DOFEED

Insert size 03

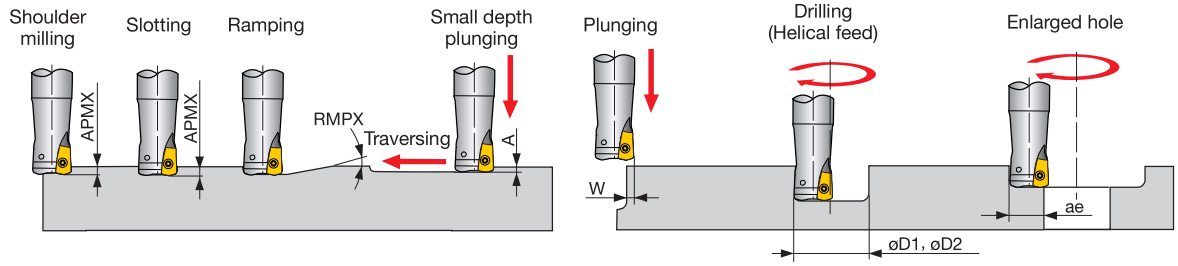
STANDARD CUTTING CONDITIONS

ZER type

ISO	Workpiece materials	Hardness	Priority	Grade	Chip-breaker	Cutting speed *Vc* (m/min)	Feed per tooth: *fz* (mm/t) Tool dia.: DCX (mm) ø16 - ø22	ø25 - ø50	Plunging	ø16, CICT = 2 *n*	ø16, CICT = 2 *Vf*	ø18, CICT = 2 *n*	ø18, CICT = 2 *Vf*	ø20 *n*	ø20 *Vf* CICT = 3	ø20 *Vf* CICT = 4
P	Carbon steels S45C, S55C, etc. C45, C55, etc.	- 300HB	First choice	AH3225	MJ	100 - 300	0.5 -1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
										Vc = 200 m/min, *fz* = 0.8 mm/t						
P	Alloy steels SCM440, SCr415, etc.	- 300HB	First choice	AH3225	MJ	100 - 300	0.5 -1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
										Vc = 200 m/min, *fz* = 0.8 mm/t						
P	Prehardened steels NAK80, PX5, etc.	30-40HRC	First choice	AH3225	MJ	100 - 200	0.5 - 1.0	0.5 - 1.0	0.1	2,980	4,170	2,650	3,710	2,390	5,020	6,690
										Vc = 150 m/min, *fz* = 0.7 mm/t						
P	Prehardened steels NAK80, PX5, etc.	30-40HRC	for wear resistance	AH8015	MJ	100 - 200	0.5 - 1.0	0.5 - 1.0	0.1	2,980	4,170	2,650	3,710	2,390	5,020	6,690
										Vc = 150 m/min, *fz* = 0.7 mm/t						
M	Stainless steels SUS304, X5CrNi18-9, etc.	- 200HB	First choice	AH130	MS	80 - 150	0.3 - 0.8	0.3 - 0.8	0.1	2,390	2,390	2,120	2,120	1,910	2,860	3,820
										Vc = 120 m/min, *fz* = 0.5 mm/t						
M	Precipitation hardening stainless steels SUS630, X5CrNiCuNb16-4, etc.	28HRC - (H1150)	First choice	AH130	MS	80 - 150	0.2 - 0.5	0.2 - 0.5	0.1	2,390	1,430	2,120	1,270	1,910	1,720	2,290
			for wear resistance	AH3225	MS					*Vc* = 120 m/min, *fz* = 0.3 mm/t						
M	Precipitation hardening stainless steels SUS630, X5CrNiCuNb16-4, etc.	40HRC - (H900)	First choice	AH3035	ML	80 - 120	0.1 - 0.3	0.1 - 0.3	0.1	1,990	800	1,770	710	1,590	950	1,270
			for impact resistance	AH3035	MJ					*Vc* = 100 m/min, *fz* = 0.2 mm/t						
K	Gray cast irons FC250, GG25, 250, etc.	150-250HB	First choice	AH725	MJ	100 - 300	0.5 - 1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
										Vc = 200 m/min, *fz* = 0.8 mm/t						
K	Ductile cast irons FCD400, etc.	150-250HB	First choice	AH725	MJ	80 - 200	0.5 - 1.2	0.5 - 1.5	0.1	2,980	4,770	2,650	4,240	2,390	5,740	7,650
										Vc = 150 m/min, *fz* = 0.8 mm/t						
S	Titanium alloy Ti-6Al-4V, etc.	- 40HRC	First choice	AH130	ML	30 - 60	0.3 - 0.7	0.3 - 0.7	0.08	800	640	710	570	640	770	1,020
			for impact resistance	AH130	MJ					*Vc* = 40 m/min, *fz* = 0.4 mm/t						
S	Heat-resistant alloy Inconel, Hastelloy, etc.	- 40HRC	First choice	AH8015	ML	20 - 50	0.1 - 0.3	0.1 - 0.3	0.05	600	240	530	210	480	290	380
			for impact resistance	AH725	ML					*Vc* = 30 m/min, *fz* = 0.2 mm/t						
H	Hot mold steel SKD61, X40CrMoV5-1, etc.	40-55HRC	First choice	AH8015	MH	80 - 150	0.1 - 0.5	0.1 - 0.5	0.05	2,390	1,430	2,120	1,270	1,910	1,720	2,290
			Low resistance	AH8015	MJ		0.1 - 0.3	0.1 - 0.3		*Vc* = 120 m/min, *fz* = 0.3 mm/t						
H	Hot mold steel of D.T.C materials DAC**, DH**, DIEVER, etc	40-55HRC	First choice	AH8015	MJ	50-100	0.1 - 0.3	0.1 - 0.3	0.05	1,590	640	1,420	570	1,270	760	1,020
			for impact resistance	AH8015	MH		0.1 - 0.5	0.1 - 0.5		*Vc* = 80 m/min, *fz* = 0.2mm/t						
H	Cold mold steels SKD11, X153CrMoV12, etc.	55-60HRC	First choice	AH8005	MH	50 - 70	0.05 - 0.2	0.03 - 0.1	0.03	1,190	290	1,060	250	950	340	450
										Vc = 60 m/min, *fz* = 0.12 mm/t						
H	Cold mold steels SKD11, X153CrMoV12, etc.	55-60HRC	for impact resistance	AH8015	MH	50 - 70	0.03 - 0.1	0.05 - 0.2	0.03	1,190	150	1,060	130	950	170	230
										Vc = 60 m/min, *fz* = 0.06 mm/t						

