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# XTR系列悬臂式隧道掘进机

XTR SERIES BOOM-TYPE TUNNEL ROADHEADER



## UNITED HEAVY EQUIPMENT & EARTH MOVERS PVT. LTD.

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XCMG FOUNDATION CONSTRUCTION MACHINERY BUSINESS DIVISION

## 企业简介

Company Profile



基础的深度 成就您的高度

徐州徐工基础工程机械有限公司（简称“徐工基础”），是徐工主机产品核心企业之一，是专业化发展煤矿机械、桩工机械、非开挖机械、能源钻采机械、隧道装备、矿山设备及铁路装备的生产制造企业。拥有雄厚的科研实力、智能制造能力以及广泛的品牌影响力和美誉度，可提供性能先进、质量可靠的优质产品。

徐工基础聚焦于地下工程领域，深耕地下岩土及资源的“钻、掘、采”产品和工法技术，不断优化成套化产品板块群，成为全球最大的钻采类机械研发生产基地和综合服务提供商。

目前，悬臂式隧道掘进机、旋挖钻机、水平定向钻机市场占有率均位居国内第一；徐工基础拥有完善的质量控制和服务保障体系，产品依靠卓越的产品性能、及时有效的服务和备件保障能力，赢得了客户的广泛赞誉，产品已出口至欧洲、美洲、非洲、东南亚等80多个国家和地区。

XCMG Foundation Construction Machinery Co., Ltd. (hereinafter referred to as "XCMG Foundation") is one of the core enterprises of XCMG. It is a manufacturing enterprise specializing in the development of coal mining machinery, piling machinery, non-excitation machinery, energy drilling and mining machinery, tunnel equipment, mining equipment and railway equipment. It has strong scientific research strength, intelligent manufacturing capacity, extensive brand influence and reputation, and can provide high-quality products with advanced performance and reliable quality.

XCMG Foundation focuses on the field of underground engineering, deeply cultivates the "drilling, excavation and mining" products and construction technology of underground geotechnical and resources, continuously optimizes the complete set of product group, and becomes the world's largest R&D and production base and comprehensive service provider of drilling and mining machinery.

At present, the market share of cantilever tunnel roadheader, rotary drilling rig and horizontal directional drilling rig ranks first in China; XCMG Foundation has a perfect quality control and service guarantee system. Its products have won wide praise from customers by relying on excellent product performance, timely and effective service and spare parts guarantee ability. Its products have been exported to more than 80 countries and regions such as Europe, America, Africa and Southeast Asia.

徐工XTR系列悬臂式隧道掘进机，是针对各种断面隧道的需求而研发的全新形式的掘进机。该系列掘进机的破岩能力强，施工效率高，切割范围广，对于中小断面的水利、地铁隧道及较大断面的公路、铁路隧道均有针对性的专业机型，能够满足隧道的施工要求。

徐工隧道掘进机地质适应能力强，可在岩石硬度120MPa范围内的隧道稳定施工；切削性能稳定，切割头磨损小，可实现半圆形、椭圆形、矩形、马蹄形等异形和突变断面的掘进。

徐工隧道掘进机采用国际知名品牌液压和电气元件，保证机器运行和控制的可靠性，配备喷雾系统和风机除尘，为施工人员提供一个低尘环境。整机配置高、机器稳定性好、自动化程度高、安全可靠。

经过市场洗礼的徐工隧道掘进机以其优越的性能在中国各地市场受到热捧，得到用户的一致好评。

XCMG XTR series boom-type tunnel roadheader is a new type of tunnel boring machine developed for the needs of various cross-section tunnels. This series of roadheader has strong rock breaking ability, high construction efficiency and wide cutting range. It is suitable for small and medium cross-section water conservancy, subway tunnels and large cross-section highway and railway tunnels.

XCMG tunnel roadheader has strong geological adaptability, and can stably work in tunnels with rock hardness of 120 MPa; Its cutting performance is stable, cutting head wear is small, semi-circular, oval, rectangular, horseshoe shaped and other special-shaped and mutation section excavation can be realized.

