

TBM DISC CUTTER



葫芦岛力天重工机械有限公司
Litian Heavy Industry Machinery Co.,Ltd



About us

Litian Heavy Industry Machinery Co., Ltd

Litian Heavy Industry focuses on the development and production of rock breaking tools and drilling tools suitable for rock excavation and mining. Through continuous research and development in key areas such as materials, heat treatment, design and manufacturing processes, and a large number of on-site tests and improvements under various rock conditions, Litian products are being widely recognized by more and more users, and become the first choice for users to deal with various complex rock excavation and mineral extraction.

We also work closely with users to select or design the most suitable products and solutions according to each user's construction conditions, equipment and excavation methods, and provide full-customized services to help users improve rock breaking efficiency, reduce the cost of comprehensive rock breaking, and become a trusted partner for users. We focus on the following areas:

★ **TBM cutting tools and services:** suitable for TBM and shield construction of various tunnels and underground projects. Litian Heavy Industry is the largest supplier of TBM hard rock cutting tools, and an expert in TBM rock excavation.

★ **Mining and engineering drilling tools and services:** suitable for various open and underground rock mine excavation and drilling construction. Litian provides world-class drilling tools and services, and be with the best comprehensive cost performance.



TBM Hard Rock Excavation Expert

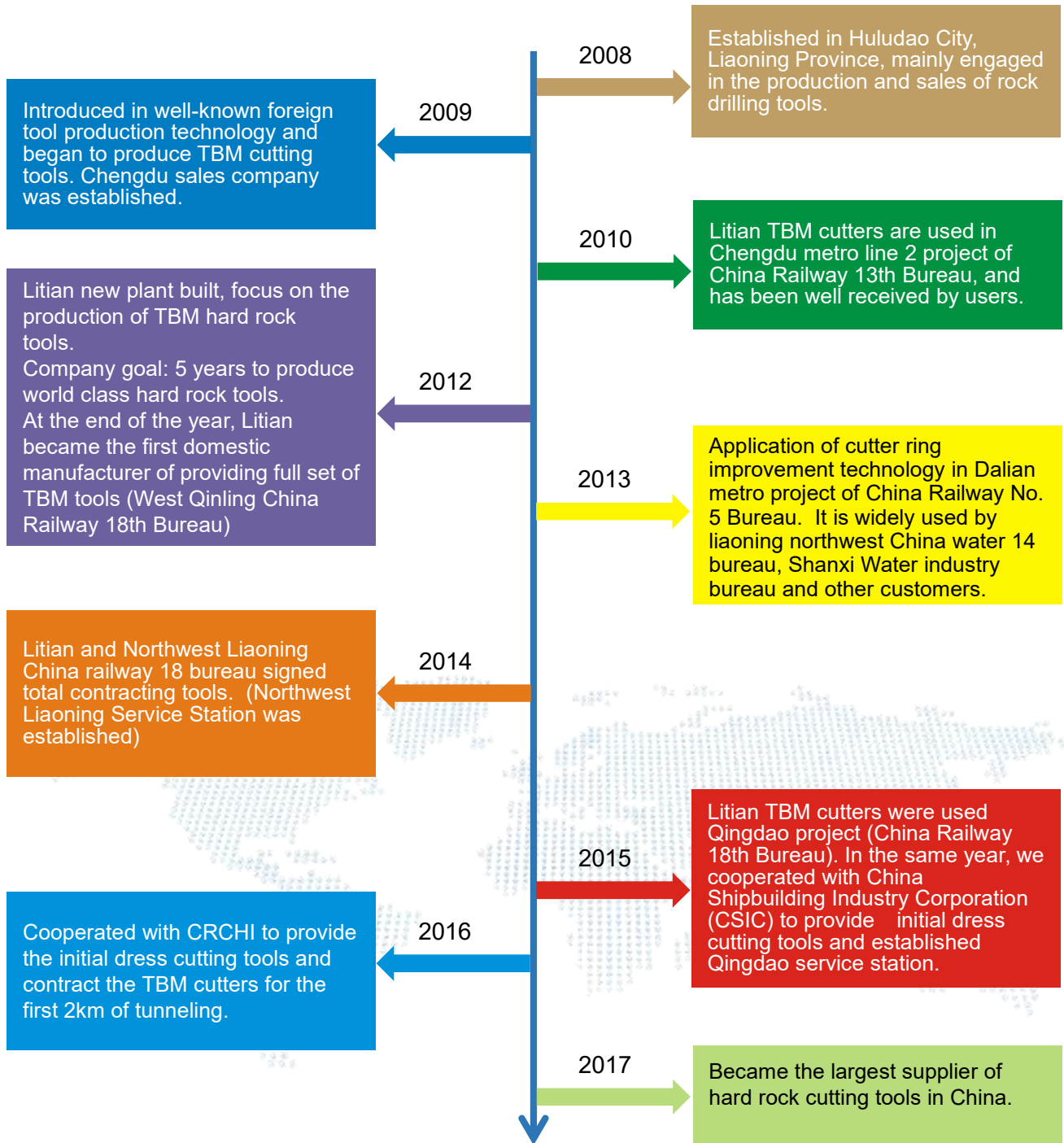
Litian has invested lots of financial resources and energy in the research and development of TBM hard rock cutting tools and solutions suitable for various rock working conditions. Litian continues to conduct research and development in key construction areas such as materials, heat treatment, manufacturing processes, and constantly optimizes the tool design to improve its efficiency in cutting rocks. At the same time, a large number of on-site tests and improvements have been carried out on various TBM equipment under complex rock conditions.

