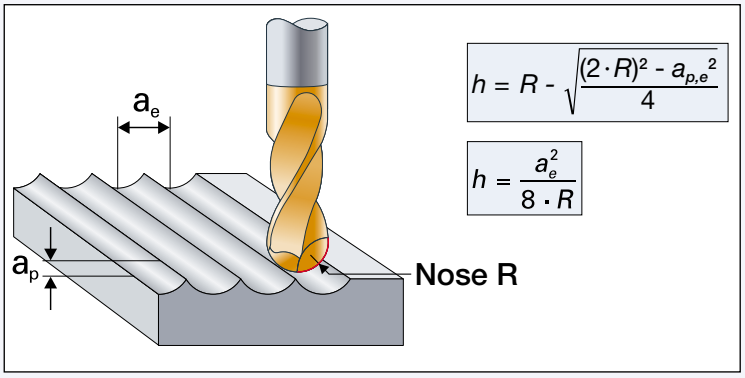
Ultra Micro Grain Solid Carbide End Mill

EPSBE | Recommended Cutting Conditions

Theoretical cusp height in end milling (µm) · Die theoretische Rautiefe in der Fräsbearbeitung (µm)
Calculo de altura de la cresta teórica en fresado (mm) · Cresta teórica de fresado (µm)
Hauteur de crête théorique en fraisage (µm)

		a_e (Pick feed) mm											
		0.005	0.01	0.015	0.02	0.03	0.04	0.05	0.075	0.1	0.15	0.2	0.3
Nose R (mm)	0.05	0.063	0.251	0.57	1.01	2.30	4.17	-	-	-	-	-	-
	0.1	0.031	0.125	0.28	0.50	1.13	2.02	3.18	-	-	-	-	-
	0.15	0.021	0.083	0.19	0.33	0.75	1.34	2.01	4.76	8.58	-	-	-
	0.2	0.016	0.063	0.14	0.25	0.56	1.00	1.57	3.55	6.35	14.60	-	-
	0.25	0.013	0.050	0.11	0.20	0.45	0.80	1.25	2.83	5.05	11.52	20.87	-
	0.3	0.011	0.042	0.09	0.17	0.38	0.67	1.04	2.35	4.20	9.53	17.18	-
	0.4	0.008	0.031	0.07	0.13	0.28	0.50	0.78	1.76	3.14	7.09	12.70	-
	0.5	0.006	0.025	0.06	0.10	0.23	0.40	0.63	1.41	2.51	5.66	10.10	-
	0.6	0.005	0.021	0.05	0.08	0.19	0.33	0.52	1.17	2.09	4.71	8.39	19.05
	0.75	0.004	0.017	0.04	0.07	0.15	0.27	0.42	0.94	1.67	3.76	6.70	15.15
	1	0.003	0.013	0.03	0.05	0.11	0.20	0.31	0.70	1.25	2.82	5.01	11.31



Feed pitch and cusp height
a_e (mm) Zeilensprung
Paso y altura de cresta
Relación Paso / Cresta
Pas et hauteur de crête

NOTE
1. Use a highly rigid and accurate machine as available.
2. The radial step over (a_e, pick feed) in the above table is for general information. Please select the conditions to suit your actual surface finish requirements, according to the cusp height stated.
3. The cutting conditions in the above table are a general guide. For your actual work piece adjust the conditions according to the machining shape, purpose and the machine tool to be used.
4. If the rpm speed available is lower, adjust the feed rate to the same ratio with the rpm.

ANMERKUNG
1. Nutzen Sie für die Bearbeitungen die Maschine mit der höchsten Genauigkeit und der höchsten Steifigkeit.
2. Der in der Tabelle angegebene Zeilensprung ist eine generelle Empfehlung. Um die jeweiligen Anforderungen an die Oberflächengüte zu erreichen wählen Sie die Bedingungen entsprechend der angegebenen Rautiefe.
3. Die in der Tabelle angegebenen Schnittbedingungen stellen eine generelle Empfehlung dar. Die Werte sollten immer an die jeweilige Bearbeitung, deren Form und die verwendete Maschine angepasst werden.
4. Sollte die Ihnen verfügbare Drehzahl niedriger als der in der Tabelle angegebene Wert sein, sollte der Vorschub im gleichen Verhältnis reduziert werden.

