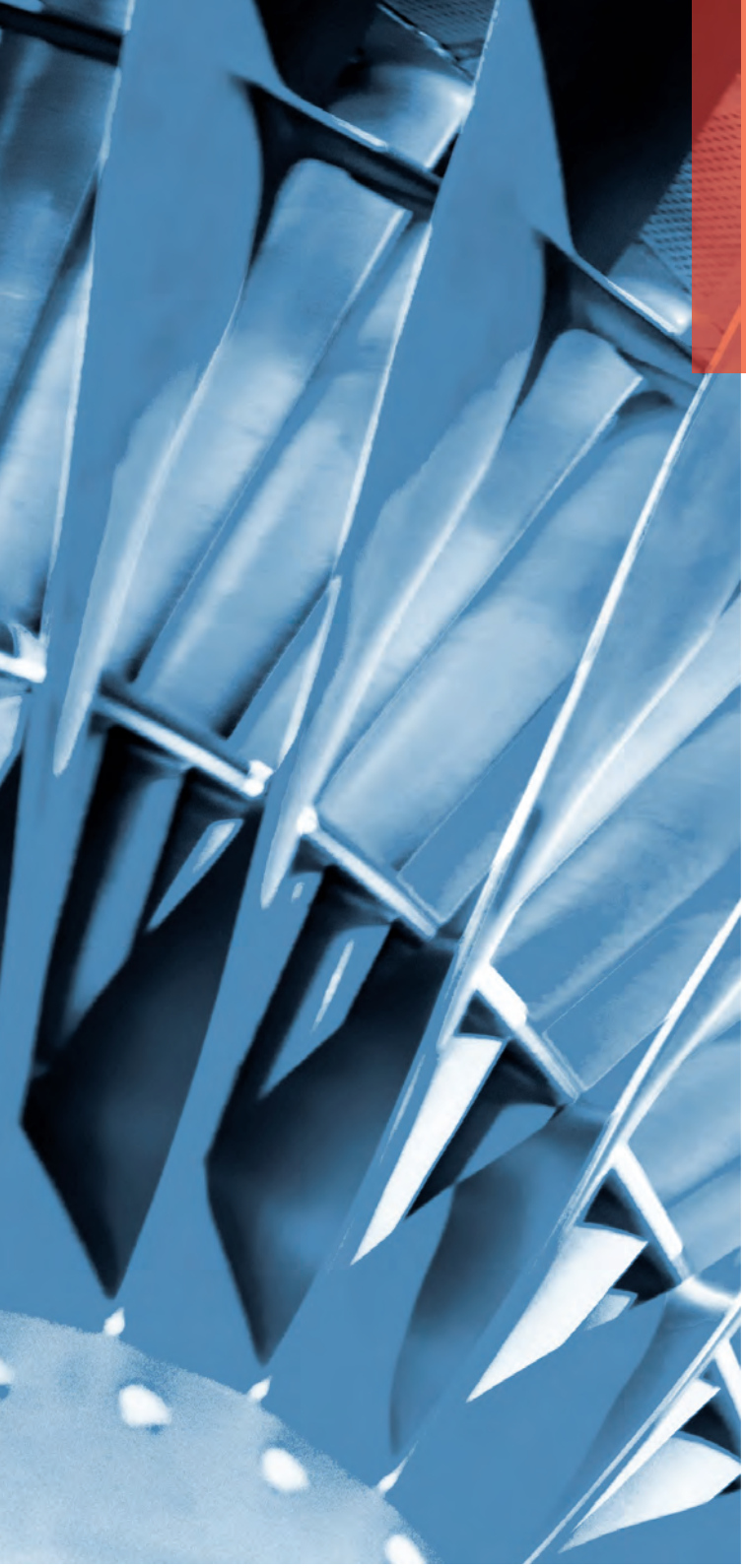
ZCC Cutting Tools
Europe GmbH

Aerospace

Tooling solutions from ZCC Cutting Tools

– EN –



Content

Tooling solutions for engine components

Typical components:

Combustion casing
Blisk
Turbine disc
Compression rotor

Typical materials:

Ti6Al4V
Stainless steel
Inconel 718
Waspaloy

Challenges:

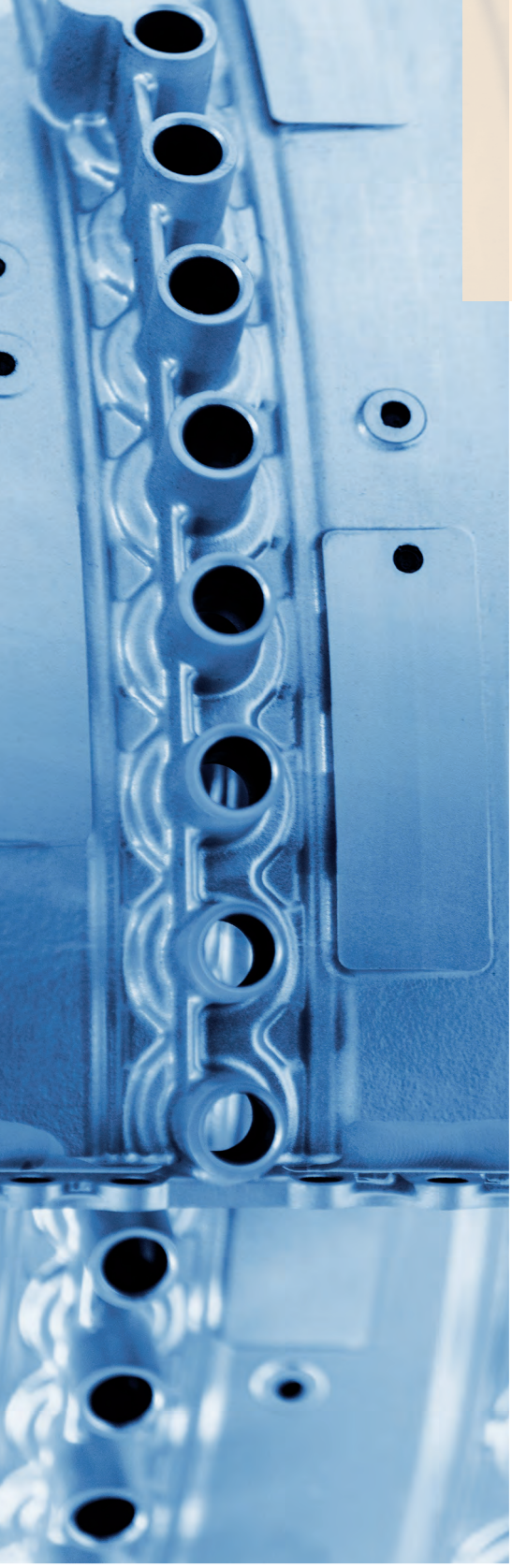
Process reliability
High chip removal rates
Short chips
Coolant flow
Low cutting forces

Tooling solutions for engine components

Typical application
– Engine components (HRSA)

Typical application
– Engine components (Stainless Steel)

Typical application
– Engine components (Titanium)



HRSA combustion casing

Typical application – Engine components (HRSA)

Tooling

General turning with precision cooling
YBS series PVD High performance grade for Nickel-based alloys
YBG series Sharp cutting edge for high temperatures
zRay High pressure tool holder system

General turning with ceramic
CS1000 SiAlON-ceramic grade for Nickel-based alloys
CW1800 Fibre-reinforced ceramics for Nickel-based alloys

General turning with CBN
YCB112 and YCB131 CBN Grade for Nickel-based alloys

Indexable square shoulder milling
EMP01/02 90° Square shoulder milling
EMP09 90° Square shoulder milling

Indexable face milling
FMR02 Profile milling
XMR01 High-feed milling
QCH Indexable heads

Indexable ceramic milling
FMR06 Face milling

Solid carbide milling
TM series First choice for demanding materials

Solid carbide drilling
SU series Universal solid carbide drill
SL series Deep hole drilling in almost any material

Typical application – Engine components (HRSA)

YBS series PVD High performance grade for Nickel-based alloys

A special feature for all grades is the improved thermal property that prevents sudden edge breakage. The result is process-reliable manufacturing. The balance between wear resistance and fracture toughness ensures flexibility in the application.

Brise-copeaux: **-NF, -NGF, -NM, SNR**

Application example

Machining type	Roughing
Material	Inconel 718
Insert	CNMG120412-SNR YBS103
Cutting speed	50 m/min
Feed rate	0,30 mm/rev
Depth of cut	2,50 mm

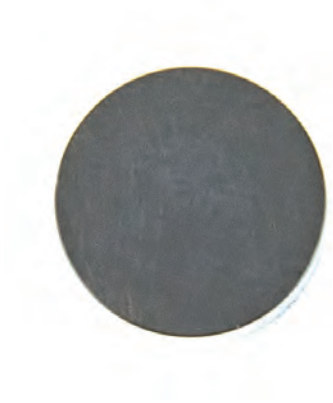
YBG series Sharp cutting edge for high temperatures

The YBG series is extremely heat resistant, which makes higher cutting speeds feasible. The thin PVD coating keeps the cutting edge sharp so that it is ideal for soft cuts. The micrograin carbide substrate has an even balance between hardness & toughness which consequently provides manageable wear in the extensive scope of application.