Our TBM cutters are increasingly recognized as the best choice for hard and complex rock excavation. At the same time, we work closely with users to help them improve the efficiency of driving, reduce the cost of comprehensive driving, and become a reliable partner of users.

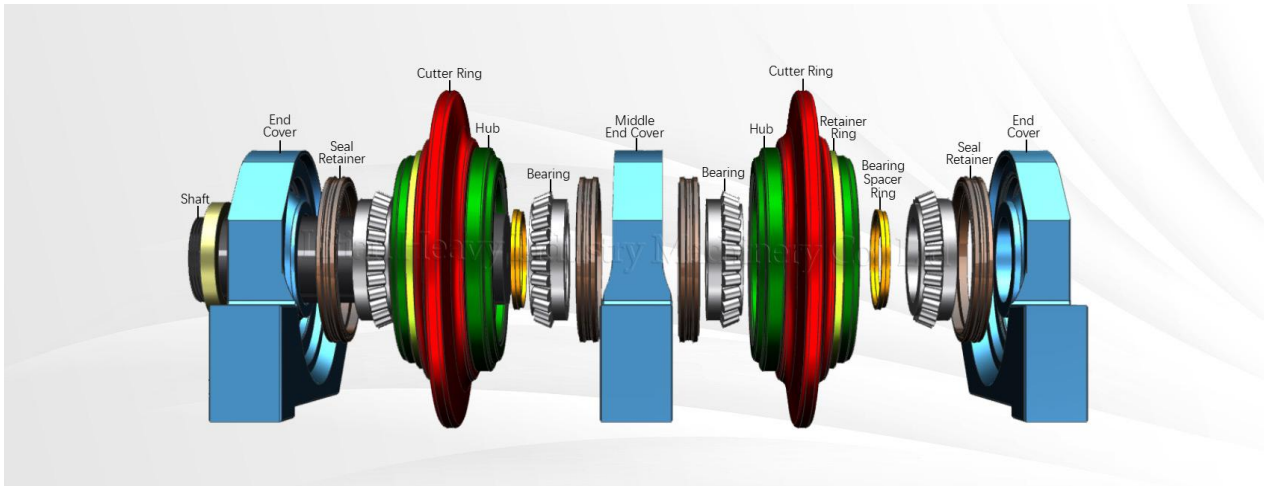
We are the largest supplier of TBM disc cutters in China.



Litian TBM cutter development history:



Litian TBM cutter Advantages



- Litian is committed to reducing customer procurement and operating costs, and helping customers improve tunnel boring machine tunneling efficiency. Litian cutting tools reduce the number of tool changes when driving under the same working conditions, increase the effective driving time, and the price is about 30% lower than foreign equivalent products. The tool life is equivalent to that of foreign manufacturers, and even exceeds some foreign manufacturers. Litian can quickly deliver the goods to customers according to customer needs. Once a customer needed the disc cutters urgently, Litian produced 40 disc cutters and delivered them to the site within 2 weeks.
- Litian has obtained 16 national patents. According to different models and different rock working conditions, the specifications and parameters of the disc cutter can be designed and adjusted to best suit the customer's site construction requirements. The material of the cutter ring is imported special steel, and the unique heat treatment process corresponding to the material is adopted, which can satisfy the unification of wear resistance and toughness, and improve the service life of the cutter ring. The bearing ring adopts two kinds of plastic and rigid to adapt to different equipment and surrounding rock conditions, to maximize the service life of the bearing and reduce the cost.
- Litian has professional application experts and service teams to select the most suitable tools for the working conditions of customers, and provide cutting tool management training and adjustment, replacement, reconditioning, maintenance and other aspects of guidance. Litian can also provide customers with a full range of cutting tool accessories, maintenance tools and workshops.
- Litian has experienced disc cutter assembly, debugging, inspection team and professional after-sales team, and has the ability and experience to provide customers with a full range of services in the way of excavation quantity contracting. While helping users to significantly reduce the comprehensive tunneling cost, it also significantly improves the tunneling efficiency.



Your tunneling partner

Litian Service Solutions



TBM cutter service and training

■ We can optimize the cutter design according to the user's construction surrounding rock conditions and the equipment used, so that the user can achieve the fastest driving speed at a lower overall cost.

■ We can provide users with a series of work or training such as cutting tool inspection, configuration, replacement, repair, etc.

■ We can provide various ways of communication and training on TBM cutting tool preparation and service.

TBM excavation contracting

■ We can use the method of TBM excavation volume contracting to help users reduce the overall cost of tunneling while significantly improving the efficiency of tunneling.

■ We can dispatch experienced TBM product application experts and professional TBM tool site preparation team to escort your TBM efficient excavation.

