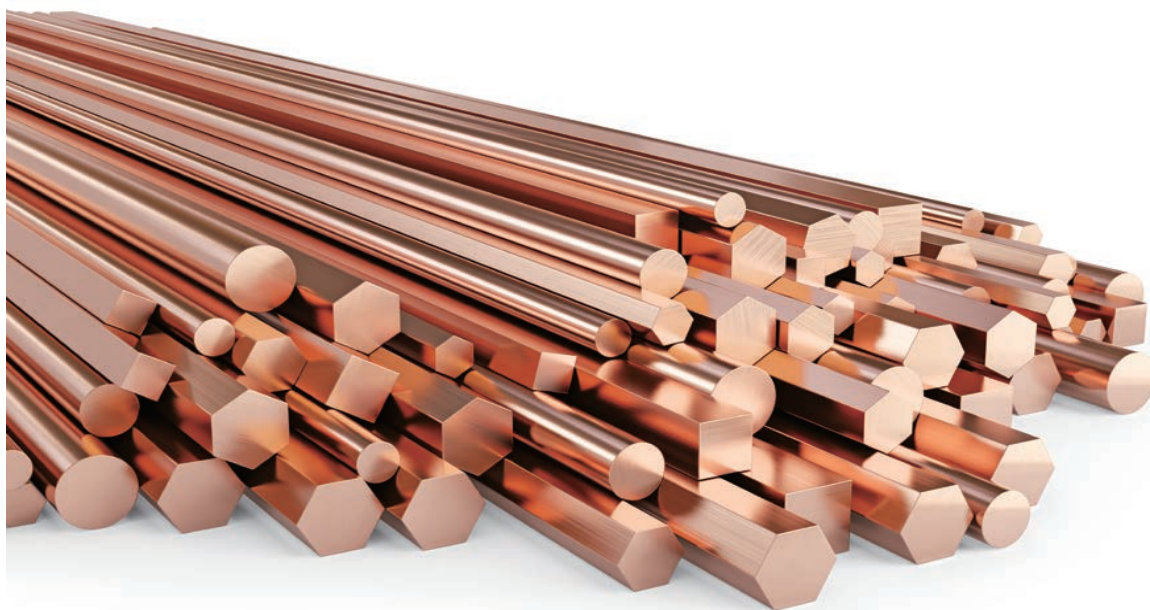


Pure Copper Machining Solutions

For turning small parts | UC1 and Y axis holder + High-pressure coolant

NTK
CUTTING TOOLS





Mastering Pure Copper Machining Delivering the solution is NTK

Pure copper parts for automotive and semiconductor equipment are difficult to machine during long production runs, due to low tool life from wear and chip control issues.

In response to this challenge, NTK has the solution to extend tool life using the diamond-coated carbide grade UC1 and improve chip control by implementing a Y-axis holder + high pressure coolant.

Pure Copper Machining Solutions

For turning small parts | UC1 grade + Y axis holder with High-pressure coolant

NTK's Work Changing Concept

Diamond-coated carbide: Longer tool life with UC1
Improved chip control with a Y-axis tool holder + high-pressure coolant

Performance

- High purity, high hardness diamond coating, and excellent adhesion performance enables long-term stable machining with UC1.
- Improved chip control by applying Y-axis direction machining with high-pressure coolant.

Applications

Pure copper (C1020/C1100) machined using Sliding head automatic lathes or CNC-lathes.

(Machining Property of C1100 Tough Pitch Copper)

Diamond-coated carbide: UC1 with excellent wear resistance & welding resistance is recommended because tooling tends to wear and the machined surface deteriorates due to welding, resulting in short tool life.

A well machined surface can be obtained by applying the appropriate cutting condition (low cutting depth/low feed) to reduce chip thickness.

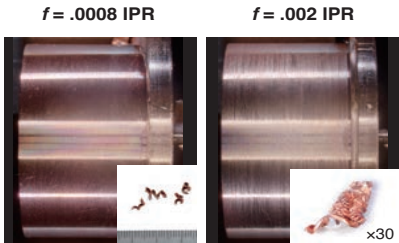
Case Study

Battery connector : C1100 φ.394 -.787 in.		
	NTK	Competitor
Tool	UC1 DCMT32.508 FNAM3	PVD super coat DCGT32.508 molded chipbreaker
Speed (SFM)	180 - 360	
Feed (IPR)	.0012	
DOC (inch)	.008	
Coolant	WET	
Tool life	1000 pcs.	50 pcs.

Electrode part : C1100 φ.472 in.		
	NTK	Competitor
Tool	UC1 DCMT32.504 FNAM3	PVD super coat DCGT32.504 molded chipbreaker
Speed (SFM)	262	
Feed (IPR)	.002	
DOC (inch)	.040	
Coolant	WET	
Tool life	2000 pcs.	100 pcs.

Machined Surface Comparison

Part material : C1100 $v_c = 260$ SFM $a_p = .040$ WET
Tool : DCMT32.508FNAM3 UC1



If cutting conditions cause the chips to become thick (high cutting depth or high feed) then the machined surface will deteriorate due to chip clogging.