Chip breaker: **-NF, -NGF, -NM, SNR**

Application example

Machining type	Finishing to medium machining
Material	Inconel 718
Insert	DNEG150608-NGF YBG105
Cutting speed	60 m/min
Feed rate	0,20 mm/rev
Depth of cut	1,00 mm



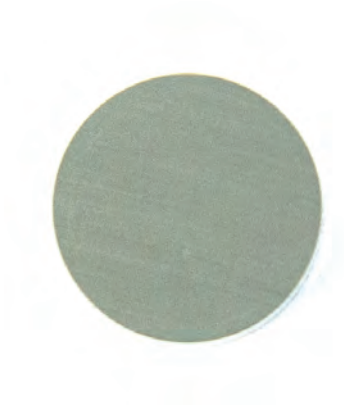
CS1000 SiAlON-ceramic grade for Nickel-based alloys

SiAlON ceramic grade for high process reliability at high removal rates.

Application example

Machining type	Roughing
Material	Inconel 718
Insert	RNGN120700 S01520 CS1000
Cutting speed	320 m/min
Feed rate	0,25 mm/rev
Depth of cut	2,50 mm

Typical application – Engine components (HRSA)



CW1800 Fibre-reinforced ceramics for Nickel-based alloys

Uncoated whisker ceramic grade for the finishing to roughing of Ni-based alloys such as Inconel or Hastelloy. Good thermal stability wear and notch wear resistance.

Application example

Machining type	Roughing
Material	Inconel 718
Insert	RNGN120400 T00520 CW1800
Cutting speed	300 m/min
Feed rate	0,20 mm/rev
Depth of cut	1,00 mm

YCB112 and YCB131 CBN Grade for Nickel-based alloys

CBN grade with a special binder phase for very good wear resistance and thermal stability. Especially suitable for final contour and super-fine finishing.

Application example

Machining type	Finishing
Material	Inconel 718
Insert	VCGW160408 E-2 YCB112
Cutting speed	250 m/min
Feed rate	0,15 mm/rev
Depth of cut	0,50 mm

Recommendation for a tool holder system: use our ceramic and CBN grades with zRay for reliable production with safe chip control.

Typical application – Engine components (HRSA)

FMR02 Profile milling

Free-form milling with round insert for universal applications.

RCKT**-NM Round insert with reinforced & fluted rib geometry.

Application example

Machining type	Face milling; Roughing
Material	Inconel 718
Insert	RCKT1204MO-NM YBS203
Cutting speed	50 m/min
Feed rate per tooth	0,20 mm
Depth of cut	2,50 mm

FMR06 Face milling

Face milling with ceramic inserts for high-speed machining of Ni-based alloys.

Ceramic round insert CS1000 or CW1800.

Application example

Machining type	Face milling; Highspeed
Material	Inconel 718
Insert	RNGN120700 T00520 CW1800
Cutting speed	730-950 m/min
Feed rate per tooth	0,08 mm
Depth of cut	1,50 mm

XMR01 High-feed milling

High-feed milling system with smooth cutting action with high metal removal rates.

SDMT**-NM Four-edged insert with fluting and reinforcing rib geometry.

Application example

Machining type	Face milling; Roughing
Material	Inconel 718
Insert	SDMT120412-NM YBS303
Cutting speed	55 m/min
Feed rate per tooth	0,50 mm
Depth of cut	0,50 mm

S

Typical application – Engine components (HRSA)

TM series First choice for demanding materials

Optimum solution for machining super alloys and titanium. Low cutting forces with extended service life when machining demanding materials. High metal removal rates with up to 9 cutting edges.

Application example	
Machining type	Edging
Material	Inconel 718
Solid carbide milling	TM-7R-D12.0-R0.5 KMS405
Cutting speed	35 m/min
Feed rate per tooth	0,10 mm
Width of cut	0,60 mm
Depth of cut	20 mm

SU series Universal solid carbide drill

Universal solid carbide drills for almost any material. Curved geometry ensures smooth & precise cutting action.