XCMG tunnel roadheader adopts international famous brand hydraulic and electrical components to ensure the reliability of operation and control, equipped with spray system and fan dust removal, so as to provide a low dust environment for construction workers. The whole machine has high configuration, good stability, high degree of automation, safe and reliable.

After the baptism of the market, XCMG tunnel roadheader with its superior performance is popular in China's market, and has been highly praised by users.



- |   |                                 |                            |
|---|---------------------------------|----------------------------|
| 1 切割机构<br>cutting mechanism                 | 2 铲板总成<br>shovel plate assembly | 3 液压系统<br>hydraulic system |
| 4 本体总成<br>body assembly                     | 5 行走机构<br>traveling mechanism   | 6 操作台<br>console           |
| 7 电气系统<br>electric system                   | 8 后支承<br>rear support           | 9 第一运输机<br>first conveyor  |
| 10 除尘风机 (可选)<br>dust removal fan (optional) | 11 卷缆系统<br>cable winding system |                            |

### 性能特点

XTR4/260悬臂式隧道掘进机是一款专门针对矿山、水利等小断面硬岩隧道而设计的窄机身大功率硬岩隧道掘进机，适用于较硬岩石、软岩、较软岩施工。整机配置高，性能先进，安全可靠，断面一次成型，施工效率高。

**窄机身、矮机身，大功率设计**  
机身宽度2.1m，切割部高度2.2m，切割功率260kW，非常适合小断面硬岩隧道施工。

**切割机构**  
配置大锥度切割头，双螺旋线截齿排布，切割效率高；盘根座采用迷宫螺旋型密封结构，有效阻止粉尘进入。

**装运机构**  
铲板与一运机构采用铰链四杆机构随动连接，运转顺畅；表面采用国际知名耐磨材料信铬钢，耐磨性高；星轮驱动装置采用回转支承式，可靠性高。

**行走机构**  
链轨式履带，行走灵活，维修方便，可靠性高；

**除尘喷雾系统**  
具备喷雾系统，配置高压水泵，实现高压喷雾，除尘效果好，降低粉尘污染。

**无线遥控**  
配置远程遥控，实现全方位操控，掘进操作方便灵活。

**集中润滑**  
配置集中润滑，保证润滑件实时润滑，减轻劳动强度，提升产品可靠性。

**安全警示**  
配置语音声光报警，提升人员安全。

**液压系统**  
采用恒功率、压力切断，负载敏感控制技术；主要液压元件均采用国际国内知名品牌，功能先进，可靠性高。

**电控系统**  
采用新型综合保护，液晶汉字动态显示，可故障自诊断及记忆；主要电气元件均采用国际国内知名品牌，功能先进，可靠性高。

### Technical Characteristics

XTR4/260 cantilever tunnel roadheader is a narrow-body high-power hard-rock tunnel boring machine specially designed for small-section hard-rock tunnels such as mines and water conservancy. It is suitable for hard rock, soft rock, and relatively soft rock construction. The whole machine is equipped with high configuration, advanced performance, safe and reliable, the section is formed at one time, and the construction efficiency is high.

**Narrow and short body, high power**

The body width is 2.1 m, the cutting section height is 2.2 m, and the cutting power is 260 kW, which is very suitable for the construction of small-section hard rock tunnels.

**Cutting mechanism**

Equipped with a large taper cutting head, double spiral line picks are arranged, and cutting efficiency is high; the packing seat adopts a labyrinth spiral sealing structure to effectively prevent dust from entering.

**Loading and transporting mechanism**

The shovel plate and the first transportation mechanism are connected by a hinged four-bar mechanism, which runs smoothly; the surface is made of internationally renowned wear-resistant material, sure alloy steel, which has high wear resistance; the star wheel drive device adopts a slewing bearing type, which has high reliability.

**Walking mechanism**

Chain track crawler, flexible walking, convenient maintenance and high reliability;

**Dust removal spray system**

Equipped with a spray system with high-pressure water pump, to achieve high-pressure spray, good dust removal effect, and reduce dust pollution.

