







1.the chemical structure stability, good heat resistance, molecules with multiple polar groups, have a strong affinity for metal surfaces, excellent high-temperature lubrication.

2.can significantly reduce the friction coefficient significantly improved lubrication performance.

3. oxidation resistance, in the course will not produce the precipitate.

4.low pour point, low temperature fluidity.

5.can improve the rust resistance of the oil.

6.non-toxic, odorless, biodegradable, has no effect on the environment.

Therefore, pentyl polyol fatty acid ester can be well positioned to meet the performance requirements the processing liquid.

#### V. PHYSICAL AND CHEMICAL PROPERTIES OF WORKING FLUIDS

The performance of processing solution developed in Table 1<sup>[6]</sup>.

TABLE I. THE PROCESSING FLUID PERFORMANCE

Item	Development indicators	Measured results	Experimental methods
Kinematic viscosity ( 40 °C ) /mm <sup>2</sup> ·s <sup>-1</sup>	41.4-50.6	48.86	GB/T265
Viscosity index	≥100	120	GB/T2541
Flash point (COC)/°C	≥210	230	GB/T3536
Pour point /°C	≤-20	-25	GB/T3535
Air release value (50°C) /min	≤10	8.6	SH/T0308
Seal to adapt to the performance index	≤11	5	SH/T0305
Resistance to emulsification ( 40-37-3mL ) /min	≤30	15	GB/T7305
54°C			
82°C			
Bubble (bubble orientation / foam stability)/ (mL/mL)			GB/T12579
24°C	≤150/10	40/0	
93.5°C	≤150/10	40/0	
after24°C	≤150/10	20/0	
Copper corrosion test ( 100°C, 3h ) /grade	≤1	1	GB/T5096
Liquid corrosion test (distilled water)	No rust	No rust	GB/T11143
And value /mgKOH·g <sup>-1</sup>	report	0.1	GB/T4945
Water /%	Trace	Trace	GB/T260
Mechanical impurities /%	none	none	GB/T511

Oxidation stability			
Oxidation 1000h Acid value /mg KOH. g <sup>-1</sup>	≤2.0	1.0	GB/T12581
Rotary bomb (150°C) /min	report	215	SH/T0193
Shear stability (250 cycles at 40 °C the kinematic viscosity change rate) /%	≤10	5	SH/T0103
Abrasion resistance			
FZG (or CL-100) gear test (A/8.3/90) / failure level	≥10	12	SH/T0306
Vane pump test total weight loss (100h) /mg	≤50	23	SH/T0307
Wear scar diameter D <sub>392N</sub> 60min /mm	report	0.54	SH/T0189
The largest non-card bite load PB/N	≥686	720	GB/T3142
Biodegradation rate /%	≥80	85	CEL-L-33-98A

#### VI. CONCLUSION

1. Use PAG developed an appropriate proportion with the additive to reconcile working fluids is feasible, and polyether applications could enhance the degradation rate of the working fluids.

2. The the Processing liquid lab evaluation the the various simulation and actual application tests, its performance to meet the use requirements of the machining center, under normal operating conditions, to ensure the normal use of the machining center, effectively extending the oil change period, comply with the development trend to the machining center.

3.The Processing solution of the development has the good natural degradation rate by the CEC-L-33-98A test and promote the use of small batch production.

#### REFERENCES

- [1] Fu-chuan Huan,Yun-qi Shao,Song Xu,Zhao-xia Lu. Universal biodegradable machining center lubricant Development and application .The oil business.vol6,december 2007.
- [2] Jie Ding, Jie Zhao. The application of high-speed processing technology in CNC lathe[J]. Mechanical design and manufacturing. Vol 45(12), 2007
- [3] Xin-Min Luo. Metal processing oil products and applications. Beijing:China Petrochemical Press, 2006
- [4] Zhi-Guang Yan.. Lubricating materials and lubrication technology. Beijing:China Petrochemical Press , 1999.
- [5] Yao-Hua Zhou,Guang-Lin Zhang. Metalworking lubricants. Beijing:China Petrochemical Press, 1998
- [6] Yao-Hua Zhou,Guang-Lin Zhang. Metalworking lubricants( Second Edition). Beijing:China Petrochemical Press, 2010.