Application example	
Machining type	Drilling
Material	Inconel 625
Solid carbide drills	1534SU03C-0500 KDG303
Cutting speed	45 m/min
Feed rate	0,04 mm/rev
Drilling depth	15 mm

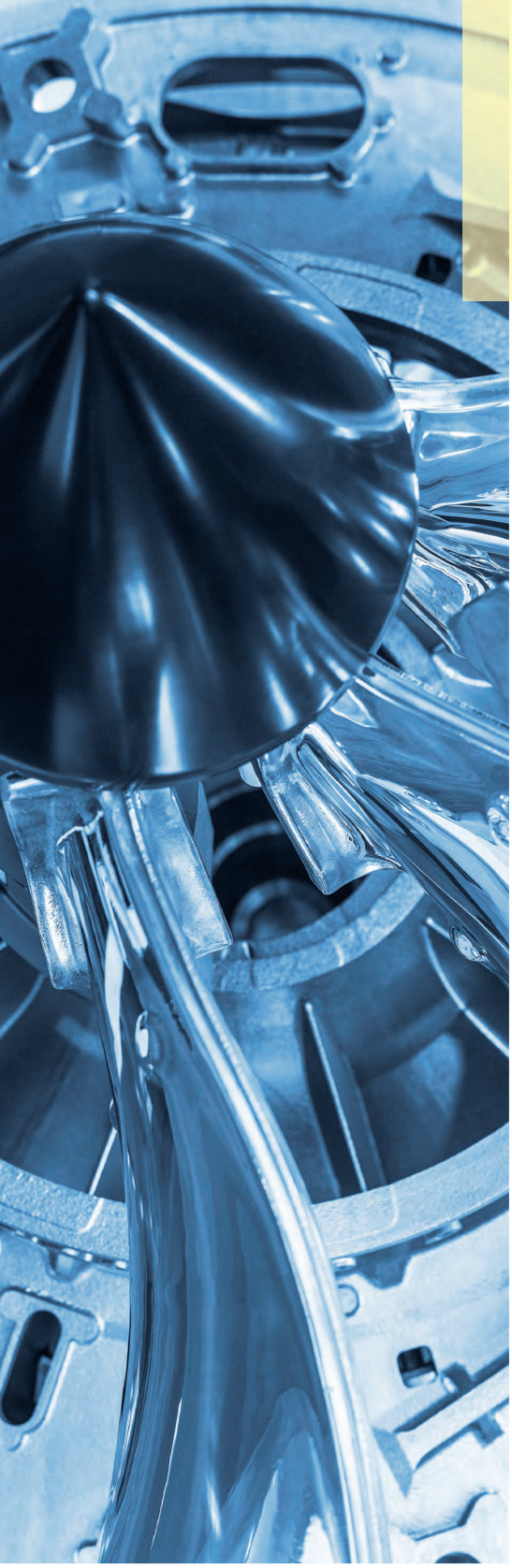
SL series Deep hole drilling in almost any material

Universal solid carbide deep hole drills for almost any material. Extra long quadruple stabilizing chamfers allow for optimum process reliability.

Application example	
Machining type	Deep hole drilling
Material	Inconel 625
Solid carbide drills	1588SL10C-0320 KDG303
Cutting speed	20 m/min
Feed rate	0,04 mm/rev
Drilling depth	26 mm

Typical application – Engine components (HRSA)

Note



Stainless steel shaft

Typical application – Engine components (Stainless Steel)

Tooling

General turning with high precision
MiniTurn for high precision internal machining

General turning
YB9320 PVD universal grade for maximum economy
YBG series Sharp cutting edge for high temperatures

Grooving
MM Geometry Reliable grooving operations with optimum chip control

Indexable square shoulder milling
EMP01/02 90° Square shoulder milling

Indexable face milling
FMR02 Profile milling
XMR01 High-feed milling
QCH Indexable heads

Solid carbide milling
VSM series Sharp cutting edges for tough materials

Solid carbide drilling
UD series Efficient drilling for stainless materials

Typical application – Engine components (Stainless Steel)

MiniTurn for high precision internal machining

Sharp cutting edge design ensures higher cutting capabilities with lower cutting forces, this allows us to achieve the highest precision components.

