



## Variable-Lead End Mill NEO Series

**NEW**



NEO-PHS

NEO-EMS

NEO-CR-PHS

NEO-CR-EMS

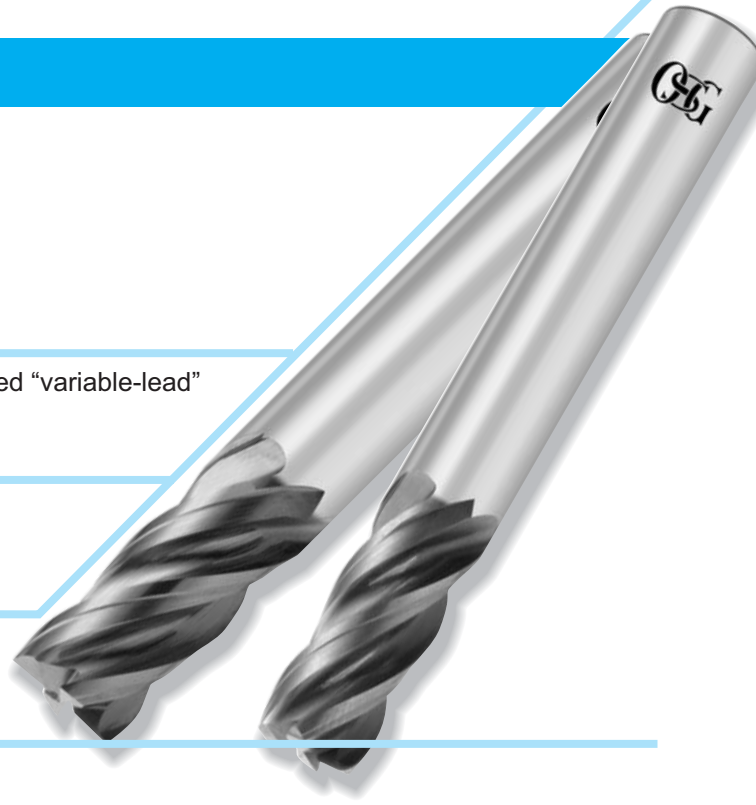
***Introducing the highly evolved  
"variable-lead" shape!***

***Suppresses chattering, allowing for outstanding milling performance.***

# Variable-Lead End Mill

# NEO

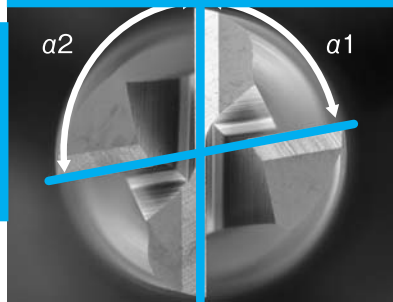
## NEO Series



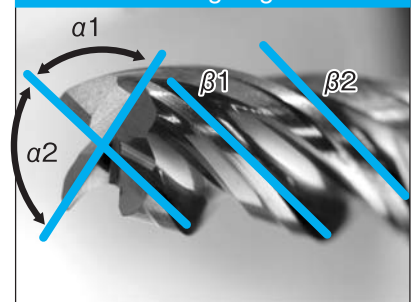
- 1** Smooth cutting is possible thanks to the highly evolved “variable-lead” shape, providing highly efficient milling !
- 2** The positive edge shape makes milling of hard-to-machine materials possible !
- 3** Comprehensive variety of corner radiuses !
- 4** Ideal flute shape for smooth chip evacuation !

This shape suppresses chattering !!!

Unequal spacing of end teeth



Variable-lead of peripheral cutting edge



**The NEO does not chatter to this extent !**

Tool NEO-PHS dia. 10 mm

Work Material SUS 304

Milling Method Slotting

Milling Speed 2.230 min<sup>-1</sup> (70 m/min)

Feed 265 mm/min (0,03 mm/t)

Milling Depth  $a_p=10\text{mm}$  (1D)

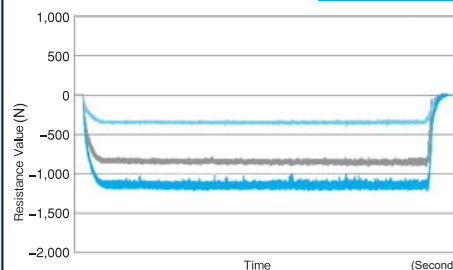
Coolant Water Soluble (5%)

