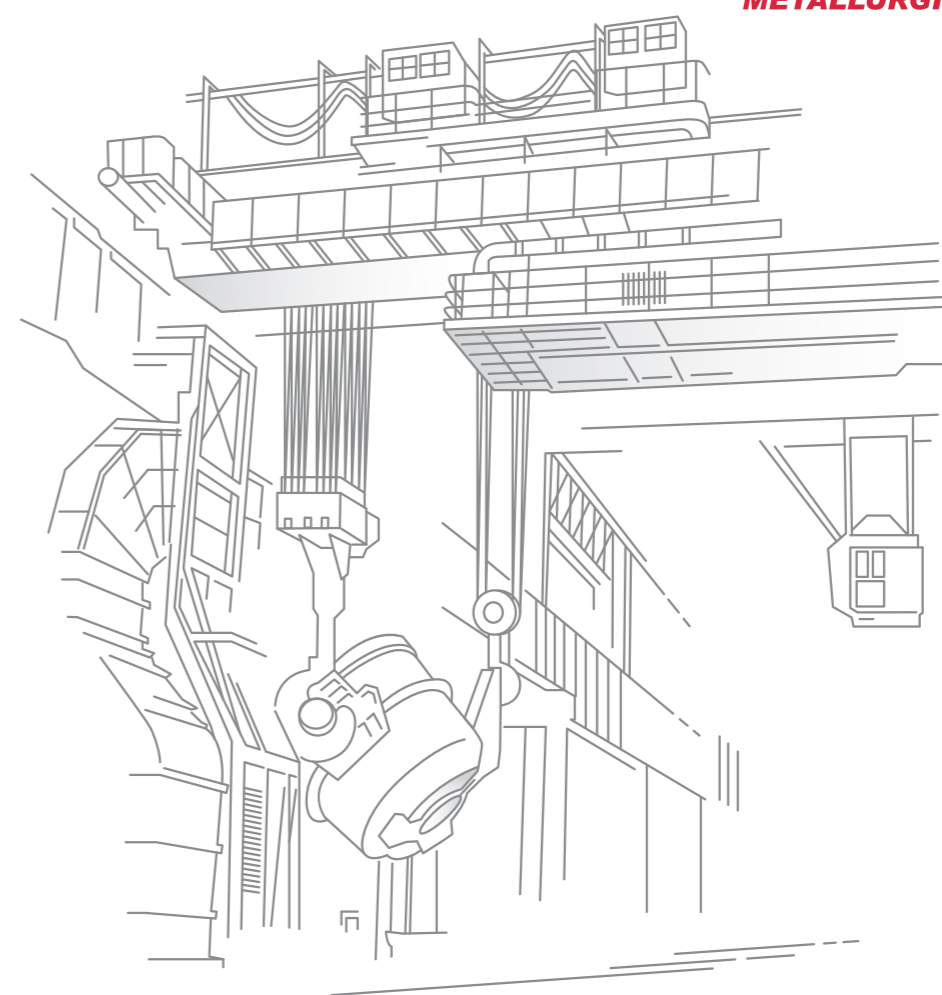


太原重工股份有限公司

TAIYUAN HEAVY INDUSTRY CO., LTD

冶金领域
METALLURGICAL FIELD



太原重工股份有限公司
TAIYUAN HEAVY INDUSTRY CO., LTD

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官方网站



微信公众号

产品宣传册

2000+^种
30000+^{台/套}

服务国家重点建设项目
2000+ types
30000+ sets
used for China key projects

460+^项
中国/世界第一
460+
National & International No.1s



1950^年
公司成立
Since 1950

493^{万m²}
公司面积
Total area of 4.93 million
square meters

10000+^人
在岗员工
10000+ employees

500+^亿
总资产
Total assets of RMB
50+ billion

INTRODUCTION 集团简介

太原重型机械集团有限公司（简称太重集团），始建于1950年，是新中国自行设计建造的第一座重型机械制造企业。主要成员单位包括太原重工股份有限公司、太原重型机械集团煤机有限公司、太重集团榆次液压工业有限公司等。公司拥有国家级技术中心和国家重点实验室，先后获得国家级发明奖4项、国家级成果奖26项、国家科技进步奖23项，创造了460多项中国和世界第一，为国家的建设、改革和发展做出了重要贡献，被誉为“国民经济的开路先锋”。

作为国内最重要的重型装备研发与制造基地之一，太重集团具有一流的装备制造水平和研发创新能力，是全国“创新型企业20强”之一，主要服务于轨道交通、矿山、冶金、煤炭、新能源、海洋工程、航天等领域，产品涵盖了铁路装备、露天矿和井工矿采掘输送设备、冶金设备、风力发电设备、工程机械、化工装备等，拥有设备成套和工程总承包能力，产品已出口到全球50多个国家和地区。

Taiyuan Heavy Machinery Group Co., Ltd (referred to as "TZCO"), founded in 1950, has been the first self-designed-and-built heavy machinery manufacturer since 1949. It is composed of Taiyuan Heavy Industry Co., Ltd, Taiyuan Heavy Machinery Group Coal Machinery Co., Ltd, Taiyuan Heavy Machinery Group Yuci Hydraulic Industry Co., Ltd etc. It has one nationally recognized technology center and one state key laboratory. In addition to four national prizes for new inventions, 26 national achievement prizes, and 23 national scientific progress prizes, It has made over 460 No.1 technology achievements in China and the world at large. It is known as "Trailbreaker for National Economy" for its important contributions to the national reform and development.

As one of the most important bases of R&D and manufacturing for heavy manufacturing in China. TZCO is one of the "Top 20 Innovative Enterprises" in China, with first-class equipment manufacturing, R&D and innovation capabilities. Its products are widely used in fields like rail transit, mining, metallurgical, coal, new energy, marine engineering, and aerospace. The products include railway equipment, equipment for open pit and underground mining and transportation, metallurgical equipment, wind power equipment, construction machinery and chemical equipment. Capable of providing complete equipment sets and EPC solutions, it has exported products to more than 50 countries and regions.

QUALIFICATIONS AND CERTIFICATIONS

资质认证



- 质量管理体系认证证书
Quality Management System Certification
- 环境管理体系认证证书
Environmental Management System Certification
- 职业健康安全管理体系认证证书
Occupational Health and Safety Management System Certification
- 实验室认可证书
Laboratory Accreditation Certificate
- 建筑企业资质证书
The Construction Enterprise Qualification Certificate
- 国际焊接企业资格认证证书
International Welding Enterprise Qualification Certificate
- 特种设备生产许可证
Special Equipment Production License



EQUIPMENT PROFILE

装备简介

4000+ 台 Sets

各类主要生产设备
Major Equipment

太重拥有冶炼、铸造、锻造、热处理、焊接、金切加工、产品组装、产品包装、起重运输等各类主要生产设备4000余台。

坚持“质量就是生命”原则，在对标先进的基础上，提高质量意识，强化全面质量管理，推广应用可靠性管理、6 σ 管理等先进方法，打造太重精品，以质量提升企业核心竞争力。

TZCO has more than 4000 sets of major production equipment, such as equipment for smelting, casting, forging, heat treatment, welding, metal cutting and processing, product assembly, product packaging, lifting and transportation.

