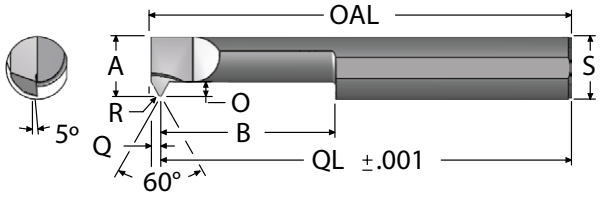
THREADING TOOLS QUALIFIED - SOLID CARBIDE



- 60° thread form for cutting UN, ISO, and NPT threads
- Positive rake improves surface finish and reduces burrs
- ALTiN+ coating provides better surface finish

"A" MIN BORE	"B" MAX DEPTH	"O" MIN OFFSET	"Q" LENGTH ±.001	"R" TOOL RADIUS	"QL" LENGTH ±.001	RECOM-MENDED TPI*	"S" SHANK DIA.	OAL	ORDER #		EDP #	
									UNCOATED	ALTiN+	UNCOATED	ALTiN+
0.060	0.150	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060150	TTQ060150A	230601	230634
0.060	0.200	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060200	TTQ060200A	230604	230637
0.060	0.250	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060250	TTQ060250A	230607	230640
0.060	0.300	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060300	TTQ060300A	230610	230643
0.075	0.200	0.020	0.014	0.0013	1.486	36 to 72	0.125	1.50	TTQ075200	TTQ075200A	230613	230646
0.075	0.300	0.020	0.014	0.0013	1.486	36 to 72	0.125	1.50	TTQ075300	TTQ075300A	230616	230649
0.075	0.400	0.020	0.014	0.0013	1.486	36 to 72	0.125	1.50	TTQ075400	TTQ075400A	230619	230652
0.090	0.200	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090200	TTQ090200A	230622	230655
0.090	0.300	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090300	TTQ090300A	230625	230658
0.090	0.400	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090400	TTQ090400A	230628	230661
0.090	0.500	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090500	TTQ090500A	230631	230664
0.120	0.250	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120250	TTQ120250A	230667	230688
0.120	0.400	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120400	TTQ120400A	230670	230691
0.120	0.600	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120600	TTQ120600A	230673	230694
0.120	0.750	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120750	TTQ120750A	230676	230697
0.150	0.350	0.035	0.023	0.0017	1.977	20 to 56	0.1875	2.00	TTQ150350	TTQ150350A	230679	230700
0.150	0.500	0.035	0.023	0.0017	1.977	20 to 56	0.1875	2.00	TTQ150500	TTQ150500A	230682	230703
0.150	0.750	0.035	0.023	0.0017	1.977	20 to 56	0.1875	2.00	TTQ150750	TTQ150750A	230685	230706
0.180	0.350	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ180350	TTQ180350A	230712	230736
0.180	0.500	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ180500	TTQ180500A	230715	230739
0.180	0.750	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ180750	TTQ180750A	230718	230742
0.180	1.000	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ1801000	TTQ1801000A	230709	230733
0.200	0.400	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ200400	TTQ200400A	230724	230748
0.200	0.600	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ200600	TTQ200600A	230727	230751
0.200	0.800	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ200800	TTQ200800A	230730	230754
0.200	1.000	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ2001000	TTQ2001000A	230721	230745
0.230	0.600	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ230600	TTQ230600A	230766	230796
0.230	0.750	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ230750	TTQ230750A	230769	230799
0.230	1.000	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ2301000	TTQ2301000A	230757	230787
0.230	1.250	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ2301250	TTQ2301250A	230760	230790
0.290	0.500	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ290500	TTQ290500A	230781	230811
0.290	0.750	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ290750	TTQ290750A	230784	230814
0.290	1.000	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ2901000	TTQ2901000A	230772	230802
0.290	1.250	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ2901250	TTQ2901250A	230775	230805
0.290	1.500	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ2901500	TTQ2901500A	230778	230808
0.320	0.500	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ320500	TTQ320500A	230826	230856
0.320	0.750	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ320750	TTQ320750A	230829	230859
0.320	1.000	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ3201000	TTQ3201000A	230817	230847
0.320	1.250	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ3201250	TTQ3201250A	230820	230850
0.320	1.500	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ3201500	TTQ3201500A	230823	230853
0.360	0.500	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ360500	TTQ360500A	230841	230871
0.360	0.750	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ360750	TTQ360750A	230844	230874
0.360	1.000	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ3601000	TTQ3601000A	230832	230862
0.360	1.250	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ3601250	TTQ3601250A	230835	230865
0.360	1.500	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ3601500	TTQ3601500A	230838	230868

*TPI = Threads Per Inch

Compatible holders with backstops are available.