Machine Vertical Machining Center (BT 40)

### NEO-PHS

Unequal spacing Variable lead

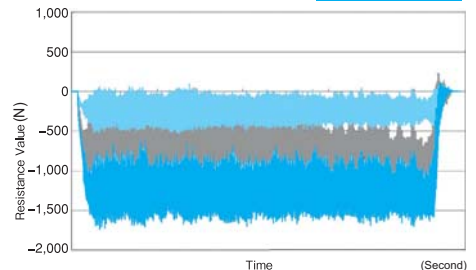
Resistance cutting force direction max. 1220N



### Competitor A

Unequal spacing Equal lead

Resistance cutting force direction max. 1730N

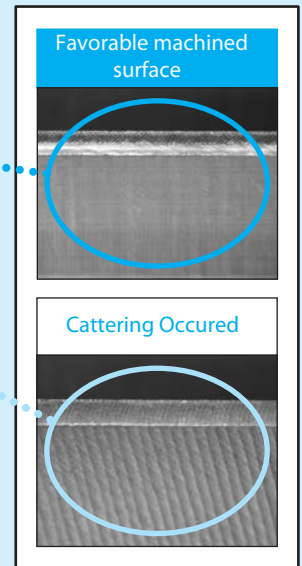
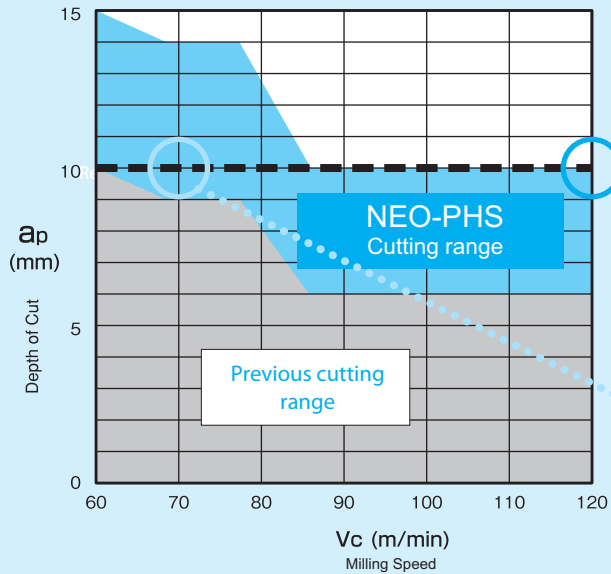
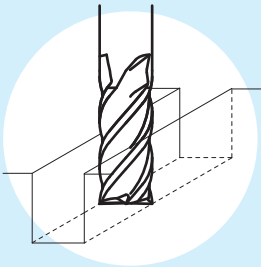


The variable-lead shape stabilizes cutting resistance to isolate vibration.

# Cutting Data

## NEO-PHS

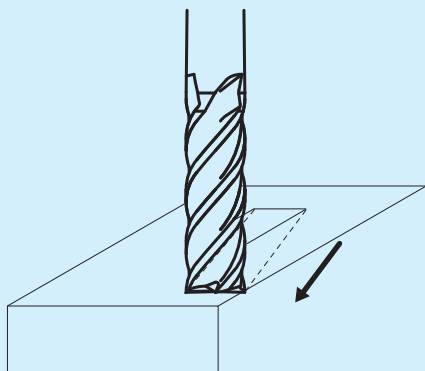
Tool	NEO-PHS dia. 10 mm
Work Material	Ti-6Al-4V
Milling Method	Slotting
Feed per Tooth	0,05 mm/t
Coolant	Water Soluble (5%)
Machine	Vertical Machining Center (BT 40)



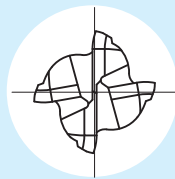
High-speed, deep plunge milling is achieved during slotting, an operation that is ordinarily difficult to achieve efficiency.

