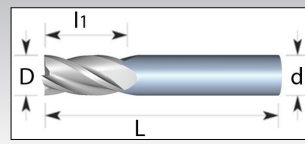




P	●	Steel
M	◐	Stainless Steel
K	●	Cast Iron
N	○	Non-Ferrous
S		High Temp. Alloys
H		Hardened Steel
● GOOD ◐ OK ○ NOT OPTIMAL		

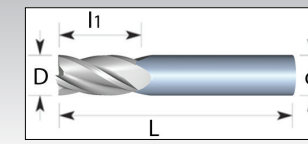
- Square End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional & Metric
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



Square End - Fractional									
Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
3/4	3/4	1	3	991045	991046	991047	991141	991142	991143
		1-1/2	4	991299	991300	991301	991694	991695	991696
		2-1/4	5	991764	--	991765	991808	--	991809
		3	6	991839	--	991840	991903	--	991904
49/64	7/8	1-1/2	4	991303	991304	991305	991698	991699	991700
25/32	7/8	1-1/2	4	991306	991307	991308	991701	991702	991703
51/64	7/8	1-1/2	4	991309	991310	991311	991704	991705	991706
13/16	7/8	1-1/2	4	991312	991313	991314	991707	991708	991709
53/64	7/8	1-1/2	4	991315	991316	991317	991710	991711	991712
27/32	7/8	1-1/2	4	991318	991319	991320	991713	991714	991715
55/64	7/8	1-1/2	4	991321	991322	991323	991716	991717	991718
7/8	7/8	1-1/2	4	991324	991325	991326	991719	991720	991721
57/64	1	1-1/2	4	991328	991329	991330	991723	991724	991725
29/32	1	1-1/2	4	991331	991332	991333	991726	991727	991728
59/64	1	1-1/2	4	991334	991335	991336	991729	991730	991731
15/16	1	1-1/2	4	991337	991338	991339	991732	991733	991734
61/64	1	1-1/2	4	991340	991341	991342	991735	991736	991737
31/32	1	1-1/2	4	991343	991344	991345	991738	991739	991740
63/64	1	1-1/2	4	991346	991347	991348	991741	991742	991743
1	1	1	3	991012	991013	991014	991108	991109	991110
		1-1/2	4	991162	991163	991164	991558	991559	991560
		2-1/4	5	991744	--	991745	991788	--	991789
		3	6	991810	--	991812	991875	--	991876

P	●	Steel
M	◐	Stainless Steel
K	●	Cast Iron
N	○	Non-Ferrous
S		High Temp. Alloys
H		Hardened Steel
● GOOD ◐ OK ○ NOT OPTIMAL		

- Square End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Metric Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



Square End - Metric									
Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
3	3	12	38	993256	993257	993258	993322	993323	993324
		25	75	993464	--	993465	993488	--	993489
		25	100	993512	--	993513	993528	--	993529
3.5	4	12	50	993259	993260	993261	993325	993326	993327
		14	50	993262	993263	993264	993328	993329	993330
4	4	25	75	993466	--	993467	993490	--	993491
		50	100	993514	--	993515	993530	--	993531
4.5	5	14	50	993265	993266	993267	993331	993332	993333
		16	50	993268	993269	993270	993334	993335	993336
5	5	25	75	993468	--	993469	993492	--	993493
		30	100	993516	--	993517	993532	--	993533
		19	63	993271	993272	993273	993337	993338	993339
6	6	25	75	993470	--	993471	993494	--	993495
		50	100	993518	--	993519	993534	--	993535
7	7	19	63	993274	993275	993276	993340	993341	993342
		19	63	993277	993278	993279	993343	993344	993345
8	8	30	100	993472	--	993473	993496	--	993497
		50	150	993520	--	993521	993536	--	993537
9	10	22	70	993280	993281	993282	993346	993347	993348
		22	70	993283	993284	993285	993349	993350	993351
10	10	38	100	993474	--	993475	993498	--	993499
		75	150	993522	--	993523	993538	--	993539
		25	70	993286	993287	993288	993352	993353	993354
12	12	25	75	993289	993290	993291	993355	993356	993357
		50	100	993476	--	993477	993500	--	993501
		75	150	993524	--	993525	993540	--	993541
14	14	30	88	993292	993293	993294	993358	993359	993360
		50	125	993478	--	993479	993502	--	993503
		75	150	993526	--	993527	993542	--	993543
16	16	32	88	993295	993296	993297	993361	993362	993363
		75	150	993480	--	993481	993504	--	993505
18	18	36	100	993298	993299	993300	993364	993365	993366
		75	150	993482	--	993483	993506	--	993507
20	20	38	100	993301	993302	993303	993367	993368	993369
		75	150	993484	--	993485	993508	--	993509
22	25	38	100	993304	993305	993306	993370	993371	993372
		38	100	993307	993308	993309	993373	993374	993375
25	25	38	100	993307	993308	993309	993373	993374	993375
		75	150	993486	--	993487	993510	--	993511



Precision Grinding with high quality surface finishes for maximum tool life!

