China CNR
Datong Electric Locomotive Co., Ltd.
CNR Datong Electric Locomotive Co., Ltd. was established in 1954, it was reconstructed to a limited liability company in 2003.

The company is one of the specialized development and production bases of electric locomotive in China. The company covers an area of 2.34km², has a total asset of 4.39 billion CNY, and employs more than 6,000 staff.

The company is the only manufacturer in China with products ranging from steam locomotive, diesel locomotive to electric locomotive.
<table>
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<th>Year</th>
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<td>1959</td>
<td>First steam locomotive</td>
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<td>2002</td>
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Introduction of capacity

Introduction of research & design capacity

Introduction of manufacture capacity

Introduction of quality control capacity
Introduction of R&D capacity

The company establishes good cooperation with more than 30 research institutes, universities, high technology companies at home and abroad to quickly improve its R&D capability.

The company has 2,091 technical persons in all kinds of professions, and 237 of them have the title of a senior professional post, 1,119 have intermediate technical titles; 14 doctors, 39 masters and 1006 bachelors. and 4 of them are awarded special allowance by the Chinese State Council.
In 2004, technology introduction from ALSTOM,

Established world top locomotive configuration (axle control+ IGBT power module+LOCOTROL),

Established a common technical platform for AC drive high power passenger & freight electric locomotive,

Greatly improved the core technology from low power DC drive to the field of high power AC drive.

The contract signing ceremony for 180 high-power AC Drive Electric Locomotives
Locomotive R&D Platform

- Locomotive integration test technology
- Pantograph technology
- Vacuum main circuit-breaker technology
- Cooling device technology
- Driver operation electric equipment technology
- Locomotive car body technology
- Bogie technology
- Traction transformer technology
- Auxiliary converter block technology
- Riveting structure apparatus cabinet manufacturing technology
Locomotive R&D Platform

- Auxiliary Convertor Block
- Common Block
- Main Convertor Block
- Pneumatic equipment cabinet
- Brake Cabinet
- System cabinet

Modularized Parts
Locomotive R&D Platform

System Integration
Introduction of manufacture capacity

At present, the company has various production equipment 1,357 sets, among them, critical equipment 59 sets; important equipment 62 sets; numerical control equipment, including CNC, welding robot, NC shearing machine, NC bending machine, NC nibbling machine and laser cutting machine etc, 83 sets; large scale numerical control equipment 12 sets;

Has processing equipment 3,557 sets for the locomotive of different types, including various large scale welding positioner, tilter, assembly devices, process car, hydraulic wrench torque, crimping tools.

The current production capacity of the company is 500 sets of locomotives.
7 production lines

- Digital Plate Stock Production Line
- Unit Body Production Line
- Specialized Bogie Production Line
- Modularized Electric Cabinet Production Line
- Specialized traction transformer manufacturing line
- Specialized Mid & High Voltage Electric Apparatus Production Line
- Locomotive Assembly Production Line
Digital Plate Stock Production Line
Unit Body Production Line
Specialized Bogie Production Line
Modularized Electric Cabinet
Production Line
Specialized Mid & High Voltage Electric Apparatus Production Line
Locomotive Assembly Production Line
Introduction of quality control

**Quality Control of Self-made Parts**

**Strict quality corrective & trace program**
--- to realize the traceability & closed loop management of quality corrective action

**Scientific method of FAI (First Article Inspection)**
--- to guarantee the delivery quality reliable & stable

**Advanced three-level quality control system**
--- to execute the three-level product quality control respectively by operator, inspector and quality engineer
Quality Control & Supplier Training System of the Purchased Parts

Pre-selected suppliers

Technical confirmation

Quality certification

FAI

Acceptance Inspection

Qualified Suppliers
澳大利亚机车项目

Australia locomotive project
CNR Datong electric locomotive Co., Ltd (hereinafter referred to as DELC) pays close attention to Australia railway since years ago, and CNR also established an agent in Australia.