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SOLID CARBIDE BORING BAR FEED AND SPEED CHART

MATERIAL	HB/Rc	SPEED (SFM)		CUTTING CONDITIONS						
				FEED IPR	TOOL DIAMETER					
		UNCOATED	ALTiN+		.015-.045	.050-.100	.110-.160	.180-.230	.290-.320	.360+
					MAX DOC	MAX DOC	MAX DOC	MAX DOC	MAX DOC	MAX DOC
CAST IRON	160 HB	75-200	200-550	.0005-.010	0.006	0.008	0.010	0.014	0.020	0.031
CARBON STEEL	18 Rc	75-200	200-450	.0005-.007	0.003	0.005	0.006	0.008	0.012	0.017
ALLOY STEEL	20 Rc	75-200	200-425	.0005-.007	0.003	0.004	0.005	0.007	0.010	0.015
TOOL STEEL	25 Rc	75-175	175-300	.0005-.005	0.002	0.003	0.004	0.006	0.008	0.012
300 STAINLESS STEEL	150 HB	75-175	175-350	.0005-.005	0.003	0.003	0.004	0.006	0.008	0.013
400 STAINLESS STEEL	195 HB	75-210	130-420	.0005-.005	0.002	0.003	0.004	0.006	0.008	0.012
HIGH TEMP ALLOY (Ni & Co BASE)	20 Rc	50-130	130-300	.0005-.004	0.002	0.003	0.003	0.005	0.007	0.010
TITANIUM	25 Rc	50-120	120-275	.0005-.005	0.003	0.004	0.005	0.006	0.009	0.014
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-100	100-200	.0005-.005	0.002	0.002	0.003	0.004	0.006	0.009
ALUMINUM	100 HB	75-250	250-750	.0005-.015	0.011	0.015	0.019	0.026	0.038	0.056
BRASS, ZINC	80 HB	75-300	250-650	.001-.010	0.009	0.012	0.015	0.021	0.030	0.045

SFM = Surface Feet Per Minute DOC = Depth of Cut IPR = Inches Per Revolution

Starting parameters only. Length-to-diameter ratios, setup, and machine rigidity may affect performance.

SFM = .262 × DIAMETER × RPM
RPM = 3.82 × SFM ÷ DIAMETER
IPM = FPT × Number of Teeth × RPM

Meters/Min = SFM × .3048
Millimeters/Rev = IPR x 25.40

SOLID CARBIDE BORING TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed and feed - See chart.
	TOOL	Select a coated tool.
	PART	Make sure prior operation did not work harden the metal.
BUILT-UP EDGE	TOOL	Select a coated tool.
	CUTTING FORCE	Check for excessive feed rate (IPR) - See chart.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
CORNER BREAKAGE	CUTTING CONDITIONS	Check for excessive feed and speed and depth of cut - see chart.
	TOOL	Select a tool with a radius. A radius is stronger than a sharp corner.
	PART	Check the drilled hole.
SURFACE TOO ROUGH	CUTTING CONDITIONS	Check for excessive feed rate (IPR) - See chart.
	BUILT-UP EDGE	See above (Built-Up Edge).
CHATTER	SET UP	Set tool above center. Reduce the overhang ratio. Clamping length should be at least 3x the boring bar diameter. Change the speed of the machine. Speed change may break up harmonics and reduce chatter.
	BORING BAR	Select the largest diameter boring bar that will bore the required diameter.
TAPER SMALLER IN BACK	CHIP PACKING	If the boring bar is too large to allow chips to evacuate, then the chips may pack on the tool and cause the bar to deflect away from the bore.
	PROGRAM	If the taper is consistent, then the program can be altered to bore a taper in opposite direction resulting in a straight hole.
TAPER BIGGER IN BACK	CUTTING FORCES	Reduce forces. Deflecting bar below center causes hole to become larger.
	BUILT-UP EDGE	Built-up edge will cause the hole to become larger until the built edge breaks off, then the hole becomes smaller.
	PROGRAM	If taper is consistent, then the program can be altered to bore a taper in the opposite direction resulting in a straight hole.

