

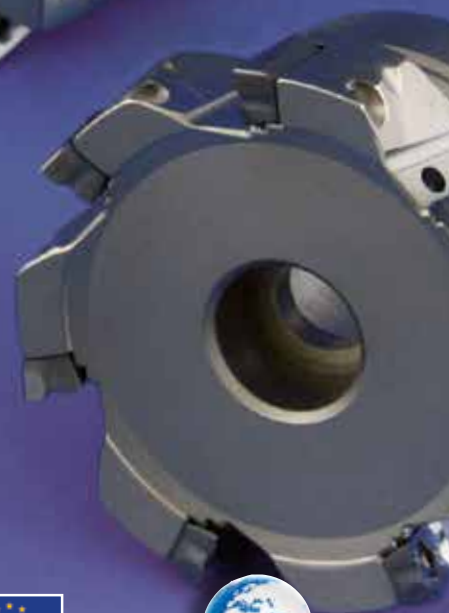


Jongen Werkzeugtechnik



The Milling System

Type B17



Products from



Willich



North Rhine-
Westphalia



Germany



Europe

for



Europe

and the



THE TOOL

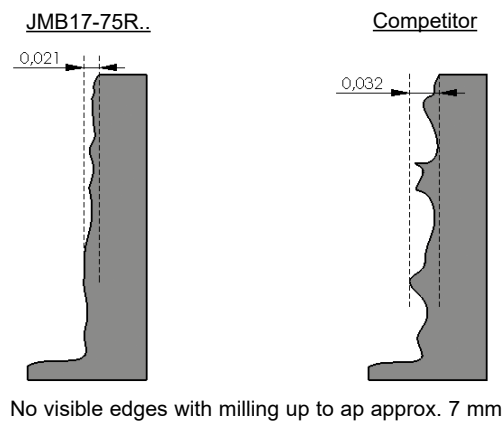
> Step milling programme that ensures smooth machining operations, with highest productivity and precision.

CHARACTERISTICS

Multi-functional step-, slot- and contour milling.

> The positive cutting geometry allows a smooth running with lowest vibrations rate.

> Almost step-free milling can be obtained.



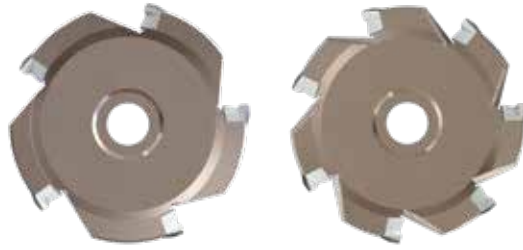
> The different tool versions shank-, screw-in-, shell- and multi-tooth milling cutters allow almost all usual milling operations.



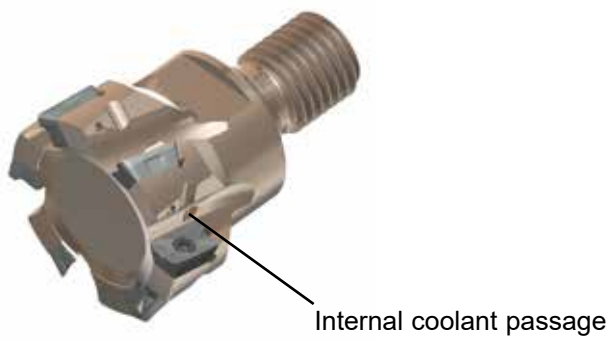
The different available versions are:

- Shell type cutters with normal and close tooth pitch, with diameter range 32-125 mm.
- Shank type milling cutters made to DIN1835-B, normal and close tooth pitch, diameters 20-40 mm
- Shank type milling cutters made to DIN1835-A, long version, diameter 20-32 mm
- Screw-in milling cutters for machining big cavities, diameters 20-40 mm.
- Multi-tooth milling cutters made to DIN1835-B, diameters 20-32 mm and as shell type mill with diameters available from 40-63 mm