TBM Cutter onsite workshop



Set up cutting tool workstation on the construction site

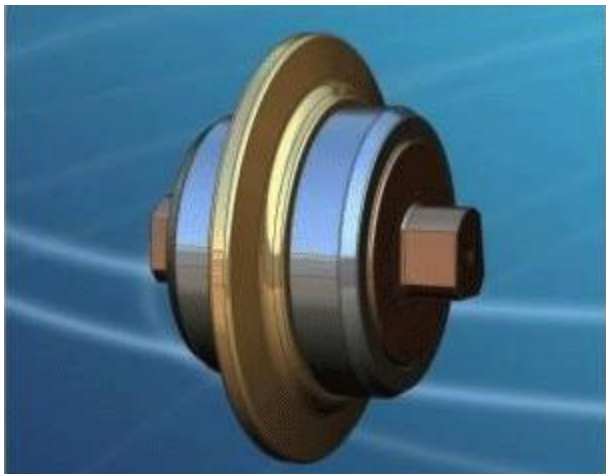
The Workstation is equipped with all necessary tools and accessories to quickly and professionally repair worn tools. Tool preparation workstations can be set up at any construction site.

Litian can also provide tool storage and staff training for construction units, and arrange technicians to provide service and support for the project, and at the same time establish a tool database to effectively manage the tools.

We believe that only by working together can we find the best solution to control tool wear and maintenance costs.



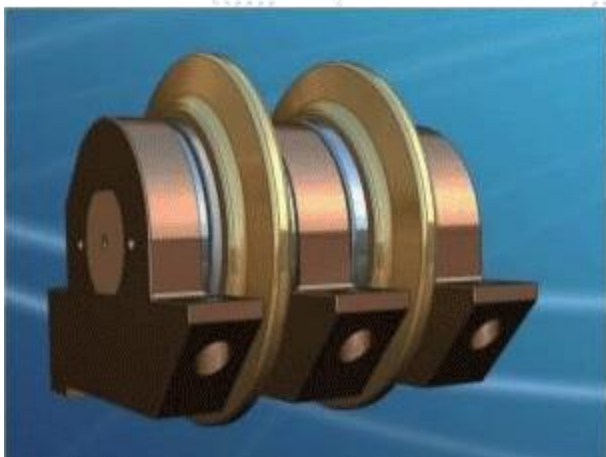
TBM Disc Cutter



The single disc cutter is installed on the front and edge of the cutter head, and is mainly used for crushing hard rock with high uniaxial compressive strength ($UCS \geq 70\text{Mpa}$). It is the key component of driving broken rock.



The double disc cutter is installed on the front and edge of the cutter head, and is mostly used for crushing soft rock with low uniaxial compressive strength ($UCS \geq 70\text{Mpa}$).



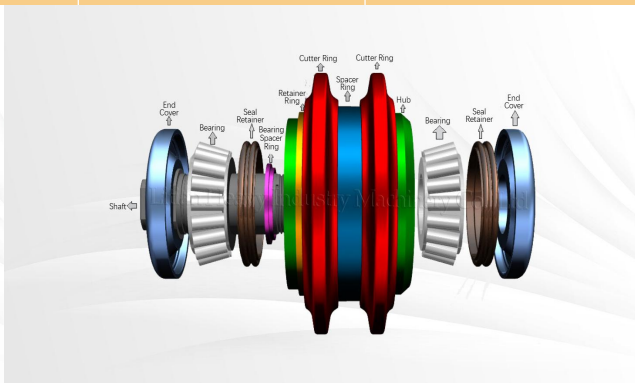
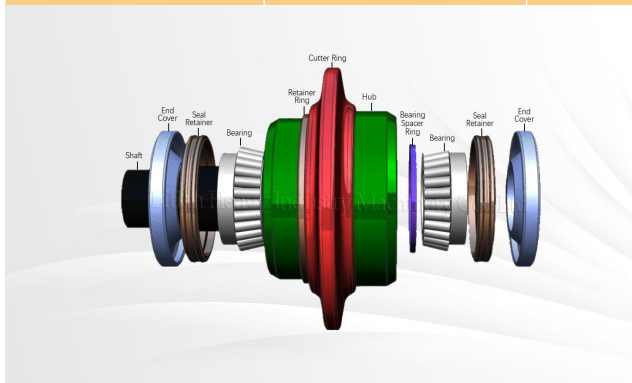
The center disc cutter is installed in the middle of the cutter head.

TBM Disc Cutter

Litian heavy industry has a complete technical team of TBM disc cutter developing, design, manufacturing, assembly, debugging, maintenance and renovation, able to provide equipment selection consulting, independent design, development, manufacturing and professional after-sales service, its testing and manufacturing level has been among the world's advanced ranks.

