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SWISS  QUALITY

# **URMA** Technology & Inserts



Order Number	r	a <sub>p</sub> mm	Range di applicazione ISO <sup>1)</sup> ISO Application Range <sup>1)</sup>						Condizioni di taglio Cutting Condition			F	M	R	E <sup>2)</sup> ≥ 5
			P	M	K	N	S	H	facile easy	medio medium	difficile difficult				
			▲	■	■	■	■	▲	○	○	○				
 CPGT 060201-FX UT150	0.1	0.05 - 0.2	▲	■	■	■	■	▲				▲			▲
CPGT 060201-FX UT200	0.1	0.05 - 0.2	▲	■	■	■	■	▲				▲			▲
CPGT 060201-FX UC360	0.1	0.05 - 0.2	▲	▲	■	■	■	▲	▲	▲	▲	▲	■	▲	▲
CPGT 060202-FX UT150	0.2	0.05 - 0.2	▲	■	■	■	■	▲				▲			▲
CPGT 060202-FX UT200	0.2	0.05 - 0.2	▲	■	■	■	■	▲				▲			▲
CPGT 060202-FX UC360	0.2	0.05 - 0.2	▲	▲	■	■	■	▲	▲	▲	▲	▲	■	▲	▲
CPGT 060204-FX UT150	0.4	0.1 - 0.4	▲	■	■	■	■	▲				▲			▲
CPGT 060204-FX UC360	0.4	0.1 - 0.4	▲	▲	■	■	■	▲	▲	▲	▲	▲	■	▲	▲
 CPMW 060202-SF UMB10	0.2	0.1 - 0.3	▲	■	▲	■	▲	▲	▲	▲	▲	▲	□	□	□
CPMW 060202-SF UMB20	0.2	0.1 - 0.3	▲	■	□	■	■	▲	▲	▲	▲	▲			□
CPMW 060202-SF UMD01	0.2	0.1 - 0.3	▲	■	■	▲	■	▲	▲	▲	▲	▲			□
CPMW 060204-SF UMB10	0.4	0.03 - 0.2	▲	■	▲	■	▲	▲	▲	▲	▲	▲	□	□	□
CPMW 060204-SF UMB20	0.4	0.03 - 0.2	▲	■	□	■	■	▲	▲	▲	▲	▲			□
CPMW 060204-SF UMD01	0.4	0.1 - 0.3	▲	■	■	▲	■	▲	▲	▲	▲	▲			□
 DCMT 070204-MFU UC250	0.4	0.1 - 0.8	▲	■	■	■	■	■	■	▲	▲	■	▲	■	■
DCMT 11T304-MFU UC250	0.4	0.1 - 0.8	▲	■	■	■	■	■	■	■	▲	■	▲	■	■
 SCMT 060204-MR UMC35	0.4	1 - 3	▲	■	■	■	■	■	■	■	▲	■	▲	■	■
SCMT 09T304-MR UMC35	0.4	1 - 3.5	▲	■	■	■	■	■	■	■	■	▲	▲	■	■
 WCGT 020102-FX UC500	0.2	0.05 - 0.2	▲	▲	■	■	■	▲	▲	□	▲	▲		▲	▲
WCGT 020104-FX UC500	0.4	0.05 - 0.2	▲	▲	■	■	■	▲	▲	□	▲	▲	□	▲	□
 WCGT 020102-FY UT150	0.2	0.05 - 0.2	▲	■	■	■	■	▲	▲	□	▲	▲		▲	▲
WCGT 020104-FY UT150	0.4	0.05 - 0.2	▲	■	■	■	■	▲	▲	□	▲	▲	□	▲	□
 WCGW 020102-SF UMD01	0.2	0.1 - 0.3	▲	■	■	▲	■	▲	▲		▲	▲		▲	□
WCGW 020102-SF UMB20	0.2	0.02 - 0.3	▲	■	□	■	■	▲	▲	■	▲	▲	□	▲	□
WCGW 020104-SF UMB20	0.4	0.03 - 0.15	▲	■	□	■	■	▲	▲	▲	▲	▲	□	▲	□

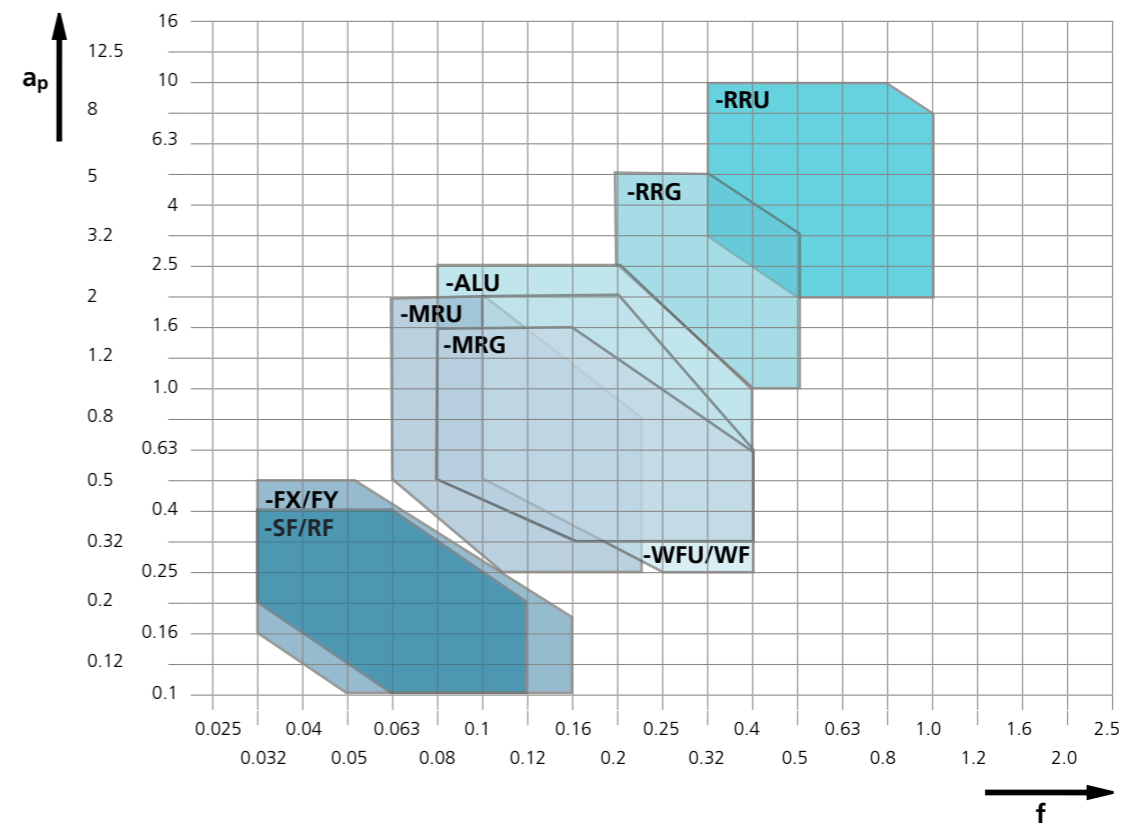
- ▲ Il più adatto
- Miglior alternativa
- Parzialmente adatto

