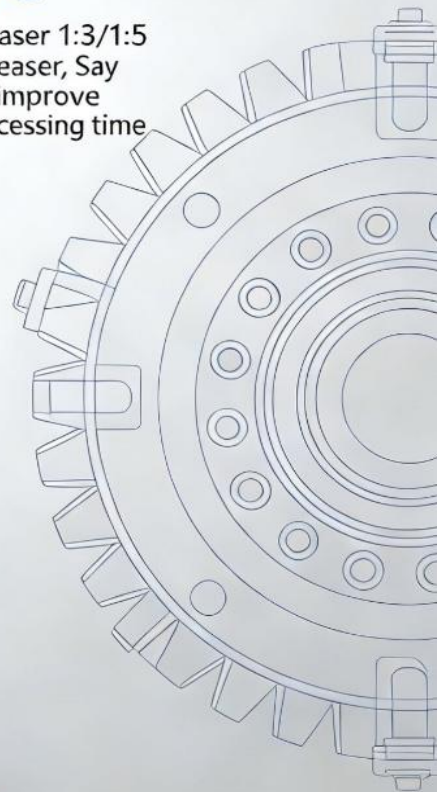


# 增速器使用说明书

## 1:3/1:5机床主轴增速器, 告别主轴低转速, 提升加工效率 节约加工时间

Instruction Manual for Speed Inverter 1:3/1:5  
Machine Tool Spindle Speed Inverter, Say  
goodbye to low spindle speed, improve  
processing efficiency and save processing time



# 主轴增速器

## 使用说明书

# Machine Tool Spindle Speed Incraser

适用范围：通用型齿轮式主轴增速器（适配 BT30/BT40/BT50/HSK 接口）

**Scope of Application: General-purpose gear spindle speed increaser  
(compatible with BT30/BT40/BT50/HSK interfaces)**

# 目录

## Table of contents

1、机床主轴增速器概述.....	4
1、 Overview of the Machine Tool Spindle Speed Increasing Gear.....	4
2、技术参数.....	4
2、 Technical Parameters.....	4
3、安全注意事项 .....	5
3、 Safety Precautions .....	5
4、增速器安装.....	7
4、 Installation Guide.....	7
5、使用操作规范.....	9
5、 Operating Instructions.....	9
6、日常维护与保养.....	11
6、 Daily Maintenance and Care.....	11
7、常见故障与排除方法.....	12
7、 Common Problems and Troubleshooting Methods.....	12
8、保修与售后务.....	13
8、 Warranty and After-Sales Service.....	13
9、附则.....	14
9、 Supplementary Provisions.....	14

## 一、产品简介

本主轴增速器（以下简称“增速器”）是安装于机床主轴与加工刀具之间的精密传动附件，核心功能为按固定比例放大机床主轴输入转速，无需改造机床本体，即可实现高速切削、高光加工、微孔加工等高精度作业，广泛应用于加工中心、数控铣床、钻攻中心等数控设备，可有效提升加工效率、零件表面光洁度及尺寸精度，延长微型刀具使用寿命，降低高速机床升级成本。

本产品结构精密、运行稳定、安装便捷，采用标准化设计，适配多数主流机床型号，满足通用机械加工、精密模具、电子医疗零件等多场景加工需求。

This spindle speed increaser (hereinafter referred to as the 'increaser') is a precision transmission accessory installed between the machine tool spindle and the cutting tool. Its core function is to amplify the spindle input speed by a fixed ratio, enabling high-speed cutting, fine machining, micro-hole processing, and other high-precision operations without modifying the machine tool itself. It is widely used in machining centers, CNC milling machines, drilling and tapping centers, and other CNC equipment, effectively improving part processing efficiency, surface finish, and dimensional accuracy, extending the service life of micro tools, and reducing the cost of upgrading high-speed machine tools.

This product features a precise structure, stable operation, and easy installation. It adopts a standardized design to fit most mainstream machine tool models, meeting the machining needs of general mechanical parts, precision molds, and electronic and medical components.

