



2017 Master Catalog

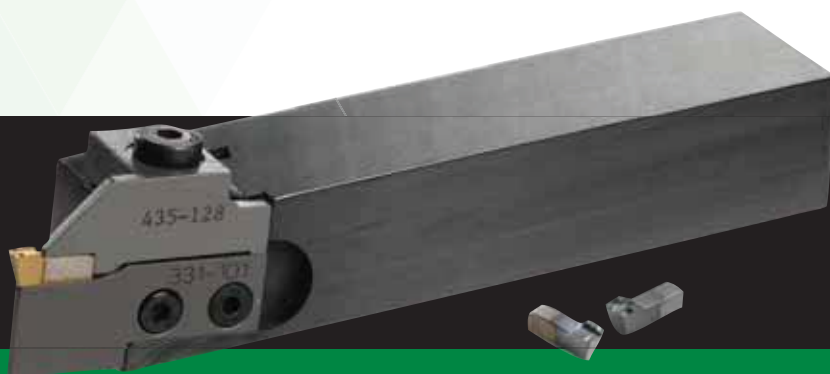
WIDIA  TM



Separator™ for Cut-Off

Specifically engineered to deliver toolholder flexibility with integral, component, universal, and blade-style designs.

Separator



Features

- Insert widths .063–.157" (2–4mm).
- Toolholder shank sizes .375–1.250" (10–31,75mm).
- Cut-off up to 3" (76mm) bar capacity.

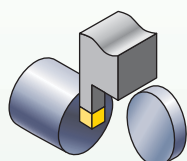
Benefits

- Quick, reliable insert indexing.
- Positive mechanical clamping.
- CNC square shank, screw machine, and PL blade-style toolholders.

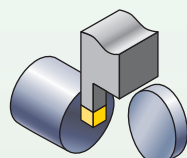


1 Choose the application to be performed:

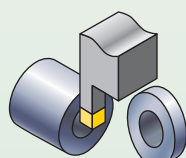
Choose lead angle of insert for application.



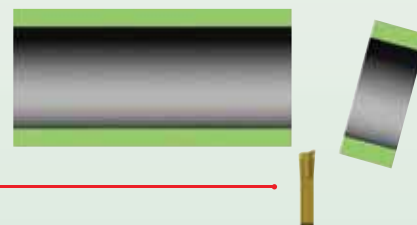
R.H. Lead Angle



L.H. Lead Angle



R.H. Lead Angle



2 Identify the material to be machined:

Each tool has a material grid marked with a letter indicating the materials that can be machined.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

3 Select your toolholder based on the application:

- A Choose the appropriate width of insert required for the application.
- B Choose the shortest cutting depth "CD" dimension for increased tool rigidity.
- C Select the largest toolholder shank "H" and "B" dimensions for maximum rigidity.

Separator™ Toolholders

WIDIA

Extended Capacity Left Hand Tool Shown

Extended Capacity Right Hand Tool Shown

■ Square Shank • Extended Capacity

order number	catalog number	A	B	C	PS	H	L2	L1	clamp	screw
right hand										
3536744	206420	1.25	1.000	398	357	1.000	1.687	8.000	435180	819164
3536745	206421	1.50	1.000	375	358	1.000	1.687	8.000	435180	819164
left hand										
3536746	206422	1.25	1.000	398	357	1.000	1.687	8.000	435181	819164

4 Select chipbreaker style for the application:

See the application guide on page E117
for a complete list of insert styles.

insert type	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
first choice	X ² -Ultra (X ² has wipers)	X ² -Ultra	X ² -Ultra	X ² -Ultra	X ² -Ultra	—
second choice	S ² -Ultra	S ² -Ultra	Classic	S ² -Ultra	S ² -Ultra	X ²

5 Select grade:

machining condition	Recommended Grades					
	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
high performance for optimal conditions (clean cuts, good machine condition, higher speed capability)	M93	M433B	M93	M93	M433B	—
	—	M93	—	—	M93	—
general purpose (1st choice for general machining)	M43	M43	M43	M43	M43	M93
unfavorable conditions (interrupted cuts, low speeds, etc.)	M45	M45	M45	M45	M45	—
	M40	M40	M40	M40	M40	—

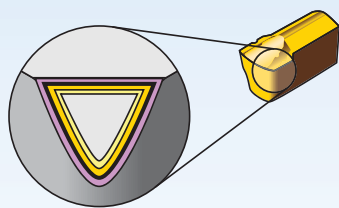
See page E116 for Grades and Grade Descriptions.

6 Determine cutting data:

- A Based on material group and grade, identify starting speed (vc).
- B First choice starting speed is in **bold**.

See pages E118–E119 for cutting data.

Separator™ Recommended Cutting Speeds • Metric													
Material Group	Cutting Speed – vc m/min												
	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min
P	M42												
	0 / 1	40	90	115	110	180	210	—	—	—	45	95	125
	2	30	80	95	75	120	100	—	—	—	40	85	95
	3	30	80	85	75	120	100	—	—	—	40	85	95
	4	25	45	60	55	90	125	30	75	115	25	45	70
M	M43												
	5	35	60	85	85	110	140	85	115	145	40	85	95
	6	15	30	40	35	50	65	35	50	70	20	30	45
	1	30	45	60	50	75	100	55	80	120	35	50	65
	2	20	30	40	35	50	65	35	50	80	25	35	50
K	M433B												
	3	20	35	40	35	50	65	35	50	85	25	40	50
	1	65	95	125	90	135	175	300	260	320	75	115	145
	2	65	95	125	90	135	175	210	270	320	75	115	145
	3	55	90	120	80	125	170	215	275	325	65	100	145
N	M45												
	1	210	320	520	275	440	610	—	—	—	245	400	550
	2	170	320	490	230	400	570	—	—	—	200	350	510
	3	135	265	275	190	260	325	—	—	—	150	230	305
	4	80	125	185	135	190	100	—	—	—	85	135	175
	5	45	75	100	60	85	115	—	—	—	50	80	110
	6	165	290	420	220	360	500	—	—	—	190	320	450
H	M40												
	7	180	340	490	245	410	560	—	—	—	215	370	520
S	M93												
	1	25	35	40	25	40	50	30	45	50	30	35	45



Coatings provide high-speed capability and are engineered for finishing to light roughing.