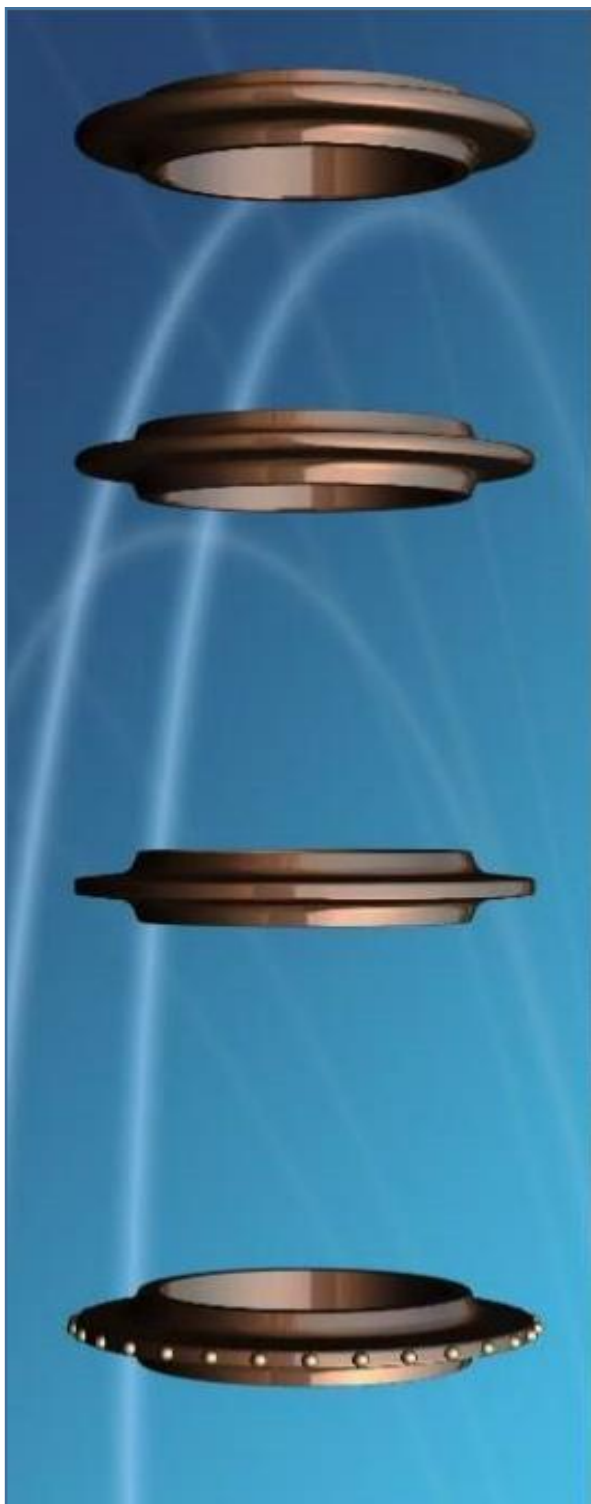
TBM disc cutter regular specifications:

Diameter	Bearing Capacity (Tonne)	Mounting	Cutter Type	Cutter Structure
6" / 150mm	4	Front	Single/Double/Triple	Monoblock
6.5" / 165mm	5	Front	Single/Double/Triple	Monoblock
7" / 180mm	8	Front/Back	Single/Double/Triple	Monoblock
8" / 200mm	8	Front/Back	Single/Double/Triple	Monoblock
9" / 220mm	9	Front/Back	Single/Double/Triple	Monoblock
10" / 250mm	10	Front/Back	Single/Double/Triple	Monoblock/Assembly
11" / 280mm	13	Front/Back	Single/Double/Triple	Monoblock/Assembly
12" / 305mm	16	Front/Back	Single/Double/Triple	Monoblock/Assembly
12.5" / 320mm	15	Front/Back	Single/Double/Triple	Monoblock/Assembly
13" / 330mm	16	Front/Back	Single/Double	Monoblock/Assembly
14" / 356mm	20	Front/Back	Single/Double	Monoblock/Assembly
15.5" / 394mm	25	Front/Back	Single/Double	Monoblock/Assembly
17" / 432mm	35	Front/Back	Single/Double	Monoblock/Assembly
18" / 457mm	35	Front/Back	Single/Double	Monoblock/Assembly
19" / 483mm	35	Front/Back	Single/Double	Monoblock/Assembly
20" / 508mm	40	Front/Back	Single/Double	Monoblock/Assembly





Cutter Ring



Optional Cutter Ring

Standard Cutter Ring

Suitable for drilling 50~150Mpa conglomerate, marble, sandstone and limestone formations.

Wear-resistant Cutter Ring

Suitable for excavation of 40Mpa compact strata, and 80 ~ 100Mpa fracture conglomerate, sandstone, sand clay and other strata.

Heavy-duty Cutter Ring

Suitable for tunneling 120~250Mpa hard rock, and 80~150Mpa high-wear rock strata, such as granite, diorite, porphyry, serpentine and basalt.

TCI Cutter Ring

Suitable for excavation of granite, basalt, porphyry and quartzite strata up to 150~250Mpa.

Cutter Ring

In order to meet the requirements of various geological applications, Litian can provide a series of cutter rings with different specifications and performances so that the cutters can give full play to their best performance. In order to meet the needs of different products, our company has conducted in-depth research on the material of the cutting ring and treated it with different strengths, so that the hardness of the cutting edge reaches HRC60 and the life is increased by 30% ~ 50%.