## 二、技术参数（固定标准参数）

参数名称	标准参数值	备注
产品型号	BT40-ER25-1:3（通用标准版）	适配主流加工中心
增速比	1:3（固定比例）	刀具转速=机床主轴转速 X3
最高输入转速	4000rpm	严禁超过此转速输入
最高输出转速	12000rpm	高速加工额定转速

刀柄接口	BT40（可选 BT30/BT50/HSK）	标准化接口，适配多数机床
刀具夹持方式	ER25 夹头	适配Φ1-16mm 刀具
径向跳动	≤0.005mm	保证精密加工精度
润滑方式	终身油脂润滑	日常加注润滑油
适用冷却方式	外冷/水雾/油气冷却	高速加工需开启冷却
额定扭矩	32N·m	适配中轻载加工
产品重量	14kg	便于安装与拆卸

### 三、安全注意事项

为保障设备安全、操作人员人身安全及加工质量，使用本产品前必须仔细阅读并严格遵守以下注意事项，违规操作将导致产品损坏、机床故障及安全事故，后果自负。

1. 使用前必须确认机床主轴转速、转向与本增速器的额定参数一致，严禁超速、反向运转，避免内部齿轮、轴承损坏。
2. 严禁超载使用、暴力撞击增速器，禁止在未安装刀具或刀具装夹不牢固的情况下运转，防止零件飞出造成安全事故。
3. 增速器的安装、拆卸必须在机床完全停止运转、切断电源的状态下进行，操作时佩戴防滑手套，避免手部被尖锐部位划伤或被旋转部件夹伤。
4. 增速器高速运转时，严禁打开机床防护门、用手或其他物品靠近旋转部位，严禁触摸增速器壳体（高速运转时会产生一定温升，避免烫伤）。
5. 运行过程中如出现异常噪音（如异响、杂音）、剧烈振动、温升过高（壳体温度超过 70℃）等情况，需立即停机，检查排除故障后，方可重新启动使用。
6. 禁止私自拆解、改装增速器内部结构，严禁更换非原厂配件（如拉钉、夹头），拆解改装将导致产品精度下降、损坏，且丧失保修资格。
7. 操作人员必须经过专业培训，熟悉增速器的使用方法及机床操作规范，无证人员严禁操作。
8. 存放、搬运增速器时，避免摔落、碰撞，防止锥面、夹头受损；长期存放时，需做好清洁防锈处理，放置于干燥、通风、无粉尘的环境中。