## NEO-CR-PHS

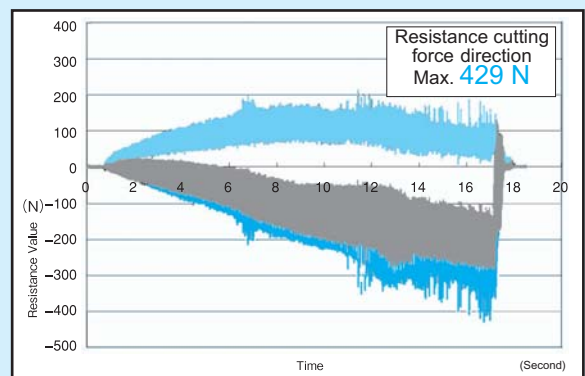
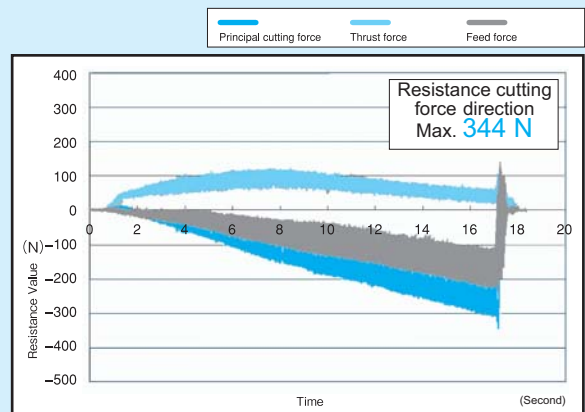
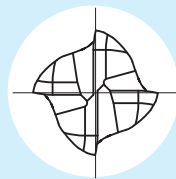
Tool	NEO-CR-PHS dia. 8 x R1
Work Material	SUS 304
Milling Method	Diagonal plunge
Milling Speed	2.785 min <sup>-1</sup> (70 m/min)
Feed	500 mm/min (0,045 mm/t)
Diagonal plunge angle	0,5°
Coolant	Water Soluble fluid (5%)
Machine	Vertical Machining Center (BT 40)



**NEO-CR-PHS**  
Unequal spacing Variable-lead



**Conventional**  
Equal spacing Equal lead



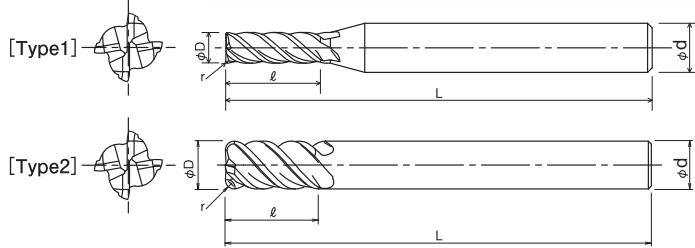
Suppresses chattering and achieves stable milling even when making diagonal pluges.



# Variable - Lead End Mill Short Bull Nose Four Flute

## NEO-CR-PHS

- Tool Material      Micro Grain Carbide
- Surface Treatment    FX Coating (TiAlN Coating)
- Tolerance for Outer Diameter     $D \leq 12$  0 ~ -0,02 mm  
12 < D 0 ~ -0,03 mm
- Helix Angle          36°/39°



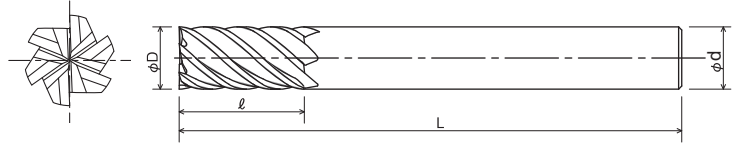
(Unit:mm)