- Reduce cycle times — high speed and feed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Coating		Grade Description		05	10	15	20	25	30	35	40	45
M40		A premium, single-phase PVD TiN coating over a tough, specially formulated substrate that performs well under extremely low to moderate speed conditions found on screw machines. Ideal for carbon steels, alloy steels, most stainless steels, and many high-temperature alloys.	P									
			M									
			K									
			N									
			S									
HC-P35												
M43		PVD-TiAlN multilayer coating over a tough, shock-resistant, fine-grained carbide substrate with increased oxidation resistance. Recommended on low to medium cutting speeds when good toughness properties are required.	P									
			M									
			K									
			N									
			S									
HC-P25												
M433B		PVD-TiAlN single-layer coating over a superiorly tough, fine-grained carbide substrate. Outstanding temperature properties with excellent resistance to avoid built-up edges. Medium to high speeds and feeds. For stainless steels and high-temperature alloys.	P									
			M									
			N									
			S									
HC-M30												
M45		A premium PVD-TiCN coated, shock-resistant carbide designed for low to moderate speeds. Excellent resistance to welding and BUE, along with improved abrasion resistance make this an ideal grade for austenitic stainless steel, low carbon steel, and high-temperature alloys.	P									
			M									
			K									
			N									
			S									
HC-P30												
M93		PVD-TiAlN multilayer coating over a tough, fine-grained carbide substrate with increased resistance to heat. Recommended for medium to higher cutting speeds under moderate conditions.	P									
			M									
			K									
			N									
			S									
HC-P20												

Separator • X² and X²-Ultra



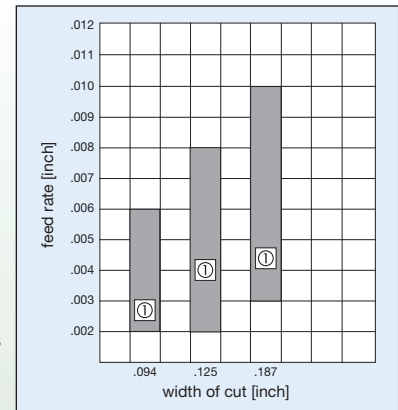
X²



X²-Ultra

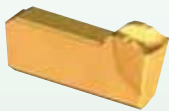
This insert has the same geometry as the WMT-SX™. Chip control geometry offers the widest range of speed and feed capabilities and provides excellent flatness and finish. This chipbreaker cuts with the least amount of tool pressure, extending tool life. The geometry also includes wipers and a corner radius. This geometry works well on a variety of materials.

This insert has the same geometry as the WMT-SX-Ultra. The X²-Ultra is an enhanced version of the X² and is ideal for stainless steels, nickel-based alloys, tool steel, INCONEL®, and titanium.



① Recommended Starting Feed

Separator • S² and S²-Ultra



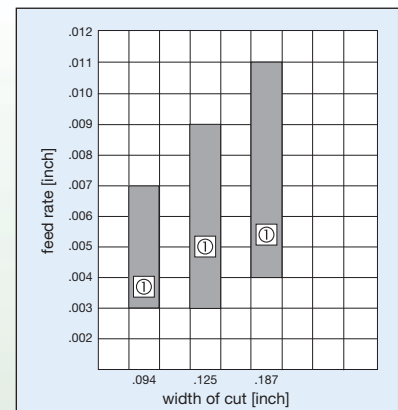
S²



S²-Ultra

High positive rake with a more open chipbreaker enables increased speeds and feeds for moderate- to high-speed applications. The geometry includes wipers and a corner radius that provides superior flatness and finish. This insert is also available with sharp corners. Its greatest strengths can be seen on stainless steels and soft gummy steels.

The S²-Ultra is an enhanced version of the S² and is ideal for 300 series stainless steels, nickel-based alloys, tool steel, INCONEL, and titanium at moderate to high speeds and feeds.



① Recommended Starting Feed

Separator • Classic and F²



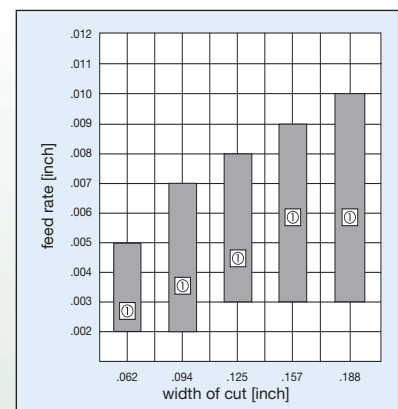
Classic



F²

A good general-purpose insert for carbon steels, alloy steels, and most stainless steels. The Separator Classic chipbreaker is designed to perform well at moderate to slow speeds and feeds. The Classic provides standard high lead angles and sharp corners, making it the first choice when choosing an insert for nib-free cut-off.

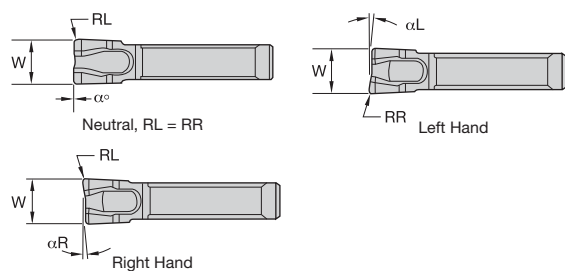
This insert provides superior flatness and finish on a wide variety of materials. Ideal for thick wall parts or cutting off larger diameter parts to center. The Separator F² performs well at slow to moderate speeds and feeds.



