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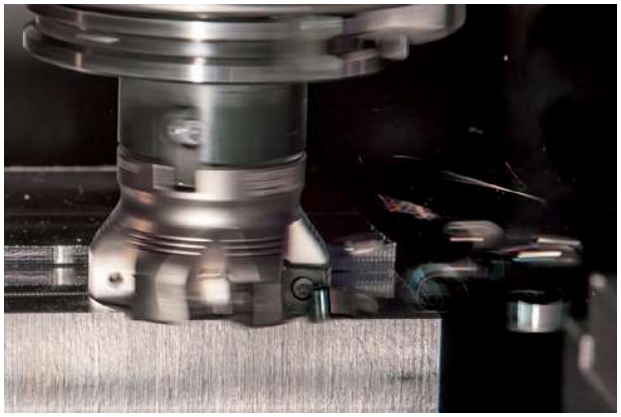
MaxiMill 491
The new 90° shoulder milling system

The new MaxiMill 491 shoulder milling system from Cutting Solutions by CERATIZIT features 8 usable cutting edges per insert and shows excellent performance, quality and price-performance ratio.

Thanks to the latest grinding technology, the precision inserts can be produced with tolerance H. This enhances the service life of the cutting edge, allowing top-quality surfaces to be achieved on your component.



Reduced vibration is a particular advantage when it comes to low-power machines and thin-walled, unstable components.

Your advantages

- ▲ Exact 90° profile with 8 usable cutting edges per insert
- ▲ Ground precision insert with tolerance H
- ▲ Smooth cut with low power consumption
- ▲ Outstanding surface quality
- ▲ Universal application (e.g. face milling, shoulder milling, peripheral milling, slot milling, trochoidal slot milling)
- ▲ Tools with irregular pitch for minimum vibration during the milling operation
- ▲ Optimum chip evacuation
- ▲ Coolant arrives directly on the cutting edge; emulsion, MQL or compressed air can be used

Your benefits

- ▲ Excellent economic efficiency regarding the price per cutting edge for 90° shoulder milling
- ▲ Exact 90° profile
- ▲ Perfect axial run-out precision and concentricity
- ▲ Very good suitability for low-power machines
- ▲ Quick and easy loading of the milling cutter possible

Maximum repeatability thanks to innovative insert design with generous contact faces

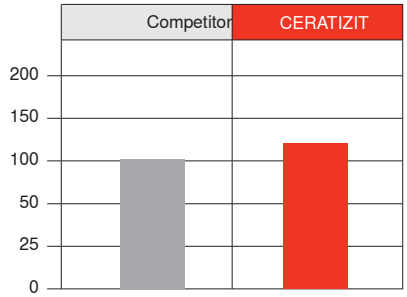
Perfectly adapted chip pockets

A practical example

Spheroidal cast iron

	Competitor	CERATIZIT
Milling cutter	–	A491.80.R.08-12
Insert	–	SNHU 12048SR-R50
Grade	–	CTPK220
Cutting edge/insert	4	**8**
V_c [m/min]	301	301
V_f [mm/rev]	1200	1200
a_p [mm]	0,5	0,5
Quantity	100	**120**