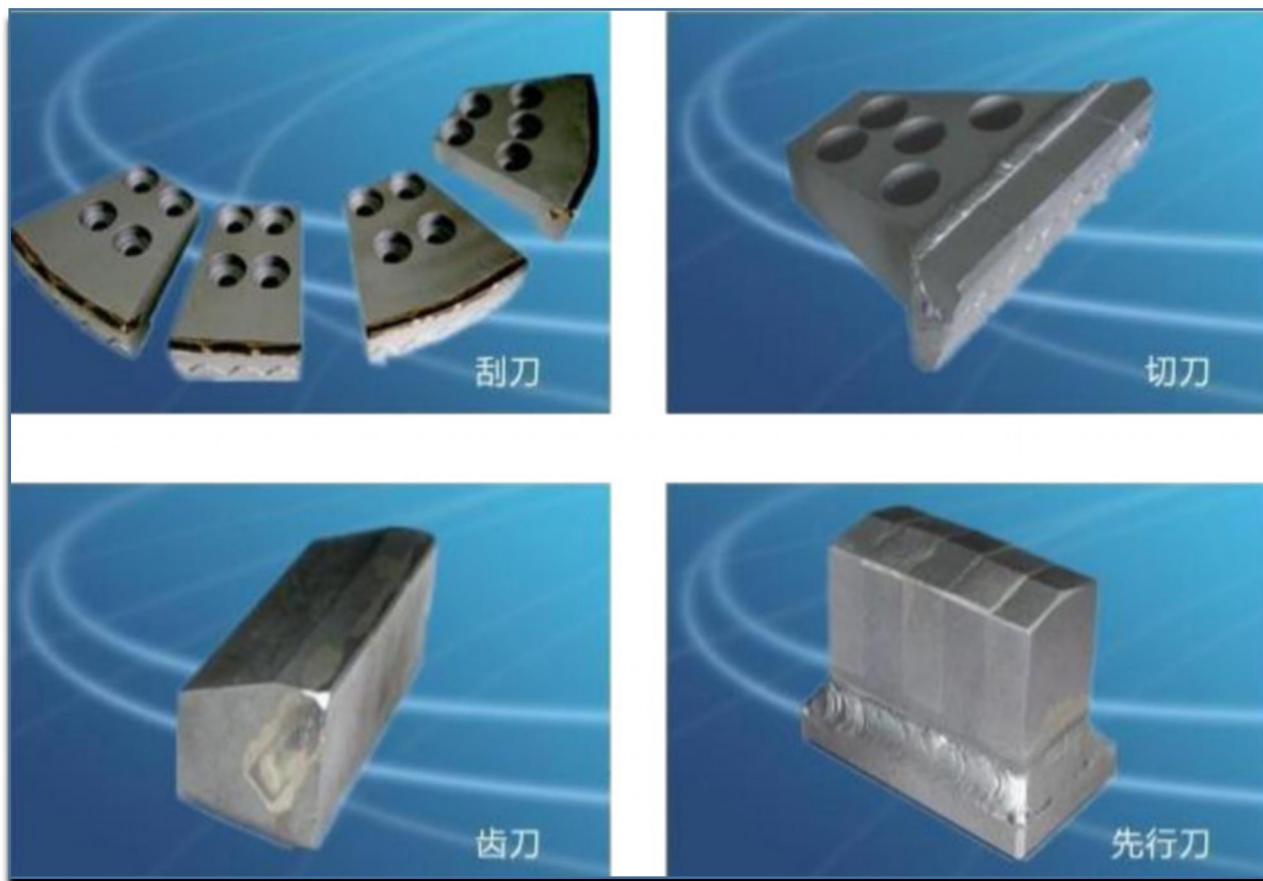
Disc cutter ring regular specifications:

Cutter Ring Size (OD)	12 inch (305mm)	15.5 inch (394mm)	17 inch (432mm)	18 inch (457mm)	19 inch (483mm)	20 inch (508mm)
Cutter Weight	60~80kg	125~170kg	135~180kg	145~195kg	180~210kg	185~215kg
Application Range	2~3m	3~5m	>5m	>6m	>8m	>10m





Soft Ground Cutter



The soft ground cutting tool refers to a rock breaking tool that only rotates with the cutter head and does not rotate. There are many kinds of soft ground cutting tools, and currently commonly used mainly include edge scraper, buckets, rippers, etc.

The suitable formation are from 15Mpa to 100Mpa, which can be used in the soft earth shield alone, and can also be used as an auxiliary tool for the hard rock.

Others



Our disc cutter can choose international famous brand TIMKEN bearings and TRELLEBORG floating seal, effectively improve the use of hob efficiency.

At the same time, our factory can customize the knife box, knife holder, bucket teeth and other accessories for the customer's disc cutter.



