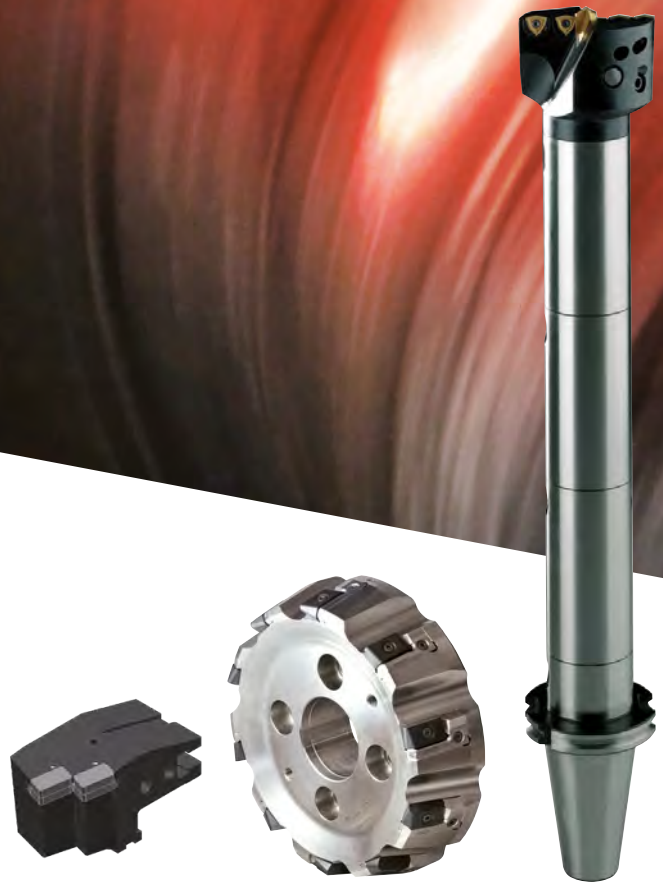




# HEAVY MACHINING

Technical Manual



TEAM CUTTING TOOLS



klenk

CERATIZIT is a high-technology engineering group specialised in cutting tools and hard material solutions.

**Tooling the Future**

[www.ceratizit.com](http://www.ceratizit.com)



## Industry Solutions

### Industry-specific applications and bespoke solutions

Every sector has its own specific requirements. Tools and materials are expected to offer maximum cutting performance, wear resistance, precision and quality – from large-scale production to the manufacture of single parts. This applies to the machining of aluminium alloys, cast materials and high-alloy steel as well as super alloys and titanium. As such, almost every sector of industry is affected – from the automotive and heavy duty machining sectors to aerospace and energy technology.

As the leading supplier of solutions for numerous industry-specific applications, we draw upon our wide-ranging expertise to offer you first-class advice and support. Whatever you need, we will work with you to find a successful, innovative solution to optimise your production process.

” As our customer, you will benefit from one of the largest ranges on the market, an efficient sales operation and our leading expertise worldwide!

# Team Cutting Tools from the CERATIZIT Group

## The full-service provider in the machining sector

Team Cutting Tools from the CERATIZIT Group is your gateway to leading international experts in machining solutions.

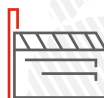
We are masters of the carbide production process, from the powder to the finished cutting tool. Not only does this allow us to develop special-purpose tools for customer-specific applications, it also means we can draw upon a full range of sector-specific standard tools, which are kept in stock and are available immediately.

We are experts at developing solutions, including the ability to analyse and optimise existing processes. And there is one thing that will never change – direct contact with our customers – thanks to streamlined structures and personal contacts.

- ▲ Uniquely extensive expertise in the field of machining
- ▲ One of the most extensive ranges on the market – from standard and semi-standard tools to special-purpose tools.
- ▲ Best-in-class R&D, sales and customer service
- ▲ Leading expertise in future technologies such as digitalisation and innovative production processes
- ▲ Many years of in-depth experience in various industry segments
- ▲ All under one roof the global CERATIZIT Group



> 9.000  
employees



33  
production facilities



> 1.000  
patents



**Solutions for heavy machining  
call for ideas on a huge scale  
– something that the experts  
at CERATIZIT have known for  
more than 30 years**

# Contents

<b>Introduction</b>	<b>2–9</b>
Industry Solutions	2
Team Cutting Tools from the CERATIZIT Group	3
Heavy machining – Overview	6–9
<b>Designation systems</b>	<b>10–15</b>
Designation systems for tools and indexable inserts	10–13
Designation system for grades	14–15
<b>Turning and grooving</b>	<b>16–63</b>
Overview and description of grades	18–24
Chip breakers	25–31
Indexable inserts and tools – turning	32–53
Indexable inserts and tools – grooving	54–59
Special tools available at customer request	60–61
Spare parts – turning and grooving	62–63
<b>Milling</b>	<b>64–83</b>
Overview and description of grades	66–69
Chip breakers	70–71
Indexable inserts and tools – milling	72–82
Spare parts – milling	83
<b>Drilling and reaming</b>	<b>84–91</b>
Drilling tools for high-performance machining	86
Drilling tools for precision holes	87
Counterboring and reaming tools for high-performance machining	88
Semi-standard – a custom combination of standard modules in an extremely wide range of dimensions	89
Core drill for machining valuable materials	90
Special tools available at customer request	91
<b>Technical references</b>	<b>92–125</b>
Success stories	94–115
Types of wear	116–117
Troubleshooting guide for turning	118
Solution to the problem	119
Troubleshooting guide for milling	120
General formulae	121
Comparison table for hardness values	122
Comparison table for materials	123–125
<b>Project engineering</b>	<b>126–129</b>

## Heavy duty solutions by CERATIZIT – in all areas of heavy machining

For us, the development of innovative solutions for turning, grooving and milling large components is not a niche area, but rather has played an important role in our company for decades. Thanks to continuous development work, the CERATIZIT product portfolio now encompasses a wide range of cutting materials, cutting inserts and tools for heavy grooving, turning and milling work. The product portfolio

covers the whole area of heavy machining, making CERATIZIT a full-service provider in the heavy duty segment. Alongside developing and recommending suitable cutting materials and tools, our area of speciality is an individual analysis with suggestions for optimising your processes. Trust in our many years of experience and use our skills to enable your success.

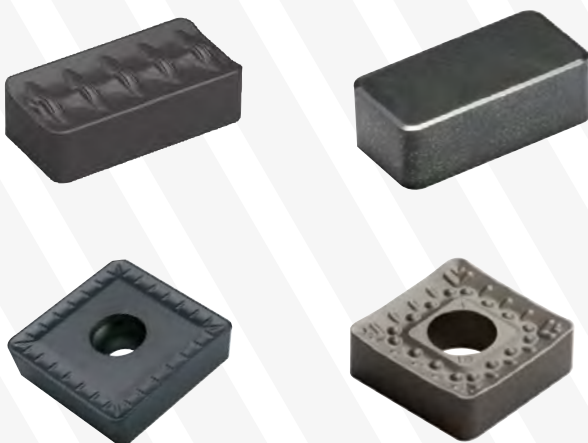
## Heavy turning – continuous further development and innovative solutions make us a competent partner in heavy duty roughing and finishing operations

Machining huge workpieces such as rolls, barrels, turbine shafts or turbine rotors constantly presents machines and tools with new challenges. Work on such oversized workpieces calls for reliable processes and high machining speeds, while also requiring the greatest possible level of safety for employees. With over 30 years of experience in heavy machining, we are one of the most experienced providers on the global market and a reliable, competent partner in large parts production. In collaboration with our customers, we are continually working to develop better

cutting materials, new chip breaker geometries and optimised solutions. At present, we have an extensive machining range for the general requirements encountered in heavy turning.

Our innovative cutting material grades, new geometries and tool solutions make machining processes more reliable, increase cutting speed and cutting depth, raise productivity and therefore help to minimise production costs.

Whether carbide, PCBN, nitride ceramic or composite ceramic – CERATIZIT is constantly developing improved cutting materials for heavy machining.



## Heavy grooving – the optimal solution for all components and all machine outputs

The broad CERATIZIT product range for heavy grooving, with grooving widths from 16 to 60 mm offers the right solution for any application. In addition to extremely deep grooving into solid material, as is found with turbine shafts,

the HX grooving system, in combination with the appropriate chip breakers, can also be used to execute undercuts and copying operations – a decisive advantage when working on profiled rolls.



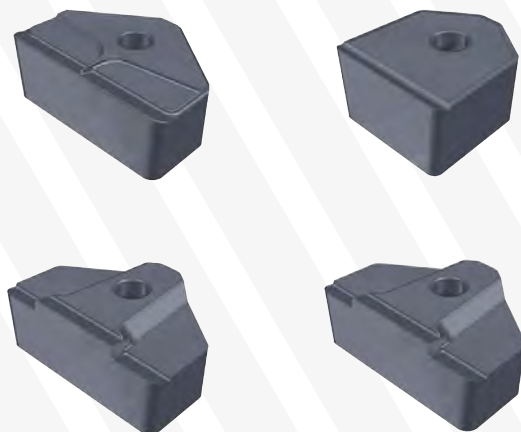
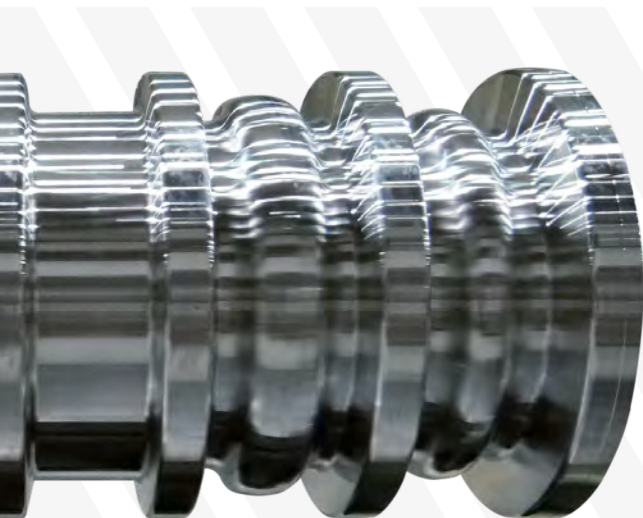
The chip splitting significantly simplifies chip removal and increases process security.

- ▲ 3-way chip split > controlled, constant short chip breakage
- ▲ Ideal solution for machining turbine shafts



Ideal combination for deep grooving: Overhead tool with -R81 chip breaker.

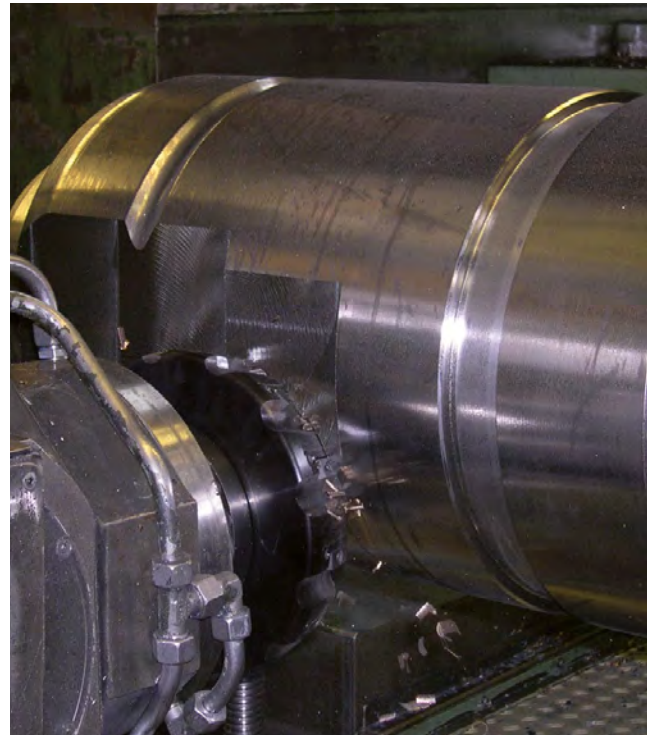
- ▲ Deep grooves (up to 300 mm) into solid material > no more chip remnants in the grooves
- ▲ The most reliable and process-secure grooving system on the market



## Heavy milling – optimum wear resistance under extreme stresses

Our heavy milling tools are designed to satisfy the very highest demands: in addition to our high-performance MaxiMill milling systems, we offer cutting material grades with significantly improved surface quality and optimum chip flow for heavy machining operations in steel and cast iron. Thanks to their robustness and high wear resistance, these tool solutions can withstand even the most extreme stresses.

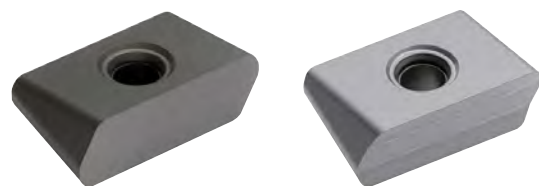
Ongoing further development and improvement of the grades, indexable inserts and tools make CERATIZIT the ideal partner for roll and rolling mill manufacturers, steel producers, suppliers for windfarms and the energy sector as a whole. Our extensive product range also includes a wide range of cutting material and tool solutions for heavy milling operations.



Stable and process-secure: machining large cast iron and steel rolls calls for robust, wear-resistant tools with high cutting depths.



The CERATIZIT MaxiMill HDM (AHDM) milling system, combined with high-quality cutting inserts (LNU..) is ideal for face milling.

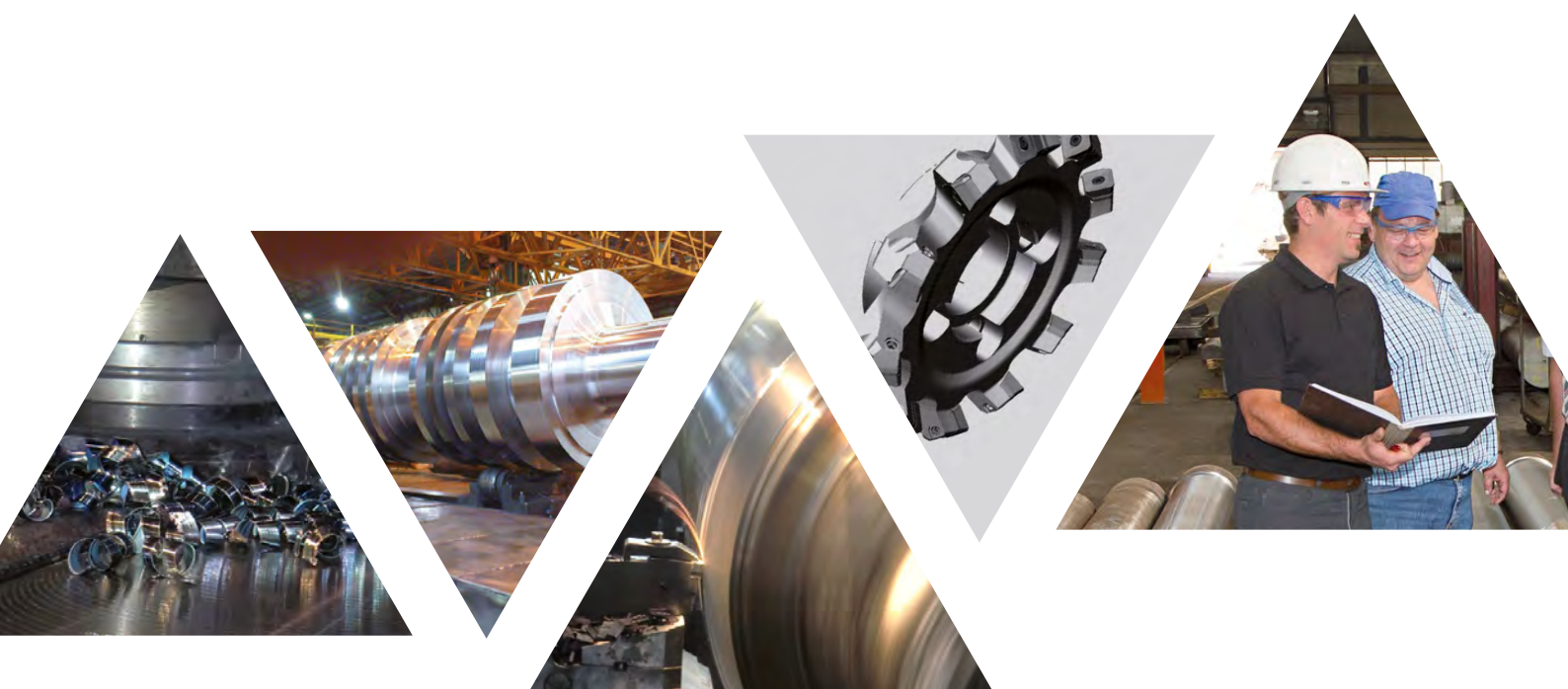




## Customer-specific tools for equipping large turning machines

Thanks to many years of experience in heavy machining, CERATIZIT now not only has a wide range of first-class standard tools for heavy grooving and turning operations, but also offers customer-specific tool solutions for all applications in the area of large parts production.

Working in collaboration with you, we develop innovative solutions and advise you on the machining of large components and best machinery equipment to increase process reliability and productivity. CERATIZIT is the world leader in this field – place your trust in our knowledge and expertise.



## Designation systems

### HD tools

<b>HD</b>	<b>H</b>	<b>T</b>	<b>N</b>	<b>40</b>	<b>40</b>	<b>W.</b>	<b>1</b>	<b>RX</b>	<b>12</b>	<b>C.</b>	<b>40</b>
Heavy duty Heavy machining	Holder Tool	T-Turning G-Grooving	R-Right / L-Left / N-Neutral	Shank height	Shank width	Length W-450 X-275	Number of inserts	Insert type	Insert size	Clamping using P-pin / C-press / S-screw	Maximum groove depth

### Designation of ISO indexable inserts

<b>R</b>	<b>C</b>	<b>G</b>	<b>X</b>	<b>12</b>	<b>07</b>	<b>00</b>	<b>SN</b>	<b>-</b>	<b>200</b>	<b>C</b>
Insert shape	Clearance angle	Tolerances	Characteristic	Cutting length	Insert thickness	Corner radius	Cutting edge		Chamfer width	Chamfer angle

### HX heavy grooving – designation of indexable inserts

<b>HX</b>	<b>40</b>	<b>24</b>	<b>90</b>	<b>-</b>	<b>R81</b>	<b>/</b>	<b>PN</b>	<b>150</b>	<b>CE</b>
Indexable inserts –system	Groove width	Corner radius	Bore diameter		Chip breaker code		Cutting edge	Chamfer width	Chamfer angle

### MX ceramic indexable inserts – designation of indexable inserts

<b>MX</b>	<b>-</b>	<b>S</b>	<b>60</b>	<b>15</b>	<b>08</b>	<b>TN</b>	<b>-</b>	<b>020</b>	<b>D</b>
Indexable inserts –system		Cutting edge S-grade / R-radius	Groove width		Corner radius	Cutting edge		Chamfer width	Chamfer angle

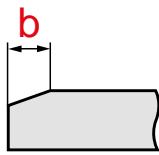
## Cutting edge finish

In the case of indexable inserts with no chip breaker, the correct chamfer design is vital, as well as the type of cutting edge. For this reason, the designation system has been

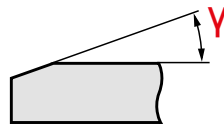
extended with the following key to the various chamfer designs. The design and angle can be seen in the overview below.

### Key to chamfers at CERATIZIT

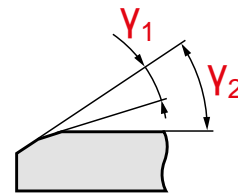
Designation in line with ISO Type of cutting edge	CERATIZIT Chamfer design	Definition Chamfer width (b) x angle ( $\gamma_1, \gamma_2$ )
<b>SN</b> (chamfered and rounded)	050D	0.50 x 20°
<b>TN</b> (chamfered)	200D	2.00 x 20°
<b>PN</b> (double-chamfered and rounded)	100CF	1.00 x 15° + 30° Chamfer width relates to $\gamma_1$



Chamfer width



Chamfer design **SN / TN**



Chamfer design **PN**

#### CODE FOR ANGLE $\gamma_1$

A	B	C	D	E	F
5°	10°	15°	20°	25°	30°

Examples	Chamfer width b [mm]	Angle $\gamma_1$	Angle $\gamma_2$
LNMN 6688SN-040D	0.40	20°	–
LNMN 6688SN-100B	1.00	10°	–
LNMN 6688PN-150CE	1.50	15°	25°
HX 40.32.65PN-150CE	1.50	15°	25°
HX 45.32.65PN-125CE	1.25	15°	25°

## Designations for holders and cartridges

Base holder with direct insert seat

HD H T R W96.2 LN66 C.10



Base holder for cartridges

HD H G R W96.G 40 - 070



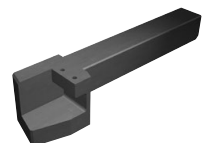
Shank holder with direct insert seat

HD H T R 6060 V.1 LN66 C - 08



Shank holder for cartridges

HD H T R 6060 V.S 40



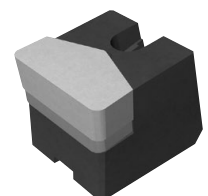
Turning cartridges

HD C T R 1 LN66 C.D 50 .08



Grooving cartridges

HD C G R 1 HX40 P. 44



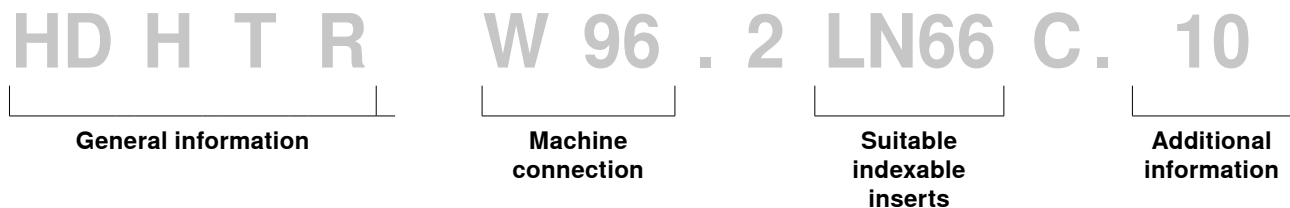
## Designation systems for tools

The designation system is made up of five components that can be specified in various combinations depending on the type of tool:

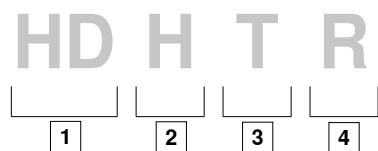
- ▲ General information on the tool type and version
- ▲ Machine connection
- ▲ Cartridge type

- ▲ Cutting insert type
- ▲ Additional information about groove depth and/or setting angle

### Designation logic for a base holder with direct insert seat



#### General information



- 1) HD = Heavy duty
- 2) H = Holder / C = Cartridge
- 3) T = Turning / G = Grooving / O = upside down
- 4) R / L / N = Direction of cut

#### Machine connection



- W/C/H/S/K .. = Interface type
- 96/124 = Slide width

#### Shank holder:

- 4040W .. = shank 40 x 40, length 450
- 5050U .. = shank 50 x 50, length 350
- 6060V .. = shank 60 x 60, length 400

#### Cartridge type



- D = Double / S = Single / G = Grooving
- 50 = Centre height / Groove width
- 33/44 = Grooving cartridge: Height

#### Cutting insert type



#### Number of inserts

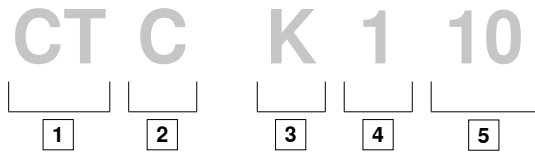
- HX16 = Insert type
- P / C / S = Clamping using pin / press / screw

#### Additional information



- 070 = Maximum groove depth
- 08 = Setting angle when turning

## Designation system for grades



### 1 Manufacturer: CERATIZIT

### 2 Cutting material type

- W Carbide uncoated
- C Carbide CVD-coated
- P Carbide PVD-coated
- T Cermet uncoated
- E Cermet coated
- N Silicon nitride uncoated
- M Silicon nitride coated
- S Composite ceramic
- K Whisker ceramic
- I Sialon
- D PKD
- B PCBN
- L PCBN coated
- H PM-HSS

### 3 Primary suitability for material Option 1: Number

- 1 Steel
- 2 Stainless steel
- 3 Cast Iron
- 4 Alloys and non-ferrous metals/non-metals
- 5 Super alloys/titanium
- 6 Hard materials
- 7 Multi-use grade without particular material focus

### 3 Primary suitability for material Option 2: ISO letter

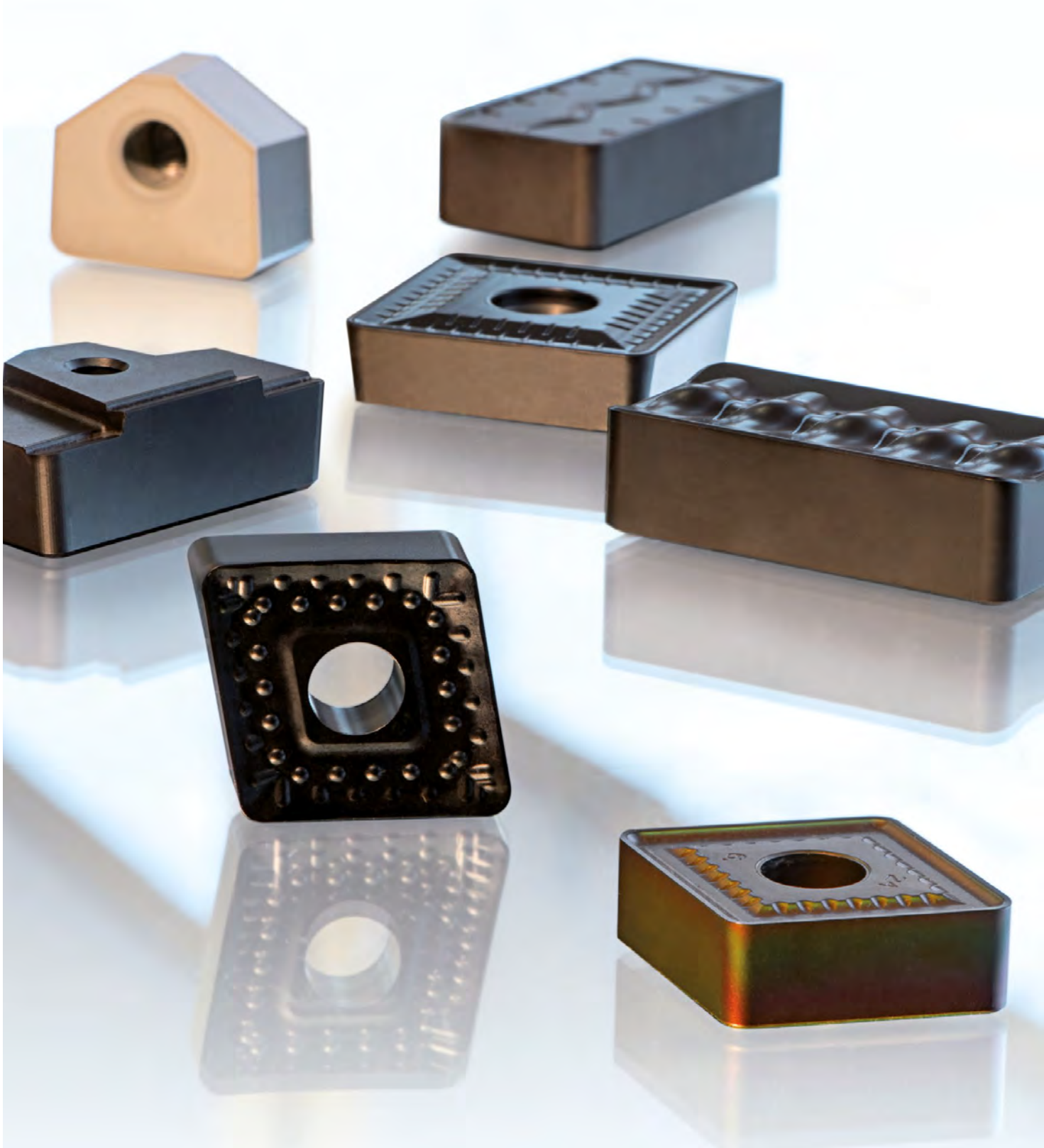
- P Steel
- M Stainless steel
- K Cast iron
- N Alloys and non-ferrous metals/non-metals
- S Super alloys/titanium
- H Hard materials
- X Multi-use grade without particular material focus

### 4 Primary suitability for application

- 1 Turning
- 2 Milling
- 3 Grooving
- 4 Drilling
- 5 Thread turning
- 6 Other
- 7 Multi-use grade without particular application focus

### 5 ISO 513 application range

- E.g.
- 01
- 05
- 10
- 15
- 25
- 35 ISO P35
- .
- .





**First-class cutting materials  
combined with the appropriate  
chip breaker create a  
performance advantage**



## Turning & grooving

Working on cast iron and steel rolls or housings, turbine rotors, rotor shafts and drive shafts for the wind power industry poses major challenges for tools and cutting materials. Machining oversized workpieces is far from easy: giant machines with turning length of up to 20 m and torque of up to 400,000 newton metres are used to manufacture the large parts. Changing conditions, high cutting depths and the service lives required under generally dry conditions make extremely high demands of tools, indexable inserts and grooving inserts.

