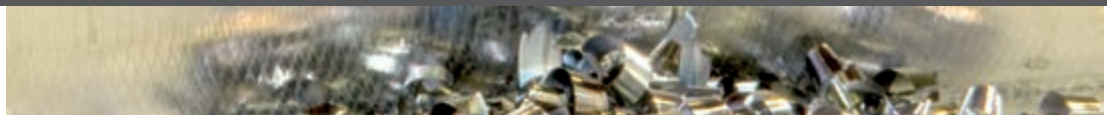


hard material matters



MaxiMill 273-06



EN



CERATIZIT – secrets of success

Secrets of success

- CERATIZIT is your partner for exceptional hard material solutions. Hard materials and tools from CERATIZIT – our solutions to complex problems are an integral part of our customers' success. Our products guarantee: economy – long life – speed! And it is precisely this combination which gives our business partners a direct competitive advantage.
 - Premier performance is only possible through a total appreciation of the requirements of our business partners. A performance achieved through flexible thinking and continuous dialogue with our customers.
- A pioneering spirit and a deep understanding of powder metallurgy characterize the history of CERATIZIT. One of the attributes of our company philosophy is the search for perfection: target oriented – sustainably – passionately!
- Intensive research and development activities, taking into account the precise requirements and working processes of the customer, are today's investment for the solutions of tomorrow – and beyond.

Corporate values

- 1 The views and focus of our business partners matter
- 2 Innovative and flexible thinking matters
- 3 Communication matters
- 4 Employee development matters
- 5 Professionalism matters
- 6 Our environment matters



Tailored cutting tool solutions

- Cutting materials, coatings, inserts, tooling systems and machining solutions – all this is included in the cutting tool division at CERATIZIT.
- Worldwide well-known companies process advanced materials applying cutting tool products from CERATIZIT: from the automotive industry to the aerospace industry, mechanical engineering, and tool construction to the oil industry.
- The basis of these long-term business relations is the faith of the customers in the extensive know-how of the carbide specialists.

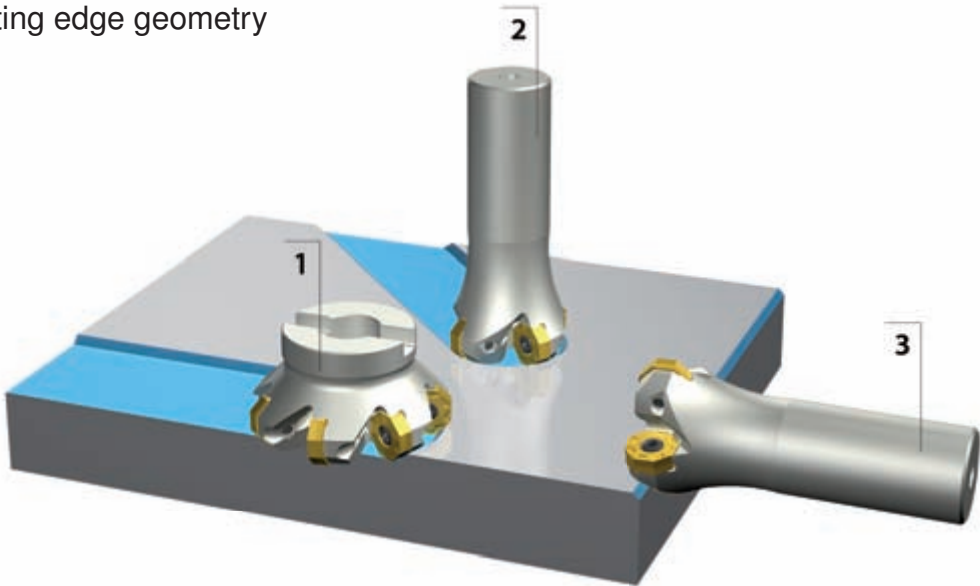
MaxiMill 273-06

Applications

Face milling with MaxiMill 273

- 16 cutting edges
- Approach angle 44.6°
- Positive cutting edge geometry

- 1 Face milling
- 2 Slot milling
- 3 Chamfering



	Ø 32 – 315 mm (400)	

CERATIZIT corporate values

1 The point of view and focus of our business partners matter

- Instead of talking product with customers, we work on real solutions for business partners.

2 Innovative and flexible thinking matters

- We have the power to challenge state-of-the-art technologies and the courage to develop intelligent alternatives.
- Our speed of thought and decisive actions give us a leading edge.

3 Communication matters

- Trust and respect enable open communication.
- We show who we are and how we feel.
- We keep our promises.
- We are open to and accept constructive criticism.

4 Employee development matters

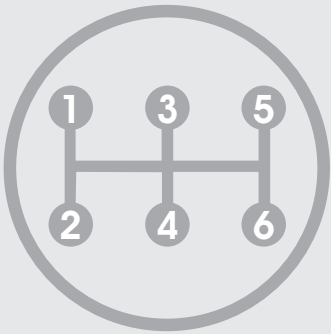
- We continuously invest in human capital and offer outstanding internal development opportunities.
- We attract talents around the world and create a favourable environment for long term growth.

5 Professionalism matters

- We strive to be professional in everything we do.
- Our performance leads to results and growth which are always above average.

6 Our environment matters

- Environmental protection is a matter of each employee – at home and at work.
- As a company we guarantee the community to be a 'considerate neighbour'.