Bearing in mind “quality is life”, we are working to move towards high standards, improve quality awareness, strengthen comprehensive quality management, and apply advanced management like reliability management and 6 σ management. By doing that, we will produce quality products and enhance our core competitiveness.



天桥式数控镗铣机群
NC Machining Centers



数控成型磨齿机群
CNC Forming Gear Grinding Machine Group



ϕ 9m 滚齿机
 ϕ 9m Hobbing Machine



8X60m龙门镗铣床
8X60m Gantry Boring and Milling Machine



125MN自由锻造液压机
125MN Open Die Forging Hydraulic Press



120t LF+VD 钢包精炼炉
120t LF+VD Ladle Refining Furnace

METALLURGICAL EQUIPMENT

冶金领域

依托核心优势，领跑行业未来

RELYING ON THE CORE ADVANTAGES AND LEADING THE INDUSTRY

太重在冶金领域创造了卓越的业绩，同时为行业发展做出巨大贡献，荣获多个“中国之最”和“中国唯一”。

With remarkable achievements in metallurgy industry, TZCO has made great contributions to the industry development and won titles like the best manufacturer in the field.

可为用户提供从料场、炼焦、炼钢到轧钢的全流程工艺装备和运维服务。大型捣固及热回收焦炉机械、干熄焦提升机、300t以上冶金起重机、无缝管轧机、油膜轴承、200t以上大型转炉倾动装置在行业内具有绝对领先优势。

We provide customers with the whole set of equipment and services for operation and maintenance from stockyard, coking, steel making to steel rolling. Our company lead the industry in the fields like large tamping and heat recovery coke oven, coke dry quenching crane, metallurgical crane of more than 300t, seamless tube rolling mill, oil film bearing, large converter tilting device of more than 200t.

产品覆盖 Products

堆取料机

Stacker-reclaimer

焦炉机械及提升机

Coke oven machinery and CDQ crane

冶金起重设备

Metallurgical crane

转炉成套设备

Complete set of converter

无缝钢管成套设备

Seamless pipe equipment

棒线材成套设备

Complete set of bar and wire mill

板带轧机和精整设备

Strip rolling mill and processing facilities

板材矫正设备

Plate leveler

轧机油膜轴承

Oil film bearing

突出成就 REMARKABLE ACHIEVEMENTS

焦炉机械及提升机: COKE DRY QUENCHING CRANE

中国最全的焦炉“四车一机”制造商。

The most complete coke oven manufacturer in China.

冶金起重设备: METALLURGICAL LIFTING EQUIPMENT

中国最大的大型、特种起重运输设备研制基地。

The largest research base for large-scale and special crane transportation equipment in China.

转炉成套设备: A COMPLETE SET OF CONVERTER EQUIPMENT

大型转炉业绩最多的制造商。

The largest manufacturer of large converters.

无缝钢管成套设备: COMPLETE EQUIPMENT OF SEAMLESS STEEL PIPE

中国最大的钢管设备设计制造基地。

The largest design and manufacturing base for steel pipe equipment in China.

棒线材轧机: BAR AND WIRE MILL

中国历史最悠久的棒线材设备制造商。

The manufacturer for rod and wire equipment with the longest history in China.

板材矫正设备: PLATE LEVELER EQUIPMENT

专业设计研究，业绩最多制造商。

The largest manufacturer with dedicated D&R team and most supply references.

油膜轴承: OIL FILM BEARING

全面替代进口，最大的油膜轴承制造基地。

The largest oil film bearing manufacturing base.

起重机 Crane

产品概述 Specification

- 专业生产大、中、小全系列化起重设备。
- It produces series of large, medium and small lifting equipment.
- 可为用户提供：冶金铸造起重机、加料起重机、锻造起重机、淬火起重机、板坯夹钳起重机、电磁挂梁起重机等。
- The products include metallurgical teeming crane, charging crane, forging crane, quenching crane, slab tong crane, and electromagnetic beam crane.
- 设计制造32~550t系列铸造起重机，承担了国内冶金行业300t以上铸造起重机超80%的设计、制造任务。550t冶金铸造起重机的诞生，促进了转炉大容量的发展趋势，提高了冶金企业的生产效率。
- In addition to teeming cranes series from 32 ~ 550t, it has undertaken more than 80% of design and manufacturing of teeming cranes over 300t in China. The rollout of 550t metallurgical teeming crane has promoted the development of converter with large capacity and improved the production efficiency of metallurgical enterprises.
- 智能化铸造起重机实现了“有人值守，无人操作”，可一键完成整个工艺过程。
- Intelligent teeming crane realized "automatic operation with manned attendance", which can automatically complete the whole process.
- 太重主持起草50余项国家和行业起重机标准的制（修）订工作，公司产品的执行标准高于行业标准，可满足美国CMAA和AISE、欧洲FEM、日本JS、印度IS等技术标准。
- It has presided over the drafting of more than 50 national and industrial crane standards (revision), As it implements standards higher than the domestic standards, its products meet technical standards of others countries, like CMAA, AISE, FEM, JS and IS.

冶金起重机 Metallurgical Crane



520t 冶金铸造起重机
520t Teeming Crane

480t 冶金铸造起重机
480t Teeming Crane

技术参数 Technical Specification

YZS550+150/20t-27.8m铸造起重机 / YZS520/100t-21.4m铸造起重机 YZS550+150/20t-27.8m teeming crane / YZS520/100t-21.4m teeming crane

起重量 Lifting Capacity	主钩 Main Hook	t	550	520
	副钩 (1) Auxiliary Hook 1		150	100
	副钩 (2) Auxiliary Hook 2		20	
跨度 Span	S	m	27.8	21.4
起升高 度 Lifting Height	主钩 Main Hook	m	34	27.3
	副钩 (1) Auxiliary Hook 1		35.5	28.3
	副钩 (2) Auxiliary Hook 2		37	
工作级别 Duty			A8	A8
速度 Speed	主钩 Main Hook	m/ min	1 - 10/0.5 - 5	0.9 - 9
	副钩 (1) Auxiliary Hook 1		1.6 - 16	0.9 - 9
	副钩 (2) Auxiliary Hook 2		1.6 - 16	
	主小车运行 Main Cross Travelling		4 - 40	3 - 30
	副小车运行 Auxiliary Cross Travelling		4 - 40	3 - 30
	大车运行 Long Travelling		8 - 80	8 - 80
极限尺寸 Limit Dimension	钩间距 Hook Distance In Between	mm	6100	5800
	主钩左极限 Main Hook Left Approach		4200	3550
	主钩右极限 Main Hook Right Approach		3500	3500
	副钩 (1) 左极限 Auxiliary Hook 1 Left Approach		4000	2400
	副钩 (1) 右极限 Auxiliary Hook 2 Right Approach		2500	2200
	副钩 (2) 左极限 Auxiliary Hook 2 Left Approach		2000	
	副钩 (2) 右极限 Auxiliary Hook 2 Right Approach		4500	
	主钩上极限 Main Hook Upper Approach		6100	6500
	副钩 (1) 上极限 Auxiliary Hook 1 Upper Approach		2500	1500
	副钩 (2) 上极限 Auxiliary Hook 2 Upper Approach		1000	
主要尺寸 Main Dimension	整车高 Crane Height	mm	10500	9350
	司机室底部距离轨道面 The Distance Between L T Rail Top and Cabin Bottom		6190	5186
	缓冲器高度 The Height of The Buffer		1500	1100
	整车宽 Over Buffer Distance		25200	21800
	大车基距 Wheel Base		20000	16200
	主小车轨距 MCT Rail Distance		14600	12800
	端梁最外侧距离轨道中心 The Distance from the Rail Center to the End Girder Edge		750	900
最大轮压 Max. Wheel load	kN	760	595	
电机总功率 Total Motor Power	kW	2740	2382	
荐用钢轨 Crane Rail Recommended		KP140	QU120	
电源 Power supply		三相交流 3-Phase AC 50Hz 690V		