Thanks to our tremendous experience in this segment, you have access to a wide range of highly wear-resistant cutting materials and robust, durable tools that are able to withstand the extreme demands. The application area here ranges from primary rough machining to finishing work and heavy grooving, an area where CERATIZIT has the most comprehensive range on the market. In order to achieve the best results, it is vital to find the optimum combination of cutting material grade, chip breaker, insert geometry and tool for each application and machine output. Place your trust in our many years of experience and benefit from our specialist knowledge.

## Grades Overview

Grade designation	Standard designation		Cutting material type	Application range											P	M	K	N	S	H	
	ISO	ANSI		01	05	10	15	20	25	30	35	40	45	50							
CTWK601	HW-K01	C4	W												●						
CTCK110	HC-K10	C3	C												●						
	HC-P05	C8	C												○						
CTCK120	HC-K20	C2	C												●						
	HC-P10	C8	C												○						
CTCP115	HC-P15	C7	C												●						
	HC-K25	C2	C												●						
	HC-M10	-	C												○						
CTP1127	HC-P25	C6	P												●						
	HC-M20	-	P												●						
CTCP125	HC-P25	C6	C												●						
	HC-K30	C1	C												●						
	HC-M20	-	C												○						
CTPM125	HC-M25	-	P												●						
	HC-P35	C5	P												●						
	HC-S25	-	P																		○
CTCP135	HC-P35	C5	C												●						
	HC-M25	-	C												○						
	HC-S25	-	C																		○
CTCP635	HC-P35	C5	C												●						
	HC-M35	-	C												●						

● Main application  
○ Extended application

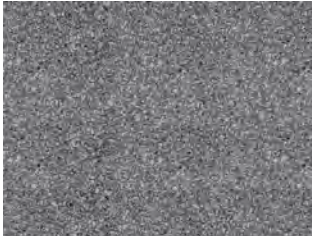


## Grade description

### CTWK601



HW-K01



**Specifications:**

Composition: Co 5.0%; WC balance | Grain size: submicron | Hardness: HV<sub>30</sub> 1950

**Recommended use:**

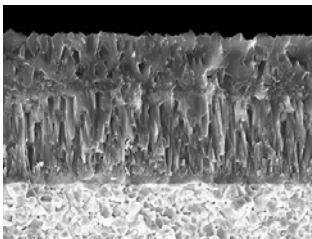
Hardest carbide grade; extremely high wear resistance; first choice for chilled iron rolls and undefined rolls.

### CTCK110

BLACKSTAR™



HC-K10 | HC-P05



**Specifications:**

Composition: Co 5.0%; mixed carbide 2.0%; WC balance | Grain size: submicron | Hardness: HV<sub>30</sub> 1810 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

**Recommended use:**

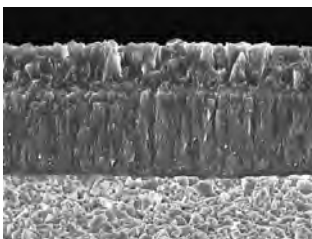
The most wear-resistant grade for working on cast iron materials with high cutting speeds in a continuous cut. Very good for work on nodular cast iron rolls and for HX grooving operations on cast iron rolls.

### CTCK120

BLACKSTAR™



HC-K20 | HC-P10



**Specifications:**

Composition: Co 6.0%, TaC 2.0%, WC balance | Grain size: 1 μm | Hardness: HV<sub>30</sub> 1630 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

**Recommended use:**

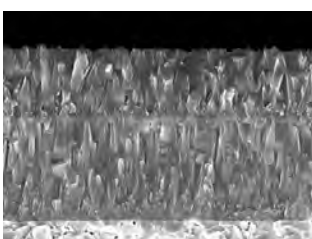
The grade for cast iron machining, with high toughness reserves for difficult conditions and interrupted cuts.

### CTCP115

BLACKSTAR™



HC-P15 | HC-K25 | HC-M10



**Specifications:**

Composition: Co 5.8%, mixed carbides 6.4%, WC balance; grain size: 1–2 μm | Hardness: HV<sub>30</sub> 1550 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

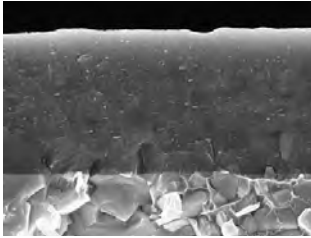
**Recommended use:**

The most wear-resistant high-performance grade, universally useable grade for general steels, stainless steels and cast iron materials.

## CTP1127



HC-P25 | HC-M20



**Specifications:**

Composition: Co 7.0%, mixed carbides 8.0%, WC balance; grain size: 1–2  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1450 | Layer system: PVD TiAlTaN

**Recommended use:**

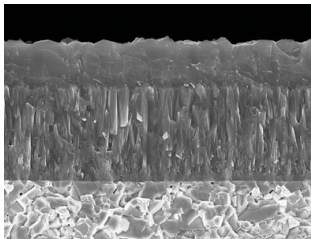
Universally useable grade with focus on machining of stainless steels. For slightly to heavily interrupted cuts under stable conditions.

## CTCP125

BLACKSTAR™



HC-P25 | HC-K30 | HC-M20



**Specifications:**

Composition: Co 7.0%, mixed carbides 8.0%, WC balance; grain size: 1–2  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1450 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

**Recommended use:**

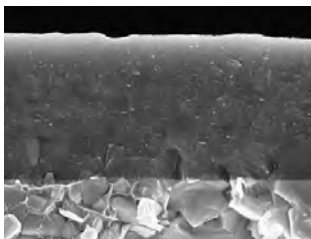
The first choice for universal machining of steels. For slightly to heavily interrupted cuts under stable conditions.

## CTPM125

BLACKSTAR™



HC-M25 | HC-P35 | HC-S25



**Specifications:**

Composition: Co 9.6%; mixed carbides 7.8%; other 0.4%; WC balance |  
Grain size: 1 - 2  $\mu\text{m}$  | Hardness: HV<sub>30</sub> 1460 | Layer system: PVD TiAlTaN

**Recommended use:**

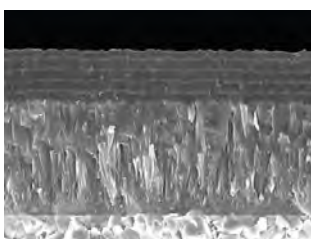
The first choice for machining of austenitic steels.

## CTCP135

COLORSTAR™



HC-P35 | HC-M25 | HC-S25



**Specifications:**

Composition: Co 9.6%, mixed carbides 6.7%, WC balance; grain size: 1–2  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1460 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub> Multilayer

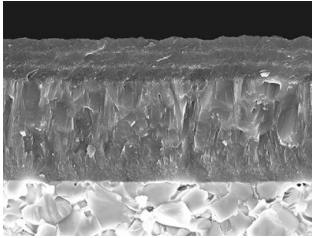
**Recommended use:**

The tough alternative for heavily interrupted cutting conditions.

## CTCP635

COLORSTAR™

HC-P35 | HC-M35 | HC-S35



**Specifications:**

Composition: Co 10.0%; mixed carbide 5.0%; WC balance | Grain size: fine |  
Hardness: HV<sub>30</sub> 1380 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

**Recommended use:**

The tough alternative for heavily interrupted cutting conditions.

## CTN3110

CN-K10



**Specifications:**

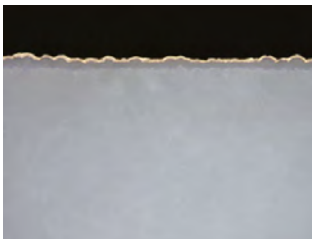
Composition: Si<sub>3</sub>N<sub>4</sub> | Grain size: > 2 μm | Hardness: HV<sub>10</sub> 1500

**Recommended use:**

The first choice for roughing cast iron rolls. Also suitable for interrupted cuts. Maximum toughness, particularly suitable for high feed rates and low cutting speeds.

## CTM3110

CC-K10



**Specifications:**

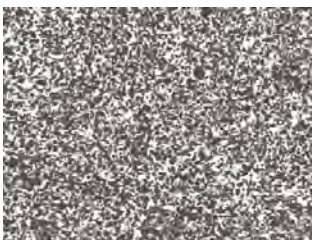
Composition: Si<sub>3</sub>N<sub>4</sub> | Grain size: > 2 μm | Hardness: HV<sub>30</sub> 1550 |  
Layer system: CVD Ti (C,N) + TiN; > 2μm

**Recommended use:**

Coated silicon nitride, very well suited to machining chromium rolls.

## CTS3105

CM-K05 | CM-H05



**Specifications:**

Composition: Al<sub>2</sub>O<sub>3</sub>; TiC | Grain size: > 1 μm | Hardness: HV<sub>30</sub> 2100

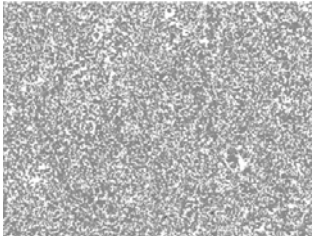
**Recommended use:**

This composite ceramic grade is suitable for hard precision turning of steel and for turning steel and cast iron or chilled iron rolls.

## CTSH110



CM-H10 | CM-K10



**Specifications:**

Composition: Al<sub>2</sub>O<sub>3</sub>; TiCN | Hardness: HV<sub>30</sub> 2150

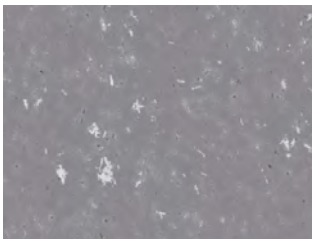
**Recommended use:**

Composite ceramic grade with very high cutting edge stability for machining of hardened materials. Suitable for slightly interrupted cuts.

## CTKX715



CA-H15 | CA-S15 | CA-K15



**Specifications:**

Composition: Al<sub>2</sub>O<sub>3</sub>; SiCW | Hardness: HV<sub>30</sub> 2050

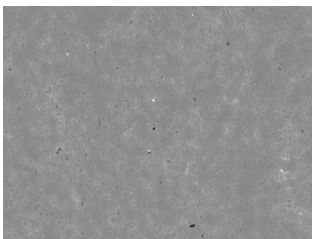
**Recommended use:**

Very well suited to hard turning under unfavourable machining conditions. First choice for the machining of cobalt-based alloys.

## CTKS710



CA-S10



**Specifications:**

Composition: Al<sub>2</sub>O<sub>3</sub>; SiCW | Hardness: HV<sub>30</sub> 2100

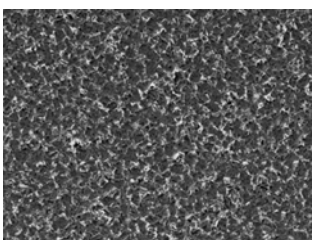
**Recommended use:**

Ideally suited to the rough machining of nickel-based alloys.

## CTBK102



BH-K10 | BH-H25



**Specifications:**

Composition: Cubic boron nitride (CBN) | 90 vol.% + metallic binder phase

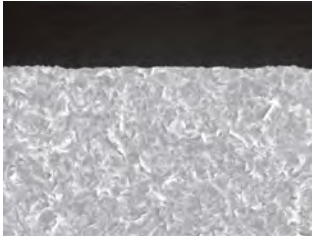
**Recommended use:**

The first choice for cast iron machining with full CBN.

## TA120



BN-H25 | BN-K30



**Specifications:**

Cubic boron nitride (CBN), 80 vol.% + binder phase (ceramic) | Grain size: ~ 15  $\mu\text{m}$  |  
Indexable insert version: full CBN

**Recommended use:**

Specially designed for chilled iron containing chromium. For reworking worn rolls and carbide rolls.





## Chip breakers LMNR

Available geometries of indexable insert LNMR 50, for heavy machining of steels, stainless steels and cast steel. For use under difficult conditions, heavily interrupted cuts

(-R90, -R98) and high feed rates (-R98). Available in various cutting material grades (p. 32).

### -R90



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ Universal geometry for steel and stainless steels</li> <li>▲ Stable cutting edge for heavily interrupted cuts</li> </ul>	1.3 – 2.2	10 – 45

### -R96



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ First choice for cast steel and steels</li> <li>▲ Preferred for tensile strengths of 900N/mm<sup>2</sup> and higher</li> </ul>	1.2 – 2.5	10 – 45

### -R98



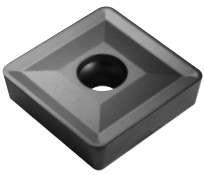
Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ Snake, number one for high feed rates</li> <li>▲ For steel and stainless steels</li> <li>▲ Stable cutting edge for heavily interrupted cuts</li> </ul>	1.4 – 2.6	10 – 45

## Chip breakers SCMT

Available chip breakers for indexable insert SCMT 38, for the machining of steels, stainless steels and cast iron materials (-R91). For use with high feed rates (-SN),

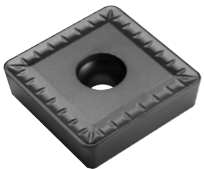
heavily interrupted cuts (-SN, -R91) and chip breakage problems (-R90). Available in various cutting material grades (p. 34).

### -SN



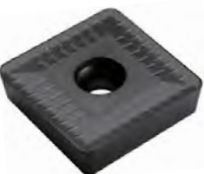
Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ Universal geometry for steel and stainless steels</li> <li>▲ Very open geometry for high feed rates</li> <li>▲ Stable cutting edge for heavily interrupted cuts</li> </ul>	0.9 – 2.0	5 – 30

### -R90



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ First choice for the machining of stainless steels</li> <li>▲ Very positive, soft cutting chip breaker</li> <li>▲ Use with chip breakage problems</li> </ul>	0.8 – 1.7	5 – 30

### -R91



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ Medium geometry between -SN and -R90</li> <li>▲ For the machining of steel, stainless steels and cast iron materials</li> <li>▲ Stable cutting edge for heavily interrupted cuts</li> </ul>	0.9 – 1.8	5 – 30

## Chip breakers RCMT / RCMX

Available chip breakers for indexable inserts RCMT and RCMX, for universal finish machining of steels and super alloys (-M23). For high surface qualities with smooth to

interrupted cuts, with some high feed rates and depths of cut. Available in various cutting material grades (p. 44).

### -M23



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ "The perfect one"</li> <li>▲ Chip breaker for finishing operations</li> <li>▲ Soft-cutting geometry for smooth cuts</li> <li>▲ Very good chip control, even with super alloys</li> </ul>	0.3 – 1.2	0.2 – 4.5

### -R33



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ "The sharp one"</li> <li>▲ Geometry with stability and small chip breakage up to medium feed and use on long-chipping materials and vibration-rich clamping</li> <li>▲ 6 indexing grooves</li> <li>▲ Can be clamped with different clamping systems</li> </ul>	0.6 – 1.2	up to 12

### -R63



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ "The universal stable one"</li> <li>▲ For maximum machining performance with high feeds</li> <li>▲ Stable even with poor forged parts and interrupted cut</li> <li>▲ 6 indexing grooves</li> <li>▲ Can be clamped with different clamping systems</li> </ul>	0.8 – 1.6	up to 12

### -SM



Description	f [mm/U]	a <sub>p</sub> [mm]
<ul style="list-style-type: none"> <li>▲ "The universal one"</li> <li>▲ Soft-cutting geometry with smooth to slightly interrupted cuts</li> </ul>	0.3 – 2.0	up to 10

## Chip breakers CNMM/T / DNMM / SNMM/T / TNMM

Available chip breakers for the indexable inserts CNMM and SNMM, for universal use with chip breakage problems (-R28), slightly interrupted cuts, unstable conditions (-R58)

and with high cutting depths and feed rates (-R88). Available in various cutting material grades (p. 40/p. 46).

### -R28



#### Description

- ▲ For chip breakage problems
- ▲ For uneven leads with varying depths of cut
- ▲ For materials with low tensile strength

#### CUTTING DATA -R28

Designation	Feed			Cutting depth		
	f min.	f Rec. [mm/U]	f max.	a <sub>p</sub> min.	a <sub>p</sub> Rec. [mm]	a <sub>p</sub> max.
CNMM 120408EN-R28	0.25	<b>0.35</b>	0.55	0.8	<b>3.0</b>	7.0
CNMM 120412EN-R28	0.30	<b>0.45</b>	0.70	1.0	<b>3.0</b>	7.0
CNMM 120416EN-R28	0.30	<b>0.60</b>	0.90	1.5	<b>3.0</b>	7.0
CNMM 160612EN-R28	0.30	<b>0.45</b>	0.70	1.0	<b>4.0</b>	9.0
CNMM 160616EN-R28	0.35	<b>0.60</b>	0.90	1.5	<b>4.0</b>	9.0
CNMM 190612EN-R28	0.30	<b>0.45</b>	0.70	1.0	<b>5.5</b>	12.0
CNMM 190616EN-R28	0.35	<b>0.60</b>	0.90	1.5	<b>5.5</b>	12.0
CNMM 190624EN-R28	0.35	<b>0.65</b>	1.00	2.0	<b>5.5</b>	12.0
DNMM 150612EN-R28	0.25	<b>0.45</b>	0.70	1.0	<b>2.5</b>	6.0
DNMM 150616EN-R28	0.30	<b>0.60</b>	0.85	1.5	<b>2.5</b>	6.0
SNMM 150612EN-R28	0.30	<b>0.35</b>	0.70	1.0	<b>4.0</b>	9.0
SNMM 150616EN-R28	0.35	<b>0.60</b>	0.90	1.5	<b>4.0</b>	9.0
SNMM 190616EN-R28	0.35	<b>0.60</b>	0.90	1.5	<b>5.5</b>	12.0
SNMM 250724EN-R28	0.35	<b>0.65</b>	1.00	2.0	<b>7.0</b>	16.0
SNMM 250924EN-R28	0.35	<b>0.65</b>	1.00	2.0	<b>7.0</b>	16.0
TNMM 220416EN-R28	0.30	<b>0.55</b>	0.85	1.5	<b>3.0</b>	7.0

### -R58



#### Description

- ▲ Universal geometry for almost all materials
- ▲ Also for slightly interrupted cuts
- ▲ Also suitable for unstable machining conditions, due to the low cutting force

#### CUTTING DATA -R58

Designation	Feed			Cutting depth		
	f min.	f Rec. [mm/U]	f max.	a <sub>p</sub> min.	a <sub>p</sub> Rec. [mm]	a <sub>p</sub> max.
CNMM 120408EN-R58	0.25	<b>0.45</b>	0.70	1.0	<b>3.0</b>	7.0
CNMM 120412EN-R58	0.30	<b>0.55</b>	0.85	1.5	<b>3.0</b>	7.0
CNMM 120416EN-R58	0.35	<b>0.65</b>	1.00	2.0	<b>3.0</b>	7.0
CNMM 160612EN-R58	0.30	<b>0.55</b>	0.85	1.5	<b>4.0</b>	9.0

**CUTTING DATA -R58**

Designation	Feed			Cutting depth		
	f min.	f Rec. [mm/U]	f max.	a <sub>p</sub> min.	a <sub>p</sub> Rec. [mm]	a <sub>p</sub> max.
CNMM 160616EN-R58	0.35	<b>0.65</b>	1.00	2.0	<b>4.0</b>	9.0
CNMM 160624EN-R58	0.40	<b>0.75</b>	1.20	2.5	<b>4.0</b>	9.0
CNMM 190612EN-R58	0.35	<b>0.55</b>	0.85	1.5	<b>5.5</b>	12.0
CNMM 190616EN-R58	0.40	<b>0.65</b>	1.00	2.0	<b>5.5</b>	12.0
CNMM 190624EN-R58	0.40	<b>0.75</b>	1.20	2.5	<b>5.5</b>	12.0
CNMM 250924EN-R58	0.45	<b>0.80</b>	1.30	2.5	<b>8.0</b>	16.0
DNMM 150612EN-R58	0.30	<b>0.50</b>	0.80	1.5	<b>2.5</b>	6.0
DNMM 150616EN-R58	0.35	<b>0.60</b>	0.90	2.0	<b>2.5</b>	6.0
SNMM 120408EN-R58	0.25	<b>0.45</b>	0.70	1.0	<b>3.0</b>	7.0
SNMM 120412EN-R58	0.30	<b>0.55</b>	0.85	1.5	<b>3.0</b>	7.0
SNMM 150612EN-R58	0.30	<b>0.55</b>	0.85	1.5	<b>4.0</b>	9.0
SNMM 150616EN-R58	0.35	<b>0.65</b>	1.00	2.0	<b>4.0</b>	9.0
SNMM 190612EN-R58	0.35	<b>0.55</b>	0.85	1.5	<b>5.5</b>	12.0
SNMM 190616EN-R58	0.40	<b>0.65</b>	1.00	2.0	<b>5.5</b>	12.0
SNMM 190624EN-R58	0.40	<b>0.75</b>	1.20	2.0	<b>5.5</b>	12.0
SNMM 250724EN-R58	0.45	<b>0.80</b>	1.30	2.5	<b>8.0</b>	16.0
SNMM 250924EN-R58	0.45	<b>0.80</b>	1.30	2.5	<b>8.0</b>	16.0

**-R88**



**Description**

- ▲ For high cutting depths and high feed rates
- ▲ Process security even with forging and casting skin
- ▲ First choice for heavily interrupted cuts

**CUTTING DATA -R88**

Designation	Feed			Cutting depth		
	f min.	f Rec. [mm/U]	f max.	a <sub>p</sub> min.	a <sub>p</sub> Rec. [mm]	a <sub>p</sub> max.
CNMM 160624SN-R88	0.40	<b>0.70</b>	1.20	2.0	<b>5.0</b>	9.0
CNMM 190616SN-R88	0.40	<b>0.70</b>	1.00	2.0	<b>5.0</b>	12.0
CNMM 190624SN-R88	0.40	<b>0.70</b>	1.20	2.0	<b>5.0</b>	12.0
CNMM 250924SN-R88	0.60	<b>1.00</b>	1.50	3.5	<b>10.0</b>	18.0
CNMT 320932SN-R88	0.70	<b>1.20</b>	1.90	5.0	<b>13.0</b>	23.0
SNMM 190616SN-R88	0.40	<b>0.70</b>	1.00	2.0	<b>5.0</b>	12.0
SNMM 190624SN-R88	0.40	<b>0.70</b>	1.20	2.0	<b>5.0</b>	12.0
SNMM 250724SN-R88	0.60	<b>1.00</b>	1.50	3.5	<b>10.0</b>	18.0
SNMM 250732SN-R88	0.60	<b>1.00</b>	1.70	3.5	<b>10.0</b>	18.0
SNMM 250924SN-R88	0.60	<b>1.00</b>	1.50	3.5	<b>10.0</b>	18.0
SNMM 250932SN-R88	0.60	<b>1.00</b>	1.70	3.5	<b>10.0</b>	18.0
SNMM 310932SN-R88	0.70	<b>1.20</b>	1.90	5.0	<b>13.0</b>	23.0
SNMT 310932SN-R88	0.70	<b>1.20</b>	1.90	5.0	<b>13.0</b>	23.0

## Chip breakers HX

Available chip breakers for indexable insert shape HX, for the machining of steels, stainless steels and cast iron materials for a range of grooving operations. Stable and

innovative geometries mean that the material is available in the required shape. Available in various cutting material grades.

### -R70



#### Description

- ▲ Suitable for steels, stainless materials and cast iron materials
- ▲ Stable cutting edge also for heavily interrupted cuts
- ▲ Preferred for undercutting and copying operations
- ▲ Optimal usage conditions with high feed rates

#### CUTTING DATA -R70

Designation	Feed			Cutting speed		
	f min.	f Rec. [mm/U]	f max.	v <sub>c</sub> min.	v <sub>c</sub> Rec. [m/min]	v <sub>c</sub> max.
HX 32	0.35	<b>0.55</b>	0.95	30	<b>70</b>	100
HX 40	0.50	<b>0.75</b>	1.00	30	<b>40</b>	90
HX 45	0.50	<b>0.80</b>	1.10	30	<b>40</b>	80
HX 50	0.55	<b>0.90</b>	1.20	30	<b>40</b>	80
HX 60	0.60	<b>1.00</b>	1.30	30	<b>40</b>	70

### -R71



#### Description

- ▲ Very positive rake angle with small negative chamfer
- ▲ Suitable for grooves and undercuts
- ▲ Suitable for steels, stainless materials and cast iron materials
- ▲ Minimal cutting force

#### CUTTING DATA -R71

Designation	Feed			Cutting speed		
	f min.	f Rec. [mm/U]	f max.	v <sub>c</sub> min.	v <sub>c</sub> Rec. [m/min]	v <sub>c</sub> max.
HX 16	0.25	<b>0.45</b>	0.90	40	<b>100</b>	140
HX 20	0.30	<b>0.50</b>	0.90	40	<b>90</b>	140
HX 25	0.30	<b>0.60</b>	1.00	40	<b>70</b>	120

**-R75**



**Description**

- ▲ Suitable for steels, stainless materials and cast iron materials
- ▲ Stable cutting edge also for interrupted cuts
- ▲ Suitable for grooving, undercutting and copying operations

**-R81**



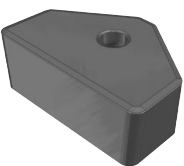
**Description**

- ▲ First choice for grooving into solid material, ideal for overhead machining
- ▲ Chip breaker prevents chip jams, maximum process security
- ▲ Suitable for steel and stainless steels
- ▲ Very soft cutting with high cutting edge stability, minimises vibrations

**CUTTING DATA -R81**

Designation	Feed			Cutting speed		
	f min.	f Rec. [mm/U]	f max.	v <sub>c</sub> min.	v <sub>c</sub> Rec. [m/min]	v <sub>c</sub> max.
HX 16	0.20	<b>0.35</b>	0.70	40	<b>100</b>	140
HX 20	0.25	<b>0.40</b>	0.75	40	<b>90</b>	140
HX 25	0.30	<b>0.45</b>	0.80	40	<b>70</b>	120
HX 32	0.35	<b>0.50</b>	0.85	30	<b>70</b>	100
HX 40	0.50	<b>0.70</b>	0.95	30	<b>40</b>	90
HX 45	0.50	<b>0.75</b>	1.00	30	<b>40</b>	80
HX 50	0.55	<b>0.80</b>	1.10	30	<b>40</b>	80
HX 60	0.60	<b>0.90</b>	1.20	30	<b>40</b>	70

**-PN**



**Description**

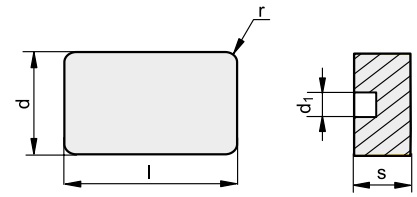
- ▲ Double-chamfered and rounded cutting edge
- ▲ Suitable for grooves, undercuts and copying operations
- ▲ Stable machine conditions are a prerequisite





f [mm/U]      a<sub>p</sub> [mm]

0.2 – 1.4      –

# LNMR 50

	●	●	●	●
M	○	○	○	○
R	●	●	○	○
S	○	○	○	○
H	○	○	○	○
	CTCK110	CTCP115	CTCP125	CTP1127
				CTCP635

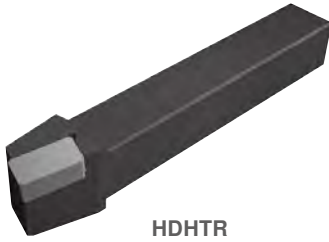


				d [mm]	l [mm]	r [mm]	d <sub>1</sub> [mm]	s [mm]
-R90 	LNMR 501432SN-R90	○ ●		25.40	50.80	3.20	6.50	14.2
-R96 	LNMR 501432SN-R96	○ ●		25.40	50.80	3.20	6.50	14.2
-R98 	LNMR 501432SN-R98	● ●		25.40	50.80	3.20	6.50	14.2
-TN 	LNMR 501432TN-040C	○		25.00	50.00	3.20	6.50	14.2

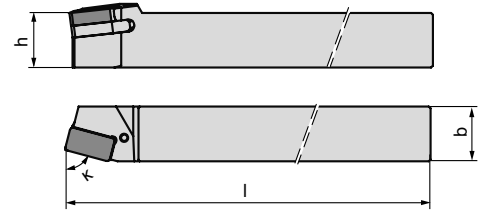
- Standard indexable inserts available from stock
- Indexable inserts with limited availability






## Tools for LNMR 50 indexable insert



HDHTR



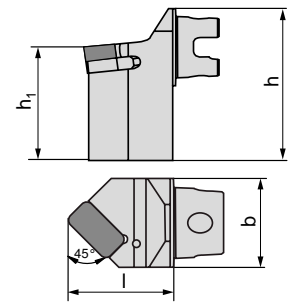
l [mm]	Type, Designation	LNR 	h [mm]	b [mm]	κ [°]	○		
350	HDHTR 5050U.1LN50SC.75	R	50	50	75	○	LNMR 501432	E01
350	HDHTL 5050U.1LN50SC.75	L	50	50	75	○	LNMR 501432	E02
400	HDHTR 6060V.1LN50SC.75	R	60	60	75	○	LNMR 501432	E01
400	HDHTL 6060V.1LN50SC.75	L	60	60	75	○	LNMR 501432	E02




Alternative adapters and setting angles available on request

- Standard tools available from stock
- Tools with limited availability



HDHTR .. UT80..



