

求实创新，追求卓越
PRAGMATIC INNOVATION
THE PURSUIT OF EXCELLENCE



品质源于
1956
Since 1956



切槽系列刀具 Slotting Knife Series

精密轮槽刀具 Precision Wheel Grooves

汽车皮带轮刀具 Car Pulley Cutter

电梯轮槽刀具 Groove Cutting Tool for Elevator Wheel



成都工具研究所有限公司
CHENGDU TOOL RESEARCH INSTITUTE CO.,LTD

地址/Add: 四川省成都市新都区工业大道东段601号
NO.601, Eastern Sec Industrial Rd, Xindu Dist, Chengdu, Sichuan, China

公司电话/Tel: 028-83243828

销售电话: 028-83242134

华东片区 (江苏、上海、浙江、福建):
028-83258061 021-33703787

华北片区 (山东、河北、河南):
028-83249579

华中片区 (安徽、湖北、湖南、江西、广东、广西):
028-83243290 028-83257552

西部片区 (重庆、四川、贵州、云南、甘肃、陕西、青海、宁夏、西藏、新疆):
028-83246516 028-83242077

北方片区 (黑龙江、吉林、辽宁、天津、北京、山西、内蒙古):
028-83246702 022-84360497

外贸及相关业务 International Trade and related business / Tel: 028-83271096 / 83242241

市场办 / Tel: 028-83257552

传真 / Fax: 028-83242075

网址 / Web: www.ctri.com.cn

阿里巴巴旺铺 / Alibaba: <http://ctri.en.alibaba.com/>



成都工具研究所有限公司
CHENGDU TOOL RESEARCH INSTITUTE CO.,LTD



COMPANY PROFILE

公司简介

成都工具研究所有限公司（以下简称“工具所”）1956年创建于北京，是原国家机械工业部直属的我国机械行业唯一的综合性工具科研开发机构，1965年内迁至成都。1998年经国家科技部批准，成为“国家精密工具工程技术研究中心”和“国家工具生产力促进中心”的依托组件单位。1999年转制为科技型企业，进入中国机械工业集团有限公司。

Chengdu Tool Research Institute Co.,Ltd (hereafter CTRI) is founded in 1956 and formally under the direction of China's Machinery Ministry as the sole comprehensive tool researching and scientific developing institution of China's Machinery industry. CTRI moved to Chengdu in 1965. Approved by Ministry of Science and Technology, CTRI became the supporting institution of State Precision Tool Engineering Technology Research Center in 1998. It was later approved into China National Machinery Industry Corporation (SINOMACH) and transformed to a scientific and technological enterprise in 1999.

工具所主要从事精密切削刀具、精密测量仪器和表面改性技术三大类机械产品共性技术研究及其高新技术产品的开发与生产。已形成了以硬质合金石油管螺纹梳刀为主导并逐步发展了轴承刀具、超硬刀具、数控刀具、深孔加工刀具、汽车刀具、型线刀具、配套刀具、齿轮测量仪器、主动量仪、激光干涉仪、工具专机以及PVD、CVD、PCVD涂层技术服务、QPQ盐浴复合处理技术与装备等多种产品并存的产业结构。

CTRI is mainly engaged in precise cutting tools, measuring instruments, surface modified technique and advanced technological products. With the leading development of carbide chasers for oil pipe, CTRI extends products varieties for more industry structures, including bearing inserts, PCD/CBN cutting tools, CNC cutting tools, deep hole machining tools, automobile cutting tools, profile cutting tools, coupling tools, gear tester, in process gauge, calibration laser interferometer, special machines, and PVD, CVD, PCVD coating technical service, QPQ salt bath treatment technology and equipment.

行业地位

Industry Status

成都工具研究所是我国工具行业科研、技术的领头羊、行业归口所，以下组织挂靠在我所：

Chengdu Tool Research Institute is a leading scientific research and technology center in China tool industry. It also works as a supporting institute for the following organizations:

- 中国机械工业金属切削刀具技术协会
China metal cutting tool Engineering Association
- 中国机床工具工业协会工具分会
China Machine Tool & Tool Builder's Association Tools Branch
- 中国仪器仪表学会机械量测试仪器学会
China Instrument and Control Society
- 国家刀具质量监督检测中心
National Tool Quality Supervision and Monitoring Center
- 机械工业量具量仪产品质量监督检测中心
Mechanical industrial measuring instrument products Quality Supervision Testing Center
- 国家进出口商品检验局刀具认可实验室
China Import and Export Commodity Inspection Bureau tool accredited laboratory
- 国家进出口商品检验局量具量仪认可实验室
China Import and Export Commodity Inspection Bureau measuring instrument for Laboratory Accreditation
- 科技成果检测鉴定国家级检验机构（刀具）

- Scientific and technological achievements identification of national inspection agency (tool)
- 科技成果检测鉴定部级检验机构（量具量仪）
- Science and technology achievements inspection level inspection agency (measuring)
- 全国刀具标准化技术委员会秘书处
The tool Standardization Technical Committee Secretariat
- 全国量具量仪标准化技术委员会秘书处
The measuring tool and instrument Standardization Technical Committee Secretariat
- ISO/TC 29 （工具）P成员国内归口单位
ISO/TC 29 (tool) P members internally controlled unit
- ISO/TC213 （产品的几何和几何技术规范及检验） 成员国内归口单位
ISO/TC213 (geometry and geometry specification and inspection of products) P members internally controlled unit
- CNACL 国家认可实验室
CNACL National Laboratory Accreditation
- 《工具技术》杂志社
Tool Engineering
- 国家精密工具工程技术研究中心
National Precision Tools Engineering Technology Research Center
- 国家工具生产力促进中心
National Tools Productivity Promotion Center
- 中国机械工业金属切削刀具技术协会
China metal cutting tool Engineering Association
- 中国机械工程学会生产工程分会切削专业委员会
China Institute of mechanical engineering, production engineering branch, cutting Committee
- 四川省机械工程学会机加工专业委员会
Sichuan Mechanical Engineering Society Machine processing professional committee



科研成果

Scientific Achievements

自成都工具研究所成立以来，主要取得以下科研成果：
Followings are main scientific achievements since the foundation of CTRI:

一、国家发明奖三项：

Three National Invention Awards

齿轮整体误差测量新技术 发明二等奖

The second prize in new technology of integrated error measuring gear Invention

单晶金刚石钎焊工艺及焊料 发明二等奖

The second prize in mono-crystalline diamond brazing technology and solder Invention

无钴易磨高性能高速钢 发明三等奖

The third prize in Wuxi easy grinding high speed steel

二、国家科技进步奖八项

Eight "the national science and technology progress awards"

量具刀具产品标准的制定和贯彻 二等奖

The second prize in The formulation and implementation of measuring tool products standard

中模数硬质合金齿轮滚刀 三等奖

The third prize in the module of carbide gear hob

立方氮化硼聚晶机理及其应用 三等奖

The third prize in PCBN mechanism and application

涂层硬质合金刀片成套技术及装备研究 三等奖

The third prize in researching coated carbide inserts integrated technology and equipment

QPQ盐浴复合处理技术及成套设备 二等奖

The second prize in composite treatment technology for QPQ salt bath and complete sets of equipment

机电一体化发展预测与综合分析（合作项目） 三等奖

The third prize in Electromechanical integration development prediction and comprehensive analysis (cooperated projects)

材料动态断裂性能研究及其在典型机械零部件上的应用（合作项目） 三等奖

Research on dynamic fracture properties of materials and its application in the typical mechanical parts on the (cooperated project) the Third prize

机械工业共性数据库（合作项目） 二等奖

The second prize in Machinery industry common database (cooperated projects)

三、省部科技进步奖

The Provincial Department of science and Technology Progress Award

121项（略）

121 items (omission)



人力资源

Human Resources

全所共有职工500余人，其中科技人员320人，有突出贡献的国家级专家3人，享受国家政府津贴26人，省部级专家15人，研究员级高级工程师27人，高级工程师103人，高级会计师、高级经济师10人、中级技术人员140人，硕士研究生14人，大中专生146人，专业涉及机械、金属材料、电子、计算机、机电一体化等专业。

CTRI presently has almost 500 employees, 320 of whom are technical staff, 3 state-level experts with outstanding contribution, 26 recipients of government special allowance, 15 ministerial level experts, 27 professor level senior engineers, 103 senior engineers, 10 senior accountants and senior economists, 140 intermediate technical staff , 14 with master degree, 146 with college diploma and employees are widely involved in machinery, metal materials, electronic, computer, electromechanical integration specialty.



核心竞争力

Competitive Advantages

目前成都工具研究所已在刀具材料、精密复杂成形刀具与数控刀具设计及加工技术、刀具表面强化改性技术与装备、大型精密量仪设计制造、激光测量及光电传感器技术以及计算机软件等技术领域，形成了独特的整体、核心成套技术优势，初步构成了以硬质合金石油管螺纹梳刀、硬质合金精密异形刀具、超硬刀具、刀具表面强化技术及装备、齿轮测量仪、激光测量仪等六项主导产品，包含30多项核心、高新技术产品的产品技术结构，这些产品和技术大都处于国内领先或国际先进水平。

Chengdu Tool Research Institute has formed a completed and unique technical competitive advantages in tool material, precise and complex shaped cutter and NC tool design and processing technology, cutting tool surface modification and strengthening technology and equipment, large-scale design precision instrument manufacturing, laser and photoelectric sensor technology and computer software technology. It initially formed six leading products including carbide treading tools for oil pipe, carbide precision special-shaped inserts, super hard cutting tools, tool surface strengthening technology and equipment, gear measuring instrument, laser measuring instrument. Those products are supported by more than 30 core, high-tech products technology structure and most of these products and technology are leading technologies in the domestic and international advanced level.

质量环境控制

Quality & Environmental Control

质量环境认证：ISO9001:2015 ISO14001:2015
Quality & Environmental Certification: ISO9001:2015 ISO14001:2015

质量环境方针：
以技术创新为先导，以质量管理为保证，以持续改进为核心，以顾客满意为目标。

Quality & Environmental Policy:
To make technical innovation as the guide, the quality of management as the guarantee, continuous improvement as the core and take customer satisfaction as the goal.

质量环境目标：
★ 贯彻ISO9001：2008标准，通过ISO9001：2008质量管理体系认证，并保持体系有效运行。
★ 技术不断创新，每年设计开发新产品或新项目2项以上。
★ 以质量管理为保证，加强过程控制，实施持续改进，产品质量精益求精，确保产品出厂合格率达100%。三年内使主导产品合格率提高到95%以上，成品交检批次合格率达到95%。
★ 以顾客为关注焦点，增进顾客满意，三年内使顾客满意率达98%以上，顾客投诉解决率达到100%。
★ 顾客重大投诉为零，重大质量事故为零，重大设备安全事故为零。

Quality & Environmental Objectives:
★ In carrying out the standard of ISO9001:2008, through the ISO9001:2008 quality management system certification, and keep the system running effectively.
★ Technology innovation, design and develop more than 2 new products or new projects each year
★ To guarantee the quality management, strengthen the process control, carry out continuous improvement, refine on product quality, to ensure 100% products manufactured pass rate. Increase leading products pass rate to 95% in three years and the finished product inspection pass rate to 95%.
★ Customer focus, improve customer satisfaction, three years to make customer satisfaction rate reaches above 98%, to solve customer complaint rate reached 100%.
★ Customer major complaints to zero, a major quality accidents to zero, zero accident of major equipment.