- F Finitura
- M Semi-Sgrossatura
- R Sgrossatura
- <sup>1)</sup> vedi pagina 16
- <sup>2)</sup> E vedi pagina 8

- ▲ most suitable
- best alternative
- conditionally suitable

- F finishing
- M semi roughing
- R roughing
- <sup>1)</sup> see page 16
- <sup>2)</sup> E see page 8

### Geometrie Rompitruciolo Chipbreaker Styles



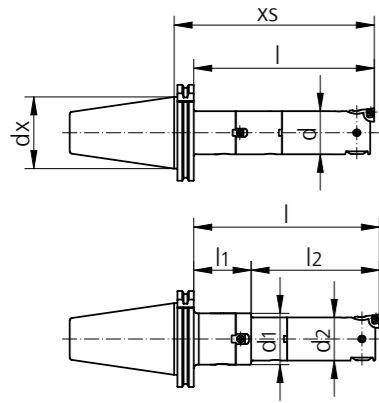


## Rapporto E

Ratio E

Il Rapporto E è un valore ottenuto dalla lunghezza totale del bareno diviso il suo diametro

Ratio E is a number obtained from the length of the boring bar and its diameter



Con la costante Ø d  
with constant d

$$E = \frac{l}{d}$$

**Importante:** se  $d_x \leq d$  allora  $E = \frac{x_s}{d_x}$  (ISO 40 :  $d_x = 44,45$   
Important: if  $d_x \leq d$  then  $E = \frac{x_s}{d_x}$  (ISO 50 :  $d_x = 69,85$ )

combinando  $d_1$  e  $d_2$   
with combined  $d_1$  and  $d_2$

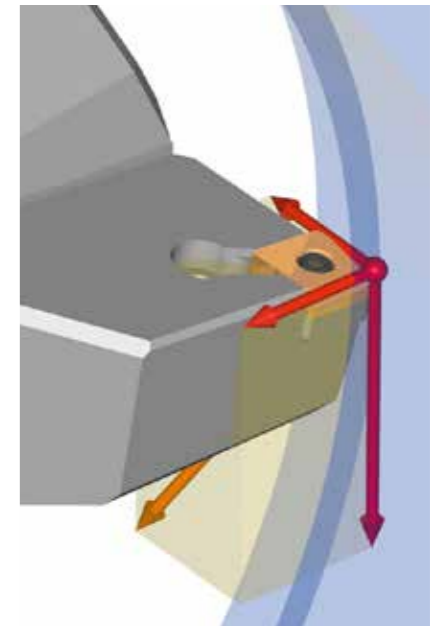
$$E = \frac{l}{d} \quad d = \frac{d_1 + d_2}{2}$$

Per calcolare E, il diametro medio d viene calcolato approssimativamente uguale a  $l_1$  e  $l_2$   
to calculate E, the mean diameter d is calculated with approximately  $l_1$  and  $l_2$

## Definizioni e formule di base

Definitions and Basic Formula

Designazione	Designation	
<b>a<sub>p</sub></b> Profondità di taglio	depth of cut	mm
<b>n</b> Velocità	speed	min <sup>-1</sup>
<b>d</b> Diametro del foro	bore diameter	mm
<b>v<sub>c</sub></b> Velocità di taglio	cutting speed	m/min
<b>v<sub>f</sub></b> Velocità di Avanzamento	feed rate	mm/min
<b>f</b> Avanzamento al Giro	feed per revolution	mm
<b>f<sub>z</sub></b> Avanzamento per singolo tagliente	feed per cutter	mm
<b>z</b> Numero di taglienti	number of cutters	
<b>k<sub>c</sub></b> Forza di taglio specifica	specific cutting force	N/mm <sup>2</sup>
<b>F<sub>c</sub></b> Forza di taglio	cutting force	N
<b>F<sub>f</sub></b> Forza di Avanzamento	feed force	N
<b>F<sub>p</sub></b> Forza passiva	passive force	
<b>r</b> Raggio Torico del Tagliente	apex radius of the cutter apex	mm
<b>l<sub>f</sub></b> Lunghezza di avanzamento	feed distance	mm
<b>M<sub>d</sub></b> Momento torcente	torque	Nm
<b>P<sub>c</sub></b> Potenza richiesta	required drive power	kW
<b>R<sub>a</sub></b> Valore medio aritmetico degli scostamenti	arithmetic centre line average value	µm
<b>R<sub>t</sub></b> Rugosità Massima	peak-to-valley height	µm
<b>R<sub>z</sub></b> Media Rugosità Massima	average peak-to-valley height	µm
<b>R<sub>m</sub></b> Resistenza alla trazione	tensile strength	N/mm <sup>2</sup>
<b>t<sub>c</sub></b> Tempo medio per pezzo	cutting time per workpiece	min
<b>T</b> Durata Vita Utensile	tool life	min
<b>γ</b> Angolo di Spoglia	cutting angle	°
<b>ε</b> Sommità dell'angolo	apex angle	°
<b>η</b> Efficienza	efficiency	-



**Velocità di Taglio**  
Cutting Speed

$$v_c = \frac{\pi \cdot d \cdot n}{1000}$$

**Forza di taglio per tagliente**  
Cutting Force (per Cutter)

$$F_c = a_p \cdot f_z \cdot k_c$$

**Velocità**  
Speed

$$n = \frac{v_c \cdot 1000}{\pi \cdot d}$$

**Momento torcente**  
Torque

$$M_d = \frac{(D^2 - d^2) \cdot f \cdot k_c}{8 \cdot 10^3}$$

**Avanzamento/min**  
Feed/min

$$v_f = f \cdot n$$

$$v_f = f_z \cdot z \cdot n$$

**Volume di taglio**  
Cutting Volume

$$V = v_c \cdot f \cdot a_p$$

**Potenza richiesta**  
Required Power

$$P_c = \frac{a_p \cdot f_z \cdot k_c \cdot v_c \cdot z}{60 \cdot 10^3 \cdot \eta}$$