MaxiMill 273-06 system

Tools

A273-06



C273-06



A260/057



Inserts OAKU-06

F40



M50



F50

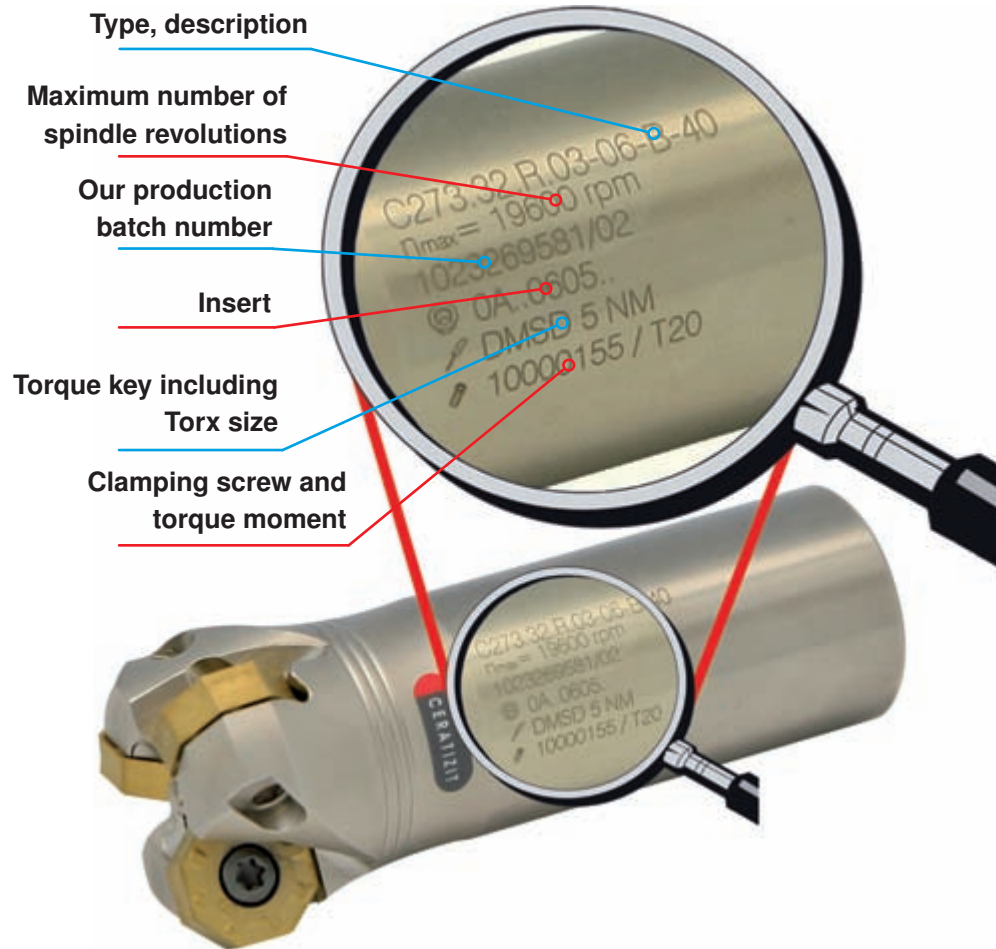


R50



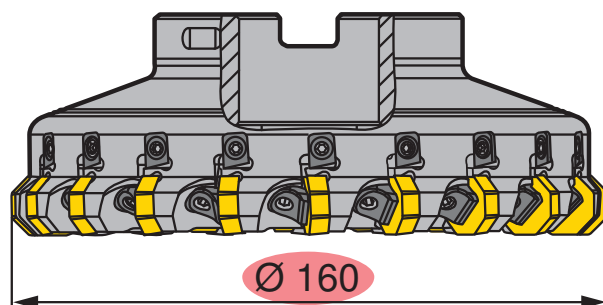
Marking

Tool description



Example: designation: A273.160.R.20A20-06

- A = shell milling cutter
- 273 = type of milling cutter
- 160 = nominal diameter in mm
- R = right-hand rotation
- 20 = effective number of cutting edges
- A = regular pitch
- 20 = number of adjustable cutting edges
- 06 = cutting edge length



Maximum economy

- 16 usable cutting edges

- The **Masterfinish** cutting edge allows higher feed rates and guarantees very good work piece surfaces.
Maximum feed rate: 2 mm/rev.



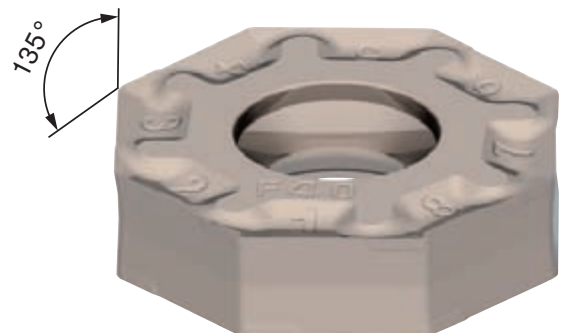
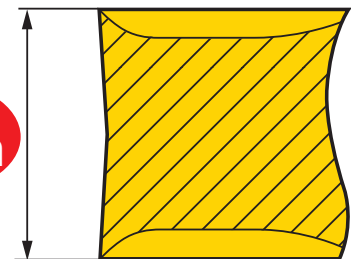
High process security

- **Consistent long tool life** thanks to the excellent **HYPER COAT** insert coating and the efficient **hard & tough** wear protection of the tool.
- **The high insert thickness and strong obtuse corner angle** improve stability, contributing to excellent system reliability.
- **Very simple clamping**
Incorrect clamping is virtually impossible, even without additional clamping devices.
- **Consistent tool life (no unpredictable downtime)** particularly in unmanned working.

HYPER COAT

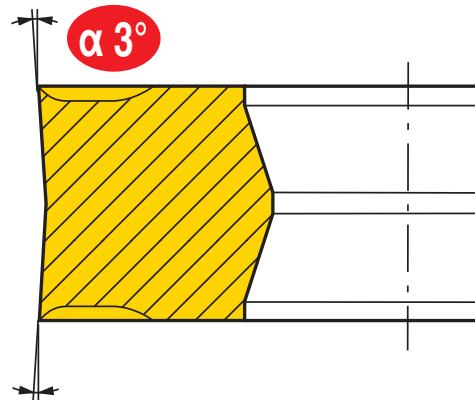
hard & tough

**S =
5,66 mm**

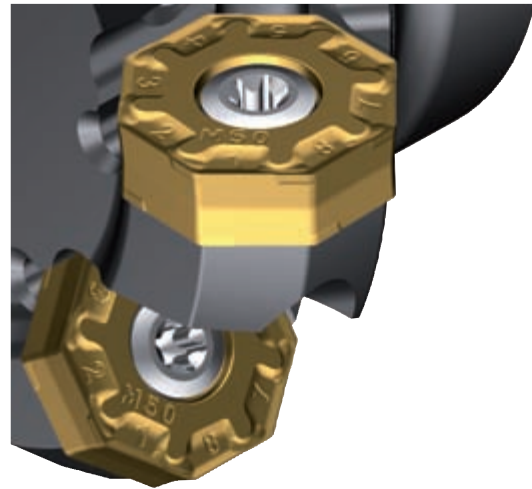


Low power consumption, reduced vibration and noise

- The **clearance angle α** additionally optimizes the cutting edge's position in the tool.
- 273-06 combines the best advantages of positive and negative inserts with none of the drawbacks:
 - Maximum number of cutting edges
 - Stability
 - Economy
 - Reduced power consumption
 - Reduced vibration
 - Clean work piece surfaces

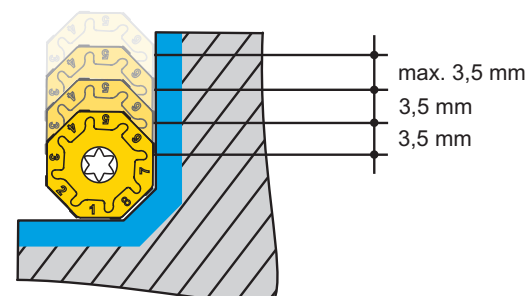
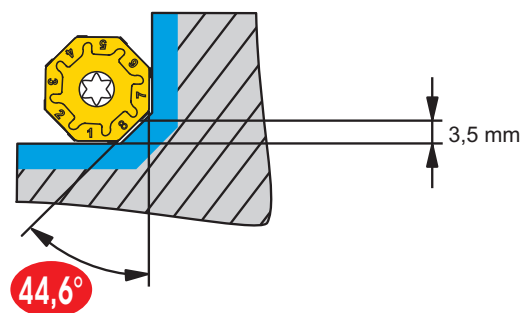


The OAKU 0605... insert, a highlight of the CERATIZIT pressing technology!