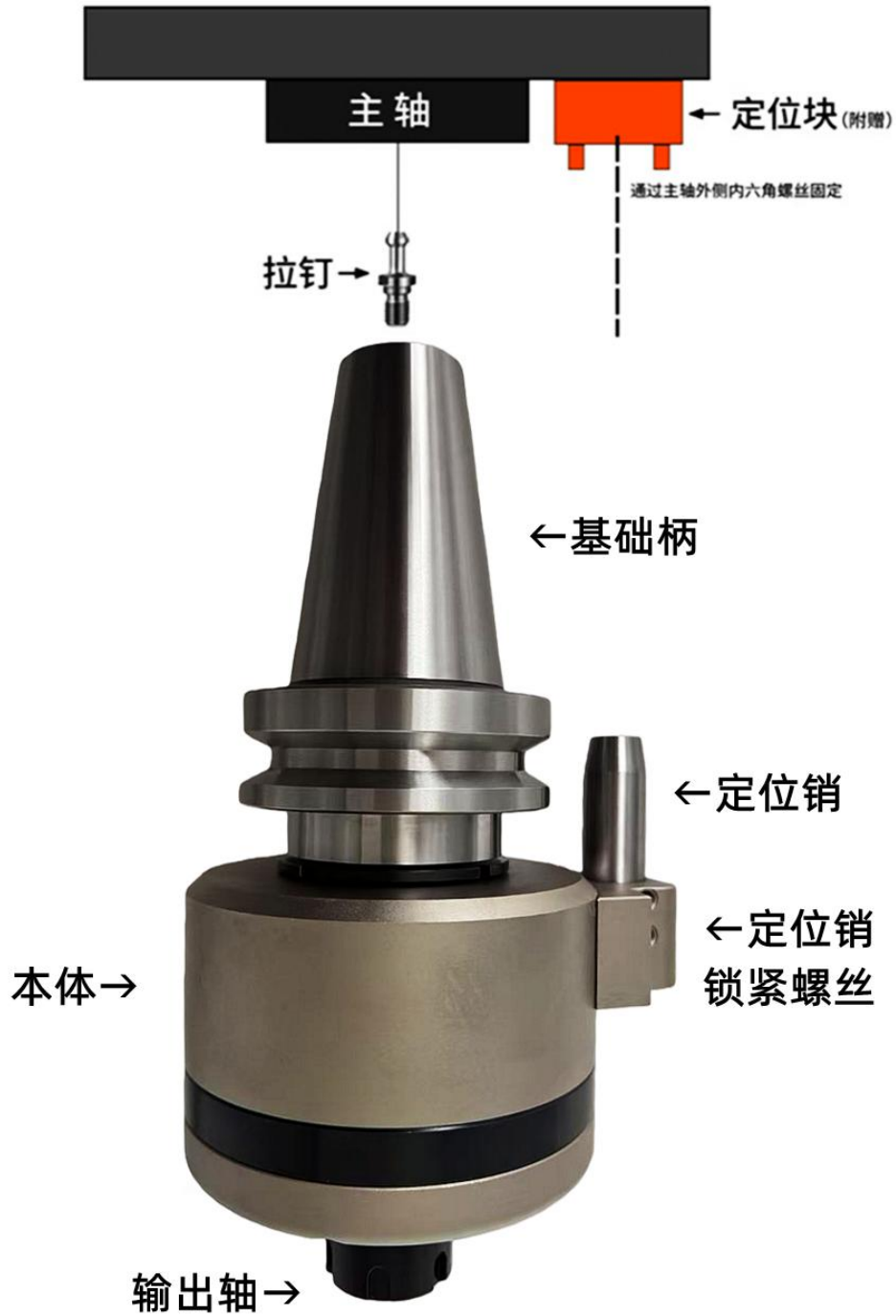
To ensure equipment safety, operator safety, and machining quality, the following

precautions must be carefully read and strictly followed before using this product. Improper operation may result in product damage, machine failure, or safety accidents, and the consequences will be borne by the user.

1. Before use, confirm that the spindle speed and rotation direction of the machine match the rated parameters of this speed increaser. Do not exceed the speed or operate in reverse to avoid damage to internal gears and bearings.
2. Do not overload or forcibly strike the speed increaser. Do not operate without a tool installed or if the tool is not securely clamped to prevent parts from flying off and causing safety accidents.
3. Installation and removal of the speed increaser must be performed with the machine completely stopped and powered off. Wear anti-slip gloves during operation to avoid cuts from sharp edges or pinching by rotating parts.
4. Do not open the machine guard or approach rotating parts with hands or other objects while the speed increaser is running at high speed. Do not touch the speed increaser housing (high-speed operation generates heat, which may cause burns).
5. If abnormal noise (such as unusual sounds or interference), severe vibration, or excessive temperature rise (housing temperature exceeding 70°C) occurs during operation, stop the machine immediately, check and eliminate the fault before restarting.
6. Do not disassemble or modify the internal structure of the speed increaser on your own. Do not replace with non-original parts (such as pull studs or collets). Disassembly or modification may reduce product precision, cause damage, and void the warranty.
7. Operators must have professional training and be familiar with the speed increaser's usage and machine operation standards. Unauthorized personnel are strictly prohibited from operating.
8. Avoid dropping or colliding with the speed increaser during storage or transportation to prevent damage to the taper or collet. For long-term storage, perform cleaning and rust prevention, and place it in a dry, ventilated, dust-free environment.