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GROOVING TOOL FEED AND SPEED CHART

MATERIAL	HB/Rc	SPEED (SFM)		CUTTING CONDITIONS				
				TOOL DIAMETER				
		UNCOATED	ALTiN+	.060 -0.080	.090 -.120	.187	.250-.312	.375+
				MAX FPR	MAX FPR	MAX FPR	MAX FPR	MAX FPR
CAST IRON	160 HB	75-200	200-550	0.0010	0.0012	0.0017	0.0031	0.0044
CARBON STEEL	18 Rc	75-200	200-450	0.0007	0.0008	0.0011	0.0022	0.0030
ALLOY STEEL	20 Rc	75-200	200-425	0.0006	0.0007	0.0010	0.0019	0.0026
TOOL STEEL	25 Rc	75-175	175-300	0.0005	0.0006	0.0008	0.0015	0.0022
300 STAINLESS STEEL	150 HB	75-175	75-350	0.0006	0.0007	0.0010	0.0019	0.0026
400 STAINLESS STEEL	195 HB	75-210	130-420	0.0005	0.0006	0.0008	0.0016	0.0023
HIGH TEMP ALLOY (NICKEL & COBALT BASE)	20 Rc	50-130	130-300	0.0004	0.0005	0.0007	0.0013	0.0017
TITANIUM	25 Rc	50-120	120-275	0.0005	0.0006	0.0008	0.0016	0.0022
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-100	100-200	0.0004	0.0004	0.0006	0.0011	0.0016
ALUMINUM	100 HB	75-250	250-750	0.0022	0.0026	0.0037	0.0065	0.0085
BRASS, ZINC	80 HB	250-300	250-650	0.0018	0.0021	0.0030	0.0053	0.0079

SFM = Surface Feet Per Minute FPR = Feed Per Revolution

Starting parameters only. Length-to-diameter ratios, setup, and machine rigidity may affect performance.

GROOVING TOOL TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed - see chart.
	TOOL	Select a coated tool.
	PART	Make sure prior operation did not work harden the material.
BUILT-UP EDGE	TOOL	Select a coated tool.
	CUTTING FORCE	Check for excessive speed rate (IPR) - see chart.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
CHATTER	CUTTING CONDITIONS	Reduce RPM and increase feed rate within the feed and speed chart parameters.
	CLAMPING	Clamping length should be a minimum of 3x the shank diameter in the tool holder. Check tool holding rigidity.
	TOOL	Hone cutting edge. A light hone (0.0001-0.0003 inch) will help keep force constant.
TOOL BREAKAGE	CUTTING CONDITIONS	Check for excessive feed rate (IPR) - see chart.
	CHIP PACKING	Stagger - Peck grooving.

SINGLE POINT THREADING TECHNICAL CHART

MATERIAL	HB/Rc	SPEED (SFM)		FIRST PASS DEPTH TOOL DIAMETER					
		UNCOATED	ALTiN+	.040-.050	.060-.092	.120-.152	.180-.232	.290-.362	.373+
CAST IRON	160 HB	75-200	200-550	0.003	0.004	0.005	0.007	0.008	0.009
CARBON STEEL	18 Rc	75-200	200-450	0.003	0.005	0.006	0.007	0.008	0.009
ALLOY STEEL	20 Rc	75-200	200-425	0.003	0.004	0.005	0.006	0.007	0.008
TOOL STEEL	25 Rc	75-175	175-300	0.002	0.003	0.004	0.005	0.006	0.007
300 STAINLESS STEEL	150 HB	75-175	175-350	0.003	0.003	0.004	0.005	0.006	0.007
400 STAINLESS STEEL	195 HB	75-210	130-420	0.003	0.004	0.005	0.006	0.006	0.007
HIGH TEMP ALLOY (NICKEL & COBALT BASE)	20 Rc	50-130	130-300	0.002	0.003	0.003	0.004	0.005	0.005
TITANIUM	25 Rc	50-100	120-275	0.003	0.003	0.004	0.005	0.006	0.007
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-100	100-200	0.002	0.002	0.003	0.004	0.004	0.005
ALUMINUM	100 HB	75-250	200-750	0.004	0.005	0.007	0.008	0.010	0.011
BRASS, ZINC	80 HB	75-300	250-650	0.003	0.005	0.006	0.007	0.008	0.009