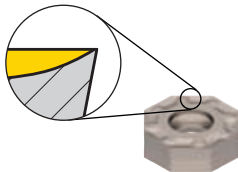
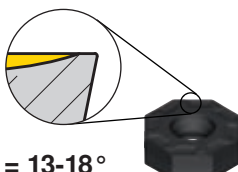
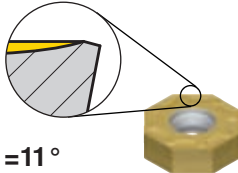


Cutting depth and approach angle

- **Approach angle κ is 44.6°.**
- **16 cutting edges** at 0 - 3.5 mm depth of cut
- f_z has to be adapted to the depth of cut (see page 18)
- **90° milling on the work piece shoulder is possible**



Chip grooves

Chip groove	Material	Machining situation and stability				Bearbeitungstyp F / M / R
 $\gamma = 15-20^\circ$	F40	Ti	x	x		F
	F50		x	x		F
 $\gamma = 13-18^\circ$	M50			x	x	M
 $\gamma = 11^\circ$	R50				x	R

MasterGuide:

- Steel
- Stainless
- Cast iron
- Non ferrous metals
- Heat resistant materials
- Titanium alloys
- Hard materials

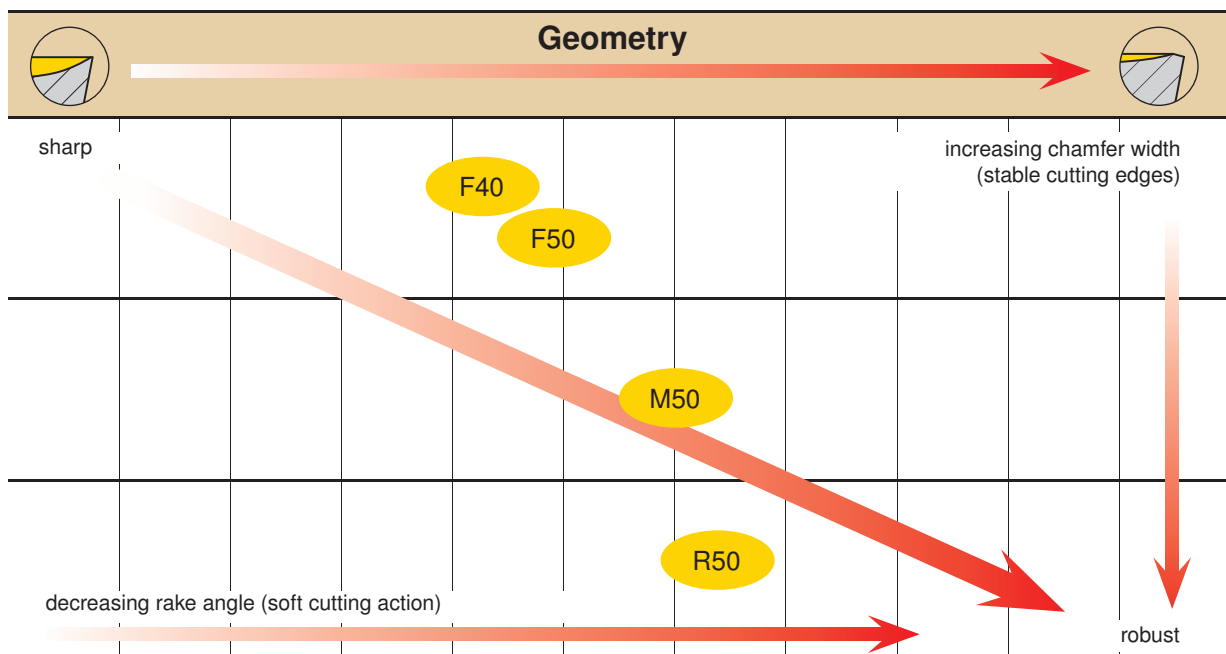
 Main application
 Extended application

Machining situation and stability:

-  excellent
-  good
-  acceptable
-  difficult

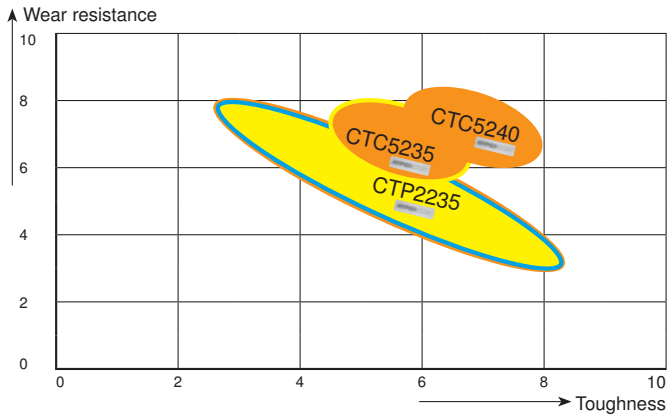
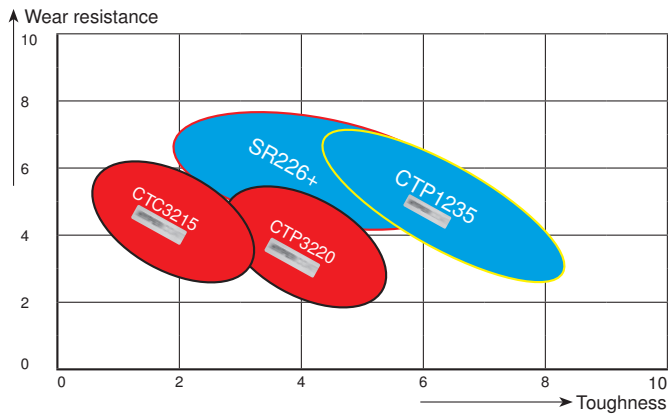
Machining type:

- F Fine machining
- M Medium machining
- R Rough machining



Grade overview

Grade designation	Standard designation	Cutting material	Application range								A	R	F	N	S	H			
			01	05	10	20	25	30	35	40	45	50	Steel	Stainless	Cast iron	Non ferrous metals	Heat resistant	Hard materials	
CTC3215	HC-K15	C																	
CTC5235	HC-M35	C																	
CTC5240	HC-M40	C																	
CTP1235	HC-P35	P																	
	HC-M30	P																	
CTP2235	HC-P40	P																	
	HC-M40	P																	
CTP3220	HC-K20	P																	
SR226+	HC-P25	C																	
	HC-M25	C																	
	HC-K20	C																	
			01	05	10	15	20	25	30	35	40	45	50	● Main application				○ Extended application	





Inserts Shape O

F40	F50	M50	R50	

(l) [mm]	Type, description	CTC3215	CTP3220	SR226+	CTP1235	CTC5235	CTC5240	CTP2235	d [mm]	s [mm]	l ₁ [mm]	r [mm]	d ₁ [mm]	α [°]
06	OAKU 060508ER-F40					●	●		17,1	5,66	2,0	0,8	5,8	3
06	OAKU 060508SR-F50			●	●			●	17,1	5,66	2,0	0,8	5,8	3
06	OAKU 060508SR-M50	●	●	●	●			●	17,1	5,66	2,0	0,8	5,8	3
06	OAKU 060508SR-R50	●	●						17,1	5,66	2,0	0,8	5,8	3
	Steel			●	●	○		○						
	Stainless			○	○	●		●						
	Cast iron	●	●	●	●	○								
	Non ferrous metals													
	Heat resistant					●	●	○						
	Hard materials													