l [mm]	Type, Designation	LNR 	l [mm]	b [mm]	κ [°]	○		
95	HDHTR UT80.1LN50SC.45	R	95	80	45	○	LNMR 501432	E01
95	HDHTL UT80.1LN50SC.45	L	95	80	45	○	LNMR 501432	E02

Alternative adapters and setting angles available on request

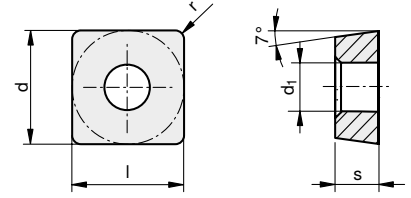
- Standard tools available from stock
- Tools with limited availability

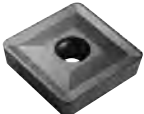
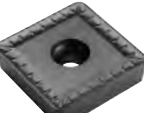
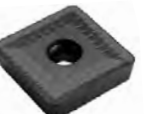


E01	U-LN50RH-HD-HSS	11793159	4209
E02	U-LN50LH-HD-HSS	11793159	4209

# SCMT 25 / 38

B	●	●	●
M	○	○	●
K	●	●	○
N	○	○	○
S	○	○	○
H	○	○	○
	CTCP115	CTCP125	CTP1127
			CTCP135



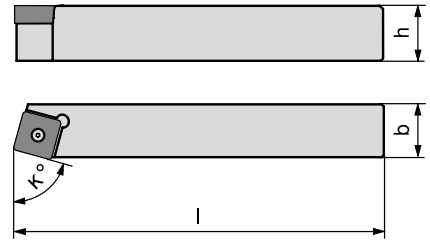
				d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]
	SCMT 380932SN	○ ● ○		38.10	38.10	9.52	3.20	8.70
-SN								
	SCMT 250924SN-R90	○ ● ●		25.40	25.40	9.52	2.40	8.60
-R90								
	SCMT 380932SN-R90	○ ● ● ●		38.10	38.10	9.52	3.20	8.70
	SCMT 250924SN-R91	○ ●		25.40	25.40	9.52	2.40	8.60
-R91								
	SCMT 380932SN-R91	○ ● ○		38.10	38.10	9.52	3.20	8.70

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

## Tools for SCMT 25 / 38 indexable insert



HDHTR



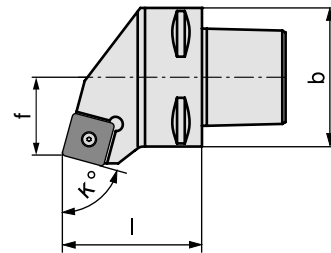
l [mm]	Type, Designation	LNR	h [mm]	b [mm]	κ [°]			
250	SSBCR 4040 S25	R	40	40	75	○	SCMT 25	E01
250	SSBCL 4040 S25	L	40	40	75	○	SCMT 25	E01
300	SSBCR 5050 T38	R	50	50	75	○	SCMT 38	E02
300	SSBCL 5050 T38	L	50	50	75	○	SCMT 38	E02

Alternative adapters and setting angles available on request

- Standard tools available from stock
- Tools with limited availability



HDHTR .. UT80..



l [mm]	Type, Designation	LNR	b [mm]	f [mm]	κ [°]			
80	PSC80-SSRCR-45080-25	R	80	45	75	○	SCMT 25	E01
80	PSC80-SSRCL-45080-25	L	80	45	75	○	SCMT 25	E01

Alternative adapters and setting angles available on request

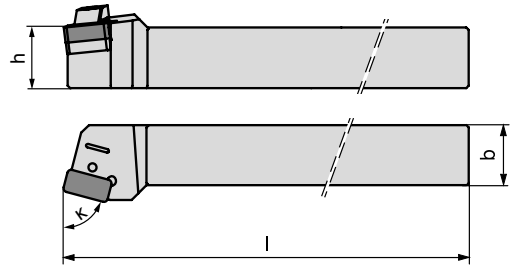
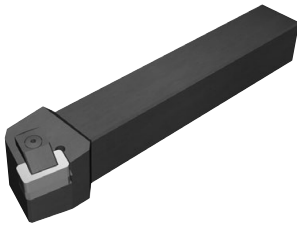
- Standard tools available from stock
- Tools with limited availability



E01	U-SC2506-S	11291667	BUC-M8-M12-10004739	8095018700
E02	U-SC380620-S	11291667	BUC-M8-M12-10004739	8095018700



## Tools for LNMN 6688 indexable insert



l [mm]	Type, Designation	LNR 	h [mm]	b [mm]	κ [°]			
350	HDHTR 5050U.1LN66C.08	R	50	50	08	○	LNMN 6688	E01
350	HDHTR 5050U.1LN66C.10	R	50	50	10	○	LNMN 6688	E01
350	HDHTL 5050U.1LN66C.10	L	50	50	10	○	LNMN 6688	E01
350	HDHTR 5050U.1LN66C.45	R	50	50	45	○	LNMN 6688	E01
350	HDHTL 5050U.1LN66C.45	L	50	50	45	○	LNMN 6688	E01
350	HDHTR 5050U.1LN66C.75	R	50	50	75	○	LNMN 6688	E01
350	HDHTL 5050U.1LN66C.75	L	50	50	75	○	LNMN 6688	E01
400	HDHTR 6060V.1LN66C.10	R	60	60	10	○	LNMN 6688	E01
400	HDHTR 6060V.1LN66C.45	R	60	60	45	○	LNMN 6688	E01
400	HDHTL 6060V.1LN66C.45	L	60	60	45	○	LNMN 6688	E01
400	HDHTR 6060V.1LN66C.75	R	60	60	75	○	LNMN 6688	E01

Alternative adapters and setting angles available on request

- Standard tools available from stock
- Tools with limited availability



E01



U-LN66-HD



4147



CLAMP HD01

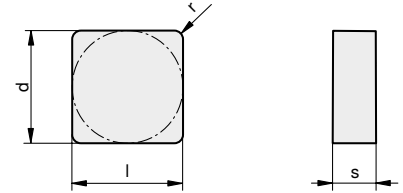
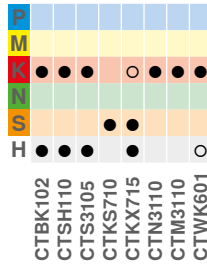


6210963

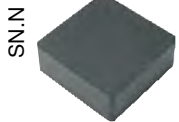


4209

# SNGN / SNUN



					d [mm]	l [mm]	s [mm]	r [mm]
	SNGN 090312TN-020D	●			9.52	9.52	3.18	1.20
	SNGN 090316TN-020D		○		9.52	9.52	3.18	1.60
	SNGN 120316TN-020D	●			12.70	12.70	3.18	1.60
	SNGN 120412TN-005D		●		12.70	12.70	4.76	1.20
	SNGN 120412PN-150CF			●	12.70	12.70	4.76	1.60
	SNGN 120416TN-005D		●		12.70	12.70	4.76	1.60
	SNGN 120416TN-020D		○		12.70	12.70	4.76	1.20
	SNGN 120708TN-005D			●	12.70	12.70	7.94	0.80
	SNGN 120716TN-005D			○	12.70	12.70	7.94	1.60
	SNGN 120716PN-150CF		○		12.70	12.70	7.94	1.60
	SNGN 120716PN-100CF		●		12.70	12.70	7.94	1.60
	SNGN 120720PN-100CF		●		12.70	12.70	7.94	2.00
	SNGN 150712TN-020D		●		15.80	15.80	7.94	1.20
	SNGN 150716PN-150CF			●	15.80	15.80	7.94	1.20
	SNGN 150720SN-200C			○	15.80	15.80	7.94	2.00
	SNGN 190716PN-150CF			● ○	19.05	19.05	7.94	1.60
	SNGN 190716PN-200CF		●		19.05	19.05	7.94	1.60
	SNGN 190720TN-020D			○	19.05	19.05	7.94	2.00
	SNGN 190720PN-100CF			○	19.05	19.05	7.94	2.00
	SNGN 190724TN-005D			○	19.05	19.05	7.94	2.40
	SNGN 190724SN-200C			○	19.05	19.05	7.94	2.40
	SNGN 250724PN-200CE		● ○	○	25.40	25.40	7.94	2.40
	SNGN 250724PN-150CE			●	25.40	25.40	7.94	2.40
	SNGN 250724PN-100CF		●		25.40	25.40	7.94	2.40
	SNUN 250724SN-100C				○	25.40	7.94	2.40
	SNGN 250724SN-200C			○	25.40	25.40	7.94	2.40
	SNGN 250924SN-030E			○	25.40	25.40	7.94	2.40
	SNGN 250924PN-150CE			● ○	25.40	25.40	9.52	2.40
	SNGN 250924PN-100CF		●		25.40	25.40	9.52	2.40
	SNUN 250924SN-100C				○	25.40	9.52	2.40
	SNGN 250924SN-200C			○	25.40	25.40	9.52	2.40
	SNGN 250924PN-200CE			○	25.40	25.40	9.52	2.40



Tool system available on request

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

## SNGN 38

		CTSH110 CTS3105	d [mm]	l [mm]	s [mm]	r [mm]
-SNGN 38		o o	38.10	38.10	12.70	0.8

Tool system available on request

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

## SNGA / SNMA

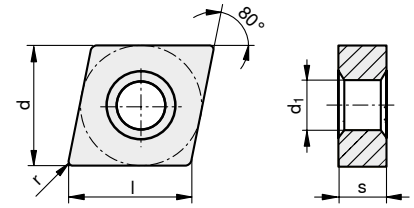
		CTCK110 CTCK120 CTSH110 CTS3105 CTN3110	d [mm]	l [mm]	s [mm]	r [mm]
-SN.A			19.05	19.05	7.94	1.20
		o	19.05	19.05	7.94	1.60
		● ●	19.05	19.05	7.94	1.20
		● ●	19.05	19.05	7.94	1.60
		●	19.05	19.05	7.94	1.60
		o	19.05	19.05	7.94	1.60

Tool system available on request

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

# CNMM / CNMT / CNMG

B	○	○	●	●	●
M	○	○	○	○	○
K	●	●	●	●	●
N	○	○	○	○	○
S	○	○	○	○	○
H	○	○	○	○	○



				CTCK110	CTCK120	CTCP115	CTCP125	CTCP135	d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]	
-R28		CNMM 160612EN-R28			●	●	●		15.88	16.10	6.35	1.20	6.35	
		CNMM 160616EN-R28			●	●	●		15.88	16.10	6.35	1.60	6.35	
		CNMM 190612EN-R28			●	●	●		19.05	19.30	6.35	1.20	7.94	
		CNMM 190616EN-R28			●	●	●		19.05	19.30	6.35	1.60	7.94	
		CNMM 190624EN-R28			●	●	●		19.05	19.30	6.35	2.40	7.94	
-R58		CNMM 160612EN-R58			●	●	●		15.88	16.10	6.35	1.20	6.35	
		CNMM 160616EN-R58			●	●	●		15.88	16.10	6.35	1.60	6.35	
		CNMM 160624EN-R58			●	●	●		15.88	16.10	6.35	2.40	6.35	
		CNMM 190612EN-R58			●	●	●		19.05	19.30	6.35	1.20	7.94	
		CNMM 190616EN-R58			●	●	●		19.05	19.30	6.35	1.60	7.94	
		CNMM 190624EN-R58			●	●	●		19.05	19.30	6.35	2.40	7.94	
		CNMM 250924EN-R58			●	●	●		25.40	25.80	9.52	2.40	9.12	
-R88		CNMM 190616SN-R88			●	●	●		19.05	19.30	6.35	1.60	7.94	
		CNMM 190624SN-R88			●	●	●		19.05	19.30	6.35	2.40	7.94	
		CNMM 190624SN-R88Q			●	●			19.05	19.30	6.35	2.40	7.94	
		CNMM 250924SN-R88			●	●	○		25.40	25.80	9.52	2.40	9.12	
		CNMT 320932SN-R88			●	●			31.75	32.24	9.52	3.20	9.12	
-M50		CNMG 160612EN-M50			●	●	●		15.88	16.10	6.35	1.20	6.35	
		CNMG 160616EN-M50			●	●	●		15.88	16.10	6.35	1.60	6.35	
-M70		CNMG 160608EN-M70			●	●	●	●	15.88	16.10	6.35	0.80	6.35	
		CNMG 160612EN-M70			●	●	●	●	15.88	16.10	6.35	1.20	6.35	
		CNMG 160616EN-M70			●	●	●	●	15.88	16.10	6.35	1.60	6.35	
		CNMG 160624EN-M70				○	●	●		15.88	16.10	6.35	2.40	6.35
		CNMG 190608EN-M70				○	●	●		19.05	19.30	6.35	0.80	7.94
		CNMG 190612EN-M70			●	●	●	●		19.05	19.30	6.35	1.20	7.94
		CNMG 190616EN-M70			●	●	●	●		19.05	19.30	6.35	1.60	7.94
		CNMG 190624EN-M70				●	●	●		19.05	19.30	6.35	2.40	7.94
		CNMG 250924EN-M70				●				25.40	25.80	9.52	2.40	9.12

● Standard indexable inserts available from stock  
○ Indexable inserts with limited availability



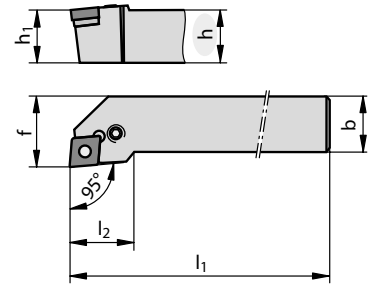
## Tools for CNMM / CNMT / CNMG indexable inserts



PCLNR



SCLNR



h [mm]	Type, Designation	LNR	h <sub>1</sub> [mm]	b [mm]	l <sub>1</sub> [mm]	l <sub>2</sub> [mm]	f [mm]		
32	PCLNR 3232 P16-T	R	32	32	170	32.6	40	CN.. 1606	E01
32	PCLNL 3232 P16-T	L	32	32	170	32.6	40	CN.. 1606	E01
32	PCLNR 3232 P19-T	R	32	32	170	38	40	CN.. 1906	E02
32	PCLNL 3232 P19-T	L	32	32	170	38	40	CN.. 1906	E02
40	PCLNR 4040 S19-T	R	40	40	250	38	50	CN.. 1906	E02
40	PCLNL 4040 S19-T	L	40	40	250	38	50	CN.. 1906	E02
40	PCLNR 4040 S25	R	40	40	250	50	50	CN.. 2509	E03
40	PCLNL 4040 S25	L	40	40	250	50	50	CN.. 2509	E03
40	SCLNR 4040 T32	R	40	40	300	60	50	CN.. 3209	E04
40	SCLNL 4040 T32	L	40	40	300	60	50	CN.. 3209	E04

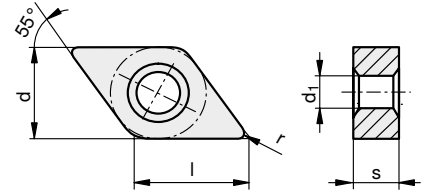
Standard range – all available indexable inserts and tools can be found in the main catalogue

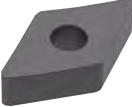
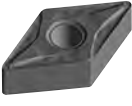
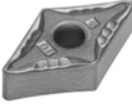
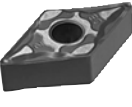



E01	U-CN160416-N	–	–	59443	KNH-IC15,875-000840	4471	–
E02	U-CN190416-N	–	–	59448	KNH-IC19,05-033442	4209	–
E03	U-CN250724-N	–	–	59449	KNH-IC25, 4-038444	4496	–
E04	U-CN320632-S	11291667	11291702	–	–	–	8095018700

# DNGA / DNMG

S	○	○	●	●	●	●
M	○	○	○	○	○	○
K	●	●	●	●	●	●
N	○	○	○	○	○	○
S	○	○	○	○	○	○
H	●	●	●	●	●	●
	CTSH110	CTS3105	CTCK110	CTCK120	CTCP115	CTCP125
					CTPM125	CTCP135



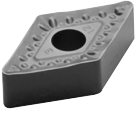


					d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]	
-TN		DNGA 150604TN-020D	●		12.70	15.50	6.35	0.40	5.16	
		DNGA 150608TN-020D	○	●		12.70	15.50	6.35	0.80	5.16
		DNGA 150612TN-020D	○	●		12.70	15.50	6.35	1.20	5.16
		DNGA 150616TN-020D	○			12.70	15.50	6.35	1.60	5.16
-F30		DNMG 150604EN-F30		●	12.70	15.50	6.35	0.40	5.16	
		DNMG 150608EN-F30		●	12.70	15.50	6.35	0.80	5.16	
-M30		DNMG 150608EN-M30		●	12.70	15.50	6.35	0.80	5.16	
		DNMG 150612EN-M30		●	12.70	15.50	6.35	1.20	5.16	
-M50		DNMG 150604EN-M50		●	12.70	15.50	6.35	0.40	5.16	
		DNMG 150608EN-M50	●	●	12.70	15.50	6.35	0.80	5.16	
		DNMG 150612EN-M50	●	●	12.70	15.50	6.35	1.20	5.16	
-M60		DNMG 150608EN-M60		●	12.70	15.50	6.35	0.80	5.16	
		DNMG 150612EN-M60		●	12.70	15.50	6.35	1.20	5.16	

All available indexable inserts and tools can be found in the main catalogue

- Standard indexable inserts available from stock
- Indexable inserts with limited availability


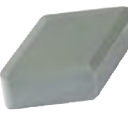
## DNMM

					d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]
		CTCP115	CTCP125	CTCP135					
-R28 	DNMM 150612EN-R28	● ● ●			12.70	15.50	6.35	1.20	5.16
	DNMM 150616EN-R28	● ● ●			12.70	15.50	6.35	1.60	5.16
	DNMM 190724EN-R28Q	○			15.87	19.05	7.94	2.40	6.35
-R58 	DNMM 150612EN-R58	● ● ●			12.70	15.50	6.35	1.20	5.16
	DNMM 150616EN-R58	● ● ●			12.70	15.50	6.35	1.60	5.16
	DNMM 190724EN-R58Q	○			15.87	19.05	7.94	2.40	6.35

All available indexable inserts and tools can be found in the main catalogue

● Standard indexable inserts available from stock  
○ Indexable inserts with limited availability

## DNGN

				d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]
		CTS3105	CTKX715					
	DNGN 150708TN-005D	●		12.70	15.50	7.94	0.80	—
	DNGN 150708TN-020D	●		12.70	15.50	7.94	0.80	—
	DNGN 150712TN-005D	○		12.70	15.50	7.94	1.20	—
	DNGN 150712TN-020D	●		12.70	15.50	7.94	1.20	—
	DNGN 150716TN-005D	●		12.70	15.50	7.94	1.60	—

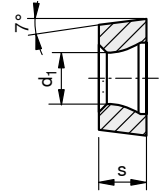
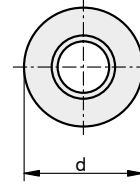
All available indexable inserts and tools can be found in the main catalogue

● Standard indexable inserts available from stock  
○ Indexable inserts with limited availability

# RCGT / RCMT / RCMX



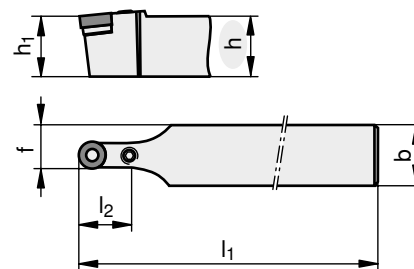
CTCP115  
CTCP125  
CTCP135  
1494



			d [mm]	s [mm]	d <sub>1</sub> [mm]	
-SM		RCGT 0602MOEN-SM	● ●	6.00	2.38	2.80
		RCGT 0803MOEN-SM	● ●	8.00	3.18	3.40
		RCMT 1003MOSN-SM	● ●	10.00	3.18	4.00
		RCMT 1204MOSN-SM	● ● ●	12.00	4.76	4.90
		RCMT 1606MOSN-SM	● ● ●	16.00	6.35	5.30
		RCMT 2006MOSN-SM	● ●	20.00	6.35	6.50
		RCMT 2507MOSN-SM	● ● ○	25.00	7.94	7.20
-M23		RCMT 1204MOSN-M23	● ●	12.00	4.76	4.90
		RCMT 1606MOSN-M23	● ●	16.00	6.35	5.30
		RCMT 2006MOSN-M23	● ●	20.00	6.35	6.50
-R33		RCMX 3209MOSN-R33	●	32.00	9.52	10.50
-R63		RCMX 2507MOSN-R63	●	25.00	8.28	7.70
		RCMX 3209MOSN-R63	●	32.00	9.52	10.50

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

## Tools for RCGT / RCMT / RCMX indexable inserts



h [mm]	Type, Designation	LNR 	h <sub>1</sub> [mm]	b [mm]	l <sub>1</sub> [mm]	l <sub>2</sub> [mm]	f [mm]		
25	PRDCN 2525 M12-T	N	25	25	150	24	18.5	RC.. 1204	E01
25	PRGCR 2525 M12-T	R	25	25	150	–	32	RC.. 1204	E01
25	PRGCL 2525 M12-T	L	25	25	150	–	32	RC.. 1204	E01
32	PRGCR 3225 P12-T	R	32	25	170	–	21	RC.. 1204	E02
32	PRGCL 3225 P12-T	L	32	25	170	–	21	RC.. 1204	E02
32	PRGCL 3225 P12-T	L	32	25	170	–	32	RC.. 1204	E02
32	PRDCR 3225 P16-T	R	32	25	170	–	32	RC.. 1606	E02
32	PRDCN 3225 P16-T	N	32	25	170	28	20.5	RC.. 1606	E02
32	PRDCN 3232 P20-T	N	32	32	170	32	26	RC.. 2006	E03
32	PRGCR 3232 P20-T	R	32	32	170	–	40	RC.. 2006	E03
32	PRGCL 3232 P20-T	L	32	32	170	–	40	RC.. 2006	E03
40	PRDCN 4040 S25-T	N	40	40	250	42	32.5	RC.. 2507	E04
40	PRGCR 4040 S25-T	R	40	40	250	–	50	RC.. 2507	E04
40	PRGCL 4040 S25-T	L	40	40	250	–	50	RC.. 2507	E04

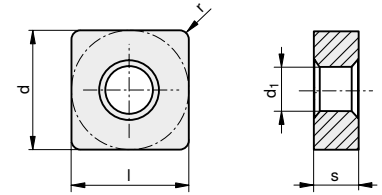
Standard range – all available indexable inserts and tools can be found in the main catalogue



E01	U-RC1203MO-N	59445	154578	KNH-IC12-000341	4770
E02	U-RN160400-N	154575	154579	KNH-IC16-000342	4771
E03	U-RN200400-N	59441	154580	KNH-IC20-000343	4773
E04	U-RN250600-N	154576	154581	KNH-IC25-000344	4209

# SNMG / SNMM / SNMT

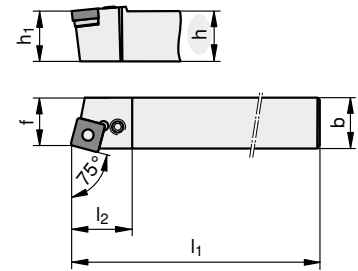
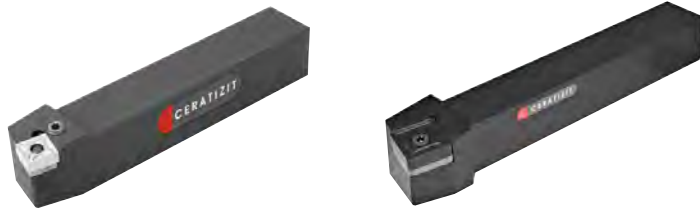
B	○	○	●	●
M	○	○	○	○
K	●	●	●	●
N	○	○	○	○
S	○	○	○	○
H				



		CTCK110	CTCK120	CTCP115	CTCP125	CTCP135	d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]
-M50			●	●	●		15.88	15.88	6.35	0.80	6.35
				●	●	●	15.88	15.88	6.35	1.20	6.35
-M70			●	●	●	●	15.88	15.88	6.35	1.20	6.35
			●	●	●	●	15.88	15.88	6.35	1.60	6.35
			●	●	●	●	19.05	19.05	6.35	1.20	7.94
			●	●	●	●	19.05	19.05	6.35	1.60	7.94
					●		25.40	25.40	9.52	2.40	9.12
-R28			●	●	●		15.88	15.88	6.35	1.20	6.35
			●	●	●		15.88	15.88	6.35	1.60	6.35
			●	●	●		19.05	19.05	6.35	1.60	7.94
					●		25.40	25.40	7.94	2.40	9.12
				○	○	●	25.40	25.40	7.94	2.40	9.12
-R58			●	●	●		15.88	15.88	6.35	1.20	6.35
			●	●	●		15.88	15.88	6.35	1.60	6.35
			●	●			19.05	19.05	6.35	1.20	7.94
			●	●	●		19.05	19.05	6.35	1.60	7.94
			●	●	●		19.05	19.05	6.35	2.40	7.94
			●	●	●		25.40	25.40	7.94	2.40	9.12
			●	●	●		25.40	25.40	9.52	2.40	9.12
-R88			●	●	●		19.05	19.05	6.35	1.60	7.94
			●	●	●		19.05	19.05	6.35	2.40	7.94
			●	●	●		25.40	25.40	7.94	2.40	9.12
			●	○			25.40	25.40	7.94	3.20	9.12
			●	●	●		25.40	25.40	9.52	2.40	9.12
			●	●	●		25.40	25.40	9.52	3.20	9.12
			●	●			31.75	31.75	9.52	3.20	9.12
			●	●			31.75	31.75	9.52	3.20	9.12

● Standard indexable inserts available from stock  
○ Indexable inserts with limited availability

## Tools for SNMG / SNMM / SNMT indexable inserts



h [mm]	Type, Designation	LNR	h <sub>1</sub> [mm]	b [mm]	l <sub>1</sub> [mm]	l <sub>2</sub> [mm]	f [mm]	K [°]			
32	PSBNR 3232 P15-T	R	32	32	170	32	27	75	●	SN.. 1506	E01
32	PSBNL 3232 P15-T	L	32	32	170	32	27	75	●	SN.. 1506	E01
32	PSBNR 3232 P19-T	R	32	32	170	39.2	27	75	●	SN.. 1906	E02
32	PSBNL 3232 P19-T	L	32	32	170	39.2	27	75	●	SN.. 1906	E02
40	PSBNR 4040 S19-T	R	40	40	250	38.5	35	75	●	SN.. 1906	E02
40	PSBNL 4040 S19-T	L	40	40	250	38.5	35	75	●	SN.. 1906	E02
40	PSBNR 4040 S25-T	R	40	40	250	48	35	75	●	SN.. 2507	E03
40	PSBNL 4040 S25-T	L	40	40	250	48	35	75	●	SN.. 2507	E03
50	PSBNR 5050 S25-T	R	50	50	250	52	43	75	○	SN.. 2507	E03
50	PSBNL 5050 S25-T	L	50	50	250	52	43	75	○	SN.. 2507	E03
40	SSBNR 4040 T31	R	40	40	300	60	43	75	●	SN.. 3109	E04
40	SSBNL 4040 T31	L	40	40	300	60	43	75	●	SN.. 3109	E04
32	PSDNN 3225 P19-T	N	32	25	170	40.4	12.5	45	●	SN.. 1906	E02
40	PSDNN 4040 S25-T	N	40	40	250	48.8	20	45	●	SN.. 2507	E03

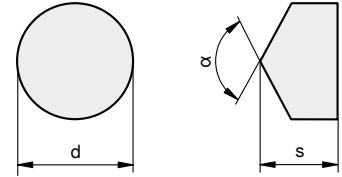
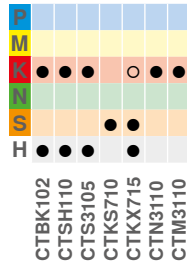
Alternative adapters and setting angles available on request

- Standard tools available from stock
- Tools with limited availability

E01	U-SN150416-N	59443	–	KNH-IC15,875-000840	4771	–
E02	U-SN190424-N	59448	–	KNH-IC19,05-033442	4209	–
E03	U-SN250624-N	59449	–	KNH-IC25,4-038444	4496	–
E04	U-SN310632-S	–	BUC-M8-M12-10004739	–	–	8095018700

U insert for SNM.. 2509: U-SN250424-N

# RCGX



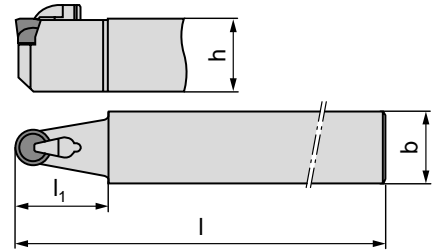
			d [mm]	s [mm]	α [°]
RCGX 060300TN-020D	○		6.00	6.20	120
RCGX 060600TN-005D		● ●	6.00	6.20	120
RCGX 060600TN-020D	○ ● ●		6.00	6.20	120
RCGX 090700TN-005D		● ●	9.52	7.70	120
RCGX 090700TN-020D	○ ● ●		9.52	7.70	120
RCGX 090700PN-100CF		○	9.52	7.70	120
RCGX 090700PN-150CF	●		9.52	7.70	120
RCGX 120700TN-005D		● ●	12.70	7.70	120
RCGX 120700TN-020D	○ ● ●		12.70	7.70	120
RCGX 120700SN-200C		●	12.70	7.70	120
RCGX 120700PN-100CF		●	12.70	7.70	120
RCGX 120700PN-150CF	●	○ ○	12.70	7.70	120
RCGX 151000TN-005D		○	15.80	10.00	120
RCGX 151000TN-020D	● ○		15.80	10.00	120
RCGX 151000PN-100CF		○	15.80	10.00	120
RCGX 151000PN-150CF	●	○ ○	15.80	10.00	120
RCGX 191000TN-020D	● ○		19.05	10.00	120
RCGX 191000SN-200C		○	19.05	10.00	120
RCGX 191000PN-100CF		○	19.05	10.00	120
RCGX 191000PN-150CF	●		19.05	10.00	120
RCGX 191000PN-200CF		○	19.05	10.00	120
RCGX 251200PN-200CE	● ●	○	25.40	12.00	140
RCGX 251200PN-200CF		● ○	25.40	12.00	140



