PLATFORM SCREEN DOOR SYSTEM

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中国中车
CRRC

PSD DEVELOPMENT AND CAPABILITIES
门产业发展和能力

BENEFITS OF PSD 屏蔽门优点

Safety
安全

Investment Savings
投入低

Energy Savings
节能

Environmental Protection
环保

☼Reduces noise pollution and wind pressure produced by trains;

减少因车辆运行产生的噪音污染和风压

☼Saves air conditioner energy;

减少空调能耗

☼ Reduces investment amounts for subway construction and station staff .

通过减少地铁结构和站台工作人员从而减少投资

PSD CONCEPTION AND TESTING CAPABILITIES

Seal Test
密封测试

EMC Test
电磁兼容测试

Load Test
负载测试

EMC Test

Shock test
震动测试

High & Lower
Temperature Test
高低温测试

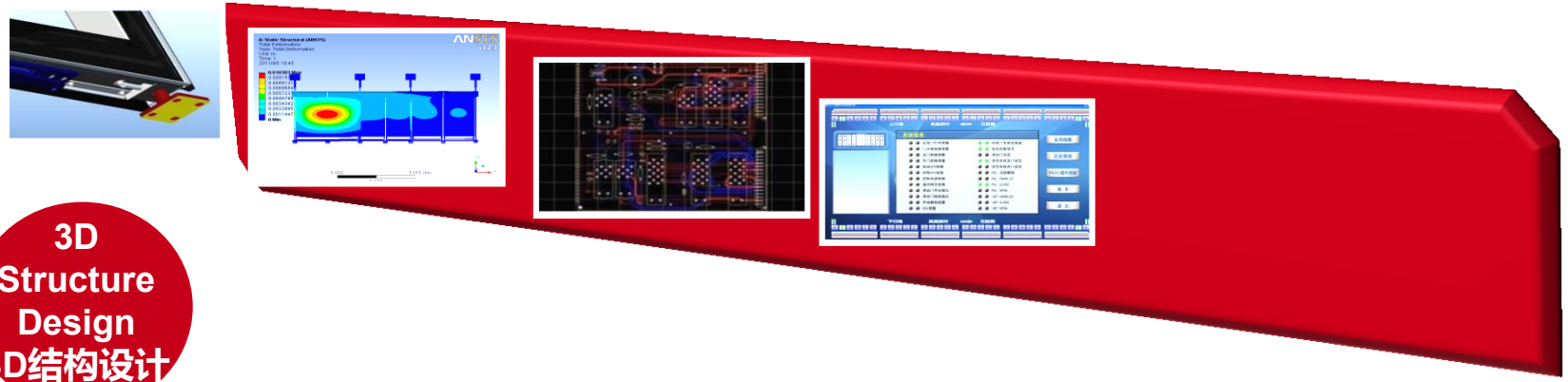
Humid & Warm
Test 湿热实验

Vibrate & Shock
Test 震动冲击实验

Evaluation Tests for Prototype: System & software comprehensive test, functional test, mechanical load & air leak test, EMC test, million times fatigue test, etc.

PSD INNOVATION AND CRAFTSMANSHIP 创新和工艺

♠ a number of qualified PSD system production bases and supporting plants nationwide.
♠ a new manufacture area of more than 30851m² with over RMB100million investment.
全国范围内有多家通过认证的系统生产基地以及供应商
新近投资超过1亿人名币打造超过30851 m²生产基地



3D Structure Design
3D结构设计

Analysis
仿真

Design
PCB设计

Software Design
软件设计

PLATFORM SCREENDOOR SYSTEM PSD系统

CONTROL SYSTEM LAYOUT FOR METRO PSD

Door machinery stimulation tech:
- main driver equipment,
- locking equipment,
- control unit DCU,
- gearing for transmission,
- electricity led functions.