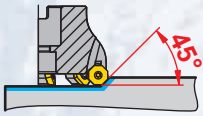
● Main application

○ Extended application

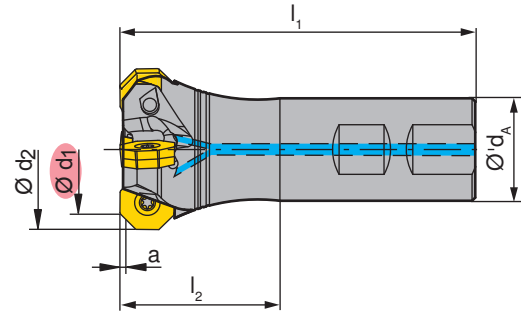
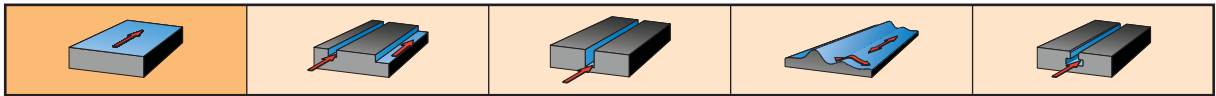
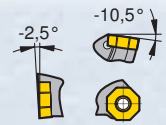
● International CERATIZIT range, for present availability see price list

Ordering example: 10 pieces OAKU 060508 SR-M50

	C273	A273	A260/057		



Milling cutters C273-06



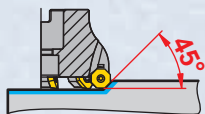
d ₁ [mm]	Type, description	d _A [mm]	d ₂ [mm]	l ₁ [mm]	l ₂ [mm]	a [mm]	n _{max} min ⁻¹	kg	z	
32	C273.32.R.03-06-B-40	32	42,1	101	40	3,5	19.600	0,56	3	OA.. 0605
40	C273.40.R.04-06-B32-50	32	50,1	111	50	3,5	17.000	0,68	4	OA.. 0605

Ordering example: 1 piece C273.32.R.03-06-B-40

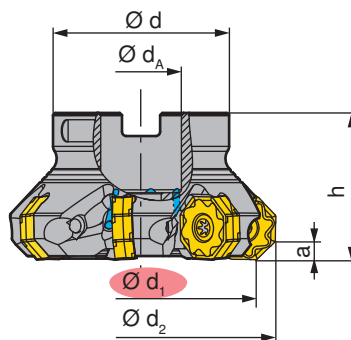
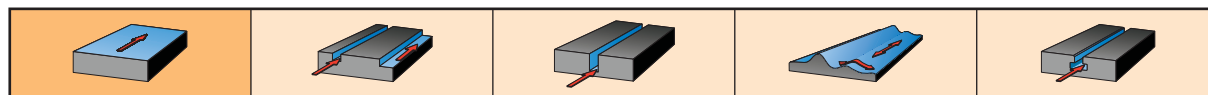
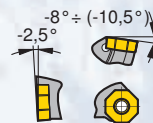
Supply details: cutter body, clamping screws for inserts

	d ₁ [mm]			
OA.. 0605..	32-40	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20

	OA.. 0605 				
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Face milling cutters A273-06



d ₁ [mm]	Type, description	d _A [mm]	d [mm]	d ₂ [mm]	h [mm]	a [mm]	n _{max} min ⁻¹	kg		
40	A273.40.R.03-06	16	38	50,2	40	3,5	17.100	0,27	3	OA.. 0605
40	A273.40.R.04-06	16	38	50,2	40	3,5	17.100	0,27	4	OA.. 0605
50	A273.50.R.05-06	22	43	60,2	40	3,5	14.900	0,40	5	OA.. 0605
63	A273.63.R.07-06	22	48	73,2	40	3,5	13.100	0,51	7	OA.. 0605
80	A273.80.R.08-06	27	58	90,2	50	3,5	11.500	1,02	8	OA.. 0605
100	A273.100.R.10-06	32	78	110,2	50	3,5	10.200	1,83	10	OA.. 0605
125	A273.125.R.12-06	40	88	135,2	63	3,5	9.000	2,99	12	OA.. 0605
160	A273.160.R.14-06	40	104	170,2	63	3,5	7.900	4,59	14	OA.. 0605

Ordering example: 1 piece A273.40.R.04-06

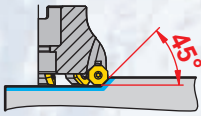
Supply details: cutter body, clamping screws for inserts



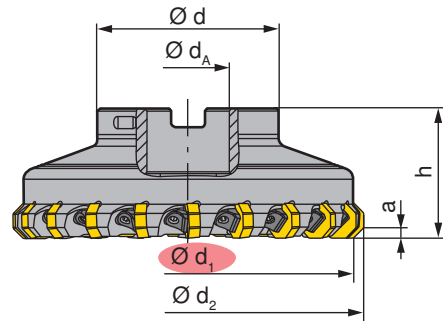
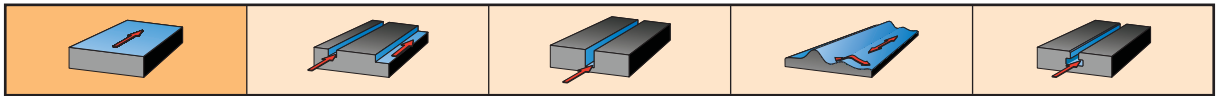
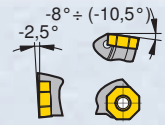
A273.40.R.04-06 → without coolant holes
A273.160.R.14-06 →

	d ₁ [mm]			
OA.. 0605..	40	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20
OA.. 0605..	50	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20
OA.. 0605..	63 - 160	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20
	d ₁ [mm]			
	40	S4/SW4	7818267/M8,0x30,0	
	50	7812301/SW5	7818268/M10,0X31,0	

	OA.. 0605 				
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Face milling cutters A273-06



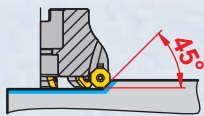
d ₁ [mm]	Type, description	d _A [mm]	d [mm]	d ₂ [mm]	h [mm]	a [mm]	kg	z	
80	A273.80.R.10-06	27	58	90,2	50	3,5	1,1	10	OA.. 0605
100	A273.100.R.14-06	32	78	110,2	50	3,5	1,9	14	OA.. 0605
125	A273.125.R.17-06	40	88	135,2	63	3,5	3,2	17	OA.. 0605
160	A273.160.R.20-06	40	104	170,2	63	3,5	4,2	20	OA.. 0605
200	A273.200.R.25-06	60	153	210,2	63	3,5	7,8	25	OA.. 0605
250	A273.250.R.31-06	60	153	260,2	63	3,5	12,1	31	OA.. 0605
315	A273.315.R.40-06	60	226	325,2	63	3,5	21,0	40	OA.. 0605