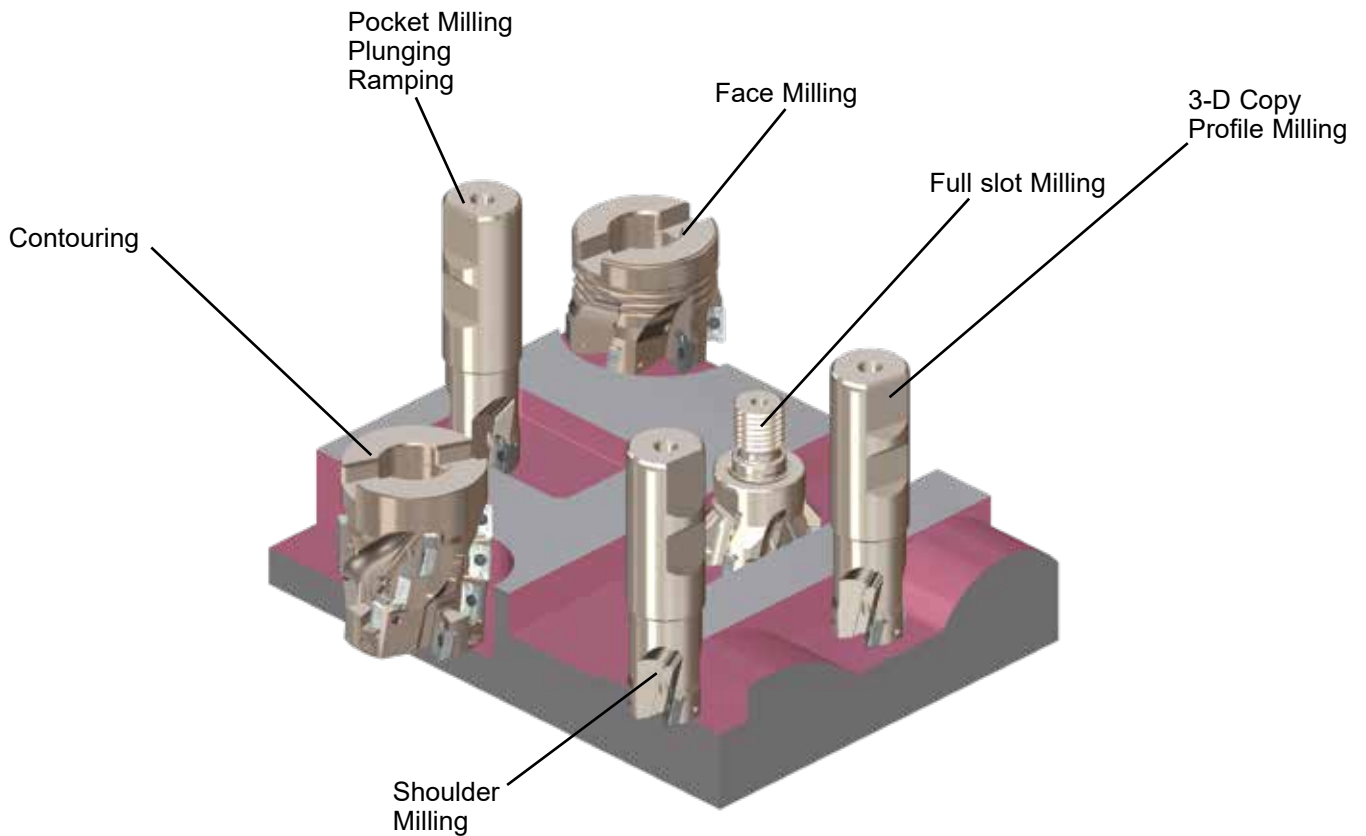
> Different numbers of teeth ensure the application of almost all milling operations, such as roughing, finishing, big cavities etc.



> All tools include internal coolant passages



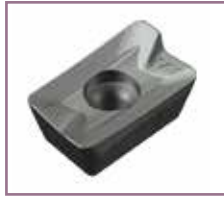
APPLICATION AREAS



THE INSERT

- > 2-edge step milling insert with a depth of cut (ap) of up to 10 mm, stable cutting edge, positive geometry.
- > The sales programme includes precision sintered as well as completely ground inserts, with different edge radii.

Precision sintered version:



JMB17-75R..
JMB17-275R..



JMB17-75MR..

with optimized cutting geometry in comparison to the JMB17-75R.. and JMB17-275R..

Precision ground version:



JMB17-76R..



JMB17-76MR..

with stabilized cutting geometry in comparison to the JMB17-76R..

Precision ground and polished version:



JMB17-76R..-K15M

- > Almost all usual materials can be processed, that means the aluminium machining, the cast iron machining, the machining of different steels and even difficult to mill materials.

Following carbide qualities are offered:

HC45



Code 41, DIN-ISO 513 Classification P30-P35, M25-M30, K20-K30

Very tough fine grain quality with a thick HIPIMS-coating for middle - high cutting speeds and high feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing of almost all steels such as structural steel, tool steel, heat-treatable steel as well as unalloyed, low alloyed and high alloyed steel, and also cast-qualities such as grey cast iron, globular graphite cast iron etc.

HT45



Code 31, DIN-ISO 513 Classification P30-P35, M25-M30, K20-K30

Very tough fine grain carbide with an AlTiN- Nanocomposit-coating for middle to high cutting speeds with high feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing of almost all steels and cast iron qualities such as: structural steel, tool steel, heat-treatable steel as well as unalloyed steel, low alloyed steel, high alloyed steel and also grey cast iron, globular graphite cast iron etc

HT50®



Code 22, DIN-ISO 513 Classification P30-P35, M25-M30, K20-K30

Very tough fine grain carbide quality with a TiAlN-coating for middle to high cutting speeds and high feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing of almost all steels and cast iron materials, e.g. structural steel, tool steel, heat-treatable steel as well as unalloyed steel, low alloyed steel, high alloyed steel and also grey cast iron, globular graphite cast iron etc.

HT32



Code 33, DIN-ISO 513 Classification P20-P30, M25-M30, S20-S30

Hard wearing and tough finest grain carbide with an AlTiN- Nanocomposit-coating for medium to high cutting speeds and middle feed rates. This quality is equally applicable for dry as well as wet milling. It is especially suited for processing stainless steel, tool steel as well as high alloyed steel.

HT30



Code 29, DIN-ISO 513 Classification P20-P30, M25-M30, S20-S30

Hard wearing and tough finest grain carbide with an multilayer AlTiN- Nanocompositcoating for middle cutting speeds and middle feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing high grade steel as well as high alloyed materials.

HC30



Code 52, DIN-ISO 513 Classification P20-P30, M25-M30, S20-S30

Hard wearing and tough finest grain carbide with HIPIMS-coating for middle cutting speeds and middle feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing high grade steel as well as high alloyed materials.

XC35



Code 46, DIN-ISO 513 Classification P20-P30, M20-M30, S15-S25

Wear resistant and tough finest grain hard metal quality with HIPIMS-coating. On the basis of the experience gained wet machining is preferably to be adopted with this quality; however the dry processing is also possible. XC35 has been especially developed for processing stainless steel, duplex steel and high-alloyed materials, but also for titanium etc..