Quantity



+20%

Insert start programme

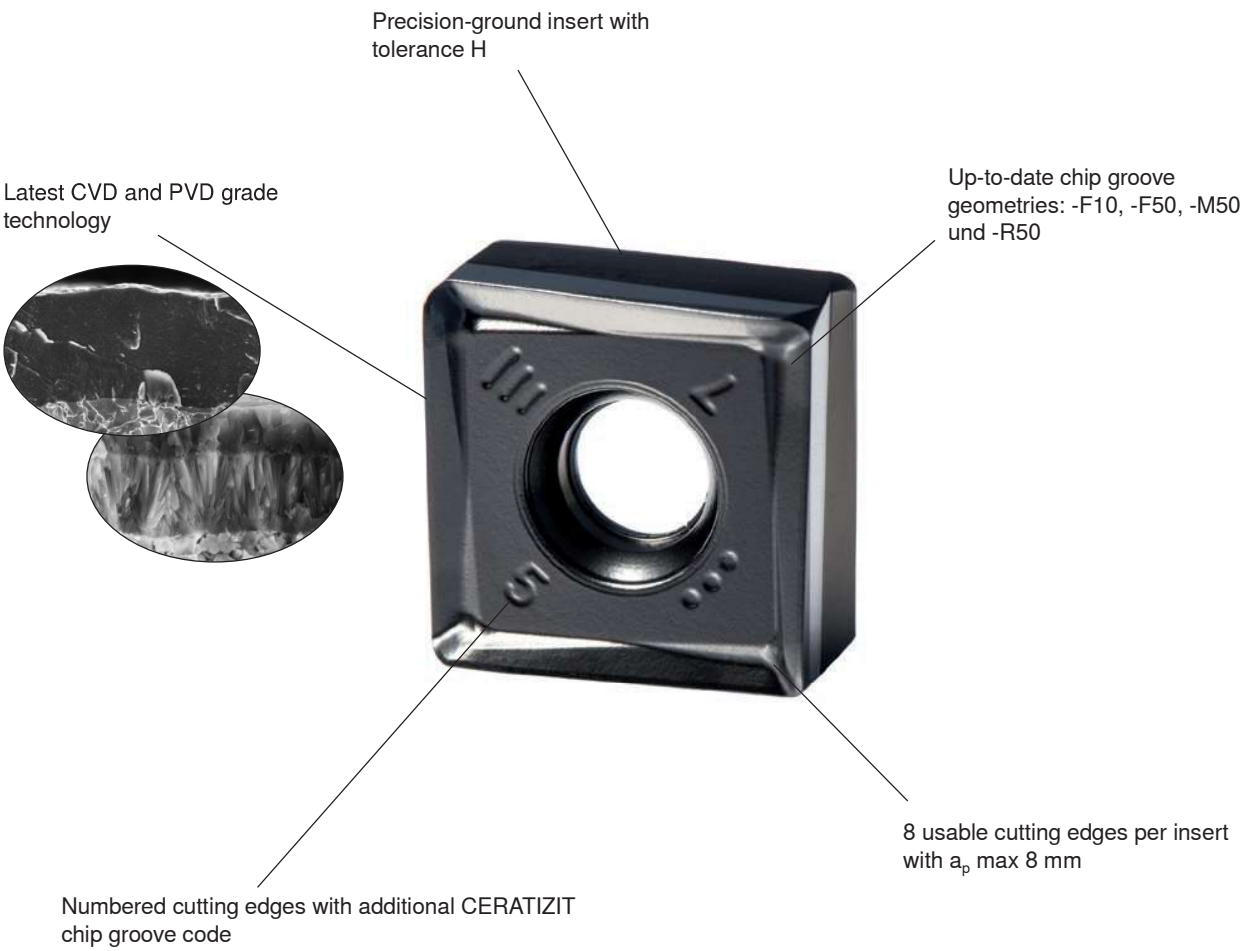
The insert start programme for ISO P steel, ISO K cast iron and ISO M stainless steel machining features the latest BLACKSTAR™ and SILVERSTAR™ manufacturing technology. For the machining of aluminium, the proven CTWN215 grade is used.

▲ Extended range of corner radii 1.2 mm - 1.6 mm - 2.0 mm

In addition to corner radius 0.8 mm the product range has been extended with the corner radii 1.2 mm, 1.6 mm and 2.0 mm.

BLACKSTAR™

SILVERSTAR™



MaxiMill 491 - product launch

The product launch of MaxiMill 491 will start with a 12 mm assembly size and includes Ø ranging from 32-160 mm. Cutting Solutions by CERATIZIT offers you shell milling cutters, end mills and milling cutters with threaded shank. The end milling cutters are available with a wide or narrow pitch. The F-M-R chip grooves combined with the latest grade technology cover applications for a variety of materials ranging from steel to cast iron, stainless steels (ISO P K M) and aluminium.

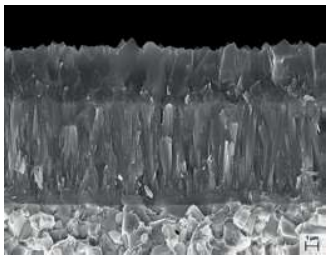
Grade overview

Grade designation	Standard designation ISO	Standard designation ANSI	*Type of cutting material	Application range 01 05 10 15 20 25 30 35 40 45 50	P Steel	M Stainless	K Cast iron	N Non-ferrous metals	S Heat-resistant	H Hard materials
CTCP230 BLACKSTAR™	HC-P30	C6	C		●					
	HC-K25	C2	C				●			
	HC-M25	-	C			○				
CTPP235 SILVERSTAR™	HC-P35	C5	P		●					
	HC-M30	-	P			○				
CTPM240 SILVERSTAR™	HC-M40	-	P			●				
	HC-P40	C5	P		○					
CTCK215 BLACKSTAR™	HC-K15	C3	C				●			
CTPK220 SILVERSTAR™	HC-K20	C2	P				●			
CTWN215	HW-N15	C3	W					●		
	HW-K15	C3	W				●			

● Main application

○ Extended application

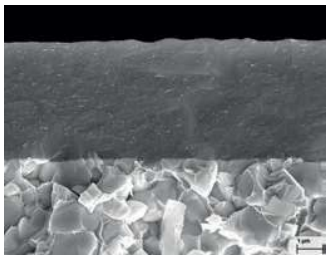
CTCP230 BLACKSTAR™	HC-P30 | HC-K25 | HC-M25	● ● ○



Specification:
Composition: Co 10.5%; mixed carbides 2.0%; WC balance | Grain size: 1-2 µm | Hardness: HV_{30} 1400 | Coating specification: CVD TiCN-Al_2O_3

Recommended application:
First choice for dry machining of steels at high cutting speeds.