**Tempo di Lavorazione**  
Machining Time

$$t_c = \frac{l_f}{f \cdot n}$$

## Potenza Richiesta

### Power Requirement

#### kc - valori per il calcolo del fabbisogno di potenza

k<sub>c</sub> Values for Calculating the Power Requirement

UC	DIN	Number	Rm N/mm <sup>2</sup>	HB	Forza specifica di taglio k <sub>c</sub> (N/mm <sup>2</sup> ) per l'avanzamento f <sub>z</sub> Specific cutting force k <sub>c</sub> (N/mm <sup>2</sup> ) for a feed rate f <sub>z</sub>						
					0.1	0.2	0.25	0.4	0.5	0.63	0.8
1	RSt-37	1.0038	> 500	160	2230	1840	1740	1540	1450	1360	1280
1	St50-2	1.0050	520	170	2540	2090	1970	1740	1650	1550	1460
2	St60-2	1.0060	620	180	2570	2140	2010	1780	1680	1580	1490
2	Ck 45	1.1191	670	180	2430	2040	1900	1660	1550	1440	1340
3	16 MnCr 5	1.7131	550	170	2460	2060	1930	1670	1560	1460	1360
3	42 CrMo 4	1.7225	730	240	2400	2030	1910	1670	1590	1500	1410
3	34 CrNiMo V6	1.6582	1010	280	2350	1990	1870	1630	1530	1430	1330
3	50 Cr V4	1.8159	1050	210	2450	2050	1930	1690	1590	1490	1390
4	100 Cr 6	1.2067		55 HRC	5060	3760	3670	3510	3430	3350	3270
5	X 5 CrNi 18 9	1.4301	640	150	3410	2350	2260	2080	1980	1900	1820
6	GG 15	0.6015		150	1450	1330	1270	1150	1100	1050	1000
6	GG 20	0.6020		180	1890	1530	1440	1280	1210	1150	1080
6	GGG 50	0.7050		195	2180	1710	1600	1390	1290	1210	1130
7	Al Mg Si 0.5 F22	3.3206.71	260	90	780	680	650	590	570	540	520

I valori sono applicabili quando la geometria del rompitrucciolo è adatta al materiale utilizzato.

The values are applicable when the chip-breaker style geometry is suitable for the particular material is used.

Esempio		Example	
Ø del foro	39 mm	Bore Diameter	Ø 39 mm
Materiale	Ck 45 (1.1191)	Material	Ck 45 (1.1191)
a <sub>p</sub>	3 mm	a <sub>p</sub>	3 mm
f	0,4 mm/U (0,2 mm/taglio)	f	0,4 mm/U (0,2 mm/cutter)
v <sub>c</sub>	170 m/min	v <sub>c</sub>	170 m/min
z	2	z	2

Per k<sub>c</sub>, la tabella mostra il valore di 2040 N/mm<sup>2</sup> con un avanzamento (che corrisponde all'avanzamento ad un angolo di contatto di 90°) di 0,2mm. I valori per la velocità di taglio, avanzamento e profondità di taglio sono stati presi dalla Tabella dei valori guida. Il rendimento totale della macchina si presuppone essere 0,8.

For k<sub>c</sub>, the table shows the value 2040 N/mm<sup>2</sup> at a feed rate (which corresponds to the feed at a contact angle of 90°) of 0,2 mm. The values for cutting speed, feed and depth of cut were taken from the table of guide values. The total efficiency of the machine is assumed to be 0,8.

#### Sgrossatura sfalsata Offset Offset Roughing

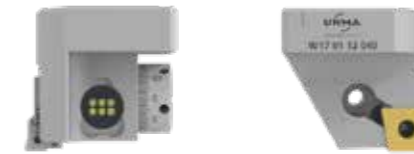
$$P_c = \frac{a_p \cdot f \cdot v_c \cdot k_c}{60 \cdot 10^3 \cdot \eta}$$

#### Sgrossatura con testina doppio tagliente Rough Machining with Double Cutter Head

$$P_c = \frac{a_p \cdot f_z \cdot v_c \cdot k_c \cdot z}{60 \cdot 10^3 \cdot \eta} \quad P_c = \frac{3 \cdot 0,2 \cdot 2040 \cdot 170 \cdot 2}{60 \cdot 10^3 \cdot 0,8} \quad P_c = 8,7 \text{ kW}$$

## Schnittdaten-Empfehlung für RFP

### Cutting Data Recommendation for RFP



Material	UC	Ø	Wiper <sup>1) 2)</sup>	F   Order Number	R   Order Number	a <sub>p</sub> (F) mm	a <sub>p</sub> (R) mm	v <sub>c</sub> m/min	Ra = 0,8 - 1,4 f = f <sub>z</sub> <sup>1)</sup> mm/rev
Acciaio al Carbonio Carbon Steel	2	49 - 88	■	CCMT 060204-WF UMC15	CCMT 09T304-MRU UC250	0,1 - 0,5	1-2	200 - 300	0,20
			■	CCMT 060208-MRU UC250	CCMT 09T304-MRU UC250	0,1 - 0,5	1-2	200 - 300	0,12
		87 - 297	■	CCMT 060204-WF UMC15	CNMG 120404-MRG UC250	0,1 - 0,5	1-2,5	200 - 300	0,20
			■	CCMT 060208-MRU UC250	CNMG 120404-MRG UC250	0,1 - 0,5	1-2,5	200 - 300	0,15
Acciaio per utensili Tool Steel	3	49 - 88	■	CCMT 060204-WF UMC15	CCMT 09T304-MRU UC250	0,1 - 0,5	1-2	140 - 250	0,20
			■	CCMT 060208-MRU UC250	CCMT 09T304-MRU UC250	0,1 - 0,5	1-2	140 - 250	0,12
		87 - 297	■	CCMT 060204-WF UMC15	CNMG 120404-MRG UC250	0,1 - 0,5	1-2	140 - 250	0,20
			■	CCMT 060208-MRU UC250	CNMG 120404-MRG UC250	0,1 - 0,5	1-2	140 - 250	0,15
Acciaio Inossidabile Stainless Steel	5	49 - 88	■	CCMT 09T308-WFU UC250	CNMG 120404-MRG UC250	0,1 - 0,5	1-2,5	140 - 250	0,24
			■	CCMT 09T308-MRU UC250	CNMG 120404-MRG UC250	0,1 - 0,5	1-2,5	140 - 250	0,15
		87 - 297	■	CCMT 060204-WF UMC15	CCMT 09T304-MRU UC350	0,1 - 0,5	1-2	80 - 200	0,12
			■	CCMT 060208-MFU UC300	CCMT 09T304-MRU UC350	0,1 - 0,5	1-2	80 - 200	0,20
Ghisa Cast Iron	6	49 - 88	■	CCMT 060204-WF UMC15	CCMT 09T304-MRU UC350	0,1 - 0,5	1-2	80 - 200	0,20
			■	CCMT 060208-MFU UC300	CCMT 09T304-MRU UC350	0,1 - 0,5	1-2	80 - 200	0,15
		87 - 297	■	CCMT 060204-WF UMC15	CNMG 120404-MRG UC300	0,1 - 0,5	1-2,5	80 - 200	0,20
			■	CCMT 060208-MRU UC250	CNMG 120404-MRG UC300	0,1 - 0,5	1-2,5	80 - 200	0,15
Alluminio Aluminium	7	49 - 88	■	CCMT 09T308-MFU UC300	CNMG 120404-MRG UC300	0,1 - 0,5	1-2,5	80 - 200	0,15
			■	CCMT 09T308-MRU UC250	CNMG 120404-MRG UC300	0,1 - 0,5	1-2,5	80 - 200	0,12
		87 - 297	■	CCMT 060208-WF UMC15	CCMT 09T304-MRU UC250	0,1 - 0,5	1-2,5	150 - 250	0,24
			■	CCMT 060208-MRU UC250	CCMT 09T304-MRU UC250	0,1 - 0,5	1-2,5	150 - 250	0,12
Alluminio Aluminium	7	87 - 297	■	CCMT 060208-WF UMC15	CNMG 120408-MRG UC250	0,1 - 0,8	1-3	150 - 250	0,24
			■	CCMT 060208-MRU UC250	CNMG 120408-MRG UC250	0,1 - 0,8	1-3	150 - 250	0,15
		150 - 2'400	■	CCMT 09T308-WFU UC250	CNMG 120408-MRG UC250	0,1 - 0,5	1-3	150 - 250	0,24
			■	CCMT 09T308-MRU UC250	CNMG 120408-MRG UC250	0,1 - 0,5	1-3	150 - 250	0,15
Alluminio Aluminium	7	49 - 88	■	CCGT 0602004-ALU UW100	CCGT 09T304-ALU UW100	0,1 - 0,5	1-2,5	250 - 600	0,12
			■	CCGT 0602004-ALU UW100	CNMG 120408-MRG UC250	0,1 - 0,8	1-3,5	250 - 600	0,15
		105 - 2'400**	■	CCMT 09T308-ALU UW100	CNMG 120408-MRG UC250	0,1 - 0,5	1-3,5	250 - 600	0,15