Application example

Machining type	Finishing
Material	1.4571
Using	T1.7.68.31.020R YPG201
Cutting speed	120 m/min
Feed rate	0,03 mm/rev
Depth of cut	0,02 mm

YB9320 PVD universal grade for maximum economy

The New coating YB9320 is extremely heat resistant, which makes higher cutting speeds feasible. The thin PVD coating keeps the cutting edge sharp so that it is ideal for soft cutting. The new micrograin carbide substrate has an even balance between hardness & toughness which consequently provides manageable wear in the extensive scope of application.

Chip breaker: **-AHF, -ADF, -EG, -MM**

Application example

Machining type	Finishing
Material	1.4571
Insert	DNMG150604-ADF YB9320
Cutting speed	180 m/min
Feed rate	0,20 mm/rev
Depth of cut	1,00 mm

MM Geometry Reliable grooving operations with optimised chip control

Recommendation for a tool holder system: use the DGSC parting & grooving tool holder for reliable production with safe chip control.

Application example

Machining type	Parting and Grooving
Material	1.4571
Insert	ZTFD0303-MM YB9320
Cutting speed	180 m/min
Feed rate	0,25 mm/rev
Depth of cut	-

M

Typical application – Engine components (Stainless Steel)

EMP01/02 90° Square shoulder milling

Universal square shoulder milling system with specially developed geometry for heat-resistant materials.

APKT**-NM New chip breaker design reduces heat absorption and provides greater protection against crater wear.

Application example

Machining type	Profiling; Finishing
Material	1.4571
Insert	APKT11T308-NM YBS303
Cutting speed	180 m/min
Feed rate per tooth	0,20 mm
Depth of cut	1,00 mm

FMR02 Profile milling

Free-form milling with round insert for universal applications.

RCKT**-NM Round insert with fluting and reinforcing rib geometry.

Application example

Machining type	Face milling; Roughing
Material	1.4571
Insert	RCKT1204MO-NM YBS303
Cutting speed	160 m/min
Feed rate per tooth	0,25 mm
Depth of cut	2,00 mm

QCH – Indexable heads

Screw-in system for jobs with large projection lengths.

SDMT**-NM Four-edged insert with fluting and reinforcing rib geometry.

Application example

Machining type	Face milling; interpolation milling
Material	1.4571
Insert	SDMT09T312-NM YBG212
Cutting speed	160 m/min
Feed rate per tooth	0,70 mm
Depth of cut	0,50 mm

Typical application – Engine components (Stainless Steel)

VSM series Sharp cutting edges for tough materials

For machining stainless steels. Positive cutting angle to prevent work hardening.

Application example

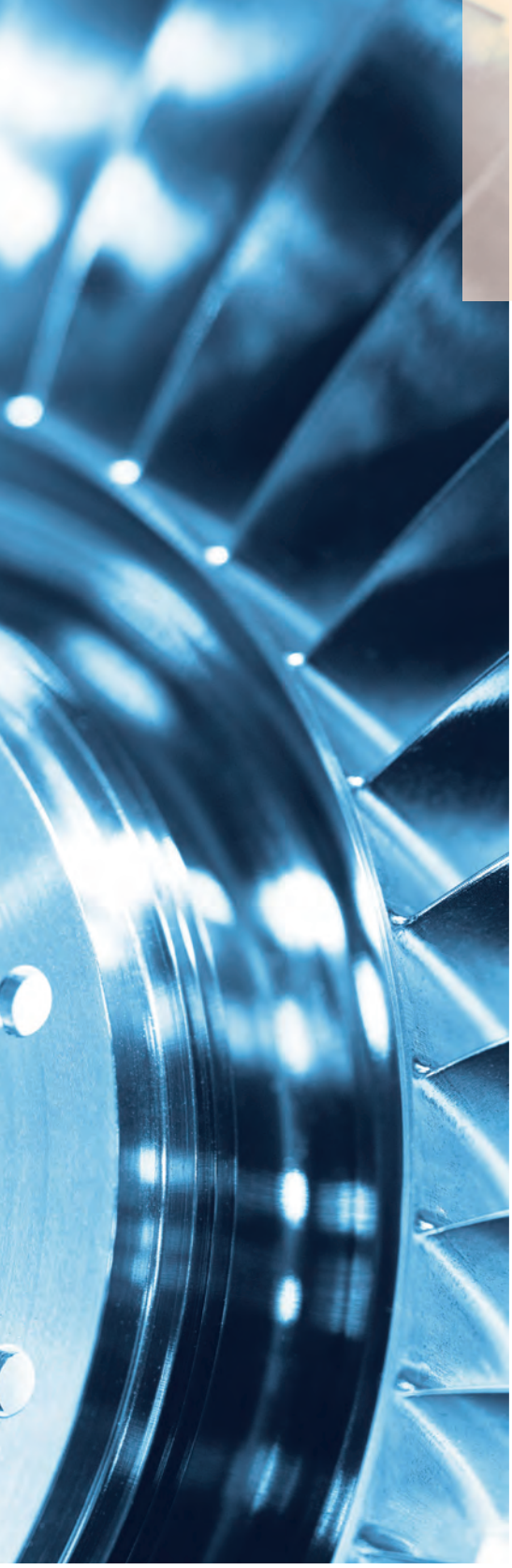
Machining type	Trochoidal machining
Material	1.4301
Solid carbide milling	VSM-4E-D10.0 KMG405
Cutting speed	160 m/min
Feed rate per tooth	0,08 mm
Width of cut	0,80 mm
Depth of cut	22 mm