NOTA
1. Usate centri di lavoro più precisi e rigidi possibile.
2. Gli indicazioni sul passo laterale (a_e) espresso nella tabella sopra riportata sono valori generali. Per ottimizzare il processo di lavoro usate le relazioni cresta/raggio più vicine alle Vostre esigenze.
3. Le condizioni di taglio indicate sono valori generali. Per ottimizzare il Vostro processo di lavoro analizzate i parametri in funzione delle geometrie che dovete generare e del centro di lavoro a disposizione.
4. Se i giri del mandrino della macchina disponibili sono più bassi rispetto al valore espresso regolate l´avanzamento con lo stesso rapporto.

OBSERVACIONES
1. Utilizar la máquina más rígida y precisa posible.
2. El paso radial (a_e, paso) de la tabla es una información general. Hay que utilizar el paso adecuado en función del acabado superficial que se pretenda obtener según la rugosidad máxima prevista (Altura de cresta).
3. Las condiciones de corte de la tabla son una orientación general. Para un trabajo específico hay que ajustar las condiciones en función de la geometría de la pieza, el resultado esperado y el tipo de máquina que vamos a utilizar.
4. Si las rpm de la maquina son inferiores, hay que ajustar el avance en proporción a las mismas.

NOTE
1. Utiliser une machine aussi fiable et rigide que possible .
2. SVP choisissez vos conditions en fonction de l'état de surface requis .
3. Les conditions de coupe du tableau sont indicatives. Pour votre application, ajuster cette base en fonction de votre machine .
4. Si le nombre de tours est insuffisant ajuster les avances dans la même proportion que la rotation disponible .

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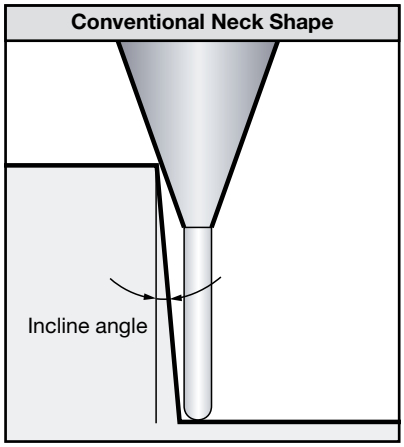
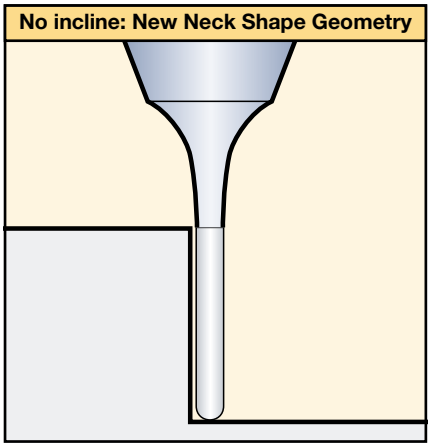
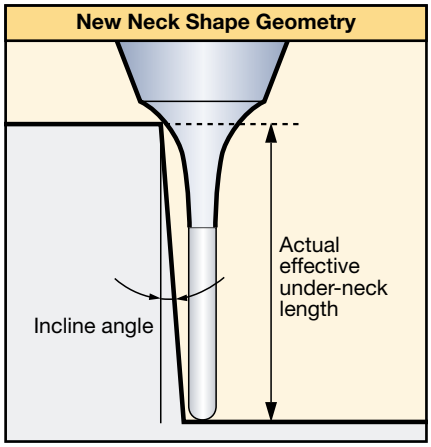
EPSBE | Recommended Cutting Conditions