\*\* su richiesta  
on request

#### NOTE

- 1) Descrizione WIPER pagina 49\*  
2) Usa il portainseriti WW20... per inserti WIPER a pagina 55\*  
R Inserto Sgrossatura  
F Inserto di finitura  
UC Codice materiale URMA

- 1) description Wiper page 49\*  
2) use insertholders WW20... for Wiper inserts page 55\*  
R roughing insert  
F finishing insert  
UC URMA material code

- Portainseriti e testine per barenatura di precisione a pagina 54 / 55\*
- RFP è adatto anche per Sistema MegaMax (da pagina 69\*)
- Il processo RFP può mostrare scarsi risultati in condizioni di lavoro instabili, in configurazioni estreme lunghezza/diametro e tagli interrotti
- Le cartucce portainseriti per finitura hanno estensione regolabile (vedi pagina 55\*)
- RFP è adatto anche per le lavorazioni OD (vedi pagina 63\*)

#### Notes

- Insert holders and fine boring heads on page 54 / 55\*
- RFP is also suitable for the MegaMax system (from page 69\*)
- RFP process can show poor results under unstable working conditions, under extreme length/diameter ratio tool setups and cutting interruptions
- Fine boring insert holders are length adjustable (see page 55\*)
- RFP is also suitable for OD machining (see page 63\*)

\* vedi «URMA Systems»  
see «URMA Systems»

**Dati di taglio raccomandati per la finitura (con testine micrometriche)**

Recommended Cutting Data for Finishing (with Fine Boring Heads)

UC	Ø 0.3 - 6 mm					Ø 5.8 - 11 mm					Ø 8.8 - 22.5 mm				
	1°scelta	1. Choice	a <sub>p</sub> max	V <sub>c</sub>	f <sub>z</sub>	1°scelta	1. Choice	a <sub>p</sub> max	V <sub>c</sub>	m/min	f <sub>z</sub>	1°scelta	1. Choice	a <sub>p</sub> max	
	2°scelta	2. Choice	mm	m/min	mm	2°scelta	2. Choice	mm	E ≤ 8	E ≤ 4	mm	2°scelta	2. Choice	mm	
1	R/L105.18xxx MG12		0.05	14 - 100	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	250	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
	R/L105.18xxx TN35		0.05	14 - 180	0.01 - 0.02	WCGT 020102-FX UC500		0.2	60	200	0.05 - 0.1	CPGT 060202-FX UT200		0.2	
2	R/L105.18xxx MG12		0.05	16 - 90	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	250	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
	R/L105.18xxx TN35		0.05	16 - 150	0.01 - 0.02	WCGT 020102-FX UC500		0.2	60	200	0.05 - 0.1	CPGT 060202-FX UT200		0.2	
3	R/L105.18xxx MG12		0.05	16 - 90	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	250	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
	R/L105.18xxx TN35		0.05	16 - 90	0.01 - 0.02	WCGT 020102-FX UC500		0.2	60	200	0.05 - 0.1	CPGT 060202-FX UT200		0.2	
3.1	R/L105.18xxx TI25		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	200	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
	R/L105.18xxx TN35		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FX UC500		0.2	60	150	0.05 - 0.1	CPGT 060202-FX UT200		0.2	
3.2	R/L105.18xxx TI25		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FY UT150		0.2	60	150	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
	R/L105.18xxx TN35		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FX UC500		0.2	50	120	0.05 - 0.1	CPGT 060202-FX UT200		0.2	
3.2	R/L105.18xxx TI25		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FY UT150		0.2	60	150	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
	R/L105.18xxx TN35		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FX UC500		0.2	50	120	0.05 - 0.1	CPGT 060202-FX UT200		0.2	
4						WCGW 020102-SF UMB20		0.1	-	60-140	0.04 - 0.09	CPMW 060202-SF UMB20		0.15	
5	R/L105.18xxx TI25		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	200	0.03 - 0.1	CPGT 060202-FX UC360		0.2	
	R/L105.18xxx TN35		0.05	19 - 90	0.01 - 0.02	WCGT 020102-FX UC500		0.2	70	180	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
5.1	R/L105.18xxx TN35		0.05	16 - 80	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	180	0.03 - 0.1	CPGT 060202-FX UC360		0.2	
						WCGT 020102-FX UC500		0.2	60	150	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
5.2	R/L105.18xxx TN35		0.05	14 - 70	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	120	0.03 - 0.1	CPGT 060202-FX UC360		0.2	
						WCGT 020102-FX UC500		0.2	70	100	0.05 - 0.1	CPGT 060202-FX UT150		0.2	
6	R/L105.18xxx MG12		0.05	16 - 90	0.01 - 0.02	WCGW 020102-SF UMB20		0.2	70	300	0.05 - 0.1	CPMW 060202-SF UMB10		0.2	
	R/L105.18xxx TN35		0.05	16 - 150	0.01 - 0.02	WCGT 020102-FX UC500		0.2	60	120	0.03 - 0.1	CPGT 060202-FX UT200		0.2	
6.1	R/L105.18xxx MG12		0.05	16 - 90	0.01 - 0.02	WCGW 020102-SF UMB20		0.2	70	300	0.05 - 0.1	CPMW 060202-SF UMB10		0.2	
	R/L105.18xxx TN35		0.05	16 - 130	0.01 - 0.02	WCGT 020102-FX UC500		0.2	50	120	0.03 - 0.1	CPGT 060202-FX UT200		0.2	
6.2	R/L105.18xxx TI25		0.05	16 - 130	0.01 - 0.02	WCGT 020102-FY UT150		0.2	70	120	0.03 - 0.1	CPGT 060202-FX UT150		0.2	
	R/L105.18xxx TN35		0.05	16 - 130	0.01 - 0.02	WCGT 020102-FX UC500		0.2	70	100	0.05 - 0.1	CPGT 060202-FX UC360		0.2	
7	R/L105.18xxx MG12		0.05	14 - 220	0.01 - 0.02	WCGT 020102-FY UT150		0.2	100	300	0.03 - 0.1	CPMW 060202-SF UMD01		0.2	
	R/L105.18xxx TN35		0.05	16 - 600	0.01 - 0.02	WCGW 020102-SF UMD01		0.2	120	400	0.03 - 0.1	CPGT 060202-FX UW100		0.2	
7.1	R/L105.18xxx MG12		0.05	14 - 220	0.01 - 0.02	WCGT 020102-FY UT150		0.2	100	250	0.03 - 0.1	CPMW 060202-SF UMD01		0.2	
	R/L105.18xxx TN35		0.05	14 - 600	0.01 - 0.02	WCGW 020102-SF UMD01		0.2	120	400	0.03 - 0.1	CPGT 060202-FX UW100		0.2	
7.2	R/L105.18xxx TI25		0.05	18 - 75	0.01 - 0.02	WCGT 020102-FY UT150		0.2	40	50	0.03 - 0.1	CPGT 060202-FX UW100		0.2	
	R/L105.18xxx TF45		0.05	18 - 75	0.01 - 0.02	WCGW 020102-SF UMD01		0.2	70	200	0.05 - 0.1	CPMW 060202-SF UMB20		0.2	
7.3						WCGW 020102-SF UMD01		0.2	-	200	0.03 - 0.1	CPMW 060202-SF UMD01		0.2	
												CPGT 060202-FX UW100		0.2	
7.4						WCGW 020102-SF UMD01		0.2	-	200	0.03 - 0.1	CPMW 060202-SF UMD01		0.2	
												CPGT 060202-FX UW100		0.2	
8	R/L105.18xxx MG12		0.05	14 - 110	0.01 - 0.02	WCGW 020102-SF UMD01		0.2	150	400	0.03 - 0.08	CPMW 060202-SF UMD01		0.2	
	R/L105.18xxx TN35		0.05	14 - 180	0.01 - 0.02							CPGT 060202-FX UW100		0.2	
8.1	R/L105.18xxx MG12		0.05	14 - 110	0.01 - 0.02	WCGW 020102-SF UMD01		0.2	150	400	0.03 - 0.08	CPMW 060202-SF UMD01		0.2	
	R/L105.18xxx TN35		0.05	14 - 180	0.01 - 0.02							CPGT 060202-FX UW100		0.2	