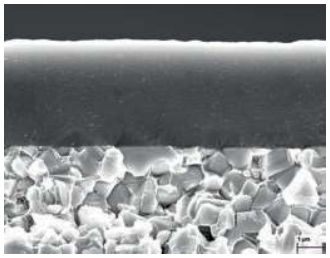
CTPP235 SILVERSTAR™	HC-P35 | HC-M30	● ○



Specification:
Composition: Co 10.5%; mixed carbide 2.0%; WC balance | Grain size: 1-2 µm | Hardness: HV_{30} 1400 | Coating specification: PVD TiAlTaN

Recommended application:
Particularly suitable for the wet machining of steels.

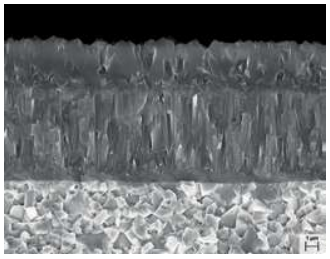
CTPM240 SILVERSTAR™	HC-M40 | HC-P40	● ○



Specification:
Composition: Co 12.5%; mixed carbides 2.0%; WC balance | Grain size: 1 µm | Hardness: HV_{30} 1380 | Coating specification: PVD TiAlTaN

Recommended application:
The first choice for the machining of austenitic steels.

CTCK215 BLACKSTAR™	HC-K15	●

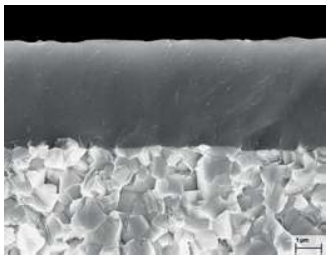


Specification:
Composition: Co 6.0%; mixed carbides 2.0%; WC balance | Grain size: 1 µm | Hardness: HV_{30} 1630 | Coating specification: CVD TiN; MT-TiCN; Al_2O_3

Recommended application:
The first choice for the machining of cast iron at high cutting speeds.

Grade description

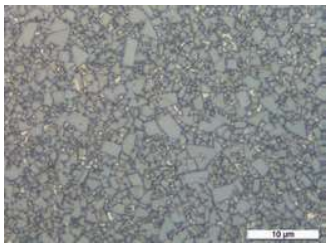
CTPK220 SILVERSTAR™	HC-K20	●



Specification:
Composition: Co 6.0%; mixed carbides 2.0%; WC balance | Grain size: 1 μm | Hardness: HV_{30} 1630 | Coating specification: PVD TiAlTaN

Recommended application:
Optimal for the machining of high-tensile cast iron materials when toughness is required.

CTWN215	HW-N15 | HW-K15	● ●

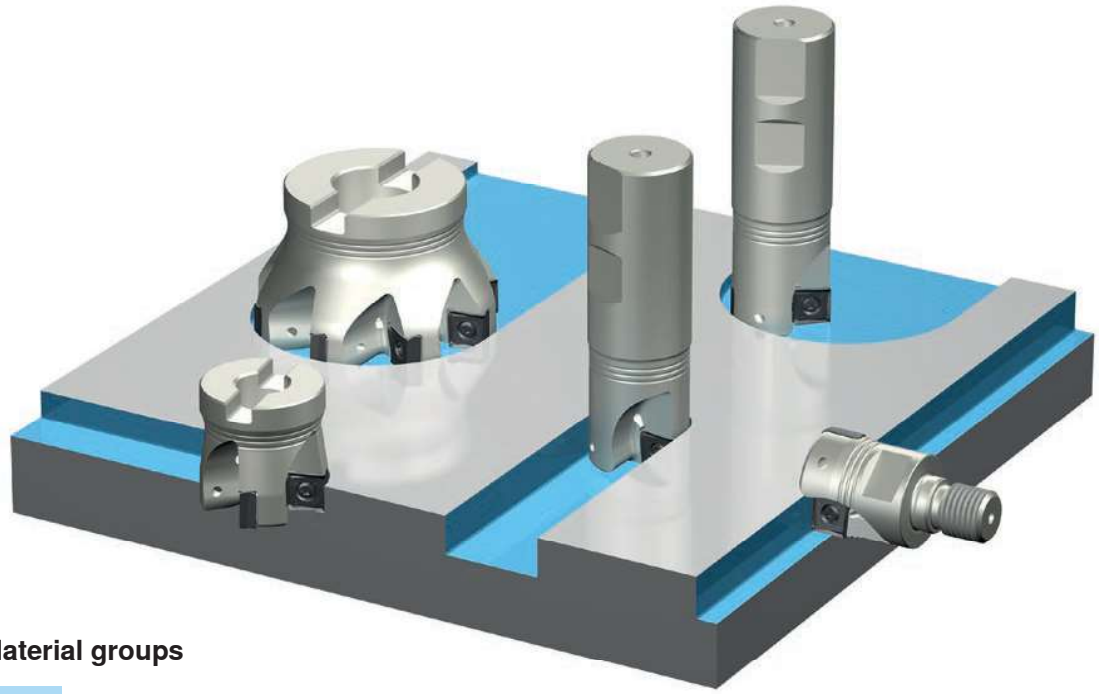


Specification:
Composition: Co 6.0%; others 0.2%; WC balance | Grain size: submicron | Hardness: HV_{30} 1650

Recommended application:
The uncoated carbide grade for the machining of aluminium and other non-ferrous metals.