Workpiece Material			Tool Steels (35 ~ 45HRC)						Hardened Steels (45 ~ 55HRC)						Hardened Steels (55 ~ 65HRC)					
R	ØD	l_n	V_c m/min	n min^{-1}	f_z mm/t	V_f mm/min	a_p mm	a_e mm	V_c m/min	n min^{-1}	f_z mm/t	V_f mm/min	a_p mm	a_e mm	V_c m/min	n min^{-1}	f_z mm/t	V_f mm/min	a_p mm	a_e mm
0.05	0.1	0.15	20	59,500	0.012	1,430	0.003	0.010	20	54,100	0.010	1,080	0.003	0.009	20	51,400	0.009	930	0.003	0.008
		0.3	20	59,500	0.011	1,290	0.002	0.007	20	50,000	0.009	900	0.002	0.006	20	51,400	0.008	830	0.002	0.005
		0.75	10	35,700	0.010	690	0.001	0.003	10	32,500	0.008	520	0.001	0.003	10	30,800	0.007	440	0.001	0.003
0.1	0.2	0.3	30	55,400	0.018	1,990	0.009	0.026	30	50,400	0.015	1,510	0.008	0.024	30	47,900	0.014	1,290	0.007	0.022
		0.6	30	55,400	0.018	1,990	0.007	0.020	30	50,400	0.015	1,510	0.006	0.018	30	47,900	0.014	1,290	0.005	0.016
		1	30	41,600	0.016	1,300	0.006	0.017	20	37,800	0.013	980	0.005	0.015	20	35,900	0.012	840	0.005	0.014
		1.5	20	33,300	0.016	1,040	0.003	0.010	20	30,200	0.013	790	0.003	0.009	20	28,700	0.012	670	0.003	0.008
		2	20	33,300	0.014	960	0.002	0.007	20	30,200	0.012	720	0.002	0.006	20	28,700	0.011	620	0.002	0.005
0.15	0.3	0.45	50	50,600	0.019	1,940	0.013	0.040	40	46,000	0.016	1,470	0.012	0.036	40	43,700	0.014	1,260	0.011	0.032
		0.9	50	50,600	0.019	1,940	0.010	0.030	40	46,000	0.016	1,470	0.009	0.027	40	43,700	0.014	1,260	0.008	0.024
		1.5	40	37,900	0.017	1,270	0.007	0.020	30	34,500	0.014	970	0.006	0.018	30	32,800	0.013	830	0.005	0.016
		2	30	30,300	0.017	1,020	0.006	0.017	30	27,600	0.014	770	0.005	0.015	20	26,200	0.013	660	0.005	0.014
		3	30	30,300	0.016	950	0.003	0.010	30	27,600	0.013	720	0.003	0.009	20	26,200	0.012	610	0.003	0.008
0.2	0.4	0.6	60	43,800	0.024	2,100	0.018	0.053	50	39,800	0.020	1,590	0.016	0.048	50	37,800	0.018	1,360	0.014	0.043
		1.2	60	43,800	0.024	2,100	0.013	0.040	50	39,800	0.020	1,590	0.012	0.036	50	37,800	0.018	1,360	0.011	0.032
		2	40	35,000	0.022	1,510	0.010	0.030	40	31,800	0.018	1,140	0.009	0.027	40	30,200	0.016	980	0.008	0.024
		3	40	28,000	0.022	1,210	0.007	0.020	30	25,500	0.018	920	0.006	0.018	30	24,200	0.016	780	0.005	0.016
		3.5	40	28,000	0.022	1,210	0.006	0.017	30	25,500	0.018	920	0.005	0.015	30	24,200	0.016	780	0.005	0.014
		4	40	28,000	0.019	1,080	0.004	0.013	30	25,500	0.016	820	0.004	0.012	30	24,200	0.014	700	0.004	0.011
0.25	0.5	0.75	60	37,300	0.026	1,970	0.022	0.066	50	34,000	0.022	1,500	0.020	0.060	50	32,300	0.020	1,280	0.018	0.054
		1.5	60	37,300	0.026	1,970	0.018	0.053	50	34,000	0.022	1,500	0.016	0.048	50	32,300	0.020	1,280	0.014	0.043
		3	40	28,000	0.024	1,340	0.011	0.033	40	25,500	0.020	1,020	0.010	0.030	40	24,200	0.018	870	0.009	0.027