After carrying out investigations on the special Australia railway conditions and the domestic developing expectations, DELC considers that it is more suitable for using high power heavy haul electric locomotives on the lines for transportation of iron ore and coal.
电力机车与内燃机车相比，经济效益和技术优势明显。

Compare electric locomotive and diesel locomotive, electric locomotive is more available because of money saving and technical advantages.
电力机车在节约能源方面的优势

Electric locomotive: energy saving

电力机车牵引所用的电能属二次能源，转化方式多样，可以综合利用资源。可以利用水力资源、核能资源、天然气资源和火力发电站供电，可使用劣质煤或重油，从能源利用多元化上，电力牵引具有无法比拟的优势。

如果考虑电力传动或液压传动部分损失，内燃机车的平均热效率仅为26%，而电力机车的平均热效率为28%；如果利用太阳能或核能发电则电力机车的平均热效率更高。因此，从提高能源利用效率，减少热损方面，大力发展电力机车牵引，对铁路运输的节能降耗工作有着重大意义。

The electric energy is secondary energy. There are several kinds of converting methods which could be obtained comprehensively, for example from water power, nuclear energy and natural gas energy. Even from heat power plant, we can also use inferior coal or heavy oil.

From the point of loss of electric transmission and hydraulic transmission, the average thermal efficiency of diesel locomotive is only 26% and the electric locomotive is 28%. If the solar energy or nuclear is used, this efficiency would be higher.

So from the angle of energy saving and decrease thermal loss, we suggest to use electric locomotive which means a lot for the energy saving on railway transportation.
再生制动技术带来的节能环保效益

Electric locomotive: regenerative brake technology

随着“再生制动”馈电技术在电气化铁路牵引机车和动车组上采用，相比传统的机械制动方式，交流调速、再生制动系统具有能量再生利用、减低制动噪声等优点，节能环保效果明显。

再生制动是将牵引电动机变成发电机后发出的电能，通过接触线或第三轨回馈回铁路供电系统，所回馈的电能可以供其他机车使用。在能效利用率上，再生制动要比内燃机车常用的空气制动方式要高得多。

Compared with traditional mechanical brake, regenerative brake technology, used on electric locomotives and electric multiple units, has the advantages of energy reuse, less braking noise and better energy saving and environment protection.

With the regenerative braking technology, during braking, the traction motors work as generators to feed the electric power back to railway power system through the overhead line or the third rail, so that electric power regenerated could be used by other electric locomotives. In respect of energy efficiency, the regenerative braking is much better than air brake usually adopted by diesel locomotives.
电力机车运行时的环保优势

Electric locomotive: environment protection

内燃机车废气造成的空气污染，对整个运行区域的生态环境、人体、植物、动物、气候都有影响。根据资料统计，1吨柴油燃烧排放的有害气体需要1.34万立方米的新鲜空气来稀释才能使空气质量达标，如果替换一台内燃机车，将相当于减少了4000辆小汽车的尾气排放。

电力机车依靠接触网上送来的清洁电能获得动力，本身不燃油，不产生废油，不排放有害气体，不但对运行区段不会造成环境污染，而且极大地改善了机车乘务员劳动条件。

The exhausted gas emitted by diesel locomotives could harmfully affect the ecological environment, human body, plant, animal and climate. According to statistics, the noxious gas emitted by combustion of 1 ton diesel requires $1.34 \times 10^4$ m$^3$ fresh air for dilution to meet the air quality standards, if a diesel locomotive is replaced with an electric locomotive, it equals to reducing exhausted gas of 4,000 cars.

The electric locomotives collect the clean power from the overhead line, they do not generate any noxious gas, so that they will not cause any pollution to the environment. Moreover they also greatly improve the working conditions of attendants on the train.
电力机车具有明显的运输和通过优势
Electric locomotive: technology advantages

电力机车与内燃机车相比，具有功率大、过载能力强、牵引力大的优势。电力机车还有一个优点就是无限行程，只要车辆不驶离电气化段，就不会“饿倒”（故障除外），无需像内燃机车那样经常补充燃料。

内燃机车的功率要增大，必须增加柴油机功率，加大发电机功率，同时必须加大燃料箱，体积上受到限制，而且燃烧效率下降比较厉害。电力机车的功率增大相对简单，目前单轴功率可达1600kW。

Compared with diesel locomotives, electric locomotives have higher power, better overload capacity and greater tractive effort. Another merit of electric locomotive is that it could run on the electrified line unrestrictedly without stop due to empty fuel (except breakdown time).