① Recommended Starting Feed

Material Group		Cutting Speed – vc m/min														
		M40			M43			M433B			M45			M93		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	40	80	115	110	160	210	–	–	–	45	85	125	150	200	245
	2	30	60	85	75	120	165	–	–	–	40	65	95	115	150	185
	3	30	60	85	75	120	165	–	–	–	40	65	95	115	150	185
	4	25	45	60	55	90	125	30	70	115	25	45	70	80	110	140
	5	35	60	85	85	110	140	85	115	145	40	65	95	105	140	170
	6	15	30	40	35	50	65	35	50	70	20	30	45	45	60	75
M	1	30	45	60	50	75	100	55	90	130	35	50	65	90	120	150
	2	20	30	40	35	50	65	35	60	80	25	35	50	55	75	95
	3	20	35	40	35	50	65	35	60	85	25	40	50	60	80	100
K	1	65	95	125	90	135	175	200	260	320	75	110	145	130	175	225
	2	65	95	125	90	135	175	210	270	330	75	110	140	135	170	225
	3	55	90	120	80	125	170	215	275	335	65	105	145	110	140	215
N	1	210	370	520	275	440	610	–	–	–	245	400	550	305	490	670
	2	170	325	480	230	400	570	–	–	–	200	355	510	265	450	630
	3	135	205	275	180	260	335	–	–	–	150	230	305	210	305	400
	4	80	120	165	105	150	190	–	–	–	95	135	175	130	180	225
	5	45	75	100	60	85	115	–	–	–	50	80	110	70	105	135
	6	165	290	420	220	360	500	–	–	–	190	320	450	255	410	560
	7	180	340	490	245	410	580	–	–	–	215	370	520	275	460	640
S	1	25	35	40	25	40	50	30	45	50	30	35	45	35	45	60
	2	10	15	20	15	20	25	15	20	25	10	15	20	20	25	30
	3	35	45	60	35	50	65	40	55	70	35	50	65	55	65	80
	4	15	25	30	25	30	35	25	30	40	20	25	35	30	35	45
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		Cutting Speed — vc SFM														
		M40			M43			M433B			M45			M93		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	125	260	370	350	525	700	—	—	—	150	275	400	500	650	800
	2	95	185	275	250	395	540	—	—	—	125	215	300	385	490	600
	3	95	185	275	250	395	540	—	—	—	125	215	300	385	490	600
	4	70	135	205	170	285	405	100	235	370	85	155	220	255	360	460
	5	110	190	275	270	365	455	270	375	475	120	215	305	345	450	555
	6	55	90	125	110	160	210	110	170	230	65	100	140	150	200	250
M	1	100	145	190	170	250	330	180	300	420	110	165	220	295	390	490
	2	70	95	120	110	160	210	120	195	270	85	120	155	180	245	310
	3	70	105	135	115	165	220	120	200	275	85	125	165	195	260	320
K	1	210	310	405	300	440	575	650	850	1050	250	365	475	425	575	725
	2	210	310	410	300	435	575	685	885	1085	240	350	460	440	555	740
	3	180	290	400	270	410	550	700	900	1100	210	340	470	360	460	700
N	1	700	1200	1700	900	1450	2000	—	—	—	800	1300	1800	1000	1600	2200
	2	565	1065	1565	765	1315	1865	—	—	—	665	1165	1665	865	1465	2065
	3	450	675	900	600	850	1100	—	—	—	500	750	1000	700	1000	1300
	4	265	400	535	350	485	615	—	—	—	310	440	575	435	585	735
	5	150	240	325	190	285	375	—	—	—	165	260	350	225	350	450
	6	550	960	1365	735	1185	1635	—	—	—	635	1050	1465	835	1335	1835
	7	600	1100	1600	800	1350	1900	—	—	—	700	1200	1700	900	1500	2100
S	1	80	105	130	90	120	150	95	130	165	90	115	140	110	145	185
	2	40	55	65	45	60	75	55	70	85	45	60	75	65	80	100
	3	110	155	200	120	170	220	130	180	230	120	165	210	180	220	260
	4	60	80	100	75	95	115	80	105	130	75	90	110	95	115	145
H	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



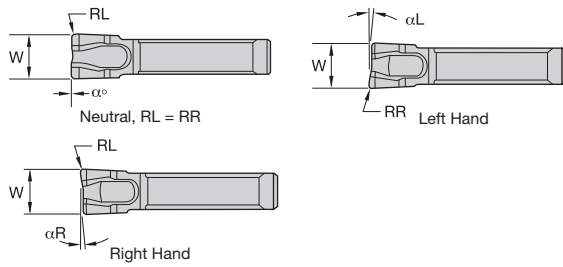
- first choice
- alternate choice

P	●	●	●	●	●
M	●	●	●	●	●
K	○	○	○	○	○
N	●	●	●	●	●
S	○	●	●	●	○
H	○	○	○	○	○

catalog number	insert size	W		RR		hand	M40	M43	M433B	M45	M93
		mm	in	mm	in						
507305	2	2,39	.094	0,14	.006	N - Neutral	●	●	●	3540872	3540873
507308	3	3,20	.126	0,17	.007	N - Neutral	●	3540878	●	3540879	3540880

catalog number	insert size	W		RR		αL	hand	M40	M43	M433B	M45	M93
		mm	in	mm	in							
507307	2	2,39	.094	0,14	.006	5	L - Left	●	●	●	3540876	3540877
507310	3	3,20	.126	0,17	.007	5	L - Left	●	●	●	3540884	3540885

catalog number	insert size	W		RL		αR	hand	M40	M43	M433B	M45	M93
		mm	in	mm	in							
507306	2	2,39	.094	0,14	.006	5	R - Right	●	●	●	3540874	3540875
507309	3	3,20	.126	0,17	.007	5	R - Right	●	●	●	3540882	3540883



- first choice
- alternate choice

P	●	●	●	●	●	●
M	●	●	●	●	●	●
K	○	○	○	○	○	○
N	●	●	●	●	●	●
S	○	○	○	○	○	○
H	○	○	○	○	○	○

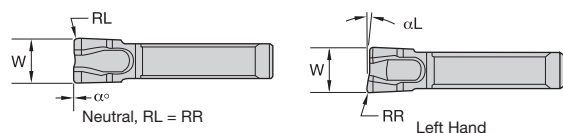
■ X² Ultra

catalog number	insert size	W		RR		hand	M40	M43	M43B	M45	M93
		mm	in	mm	in						
507354	2	2,39	.094	0,15	.006	N - Neutral	■	■	3540926	■	■
507357	3	3,20	.126	0,15	.006	N - Neutral	■	■	3540929	■	■

catalog number	insert size	W		RR		αL	hand	M40	M43	M43B	M45	M93
		mm	in	mm	in							
507356	2	2,39	.094	0,13	.005	5	L - Left	■	■	3540928	■	■
507359	3	3,20	.126	0,15	.006	5	L - Left	■	■	3540931	■	■

catalog number	insert size	W		RL		αR	hand	M40	M43	M43B	M45	M93
		mm	in	mm	in							
507355	2	2,39	.094	0,13	.005	5	R - Right	■	■	3540927	■	■
507358	3	3,20	.126	0,15	.006	5	R - Right	■	■	3540930	■	■

Grooving and Cut-Off



- first choice
- alternate choice

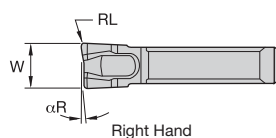
P	●	●	●	●	●
M	●	●	●	●	●
K	○	○	○	○	○
N	●	●	●	●	●
S	○	○	○	○	○
H	○	○	○	○	○

S²

catalog number	insert size	W		RR		hand	M40	M43	M43B	M45	M93
		mm	in	mm	in						
507275	2	2,39	.094	0,20	.008	N - Neutral	3540807	3540803			
507295	3	3,00	.118	0,25	.010	N - Neutral		3540857		3540805	3540806
507278	3	3,20	.126	0,25	.010	N - Neutral	3540822	3540818			
507378	4	4,00	.158	0,25	.010	N - Neutral		3540951		3540952	3540953
507281	5	4,78	.188	0,25	.010	N - Neutral		3540833		3540835	3540836
507277	2	2,39	.094	0,20	.008	L - Left				3540815	3540816
507297	3	3,00	.118	0,20	.008	L - Left		3540863			3540865
507280	3	3,20	.126	0,20	.008	L - Left				3540830	
507283	5	4,78	.188	0,20	.008	L - Left					3540846

(continued)

