

微量润滑冷却系统

Minimum Quantity Lubrication
(MQL) Cooling System





YIKTIN

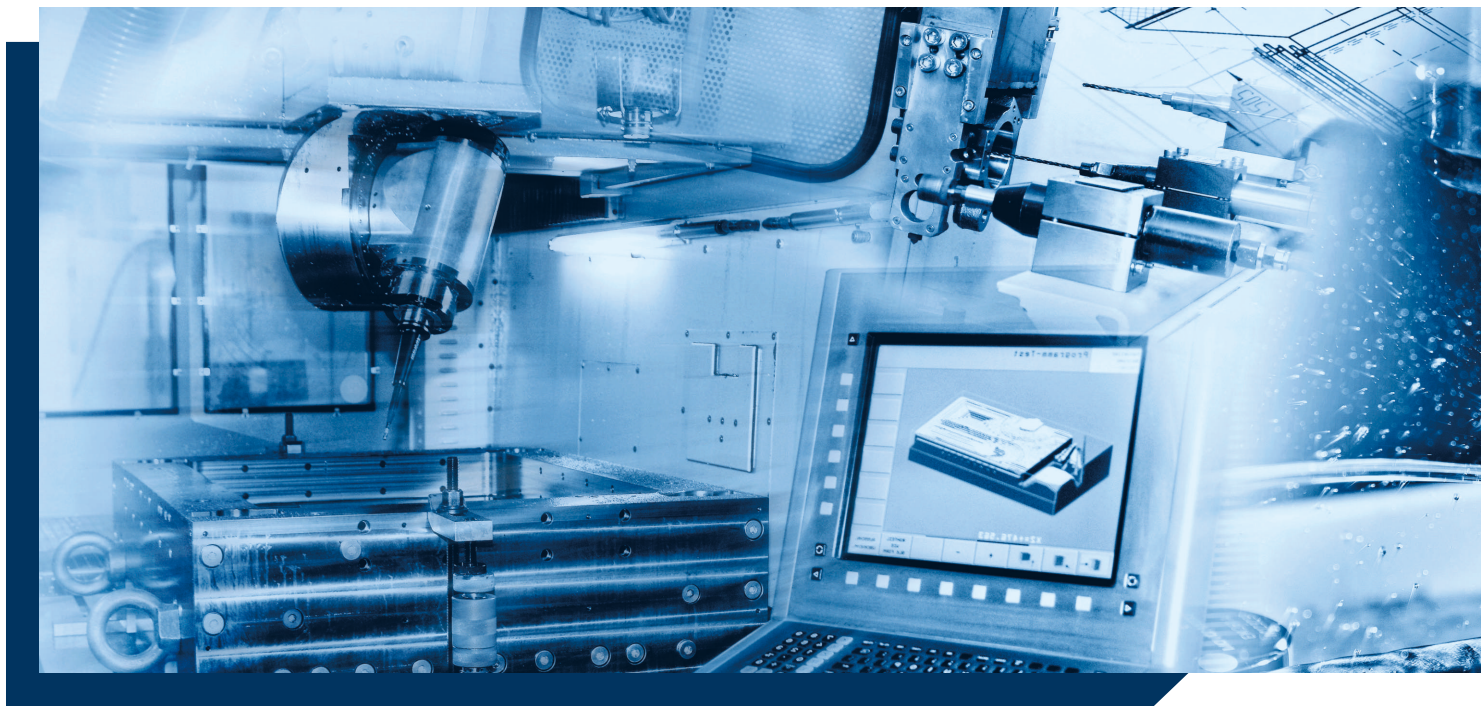


目录 Table of Contents

公司介绍	01
Company Profile	
微量润滑系统介绍	03
Introduction of MQL System	
产品介绍	07
Product Introduction	
应用案例	29
Applications	

公司介绍

Company Profile



广东益田工业有限公司致力成为高端制造业综合服务商，主要为用户提供高效能工业产品及绿色加工解决方案，产品涵盖精密机床部件、精密刀柄、切削刀具、绿色加工、机器人部品、工业管理与数据系统等。

Yiktin Industrial Co., Ltd. is committed to becoming a comprehensive service provider for high-end manufacturing industry, mainly providing users with high-efficiency industrial products and environmental processing solutions. The products cover precision machine tool accessories, precision tool holders, cutting tools, green machining, industrial robot components, and industrial management and data systems.

益田工业总部位于广州，设有中山、东莞和柳州子公司，及重庆、武汉等区域办事处，具备方案设计、管理生产、技术营销和服务一体化能力。主要为汽车零部件、家电及模具、医疗器械、工程机械、国防军工、航天航空、绿色能源及通用精密等制造领域客户，提升其生产力，提供更具成本效益的产品和技术服务。

Yiktin Industrial is headquartered in Guangzhou, with subsidiaries in Zhongshan, Dongguan and Liuzhou, as well as regional offices in Chongqing and Wuhan. Yiktin is a company with integrated capabilities of processing solutions, production management, technical marketing and service, mainly for customers in the manufacturing fields of auto parts, home appliances and molds, medical equipment, construction machinery, national defense and military industry, aerospace, green energy and general precision, to improve their productivity and provide more cost-effective products and technical services.

COMPANY PROFILE



益田工业坚持以客户为中心，通过提供高品质产品和优质的技术服务，注重用户生产效率和产品质量保证，秉承专业、专注、持续、创新的经营理念，经过多年发展业已成为高端制造业的优质供应商。公司非常重视产品的技术应用，运用先进的加工解决方案、以快速响应、迅捷交付为宗旨，配合提升用户的核心竞争力，满足用户高效率、高精度、低成本的生产需求。

Yiktin Industrial insists on customer-centric, by providing high-quality products and excellent technical services, focusing on user production efficiency and product quality assurance, adhering to the professional, dedicated, continuous and innovative business philosophy, after years of development, it has become a professional metal processing industry supplier. The company attaches great importance to the technical application of products, using advanced processing solutions, with the aim of quick response and swift delivery, to enhance the core competitiveness of customers, and to meet customers' high-efficiency, high-precision, and low-cost production needs.

益田工业将持续关注客户生产经营过程中的产品质量、生产效率和成本控制，以帮助客户解决上述问题为己任，并将不懈努力。

Yiktin Industrial will continue to pay attention to the product quality, efficiency and cost control in the process of production and operation for customers, to take it as its own responsibility to help customers solve the above problems, and will make unremitting efforts.



LB-M101



LB-M102



LB-M201



微量
冷却

Minimum Quantity
(MQL) Cooling

LB-M101 Pro



LB-SM101 Pro



LB-AM101 Pro



润滑
系统

Quality Lubrication
ooling System

创新型微量润滑冷却系统

Innovative MQL Cooling System

微量润滑（MQL）冷却系统研发

益田工业基于十余年金属切削与刀具研发、生产和销售基础，开发了可实现高效加工的微量润滑（MQL）冷却系统。针对不同应用场合，开发了各式不同结构喷嘴和专用微量润滑剂，为客户提供高效、节能、绿色、环保的微量润滑切削解决方案，实现清洁生产，降本增效。

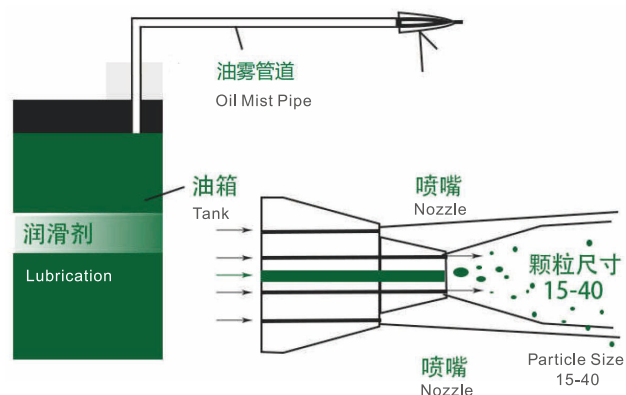
Based on more than ten years of research and development, production and sales of metal cutting and cutting tools, Yiktin Industrial has developed a Minimum Quantity Lubrication (MQL) cooling system that can realize efficient machining. According to different application occasions, various nozzles with different structures and special minimum quantity lubricants have been developed to provide customers with efficient, energy-saving, green and environment-friendly MQL cutting solutions to realize cleaner production, cost reduction and efficiency improvement.

微量润滑切削技术原理

Technical Principles of Minimum Quantity Lubrication Cutting Technology

微量润滑 (MQL) 切削技术，也称准干式切削或半干式切削技术，是采用压缩气体（空气、氮气、二氧化碳等）与极微量的润滑油混合汽化后，形成微米级的液滴，喷射到加工区进行有效润滑的一种切削加工方法。

Minimum Quantity Lubrication (MQL) cutting technology, also known as quasi-dry cutting or semi-dry cutting technology, is a cutting method that uses compressed gas (air, nitrogen, carbon dioxide, etc.) and extremely minimum amount of lubricating oil to form micron-sized liquid droplets and spray them into the machining area for effective lubrication.



