

## CUTTING CONDITIONS

### MACHINING WITH A FIXED WORKPIECE

Materials to be machined			CARBIDE		TiAlN		CUTINOX	
			Vc [m/min]		Vc [m/min]		Vc [m/min]	
<b>P</b>	Unalloyed steel / Low alloyed steel	< 600 N/mm <sup>2</sup>	<b>65</b>	80	<b>90</b>	130		
<b>P</b>	Unalloyed steel / Low alloyed steel	600 – 1500 N/mm <sup>2</sup>			<b>70</b>	100		
<b>P</b>	High alloyed steel	700 – 1500 N/mm <sup>2</sup>			<b>75</b>	105	<b>80</b>	110
<b>M</b>	Stainless steel	400 – 700 N/mm <sup>2</sup>	<b>35</b>	50	<b>70</b>	100		
<b>M</b>	DUPLEX stainless steel	> 800 N/mm <sup>2</sup>			<b>55</b>	80	<b>60</b>	85
<b>K</b>	Tool steel and cast iron	> 1500 N/mm <sup>2</sup> (50 - 65 HRC)	<b>80</b>	100	<b>90</b>	110		
<b>K</b>	Grey cast iron / Nodular pearlitic iron	< 250 HB	<b>65</b>	80	<b>75</b>	90		
<b>K</b>	Alloyed cast iron / Nodular pearlitic iron	> 250 HB	<b>60</b>	75	<b>70</b>	85		
<b>S</b>	Special alloys / Heat resistant stainless steel	Inconel Nimonic Hastelloy			<b>25</b>	50	<b>30</b>	55
<b>S</b>	Titanium, titanium alloys		<b>50</b>	90				
<b>N</b>	Copper alloys - easy to machine (brass - bronze)		<b>80</b>	200				
<b>N</b>	Copper alloys - difficult to machine / Aluminium bronze	(CuAlFe) (Ampco)	<b>70</b>	150				
<b>N</b>	Gold, silver		<b>80</b>	200				

### MACHINING ON A SWISS-TURNING MACHINE - Workpiece turns

Materials to be machined		CARBIDE	fz [mm] Pitch	fz [mm] Pitch	fz [mm] Pitch	fz [mm] Pitch
		Vc [m/min]	0.20 - 0.25	0.30 - 0.35	0.40 - 0.50	0.70 - 1.00
<b>P</b>	Steel	<b>50 - 100</b>	<b>0.002 - 0.004</b>	<b>0.002 - 0.004</b>	<b>0.003 - 0.006</b>	<b>0.005 - 0.013</b>
<b>M</b>	Stainless steel	<b>40 - 80</b>	<b>0.002 - 0.003</b>	<b>0.002 - 0.004</b>	<b>0.002 - 0.005</b>	<b>0.004 - 0.01</b>
<b>S</b>	Titanium, titanium alloys	<b>50 - 90</b>	<b>0.002 - 0.003</b>	<b>0.002 - 0.004</b>	<b>0.002 - 0.005</b>	<b>0.004 - 0.01</b>
<b>N</b>	Copper alloys	<b>60 - 150</b>	<b>0.002 - 0.005</b>	<b>0.002 - 0.006</b>	<b>0.003 - 0.007</b>	<b>0.005 - 0.013</b>



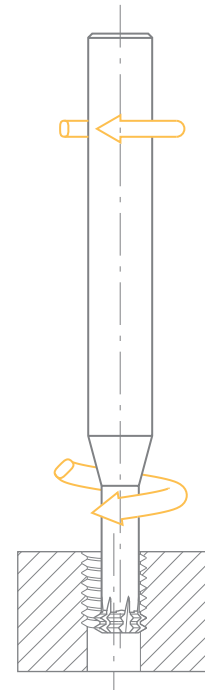
$$n \text{ [tr/min]} = \frac{Vc \text{ [m/min]} \times 1000}{\pi \times D_1 \text{ [mm]}}$$

$$Vf \text{ [mm/min]} = n \text{ [tr/min]} \times fz \text{ [mm]} \times z$$

Feed per tooth

$fz$  [mm]

$\varnothing D_1$ 0.20 - 0.60	$\varnothing D_1$ 0.60 - 1.20	$\varnothing D_1$ 1.20 - 2.00	$\varnothing D_1$ 2.00 - 3.00	$\varnothing D_1$ 3.00 - 5.00	$\varnothing D_1$ 5.00 - 8.00
0.001 - 0.006	0.004 - 0.016	0.010 - 0.026	0.017 - 0.04	0.03 - 0.06	0.04 - 0.10
0.001 - 0.006	0.004 - 0.015	0.009 - 0.024	0.015 - 0.04	0.02 - 0.06	0.04 - 0.09
0.001 - 0.005	0.003 - 0.013	0.008 - 0.022	0.014 - 0.03	0.02 - 0.05	0.03 - 0.08
0.001 - 0.005	0.003 - 0.013	0.008 - 0.022	0.014 - 0.03	0.02 - 0.05	0.03 - 0.08
0.001 - 0.004	0.003 - 0.011	0.007 - 0.018	0.011 - 0.03	0.02 - 0.04	0.03 - 0.06
0.002 - 0.011	0.007 - 0.026	0.017 - 0.044	0.028 - 0.07	0.04 - 0.10	0.07 - 0.16
0.002 - 0.008	0.005 - 0.020	0.013 - 0.033	0.021 - 0.05	0.03 - 0.08	0.05 - 0.12
0.002 - 0.008	0.005 - 0.020	0.013 - 0.033	0.021 - 0.05	0.03 - 0.08	0.05 - 0.12
0.001 - 0.003	0.002 - 0.007	0.004 - 0.011	0.007 - 0.02	0.01 - 0.03	0.02 - 0.04
0.001 - 0.007	0.004 - 0.017	0.011 - 0.028	0.018 - 0.04	0.03 - 0.07	0.04 - 0.10
0.002 - 0.011	0.007 - 0.026	0.017 - 0.044	0.028 - 0.07	0.04 - 0.10	0.07 - 0.16
0.001 - 0.007	0.004 - 0.017	0.011 - 0.028	0.018 - 0.04	0.03 - 0.07	0.04 - 0.10
0.002 - 0.008	0.005 - 0.020	0.013 - 0.033	0.021 - 0.05	0.03 - 0.08	0.05 - 0.12



### Example for M2 x 0.40 in titanium, DIXI 1730 $\varnothing D_1 = 1.55$

① Tool rotation  $n \text{ (min}^{-1}\text{)} = \frac{1000 \times Vc}{\pi \times \varnothing D_1}$

$$\frac{1000 \times 90}{(\pi \times 1.55)} \Rightarrow 19'000 \text{ min}^{-1}$$

② Feed  $Vf \text{ mm/min} = n \times fz \times z$

$$19'000 \times 0.004 \times 3 = 223 \text{ mm/min}$$

③ Piece rotation  $\text{min}^{-1} = \frac{Vf}{\text{threaded } \varnothing \times \pi}$

$$\frac{223}{M2 \times \pi} \Rightarrow 36 \text{ min}^{-1}$$

When necessary, convert in degrees  $nb^\circ = \text{min}^{-1} \times 360^\circ \Rightarrow 36 \text{ min}^{-1} \times 360^\circ = 12960^\circ$