**Wireless remote control**

It is equipped with remote control to realize all-round control, and the tunneling operation is convenient and flexible.

**Centralized lubrication**

Centralized lubrication is equipped to ensure real-time lubrication of lubricating parts, reduce labor intensity and improve product reliability.

**Safety warning**

Equipped with audible and visual alarm to improve personnel safety.

**Hydraulic system**

It adopts constant power, pressure cut-off, and load-sensitive control technology; the main hydraulic components adopt well-known international and domestic brands, with advanced functions and high reliability.

**Electric control system**

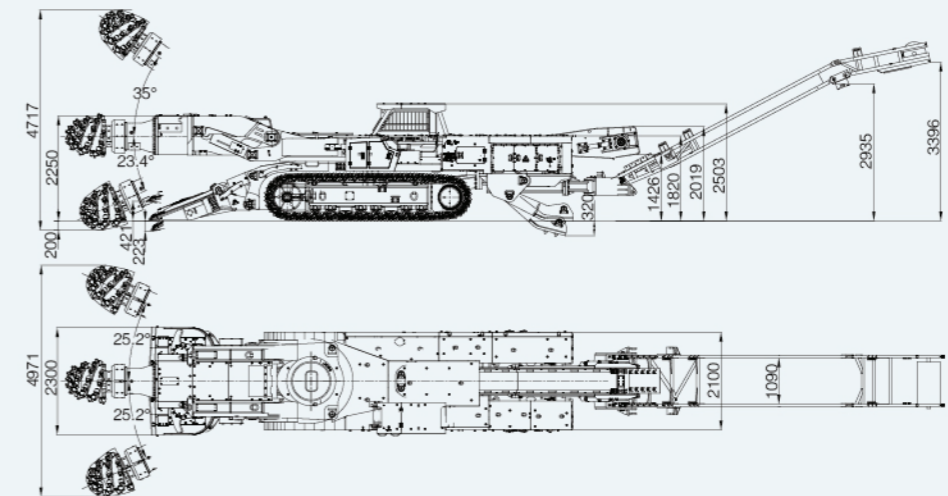
It adopts new comprehensive protection, dynamic LCD display of Chinese characters, self-diagnosis and memory of faults; main electrical components adopt well-known international and domestic brands, with advanced functions and high reliability.

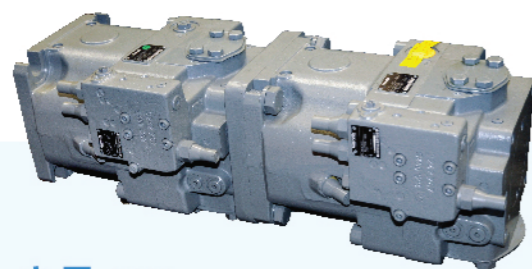


### 主要技术参数

### Main Technical Specification

项目 Item	单位 Unit	参数 Parameter		
整机质量 Overall weight	t	80		
外形尺寸 Dimension	长/含二运 Length (including second conveyor)	mm	12300/19100	
	宽 Width	铲板 Shovel plate	mm	2300
		机身 Main frame	mm	2100
	高 Height	切割头水平放置最高点 Maximum height of cutting head placed horizontally	mm	2250
		机身 Main frame	mm	1820
	卧底深度 Dinting depth	mm	200	
	地隙 Ground clearance	mm	233	
	切割范围 Cutting range	高度 Height	mm	4720
		宽度 Width	mm	4970
	龙门高度 Gantry height	mm	380	
行走速度 Travel speed	m/min	0~7		
切割电机功率 (标配) Power of cutting motor(Standard)	kW	260		
切割电机功率 (选配) Power of cutting motor(Optional)	kW	260/200		
泵站电机功率 Power of pump station motor	kW	132		
供电电压 Supply voltage	V	AC 1140		
供电频率 Power supply frequency	Hz	50		
装载能力 Loading capacity	m <sup>3</sup> /min	星轮式/3.2		
喷雾水压 Spray water pressure	MPa	4		