EDP No.	D×r			L	ℓ	d	Type	Euro
8529531	3	×	R0,2	50	6	6	1	
8529533	3	×	R0,5	50	6	6	1	
8529541	4	×	R0,2	50	8	6	1	
8529543	4	×	R0,5	50	8	6	1	
8529545	4	×	R1	50	8	6	1	
8529551	5	×	R0,2	50	10	6	1	
8529553	5	×	R0,5	50	10	6	1	
8529555	5	×	R1	50	10	6	1	
8529562	6	×	R0,3	50	12	6	2	
8529563	6	×	R0,5	50	12	6	2	
8529565	6	×	R1	50	12	6	2	
8529582	8	×	R0,3	60	16	8	2	
8529583	8	×	R0,5	60	16	8	2	
8529585	8	×	R1	60	16	8	2	
8529587	8	×	R1,5	60	16	8	2	
8529589	8	×	R2	60	16	8	2	
8529602	10	×	R0,3	70	20	10	2	
8529603	10	×	R0,5	70	20	10	2	
8529605	10	×	R1	70	20	10	2	
8529607	10	×	R1,5	70	20	10	2	
8529609	10	×	R2	70	20	10	2	
8529613	10	×	R3	70	20	10	2	
8529633	12	×	R0,5	75	24	12	2	
8529635	12	×	R1	75	24	12	2	
8529637	12	×	R1,5	75	24	12	2	
8529639	12	×	R2	75	24	12	2	
8529643	12	×	R3	75	24	12	2	
8529662	16	×	R1	100	32	16	2	
8529663	16	×	R1,5	100	32	16	2	
8529664	16	×	R2	100	32	16	2	
8529665	16	×	R3	100	32	16	2	
8529682	20	×	R1	105	40	20	2	
8529684	20	×	R2	105	40	20	2	
8529685	20	×	R3	105	40	20	2	
8529686	20	×	R4	105	40	20	2	
8529687	20	×	R5	105	40	20	2	
8529702	25	×	R1	120	50	25	2	
8529704	25	×	R2	120	50	25	2	
8529705	25	×	R3	120	50	25	2	
8529706	25	×	R4	120	50	25	2	
8529707	25	×	R5	120	50	25	2	

## Variable - Lead End Mill Short Six Flute

# NEO-EMS

- Tool Material      Micro Grain Carbide
- Surface Treatment    FX Coating (TiAlN Coating)
- Tolerance for Outer Diameter    0~- 0,02 mm
- Helix Angle      37°/38°/39°

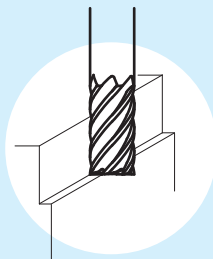


(Unit:mm)

EDP No.	D	L	l	d	Euro
8519360	6	50	12	6	
8519380	8	60	16	8	
8519400	10	70	20	10	
8519420	12	75	24	12	
8519460	16	100	32	16	
8519500	20	105	40	20	
8519550	25	120	50	25	

### Highly efficient and long-life milling even at high speeds !

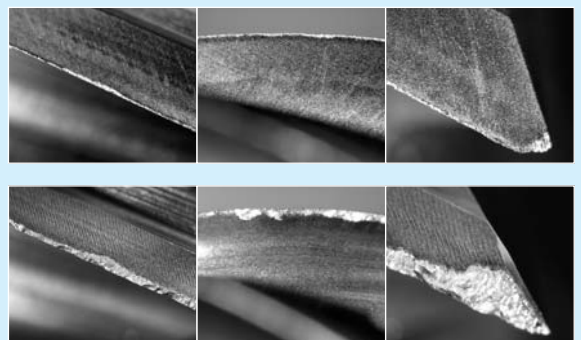
Tool	NEO-EMS dia. 10 mm
Work Material	SUS 304
Milling Method	Side milling
Milling Speed	6.370 min <sup>-1</sup> (200m/min)
Feed	1.910 mm/min (0,05 mm/t)
Milling Depth	a <sub>p</sub> =15mm (1.5D) a <sub>e</sub> =1mm (0.1D)
Coolant	Water Soluble fluid (5%)
Machine	Vertical Machining Center (BT 40)



NEO-EMS

Competitor A

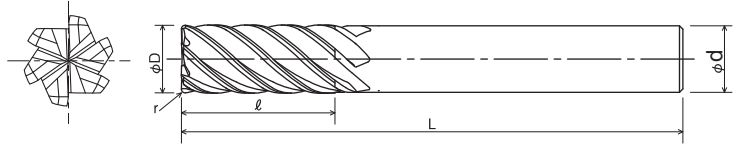
Condition of the edge after milling 112 meters



# Variable - Lead End Mill Short Bull Nose Six Flute

## NEO-CR-EMS

- Tool Material      Micro Grain Carbide
- Surface Treatment    FX Coating (TiAlN Coating)
- Tolerance for      0 ~- 0,02 mm  
Outer Diameter
- Helix Angle        37°/38°/39°



(Unit:mm)