- Standard indexable inserts available from stock
- Indexable inserts with limited availability



## Tools for RCGX indexable insert

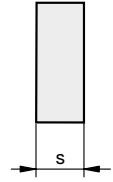
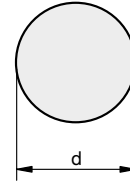
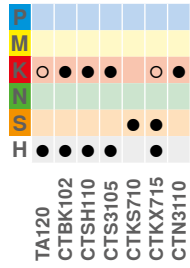


l [mm]	Type, Designation	LNR 	h [mm]	b [mm]	l <sub>1</sub> [mm]		
450	HDHTR 4040W.1RX06C-15	R	40	40	15	RCGX 06	E01
450	HDHTL 4040W.1RX06C-15	L	40	40	15	RCGX 06	E01
450	HDHTN 4040W.1RX06C.20	N	40	40	20	RCGX 06	E01
450	HDHTR 4040W.1RX09C.40	R	40	40	15	RCGX 09	E02
450	HDHTL 4040W.1RX09C.40	L	40	40	15	RCGX 09	E02
450	HDHTN 4040W.1RX09C.40	N	40	40	20	RCGX 09	E02
450	HDHTR 4040W.1RX12C.40	R	40	40	40	RCGX 12	E03
450	HDHTL 4040W.1RX12C.40	L	40	40	40	RCGX 12	E03
450	HDHTN 4040W.1RX12C.40	N	40	40	40	RCGX 12	E03
450	HDHTN 4040W.1RX19C.50	N	40	40	50	RCGX 19	E05
450	HDHTN 4040W.1RX25C.50	N	40	40	50	RCGX 25	E06

Alternative tools available on request

E01	–	CLAMP RX01	–	–	–	–	8095010600
E02	U-RC09-P	CLAMP RX01	–	–	6210961	–	8095010600
E03	U-RC12-P	CLAMP RX02	–	–	6210963	4209	–
E04	U-RC15-P	CLAMP RX02	–	–	6210963	4209	–
E05	U-RC19-P	CLAMP RX02	–	–	6210963	4209	–
E06	U-RC25-P	–	4147	CLAMP HD01	6210963	4209	–

# RNGN / RNMN



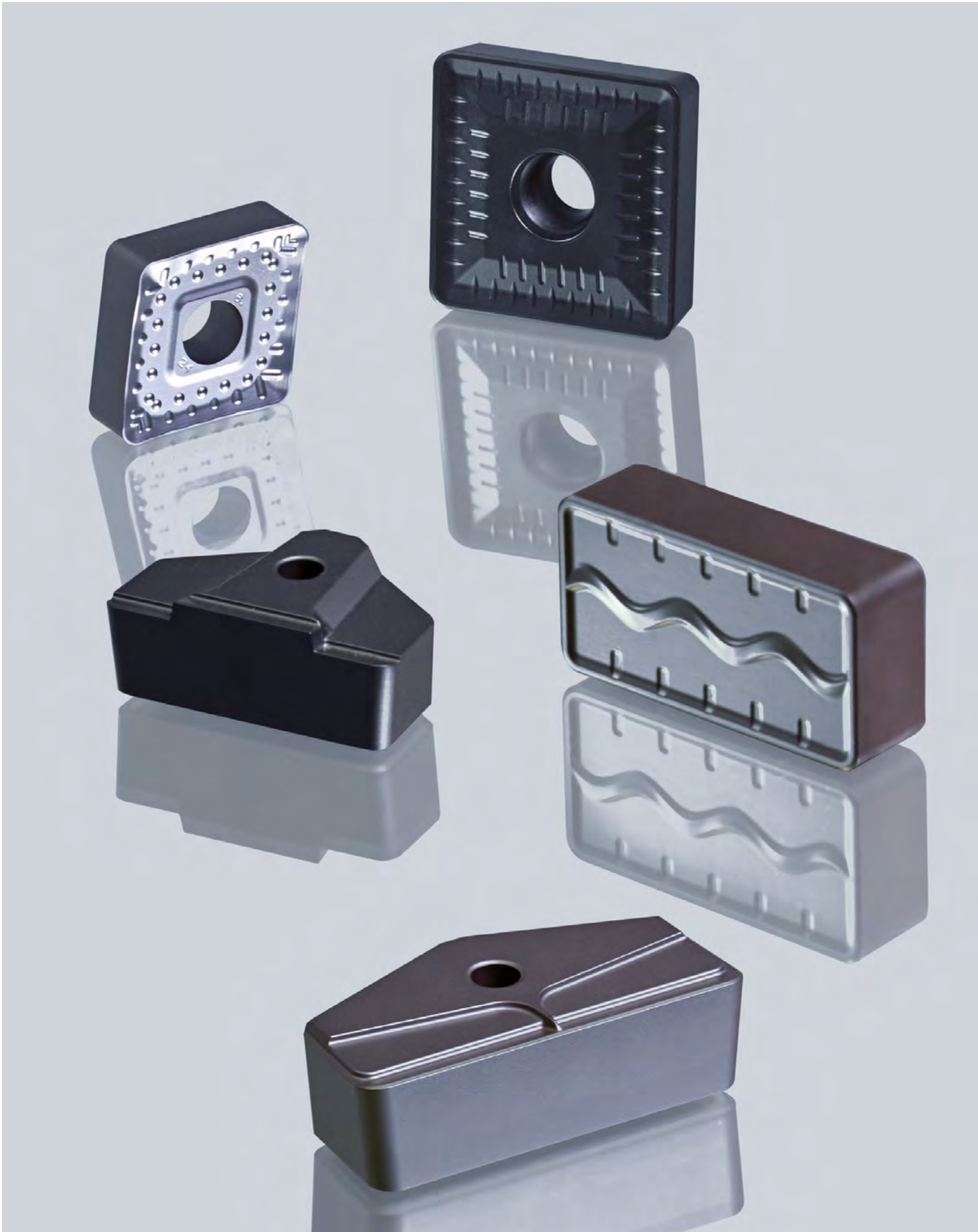
						d [mm]	s [mm]
RNGN 060300TN-020D		○				6.35	3.18
RNGN 060400TN-020D			○			6.35	4.76
RNGN 090300TN-005D				○		9.52	3.18
RNGN 090300TN-020D		●				9.52	3.18
RNGN 090400TN-020D			○			9.52	4.76
RNGN 120300TN-020D		●				12.70	3.18
RNGN 120400TN-020D		●				12.70	4.76
RNGN 120700TN-005D				● ●		12.70	7.94
RNGN 120700TN-020D			●			12.70	7.94
RNGN 120700PN-100CF			●			12.70	7.94
RNGN 120700PN-150CF			○			12.70	7.94
RNGN 120700SN-200C			○	○		12.70	7.94
RNGN 120700PN-150CF			○	○		12.70	7.94
RNGN 150700SN-200C			○			15.88	7.94
RNGN 150700PN-150CE				●		15.88	7.94
RNGN 190700TN-005D				● ●		19.05	7.94
RNGN 190700PN-100CF			○			19.05	7.94
RNGN 190700TN-020D			○			19.05	7.94
RNGN 190700PN-150CE				○		19.05	7.94
RNGN 190700PN-150CF			○			19.05	7.94
RNGN 250700TN-005D				○ ○		25.40	7.94
RNGN 250700PN-100CF			●			25.40	7.94
RNGN 250700PN-200CE			○ ○ ○ ○ ●			25.40	7.94
RNGN 250700TN-020D			●			25.40	7.94
RNGN 310900PN-100CF			○			31.75	9.52
RNGN 310900PN-215CF				○		31.75	9.52
RNGN 310900PN-200CE			○			31.75	9.52
RNMN 090300TN-020D		○				9.52	3.18
RNMN 120300TN-020D		○				12.70	3.18
RNMN 120300TN-035D		○				12.70	3.18

RN..N



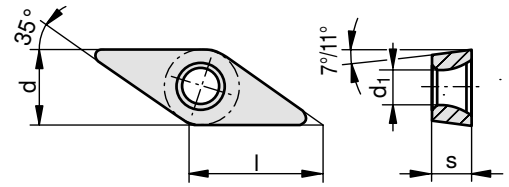
Tool system available on request





- Standard indexable inserts available from stock
- Indexable inserts with limited availability



# VCMT / VNGA

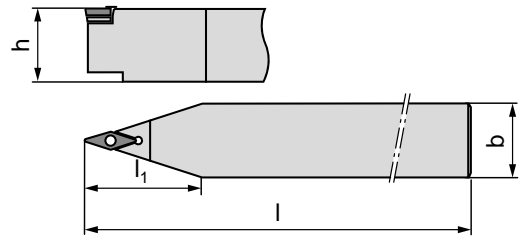
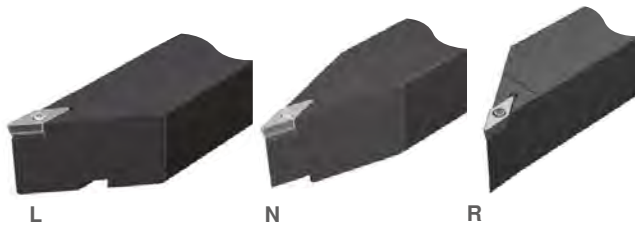
S		○	○	●
M			○	○
K	●	●	●	●
N				
S				
H	●	●		






		CTS3105	CTSH110	CTCK110	CTCK120	CTCP115	CTCP125	d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]
-SF					●	●		9.52	16.60	4.76	0.40	4.40
					●	●		9.52	16.60	4.76	0.80	4.40
-SMF					●	●		9.52	16.60	4.76	0.40	4.40
					●	●		9.52	16.60	4.76	0.80	4.40
-SM					●	●	●	9.52	16.60	4.76	0.40	4.40
					●	●	●	9.52	16.60	4.76	0.80	4.40
					●	●		9.52	16.60	4.76	1.20	4.40
-VNGA 16			●	●				9.52	16.60	4.76	0.80	3.81
			●					9.52	16.60	4.76	1.20	3.81

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

## Tools for indexable inserts VCMT 16.. / VNGA 16..



l [mm]	Type, Designation	LNR 	h [mm]	b [mm]	l <sub>1</sub> [mm]	Availability	
							
450	HDHTR 4040W.1VC16S.93	R	40	40	40	○	VCMT 1604.. E01
450	HDHTL 4040W.1VC16S.93	L	40	40	40	○	VCMT 1604.. E01
450	HDHTN 4040W.1VC16S.72.5	N	40	40	40	○	VCMT 1604.. E01
450	HDHTR 4040W.1VN16S.93	R	40	40	40	○	VNGA 1604.. E02
450	HDHTL 4040W.1VN16C.72	L	40	40	40	○	VNGA 1604.. E02
450	HDHTN 4040W.1VN16C.93	N	40	40	40	○	VNGA 1604.. E02

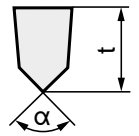
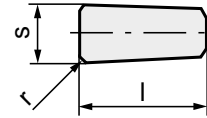
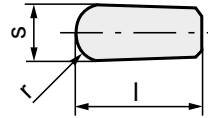
- Standard tools available from stock
- Tools with limited availability

						
E01	U-VC160302-S	24647	BUC-M3,5-M5-7883102	–	69293	–
E02	U-VN160308-D	11227305	–	11227311	–	11227314

# Grooving inserts MX



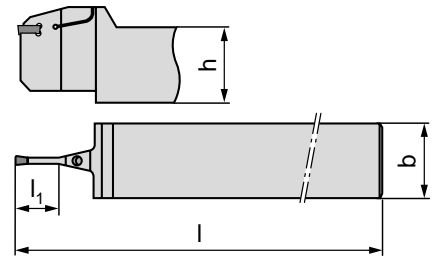
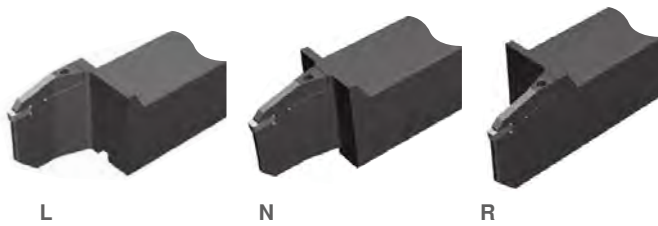
CTS3105






		CTS3105	l [mm]	s [mm]	r [mm]	t [mm]	$\alpha$ [°]
MX-R		●	12.00	4.00	2.00	5.00	120
		●	12.00	5.00	2.50	5.00	120
		●	15.00	6.00	3.00	7.50	120
		●	15.00	10.00	5.001	7.50	120
MX-S		●	12.00	4.00	0.50	5.00	120
		●	12.00	5.00	0.80	5.00	120
		●	15.00	6.00	0.80	7.50	120
		●	15.00	10.00	0.80	7.50	120

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

## Tools for MX grooving inserts



l [mm]	Type, Designation	LNR 	h [mm]	b [mm]	l <sub>1</sub> [mm]		
450	HDHGR 4040W.1MX05C-025	R	40	40	25	MX-R50 / MX-S50	E01
450	HDHGL 4040W.1MX05C-025	L	40	40	25	MX-R50 / MX-S50	E01
450	HDHGN 4040W.1MX05C-025	N	40	40	25	MX-R50 / MX-S50	E01
450	HDHGR 4040W.1MX10C-040	R	40	40	40	MX-R10 / MX-S10	E02
450	HDHGL 4040W.1MX10C-040	L	40	40	40	MX-R10 / MX-S10	E02
450	HDHGN 4040W.1MX10C-040	N	40	40	40	MX-R10 / MX-S10	E02

Alternative tools available on request



E01

–

6108530

4770

–

E02

11007006

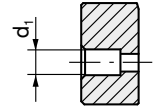
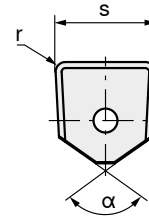
–

–

8095010600

# Grooving inserts HX

P					○	●
M						○
K	●	●	●	●	●	●
S						
H	●	●				
	CTSH110	CTS3105	CTN3110	CTM3110	CTCK110	CTCP125



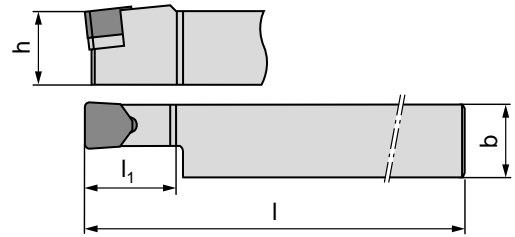
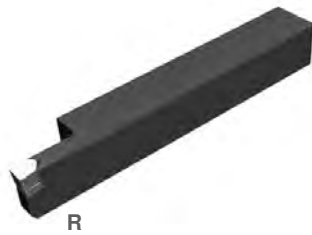
					s [mm]	r [mm]	d <sub>1</sub> [mm]	α [°]		
-R70		HX 32.20.90-R70			○ ●	32	2.0	9.2	110	
		HX 40.24.90-R70				○ ●	40	2.4	9.2	110
		HX 45.24.90-R70				○ ●	45	2.4	9.2	140
		HX 50.32.90-R70				○ ●	50	3.2	9.2	140
		HX 60.35.90-R70				●	60	3.5	9.2	140
-R71		HX 16.12.60-R71				○ ●	16	1.2	6.5	110
		HX 20.16.60-R71				○ ●	20	1.6	6.5	110
		HX 25.16.90-R71				○ ●	25	1.6	9.2	110
-R75		HX 25.16.90-R75				○	25	1.6	9.2	110
-R81		HX 16.12.60-R81				●	16	1.2	6.5	110
		HX 20.16.60-R81				●	20	1.6	6.5	110
		HX 25.16.90-R81				●	25	1.6	9.2	110
		HX 32.20.90-R81				●	32	2.0	9.2	110
		HX 40.24.90-R81				●	40	2.4	9.2	110
		HX 45.24.90-R81				●	45	2.4	9.2	140
		HX 50.32.90-R81				●	50	3.2	9.2	140
		HX 60.35.90-R81				○	60	3.5	9.2	140
-PN		HX 16.12.65PN-025CE				○	16	1.2	6.5	110
		HX 16.16.65PN-025CE				○ ○	20	1.6	6.5	110
		HX 25.25.65PN-150CE				● ○ ○	25	2.5	6.5	110
		HX 25.25.65PN-200CE				○	25	2.5	6.5	110
		HX 32.32.65PN-150CE				○ ○	32	3.2	6.5	110
		HX 40.24.90PN-045CE				○	40	2.4	9.2	110
		HX 40.32.65PN-150CE				○ ○	40	3.2	6.5	110
		HX 45.24.90PN-150CE				○	45	2.4	9.2	140
		HX 45.25.65PN-200CE				○	45	2.5	6.5	140
		HX 45.32.65PN-125CE				○	45	3.2	6.5	140
		HX 50.35.65PN-150CE				○ ○	50	3.5	6.5	140

The grooving inserts in ceramic grades CTSH110, CTS3105, CTN3110 and CTM3110 have a blind hole. For these inserts, please use PIN 65.M12. The carbide grades have a through-hole and can be mounted from above.

- Standard indexable inserts available from stock
- Indexable inserts with limited availability



## 40x40 shank tools for HX16.. / HX25.. Grooving inserts



l [mm]	Type, Designation	L N R 	h [mm]	b [mm]	l <sub>1</sub> [mm]		
450	HDHGR 4040W.HX16P-050	R	40	40	50	HX 16	E01
450	HDHGL 4040W.HX16P-050	L	40	40	50	HX 16	E01
450	HDHGN 4040W.1HX16P-050	N	40	40	50	HX 16	E01
450	HDHGR 4040W.HX25P-050	R	40	40	50	HX 25 *)	E02
450	HDHGL 4040W.HX25P-050	L	40	40	50	HX 25 *)	E02
450	HDHGN 4040W.HX25P-050	N	40	40	50	HX 25 *)	E02

\*) for composite ceramic inserts, cartridge with additional clamping claw



E01



U-HX16-HD



-



PIN 65.M8



4771

E02

U-HX25-HD

CLAMP RX01 \*)

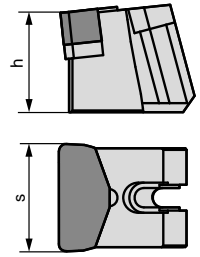
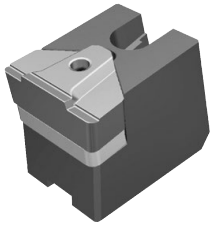
PIN 90.M12 / PIN 65.M12 <sup>1)</sup>




4209

\*) for composite ceramic inserts, cartridge with additional clamping claw






<sup>1)</sup> PIN 65.M12 when using ceramic inserts

## HX cartridges



s [mm]	Type, Designation	LNR 	h [mm]		
16	HDCGN 1HX16P.33	N	33	HX 16	E01
20	HDCGN 1HX20P.33	N	33	HX 20	E02
25	HDCGN 1HX25P.44	N	44	HX 25	E03
25	HDCGN 1HX25PC.44	N	44	HX 25 *)	E03
32	HDCGN 1HX32P.44	N	44	HX 32	E04
40	HDCGN 1HX40P.44	N	44	HX 40	E05
45	HDCGN 1HX45P.44	N	44	HX 45	E06
45	HDCGN 1HX45PC.44	N	44	HX 45 *)	E06
50	HDCGN 1HX50P.44	N	44	HX 50	E07
60	HDCGN 1HX60P.55	N	55	HX 60	E08

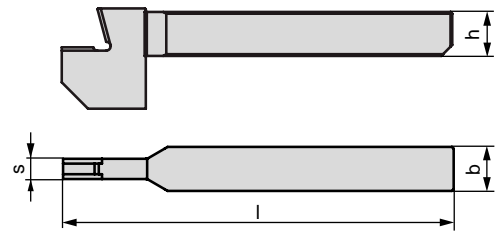
\*) for composite ceramic inserts, cartridge with additional clamping claw




				
E01	U-HX16-HD	–	PIN 65.M8	4771
E02	U-HX20-HD	–	PIN 65.M8	4771
E03	U-HX25-HD	CLAMP RX01*)	PIN 90.M12 / PIN 65.M12 <sup>1)</sup>	4209
E04	U-HX32-HD	–	PIN 90.M12 / PIN 65.M12 <sup>1)</sup>	4209
E05	U-HX40-HD	–	PIN 90.M12 / PIN 65.M12 <sup>1)</sup>	4209
E06	U-HX45-HD	CLAMP RX01*)	PIN 90.M12 / PIN 65.M12 <sup>1)</sup>	4209
E07	U-HX50-HD	–	PIN 90.M12 / PIN 65.M12 <sup>1)</sup>	4209
E08	U-HX60-HD	–	PIN 90.M12 / PIN 65.M12 <sup>1)</sup>	4209

\*) for composite ceramic inserts, cartridge with additional clamping claw

<sup>1)</sup> PIN 65.M12 when using ceramic inserts

## 50x50 shank tools for HX cartridges



s [mm]	Type, Designation	LNR 	h [mm]	b [mm]	l [mm]		
16	HDHGN 5050U.G16-070	N	50	50	350	HDCGN 1HX16P.33	E01
20	HDHGN 5050U.G20-070	N	50	50	350	HDCGN 1HX20P.33	E01
25	HDHGN 5050U.G25-100	N	50	50	350	HDCGN 1HX25P.44	E02
32	HDHGN 5050U.G32-100	N	50	50	350	HDCGN 1HX32P.44	E02

Alternative tools/interfaces  
Available on request



E01  
E02

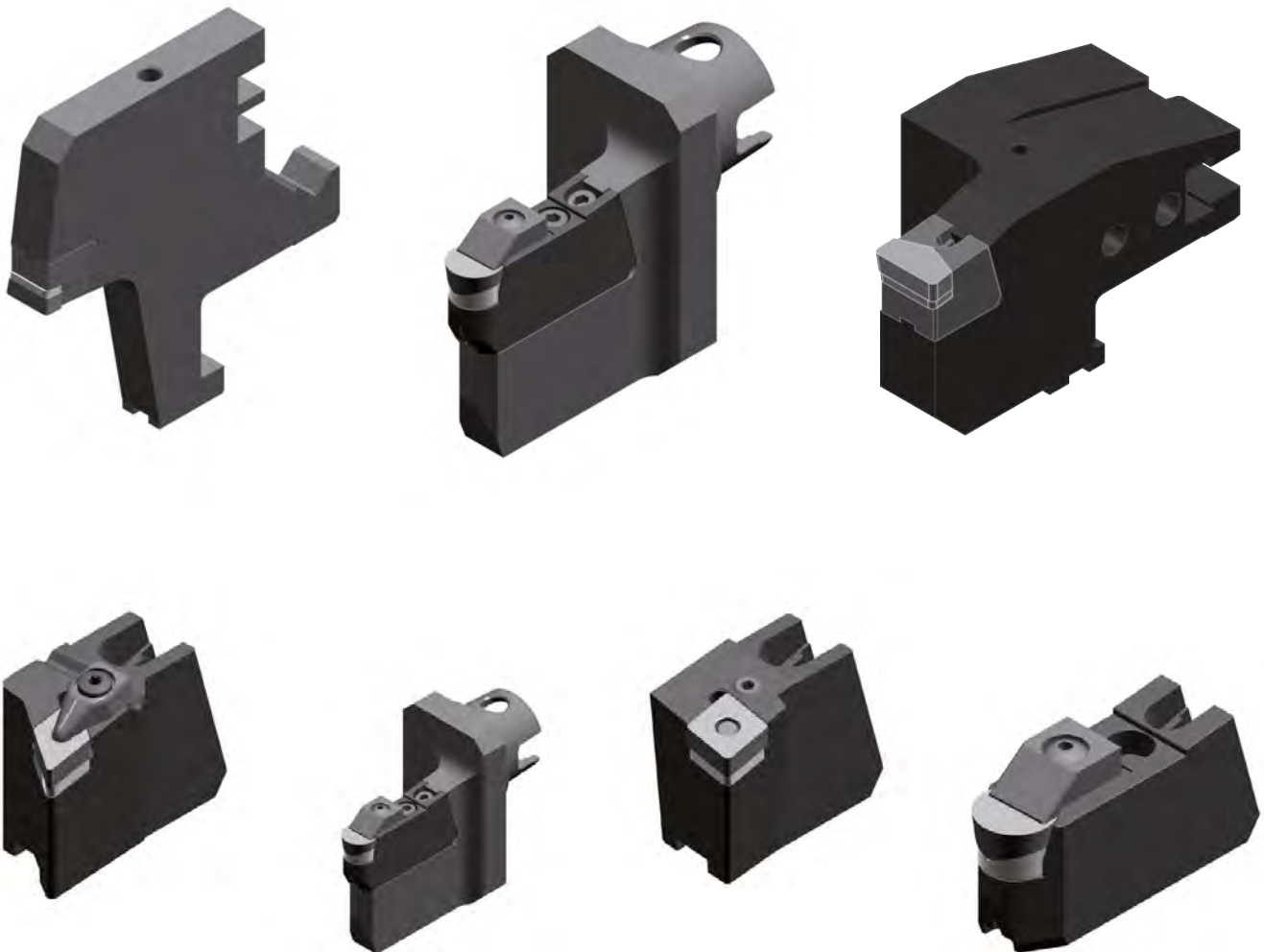


11512352  
11474917

## Special tools available at customer request

The variety of workpieces and machining situations in the production of large parts frequently means that individual tools and cutting materials tailored to the situation on site are required. As CERATIZIT, in its capacity as the leading provider of hard materials solutions and cutting tools, controls the whole manufacturing process, we are able to respond quickly to your requests and tailor our product

range to your needs. The special tools shown, such as overhead grooving tools or grooving tools with cartridges, were developed in response to customer wishes and are examples of the successful realisation of customer-specific requests. We support you in optimising your processes. Benefit from our extensive experience in heavy turning and grooving.



Alternative cartridges for turning operations available on request



## Spare parts - turning & grooving

Indexable inserts/ Cutting inserts Type	Insert seat	Clamping screw/ Screw	Set/ range	Clamping element	Key
CNM. 2509	U-CN250724-N	59449		H-IC25,4-038444	4496
CNMT 32	U-CN320632-S	11291667	BUC-M8-M12-10004739		8095018700
HX 16	U-HX16-HD			PIN 65.M8	4771
HX 20	U-HX20-HD			PIN 65.M8	4771
HX 25	U-HX25-HD		CLAMP RX01*)	PIN 90.M12 <sup>1)</sup>	4209
HX 32	U-HX32-HD			PIN 90.M12 <sup>1)</sup>	4209
HX 40	U-HX40-HD			PIN 90.M12 <sup>1)</sup>	4209
HX 45	U-HX45-HD		CLAMP RX01*)	PIN 90.M12 <sup>1)</sup>	4209
HX 50	U-HX50-HD			PIN 90.M12 <sup>1)</sup>	4209
HX 60	U-HX60-HD			PIN 90.M12 <sup>1)</sup>	4209
LNMR 50	U-LN50-HD			PIN 90.M12 <sup>1)</sup>	4209
LNMR 50	U-LN50RH-HD-HSS	11793159			4209
LNMR 50	U-LN50LH-HD-HSS	11793159			4209
LNMN 6688	U-LN66-HD	4147	CLAMP HD01		4209
MX 05		6108530			4770
MX 10		11007006			8095010600
RCGX 06			CLAMP RX01		8095010600
RCGX 09	U-RC09-P		CLAMP RX01	6210961	8095010600
RCGX 12	U-RC12-P		CLAMP RX02	6210963	4209
RCGX 15	U-RC15-P		CLAMP RX02	6210963	4209
RCGX 19	U-RC19-P		CLAMP RX02	6210963	4209
RCGX 25	U-RC25-P	4147	CLAMP HD01	6210963	4209
RC.. 1204 HM	U-RC1203MO-N	59445	SET-7853416	KNH-IC12-000341	4770
RC.. 1606 HM	U-RN160400-N	154575	SET-7853417	KNH-IC16-000342	4771
RC.. 2006 HM	U-RN200400-N	59441	SET-7853418	KNH-IC20-000343	
RC.. 2507 HM	U-RN250600-N	154576	SET-7853419	KNH-IC25-000344	4209
RN.N 0903	U-RN090400-SN	4259	7485865/SP (7817911/SORT)	KEN-IC9,525- 7480902	8095010600
RN.N 1204	U-RN120400-SN	4259	7485865/SP (7817912/SORT)	KEN-IC12,7- 7480901	8095010600

\*) for composite ceramic inserts, cartridge with additional clamping claw

<sup>1)</sup> with ceramic inserts, please use PIN 65.M12

Indexable insert Type	Insert seat	Clamping screw/ Screw	Set/ range	Clamping element	Key
SN.. 1506	U-SN150416-N	59443		KNH-IC15,875-000840	4771
SN. 1906	U-SN190424-N	59448		KNH-IC19,05-033442	4209
SN. 2507	U-SN250624-N	59449		KNH-IC25,4-038444	4496
SN. 2509	U-SN250424-N	59449		KNH-IC25,4-038444	4496
SNMT 31	U-SN310632-S		BUC-M8-M12-10004739		
SCMT 38	U-SC380620-S	M8x22/T30IP	BUC-M8-M12-10004739		
VCMT 1604	U-VC160302-S	BUC-M3,5-M5-7883102	24647		69293



**Clamping wedge**

HD clamping wedge for slide	30 mm	11849812
HD clamping wedge for slide	60 mm	11673835
HD clamping wedge for slide	90 mm	11671427
HD clamping wedge for slide	120 mm	11518950



**Heavy milling demands an extremely high level of stability and performance in order for optimum results to be obtained even with high cutting depths**



## Milling

Process-secure milling of large parts calls for high-quality cutting material grades and robust, extremely stable tools for high cutting depths. When rough milling slabs to remove scale, cast skin and forging skin, or when face milling flat spigots in the case of large cast iron and steel rolls, tremendous forces are generated. Tools and cutting materials are therefore placed under an extremely high level of stress. The aim is to avoid sudden insert breakages while simultaneously improving the service life and surface quality.