L'avanzamento raccomandato per l'ottenimento di una qualità superficiale pre-determinata in relazione al raggio di punta, è a pagina 6

Recommended feed rates in order to achieve a defined surface quality in relation to the nose radius see page 6



V <sub>c</sub>	m/min	f <sub>z</sub>	Ø 20 - 153 mm					Ø 150 - 805 mm						
			1°scelta	1. Choice	a <sub>p</sub> max	V <sub>c</sub>	m/min	f <sub>z</sub>	1°scelta	1. Choice	a <sub>p</sub> max	V <sub>c</sub>	m/min	f <sub>z</sub>
			2°scelta	2. Choice	mm	E ≤ 6	E ≤ 4	mm	2°scelta	2. Choice	mm	L > 220	L < 220	mm
70	350	0.05 - 0.12	CCGT 060204-FX UT150		0.3	120	350	0.06 - 0.12	CCMT 09T304-MFU UT150		0.4	120	350	0.1 - 0.15
70	350	0.05 - 0.12	CCMT 060204-MFU UC250		0.4	-	300	0.08 - 0.15	CCMT 09T304-WFU UC250		0.4	100	300	0.15 - 0.3
70	350	0.05 - 0.12	CCGT 060204-FX UT150		0.3	120	350	0.06 - 0.12	CCMT 09T304-MFU UT150		0.4	120	350	0.1 - 0.15
70	350	0.05 - 0.12	CCMT 060204-MFU UC250		0.4	-	300	0.08 - 0.15	CCMT 09T304-WFU UC250		0.4	100	300	0.15 - 0.3
70	350	0.05 - 0.12	CCGT 060204-FX UT150		0.3	120	350	0.06 - 0.12	CCMT 09T304-MFU UT150		0.4	120	350	0.1 - 0.15
70	350	0.05 - 0.12	CCMT 060204-MFU UC250		0.4	-	300	0.08 - 0.15	CCMT 09T304-WFU UC250		0.4	100	300	0.15 - 0.3
70	300	0.05 - 0.1	CCGT 060204-FX UT150		0.3	110	300	0.06 - 0.12	CCMT 09T304-MFU UT150		0.4	110	300	0.1 - 0.15
70	350	0.05 - 0.12	CCMT 060204-MFU UC250		0.4	-	250	0.08 - 0.15	CCMT 09T304-WFU UC250		0.4	100	300	0.15 - 0.3
60	200	0.05 - 0.1	CCGT 060204-FX UT150		0.3	100	200	0.06 - 0.12	CCMT 09T304-MFU UT150		0.4	100	200	0.1 - 0.15
60	200	0.05 - 0.12	CCMT 060204-MFU UC250		0.4	-	180	0.08 - 0.15	CCMT 09T304-WFU UC250		0.4	100	300	0.15 - 0.3
60	120	0.05 - 0.1	CCGT 060204-FX UT150		0.3	60	120	0.06 - 0.12	CCMT 09T304-MFU UT150		0.4	60	120	0.1 - 0.15
60	120	0.05 - 0.12	CCMT 060204-MFU UC250		0.3	60	120	0.08 - 0.12	CCMT 09T304-WFU UC250		0.4	60	110	0.1 - 0.15
-	60-140	0.04 - 0.09	CCMW 060204-SF UMB20		0.2	-	60 - 140	0.04 - 0.09	CCMW 09T304-SF UMB20		0.3	60	140	0.08 - 0.15
70	200	0.05 - 0.1	CCGT 060202-FX UT200		0.3	120	220	0.08 - 0.12	CCMT 09T304-MFU UC300		0.4	100	200	0.08 - 0.15
70	220	0.05 - 0.1	CCMT 060204-FX UC360		0.2	100	180	0.10 - 0.15	CCGT 09T304-FX UT150		0.2	110	220	0.08 - 0.15
70	180	0.05 - 0.1	CCGT 060202-FX UT200		0.3	100	200	0.08 - 0.12	CCMT 09T304-MFU UC300		0.4	90	180	0.08 - 0.15
80	200	0.05 - 0.1	CCMT 060204-MFU UC300		0.2	90	170	0.10 - 0.15	CCGT 09T304-FX UT150		0.2	100	190	0.08 - 0.15
70	120	0.05 - 0.1	CCMT 060204-MFU UC300		0.3	70	120	0.10 - 0.15	CCMT 09T304-MFU UC300		0.4	70	120	0.15 - 0.3
80	130	0.05 - 0.1	CCGT 060202-FX UT200		0.2	80	140	0.08 - 0.12	CCGT 09T304-FX UT150		0.2	80	130	0.08 - 0.15
80	300	0.05 - 0.12	CCMW 060204-SF UMB10		0.3	100	300	0.08 - 0.12	CCMW 09T304-SF UMB10		0.3	100	300	0.08 - 0.12
80	160	0.05 - 0.1	CCMT 060204-MFU UC250		0.4	80	180	0.10 - 0.15	CCGT 09T304-FX UT150		0.3	100	180	0.15 - 0.3
70	300	0.05 - 0.12	CCMW 060204-SF UMB10		0.3	100	300	0.08 - 0.12	CCMW 09T304-SF UMB10		0.3	100	300	0.08 - 0.12
80	160	0.05 - 0.1	CCMT 060204-MFU UC250		0.4	80	180	0.10 - 0.15	CCMT 09T304-MRU UC250		0.3	100	180	0.15 - 0.3
70	120	0.05 - 0.1	CCMT 060204-MFU UC250		0.3	100	180	0.05 - 0.15	CCMT 09T304-MR UMC15		0.3	100	180	0.1 - 0.15
80	120	0.05 - 0.1	CCMT 060204-MRU UC250		0.2	80	180	0.05 - 0.1	CCMT 09T304-MRU UC250		0.3	100	180	0.15 - 0.3
120	400	0.03 - 0.1	CCMW 060204-SF UMD01		0.2	150	500	0.08 - 0.15	CCMW 09T304-SF UMD01		0.2	200	500	0.04 - 0.1
1														