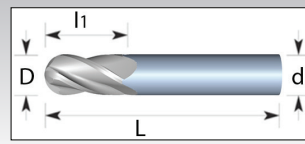
Square End - Metric									
Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
1	1	3	38	993244	993245	993246	993310	993311	993312
1.5	2	5	38	993247	993248	993249	993313	993314	993315
2	2	6	38	993250	993251	993252	993316	993317	993318



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

● GOOD ○ OK ○ NOT OPTIMAL

- Ball Nose End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling

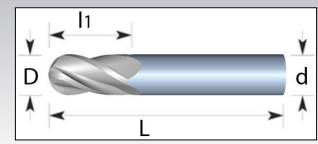


Ball Nose - Fractional									
Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
3/4	3/4	1	3	991952	991953	991954	992047	992048	992049
		1-1/2	4	992193	992194	992195	992578	992579	992580
		2-1/4	5	992646	--	992647	992690	--	992691
		3	6	992720	--	992721	992784	--	992785
49/64	7/8	1-1/2	4	992196	992197	992198	992581	992582	992583
25/32	7/8	1-1/2	4	992199	992200	992201	992584	992585	992586
51/64	7/8	1-1/2	4	992202	992203	992204	992587	992588	992589
13/16	7/8	1-1/2	4	992205	992206	992207	992590	992591	992592
53/64	7/8	1-1/2	4	992208	992209	992210	992593	992594	992595
27/32	7/8	1-1/2	4	992211	992212	992213	992596	992597	992598
55/64	7/8	1-1/2	4	992214	992215	992216	992599	992600	992601
7/8	7/8	1-1/2	4	992217	992218	992219	992602	992603	992604
57/64	1	1-1/2	4	992220	992221	992222	992605	992606	992607
29/32	1	1-1/2	4	992223	992224	992225	992608	992609	992610
59/64	1	1-1/2	4	992226	992227	992228	992611	992612	992613
15/16	1	1-1/2	4	992229	992230	992231	992614	992615	992616
61/64	1	1-1/2	4	992232	992233	992234	992617	992618	992619
31/32	1	1-1/2	4	992235	992236	992237	992620	992621	992622
63/64	1	1-1/2	4	992238	992239	992240	992623	992624	992625
1	1	1	3	991919	991920	991921	992014	992015	992016
		1-1/2	4	992068	992069	992070	992451	992452	992453
		2-1/4	5	992626	--	992627	992670	--	992671
		3	6	992692	--	992693	992756	--	992757

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

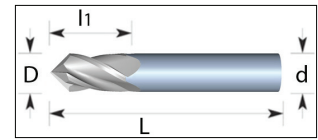
● GOOD ○ OK ○ NOT OPTIMAL

- Ball Nose End
- 2 & 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Metric Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling

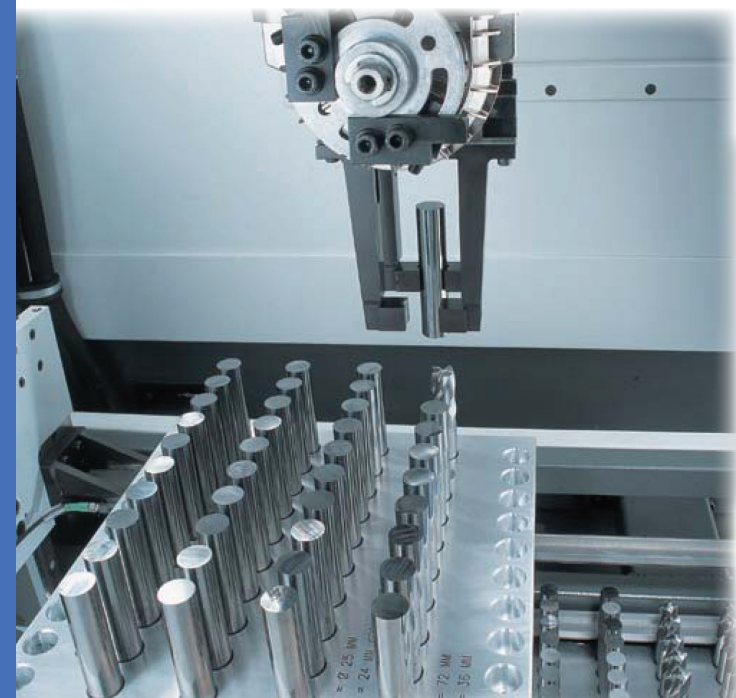


Ball Nose - Metric									
Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
1	1	3	38	993376	--	993377	993420	--	993421
1.5	2	5	38	993378	--	993379	993422	--	993423
2	2	6	38	993380	--	993381	993424	--	993425
3	3	12	38	993384	--	993385	993428	--	993429
3.5	4	12	50	993386	--	993387	993430	--	993431
4	4	14	50	993388	--	993389	993432	--	993433
4.5	5	14	50	993390	--	993391	993434	--	993435
5	5	16	50	993392	--	993393	993436	--	993437
6	6	19	63	993394	--	993395	993438	--	993439
7	7	19	63	993396	--	993397	993440	--	993441
8	8	19	63	993398	--	993399	993442	--	993443
9	9	22	70	993400	--	993401	993444	--	993445
10	10	22	70	993402	--	993403	993446	--	993447
11	11	25	70	993404	--	993405	993448	--	993449
12	12	25	75	993406	--	993407	993450	--	993451
14	14	30	88	993408	--	993409	993452	--	993453
16	16	32	88	993410	--	993411	993454	--	993455
18	18	36	100	993412	--	993413	993456	--	993457
20	20	38	100	993414	--	993415	993458	--	993459
22	25	38	100	993416	--	993417	993460	--	993461
25	25	38	100	993418	--	993419	993462	--	993463

- 90 Degree End
- 2 & 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Milling, Drilling
- Countersinking
- Chamfering, De-burring



Drill/Mill 90 Degree - Fractional									
Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
1/8	1/8	1/2	1-1/2	993544	--	993545	993562	--	993563
3/16	3/16	5/8	2	993546	--	993547	993564	--	993565
1/4	1/4	3/4	2-1/2	993548	--	993549	993566	--	993567
5/16	5/16	7/8	2-1/2	993550	--	993551	993568	--	993569
3/8	3/8	1	2-1/2	993552	--	993553	993570	--	993571
7/16	7/16	1	2-3/4	993554	--	993555	993572	--	993573
1/2	1/2	1	3	993556	--	993557	993574	--	993575
5/8	5/8	1-1/4	3-1/2	993558	--	993559	993576	--	993577
3/4	3/4	1-1/2	4	993560	--	993561	993578	--	993579

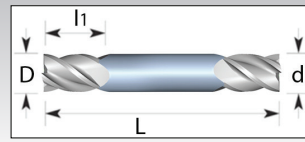


*“Lights-Out” automated loader production on world class 5 Axis CNC Grinding Machines!*

P	●	Steel
M	◐	Stainless Steel
K	●	Cast Iron
N	○	Non-Ferrous
S		High Temp. Alloys
H		Hardened Steel

● GOOD ◐ OK ○ NOT OPTIMAL

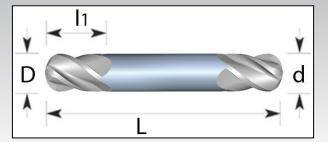
- Square End
- 2 & 4 Flute
- Double End
- Round & Weldon Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



P	●	Steel
M	◐	Stainless Steel
K	●	Cast Iron
N	○	Non-Ferrous
S		High Temp. Alloys
H		Hardened Steel

● GOOD ◐ OK ○ NOT OPTIMAL

- Ball Nose End
- 2 & 4 Flute
- Double End
- Round & Weldon Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