服务管理

Service Management

服务宗旨：
全心全意为用户服务

服务承诺：
尽可能满足用户的合理需求

服务标准：
快速、及时、有效，向用户提供一流产品和一流服务

Service Aim : put one's heart and soul into service for the user

Service Commitment: to meet the reasonable needs of users as far as possible

Service standards: rapid, timely, effective, provide first-class products and first-class service to users

企业合作

Business Cooperation

- 与联合国合作建立中国量仪基地
- 与德国Klingelnberg公司合作，锥齿轮测量技术出口德国
- 广范与国外公司进行技术交流与合作
- 与国内大专院校、大型企业进行广范的技术交流与合作
- 与英国普华永道咨询公司合作，全面提升企业形象和管理能力

- Cooperation with the United Nations to establish Chinese instrument base
- Cooperation with Klingelnberg (Germany), bevel gear measurement technology exported to Germany
- Technological exchanges and cooperation with foreign companies
- A wide range of cooperation and technological exchanges with colleges, universities and large domestic enterprises
- Cooperation with British consulting company to improve corporate image and management ability

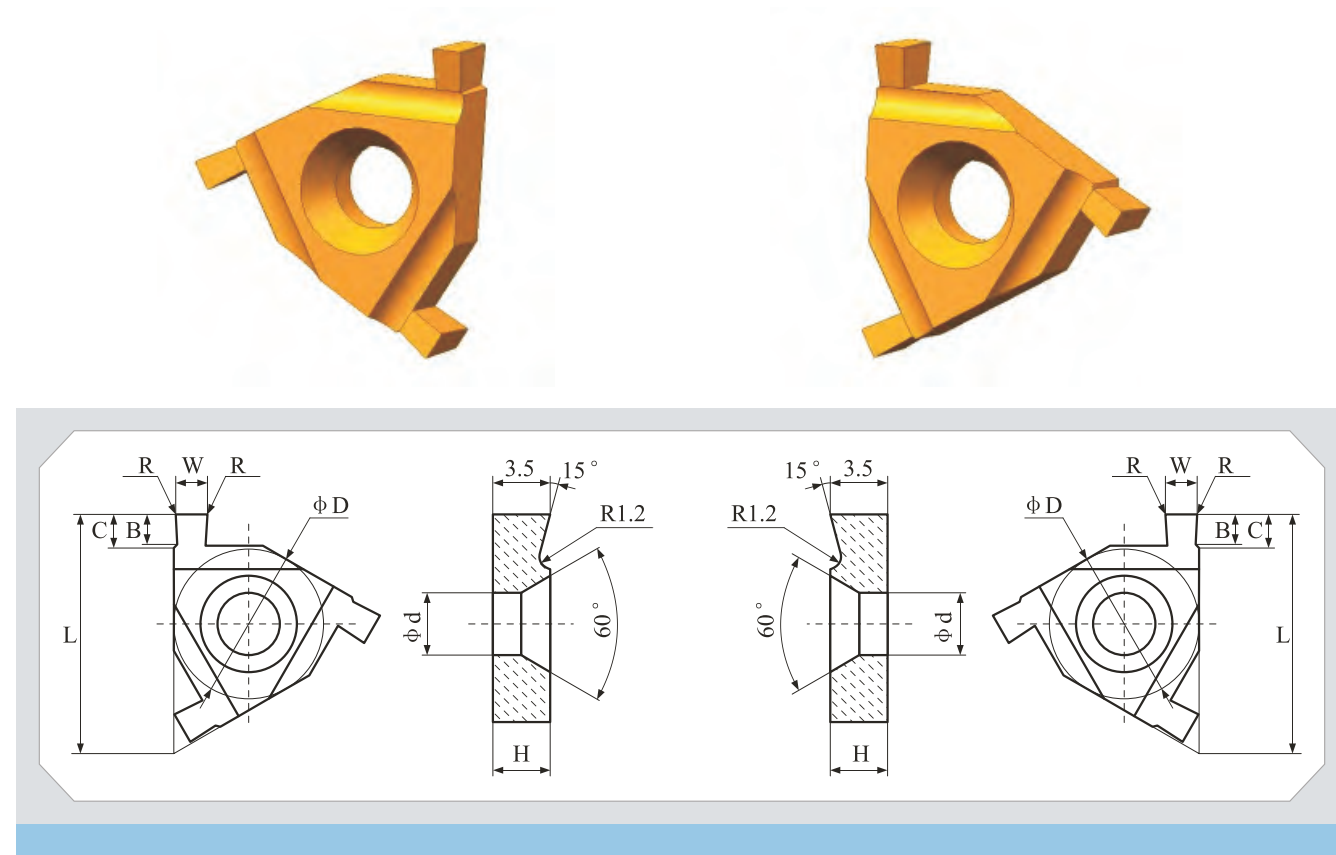
目录 CONTENTS

6	平装浅切槽刀具 Groove Cutting Tools (Horizontal Design Type)
7	平装浅切槽刀具 Groove Cutting Tools (Horizontal Design Type)
8	切槽刀具推荐切削条件 Groove Cutting Tools Recommended Cutting Parameter
8	加工要点 Processing Key Points
9	立装浅切槽刀具 Groove Cutting Tool (Vertical Design Type)
11	立装浅切槽刀具 Groove Cutting Tool (Vertical Design Type)
13	切槽刀具推荐切削条件 Groove Cutting Tools Recommended Cutting Parameter
13	加工要点 Processing Key Points
14	可转位内孔浅切槽刀具 Indexable Inner Bore Groove Cutting Tool
15	可转位内孔浅切槽刀具 Indexable Inner Bore Groove Cutting Tool
17	推荐切削条件 Recommended Cutting Parameter
18	汽车皮带轮刀具 Automobile Pulley Cutter
18	双齿皮带轮刀具 Double Gear Pulley Cutter
19	V型多齿皮带轮刀具 V Type Multiple Cutting Edges Pulley Cutting Tool
20	加工要点 Processing Key Points
21	立装皮带轮刀具 Pulley Groove Cutting Tools (Vertical Design)
22	电梯轮槽刀具 Groove Cutting Tool for Elevator Wheel
22	电梯轮槽刀具 Groove Cutting Tool for Elevator Wheel
23	整体硬质合金立铣刀 Solid Carbide End Milling Cutter
23	四刃直柄平头立铣刀 Four Edges Straight Shank Flat End Milling Cutter
25	四刃直柄球头立铣刀 Four Blade Straight Handle Ball End Mill
27	四刃直柄圆弧立铣刀 Four Edges Straight Shank Corner Radius End Mill Cutter
29	汽车（曲轴）刀具 Automobile (Crankshaft) Cutting Tool



平装浅切槽刀具

Groove Cutting Tools (Horizontal Design Type)



(单位: mm Unit: mm)

型号 Order No.		槽宽W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	位置L Location L	ΦD	Φd	R	H	刀杆型号 Holder Order No.
JT16ER/NL1.00	JT16NR/EL1.00	1.00	1.85	1.8	15.3	9.525	4	0.05	3.65	SER/L1212H16
JT16ER/NL1.05	JT16NR/EL1.05	1.05								SER/L1616H16
JT16ER/NL1.10	JT16NR/EL1.10	1.10								SER/L2020H16
JT16ER/NL1.15	JT16NR/EL1.15	1.15								SER/L2525H16
JT16ER/NL1.20	JT16NR/EL1.20	1.20								SER/L3225H16
JT16ER/NL1.25	JT16NR/EL1.25	1.25								SER/L3232H16
JT16ER/NL1.30	JT16NR/EL1.30	1.30	2.05	2						SNR/L0013M16
JT16ER/NL1.35	JT16NR/EL1.35	1.35								SNR/L0016N16
JT16ER/NL1.40	JT16NR/EL1.40	1.40								SNR/L0020Q16
JT16ER/NL1.45	JT16NR/EL1.45	1.45								SNR/L0025R16W
JT16ER/NL1.50	JT16NR/EL1.50	1.50								SNR/L0032S16W
JT16ER/NL1.55	JT16NR/EL1.55	1.55								

平装浅切槽刀具

Groove Cutting Tools (Horizontal Design Type)

(单位: mm Unit: mm)

型号 Order No.		槽宽W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	位置L Location L	ΦD	Φd	R	H	刀杆型号 Holder Order No.					
JT16ER/NL1.60	JT16NR/EL1.60	1.60	2.05	2	15.3	9.525	4	0.05	3.65	SER/L1212H16 SER/L1616H16 SER/L2020H16 SER/L2525H16 SER/L3225H16 SER/L3232H16 SNR/L0013M16 SNR/L0016N16 SNR/L0020Q16 SNR/L0025R16W SNR/L0032S16W					
JT16ER/NL1.65	JT16NR/EL1.65	1.65													
JT16ER/NL1.70	JT16NR/EL1.70	1.70	2.25	2.2											
JT16ER/NL1.75	JT16NR/EL1.75	1.75													
JT16ER/NL1.80	JT16NR/EL1.80	1.80													
JT16ER/NL1.85	JT16NR/EL1.85	1.85													
JT16ER/NL1.90	JT16NR/EL1.90	1.90													
JT16ER/NL1.95	JT16NR/EL1.95	1.95													
JT16ER/NL2.00	JT16NR/EL2.00	2.00	2.45	2.4											
JT16ER/NL2.05	JT16NR/EL2.05	2.05													
JT16ER/NL2.10	JT16NR/EL2.10	2.10													
JT16ER/NL2.15	JT16NR/EL2.15	2.15													
JT16ER/NL2.20	JT16NR/EL2.20	2.20													
JT22ER/NL2.25	JT22NR/EL2.25	2.25	2.55	2.5						20.2	12.7	5	0.1	4.76	SER/L2525M22 SER/L3225P22 SER/L3232P22 SNR/L0032S22 SNR/L0040T22
JT22ER/NL2.30	JT22NR/EL2.30	2.30													
JT22ER/NL2.35	JT22NR/EL2.35	2.35													
JT22ER/NL2.40	JT22NR/EL2.40	2.40													
JT22ER/NL2.45	JT22NR/EL2.45	2.45													
JT22ER/NL2.50	JT22NR/EL2.50	2.50	3.05	3											
JT22ER/NL2.55	JT22NR/EL2.55	2.55													
JT22ER/NL2.60	JT22NR/EL2.60	2.60													
JT22ER/NL2.65	JT22NR/EL2.65	2.65													
JT22ER/NL2.70	JT22NR/EL2.70	2.70													
JT22ER/NL2.75	JT22NR/EL2.75	2.75													
JT22ER/NL2.80	JT22NR/EL2.80	2.80	3.00												
JT22ER/NL2.85	JT22NR/EL2.85	2.85													
JT22ER/NL2.90	JT22NR/EL2.90	2.90													
JT22ER/NL2.95	JT22NR/EL2.95	2.95													
JT22ER/NL3.00	JT22NR/EL3.00	3.00													