# 安装示意图

附件：配套拉钉、数控扳手、定位块、说明书



## 四、安装步骤

本增速器安装流程简单，无需改动机床结构，按以下步骤操作，确保安装到位、装夹牢固，避免因安装不当导致加工偏差或设备损坏。

1. 清洁准备：用干净的抹布或毛刷，彻底清洁机床主轴锥孔、增速器锥柄表面，确保无铁屑、油污、灰尘等杂物，避免影响安装精度和配合间隙。
2. 拉钉安装：将标准拉钉（适配 BT40 接口）正确安装在增速器尾部螺纹孔内，用扭矩扳手均匀拧紧，拧紧力矩控制在 45-50N·m，严禁过度拧紧或未拧紧。
3. 定位块安装，拆卸机床主轴端面螺栓，将定位块安装在主轴上锁紧（不要影响换刀臂自动换刀）。
4. 增速器安装：将安装好拉钉的增速器对准机床主轴锥孔，定位销对准定位块凹槽，缓慢推入，启动机床主轴拉紧功能，确认增速器被牢牢拉紧，调节定位销高度，使增速器无松动、无晃动现象，锁紧定位销螺丝。（可手动轻轻晃动增速器，检查安装稳定性）。
4. 刀具装夹：
  - 选用与加工需求匹配、且适配 ER25 夹头的刀具，清洁刀具柄部及夹头内孔，去除油污、铁屑。
  - 将刀具插入夹头内，根据加工需求调整刀具伸出长度，伸出长度尽量缩短（建议不超过 50mm），以提高加工刚性，减少振动。
  - 将装有待装刀具的夹头装入增速器前端，用扳手均匀锁紧螺母，严禁暴力敲击、过度拧紧，防止夹头变形或刀具损坏。
5. 安装检查：手动转动机床主轴（断电状态下），观察增速器及刀具运转情况，确保无卡滞、无异常摩擦、无晃动，确认安装无误后，方可启动机床。

This speed booster is simple to install and does not require modifications to the machine structure. Follow the steps below to ensure proper installation and secure clamping, avoiding machining errors or equipment damage due to incorrect installation.

1. Cleaning Preparation: Use a clean cloth or brush to thoroughly clean the spindle taper of the machine and the taper shank surface of the speed booster. Ensure there are no iron filings, oil, dust, or other debris to avoid affecting installation accuracy and fitting clearance.
2. Drawbar Installation: Correctly install the standard drawbar (compatible with the BT40 interface) into the threaded hole at the rear of the speed booster. Use a torque wrench to tighten evenly, controlling the torque at 45-50 N·m. Do not over-tighten or leave it loose.
3. Locating Block Installation: Remove the spindle face bolts and install the locating block on the spindle, securing it without affecting the automatic tool change arm.

4. Speed Booster Installation: Align the speed booster with the installed drawbar to the machine spindle taper, and match the locating pin with the locating block groove. Push in slowly, activate the spindle drawbar function, ensure the speed booster is firmly tightened, adjust the height of the locating pin so there is no looseness or wobbling, and tighten the locating pin screws. (The speed booster can be lightly shaken by hand to check the stability of the installation.)

#### 5. Tool Clamping:

- Select tools that match the machining requirements and are compatible with the ER25 collet. Clean the tool shank and the inside of the collet, removing oil and iron filings.

- Insert the tool into the collet and adjust the tool extension according to the machining requirements, keeping the extension as short as possible (recommended not exceeding 50mm) to improve rigidity and reduce vibration.

- Install the collet with the tool into the front end of the speed booster and tighten the nut evenly using a wrench. Avoid striking or over-tightening to prevent collet deformation or tool damage.

6. Installation Check: Manually rotate the machine spindle (with power off) and observe the operation of the speed booster and tool. Ensure there is no binding, abnormal friction, or wobbling. Only start the machine after confirming proper installation.

## 五、使用操作规范

严格按照以下操作规范使用增速器，可有效延长产品使用寿命，保证加工精度和效率，避免违规操作导致的设备故障。

### 5.1 试运转操作

每次安装增速器或更换刀具后，正式加工前必须进行试运转，检查设备运行状态：

1. 启动机床，将机床主轴转速调至 500-1000rpm（低速），空转 1-2 分钟。
2. 观察增速器运转情况，确认无异常噪音、无抖动、无明显温升，刀具无偏摆。
3. 试运转正常后，方可逐步提高主轴转速，进行正式加工；若试运转过程中出现异常，立即停机检查。