To achieve a greater power of a diesel locomotive, the power of diesel engine and generator should be increased, meanwhile the fuel tank should be enlarged. With the tank increasing, the fuel efficiency decreases badly, and the tank also has volume limit. However, it is easier to increase the power of electric locomotive, at present single axle power is up to 1,600kW.
Besides the advantages above mentioned, the electric locomotive still has other superiority such as higher speed, higher efficiency of service work, less maintenance, less operation cost, more easily realize locomotive couple, etc. And the electric locomotive could display the climbing capacity specially in mountain region, and when the electric locomotive goes down the slope it could also feedback the electric energy to overhead line by regenerative brake.

The operation speed and carrying capacity can be highly increased and the transportation capacity and pass ability can also be greatly boosted by using electric locomotive to drag train. The electric locomotive has high start acceleration, strong climbing ability and less being influenced from ambient such as frost. The electric locomotive can also better display its advantage on busy railway and the trunk with many tunnels and slope in mountain region.
At present, the most advanced diesel locomotive only has about 5,000kW single-machine power, but the HX_{D2} electric locomotive manufactured by DELC is with 10,000kW single-machine power and load capacity of 10,000t, and suitable to work on iron and coal railways in Australia.
同车公司目前主要生产以下四种大功率交流传动电力机车：

HXd2型电力机车
HXd2B型电力机车
HXd2C型电力机车
“中白货运I型”电力机车

DELC are mainly manufacturing four types of high power AC drive electric locomotive:

HXd2 electric locomotive
HXd2B electric locomotive
HXd2C electric locomotive
BKT-1 electric freight locomotive
HXD2型电力机车
HXD2 Electric Locomotive

同车公司目前共生产了180台该型机车，目前全部运行于太原铁路局湖东机务段。

“HXD2”型电力机车是由法国阿尔斯通交通运输股份有限公司和中国北车集团大同电力机车有限责任公司为中国大秦铁路牵引20000吨重载货运列车而联合设计开发的一种新型大功率交流传动电力机车。

DELC has manufactured 180 sets of “HXD2” locomotive by far and all of them are running at Hudong depot of Taiyuan railway bureau.

“HXD2” electric locomotive is jointly designed by DELC and France ALSTOM. It is a new type high power AC drive electric locomotive specially developed for China Da-Qin railway 20,000t heavy haul freight train.
**Main Technical Parameter:**
Continuous power : 10,000 kW
Maximum speed : 120 km/h
Starting tractive effort : ≥700 kN (23t axle load)
                      : ≥760 kN (25t axle load)

**Main Structure Form:**
Axle arrangement : 2(B₀-B₀)
Suspension mode : half suspension
Length over coupler centers : 18,975 mm

**Main characteristics of Locomotive:**
★ Logical control and self-diagnosis
★ Adopts independent axle control
★ Total power up to 10MW, is the highest power in existing domestic locomotives.
HXd2B型电力机车
HXd2B Electric Locomotive

同车公司共出厂了500台该型机车，主要交付北京铁路局天津机务段、丰台机务段、唐山机务段和上海铁路局南京机务段和徐州机务段使用。

六轴大功率交流传动货运电力机车是由中国北车集团大同电力机车有限责任公司为牵引重载货运列车而设计开发的一种新型大功率交流传动电力机车。

DELC has manufactured 500 sets of “HXd2B” locomotive by far, and most of them are running at Tianjin, Fengtai, Tangshan depot of Beijing railway bureau and Nanjing, Xuzhou depot of Shanghai railway bureau.