智能起重机 Intelligent Crane

太重致力于智能起重机的研究开发，主要包括：智能吊具、精准定位、视频监控及物项识别、数据挖掘与分析、远程控制等智能化系列技术，以高起点、高性能、高效率和高可靠性为前提，可实现复杂环境下自动运行、作业空间识别与路径优化、复杂装备全寿命周期管理等智能化功能，梅钢250t智能化铸造起重机、首钢迁安自动化仓储系统行车智能化水平位居行业前列，实际应用效果良好。

The company is committed to the research and development of intelligent crane. The research includes Intelligent lifting device, accurate positioning, video monitoring and items recognition, data mining and analysis, remote control and the other intelligent series of technology. With good performance, high efficiency and reliability, the crane can fulfill functions like operation under complicated environment, work space recognition, path optimization, intelligent management of total life cycle. The 250t teeming crane used by Meishan Iron and Steel Co.Ltd. and the automated storage crane used by Shougang Qian'an Iron and Steel Co.Ltd. Takes a lead in the industry for its smart and ideal application.



梅钢250t智能化铸造起重机
250t teeming crane used by Meishan Iron and Steel Co.,Ltd



首钢迁安自动化仓储系统行车
The automated storage crane used by Shougang Qian'an Iron and Steel Co.,Ltd

技术特点 Technical Characteristics

》》》 数字化全变频技术 (AFE) Digital Frequency Converter Technology (AFE)

采用全变频控制技术，可实现对电动机的平稳启制动和精准速度控制，极大地降低了机械冲击，提高了零部件使用寿命。配有回馈功能的AFE供电单元，可以将重物下放时的能量回馈电网，有效起到节能、环保的作用。The frequency converter control technology, which ensures stable starting and braking of the motor and the precise speed control, reduces the mechanical impact and improves the service life of the parts. AFE power supply unit equipped with feedback function can feed back the energy to the grid when heavy objects are lowered, which effectively achieves the goals of energy saving and environmental protection.

》》》 冗余网络安全 Redundant Network Security

具有冗余备份电控系统，在主系统故障的时候，可快速切换至备用系统，提高起重机的运行可靠性。The redundant backup electronic control system can quickly switch to the standby system when the main system fails. It improves operation reliability.

》》》 安全制动器控制技术 Emergency Brake Control Technology

起升机构设置安全制动器，控制系统对起升机构运行状态实时监测，在发生超速或传动链故障时，可迅速闭合安全制动器，防止负载坠落。Hydraulic Emergency brake is designed for wire rope drum of hoisting mechanism. The control system can monitor drum operation in real time. In case of over-speed or transmission chain failure, the safety brake can be closed quickly to prevent the load from slipping down.

》》》 平衡梁平稳度识别技术 Balance Beam Stable Identification Technology

通过传感器检测平衡梁水平状态，并进行动态调整，先进的控制算法，保证了平衡梁的动态稳定性和平稳度。Dynamic adjustment is made when the horizontal state of balance beam is detected by the sensor. The advanced control algorithm ensures the dynamic stability of the balance beam.

》》》 全数字化控制技术 Digital Control Technology

起重机具有自动运行、智能化远程运维等功能，可融入整个工厂智能化系统中。The crane has a variety of intelligent functions such as automatic and intelligent operation and maintenance, which can be integrated into the whole intelligent system of the factory.

通用起重机 Crane for General Purpose

双梁起重机，采用国际先进标准设计制造，额定起重量为3t~1300t。

Double girder EOT crane with a lifting capacity from 3t~ 1300t is designed and manufactured in line with the international advanced standard.



性能特点 Features

自重量轻、轮压小、限界尺寸小、性能可靠、操作方便的起重设备，是各种物料搬运场所优越的机型。

Thanks to light deadweight, small wheel pressure, small limit clearance, reliable performance and convenient operation, it is a ideal crane for various material handling fields.

轮压小、限界尺寸小，便可降低厂房等前期工程投资。

With small wheel load and limit clearance, it can reduce investment in early stage, like workshop.

产品性能可靠，经久耐用，使产品在后期使用过程中所需的附加费用降低。

Its reliable performance and durable quality will reduce additional costs.

单梁桥式起重机，额定起重量3.2t~16t。

Single beam bridge crane with lifting capacity from 3.2t ~ 16t.



性能特点 Features

广泛应用于机械制造、冶金、石油、石化、港口、铁路、民航、电力、食品、造纸、建材、电子等行业的车间、仓库等物料搬运场合。

It is widely used in various material handling situations like machinery manufacturing, metallurgy, petroleum, petrochemical, ports, railways, civil aviation, electric power, food industry, paper making, building materials and power industry.

具有刚性强、自重轻、结构设计出众、行走结构特点独特等优点，能有效地节约厂房空间和投资成本。

Single beam bridge crane ,with strong rigidity, light weight, outstanding structural design and unique travelling structure, can effectively save the workshop space and investment costs.

焦炉机械及焦炉工程 Coke Oven Machinery & Coking Project

产品概述 Specification

- 中国最大的大型焦炉设备设计制造企业之一，具备焦化工程总承包能力。

As one of the largest design & manufacture bases of coke oven machinery in China, it is capable of general contracting of coking project.

- 清洁型热回收焦炉涵盖2.8m、3.0m、3.6m。

Heat-recovery coke oven machinery covers the models of 2.8m, 3.0m and 3.6m.

- 捣固型焦炉成套设备涵盖4.3m、5.5m、6m、6.25m、6.78m。

Tamping coke oven machinery covers the models of 4.3m, 5.5m, 6m, 6.25m, 6.78m.

- 顶装型焦炉成套设备涵盖4.3m、6m、7m、7.3m、7.5m、7.63m、8m。

Top-charging coke oven machinery covers the models of 4.3m, 6m, 7m, 7.3m, 7.5m, 7.63m, 8m.

- 可为焦化厂提供干熄焦提升机，具有全自动运行、精确定位、能量回馈等特点。

It can provide coking plants with coke dry quenching cranes which feature automatic operation, accurate-positioning and energy-feedback.

- 焦炉设备“四车一机”智能化实现了“有人值守，无人操作”平稳运行。

The intelligent coke oven machinery has realized stable running of watch-over & unmanned-operation.

- 焦炉设备车载除尘系统实现了生产过程无可视烟尘逸散，技术达到国际先进水平。

The cutting-edge technology of dust-removal system has realized invisible-smoke emission during production.

太重主持（参与）起草11项焦炉机械行业标准的制（修）订工作，公司产品的执行标准高于行业标准，可满足俄罗斯、印度、马来西亚、印尼、越南等国家相关技术标准。

It has presided over (participated in) the draft and revision of 11 industrial standards concerning coke oven machinery. As it implements stricter standards than the domestic standards, its products meet technical requirements of other countries like Russia, India, Malaysia, Indonesia and Vietnam.