HT20



Code 32, DIN-ISO 513 Classification K15-K20, H15-H20

Very hard wearing fine grain carbide with an AlTiN- Nanocomposit-coating for middle – high cutting speeds with high feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing of cast iron materials, e.g. grey-, tempered-, vermicular-, graphite- and globular graphite cast iron.

KT28



Code 23, DIN-ISO 513 Classification K15-K20, H15-H20

Very hard wearing fine grain carbide with a TiAlN-coating for middle to high cutting speeds and high feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing of cast iron materials such as: grey-, tempered-, vermicular-, graphite- and globular graphite cast iron.

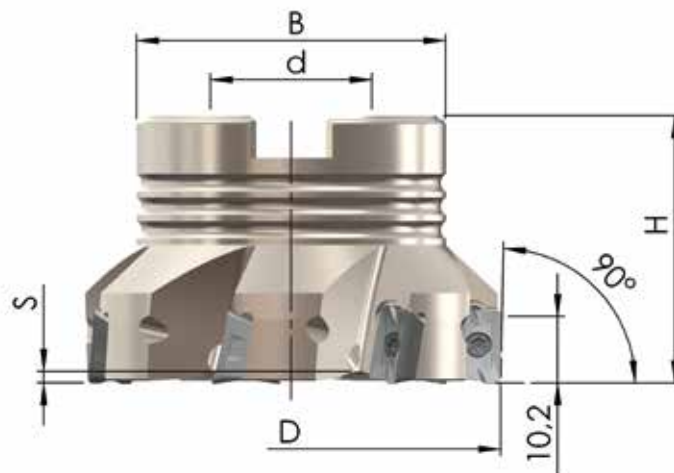
K15M



Code 8, DIN-ISO 513 Classification N20-N25

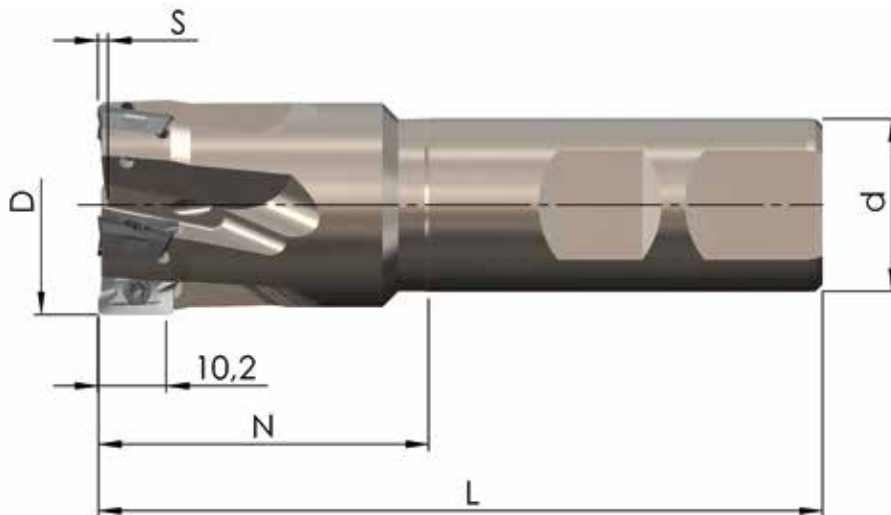
Very hard wearing fine grain carbide, for high cutting speeds with high feed rates. This quality is suitable for dry milling and can also be adopted with cooling. Application areas are roughing and finishing nonferrous heavy materials and aluminium up to a Si-content of approx. 8%.

Shell Type Milling Cutters



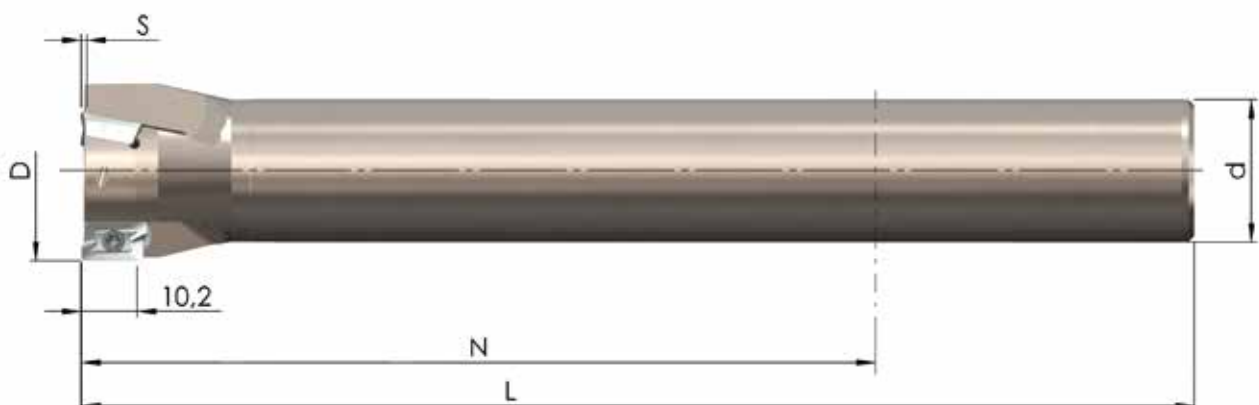
Order-Nr.	D	H	d	B	S	Z	MS
90PP-040-75-16-4	40	40	16	32	2,0	4	MS-8x25-912
90PP-040-75-22-4	40	40	22	38	2,0	4	MS-10x25-912
90PP-050-75-5	50	40	22	46	2,0	5	MS-10x25-912
90PP-063-75-5	63	40	22	46	2,0	5	MS-10x25-912
90PP-080-75-7	80	50	27	54	2,0	7	MS-12x35-912
90PP-100-75-9	100	50	32	64	2,0	9	MS-16x30-912
90PP-125-75-13	125	50	40	90	2,0	13	MS-20x45-7991
Close teeth pitch							
90PP-032-75-16-5	32	35	16	29	2,2	5	DS12
90PP-040-75-16-5	40	40	16	32	2,0	5	MS-8x25-912
90PP-040-75-22-5	40	40	22	38	2,0	5	MS-10x25-912
90PP-050-75-6	50	40	22	46	2,0	6	MS-10x25-912
90PP-063-75-7	63	40	22	46	2,0	7	MS-10x25-912
90PP-080-75-9	80	50	27	54	2,0	9	MS-12x35-912
90PP-100-75-12	100	50	32	64	2,0	12	MS-16x30-912