Door System

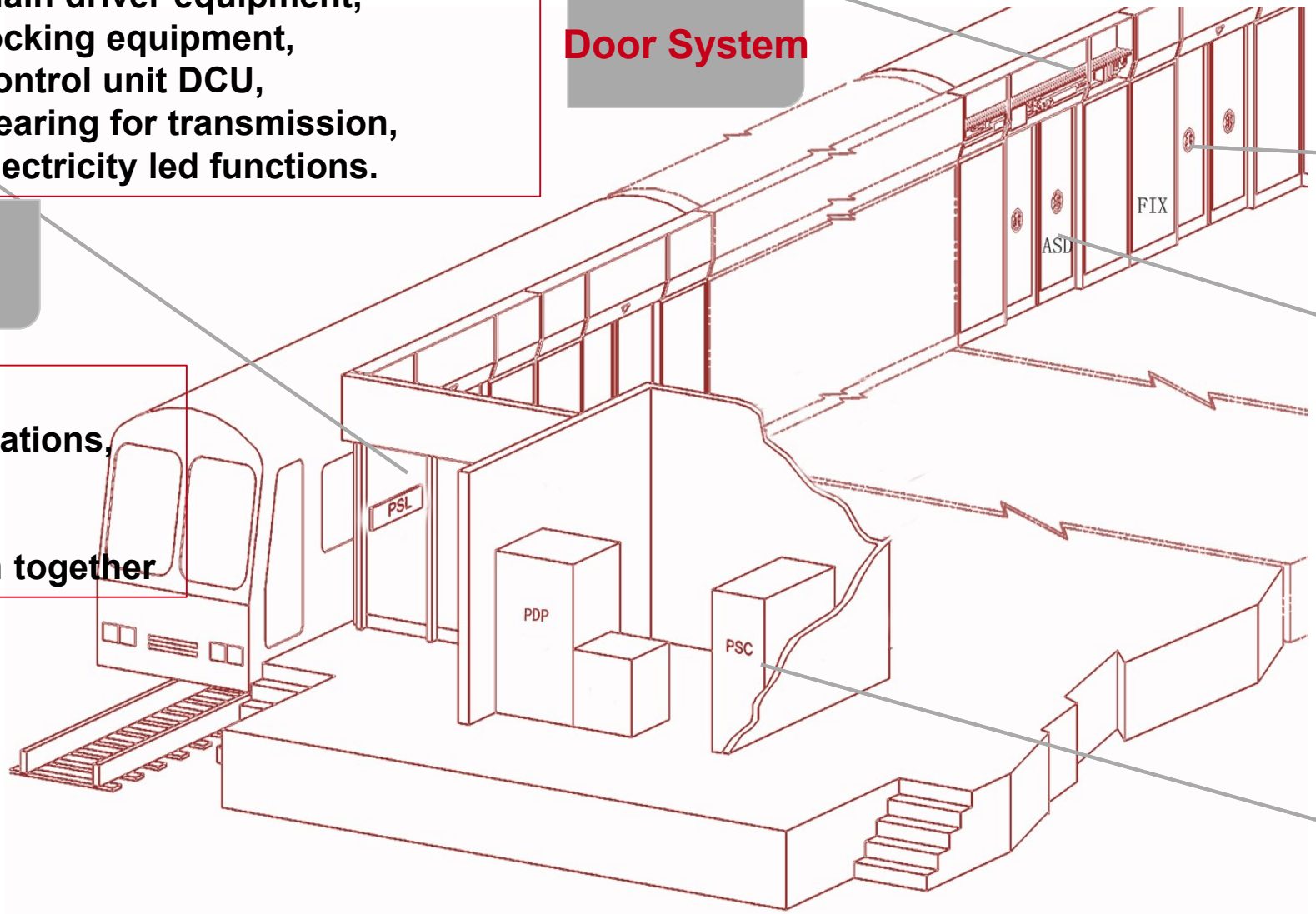
Fixed Panel

PSD Local Control Panel (PSL)

Automatic Sliding Door

handles
- electric stimulations,
- electric switch

Controls
- whole platform together



Controls:
- 2 sides of PSD

Ensures doors'
- safe running
- closing
- opening.

Platform Station Controller (PSC)

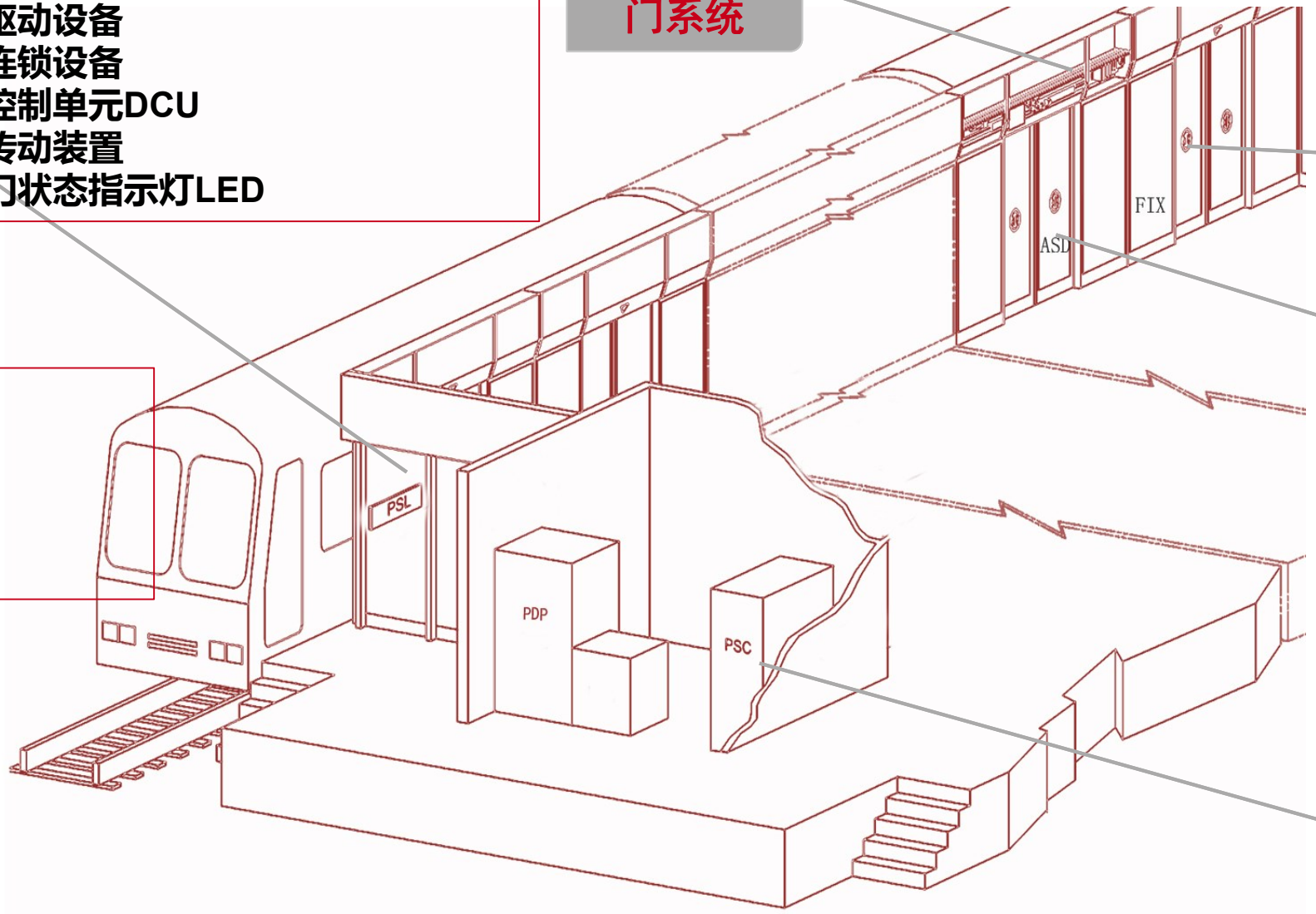
地铁PSD控制系统配置

门机械装置配置：
- ➢驱动设备
- ➢连锁设备
- ➢控制单元DCU
- ➢传动装置
- ➢门状态指示灯LED

PSD 本地控制平台(PSL)