### Dati di taglio consigliati per sgrossatura (con testine doppio tagliente) \*

Recommended Cutting Data for Roughing (with Double Cutter Heads) \*

UC	Ø 19,5 - 39 mm						Ø 38 - 67 mm					
	1°scelta	1. Choice	a <sub>p</sub> max mm	V <sub>c</sub> E ≤ 6	m/min E ≤ 4	f <sub>z</sub> mm	1°scelta	1. Choice	a <sub>p</sub> max mm	V <sub>c</sub> E ≤ 6	m/min E ≤ 4	f <sub>z</sub> mm
	2°scelta	2. Choice					2°scelta	2. Choice				
1	CCMT 060204-MRU UC250	UC250	1.75	80	200	0.15 - 0.2	CCMT 09T308-MRU UC350	UC350	3	80	200	0.2 - 0.25
	CCMT 060204-MFU UT150	UT150	1.75	100	220	0.12 - 0.2	CCMT 09T304-MRU UC250	UC250	2.5	100	200	0.15 - 0.2
2	CCMT 060204-MRU UC250	UC250	1.75	80	200	0.15 - 0.2	CCMT 09T308-MRU UC350	UC350	3	80	200	0.2 - 0.25
	CCMT 060204-MFU UT150	UT150	1.75	100	220	0.12 - 0.2	CCMT 09T304-MRU UC250	UC250	2.5	100	200	0.15 - 0.2
3	CCMT 060204-MRU UC250	UC250	2	80	220	0.1 - 0.2	CCMT 09T308-MRU UC350	UC350	3.5	80	220	0.2 - 0.25
	CCMT 060204-MFU UT150	UT150	2	100	230	0.1 - 0.2	CCMT 09T304-MRU UC250	UC250	2.5	100	220	0.15 - 0.2
3.1	CCMT 060204-MRU UC250	UC250	2	80	180	0.1 - 0.2	CCMT 09T308-MRU UC350	UC350	3.5	80	180	0.2 - 0.25
	CCMT 060204-MFU UT150	UT150	2	70	160	0.1 - 0.2	CCMT 09T304-MRU UC250	UC250	2.5	100	200	0.15 - 0.2
3.2	CCMT 060204-MRU UC250	UC250	2	70	140	0.1 - 0.2	CCMT 09T308-MRU UC350	UC350	3.5	70	140	0.1 - 0.2
	CCMT 060204-MFU UT150	UT150	2	70	140	0.1 - 0.2	CCMT 09T304-MRU UC250	UC250	2.5	80	150	0.1 - 0.2
3.3	CCMT 060204-MRU UC250	UC250	2	60	90	0.08 - 0.15	CCMT 09T308-MRU UC350	UC350	3	60	90	0.1 - 0.2
	CCMT 060208-MRU UC350	UC350	2	65	90	0.08 - 0.15	CCMT 09T304-MRU UC250	UC250	2.5	60	100	0.1 - 0.2
4												
5	CCMT 060204-MRU UC250	UC250	1.75	90	140	0.08 - 0.2	CCMT 09T308-MRU UC350	UC350	3	90	140	0.15 - 0.25
	CCMT 060204-MFU UC300	UC300	1.75	90	140	0.08 - 0.2	CCMT 09T308-MFU UC300	UC300	2.5	90	140	0.15 - 0.25
5.1	CCMT 060204-MRU UC250	UC250	1.75	90	140	0.08 - 0.2	CCMT 09T308-MRU UC350	UC350	3	90	140	0.15 - 0.25
	CCMT 060204-MFU UC300	UC300	1.75	90	140	0.08 - 0.2	CCMT 09T308-MFU UC300	UC300	2.5	90	140	0.15 - 0.25
5.2	CCMT 060204-MRU UC250	UC250	1.75	60	90	0.08 - 0.15	CCMT 09T308-MRU UC350	UC350	3	60	90	0.15 - 0.25
	CCMT 060204-MFU UC300	UC300	1.75	60	90	0.08 - 0.2	CCMT 09T308-MFU UC300	UC300	2.5	60	90	0.15 - 0.25
6	CCMT 060204-MRU UC250	UC250	2.5	120	180	0.15 - 0.25	CCMT 09T308-MRU UC250	UC250	3.5	100	180	0.15 - 0.3
	CCMT 060204-WF UMC15	UMC15	2.5	120	180	0.15 - 0.25						
6.1	CCMT 060204-MRU UC250	UC250	2.5	90	180	0.15 - 0.25	CCMT 09T308-MRU UC250	UC250	3.5	90	180	0.15 - 0.3
	CCMT 060204-WF UMC15	UMC15	2.5	90	180	0.15 - 0.25						
6.2	CCMT 060204-MRU UC250	UC250	2.5	70	120	0.15 - 0.25	CCMT 09T308-MRU UC250	UC250	3.5	10	120	0.15 - 0.3
	CCMT 060204-WF UMC15	UMC15	2.5	80	140	0.15 - 0.25						
7	CCGT 060204-ALU UW100	UW100	2.5	120	300	0.15 - 0.25	CCGT 09T308-ALU UW100	UW100	3.5	120	300	0.2 - 0.3
7.1	CCGT 060204-ALU UW100	UW100	2.5	120	400	0.15 - 0.25	CCGT 09T308-ALU UW100	UW100	3.5	120	300	0.2 - 0.3
7.2	CCGT 060204-ALU UW100	UW100	2	40	60	0.08 - 0.15	CCGT 09T308-ALU UW100	UW100	3.5	40	60	0.1 - 0.2
7.3	CCMT 060208-MRU AC510U	AC510U	1.5	30	70	0.1 - 0.2	CCMT 09T308-MRU AC510U	AC510U	1.5	30	70	0.1 - 0.25
7.4	CCMT 060208-MRU AC510U	AC510U	1.5	30	70	0.1 - 0.2	CCMT 09T308-MRU AC510U	AC510U	1.5	30	70	0.1 - 0.25
8	CCGT 060204-ALU UW100	UW100	2.5	100	150	0.15 - 0.25	CCMW 09T308-SF UMD01	UMD01	2.0	120	1000	0.15 - 0.3
							CCGT 09T308-ALU UW100	UW100	3.5	120	400	0.20 - 0.4
8.1	CCGT 060204-ALU UW100	UW100	2.5	100	150	0.15 - 0.25	CCMW 09T308-SF UMD01	UMD01	2.0	120	1000	0.15 - 0.3
							CCGT 09T308-ALU UW100	UW100	3.5	120	400	0.20 - 0.4