90° shoulder milling system with 8 cutting edges per insert

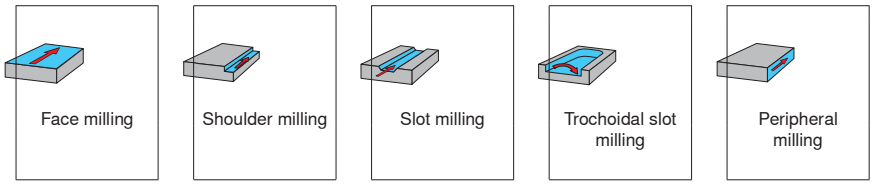
- Exact 90° profile
- Easy handling
- Ground precision insert with tolerance H



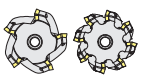
Material groups

P	●
M	○
K	●
N	●
S	
H	

Possible applications



Detailed information

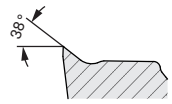
Pitch	Ø range	Inserts
	Ø 32 - 160 mm	SNHU 12..

MaxiMill 491 system

Geometry overview

-F10

- Highly positive geometry
- Sharp cutting edge
- Low tendency to adhesion
- First choice for non-ferrous metals



f_z [mm]

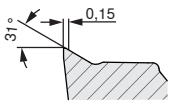
0,05 - 0,25

Machining conditions

CTWN215		
CTWN215	**CTWN215**	**CTWN215**

-F50

- Positive geometry
- Finishing and roughing
- First choice for stainless steel materials



f_z [mm]

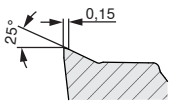
0,10 - 0,20

Machining conditions

CTPM240	**CTPM240**	

-M50

- Universal geometry
- Light to medium roughing operations
- First choice for general steel materials



f_z [mm]

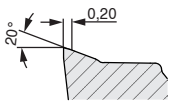
0,10 - 0,25

Machining conditions

	CTCP230 CTPP235	CTCP230 **CTPP235**
	CTPM240	**CTPM240**

-R50

- Stable geometry
- Roughing
- For heavily interrupted cut
- First choice for cast iron materials

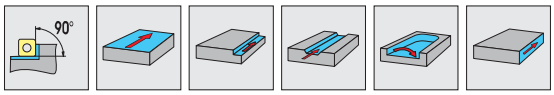


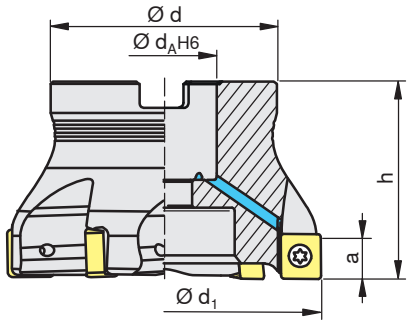
f_z [mm]

0,10 - 0,30

Machining conditions

	CTCK215 CTPK220	CTCK215 **CTPK220**



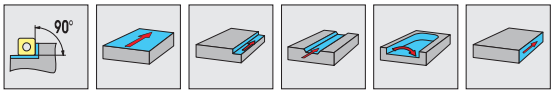


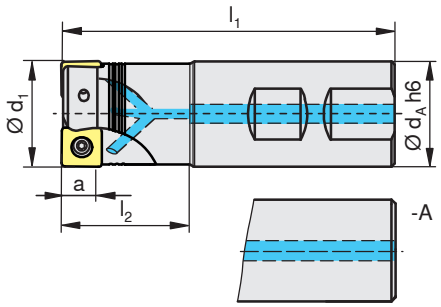
	d_1 [mm]	Type, description	h [mm]	d [mm]	d_A [mm]	a [mm]	z	n_{max} [min^{-1}]	[Nm]		
	40	A491.40.R.03-12	40	38	16	8	3	11500	3.2	SNHU 1204..	E01
	40	A491.40.R.04-12	40	38	16	8	4	11500	3.2	SNHU 1204..	E01
	50	A491.50.R.04-12	40	43	22	8	4	9800	3.2	SNHU 1204..	E02
	50	A491.50.R.05-12	40	43	22	8	5	9800	3.2	SNHU 1204..	E02
	63	A491.63.R.05-12	40	48	22	8	5	8500	3.2	SNHU 1204..	E02
	63	A491.63.R.06-12	40	48	22	8	6	8500	3.2	SNHU 1204..	E02
	80	A491.80.R.06-12	50	58	27	8	6	7400	3.2	SNHU 1204..	E02
	80	A491.80.R.08-12	50	58	27	8	8	7400	3.2	SNHU 1204..	E02
	100	A491.100.R.07-12	50	78	32	8	7	6500	3.2	SNHU 1204..	E02
	100	A491.100.R.10-12	50	78	32	8	10	6500	3.2	SNHU 1204..	E02
	125	A491.125.R.08-12	63	88	40	8	8	5700	3.2	SNHU 1204..	E02
	125	A491.125.R.12-12	63	88	40	8	12	5700	3.2	SNHU 1204..	E02
	160	A491.160.R.09-12	63	98	40	8	9	5000	3.2	SNHU 1204..	E02
	160	A491.160.R.14-12	63	98	40	8	14	5000	3.2	SNHU 1204..	E02