EDP No.	D × r			L	l	d	Euro
8519662	6	×	R0,3	50	12	6	
8519663	6	×	R0,5	50	12	6	
8519665	6	×	R1	50	12	6	
8519682	8	×	R0,3	60	16	8	
8519683	8	×	R0,5	60	16	8	
8519685	8	×	R1	60	16	8	
8519687	8	×	R1,5	60	16	8	
8519689	8	×	R2	60	16	8	
8519702	10	×	R0,3	70	20	10	
8519703	10	×	R0,5	70	20	10	
8519705	10	×	R1	70	20	10	
8519707	10	×	R1,5	70	20	10	
8519709	10	×	R2	70	20	10	
8519713	10	×	R3	70	20	10	
8519733	12	×	R0,5	75	24	12	
8519735	12	×	R1	75	24	12	
8519737	12	×	R1,5	75	24	12	
8519739	12	×	R2	75	24	12	
8519743	12	×	R3	75	24	12	
8519762	16	×	R1	100	32	16	
8519763	16	×	R1,5	100	32	16	
8519764	16	×	R2	100	32	16	
8519765	16	×	R3	100	32	16	
8519782	20	×	R1	105	40	20	
8519784	20	×	R2	105	40	20	
8519785	20	×	R3	105	40	20	
8519786	20	×	R4	105	40	20	
8519787	20	×	R5	105	40	20	
8519802	25	×	R1	120	50	25	
8519804	25	×	R2	120	50	25	
8519805	25	×	R3	120	50	25	
8519806	25	×	R4	120	50	25	
8519807	25	×	R5	120	50	25	

## Recommended Milling Conditions

# NEO-PHS NEO-CR-PHS

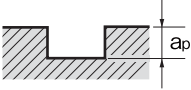
### Side Milling

WORK MATERIAL	MILD STEELS-CARBON STEELS-CAST IRON SS400-S55C-FC250 (~750N/mm <sup>2</sup> )		ALLOY STEELS-TOOL STEELS SCM-SKT-SKS-SKD (~30HRC)		HARDENED STEELS-PREHARDENED STEELS (FREE-CUTTING) SKT-SKD-NAK55-HPM1 (30~38HRC)		STAINLESS STEELS-HARDENED STEELS SUS304-SKD (38~45HRC)		HARDENED STEELS-TITANIUM ALLOY STEELS (45~55HRC)		HARDENED STEELS-HEAT RESISTANT ALLOY STEELS (55~60HRC)		HEAT RESISTANT ALLOY STEELS-INCONEL®													
	MILL DIA. (mm)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)											
3	12.500	1.100	9.550	840	8.100	625	7.650	615	7.400	545	3.200	190	3.800	220												
4	9.750	1.200	7.550	985	6.400	680	6.050	710	5.850	630	2.400	190	3.000	240												
5	7.950	1.300	6.150	1.050	5.250	725	4.950	775	4.800	670	1.900	190	2.450	245												
6	6.750	1.600	5.250	1.200	4.450	890	4.200	835	4.050	695	1.600	190	2.100	250												
8	5.050	1.550	3.950	1.100	3.350	815	3.150	810	3.050	675	1.200	175	1.600	225												
10	4.100	1.450	3.200	1.050	2.700	725	2.550	715	2.450	635	955	160	1.250	215												
12	3.400	1.400	2.650	1.000	2.250	720	2.100	675	2.050	605	795	160	1.050	210												
16	2.550	1.200	2.000	940	1.700	635	1.600	555	1.550	505	595	160	765	210												
20	2.050	985	1.600	755	1.350	590	1.250	515	1.250	460	475	160	635	200												
25	1.650	880	1.250	675	1.100	535	1.000	485	990	395	380	160	510	185												
DEPTH OF CUT							<table border="1"> <tr> <td><math>a_p</math></td> <td><math>a_e</math></td> </tr> <tr> <td><math>\leq 1.5D</math></td> <td><math>\leq 0.2D</math></td> </tr> </table>		$a_p$	$a_e$	$\leq 1.5D$	$\leq 0.2D$	<table border="1"> <tr> <td><math>a_p</math></td> <td><math>a_e</math></td> </tr> <tr> <td><math>\leq 1.5D</math></td> <td><math>\leq 0.1D</math></td> </tr> </table>		$a_p$	$a_e$	$\leq 1.5D$	$\leq 0.1D$	<table border="1"> <tr> <td><math>a_p</math></td> <td><math>a_e</math></td> </tr> <tr> <td><math>\leq 1.5D</math></td> <td><math>\leq 0.05D</math></td> </tr> </table>				$a_p$	$a_e$	$\leq 1.5D$	$\leq 0.05D$
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$a_p$	$a_e$																									
$\leq 1.5D$	$\leq 0.05D$																									

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Please use a suitable fluid with high smoke retardant properties.
4. During Dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.