微量润滑系统优势

Advantages of MQL System

MQL 有多种优势，可直接解决传统切削液所衍生的各种问题。

MQL has many advantages and can directly solve various problems derived from conventional cutting fluid.

► **延长刀具寿命**——用润滑油来取代传统切削液加工，达到更高的冷却润滑效率，减少摩擦，延长了刀具寿命。

Prolong the tool life-Use lubricating oil to replace the conventional cutting fluid machining to achieve higher cooling and lubrication efficiency, reduce friction and prolong the service life of the tool.

► **提高加工效率**——良好的润滑性能，允许使用更高的切削速度和进给率，提高了加工效率。

Improve machining efficiency-Good lubrication performance, allowing higher cutting speed and feed rate, improving machining efficiency.

► **提高加工精度**——改善工件与刀具的摩擦接触状态，利于工件平面度和粗糙度的改善。

Improve the machining accuracy-Improve the friction contact state between the workpiece and the cutting tool, which is beneficial to the improvement of the flatness and roughness of the workpiece.

► **降低加工成本**——节约切削液大量采购及切削废液处理成本。

Reduce the machining cost-Save the cost of purchasing a large amount of cutting fluid and treating cutting waste fluid.

► **利于车间环境改造**——使工作现场干净整洁，无刺激性油烟产生，机床周边空气质量高。

Conducive to the environmental transformation of the workshop-make the work site clean and tidy, free from irritating lampblack generation, and have high air quality around the machine tool.

► **利于环境保护**——无切削废液产生，避免了切削废液处理和排放。

Beneficial to environmental protection-No cutting waste liquid is generated, thus avoiding the treatment and discharge of cutting waste liquid.

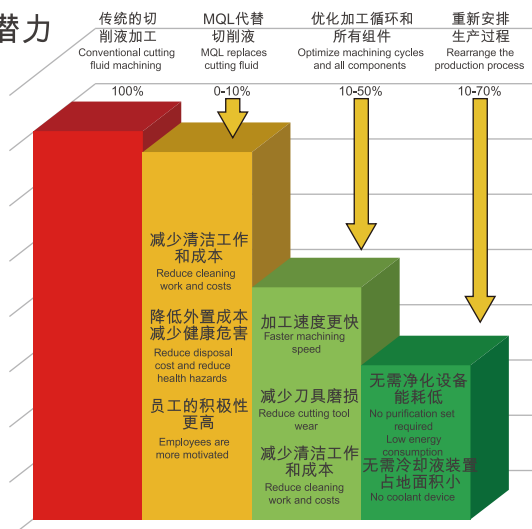
► **节约能源**——无需大功率抽液泵及切削液循环过滤系统，节省了电能消耗。

Save energy -No need for high-power liquid pump and cutting fluid circulation and filtration system, thus saving electric energy consumption.

► **利于员工健康**——使用微量润滑剂无毒无污染，操作环境清洁干燥。

Beneficial to the health of employees-Use of minimum quantity lubricants is non-toxic and pollution-free, and the operating environment is clean and dry.

节约潜力



Product Introduction

产品介绍

产品特点Features :

结构紧凑，方便易用，尤其适用于小型车床、钻床、铣床及锯床应用。

Compact structure, convenient and easy to use, especially suitable for small lathes, drilling machines, milling machines and sawing machines.



LB-M101

产品特点Features :

具备报警提示功能，可结合涡流制冷技术实现喷嘴出口温度 $-5\sim 5^{\circ}\text{C}$ ，增强冷却润滑效果。

It has the function of alarm and prompt, and can realize the nozzle outlet temperature of $-5\sim 5^{\circ}\text{C}$ in combination with eddy current refrigeration technology to enhance the cooling and lubrication effect.



LB-M102

产品特点Features :

采用新型油水复合雾化技术，兼具水滴蒸发吸热和微量油强效润滑效果。

A new type of oil-water composite atomization technology is adopted, which has the effects of evaporation and heat absorption of water droplets and strong lubrication of trace oil.



LB-M201

产品特点Features :

结构紧凑，方便易用，尤其适用于具有内冷孔切削刀具应用以及需要恒定油雾进行冷却润滑的加工场合。

Compact structure, convenient and easy to use, especially suitable for the application of cutting tools with internal cold holes and machining occasions requiring constant oil mist for cooling and lubrication.



LB-M101 Pro

产品特点Features :

具备加气调节和油雾流量调节功能，可连入机床控制系统控制启停，并实现油雾输出量半自动调节。

It has the functions of air filling regulation and oil mist flow regulation, and can be connected to the machine tool control system to control start and stop, and realize semi-automatic regulation of oil mist output.



LB-SM101 Pro

产品特点Features :

能够根据相应的刀具和工艺参数自适应地匹配所需的油雾量。特别适用于具有多类型刀具且需要单独控制油雾输出量的现代化加工中心。

It can match the required oil mist amount adaptively based on the corresponding tool and process parameters. It is especially suitable for modern machining centers that use multiple types of tools and need to control their oil mist output separately.



LB-AM101 Pro

润滑油系列

Lubricating oil series



LB系列

LB series

工作原理

Working principle

切削区所需气雾剂在喷嘴出口处产生。将定量的润滑剂通过压缩气体在喷嘴出口部位进行雾化处理，产生微米级悬浮微粒，并随着压缩气体沿着喷嘴喷射方向到达切削区域，在刀具和工件之间形成润滑油膜。

The aerosol required for the cutting zone is generated at the nozzle. A certain amount of lubricant is atomized at the outlet of the nozzle through the compressed gas to generate micron-sized suspended particles, and the compressed gas reaches the cutting area along the injection direction of the nozzle to form a lubricating oil film between the cutting tool and the workpiece.

配合特殊设计的不同喷嘴结构和高品质专用微量润滑剂，可为不同应用场合提供最佳微量润滑冷却方式，保证微量润滑系统性能的良好发挥。

With specially designed different nozzle structures and high-quality special minimum quantity lubricant, it can provide the best MQL cooling method for different applications and ensure the good performance of the MQL system.

外冷型微量润滑系统包含LB-M101、LB-M102及LB-M201等三种类型，针对不同应用场合，为客户提高最佳解决方案。

External cooling MQL systems include LB-M101, LB-M102 and LB-M201 to improve the best solution for customers in different applications.



LB系列

LB series

LB-M101

微量润滑系统

MQL system



- ▶ LB-M101采用精密微型油泵实现微量润滑剂的泵油及输出，配合精密油泵动作调频器以及油量调节装置进行油量调节。

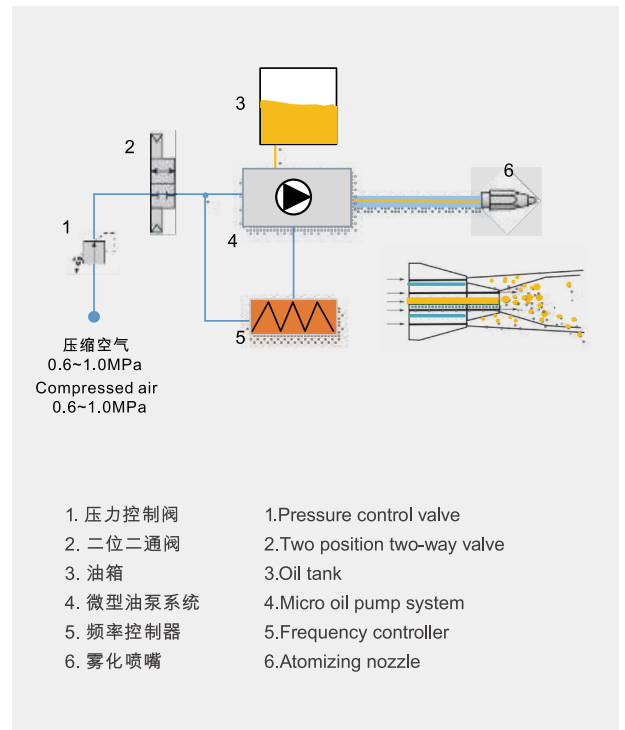
LB-M101 uses precision micro oil pump to realize the pump oil and output of minimum quantity lubricant, and cooperates with precision oil pump movement frequency modulator and oil quantity regulating device to adjust oil quantity.

- ▶ 多项专利设计的微量润滑专用喷嘴，使得恰当油气混合物喷射到切削区域，因此空气中不会产生大量雾化油气。

The MQL special nozzle designed by several patents enables the appropriate oil and gas mixture to be injected into the cutting area, so that no large amount of atomized oil and gas will be generated in the air.

- ▶ 设备安装简便，几乎不需要修改原有设备，更无需前期繁琐设计。

The installation of the equipment is simple and convenient, and there is almost no need to modify the original equipment, let alone complicated design in the early stage.