手柄
- ▸ 电刺激,
- ▸电闸

控制
- ▸控制整个月台



门系统

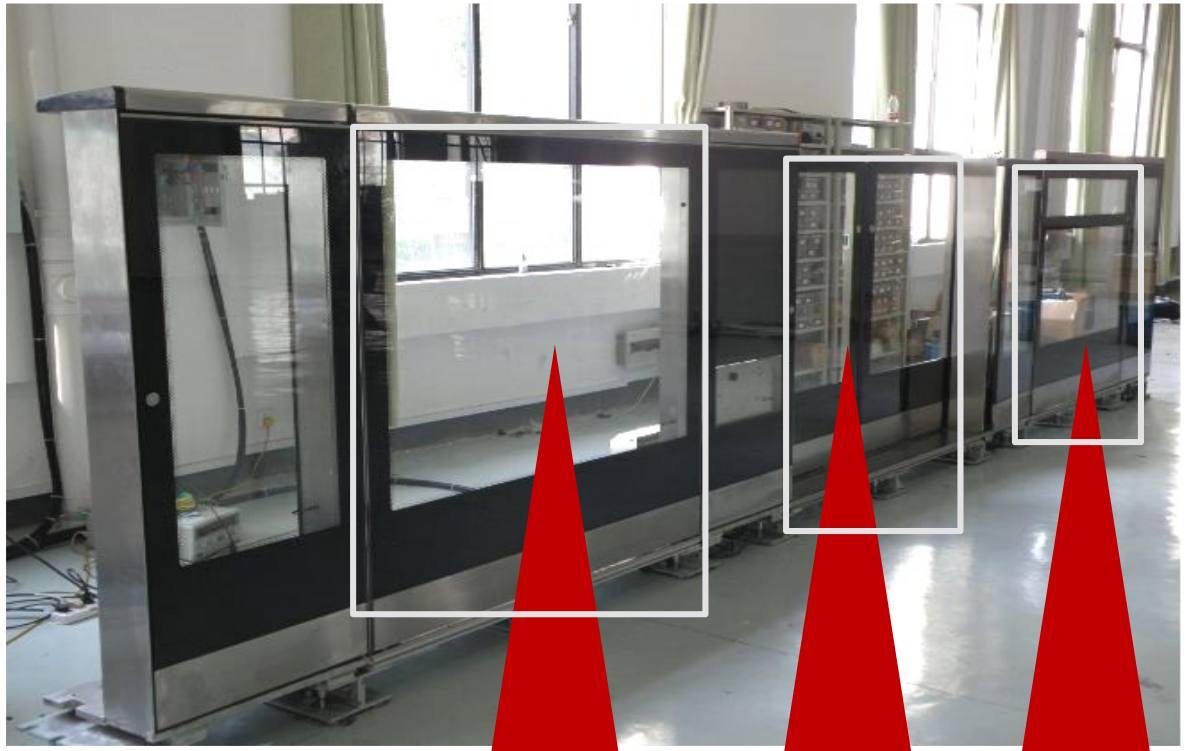
固定板

自动门

主要控制屏蔽门的两侧门，确保:
- ▸ 安全运行
- ▸门正常开闭

站台控制器 (PSC)

CONTROL SYSTEM LAYOUT FOR METRO PSD
控制系统配置



FIX ASD EDD

Full-height, fully-closed
全高门

Half-height
半高门

Our PSD products include all 3 of fixed, sliding and emergency doors.
Our door panels comprise models from half-height to full-height , with fully closed system option.
Half-height PSD height can vary between 1,2m to 1,7m.

CONTROL SYSTEM LAYOUT FOR METRO PSD
控制系统配置图

PSD LAYOUT COMPONENTS
ASD（Automatic Sliding Door）
EED（ Emergency Escape Door）
FIX（Fixed Panel）
MSD（Manual Secondary Door）
PSL（PSD Local Control Panel/PSD）
PSC（Platform Station Controller）
DCU（Door Control Unit）
DOI（Door Open Indicator (light alarm)）
LCB（Local Control Box）
PEDC（Platform End Door Controller）
PSD（Platform Screen Door）
SIG（Signal System）
PTE（Portable Test Equipment）
UPS（Uninterrupted Power Supply）
IBP（Integration Backup Panel）

CONTROL SYSTEM LAYOUT FOR METRO PSD
控制系统配置

PSD System
Controller (PSC)

Platform – PSC

CONTROL SYSTEM OF 5 LEVELS

五级控制系统

Manual Unlocking Operation 手动开锁操作

Single Door Local Control (LCB)单开门就地控制

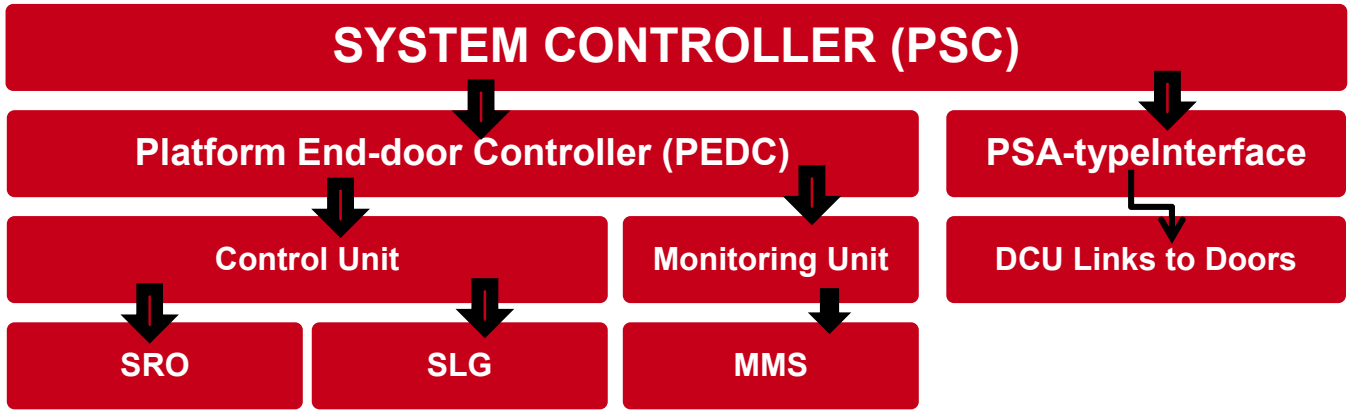
Emergency Control (IBP)紧急控制

Platform Control (PSL)平台控制

System Control (PSC) 系统控制

Communication interlinks between
dual CAN(Bus level) and
Ethernet transmission(Hard drive level)
are implemented by the PEDC through
hot stand-by system.