Shank Type Milling Cutters made to DIN 1835-B (Weldon)



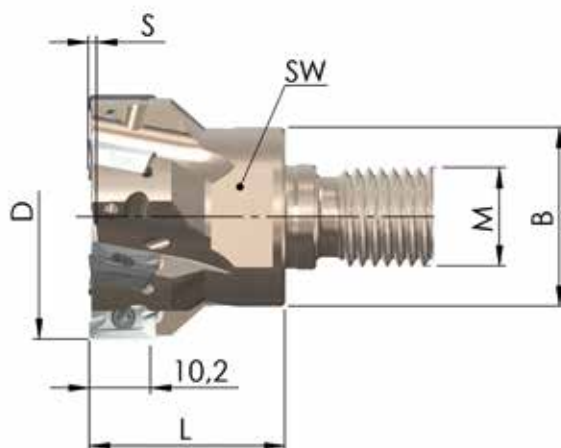
Order-Nr.	D	L	d	N	S	Z
90PP-20-32-75-2	20	82,4	20	32	2,0	2
90PP-20-50-75-2	20	100,4	20	50	2,0	2
90PP-22-33-75-3	22	83,3	20	33	2,0	3
90PP-25-38-75-3	25	95,2	25	38	2,0	3
90PP-25-60-75-3	25	117,2	25	60	2,0	3
90PP-28-42-75-4	28	98,4	25	42	2,0	4
90PP-30-45-75-4	30	101,3	25	45	2,0	4
90PP-32-48-75-3	32	104,3	25	48	2,0	3
90PP-32-60-75-3	32	116,3	25	60	2,0	3
90PP-36-48-75-5	36	104,2	25	48	2,0	5
90PP-40-48-75-5	40	104,1	25	48	2,0	5
Close teeth pitch						
90PP-20-30-75-3	20	81,8	20	30	2,0	3
90PP-25-38-75-4	25	95,2	25	38	2,0	4
90PP-32-48-75-5	32	104,3	25	48	2,0	5

Shank Type Milling Cutters made to DIN 1836 (cylindrical)







Order-Nr.	D	L	d	N	S	Z
90PP-16-75-2-150	16	150	16	101	1,3	2
90PP-20-75-2-150	20	150	18	101	2,0	2
90PP-25-75-2-170	25	170	20	119	2,0	2
90PP-32-75-3-195	32	195	25	138	2,0	3

Screw-In Cutters

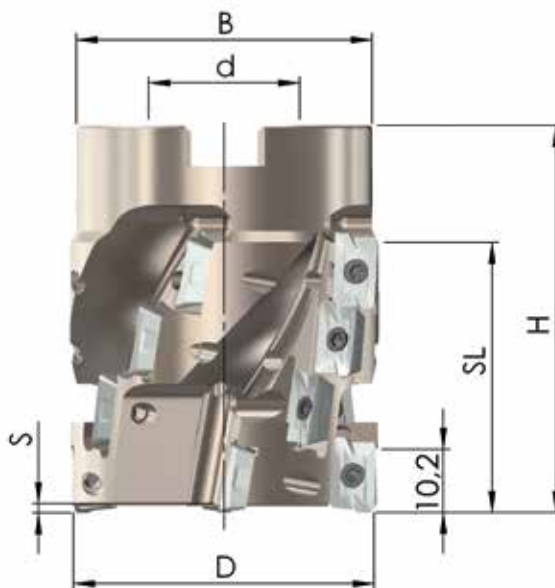


Order-Nr.	D	L	M	B	SW	S	Z
ESF-20-27-M10-75-2	20	27	M10	18,0	SW16	2,0	2
ESF-25-32-M12-75-3	25	32	M12	21,0	SW18	2,0	3
ESF-32-32-M16-75-3	32	32	M16	29,0	SW24	2,0	3
ESF-35-32-M16-75-4	35	32	M16	29,0	SW24	2,0	4
ESF-40-32-M16-75-4	40	32	M16	29,0	SW24	2,0	4
Close teeth pitch							
ESF-20-27-M10-75-3	20	27	M10	18,0	SW16	2,0	3
ESF-25-32-M12-75-4	25	32	M12	21,0	SW18	2,0	4
ESF-32-32-M16-75-5	32	32	M16	29,0	SW24	2,0	5
ESF-35-32-M16-75-5	35	32	M16	29,0	SW24	2,0	5
ESF-40-32-M16-75-6	40	32	M16	29,0	SW24	2,0	6