工作原理 Working principle

LB系列

LB series

LB-M102

微量润滑系统 MQL system



- ▶ LB-M102系统配备液位报警、气压报警、电源指示及启动指示等报警提示功能，增强设备自动化功能。

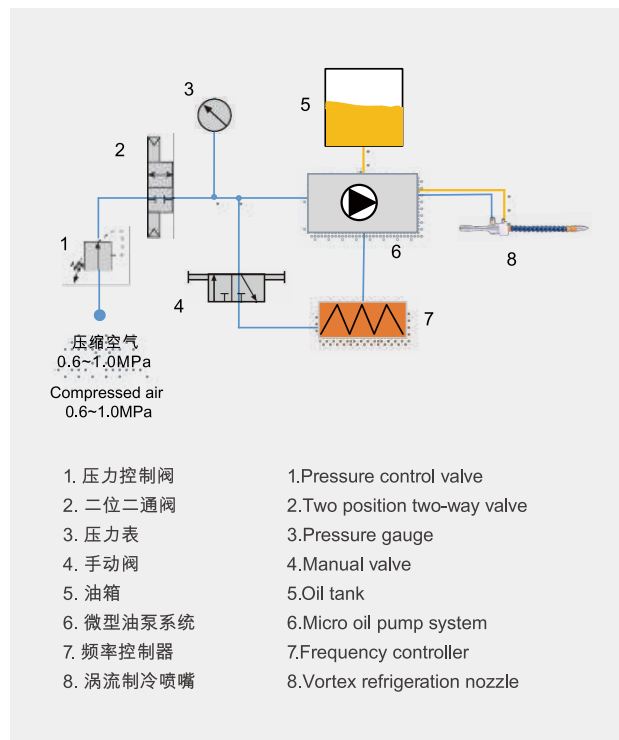
LB-M102 system is equipped with alarm prompt functions such as liquid level alarm, air pressure alarm, power supply indication and start indication to enhance the automation function of the equipment.

- ▶ 特殊系统硬件设置，可选配专用涡流制冷喷嘴，实现喷嘴出口温度达-5~5℃，增强冷却润滑效果。

Special system hardware setting and optional special vortex refrigeration nozzle can realize nozzle outlet temperature up to -5~5℃ to enhance cooling and lubrication effect.

- ▶ 允许通过机床信号控制系统启停，增强系统响应速度，保证加工工艺稳定性。

It is allowed to start and stop the machine tool signal control system to enhance the response speed of the system and ensure the stability of the machining process.



工作原理 Working principle

LB系列

LB series

LB-M201

微量润滑系统 MQL system



- ▶ LB-M201系统采用新型油水复合雾化技术，形成微细油膜附水滴（Oil on Water, OoW）颗粒，保证微量润滑油高效润滑作用良好发挥，同时可利用水滴蒸发吸热带走大量切削热，增强切削刀具的高效冷却和润滑作用。

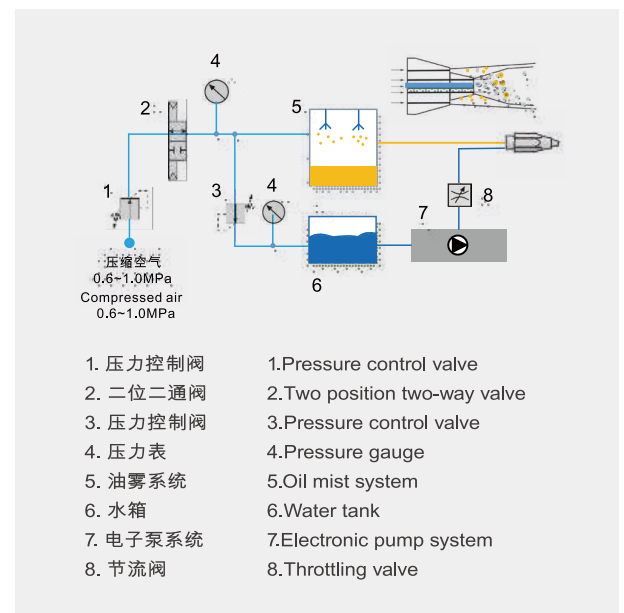
LB-M201 system adopts a new type of oil-water composite atomization technology to form fine oil on water (OoW) particles, which ensures that the high-efficiency lubricating effect of trace of lubricating oil is well exerted, and at the same time, a large amount of cutting heat can be taken away by evaporation and heat absorption of water droplets, thus enhancing the high-efficiency cooling and lubricating effect of cutting tools.

- ▶ 专利设计的油水复合雾化系统，采用同轴双层输送管将润滑剂混合气雾及水传输至喷嘴端，微细油膜附水滴（Oil on Water, OoW）颗粒在喷口形成，并被精准输送至切削区；

The patented oil-water composite atomization system uses coaxial double-layer conveying pipes to transmit lubricant mixed aerosol and water to the nozzle end, and fine oil on water (OoW) particles are formed at the nozzle and accurately transported to the cutting area.

- ▶ 作为复合相的“水”可以选用纯净水，也可选用具有防锈添加剂的低浓度水溶性切削液，增强加工效果。

As the "water" of the composite phase, purified water can be selected, or low-concentration water-soluble cutting fluid with antirust additives can be selected to enhance the machining effect.



工作原理 Working principle

技术参数

Technical parameters

	LB-M101		LB-M102		LB-M201
油泵类型 Oil pump type	柱塞泵型 Plunger pump type	电子泵型 Electronic pump type	柱塞泵型 Plunger pump type	电子泵型 Electronic pump type	—
水泵类型 Water pump type	—	—	—	—	电子泵型 Electronic pump type
设备尺寸 (mm) Equipment size (mm)	270x135x355	220x320x400	320x235x425	220x320x400	400x310x500
油箱容积 (L) Oil tank capacity (L)	1.8	1.8	2.0	2.0	3.5
水箱容积 (L) Water tank capacity (L)	—	—	—	—	5.0
使用电源 (标准) Power supply (standard)	24V DC	24V DC	24V DC	24V DC	24V DC
进气压力 (MPa) Inlet pressure (MPa)	0.6~1.0	0.6~1.0	0.6~1.0	0.6~1.0	0.6~1.0
液位指示器 (目视) Liquid level indicator (visual)	•	•	•	•	•
液位监测 Liquid level monitoring	—	•	◦	•	•
气压监测 Barometric monitoring	—	•	◦	•	•
出口数量 Number of outlets	1-5	1-5	1-3	1-3	1-3
耗气量 (L/min) Gas consumption (L/min)	50~300 *	50~300 *	50~1000*	50~1000*	50~300*
耗油量 (ml/h) Oil consumption (m/h)	10~100*	5~150*	10~100*	5~150*	1~120*
耗水量 (L/h) Water consumption (L/h)	—	—	—	—	0.5~5
设备空油箱重量 (kg) Weight of empty oil tank of equipment (kg)	5	15	15	18	20

(继上表) (Following the table above)

	LB-M101		LB-M102		LB-M201
油量调节 Oil regulation	机械式 (手调旋钮) Mechanical (hand-adjusted knob)	电控式 (触摸屏) Electronically controlled (touch screen)	机械式 (手调旋钮) Mechanical (hand-adjusted knob)	电控式 (触摸屏) Electronically controlled (touch screen)	机械式 (手调旋钮) Mechanical (hand-adjusted knob)
参数显示 Parameter display	无 None	数字化显示 Digital display	无 None	数字化显示 Digital display	数字化显示 Digital display
水量调节 Water regulation	—	—	—	—	电控式 Electronically controlled
自动补液装置 Automatic fluid rehydration device	—	—	—	支持 Support	支持 Support
喷嘴启停控制 Nozzle start-stop control	手动或联机 Manual or online	手动或联机 Manual or online	手动或联机 Manual or online	手动或联机 Manual or online	手动或联机 Manual or online
冷却能力 Cooling capacity	一般 (常温风冷) General (Air cooling at normal temperature)	一般 (常温风冷) General (Air cooling at normal temperature)	良好 (低温风冷-5~5℃) Good (Low temperature air cooling-5~5℃)	良好 (低温风冷-5~5℃) Good (Low temperature air cooling-5~5℃)	良好 (水滴蒸发吸热) Good (Water droplets evaporation and heat absorption)
备注 Remarks : * 依据具体加工工艺 In accordance with specific machining technology - 无 None • 标配 Standard configuration ◦ 选配 Optional					

应用推荐

Application recommendation

	LB-M101	LB-M102	LB-M201
锯床 Sawing machine	✓	◦	◦
车床 Lathe	✓	●	●
铣床 Milling machine	◦	✓	●
钻床 Drilling machine	◦	x	x
滚齿机 Gear hobbing machine	x	◦	✓
加工中心 Machining center	x	●	●
龙门铣床 Plano milling machine	x	◦	●
备注 Remarks : ✓ 优异 Excellent • 良好 Good ◦ 可选 Optional x 不推荐 Not recommended			