CONTROL SYSTEM LAYOUT FOR METRO PSD
控制系统配置

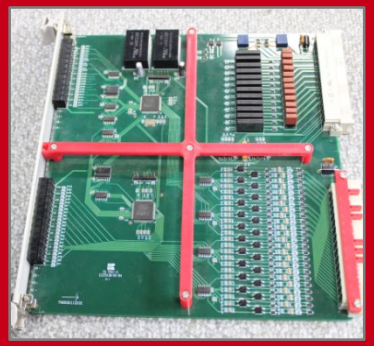


The ***PSD System Controller (PSC)*** :
- a **Platform End Door Controller (PEDC)**
- an information interface such as **PSA** platform.

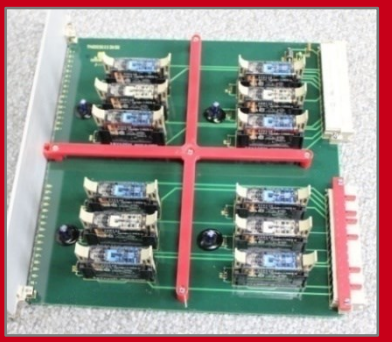
The ***Platform End-Door Controller (PEDC)***
- the key signal unit to controls doors' status, from running to failure.

SRO-- controls door-opening and on-off permission signal.
SLG-- analyzes input signal and outputs control signal to SRO.
Monitoring is ensured by **MMS** plug-in which makes checks and data communication.

The plug-in design of PSC is based on **standard vehicle-carried 6U plug-in box**, which failed plug-in is easy to replace by pull and draw. Safe circuit design through **Omron Safety Relay**, consistent with EN50205, made up of 3 safety relays with double tangential redundancy. **Dual logical chips** control outputs. If one chip detects anything unusual or breaks, output is blocked to ensure safety.

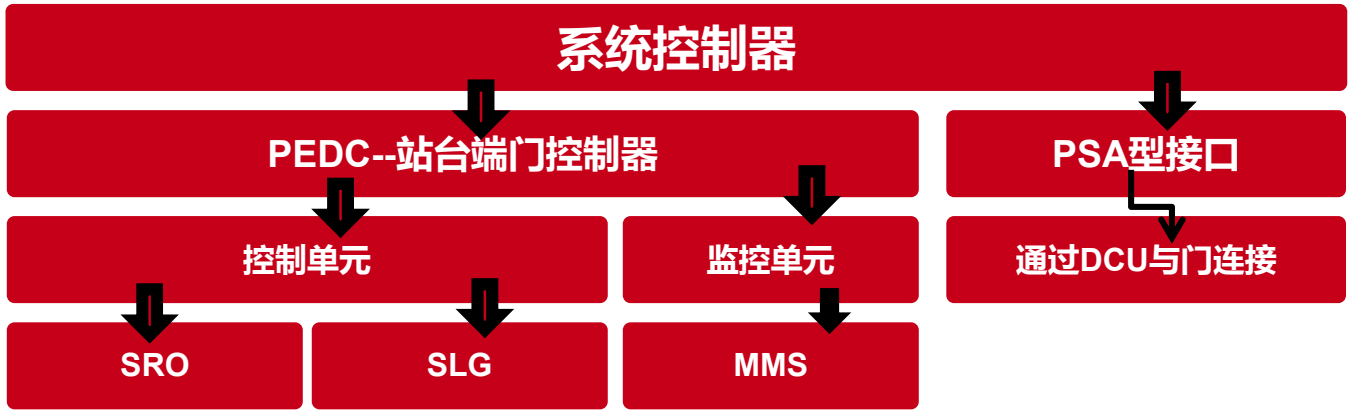


SRO plug-in



SLG plug-in

CONTROL SYSTEM LAYOUT FOR METRO PSD
控制系统配置

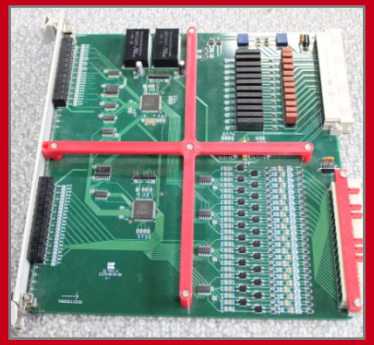


PSD 系统控制器(PSC) :
站台端门控制器(PEDC)
类似PSA平台的信息界面

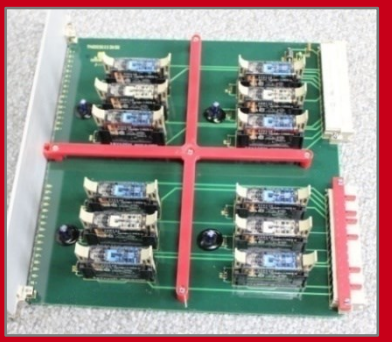
PEDC- 站台端门控制器
- 控制门状态的主要信号单元。

SRO– 控制门开闭的允许信号
SLG– 传输到SRO的模拟输入和输出控制信号
MMS插件通过检查数据和通讯完成对系统的检测

SC插件基于标准车载6U插件箱设计，通过插拔很容易替换. 安全电路设计使用欧姆
电器，符合EN50205标准，由3个安全继电器组成，双重切线冗余。采用双逻辑芯片
制输出，任何一个芯片检测到异常或断路，输出将被锁定以确保安全。