Ordering example: 1 piece A273.80.R.10-06

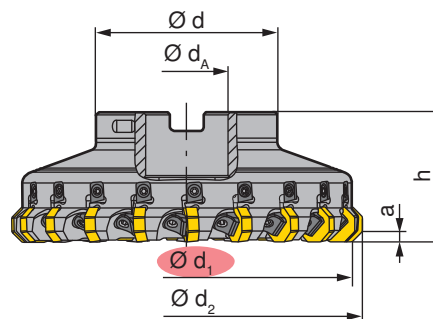
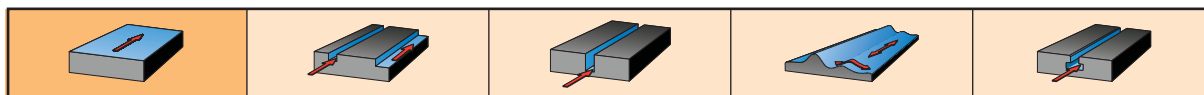
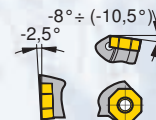
Supply details: cutter body, clamping screws, wedges

	d ₁ [mm]				
QA.. 0605..	80 - 315	7724103/TORX T15	DMSD 4,0Nm/SORT T15	S-10007860/M6,0X21,0/T15	K-10007861/11,8x12,5

	OA.. 0605 				
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Adjustable face milling cutters A273-06



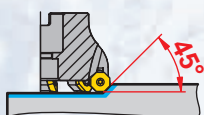
d ₁ [mm]	Type, description	d _A [mm]	d [mm]	d ₂ [mm]	h [mm]	a [mm]	kg		
80	A273.80.R.10A10-06	27	58	90,2	50	3,5	1,3	10	OA.. 0605
100	A273.100.R.14A14-06	32	78	110,2	50	3,5	2,0	14	OA.. 0605
125	A273.125.R.17A17-06	40	88	135,2	63	3,5	3,5	17	OA.. 0605
160	A273.160.R.20A20-06	40	104	170,2	63	3,5	6,8	20	OA.. 0605
200	A273.200.R.25A25-06	60	153	210,2	63	3,5	8,4	25	OA.. 0605
250	A273.250.R.31A31-06	60	153	260,2	63	3,5	12,8	31	OA.. 0605
315	A273.315.R.40A40-06	60	226	325,2	63	3,5	22,1	40	OA.. 0605

Ordering example: 1 piece A273.80.R.10A10-06

Supply details: cutter body, clamping screws, wedges, hexagon key

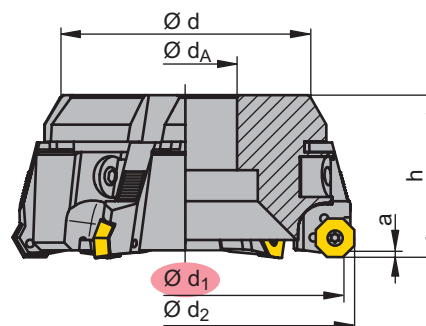
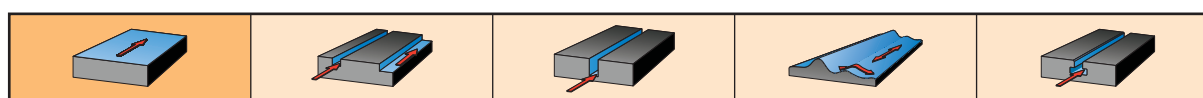
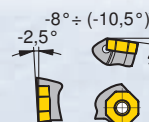
	d ₁ [mm]			
OA.. 0605..	80 - 315	7724103/TORX T15	DMSD 1,0Nm/SORT T15 DMSD 4,0Nm/SORT T15	S-10007860/M6,0X21,0/T15
	d ₁ [mm]			
	80 - 315	K-10007861/11,8X12,5	10002113-0/AW-ZNHW12	10002362-0/WS-L T15

	OA.. 0605 				
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Face milling cutters

A273-06



d ₁ [mm]	Type, description	d _A [mm]	d [mm]	d ₂ [mm]	h [mm]	a [mm]	kg	z	
82	A260.08.R.05/057	27	66	92,2	54	3,5	1,33	5	OA.. 0605
102	A260.10.R.06/057	32	86	112,2	54	3,5	1,94	6	OA.. 0605
125	A260.12.R.07/057	40	95	135,2	65	3,5	3,49	7	OA.. 0605
160	A260.16.R.10/057	40	130	170,2	65	3,5	6,04	10	OA.. 0605
200	A260.20.R.12/057	60	172	210,2	65	3,5	9,91	12	OA.. 0605
250	A260.25.R.14/057	60	222	260,2	65	3,5	16,74	14	OA.. 0605
315	A260.31.R.18/057	60	280	325,2	82	3,5	31,51	18	OA.. 0605
400	A260.40.R.22/057	60	365	410,2	82	3,5	67,57	22	OA.. 0605

Ordering example: 1 piece A260.08.R.05/057

Supply details: cutter body, cassettes, clamping screws, wedges, clamping screws for inserts, S4 clamping key, eccentric key

QA.. 0605..	d ₁ [mm]	10000155/M5,0X14/T20	7724104/TORX T20	DMSD 5,0Nm/SORT T20	7818044/M8X21/R-L
	80 - 398				
		S4/SW4	7818043/K		7818048/EXZS

7818057/KA					
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OA.. 0605					
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Cutting data

Tool, material

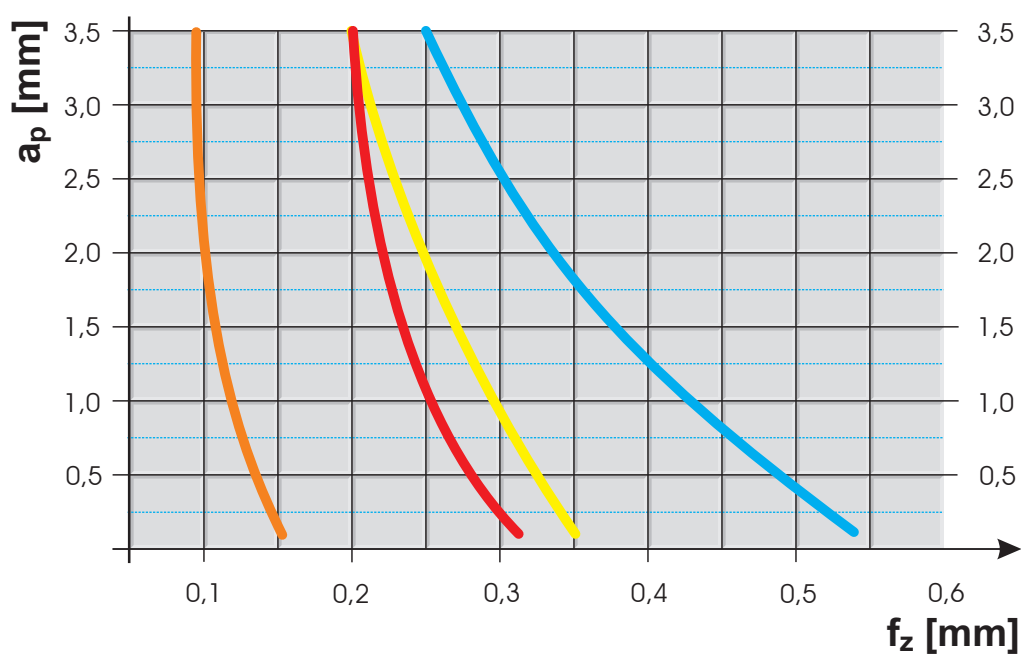
Recommendations for economic milling

	v_c [m/min]	f_z [mm]	a_p [mm]				
							
MaxiMill 273-06							
	350 - 60	0,05 - 0,6	0,2 - 3,5				
	250 - 40	0,05 - 0,4	0,2 - 3,5				
	280 - 70	0,05 - 0,4	0,2 - 3,5				
	100 - 10	0,05 - 0,15	0,2 - 3,5				