技术特点 Technical Characteristics

»»»» 安全性高 High Security

配备连锁控制系统，减少人工误操作引发的事故，安全性高；配备停电应急系统，避免停电等极端情况下设备的损坏；配备视频监控系统，便于操作人员观察生产环境，减少意外事故，保证人员安全。

Interlock control system is equipped to reduce accidents caused by mis-operation. Emergency power system is adopted to avoid power-cut damage. Video monitoring system is equipped to guarantee sufficient view and reduce accidents.

»»»» 质量可靠 Reliable Quality

采用先进的设计分析手段，优化产品设计，确保产品结构合理，使用寿命长；精选优质材料和知名品牌配套件，专业化制造和厂内总装调试，保证了产品质量。

Advanced design analysis methods are used to optimize product design and guarantee reasonable product structure and long service life; The high-quality materials and well-known brand bought out items are selected, the professional manufacturing and in-plant assembly and commissioning to ensure product quality.

»»»» 智能化控制 Intelligent Operation

配备炉号识别系统，车辆自动完成对位配合，无需人工确认；采用三级控制总线传输方式，安全可靠；采用远程监控控制系统，减少现场作业负担。实现了“有人值守、无人操作”智能化控制。

Oven number identification system is adopted to realize automatic positioning. Three-level bus control transmission mode is used to ensure reliable running. Remote monitoring system is adopted to reduce labor burden, which realize the intelligent control of "automatic operation with manned attendance".

»»»» 环保降耗 Eco-Friendly & Low Consumption

各环节、各设备配备防尘罩装置，将烟尘逸散降至最低，达到了环保要求；各类配套件选用低耗高效产品，减少能耗；配备余煤余焦回收装置，减少生产过程中的材料浪费。

Eco-friendly measures are taken to meet environment protection requirements. Low-consumption and high effective parts are used to reduce power consumption. De-dusting system helps reduce smoke emission. Coal & coke spillage recovery devices are equipped to reduce material wastes.

捣固焦炉设备 Tamping Coke Oven Machinery



6.78m捣固焦炉装煤车技术参数
Tamping Coke Oven Machinery (Parameters of 6.78m)

装煤重量 Coal-Loading Capacity	t	~ 57.08 (干基 Dry)
轨距 Gauge	m	14
装煤行程 Charging travel	m	21
速度 Speed	装煤速度 Charging	1.6 ~ 16
	大车运行 Travelling	m/min 8 ~ 80
	后挡板速度 Tail gate	20.3
对位精度 Positioning accuracy	mm	±5
最大外形尺寸 Max. overall dimension	长 L	33.1
	宽 W	17.3
	高 H	15.6
煤饼尺寸 Cake dimension	长 (底/顶) L(top/bottom)	mm 17800/17600
	宽 W	mm 500
	高 H	mm 6450
最大轮压 Max. Wheel load	kN	575
电机总功率 Total Motor Power	kW	966
荐用钢轨 Crane Rail Recommended		QU120
电源 Power Supply		三相交流 3-Phase A.C 50Hz 660V

顶装焦炉设备 Top-Charging Coke Oven Machinery



7.3m顶装焦炉推焦车技术参数
Top-charging Coke Oven Machinery (Parameters of 7.3m)

推焦重量 Pushing Capacity	t	40.7
轨距 Gauge	m	15
推焦行程 Pushing Travel	m	31
平煤行程 Leveling Travel	m	21
速度 Speed	推焦速度 Pushing	2.7 ~ 28
	大车运行 Travelling	m/min 0 ~ 75
	平煤速度 Leveling Travel	0 ~ 60
对位精度 Positioning accuracy	mm	±5
最大外形尺寸 Max. overall dimension	长 L	36
	宽 W	20
	高 H	20
最大轮压 Max. Wheel load	kN	560
电机总功率 Total Motor Power	kW	782
荐用钢轨 Crane Rail Recommended		QU120
电源 Power Supply		三相交流 3-Phase A.C 50Hz 660V

热回收焦炉设备 Heat-Recovery Coke Oven Machinery



3.6m热回收焦炉装煤推焦一体机技术参数
Heat-recovery Coke Oven Machinery (Parameters of 3.6m)

装煤重量 Coal Charging Capacity	t	68.9
推焦重量 Pushing Capacity	t	49.8
轨距 Gauge	m	13.6
装煤行程 Charging Travel	m	16.9
推焦行程 Pushing Travel	m	20.3
速度 Speed	装煤速度 Charging	0 ~ 18
	推焦速度 Pushing	0 ~ 27
	大车运行 Travelling	0 ~ 90
	后挡板速度 Tail Gate	20.3
对位精度 Positioning Accuracy	mm	±5
最大外形尺寸 Max. Overall Dimension	长 L	22
	宽 W	18.2
	高 H	8.6
煤饼尺寸 Cake Dimension	长 L	15200
	宽 W	3600
	高 G	1150
最大轮压 Max. Wheel load	kN	700
电机总功率 Total Motor Power	kW	1100
荐用钢轨 Crane Rail Recommended		QU120
电源 Power Supply		三相交流 3-Phase A.C 50Hz 380V



干熄焦提升机
Coke Dry Quenching Crane

技术参数
Technical Specification

起重量 Lifting Capacity	主钩 Hook	t	66	90	132
跨度 Span	S	m	13	16	16
起升高度 Lifting Height		m	40.2	43.99	36.95
工作制度 Duty			A8	A8	A8
速度 Speed	主钩 Hook	m/min	27/10/5	25/10/4	30/10/4
	大车运行 Travelling		3.5 ~ 40	4 ~ 40	3.5 ~ 40
停止精度 Operation stop precision	起升 Lifting		±45	±45	±45
	运行 Travelling		±20	±20	±20
主要尺寸 Main Dimension	H0	mm	1200	1200	1200
	H1		8350	8450	8650
	H2		2907	1110	/
	H3		10680	10625	12710
	H4		2080	870	1460
	B1		5860	5298	6050
	B2		6700	6612	7550
	B3		11100	12800	12800
	B4		8180	8190	10000
B5	7480	7290	8600		
W	7550	6500	9500		
最大轮压 Max. Wheel loading		kN	360	480	550
电机总功率 Total Motor Power		kW	574	838.6	1504.6
荐用钢轨 Crane Rail Recommended			QU120 三相交流 3-Phase A.C 50Hz 380V	QU120 三相交流 3-Phase A.C 50Hz 380V	QU120 三相交流 3-Phase A.C 50Hz 660V
电源 Power Supply					

转炉成套设备 Complete Set of Converters

产品概述 Specification

太重具备30-350t转炉成套设备的设计制造能力，大吨位倾动装置完全替代进口，200t及以上转炉设备市场占有率高，承制的宝钢湛江基地350t转炉为国内最大。

In addition to designing and manufacturing complete set of converters (30t to 350t), TZCO has occupied the domestic market of converters over 200t. The 350t converter we supplied to Baoshan Iron & Steel Co., Ltd. for its Zhanjiang Project is the biggest converter in China.

太重参与起草3项国家和行业转炉设备标准的制(修)订工作，公司产品执行标准高于行业标准。

TZCO has participated in drafting and revising three national and industrial standards concerning converters. It has been implementing stricter standards than domestic standards.