*可根据客户需要定制槽型

Groove can be designed as per customer's request

切槽刀具推荐切削条件

Groove Cutting Tools Recommended Cutting Parameter

国际标准 National Standard	材料 Material	速度m/min Speed m/min
P	低、中碳钢 Low,medium carbon steel	20-100
	高碳钢 High carbon contented steel	30-80
	合金钢、调质钢 Alloy steel,Quenched and tempered steel	40-90
M	不锈钢 Stainless steel	30-80
	铸钢 Cast iron steel	30-90
K	铸铁 Cast iron	30-90
N	非铁金属或铝合金 Nonferrous or Aluminum	20-200

加工要点

Processing Key Point

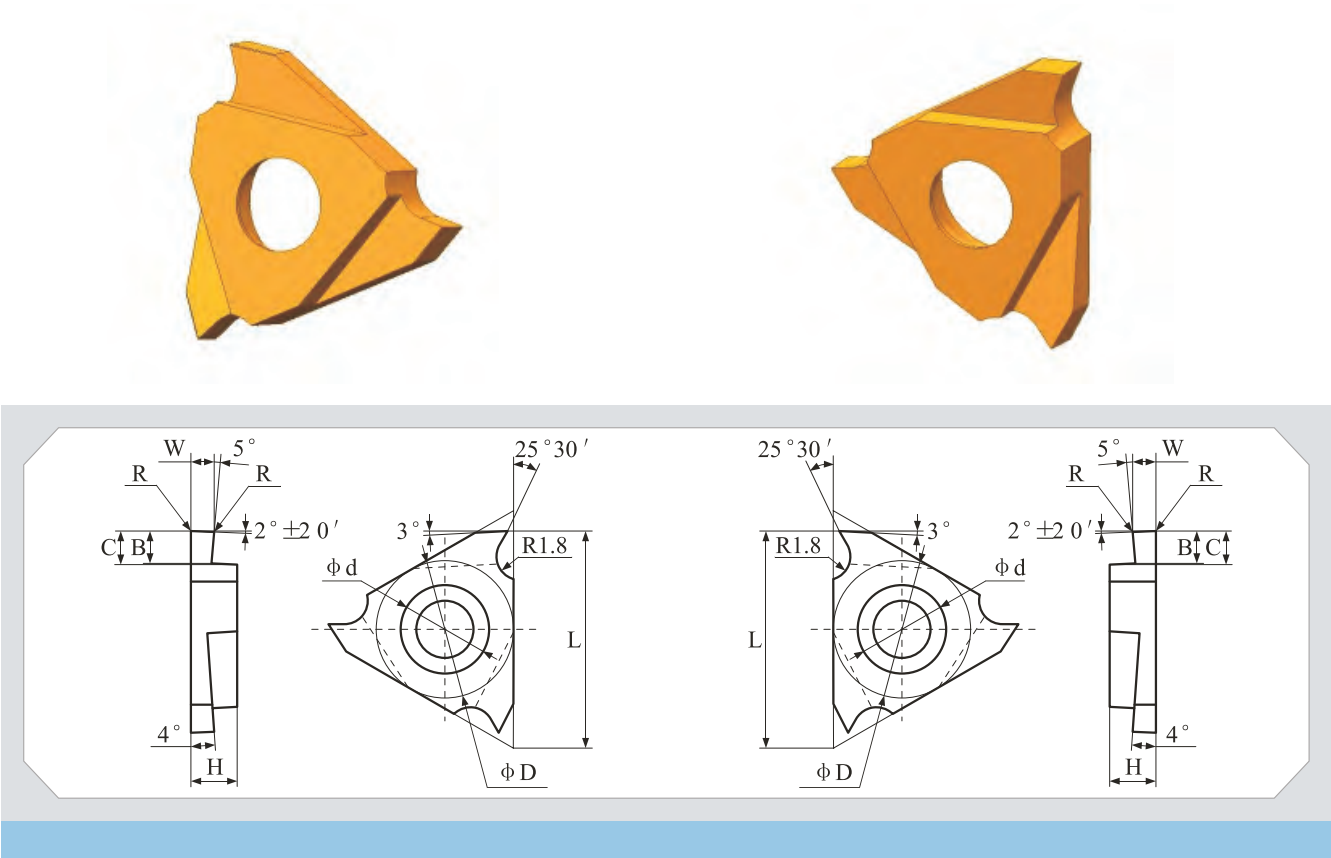
切槽深度在0.5mm以下，精加工时刀尖负荷小，所以切槽加工后，可直接做横向加工无需停顿。
Groove depth is below 0.5mm, limited load on insert's tip in finish processing so there is no interruption only horizontal processing after groove machining.

目前我公司的切槽刀具主要以浅切槽加工为主，考虑到不同的加工习惯、不同的被加工工件结构，主要分为可转位平装切槽刀、可转位立装切槽刀以及小孔径内孔槽刀这几类，精确保证槽型尺寸和转位精度，充分发挥我公司从毛坯压制到涂层覆盖一整套自主工艺的优势，展示了国内切槽刀具的新水准。标准刀具系列只是我们业务的一部分，异形槽刀具和非标槽刀具也是我们的强项。

CTRI groove cutting tool is mainly used for shallow groove. It is categorized into indexable groove cutting tools (laydown type), indexable groove cutting tools (on edge type), and groove cutting tools for small inner bore considering different machining ways and component's structure to ensure groove dimensions and accuracy with the best utilization of whole independent processing from blank pressing to coating application, and achieved new grooving performance. Standard groove cutting tool is only part of CTRI business, special profile groove cutter and non-standard groove cutter are where major strength lies in.

立装浅切槽刀具

Groove Cutting Tool (Vertical Design Type)



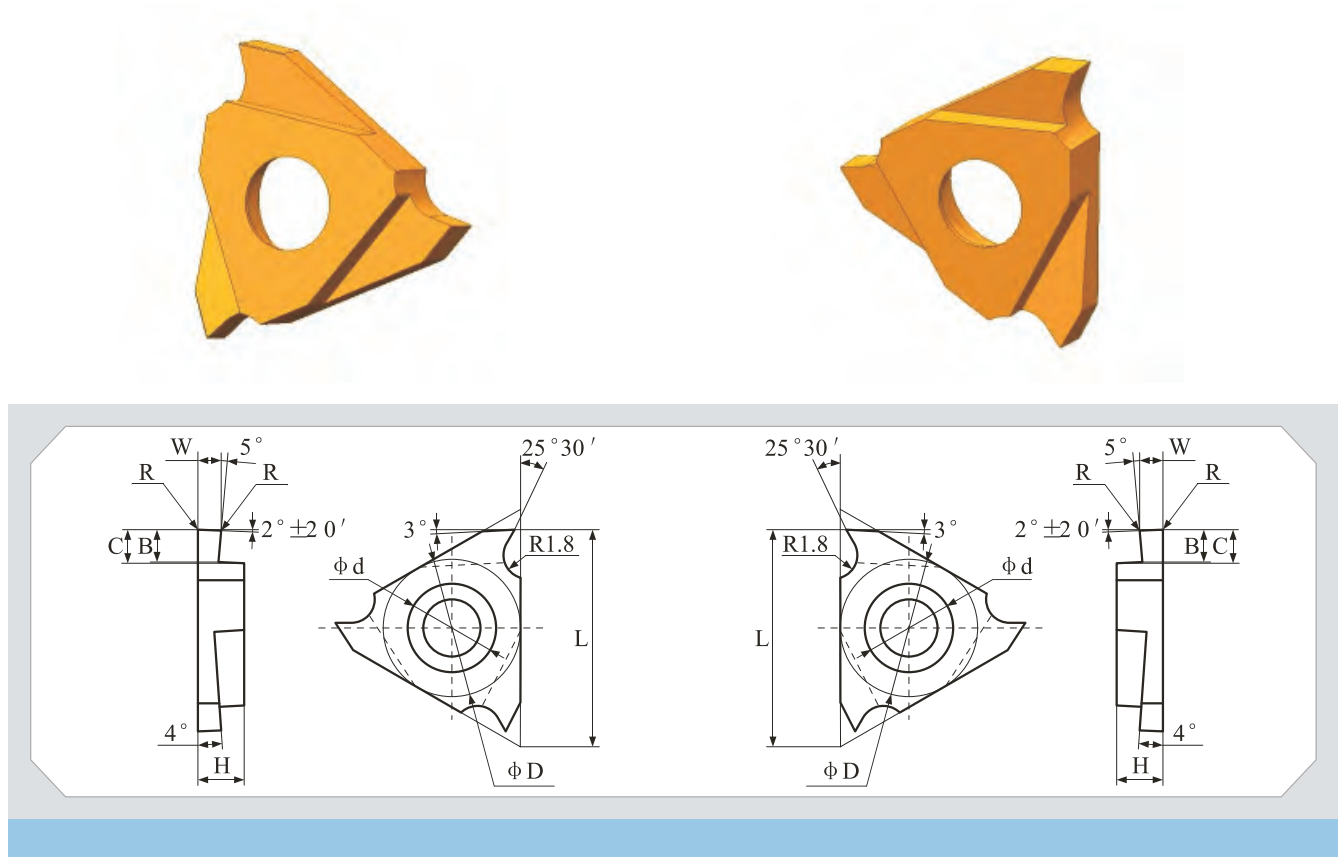
(单位: mm Unit: mm)

型号 Order No.	槽宽W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	位置L Location L	ΦD	Φd	R	H	刀杆型号 Holder Order No.
JTGR/L3050	0.50	1.2	1.1	15.1	9.525	4.4	0.03	3.18	
JTGR/L3055	0.55	2	1.9						
JTGR/L3060	0.60								
JTGR/L3065	0.65								
JTGR/L3070	0.70								
JTGR/L3075	0.75								
JTGR/L3080	0.80								
JTGR/L3085	0.85								
JTGR/L3090	0.90								
JTGR/L3095	0.95								
JTGR/L3100	1.00	2.2	2.1				0.05		
JTGR/L3105	1.05								