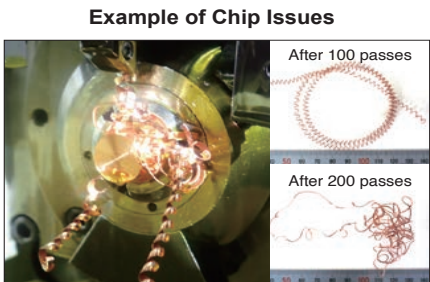
Cutting conditions

Grade	Material	Operation	Machining	Speed (SFM)	Feed (IPR)	DOC (inch)	WET
UC1	Tough pitch copper C1100	Turning	Rough - Finish	160 - 500	.0008 - .002	.008 - .080	●

Using the cutting conditions shown, chips can be segmented and controlled with the AM3 chipbreaker.
When machining at large depths of cut and high feed rate, select the CL or ZP chipbreaker to prevent chip clogging.

(Machining Properties of C1020 Oxygen-free Copper)

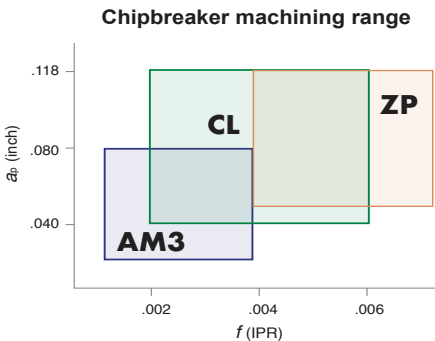
Stable chip generation may be difficult with a chipbreaker alone, it is recommended to add a Y-axis holder + high pressure coolant



Even if good chip control is obtained at initial stage of machining, sudden chip entanglement can occur leading to tool wear.



Chip tangling can be suppressed by applying Y-axis machining and high-pressure coolant.

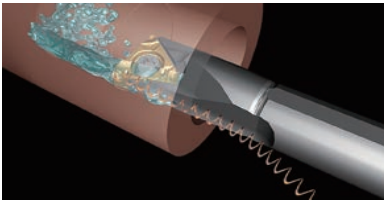


Cutting Conditions

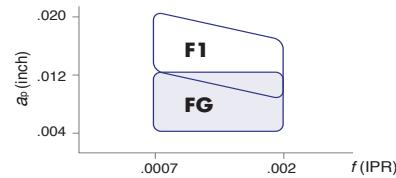
Grade	Material	Operation	Machining	Speed (SFM)	Feed (IPR)	DOC (inch)	WET
UC1 TM4	Oxygen-free copper C1020	Turning	Rough - Finish	160 - 500	.0008 - .008	.020 - .118	●

Refer to content above to select cutting conditions and chip breaker to obtain good chip control.
If you want longer tool life than PVD Carbide: TM4, use Diamond-Coated Carbide: UC1.

(**Boring**) Improve chip control by using FG or F1 chipbreaker to evacuate chips backwards and applying high-pressure coolant

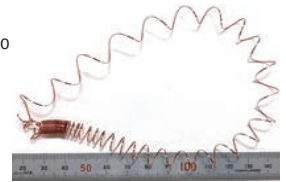


FG / F1 chipbreaker chip control range



Example of FG chipbreaker chips

Part material : C1020
 $v_c = 260$ SFM
 $f = .0008''$ IPR
 $a_p = .0008$ inch
 Internal coolant



Cutting Conditions

Grade	Material	Operation	Machining	Speed (SFM)	Feed (IPR)	DOC (inch)	WET
UC1 TM4	C1100 C1020	Turning	Finish	160 - 500	.0008 - .002	.004 - .020	●

If you want longer tool life than PVD Carbide: TM4, use Diamond-Coated Carbide: UC1.

Insert lineup

*For details, please refer to the NTK General Catalog or Swiss Tooling Catalog.

Shape	EDP	Item Number	Corner R	Grade		Dimensions (inch)	
				UC1	TM4	IC	Thickness
AM3 2 corners	5970728	DCMT 32.504 FNAM3	.004	●			
	5970736	DCMT 32.508 FNAM3	.008	●		3/8	5/32
	5970744	DCMT 32.51 FNAM3	.016	●			
F1* 3 corners	5970702	TPMH 2208 FRF1	.008	○		1/4	1/8
	5970710	TPMH 221 FRF1	.016	○			
ZP 6 corners	5970686	TNMG 3308 FNZP	.008	●		3/8	3/16
	5967351	TNMG 331 FNZP	.016	●			
	5970694	TNMG 332 FNZP	.031	●			
ZP 4 corners	5970660	CNMG 431 FNZP	.015	●		1/2	3/16
	5970678	CNMG 432 FNZP	.031	●			
AM3 	5694633	DCGT 32.504M FNAM3	.003		○	3/8	5/32
	5694641	DCGT 32.508M FNAM3	.007		○		
	5693783	DCGT 32.51M FNAM3	.015		○		
CL² 	5757091	DCGT 32.504M CL	.003		●	3/8	5/32
	5758040	DCGT 32.508M CL	.007		●		
	5765730	DCGT 32.51M CL	.015		●		
FG* R-hand shown	5790100	TPGP 7308 RFG	.008		●	7/32	3/32
	5790092	TPGP 731 RFG	.016		●		
	5790142	TPGH 2208 RFG	.008		●	1/4	1/8
	5790134	TPGH 221 RFG	.016		●		
ZP 	5731146	TNGG 3308 FNZP	.008		○	3/8	3/16
	5731211	TNGG 331 FNZP	.016		○		

The R symbol (.04M, .08M, .1M) can be used for machining where the R indication of the workpiece part is less than or equal to R0.003, R0.007, R0.015.

* Right-hand inserts with FG and F1 chipbreakers should be used with right-hand holders

*2 The CL breaker differs slightly from the above dimensions due to product specifications, but there is no problem with machining.

●: Stock

○: 1-2 week delivery

NTK
CUTTING TOOLS

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