LB Pro系列

LB Pro series

工作原理

Working principle

内冷型微量润滑切削技术，是利用压缩空气所携带的高分散型微米级气雾剂，在刀具和工件之间实现润滑。气雾剂在微量润滑系统的雾化箱内产生，并通过机床旋转主轴进入切削刀具，从刀具内冷通道喷出；或由外置喷嘴喷出。根据不同切削需要，可调节最佳油雾量和排气量，实现精准渗透和润滑。

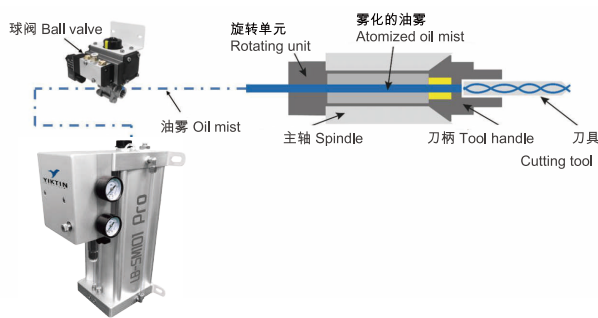
Internal cooling MQL cutting technology uses highly dispersed micron aerosol carried by compressed air to realize lubrication between cutting tools and workpieces. Aerosol is generated in the atomization box of the MQL system, enters the cutting tool through the rotating spindle of the machine tool, and is sprayed out from the cold channel in the tool; or from an external nozzle. According to different cutting requirements, the optimal oil mist amount and exhaust amount can be adjusted to realize accurate penetration and lubrication.

特殊设计的雾化喷嘴和调节装置可通过压缩空气将润滑剂进行可控雾化，产生直径约为0.5-3 μ m的微细油雾颗粒。这些细小的油雾颗粒极易渗透至切削区域，改善切削刀具摩擦状态，降低切削热量的产生。

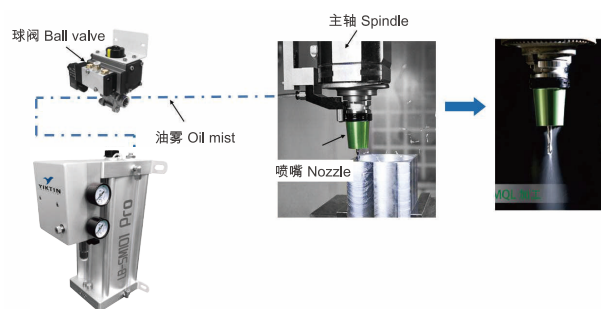
Specially designed atomizing nozzles and regulating devices can controllably atomize lubricant through compressed air to produce fine oil mist particles with a diameter of about 0.5~3 μ m. These fine oil mist particles easily penetrate into the cutting area, improving the friction state of cutting tools and reducing the generation of cutting heat.

内冷型微量润滑系统包含LB-M101 Pro和LB-SM101 Pro两种类型，依据不同应用场合，为客户提供最佳解决方案。

Internal cooling MQL system includes LB-M101 Pro and LB-SM101 Pro types, providing customers with the best solution according to different applications.



接内冷主轴 Connect internal cooling spindle



接外置喷嘴 Connect external nozzle

LB Pro系列

LB Pro series

LB-M101 Pro

微量润滑系统 MQL system



- ▶ LB-M101 Pro 是一种易于操作的简易型微量润滑内冷系统，特别适用于需要恒定气雾进行润滑的切削加工。

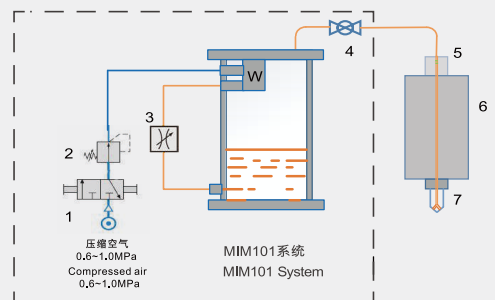
LB-M101 Pro is a simple and easy-to-operate MQL internal cooling system, which is especially suitable for cutting machining requiring constant aerosol lubrication.

- ▶ LB-M101 Pro 需通过手动按钮控制雾化装置的开启，实现气雾剂的恒定输出。

LB-M101 Pro needs to control the opening of the atomization device through manual buttons to realize constant output of aerosol.

- ▶ LB-M101 Pro 油雾输出通过球阀控制，球阀设置在靠近机床主轴或外置喷嘴附近，响应时间短，保证了切削可靠性。

LB-M101 Pro oil mist output is controlled by ball valve, which is located near the spindle of the machine tool or the external nozzle, with short response time and ensuring cutting reliability.



- | | |
|----------|---------------------------------|
| 1. 手动阀 | 1.Manual valve |
| 2. 压力控制阀 | 2.Pressure control valve |
| 3. 油量控制器 | 3.Oil quantity controller |
| 4. 球阀 | 4.Ball valve |
| 5. 旋转接头 | 5.Rotary joint |
| 6. 主轴 | 6.Spindle |
| 7. 内冷刀具 | 7.Internal cooling cutting tool |

工作原理 Working principle

LB Pro系列

LB Pro series



LB-SM101 Pro

微量润滑系统 MQL system

- ▶ LB-SM101 Pro是一种半自动控制型微量润滑内冷系统，适用于需要改变气雾量进行润滑的切削加工。

LB-SM101 Pro is a semi-automatic control MQL internal cooling system, which is suitable for cutting machining that needs to change the amount of aerosol for lubrication.

- ▶ LB-SM101 Pro雾化箱内配备多个特殊雾化装置及加气调节阀，并通过电磁阀进行组合控制，实现5种流量调节方式。

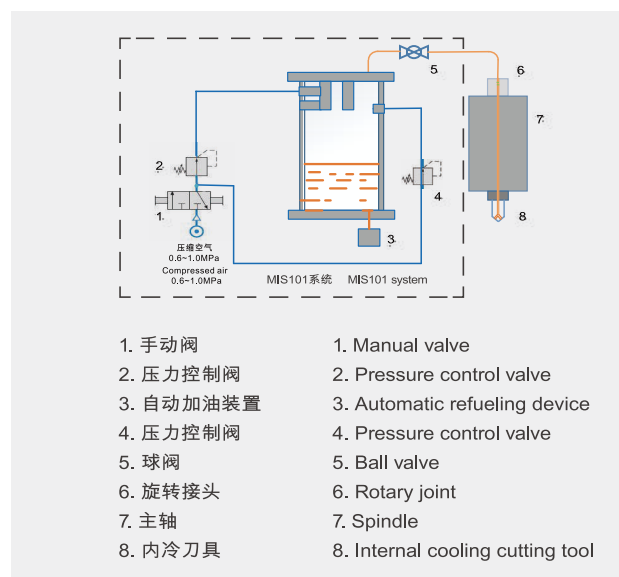
LB-SM101 Pro atomization box is equipped with a number of special atomization devices and aerating regulating valves, and is controlled by electromagnetic valves to realize 5 flow regulating modes.

- ▶ LB-SM101 Pro油雾输出通过球阀控制，球阀设置在靠近机床主轴或外置喷嘴附近，响应时间短，保证了切削可靠性。

LB-SM101 Pro oil mist output is controlled by ball valve, which is located near the spindle of the machine tool or the external nozzle, with short response time and ensuring cutting reliability.

- ▶ LB-SM101 Pro可通过获取机床信号机床控制各电磁阀开启和关闭，实现气雾输出半自动调节并产生不同剂量的油雾，以满足各个刀具和切削工序的不同需求。

LB-SM101 Pro can control the opening and closing of each solenoid valve by acquiring machine tool signals, thus realizing semi-automatic adjustment of aerosol output and generating different doses of oil mist to meet different requirements of each cutting tool and cutting process.



工作原理 Working principle

LB Pro系列

LB Pro series

LB-AM101 Pro

微量润滑系统 MQL system



- ▶ LB-AM101 Pro是一种智能型微量润滑内冷系统，可自动控制油雾输出量。适用于需要改变气雾量进行润滑的切削加工，例如：钻削、车削或铣削。

LB-AM101 Pro is an intelligent internal cooling MQL (Minimum Quantity Lubrication) system and it can control the oil mist output automatically. It is suitable for the cutting processes which need to change the air mist amount for lubrication, including drilling, turning, and milling.