### 5.2 转速控制

1. 严格按照“刀具转速=机床主轴转速×增速比（1:3）”的公式，计算并设定机床主轴转速，严禁超过增速器最高输出转速（12000rpm）。
2. 加工过程中，严禁突然升高或降低主轴转速，需逐步调节，避免冲击载荷损坏增速器内部结构。
3. 不同刀具适配不同转速，微型刀具（Φ1-Φ5mm）建议采用较高转速（10000-

12000rpm)，大型刀具（Φ10-16mm）建议采用中低速（5000-10000rpm）。

### 5.3 切削参数设置

1. 采用“小切深、高转速、快进给”的切削原则，避免重载切削，减少增速器负载，延长使用寿命。
2. 根据加工材料（如铝、铜、钢、亚克力、模具钢等）、刀具类型，合理调整切削速度、进给量、切深，建议参考刀具厂家提供的参数范围。
3. 高光加工、镜面加工时，需提高转速、降低切深和进给量，确保加工表面质量；微孔加工时，需选用高精度微型刀具，控制转速稳定，避免刀具断裂。

### 5.4 冷却操作

1. 当增速器输出转速超过 12000rpm 时，必须开启机床冷却系统（外冷、水雾或油气冷却均可），确保冷却充分，降低增速器壳体及刀具温度，避免轴承过热损坏。
2. 冷却过程中，确保冷却液不直接喷射到增速器与机床主轴的连接处，防止冷却液进入主轴锥孔，导致锈蚀或配合间隙变大。
3. 加工过程中，定期检查冷却系统运行情况，确保冷却液充足、喷射位置准确，避免因冷却不足导致刀具磨损或加工精度下降。

The use of speed extenders in strict accordance with the following operating specifications can effectively extend the service life of the product, ensure processing accuracy and efficiency, and avoid equipment failures caused by illegal operations.

#### 5.1 Commissioning operation

After each installation of the speed booster or replacement of the tool, a test run must be carried out before the formal processing to check the operating status of the equipment:

1. Start the machine tool, adjust the machine tool spindle speed to 500-1000rpm (low speed), and idle for 1-2 minutes.
2. Observe the operation of the speed increaser and confirm that there is no abnormal noise, no jitter, no obvious temperature rise, and no deflection of the tool.
3. After the trial operation is normal, the spindle speed can be gradually increased for formal processing; If there is an abnormality during the trial operation, stop the machine immediately for inspection.

#### 5.2 Speed control

1. Strictly follow the formula of "tool speed = machine tool spindle speed × growth rate ratio (1:3)", calculate and set the machine tool spindle speed, and it is strictly forbidden to exceed the maximum output speed of the speed booster (12000rpm).
2. During the processing process, it is strictly forbidden to suddenly increase or decrease the spindle speed, and it needs to be gradually adjusted to avoid damage to the internal structure of the speed extender due to impact load.
3. Different tools are adapted to different speeds, micro tools (Φ1-Φ5mm) are recommended to use higher speed (10000-12000rpm), large tools (Φ10-16mm) are recommended to use medium and low speeds (5000-10000rpm).

### 5.3 Cutting parameter setting

1. Adopt the cutting principle of "small cutting depth, high speed, fast feed" to avoid heavy load cutting, reduce the load of the speed increaser, and extend the service life.
2. According to the processing material (such as aluminum, copper, steel, acrylic, mold steel, etc.) and tool type, reasonably adjust the cutting speed, feed rate, and cutting depth, and it is recommended to refer to the parameter range provided by the tool manufacturer.
3. When high-gloss processing and mirror processing, it is necessary to increase the rotation speed, reduce the cutting depth and feed to ensure the quality of the processed surface; When machining micro-holes, high-precision micro tools should be selected to control the rotation speed and avoid tool breakage.

### 5.4 Cooling Operation

1. When the output speed of the speed increaser exceeds 12000rpm, the machine tool cooling system (external cooling, water mist or oil and gas cooling is acceptable) must be turned on to ensure sufficient cooling, reduce the temperature of the speed extender housing and tools, and avoid overheating and damage to the bearing.
2. During the cooling process, ensure that the coolant is not directly sprayed into the connection between the speed booster and the machine tool spindle to prevent the coolant from entering the spindle cone hole, resulting in rust or larger mating gaps.
3. During the processing process, regularly check the operation of the cooling system to ensure sufficient coolant and accurate injection position to avoid tool wear or reduced machining accuracy due to insufficient cooling.