UC Codice materiale URMA (vedi pagina 16)

\* Per il calcolo dell'avanzamento nella sgrossatura sfalsata Offset, considera un solo tagliente

UC URMA material-code (see page 16)

\* offset roughing requires only one cutting edge for the feed rate calculation



UC	Ø 66 - 88 mm						Ø 87 - 805 mm					
	1°scelta	1. Choice	a <sub>p</sub> max mm	V <sub>c</sub> E ≤ 6	m/min E ≤ 4	f <sub>z</sub> mm	1°scelta	1. Choice	a <sub>p</sub> max mm	V <sub>c</sub> E ≤ 6	m/min E ≤ 4	f <sub>z</sub> mm
	2°scelta	2. Choice					2°scelta	2. Choice				
1	CNMM 120408-RRU UC350	UC350	4.5	80	250	0.25 - 0.35	CNMM 160612-RRU UC350	UC350	6	80	200	0.3 - 0.8
	CNMG 120408-RRG UC250	UC250	3.5	120	270	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	80	200	0.3 - 0.6
2	CNMM 120408-RRU UC350	UC350	4.5	80	220	0.25 - 0.35	CNMM 160612-RRU UC350	UC350	6	80	200	0.3 - 0.8
	CNMG 120408-RRG UC250	UC250	3.5	120	250	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	80	200	0.3 - 0.6
3	CNMM 120408-RRU UC350	UC350	4.5	80	220	0.25 - 0.35	CNMM 160612-RRU UC350	UC350	7	80	180	0.3 - 0.8
	CNMG 120408-RRG UC250	UC250	3.5	120	250	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	80	180	0.3 - 0.6
3.1	CNMM 120408-RRU UC350	UC350	4.5	80	180	0.25 - 0.35	CNMM 160612-RRU UC350	UC350	7	80	180	0.3 - 0.8
	CNMG 120408-RRG UC250	UC250	3.5	120	220	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	80	180	0.3 - 0.6
3.2	CNMM 120408-RRU UC350	UC350	4.5	70	140	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	70	140	0.25 - 0.6
	CNMG 120408-RRG UC250	UC250	3.5	120	180	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	80	140	0.3 - 0.6
3.3	CNMM 120408-RRU UC350	UC350	4.5	60	90	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	5	60	90	0.25 - 0.6
	CNMG 120408-RRG UC250	UC250	3.5	80	120	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	3	60	90	0.25 - 0.5
4	CNMM 120408-RRU UC350	UC350	4	90	140	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	90	140	0.3 - 0.8
	CNMG 120408-RRG UC300	UC300	4	90	140	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	90	140	0.25 - 0.6
5.1	CNMM 120408-RRU UC350	UC350	4	90	140	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	90	140	0.3 - 0.8
	CNMG 120408-RRG UC300	UC300	4	90	140	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	90	140	0.25 - 0.6
5.2	CNMM 120408-RRU UC300	UC300	4	60	90	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	60	90	0.2 - 0.3
	CNMG 120408-RRG UC100	UC100	4	60	90	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	4	80	140	0.2 - 0.3
6	CNMM 120408-RRU UC350	UC350	4	100	180	0.2 - 0.35	CNMG 160612-RRG UC100	UC100	6	100	180	0.25 - 0.35
	CNMG 120408-RRG UC100	UC100	4	90	180	0.2 - 0.35	CNMM 160612-RRU UC350	UC350	7	80	160	0.3 - 0.8
6.1	CNMM 120408-RRU UC100	UC100	4	70	120	0.2 - 0.35	CNMG 160612-RRG UC100	UC100	5	80	150	0.25 - 0.35
	CNMG 120408-RRG UC350	UC350	4	60	120	0.25 - 0.4	CNMM 160612-RRU UC350	UC350	7	70	120	0.3 - 0.8
6.2	CNMM 120408-RRU UC350	UC350	3.5	120	300	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	6	120	300	0.25 - 0.35
	CNMG 120408-RRG UC300	UC300	3.5	120	300	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	120	300	0.25 - 0.35
7	CNMM 120408-RRU UC350	UC350	3.5	120	300	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	6	120	300	0.25 - 0.35
	CNMG 120408-RRG UC300	UC300	3.5	120	300	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	120	300	0.25 - 0.35
7.1	CNMM 120408-RRU UC300	UC300	2.5	30	70	0.1 - 0.3	CNMG 160612-RRG UC350	UC350	4	30	50	0.2 - 0.3
	CNMG 120408-UP AC520U	AC520U	2.5	30	70	0.1 - 0.3	CNMG 160612-MU AC520U	AC520U	4	30	70	0.2 - 0.5
7.2	CNMM 120408-RRU UC300	UC300	2.5	30	70	0.1 - 0.3	CNMG 160612-RRG UC350	UC350	4	30	50	0.2 - 0.3
	CNMG 120408-UP AC520U	AC520U	2.5	30	70	0.1 - 0.3	CNMG 160612-MU AC520U	AC520U	4	30	70	0.2 - 0.5
7.3	CNMM 120408-RRU UC300	UC300	3.5	120	300	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	6	120	300	0.25 - 0.35
	CNMG 120408-RRG UC300	UC300	3.5	120	300	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	120	300	0.25 - 0.35
7.4	CNMM 120408-RRU UC300	UC300	3.5	120	300	0.2 - 0.3	CNMG 160612-RRG UC350	UC350	6	120	300	0.25 - 0.35
	CNMG 120408-RRG UC300	UC300	3.5	120	300	0.2 - 0.3	CNMM 160612-RRU UC350	UC350	6	120	300	0.25 - 0.35

### Tavola comparazione materiali

Material Comparison Table

ISO	UC	Denominazione Materiale	Material Designation	R <sub>m</sub> N/ mm <sup>2</sup>	HB HRC	k <sub>c</sub> N/ mm <sup>2</sup>	DIN Number	DIN Designation
1								