CASES

Project Name	West Qinling Tunnel of Lanyu Railway
Cooperation unit	China Railway 18th Bureau
Project introduction	<p>The West Qinling Tunnel of Lan-Yu Railway, with a length of 28,236 meters, is the second longest railway tunnel in China (including under construction). The tunnel is located in Wudu District, Longnan City, Gansu Province. The tunnel is a double-hole single-line tunnel, which was constructed by China Tunnel Group and China Railway 18th Bureau using two tunnel boring machines and the methods of drilling and blasting.</p> <p>The tunnel's natural conditions for entering the tunnel are harsh, and with long sections of class V and Class IV surrounding rocks. Adopting Litian 19inch disc cutters, maintenance services and technical support, the frequency of tool changes are reduced and the speed of tool change and the efficiency of the tunnel boring machines are improved, which ensure the completion of the entire project.</p>
Products and services	19inch TBM disc cutters, on-site cutters repair and technical support
Application effect	In the practice of tunneling, Litian disc cutters beat the imported ones, showing amazing hard rock tunneling ability.



CASES

Project Name	Northwest Liaoning Water Supply project,TBM6, 2nd Section, 4th Section
Cooperation unit	China Railway 18th Bureau
Project introduction	<p>The water supply project in northwestern Liaoning passes through Tieling City. After the implementation of the project, not only can the water demand for industry and living in northwestern Liaoning be guaranteed, but also because of the increase in the amount of water resources available, it is possible to optimize the allocation and rational use of water resources in northwestern Liaoning. At the same time, it will have an important impact on improving water quality, curbing river desertification, restoring river ecology, and realizing a virtuous cycle of the regional ecological environment.</p> <p>The tunnel's natural conditions for entering the tunnel are harsh, and with long sections of class V and Class IV surrounding rocks. Adopting Litian 20inch disc cutters, maintenance services and technical support, the frequency of tool changes are reduced and the speed of tool change and the efficiency of the tunnel boring machines are improved, which ensure the completion of the entire project.</p>
Products and services	tunneling volume contracting
Application effect	<p>Litian disc cutter application experts timely adjust and optimize tool parameters (including the changes of cutter ring material, the adjustment of heat treatment process, and the shape design adjustment for standard type, heavy type and improved type cutter ring). And through the adjustment of disc cutter pre-tightening torque, layout, knife difference adjustment, etc., it improves the working conditions and service life of rock cutting, and significantly improves the cutting and driving efficiency. The TBM6-(1+2) section has a total excavation of 6162.4m+3271m, with an average monthly footage of 628.8m, an average equipment utilization rate of 50.1%, a maximum daily footage of 46.5m, and a maximum monthly footage of 763m.</p>





CASES

Project Name	Qingdao Metro Line 2
Cooperation unit	China Railway 18th Bureau
Project introduction	<p>The total length of this project is 941 meters. The tunnel boring machine starts from Hai'an Road Station, passes through Haichuan Road Station, Haiyou Road Station, and Maidao Station, and finally dismantles and hangs out at Kaohsiung Road Station.</p> <p>Because the geological conditions of Qingdao subway are mainly micro-weathered granite strata, the rock has strong hardness and high quartz content. Therefore, it is specially designed and targeted to use TBM for construction. Qingdao Metro applied the TBM construction method for the first time.</p>
Products and services	19-inch disc cutter, on-site maintenance service
Application effect	The continuity of this section has achieved the highest daily footage of 22.5 meters and the highest monthly footage of 350 meters.



CASES

Project Name	Shenzhen North Ring Cable Tunnel II
Cooperation unit	TBM Branch of China Railway Tunnel Bureau
Project introduction	5 kilometers underground tunnel. The upper layer is soft and the lower layer is hard. The upper part of the interval is hard plastic clay and residual soil, the lower part is strongly weathered granite, and the lithology of the tunnel section is quite different. There is a 60m-long bedrock protrusion in the interval, and the bottom protrusion is medium and slightly weathered granite. The uniaxial compressive strength of micro-weathered granite rock is up to 120Mpa, the rock is very hard and extremely difficult to break.
Cooperation Mode	New disc cutters and repair the old ones (15.5 inches)
Customer evaluation	Litian disc cutters has no abnormal damage such as eccentric wear and cutter ring breakage during the use of the project. The tool has good quality and stable performance. It shows good wear resistance during the high-strength granite tunneling process. The new cutting tool of the whole disk has a single excavation of more than 1060 meters, and part of the cutting tools can still be used for the second excavation, which greatly improves the work efficiency of the project and saves costs for the procurement of project tools.





CASES

Project Name	Chongqing Tunnel Underground Pipe Network Project
Cooperation unit	China Railway Tunnel Group One Co., Ltd.
Project introduction	1.5 km underground pipe network tunnel. The project geology is sandy mudstone, sandstone, interbedded sandy mudstone and plain fill. The groundwater is widely distributed, with no hydraulic connection in a large range, the water volume is slightly larger, and it is dynamic and stable; sandstone is a weakly permeable layer.
Cooperation Mode	Provide new disc cutters and repair the old ones (12 inches)
Customer evaluation	In the process of using Litian disc cutters, there is no abnormal damage such as partial grinding, cutter ring fracture, etc. The tool has excellent wear resistance and stable performance in the sandstone formation. Litian tool is trustworthy!