UD series Efficient drilling for stainless materials

Solid carbide drills for machining stainless materials. Aggressive cutting geometry for the best possible chip breaking in tough materials.

Application example

Machining type	Drilling
Material	1.4571
Solid carbide drills	1536UD05C-0600 KDG305
Cutting speed	80 m/min
Feed rate	0,12 mm/rev
Depth of cut	24 mm



Blisk made of **Titanium**

Typical application – Engine components (Titanium)

Tooling

General turning with high precision
YPD201 PVD High performance grade for titanium alloys
zRay High pressure tool holder system

General turning with CBN
YCB112 CBN Grade for Nickel-based alloys

Indexable square shoulder milling
EMP01/02 90° Square shoulder milling

Indexable face milling
FMR02 Profile milling
XMR01 High-feed milling

Indexable face milling
TM series First choice for demanding materials

Typical application – Engine components (Titanium)

YPD201 PVD High performance grade for titanium alloys

This grade is versatile for all applications. Process reliability due to excellent temperature resistance and fracture toughness.

Chip breaker: **-SNR**

Application example

Machining type	Roughing
Material	Ti6Al4V
Insert	CNMG120408-SNR YPD201
Cutting speed	50 m/min
Feed rate	0,25 mm/rev
Depth of cut	2,00 mm

YCB112 CBN Grade for Nickel-based alloys

Low per cent CBN grade with a special binder phase for very good wear resistance and thermal stability. Suitable for use in smooth cutting of hardened steels as well as super alloys such as Inconel.

Application example

Machining type	Finishing
Material	Ti6Al4V
Insert	CNGA120408 T00510-2 YCB112
Cutting speed	200 m/min
Feed rate	0,15 mm/rev
Depth of cut	0,50 mm

EMP01/02 90° Square shoulder milling

Universal square shoulder milling system with specially developed geometry for titanium alloys.

APKT**-APF Light-cutting insert for finishing.

Application example

Machining type	Profiling; Finishing
Material	Ti6Al4V
Insert	APKT160408-APF YB9320
Cutting speed	80 m/min
Feed rate per tooth	0,13 mm
Depth of cut	3,00 mm

S

Typical application – Engine components (Titanium)

FMR02 Profile milling

Free-form milling with round insert for universal applications.

RCKT**-NM Round insert with fluting and reinforcing rib geometry.

Application example

Machining type	Face milling; Roughing
Material	Ti6Al4V
Insert	RCKT1204MO-NM YBS203
Cutting speed	50 m/min
Feed rate per tooth	0,20 mm
Depth of cut	2,50 mm

XMR01 High-feed milling

High-feed milling for very smooth running at high chip removal rates.

SDMT**-NM Four-edged insert with fluting and reinforcing rib geometry.

Application example

Machining type	Face milling; Interpolar milling
Material	Ti6Al4V
Insert	SDMT09T312-NM YBS303
Cutting speed	50 m/min
Feed rate per tooth	0,45 mm
Depth of cut	1,00 mm

TM series First choice for demanding materials

Optimum solution for processing super alloys and titanium. Low cutting forces and long service life even with demanding materials. High chip removal rates with up to 9 cutting edges.