性能特点 Features

丰富的转炉设备设计制造经验 Rich Experience

太重具有丰富的转炉设备的设计、制造经验，可以根据用户的各种炉型、不同吊挂装置等要求，结合公司多年设计、制造转炉设备的实际经验，进行不同容量、不同结构的转炉成套设备的设计与制造。

With rich experience in designing and manufacturing complete set of converters, we supply the custom with tailored converters in accordance with their requirements of vessel type, suspension method, converter capacity and structure.

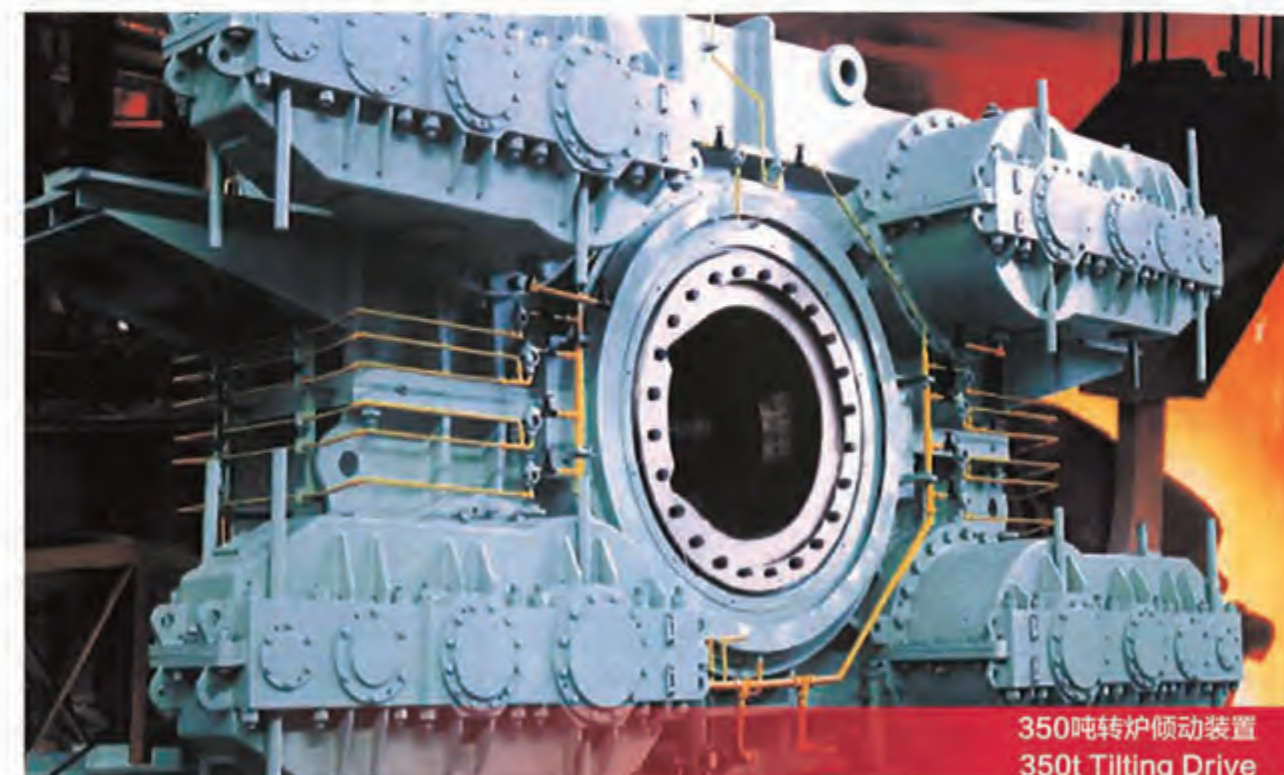
高可靠性 High Reliability

具有承载能力高、使用寿命长、运转平稳、结构紧凑、高可靠性等特点。

Converters feature high load capacity, long lifetime, stable operation, compact structure and high reliability.



韩国现代320吨转炉倾动装置
320t Tilting Drive in HYUNDAI Steel, Korea



350吨转炉倾动装置
350t Tilting Drive

倾动装置技术参数 Technical Specification for Tilting Drives

出钢量 (t) Tapping Capacity	最大倾动力矩 (kN.m) Maximum Tilting Torque	输出转速 (r/min) Output Speed	电机功率 (kW) Motor Power
80-130	3100	1.3-1.5	132/160
130-160	3600	1.3-1.5	160/200
160-200	4200	1.3-1.5	200/220
200-250	5600	1.3-1.5	250/300
250-350	6500	1.3-1.5	400

转炉本体技术参数 Technical Specification for Vessel

出钢量 (t) Tapping Capacity	炉体直径 (mm) Vessel DIA	炉体高度 (mm) Vessel Height	吊挂形式 Suspension Method
80-130	Φ5530-Φ6740	7590-9000	三点球铰 / 五连杆下悬挂 Three Points Spherical Hinge/ Five Connecting Rods Lower Suspension
130-160	Φ6740-Φ7140	9050-9160	三点球铰 / 五连杆下悬挂 Three Points Spherical Hinge/ Five Connecting Rods Lower Suspension
160-200	Φ7300-Φ7420	9350-10350	五连杆下悬挂 Five Connecting Rods Lower Suspension
200-250	Φ7860-Φ8160	10300-10560	五连杆下悬挂 Five Connecting Rods Lower Suspension
250-350	Φ8480-Φ8770	11200-12100	五连杆下悬挂 / 两点支撑 (宝钢) Five Connecting Rods Lower Suspension/ Two Points Support (BaoSteel)

无缝钢管成套设备 Seamless Pipe Plants

产品概述 Specification

中国最大的钢管设备设计制造基地。

We are the largest supplier for the design and manufacturing of various pipe mills in China.

设计制造的具有自主知识产权三辊连轧、ASSEL、ACCU-ROLL、斜轧扩管无缝钢管成套设备。产品规格为直径 Φ 48.3~1200mm、壁厚4.83~100mm的各种钢级，涵盖了油井管、管线管、能源用管、高压锅炉管、核电用管的使用范围。

We have designed and manufactured various seamless pipe mills with proprietary intellectual property rights involving Three-roll type continuous rolling mill (TCM) line, Assel mill line, Accu-roll mill line, Cross-rolling expander line. The pipe size covers the range from OD48.3 to 1200mm, WT4.83 to 100mm. Such pipes are widely used for tubing pipes, casing pipes, line pipes, pipes for energy, pipes for high pressure boiler and pipes for nuclear power.

太重主持（参与）起草11项无缝钢管设备行业标准的制（修）订工作，公司产品的执行标准高于行业标准，可满足国际ISO、欧洲EN、德国DIN和SN200、美国ASTM、俄罗斯GOST、日本JIS等技术标准。

TZCO has presided over (participated in) drafting and revising of 11 industrial standards regarding seamless pipe production equipment. The implemented standards of TZCO products are not only higher than the industrial standards in China, but also conform to ISO, EN, DIN and SN200, ASTM, GOST, JIS and other technical standards.

技术特点 Technical Characteristics

高精度的辊缝控制技术 High-accuracy Roll Gap Control Technology

自主开发出的液压小舱和辊缝控制技术，打破了国外的技术封锁，实现如下功能：按预设值自动对辊定位，补偿轧制过程中由钢管冲击引起的峰值压力，补偿轧管过程中轧辊机架的变形，对实际轧制压力进行控制等。

Hydraulic capsule and roll gap control technology independently developed by TZCO have broken the technological blockade of other countries. Such technology is capable of positioning work rolls automatically as per preset values, compensating the peak force due to the impact of pipes and the deformation of work rolls during rolling, and controlling actual rolling force etc.