CASES

Project Name	No. 2 Civil Engineering Contract of Chengdu Metro Line 10
Cooperation unit	China Railway 23rd Bureau Group
Project introduction	The engineering geology is sandy mudstone, sandstone, interbedded sandy mudstone and plain fill. Groundwater is widely distributed, and sandstone is a weakly permeable layer. The pebble geology peculiar to Chengdu. It is Chengdu's unique cobblestone geology.
Cooperation Mode	Provide new disc cutters and repair the old ones (17.5 inches)
Technology and service	According to the requirements of customers, the cutter ring is improved to 17.5 inches. Before digging, we sent after-sales service personnel to go to the site to assist in tool installation, and regularly exchange learning with the project department personnel. We provide consulting services 24 hours to ensure that customers are assured of Litian tools!





CASES

Project Name	Xinjiang ABH Water Delivery Tunnel Project
Cooperation unit	China Railway Construction Heavy Industry Group China Railway 18th Bureau Group Co., Ltd.
Project introduction	The engineering tunnel is about 42km long, the excavation diameter is 6.53m, the designed water delivery flow is 70m ³ /s, and the tunnel slope is 2‰. The tunnel is mainly dominated by type II and III surrounding rocks, and the uniaxial compressive strength of the surrounding rock is mostly between 80 and 180 MPa. The tunnel passes through multiple fault zones, where faults and unconformity contact zone groundwater develops. In addition, the tunnel boring machine requires continuous tunneling of about 20 kilometers, which is currently the longest tunnel in China are along the tunnel, which is the most challenging tunnel for TBM construction at present.
Major engineering difficulties	The engineering geological conditions are very complex. The average burial depth of the tunnel is more than 1100 meters, and the maximum burial depth is about 2700 meters, which is 2-5 times the burial depth of the general project. The ground stress is high and the lithology changes greatly. The project has to pass through granite , tuff and sandstone, and three major global construction problems need to be overcome, and they are: high burial depth, high ground temperature, high ground stress, strong rock burst; long-distance single-head ventilation, reverse slope drainage; large faults, large surrounding rock deformation. The construction difficulty is rare at home and abroad.
Cooperation Mode	The first 2KM cooperated with China Railway Construction Heavy Industry Co., Ltd. in a contracted manner, and then cooperated with China Railway 18th Bureau Group Co., Ltd.
Project highlights	In the process of cooperation with China Railway Construction, our company conducted tests with many disc cutter brands such as Robbins, Jilin Giants, Tianjin Lilin, and China Railway Equipment. From the rock hardness, cutter ring wear value, driving distance and other aspects of the test stage, Litian cutters performance is far superior to other manufacturers' hob.



CASES

Project Name	Qinling Tunnel Lingbei Project of YinhanjiWei Project
Cooperation unit	China Railway 18th Bureau Group Co., Ltd.
Project introduction	The TBM construction section of the North Qinling Tunnel of the YinhanjiWei Qinling Tunnel includes the main tunnel of 16592 meters and the No. 5 branch tunnel of 4620 meters. Among them, the main tunnel was constructed with full-face hard rock TBM 16177 meters and the excavation diameter is 8.02 meters. This project is faced with world-class technical problems such as large deformation of soft rock under high ground stress, long distance geological structural belt, large buried depth, large flow surge water, long distance single head ventilation and TBM synchronous lining under internal arc invert block conditions.
Engineering difficulties	Sudden water inflows and rockfalls occur during tunneling, and the hardness of the rock is high, which puts forward high requirements on the wear resistance and toughness of the cutter ring.
Cooperation Mode	TBM disc cutters and accessories sales
Project highlights	At the beginning of the cooperation, a trial comparison was conducted with brands such as Herrenknecht. Through the test, whether the wear resistance or toughness of the cutter ring, Litian tools has shown amazing results, which has won the trust and choice of customers.