SRO插件



SLG 插件

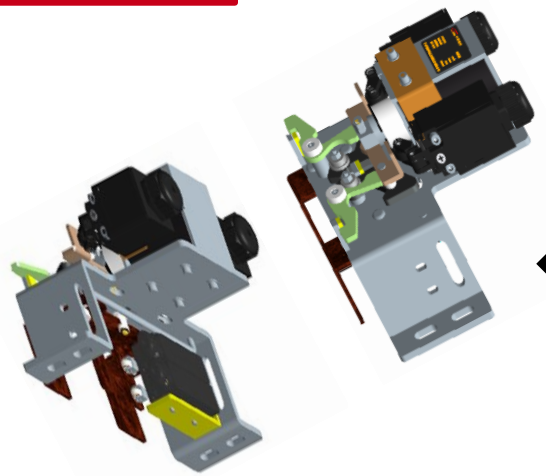
DOOR MACHINERY STIMULATION COMPONENTS

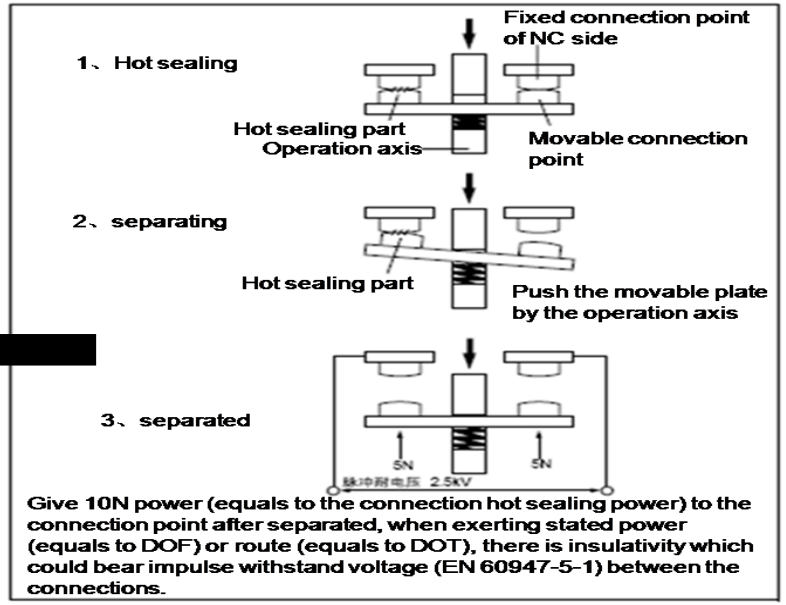
Door Control Unit (DCU) - motor control device of the rolling doo

It separates control/power. Each pair of PSD includes 1DCU.
DCU deals with control orders from system control and local control device.
It collects/sends door status information and failures, detects obstacles.
DCU and PSC communicate in dual way CAN redundancy.
DCU parameters are set up in the PSA information platform.
DCU is compatible with a wide range of AC signal (24V-220V). It adopts both brushless motor and motor with brush.

Door Locking Equipment

PSD Header Lock:
- designed with two dependent electric safe circuits and two inching switches to detect manual unlocking,
- passed more than 1,500,000 cycle tests,
- locks automatically under gravity,
- reset without elastic element,
- Simple mechanical structure,
- safe locking.





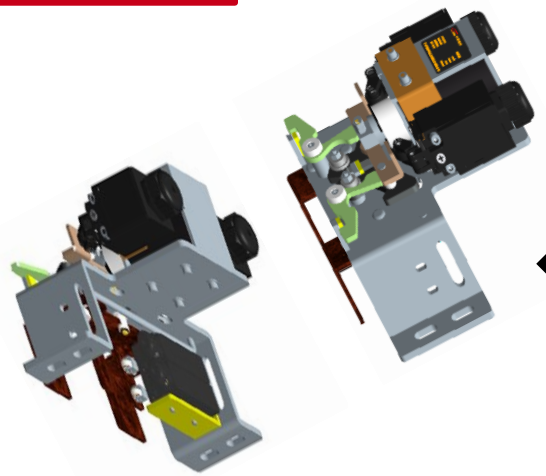
DOOR MACHINERY STIMULATION COMPONENTS
门机系统组成

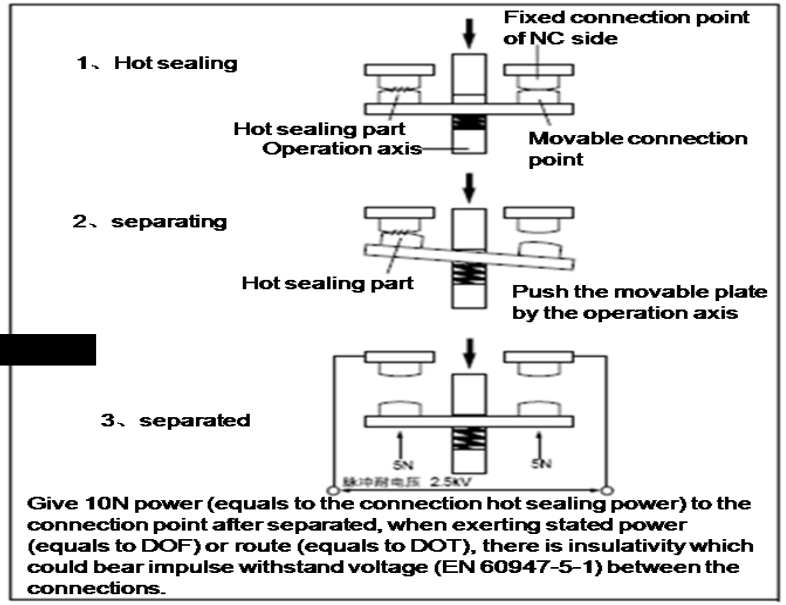
门控单元(DCU) – 滚动门的电机控制器

该设备可将控制和电源区分开，每对屏蔽门包括1个DCU。DCU主要处理来自系统控制和本地控制设备的控制命令。
DCU主要收集/发送门状态信息和故障信息，检测障碍物。
DCU和门通过冗余的CAN总线进行双向通信，其参数可通过PSA信息平台进行设置，DCU可接收24V~220V的交流信号，并且可兼容有刷和无刷电机。

门锁设备

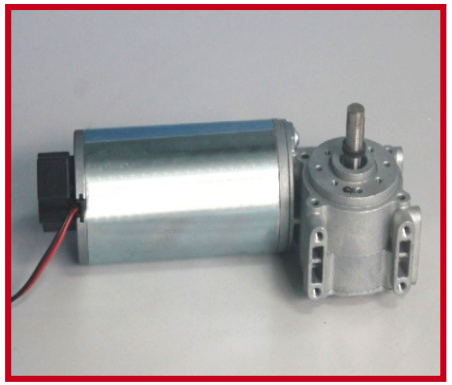
PSD 端锁:
- 由两个关联的电气安全电路和两个微调开关构成，以检测手工开锁。
- 通过1,500,000次循环测试。
- 重力作用下自动上锁
- 无须弹性元件可实现重新设置
- 机械结构简单
- 安全锁





DOOR MACHINERY STIMULATION COMPONENTS

- **Motors**



- **Motor Type 1**
- **110V DC brushless motor, supplied by Dunker motor**
- **Designed and tested lifetime : longer than 3 million cycles**