独创的计算模型和数据库 Unique Calculation Model and Database

机组轧制工艺技术结合了三辊连轧管机轧制理论计算和国内同类设备实际轧制经验，形成了太重独创的计算模型和数据库，轧制影响因子分析更精准、轧制钢管精度更高。

TZCO has developed its own calculation model and database based on theoretical calculation of three-roll continuous tube mill and actual rolling experience of the same type of mills. The analysis on the factors affecting the rolling are more precise and the pipe tolerance is closer.

高变形抗力的穿孔技术 Piercing Technology with High Deformation Resistance

采用锥型辊穿孔，可穿薄壁和高合金钢难变形毛管，具有穿孔效率高、可实现大延伸、大扩径量穿孔、工具消耗少等特点。

Our cone type piercing mill is capable of piercing thin-walled pipes and high alloy difficult-to-deform pipes. Such piercing mill features high piercing efficiency, big elongation and diameter expansion, and less tool consumption.



Φ180mm三辊连轧管机组
Φ180mm TCM Line



Φ325mm Assel 轧管机组
Φ325mm Assel Mill

连轧管机组

TCM line

机组型号 Model	直径 (mm) Outside diameter	壁厚 (mm) Wall thickness	产能 (吨/年) Capacity (t/y)
Φ89	25 ~ 89	2.5 ~ 12	150000
Φ180	48 ~ 180	4 ~ 25	350000
Φ273	114 ~ 273	4 ~ 40	450000
Φ356	140 ~ 355	5 ~ 40	500000
Φ460	180 ~ 457	5.2 ~ 55	600000

大口径无缝钢管生产成套设备

Large-diameter seamless pipe mills

机组型号 Model	直径 (mm) Outside diameter	壁厚 (mm) Wall thickness	产能 (吨/年) Capacity (t/y)
热轧 Φ720 Hot mill Φ720	273 ~ 720	10 ~ 120	150000
冷轧 Φ120 Cold mill Φ120	80 ~ 120	1.4 ~ 16	2000
冷轧 Φ150 Cold mill Φ150	100 ~ 150	3 ~ 18	2500
冷轧 Φ200 Cold mill Φ200	140 ~ 219	3.5 ~ 22	3000
冷轧 Φ450 Cold mill Φ450	219 ~ 450	5 ~ 40	6000
冷轧 Φ530 Cold mill Φ530	325 ~ 530	6 ~ 50	8000
冷轧 Φ720 Cold mill Φ720	406 ~ 711	15 ~ 65	12000

Accu-Roll 热轧机组

Accu-roll mill line

机组型号 Model	直径 (mm) Outside diameter	壁厚 (mm) Wall thickness	产能 (吨/年) Capacity (t/y)
Φ140	73 ~ 140	4.5 ~ 15	120000
Φ219	80 ~ 219	4.5 ~ 40	180000
Φ273	140 ~ 273	5 ~ 40	220000
Φ340	180 ~ 340	5 ~ 45	280000

Assel 轧管机组

Assel mill line

机组型号 Model	直径 (mm) Outside diameter	壁厚 (mm) Wall thickness	产能 (吨/年) Capacity (t/y)
Φ108	60 ~ 108	6 ~ 20	100000
Φ140	80 ~ 140	8 ~ 25	150000
Φ219	114 ~ 219	10 ~ 35	200000
Φ273	140 ~ 273	12 ~ 40	250000
Φ340	180 ~ 350	12 ~ 60	300000
Φ460	219 ~ 490	19 ~ 70	400000

板材矫正设备 Plate Levelers

产品概述 Specification

矫正机从五辊到二十三辊，矫平厚度从0.5-100mm，矫正宽度可达5500mm，已发展成为系列产品。公司自主研发的九辊和十一辊热态中厚板矫正机，矫平厚度达100mm，宽度达5500mm，在同类产品中居世界先进水平。

Our plate levelers cover the types from 5-roll to 23-roll. The plate thickness is from 0.5 to 100mm. Leveling width can reach 5500mm. Such levelers have become our series products. 9-roll and 11-roll levelers for hot medium and thick plate developed by TZCO with the leveling thickness up to 100mm and the width up to 5500mm, are at the leading position all over the globe.

太重主持起草了2项板材矫正机行业标准的制(修)订工作，公司产品的执行标准高于行业标准，可满足国际ISO、欧洲EN、德国DIN和SN200等技术标准。

TZCO has presided over (participates in) drafting (revision) of two standards for plate leveler. As it implements stricter standards than the domestic standards, its products meet ISO, EN, DIN, SN200 and other technical standards.

技术特点 Technical Characteristics

专业化程度高 Professional Manufacturer

具有专业的设计团队和专业制造能力

It has dedicated design team and professional manufacturing capabilities.

制造业绩多 Many References

已生产板材矫正机500余台,是国内生产业绩最多的企业。其中:生产中厚板冷、热、预矫设备约80台。

It is the enterprise with the largest output of plate levelers. It has manufactured over 500 sets of plate levelers, which accounts for the largest domestic market share. The number of hot levelers, cold levelers and pre-levelers for medium and thick plates are up to 80 sets.

自动化水平高 High Automation Level

配备一流的电气自动化系统,过程控制系统先进,人机交互界面友好,为用户带来极大的便利。

The machine is equipped with state-of-the-art electrical automation system. Advanced process control system and user-friendly interface offer great convenience for customers.

产品质量有保证 Reliable Product Quality

具有50余年的生产历史,二十一辊、十七辊板材矫正机获国家优质产品银质奖和金质奖,产品质量有保证。

We have designed and manufactured plate levelers for more than 50 years. Gold award and silver award have been granted for 21-roll and 17-roll plate levelers. Quality of TZCO products are guaranteed.

板带轧机和精整设备 Strip Rolling Mills and Processing Facilities

产品概述 Specification

可设计制造连续式酸洗机组、热处理线、可逆冷轧机组、冷连轧机组、平整机组、重卷机组、镀锌机组、彩涂机组、翻卷机组、打包机组等。

We are capable of designing and manufacturing continuous pickling line, heat treatment line, reversible cold rolling mill, tandem cold rolling mill, skin pass mill, re-coiler, galvanizing line, color coating line, coil turning line, and packing line.

技术特点 Technical Characteristics

》》》 高端的核心技术 Advanced Technology

通过合作研制了世界顶级的18辊不锈钢RAP300机组，掌握了18辊轧机机组的核心设计与制造方法。

We have manufactured the most advanced 18-high RAP300 rolling line for stainless steel through cooperation. We have mastered the core design and manufacturing of 18-high rolling mills.

》》》 更高的性价比 Better Cost-performance Ratio

自主研发的轧机核心抱臂系统相比进口产品，成本下降40%，供货周期缩短50%。

The cost of core parts of the rolling mill are 40% less than imported products and the delivery period is reduced by half.

》》》 更严格的质量要求 Strict Quality Requirements

板带处理机组，吸取并沿用着国外先进的设计研发经验与严格的质量检验规程，现场一次成功过钢率高达97%，具有更强的市场竞争力。

Thanks to the state-of-the-art of design experience and strict quality inspection regulations the success rate of one-time rolling at site is up to 97%. Our products are more competitive in the market.