E01	11036880	11610311	11450867	8095012000	4425
E02		11610311	11450867	8095012000	

MaxiMill 491 system

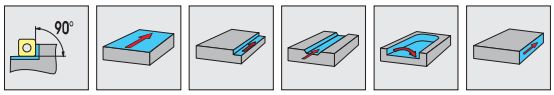
C491-12

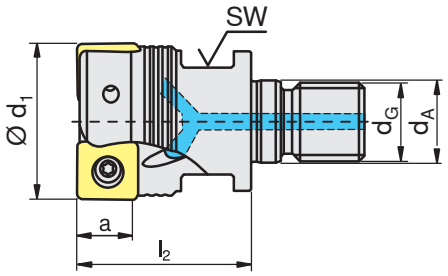




d1 [mm]	Type, description	l1 [mm]	l2 [mm]	dA [mm]	a [mm]	z	nmax [min-1]	[Nm]		
32	C491.32.R.02-12-A-63-250	250	63	32	8	2	10200	3.2	SNHU 1204..	E01
32	C491.32.R.02-12-B-40	102	40	32	8	2	13600	3.2	SNHU 1204..	E01

E01	11610311	11450867	8095012000





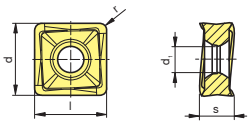
d1 [mm]	Type, description	l2 [mm]	dG [mm]	dA [mm]	a [mm]	z	nmax [min-1]	[Nm]		
32	G491.32.R.02-12	35	16	17.0	8	2	13600	3.2	SNHU 1204..	E01