型号 Order No.	槽宽W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	位置L Location L	ΦD	Φd	R	H	刀杆型号 Holder Order No.
JTGR/L3110	1.10	2.2	2.1	15.1	9.525	4.4	0.05	3.18	QTGFR/L1010H-16 QTGFR/L1212H-16 QTGFR/L1616H-16 QTGFR/L2020H-16 QTGFR/L2525H-16
JTGR/L3115	1.15								
JTGR/L3120	1.20								
JTGR/L3125	1.25								
JTGR/L3130	1.30								
JTGR/L3135	1.35								
JTGR/L3140	1.40								
JTGR/L3145	1.45								
JTGR/L3150	1.50								
JTGR/L3155	1.55								
JTGR/L3160	1.60								
JTGR/L3165	1.65								
JTGR/L3170	1.70								
JTGR/L3175	1.75								
JTGR/L3180	1.80								
JTGR/L3185	1.85								
JTGR/L3190	1.90								
JTGR/L3195	1.95	2.7	2.6	15.1	9.525	4.4	0.05	3.18	QTGFR/L1010H-16 QTGFR/L1212H-16 QTGFR/L1616H-16 QTGFR/L2020H-16 QTGFR/L2525H-16
JTGR/L3200	2.00								
JTGR/L3205	2.05								
JTGR/L3210	2.10								
JTGR/L3215	2.15								
JTGR/L3220	2.20								
JTGR/L3225	2.25								
JTGR/L3230	2.30								
JTGR/L3235	2.35								
JTGR/L3240	2.40								
JTGR/L3245	2.45								
JTGR/L3250	2.50								
JTGR/L3255	2.55								
JTGR/L3260	2.60								
JTGR/L3265	2.65								
JTGR/L3270	2.70								
JTGR/L3275	2.75								
JTGR/L3280	2.80								
JTGR/L3285	2.85								
JTGR/L3290	2.90								
JTGR/L3295	2.95								
JTGR/L3300	3.00								

立装浅切槽刀具

Groove Cutting Tool (Vertical Design Type)



(单位: mm Unit: mm)

型号 Order No.	槽宽W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	位置L Location L	ΦD	Φd	R	H	刀杆型号 Holder Order No.
JTGR/L4150	1.50	3.6	3.5	20.4	12.7	5	0.1	4.76	QTGFR/L1010H-16 QTGFR/L1212H-16 QTGFR/L1616H-16 QTGFR/L2020H-16 QTGFR/L2525H-16
JTGR/L4155	1.55								
JTGR/L4160	1.60								
JTGR/L4165	1.65								
JTGR/L4170	1.70								
JTGR/L4175	1.75								
JTGR/L4180	1.80								
JTGR/L4185	1.85								
JTGR/L4190	1.90								
JTGR/L4195	1.95								
JTGR/L4200	2.00								
JTGR/L4205	2.05								
JTGR/L4210	2.10								

型号 Order No.	槽宽W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	位置L Location L	ΦD	Φd	R	H	刀杆型号 Holder Order No.
JTGR/L4215	2.15	3.6	3.5	20.4	12.7	5	0.1	4.76	QTGFR/L1010H-16 QTGFR/L1212H-16 QTGFR/L1616H-16 QTGFR/L2020H-16 QTGFR/L2525H-16
JTGR/L4220	2.20								
JTGR/L4225	2.25								
JTGR/L4230	2.30								
JTGR/L4235	2.35								
JTGR/L4240	2.40								
JTGR/L4245	2.45								
JTGR/L4250	2.50	4.6	4.5						
JTGR/L4255	2.55								
JTGR/L4260	2.60								
JTGR/L4265	2.65								
JTGR/L4270	2.70								
JTGR/L4275	2.75								
JTGR/L4280	2.80								
JTGR/L4285	2.85								
JTGR/L4290	2.90	5.1	5						
JTGR/L4295	2.95								
JTGR/L4300	3.00								
JTGR/L4305	3.05								
JTGR/L4310	3.10								
JTGR/L4315	3.15								
JTGR/L4320	3.20								
JTGR/L4325	3.25								
JTGR/L4330	3.30								
JTGR/L4335	3.35								
JTGR/L4340	3.40								
JTGR/L4345	3.45								
JTGR/L4350	3.50								
JTGR/L4355	3.55								
JTGR/L4360	3.60								
JTGR/L4365	3.65								
JTGR/L4370	3.70								
JTGR/L4375	3.75								
JTGR/L4380	3.80								
JTGR/L4385	3.85								
JTGR/L4390	3.90								
JTGR/L4395	3.95								
JTGR/L4400	4.00								
JTGR/L4405	4.05								

型号 Order No.	槽宽W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	位置L Location L	ΦD	Φd	R	H	刀杆型号 Holder Order No.
JTGR/L4410	4.10	5.1	5	20.4	12.7	5	0.1	4.76	QTGFR/L1010H-16 QTGFR/L1212H-16 QTGFR/L1616H-16 QTGFR/L2020H-16 QTGFR/L2525H-16
JTGR/L4415	4.15								
JTGR/L4420	4.20								
JTGR/L4425	4.25								
JTGR/L4430	4.30								
JTGR/L4435	4.35								
JTGR/L4440	4.40								
JTGR/L4445	4.45								
JTGR/L4450	4.50								

*可根据客户需要定制槽型 Groove can be designed as per customer's request

切槽刀具推荐切削条件

Groove Cutting Tools Recommended Cutting Parameter

国际标准 National Standard	材料 Material	速度m/min Speed m/min
P	低、中碳钢 Low/Midium Carbon steel	20-100
	高碳钢 High Carbon Contented Steel	30-80
	合金钢、调质钢 Alloy Steel,quenched and tempered steel	40-90
M	不锈钢 Stainless Steel	30-80
	铸钢 Cast Iron Steel	30-90
K	铸铁 Cast Iron	30-90
N	非铁金属或铝合金 Nonferrous or Aluminum	20-200

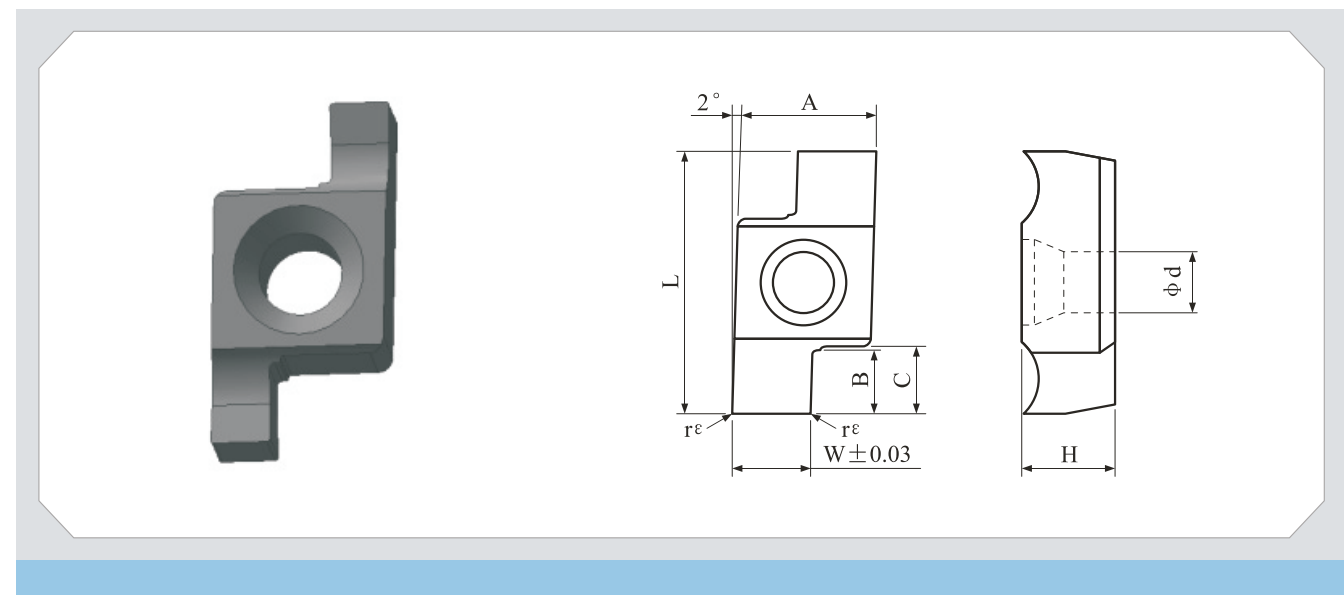
加工要点

Processing Key Points

切槽深度在0.5mm以下，精加工时刀尖负荷小，所以切槽加工后，可直接做横向加工无需停顿。
Groove depth is below 0.5mm, limited load on insert's tip in finish processing so there is no interruption only horizontal processing after groove machining.

可转位内孔浅切槽刀具

Indexable Inner Bore Groove Cutting Tool



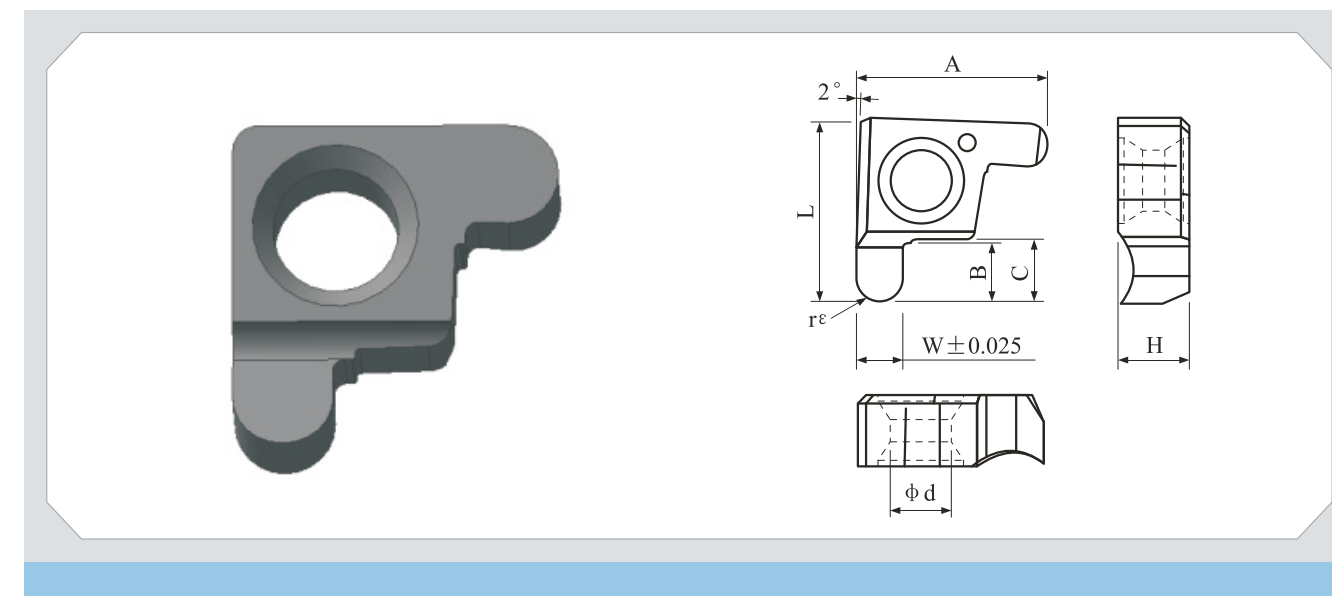
(单位: mm Unit: mm)