板带冷轧机组
Strip Cold Rolling Mill



5米热矫正机
5m Hot Leveler

技术参数 Technical Specification

机型 Model	规格 (mm) Size (mm) (辊数-辊径/辊距-设备规格) (No. of rolls-Roll dia./Roll gap-Machine size)	最大矫正力 (kN) Max. leveling force (kN)	矫正速度 (m/s) Leveling speed (m/s)	矫正最大板材规格 (宽*厚, mm) Max plate size (width * thickness, mm)
预矫直机 Pre-levelers	5-500/550-4500	25000	0 - 1.5/2.5	4200*(6 - 60)
	7-320/360-3000	30000	0 - 1.5/2.0	2500*(10 - 60)
	7-360/380-4500	34000	0 - 1.5/2.5	4100*(6 - 100)
热矫直机 Hot levelers	11-300/325-3300	25000	0.5 - 1.5	3100*(6 - 50)
	11-285/320-4500	30000	0 - 1.5/2.5	3300*(6 - 60)
	9-360/400-4300	33000	0 - 1.5/2	4100*(12 - 80)
冷矫直机 Cold levelers	11-285/320-3500	44000	0 - 1.2/1.5	3250*(8 - 100)
	9-360/400-4300	54000	0 - 1/1.8	4200*(6 - 50)
热处理矫直机 Heat-treatment levelers	11-285/300-3500	30000	0 - 1/1.5	4180*(6 - 60)
	11-285/320-5000	35000	0 - 1/1.5	4650*(8 - 60)

技术参数 Technical Specification

序号 Sr.No	设备名称 Equipment name	产品规格 (板厚 宽度) Strip size (strip thickness and width)
1	六辊五机架酸洗连轧机组 Six-high five-stand pickling & continuous rolling mill	$\delta=0.3-2.5\text{mm}$ B=900-1880mm $\delta=0.3-1\text{mm}$ B=1300mm
2	2650 铝板 1+5 热连轧机组 1+5 hot continuous rolling mill for 2650mm aluminum strip	$\delta=2-12\text{mm}$ B=1000-2250mm
3	单机架六辊可逆轧机 Six-high single-stand reversible rolling mill	$\delta=0.14-1.8\text{mm}$ B=750-1250mm
4	十八辊五机架冷连轧机组 18-high 5-stand cold continuous rolling mill	$\delta=0.6-2\text{mm}$ B=1040-1650mm
5	六辊五机架冷连轧机组 Six-high five-stand tandem cold mill	$\delta=0.6-2\text{mm}$ B=1040-1650mm
6	HZ 轧机组 HZ rolling mill	$\delta=0.25-1\text{mm}$ B=1300mm
7	四机架六辊冷连轧机组 Six-high four-stand tandem cold mill	$\delta=0.3-3\text{mm}$ B=1620mm
8	酸洗机组 Pickling line	$\delta=1.8-3.5\text{mm}$ B=1300mm $\delta=0.25-2\text{mm}$ B=1850mm $\delta=0.3-3\text{mm}$ B=1620mm
9	带钢退火酸洗线 Annealing & pickling line	$\delta=2-14\text{mm}$ B=1250-2100mm
10	连退机组 Continuous annealing line	$\delta=0.3-3\text{mm}$ B=1030-1880mm $\delta=0.15-0.55\text{mm}$ B=1300mm
11	热镀锌机组 Hot galvanizing line	$\delta=0.40-1.60\text{mm}$ B=900-1880mm $\delta=0.4-2.5\text{mm}$ B=800-1870mm $\delta=0.3-2.5\text{mm}$ B=2080mm
12	彩色涂层机组 Color coating line	$\delta=0.3-2.5\text{mm}$ B=2080mm
13	平整机组 Skin pass mill	$\delta=1.2-6.5\text{mm}$ B=900-2100mm $\delta=1.2-6.5\text{mm}$ B=600-1300mm $\delta=0.8-6.5\text{mm}$ B=600-850mm
14	重卷机组 Re-coiler	$\delta=0.25-3\text{mm}$ B=1620mm
15	打包机组 Packing line	$\delta=0.25-3\text{mm}$ B=1660mm

棒线材成套设备 Bar and Wire Mill

产品概述 Specification

太重致力于棒线生产线、型钢生产线等项目的成套解决方案，可以实现工厂设计、工艺设计、设备设计制造、现场安装调试和试生产为一体的交钥匙工程。

We are dedicated in EPC projects for bar mills and section mills. We are capable of undertaking the turnkey projects covering factory design, process design, equipment design and manufacturing, site erection and commissioning and trial run.

太重参与起草2项棒线材轧机行业标准的制(修)订工作，公司产品的执行标准高于行业标准，可满足国际ISO、欧洲EN、德国标准DIN和SN200、日本JIS等技术标准。

TZCO participates in formulation (revision) of two industrial standards of bar and wire mills. As TZCO has implemented higher standard than domestic standards, its products meet technical requirements of ISO, EN, DIN, SN200, JIS and other technical standards.



140万吨/年棒材生产线
1400000t/y bar mill



短应力轧机
Short stress rolling mill



闭口牌坊轧机
Rolling mill with closed mill housing

油膜轴承 Oil Film Bearing

产品概述 Technical Specification

中国唯一能够集研究开发、设计制造、营销服务为一体的油膜轴承专业化企业。产品规格涵盖 $\Phi 160 \sim 2000\text{mm}$ ，五十余种动压、静-动压油膜轴承。累计为板材热轧机组、冷轧机组、中厚板轧机和高速线材轧机设计制造了数万套油膜轴承。

It is the only professional oil film bearing enterprise in China integrating research and development, design and manufacture, production and sales, and consulting services. Products include $\Phi 160 \sim 2000\text{mm}$ bearings, and more than 50 kinds of dynamic pressure, static - dynamic pressure oil film bearings. We have designed and manufactured tens of thousands of sets of hot rolling mills, cold rolling mills, medium plate mills and high-speed wire mills.

太重是JB/T9409—2007 轧辊油膜轴承标准的主要起草者。

TZCO is the main setter of oil film bearing standard of JB/T9409-2007.

技术特点 Technical Characteristics

»»» 高端的核心技术 Advanced Technology

油膜轴承具有承载能力大、使用寿命长、结构尺寸小、速度范围宽、抗冲击能力强、抗污染能力强等特点。技术和产品质量达到了国际先进水平。

Oil film bearing has the characteristics of large bearing capacity, long service life, small structure size, wide speed range, strong impact resistance and strong anti-pollution ability. Its technology and product quality have been among the best worldwide.

»»» 制造精度高 Manufacturing Accuracy

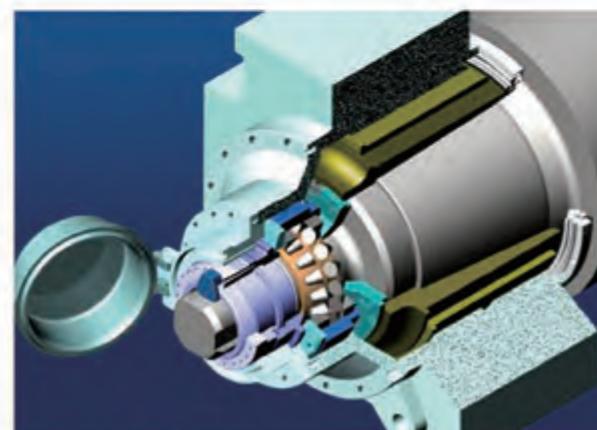
采用先进的制造工艺，配备专用的加工设备，形成了专业化的油膜轴承制造基地，产品精度达到 μ 级。

TZCO is a specialized manufacturer for oil-film bearings with advanced technologies and processing equipment, Its product precision reaches to the μ level.