## Studio di Lavorazione

## Machining Study

<b>Mittente *</b> Sender	Number	
<b>Azienda</b> Company	<b>Distributore URMA</b> URMA Distributor	
<b>Indirizzo</b> Address	<b>Contatto</b> Contact	
	<b>Dipartimento/Reparto</b> Department	
<b>Telefono</b> Telephone	<b>Fax</b> Fax	<b>E-Mail</b> E-Mail
<b>Macchina</b> Machine-tool		
<b>Modello</b> Machine Type	<b>Potenza (kW)</b> Drive Power (kW)	
<b>Orizzontale *</b> Horizontal <input type="checkbox"/>	<b>Verticale *</b> Vertical <input type="checkbox"/>	<b>Rotazione utensile *</b> Tool Rotating <input type="checkbox"/>
<b>Stabilità</b> Stability		
<b>Attacco mandrino *</b> Spindle Holder		
<b>Restrizioni imposte da</b> Restrictions due to		
<b>Lubrificante</b> Lubricant		
<b>Olio *</b> Oil <input type="checkbox"/>	<b>MMS * 1)</b> MLS 1) <input type="checkbox"/>	<b>Emulsione *</b> Emulsion <input type="checkbox"/>
<b>Rapporto di miscelazione</b> Ratio of Mixture		<b>Stabilità</b> Stability
<b>Lubrificazione interna *</b> Internal Coolant Supply <input type="checkbox"/>		
<b>Pressione (bar) *</b> Coolant Pressure (bar)		
<b>Pezzo</b> Workpiece		
<b>Designazione/tipologia</b> Designation	<b>Numero disegno</b> Drawing Number	<b>Numero materiale *</b> Material Number
<b>Specificazione *</b> Specification	<b>Condizione di trattamento *</b> Treatment Condition	<b>Resistenza/Forza *</b> Strength
Numero fori per Anno * Number of Bores per Year	Dimensione dei lotti Batch Size	
<b>Esigenze di lavorazione</b> Machining requirements		
<b>Ø foro *</b> Bore ø	<b>Profondità foro *</b> Bore length	<b>Ø prelavorato *</b> Pre-Machined ø
<b>Tolleranza *</b> Tolerance	Lunghezza utensile (xs) Gage length (xs)	<b>Metodo di prelavorazione *</b> Method of Pre-Machining
<b>requisiti di tolleranza supplementari</b> Additional Tolerance Requirements	<b>Foro cieco *</b> Blind Hole <input type="checkbox"/>	<b>Tempo di esecuzione</b> Target Time
<b>Qualità superficiale (µm) *</b> Surface Quality (µm)	<b>Taglio interrotto *</b> Cutting Interruption <input type="checkbox"/>	<b>Quantitativo pezzi</b> Target Quantity
R <sub>a</sub> <input type="checkbox"/> R <sub>z</sub> <input type="checkbox"/> R <sub>t</sub> <input type="checkbox"/>	<b>Tempo di lavorazione</b> Cycle Time <input type="checkbox"/>	
<b>Data *</b> Date	<b>Firma *</b> Visa	<b>Allegato: Bozza lavorazione *</b> Attachement: Your application sketch

\* Campi obbligatori  
mandatory fields1) Sistema di lubrificazione minimale  
minimal lubrication system (mist coolant)Fax +41 62 889 20 28  
customerservice@urma.ch

## Soluzione pratiche ai problemi di lavorazione

## Practical Solutions for Cutting Problems

	Scheggiatura Fragmentation	Sfaldamento bordo Flank Wear	Usura p. cra- terizzazione Crater Wear	Materiale di riporto Built-up Edges	Deformazione plastica Plastic Deformation	frammentazione/ rottura inserto Fragments/Insert Break
<b>Parametri di lavorazione</b> Cutting Data						
<b>Velocità di taglio</b> Cutting Speed	↑	↓	↓	↑	↓	
<b>Velocità di rotazione</b> Permitted Rotary Speed						
<b>Avanzamento</b> Feed	↓	↑	↓	↑	↓	↓
<b>Profondità di taglio</b> Depth of Cut				↓	△	△
<b>Inserti</b> Indexable Inserts						
<b>Rompitrucolo</b> Chipbreaker Geometry	△		△	△	△	△
<b>Raggio di punta</b> Nose Radius	↑	↓			↑	↑
<b>Fissaggio</b> Fixing						△
<b>Materiale Inserto</b> Cutting Material						
<b>Scelta del materiale</b> Cutting Material Selection	△	△	△	△	△	△
<b>Durezza</b> Toughness	↑					↑
<b>Resistenza all'usura</b> Wear Resistance		↑	↑		↑	
<b>Usura del tagliente</b> Cutting Edge Wear						△
<b>Utensile</b> Tool						
<b>Fissaggio portainsero</b> Insert Holder Fixing						
<b>Interfaccia fissaggio</b> Fixing Interface	△					
<b>Angolo di lavorazione portainsero</b> Insert Holder Setting Angle						
<b>Rapporto E</b> Ratio E	↓					↓
<b>Orientamento tagliente</b> Cutting Edge Orientation		△				
<b>Bilanciamento</b> Balance						
<b>Bloccaggio dell'elemento di regolazione</b> Blocking of Adjusting Element						
<b>Pezzo</b> Workpiece						
<b>Serraggio</b> Clamping Device	↑					
<b>Spazio per i trucioli</b> Chip Space	↑					↑
<b>Macchina</b> Machine						
<b>Stabilità</b> Stability	↑					↑
<b>Pressione/portata del refrigerante</b> Coolant Pressure/Flow Rate			↑	↓	↑	↑
<b>Potenza mandrino</b> Spindle Power						

↑ Aumentare, migliorare  
increase, improve↓ Ridurre, diminuire  
reduce, decrease△ Controllare, ottimizzare  
check, optimize

Ronzio Rumore Chattering	Vibrazioni Vibration	Scostamenti dimensionali Dimensional Deviation	Foro conico Conical Bore	Bassa qualità della rugosità superficiale Poor Surface Quality	Angoli del pez- zo scheggiati Chipped Workpiece Edges	Trucioli troppo lunghi Chips too Long	Accumulazione trucioli Chip Accumulation	Riscaldamento del pezzo Heating of Workpiece
↑	↓	△	↓	↑	↑	↓	↓	↓
	△		△	△				
↑	↑	△	↑	↓	↓	↑	△	↑
↓	↑	↓	↓	↓		↑	↓	↓
△	△	△	△	△		△		△
↓	↓		↓	△				↓
		△	△	△				
		↑	↑					
△	△	△	△	△				△
△		△		△				
△								
↑		↑		↑	↓	△	△	
↓	↓	↓	↓	↓				
	△							
	△	△		△				
		△	△	△				
△	↑	△	△	△				
↑							↑	△
	↑	△	△	↑				
				↑		↑	↑	↑
△								

# URMA Tools

## Reaming & Boring





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