Our many years of experience and the continuous further development and improvement of cutting materials, cutting inserts and tools make us a reliable partner for the steel industry. The CERATIZIT product range also includes a wide spectrum of solutions for heavy milling. In addition to our high-performance Maxi-Mill milling system, we offer cutting inserts that have undergone further development to make them particularly suitable for heavy milling operations. Due to their improved surface quality, they contribute to an optimal chip flow, thereby increasing performance and process security.

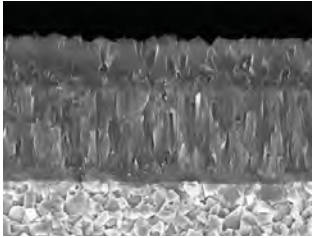


## Grade description

### CTCK215

BLACKSTAR™

HC-K15



**Specifications:**

Composition: Co 6.0%, mixed carbides 2.0%, WC balance | Grain size: 1 μm |  
Hardness: HV<sub>30</sub> 1630 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

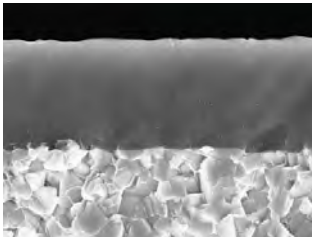
**Recommended use:**

The first choice for working on cast iron materials with high cutting speeds.

### CTPK220

SILVERSTAR™

HC-K20



**Specifications:**

Composition: Co 6.0%, mixed carbides 2.0%, WC balance | Grain size: 1 μm |  
Hardness: HV<sub>30</sub> 1630 | Layer system: PVD TiAlTaN

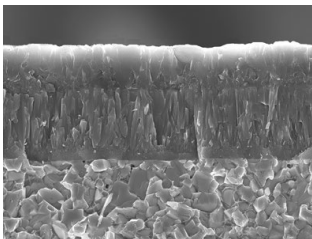
**Recommended use:**

Optimal for machining high-strength cast iron materials in the tougher application range.

### CTCP220

BLACKSTAR™

HC-P20 | HC-K20



**Specifications:**

Composition: Co 8.0%, mixed carbides 2.0%, WC balance | Grain size: 1–2 μm |  
Hardness: HV<sub>30</sub> 1500 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

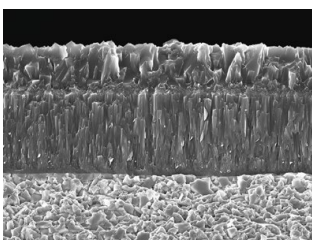
**Recommended use:**

The wear-resistant grade for dry machining of steels.

### CTPP225

SILVERSTAR™

HC-P25 | HC-K25



**Specifications:**

Composition: Co 8.0%, mixed carbides 2.0%, WC balance | Grain size: 1–2 μm |  
Hardness: HV<sub>30</sub> 1500 | Layer system: PVD TiAlTaN

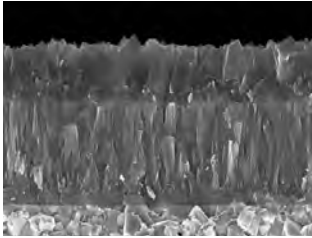
**Recommended use:**

The wear-resistant grade for wet machining of steels.

## CTCP230

BLACKSTAR™

HC-P30 | HC-K25 | HC-M25



### Specifications:

Composition: Co 10.5%, mixed carbides 2.0%, WC balance | Grain size: 1–2  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1400 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

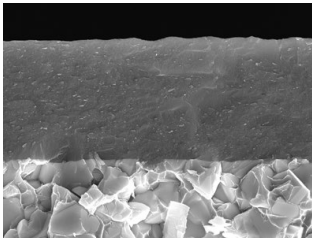
### Recommended use:

The first choice for dry machining of steels with high cutting data.

## CTPP235

SILVERSTAR™

HC-P35 | HC-M30



### Specifications:

Composition: Co 10.5%, mixed carbides 2.0%, WC balance | Grain size: 1–2  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1400 | Layer system: PVD TiAlTaN

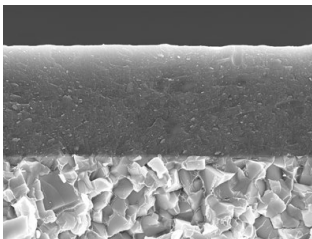
### Recommended use:

Particularly well suited to wet machining of steels.

## CTPM225

SILVERSTAR™

HC-M25 | HC-P25



### Specifications:

Composition: Co 9.0%, mixed carbides 0.75%, WC balance | Grain size: 0.7-1  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1590 | Layer system: PVD TiAlTaN

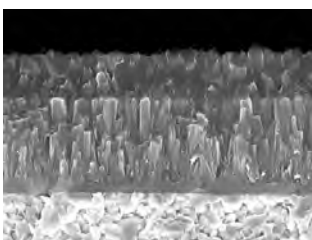
### Recommended use:

The wear-resistant choice for machining of austenitic steels.

## CTCM235

BLACKSTAR™

HC-M35 | HC-P40



### Specifications:

Composition: Co 12.5%, mixed carbides 2.0%, WC balance | Grain size: 1  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1380 | Layer system: CVD TiCN-Al<sub>2</sub>O<sub>3</sub>

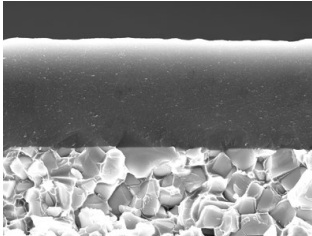
### Recommended use:

Suitable for martensitic steel materials and the tough alternative in general steel machining.

## CTPM240

SILVERSTAR™

HC-M40 | HC-P40



### Specifications:

Composition: Co 12.5%, mixed carbides 2.0%, WC balance | Grain size: 1  $\mu\text{m}$  |  
Hardness: HV<sub>30</sub> 1380 | Layer system: PVD TiAlTaN

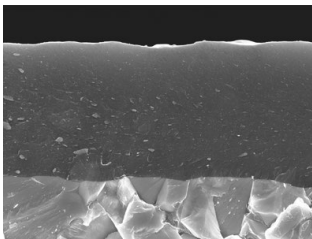
### Recommended use:

The first choice for machining of austenitic steels.

## CTPM245

SILVERSTAR™

HC-M45 | HC-P45



### Specifications:

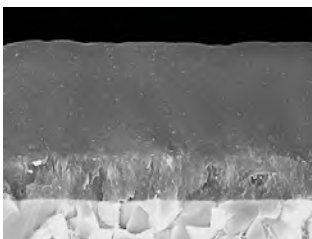
Composition: 10.0% binder, WC balance | Grain size: 2  $\mu\text{m}$  | Hardness: HV<sub>30</sub> 1330 |  
Layer system: PVD TiAlTaN

### Recommended use:

Particularly suitable for the machining of creep-resistant steels and iron-based alloys.

## CTC5240

HC-S40



### Specifications:

Composition: 10.0% binder, WC balance | Grain size: 2  $\mu\text{m}$  | Hardness: HV<sub>30</sub> 1330 |  
Layer system: CVD TiN-TiB<sub>2</sub>

### Recommended use:

Recommended for the machining of titanium materials.

## CTCS245

HC-S40 / HC-S45



### Specifications:

Composition: 12.0% binder, WC balance | Grain size: 2  $\mu\text{m}$  |  
Hardness 1330 HV<sub>30</sub> | Layer system: CVD TiN-TiB<sub>2</sub>

### Recommended use:

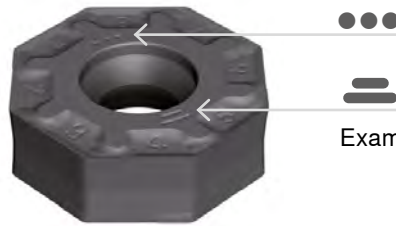
New grade for milling heat-resistant nickel-based alloys.

# Chip breakers – milling

M 50

1

2



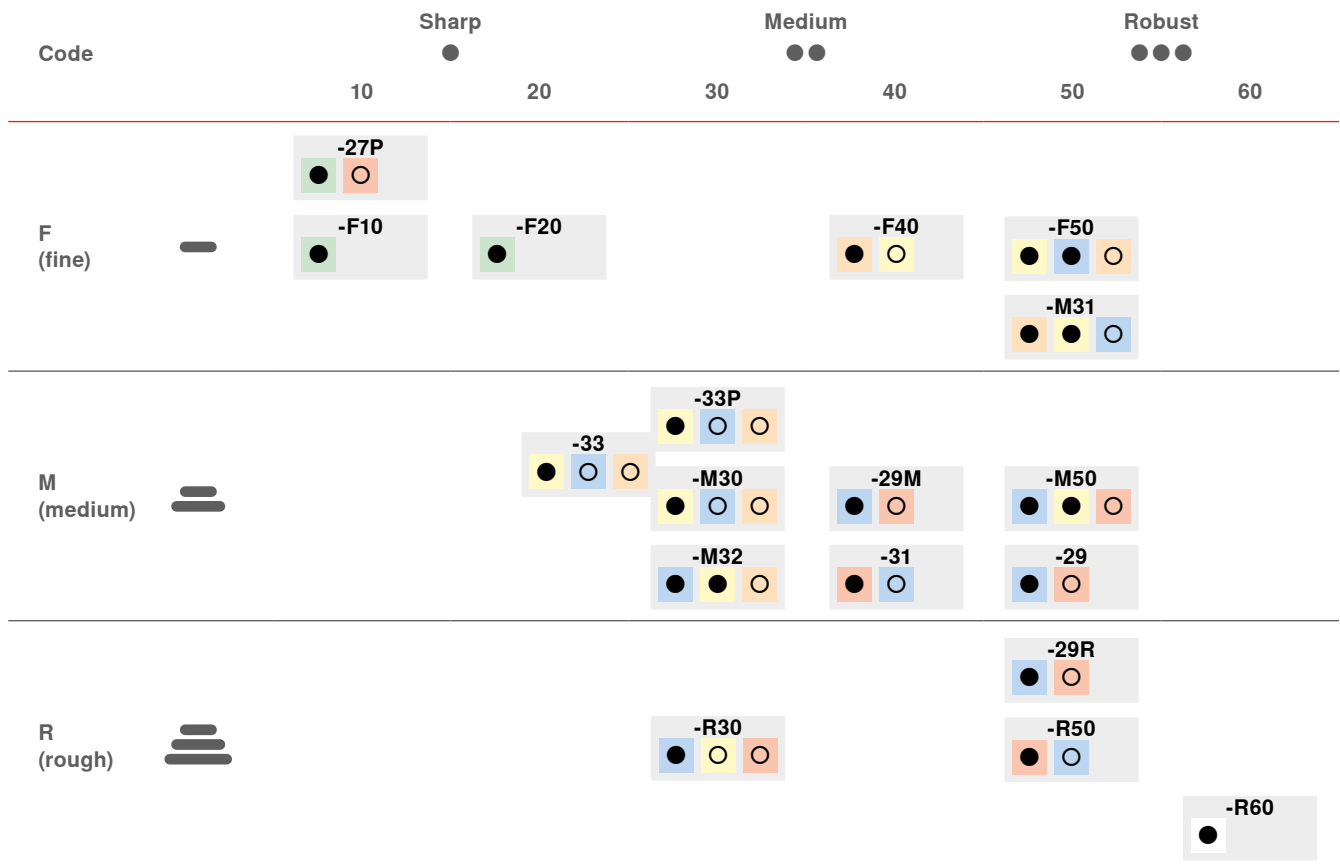
Example: OAKU 060508SR-M50

## 1 Wedge angle

- F = Fine
- M = Medium
- R = Rough

## 2 Type of cutting edge

- Sharp
- Medium
- Robust



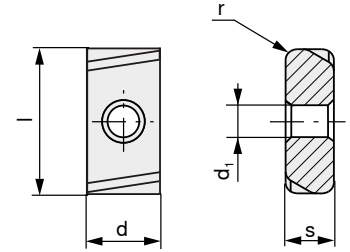
- |                   |  |  |
|-------------------|--|--|
| P Steel           | N Non-ferrous metals                     | <ul style="list-style-type: none"> <li> Main application</li> <li> Extended application</li> </ul> |
| M Stainless steel | S Materials suitable for heavy machining |  |
| K Cast iron       | H Hard materials                         |  |
|                   |  |  |

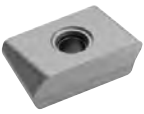
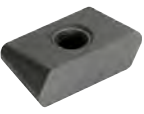


# LNUJ / LNUC



CTPK220  
CTPP235

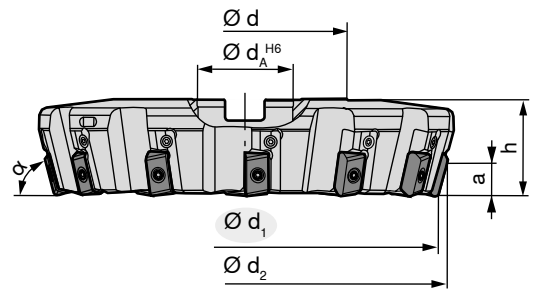




		CTPK220 CTPP235	d [mm]	l [mm]	s [mm]	r [mm]	d <sub>1</sub> [mm]
LNUJ 	LNUJ 220920SR	●	15.81	27.85	9.52	2.00	5.90
LNUC 	LNUC 220920ER	○	14.28	28.57	9.52	2.00	5.90

- Standard indexable inserts available from stock
- Indexable inserts with limited availability



# AHDM



$d_1$ [mm]	Type, Designation	$d_2$ [mm]	$h$ [mm]	$d$ [mm]	$d_A$ [mm]	$a$ [mm]	$z$	$\alpha$ [°]	 [Nm]	
160	AHDM.160.R.08-60-22	180	63	110	40	18	8	60	5	o LN.. 2209.. E01
160	AHDM.160.R.08-75-22	171	63	110	40	20	8	75	5	o LN.. 2209.. E01
160	AHDM.160.R.08-90-22	160	63	110	40	22	8	90	5	o LN.. 2209.. E01
200	AHDM.200.R.10-75-22	211	63	131	60	20	10	75	5	o LN.. 2209.. E01
250	AHDM.250.R.10-60-22	270	63	174	60	18	10	60	5	o LN.. 2209.. E01
250	AHDM.250.R.12-75-22	261	63	174	60	20	12	75	5	o LN.. 2209.. E01
250	AHDM.250.R.12-90-22	250	63	174	60	22	12	90	5	o LN.. 2209.. E01
315	AHDM.315.R.14-60-22	335	80	226	60	18	14	60	5	o LN.. 2209.. E01
315	AHDM.315.R.14-75-22	326	80	226	60	20	14	75	5	o LN.. 2209.. E01
315	AHDM.315.R.14-90-22	315	80	226	60	22	14	90	5	o LN.. 2209.. E01

- Standard tools available from stock
- o Tools with limited availability



E01



CA HDM-22-R



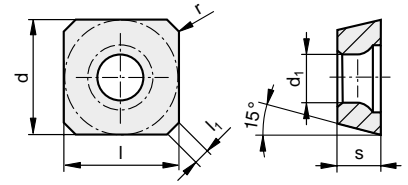
11423964



8095010500

# SDKT -M50 / -R50

S	●	○	○	○
M	○	○	○	○
K	●	○	○	○
N	○	○	○	○
S	○	○	○	○
H	○	○	○	○



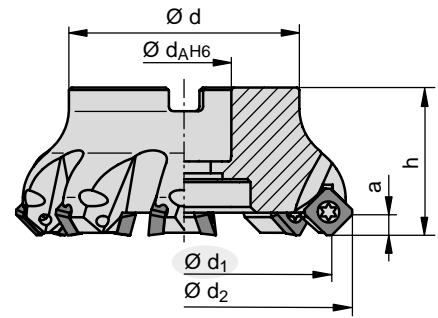
					d [mm]	l [mm]	s [mm]	l <sub>1</sub> [mm]	r [mm]	d <sub>1</sub> [mm]	α [°]
-M50	SDKT 1907AESN-M50	●			19.05	19.05	7.16	2.00	1.60	6.00	15
-R50	SDKT 1907AESN-R50	●	●	●	19.05	19.05	7.16	2.00	1.60	6.00	15




- Standard indexable inserts available from stock
- Indexable inserts with limited availability




# MaxiMill A270 -19



Image shows right-hand version



$d_1$ [mm]	Right-hand version Designation	$d_2$ [mm]	h [mm]	d [mm]	$d_A$ [mm]	a [mm]	z	 [Nm]		
125	A270.125.R.07-19	146.40	63	88	40	10	7	5	●	SD.. 1907.. E01
160	A270.160.R.09-19	181.40	63	104	40	10	9	5	●	SD.. 1907.. E01
200	A270.200.R.11-19	221.40	63	134	60	10	11	5	●	SD.. 1907.. E01
250	A270.250.R.14-19	271.30	63	134	60	10	14	5	○	SD.. 1907.. E01
315	A270.315.R.17-19	336.30	63	226	60	10	17	5	○	SD.. 1907.. E01

$d_1$ [mm]	Left-hand version Designation	$d_2$ [mm]	h [mm]	d [mm]	$d_A$ [mm]	a [mm]	z	 [Nm]		
125	A270.125.L.07-19	146.40	63	88	40	10	7	5	○	SD.. 1907.. E01
160	A270.160.L.09-19	181.40	63	104	40	10	9	5	○	SD.. 1907.. E01
200	A270.200.L.11-19	221.40	63	134	60	10	11	5	○	SD.. 1907.. E01
250	A270.250.L.14-19	271.30	63	134	60	10	14	5	○	SD.. 1907.. E01
315	A270.315.L.17-19	336.30	63	226	60	10	17	5	○	SD.. 1907.. E01

- Standard tools available from stock
- Tools with limited availability



E01



U-SD1904AE-270



11107792



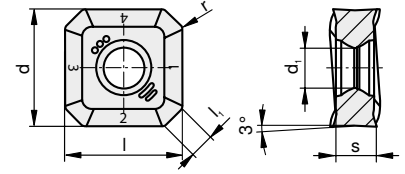
BUC-M5-M7-10011756


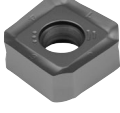
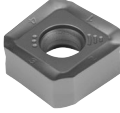


11802576

# SAKU 17 -F50 / -M50 / -R50

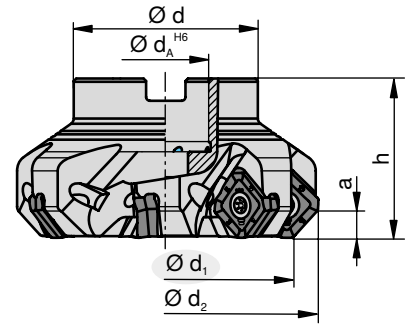
P	●	○	●	●	●	○	○	○	○
M	●	●	○	○	○	○	○	○	○
K	●	●	●	●	●	○	○	○	○
S	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○






		CTCK215	CTPK220	CTCP220	CTPM225	CTPP225	CTPP235	CTCP230	CTCM235	CTPM240	CTPM245	CTC5240	CTCS245	d [mm]	l [mm]	s [mm]	l <sub>1</sub> [mm]	r [mm]	d <sub>1</sub> [mm]	α [°]				
-F50 	SAKU 1706ABSR-F50	●	●	●	●	●	●	●	●	●	●	●	●	17.00	17.00	6.35	3.70	0.80	5.80	3				
-M50 	SAKU 1706ABSR-M50	●	●	●	●	●	●	●	●	●	●	●	●	17.00	17.00	6.35	3.70	0.80	5.80	3				
-R50 	SAKU 1706ABSR-R50	●	●											17.00	17.00	6.35	3.70	0.80	5.80	3				

- Standard indexable inserts available from stock
- Indexable inserts with limited availability

# MaxiMill A271

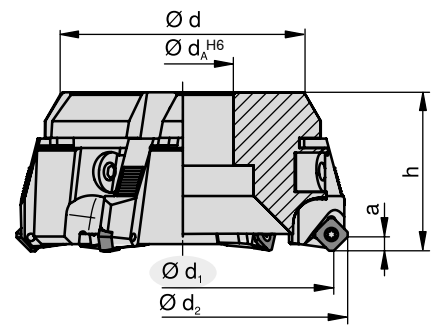





$d_1$ [mm]	Type, Designation	$d_2$ [mm]	$h$ [mm]	$d$ [mm]	$d_A$ [mm]	$a$ [mm]	$z$	$n_{max}$ [rpm]	 [Nm]		
50	A271.50.R.04-17	66.10	40	43	22	8.40	4	14,500	5	SAKU 1706..	E01
63	A271.63.R.06-17	79.10	40	48	22	8.40	6	13,000	5	SAKU 1706..	E02
80	A271.80.R.07-17	96.10	50	58	27	8.40	7	11,200	5	SAKU 1706..	E02
100	A271.100.R.08-17	116.10	50	78	32	8.40	8	9,900	5	SAKU 1706..	E02
125	A271.125.R.10-17	141.10	63	88	40	8.40	10	8,800	5	SAKU 1706..	E02
160	A271.160.R.12-17	176.10	63	104	40	8.40	12	7,700	5	SAKU 1706..	E02
200	A271.200.R.13-17	216.10	63	134	60	8.40	13	6,900	5	SAKU 1706..	E02
250	A271.250.R.15-17	266.10	63	134	60	8.40	15	6,100	5	SAKU 1706..	E02



E01	11040298	11107792	11210490
E02	-	11107792	11210490

## MaxiMill A260 -058



$d_1$ [mm]	Type, Designation	$d_2$ [mm]	h [mm]	d [mm]	$d_A$ [mm]	a [mm]	z	[kg]	 [Nm]		
77	A260.08.R.05/058	93	56	66	27	8.4	5	1.39	5	SAKU 1706..	E01
97	A260.10.R.06/058	113	56	86	32	8.4	6	2.01	5	SAKU 1706..	E01
120	A260.12.R.07/058	136	67	95	40	8.4	7	3.55	5	SAKU 1706..	E01
155	A260.16.R.10/058	171	67	130	40	8.4	10	6.09	5	SAKU 1706..	E01
195	A260.20.R.12/058	211	67	172	60	8.4	12	9.96	5	SAKU 1706..	E01
245	A260.25.R.14/058	261	67	222	60	8.4	14	16.79	5	SAKU 1706..	E01
310	A260.31.R.18/058	326	84	280	60	8.4	18	31.53	5	SAKU 1706..	E01
395	A260.40.R.22/058	411	84	365	60	8.4	22	67.98	5	SAKU 1706..	E01



E01



106607



11107792



SPK-A260-7818043



7818058/KA



11210490



4425



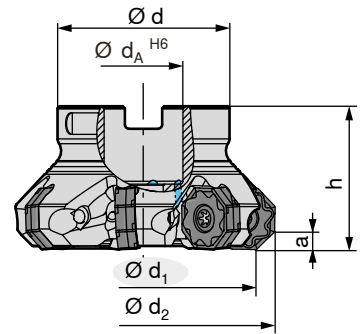
8095010600

















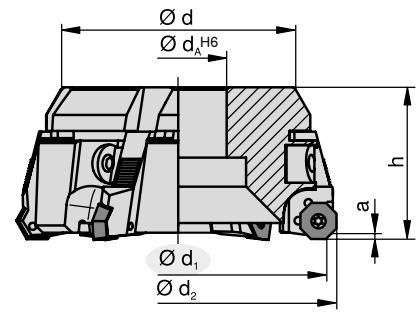
# MaxiMill A273





$d_1$ [mm]	Type, Designation	$d_2$ [mm]	$h$ [mm]	$d$ [mm]	$d_A$ [mm]	$a$ [mm]	$z$	$n_{max}$ [rpm]	 [Nm]		
40	A273.40.R.03-06	50.2	40	38	16	3.5	3	17,100	5	OA.. 0605..	E01
40	A273.40.R.04-06	50.2	40	38	16	3.5	4	17,100	5	OA.. 0605..	E01
50	A273.50.R.05-06	60.2	40	48	22	3.5	5	14,900	5	OA.. 0605..	E02
63	A273.63.L.07-06	73.2	40	48	22	3.5	7	13,100	5	OA.. 0605..	E03
63	A273.63.R.07-06	73.2	40	48	22	3.5	7	13,100	5	OA.. 0605..	E03
80	A273.80.R.08-06	90.2	50	58	27	3.5	8	11,500	5	OA.. 0605..	E03
100	A273.100.R.10-06	110.2	50	78	32	3.5	10	10,200	5	OA.. 0605..	E04
125	A273.125.L.12-06	135.2	63	78	40	3.5	12	9,000	5	OA.. 0605..	E04
125	A273.125.R.12-06	135.2	63	88	40	3.5	12	9,000	5	OA.. 0605..	E04
160	A273.160.L.14-06	170.2	63	88	40	3.5	14	7,900	5	OA.. 0605..	E04
160	A273.160.R.14-06	170.2	63	104	40	3.5	14	7,900	5	OA.. 0605..	E04

						
E01	11036880	11107792	11210490	–	8095010600	4425
E02	11040298	11107792	11210490	4496	8095010600	–
E03	–	11107792	11210490	–	8095010600	–
E04	–	11107792	11802576	–	8095010600	–

# MaxiMill A260 -057



$d_1$ [mm]	Type, Designation	$d_2$ [mm]	$h$ [mm]	$d$ [mm]	$d_A$ [mm]	$a$ [mm]	$z$	[kg]	[Nm]		
82	A260.08.R.05/057	92.2	54	66	27	3.5	5	1.52	5	OA/XA..0605..	E01
102	A260.10.R.06/057	112.2	54	86	32	3.5	6	1.90	5	OA/XA..0605..	E01
125	A260.12.R.07/057	135.2	65	95	40	3.5	7	3.48	5	OA/XA..0605..	E01
160	A260.16.R.10/057	170.2	65	130	40	3.5	10	5.98	5	OA/XA..0605..	E01
200	A260.20.R.12/057	210.2	65	172	60	3.5	12	9.75	5	OA/XA..0605..	E01
250	A260.25.R.14/057	260.2	65	222	60	3.5	14	15.69	5	OA/XA..0605..	E01
315	A260.31.R.18/057	325.2	82	280	60	3.5	18	31.38	5	OA/XA..0605..	E01
400	A260.40.R.22/057	410.2	82	365	60	3.5	22	67.33	5	OA/XA..0605..	E01



E01

106607

11107792

SPK-A260-  
7818043

7818057/KA

11210490

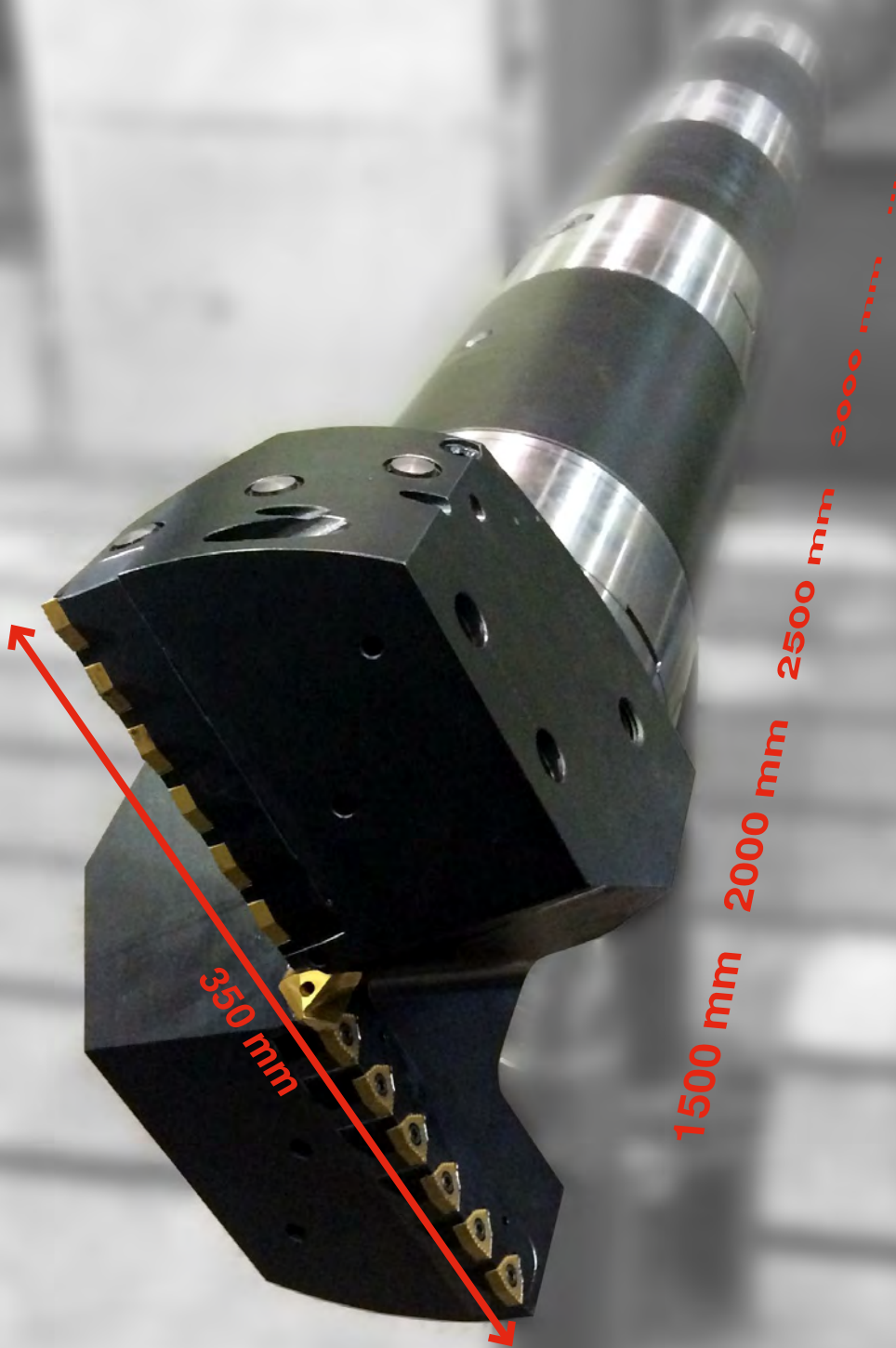
11210490

8095010600

4425

## Spare parts – milling

Cutter	Indexable insert Type	Insert seat	Miscellaneous/ Bushing	Differential screw	Clamping screw	Clamping wedge	Cartridges	Key
AHDM	LNU. 2209..	–		–	11423964	–	CA HDM-22-R	8095010500
A273.40.R.03-06 A273.40.R.04-06	OA.. 0605..	–	–	11036880	11107792	–	–	11210490 8095010600 4425
A273.50.R.05-06	OA.. 0605..	–	–	11040298	11107792	–	–	11210490 4496 8095010600
A273.63.R.07-06 A273.80.R.08-06	OA.. 0605..	–	–	–	11107792	–	–	11210490 8095010600
A273.100.R.10-06 A273.125.R.12-06 A273.160.R.14-06	OA.. 0605..	–	–	–	11107792	–	–	11802576 8095010600
A260.. 057	OA/ XA..0605..	–	–	106607	11107792	SPK-A260-7818043	7818057/KA	11210490 4425 8095010600
A271.50.R.04-17	SAKU 1706..	–	–	11040298	11107792	–	–	11210490
A271.63 - 250..17	SAKU 1706..	–	–	–	11107792	–	–	11210490
A260.. 058	SAKU 1706..	–	–	106607	11107792	SPK-A260-7818043	7818058/KA	11210490 4425 8095010600
A270.. 19	SD.. 1907..	U-SD1904AE-270	BUC-M5-M7-10011756	–	11107792	–	–	11802576



## New levels of solid drilling

## Drilling & reaming

Way back in 1977, KOMET presented the world's first indexable insert drilling tool without a centring tip and, in so doing, laid the foundations for the success of the KUB drill. Within a few years, the KUB indexable insert drills became the most commonly used drilling tools in the diameter ranges from 12 millimetres to 350 millimetres and hole depths up to 14xD.

