

Cutting data recommendation for TTD replaceable head drills

Feed and cutting speed

Type 01 – Uni-Plus

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1,200
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1,400
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800
		P3.2 Tool, bearing, spring and high-speed steels**	< 1,000
		P3.3 Tool, bearing, spring and high-speed steels**	< 1,500
P5	P5.1 Cast steel		
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300
		K2.1 Cast iron with spheroidal graphite, GJS	< 500
	K2	K2.2 Cast iron with spheroidal graphite, GJS	≤ 800
		K2.3 Cast iron with spheroidal graphite, GJS	> 800
	K3	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500

Type 04 – Steel

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]
P	P1	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700
		P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1,200
	P2	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900
		P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1,400
	P3	P3.1 Tool, bearing, spring and high-speed steels**	< 800
		P3.2 Tool, bearing, spring and high-speed steels**	< 1,000
		P3.3 Tool, bearing, spring and high-speed steels**	< 1,500
P4	P4.1 Stainless steels, ferritic and martensitic		
P5	P5.1 Cast steel		
P6	P6.1 Stainless cast steel, ferritic and martensitic		
K	K1	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300
		K2.1 Cast iron with spheroidal graphite, GJS	< 500
	K2	K2.2 Cast iron with spheroidal graphite, GJS	≤ 800
		K2.3 Cast iron with spheroidal graphite, GJS	> 800
	K3	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500
		K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500

Type 03 – Alu

MMG*		Workpiece material	Strength/hardness [N/mm ²] [HRC]
N	N1	N1.1 Aluminium, non-alloy and alloy < 3 % Si	
		N1.2 Aluminium, alloy ≤ 7 % Si	
		N1.3 Aluminium, alloy > 7-12 % Si	
		N1.4 Aluminium, alloy > 12 % Si	
	N2	N2.1 Copper, non-alloy and low-alloy	< 300
		N2.2 Copper, alloy	> 300
		N2.3 Brass, bronze, gunmetal	< 1,200

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8% then select the next highest MAPAL machining group.

	Cutting speed v_c [m/min]				Feed f [mm] for drill diameter					
	Internal cooling	External cooling	MQL	Air	12.00	15.50	19.50	25.00	32.00	40.00
	110	100	100		0.23	0.26	0.29	0.32	0.33	0.33
	100	85	85		0.29	0.33	0.37	0.40	0.41	0.41
	110	95	95		0.27	0.31	0.35	0.37	0.39	0.39
	75	65	65		0.22	0.25	0.27	0.30	0.31	0.31
	85	70	70		0.24	0.28	0.31	0.34	0.35	0.35
	65	60	60		0.20	0.23	0.25	0.27	0.28	0.29
	65	50	55		0.16	0.18	0.20	0.21	0.22	0.22
	110	95	95		0.27	0.31	0.35	0.37	0.39	0.39
	110	75	75	75	0.34	0.39	0.44	0.48	0.49	0.49
	145	90	110	110	0.31	0.36	0.40	0.44	0.45	0.46
	90	70	70		0.27	0.31	0.35	0.38	0.39	0.39
	55	35	45		0.18	0.21	0.23	0.25	0.26	0.26
	80	70	70		0.29	0.34	0.37	0.40	0.42	0.42
	70	65	65		0.23	0.27	0.30	0.32	0.33	0.33

	Cutting speed v_c [m/min]				Feed f [mm] for drill diameter					
	Internal cooling	External cooling	MQL	Air	12.00	15.50	19.50	25.00	32.00	40.00
	110	100	100		0.26	0.30	0.34	0.36	0.38	0.38
	100	85	85		0.33	0.38	0.42	0.46	0.47	0.47
	110	95	95		0.31	0.36	0.40	0.43	0.45	0.45
	75	65	65		0.25	0.28	0.31	0.34	0.35	0.35
	85	70	70		0.28	0.32	0.36	0.39	0.40	0.41
	65	60	60		0.23	0.26	0.29	0.32	0.33	0.33
	65	50	55		0.18	0.20	0.23	0.24	0.25	0.25
	65	50	55		0.18	0.21	0.24	0.25	0.26	0.27
	110	95	95		0.31	0.36	0.40	0.43	0.45	0.45
	110	75	75	75	0.37	0.44	0.49	0.53	0.55	0.55
	145	90	110	110	0.35	0.40	0.45	0.49	0.50	0.51
	90	70	70		0.30	0.35	0.39	0.42	0.43	0.43
	55	35	45		0.20	0.23	0.25	0.27	0.28	0.29
	80	70	70		0.32	0.37	0.41	0.45	0.47	0.47
	70	65	65		0.26	0.30	0.33	0.35	0.37	0.37

	Cutting speed v_c [m/min]				Feed f [mm] for drill diameter					
	Internal cooling	External cooling	MQL	Air	12.00	15.50	19.50	25.00	32.00	40.00
	300	200	250		0.23	0.26	0.29	0.32	0.33	0.33
	250	180	200		0.30	0.35	0.39	0.42	0.43	0.43
	220	150	180		0.30	0.35	0.39	0.42	0.43	0.43
	180	120	150		0.30	0.35	0.39	0.42	0.43	0.43
	140	100			0.23	0.26	0.29	0.32	0.33	0.33
	120	90			0.30	0.35	0.39	0.42	0.43	0.43
	200	160	160	120	0.37	0.44	0.49	0.53	0.55	0.55

The specified cutting values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendation for TTD replaceable head drills