		5	40	23,100	0.022	1,000	0.006	0.017	30	21,000	0.018	760	0.005	0.015	30	20,000	0.016	650	0.005	0.014
0.3	0.6	0.9	70	35,000	0.030	2,100	0.033	0.099	60	31,800	0.025	1,590	0.030	0.090	60	30,200	0.023	1,360	0.027	0.081
		1.8	70	35,000	0.030	2,100	0.026	0.079	60	31,800	0.025	1,590	0.024	0.072	60	30,200	0.023	1,360	0.022	0.065
		3	50	27,000	0.028	1,490	0.019	0.056	50	24,500	0.023	1,130	0.017	0.051	40	23,300	0.021	960	0.015	0.046
		5	40	22,200	0.028	1,230	0.012	0.036	40	20,200	0.023	930	0.011	0.033	40	19,200	0.021	790	0.010	0.030
		6	40	22,200	0.025	1,120	0.008	0.023	40	20,200	0.021	850	0.007	0.021	40	19,200	0.019	730	0.006	0.019
0.4	0.8	1.2	70	29,200	0.034	1,960	0.044	0.132	70	26,500	0.028	1,480	0.040	0.120	60	25,200	0.025	1,270	0.036	0.108
		2.4	70	29,200	0.034	1,960	0.035	0.106	70	26,500	0.028	1,480	0.032	0.096	60	25,200	0.025	1,270	0.029	0.086
0.5	1	1.5	90	28,600	0.043	2,470	0.055	0.165	80	26,000	0.036	1,870	0.050	0.150	80	24,700	0.032	1,600	0.045	0.135
		3	90	28,600	0.043	2,470	0.044	0.132	80	26,000	0.036	1,870	0.040	0.120	80	24,700	0.032	1,600	0.036	0.108
		6	70	22,300	0.043	1,920	0.028	0.083	60	20,300	0.036	1,460	0.025	0.075	60	19,300	0.032	1,250	0.023	0.068
		8	60	19,300	0.042	1,630	0.022	0.066	50	17,500	0.035	1,230	0.020	0.060	50	16,600	0.032	1,050	0.018	0.054
		10	60	19,300	0.040	1,540	0.014	0.043	50	17,500	0.033	1,160	0.013	0.039	50	16,600	0.030	990	0.012	0.035
0.6	1.2	1.8	100	25,300	0.052	2,630	0.066	0.198	90	23,000	0.043	1,990	0.060	0.180	80	21,800	0.039	1,700	0.054	0.162
		3.6	100	25,300	0.052	2,630	0.053	0.158	90	23,000	0.043	1,990	0.048	0.144	80	21,800	0.039	1,700	0.043	0.130
0.75	1.5	2.25	100	21,400	0.065	2,780	0.083	0.248	90	19,500	0.054	2,110	0.075	0.225	90	18,500	0.049	1,800	0.068	0.203
		4.5	100	21,400	0.065	2,780	0.066	0.198	90	19,500	0.054	2,110	0.060	0.180	90	18,500	0.049	1,800	0.054	0.162
		8	90	18,300	0.061	2,240	0.046	0.139	80	16,700	0.051	1,700	0.042	0.126	70	15,800	0.046	1,450	0.038	0.113
		12	80	16,600	0.058	1,910	0.033	0.099	70	15,100	0.048	1,450	0.030	0.090	70	14,400	0.043	1,240	0.027	0.081
1	2	3	120	18,400	0.086	3,170	0.099	0.297	100	16,700	0.072	2,400	0.090	0.270	100	15,900	0.065	2,060	0.081	0.243
		6	120	18,400	0.086	3,170	0.079	0.238	100	16,700	0.072	2,400	0.072	0.216	100	15,900	0.065	2,060	0.065	0.194
		8	120	18,400	0.086	3,170	0.072	0.215	100	16,700	0.072	2,400	0.065	0.195	100	15,900	0.065	2,060	0.059	0.176
		12	100	15,300	0.077	2,350	0.050	0.149	90	13,900	0.064	1,780	0.045	0.135	80	13,200	0.058	1,520	0.041	0.122
		16	90	14,600	0.072	2,110	0.035	0.106	80	13,300	0.060	1,600	0.032	0.096	80	12,600	0.054	1,360	0.029	0.086
		20	80	13,500	0.072	1,950	0.024	0.073	80	12,300	0.060	1,480	0.022	0.066	70	11,600	0.054	1,260	0.020	0.059