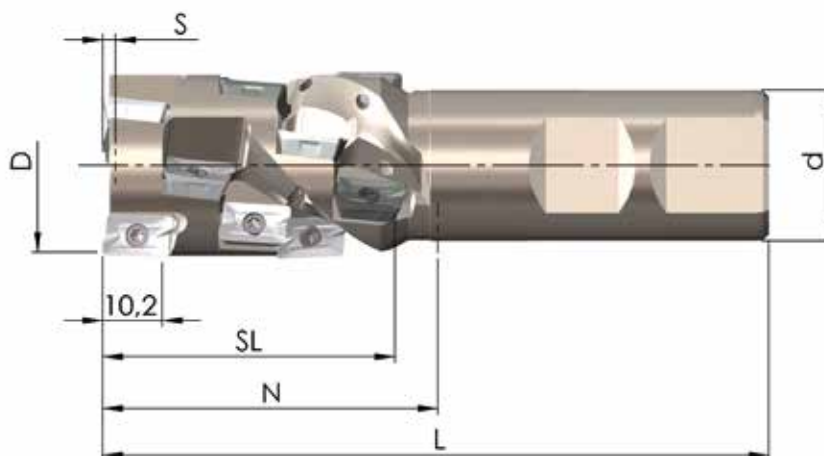
Spare Parts

	SS2,5-6	tightening torque 1,2 - 1,3 Nm	Fixing screw for tools with diam. 20
	SS2,5-7	tightening torque 1,2 - 1,3 Nm	Fixing screw
	T08+	Screw driver	
	100g	Heavy duty grease	

Multi-Tooth Milling Cutters



Order-Nr.	D	SL	H	d	B	S	Z _{eff.}	ZZ	MS
VZF 40-35-75-3 KD16	40	35	54	16	36	2,0	3	12	MS-8x40-912
VZF 50-35-75-4 KD22	50	35	60	22	46	2,0	4	16	MS-10x50-912
VZF 63-44-75-5 KD27	63	44	69	27	55	2,0	5	25	MS-12x60-912
Close pitch									
VZF 40-35-75-4 KD16	40	35	54	16	36	2,0	4	16	MS-8x40-912



Order-Nr.	D	SL	N	L	d	S	Z _{eff.}	ZZ
VZF 20-18-20-75-2	20	20	50	100	20	2,0	2	4
VZF 25-27-25-75-2	25	27	54	110	25	2,0	2	6
VZF 28-27-25-75-2	28	27	54	110	25	2,0	2	6
VZF 32-44-25-75-3	32	44	54	110	25	2,0	3	12
VZF 32-44-32-75-3	32	44	60	120	32	2,0	3	12

Inserts

			HC45 (code 41) 	HT45 (code 31) 	HT50 (code 22) 	HT32 (code 33) 	HT30 (code 29) 	HC30 (code 52) 	XC35 (code 46) 
	JMB17-75R04- 12,0x7,0x4,0 R0,4 	Order-No.		B17A-XM31	B17A-YK22	B17A-WL33	B17A-UH29		
	f_z [mm]			0,10 (0,05-0,30)	0,10 (0,05-0,30)	0,10 (0,05-0,30)	0,10 (0,05-0,30)		
	JMB17-275R04- 12,0x7,0x4,0 R0,4 	Order-No.		B17A-DT31		B17A-CX33			
	f_z [mm]			0,10 (0,05-0,30)		0,10 (0,05-0,30)			
	JMB17-275R08- 12,0x7,0x4,0 R0,8 	Order-No.		B17A-RA31		B17A-KJ33			
	f_z [mm]			0,10 (0,05-0,30)		0,10 (0,05-0,30)			
	JMB17-75MR10- 12,0x7,0x4,0 R1,0 	Order-No.	B17A-TK41					B17A-SH52	
	f_z [mm]			0,15 (0,05-0,30)				0,15 (0,05-0,30)	
	JMB17-75R10- 12,0x7,0x4,0 R1,0 	Order-No.		B17A-KU31	B17A-LK22	B17A-JP33	B17A-HT29		
	f_z [mm]			0,10 (0,05-0,30)	0,10 (0,05-0,30)	0,10 (0,05-0,30)	0,10 (0,05-0,30)		
	JMB17-76R04- 12,0x7,0x4,0 R0,4 	Order-No.			B17B-NK22		B17B-GP29		
	f_z [mm]				0,15 (0,10-0,30)		0,10 (0,05-0,30)		
	JMB17-76R06- 12,0x7,0x4,0 R0,6 	Order-No.			B17B-SX22		B17B-RK29		
	f_z [mm]				0,10 (0,05-0,30)		0,10 (0,05-0,30)		
	JMB17-76MR08- 12,0x7,0x4,0 R0,8 	Order-No.							B17B-AO46
	f_z [mm]								0,10 (0,09-0,25)
	JMB17-76R08- 12,0x7,0x4,0 R0,8 	Order-No.			B17B-WR22		B17B-UW29		B17B-ZS46
	f_z [mm]				0,10 (0,05-0,30)		0,10 (0,05-0,30)		0,10 (0,04-0,20)
	JMB17-76R02- 12,0x7,0x4,0 R0,2 	Order-No.							
	f_z [mm]								
	JMB17-76R04- 12,0x7,0x4,0 R0,4 	Order-No.							
	f_z [mm]								
	JMB17-76R06- 12,0x7,0x4,0 R0,6 	Order-No.							
	f_z [mm]								
			20	20	20	20	20	20	20