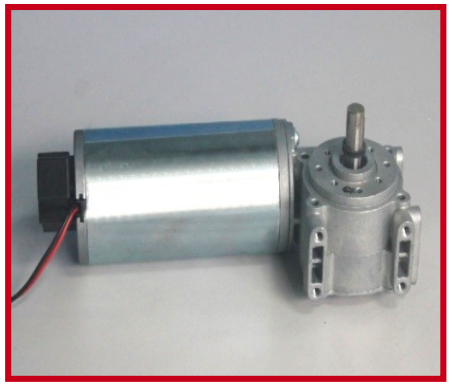
power rating (W)	96.6 W	Max. outputting voltage	211.3W
voltage rating	110V	Nm/A torque constant(kt) Nm/A	30.9×10^{-2}
Min. working voltage	90V	rating torque of electric motor	28.6×10^{-2}Nm
Max. working voltage	135V	moment of inertia of electric motor (N/m2)	353×10^{-7}
rating current of motor (A)	1.29	wire resistance of electrical motor (Ω)	2.11Ω±10%
startup current	6.6 ±10% A	insulation class	E VDE 0530
rating rotate speed (r.p.m)	3225 ±10%	protection class of shell	IP54
surface temperature of electric motor and reduction gear	Temperature contrast less than 15℃ under normal on-off cycle.		

power rating (W)	102 W	**Max. outputting voltage**	276W
voltage rating	110V	**Nm/A torque constant (kt) Nm/A**	29.5×10^{-2}
Min. working voltage	90V	**rating torque of electric motor**	28.3×10^{-2}Nm
Max.working voltage	135V	**moment of inertia of electric motor (N/m2)**	750×10^{-7}
rating current of motor (A)	1.1	**wire resistance of electrical motor (Ω)**	3.41Ω±10%
startup current	10 ±10% A	**insulation class**	E VDE 0530
rating rotate speed (r.p.m)	3450 ±10%	**protection class of shell**	IP54
surface temperature of electric motor and reduction gear	Temperature contrast less than 15℃ under normal on-off cycle.		

- **Motor Type 2**
- **110V DC with brush, supplied by Dunker motor**
- **Designed and tested lifetime : longer than 3 million cycles**

DOOR MACHINERY STIMULATION COMPONENTS

- **电机**



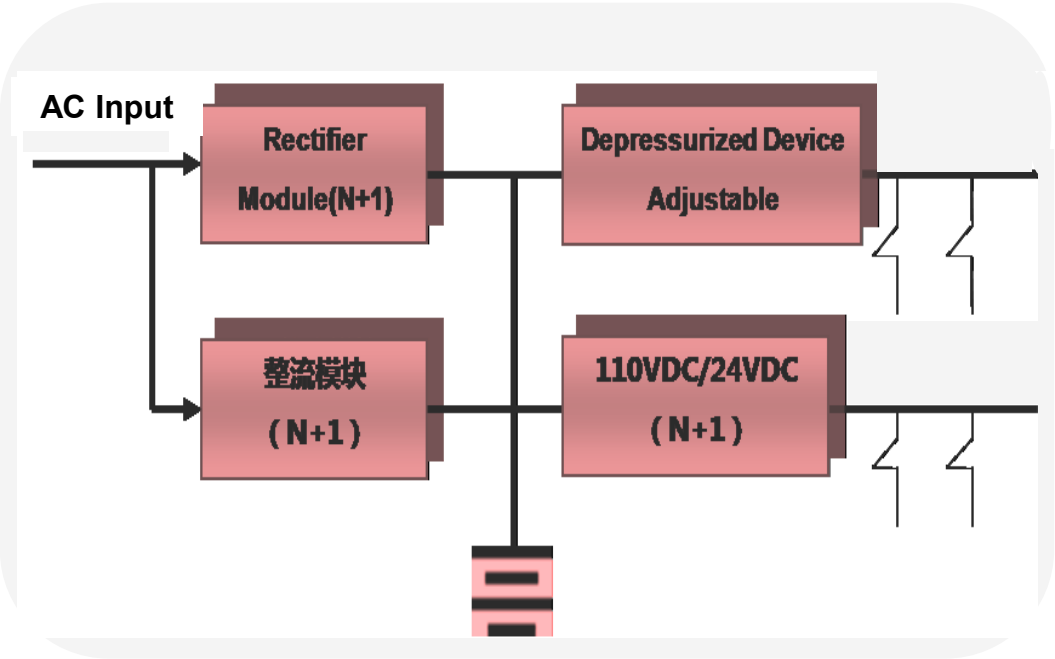
- **电机1**
- **110V 直流无刷电机,**
- **供应商：Dunker motor**
- **设计及测试寿命: 至少三百万次循环。**

额定功率（W）	96.6 W	**最大输出电压**	211.3W
额定电压	110V	扭矩常数(kt) Nm/A	30.9×10^{-2}
最小工作电压	90V	**电机额定扭矩**	28.6×10^{-2}Nm
最大工作电压	135V	电机惯性力矩（N/m2）	353×10^{-7}
电机额定电流（A）	1.29	电机导线电阻（Ω）	2.11Ω±10%
启动电流	6.6 ±10% A	**绝缘等级**	E VDE 0530
额定转速（r.p.m）	3225 ±10%	**外壳防护等级**	IP54
电机表面温度	正常开合周期内表面温差小于15度		

额定功率（W）	102 W	**最大输出电压**	276W
额定电压	110V	扭矩常数(kt) Nm/A	29.5×10^{-2}
最小工作电压	90V	**电机额定扭矩**	28.3×10^{-2}Nm
最大工作电压	135V	电机惯性力矩（N/m2）	750×10^{-7}
电机额定电流（A）	1.1	电机导线电阻（Ω）	3.41Ω±10%
启动电流	10 ±10% A	**绝缘等级**	E VDE 0530
额定转速（r.p.m）	3450 ±10%	**外壳防护等级**	IP54
电机表面温度	正常开合周期内表面温差小于15度		

