

Cutting data recommendations for countersinks

Countersink with extremely unequal spacing – HSS design, coated
Feed and cutting speed

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	
M	M1	M1.1 Stainless steels, austenitic	< 700
		M1.2 Stainless steels, ferritic/austenitic (duplex)	< 1,000
	M2	M2.1 Stainless/heat-resistant cast steel, austenitic	< 700
		M3.1 Stainless cast steel, ferritic/austenitic (duplex)	< 1,000
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
N	N1	N1.1 Aluminium, unalloyed and alloyed < 3 % Si	
		N1.2 Aluminium, alloyed ≤ 7 % Si	
		N1.3 Aluminium, alloyed > 7-12 % Si	
		N1.4 Aluminium, alloyed > 12 % Si	
	N2	N2.1 Copper, non-alloy and low-alloy	< 300
		N2.2 Copper, alloy	> 300
		N2.3 Brass, bronze, gunmetal	< 1,200
	N4	N4.1 Plastic, thermoplastics	
		N4.2 Plastic, thermosets	
		N4.3 Plastic, foams	
S	S1	S1.1 Titanium, titanium alloys	< 400
		S2.1 Titanium, titanium alloys	< 1,200
	S2	S2.2 Titanium, titanium alloys	> 1,200
		S3.1 Nickel, non-alloy and alloy	< 900
	S3	S3.2 Nickel, non-alloy and alloy	> 900
		S4.1 High-temperature super alloy Ni, Co and Fe-based	
	S5	S5.1 Tungsten and molybdenum alloys	
H	H1	H1.1 Hardened steel/cast steel	< 44
		H1.2 Hardened steel/cast steel	< 55

* MAPAL machining groups

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

Next page:
Solid carbide design

	ø < 5 [mm]		ø < 5-8 [mm]		ø < 8-12 [mm]		ø < 12-16 [mm]		ø < 16-20 [mm]		ø < 20-25 [mm]		ø < 25-31 [mm]	
	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]
	40	0.06	40	0.08	40	0.10	40	0.12	40	0.14	40	0.18	40	0.22
	30	0.04	30	0.06	30	0.08	30	0.10	30	0.12	30	0.14	30	0.18
	30	0.04	30	0.06	30	0.08	30	0.10	30	0.12	30	0.14	30	0.18
	12	0.03	12	0.04	12	0.05	12	0.06	12	0.08	12	0.10	12	0.12
	30	0.04	30	0.06	30	0.08	30	0.10	30	0.12	30	0.14	30	0.18
	12	0.03	12	0.04	12	0.05	12	0.06	12	0.08	12	0.10	12	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	30	0.04	30	0.06	30	0.08	30	0.10	30	0.12	30	0.14	30	0.18
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	20	0.06	20	0.10	20	0.12	20	0.14	20	0.18	20	0.20	20	0.25
	20	0.06	20	0.10	20	0.12	20	0.14	20	0.18	20	0.20	20	0.25
	20	0.06	20	0.10	20	0.12	20	0.14	20	0.18	20	0.20	20	0.25
	20	0.06	20	0.10	20	0.12	20	0.14	20	0.18	20	0.20	20	0.25
	20	0.06	20	0.10	20	0.12	20	0.14	20	0.18	20	0.20	20	0.25
	20	0.06	20	0.10	20	0.12	20	0.14	20	0.18	20	0.20	20	0.25
	50	0.08	50	0.10	50	0.12	50	0.14	50	0.18	50	0.22	50	0.26
	50	0.08	50	0.10	50	0.12	50	0.14	50	0.18	50	0.22	50	0.26
	40	0.08	40	0.10	40	0.12	40	0.14	40	0.18	40	0.22	40	0.26
	40	0.08	40	0.10	40	0.12	40	0.14	40	0.18	40	0.22	40	0.26
	40	0.10	40	0.12	40	0.14	40	0.18	40	0.20	40	0.24	40	0.30
	40	0.10	40	0.12	40	0.14	40	0.18	40	0.20	40	0.24	40	0.30
	40	0.10	40	0.12	40	0.14	40	0.18	40	0.20	40	0.24	40	0.30
	40	0.10	40	0.12	40	0.14	40	0.18	40	0.20	40	0.24	40	0.30
	40	0.10	40	0.12	40	0.14	40	0.18	40	0.20	40	0.24	40	0.30
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	10	0.04	10	0.05	10	0.06	10	0.07	10	0.08	10	0.09	10	0.12
	6	0.04	6	0.05	6	0.06	6	0.08	6	0.08	6	0.10		
	6	0.04	6	0.05	6	0.06	6	0.08	6	0.08	6	0.10		

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 recommendations for countersinks

Countersink with extremely unequal spacing – solid carbide design, coated
Feed and cutting speed