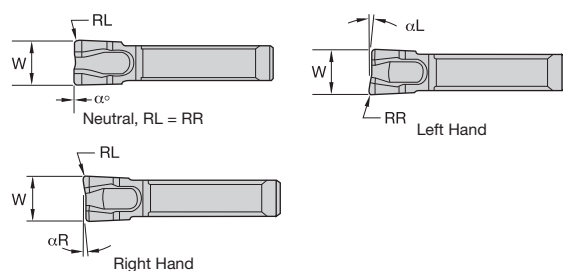
(S² — continued)


 ● first choice
 ○ alternate choice

P	●	●	●	●	●
M	●	●	●	●	●
K	○	○	○	○	○
N	●	●	●	●	●
S	○	●	●	●	○
H	○	○	○	○	○

catalog number	insert size	W		RL		αR	hand		M40	M43	M43B	M45	M93
		mm	in	mm	in								
507276	2	2,39	.094	0,20	.008	5	R - Right		3540812	3540808			
507301	2	2,39	.094	—	—	5	R - Right					3540870	3540811
507296	3	3,00	.118	0,20	.008	5	R - Right			3540860		3540861	3540862
507279	3	3,20	.126	0,20	.008	5	R - Right	3540827	3540823			3540825	3540826
507298	3	3,20	.126	—	—	5	R - Right		3540866			3540867	3540868
507379	4	4,00	.158	0,25	.010	5	R - Right		3540954			3540955	
507282	5	4,78	.188	0,20	.008	5	R - Right		3540838			3540840	3540841

Grooving and Cut-Off



● first choice
○ alternate choice

P	●	●	●	●	●
M	●	●	●	●	●
K	○	○	○	○	○
N	●	●	●	●	●
S	○	●	●	●	○
H	○	○	○	○	○

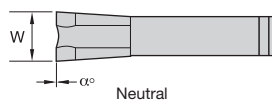
■ S² Ultra

catalog number	insert size	W		RR		hand	M40	M43	M43B	M45	M93
		mm	in	mm	in						
507329	2	2,39	.094	0,15	.006	N - Neutral	■	■	3540907	■	■
507332	3	3,18	.125	0,15	.006	N - Neutral	■	■	3540910	■	■

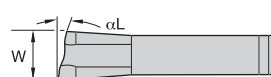
catalog number	insert size	W		RR		αL	hand	M40	M43	M43B	M45	M93
		mm	in	mm	in							
507331	2	2,39	.094	0,15	.006	5	L - Left	■	■	3540909	■	■
507334	3	3,18	.125	0,15	.006	5	L - Left	■	■	3540912	■	■

catalog number	insert size	W		RL		αR	hand	M40	M43	M43B	M45	M93
		mm	in	mm	in							
507330	2	2,39	.094	0,15	.006	5	R - Right	■	■	3540908	■	■
507333	3	3,18	.125	0,15	.006	5	R - Right	■	■	3540911	■	■

Grooving and Cut-Off



Neutral



Left Hand

- first choice
- alternate choice

P	●	●	●	●	●
M	●	●	●	●	●
K	○	○	○	○	○
N	●	●	●	●	●
S	○	●	●	●	○
H	○	○	○	○	○

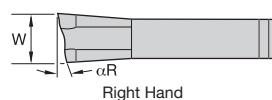
■ Classic

catalog number	insert size	W		hand	M40	M43	M43B	M45	M93
		mm	in						
507196	2	1,60	.063	N - Neutral	3540664	3540664	3540663	3540663	3540663
507140	2	2,39	.094	N - Neutral	3540530	3540530	3540528	3540529	3540529
507117	3	3,20	.126	N - Neutral	3540461	3540461	3540459	3540460	3540460
507116	5	4,78	.188	N - Neutral	3540449	3540449	3540447	3540447	3540447
catalog number	insert size	W		hand	M40	M43	M43B	M45	M93
		mm	in						
507152	2	2,36	.093	L - Left	3540594	3540594	3540593	3540593	3540593
507144	2	2,39	.094	L - Left	3540554	3540554	3540553	3540553	3540553
507154	3	3,15	.124	L - Left	3540598	3540598	3540597	3540597	3540597
507129	3	3,20	.126	L - Left	3540510	3540510	3540509	3540509	3540509
507125	5	4,78	.188	L - Left	3540487	3540487	3540487	3540487	3540487

(continued)

Grooving and Cut-Off

(Classic — continued)



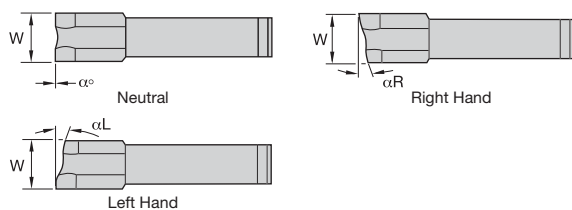
● first choice
○ alternate choice

P	●	●	●	●	●	●
M	●	●	●	●	●	●
K	○	○	○	○	○	○
N	●	●	●	●	●	●
S	○	○	○	○	○	○
H	○	○	○	○	○	○

Grooving and Cut-Off

catalog number	insert size	W		αR	hand					
		mm	in			M40	M43	M43B	M45	M93
507197	2	1,60	.063	4	R - Right	3540666	3540666	3540666	3540666	3540666
507214	2	1,60	.063	12	R - Right	3540692	3540692	3540692	3540692	3540692
507207	2	2,31	.091	4	R - Right	3540589	3540589	3540589	3540589	3540589
507151	2	2,36	.093	12	R - Right	3540589	3540589	3540589	3540589	3540589
507143	2	2,39	.094	4	R - Right	3540544	3540544	3540544	3540544	3540544
507161	2	2,39	.094	18	R - Right	3540613	3540613	3540613	3540613	3540613
507171	3	3,12	.123	6	R - Right	3540628	3540628	3540628	3540628	3540628
507146	3	3,15	.124	12	R - Right	3540562	3540562	3540562	3540562	3540562
507155	3	3,15	.124	18	R - Right	3540603	3540603	3540603	3540603	3540603
507128	3	3,20	.126	4	R - Right	3540498	3540498	3540498	3540498	3540498
507224	3	3,20	.126	4	R - Right	3540700	3540700	3540700	3540700	3540700
507176	5	4,72	.186	12	R - Right	3540634	3540634	3540634	3540634	3540634
507124	5	4,78	.188	4	R - Right	3540479	3540479	3540479	3540479	3540479

NOTE: No RR on classic inserts. Inserts are sharp.
507207 and 507224 have a modified aggressive chip control design.