It is a new type of six axle high power AC drive freight electric locomotive which is specially developed for heavy haul freight transportation by DELC.
Main Technical Parameter:
Continuous power: 9,600 kW
Maximum speed: 120 km/h
Starting tractive effort: ≥ 584 kN

Main Structure Form:
Axle arrangement: C₀-C₀
Suspension mode: half suspension
Length over coupler centers: 22,960 mm

Main characteristics of Locomotive:
★ Logical control and self-diagnosis.
★ Adopts independent axle control.
★ Single axle power up to 1,600kW, is the highest single axle power in existing domestic locomotives.

Main Technical Parameter:
Суммарная мощность: 9,600 кВт
Максимальная скорость: 120 км/ч
Пусковой тяговый момент: ≥ 584 кН

Main Structure Form:
Шасси: C₀-C₀
Модель подвески: полусоспендер
Длина по оси: 22,960 мм

Main characteristics of Locomotive:
★ Логическое управление и самodiагностика.
★ Использование независимого контроля оси.
★ Практически не используется в парных грузовых составах.
★ Суммарная мощность одного вала до 1,600кВт, является самым мощным вагоном в существующих поездах.
同车公司共生产了220台该型机车，主要服役于郑州铁路局新乡机务段。
HXD2C型电力机车为中国北车集团大同电力机车有限责任公司自主研发的新型电力机车，机车技术指标达到了世界一流。HXD2C型电力机车主要针对铁路重载运输而设计，机车单轴功率1250kW，机车总功率大于7200kW，可实现单机牵引5000-6000t重载货物列车。

DELC has manufactured 220 sets of “HXD2C” locomotive by far, and most of them are running at Xinxiang depot of Zhengzhou railway bureau.

The HXD2C type of electric locomotive is the self-designed new type locomotive by DELC which has absorbed the advanced and mature technology of the world level electric locomotive and its technique index has reach the most advanced level of world. HXD2C electric locomotive is designed for the railway heavy-load transportation with the single-axle power 1,250kW and locomotive total power more than 7,200kW, which could perform the single unit leading 5,000-6,000t heavy-load train.
主要技术参数：
机车持续功率：7,200 kW
机车最大速度：120 km/h
机车起动牵引力：≥520kN（23t 轴重）
              ≥570kN（25t 轴重）

主要结构形式：
轴式：C₀-C₀
悬挂方式：半悬挂
前后车钩中心距：22,960 mm

机车主要特性：
逻辑控制和自诊断功能
采用独立轴控方式

Main Technical Parameter：
Continuous power：7,200 kW
Maximum speed：120 km/h
Starting tractive effort：≥520kN（23t axle load）
              ≥570kN（25t axle load）

Main Structure Form：
Axle arrangement：C₀-C₀
Suspension mode：half suspension
Length over coupler centers：22,960 mm

Main characteristics of Locomotive：
Logical control and self-diagnosis
Independent axle control.
BKT-1 freight electric locomotive is a brand new high power AC drive electric locomotive which is designed by DELC in light of the requirement of Belarus Railways, and DELC will manufacture and export 12 sets. BKT-1 locomotive is eight axle high power AC drive electric locomotive which is developed according to the operating environment in Belarus and with 1,520mm gauge.
**Main Technical Parameters:**

- **Track gauge:** 1,520 mm
- **Continuous power:** 9,600 kW
- **Axle load:** 25 t
- **Max. speed:** 120 km/h;
- **Starting tractive force:** ≥ 760 kN

**Main Structural Form:**
- **Axle arrangement:** 2(B₀-B₀)
- **Suspension mode:** half suspension
- **Length over coupler centers:** 19,075 mm

**Main Technical Parameters:**

- **Track gauge:** 1,520 mm
- **Continuous power:** 9,600 kW
- **Axle load:** 25 t
- **Max. speed:** 120 km/h;
- **Starting tractive force:** ≥ 760 kN

**Main Structural Form:**
- **Axle arrangement:** 2(B₀-B₀)
- **Suspension mode:** half suspension
- **Length over coupler centers:** 19,075 mm
Our commitments

Provide satisfactory locomotive product and service for you.

Bring you great economic benefit and social value.