型号 Order No.	槽宽 W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	re	A	L	H	
JTNCR100C	1.0	2.3	2.2	0.1	11.5	5.8	2.8	
JTNCR110C	1.1							
JTNCR120C	1.2							
JTNCR130C	1.3							
JTNCR140C	1.4							
JTNCR150C	1.5							
JTNCR160C	1.6			0.15				
JTNCR170C	1.7							
JTNCR180C	1.8							
JTNCR190C	1.9							
JTNCR200C	2.0							
JTNCR250C	2.5							
JTNCR300C	3.0							0.2
JTNCR350C	3.5							

*可根据客户需要定制槽型
Groove can be designed as per customer's request

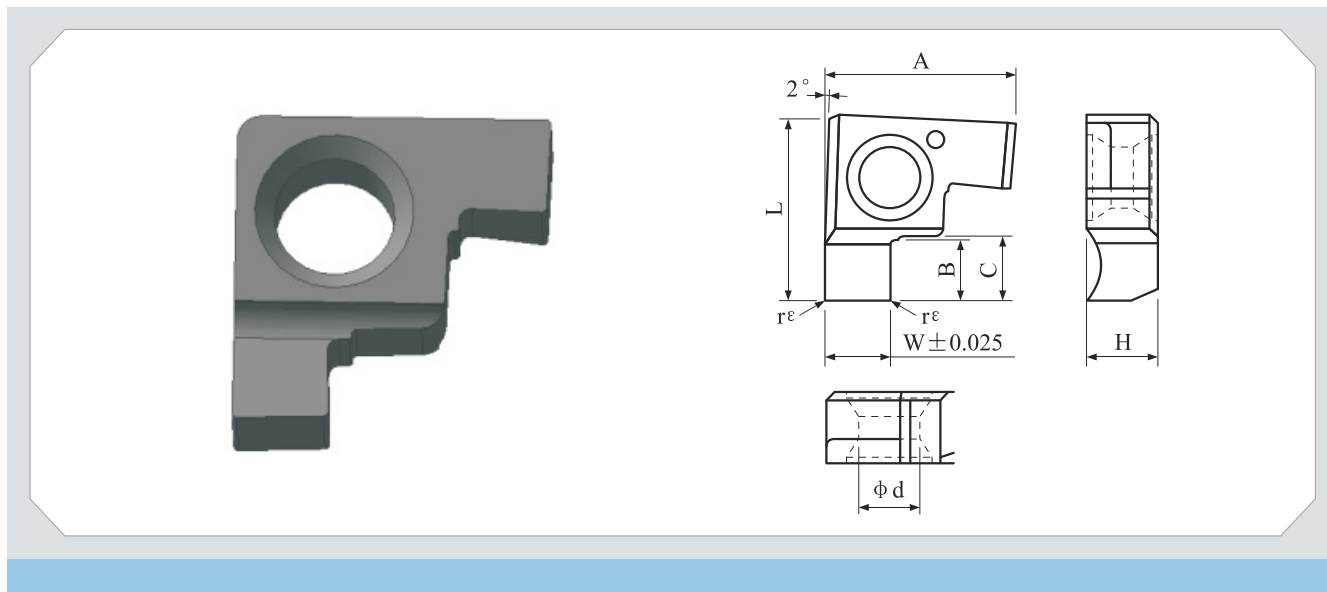
可转位内孔浅切槽刀具

Indexable Inner Bore Groove Cutting Tool



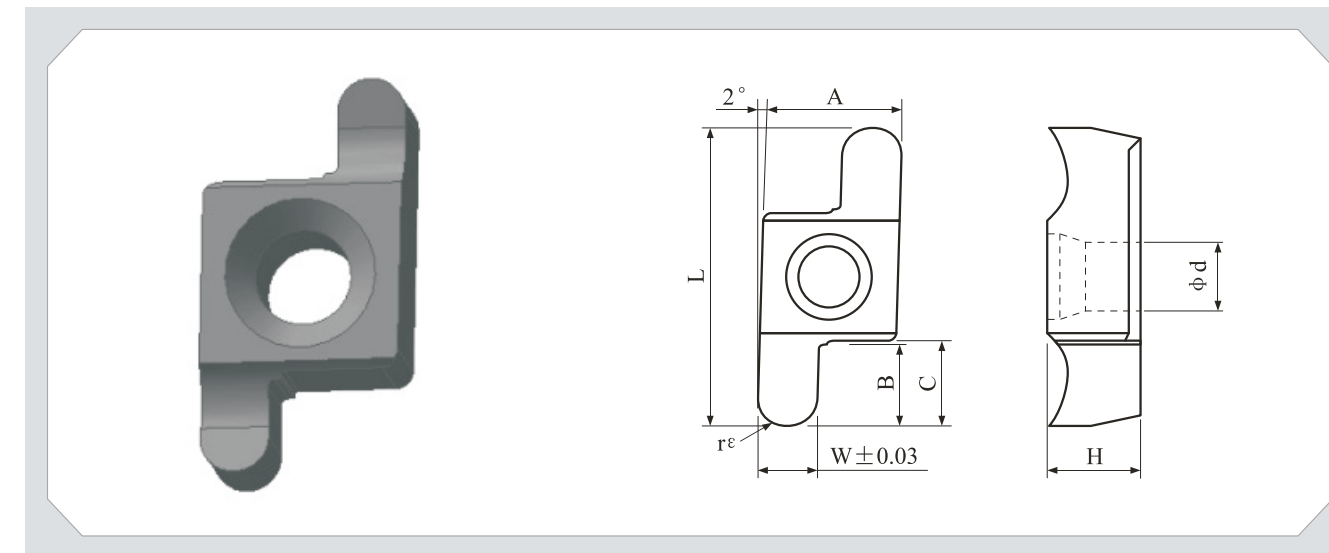
(单位: mm Unit: mm)

型号 Order No.	槽宽 W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	re	A	L	H
JTNCR100-050AR	1.0	1.7	1.5	0.5	6.4	5.9	2.5
JTNCR120-060AR	1.2			0.6			
JTNCR140-070AR	1.4			0.7			
JTNCR150-075AR	1.5			0.75			
JTNCR160-080AR	1.6			0.8			
JTNCR180-090AR	1.8			0.9			
JTNCR200-100AR	2.0			1.0			
JTNCR100-050BR	1.0	2.6	2.2	0.5	8.2	8.5	2.8
JTNCR120-060BR	1.2			0.6			
JTNCR140-070BR	1.4			0.7			
JTNCR150-075BR	1.5			0.75			
JTNCR160-080BR	1.6			0.8			
JTNCR180-090BR	1.8			0.9			
JTNCR200-100BR	2.0			1.0			
JTNCR220-110BR	2.2			1.1			
JTNCR240-120BR	2.4			1.2			
JTNCR250-125BR	2.5			1.25			
JTNCR260-130BR	2.6			1.3			
JTNCR280-140BR	2.8			1.4			
JTNCR300-150BR	3.0			1.5			



(单位: mm Unit: mm)

型号 Order No.	槽宽 W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	rε	A	L	H
JTNCR100A	1.0	1.7	1.5	0.05	6.4	5.9	2.5
JTNCR110A	1.1						
JTNCR120A	1.2						
JTNCR125A	1.25						
JTNCR130A	1.3						
JTNCR140A	1.4						
JTNCR150A	1.5						
JTNCR160A	1.6						
JTNCR170A	1.7						
JTNCR180A	1.8						
JTNCR190A	1.9	2.6	2.2	0.1	8.2	8.5	2.8
JTNCR200A	2.0						
JTNCR100B	1.0						
JTNCR110B	1.1						
JTNCR120B	1.2						
JTNCR130B	1.3						
JTNCR140B	1.4						
JTNCR150B	1.5						
JTNCR160B	1.6						
JTNCR170B	1.7						
JTNCR180B	1.8	2.6	2.2	0.15	8.2	8.5	2.8
JTNCR190B	1.9						
JTNCR200B	2.0						
JTNCR250B	2.5						
JTNCR300B	3.0	2.6	2.2	0.2	8.2	8.5	2.8



(单位: mm Unit: mm)

型号 Order No.	槽宽 W Groove Width W	最大深度C Maximum Depth C	可加工深度B Depth to Be Cut B	rε	A	L	H
JTNCR150-075CR	1.5	2.7	2.5	0.75	11.5	5.8	2.8
JTNCR200-100CR	2.0			1.0			
JTNCR250-125CR	2.5			1.25			
JTNCR300-150CR	3.0			1.5			
JTNCR150-075DR	1.5	4.8	3.2	0.75	16.5	6.8	3.4
JTNCR200-100DR	2.0			1.0			
JTNCR250-125DR	2.5			1.25			
JTNCR300-150DR	3.0		4.5	1.5			
JTNCR400-200DR	4.0			2.0			