### Square Double End - Fractional

Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
1/32	1/8	1/16	1-1/2	992788	--	992789	992860	--	992861
3/64	1/8	3/32	1-1/2	992790	--	992791	992862	--	992863
1/16	1/8	1/8	1-1/2	992792	--	992793	992864	--	992865
3/32	1/8	3/16	1-1/2	992794	--	992795	992866	--	992867
		5/16	3	993004	--	993005	993032	--	993033
7/64	1/8	7/32	1-1/2	992796	--	992797	992868	--	992869
1/8	1/8	1/4	1-1/2	992798	--	992799	992870	--	992871
		3/8	3-1/16	993006	--	993007	993034	--	993035
5/32	3/16	5/16	2	992800	--	992801	992872	--	992873
		7/16	3-1/8	993008	--	993009	993036	--	993037
3/16	3/16	5/16	2	992802	--	992803	992874	--	992875
		1/2	3-1/4	993010	--	993011	993038	--	993039
7/32	1/4	3/8	2-1/2	992804	--	992805	992876	--	992877
		9/16	3-1/2	993012	--	993013	993040	--	993041
1/4	1/4	1/2	2-1/2	992806	--	992807	992878	--	992879
		5/8	3-1/2	993014	--	993015	993042	--	993043
9/32	5/16	1/2	2-1/2	992808	--	992809	992880	--	992881
5/16	5/16	1/2	2-1/2	992810	--	992811	992882	--	992883
		3/4	3-1/2	993016	--	993017	993044	--	993045
3/8	3/8	9/16	2-1/2	992812	--	992813	992884	--	992885
		3/4	3-1/2	993020	--	993021	993048	--	993049
7/16	1/2	9/16	2-3/4	992814	--	992815	992886	--	992887
		7/8	4	993022	--	993023	993050	--	993051
1/2	1/2	5/8	3	992816	--	992817	992888	--	992889
		1	4	993024	--	993025	993052	--	993053
9/16	5/8	11/16	3-1/2	992818	--	992819	992890	--	992891
5/8	5/8	11/16	3-1/2	992820	--	992821	992892	--	992893
		1-1/2	6	993028	--	993029	993056	--	993057
3/4	3/4	7/8	4	992822	--	992823	992894	--	992895
		1-1/2	6	993030	--	993031	993058	--	993059

### Ball Nose Double End - Fractional

Cutter D	Shank d	LOC l1	Overall L	Uncoated			TiALN		
				2 Flute	3 Flute	4 Flute	2 Flute	3 Flute	4 Flute
1/32	1/8	1/16	1-1/2	992896	--	992897	992968	--	992969
3/64	1/8	3/32	1-1/2	992898	--	992899	992970	--	992971
1/16	1/8	1/8	1-1/2	992900	--	992901	992972	--	992973
3/32	1/8	3/16	1-1/2	992902	--	992903	992974	--	992975
		5/16	3	993060	--	993061	993088	--	993089
7/64	1/8	7/32	1-1/2	992904	--	992905	992976	--	992977
1/8	1/8	1/4	1-1/2	992906	--	992907	992978	--	992979
		3/8	3-1/16	993062	--	993063	993090	--	993091
5/32	3/16	5/16	2	992908	--	992909	992980	--	992981
		7/16	3-1/8	993064	--	993065	993092	--	993093
3/16	3/16	5/16	2	992910	--	992911	992982	--	992983
		1/2	3-1/4	993066	--	993067	993094	--	993095
7/32	1/4	3/8	2-1/2	992912	--	992913	992984	--	992985
		9/16	3-1/2	993068	--	993069	993096	--	993097
1/4	1/4	1/2	2-1/2	992914	--	992915	992986	--	992987
		5/8	3-1/2	993070	--	993071	993098	--	993099
9/32	5/16	1/2	2-1/2	992916	--	992917	992988	--	992989
5/16	5/16	1/2	2-1/2	992918	--	992919	992990	--	992991
		3/4	3-1/2	993072	--	993073	993100	--	993101
3/8	3/8	9/16	2-1/2	992920	--	992921	992992	--	992993
		3/4	3-1/2	993076	--	993077	993104	--	993105
7/16	1/2	9/16	2-3/4	992922	--	992923	992994	--	992995
		7/8	4	993078	--	993079	993106	--	993107
1/2	1/2	5/8	3	992924	--	992925	992996	--	992997
		1	4	993080	--	993081	993108	--	993109
9/16	5/8	11/16	3-1/2	992926	--	992927	992998	--	992999
5/8	5/8	11/16	3-1/2	992928	--	992929	993000	--	993001
		1-1/2	6	993084	--	993085	993112	--	993113
3/4	3/4	7/8	4	992930	--	992931	993002	--	993003
		1-1/2	6	993086	--	993087	993114	--	993115