Ultra Micro Grain Solid Carbide End Mill

EPSBE | Recommended Cutting Conditions

Hardened Steels, Powder Steels (65 ~ 68HRC)						Hardened Steels, Powder Steels (68 ~ 72HRC)						Workpiece Material		
V_c m/min	n min^{-1}	f_z mm/t	V_f mm/min	a_p mm	a_e mm	V_c m/min	n min^{-1}	f_z mm/t	V_f mm/min	a_p mm	a_e mm	R	ØD	l_n
20	54,100	0.010	1,080	0.003	0.009	20	51,400	0.009	930	0.003	0.008			0.15
20	50,000	0.009	900	0.002	0.006	20	51,400	0.008	830	0.002	0.005	0.05	0.1	0.3
10	32,500	0.008	520	0.001	0.003	10	30,800	0.007	440	0.001	0.003			0.75
30	50,400	0.015	1,510	0.008	0.024	30	47,900	0.014	1,290	0.007	0.022			0.3
30	50,400	0.015	1,510	0.006	0.018	30	47,900	0.014	1,290	0.005	0.016			0.6
20	37,800	0.013	980	0.005	0.015	20	35,900	0.012	840	0.005	0.014	0.1	0.2	1
20	30,200	0.013	790	0.003	0.009	20	28,700	0.012	670	0.003	0.008			1.5
20	30,200	0.012	720	0.002	0.006	20	28,700	0.011	620	0.002	0.005			2
40	46,000	0.016	1,470	0.012	0.036	40	43,700	0.014	1,260	0.011	0.032			0.45
40	46,000	0.016	1,470	0.009	0.027	40	43,700	0.014	1,260	0.008	0.024			0.9
30	34,500	0.014	970	0.006	0.018	30	32,800	0.013	830	0.005	0.016	0.15	0.3	1.5
30	27,600	0.014	770	0.005	0.015	20	26,200	0.013	660	0.005	0.014			2
30	27,600	0.013	720	0.003	0.009	20	26,200	0.012	610	0.003	0.008			3
50	39,800	0.020	1,590	0.016	0.048	50	37,800	0.018	1,360	0.014	0.043			0.6
50	39,800	0.020	1,590	0.012	0.036	50	37,800	0.018	1,360	0.011	0.032			1.2
40	31,800	0.018	1,140	0.009	0.027	40	30,200	0.016	980	0.008	0.024	0.2	0.4	2
30	25,500	0.018	920	0.006	0.018	30	24,200	0.016	780	0.005	0.016			3
30	25,500	0.018	920	0.005	0.015	30	24,200	0.016	780	0.005	0.014			3.5
30	25,500	0.016	820	0.004	0.012	30	24,200	0.014	700	0.004	0.011			4
50	34,000	0.022	1,500	0.020	0.060	50	32,300	0.020	1,280	0.018	0.054			0.75
50	34,000	0.022	1,500	0.016	0.048	50	32,300	0.020	1,280	0.014	0.043	0.25	0.5	1.5
40	25,500	0.020	1,020	0.010	0.030	40	24,200	0.018	870	0.009	0.027			3
30	21,000	0.018	760	0.005	0.015	30	20,000	0.016	650	0.005	0.014			5
60	31,800	0.025	1,590	0.030	0.090	60	30,200	0.023	1,360	0.027	0.081			0.9
60	31,800	0.025	1,590	0.024	0.072	60	30,200	0.023	1,360	0.022	0.065			1.8
50	24,500	0.023	1,130	0.017	0.051	40	23,300	0.021	960	0.015	0.046	0.3	0.6	3
40	20,200	0.023	930	0.011	0.033	40	19,200	0.021	790	0.010	0.030			5
40	20,200	0.021	850	0.007	0.021	40	19,200	0.019	730	0.006	0.019			6
70	26,500	0.028	1,480	0.040	0.120	60	25,200	0.025	1,270	0.036	0.108	0.4	0.8	1.2
70	26,500	0.028	1,480	0.032	0.096	60	25,200	0.025	1,270	0.029	0.086			2.4
80	26,000	0.036	1,870	0.050	0.150	80	24,700	0.032	1,600	0.045	0.135			1.5
80	26,000	0.036	1,870	0.040	0.120	80	24,700	0.032	1,600	0.036	0.108			3
60	20,300	0.036	1,460	0.025	0.075	60	19,300	0.032	1,250	0.023	0.068	0.5	1	6
50	17,500	0.035	1,230	0.020	0.060	50	16,600	0.032	1,050	0.018	0.054			8
50	17,500	0.033	1,160	0.013	0.039	50	16,600	0.030	990	0.012	0.035			10
90	23,000	0.043	1,990	0.060	0.180	80	21,800	0.039	1,700	0.054	0.162	0.6	1.2	1.8
90	23,000	0.043	1,990	0.048	0.144	80	21,800	0.039	1,700	0.043	0.130			3.6
90	19,500	0.054	2,110	0.075	0.225	90	18,500	0.049	1,800	0.068	0.203			2.25
90	19,500	0.054	2,110	0.060	0.180	90	18,500	0.049	1,800	0.054	0.162	0.75	1.5	4.5
80	16,700	0.051	1,700	0.042	0.126	70	15,800	0.046	1,450	0.038	0.113			8
70	15,100	0.048	1,450	0.030	0.090	70	14,400	0.043	1,240	0.027	0.081			12
100	16,700	0.072	2,400	0.090	0.270	100	15,900	0.065	2,060	0.081	0.243			3
100	16,700	0.072	2,400	0.072	0.216	100	15,900	0.065	2,060	0.065	0.194			6
100	16,700	0.072	2,400	0.065	0.195	100	15,900	0.065	2,060	0.059	0.176	1	2	8
90	13,900	0.064	1,780	0.045	0.135	80	13,200	0.058	1,520	0.041	0.122			12
80	13,300	0.060	1,600	0.032	0.096	80	12,600	0.054	1,360	0.029	0.086			16
80	12,300	0.060	1,480	0.022	0.066	70	11,600	0.054	1,260	0.020	0.059			20