# Recommended Milling Conditions

## ■ Slotting

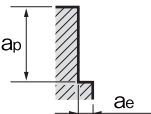
WORK MATERIAL	MILD STEELS-CARBON STEELS-CAST IRON SS400-S55C-FC250 (~750N/mm <sup>2</sup> )		ALLOY STEELS-TOOL STEELS SCM-SKT-SKS-SKD (~30HRC)		HARDENED STEELS-PREHARDENED STEELS (FREE-CUTTING) SKT-SKD-NAK55-HPM1 (30~38HRC)		STAINLESS STEELS-HARDENED STEELS SUS304-SKD (38~45HRC)		HARDENED STEELS-TITANIUM ALLOY STEELS (45~55HRC)		HARDENED STEELS-HEAT RESISTANT ALLOY STEELS (55~60HRC)		HEAT RESISTANT ALLOY STEELS-INCONEL®		
	MILL DIA. (mm)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)
3	10.500	730	8.550	680	7.850	520	7.450	460	7.200	440	2.100	110	2.500	125	
4	7.750	730	6.400	775	5.900	520	5.550	515	5.400	495	1.600	120	1.900	135	
5	6.200	735	5.100	755	4.700	545	4.450	545	4.300	535	1.250	125	1.500	145	
6	5.150	740	4.250	635	3.950	575	3.700	570	3.600	545	1.050	125	1.250	145	
8	3.850	600	3.200	550	2.950	550	2.800	525	2.700	510	795	125	945	155	
10	3.100	580	2.550	540	2.350	480	2.250	475	2.150	455	635	115	760	145	
12	2.600	560	2.150	475	1.950	460	1.850	440	1.800	435	530	115	630	145	
16	1.950	555	1.600	430	1.500	370	1.400	370	1.350	365	400	88	475	110	
20	1.550	475	1.300	380	1.200	355	1.100	330	1.100	330	320	89	380	110	
25	1.250	450	1.000	365	945	315	890	285	865	235	255	89	300	105	
DEPTH OF CUT	 $\frac{a_p}{\leq 1D}$ $a_{pMAX}=12mm$						$\frac{a_p}{\leq 0.5D}$			$\frac{a_p}{\leq 0.2D}$					

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Please use a suitable fluid with high smoke retardant properties.
4. During DRY (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.

## Recommended Milling Conditions

# NEO-EMS NEO-CR-EMS

### Side Milling

WORK MATERIAL	MILD STEELS-CARBON STEELS-CAST IRON SS400-S55C-FC250 (~750N/mm <sup>2</sup> )		ALLOY STEELS-TOOL STEELS SCM-SKT-SKS-SKD (~30HRC)		HARDENED STEELS-PREHARDENED STEELS (FREE-CUTTING) SKT-SKD-NAK55-HPM1 (30~38HRC)		STAINLESS STEELS-HARDENED STEELS SUS304-SKD (38~45HRC)		HARDENED STEELS-TITANIUM ALLOY STEELS (45~55HRC)		HEAT RESISTANT ALLOY STEELS- INCONEL®	
	MILL DIA. (mm)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )
6	7.100	2.300	5.500	1.750	4.700	1.300	4.400	1.250	4.300	1.050	2.200	360
8	5.350	2.250	4.150	1.600	3.500	1.200	3.300	1.200	3.200	1.000	1.650	330
10	4.300	2.100	3.350	1.550	2.850	1.100	2.650	1.050	2.600	925	1.350	310
12	3.600	2.000	2.800	1.500	2.350	1.050	2.250	980	2.150	875	1.100	305
16	2.700	1.750	2.100	1.350	1.750	925	1.650	805	1.600	735	835	305
20	2.150	1.450	1.650	1.100	1.400	850	1.350	745	1.300	665	670	300
25	1.700	1.300	1.350	975	1.150	775	1.050	705	1.050	575	535	265
DEPTH OF CUT					$\frac{a_p}{\leq 1.5D} \quad \frac{a_e}{\leq 0.2D}$		$\frac{a_p}{\leq 1.5D} \quad \frac{a_e}{\leq 0.1D}$		$\frac{a_p}{\leq 1.5D} \quad \frac{a_e}{\leq 0.05D}$			

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Please use a suitable fluid with high smoke retardant properties.
4. During Dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.