Inserts

			HT20 (code 32)	KT28 (code 23)	K15M (code 8)				
									
	JMB17-75R04- 12,0x7,0x4,0 R0,4	Order-No.		B17A-ZE23					
	 f_z [mm]			0,15 (0,10-0,30)					
	JMB17-275R04- 12,0x7,0x4,0 R0,4	Order-No.	B17A-BR32						
	 f_z [mm]			0,15 (0,10-0,30)					
	JMB17-275R08- 12,0x7,0x4,0 R0,8	Order-No.	B17A-FY32						
	 f_z [mm]			0,10 (0,05-0,30)					
	JMB17-75MR10- 12,0x7,0x4,0 R1,0	Order-No.							
	 f_z [mm]								
	JMB17-75R10- 12,0x7,0x4,0 R1,0	Order-No.		B17A-MU23					
	 f_z [mm]			0,10 (0,05-0,30)					
	JMB17-76R04- 12,0x7,0x4,0 R0,4	Order-No.		B17B-JT23					
	 f_z [mm]			0,10 (0,05-0,30)					
	JMB17-76R06- 12,0x7,0x4,0 R0,6	Order-No.		B17B-TY23					
	 f_z [mm]			0,10 (0,05-0,30)					
	JMB17-76MR08- 12,0x7,0x4,0 R0,8	Order-No.							
	 f_z [mm]								
	JMB17-76R08- 12,0x7,0x4,0 R0,8	Order-No.		B17B-YT23					
	 f_z [mm]			0,10 (0,05-0,30)					
	JMB17-76R02- 12,0x7,0x4,0 R0,2	Order-No.			B17D-NU08				
	 f_z [mm]				0,10 (0,05-0,30)				
	JMB17-76R04- 12,0x7,0x4,0 R0,4	Order-No.			B17D-MX08				
	 f_z [mm]				0,10 (0,05-0,30)				
	JMB17-76R06- 12,0x7,0x4,0 R0,6	Order-No.			B17D-NT08				
	 f_z [mm]				0,10 (0,05-0,30)				
			20	20	20				

PARAMETERS STEP MILLING

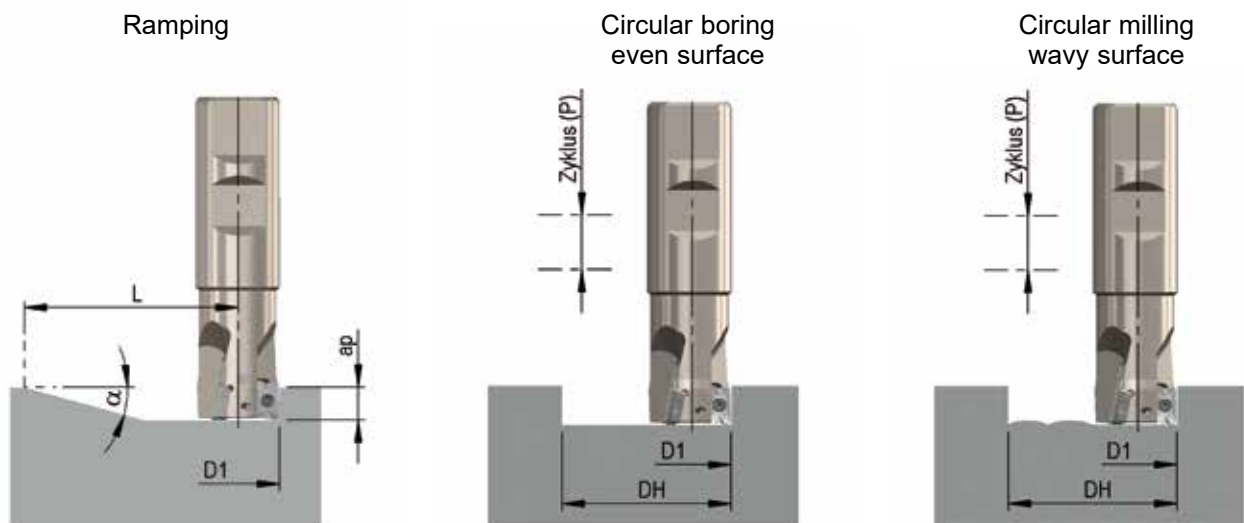
Material	Hardness	Quality	Depth of cut a_e [mm]	Cutting speed V_c [m/min.]	
P	Structural steel, Unalloyed steel	HC45 HT45 HT50	-0,25D	250 (200-350)	
			-0,5D		
			-0,75D		
			>0,75D-1D		
	Tool steel, Heat-treatable steel, Alloyed steel	180-350 HB	HC45 HT45 HT50 (HT32)	-0,25D	220 (160-280)
				-0,5D	
				-0,75D	
				>0,75D-1D	
M	Stainless-steel, High grade steel, High alloyed steel,	XC35 HC30 HT30 HT32 (HC45) (HT45) (HT50)	-0,25D	240 (140-300)	
			-0,5D		
			-0,75D		
			>0,75D-1D		
S	Heat-resistant super alloys Titan alloys	XC35 HC30 HT32 HC30 (HT30)	-0,25D	60 (40-200)	
			-0,5D		
			-0,75D		
			>0,75D-1D		
H	Tempered steel	HT20 KT28	-0,25D	80 (50-120)	
			-0,5D		
			-0,75D		
			>0,75D-1D		
K	Grey cast iron	HT20 KT28	-0,25D	250 (180-350)	
			-0,5D		
			-0,75D		
			>0,75D-1D		
	Globular graphite cast iron	<350 N/mm ²	HT20 KT28 (HC45) (HT45) (HT50)	-0,25D	200 (130-280)
				-0,5D	
				-0,75D	
				>0,75D-1D	
N	Aluminium Non-ferrous metals	K15M	-0,25D	500 (500-1000)	
			-0,5D		
			-0,75D		
			>0,75D-1D		

The above mentioned data are standard values.

