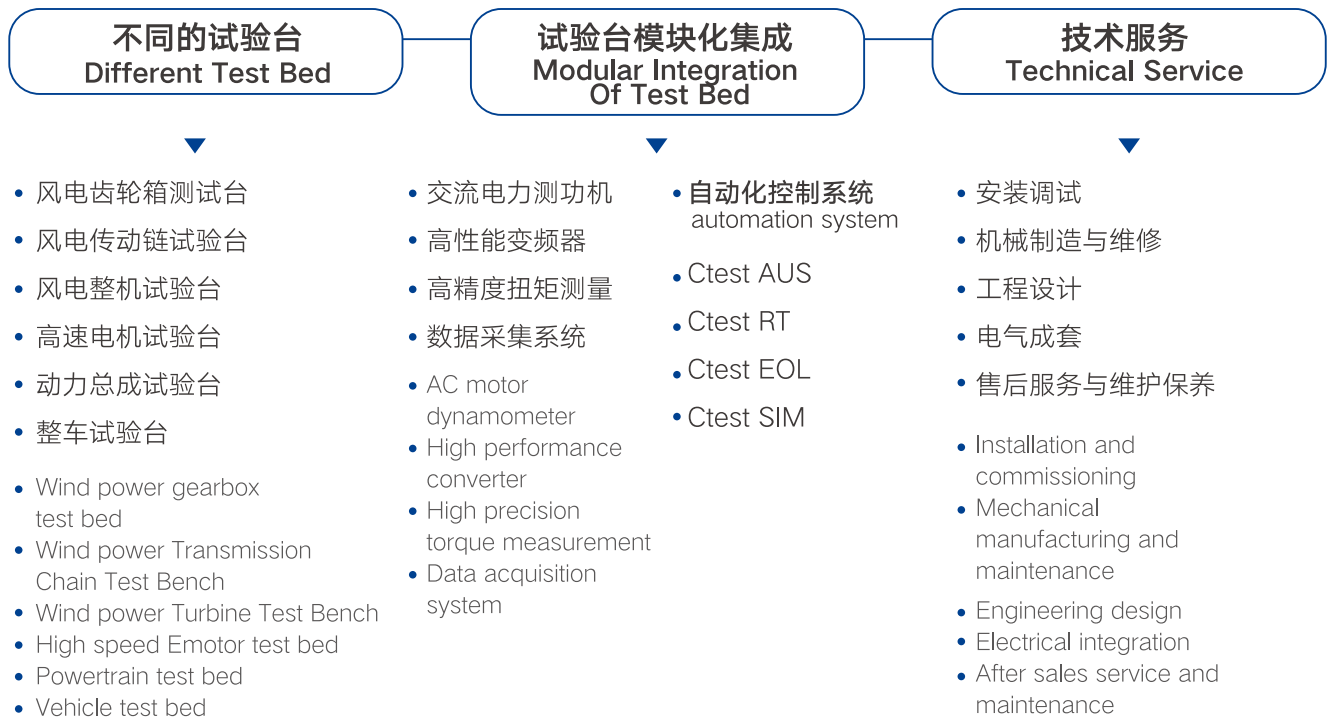


# 解决方案

THE SOLUTION

## 动力系统试验台解决方案

Powertrain test bed solution



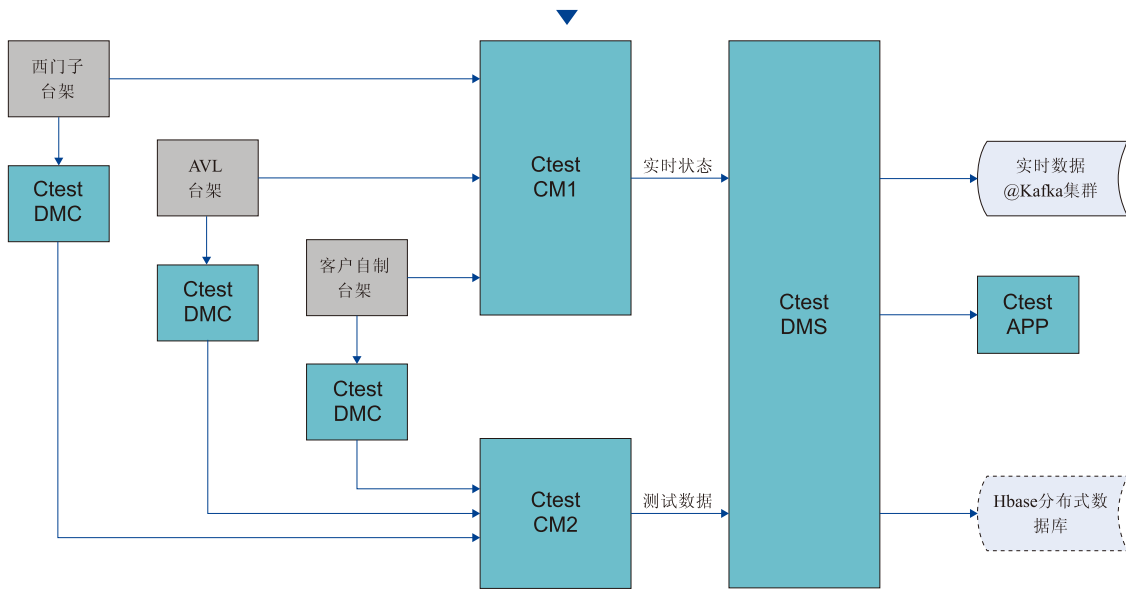
## 系统集成技术

System Integration Technique

工控机 IPC	SIMATIC IPC
PLC控制器 PLC controller	S7-1200/1500-F, ET200
实时控制器 Real time controller	Ctest RT
仿真技术 Simulation technology	Matlab Simulink , SIEMENS LMS Amesim
HMI	SIMATIC OP, MP, KP, TP
网络通讯 Network communication	ETHERNET, PROFIBUS, PROFINET
变频器 Frequency converter	SINAMICS S120 / S150, ABB , INOVANCE , HOPEWIND
测功机 Dynamometer	1SH8, 1PH8, AKH, SCHORCH, K&A, ABB, VEM



## 实验室管理系统 Test center management system



适用于试验中心多台试验设备的实时状态和试验数据的集中监控与管理，同时具有试验流程管理、试验档案管理、DVP过程管理、设备管理、样品管理、计量器具管理等功能。

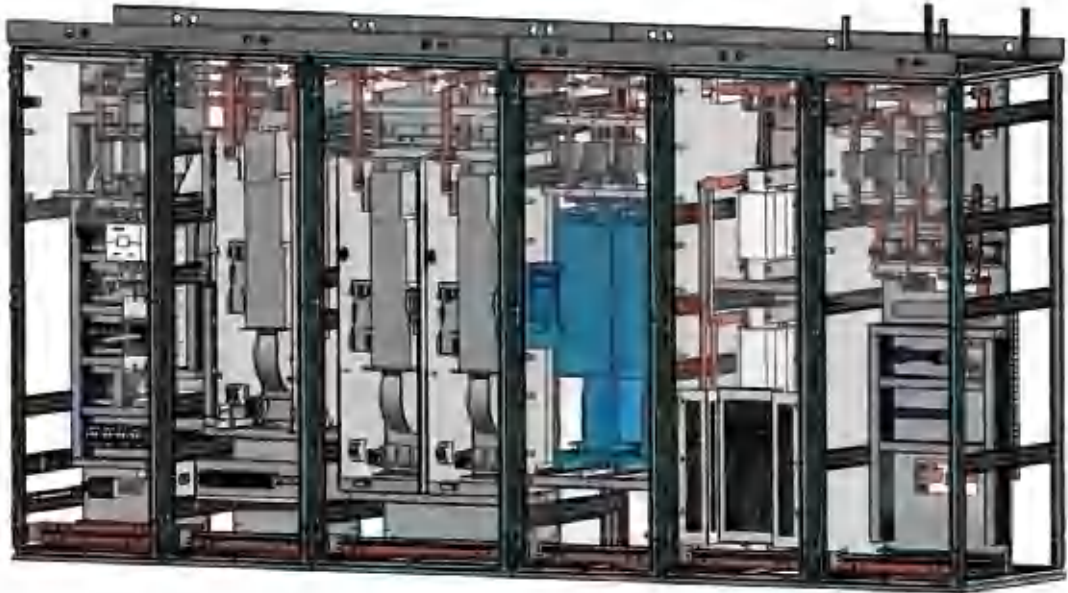
It is suitable for the centralized monitoring and management of the real-time status and test data of several test equipment in the test center, with testing process management, the test results management, the DVP process management, the equipment management, the sample management, the measurement instrument management and so on.

## Ctest 测控软件 Ctest Measure And Control Software



## 电气结构设计

Electrical Structure Design



## 工程能力

Engineering Capability

凯测股份具有一套完善的、科学的项目管理制度，从项目设计、设计评审、制造、出厂测试、交货、安装、调试、对拖试验、带产品试验、交付使用、培训，以及售后服务等；

公司具有成熟的电气成套、现场安装、现场调试与测试验证等标准和规范，能保障交付项目的顺利实施；

公司拥有强大的工程团队，具备丰富的项目管理和项目实施经验，确保项目高标准、高水平、及时性地交付。



Ctest has a set of perfect and scientific project management system, from project design, design review, manufacturing, factory testing, delivery, installation, commissioning, Back to back test, product test, production, training, and after-sales service.