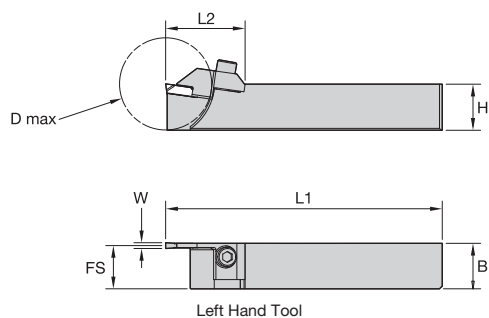
● first choice
 ○ alternate choice

P	●	●	●	●	●
M	●	●	●	●	●
K	○	○	○	○	○
N	●	●	●	●	●
S	○	●	●	●	○
H	○	○	○	○	○

■ F²

catalog number	insert size	W		hand	M40	M43	M433B	M45	M93
		mm	in						
507240	2	2,39	.094	N - Neutral	3540744	3540744	3540744	3540743	3540743
507244	3	3,20	.126	N - Neutral	3540756	3540756	3540755	3540743	3540743
catalog number	insert size	W		hand	M40	M43	M433B	M45	M93
		mm	in						
507255	2	2,39	.094	L - Left	3540781	3540781	3540781	3540784	3540784
507257	3	3,18	.125	L - Left	3540784	3540784	3540784	3540784	3540784
catalog number	insert size	W		hand	M40	M43	M433B	M45	M93
		mm	in						
507241	2	2,39	.094	R - Right	3540747	3540747	3540746	3540746	3540746
507242	2	2,39	.094	R - Right	3540750	3540750	3540749	3540746	3540746
507243	2	2,39	.094	R - Right	3540753	3540753	3540752	3540752	3540752
507245	3	3,18	.125	R - Right	3540759	3540759	3540758	3540758	3540758
507246	3	3,18	.125	R - Right	3540762	3540762	3540761	3540761	3540761
507247	3	3,18	.125	R - Right	3540764	3540764	3540763	3540763	3540763
507252	5	4,75	.187	R - Right	3540774	3540774	3540773	3540773	3540773
507253	5	4,78	.188	R - Right	3540777	3540777	3540776	3540776	3540776

Grooving and Cut-Off

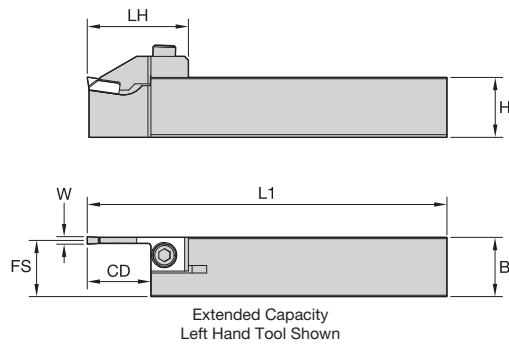


■ Square Shank



order number	catalog number	W	D max	B	FS	H	L2	L1	clamp	clamp screw
right hand										
3538685	206173	.094	1.063	.365	.328	.375	.987	2.630	435152	619122
3538687	206175	.094	1.063	.490	.453	.500	.978	6.000	435152	619122
3538679	206167	.094	1.500	.615	.578	.625	1.293	4.500	435140	619123
3538683	206171	.094	1.500	.740	.703	.750	1.293	4.500	435140	619120
3538672	206145	.125	1.000	.488	.437	.500	.928	6.000	435130	619122
3563787	206139	.125	1.500	.738	.687	.750	1.293	4.500	435126	619120
3538681	206169	.125	1.500	.613	.562	.625	1.293	4.500	435126	619123
left hand										
3538686	206174	.094	1.063	.365	.328	.375	.987	2.630	435153	619122
3538688	206176	.094	1.063	.490	.453	.500	.978	6.000	435153	619122
3538680	206168	.094	1.500	.615	.578	.625	1.293	4.500	435141	619123
3538684	206172	.094	1.500	.740	.703	.750	1.293	4.500	435141	619120
3538673	206146	.125	1.000	.488	.437	.500	.928	6.000	435131	619122
3563800	206140	.125	1.500	.738	.687	.750	1.293	4.500	435127	619120
3538682	206170	.125	1.500	.613	.562	.625	1.293	4.500	435127	619123

NOTE: Above toolholders are supplied with clamp and clamp screw.



■ Square Shank • Extended Capacity

order number	catalog number	W	CD	B	FS	H	LH	L1	clamp	clamp screw
right hand										
3538744	206420	.125	1.000	.988	.937	1.000	1.687	6.000	435180	619164
3538745	206421	.188	1.000	.978	.906	1.000	1.691	6.000	435180	619164
left hand										
3538746	206422	.125	1.000	.988	.937	1.000	1.687	6.000	435181	619164
3538747	206423	.188	1.000	.978	.906	1.000	1.687	6.000	435181	619164

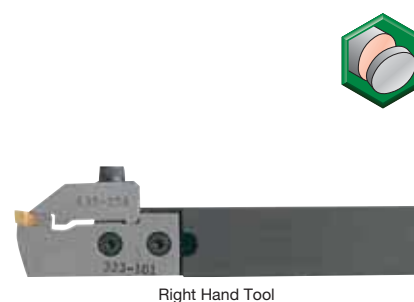
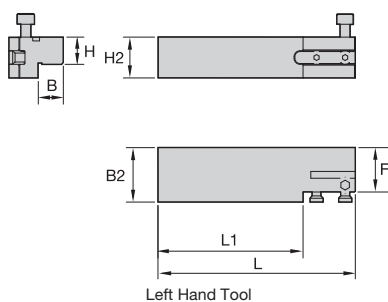
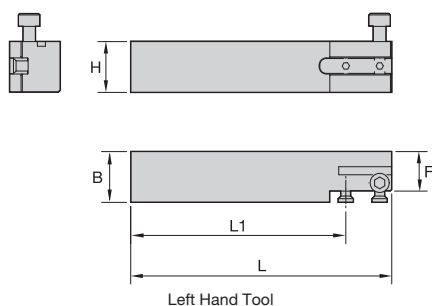
NOTE: Above toolholders are supplied with clamp and clamp screw.

■ Square Shank • Max Capacity

order number	catalog number	W	CD	B	FS	H	LH	L1	clamp screw
right hand									
3583634	206473	.188	1.260	1.000	1.156	1.000	2.219	6.000	MS337
3614343	206475	.188	1.260	1.250	1.406	1.250	2.219	6.000	MS337
left hand									
3582583	206474	.188	1.260	1.000	1.156	1.000	2.219	6.000	MS337
3538759	206476	.188	1.260	1.250	1.406	1.250	2.219	6.000	MS337

NOTE: Above toolholders are supplied with clamp and clamp screw.