## 六、日常维护与保养

日常做好增速器的维护与保养，可有效延长产品使用寿命，保持加工精度稳定，减少故障发生率，具体操作如下：

1. 每次使用完毕后，关闭机床，待增速器完全停止运转、温度降至室温后，用干净的抹布清洁增速器壳体、锥柄、夹头及刀具装夹部位，去除铁屑、油污、冷却液残留，防止锈蚀。
2. 定期检查增速器的安装状态，确认无松动、晃动，拉钉无磨损、变形，夹头无松动、划痕，如有异常及时更换。
3. 本产品采用终身油脂润滑，无需日常加注润滑油，但需定期检查润滑状态，若发现增速器运转时出现干涩异响、温升异常，需联系厂家进行润滑维护，严禁自行加注非原厂润滑油。
4. 避免增速器摔落、撞击、强行敲打，严禁用增速器撞击工件或机床部件，防止内部齿轮、轴承损坏，锥面变形。
5. 长期不用（超过 15 天）时，需对增速器进行全面清洁，在锥柄、夹头内孔涂抹少量防锈油，装入原厂包装盒，放置于干燥、通风、无粉尘、无腐蚀性气体的环境中，避免潮湿、锈蚀。
6. 定期（每 3 个月）检查增速器的径向跳动精度，若发现跳动量超过 0.005mm，需

联系厂家进行校准或维修。

Regular maintenance and upkeep of the speed booster can effectively extend the product's service life, maintain machining accuracy, and reduce the occurrence of malfunctions. The specific procedures are as follows:

1. After each use, turn off the machine, wait for the speed booster to come to a complete stop and cool down to room temperature, then use a clean cloth to clean the booster housing, taper shank, chuck, and tool clamping areas to remove metal shavings, oil stains, and coolant residues, preventing rust.

2. Regularly check the installation status of the speed booster to ensure there is no looseness or wobbling, that pull studs are not worn or deformed, and that the chuck is not loose or scratched. Replace any defective parts promptly.

3. This product uses lifetime grease lubrication, so daily addition of lubricant is unnecessary. However, the lubrication condition should be checked periodically. If the speed booster operates with dryness, abnormal noise, or unusual temperature rise, contact the manufacturer for lubrication maintenance. Never add non-original lubricants yourself.

4. Avoid dropping, impact, or forceful striking of the speed booster. Do not use the booster to hit workpieces or machine components to prevent damage to internal gears, bearings, or taper deformation.

5. If not in use for an extended period (more than 15 days), thoroughly clean the speed booster. Apply a small amount of anti-rust oil to the taper shank and chuck bore, place it in the original packaging, and store it in a dry, ventilated environment free of dust and corrosive gases to avoid moisture and rust.

6. Periodically (every 3 months) check the radial runout accuracy of the speed booster. If the runout exceeds 0.005mm, contact the manufacturer for calibration or repair.

## 七、常见故障与排除方法

使用过程中若出现以下故障，可按对应方法排查处理，若故障无法排除，请勿私自拆解，及时联系厂家售后人员，避免故障扩大。

故障现象	可能原因	排除方法
运转时出现异常噪音（异响、杂音）	1. 轴承损坏；2. 刀具装夹不牢固、偏摆过大；3. 增速器安装不到位、松动；4. 内部齿轮磨损；5. 润滑不足	1. 停机，检查刀具装夹情况，重新装夹牢固；2. 检查增速器安装状态，重新安装拉紧；3. 若仍有异响，联系厂家检查轴承、