推荐切削条件

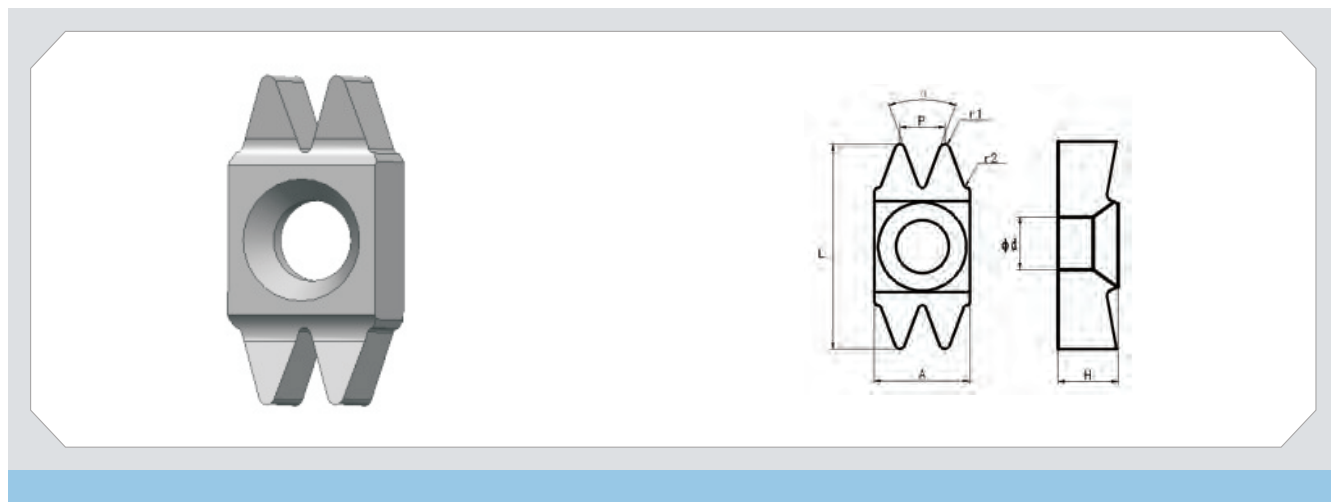
Recommended Cutting Parameter

被加工材料 Material to Be Cut	推荐刀片材质 (切削速度) (m/min)	①切槽加工时的进给 Feed while groove cutting			备注 Remarks
	Recommended Insert Grade (Cutting Speed)	②横向进给加工时的进给 Feed while horizontal processing			
	PVD涂层硬质合金 PVD Coating Carbide	③横向进给加工时的切深 (m/rev) Cutting depth while Horizontal processing (m/rev)			
		JTNCR100A—200A JTNCR100-050AR—100AR	JTNCR100B—200B JTNCR100-050BR—100BR	JTNCR250B—300B	
碳钢 Carbon Steel	50-80	①0.01-0.03	①0.02-0.04	①0.02-0.04	湿式 Wet Cutting
		②0.01-0.03	②0.02-0.04	②0.02-0.04	
		③Max.0.05	③Max.0.05	③Max.0.1	
合金钢 Alloy Steel	50-80	①0.01-0.03	①0.02-0.04	①0.02-0.04	
		②0.01-0.03	②0.02-0.04	②0.02-0.04	
		③Max.0.05	③Max.0.05	③Max.0.1	
不锈钢 Stainless Steel	50-80	①0.01-0.03	①0.01-0.03	①0.01-0.03	
		②0.01-0.03	②0.01-0.03	②0.01-0.03	
		③Max.0.1	③Max.0.1	③Max.0.2	

汽车皮带轮刀具 Automobile Pulley Cutter

双齿皮带轮刀具

Double Gear Pulley Cutter



(单位: mm Unit: mm)

型号 Order No.	r1	r2	P	L	A	H	α	Φd	刀杆型号 Holder Order No.
PDL40(3.04)	0.49	0.46	3.56	16.2	7.58	4.75	40°35'	4.2	
PDL40(3.45)	0.4	0.3	3.56	16.2	7.58	4.75	40°35'	4.2	DPDL2020M40-345
PDL40(3.45)YL	0.413	0.312	3.56	16.2	7.58	4.75	40°	4.2	DPDL2525M40-345
PDL37(2-2)	0.3	0.25	3.56	16.2	7.58	4.75	37°	4.2	

*可根据客户需要定制槽型 Groove can be designed as per customer's request

该型刀具采用了合理的结构、可靠的装夹方式，相比传统的皮带轮加工方式，不仅仅是缩短了单件加工时间，更简化了整个生产流程，减少了不必要的用刀，而槽型的精度和表面光洁度还得到了极大提升，体现出刀具的超高性价比。

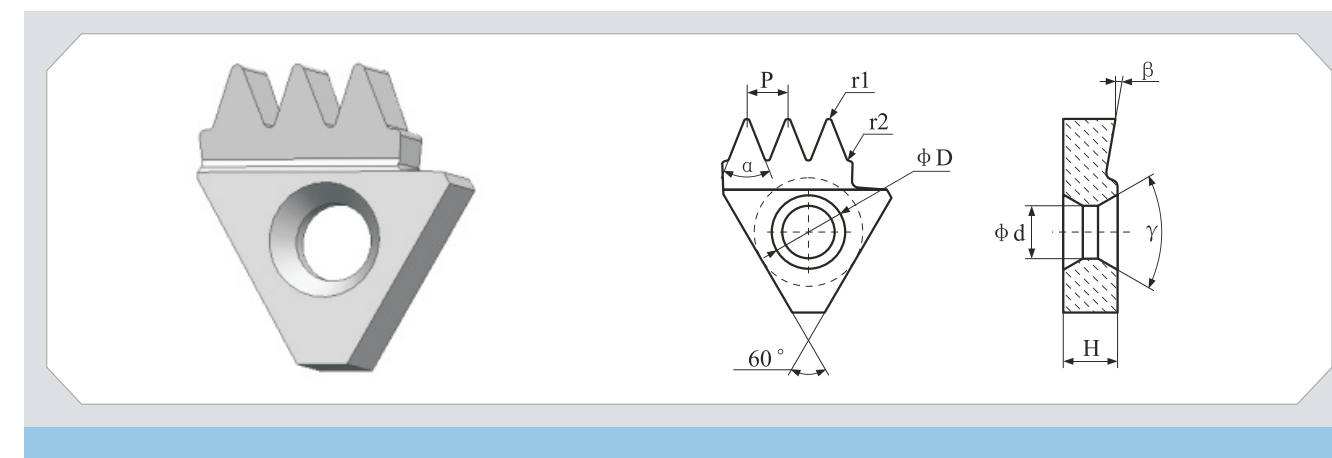
Compared to traditional pulley processing, CTRI groove cutter reduces operation time, simplifies whole processing, reduces unnecessary insert change, improves groove accuracy and surface roughness with reasonable insert structure and stable clamping.



品质源于
1956
Since 1956

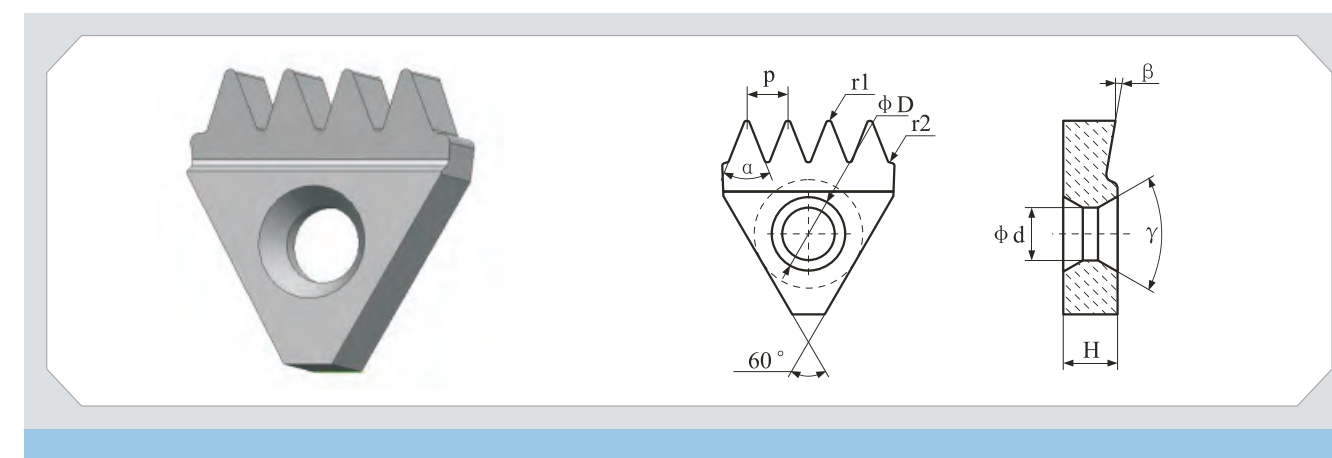
V型多齿皮带轮刀具

V Type Multiple Cutting Edges Pulley Cutting Tool



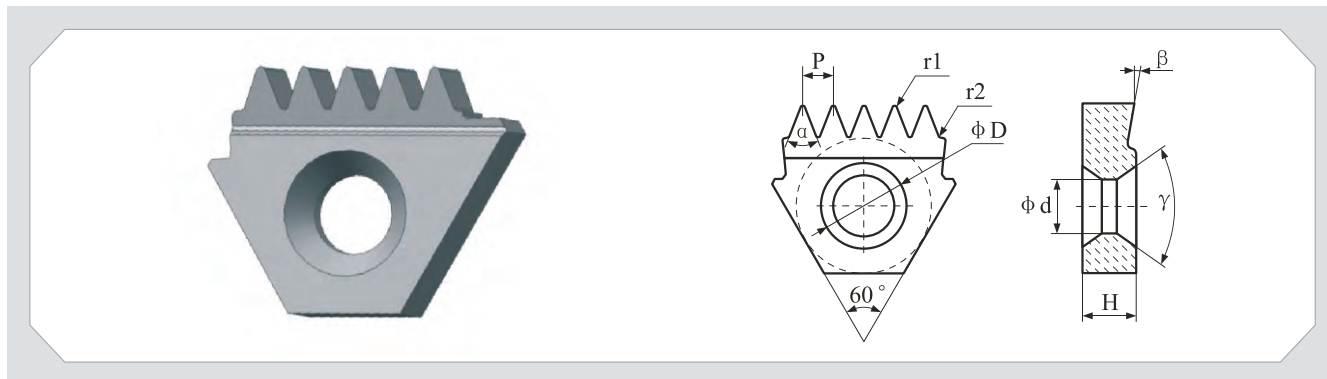
(单位: mm Unit: mm)

型号 Order No.	ΦD	Φd	r1	r2	α	β	γ	P	刀杆型号 Holder Order No.
VPDL3CI	9.525	4.44	不定 customized	不定 customized	40° (不定) 40° customized	10°	60°	3.56	PDL3C-DG
VPDL3C II	9.525	6.35	不定 customized	不定 customized	40° (不定) 40° customized	10°	75°	3.56	PDL4C-DG



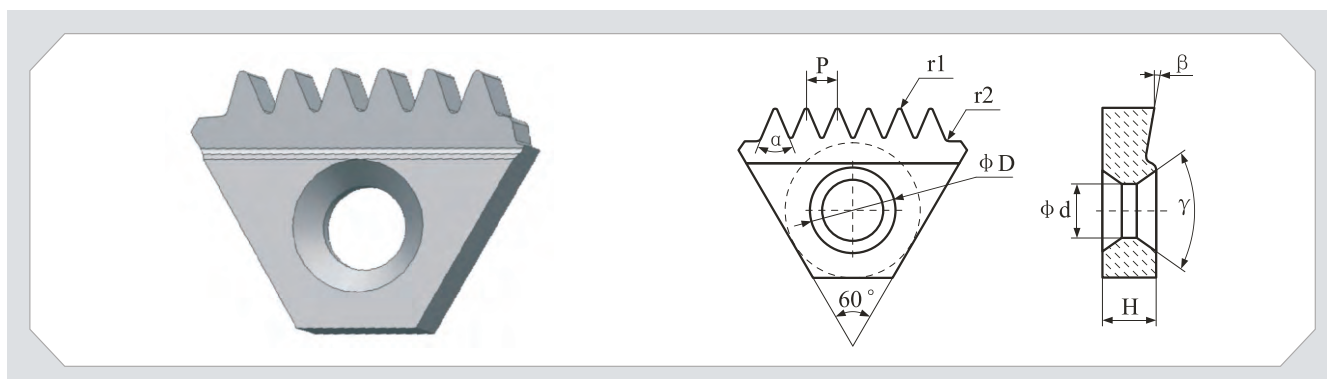
(单位: mm Unit: mm)