E01	11610311	11450867	8095012000

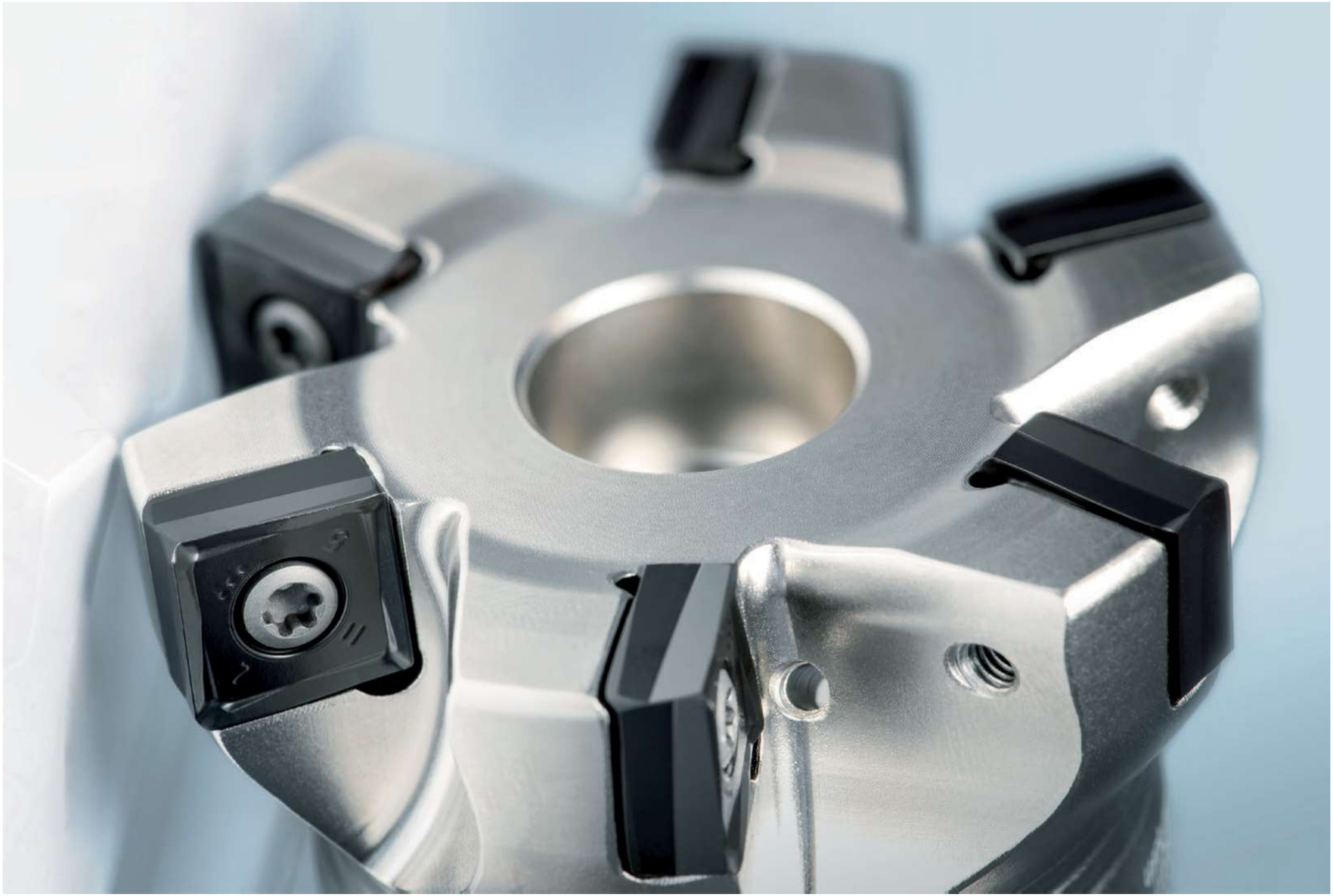
MaxiMill 491 system

SNHU..

			CTCP230	CTPP235	CTPM240	CTCK215	CTPK220	CTWN215	d [mm]	l [mm]	s [mm]	r [mm]	d_1 [mm]
P			●	●	○								
M			○	○	●								
K			●			●	●	●					
N								●					
S													
H													
-F10		SNHU 120408FR-F10						●	12.20	12.20	5.00	0.80	4.40
		SNHU 120412FR-F10						●	12.20	12.20	5.00	1.20	4.40
		SNHU 120416FR-F10						●	12.20	12.20	5.00	1.60	4.40
		SNHU 120420FR-F10						●	12.20	12.20	5.00	2.00	4.40
-F50		SNHU 120408SR-F50			●				12.20	12.20	5.00	0.80	4.40
		SNHU 120412SR-F50			●				12.20	12.20	5.00	1.20	4.40
		SNHU 120416SR-F50			●				12.20	12.20	5.00	1.60	4.40
		SNHU 120420SR-F50			●				12.20	12.20	5.00	2.00	4.40
-M50		SNHU 120408SR-M50	●	●	●				12.20	12.20	5.00	0.80	4.40
		SNHU 120412SR-M50		●					12.20	12.20	5.00	1.20	4.40
		SNHU 120416SR-M50		●					12.20	12.20	5.00	1.60	4.40
		SNHU 120420SR-M50		●					12.20	12.20	5.00	2.00	4.40
-R50		SNHU 120408SR-R50				●	●		12.20	12.20	5.00	0.80	4.40
		SNHU 120412SR-R50				●			12.20	12.20	5.00	1.20	4.40
		SNHU 120416SR-R50				●			12.20	12.20	5.00	1.60	4.40
		SNHU 120420SR-R50				●			12.20	12.20	5.00	2.00	4.40
			CTCP230	CTPP235	CTPM240	CTCK215	CTPK220	CTWN215	d	l	s	r	d_1