Application example

Machining type	Profiling; Roughing
Material	Ti6Al4V
Solid carbide milling	TM-7R-D16.0-R3.0 KMS405
Cutting speed	80 m/min
Feed rate per tooth	0,25 mm
Width of cut	2,00 mm
Depth of cut	20 mm

Tooling solutions for chassis components

Typical components:

Main landing gear
Nose landing gear
Drag struts

Typical materials:

300M
Ti-5553

Challenges:

High chip removal rate
Large tool lengths
Low cutting forces

Tooling solutions for chassis components

Typical application
– Chassis components (High Alloyed Steel)

Main landing gear made of **high-alloy steel**

Typical application – Chassis components (High Alloyed Steel)

Tooling

Indexable face milling
FMA11 45° Face milling
FMR04 Profile milling
EMP09 90° Square shoulder milling

Solid carbide milling
UM series High speed without vibrations
QCH PM series Indexable solid carbide heads

Indexable drilling
ZSD series For optimal surfaces

Solid carbide drilling
SU series Universal Solid carbide drilling
SL series Deep hole drilling in almost any material

Typical application – Chassis components (High Alloyed Steel)

FMA11 45° Face milling

Eight-edged insert with a wide selection of geometries and grades.

SNEG**-HGR Eight-edged insert with fluting and increased edge stability.

Application example

Machining type	Face milling; Roughing
Material	1.7225
Insert	SNEG1506ANR-HGR YBD252
Cutting speed	280 m/min
Feed rate per tooth	0,25 mm
Depth of cut	4,00 mm

FMR04 Profile milling

Profile milling for mould-making.

RDKW**-MO3 Round insert with 22° protective chamfering for roughing.

Application example

Machining type	Face milling; Roughing
Material	1.7225
Insert	RDKW1604MO-3 YBD252
Cutting speed	240 m/min
Feed rate per tooth	0,25 mm
Depth of cut	2,50 mm

EMP09 90° Square shoulder milling

Square shoulder milling system with tangential inserts for high productivity, exact 90° edges and optimum surfaces.

LNKT**-GM Four-edged tangential insert with soft-cutting geometry for increased feed rates.

Application example

Machining type	Finishing; Profiling
Material	1.7225
Insert	LNKT120608PNR-GM YBD252
Cutting speed	285 m/min
Feed rate per tooth	0,37 mm
Depth of cut	5,10 mm
Width of cut	6,00 mm

P

Typical application – Chassis components (High Alloyed Steel)

UM series High speed without vibrations

Optimised tool for HSC machining of steel material of all kinds. Patented 2-stage chip space design for the perfect balance between stability and chip removal. Variable pitch and helix angle for minimisation of vibrations.

Application example	
Machining type	Edging
Material	300M
Solid carbide drills	UM-4E-D12.0 KMG405
Cutting speed	160 m/min
Feed rate per tooth	0,08 mm
Width of cut	1,00 mm
Depth of cut	20 mm

QCH PM series Indexable solid carbide heads

Universal exchangeable head system with carbide shanks and patented interface. Virtually vibration-free and precise, even with large projections.

Application example	
Machining type	Roughing
Material	300M
Solid carbide milling	Q12-PM-4R-D20.0R1.0 KMG405
Cutting speed	150 m/min
Feed rate per tooth	0,15 mm
Width of cut	1,00 mm
Depth of cut	10 mm

ZSD series For optimal surfaces

Specially designed carrier tools with high rigidity.

SPMX-XM:** Wavy chip breaker ensures optimum chip breaking and removal of short chips.

Application example	
Machining type	Drilling
Material	300M
Insert	SPMX140512-XM YB9320
Cutting speed	160 m/min
Feed rate	0,10 mm/rev
Depth of cut	35 mm

Typical application – Chassis components (High Alloyed Steel)

SU series Universal Solid carbide drilling

Universal solid carbide drills for almost any material. Sickle geometry ensures smooth running & precision even for high cutting data.

Application example

Machining type	Drilling
Material	300M
Solid carbide drills	1534SU03C-0680 KDG303
Cutting speed	120 m/min
Feed rate	0,06 mm/rev
Drilling depth	15 mm

SL series Deep hole drilling in almost any material

Universal solid carbide deep hole drills for almost any material. Quadruple extra-long supporting chamfers for optimum process stability.

Application example

Machining type	Deep hole drilling
Material	300M
Solid carbide drills	1588SL30C-0600 KMG303
Cutting speed	55 m/min
Feed rate	0,08 mm/rev
Drilling depth	152 mm

P

Typical application – Chassis components (High Alloyed Steel)

Note

Tooling solutions for structural components

Typical components:

Wings
Reinforcement ribs

Typical materials:

A7075
Ti-6Al-4V
CFRP

Challenges:

Process reliability
High chip removal rate
Absence of burrs
Low cutting forces

Tooling solutions for structural components

Typical applications
– Structural components (Aluminium)

Aluminium reinforcement ribs

Typical application – Structural components (Aluminium)

Tooling

Indexable face milling
FMR04 Profile milling

Indexable square shoulder milling
EMP13 90° Square shoulder milling
EMPX 90° Square shoulder milling

Solid carbide milling
ALP series High-performance machining of aluminum
AL series Aluminium universal

Solid carbide drilling
SU series Universal solid carbide drilling

Typical application – Structural components (Aluminium)

FMR04 Profile milling

Profile milling for mould-making.