型号 Order No.	ΦD	Φd	r1	r2	α	β	γ	P	刀杆型号 Holder Order No.
VPDL4CI	9.525	4.44	不定 customized	不定 customized	40° (不定) 40° customized	10°	60°	3.56	PDL3C-DG
VPDL4C II	15.875	6.35	不定 customized	不定 customized	40° (不定) 40° customized	10°	75°	3.56	PDL4C-DG



(单位: mm Unit: mm)

型号 Order No.	ΦD	Φd	r1	r2	α	β	γ	P	刀杆型号 Holder Order No.
VPDL5C	15.875	6.35	不定 customized	不定 customized	40° (不定) 40° customized	10°	75°	3.56	PDL4C-DG



(单位: mm Unit: mm)

型号 Order No.	ΦD	Φd	r1	r2	α	β	γ	P	刀杆型号 Holder Order No.
VPDL6C	15.875	6.35	不定 customized	不定 customized	40° (不定) 40° customized	10°	75°	3.56	PDL4C-DG

加工要点

Processing Key Points

此类刀具齿数较多，切深较深，为保证刀具使用时间，建议用于精加工，可先对被加工件进行预处理；由于加工阻力较大，建议机床功率不小于11KW。

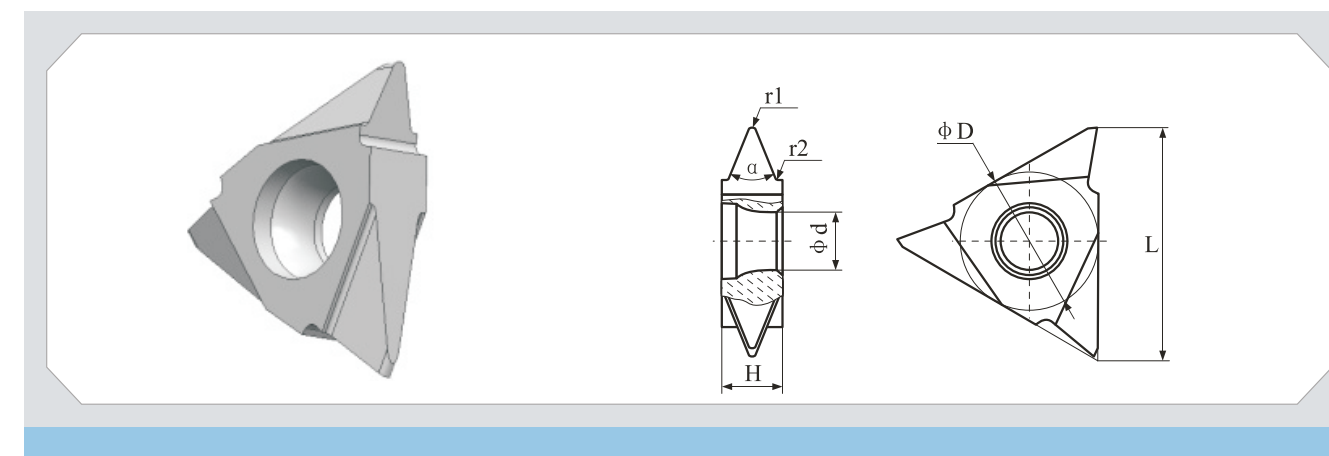
There are more cutting edges and deeper cutting depth in this kind groove cutter. To ensure inserts life, we suggest apply multiple groove cutters in finish processing and do rough processing earlier. Machine power suggested to be less than 11kw due to processing resistance.

本产品为硬质合金皮带轮楔槽成型加工专用切削刀具，是我公司的实用新型专利。该刀具使皮带轮加工实现楔槽一次性精密加工，大大提高皮带轮成品的尺寸精度和表面质量，减少换刀次数和用刀种类，大大缩短单件产品加工时间，让用户在皮带轮加工中极大的提高生产效率和产品质量，改变国内皮带轮行业“中低端过剩、高端不足”的局面。

Pulley groove inserts developed by CTRI are specially designed for carbide automobile belt pulley cutting new patented products and make one time cutting possible for precise machining. This application greatly improves accuracy and surface quality of the pulley. It reduces times of changing inserts, shortens machining time per component, improves efficiency and product quality, and thus eventually changes the “insufficient high level products” situation in domestic pulley industry.

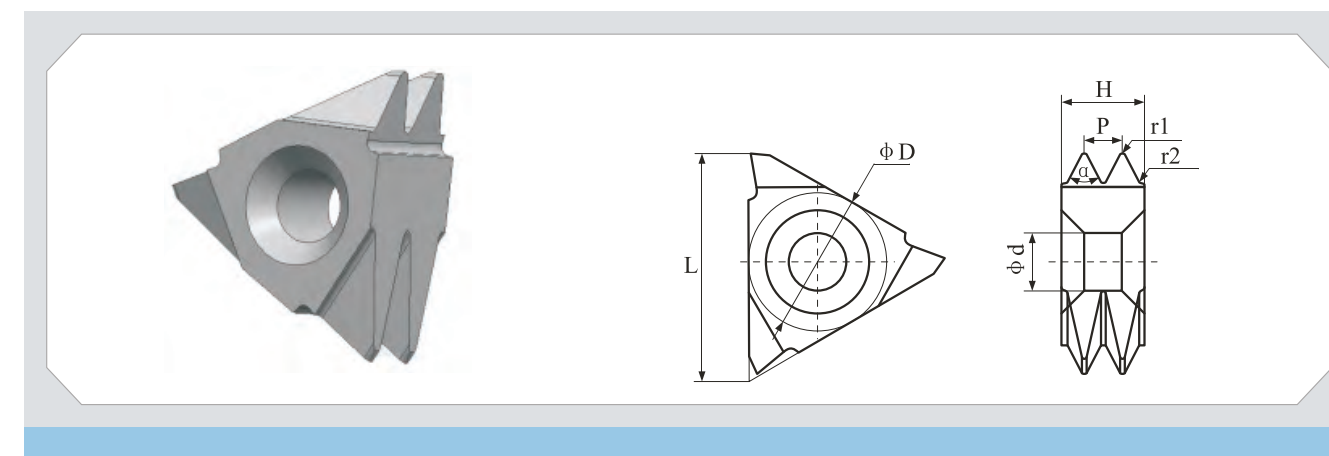
立装皮带轮刀具

Pulley Groove Cutting Tools (Vertical Design)



(单位: mm Unit: mm)

型号 Order No.	ΦD	Φd	r1	r2	α	L	H	P
PDL40(3-1)	9.525	4.4	0.43	0.32	40°	16.1	4.15	



(单位: mm Unit: mm)

型号 Order No.	ΦD	Φd	r1	r2	α	L	H	P
PDL40(3-2)YL	12.7	5.3	0.413	0.312	40°	21	7.56	3.56

*可根据客户需要定制槽型 Groove can be designed as per customer's request

此类刀具是在双齿双头皮带轮刀具的基础之上，结合我公司长期的刀具经验开发而来，目的是更全面地照顾到客户的用刀习惯、进一步满足客户的增效要求，该刀具转位精度高、单片效率高，是皮带轮加工新的选择。

Pulley groove inserts (on edge type) are developedI based on double cutting edges pulley groove cutting tools with years manufacturing experience. It aims to meet customer's increasing requirement. This groove cutter shows high indexable accuracy and efficiency, is a new option for pulley machining.

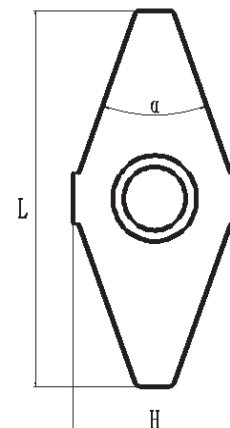
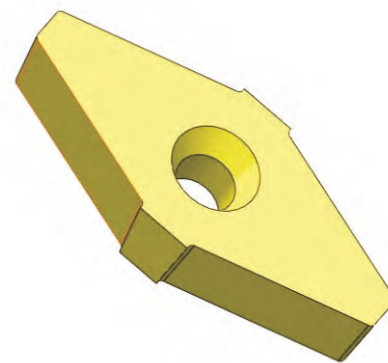
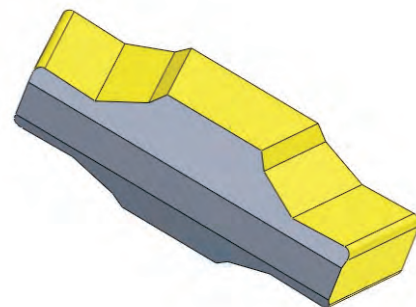
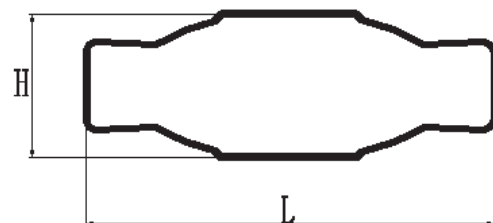
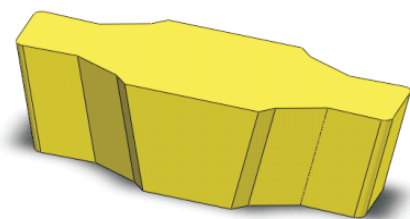
电梯轮槽刀具 Groove Cutting Tool for Elevator Wheel

电梯轮槽刀具

Groove Cutting Tool for Elevator Wheel

刀片示意
Insert Sketch

我公司具有制造中大型轮槽刀具的丰富经验，图片为主要产品展示，代表不同结构。刀具规格与具体尺寸可进行定制。
Our company has the rich experience in manufacturing large wheel grooves. The pictures show the main products and represent different structures. Tool specifications and specific dimensions can be customized.



整体硬质合金立铣刀 Solid Carbide End Milling Cutter

四刃直柄平头立铣刀

Four Edges Straight Shank Flat End Milling Cutter

(单位: mm Unit: mm)

刀片示意 Insert Sketch	型号 Order No.	基本尺寸(mm) Basic Size				齿数 Number of Teeth
		D	d	H	L	
	D3*8*50*d4*4T	3	4	8	50	4
	D4*11*50*d4*4T	4	4	11	50	4
	D3*8*50*d6*6T	3	6	8	50	4
	D3.5*10*50*d6*4T	3.5	6	10	50	4
	D4*11*50*d6*4T	4	6	11	50	4
	D4.5*11*50*d6*4T	4.5	6	11	50	4
	D5*13*50*d6*4T	5	6	13	50	4
	D5.5*16*50*d6*4T	5.5	6	16	50	4
	D6*16*50*d6*4T	6	6	16	50	4
	D7*20*60*d8*4T	7	8	20	60	4
	D8*20*60*d8*4T	8	8	20	60	4
	D9*22*75*d10*4T	9	10	22	75	4
	D10*25*75*d10*4T	10	10	25	75	4
	D11*26*75*d12*4T	11	12	26	75	4
	D12*30*75*d12*4T	12	12	30	75	4

以上型号为标准通用型，也可根据客户实际需求选择刃数、刃长短，或定制其他非标尺寸
The above model is standard general type, and the number of edges, edges and other non - standard sizes can be selected according to the actual needs of the customers.