Parameters are a starting point based on machinability rating at hardness listed.
Check machinability rating of the material to be machined and adjust First Pass Depth.

Helpful Formulas and Information

$$\text{PITCH} = \frac{1}{\text{TPI}}$$

TPI = Threads Per Inch

ACME Thread Depth = Pitch × 0.5

Stub ACME Thread Depth = Pitch × 0.3

NPT Pipe Thread Depth = Pitch × 0.76

Internal 60° Thread Depth = Pitch × 0.54

Feed Rate = Pitch × Number of Thread Starts

Minimum Depth per Pass should not be less than 0.0003

Threads not ending in a relief need at least one thread pitch length of pullout

Make sure feed rate calculation does not exceed the maximum feed rate of the machine

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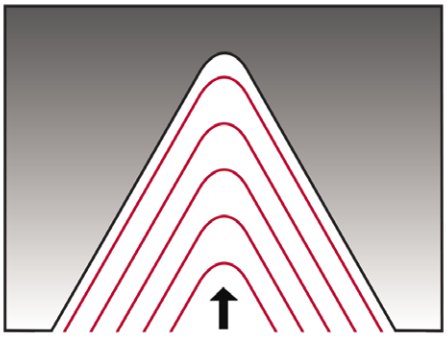
SINGLE POINT THREADING TROUBLESHOOTING

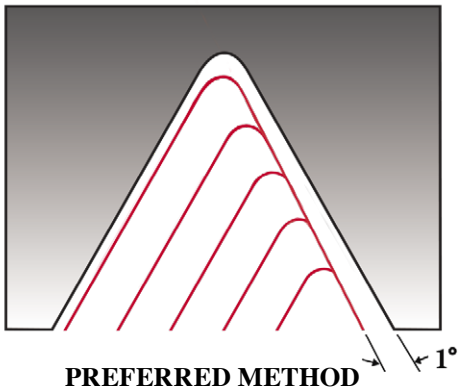
PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed - see chart.
	PART	Make sure prior operation did not work harden the material.
	TOOL	Select a coated tool.
BUILT-UP EDGE	TOOL	Select a coated tool.
	CUTTING FORCE	Increase the number of passes.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
CORNER BREAKAGE	CUTTING CONDITIONS	Reduce the depth-of-cut on the first pass.
	PROGRAM	If there is no thread relief, withdraw the tool on an angle.
	PART	End in thread relief.
CHIPS WRAPPING AROUND TOOL	TOOL	Use a tool that is at least 30% smaller than the hole diameter.

RADIAL INFEED



NOT RECOMMENDED

MODIFIED FLANK



PREFERRED METHOD

Radial Infeed is not recommended. Modified flank at 1° is recommended.

For unfavorable length-to-diameter ratios or difficult-to-machine materials, the number of passes will need to be increased up to 40% more.

Depth of cut per pass should not be less than 0.0003 inch.

SINGLE POINT CBN & PCD TECHNICAL & APPLICATION

PCD TIPPED TOOL INFORMATION

SCT PCD tools and inserts are excellent for continuous cutting of a wide range of non-ferrous and non-metal materials.
The products are precision ground for machining to sub-micron finishes with maximum tool life.
PCD allows for higher cutting speeds with longer tool life.

