

MQL(Minimum Quantity Lubrication) In China

Practice for green manufacture and lower emission by Peak Foster Technology

TOPSET 多普赛
MQL EXPERTS
PEAK FOSTER TECHNOLOGY CO., LTD

MQL units from Peak Foster

Internal MQL:

External MQL:



Cutting fluid, Coolant

- ◆ Functions of cutting fluid in metalworking:
Cooling, Lubrication, Assistance to chip remove
- ◆ Guidelines of cutting fluid in metalworking:
Contamination, Potential Health Risks(oil acne, skin irritation, allergies, asthma, eye irritation, lung irritation, breathing difficulties, hypersensitivity, pneumonitis or bronchitis),
Safety Precautions



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The functional principle of MQL

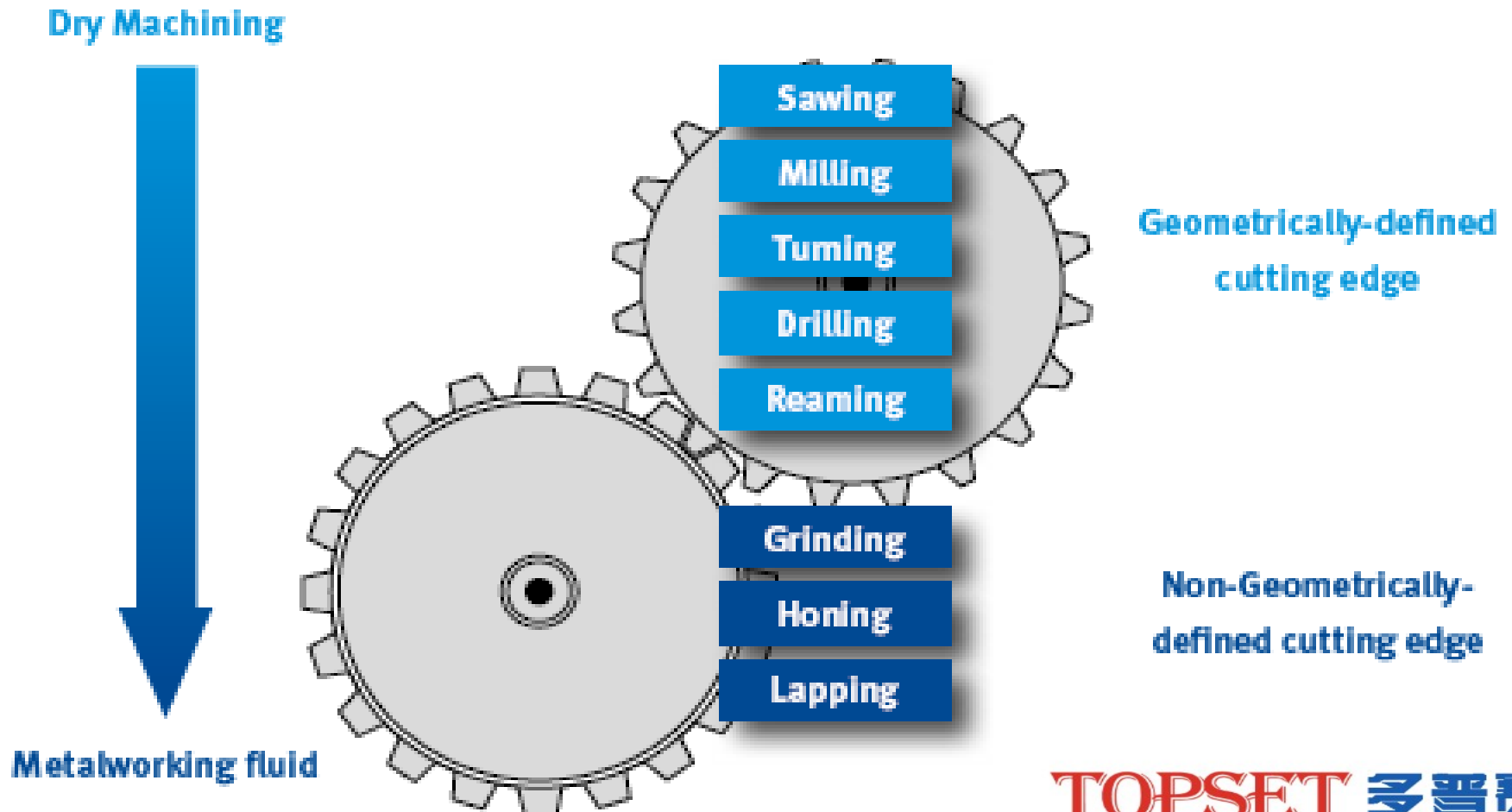
- ◆ The enormous reduction in the quantity of lubricant compared to the circulated quantities of conventional metalworking fluid systems is the key feature of MQL. In contrast to conventional flood lubrication, minimum quantity lubrication uses only a few millilitres (ml) of lubrication per hour for the machining process.
- ◆ Minimum quantity lubrication today uses such precise metering that the lubricant is nearly completely used up. Typical dosage quantities range from 5 ml to 50 ml per process hour (tool cutting time).
- ◆ The lubricant is either applied from outside as an aerosol using compressed air or it is “shot” at the tool in the form of droplets.