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)	< 1000
	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
N	N1.1 Aluminium, unalloyed and alloyed < 3 % Si	
	N1.2 Aluminium, alloyed ≤ 7 % Si	
	N1.3 Aluminium, alloyed > 7-12 % Si	
	N1.4 Aluminium, alloyed > 12 % Si	
	N2.1 Copper, non-alloy and low-alloy	< 300
	N2.2 Copper, alloy	> 300
	N2.3 Brass, bronze, gunmetal	< 1,200
	N3.1 Graphite > 8 µm	
	N3.2 Graphite < 8 µm	
	N4.1 Plastic, thermoplastics	
N4.2 Plastic, thermosets		
N4.3 Plastic, foams		
C	C1.1 Plastic matrix, aramide fibre-reinforced (AFRP)	
	C1.2 Plastic matrix (thermosetting), CFRP/GFRP	
	C1.3 Plastic matrix (thermoplastic), CFRP/GFRP	
	C2.1 Carbon matrix, carbon fibre-reinforced (CFC)	
	C3.1 Metal matrix (MMC)	
	C4.1 Sandwich construction, honeycomb core	
	C4.2 Sandwich construction, foam core	
	C5.1 Composite (stack), non-metal - non-ferrous metal composite	
	C5.2 Composite (stack), non-metal - metal composite	
	C5.3 Composite (stack), non-metal - non-metallic composite	
	C5.4 Composite (stack), non-ferrous metal - non-ferrous metal composite	
	C5.5 Composite (stack), non-ferrous metal - metal composite	
C5.6 Composite (stack), metal - metal composite		
S	S1.1 Titanium, titanium alloys	< 400
	S2.1 Titanium, titanium alloys	< 1,200
	S2.2 Titanium, titanium alloys	> 1,200
	S3.1 Nickel, non-alloy and alloy	< 900
	S3.2 Nickel, non-alloy and alloy	> 900
	S4.1 High-temperature super alloy Ni, Co and Fe-based	
S5.1 Tungsten and molybdenum alloys		
H	H1.1 Hardened steel/cast steel	< 44
	H1.2 Hardened steel/cast steel	< 55
	H2.1 Hardened steel/cast steel	< 60
	H2.2 Hardened steel/cast steel	< 65
H3.1 Wear-resistant cast/chill casting, GJN	< 68	

* MAPAL machining groups

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

	ø < 5 [mm]		ø < 5-8 [mm]		ø < 8-12 [mm]		ø < 12-16 [mm]		ø < 16-20 [mm]		ø < 20-25 [mm]		ø < 25-31 [mm]	
	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]	v _c [m/min]	f [mm]
	60	0.06	60	0.08	60	0.10	60	0.12	60	0.14	60	0.18	60	0.22
	50	0.04	50	0.06	50	0.08	50	0.10	50	0.12	50	0.14	50	0.18
	50	0.04	50	0.06	50	0.08	50	0.10	50	0.12	50	0.14	50	0.18
	40	0.03	40	0.04	40	0.05	40	0.06	40	0.08	40	0.10	40	0.12
	50	0.04	50	0.06	50	0.08	50	0.10	50	0.12	50	0.14	50	0.18
	40	0.03	40	0.04	40	0.05	40	0.06	40	0.08	40	0.10	40	0.12
	30	0.04	30	0.05	30	0.06	30	0.07	30	0.08	30	0.09	30	0.12
	50	0.04	50	0.06	50	0.08	50	0.10	50	0.12	50	0.14	50	0.18
	30	0.04	30	0.05	30	0.06	30	0.07	30	0.08	30	0.09	30	0.12
	30	0.04	30	0.05	30	0.06	30	0.07	30	0.08	30	0.09	30	0.12
	25	0.04	25	0.05	25	0.06	25	0.07	25	0.08	25	0.09	25	0.12
	30	0.04	30	0.05	30	0.06	30	0.07	30	0.08	30	0.09	30	0.12
	25	0.04	25	0.05	25	0.06	25	0.07	25	0.08	25	0.09	25	0.12
	50	0.06	50	0.10	50	0.12	50	0.14	50	0.18	50	0.20	50	0.25
	45	0.06	45	0.10	45	0.12	45	0.14	45	0.18	45	0.20	45	0.25
	45	0.06	45	0.10	45	0.12	45	0.14	45	0.18	45	0.20	45	0.25
	45	0.06	45	0.10	45	0.12	45	0.14	45	0.18	45	0.20	45	0.25
	35	0.06	35	0.10	35	0.12	35	0.14	35	0.18	35	0.20	35	0.25
	35	0.06	35	0.10	35	0.12	35	0.14	35	0.18	35	0.20	35	0.25
	80	0.08	80	0.10	80	0.12	80	0.14	80	0.18	80	0.22	80	0.26
	80	0.08	80	0.10	80	0.12	80	0.14	80	0.18	80	0.22	80	0.26
	60	0.08	60	0.10	60	0.12	60	0.14	60	0.18	60	0.22	60	0.26
	60	0.08	60	0.10	60	0.12	60	0.14	60	0.18	60	0.22	60	0.26
	70	0.10	70	0.12	70	0.14	70	0.18	70	0.20	70	0.24	70	0.30
	70	0.10	70	0.12	70	0.14	70	0.18	70	0.20	70	0.24	70	0.30
	70	0.10	70	0.12	70	0.14	70	0.18	70	0.20	70	0.24	70	0.30
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	70	0.10	70	0.12	70	0.14	70	0.18	70	0.20	70	0.24	70	0.30
	70	0.10	70	0.12	70	0.14	70	0.18	70	0.20	70	0.24	70	0.30
	70	0.10	70	0.12	70	0.14	70	0.18	70	0.20	70	0.24	70	0.30
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	25	0.06	25	0.10	25	0.12	25	0.14	25	0.18	25	0.20	25	0.25
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	15	0.04	15	0.05	15	0.06	15	0.07	15	0.08	15	0.09	15	0.12
	12	0.04	12	0.05	12	0.06	12	0.08	12	0.08	12	0.10		
	12	0.04	12	0.05	12	0.06	12	0.08	12	0.08	12	0.10		
	8	0.04	8	0.05	8	0.06	8	0.08	8	0.08	8	0.10		
	8	0.04	8	0.05	8	0.06	8	0.08	8	0.08	8	0.10		
	12	0.04	12	0.05	12	0.06	12	0.08	12	0.08	12	0.10		

The specified cutting values are guide values.

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