#R01# #R02# #R03#



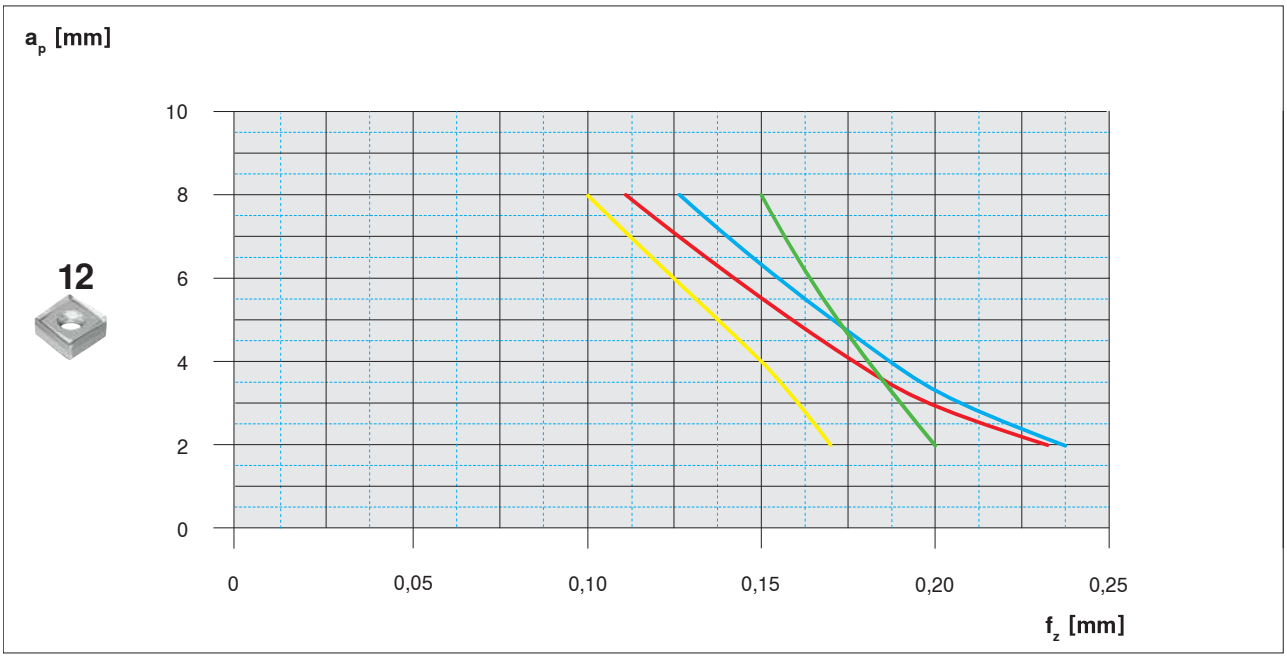
MaxiMill 491 system

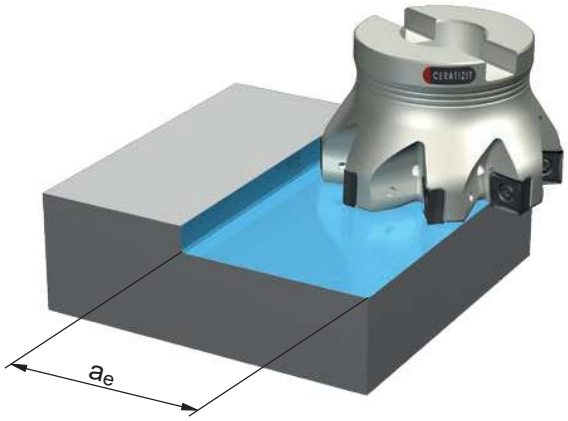
Starting parameters for example materials

Materials				Insert		v_c [m/min]	Coolant
▼	1.2312	40CrMnMoS8-6	1.000 N/mm²	SNHU 120408SR-M50	CTPP235	200	dry
▼	1.4571	X6CrNiMoTi17-12-2	600 N/mm²	SNHU 120408SR-F50	CTPM240	140	dry
▼	5.1301	EN-GJL-250	HB 180	SNHU 120408SR-R50	CTCK215	250	dry
▼	3.4365	Alu	450 N/mm²	SNHU 120408SR-F10	CTCK215	1500	Minimum quantity lubrication

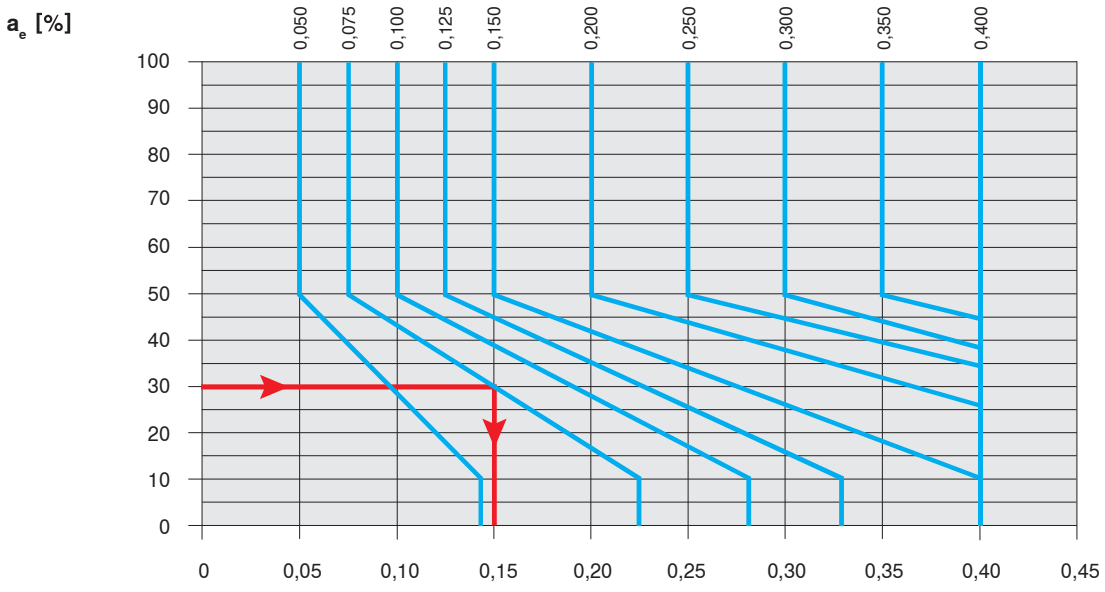
If a_e < 50% use correction list

#R01#





Starting values f_z [mm] from starting parameter diagram



Corrected values f_z [mm]

These parameters apply for cutting width (a_e) below 50%

Example:
Starting value [f_z] = 0.075 mm
a_e = 30%
Corrected value [f_z] = 0.15 mm