Achievements

No.	Cooperative units and projects	TBM Maker	Products	
1	China Railway Construction Heavy Industry Group Co. LTD	CRCHI	Initial dress TBM cutters & buckets	19" disc cutters 17" twin disc cutters
2	China Shipbuilding Heavy Industry (Qingdao) Group Co. LTD	CSIC	Initial dress TBM cutters	19" disc cutters
3	China Railway 13th Bureau Group Co., LTD, Chengdu Metro Project	Herrenknecht	Provide disc cutters & components	17" disc cutters
4	Sinohydro 14 Bureau, Tianjin Metro Project	Herrenknecht	Provide disc cutter rings	17" disc cutters
5	Chengdu Metro shield Project	Herrenknecht	Provide disc cutters & Scrapers	17" disc cutters
6	China Railway First Bureau Group Urban Rail Transit Engineering Co. LTD, Civil engineering of phase I of Chengdu Metro Line 4	CREG	Provide components & maintenance	18" disc cutters
7	Kunming Metro Project Department, China Railway No.5 Bureau	Herrenknecht	Provide disc cutters	17" disc cutters
8	China Railway Bureau, Chengdu Metro Line 3	CREG	Provide components & maintenance	18" disc cutters
9	China Railway 13th Bureau, Dalian Metro 106 bid	Herrenknecht	Provide cutter rings & components	17" disc cutters
10	China Railway No.3 Bureau, Chengdu Metro Line 3 phase 1	CREG	Provide components & maintenance	18" disc cutters
11	Urban Rail Transit Engineering Branch of China Railway No. 5 Engineering Group Co. LTD, Dalian Metro 103	CRTG	Provide components & maintenance	17" disc cutters
12	China Railway 23 Group, Chengdu Metro Line 10 civil engineering Project	CREG Robbins	Provide full set of TBM cutters, components & maintenance	17.5" disc cutters
13	China Railway 23rd Bureau, Chengdu Metro Line 5 civil Engineering	CREG Robbins	Provide full set of TBM cutters, components & maintenance	17" disc cutters
14	China Railway 18th Bureau No.4 Engineering, Chengdu Metro Line 5 Civil Engineering No.4 Project	CREG	Provide full set of TBM cutters, components & maintenance	17" disc cutters
15	China Railway 18th Bureau, Civil engineering of Chengdu Metro Line 6	CREG	Provide full set of TBM cutters, components & maintenance	17" disc cutters
16	China Railway 18th Bureau, Phase II project of Qingdao Metro Line 2	Italy CD	Provide full set of TBM cutters, components & maintenance	19" disc cutters
17	China Railway 22nd Bureau, Chengdu Metro Line 6 project	CRCHI	Provide full set of TBM cutters, components & maintenance	17" disc cutters
18	China Railway No.14 Bureau, Xiamen Metro Line 2	Palmieri	Provide full set of TBM cutters, components & maintenance	17" disc cutters 18" disc cutters
19	Yunnan Huigu Engineering Construction Co., LTD., shield construction project	Herrenknecht	Provide disc cutters	17" disc cutters
20	China Railway Tunnel Group Co., LTD. Shenzhen North Ring cable tunnel ii standard shield construction project	CREG	Provide full set of TBM cutters, components & maintenance	15.5" disc cutters
21	China Railway Tunnel Group, Chongqing underground pipe network project	CCCCTH	Provide full set of TBM cutters, components & maintenance	12" disc cutters
22	China Railway 18th Bureau, West Qinling TBM Project	Robbins	Provide full set of TBM cutters, components & maintenance	19" disc cutters 17" twin disc cutters

Achievements

No.	Cooperative units and projects	TBM Maker	Products	
23	China Railway Construction 18th Bureau, Qingdao Metro Line 2, Haihai area	CMC TBM	Provide full set of TBM cutters, components & maintenance	19" disc cutters 17" twin disc cutters
24	China Railway 18th Bureau, West Qinling TBM Project Department,	Robbins	Provide full set of TBM cutters, components & maintenance	19" disc cutters 17" twin disc cutters
25	China Railway 18th Bureau, Hanjiang to Weihe River Project	Herrenknecht	Provide full set of TBM cutters, components	19" disc cutters 17" twin disc cutters
26	China Railway 18th Bureau, Jilin Song water supply project	CRCHI	Provide full set of TBM cutters, components & maintenance	19" disc cutters 17" twin disc cutters
27	Beijing vibroflotation Jilin Songsong water supply project	CREG	Provide full set of TBM cutters, components & maintenance	19" disc cutters 17" twin disc cutters
28	China Railway Tunnel Company, Northwest Liaoning water supply project	Robbins	Provide full set of TBM cutters, components & maintenance	20" disc cutters
29	Sinohydro No.6 Engineering Bureau Co., LTD., T3 exploration and test Tunnel project Department of Xinjiang Kazuang Tunnel	Robbins	Provide full set of TBM cutters, components & maintenance	19" disc cutters 17" twin disc cutters
30	Sinohydro Third Engineering Bureau Co., LTD. Lanzhou Water source Project	CRCHI	Provide full set of TBM cutters, components & maintenance	19" disc cutters
31	Shanxi Provincial Bureau of Hydraulic Engineering, Xinjiang Katang Tunnel T4 project	CRCHI	Provide full set of TBM cutters, components & maintenance	19" disc cutters 17" twin disc cutters
32	Hydro 10, Ecuador Project	Herrenknecht	Provide disc cutters	19" disc cutters
33	Sinohydro Sixth Engineering Bureau Co., LTD., Liaoning Northwest Project (fourth section) construction of the third bid project	Robbins	Provide cutter rings & components	19" disc cutters
34	Shanxi Hydraulic engineering Bureau, liaoning northwest water supply project section 2	Robbins	Provide full set of TBM cutters, components & maintenance	20" disc cutters
35	TBM Project Department, Causeway Mountain, China Railway 18th Bureau Group Co., LTD	Robbins	Provide disc cutters	19" disc cutters 17" twin disc cutters
36	Hydro 14 Bureau, Hengji Tunnel project	Robbins	Provide disc cutters & components	19" disc cutters
37	China Railway 18 bureau, Northwest Liaoning water supply project 2 section 4	Robbins	Provide disc cutters & components	
38	Sinohydro 14 Bureau, Ecuador project	Herrenknecht	Provide disc cutters & components	19" disc cutters
39	China Railway Tunnel Group co., LTD., West Qinling Tunnel project XQLS2 bid	Robbins	Provide disc cutters & components	19" disc cutters 17" twin disc cutters



Litian Heavy Industry provides rock breaking tools and rock drilling tools suitable for various rock excavation projects and mining operations, as well as services and solutions. The scope of application covers tunnel excavation, mine excavation, surface and underground geotechnical excavation engineering and other fields.

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