Grooving and Cut-Off



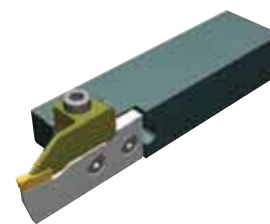
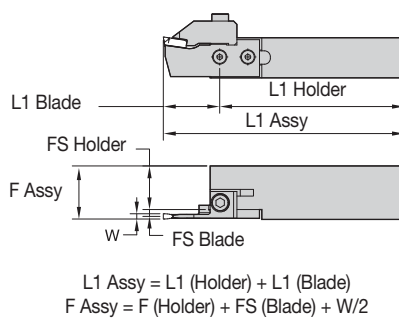
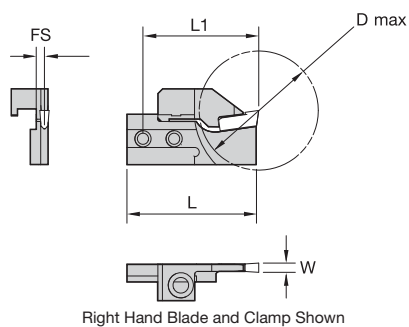
■ 1/2" and 3/4" Shank Toolholders

Grooving and Cut-Off

order number	catalog number	H	B	B2	L	L1	H2	F	support blade screw	clamp screw
right hand										
3563801	206179	.500	.460	1.000	3.625	2.913	.750	.815	606167	619124
left hand										
3538689	206178	.745	.750	—	3.625	2.913	—	.575	606167	619124

NOTE: 206178 can use right or left hand blade and clamp.





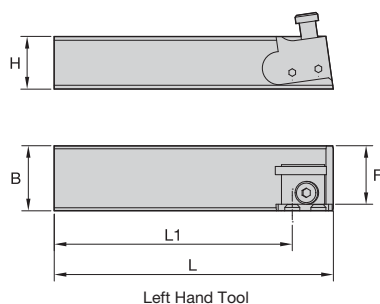
■ 1/2" and 3/4" Shank Blades

order number	catalog number	W	D max	FS	L	L1	clamp
right hand							
3539522	333111	.079	1.625	.134	1.767	1.580	435194
3539515	333101	.094	1.625	.128	1.767	1.580	435154
3539516	333102	.125	1.625	.112	1.767	1.580	435155
left hand							
3539517	333103	.094	1.625	.128	1.767	1.580	435156
3539518	333104	.125	1.625	.112	1.767	1.580	435157

NOTE: Clamps do not ship with blades. Order clamps separately.

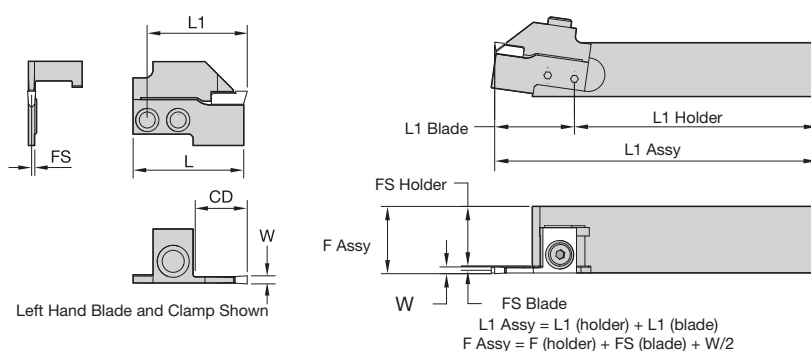


Grooving and Cut-Off



■ 1" and 1-1/4" Shank Toolholders

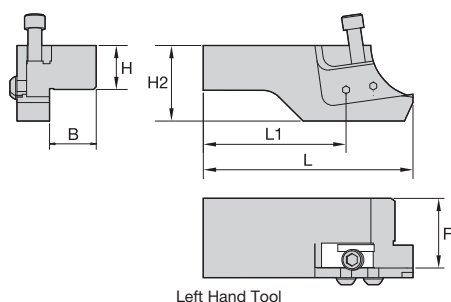
order number	catalog number	H	B	L	L1	F	support blade screw	clamp screw
right hand								
3538669	206141	1.000	1.234	5.291	4.510	1.109	606164	619121
3538670	206143	1.250	1.484	5.291	4.510	1.359	606164	619121
left hand								
3563786	206142	1.000	1.234	5.291	4.510	1.109	606164	619121



■ 1" and 1-1/4" Shank Blades

order number	catalog number	W	FS	L	L1	clamp
right hand						
3563591	331117	.094	.094	1.419	1.165	435142
3539504	331101	.125	.078	1.724	1.482	435128
3539508	331109	.158	.078	1.724	1.482	435128
3539506	331103	.188	.078	1.724	1.482	435128
left hand						
3539505	331102	.125	.078	1.724	1.482	435129
3539509	331110	.158	.078	1.724	1.482	435129
3539507	331104	.188	.078	1.724	1.482	435129

NOTE: Clamps do not ship with blades. Order clamps separately.



■ Universal Style Toolholder • 2-1/4" Bar Capacity

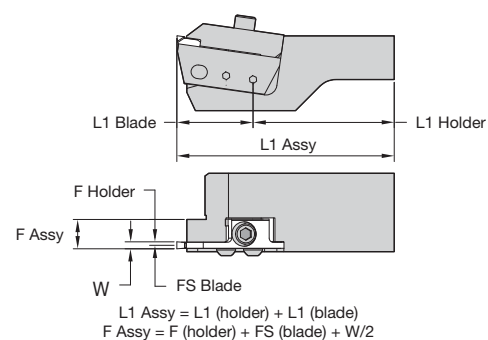
order number	catalog number	B	H	H2	F	L1	L	support blade screw	clamp screw
right hand									
3538667	206128	.812	.750	1.719	1.334	2.747	4.270	606171	619112
3538659	206114	.912	1.000	1.719	1.434	3.867	5.390	606171	619112
3538658	206113	1.062	1.000	1.719	1.584	4.247	5.770	606171	S352
3538665	206123	1.062	1.000	1.719	1.584	3.247	4.770	606171	S352
left hand									
3538662	206118	.812	.750	1.719	1.334	2.747	4.270	606171	619112
3563798	206108	1.062	1.000	1.719	1.584	3.867	5.390	606171	619112
3538668	206136	1.062	1.000	1.719	1.584	3.247	4.770	606171	619112

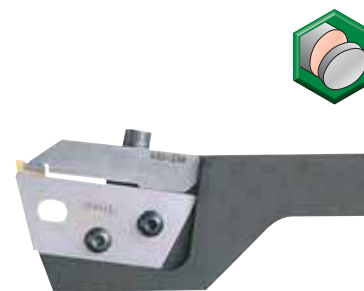
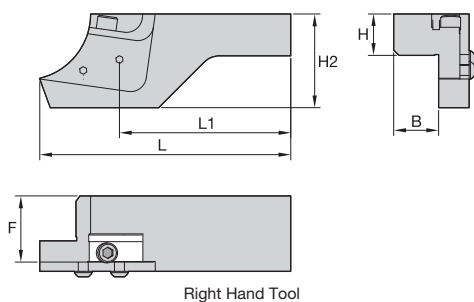
NOTE: Ships with blade and clamp screws.
 Support blade requires two screws.
 .750" shank holders 206118 and 206128 use different clamps.