	Material	Type, description
	11036880	7818267/M8,0x30,0

	Material	Type, description	Key size	Torque moment [Nm]	Torque moment [in.lbs] [lb]
	11450867	DMSD 3,2Nm/SORT 15IP	IP15	3.2	28,3

	Material	Type, description	Key size
	8095012000	SD-T15IP-80mm	15IP
	4425	S4/SW4	SW4

	Material	Type, description	l [mm]	Thread size	Key size
	11610311	M3,5X8,6-15IP/10008749	8.6	M3,5	15IP

Cutting data

Grades, material

	Work piece material	Type of treatment / alloy		VDI 3323 group	Hard-ness HB
P	Non alloyed steel	annealed	≤ 0.15 % C	1	125
		annealed	0.15 % - 0.45 % C	2	150 - 250
		tempered	≥ 0.45 % C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Stainless steel	annealed	ferritic / martensitic	12	200
		tempered	martensitic	13	325
		heat-treated	ferritic / martensitic	13	200
M	Stainless steel	quenched	austenitic	14	180
		quenched	ferritic / austenitic (Duplex)	14	230 - 260
		hardened	austenitc, precipitation hardened (PH)	14	330
K	Grey cast iron		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	250
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12 % Si	23	75
		hardened	< 12 % Si	24	90
		non hardened	> 12 % Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	(110)
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	28	100
	Non-metallic materials		thermosetting plastics	29	–
			fibre-reinforced plastics	29	–
			hard rubber	30	–
S	Heat-resistant alloys	annealed	Fe-base	31	200
		hardened	Fe-base	32	280
		annealed	Ni or Co-base	33	250
		hardened	Ni or Co-base 30 - 58 HRC	34	(350)
		cast	Ni or Co-base 1500 - 2200 N/mm²	35	(320)
	Titanium alloys		pure titanium	36	R_m 440*
			alpha + beta alloys	37	R_m 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		41	55 HRC

* R_m = ultimate tensile strength, measured in MPa

CTCP230		CTPP235		CTPM240		CTCK215		CTPK220	
v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]
280	150	240	140	220	120				
250	135	210	120	190	110				
190	110	160	100	140	90				
250	135	220	120	200	110				
190	110	160	100	140	90				
140	100	120	90	100	70				
130	90	110	80	110	80				
80	60	80	60	80	60				
130	90	110	80	110	80				
90	60	80	60	80	60				
130	90	110	80	110	80				
		150	110	170	110				
		150	110	160	110				
		130	90	130	90				
310	190					360	210	320	190
160	100					220	130	170	100
200	120					230	140	210	130
130	80					160	100	140	90
190	115					250	150	200	120
160	100					210	130	170	100

The cutting data are non-binding indications for the operator. It is recommended to adapt them to the current conditions.

Cutting data

Grades, material

	Work piece material	Type of treatment / alloy		VDI 3323 group	Hard-ness HB
P	Non alloyed steel	annealed	≤ 0.15 % C	1	125
		annealed	0.15 % - 0.45 % C	2	150 - 250
		tempered	≥ 0.45 % C	3	300
	Low alloyed steel	annealed		6	180
		tempered		7 / 8	250 - 300
		tempered		9	350
	High alloyed steel	annealed		10	200
		tempered		11	350
	Stainless steel	annealed	ferritic / martensitic	12	200
		tempered	martensitic	13	325
		heat-treated	ferritic / martensitic	13	200
M	Stainless steel	quenched	austenitic	14	180
		quenched	ferritic / austenitic (Duplex)	14	230 - 260
		hardened	austenitc, precipitation hardened (PH)	14	330
K	Grey cast iron		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	250
	Malleable cast iron		ferritic	19	130
			pearlitic	20	230
N	Aluminium wrought alloys	non hardened		21	60
		hardened		22	100
	Aluminium cast alloys	non hardened	< 12 % Si	23	75
		hardened	< 12 % Si	24	90
		non hardened	> 12 % Si	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	(110)
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	28	100
	Non-metallic materials		thermosetting plastics	29	–
			fibre-reinforced plastics	29	–
			hard rubber	30	–
S	Heat-resistant alloys	annealed	Fe-base	31	200
		hardened	Fe-base	32	280
		annealed	Ni or Co-base	33	250
		hardened	Ni or Co-base 30 - 58 HRC	34	(350)
		cast	Ni or Co-base 1500 - 2200 N/mm²	35	(320)
	Titanium alloys		pure titanium	36	R_m 440*
			alpha + beta alloys	37	R_m 1050*
H	Tempered steel	hardened and tempered		38	55 HRC
		hardened and tempered		39	60 HRC
	Chilled castings	cast		40	400
	Tempered cast iron	hardened and tempered		41	55 HRC

* R_m = ultimate tensile strength, measured in MPa

	CTWN215	
	v_c [m/min]	v_c [m/min]
	130	130
	110	110
	130	130
	120	120
	130	130
	110	120
		1500
		1000
		1100
		1000
		280
		350
		350
		320
		320
	160	160
	240	240

The cutting data are non-binding indications for the operator. It is recommended to adapt them to the current conditions.