- **电机 2**
- **110V 直流有刷电机,**
- **供应商：Dunker motor**
- **设计及测试寿命: 至少三百万次循环。**

POWER SYSTEM COMPOSITION

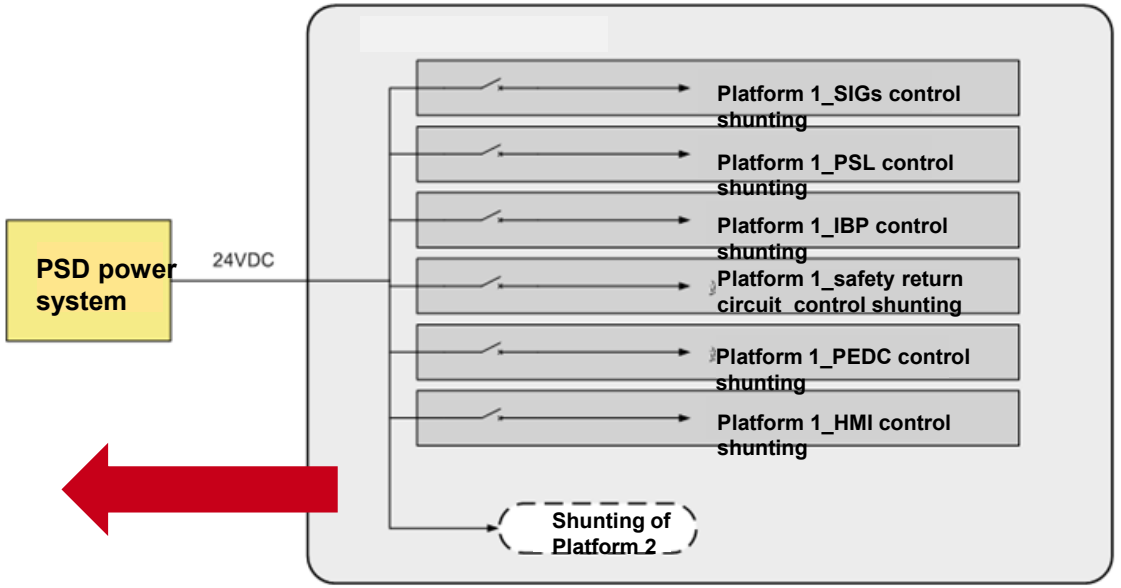


The power device:
- ▸a rectifier module ▸ distribution unit ▸ intelligent monitor system
- ▸ DC/DC module ▸ insulation monitor unit ▸ battery inspection unit
- ▸depressurization device
- ▸accumulator group

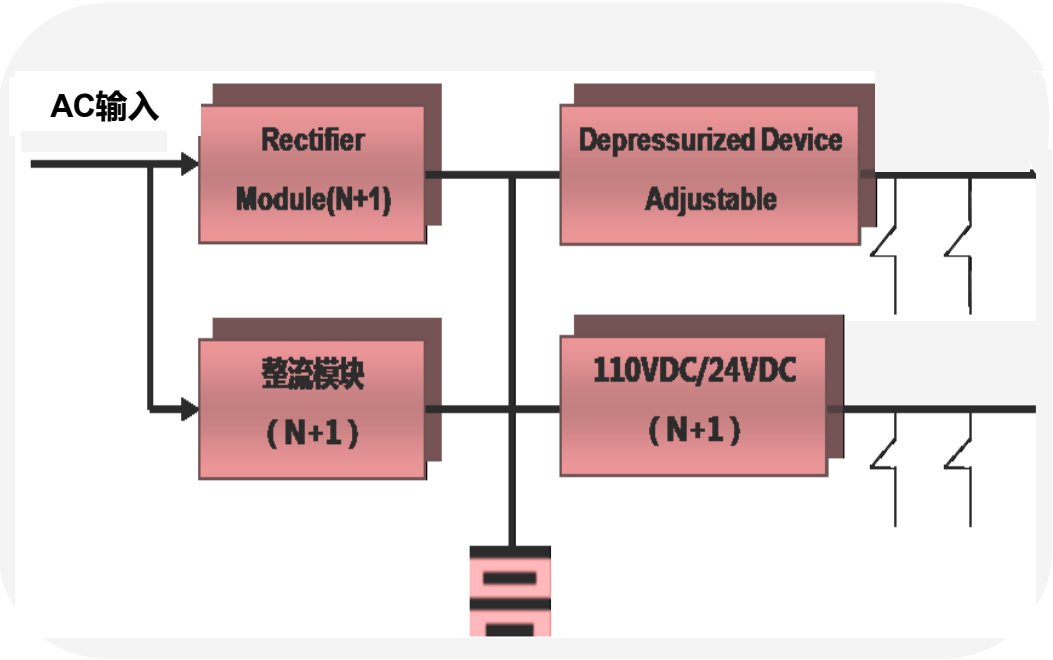
The drive power is supplied by 4 groups of return circuits, ensuring high availability. Main parts of the power system achieve stand-by function, online hot drawing inserting and online maintenance mission.

The return circuit of control power is protected in PSC box. Any failure in one return circuit would not affect other return circuits.

The accumulator ensures all door units work 3-5 times in 60min, and supply the energy for control device.
Drive power and control power both share the same accumulator.



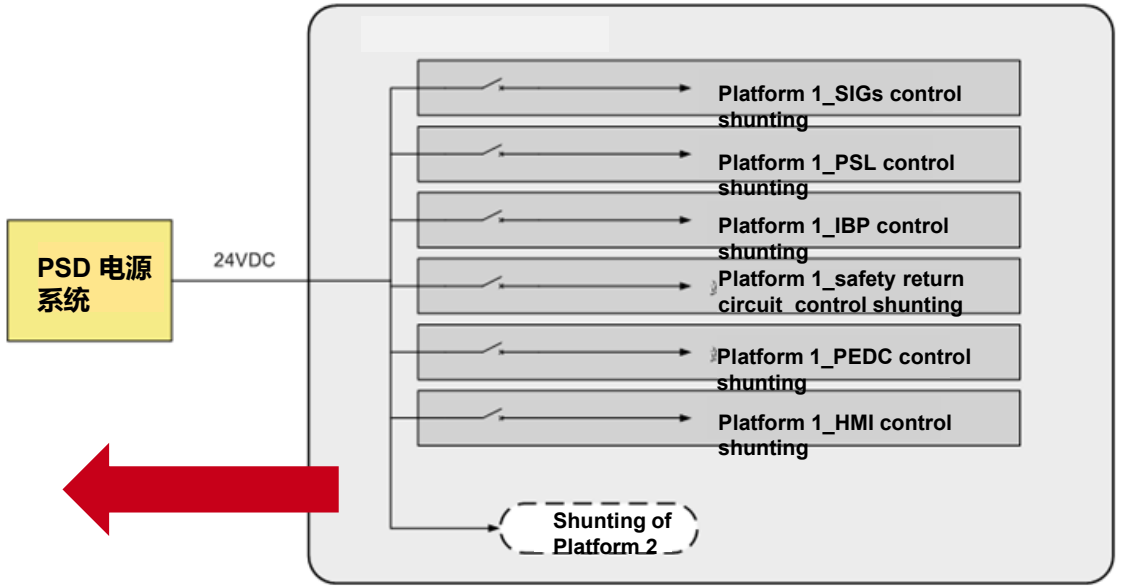
POWER SYSTEM COMPOSITION 电源系统组成



电源:
▸整流器模块 ▸ 配电装置 ▸ 智能检测系统
▸ DC/DC 模块 ▸ 绝缘监测单元 ▸ 电池检测单元
▸减压设备
▸需电池
驱动电源由四组回馈回路组成，以确保高可靠性。电源系统的主要元件都设计有备份功能，在线热拉法插入和在线维护功能。