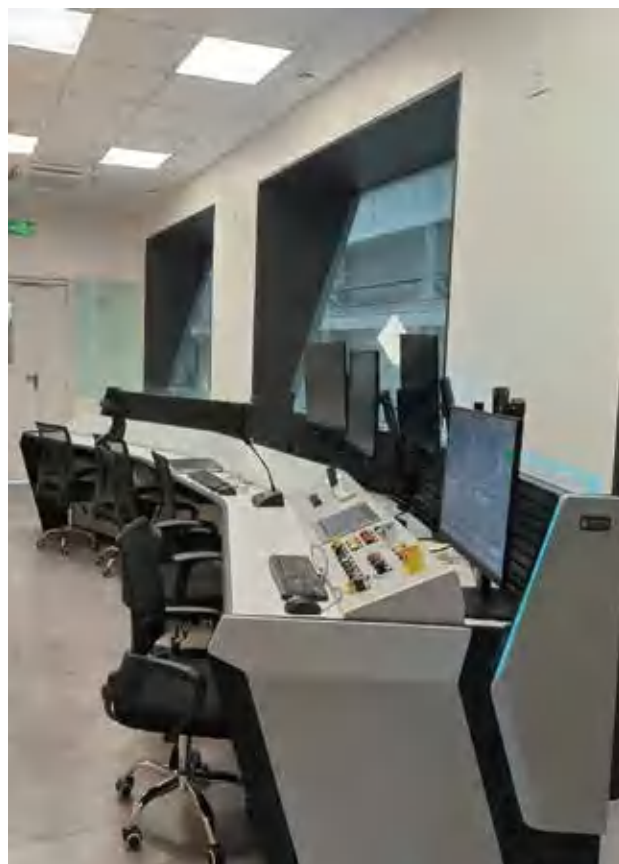
The company has made the strict standards and specifications in electrical component integration, on-site installation&commissioning and testing&verification, to ensure the success of the project.

The company has a strong engineering team, with rich experience in project management and project implementation, to ensure that the project is timely delivered in a high standard.

## 电气成套 Assembly Of Electric Equipment

采用专业的3D软件，对柜体、钣金件、铜排等进行设计，充分考虑柜体散热、振动、EMC等。

Professional 3D software is used to design the cabinet, sheet metal parts, copper bars, etc., fully considering the cabinet heat dissipation, vibration, EMC, etc.





## 案例

### THE REFERENCE

## 10MW风电齿轮箱试验台

### 10MW Wind Power Gearbox Test Bench

- 2x测功电机：转速1200/2200rpm，功率10MW，扭矩79.58kNm；
  - 1x中压变频器：1x10MVA整流器+2x12MVA逆变器；
  - 2x扭矩传感器：扭矩100kNm；
  - 2x电机三维移动底座；
  - 1x中间刚性轴支撑系统；
  - 1x300T/h冷却塔系统；
  - 1x控制系统+电源模拟系统。
- 2x Dynamometer motor: speed 1200/2200rpm, power 10MW, torque 79.58kNm.
  - 1x Medium voltage inverter: 1x10MVA rectifier +2x12MVA inverter.
  - 2x Torque sensor: torque 100kNm.
  - 2x Motor 3D moving base.
  - 1x Middle block system.
  - 1x 300T/h cooling tower system.
  - 1x Control system + power analog system.



## 16MW风电齿轮箱试验台

### 16MW wind power gearbox test bench

- 2x测功电机：转速1200/2200rpm，功率16MW，扭矩127.33kNm；
  - 1x中压变频器：1x10MVA整流器+2x20MVA逆变器；
  - 2x扭矩传感器：扭矩150kN；
  - 2x电机三维移动底座：X轴±1500mm，Y轴±750mm，Z轴±400mm；
  - 1x600T/h冷却塔系统；
  - 1x控制系统+电源模拟系统。
- 2x Dynamometer motor: speed 1200/2200rpm, power 16MW, torque 127.33kNm.
  - 1x Medium voltage inverter: 1x10MVA rectifier +2x20MVA inverter.
  - 2x Torque sensor: torque 150kNm.
  - 2x Motor 3D moving base: Xaxis ± 1500mm, Yaxis ± 750mm, Zaxis ± 400mm.
  - 1x 600T/h cooling tower system.
  - 1x Control system + power analog system.