Up and down corrections are admitted depending on the machine type, tool and holding fixture.

Feed rate per tooth f_z [mm]		
$\varnothing 20-28$	$\varnothing 30-50$	$\varnothing 63-125$
0,22 (0,18-0,30)	0,24 (0,18-0,30)	0,25 (0,18-0,30)
0,20 (0,18-0,28)	0,21 (0,18-0,28)	0,23 (0,18-0,28)
0,15 (0,10-0,25)	0,17 (0,10-0,25)	0,18 (0,10 -0,25)
0,12 (0,10-0,25)	0,14 (0,10-0,25)	0,15 (0,10-0,25)
0,22 (0,18-0,30)	0,23 (0,10-0,30)	0,25 (0,10-0,30)
0,20 (0,18-0,28)	0,21 (0,10-0,28)	0,23 (0,10-0,28)
0,15 (0,10-0,25)	0,18 (0,10-0,25)	0,18 (0,10-0,25)
0,12 (0,10-0,25)	0,13 (0,10-0,25)	0,15 (0,10-0,25)
0,18 (0,10-0,30)	0,19 (0,10-0,30)	0,20 (0,10-0,30)
0,12 (0,05-0,25)	0,13 (0,05-0,25)	0,14 (0,05-0,25)
0,10 (0,05-0,25)	0,13 (0,05-0,25)	0,12 (0,05-0,25)
0,10 (0,05-0,25)	0,11 (0,10-0,25)	0,13 (0,10-0,25)
0,18 (0,10-0,30)	0,19 (0,10-0,30)	0,20 (0,10-0,30)
0,12 (0,05-0,25)	0,13 (0,05-0,25)	0,14 (0,05-0,25)
0,10 (0,05-0,25)	0,13 (0,05-0,25)	0,12 (0,05-0,25)
0,08 (0,05-0,25)	0,09 (0,10-0,25)	0,10 (0,10-0,25)
0,10 (0,08-0,25)	0,10 (0,08-0,25)	0,10 (0,08-0,25)
0,07 (0,05-0,25)	0,07 (0,05-0,25)	0,07 (0,05-0,25)
0,06 (0,05-0,25)	0,06 (0,05-0,25)	0,06 (0,05-0,25)
0,05 (0,03-0,15)	0,05 (0,03-0,15)	0,05 (0,03-0,15)
0,27 (0,20-0,35)	0,29 (0,20-0,35)	0,30 (0,20-0,35)
0,26 (0,20-0,35)	0,27 (0,20-0,35)	0,28 (0,20-0,35)
0,21 (0,20-0,35)	0,22 (0,20-0,35)	0,23 (0,20-0,35)
0,19 (0,15-0,30)	0,20 (0,15-0,30)	0,20 (0,15-0,30)
0,27 (0,20-0,35)	0,29 (0,20-0,35)	0,30 (0,20-0,35)
0,26 (0,20-0,35)	0,27 (0,20-0,35)	0,28 (0,20-0,35)
0,21 (0,20-0,35)	0,22 (0,20-0,35)	0,23 (0,20-0,35)
0,19 (0,15-0,30)	0,20 (0,15-0,30)	0,20 (0,15-0,30)
0,42 (0,20-0,50)	0,43 (0,20-0,50)	0,45 (0,20-0,50)
0,37 (0,20-0,50)	0,39 (0,20-0,50)	0,40 (0,20-0,50)
0,32 (0,20-0,50)	0,34 (0,20-0,50)	0,35 (0,20-0,50)
0,27 (0,20-0,40)	0,29 (0,20-0,40)	0,30 (0,20-0,40)

PARAMETERS PROFILE MILLING AND CIRCULAR MILLING



D1	Ramping Angle		Circular boring (flat surface)				Circular milling (wavy surface)	
	Anlge of lead max. α (°)	Processing distance min. L (mm)	Diam. max. DH (mm)	Depth of cut max. cycle P (mm)	Diam. min. DH (mm)	Depth of cut max. cycle P (mm)	Diam. min. DH (mm)	Depth of cut max. cycle P (mm)
20	7,9	13	39,2	4,6	38	4,3	33,5	3,3
22	6,8	15	43,2	4,4	42	4,2	37,5	3,2
25	5,7	18	49,2	4,2	48	4,0	43,5	3,2
28	4,9	21	55,2	4,1	54	3,9	49,5	3,2
30	4,5	23	59,2	4,0	58	3,8	53,5	3,2
32	4,1	25	63,2	3,9	62	3,8	57,5	3,2
35	3,7	28	69,2	3,8	68	3,7	63,5	3,2
36	3,6	29	71,2	3,8	70	3,7	65,5	3,2
40	3,1	33	79,2	3,7	78	3,6	73,5	3,2
50	2,4	43	99,2	3,6	98	3,5	93,5	3,2
63	1,8	56	125,2	3,5	124	3,4	119,5	3,2
80	1,4	73	159,2	3,4	158	3,4	153,5	3,2
100	1,1	93	199,2	3,4	198	3,3	193,5	3,2
125	0,9	118	249,2	3,3	248	3,3	243,5	3,2

Formula for calculating the max. angle of immersion:

$$\tan \alpha = \frac{s}{(D-7)}$$

s = Variable (see above)
7 = Insert's width
D = Tool diam.