RDHT**MO-LH Round insert with peripheral ground and highly polished aluminium geometry.

Application example

Machining type	Face milling; Roughing
Material	AW7075
Insert	RDHT1604MO-LH YD101
Cutting speed	830 m/min
Feed rate per tooth	0,42 mm
Depth of cut	2,50 mm

EMP13 90° Square shoulder milling

Universal square shoulder milling system with ground highly polished inserts for superior chip control. Produces exact 90° edges with optimum surface finish.

ANGX**PNR-LH Four-edged peripheral ground and highly polished aluminium geometry.

Application example

Machining type	Finishing; Profiling
Material	AW7075
Insert	ANGX150608PNR-LH YD101
Cutting speed	2776 m/min
Feed rate per tooth	0,13 mm
Depth of cut	3,00 mm

EMPX 90° Square shoulder milling

Square shoulder milling system with ground inserts for roughing.

VCGX2205**-LC Highly positive submersible insert with peripheral ground and highly polished aluminium geometry.

Application example

Machining type	Roughing, Profiling
Material	AW7075
Insert	VCGX220530-LC YD101
Cutting speed	2830 m/min
Feed rate per tooth	0,35 mm
Depth of cut	10 mm

N

Typical application – Structural components (Aluminium)

ALP series High-performance machining of aluminum

For highly efficient roughing of aluminium. Optional with DLC coating for reduced friction and longer service life.

Application example	
Machining type	Full-slot
Material	EN AW-7075
Solid carbide milling	ALP-3E-D8.0 KMD401
Cutting speed	452 m/min
Feed rate per tooth	0,148 mm
Width of cut	8 mm
Depth of cut	10 mm

AL series Aluminium universal

Broad range of uncoated tools for aluminium machining. Single-edged tools optimal for manufacturing profile cutouts. Toric tools with corner radii typical for the aviation industry.

Application example	
Machining type	Cut out milling
Material	EN AW-7075
Solid carbide drills	AL-1E-D6.0 KMD401 (598656)
Cutting speed	339 m/min
Feed rate per tooth	0,25 mm
Width of cut	6 mm
Depth of cut	8 mm

SU series Universal solid carbide drilling

Universal solid carbide drills for almost any material. Sickle geometry ensures smooth running & precision even for high cutting data.

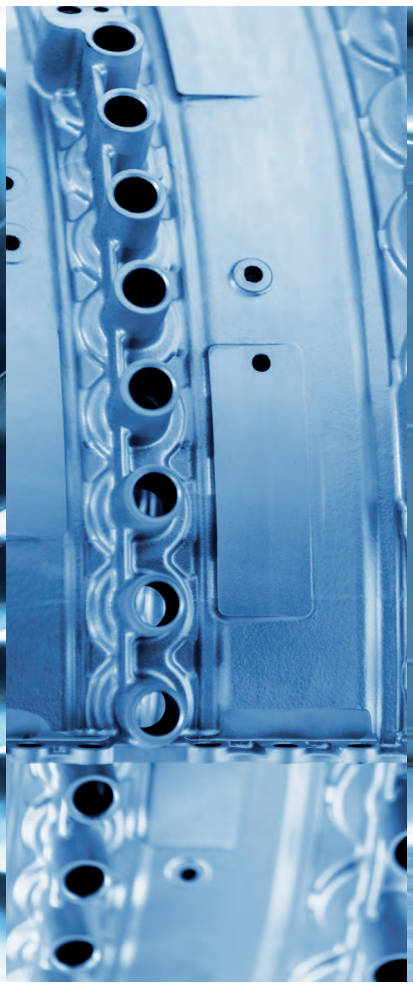
Application example	
Machining type	Drilling
Material	EN AW-7075
Solid carbide drills	1536SU05C-1000 KDG303
Cutting speed	300 m/min
Feed rate	0,2 mm/rev
Drilling depth	35 mm

Typical application – Structural components (Aluminium)

Note

Aerospace

Tooling solutions from ZCC Cutting Tools

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