■ Components

W	L1	FS	left hand clamp	clamp for toolholder 206118 only	support blade	clamp for toolholder 206128 only	right hand clamp
.094	1.752	.036	435149	435151	310109	435150	435148
.125	1.752	.050	435104	435110	310102	435116	435101
.188	1.752	.072	435105	435109	310108	435117	435102

NOTE: All components ship separately.





■ Universal Style Toolholder • 3" Bar Capacity

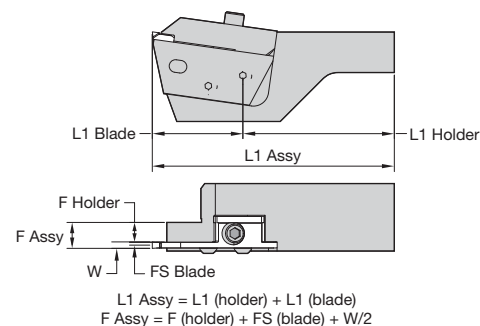
order number	catalog number	B	H	H2	F	L1	L	support blade screw	clamp screw
right hand									
3538660	206115	.964	1.000	2.219	1.454	3.754	5.640	606171	S352
3538661	206116	1.064	1.000	2.219	1.554	3.754	5.640	606171	619112
3587587	206121	1.194	1.250	2.219	1.684	4.004	5.890	606171	619112
left hand									
3563799	206110	1.074	1.000	2.219	1.564	3.304	5.190	606171	619112
3538663	206119	1.104	1.000	2.219	1.594	3.754	5.640	606171	619112

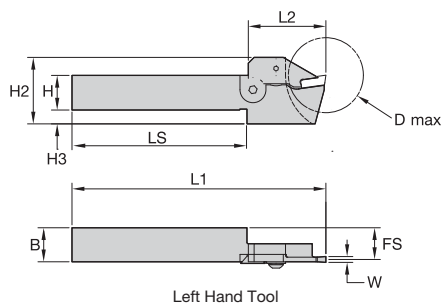
NOTE: Ships with blade and clamp screws.
Support blade requires two screws.

■ Components

W	L1	FS	left hand clamp	support blade	right hand clamp
.125	2.246	.050	435137	309111	435136
.188	2.246	.072	435106	309105	435103
.250	2.246	.094	435107	309106	435108

NOTE: All components ship separately.





■ Sub-Spindle



order number	catalog number	W	D max	B	FS	H	H2	H3	L1	LS	L2	button-head cap screw	clamp	flat-head cap screw	washer
right hand															
3538762	206502	.094	1.630	.740	.703	.750	1.444	.300	5.500	3.790	1.680	619174	409184	619177	613139
3538760	206500	.126	2.630	.987	.937	1.000	1.754	.375	6.000	3.600	2.375	619174	409182	619175	613139
3538761	206501	.126	2.630	.987	.937	1.000	1.754	.375	6.000	3.600	2.375	619174	409183	619175	613139
left hand															
3538764	206504	.126	1.630	.737	.687	.750	1.439	.300	5.500	3.790	1.681	619174	409186	619176	613139
3538765	206505	.126	1.630	.737	.687	.750	1.439	.300	5.500	3.790	1.681	619174	409187	619176	613139

Grooving and Cut-Off

Definitions and Guidelines

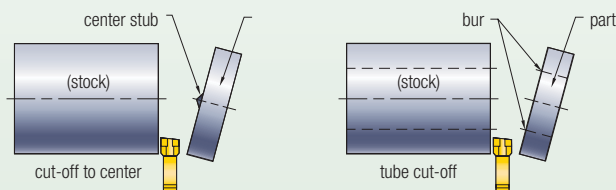
1. Width of cut (W) = width of the insert.
2. Lead angle = 0° (neutral); 4°, 5°, 12°, 18° (RH or LH).

Reduce bur of cut-off faces:

- Use lead angle-type inserts (Figures 1 and 2). Lead angle on a cut-off insert reduces the bur that remains on the part but decreases tool life and increases tool side deflection and possibly cycle time.

Figure 1

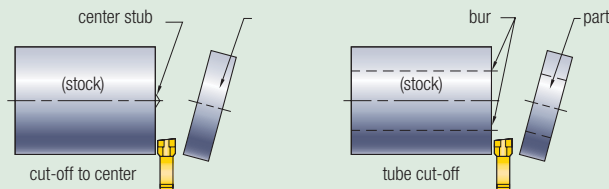
Insert selection **left-hand lead**



Left-hand lead insert leaves center stub or bur on part and produces clean stock surface.

Figure 2

Insert selection **right-hand lead**

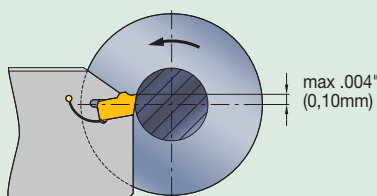


Right-hand lead insert leaves center stub or bur on stock and produces clean part surface.

- Check total height and maintain on center with part diameter.
- The cutting edge height should be within $\pm .004"$ (0,1mm) to the center; recommended cutting position is $.002"$ (0,05mm) above center.

Figure 3

Above center



- If 0° lead angle is mandatory, use the narrowest possible cut-off insert and blade. This will minimize the center stub or cut-off bur length. Decrease the feed rate to maximum $.002"$ (0,05mm) or less at the point where diameter equals insert width.
- On tubing-type parts that require a chamfer on the I.D., align I.D. chamfer tool with cut-off surface. This will enable the chamfering operation to actually separate the part from the bar (see Figure 4). Note the part may drop onto the chamfering bar, which, in this case, will act like a catcher for the part.

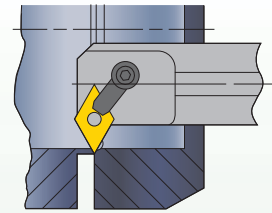


Figure 4

Internal chamfer line up

Improve surface finish of cut-off faces:

- Use insert with 0° lead angle.
- Increase coolant flow or improve application technique, as shown in Figure 5.
- Decrease the feed rate near the break-through point of the cut.
- Check that the grooving tool is set at the correct angle.
- Use blades with the greatest possible face height and smallest possible cutting width.
- Increase the speed.

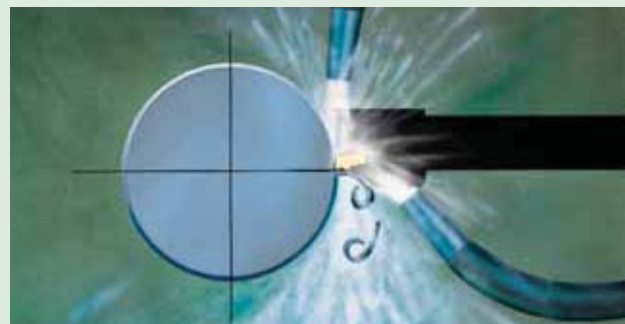


Figure 5

Preferred method for applying coolant

- Mount cut-off tool upside down. This enables gravity to remove chips and avoid cutting the chips twice. Another benefit of mounting the tool upside down is preventing chips from wedging between the tool insert and the groove side walls, which galls the side wall surfaces.

