HARVEY TOOL

Speeds & Feeds

Product Table: Drill/End Mills - Cobalt - Mill Style - 2 & 4 Flute
Characteristics: 90° Included Angle, 4 Flutes
Series: 143xx

Product Notes:

Milling - Presented data reflects slotting application using OD of cutter up to .5x Dia Axial DOC
- Use OD of cutter for Chip Load selection and RPM calculation
- If Axial DOC exceeds .5x Dia, Chip Load and/or Radial DOC must be reduced

Chamfering - Presented data reflects full chamfer engagement on one side of workpiece
- Due to a varying tip diameter, an Effective Cutter Diameter is needed for Chip Load selection and RPM calculation. Consider the major and minor diameters along the actual contact length and average them: (Major Diameter + Minor Diameter)/2
- Depth of Cut is shown as number of Passes with each made using a descending stepover
- Feed rates may be increased (or number of passes decreased) when creating traditional edge breaks

Drilling - Presented values are Chip Load per Tooth and not Chip Load per Rev
- Use OD for Chip Load selection and RPM calculation
- Since only 2 flutes are center cutting in 2 and 4 flute drill/mills, all drilling feed calulations should be made using 2 Effective Flutes
- Depth of Cut not shown as it is not applicable
- Drilling is not recommended for tools with < 82° included point angle

General Notes:

All posted speed and feed parameters are suggested starting values that may be increased given optimal setup conditions. Chip loads reflect uncoated cutters and may be increased 10%-20% if coated. For ferrous materials with hardness ≤ 28 Rc, chip loads can be increased 10%-20%.

If you require additional information, Harvey Tool has a team of technical experts available to assist you through even the most challenging applications. Please contact us at **800-645-5609** or **Harveytech@harveyperformance.com**.

WARNING: Cutting tools may shatter under improper use. Government regulations require use of safety glasses and other appropriate safety equipment in the vicinity of use.

Hardness: ≤ 28 Rc (≤ 271 HBn)

MATERIAL	SFM		Chip Load (IPT) By Cutter Diameter												Depth of Cut	
			0.062	0.078	0.093	0.125	0.187	0.250	0.312	0.375	0.500	0.625	0.750	1.000	Radial	Axial
ALUMINUM ALLOYS	300	Milling	.00055	.00069	.00082	.00110	.00165	.00220	.00275	.00330	.00440	.00550	.00660	.00880	1x Dia	.5x Dia
Casting (2xx, 5xx, 7xx, 8xx)		Chamfering	.00055	.00069	.00082	.00110	.00165	.00220	.00275	.00330	.00440	.00550	.00660	.00880	2 passes	
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	400	Drilling	.00033	.00041	.00049	.00066	.00099	.00132	.00165	.00198	.00264	.00330	.00396	.00528	-	
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	300	Milling	.00049	.00062	.00074	.00099	.00148	.00198	.00247	.00297	.00396	.00495	.00594	.00792	1x Dia	.5x Dia
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	280															
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	260	Chamfering	.00049	.00062	.00074	.00099	.00148	.00198	.00247	.00297	.00396	.00495	.00594	.00792	2 passes	
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	190															
Wrought - 5%-8% Si (4xxx)	400	Drilling	.00029	.00037	.00044	.00059	.00089	.00119	.00148	.00178	.00238	.00297	.00356	.00475	-	
Wrought - 8%-12% Si (4xxx)	320															
MAGNESIUM ALLOYS	600	Milling	.00055	.00069	.00082	.00110	.00165	.00220	.00275	.00330	.00440	.00550	.00660	.00880	1x Dia	.5x Dia
		Chamfering	.00055	.00069	.00082	.00110	.00165	.00220	.00275	.00330	.00440	.00550	.00660	.00880	2 passes	
ZINC ALLOYS	320	Drilling	.00033	.00041	.00049	.00066	.00099	.00132	.00165	.00198	.00264	.00330	.00396	.00528	-	
COPPER ALLOYS High Coppers - 90%+ (C1xxxx)	90	Milling	.00044	.00055	.00065	.00088	.00132	.00176	.00220	.00264	.00352	.00440	.00528	.00704	1x Dia	.5x Dia
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	200															
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	90															
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	200	Chamfering	.00044	.00055	.00065	.00088	.00132	.00176	.00220	.00264	.00352	.00440	.00528	.00704	2 passes	
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	200															
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	90															
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	220	Drilling	.00026	.00033	.00039	.00053	.00079	.00106	.00132	.00158	.00211	.00264	.00317	.00422	-	

Hardness: 29-37 Rc (279-344 HBn)