$v_c \rightarrow$ see also: cutting data - grades/materials

Starting parameters for example materials

	Example materials	
	High alloyed steel	1.000 N/mm ²
	Stainless steel, austenitic	600 N/mm ²
	Grey cast iron pearlitic, ferritic	HB 180
	Super alloys, Ni-base, hardened	1.450 N/mm ²



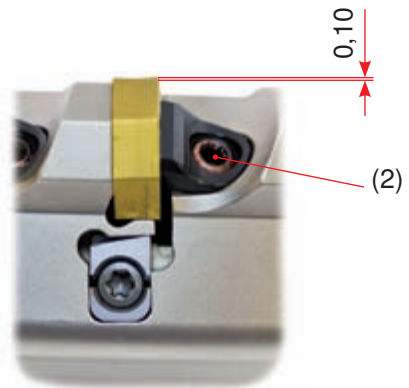
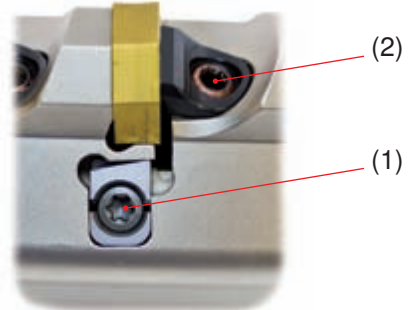
Mounting instructions

Precision setting procedure

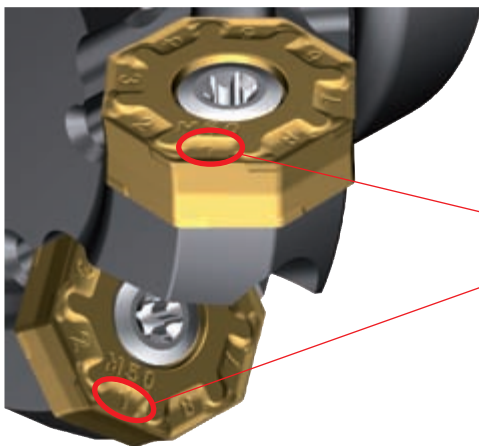
1. Mount the setting wedges in the cutter (as supplied) and tighten the setting screw (1), to lightly hold the wedge without deforming it.
2. Mount inserts and tighten clamping screws (2) with 1.0 Nm.
3. Mark 'highest cutting edge' using a presetting device.
4. Change position of insert by 0.02 mm turning the setting screw (1) clockwise. For this purpose use the TORX key included in the delivery!
5. Set the other cutting edges to this level, maximum deviation of 0.005 mm.

Maximum adjustment = 0.10 mm.

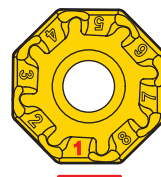
6. Tighten all clamping screws (2) with 4.0 Nm.
7. Check axial run-out of all inserts
→ target < 0.005 mm



Cutting edge position



For **optimal surface finish**: place the inserts in their seats in a way that all cutting edges which are in cutting position show the same number.

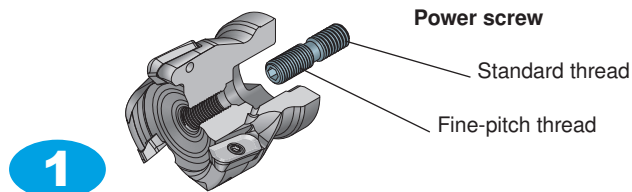




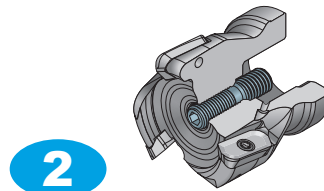
How to use the power screw

Power screw:

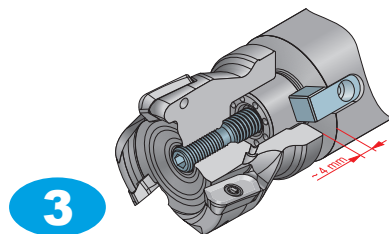
- > 3 x clamping force of a standard cap-head screw.
- > Stronger cutter body thanks to no counter-bore for cap-head screw.
- > The use of a torque screwdriver is recommended.



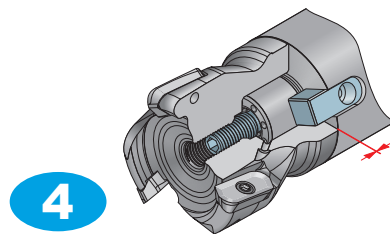
1 The fine-pitch part of the power screw is threaded into the milling cutter



2 Turn the power screw carefully until the stop (as screw was delivered)



3 In order to guarantee an optimum connection of tool and shank a gap of 4 mm is required between cutter body and adapter prior to final clamping.



4 Turn power screw

Torque:

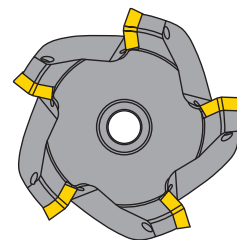
$\varnothing d_1 = 40 \text{ mm} \rightarrow 15 \text{ Nm!}$

$\varnothing d_1 = 50 \text{ mm} \rightarrow 20 \text{ Nm!}$

Pitch

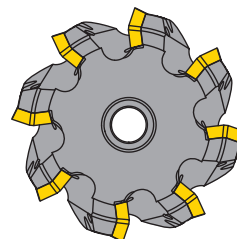
Coarse or normal pitch

- Low power machines
- Unstable working conditions
- Long-chipping materials



Close pitch

- High power machines
- Stable work holding
- Stable working conditions
- Maximum metal removal rates





Spare parts, torque moments, accessories

 Torque screwdriver 7724103/TORX T15 7724104/TORX T20	Non-slip handle.	For mounting the clamping screw the use of a torque key is recommended.
 Clamping screw 10000155/M5,0X14/T20 For inserts OAKU 0605	Torque moment: 5.0 Nm	For safe and HSC suitable mounting of the insert. Quality of screw: 16.9..
 Special grease 7730102/GREASE	5 g tube.	Makes removal of the clamping screw easier.
 Torque screwdriver DMSD 1,0Nm/SORT T15 DMSD 4,0Nm/SORT T15 DMSD 5,0Nm/SORT T20	Set with handle, one tool holder and 5 inserts.	For the correct torque moment. A tool that guarantees safe machining. Non-slip handle, even when touching it with oily or wet hands.
DMSD 1-5Nm/SORT	Set with handle and one tool holder	
 Power screw 7818267/M8,0x30,0 7818268/M10,0x31,0	Torque moment: 15 Nm 20 Nm	Easy and safe handling. Fixed safely with screws in the tool and increases stability of tools with a small Ø.
 Clamping wedge K-10007861/11,8x12,5		Safe mounting of the insert (tools with extra-fine pitch).
 Clamping screw S-10007860/M6,0X21,0/T15	Torque moment: 4.0 Nm	For mounting the clamping wedge.
 Set of setting wedges 10002113-0/AW-ZNHW12	Adjust with torque key!	For precise axial setting of the cutting edges (axial run-out). Set: screw is mounted.
 Torque key 10002362-0/WS-L T15		For secure and easy adjustment of the setting wedges.
 Cassette 7818057/KA		 A260/057