Constant innovation meant KOMET was able to establish itself as a fixed player on the world market for reaming tools. Its current portfolio includes monoblock tools, modular systems and indexable insert reaming tools in a huge variety of types and versions.



**Catalogue no. 99 022 00999**  
**The KOMET-Programme**  
Section 1 – DRILLING  
Section 2 – REAMING



**Catalogue no. 94 221 00019**  
**The Catalogue**  
Section 3 – Pages 20-26  
MaxiDrill 900

## Drilling tools for high-performance machining

### KUB Quatron

Workhorse...heavy machining in the 3xD range, process-secure operations even with extremely high feeds

- ▲ Ø 14 – 65 mm | 2xD and 3xD
- ▲ For difficult drilling conditions, such as casting drafts, mill scale or interrupted cut
- ▲ Outstanding drilling quality with no retraction scoring
- ▲ Highly cost-effective due to four cutting edges on each indexable insert
- ▲ Tough, high-strength base substrate combined with the latest coatings reduce friction and guarantee maximum tool lives



### KUB Pentron

Entire range from 2xD to 5xD with the latest technology in a wide variety of shank variants

- ▲ Ø 14 – 46 mm | 2xD, 3xD, 4xD and 5xD
- ▲ MMS 1 channel with ABS 2xD and 3xD
- ▲ Outstanding surface quality with no retraction scoring
- ▲ Up to 20% higher cutting and feed rate values, for extreme machining situations such as drilling through stacks, spot drilling on an edge, pointed corner or a weld joint or corrugated surface
- ▲ Ideal for machining steel, cast iron, aluminium and stainless materials
- ▲ Optimised chip spaces for process-secure drilling
- ▲ Deflection practically independent of feed

### MaxiDrill 900

High productivity and process security for virtually all materials

- ▲ Ø 12 – 63 mm | 2xD, 3xD, 4xD and 5xD
- ▲ Easy handling / one geometry for the centre and periphery with the CTPP430 grade
- ▲ What's more, with the CTCP420 high-performance grade, it is possible to increase the cutting speed further by up to 30%
- ▲ The patented geometry of the SONT indexable insert is tailored to the requirements of a modern drilling process
- ▲ Wide range of applications in materials such as steel, cast iron, aluminium and stainless materials right through to titanium



## Drilling tools for precision holes

### KUB Trigon

The perfect geometry and the ideal cutting material for any application under challenging machining conditions or on unstable machines

- ▲  $\varnothing$  12 – 82 mm | 2xD, 3xD and 4xD
- ▲ Machining to finished size with very good surface quality (no retraction scoring)

- ▲ Universal application – rotating and stationary usage
- ▲ Low cutting forces, therefore can also be used on unstable machines
- ▲ Gives a smooth cut
- ▲ Large adjustment range: up to 3 mm in diameter
- ▲ Good centring



### KUB Centron

Highest performance data coupled with highest level of process security for hole depths up to 9xD

- ▲  $\varnothing$  20 – 81 mm | up to 9xD
- ▲ Short processing times due to high performance parameters
- ▲ Low operating costs due to long service life
- ▲ High level of flexibility thanks to the modular design
- ▲ Reliable machining in practically all materials
- ▲ Suitable for rotating and stationary usage as well as for vertical and horizontal application
- ▲ Combination options reduce tool costs

### KUB V464

Drill bit with ABS connection for hole depths up to 9xD

- ▲  $\varnothing$  80 – 160 mm | up to 9xD
- ▲ Larger diameters and longer versions available for special applications



## Counterboring and reaming tools for high-performance machining

### Counterboring with the TwinKom twin cutter

The innovative TwinKom twin cutter range from KOMET is particularly impressive thanks to its high performance and flexibility. A large selection of different holders and indexable inserts makes the range ideal for any application – even difficult machining tasks – with the right cutting edge geometry.

- ▲ Tool cutting edge holder can be adjusted axially for an even cut distribution on both cutting edges
- ▲ Tool holders can be adjusted radially for precise twin cutting ability
- ▲ Radially adjustable tool holders facilitate cut distribution with greater cutting depths
- ▲ Compact tool design
- ▲ The spiral grooves facilitate the removal of chips when used for deep counterboring operations
- ▲ With tried-and-tested ABS interface
- ▲ Application range from 24 to 401 mm diameter



### TwinKom twin cutter in light-weight design Ø 365 - 2000 mm



### Innovative solutions for fine hole machining for diameters from 2.96-110.59 mm

KOMET is synonymous with high-precision reaming. We meet the increasing demand for customer-specific special solutions and flexible standard tools by expanding our expertise in developing solutions and our innovative edge. Our leading market position is the result of constant high quality and continuous development.





## Semi standard indexable drills – The best quality in the shortest time!

The SEMI-STANDARD INDEXABLE DRILLING RANGE enables you to rapidly put together your own combination of standard modules across an extremely wide range of dimensions to suit your individual needs, all at a standard price level. Speak to your Technical Sales Engineer for further details!

**Conventional machining**

drilling / milling / countersinking

**Combined machining**

- ▲ Shorter processing times due to high performance parameters
- ▲ Ideal positioning accuracy increases the quality of the hole produced across all steps
- ▲ Reduces the need for tool changes due to combined machining

### Large range of tool types

	<p><b>Straight-fluted base body with up to 3 steps</b></p> <p>Drilling <math>\varnothing</math> 14 - 44 mm max. 2xD Drilling tolerance:  <span style="border: 1px solid black; padding: 2px;">⊕</span> SOEX <math>\pm 0,2</math>  <span style="border: 1px solid black; padding: 2px;">⊖</span> WOEX <math>\pm 0,1</math></p>	<p>Step <math>\varnothing</math>: 17.5 - 50 mm Step angle: 90°-15°</p>	<p>ABS 50</p> <p><math>\varnothing</math> 20 <math>\varnothing</math> 25 <math>\varnothing</math> 32</p> <p>HSK-A63 up to 2 steps with WOEX</p>
	<p><b>Spiral base body with chamfered step</b></p> <p>Drilling <math>\varnothing</math> 14 - 44 mm 2xD, 3xD, 4xD Drilling tolerance:  <span style="border: 1px solid black; padding: 2px;">⊖</span> WOEX <math>\pm 0,1</math></p>	<p>Chamfered step: <math>\varnothing</math> 17.5 - 50 mm max. 4xD Step angle: 90°-15°</p>	<p>ABS 50</p> <p><math>\varnothing</math> 20 <math>\varnothing</math> 25 <math>\varnothing</math> 32</p>

## Core drill for machining valuable materials

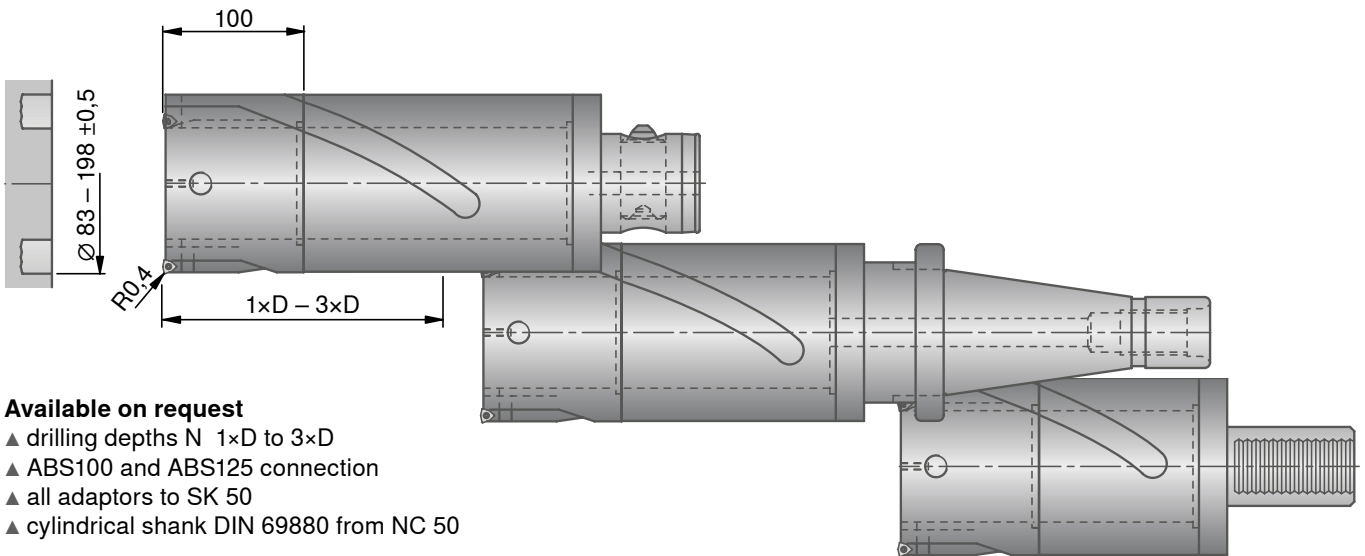
The KOMET trepanning tool is used to enable recycling of residue when cutting particularly expensive materials or using this for verification. Because the tool only removes a ring of material, the amount of power required is very low, making it suitable for machining larger holes on less powerful machine tools.

With central coolant supply.

For administration purposes, please provide details of the type and size of connection and the required drilling depth with the enquiry.

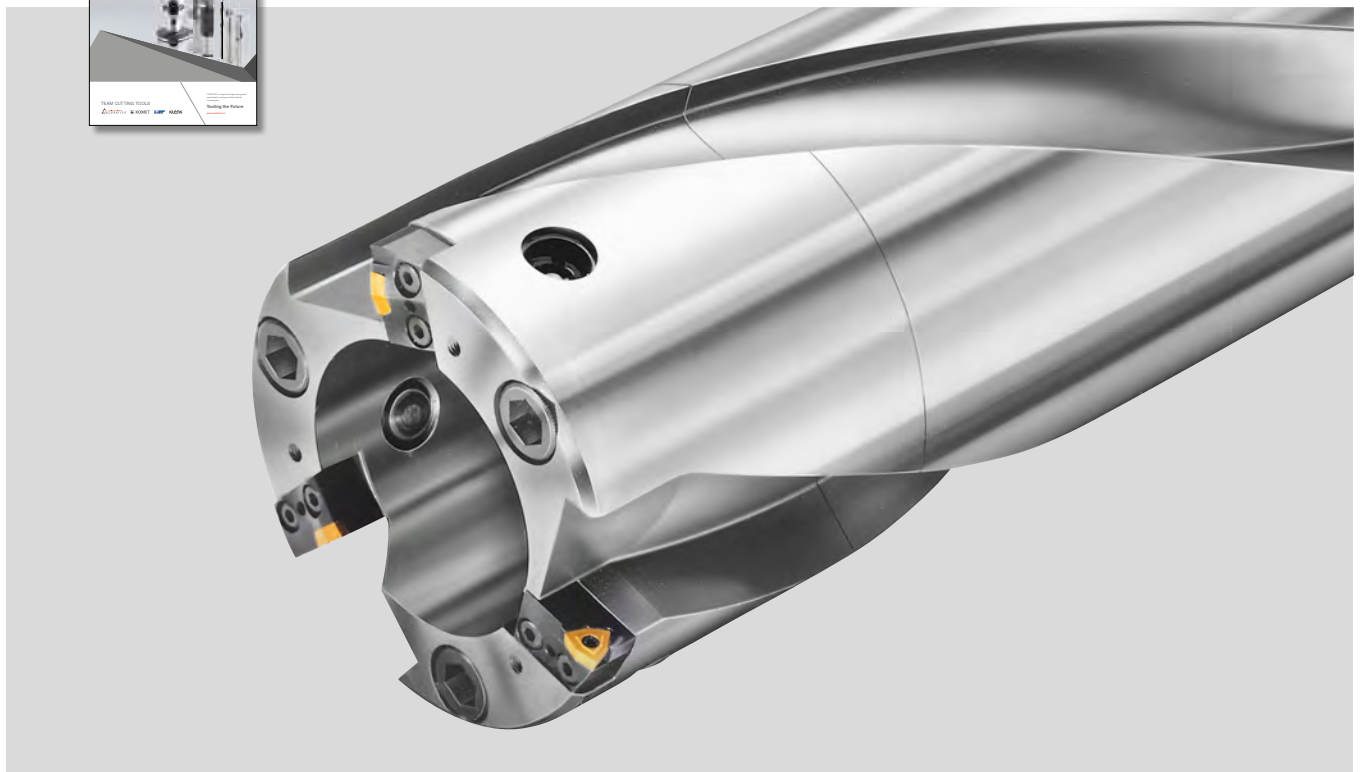
Please note:

Trepanning tool must be removed manually. Cutting width 25 mm



### Available on request

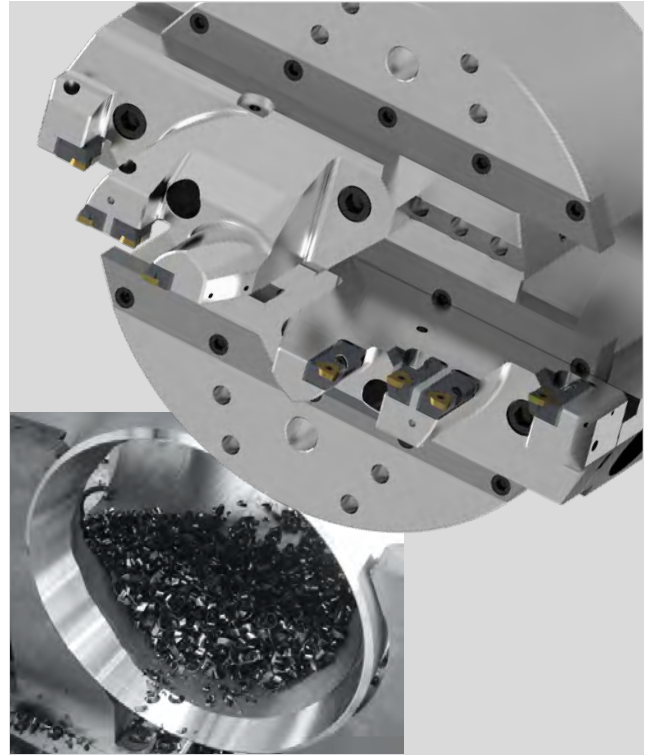
- ▲ drilling depths N  $1 \times D$  to  $3 \times D$
- ▲ ABS100 and ABS125 connection
- ▲ all adaptors to SK 50
- ▲ cylindrical shank DIN 69880 from NC 50



## Special tools available at customer request



Reverse machining screw head  
on turbine housing  $\varnothing$  189 mm



Pipe end machining  
 $\varnothing$  120 - 420 mm

Lock disc rotor: hole for lock bolt  $\varnothing$  165 mm / 5°





**The use of innovative cutting materials and optimised tools gives a decisive advantage**

## Technical references

Thanks to the continuous further development of cutting materials and the optimisation of tool solutions, we are able to offer many innovative solutions for our customers in roll manufacture, the raw materials industry, the wind industry and the energy sector as a whole. Well-established and new high-performance grades for steel and cast iron machining, and machining of stainless steel through to super alloys, combined with improved chip breakers, indexable inserts and tools enable significantly longer service lives and better cutting data in large parts production.

Our newly-developed carbide, ceramic and CBN cutting materials, improved tools and optimised chip breakers, such as the -R81 with its ideal, three-part chip split are already being used successfully. Thanks to these new developments, improved cutting edges and geometries, insert breakages can be avoided entirely and machining times are reduced. The result: higher feed rates, greater cutting depths and optimised cutting speeds – as shown in impressive fashion by the success stories on the following pages. The CERATIZIT hard material solutions and tools for heavy turning, heavy grooving and heavy milling bring a considerable advantage in terms of process security and performance, with the improvement sometimes in the tens or hundreds of percent. See for yourself.

## Success story – turning

### HEAVY TURNING OF HOUSING



### SITUATION

Application	Heavy turning
Workpiece	Housing
Material	8630 VGS
Properties/Hardness	277 – 321HB

### PREVIOUSLY

Tool	C8 SCLNR 25
Indexable insert	CNMM 250924
Grade	P25

### CERATIZIT

Tool	C8 SCLNR 32
Indexable insert	CNMT 320932SN-R88
Grade	CTCP125

### PROBLEM/CRITERIA

- ▲ Cutting depth too low

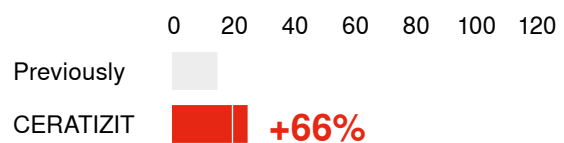
### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	65	65
$a_p$ [mm]	15	25
$f$ [mm]	1	1
Cooling	Emulsion	Emulsion
Service life/Cutting edge [min]	76	76

### RESULT / CUSTOMER BENEFIT

- ▲ Greater cutting depth saves on a cut
- ▲ 38-minute time saving/piece
- ▲ Process-secure machining

### CUTTING DEPTH



## Success story – turning

### HEAVY TURNING OF ROLL/SPIGOT



#### SITUATION

Application	Heavy turning
Workpiece	Roll / spigot
Material	Cast iron
Properties/Hardness	38 – 40ShC

#### PREVIOUSLY

Tool	Double holder with 60°
Indexable insert	LNMN 6688
Grade	Silicon nitride

#### CERATIZIT

Tool	Double holder with 60°
Indexable insert	LNMN 6688PN-150CE
Grade	CTN3110

#### PROBLEM/CRITERIA

- ▲ Service life too short

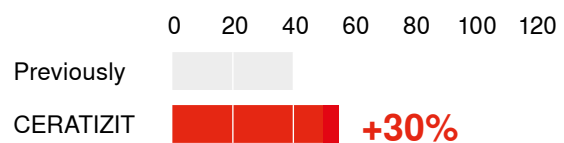
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	40	54
$a_p$ [mm]	50	50
$f$ [mm]	0.8 – 1.0	0.8 – 1.0
Cooling	dry	dry
Service life/Cutting edge [min]	40	<b>52+</b>

#### RESULT / CUSTOMER BENEFIT

- ▲ A spigot has been machined using a cutting edge
- ▲ Volume of material removed +30%
- ▲ Process-secure machining

#### SERVICE LIFE



## Success story – turning

### HEAVY TURNING OF ROLL



#### SITUATION

Application	Heavy turning
Workpiece	Roll Ø 1570
Material	Cast steel
Properties/Hardness	–

#### PREVIOUSLY

Tool	HDCTR 1LN50P.D50.75
Indexable insert	LNMR 501432
Grade	P35

#### CERATIZIT

Tool	HDCTR 1LN50P.D50.75
Indexable insert	LNMR 501432SN-R90
Grade	CTCP125

#### PROBLEM/CRITERIA

- ▲ Increased process security
- ▲ Improved service life

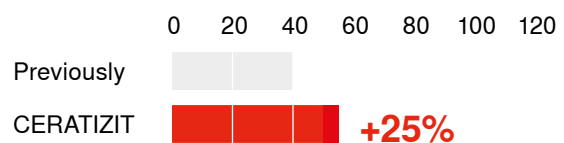
### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	29	29
$a_p$ [mm]	45	45
$f$ [mm]	1.5	1.5
Cooling	dry	dry
Service life/Cutting edge [min]	40	<b>50</b>

#### RESULT / CUSTOMER BENEFIT

- ▲ Service life +25%
- ▲ Wear, but no insert breakage
- ▲ Process-secure machining

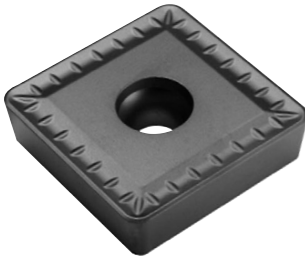
#### SERVICE LIFE





## Success story – turning

### ROUGH TURNING OF TURBINE ROTOR



#### SITUATION

Application	Rough turning
Workpiece	Turbine rotor Ø 990
Material	1.69661/24NiCrMoV10-10
Properties/Hardness	–

#### PREVIOUSLY

Tool	HD tool with 75°
Indexable insert	SCMT 380932
Grade	P25

#### CERATIZIT

Tool	HD tool with 75°
Indexable insert	SCMT 380932SN-R90
Grade	CTP1127

#### PROBLEM/CRITERIA

- ▲ Extended service life
- ▲ Prevention of chip breakage

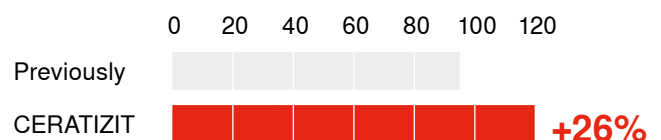
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	50	50
$a_p$ [mm]	21 – 25	21 – 25
$f$ [mm]	1.4	1.65
Cooling	dry	dry
Service life/Cutting edge [min]	95	<b>120</b>

#### RESULT / CUSTOMER BENEFIT

- ▲ Chip removal rate +18%
- ▲ Service life increased by 26%
- ▲ Very short chip curls
- ▲ Universal indexable insert

#### SERVICE LIFE



## Success story – turning

### ROUGH TURNING OF TURBINE SHAFT



#### PROBLEM/CRITERIA

- ▲ Increased chip removal rate
- ▲ Extended service life

#### SITUATION

Application	Rough turning
Workpiece	Turbine shaft Ø 1250
Material	1.6957 / 27NiCrMoV15-6
Properties/Hardness	850N/mm <sup>2</sup>

#### PREVIOUSLY

Tool	HD tool with 75°
Indexable insert	LNMR 501432
Grade	P25

#### CERATIZIT

Tool	HD tool with 75°
Indexable insert	LNMR 501432SN-R98
Grade	CTP1127

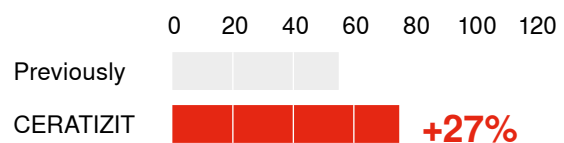
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	29	36
$a_p$ [mm]	1.6	1.8
$f$ [mm]	1.6	1.8
Cooling	dry	dry
Service life/Cutting edge [min]	55	<b>70</b>

#### RESULT / CUSTOMER BENEFIT

- ▲ Chip removal rate +40%
- ▲ Service life +30% compared to the competition
- ▲ Universal roughing insert

#### SERVICE LIFE



## Success story – turning

### ROUGH TURNING OF ROLL/BARREL



#### SITUATION

Application	Rough turning
Workpiece	Roll / barrel Ø 680
Material	Undefined roll
Properties/Hardness	76 – 80ShC

#### PREVIOUSLY

Tool	Special holder with 30°
Indexable insert	LNMN 6688PN
Grade	Composite ceramic

#### CERATIZIT

Tool	Special holder with 30°
Indexable insert	LNMN 6688PN-200CE
Grade	CTSH110

#### PROBLEM/CRITERIA

- ▲ Cutting edge breakage

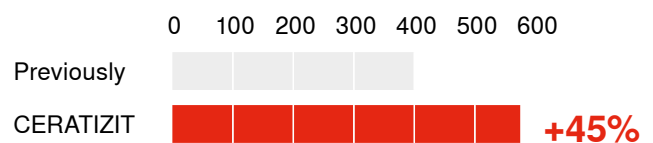
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	62	70
$a_p$ [mm]	8 – 12	8 – 12
$f$ [mm]	0.375	0.4
Cooling	dry	dry
Service life/Cutting edge [mm]	400	<b>580</b>

#### RESULT / CUSTOMER BENEFIT

- ▲ Higher cutting data
- ▲ Service life increased by 45%
- ▲ The CTSH110 grade has very high cutting-edge stability

#### SERVICE LIFE



## Success story – turning

### ROUGHING OF ROLL/BARREL



#### PROBLEM/CRITERIA

- ▲ Extended service life

#### SITUATION

Application	Roughing
Workpiece	Roll / barrel
Material	High chrome
Properties/Hardness	74 – 78 ShC

#### PREVIOUSLY

Tool	Dual tool
Indexable insert	2 x SNGN 250924
Grade	Sialon

#### CERATIZIT

Tool	Dual tool
Indexable insert	2 x SNGN 250924PN-150CE
Grade	CTM3110

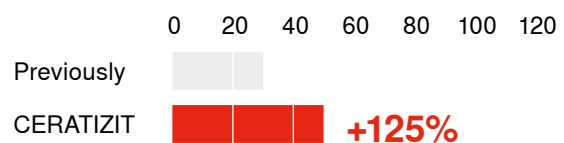
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	33	20
$a_p$ [mm]	4	4
$f$ [mm]	1.2	2.2
Cooling	dry	dry
Service life/Cutting edge [min]	20	<b>45</b>

#### RESULT / CUSTOMER BENEFIT

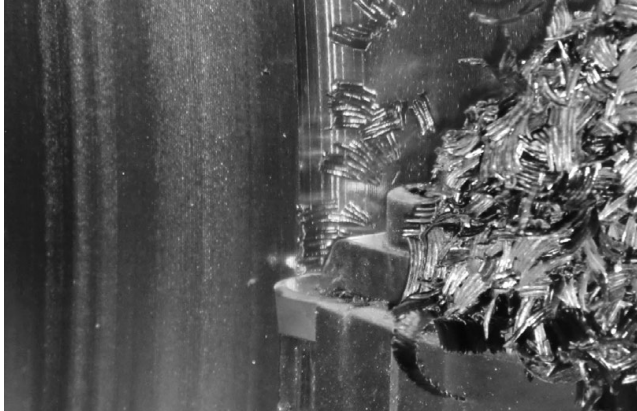
- ▲ Volume of material removed +13%
- ▲ Service life extended by 125%
- ▲ Improved dimensional accuracy on the diameter
- ▲ Extremely process-secure machining