- ▶ LB-AM101 Pro配备3个雾化喷头及比例调节阀，通过不同调节组合可实现27种流量变化。

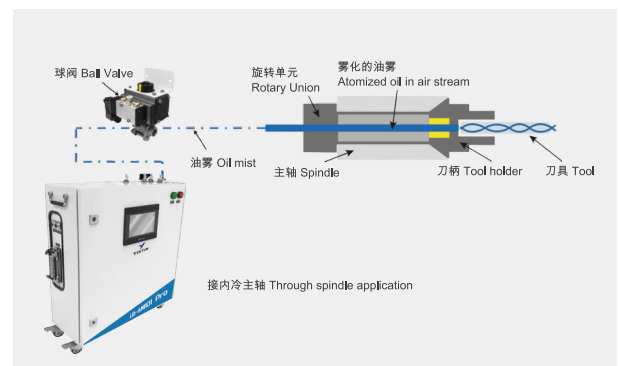
LB-AM101 Pro is equipped with 3 atomizing nozzles and proportioning valves and can output 27 different flow rates through different regulating combinations.

- ▶ LB-AM101 Pro可通过机床控制激活，并且可通过比例调节阀进行压差自动设置，实现气雾输出量自动调节。

LB-AM101 Pro can be activated by the machine tool control and can realize the automatic setting of the differential pressure via proportioning valves to regulate the air mist output automatically.

- ▶ 可选配增压系统，实现微量润滑设备智能增压控制，解决小孔径刀具油雾输出难题；产品适用内冷孔径范围： ≥ 0.5 mm。

A boosting system is optional to realize the intelligent boosting control of the MQL equipment and solve the oil mist output problem for small aperture tools. Applicable aperture range of internal cooling of the product is ≥ 0.5 mm.



工作原理 Working principle

产品技术参数 Product technical parameters

	LB-M101 Pro		LB-SM101 Pro		LB-AM101 Pro	
设备尺寸 (mm) Equipment size (mm)	240x210x390		267×200×380		635x245x674	
油箱容积 (L) Oil tank capacity (L)	2.8		2.8		2.8	
使用电源 (标准) Power supply (standard)	24V DC		24V DC		AC 220V / DC24V (选配 Optional)	
进气压力 (MPa) Inlet pressure (MPa)	0.6~1.0		0.6~1.0		0.6~1.0	
液位指示器 (目视) Liquid level indicator (visual)	●		●		●	
液位监测 Liquid level monitoring	○		●		●	
气压监测 Barometric monitoring	○		○		●	
出口数量 Number of outlets	1-3		1-3		1-3	
耗气量 (L/min) Gas consumption (L/min)	50~800 *		50~800 *		50~800 *	
耗油量 (ml/h) Oil consumption (ml/h)	1~120*		1~120*		1~120*	
设备空油箱重量 (kg) Weight of empty oil tank of equipment (kg)	8		10		42	
油量调节 Oil regulation	手动	Manual	手动	Manual	自动	Auto
油量变化 Oil quantity change	恒定	Constant	5种	5	自动	Auto
自动加油装置 Automatic refueling device	不支持	Not support	支持	Support	支持	With
油雾启停 Oil mist start-stop	球阀	Ball valve	球阀	Ball valve	球阀	Ball Valve
适用孔径 Applicable aperture	≥0.8 mm		≥0.8 mm		≥0.5 mm	
备注 Remarks : * 依据具体加工工艺 In accordance with specific machining technology ● 标配 Standard configuration ○ 选配 Optional						

应用推荐 Application recommendation

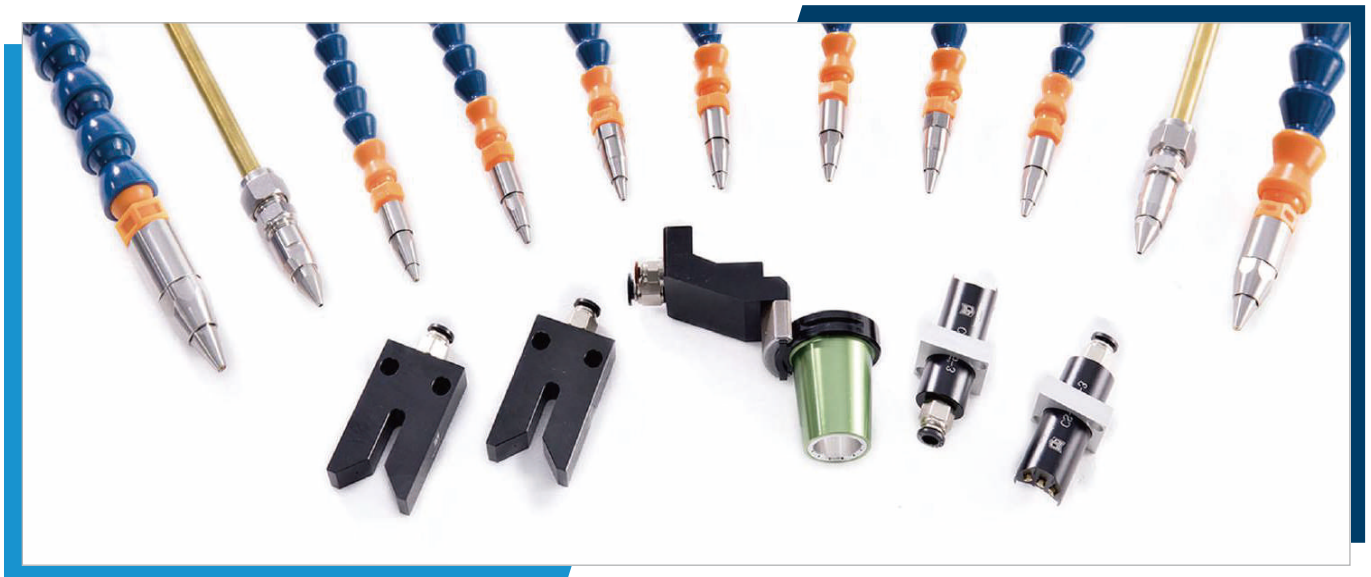
	LB-M101 Pro	LB-SM101 Pro	LB-AM101 Pro
车 床 Lathe	●	●	●
铣 床 Milling machine	●	✓	✓
钻 床 Drilling machine	●	●	●
加工 中心 Machining center	○	✓	✓
龙 门 铣 床 Plano milling machine	○	✓	✓
备注 Remarks : ✓ 优异 Excellent ● 良好 Good ○ 可选 Optional			

配套附件

Accessories

益田工业开发出的各式雾化喷头和喷嘴均采用喷射方式，具有喷射精度高、喷雾均匀、不会产生大量油雾的特性。针对不同应用领域，我们可提供丰富多样的喷头和喷嘴供客户选择。我们的技术人员具有丰富的微量润滑设计经验，可为用户提供最适合的个性化解决方案。

All kinds of atomizing sprayers and nozzles developed by Yiktin Industrial adopt spraying methods, which have the characteristics of high spraying accuracy, uniform spraying and no large amount of oil mist. For different application fields, we can provide a rich variety of sprayers and nozzles for customers to choose from. Our technicians have rich experience in MQL design and can provide users with the most suitable personalized solutions.



微量润滑系统配套附件

Accessories for MQL System

配套附件 Accessories

NA31/NA32环型喷流喷嘴 NA31/NA32 annular jet nozzle



- ▶ 独特卡套型结构设计，可保证油雾气流均匀稳定且精准的吹扫到切削刀刃上。

The unique clamping sleeve structure design can ensure that the oil mist airflow is evenly, stably and accurately purged onto the cutting edge.

- ▶ 雾化器油雾出口紧贴切削刃口部位，强劲油雾气流可以快速清除切削过程产生的切屑。

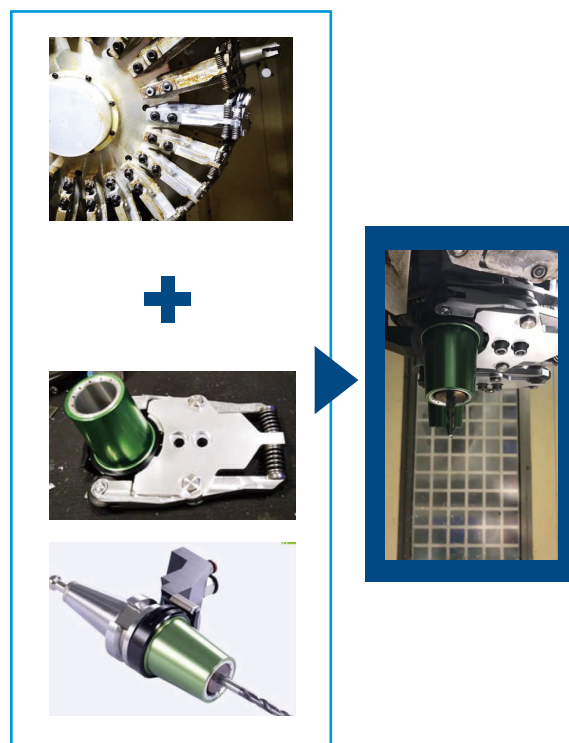
The oil mist outlet of the atomizer is close to the cutting edge, and strong oil mist air flow can quickly remove chips generated in the cutting process.