## 24MW风电齿轮箱及传动链试验台

### 24MW wind power gearbox and transmission chain test bench

- 2x测功电机：转速1200/1800rpm，功率24MW，扭矩191kNm；
  - 1x中压变频器：1x10MVA整流器+2x28MVA逆变器；
  - 2x扭矩传感器：扭矩250kNm；
  - 2x电机三维移动底座：X轴±1500mm，Y轴±750mm，Z轴±400mm；
  - 1x750T/h冷却塔系统；
  - 1x控制系统+电源模拟系统。
- 2x Dynamometer motor: speed 1200/1800rpm, power 24MW, torque 191kNm.
  - 1x Medium voltage inverter: 1x10MVA rectifier +2x28MVA inverter.
  - 2x Torque sensor: torque250kNm.
  - 2x Motor 3D moving base: Xaxis ± 1500mm, Yaxis ± 750mm, Zaxis ± 400mm.
  - 1x 750T/h cooling tower system.
  - 1x Control system + power analog system.



## 滑动轴承试验台

### Plain Bearing Test Bench

- 径向加载力：3000kN；
  - 轴向加载力：1000kN；
  - 弯矩加载力：100kN；
  - 具有径向、轴向、弯矩动态加载功能；
  - 加载频率可达3Hz；
  - 具有轴心轨迹、油膜压力、油膜厚度测试能力；
  - 自动化程度高，测试自动完成。
- Radial loading force: 3000 kN,
  - Axial loading force: 1000 kN,
  - Bending moment loading force: 100 kN,
  - With radial, axial, bending moment dynamic loading function.
  - Loading frequency up to 3Hz.
  - With axis trajectory, oil film pressure, oil film thickness test ability.
  - High degree of automation, automatic testing.



## 高速电机试验台

### High speed E-motor Test Bench

- 400Kw, 545Nm, 20000rpm;
- 系统包含：机械系统，测功机系统，变频器系统，电池模拟器，冷却系统，环境舱，功率分析仪，自动化控制系统，测控软件等；
- 试验台采用整体式机械设计，包含一个整体式机械底座，可直接安装于工厂地面，无需再配置铸铁地板；
- 被测电机经过适配轴、过渡安装盘安装至台架的安装支架上；被测电机在台架上的安装更加方便、快速。
- System includes: mechanical system, dynamometer system, frequency converter system, battery simulator system, cooling system, climate chamber, power analyzer, automatic control system, measure and control software etc.
- The whole base frame structure are used, includes an integral mechanical base, can be installed directly on the factory floor, without cast iron plate.
- The test object is installed on the mounting bracket of the test bench through adapter shaft and adapter mounting plate, The installation of the test object to the test bed is more convenient and quick.



## 动力总成试验台

### Powertrain Test Bench

#### 国家重点传动试验室(三电机)

- 1x输入电机：转速7000/20000rpm  
功率400Kw；扭矩545Nm；
- 2x负载电机：转速700/3300rpm  
功率272/220Kw；扭矩3711/636Nm；
- 该项目二期增加2x负载电机、驾驶机器人等设备，扩展为五电机性能试验台。

#### National Key Transmission Laboratory (Three Motors)

- 1x Drive motor: Speed 4200/10000rpm, Power 330/250Kw, Torque 750/239Nm.
- 2x Load motor: Speed 700/3300rpm, Power 272/220Kw, Torque 3711/636Nm.
- In the second phase of this project, 2x load motor, driving robot and other equipment will be added to expand to five motor performance test bed.



## 电驱动总成下线试验台

### Electric Drive Assembly EOL Test Bench

- 采用整体式机构，包含一个整体式机械底座，可直接安装于工厂地面；
  - 由被测电驱动总成提供驱动力，由负载测功机提供加载载荷；
  - 测控软件为可视化操作、监控界面；
  - 测试自动完成，无需人工干预；
  - NVH 下线测试；
  - 与生产交互的 MES 系统。
- 
- An integral mechanism, including a whole base frame, can be installed directly on the factory floor.
  - The driving power is provided by the test object, and the loading power is provided by the load machine.
  - Measurement and control software for visual operation, monitoring interface.
  - The test is finished automatically.
  - NVH EOL testing.
  - MES interface.



## 动态液压扭矩加载器

### Dynamic hydraulic torque loader

- 300kNm 及以上的液压扭矩加载系统；
  - 采用串联式方案，模块化设计，传动链更为紧凑；
  - 旋转接头通过液压轴承及非接触式密封技术实现液压流体的可靠传递；
  - 可靠的实时控制系统和控制策略；
  - 高动态控制和快速的响应。
- 
- 300kNm and above hydraulic torque loading system.
  - The series hydraulic torque loading solution makes the transmission chain more compact.
  - The rotary joint achieves reliable transfer of hydraulic fluid through hydraulic bearing and non-contact sealing technology.
  - Reliable real-time control system and control strategy.
  - High dynamic control and fast response.





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