#### SERVICE LIFE



## Success story – turning

### ROUGHING OF ROLL RING



#### PROBLEM/CRITERIA

- ▲ Extended service life
- ▲ Composite ceramic insert too fragile for this type of machining

#### SITUATION

Application	Roughing
Workpiece	Roll ring
Material	High chrome
Properties/Hardness	70 – 74 ShC

#### PREVIOUSLY

Tool	HDHTR UT80.1RX25
Indexable insert	RCGX 251200PN
Grade	Composite ceramic

#### CERATIZIT

Tool	HDHTR UT80.1RX25
Indexable insert	RCGX 251200PN-200CF
Grade	CTM3110

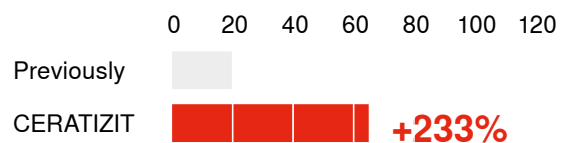
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	120	65
$a_p$ [mm]	6	6
$f$ [mm]	0.2	0.35
Cooling	dry	dry
Service life/Cutting edge [min]	18	<b>60</b>

#### RESULT / CUSTOMER BENEFIT

- ▲ Volume of material removed -5%
- ▲ Service life +234%

#### SERVICE LIFE



## Success story – turning

### RE-TURNING OF ROLL/BARREL



#### PROBLEM/CRITERIA

- ▲ Improvement of cutting data and service life

#### SITUATION

Application	Re-turning
Workpiece	Roll / barrel
Material	1.2362 / X63CrMoV51
Properties/Hardness	56 – 59 HRC

#### PREVIOUSLY

Tool	Special tool
Indexable insert	RNGN 190700TN
Grade	Whisker ceramic

#### CERATIZIT

Tool	Special tool
Indexable insert	RNGN 190700TN-005D
Grade	CTKX715

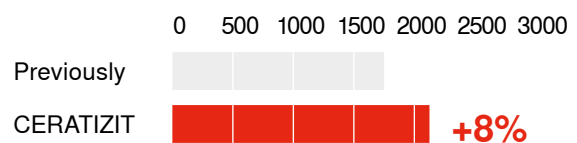
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	80	80
$a_p$ [mm]	0.3 – 0.5	0.3 – 0.5
$f$ [mm]	1.2	1.4
Cooling	Emulsion	Emulsion
Service life/Cutting edge [mm]	1850	2000

#### RESULT / CUSTOMER BENEFIT

- ▲ Higher cutting data
- ▲ Longer service life

#### SERVICE LIFE



## Success story – turning

### RE-TURNING OF REBAR ROLL



#### PROBLEM/CRITERIA

- ▲ High cutting edge stability in order to withstand the interrupted cut

#### SITUATION

Application	Re-turning
Workpiece	Roll / barrel Ø 400
Material	tool steel
Properties/Hardness	approx. 60 HRC

#### PREVIOUSLY

Tool	Special tool
Indexable insert	RCGX 120700PN
Grade	Composite ceramic

#### CERATIZIT

Tool	HDHTN 4040W.1RX12C.40
Indexable insert	RCGX 120700PN-150CF
Grade	CTSH110

#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	80	113
$a_p$ [mm]	0 – 2	0-2
$f$ [mm]	0.3	0.3
Cooling	dry	dry
Service life/Cutting edge [min]	6 gauge	Complete roll

#### RESULT / CUSTOMER BENEFIT

- ▲ Higher process security
- ▲ Longer service life
- ▲ Outstanding result

## Success story – turning

### SEMI-FINISHING OF ROLL / BARREL



#### PROBLEM/CRITERIA

- ▲ Improvement in volume of material removed
- ▲ Increase in cutting speed

#### SITUATION

Application	Semi-finishing
Workpiece	Roll / barrel
Material	Undefined roll
Properties/Hardness	64 – 70 ShC

#### PREVIOUSLY

Tool	Special tool
Indexable insert	RNGN 120700 whisker ceramic
Grade	Whisker ceramic

#### CERATIZIT

Tool	Special tool
Indexable insert	RNGN 120700PN-100CF
Grade	CTS3105

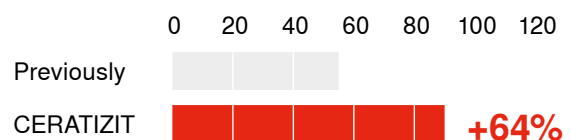
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	55	90
$a_p$ [mm]	1	1
$f$ [mm]	0.3	0.5
Cooling	dry	dry
Service life/Cutting edge [min]	1650	1650

#### RESULT / CUSTOMER BENEFIT

- ▲ Volume of material removed +225%
- ▲ Cutting speed increased by 65%

#### CUTTING SPEED





## Success story – turning

### SEMI-FINISHING OF ROLL / RE-TURNING OF BARREL



### SITUATION

Application	Semi-finishing / finishing
Workpiece	Roll / re-turning of barrel
Material	Chilled iron roll
Properties/Hardness	84 ShC

### PROBLEM/CRITERIA

- ▲ Improved surface quality

### CERATIZIT

Tool	CRDNN 4040
Indexable insert	RNMN 090300TN-020D
Grade	TA120

### RESULT

	PRE-TURNING	FINISHING
$V_c$ [m/min]	86	96
$a_p$ [mm]	1.75	0.25
$f$ [mm]	0.4	0.4
Cooling	dry	dry
Service life/Cutting edge [min]	86	75

### RESULT / CUSTOMER BENEFIT

- ▲ One cut across the whole barrel
- ▲ Surface quality Ra 0.82 – 1.23
- ▲ Previous situation equated to rough-machining, CERATIZIT situation equates to finishing

## Success story – grooving

### LATERAL GROOVES ON BARREL



### SITUATION

Application	Grooving operation
Workpiece	Roll / barrel Ø 860 – 720
Material	Undefined cast iron roll
Properties/Hardness	75 – 80 ShC

### PROBLEM/CRITERIA

- ▲ Increased process security

### CERATIZIT

Tool	Special tool
Indexable insert	HX 40.32.92PN-150CE
Grade	CTN3110

### RESULT

	<b>CERATIZIT</b>
$V_c$ [m/min]	60
$a_p$ [mm]	36
$f$ [mm]	0.24
Cooling	dry
Service life/Cutting edge [min]	90

### RESULT / CUSTOMER BENEFIT

- ▲ Very high process security
- ▲ Very high removal rate

## Success story – grooving

### TURBINE ROTOR GROOVING OPERATION



#### PROBLEM/CRITERIA

- ▲ Process-secure machining without chip breakage

#### SITUATION

Application	Grooving operation
Workpiece	Turbine rotor
Material	1.6951 / 24NiCrMoV10-10
Properties/Hardness	1000N/mm <sup>2</sup>

#### PREVIOUSLY

Tool	Special tool
Indexable insert	Special grooving insert
Grade	P35

#### CERATIZIT

Tool	HDHON K36.1HX40HE
Indexable insert	HX 40.24.90-R81
Grade	CTCP125

#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	45	38 – 42
$a_p$ [mm]	40	40
$f$ [mm]	0.3	<b>0.8 – 0.85</b>
Cooling	Emulsion	Emulsion
Service life/Cutting edge [min]	95	105

#### RESULT / CUSTOMER BENEFIT

- ▲ Perfect chip control
- ▲ Maximum process security
- ▲ No calibration of the new grooving insert required after the change of insert

## Success story – grooving

### TURBINE ROTOR GROOVING OPERATION



#### PROBLEM/CRITERIA

- ▲ Prevention of chip breakage
- ▲ Increased process security

#### SITUATION

Application	Grooving operation
Workpiece	Turbine rotor
Material	1.6957 (27NiCrMoV15-6)
Properties/Hardness	–

#### PREVIOUSLY

Tool	Special tool
Indexable insert	Special grooving insert
Grade	P25

#### CERATIZIT

Tool	HDHON K40.1HX45HE
Indexable insert	HX 45.24.90-R81
Grade	CTCP125

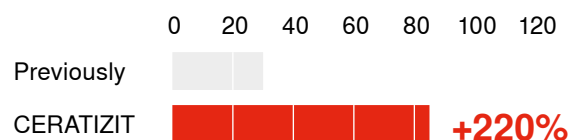
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	75	65 – 75
$a_p$ [mm]	45	45
$f$ [mm]	0.5	0.7
Cooling	Emulsion	Emulsion
Service life/Cutting edge [min]	25	<b>80</b>

#### RESULT / CUSTOMER BENEFIT

- ▲ Perfect chip control
- ▲ Maximum process security
- ▲ Superb service life +220%

#### SERVICE LIFE



## Success story – milling

### MILLING OF FLAT SPIGOT FOR A ROLL



#### PROBLEM/CRITERIA

- ▲ 90° shoulder required
- ▲ Extended service life

#### SITUATION

Application	Milling
Workpiece	Flat spigot
Material	Cast iron
Properties/Hardness	~ 38 – 42 ShC

#### PREVIOUSLY

Tool	with 75° setting angle
Indexable insert	Tangential milling system
Grade	K20

#### CERATIZIT

Tool	A271.120.R.07K2-17 45°/90°
Indexable insert	SAKU 1706ABSR-R50
Grade	CTPK220

#### RESULT

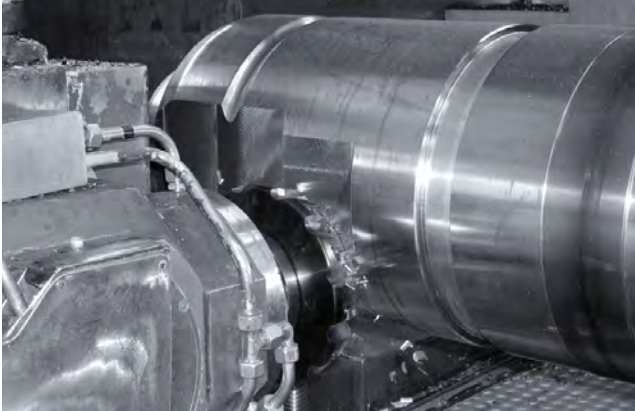
	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	140	140
$n$ [U/min]	357	371
$v_f$ [mm/min]	96	93
$f_z$ [mm]	0.27	0.25
$a_p$ [mm]	8	8
Cooling	dry	dry

#### RESULT / CUSTOMER BENEFIT

- ▲ 90° shoulder
- ▲ The roughing operation is very close to the finished contour
- ▲ Extremely soft cutting
- ▲ 30 – 80% increase in service life

## Success story – milling

### MILLING OF FLAT SPIGOT FOR A ROLL



#### SITUATION

Application	Milling operation
Workpiece	Roll / flat spigot
Material	Cast iron
Properties/Hardness	~40 ShC

#### PREVIOUSLY

Tool	Tangential milling system
Indexable insert	–
Grade	–

#### CERATIZIT

Tool	AHDM.250.12-75
Indexable insert	LNUC 220920ER
Grade	CTPK220

#### PROBLEM/CRITERIA

- ▲ Service life too short

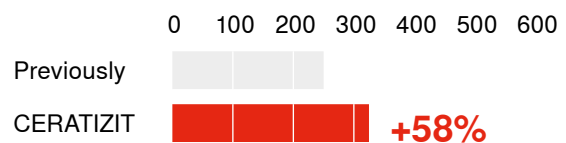
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	71.5	80.2
$n$ [U/min]	72	81
$v_f$ [mm/min]	190	<b>301</b>
$f_z$ [mm]	0.22	0.31
$a_p$ [mm]	14	14
Cooling	dry	dry

#### RESULT / CUSTOMER BENEFIT

- ▲ Feed rate increased by 30%
- ▲ Higher process security

#### FEED



## Success story – milling

### MILLING INCONEL



#### PROBLEM/CRITERIA

- ▲ Reduction of machining time

#### SITUATION

Application	Milling Inconel
Workpiece	Tensile strength tests
Material	Inconel 718
Properties/Hardness	–

#### PREVIOUSLY

Tool	Tangential milling system
Indexable insert	–
Grade	–

#### CERATIZIT

Tool	A271.125.R.10-17
Indexable insert	SAKU 1706ABSR-F50
Grade	CTPM245

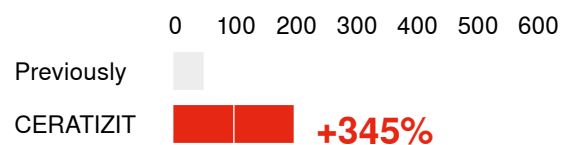
#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	25	35
$n$ [U/min]	64	89
$v_f$ [mm/min]	40	<b>178</b>
$f_z$ [mm]	0.06	<b>0.2</b>
$a_p$ [mm]	3	5
Service life [min]	20	20
Cooling	Emulsion	Emulsion

#### RESULT / CUSTOMER BENEFIT

- ▲ Drastic reduction of cutting force
- ▲ Cutting data increased by 100%

#### FEED



## Success story – milling

### SLAB ROUGH MILLING



#### PROBLEM/CRITERIA

- ▲ Extension of service life with high-chromium steels

#### SITUATION

Application	Rough milling
Workpiece	Slab
Material	1.2892 / X5CrNiCuNb15-5
Properties/Hardness	360 – 395 HB

#### PREVIOUSLY

Tool	Cartridge tool
Indexable insert	–
Grade	P35

#### CERATIZIT

Tool	A270.315.R17-19
Indexable insert	SDKT 1907AESN-M50
Grade	CTPP235

#### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	51	68
$n$ [U/min]	51	68
$v_f$ [mm/min]	364	<b>508</b>
$f_z$ [mm]	0.42	0.44
$a_p$ [mm]	10	10
Cooling	dry	dry

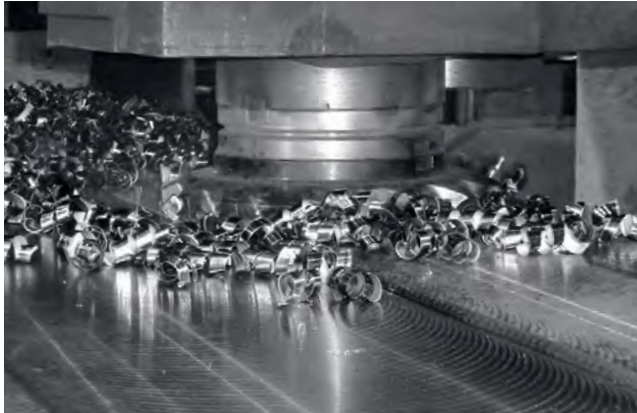
#### RESULT / CUSTOMER BENEFIT

- ▲ Doubling of service life with high-chromium steels
- ▲ Increased cutting parameters



## Success story – milling

### SLAB ROUGH MILLING



### SITUATION

Application	Rough milling
Workpiece	Slab
Material	1.2316 / X36CrMo17
Properties/Hardness	450HB

### PREVIOUSLY

Tool	Cartridge tool
Indexable insert	–
Grade	P35

### CERATIZIT

Tool	A270.250.R.14-19
Indexable insert	SDKT 1907AESN-R50
Grade	CTPP235

### PROBLEM/CRITERIA

- ▲ Process-secure machining without sudden insert breakages

### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	53	53
$n$ [U/min]	68	68
$v_f$ [mm/min]	400	<b>419</b>
$f_z$ [mm]	0.42	0.44
$a_p$ [mm]	8 – 9	8 – 9
Cooling	dry	dry

### RESULT / CUSTOMER BENEFIT

- ▲ Significant extension of service life
- ▲ 12 metre tool life

## Success story – milling

### ROUGH MILLING OF SLAB WITH FORGING SKIN



### SITUATION

Application	Rough milling
Workpiece	Slab with forging skin
Material	1.2379 / X155CrVMo12-1
Properties/Hardness	195 - 206HB

### PREVIOUSLY

Tool	Cartridge tool
Indexable insert	–
Grade	P35

### CERATIZIT

Tool	A271.250.R.15-17
Indexable insert	SAKU1706ABSR-M50
Grade	CTPP235

### PROBLEM/CRITERIA

- ▲ Improvement of service life and surface quality

### RESULT

	PREVIOUSLY	CERATIZIT
$V_c$ [m/min]	60	70
$n$ [U/min]	76	89
$v_f$ [mm/min]	171	360
$f_z$ [mm]	0.15	0.27
$a_p$ [mm]	3 – 6	3 – 6
Cooling	dry	dry

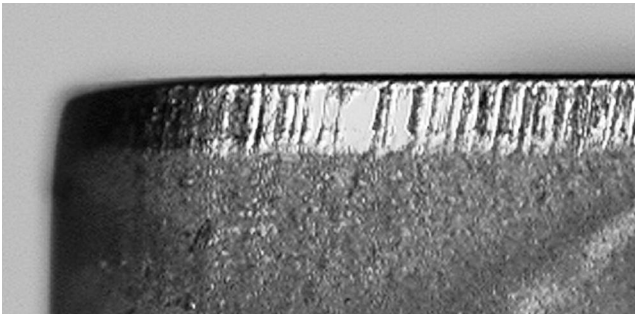
### RESULT / CUSTOMER BENEFIT

- ▲ Perfect chip control
- ▲ Maximum process security



## Types of wear

### Flank wear



Abrasion on flank, normal wear after a certain machining time.

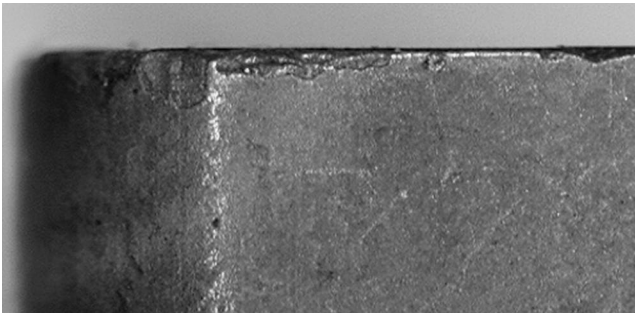
#### Cause

- ▲ Cutting speed too high
- ▲ Carbide grade does not have enough wear resistance
- ▲ Feed not adapted to application

#### Solution

- ▲ Select a carbide grade with a higher wear resistance
- ▲ Bring feed rate into the right relationship with cutting speed and cutting depth (increase feed rate)

### Edge breakages



Through excessive mechanical stress at the cutting edge fracture and chipping can occur.

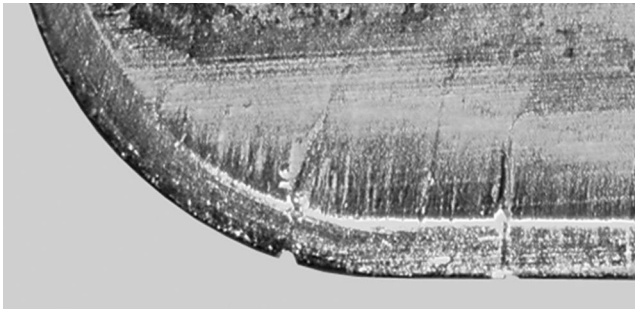
#### Cause

- ▲ Grades with too high a wear resistance
- ▲ Vibration
- ▲ Feed rate or cutting depth is too high
- ▲ Interrupted cut
- ▲ Chip stroke

#### Solution

- ▲ Use tougher grades
- ▲ Use negative cutting edge geometry with a chip breaker
- ▲ Improve stability (tool, workpiece)

### Crack at right angles to the cutting edge



Small cracks at 90° to cutting edge.

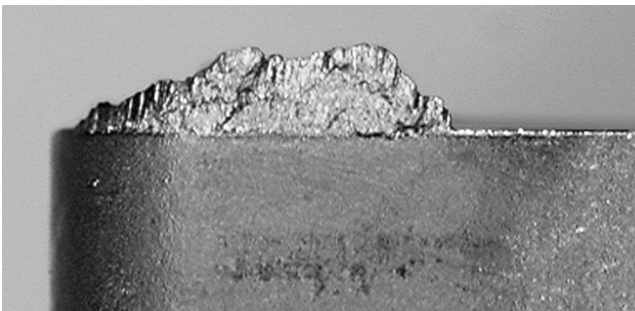
#### Cause

- ▲ Changing cutting temperature, thermal shock
- ▲ Incorrect cooling
- ▲ High tensile materials
- ▲ Cutting speed too high

#### Solution

- ▲ Use grade resistant to cracking at right angles to the cutting edge
- ▲ Use a generous amount of cooling lubricant or dry mill
- ▲ Reduce cutting speed
- ▲ Reduce feed rate

### Built-up edge formation



Built-up edge occurs when the chip is not evacuated properly due to insufficient cutting temperature.

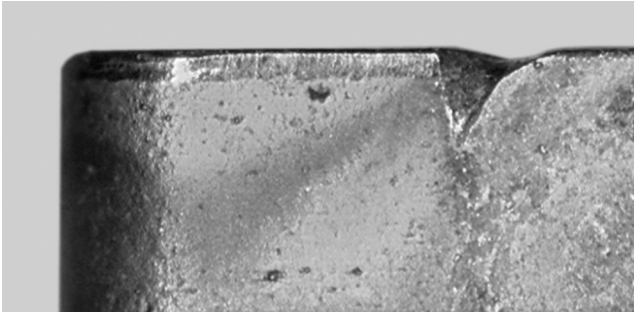
#### Cause

- ▲ Cutting speed too low
- ▲ Rake angle too small
- ▲ Incorrect cutting material
- ▲ Missing coolant/lubrication

#### Solution

- ▲ Increase cutting speed
- ▲ Increase rake angle
- ▲ Use TiN coating
- ▲ Use thicker emulsion

### Notch wear



Notch at the maximum cutting depth.

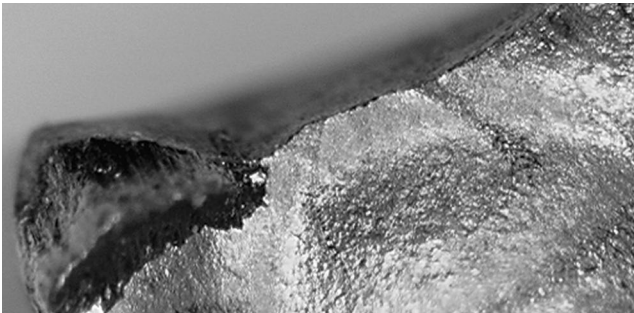
#### Cause

- ▲ Work-hardening materials (e.g. super alloys)
- ▲ Casting and forging skin
- ▲ Burr formation

#### Solution

- ▲ Reduce cutting speed
- ▲ Climb milling
- ▲ Change the working position of the milling cutter
- ▲ Reduce setting angle

### Insert breakage



Excessive stress of the insert causes breakage.

#### Cause

- ▲ Overload of carbide grade
- ▲ Lack of stability
- ▲ Wedge angle too small
- ▲ Excessive notch wear
- ▲ Shock type changes in cutting force

#### Solution

- ▲ Use a tougher cutting material
- ▲ Use chamfer for edge protection
- ▲ Increase rounding of cutting edge
- ▲ Use more stable geometry
- ▲ Reduce feed rate

### Crater wear



The hot chip which is being evacuated causes cratering at the rake face of the cutting edge.

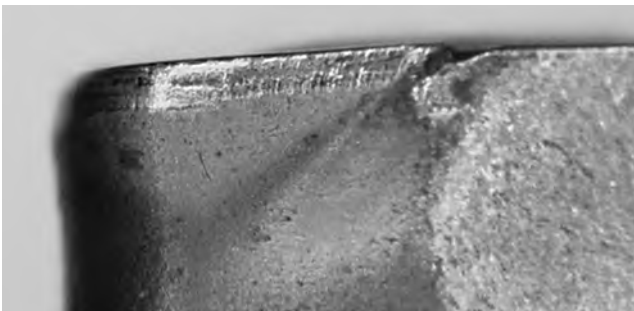
#### Cause

- ▲ Cutting speed, feed rate or both are too high
- ▲ Rake angle too low
- ▲ Carbide grade does not have enough wear resistance
- ▲ Incorrectly supplied coolant

#### Solution

- ▲ Reduce cutting speed and/or feed rate
- ▲ Increase amount and/or pressure of coolant, check supply
- ▲ Use a more crater-resistant grade

### Plastic deformation



High machining temperature and simultaneous mechanical stress can lead to plastic deformation.

#### Cause

- ▲ Working temperature too high, softening of the base material
- ▲ Damage to the coating
- ▲ Chip breaker too narrow

#### Solution

- ▲ Reduce cutting speed
- ▲ Select a carbide grade with a higher wear resistance
- ▲ Make provisions for cooling

# Troubleshooting guide for turning

## Problem

Type of wear				Workpiece problems						Solution, measures
Flank wear	Crater wear	Notch wear	Cracks at right angles to the cutting edge	Edge breakage	Insert breakage	Chipping on the surface	Surface quality	Vibration	burr formation	
	↓		↓			↓	↑	↓		Cutting speed $v_c$
↑	↑	↓	↓	↓		↑	↓	≈	↑	Feed $f$
↑			↓	↓					↑	Depth of cut $a_p$
	↓		↓	↑	↑	↓	↓		↓	Chamfer angle 35°, strongly interrupted cut Chamfer angle 25°, continuous, slightly interrupted cut Chamfer angle 15°, continuous, slightly interrupted cut
		↑		↑	↑		↑	↓	↓	Corner radius larger ↑ smaller ↓
↓	↓		↓	↓	↑	↓	↓	↓	↓	Rounding
	↓	↑	↑	↑	↑					BH wear resistance PCBN content BL Toughness
				≈	≈	≈	≈	≈		Tool clamping
				≈	≈	≈	≈	≈		Workpiece clamping
				≈	≈	↓	↓	↓		Overhang
≈				≈	≈	≈	≈	≈		Pitch height
□		□	□	□	□				■	Cooling lubricant

↑ raise, increase, large influence  
 ↑ raise, increase, small influence

↓ avoid, reduce, large influence  
 ↓ avoid, reduce, small influence

≈ check, optimise  
 ■ use  
 □ do not use

## Measures in the case of turning problems with CBN

### Solution to the problem

Problem	Possible causes	Solution
Poor tool lives	<ul style="list-style-type: none"> <li>▲ Cutting speed not within the specifications</li> <li>▲ Chip softening not carried out</li> </ul>	<ul style="list-style-type: none"> <li>▲ Increase cutting speed</li> <li>▲ Ideally, chip is red hot</li> </ul>
Poor surface quality	<ul style="list-style-type: none"> <li>▲ Feed rate too high</li> <li>▲ Corner radius too small</li> </ul>	<ul style="list-style-type: none"> <li>▲ Reduce feed rate</li> <li>▲ Increase corner radius</li> <li>▲ Use MASTERFINISH</li> </ul>
Chatter marks	<ul style="list-style-type: none"> <li>▲ Tool overhang too long</li> </ul>	<ul style="list-style-type: none"> <li>▲ Reduce, use more stable holder</li> </ul>
Vibration	<ul style="list-style-type: none"> <li>▲ Cutting pressure too high</li> <li>▲ Chip thickness too high</li> <li>▲ Centre height incorrect</li> <li>▲ Unstable tool or workpiece clamping</li> <li>▲ Indexable insert radius too large, high recoil force</li> </ul>	<ul style="list-style-type: none"> <li>▲ Reduce cutting pressure</li> <li>▲ Reduce chip thickness</li> <li>▲ Check / adjust centre height</li> <li>▲ Clamp with C-clamp</li> <li>▲ Use smaller radius</li> </ul>
Burrs on workpiece	<ul style="list-style-type: none"> <li>▲ With soft materials (sintered steel)</li> <li>▲ Cutting pressure too high</li> </ul>	<ul style="list-style-type: none"> <li>▲ Use smaller radius</li> <li>▲ Adjust chip thickness</li> <li>▲ Increase cutting depth</li> <li>▲ Increase cutting speed</li> <li>▲ Reduce chamfer angle</li> <li>▲ Use sharp cutting edge</li> <li>▲ Use cooling</li> </ul>
Notch wear	<ul style="list-style-type: none"> <li>▲ Feed mark of cutting depth</li> </ul>	<ul style="list-style-type: none"> <li>▲ With the two-cut strategy, use alternating cutting depths</li> </ul>
Notch wear (chemical)	<ul style="list-style-type: none"> <li>▲ Deep scoring on the main cutting edge</li> </ul>	<ul style="list-style-type: none"> <li>▲ Check material</li> <li>▲ For example, ferrite content too high</li> </ul>
Edge breakage on the workpiece	<ul style="list-style-type: none"> <li>▲ Sharp edge at the exit</li> </ul>	<ul style="list-style-type: none"> <li>▲ Change machining direction</li> <li>▲ Reduce the feed rate during entry and exit</li> </ul>