- ▶ 强劲油雾出口采用多角度或固定喷射角度设计，适应不同切屑刀具，实现最佳润滑。

The outlet of strong oil mist is designed with multi-angle or fixed injection angle, which is suitable for different chip cutting tools and realizes the best lubrication.

- ▶ 卡套型结构可根据每一款刀柄进行定制设计，并可与配套刀架一同安装于自动换刀装置中，实现自动化快速换刀。

The clamping sleeve structure can be customized and designed according to each tool handle, and can be installed in the automatic tool change device together with the matching tool holder to realize automatic and rapid tool change.



环形喷嘴换刀系统 Annular nozzle tool change system

配套附件

Accessories

NC21/NC22圆喷流喷嘴

NC21/NC22 circular jet nozzle

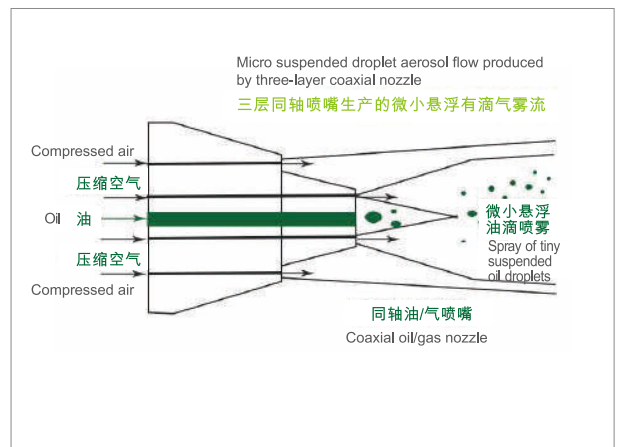


- ▶ 适用于各类车削、铣削、钻削、攻牙等加工过程中刀具的冷却润滑。

It is suitable for cooling and lubricating of cutting tools in various turning, milling, drilling, tapping and other machining processes.

- ▶ 喷嘴结构采用三层同轴套管方式，定量的润滑由从喷嘴内部毛细管流出，外部输送压缩空气，确保油雾能够集中喷射，使得润滑剂可精确输送至切削区。

The nozzle structure adopts a three-layer coaxial casing, quantitative lubrication flows out from the capillary tube inside the nozzle, and compressed air is transported from the outside to ensure centralized injection of oil mist, so that lubricant can be accurately transported to the cutting area.



工作原理 Working principle

配套附件

Accessories



NC11圆喷流喷嘴

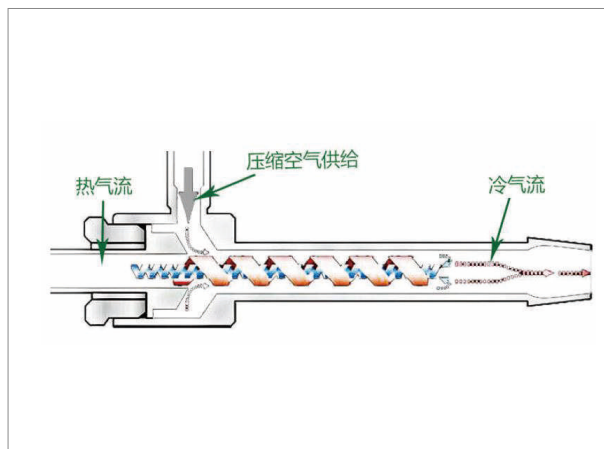
NC11 circular jet nozzle

- ▶ 适用于各类车削、铣削、钻削、攻牙等加工过程的冷却润滑。

It is suitable for cooling and lubricating in various turning, milling, drilling, tapping and other machining processes.

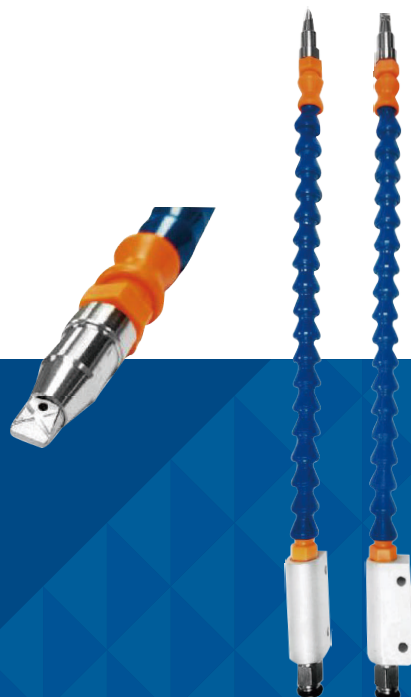
- ▶ 喷嘴结合涡流制冷技术，将常温压缩空气接入喷嘴的涡流管制冷端，能瞬间产生-30℃温差获得低温油雾，而不使用任何冷媒。

Combining vortex refrigeration technology, the nozzle connects the normal temperature compressed air to the cold end of the vortex tube of the nozzle, which can instantly generate a temperature difference of -30℃ to obtain low temperature oil mist without using any refrigerant.



工作原理 Working principle

配套附件 Accessories



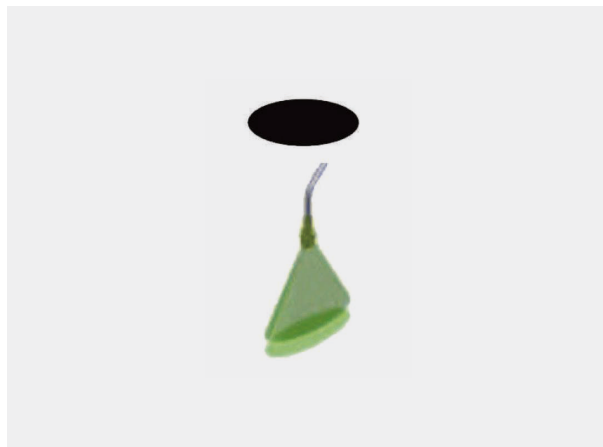
NW12宽喷流喷嘴 NW12 wide jet nozzle

- ▶ 适用于各类冲压、锻压、拉拔等加工过程中工具的冷却润滑。

It is suitable for cooling and lubricating tools in various stamping, forging, drawing and other machining processes.

- ▶ 喷嘴前端结构采用宽喷流设计，能够确保喷出的油雾呈扇形状，使润滑剂能够完全覆盖工具加工区域，实现精准冷却润滑。

The front end structure of the nozzle adopts a wide jet design, which can ensure that the sprayed oil mist is in a fan shape, so that the lubricant can completely cover the tool machining area and realize accurate cooling and lubrication.



工作原理 Working principle

配套附件

Accessories



NM31多点喷流喷嘴

NM31 multi-point jet nozzle

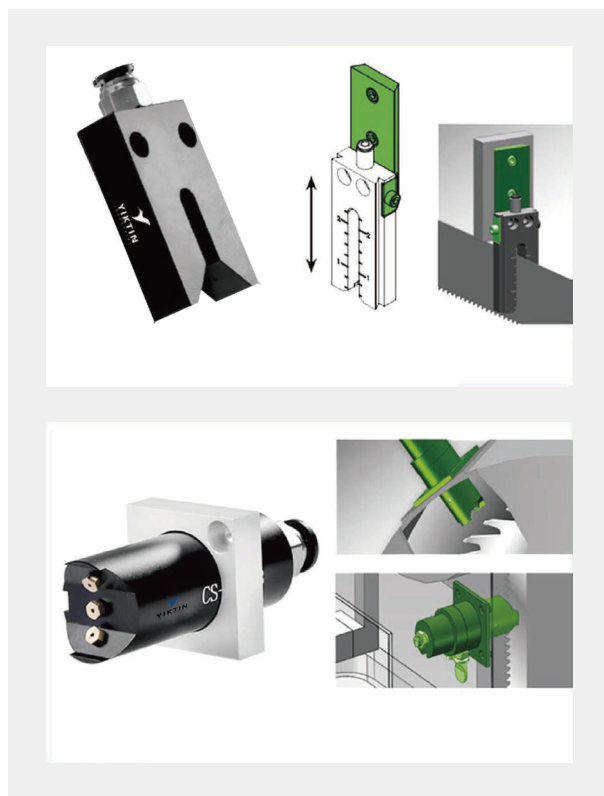


- ▶ 锯片专用喷嘴适用于各类锯片锯切加工过程中的冷却和润滑，如垂直带锯、水平带锯、圆锯等锯片。

The special nozzle for saw blade is suitable for cooling and lubricating all kinds of saw blades during sawing machining, such as vertical band saw, horizontal band saw, circular saw and other saw blades.

- ▶ 其中带锯条喷嘴设计可用于垂直带锯或水平带锯锯切加工，圆形喷嘴设计可用于各种圆锯及带锯锯切加工。

Among them, the band saw blade nozzle design can be used for vertical band saw or horizontal band saw sawing machining, and the circular nozzle design can be used for various circular saws and band saw sawing machining.