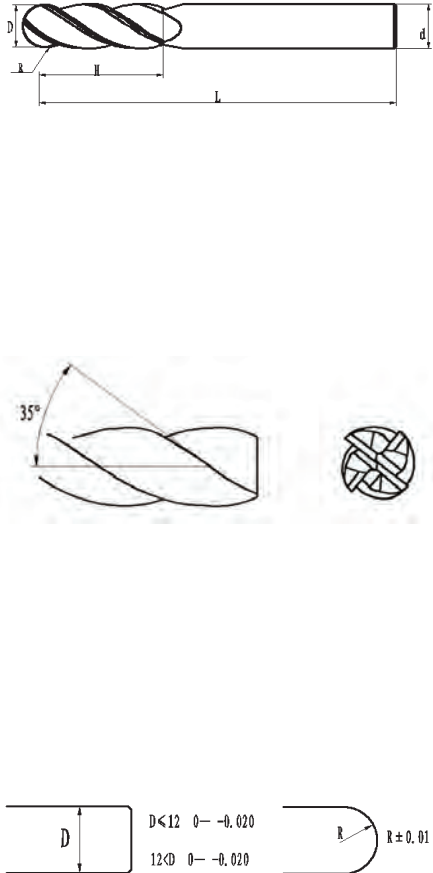
(单位: mm Unit: mm)

被加工料 Processed Material	铸铁, 球墨铸铁 Cast Iron, Spheroidal Graphite Cast Iron		碳素钢, 合金钢 -750N/mm		碳素钢, 合金钢 -30HRC		预硬钢, 调质钢 -40HRC		不锈钢 Stainless Steel		预硬钢, 调质钢 -50HRC	
直径 Diameter	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)
3	14000	610	14000	610	13000	570	10600	470	7500	110	8500	370
4	10800	630	10800	630	10000	575	8000	480	5500	115	6500	380
5	8200	660	8200	660	7600	600	6400	505	4500	115	5000	400
6	7000	675	7000	675	6400	620	5300	515	3700	120	4200	405
8	5200	665	5200	665	4800	610	4000	510	2800	120	3200	415
10	4200	660	4200	660	3800	600	3200	505	2200	120	2500	390
12	3500	660	3500	660	3200	600	2650	505	1850	120	2100	390

四刃直柄球头立铣刀

Four Blade Straight Handle Ball End Mill

(单位: mm Unit: mm)

刀片示意 Insert Sketch	型号 Order No.	基本尺寸(mm) Basic Size					齿数 Number of Teeth
		D	d	H	L	R	
	D3-R1.5*6*50*d6*4T	3	6	6	50	1.5	4
	D4-R2.0*8*50*d6*4T	4	6	8	50	2	4
	D5-R2.5*10*50*d6*4T	5	6	10	50	2.5	4
	D6-R3.0*12*50*d6*4T	6	6	12	50	3	4
	D8-R4.0*16*60*d8*4T	8	8	16	60	4	4
	D10-R5.0*20*75*d10*4T	10	10	20	75	5	4
	D12-R6.0*24*75*d12*4T	12	12	24	75	6	4

以上型号为标准通用型，也可根据客户实际需求选择刃数、刃长短，或定制其他非标尺寸
The above model is standard general type, and the number of edges, edges and other non - standard sizes can be selected according to the actual needs of the customers.

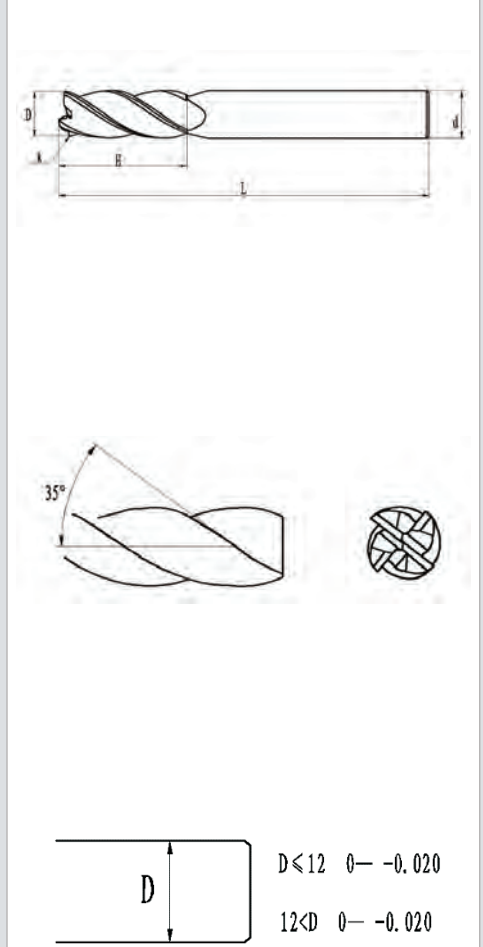
(单位: mm Unit: mm)

被加工料 Processed Material	铸铁, 球墨铸铁 Cast Iron, Spheroidal Graphite Cast Iron		碳素钢, 合金钢 -750N/mm Carbon Steel, Alloy Steel -750N/mm		碳素钢, 合金钢 -30HRC Carbon Steel, Alloy Steel -30HRC		预硬钢, 调质钢 -40HRC Pre hardened Steel, Quenched and Tempered Steel -40HRC		不锈钢 Stainless Steel		预硬钢, 调质钢 -50HRC Pre Hardened Steel, Quenched and Tempered Steel -50HRC	
直径 Diameter	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)
R1.5	15500	1710	15500	1710	12750	1340	10600	810	7400	520	8500	500
R2.0	11500	1710	11500	1710	9550	1340	8000	990	5550	660	6500	665
R2.5	9500	1890	9500	1890	7650	1440	6400	990	4450	660	5000	675
R3.0	8000	1890	8000	1890	6400	1440	5300	1040	3700	700	4200	700
R4.0	6000	2340	6000	2340	4800	1710	4000	1260	2750	820	3200	790
R5.0	4800	2160	4800	2160	3800	1620	3200	1170	2200	770	2500	790
R6.0	4000	1980	4000	1980	3200	1510	2650	1100	1850	770	2100	755

四刃直柄圆弧立铣刀

Four Edges Straight Shank Corner Radius End Mill Cutter

(单位: mm Unit: mm)

刀片示意 Insert Sketch	型号 Order No.	基本尺寸(mm) Basic Size					齿数 Number of Teeth
		D	d	H	L	R	
	D6*R0.5*16*50*d6*4T	6	6	16	50	0.5	4
	D6*R1.0*16*50*d6*4T	6	6	16	50	1	4
	D8*R0.5*20*60*d8*4T	8	8	20	60	0.5	4
	D8*R1.0*20*60*d8*4T	8	8	20	60	1	4
	D10*R0.5*25*75*d10*4T	10	10	25	75	0.5	4
	D10*R1.0*25*75*d10*4T	10	10	25	75	1	4
	D10*R2.0*25*75*d10*4T	10	10	25	75	2	4
	D10*R3.0*25*75*d10*4T	10	10	25	75	3	4
	D12*R0.5*30*75*d12*4T	12	12	30	75	0.5	4
	D12*R1.0*30*75*d12*4T	12	12	30	75	1	4
	D12*R2.0*30*75*d12*4T	12	12	30	75	2	4
	D12*R3.0*30*75*d12*4T	12	12	30	75	3	4

以上型号为标准通用型，也可根据客户实际需求选择刃数、刃长短，或定制其他非标尺寸
The above model is standard general type, and the number of edges, edges and other non - standard sizes can be selected according to the actual needs of the customers.

(单位: mm Unit: mm)

被加工料 Processed Material	铸铁，球墨铸铁 Cast Iron, Spheroidal Graphite Cast Iron		碳素钢，合金钢 -750N/mm		碳素钢，合金钢 -30HRC		预硬钢，调质钢 -40HRC		不锈钢 Stainless Steel		预硬钢，调质钢 -50HRC	
	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)	转速 (min-1) Speed (min-1)	进给速度 (mm/min) Feed Speed (mm/min)
4	10800	840	10800	840	10000	770	8000	640	5500	145	6500	500
5	8200	8800	8200	8800	7600	810	6400	670	4500	145	5000	530
6	7000	900	7000	900	6400	830	5300	690	3700	145	4200	540
8	5200	890	5200	890	4800	815	4000	680	2800	160	3200	550
10	4200	880	4200	880	3800	810	3200	670	2200	160	2500	520
12	3500	880	3500	880	3200	810	2650	670	1850	160	2100	520

汽车（曲轴）刀具

Automobile (Crankshaft) Cutting Tool

简介：

汽车产业蓬勃发展，零部件的加工要求越来越高，我部门充分发挥磨加工优势，开发制造出高精度、高寿命以及高效率的专用刀具。通过对刀片刃口进行分屑设计完美解决了曲轴加工中不断屑的问题，多片刀片配合使用，保证已加工表面良好的表面质量，针对曲轴加工专门设计的刃口具有高的抗冲击性与切削性能。

下表为主要产品展示，代表结构和基本尺寸，承接同行业各类非标刀具定制。

Brief introduction:

The automotive industry is developing vigorously, and the processing requirements of parts are higher and higher. Our department is making full use of the advantages of grinding processing, developing and manufacturing special tools with high accuracy, high life and high efficiency. The chip cutting design of blade edge perfectly solves the problem of continuous chip in crankshaft processing. Multi inserts cooperate to ensure the good surface quality of the machined surface. For the crankshaft machining, the specially designed insert has high impact resistance and cutting performance.

The following table is the main product display, representing the structure and the basic size, to undertake the various kinds of non standard tool customization in the same industry.

(单位: mm Unit: mm)

刀片示意 Insert Sketch	型号 Order No.	基本尺寸(mm) Basic Size							齿数 Number of Teeth
		P	α	h	d	H	L	A	
	PDL60(3-2)	3.6	60°	0.84	4.4	4.79	12.74	9.56	3
	PDL60(3-2)II	3.2	44°	1.3	4.4	6.35	15.8	8	3
	PDL45(4-2)	3	90°	1	5.4	6.35	14	18	4
	PDL45(6-2)	3	90°	1.11	5.4	6.35	14	18	6