Improve chip control:

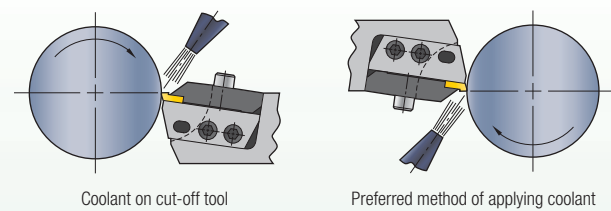
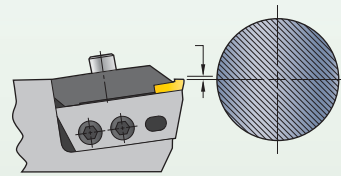
- Adjust feed rate up or down to accommodate chip formation.
- Use a 0° or smallest lead available.
- Use ample amounts of well-directed coolant (see Figure A).
- Maintain sharp cutting edge and corners.

Improve flatness of cut-off surfaces:

- Maintain 90° position (perpendicular alignment) between cut-off tool and workpiece.
- For low to moderate speed (sfpm), use Separator F².
- For moderate to high speed (sfpm), use Separator S² or X².
- Use strongest toolholder system possible.
- Use 0° lead angle inserts when possible. If lead angle inserts are needed, reduce the feed rate.
- Check for minimum overhang of holder and blade.
- Set up for minimum workpiece overhang (distance out of chuck).
- Reduce feed rate.
- Maintain sharp edge and corners on cut-off insert.
- Increase speed (RPM).
- Use ample amounts of well-directed coolant (see Figure A).
- Maintain proper tool center height .000–.005" (0–0.1mm) above center (see Figure B).

Improve surface finish:

- For low to moderate speed (sfpm), use Separator F².
- For moderate to high speed (sfpm), use Separator S² or X².
- Avoid overly aggressive chip control.
- Increase speed.
- Reduce lead angle and feed rate.
- Determine if corner radius is too large or small.
- Use a coated grade.
- Use coolant (see Figure A).

Figure A

Figure B

Minimize edge chipping:

- Check to see if tool is significantly above or below center.
- Reduce feed prior to part drop-off.
- Use Separator S² or X².
- Choose the proper speed associated with the insert grade used.
- Call Technical Support to see if a larger hone size is needed.
- Eliminate chatter.
- Avoid chip re-cutting.
- Check for these part and machine problems:
 - Slide is loose.
 - Slide travel is irregular.
 - Bar/tube I.D. and/or O.D. is out of round.
 - Bar/tube is bent.
 - Thin wall collapses (deforms) in the cut.
 - Part is unstable.
 - Cut-off through unturned stock.
 - Excessive tool overhang.
 - Bent or partly attached flash ring.

(continued)

(continued)

Eliminate chatter:

- Minimize tool blade and holder overhang.
- Minimize part overhang.
- Use strongest toolholder system.
- Use a more narrow width of insert.
- Chipbreaker might be too aggressive.
(Call Technical Support.)
- Adjust speed and feed rate up or down.
- Hold workpiece rigidly.
- With a longer part, support with steady rest or live center.
- Avoid machine dwell.
- Use S² or X² to reduce cutting forces.

Reduce cut-off nib on solid bar or I.D. bur on tubing:

- Check tool height. Insert cutting edge should be on center to .002" (0,05mm) above centerline of workpiece.
- To reduce nib on part, use a high lead angle-type insert.
Lead angle on a cut-off insert reduces the nib, which remains on the workpiece.
CAUTION: the higher the lead, the more tool-side deflection.
- Use the narrowest possible cut-off insert to minimize the cut-off bur length.
- Reduce feed rate at the end of a cut.
- On most tubing-type parts, a 4° or 5° lead angle will be sufficient.
- Add support to a long slender-type part.
- Maintain proper sub-spindle alignment.
- If nib or bur persists, call Technical Support about reducing hone size.
- Use small- or no-corner radius.

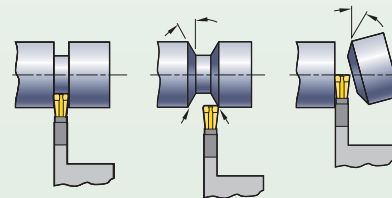
Eliminate built-up edge:

- Select proper grade for insert.
- Increase speed (RPM).
- Increase the feed rate.
- Use ample amounts of well-directed coolant
(see Figure A on page E137).

Chamfer and cut-off operations:

- Use Separator S² or X².
- Groove or breakdown workpiece surface being machined.
- Machine the chamfer.
- For jobs requiring a chamfer on both ends of the part, begin by plunging to a depth just beyond the depth of the chamfers. Then, return to the part O.D. and profile each chamfer individually. Finish the cut-off after completion of the second chamfer.
- Cut off the workpiece (see Figure C).

Figure C



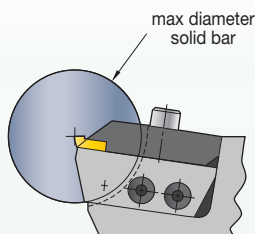
Modifications for Increased Depth of Cut


Figure 1
Standard bar capacity shown

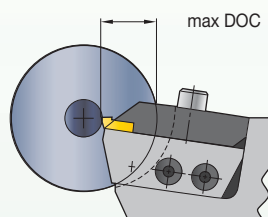


Figure 2
Larger bar diameter shown

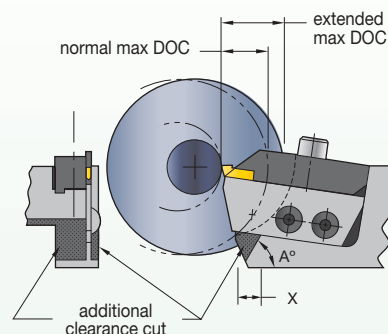


Figure 3
Modified toolholder with larger bar diameter shown

Capacity Chart for 2-1/4" Diameter Bar Capacity Tooling

bar diameter	2.5"	3.0"	3.5"	4.0"	4.5"	5.0"	6.0"	NOTE
max DOC	0.94"	0.75"	0.62"	0.56"	0.50"	0.47"	0.44"	with no modification on toolholder
	1.12"	1.03"	0.97"	0.91"	0.87"	0.84"	0.78"	with no modification on toolholder X = .40" A = 50"

Capacity Chart for 3" Diameter Bar Capacity Tooling

bar diameter	3.5"	4.0"	4.5"	5.0"	6.0"	NOTE
max DOC	1.12"	1.00"	0.88"	0.78"	0.69"	with no modification on toolholder
	1.44"	1.37"	1.31"	1.25"	1.12"	with no modification on toolholder X = .40" A = 50"