配套附件 Accessories

外转内刀柄 External-turning-internal shank



- 独特的外转内油雾流道设计，满足无中心出水主轴的机床内喷加工需求。

Its unique external-turning-internal oil mist flow channel design can meet the internal spraying processing requirements of the machines without central water discharge spindles.

独特的油雾密封结构设计，解决了刀柄旋转发热问题，刀柄最高转速可达10000rpm。

Its unique oil mist sealing structure design can solve the heating problem of the shank due to rotation and enable the maximum speed of the shank to reach 10000rpm.

- 安装至机床上时可使用自动换刀定位块，实现刀柄的自动换刀。

When installed on the machine tool, it may use an automatic tool-changing positioning block to realize automatic tool changing.

微量润滑系统专用润滑剂

Special lubricant for MQL system

微量润滑冷却系统是采用高品质微量润滑剂进行冷却润滑，而不是传统的水性切削液或油性切削液。针对微量润滑切削技术，开发了专用润滑剂。

MQL cooling system uses high-quality minimum quantity lubricants for cooling and lubrication, instead of conventional water-based cutting fluid or oily cutting fluid. Aiming at MQL cutting technology, special lubricants were developed.

系列微量润滑剂，以高润滑性天然植物油和合成酯基础油为主要成分，加入极压添加剂，不含游离氯及其衍生物，安全无毒。

Series minimum quantity lubricants are mainly composed of highly lubricating natural vegetable oil and synthetic ester

base oil, and are added with extreme pressure additives without contain free chlorine and its derivatives, and are safe and non-toxic.

可在切削工具/工件之间形成均匀稳定的润滑薄膜，减少摩擦力，防止热量积聚，特别适合微量润滑状态下的金属切削。

It can form a uniform and stable lubricating film between cutting tools/workpieces, reduce friction and prevent heat accumulation, and is especially suitable for metal cutting under MQL.

品名	加工材质 Machining materials				作业强度 Operation intensity		水溶性	外冷MQL	内冷MQL
	铝材 /铜材	铸铁 Cast iron	中低碳合金钢	高碳合金钢 /镍铬合金	重载加工	轻中载加工			
F20-E	●	○	○	○	○	●	×	●	○
F20-A	●	○	○	○	○	●	×	●	●
F30-E	○	●	●	○	●	●	×	●	×
F30-A	○	●	●	●	●	●	×	●	×
备注 Remarks : ● 适合 Suitable ○ 一般 General × 不可 Not allowed									

润滑油
lubricating oil



传统切削液
Conventional cutting fluid



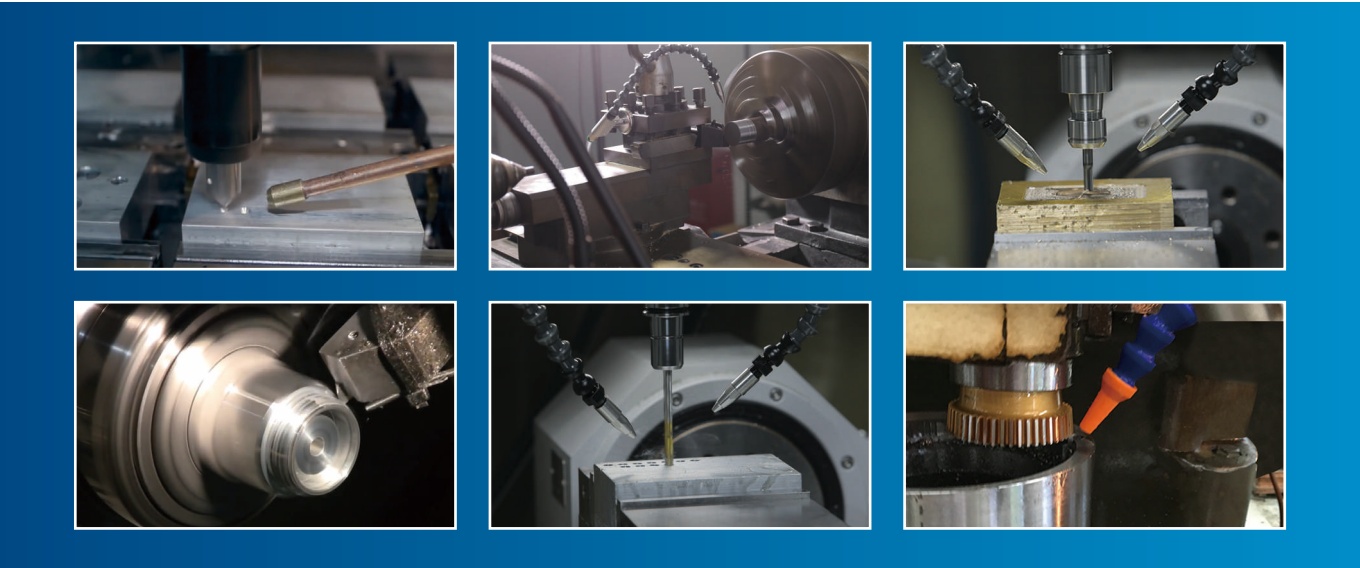
应用范围

Application scope

微量润滑 (MQL)作为一种金属加工的冷却润滑方式，几乎每种金属加工过程都能用到MQL系统，尤其是在金属切削和金属成型方面。如：车削、铣削、钻孔、铰削、拉削、磨削、锯切、攻牙、螺纹加工、折叠、折弯、冲压、压紧、焊接、铆接、压紧、模具成型等等。另外，MQL系统在链条润滑、高速轴承润滑和印刷、建筑等行业均有应用。

cutting and metal forming. For example: Turning, milling, drilling, reaming, broaching, grinding, sawing, tapping, thread machining, folding, bending, stamping, pressing, welding, riveting, pressing, die forming, etc. In addition, MQL system has been applied in chain lubrication, high-speed bearing lubrication, printing, construction and other industries.

Minimum Quantity Lubrication (MQL) is a cooling lubrication method for metal machining. MQL system can be used in almost every metal machining process, especially in metal



现有可提供方案如下: The following options are available:

» 铝合金专用加工方案	» Special machining scheme for aluminium alloy
» 不锈钢专用加工方案	» Special machining scheme for stainless steel
» 铜专用加工方案	» Special machining scheme for copper
» 铸铁专用加工方案	» Special machining scheme for cast iron
» 贵金属专用加工方案	» Special machining scheme for precious metals
» 钴铬钼专用加工方案	» Special machining scheme for cobalt, chromium and molybdenum
» 陶瓷专用加工方案	» Special machining scheme for ceramics

应用案例 Applications

润滑系统在各式机床上针对不同应用都能展现卓越性能

Lubrication systems exhibit superior performance on various machine tools for different applications



表面粗糙度比较-使用MQL加工的工件粗糙度明显优于使用传统切削液加工的

Surface roughness comparison-The roughness of the workpiece machined by MQL is obviously superior than that machined by conventional cutting fluid.

» 工件材料：6063铝合金/H59铜合金

Workpiece material: 6063 aluminium alloy/H59 copper alloy

» 刀具材料：硬质合金

Cutting tool materials: Hard alloy

» 刀具直径：D=20mm

Cutting tool diameter D=20mm

» 切削速度：Vc=94.2m/min

Cutting speed: Vc=94.2m/min

» 进给量：F=1000mm/min

Feed rate: F=1000mm/min

» 背吃刀量：ap=0.2mm

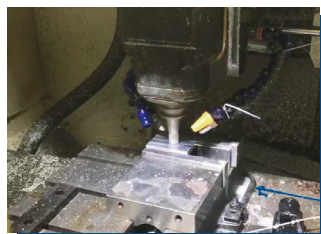
Depth of cut: ap=0.2mm

加工现场：
Machining site:



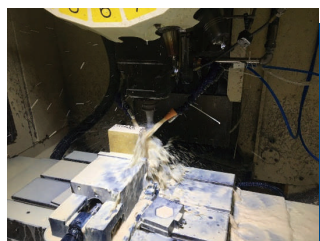
切削液加工6063铝合金

Cutting fluid machining 6063
aluminum alloy



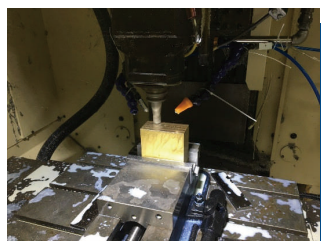
MQL加工6063铝合金

MQL machining 6063 aluminum
alloy



切削液加工H59铜合金

Cutting fluid machining H59
copper alloy



MQL加工H59铜合金

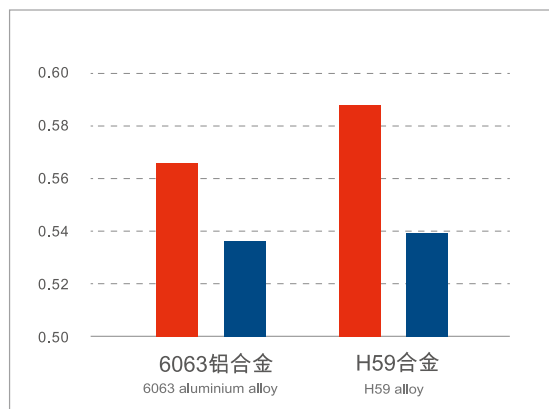
MQL machining H59 copper alloy

表面加工效果：

Surface machining effect:

表面粗糙度对比：MQL VS 切削液加工 (Ra:μm)

Surface Roughness Comparison:MQL VS Cutting Fluid Machining (Ra: μm)



■ 切削液 Cutting fluid ■ MQL

结果：Results:

工件表面质量明显提高。

The surface quality of the workpiece is obviously improved.