# Troubleshooting guide for milling

## Problem

Flank wear	Cutting edge breakage	Cracks at right angles to the cutting edge	Built-up edges	Notch wear	Insert breakage, cutting edge breakage	Crater wear	Cutting-edge deformation	Poor workpiece surface	Chatter, vibrations	Chip formation, chip jam	Edge breakage on the workpiece	Machine overload	Solution, measure
↓	↑	↓	↑	↓		↓	↓	↑	≈			↓	Cutting speed
↑	↓	↓	↑	↓	↓	↓	↓	↓	≈		↓	↓	Feed per tooth
	↑	≈		↑	↑								Toughness of cutting material
↑				≈		↑	↑						Wear resistance of cutting material
		↓	≈	↓					↓	≈	↓	↓	Setting angle
	≈		↑	≈	≈		↑		↑	≈			Rake angle
	↑		≈	↑				↓			↓		Cutting edge chamfer
	↑				↑			↑	↑				Stability
								↑	↑		≈		Axial run-out accuracy, radial run-out accuracy
≈	≈				≈		≈	≈			≈		Cutting edge wear
					≈			≈	≈		≈		Positioning of the milling tool
		↑	↑	↑		↑	≈	≈		≈			Cooling, chip removal
					≈			≈	≈				Indexable insert, cartridge clamping
	≈			≈	≈			≈	≈		↓	↓	Cutting depth

↑ raise, increase,

↓ avoid, reduce

≈ check, optimise



## General formulae

### Turning/milling/drilling

Cutting speed [m/min]

$$V_c = \frac{d \cdot \pi \cdot n}{1000}$$

Speed [rpm]

$$n = \frac{V_c \cdot 1000}{\pi \cdot d}$$

### Specific formulae for turning

Feed [mm/U]

$$f = \frac{V_f}{n}$$

Chip cross-section area [mm<sup>2</sup>]

$$A = a_p \cdot f$$

### Specific formulae for milling

Feed rate [mm/min]

$$V_f = f \cdot n = f_z \cdot z \cdot n \quad [\text{mm/min}]$$

Chip volume [mm<sup>3</sup>/min]

$$Q = a_p \cdot a_e \cdot V_f \quad [\text{mm}^3/\text{min}]$$

#### KEY

$V_c$	=	Cutting speed [m/min]
$d$	=	Roll diameter [mm]
$n$	=	Speed [rpm]
$\pi$	=	3.141592
$f$	=	Feed [mm/U]
$V_f$	=	Feed rate [mm/min]
$A$	=	Chip cross-section area [mm <sup>2</sup> ]
$a_p$	=	Cutting depth [mm]
$z$	=	Number of teeth
$f_z$	=	Feed/tooth [mm]
$Q$	=	Chip volume [mm <sup>3</sup> /min]
$a_e$	=	Operational reach [mm]

## Comparison table for hardness values

Tensile strength N/mm	Vickers HV	Brinell HB	Rockwell HRC	Shore C	Tensile strength N/mm	Vickers HV	Brinell HB	Rockwell HRC	Shore C
575	180	171			1845	560	532	53	63
595	185	176			1880	570	542	53.6	64
610	190	181			1920	580	551	54.1	65
625	195	185			1955	590	561	54.7	66
640	200	190	12		1995	600	570	55.2	67
660	205	195	13		2030	610	580	55.7	68
675	210	199	14		2070	620	589	56.3	69
690	215	204	15		2105	630	599	56.8	70
705	220	209	15	28	2145	640	608	57.3	71
720	225	214	16		2180	650	618	57.8	72
740	230	219	17	29	2210	660	628	58.3	73
755	235	223	18		2240	665	633	58.8	74
770	240	228	20.3	30	2280	670	638	59.3	
785	245	233	21.3		2310	675	643	59.8	75
800	250	238	22.2	31	2350	680	648	60.3	76
820	255	242	23.1	32	2380	685	653	61.1	77
835	260	247	24	33	2410	690	658	61.3	78
850	265	252	24.8		2450	695	663	61.7	79
865	270	257	25.6		2480	710	668	62.2	80
880	275	261	26.4	34	2520	720	678	62.6	81
900	280	268	27.1		2550	730	683	63.1	82
915	285	271	27.8	35	2590	740	693	63.5	
930	290	276	28.5		2630	750	703	63.9	83
950	295	280	29.2	36	2660	760	708	64.3	84
965	300	285	29.8	37	2700	770	718	64.7	85
995	310	295	31	38	2730	780	723	65.1	
1030	320	304	32.2	39	2770	790	733	65.5	86
1060	330	314	33.3	40	2800	800	738	65.9	
1095	340	323	34.3	41	2840	810	748	66.3	87
1125	350	333	35.5	42	2870	820	753	66.7	88
1155	360	342	36.6	43	2910	830	763	67	
1190	370	352	37.7	44	2940	840	768	67.4	89
1220	380	361	38.8	45	2980	850		67.7	
1255	390	371	39.8	46	3010	860		68.1	90
1290	400	380	40.8	47	3050	870		68.4	
1320	410	390	41.8	48	3080	880		68.7	91
1350	420	399	42.7		3120	890		69	
1385	430	409	43.6	49	3150	900		69.3	92
1420	440	418	44.5		3190	910		69.6	
1455	450	428	45.3	51	3220	920		69.9	
1485	460	437	46.1	52	3260	930		70.1	
1520	470	447	46.9	53					
1555	480	465	47.7	54					
1595	490	466	48.4						
1630	500	475	49.1	57					
1665	510	485	49.8	58					
1700	520	494	50.5	59					
1740	530	504	51.1	60					
1775	540	513	51.7	61					
1810	550	523	52.3	62					

Conversion values are approximate, based on DIN EN ISO18265 (02-2004)

## Comparison table for materials

DIN	Work-piece No.	BS	AFNOR	SS	AISI	Japan JIS	K <sub>c</sub> 1.1 N/mm <sup>2</sup>	mc	VDI 3323 Group
10 SPb 20	1.0722		10 PbF 2		11 L 08		1350	0,20	1
100 Cr 6	1.2067	BL 3	Y 100 C 6		L 3	SUJ2	1775	0,24	6/9
105 WCr 6	1.2419		105 WC 13			SKS31	1775	0,24	6/9
12 CrMo 9 10	1.7380	1501-622 Gr. 31; 45	10 CD 9.10	2218	A 182-F22	SPVA,SCMV4	1675	0,24	6/7
12 Ni 19	1.5680		Z 18 N 5		2515		2450	0,23	10/11
13 CrMo 4 4	1.7335	1501-620 Gr. 27	15 CD 3.5	2216	A 182-F11; F12	SPVAF12	1675	0,24	6/7
14 MoV 6 3	1.7715	1503-660-440					1675	0,24	6/7
14 Ni 6	1.5622		16 N 6		A 350-LF 5		1675	0,24	6/7
14 NiCr 10	1.5732		14 NC 11		3415	SNC415(H)	1675	0,24	6/7
14 NiCr 14	1.5752	655 M 13	12 NC 15		3310; 9314	SNC815(H)	1675	0,24	6/7
14 NiCrMo 13 4	1.6657						1675	0,24	6/7
15 Cr 3	1.7015	523 M 15	12 C 3		5015		1675	0,24	6/7
15 CrMo 5	1.7262		12 CD 4			SCM415(H)	1675	0,24	6/7
15 Mo 3	1.5415	1501-240	15 D 3	2912	A 204 Gr. A		1675	0,24	6/7
16 MnCr 5	1.7131	527 M 17	16 MC 5	2511	5115	SCR415	1675	0,24	6/7
16 Mo 5	1.5423	1503-245-420			4520	SB450M	1675	0,24	6/7
17 CrNiMo 6	1.6587	820 A 16	18 NCD 6				1675	0,24	6/7
21 NiCrMo 2	1.6523	805 M 20	20 NCD 2	2506	8620	SNCM220(H)	1725	0,24	6/8
25 CrMo 4	1.7218	1717 CDS 110	25 CD 4 S	2225	4130	SM420;SCM430	1725	0,24	6/8
28 Mn 6	1.1170	150 M 28	20 M 5		1330		1500	0,22	2
32 CrMo 12	1.7361	722 M 24	30 CD 12	2240			1775	0,24	6/9
34 Cr 4	1.7033	530 A 32	32 C 4		5132	SCR430(H)	1725	0,24	6/8
34 CrMo 4	1.7220	708 A 37	35 CD 4	2234	4135; 4137	SCM432;SCCRM3	1775	0,24	6/9
34 CrNiMo 6	1.6582	817 M 40	35 NCD 6	2541	4340	SNCM447	1775	0,24	6/9
35 S 20	1.0726	212 M 36	35 MF 4	1957	1140		1525	0,22	2/3
36 CrNiMo 4	1.6511	816 M 40	40 NCD 3		9840	SNCM447	1775	0,24	6/9
36 Mn 5	1.1167						1525	0,22	2/3
36 NiCr 6	1.5710	640 A 35	35 NC 6		3135	SNC236	1800	0,24	3/9
38 MnSi 4	1.5120						1800	0,24	3/9
39 CrMoV 13 9	1.8523	897 M 39					1775	0,24	6/9
40 Mn 4	1.1157	150 M 36	35 M 5		1039		1525	0,22	2/3
40 NiCrMo 2 2	1.6546	311-Type 7	40 NCD 2		8740	SNCM240	1775	0,24	6/9
41 Cr 4	1.7035	530 M 40	42 C 4		5140	SCR440(H)	1775	0,24	6/9
41 CrAlMo 7	1.8509	905 M 39	40 CAD 6.12	2940	A 355 Cl. A	SACM645	1775	0,24	6/9
41 CrMo 4	1.7223	708 M 40	42 CD 4 TS	2244	4142; 4140	SCM440	1775	0,24	6/9
42 Cr 4	1.7045	530 A 40	42 C 4 TS	2245	5140	SCr440	1775	0,24	6/9
42 CrMo 4	1.7225	708 M 40	42 CD 4	2244	4142; 4140	SCM440(H)	1775	0,24	6/9
45 WCrV 7	1.2542	BS 1		2710	S 1		1775	0,24	6/9
50 CrV 4	1.8159	735 A 50	50 CV 4	2230	6150	SUP10	1775	0,24	6/9
55 Cr 3	1.7176	527 A 60	55 C 3	2253	5155	SUP9(A)	1775	0,24	6/9
55 NiCrMoV 6	1.2713		55 NCDV 7		L 6	SKH1;SKT4	1775	0,24	6/9
55 Si 7	1.0904	250 A 53	55 S 7	2085; 2090	9255		1775	0,24	6/9
58 CrV 4	1.8161						1775	0,24	6/9
60 SiCr 7	1.0961		60 SC 7		9262		1775	0,24	6/9
9 SMn 28	1.0715	230 M 07	S 250	1912	1213	SUM22	1350	0,21	1
9 SMn 36	1.0736	240 M 07	S 300		1215		1350	0,21	1
9 SMnPb 28	1.0718		S 250 Pb	1914	12 L 13	SUM22L	1350	0,21	1
9 SMnPb 36	1.0737		S 300 Pb	1926	12 L 14		1350	0,21	1
Al99	3.0205						700	0,25	21

## Comparison table for materials

DIN	Work-piece No.	BS	AFNOR	SS	AISI	Japan JIS	K <sub>c</sub> 1.1 N/mm <sup>2</sup>	mc	VDI 3323 Group
AlCuMg1	3.1325						700	0,25	22
AlMg1	3.3315						700	0,25	21
AlMgSi1	3.2315						700	0,25	22
C 105 W1	1.1545		Y1 105	1880	W 110	SK3	1675	0,24	3
C 125 W	1.1663		Y2 120		W 112		1675	0,24	3
C 15	1.0401	080 M 15	AF3 7 C 12; XC 18	1350	1015	S15C	1350	0,21	1
C 22	1.0402	050 A 20	AF 42 C 20	1450	1020	S20C, S22C	1350	0,21	1
C 35	1.0501	060 A 35	AF 55 C 35	1550	1035	S35C	1525	0,22	2/3
C 45	1.0503	080 M 46	AF 65 C 45	1650	1045	S45C	1525	0,22	2/3
C 55	1.0535	070 M 55		1655	1055	S55C	1675	0,24	3
C 60	1.0601	080 A 62	CC 55		1060	S60C	1675	0,24	3
Cf 35	1.1183					S35C	1525	0,22	2/3
Cf 53	1.1213					S50C	1525	0,22	2/3
Ck 101	1.1274	060 A 96		1870	1095		1675	0,24	3
Ck 15	1.1141	080 M 15	XC 15; XC 18	1370	1015	S15C	1350	0,21	1
Ck 55	1.1203	070 M 55	XC 55		1055	S55C	1675	0,24	3
Ck 60	1.1221	080 A 62	XC 60	1665; 1678	1060	S58C	1675	0,24	3
CoCr20W15Ni	2.4764						3300	0,24	35
CuZn15	2.0240						700	0,27	27
CuZn36Pb3	2.0375						700	0,27	26
E-Cu57	2.0060						700	0,27	28
G-AlSi10Mg	3.2381						700	0,25	24
G-AlSi12	3.2581						700	0,25	23
G-AlSi9Cu3	3.2163						700	0,25	23
G-CuSn5ZnPb	2.1096						700	0,27	26
G-CuZn40Fe	2.0590						700	0,27	28
G-X 120 Mn 12	1.3401	Z 120 M 12	Z 120 M 12		A 128 (A)		3300	0,24	35
G-X 20 Cr 14	1.4027	420 C 29	Z 20 C 13 M			SCS2	1875	0,21	12/13
G-X 40 NiCrSi 38 18	1.4865	330 C 40					2600	0,24	31
G-X 45 CrSi 9 3	1.4718	401 S 45	Z 45 CS 9		HNV 3		2450	0,23	10/11
G-X 5 CrNi 13 4	1.4313	425 C 11	Z 5 CN 13.4	2385	CA 6-NM		1875	0,21	12/13
G-X 5 CrNiMoNb 18 10	1.4581	318 C 17	Z 4 CNDNb 18.12 M				2150	0,20	14
G-X 6 CrNi 18 9	1.4308	304 C 15	Z 6 CN 18.10 M	2333	CF-8		2150	0,20	14
G-X 6 CrNiMo 18 10	1.4408						2150	0,20	14
G-X 7 Cr 13	1.4001						1875	0,21	12/13
GG-10	0.6010		Ft 10 D	01 10-00	A48-20 B	FC100	1150	0,20	15
GG-15	0.6015	Grade 150	Ft 15 D	01 15-00	A48-25 B	FC150	1150	0,20	15
GG-20	0.6020	Grade 220	Ft 20 D	01 20-00	A48-30 B	FC200	1150	0,20	15
GG-25	0.6025	Grade 260	Ft 25 D	01 25-00	A48-40 B	FC250	1250	0,24	15/16
GG-30	0.6030	Grade 300	Ft 30 D	01 30-00	A48-45 B	FC300	1350	0,28	16
GG-35	0.6035	Grade 350	Ft 35 D	01 35-00	A48-50 B	FC350	1350	0,28	16
GG-40	0.6040	Grade 400	Ft 40 D	01 40-00	A48-60 B	FC400	1350	0,28	16
GGG-35.3	0.7033					FCD350	1225	0,25	17
GGG-40	0.7040	SNG 420/12	FGS 400-12	0717-02	60-40-18	FCD400	1225	0,25	17
GGG-40.3	0.7043	SNG 370/17	FGS 370-17	0717-15		FCD400	1225	0,25	17
GGG-50	0.7050	SNG 500/7	FGS 500-7	0727-02	65-45-12	FCD500	1350	0,28	18
GGG-60	0.7060	SNG 600/3	FGS 600-3	0732-03	80-55-06	FCD600	1350	0,28	18
GGG-70	0.7070	SNG 700/2	FGS 700-2	0737-01	100-70-03	FCD700	1350	0,28	18
GGG-NiCr 20 2	0.7660	S-NiCr 20 2	S-NC 20 2		A 439 Type D-2		1350	0,28	18

## Comparison table for materials

DIN	Work-piece No.	BS	AFNOR	SS	AISI	Japan JIS	K <sub>c</sub> 1.1 N/mm <sup>2</sup>	mc	VDI 3323 Group
GGG-NiMn 13 7	0.7652	S-NiMn 13 7	S-NM 13 7				1350	0,28	18
GS-Ck 45	1.1191	080 M 46	XC 42	1672	1045	S45C	1525	0,22	2/3
GTS-35-10	0.8135	B 340/12	MN 35-10				1225	0,25	19
GTS-45-06	0.8145	P 440/7					1420	0,30	20
GTS-55-04	0.8155	P 510/4	MP 50-5				1420	0,30	20
GTS-65-02	0.8165	P 570/3	MP 60-3				1420	0,30	20
GTS-70-02	0.8170	P 690/2	IP 70-2				1420	0,30	20
NiCr20TiAl	2.4631	HR 401; 601	Nimonic 80 A				3300	0,24	33
NiCr22Mo9Nb	2.4856		Inconel 625				3300	0,24	33
NiCu30Al	2.4375		Monel K 500				3300	0,24	34
NiFe25Cr20NbTi	2.4955						3300	0,24	34
S 18-0-1	1.3355	BT 1	Z 80 WCV 18-04-01		T 1		2450	0,23	10/11
S 18-1-2-5	1.3255	BT 4	Z 80 WKC V 18-05-04-0		T 4		2450	0,23	10/11
S 2-9-2	1.3348		Z 100 DCWV 09-04-02-	2782	M 7		2450	0,23	10/11
S 6-5-2	1.3343	BM 2	Z 85 WDCV 06-05-04-0	2722	M 2	SKH9; SKH51	2450	0,23	10/11
S 6-5-2-5	1.3243		Z 85 WDKCV 06-05-05-	2723		SKH55	2450	0,23	10/11
TiAl6V4	3.7165	TA 10 bis TA 13	T-A 6 V				2110	0,22	37
X 10 Cr 13	1.4006	410 S 21	Z 12 C 13	2302	410; CA-15	SUS410	1875	0,21	12/13
X 10 CrNiMoNb 18 12	1.4583				318		2150	0,20	14
X 10 CrNiS 18 9	1.4305	303 S 21	Z 10 CNF 18.09	2346	303		2150	0,20	14
X 100 CrMoV 5 1	1.2363	BA 2	Z 100 CDV 5	2260	A 2		2450	0,23	10/11
X 12 CrMoS 17	1.4104		Z 10 CF 17	2383	430 F	SUS430F	1875	0,21	12/13
X 12 CrNi 17 7	1.4310	301 S 21	Z 12 CN 17.07		301		2150	0,20	14
X 12 CrNi 22 12	1.4829					SUS301	1350	0,28	16
X 12 CrNi 25 21	1.4845	310 S24	Z 12 CN 25.20	2361	310 S	SUH310; SUS310S	2150	0,20	14
X 12 CrNiTi 18 9	1.4878	321 S 20	Z 6 CNT 18.12 (B)	2337	321		2150	0,20	14
X 12 NiCrSi 36 16	1.4864	NA 17	Z 12 NCS 37.18		330	SUH330	2600	0,24	31
X 15 CrNiSi 20 12	1.4828	309 S 24	Z 15 CNS 20.12		309	SUH309	1350	0,28	16
X 165 CrMoV 12	1.2601			2310			2450	0,23	10/11
X 2 CrNiMo 18 13	1.4440						2150	0,20	14
X 2 CrNiMoN 17 13 3	1.4429	316 S 62	Z 2 CND 17.13 Az	2375	316 LN	SUS316LN	2150	0,20	14
X 2 CrNiN 18 10	1.4311	304 S 62	Z 2 CN 18 .10	2371	304 LN	SUS304LN	2150	0,20	14
X 20 CrNi 17 2	1.4057	431 S 29	Z 15 CN 16.02	2321	431	SUS431	1875	0,21	12/13
X 210 Cr 12	1.2080	BD 3	Z 200 C 12		D 3		2450	0,23	10/11
X 210 CrW 12	1.2436			2312			2450	0,23	10/11
X 30 WCrV 9 3	1.2581	BH 21	Z 30 WCV 9		H 21	SKD5	2450	0,23	10/11
X 40 CrMoV 5 1	1.2344	BH 13	Z 40 CDV 5	2242	H 13	SKD61	2450	0,23	10/11
X 46 Cr 13	1.4034	420 S 45	Z 40 C 14				1875	0,21	12/13
X 5 CrNi 18 9	1.4301	304 S 15	Z 6 CN 18.09	2332; 2333	304; 304 H	SUS304	2150	0,20	14
X 5 CrNiMo 17 13 3	1.4436	316 S 16	Z 6 CND 17.12	2343	316	SUS316	2150	0,20	14
X 5 CrNiMo 18 10	1.4401	316 S 16	Z 6 CND 17.11	2347	316	SUS316	2150	0,20	14
X 53 CrMnNiN 21 9	1.4871	349 S 54	Z 52 CMN 21.09		EV 8		1875	0,21	12/13
X 6 Cr 13	1.4000	403 S 17	Z 6 C 13	2301	403	SUS403	1875	0,21	12/13
X 6 Cr 17	1.4016	430 S 15	Z 8 C 17	2320	430	SUS430	1875	0,21	12/13
X 6 CrMo 17	1.4113	434 S 17	Z 8 CD 17.01	2325	434	SUS434	1875	0,21	12/13
X 6 CrNiMoTi 17 12 2	1.4571	320 S 31	Z 6 CNT 17.12	2350	316 Ti		2150	0,20	14
X 6 CrNiNb 18 10	1.4550	347 S 17	Z 6 CNNb 18.10	2338	347		2150	0,20	14
X 6 CrNiTi 18 10	1.4541	321 S 12	Z 6 CNT 18.10	2337	321		2150	0,20	14
X2 CrNi 18-8	1.4317						2150	0,20	14



**From consulting to successful completion, we realize your application-specific project goals**

# Developing optimal manufacturing processes

Benefit from our innovative tool concepts, many years of experience and professional advice to increase your productivity

In order to machine increasingly complex workpieces cost effectively and to a high level of quality, all the process parameters need to be tailored to the specific task. Those who succeed in meeting these challenges will remain competitive on the global market.

However, the reality is that businesses often do not have the capacity to analyse manufacturing processes and optimise them to make them more efficient. There is also usually not enough time to tailor new cutting materials, tool geometries or process technologies to the individual machining operations.

This is precisely where our project engineering comes in. As one of the leading tool manufacturers and innovators in the machining industry, we develop ideal tool concepts for you based on key success factors such as efficiency, time and quality.

Why are we the ideal system partner for you? We have many years of experience in the development of innovative tool solutions, can draw on sound technical expertise and provide first-rate service. What's more, with our leading product brands Cutting Solutions by CERATIZIT, KOMET, WNT and KLENK, we are a full-service provider in machining, offering one of the most comprehensive ranges of cutting tools and services.

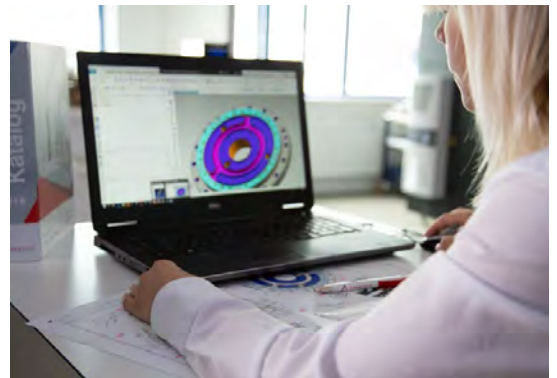
If you want to set the pace rather than risk falling behind the international competition, then get in touch with us now!

You can rely on us to implement your project successfully!

## Project consulting



## Project development & quotation



## Project implementation



## Ongoing support





**We always keep your objectives in mind**

and provide you with advice across all industries in all application ranges. Benefit from our many years of experience and our innovative solutions.

The services we provide

- ▲ Consulting service for all applications and industries
- ▲ Needs-oriented advice on process optimisation
- ▲ Dedicated project manager

**Our interdisciplinary project team**

develops the ideal machining concept for your individual specifications and objectives using high-end CERATIZIT tools.

The services we provide

- ▲ Development of a machining and tool concept
- ▲ Cycle time consideration
- ▲ Machining tests in our in-house Technical Centers
- ▲ Prognosis of the tooling requirement and tool costs per component
- ▲ Business quotation

**Our expert team**

implements the concept on your machine, working closely with you and your dedicated CERATIZIT application engineer. This on-site support guarantees you will receive a stable and cost-effective manufacturing process for your product.

The services we provide

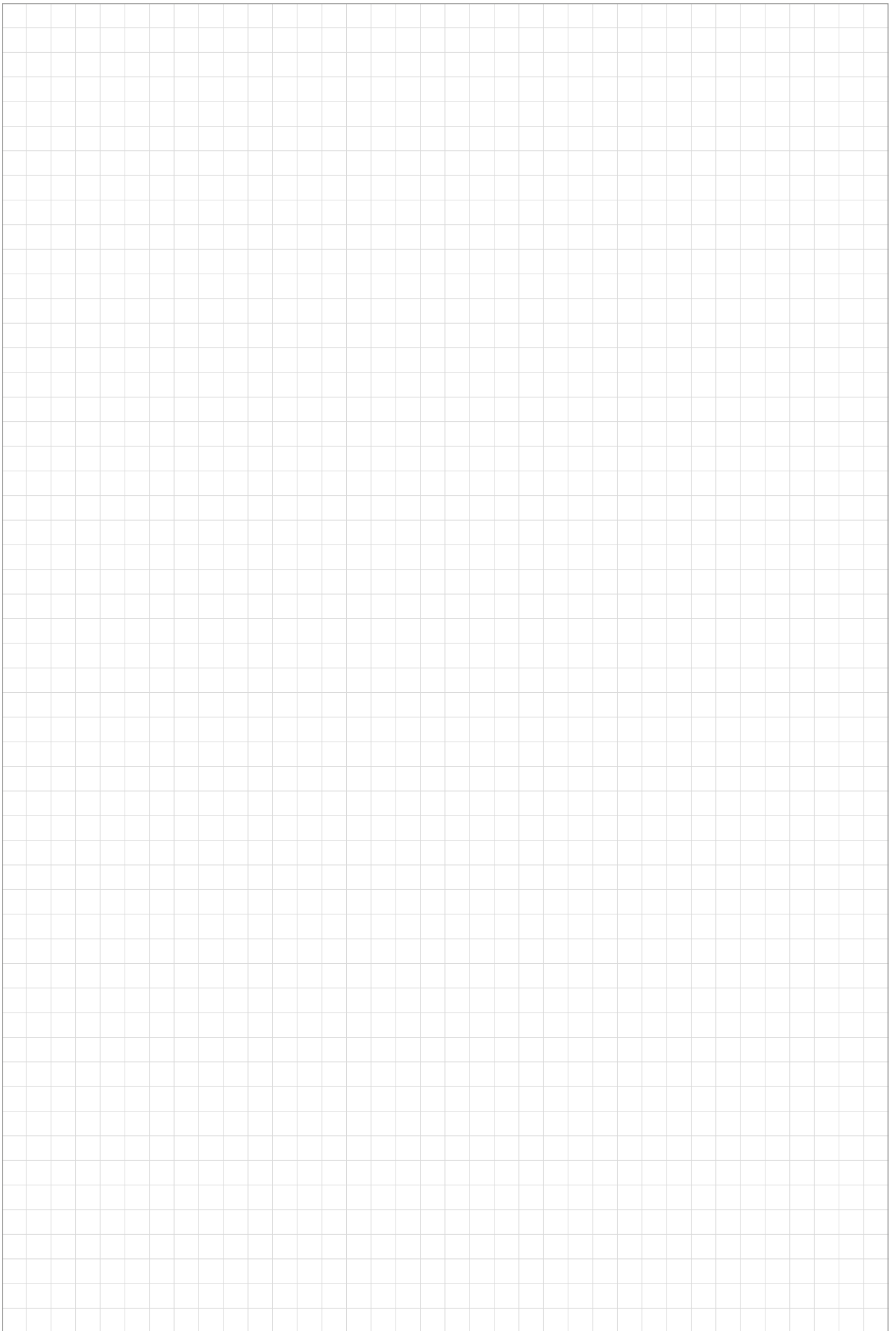
- ▲ Detailed planning of the machining process
- ▲ Tool design
- ▲ Collision monitoring
- ▲ Tool assembly
- ▲ Support from a dedicated application engineer when proving out the machining process and for CNC programming
- ▲ Tool documentation
- ▲ Regular project status reports

**Even after successful implementation**

of the project, we are here for you. Your dedicated application engineer keeps an eye on your manufacturing processes, determines further potential for optimisation and provides you with ongoing support for all the challenges you face.

The services we provide

- ▲ Ongoing manufacturing support
- ▲ Series production support and process optimisation





# UNITED. EXPERIENCED. METAL CUTTING.



**SPECIALIST FOR INDEXABLE INSERT TOOLS  
FOR TURNING, MILLING AND GROOVING**

The product brand CERATIZIT stands for high-quality indexable insert tools. The products are characterized by their high quality and contain the DNA of many years of experience in the development and production of carbide tools.



**THE QUALITY LABEL FOR  
EFFICIENT BORE PRODUCTION**

High-precision drilling, reaming, countersinking and boring is a matter of expertise: efficient tooling solutions for drilling and mechatronic tools are therefore part of the KOMET brand name.



**EXPERTS FOR ROTATING TOOLS,  
TOOL HOLDERS AND CLAMPING SOLUTIONS**

WNT is synonymous with product diversity: solid carbide and HSS rotating tools, tool holders and efficient workholding solutions are all part of this brand.



**CUTTING TOOLS  
FOR THE AEROSPACE INDUSTRY**

Solid carbide drills specially developed for the aerospace industry bear the product name KLENK. The highly specialized products are specifically designed for machining lightweight materials.

**CERATIZIT UK & IRELAND LTD**  
Europa Link \ UK-Sheffield S9 1XU  
Tel.: +44 114 242 8 820  
info.uk@ceratizit.com \ www.ceratizit.com