		齿轮及润滑状态，必要时维修更换
增速器温升过高（壳体温度超过 70℃）	1. 超速使用；2. 冷却不足或冷却系统故障；3. 负载过大；4. 润滑不良	1. 降低机床主轴转速，确保不超过额定输出转速；2. 检查冷却系统，开启冷却或修复冷却故障；3. 调整切削参数，减小切深、进给量，降低负载；4. 联系厂家检查润滑状态
加工尺寸不稳定、精度下降	1. 刀具松动、偏摆；2. 机床主轴锥孔或增速器锥柄有油污、铁屑；3. 径向跳动精度超标；4. 轴承磨损	1. 重新装夹刀具，检查夹头状态；2. 清洁机床主轴锥孔和增速器锥柄；3. 检查径向跳动精度，联系厂家校准；4. 联系厂家检查轴承，必要时更换
刀具断裂频繁	1. 转速过高或过低，与刀具、材料不匹配；2. 切削参数不合理（切深过大、进给过快）；3. 刀具装夹过长，刚性不足；4. 冷却不足	1. 调整主轴转速，匹配刀具与加工材料；2. 优化切削参数，减小切深、调整进给量；3. 缩短刀具伸出长度，提高刚性；4. 确保冷却充分
增速器无法正常运转、卡滞	1. 内部齿轮、轴承损坏；2. 铁屑进入增速器内部，卡住运动部件；3. 安装不当，受力变形	1. 立即停机，严禁强行启动；2. 检查是否有铁屑残留，清理干净；3. 若仍卡滞，联系厂家售后维修，请勿私自拆解

## 八、保修与售后服务

### 8.1 保修范围与期限

1. 本产品自购买之日起，享受 12 个月免费保修服务（人为损坏、违规操作导致的损坏除外）。
2. 保修范围：产品本身质量问题导致的齿轮、轴承损坏、精度下降、无法正常运转

等故障；非保修范围：人为撞击、超载、超速、反向运转、私自拆解、改装、使用非原厂配件、安装不当、保养不善导致的产品损坏，以及正常磨损（如夹头磨损）。

3. 超过保修期限后，产品出现故障，可联系厂家提供有偿维修服务，收取合理的配件费与维修费。

1. From the date of purchase, this product comes with a 12-month free warranty service (excluding damage caused by human factors or improper operation).

2. Warranty coverage: Failures caused by product quality issues, such as damage to gears or bearings, reduced precision, or inability to operate normally; non-warranty coverage: Damage caused by human impact, overload, overspeed, reverse operation, unauthorized disassembly, modification, use of non-original parts, improper installation, poor maintenance, as well as normal wear and tear (such as chuck wear).

3. After the warranty period, if the product malfunctions, you can contact the manufacturer for paid repair services, with reasonable charges for parts and labor.

## 8.2 售后服务

1. 使用过程中遇到任何问题（安装、操作、故障排查等），可随时联系厂家售后人员，我们将在 24 小时内响应，提供技术指导。

2. 产品需要维修时，请将产品妥善包装，寄回厂家指定地址，同时提供购买凭证、产品型号及故障描述，以便快速处理。

3. 厂家提供终身技术支持服务，可根据用户需求，提供安装培训、操作指导、参数优化等个性化服务。

4. 售后联系电话：\_\_\_\_\_

5. 售后联系邮箱：\_\_\_\_\_

1. If you encounter any issues during use (installation, operation, troubleshooting, etc.), you can contact the manufacturer's after-sales staff at any time. We will respond within 24 hours and provide technical guidance.

2. When the product requires repair, please pack it properly and send it to the address designated by the manufacturer, while providing the purchase proof, product model, and a description of the issue for quick processing.

3. The manufacturer offers lifetime technical support services and can provide personalized services according to user needs, including installation training, operational guidance, and parameter optimization.

## 九、附则

1. 本说明书为通用正式版，可直接打印使用

2. 本厂家保留对本说明书内容的修改权，若产品升级、参数调整，将另行通知，最新说明书以厂家提供的版本为准。

3. 操作人员必须严格按照本说明书操作，本厂家不承担因违规操作导致的任何损

失。

1. This manual is a general official version and can be printed and used directly.
2. The manufacturer reserves the right to modify the content of this manual. If the product is upgraded or parameters are adjusted, a separate notice will be issued. The latest manual provided by the manufacturer shall prevail.
3. Operators must strictly follow the instructions in this manual. The manufacturer is not responsible for any loss caused by improper operation.

\_\_\_\_\_ (厂家名称)

\_\_\_\_\_ (联系方式)