刀具寿命比较-使用MQL进行钻削加工的刀具寿命明显优于使用传统切削液的刀具寿命

Comparison of tool life-The tool life using MQL for drilling is obviously superior than that using conventional cutting fluid.



1 钻削加工-CoCrMo

Drilling machining-CoCrMo

» 工件材料：CoCrMo

Workpiece material: CoCrMo

» 刀具材料：PCD

Tool material: PCD

» 刀具直径：D=20mm

Tool diameter: D=20mm

» 切削速度：Vc=25.12m/min

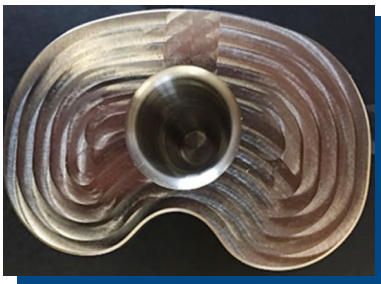
Cutting speed: Vc=25.12m/min

» 进给量：F=30mm/min

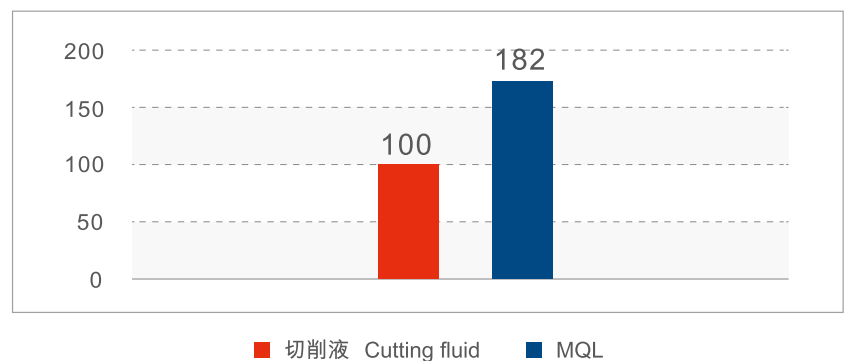
Feed rate: F=30mm/min

» 钻削深度：L=20mm

Drilling depth: L=20mm



完成孔数 (个)
Number of completed holes (pcs)



结果：Results:

钻削寿命增加80%。

Lifespan of the drilling tool is increased by 80%.



刀具寿命比较-使用MQL进行铣削加工的刀具寿命是使用传统切削液刀具寿命的2倍或以上

Comparison of tool life-The tool life using MQL for milling is 2 times or more than that using conventional cutting fluid.



铣削加工-H59铜合金

Milling machining--H59 copper alloy

» 工件材料：H59铜合金

Workpiece material: H59 copper alloy

» 刀具材料：硬质合金

Tool materials: Hard alloy

» 刀具直径：D=6mm

Tool diameter D=6mm

» 切削速度：Vc=23.55m/min

Cutting speed: Vc=23.55m/min

» 进给量：F=1600mm/min

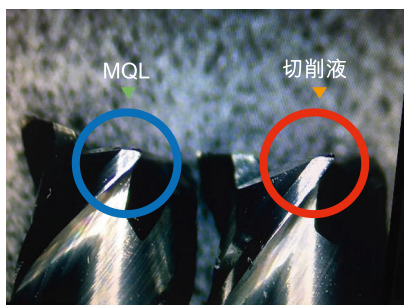
Feed rate: F=1600mm/min

» 背吃刀量：ap=0.2mm

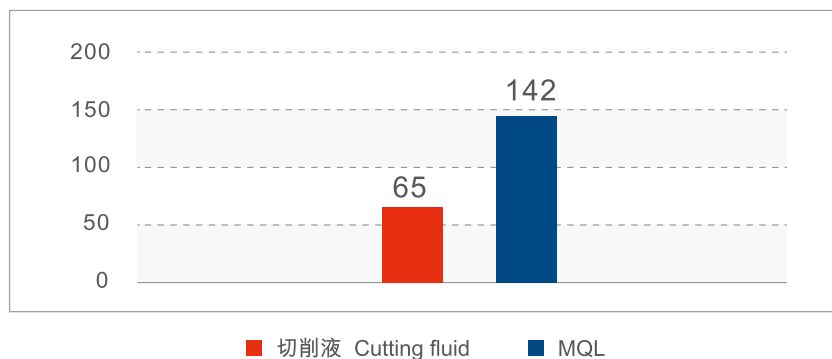
Depth of cut: ap=0.2mm

使用切削液进行加工的刀具磨损量达到VB=0.2mm时，刀具铣削时间为65min，使用MQL的刀具铣削时间为142min，即采用MQL方案的刀具寿命是切削液的2.18倍。

When the wear amount of cutting tools with cutting fluid for machining reaches VB=0.2mm, the milling time of cutting tools is 65min, while the milling time of cutting tools with MQL is 142min, that is, the life of cutting tools with MQL solution is 2.18 times that of cutting fluid.



刀具寿命 (Min)
Tool life



结果 : Results:

铣削刀具的寿命增加两倍。

The life of milling tool has tripled.

3

铣削加工-H13模具钢

Milling machining-H13 die steel

» 工件材料：H13模具钢 (HRC56±2)

Workpiece material: H13 die steel (HRC56 + 2)

» 刀具材料：硬质合金立铣刀D6，TiSiN

Tool materials: Cemented carbide end milling cutter D6, TiSiN

» 进给量：F=4000mm/min

Feed rate: F=4000mm/min

» 切削速度：Vc=188.4m/min

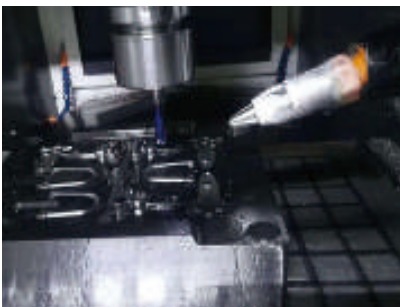
Cutting speed: Vc=188.4m/min

» 背吃刀量：ap=0.05mm

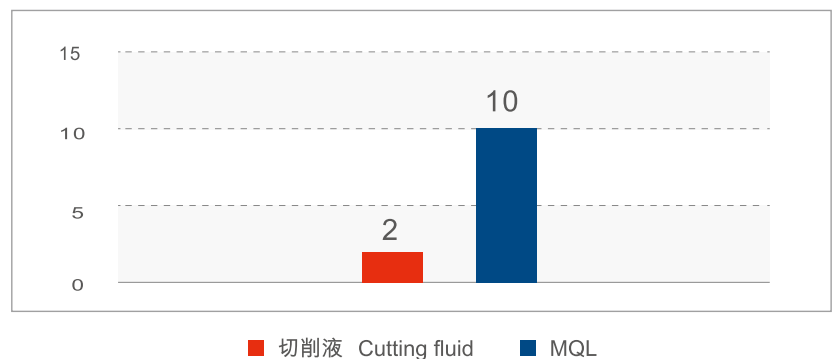
Depth of cut: ap=0.05mm

相同条件下，使用传统切削液进行加工，工件完成数量为2，而使用MQL方案进行加工，则工件完成数量可达到10。

Under the same conditions, the number of workpieces completed by using conventional cutting fluid for machining is 2, while the number of workpieces completed by using MQL solution can reach 10.



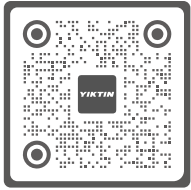
完成工件数（个）
Number of completed workpieces (pcs)



结果 : Results:

刀具寿命相比切削液冷却提升了5倍。

The tool life is 5 times higher than that of cutting fluid cooling.



YIKTIN

广东益田工业有限公司

YIKTIN INDUSTRIAL CO., LTD.

中国广东省广州天河区奥体南路6号东澳小镇A区12栋
Unit A1209, No.6 Aotinan Road, Guangzhou, China 510660
Tel. +86 20 8200 6193
Fax +86 20 8200 6193
cs@yiktin.com
www.yiktin.com