- When chips stay in the cutting zone during slotting or pocketing, use air blast to remove chips from the work area
- Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed

APPLICATION RANGE



Designation	DCX	Max. depth of cut APMX	Max. ramping angle RMPX MJ/ML/MS	RMPX MH	Max. plunging depth A	Max. cutting width in plunging W MJ/ML/MS	W MH	Min. machinable hole dia. øD1 MJ/ML/MS	øD1 MH	Max. machinable hole dia. øD2	Max. cutting width in enlarged hole ae
E/HXN03R016M...	16	1	2.1	1.7	0.3	3.5	3	22	23	30	12.5
E/HXN03R018M...	18	1	1.7	1.6	0.3	3.5	3	26	27	34	14.5
E/HXN03R020M...	20	1	1.4	1.3	0.3	3.5	3	30	31	38	16.5
E/HXN03R022M...	22	1	1.2	1.1	0.3	3.5	3	34	35	42	18.5
E/HXN03R025M...	25	1	1.0	0.9	0.3	3.5	3	40	41	48	21.5
E/HXN03R028M...	28	1	0.8	0.8	0.3	3.5	3	46	46	54	24.5
E/HXN03R030M...	30	1	0.7	0.7	0.3	3.5	3	50	50	58	26.5
E/HXN03R032M...	32	1	0.7	0.7	0.3	3.5	3	54	54	62	28.5
EXN03R035M...	35	1	0.6	0.6	0.3	3.5	3	60	60	68	31.5
E/H/TXN03R040M…	40	1	0.5	0.5	0.3	3.5	3	70	70	78	36.5
TXN03R050M...	50	1	0.4	0.4	0.3	3.5	3	90	90	98	46.5

Note: For DCX above ø33 mm, slot milling, ramping or contouring is not recommended as chips may be re-cut

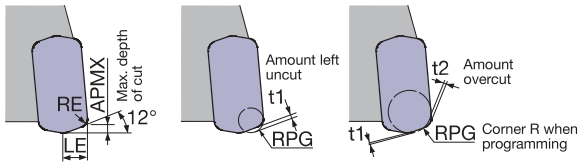
Tool dia.: DCX (mm), Number of revolutions: *n* (min^{-1}), Feed speed: *V*f (mm/min), Max. depth of cut: *a*p = 1 mm, Number of teeth: CICT