控制电源回路由PSC箱进行保护，任何回路出现故障不会对另一个回路造成影响。

蓄电池可保证所有门单元在一小时内工作3~5次，
并确保为控制部件提供能量。
驱动电源和控制电源共用同一个蓄电池。



PSD REFERENCE PROJECTS 参考业绩

PSD Project of Ningbo Metro Line 1- Phase 1: 20 stations,
960 full height and fully closed doors between 2.5-3m. In operation in May 2014.
宁波地铁1号线1期，20站，960个全高全封闭门，门高在2.5~3米之间，2014年5月投入运行

Ningbo Metro Line 2- Phase 1: 22 stations, including 18 underground stations and 4 overhead stations.
Guangzhou-Foshan Metro Line - Phase2. Guangzhou subway PSD maintenance project, 72 stations.
宁波地铁2号线1期，22站，其中18个地下站台，4个地面站台
广州-佛山地铁线2期，广州地铁屏蔽门维保项目，包含72站

Guiyang-Kaiyang Intercity Line: 2 stations, 104 doors between 1.2-1.5m. Maintenance, with capacity of extension.
Implementation of 'secure-fall' key security signal of control system.
贵阳-开阳城轨4号线，2个站，104单门单元，门高1.2~1.5米，可扩展。
控制系统对开关门等安全信号具有双线冗余功能

Ningbo Metro Line1
宁波地铁1号线

Guangzhou – Foshan Line
广州-佛山线

PSD REFERENCE PROJECTS 参考业绩

- 主要项目业绩

序号	项目	数量	状态
1	宁波市轨道交通1号线一期工程	20座站台	运营
2	广州地铁8号线赤岗站站项目	1座站台	运营
3	宁波轨道交通2号线一期工程	22座站台	运营
4	贵阳至开阳城际铁路安全门项目	2座站台	运营
5	长沙地铁2号线西沿线项目	4座站台	运营
6	长沙磁悬浮项目	3座站台	运营
7	广深港城际客运福田站项目	8侧站台	运营
8	新郑机场站	4侧站台	运营
9	广州地铁4号线庆盛站	1座站台	运营
10	广州地铁6号线2期项目	9座站台	运营
11	广州至佛山段二期工程	4座站台	运营

PSD REFERENCE PROJECTS 参考业绩

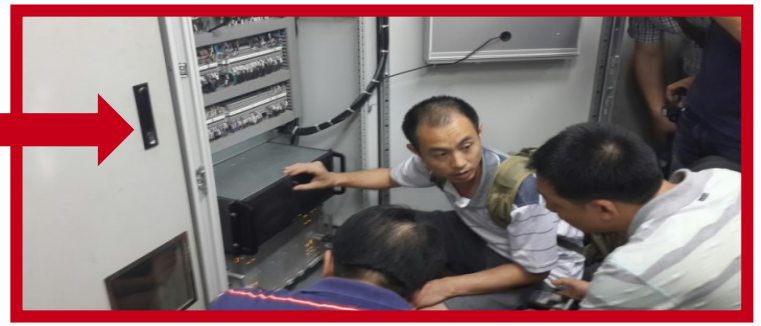
序号	项目	数量	状态
12	昆明1号线支线	4座站台	运营
13	长株潭城际线	9座站台	运营
14	温州S1市域城际屏蔽门项目	19座站台	建设中
15	杭州地铁2号线2期屏蔽门项目	9座站台	建设中
16	广州地铁8号线北延段项目	10座站台	建设中
17	长沙地铁4号线1期项目	25座站台	建设中
18	宁波地铁3号线1期项目	15座站台	建设中
19	广州至珠海城际站台门改造项目	8座站台	建设中
20	昆明6号线二期项目	4座站台	建设中
21	巴西圣保罗17号线项目	8座站台	建设中
22	印度加尔各答东西线项目	12座站台	建设中

PROJECT CASE: CHIGANG STATION
典型项目：赤岗站

TEC PROPRIETARY RESEARCH SYSTEM APPLIED RESULTS
Guangzhou subway line 8 Chigang station
TEC自主开发的系统应用实例
广州地铁8号线赤岗站

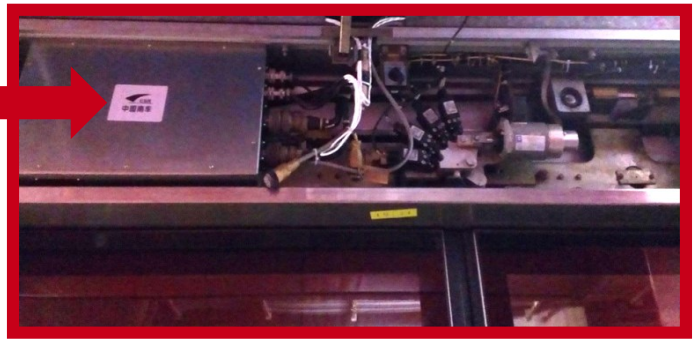
Replaced PSC
替换屏蔽门

On-site Display
现场替换



Project receiving Inspection
项目评审

Replaced DCU
替换DCU



2011.11 – 2013.01	Nationalized formation over self-developed control system by CRRC Times Electric at Chigang Station of Guangzhou Metro Line 8. Trial Operation for Chigang Station after formation赤岗站于2011.11~2013.11进行试运行
2012.11 – 2013.06	Perfect performance in operation. Evaluation from operator, on-site inspections and on-site display. Obtained appraisal from the metro company. 2012年11月至2013年6月，在线检测和替换等操作获得了用户地铁公司的好评

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Thank You

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