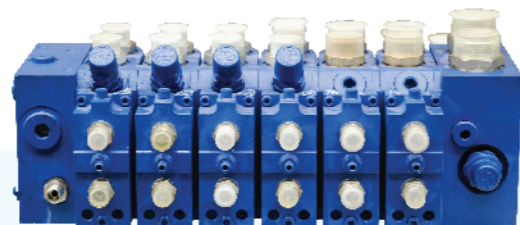




### 主泵 Main pump

知名进口品牌液压主泵，压力等级高。负载敏感泵，并带恒功率控制和压力切断，控制可选择性多，可满足不同需求。能为系统提供与负载相匹配的压力和流量，液压系统工作更稳定，效率更高。

Famous import brand hydraulic main pump with high pressure level, Load sensing, constant power and pressure cut off, Optional control, Meeting different requirement. Pressure and flow matching the load, Stable and high efficient



### 主阀 Main valve

进口品牌主阀，采用专门设计的无铝方案。负载敏感阀，可为执行机构提供与负载压力无关的流量。每联阀带负载压力补偿器，控制精度高。整体采用模块化设计，维修方便。

The imported main valve adopts special designed aluminum free scheme. Load sensing valve can provide the actuator with flow independent of load pressure. Each valve is equipped with load pressure compensator with high control accuracy. Modular design is adopted for convenient maintenance.



### 手柄 Handle

进口品牌液压手柄，采用渐进式控制，灵敏度高，有精确无游隙控制特征。手柄柱塞具有防锈特征，使用寿命长，操作感好，故障率低。

Imported hydraulic handle adopts progressive control with high sensitivity and no clearance. The anti-rust handle plunger has long service life, good operation feeling and low failure rate.

### 行走部 Traveling system

行走驱动采用进口品牌液压马达、减速机，牵引力大，爬坡能力强。高强度锻造履带板，抗冲击性强。

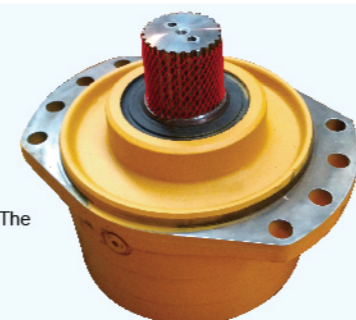
Traveling drive adopts imported hydraulic motor and reducer, with large traction force and strong climbing ability. The high strength forged track shoes have strong impact resistance.



### 星轮马达 Star wheel motor

采用进口品牌马达，结构紧凑。低转速运行输出扭矩大，性能稳定、可靠。

It adopts imported motor with compact structure and stable performance. The motor has high output torque when it operates at low speed.



### 油泵电机 Oil pump motor

机座采用钢板焊接而成，结构坚固耐用，电机功率大，为设备提供强大动力。自扇冷式，散热筋与电机后端的风扇构成电机冷却系统，冷却效率高。

The frame is made of welded steel plate. The structure is firm and durable, and the motor power is high. The cooling rib and the fan at the back end of the motor constitute the motor cooling system, with high cooling efficiency.



### 星轮 Star wheel

铲板驱动装置采用低速大扭矩液压马达驱动，内部装有进口轴承和端面密封。星轮分为三爪、四爪、五爪式结构，其上花堆耐磨层，耐磨损，效率高。

The shovel plate driving device is driven by a low-speed high torque hydraulic motor, with inlet bearing and end face seal installed inside. The star wheel is divided into three claw, four claw and five claw structure with wear-resistant layer piled on it.



### 切割头 Cutting head

运用3D数模设计，有限元分析进行优化，截齿布置合理，破岩能力强。截齿切割效率高，刀体、刀头耐磨损，寿命高。导料板采用进口高强度耐磨钢板，提高了使用寿命。

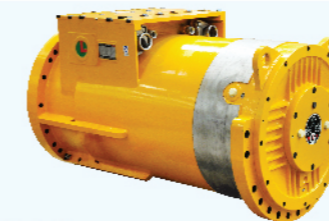
Using 3D digital model design and finite element analysis, the pick layout is reasonable and the rock breaking ability is strong. The cutting teeth has high cutting efficiency, the cutting head is wear-resistant and has long service life. The guide plate adopts imported high strength wear-resistant steel plate.