MATERIAL	SFM		Chip Load (IPT) By Cutter Diameter												Depth of Cut	
			0.062	0.078	0.093	0.125	0.187	0.250	0.312	0.375	0.500	0.625	0.750	1.000	Radial	Axial
CARBON STEELS	240	Milling	.00019	.00024	.00028	.00038	.00057	.00076	.00094	.00113	.00151	.00189	.00227	.00302	1x Dia	.5x Dia
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx		Chamfering	.00023	.00029	.00035	.00047	.00071	.00095	.00118	.00142	.00189	.00236	.00284	.00378	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	80	Milling	.00017	.00022	.00026	.00035	.00052	.00069	.00086	.00104	.00138	.00173	.00207	.00276	1x Dia	.5x Dia
		Chamfering	.00021	.00027	.00032	.00043	.00065	.00086	.00108	.00130	.00173	.00216	.00259	.00346	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
STAINLESS STEELS	180	Milling	.00019	.00024	.00028	.00038	.00057	.00076	.00094	.00113	.00151	.00189	.00227	.00302	1x Dia	.5x Dia
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe		Chamfering	.00023	.00029	.00035	.00047	.00071	.00095	.00118	.00142	.00189	.00236	.00284	.00378	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	80	Milling	.00017	.00022	.00026	.00035	.00052	.00069	.00086	.00104	.00138	.00173	.00207	.00276	1x Dia	.5x Dia
		Chamfering	.00021	.00027	.00032	.00043	.00065	.00086	.00108	.00130	.00173	.00216	.00259	.00346	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	60	Milling	.00011	.00013	.00016	.00022	.00032	.00043	.00054	.00065	.00086	.00108	.00130	.00173	1x Dia	.5x Dia
		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
TOOL STEELS	80	Milling	.00017	.00022	.00026	.00035	.00052	.00069	.00086	.00104	.00138	.00173	.00207	.00276	1x Dia	.5x Dia
A, L, O, P, W series		Chamfering	.00021	.00027	.00032	.00043	.00065	.00086	.00108	.00130	.00173	.00216	.00259	.00346	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
D, H, M, T, S series	60	Milling	.00011	.00013	.00016	.00022	.00032	.00043	.00054	.00065	.00086	.00108	.00130	.00173	1x Dia	.5x Dia
		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
TITANIUM ALLOYS	60	Milling	.00011	.00013	.00016	.00022	.00032	.00043	.00054	.00065	.00086	.00108	.00130	.00173	1x Dia	.5x Dia
		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
HIGH TEMP ALLOYS	30	Milling	.00011	.00013	.00016	.00022	.00032	.00043	.00054	.00065	.00086	.00108	.00130	.00173	1x Dia	.5x Dia
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	3 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	

Hardness: 38-45 Rc (353-421 HBn)

MATERIAL	SFM		Chip Load (IPT) By Cutter Diameter												Depth of Cut	
			0.062	0.078	0.093	0.125	0.187	0.250	0.312	0.375	0.500	0.625	0.750	1.000	Radial	Axial
CARBON STEELS	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx			-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
STAINLESS STEELS	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe			-	-	-	-	-	-	-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	40	Milling	.00009	.00011	.00013	.00017	.00026	.00035	.00043	.00052	.00069	.00086	.00104	.00138	1x Dia	.5x Dia
		Chamfering	.00021	.00027	.00032	.00043	.00065	.00086	.00108	.00130	.00173	.00216	.00259	.00346	4 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	35	Milling	.00005	.00007	.00008	.00011	.00016	.00022	.00027	.00032	.00043	.00054	.00065	.00086	1x Dia	.5x Dia
		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	4 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
TOOL STEELS	40	Milling	.00009	.00011	.00013	.00017	.00026	.00035	.00043	.00052	.00069	.00086	.00104	.00138	1x Dia	.5x Dia
A, L, O, P, W series		Chamfering	.00021	.00027	.00032	.00043	.00065	.00086	.00108	.00130	.00173	.00216	.00259	.00346	4 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
D, H, M, T, S series	35	Milling	.00005	.00007	.00008	.00011	.00016	.00022	.00027	.00032	.00043	.00054	.00065	.00086	1x Dia	.5x Dia
		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	4 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
TITANIUM ALLOYS	30	Milling	.00005	.00007	.00008	.00011	.00016	.00022	.00027	.00032	.00043	.00054	.00065	.00086	1x Dia	.5x Dia
		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	4 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	
HIGH TEMP ALLOYS	20	Milling	.00005	.00007	.00008	.00011	.00016	.00022	.00027	.00032	.00043	.00054	.00065	.00086	1x Dia	.5x Dia
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy		Chamfering	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	.00135	.00162	.00216	4 passes	
		Drilling	-	-	-	-	-	-	-	-	-	-	-	-	-	