Application of MQL

- ◆ **External feed for standard processes**
- ◆ **Internal feed for demanding processes**
- ◆ **Dry processing**



Coolant requirements for machining process


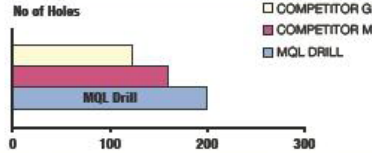


Applications of MQL

	Cast alloy(Al)	Forged alloy (Al)	High-alloy steel	Free cutting alloy steel	Cast iron
Drilling	MQL	MQL	MQL	Dry	Dry
Reaming	MQL	MQL	MQL	MQL	MQL
Thread cutting	MQL	MQL	MQL	MQL	MQL
Deep drilling	MQL	MQL		MQL	MQL
Milling		MQL	Dry	Dry	Dry
Turning	MQL/dry	MQL/dry	Dry	Dry	Dry
Hobbing			Dry	Dry	Dry
Sawing	MQL	MQL	MQL	MQL	MQL
Broaching			MQL	MQL/dry	Dry

HORKOS



Drill		MQL Power Long Drill
WORK PIECE		
INDUSTRY		Automotive
COMPONENT		Crankshaft (L4 Engine)
CUTTING CONDITIONS	DRILL DIAMETER	6.19mm (Special)
	CUTTING SPEED (SFM)	267
	RPM	4180
	FEED (IPR)	0.008
	FEED (mm/rev)	0.2
	DOC	3.75"(95mm)
	HOLE DESCRIPTION	Blind
COOLANT		MQL
MATERIAL		Carbon Steel
HARDNESS		25 HRC
MACHINE		Toyoseiki MQL Machine
PERFORMANCE		 <p>No of Holes</p> <p>COMPETITOR G COMPETITOR M MQL DRILL</p>
RESULT		Consistent tool life of 200 Cranks

Peak Foster(Crankshaft only)

Materials	Hardne ss (HB)	Hole(Q't y- diamete r-Depth)	Speed (RPM)	Feed(mm/r)	Process time	Oil consump tion
48MnV	217-280	6-Φ8- 100	2000	0.17	8'50"	2L/12天
48MnV	217-280	6-Φ7- 150	2600	0.18	8'50"	2L/12天
45	180-220	12-Φ8- 100	2200	0.16	7'15"	2L/12天
42CrMo(A)	237-280	6-Φ8.8- 130	2000	0.18	5'30"	2L/12天

Lubricants for minimum quantity lubrication

- ◆ **Synthetic esters** are preferable for all machining processes (threading, drilling, reaming and turning). **Synthetic** esters have the advantage that, despite low viscosity, they have a high boiling point and flash point. This means that much less vapour is emitted in the workspace compared to conventional mineral oils. In addition to these properties, ester oils exhibit very low toxicity and are rated as Water Pollution Category 1 (WPC 1) or “non-hazardous to water”.
- ◆ **Fatty alcohols** are preferred for machining processes in which the separation effect rather than the lubricating effect is of prime importance (avoidance of built-up edges). An example of this is the machining of non-ferrous metals. Fatty alcohols have very good biodegradability, are toxicologically harmless, and likewise are rated as non-hazardous to water (nhw) or Water Pollution Category 1 (WPC 1).

Tools for minimum quantity lubrication

- ◆ Machining with minimum quantity lubrication uses extremely small amounts of lubricant. This is why continuous supply of the medium to the contact point is of overriding importance. The tool is a vital system element.
- ◆ For minimum quantity lubrication, conventional systems are often of limited suitability. The tools used in wet machining frequently continue to be used. When this happens, the limitations concerning tool efficiency soon become apparent. Especially for processes with high heat development and high cutting speeds, MQL-compatible tools are a basic prerequisite for efficient machining.
- ◆ On one hand, dry machining and minimum quantity lubrication are based on reduced heat development and on the other, on rapid heat dissipation via the chips. MQL-compatible tools are optimised to these requirements with respect to cutting materials and tool geometry.
- ◆ Modern HPC drilling tools are characterised by high-performance materials, MQL-compatible coatings and geometries that assist chip removal and combat overheating.