### 切割电机 Cutting motor

采用大功率双速切割技术，根据所切割煤岩的硬度，高低速可人工进行切换，切割效率高。采用外壳水冷结构，冷却效果好，防护等级高，绕组出线端部埋设了温度继电器和铂热电阻，可对电机进行有效地温度保护。接线腔单独由钢板焊接而成，可连接1140V/660V电源电压。

According to the rock hardness, high power double speed cutting technology is adopted, high and low speed can be manually switched, and the cutting efficiency is high. The temperature relay and platinum thermistor are embedded in the end of winding outlet, which can effectively offer the motor temperature protection. The wiring cavity is welded by steel plate alone and can be connected with 1140V/660V voltage.



### 电控箱 Electric control box

采用高性能PLC控制，具有过压、欠压、短路、超温、过载、过流、三相不平衡、低压漏电保护、历史故障查询等保护功能；电气系统采用模块化设计，具有液晶汉字动态显示，故障自诊断及记忆功能；电控箱内的关键元器件，均采用国际知名品牌配套，可靠性高。

It is controlled by high-performance PLC, with over voltage, under voltage, short circuit, overheat, overload, over current, three-phase imbalance, low voltage and leakage protection, historical fault inquiry and other protection functions. The electric system adopts modular design, with LCD dynamic display, fault self diagnosis and memory functions. The key components in the electric control box are all from international famous brands.



### 1、悬臂式隧道掘进机掘进

适应各类山体隧道自由断面截割。

1.The boom-type tunnel roadheader is suitable for cutting the section of various mountain tunnels.



### 2、装运出渣

将截割的岩土运出隧道。

Loading and unloading slag

1) 运用掘进机自带装运机构和特配二运转载机，将岩土输送到卡车上运出隧道。

1) The rock and soil are transported to the truck and out of the tunnel by using the loading and unloading mechanism and the second transport loader.



2) 利用装载机将岩土装到卡车上运出隧道。

2) The rock and soil are loaded onto trucks by loaders and transported out of the tunnel.

### 3、钢架支护 Steel frame support

通过支护台车或掘进机车平台将工字钢贴于隧道内壁，焊接固定。

The I-steel is pasted on the inner wall of the tunnel through the support trolley or the loading platform of the roadheader, and then welded and fixed.



### 4、锚固 Anchoring

在工字钢内侧和外侧铺设钢丝网，各个钢丝网之间点焊。然后在隧道侧壁打密集锚杆。

The steel mesh is anchored on the inside and outside of I-steel, and spot welding is carried out between each wire mesh. Then, dense bolts are drilled on the side wall of the tunnel.



### 5、喷浆 Gunite

拱架架设完成后喷射混凝土至设计厚度。

Spray concrete to the design thickness after the erection of steel arch.



### 6、仰拱 Inverted arch

隧道底部挖掘弧形圆拱，铺设工字钢，钢丝网，喷射混凝土。形成反向拱型结构以改善隧道上部支护结构受力。

Excavate arch at the tunnel bottom, lay I-steel, steel mesh and shotcrete. The inverted arch structure is formed to improve the stress of the upper supporting structure of the tunnel.

### 7、防水 Waterproof

初衬后的隧道壁表面涂喷防水材料或者添加防水塑料薄膜。

Spray waterproof materials or add waterproof plastic film on the surface of tunnel wall after the initial support.

### 8、二衬 Secondary lining

防水层外，增加工字钢和钢筋网，再次喷浆，完成二次衬砌。

In addition to the waterproof layer, I-steel and steel mesh shall be added, and the secondary lining shall be completed by shotcreting again.



### 9、完工 Completion

隧道表面处理，道路铺设沥青，安装路灯等辅助设施。

Process the tunnel surface, pave bitumen on road, install street lamp and other auxiliary facilities.