Cutting data

Grades / materials

Work piece material		Type of treatment / alloy		VDI 3323 group	Hardness HB
A	Non alloyed steel	annealed	$\leq 0,15\% \text{ C}$	1	125
		annealed	$0,15\% - 0,45\% \text{ C}$	2	150 - 250
		tempered	$\geq 0,45\% \text{ C}$	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	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	Grey cast iron		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	-
	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	$< 12\% \text{ Si}$	23	80
		hardened	$< 12\% \text{ Si}$	24	90
		non hardened	$> 12\% \text{ Si}$	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	-
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	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	-
		cast	Ni or Co base 1500 - 2200 Nmm ²	35	-
	Titanium alloys		Ni or Co base	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		40	55 HRC

* R_m = ultimate tensile strength, measured in MPa

Cutting data

Grades / materials

Coated carbide					
CTC3215		CTC5235		CTC5240	
 	 	 	 	 	 
v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]	v_c [m/min]
—	—	150 - 260	90 - 180	—	—
—	—	150 - 260	90 - 180	—	—
—	—	150 - 260	90 - 180	—	—
—	—	80 - 220	70 - 160	—	—
—	—	80 - 220	70 - 160	—	—
—	—	80 - 220	70 - 160	—	—
—	—	90 - 180	70 - 140	—	—
—	—	90 - 180	70 - 140	—	—
—	—	70 - 180	60 - 140	—	—
—	—	70 - 180	60 - 140	—	—
—	—	220 - 350	—	—	—
—	—	150 - 240	—	—	—
—	—	80 - 160	60 - 140	—	—
—	—	80 - 200	60 - 180	—	—
180 - 350	180 - 350	—	—	—	—
140 - 280	140 - 280	—	—	—	—
130 - 250	130 - 250	—	—	—	—
100 - 200	100 - 200	—	—	—	—
150 - 320	150 - 320	—	—	—	—
120 - 250	120 - 250	—	—	—	—
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—	—	—	—	—	20 - 60
—	—	—	—	—	10 - 50
—	—	—	—	—	10 - 40
—	—	—	—	—	60 - 120
—	—	—	—	—	40 - 80
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  Recommended application

  Possible application

Cutting data

Grades / materials

Work piece material		Type of treatment / alloy		VDI 3323 group	Hardness HB
A	Non alloyed steel	annealed	$\leq 0,15\% \text{ C}$	1	125
		annealed	$0,15\% - 0,45\% \text{ C}$	2	150 - 250
		tempered	$\geq 0,45\% \text{ C}$	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	12	200
		tempered	martensitic	13	325
R	Stainless steel	annealed	ferritic / martensitic	14	200
		quenched	austenitic	14	180
		quenched	duplex	14	230 - 260
		hardened	martensitic / austenitic	14	330
F	Grey cast iron		pearlitic / ferritic	15	180
			pearlitic / martensitic	16	260
	Spheroidal cast iron		ferritic	17	160
			pearlitic	18	-
	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	$< 12\% \text{ Si}$	23	80
		hardened	$< 12\% \text{ Si}$	24	90
		non hardened	$> 12\% \text{ Si}$	25	130
	Copper and copper alloys (bronze, brass)		machining alloy stock (1% Pb)	26	-
			brass, red bronze	27	90
			bronze	28	100
			lead-free copper and electrolytic copper	29	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	-
		cast	Ni or Co base 1500 - 2200 Nmm ²	35	-
	Titanium alloys		Ni or Co base	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		40	55 HRC

* R_m = ultimate tensile strength, measured in MPa

Cutting data

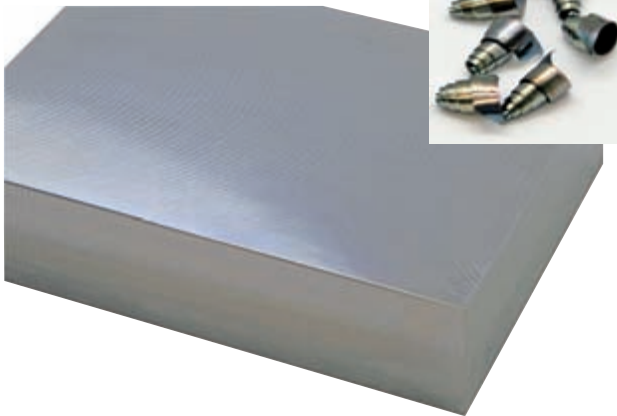
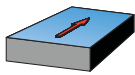
Grades / materials

Coated carbide							
CTP1235		CTP2235		CTP3220		SR226+	
 □	 ☒	 □	 ☒	 ☒	 ☒	 ☒	 ☒
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]
100-220	70-180	150 - 260	90 - 180	—	—	210 - 350	130 - 200
100-220	70-180	150 - 260	90 - 180	—	—	170 - 320	110 - 180
100-220	70-180	150 - 260	90 - 180	—	—	150 - 280	90 - 150
80-220	70-170	80 - 220	70 - 160	—	—	150 - 250	80 - 140
80-220	70-170	80 - 220	70 - 160	—	—	140 - 210	60 - 120
80-220	70-170	80 - 220	70 - 160	—	—	100 - 180	60 - 110
80-180	60-140	90 - 180	70 - 140	—	—	140 - 210	60 - 110
80-180	60-140	90 - 180	70 - 140	—	—	100 - 170	60 - 100
70-180	60-140	70 - 180	60 - 140	—	—	140 - 190	80 - 140
70-180	60-140	70 - 180	60 - 140	—	—	100 - 170	70 - 120
60-200	40-140	60 - 200	60 - 140	—	—	110 - 200	—
60-200	40-140	60 - 200	60 - 140	—	—	120 - 210	—
60-200	40-140	60 - 200	60 - 140	—	—	—	—
60-200	40-140	60 - 200	60 - 140	—	—	80 - 140	—
—	—	—	—	120 - 300	120 - 300	160 - 220	120 - 180
—	—	—	—	130 - 280	130 - 280	100 - 170	80 - 150
—	—	—	—	120 - 210	120 - 210	100 - 200	80 - 170
—	—	—	—	110 - 200	110 - 200	90 - 180	70 - 140
—	—	—	—	200 - 340	200 - 340	90 - 180	70 - 140
—	—	—	—	160 - 280	160 - 280	80 - 160	70 - 130
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 Recommended application

  ☐ Possible application

Machining examples



Criteria, objective:

- > Reduce machining time
- > Achieve good surface quality
- > Ensure process security
- > Milling cutter can be axially adjusted
- > Roughing

Results:

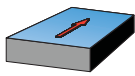
Very high metal removal rate:

- > Maximum DOC with 90% cutting width
- > Stable machining operation, reduced noise
- > Very good surface quality ($R_a = 0.6$ to $0.8 \mu\text{m}$)

Work piece: test block
Material: 40 CrMnMoS 8-6 (1.2312)
Machine: Mazak MTV 815/80
Tool: A273.160.R.20A20-06
Insert: OAKU 060508SR-M50
Grade: CTP1235
Coolant: dry machining

Cutting data:

$v_c = 180 \text{ m/min}$
 $v_f = 1,790 \text{ mm/min}$
 $f_z = 0.25 \text{ mm}$
 $a_p = 3.5 \text{ mm}$
 $a_e = 150 \text{ mm}$
 $Q = 940 \text{ cm}^3/\text{min}$