»»» 产品覆盖范围广 Wide Product Coverage

产品规格涵盖 $\Phi 160 \sim 2000\text{mm}$ ，各种结构可按照要求进行互换组合，可以为所有世界现存的各种轧机配套、设计、制造油膜轴承。

Serving range covered $\Phi 160 \sim 2000\text{mm}$, Interchangeable parts can be assembled according to requirements. Oil film bearings can fit various kinds of rolling mills in the world.



油膜轴承结构示意图
Structural Diagram



板带轧机油膜轴承
Oil Film Bearing for Strip Mill



专业的油膜轴承车间
Professional Plants

无键轴承系列尺寸及承载能力 Dimension and Load Capacity of WJ Series

序号 No.	轴承规格 Specification	轴 承 长径比 Diameter Ratio	载 荷 (kN) Rated Load	L1 (mm)	Hy		Hd (mm)	B _{min} (mm)	D1 (mm)	H1 (mm)	B1 (mm)	D2 (mm)	D3 _{min} (mm)	备注 Remarks
					(mm)									
1	785	67	10210	370	600	645	1065	845	510	800	705	1000	40°	
		75	11430	400	630	670								
		84	12790	435	660	700								
2	825	67	11260	390	630	675	1115	885	535	800	740	1050	42°	
		75	12600	425	660	705								
		84	14110	460	690	735								
3	865	67	12360	400	660	710	1170	930	560	850	775	1090	44°	
		75	13830	435	690	740								
		84	15490	475	725	770								
4	905	67	13510	425	690	740	1220	970	585	900	810	1150	46°	
		75	15110	460	720	770								
		84	16930	500	760	805								
5	945	67	14700	435	725	775	1270	1015	610	950	850	1180	48°	
		75	16460	470	755	805								
		84	18430	515	790	840								
6	985	67	15960	450	755	810	1320	1060	635	1000	885	1230	50°	
		75	17860	490	790	840								
		84	20000	535	825	880								
7	1025	67	17250	470	780	835	1370	1095	660	1050	920	1260	52°	
		75	19310	510	815	870								
		84	21640	555	855	910								
8	1065	67	18610	485	815	870	1420	1140	685	1100	955	1290	54°	
		75	20830	530	850	905								
		84	23330	575	890	945								
9	1115	67	20430	505	855	910	1475	1195	710	1150	1015	1350	56°	
		75	22860	550	890	950								
		84	25610	600	930	995								
10	1195	67	23450	525	910	975	1570	1275	760	1200	1095	1440	60°	
		75	26250	570	950	1015								
		84	29410	625	955	1060								
11	1270	67	26680	555	985	1065	1675	1360	810	1350	1170	1520	64°	
		75	29870	605	1035	1110								
		84	33460	660	1090	1160								
12	1340	67	29710	575	1045	1125	1775	1440	865	1450	1245	1640	68°	
		75	33260	630	1095	1175								
		84	37250	690	1155	1225								
13	1450	67	34540	610	1125	1210	1910	1550	915	1550	1340	1740	72°	
		75	38670	670	1180	1265								
		84	43310	740	1240	1325								
14	1560	67	39980	650	1210	1305	2040	1670	965	1650	1440	1860	76°	
		75	44750	715	1270	1360								
		84	50220	780	1335	1425								
15	1670	67	45820	685	1305	1405	2180	1800	1015	1750	1540	2000	80°	
		75	51290	755	1365	1465								
		84	57440	830	1435	1530								
16	1720	67	48510	700	1345	1445	2230	1850	1040	1800	1590	2050	82°	
		75	54410	775	1405	1505								
		84	61160	850	1480	1575								
17	1760	67	50930	715	1380	1480	2290	1890		1850	1630	2100	84°	
		75	56970	785	1440	1540								
		84	63880	865	1520	1610								

无键薄壁轴承系列尺寸及承载能力 Dimension and Load Capacity of WJB Series

序号 No.	轴承规格 Specification	轴 承 长径比 Diameter Ratio	载 荷 (kN) Rated Load	L1 (mm)	Hy		Hd (mm)	B _{min} (mm)	D1 (mm)	H1 (mm)	B1 (mm)	D2 (mm)	D3 _{min} (mm)	备注 Remarks
					(mm)									
1	805	66	11750	395	605	665	1090	860	515	860	755	1020	40°	
		76	13530	435	650	700								
		86	15310	475	690	740								
2	840	66	12790	405	635	695	1130	900	540	900	790	1060	42°	
		76	14730	450	680	735								
		86	16670	490	720	770								
3	875	66	13880	420	665	725	1180	940	560	945	825	1110	44°	
		76	15980	460	710	765								
		86	18090	505	750	805								
4	920	66	15340	435	695	760	1235	985	590	1000	870	1160	46°	
		76	17670	480	745	805								
		86	19990	525	790	845								
5	955	66	16530	445	725	790	1280	1025	610	1040	900	1190	48°	
		76	19040	490	775	835								
		86	21540	540	820	875								
6	990	66	17770	455	750	820	1320	1060	635	1080	935	1230	50°	
		76	20460	505	800	865								
		86	23150	555	850	910								
7	1030	66	19230	470	780	855	1370	1105	660	1120	970	1260	52°	
		76	22150	520	835	900								
		86	25060	570	885	945								
8	1090	66	21540	490	830	905	1445	1170	700	1195	1035	1330	54°	
		76	24800	545	885	950								
		86	28070	600	935	1000								
9	1130	66	23150	505	855	935	1500	1210	720	1240	1070	1370	56°	
		76	26660	565	915	985								
		86	30160	620	970	1035								
10	1170	66	24820	520	890	970	1545	1255	745	1285	1110	1410	58°	
		76	28580	580	950	1025								
		86	32340	635	1010	1075								
11	1250	66	28330	545	960	1060	1645	1340	795	1375	1185	1490	62°	
		76	32620	610	1025	1120								
		86	36910	670	1095	1180								
12	1320	66	31590	575	1015	1120	1740	1415	840	1460	1255	1580	66°	
		76	36370	640	1085	1185								
		86	41160	710	1155	1245								
13	1420	66	36560	610	1090	1205	1860	1520	905	1575	1350	1690	70°	
		76	42090	680	1165	1270								
		86	47630	750	1245	1340								
14	1520	66	41890	645	1170	1290	1990	1630	970	1690	1450	1800	74°	
		76	48230	720	1250	1365								
		86	54580	800	1330	1435								
15	1620	66	47580	680	1245	1375	2120	1735	1030	1810	1550	1920	78°	
		76	54790	760	1335	1455								
		86	61990	840	1420	1530								
16	1670	66	50560	695	1285	1420	2180	1790	1065	1870	1600	1980	80°	
		76	58220	780	1375	1500								
		86	65880	860	1465	1580								