MATERIAL	BHN/Rc	SPEED RANGE (SFM)	FEED IPR	SINGLE POINT PCD TIPPED BARS			
				TOOL DIAMETER			
				.120-160	.180-.230	.290-.320	.360+
				MAX DOC	MAX DOC	MAX DOC	MAX DOC
LOW SILICON ALUMINUM	225-350 BHN	1000-5000	.001-.007	0.015	0.021	0.03	0.045
HIGH SILICON ALUMINUM	270-425 BHN	600-3000	.001-.007	0.015	0.021	0.03	0.045
METAL MATRIX COMPOSITIES	N/A	500-2000	.001-.007	0.008	0.012	0.02	0.03
COPPER ALLOYS, BRASS, BRONZE	80-120 BHN	750-3500	.001-.007	0.015	0.021	0.03	0.045
PRESINTERED TUNGSTEN CARBIDE	140-300 BHN	100-350	.001-.005	0.003	0.005	0.007	0.012
ACRYLICS	N/A	700-1500	.001-.007	0.015	0.021	0.03	0.045
FIBERGLASS	N/A	600-1000	.001-.007	0.012	0.02	0.03	0.045
GRAPHITES	N/A	600-1000	.001-.007	0.015	0.021	0.03	0.045
NYLON, PLASTIC	N/A	700-1500	.001-.007	0.015	0.021	0.03	0.045
HARD RUBBER	N/A	500-2500	.001-.007	0.015	0.021	0.03	0.045

As the DOC decreases the feed rate can increase DOC = Depth of Cut SFM = Surface Feet per Minute

APPLICATION GUIDELINES

- Make sure the machine and setup is rigid and solid. Chatter will cause chipping.
- Tool height when boring should be slightly above center. Tool deflection will put the tool on center.
- Do not stop the machine with the tool in cut. This will result in tool breakage.
- Use of coolant will reduce heat and improve surface finish.
- Do not contact the tool to a hard surface prior to the machining process- this will cause chipping.
- Higher speeds minimize tool buildup.
- Depth of cut should not exceed 70% of PCD tip length.

CBN TIPPED TOOL INFORMATION

SCT CBN tools and inserts are excellent for continuous cutting of a wide range of hardened steels, powdered metals, cast irons and super alloys. The products are precision ground with hones for machining to sub-micron finishes with maximum tool life.
CBN tipped tools and inserts can take the place of grinding.

MATERIAL	BHN/Rc	SPEED RANGE (SFM)	FEED IPR	SINGLE POINT CBN TIPPED BARS			
				TOOL DIAMETER			
				.120-160	.180-.230	290-.320	.360+
				MAX DOC	MAX DOC	MAX DOC	MAX DOC
HEAT TREATED ALLOY	45-60Rc	200-600	.001-.005	0.003	0.004	0.006	0.009
TOOL STEEL	45-60Rc	200-600	.001-.005	0.003	0.004	0.006	0.009
NODULAR IRON	N/A	600-1500	.001-.005	0.006	0.01	0.02	0.03
PEARLITIC IRON	220-240BHN	600-2500	.001-.007	0.006	0.01	0.02	0.03
WHITE/CHILLED IRON	54-60Rc	200-500	.001-.005	0.005	0.008	0.012	0.015
SUPER ALLOY Ni BASE	240-475 BHN	200-800	001-.005	0.003	0.004	0.006	0.025
COBOLT BASED ALLOY, STELLITE	45-55Rc	200-500	.001-.005	0.003	0.004	0.006	0.009
INCONELS	45-55Rc	200-500	.001-.005	0.003	0.004	0.006	0.009

As the DOC decreases the feed rate can increase DOC = Depth of Cut SFM = Surface Feet per Minute

APPLICATION GUIDELINES

- Make sure the machine and setup is rigid and solid. Chatter will cause chipping
- Tool height when boring should be slightly above center. Tool deflection will put the tool on center.
- Do not stop the machine with the tool in cut. This will result in tool breakage.
- Coolant use is not advised as it could cause thermal cracking.
- Do not contact the tool to a hard surface prior to the machining process. This will cause chipping.
- Depth of cut should not exceed 30% of CBN tip length.

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