FORMULAE FOR MILLING

RPM of spindle:

$$n = \frac{1000 \cdot v_c}{D \cdot \pi} \text{ [min}^{-1}\text{]}$$

Cutting speed:

$$v_c = \frac{D \cdot \pi \cdot n}{1000} \text{ [m/min]}$$

Feed rate:

$$v_f = f_z \cdot Z \cdot n \text{ [mm/min]}$$

Average chip thickness:

$$h_m \approx f_z \sqrt{\frac{a_e}{D}} \text{ [mm]} \quad \rightarrow \quad f_z \approx h_m \sqrt{\frac{D}{a_e}} \text{ [mm]}$$

Chip volume per minute when milling:

$$Q = \frac{a_p \cdot a_e \cdot v_f}{1000} \text{ [cm}^3\text{/min]}$$

Controlled Machine Time:

$$t_n = \frac{L \cdot i}{v_f} \text{ [min]}$$

Specific cutting force

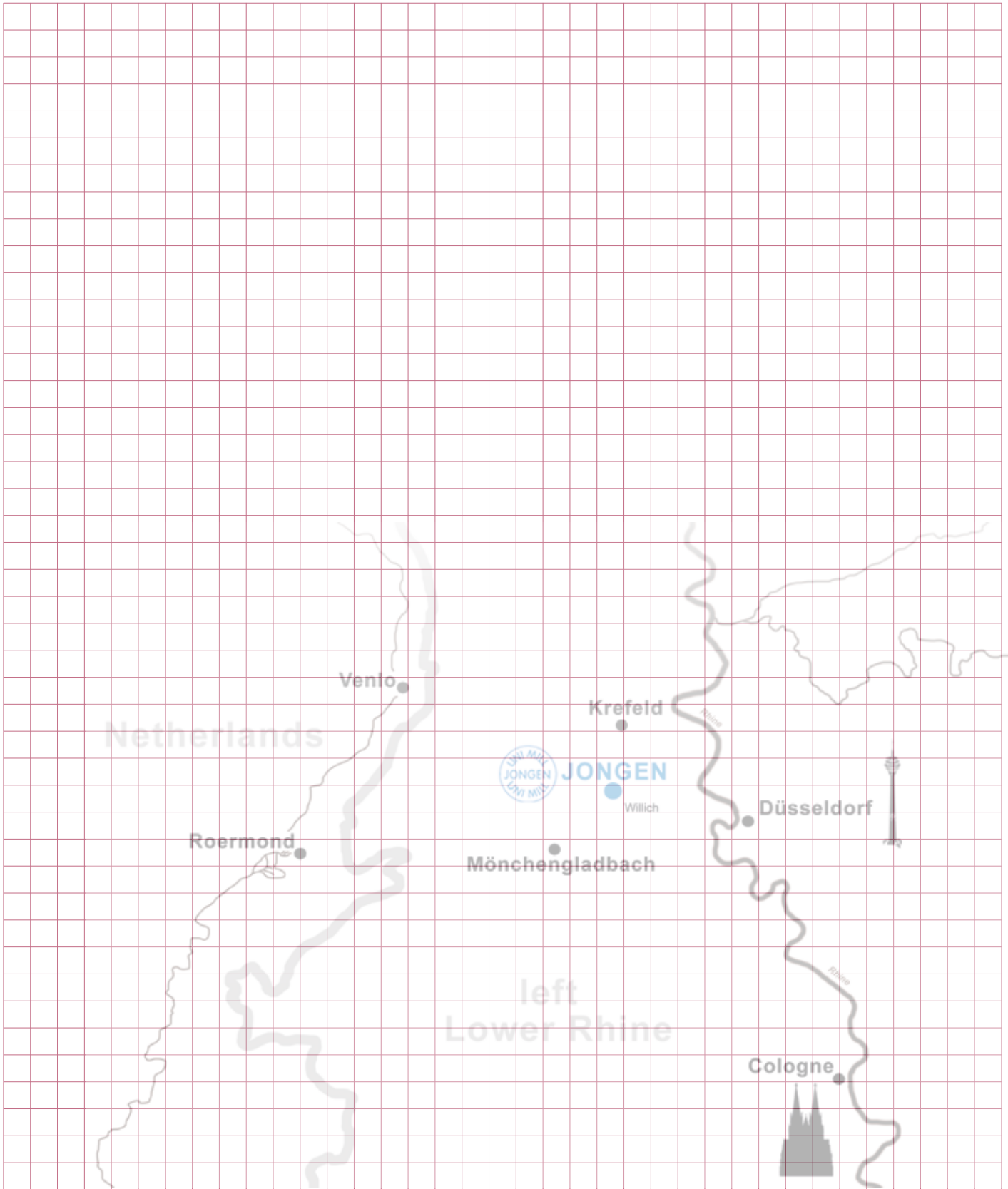
$$k_c = h_m^{-mc} \cdot k_{c 1.1} \text{ [N/mm]}$$

Spindle power

$$P_s = \frac{a_p \cdot a_e \cdot v_f \cdot k_c}{60 \cdot 10^6} \text{ [kW]}$$

Motor power

$$P_c = \frac{P_s}{\eta} \text{ [kW]}$$



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