# Recommended Milling Conditions

## HIGH SPEED SIDE MILLING



Caution: Sparks generated during operation or heat caused by tool breakage can cause fire. Be sure to use all proper fire-prevention measures. The conditions below are for high speed / high precision machining centers.

WORK MATERIAL	MILD STEELS-CARBON STEELS-CAST IRON SS400-S55C-FC250 (~750N/mm <sup>2</sup> )		ALLOY STEELS-TOOL STEELS SCM-SKT-SKS-SKD (~30HRC)		HARDENED STEELS-PREHARDENED STEELS (FREE-CUTTING) SKT-SKD-NAK55-HPM1 (30~38HRC)		STAINLESS STEELS-HARDENED STEELS SUS304-SKD (38~45HRC)		HARDENED STEELS-TITANIUM ALLOY STEELS (45~55HRC)		HEAT RESISTANT ALLOY STEELS- INCONEL®														
	MILL DIA. (mm)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)												
6	14.000	4.750	11.000	3.550	9.150	2.650	8.600	2.500	8.350	2.100	4.300	745													
8	10.500	4.600	8.050	3.300	6.850	2.450	6.450	2.400	6.250	2.050	3.250	675													
10	8.400	3.900	6.500	3.000	5.550	2.200	5.200	2.100	5.050	1.900	2.600	640													
12	7.000	3.800	5.450	2.900	4.600	2.150	4.350	2.000	4.200	1.800	2.150	625													
16	5.250	3.550	4.100	2.800	3.450	1.900	3.250	1.650	3.150	1.500	1.650	620													
20	4.200	2.900	3.250	2.250	2.750	1.750	2.600	1.550	2.550	1.350	1.300	610													
25	3.350	2.600	2.600	2.000	2.200	1.600	2.100	1.450	2.000	1.150	1.050	550													
DEPTH OF CUT					<table border="1"> <tr> <td><math>a_p</math></td> <td><math>a_e</math></td> </tr> <tr> <td><math>\leq 1.5D</math></td> <td><math>\leq 0.05D</math></td> </tr> <tr> <td></td> <td><math>a_{eMAX}=0.5mm</math></td> </tr> </table>	$a_p$	$a_e$	$\leq 1.5D$	$\leq 0.05D$		$a_{eMAX}=0.5mm$	<table border="1"> <tr> <td><math>a_p</math></td> <td><math>a_e</math></td> </tr> <tr> <td><math>\leq 1.5D</math></td> <td><math>\leq 0.02D</math></td> </tr> <tr> <td></td> <td><math>a_{eMAX}=0.5mm</math></td> </tr> </table>	$a_p$	$a_e$	$\leq 1.5D$	$\leq 0.02D$		$a_{eMAX}=0.5mm$	<table border="1"> <tr> <td><math>a_p</math></td> <td><math>a_e</math></td> </tr> <tr> <td><math>\leq 1D</math></td> <td><math>\leq 0.02D</math></td> </tr> <tr> <td></td> <td><math>a_{eMAX}=0.5mm</math></td> </tr> </table>	$a_p$	$a_e$	$\leq 1D$	$\leq 0.02D$		$a_{eMAX}=0.5mm$
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1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Please use a suitable fluid with high smoke retardant properties.
4. During Dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.



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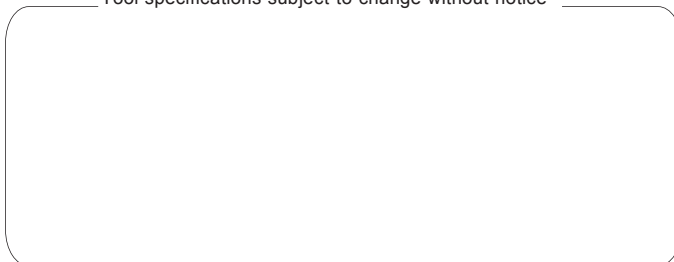
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