Feed and cutting speed

Type 02 – Inox

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]
P	P1.1 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700
	P1.2 Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1,200
	P2.1 Nitrided, case hardened and heat-treated steels, alloy	< 900
	P2.2 Nitrided, case hardened and heat-treated steels, alloy	< 1,400
	P3.1 Tool, bearing, spring and high-speed steels**	< 800
	P3.2 Tool, bearing, spring and high-speed steels**	< 1,000
	P3.3 Tool, bearing, spring and high-speed steels**	< 1,500
	P4.1 Stainless steels, ferritic and martensitic	
	P5.1 Cast steel	
	P6.1 Stainless cast steel, ferritic and martensitic	
M	M1.1 Stainless steels, austenitic	< 700
	M1.2 Stainless steels, ferritic/austenitic (duplex)	< 1,000
	M2.1 Stainless/heat-resistant cast steel, austenitic	< 700
	M3.1 Stainless cast steel, ferritic/austenitic (duplex)	< 1,000
K	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300
	K2.1 Cast iron with spheroidal graphite, GJS	< 500
	K2.2 Cast iron with spheroidal graphite, GJS	≤ 800
	K2.3 Cast iron with spheroidal graphite, GJS	> 800
	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500
	K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500
N2	N2.1 Copper, non-alloy and low-alloy	< 300
	N2.2 Copper, alloy	> 300
	N2.3 Brass, bronze, gunmetal	< 1,200
S	S1.1 Titanium, titanium alloys	< 400
	S2.1 Titanium, titanium alloys	< 1,200
	S2.2 Titanium, titanium alloys	> 1,200
	S3.1 Nickel, unalloyed and alloyed	< 900
	S3.2 Nickel, unalloyed and alloyed	> 900
	S4.1 High-temperature super alloy Ni, Co and Fe-based	
	S5.1 Tungsten and molybdenum alloys	

Type 05 – Iron

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]
K	K1.1 Cast iron with lamellar graphite (grey cast iron), GJL	< 300
	K2.1 Cast iron with spheroidal graphite, GJS	< 500
	K2.2 Cast iron with spheroidal graphite, GJS	≤ 800
	K2.3 Cast iron with spheroidal graphite, GJS	> 800
	K3.1 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500
	K3.2 Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500

* MAPAL machining groups

** If the alloy parts Cr, Mo, Ni, V, W in total > 8% then select the next highest MAPAL machining group.

	Cutting speed v_c [m/min]				Feed f [mm] for drill diameter					
	Internal cooling	External cooling	MQL	Air	12.00	15.50	19.50	25.00	32.00	40.00
	100	90	90		0.21	0.24	0.26	0.28	0.30	0.30
	90	75	75		0.26	0.30	0.33	0.36	0.37	0.37
	100	85	85		0.24	0.28	0.31	0.34	0.35	0.35
	70	60	60		0.19	0.22	0.25	0.27	0.28	0.28
	75	65	65		0.22	0.25	0.28	0.30	0.32	0.32
	60	55	55		0.18	0.21	0.23	0.25	0.26	0.26
	60	45	50		0.14	0.16	0.18	0.19	0.20	0.20
	60	45	50		0.14	0.17	0.18	0.20	0.21	0.21
	100	85	85		0.24	0.28	0.31	0.34	0.35	0.35
	60	45	50		0.14	0.17	0.18	0.20	0.21	0.21
	55	35	35		0.18	0.21	0.24	0.25	0.26	0.27
	50	30	30		0.16	0.18	0.20	0.22	0.23	0.23
	55	35	35		0.18	0.21	0.24	0.25	0.26	0.27
	50	30	30		0.16	0.18	0.20	0.22	0.23	0.23
	95	70	70	70	0.34	0.39	0.44	0.48	0.49	0.49
	130	80	95	95	0.31	0.36	0.40	0.44	0.45	0.46
	80	60	60		0.27	0.31	0.35	0.38	0.39	0.39
	50	30	40		0.18	0.21	0.23	0.25	0.26	0.26
	70	65	65		0.29	0.34	0.37	0.40	0.42	0.42
	65	55	55		0.23	0.27	0.30	0.32	0.33	0.33
	140	100			0.23	0.26	0.29	0.32	0.33	0.33
	120	90			0.30	0.35	0.39	0.42	0.43	0.43
	200	160	160	120	0.37	0.44	0.49	0.53	0.55	0.55
	40	25			0.16	0.18	0.21	0.22	0.23	0.23
	30	20			0.14	0.16	0.18	0.19	0.20	0.20
	25	15			0.11	0.13	0.15	0.16	0.16	0.17
	20	15			0.09	0.11	0.12	0.13	0.13	0.13
	15	10			0.11	0.13	0.15	0.16	0.16	0.17
	15	10			0.09	0.11	0.12	0.13	0.13	0.13
	15	10			0.09	0.11	0.12	0.13	0.13	0.13

	Cutting speed v_c [m/min]				Feed f [mm] for drill diameter					
	Internal cooling	External cooling	MQL	Air	12.00	15.50	19.50	25.00	32.00	40.00
	120	85	85	85	0.45	0.52	0.58	0.63	0.66	0.66
	160	100	120	120	0.42	0.48	0.54	0.58	0.60	0.61
	100	75	75		0.36	0.42	0.46	0.50	0.52	0.52
	60	40	50		0.24	0.28	0.30	0.33	0.34	0.34
	90	80	80		0.39	0.45	0.50	0.54	0.56	0.56
	80	70	70		0.31	0.36	0.39	0.43	0.44	0.44

The specified cutting values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.