Criteria, objective:

- > Finishing of the front faces
- > Walls are connected through welding seams
- > Achieve certain minimum service life and surface quality (despite heavy vibration)

Result:

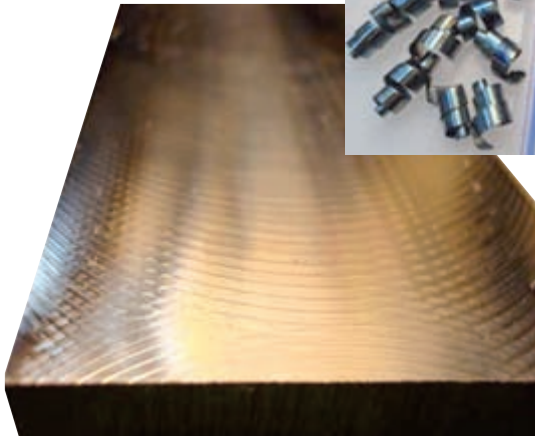
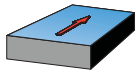
- > Process security, reduced vibration and noise
- > Required surface quality exceeded
- > Costs per work piece decreased by min. 10–15%

Work piece: rotor
Material: ST52 (1.0580) and ST37 (1.0037)
Machine: boring mill
Tool: A273.80.R.08-06
Insert: OAKU 060508SR-M50
Grade: SR226+
Coolant: dry machining

Cutting data:

$v_c = 158 \text{ m/min}$
 $v_f = 800 \text{ mm/min}$
 $f_z = 0.16 \text{ mm}$
 $a_p = 2.5 \text{ mm}$
 $a_e = 10\text{--}60 \text{ mm}$
 $Q = 20\text{--}120 \text{ cm}^3/\text{min}$
Machining time 8 min.

Machining examples



Criteria, objective:

- > Roughing operation
- > Improve surface quality

Result:

Surface quality increased:

- > from $R_a = 1.52$ to $R_a = 1.18$
- > with the same cutting data the metal removal rate is increased by 16%
- > regular chip formation

Work piece: assembly plate
Material: 40 CrMnNiMo 8-6-4 (1.2738)
Machine: Cincinnati
Tool: A273.63.R.07-06
Insert: OAKU 060508SR-M50
Grade: CTP1235
Coolant: dry machining

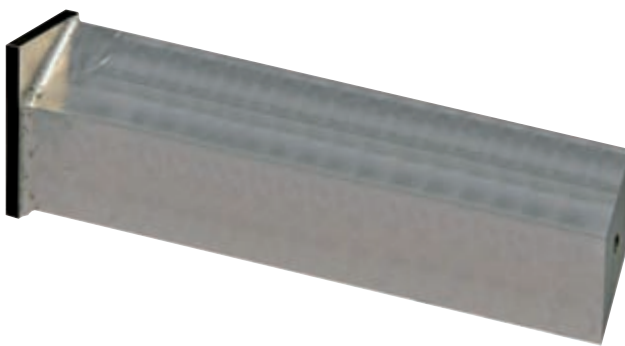
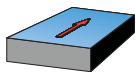
Cutting data:

CERATIZIT

$v_c = 200$ m/min
 $v_f = 1,500$ mm/min
 $f_z = 0.25$ mm
 $a_p = 2$ mm
 $a_e = 51$ mm
 $z = 7$
 $Q = 178$ cm³/min

Competitor

$v_c = 200$ m/min
 $v_f = 1,500$ mm/min
 $f_z = 0.25$ mm
 $a_p = 2$ mm
 $a_e = 51$ mm
 $z = 6$
 $Q = 153$ cm³/min



Criteria, objective:

- > Process security when machining one blade with only one cutting edge
- > Roughing of the blade faces
- > Make optimal use of machine power (machine has 25 kW spindle power)

Result:

- > High metal removal rates achieved
- > Very good service life per cutting edge
- > Cycle time reduced by approx. 20%

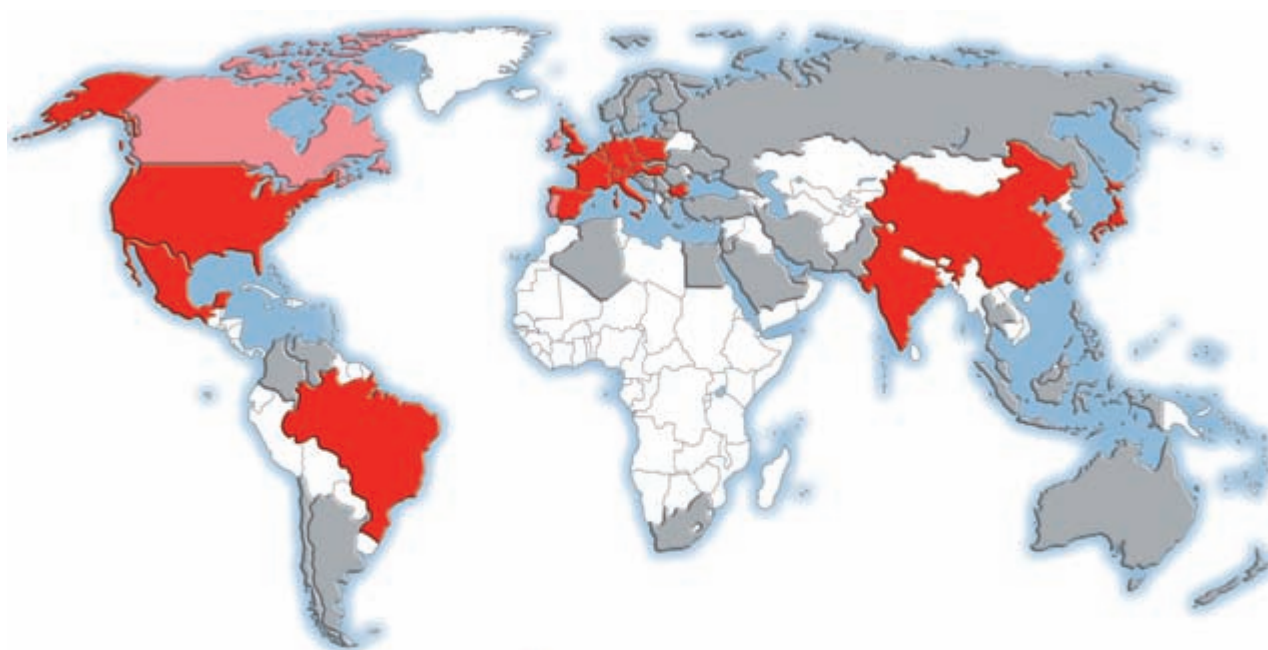
Work piece: turbine blade
Material: X22 CrMoV 12-1 (1.4923)
Machine: Starrag Heckert
Tool: A273.40.R.04-06
Insert: OAKU 060508SR-M50
Grade: CTP1235
Coolant: MQL (minimum quantity lubrication), external

Cutting data:

$v_c = 250$ m/min
 $v_f = 2,560$ mm/min
 $f_z = 0.32$ mm
 $a_p = 2.5$ mm
 $a_e = 30-50$ mm
 $Q = 192-320$ cm³/min
Machining time 10-15 min

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