ø22			ø25			ø28			ø30			ø32			ø35			ø40			ø50		
n	*V*f		*n*	*V*f		*n*	*V*f		*n*	*V*f		*n*	*V*f		*n*	*V*f		*n*	*V*f		*n*	*V*f	
	CICT = 3	CICT = 4		CICT = 4	CICT=5		CICT = 4	CICT = 5		CICT = 4	CICT = 5		CICT = 5	CICT = 6		CICT = 5	CICT = 6		CICT = 5	CICT = 6		CICT = 5	CICT = 8
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, *fz* = 1.0 mm/t																							
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, *fz* = 1.0 mm/t																							
2,170	4,560	6,080	1,910	5,350	6,690	1,710	4,790	5,990	1,590	4,450	5,570	1,490	5,220	6,260	1,360	4,760	5,710	1,190	4,170	5,000	950	3,330	5,320
Vc = 150 m/min, *fz* = 0.7 mm/t																							
2,170	4,560	6,080	1,910	5,350	6,690	1,710	4,790	5,990	1,590	4,450	5,570	1,490	5,220	6,260	1,360	4,760	5,710	1,190	4,170	5,000	950	3,330	5,320
Vc = 150 m/min, *fz* = 0.7 mm/t																							
3,180	4,770	6,360	1,530	3,060	3,820	1,360	2,720	3,400	1,270	2,540	3,180	1,190	2,980	3,570	1,090	2,720	3,270	960	2,400	2,880	760	1,900	2,280
Vc = 120 m/min, *fz* = 0.5 mm/t																							
1,740	1,570	2,090	1,530	1,840	2,300	1,370	1,640	2,060	1,270	1,520	1,910	1,190	1,790	2,140	1,090	1,640	1,960	960	1,440	1,730	760	1,140	1,820
Vc = 120 m/min, *fz* = 0.3 mm/t																							
1,450	870	1,160	1,270	1,020	1,270	1,140	910	1,140	1,060	850	1,060	1,000	1,000	1,200	910	910	1,090	800	800	960	640	640	1,020
Vc = 100 m/min, *fz* = 0.2 mm/t																							
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, *fz* = 1.0 mm/t																							
2,170	5,210	6,940	1,910	6,110	7,640	1,710	5,460	6,820	1,590	6,360	7,950	1,490	7,450	8,940	1,360	6,800	8,160	1,190	5,950	7,140	950	4,750	5,700
Vc = 150 m/min, *fz* = 1.0 mm/t																							
580	700	930	510	820	1,020	450	730	910	420	840	1,050	400	1,000	1,200	360	900	1,080	320	800	960	250	630	1,000
Vc = 40 m/min, *fz* = 0.5 mm/t																							
430	260	340	380	230	290	340	200	260	320	260	320	300	300	360	270	270	320	240	240	290	190	190	300
Vc = 30 m/min, *fz* = 0.2 mm/t																							
1,740	1,570	2,090	1,530	1,840	2,300	1,360	1,630	2,040	1,270	1,520	1,910	1,190	1,790	2,140	1,090	1,640	1,960	950	1,430	1,710	760	1,140	1,820
Vc = 120 m/min, *fz* = 0.3 mm/t																							
1,160	700	930	1,020	820	1,020	910	730	910	850	680	850	800	800	960	730	730	880	640	640	770	510	510	820
Vc = 80 m/min, *fz* = 0.2mm/t																							
870	310	420	760	300	380	680	270	340	640	260	320	600	300	360	550	230	340	480	240	280	380	200	300
Vc = 60 m/min, *fz* = 0.1 mm/t																							
870	160	210	760	150	190	680	140	170	640	130	160	600	150	180	550	120	170	480	120	140	380	100	150
Vc = 60 m/min, *fz* = 0.06 mm/t																							

- The above table shows the conditions for standard shank type cutters. When using long shank type cutters, the number of teeth may be different.
- Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the standard cutting conditions and then increase the value gradually while making sure the machine is running normally

TOOL GEOMETRY ON PROGRAMMING

When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as R = 1.5 mm.
If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t1) and overcut (t2).



LNMU0303ZER...

Max. depth of cut APMX (mm)	Corner radius RE (mm)	LE (mm)	Corner R when programming RPG	Amount left uncut t1 (mm)	Amount overcut t2 (mm)
1	1.2	3	1	0.6	-
1	1.2	3	1.5	0.5	-
1	1.2	3	2	0.25	0.08
1	1.2	3	2.5	0.14	0.26

Note: Each value in table is calculated theoretically at the maximum condition

LNGU0303ZER...

Max. depth of cut APMX (mm)	Corner radius RE (mm)	LE (mm)	Corner R when programming RPG	Amount left uncut t1 (mm)	Amount overcut t2 (mm)
1	1.2	3	1	0.45	-
1	1.2	3	1.5	0.35	-
1	1.2	3	2	0.2	0.1
1	1.2	3	2.5	0.08	0.29