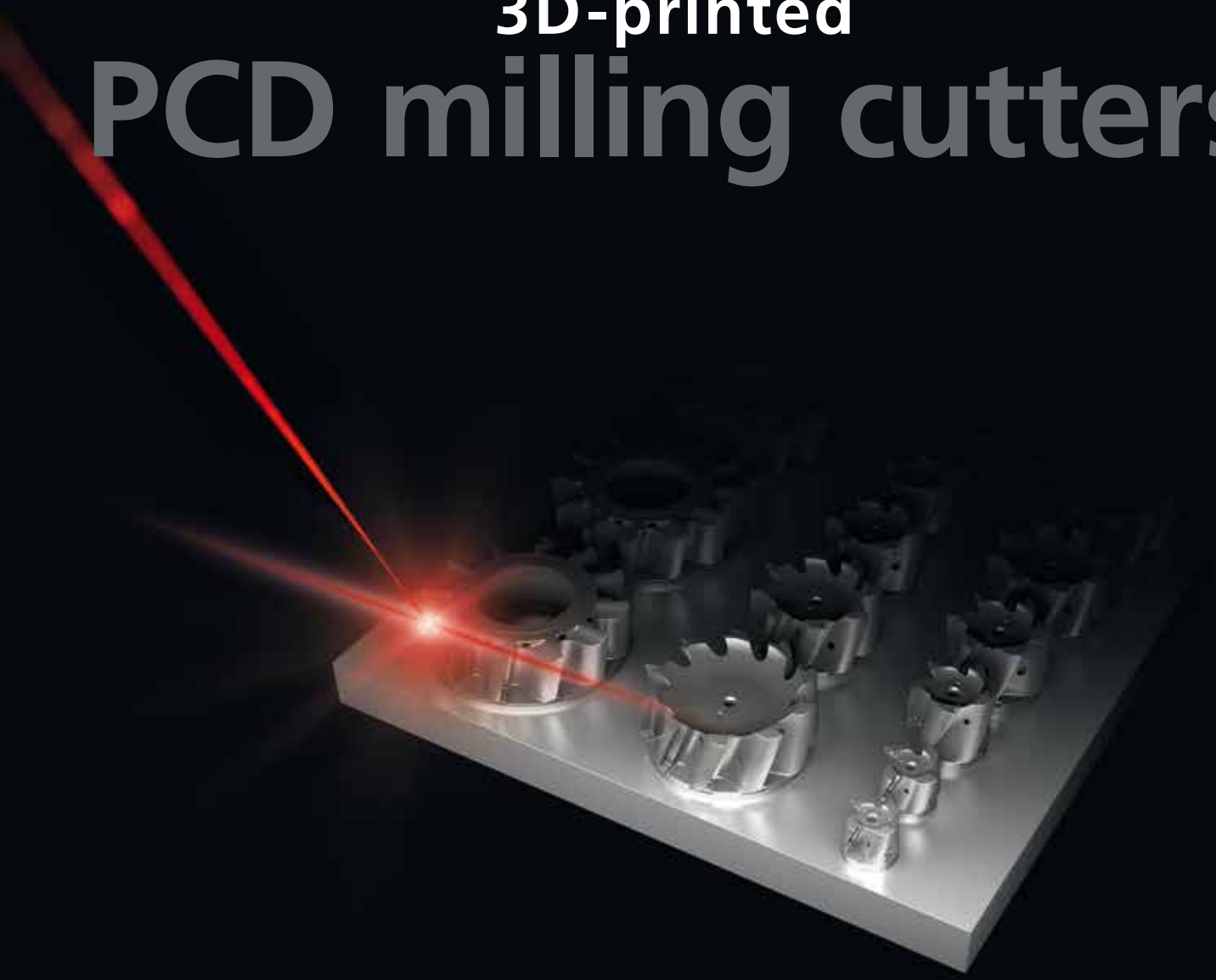
KOMET GROUP

3D-printed PCD milling cutters



3D-printed tools – welcome to the machining revolution
Maximum number of cutting edges – up to 100% increase in productivity

TOOLS + IDEAS®

KOMET JEL®

3D-printed HPC PCD milling cutters

The use of 3D printing to manufacture tools produces geometries that would otherwise be impossible by conventional means. This new dimension to tool design has its unique advantages: More cutting edges and an HPC-optimised cutting edge geometry significantly increase tool productivity, achieving a reduction in process times of up to 50%. The optimised course of the coolant channels ensures that each cutting edge is precisely supplied with coolant by a separate channel.

When manufacturing 3D-printed tools using selective laser melting technology, the choice of laser processing strategy is crucial. The combination of technological expertise in 3D printing and decades of knowledge and experience in manufacturing high-precision tools is revolutionising the future of tool design.

Dr. Reinhard Durst, Head of research and development for solid carbide tools at KOMET GROUP, explains: "The ability to freely design the internal and external tool geometry alone means that excluding this additive process from our future plans would be inconceivable. This process increases tool performance and productivity to such a great extent that it creates considerable added value for our customers."

KOMET JEL® PCD-tipped HPC end milling and screw-in cutters

3D-printed cutting edge holder with PCD cutting edges. Available as a screw-in cutter for variable tool lengths or with a solid carbide shank for projection lengths of up to 4×D.

- Maximum number of cutting edges for an incredibly high metal removal rate
- Lower cutting forces and less burring than conventional milling cutters
- 2.5×D, 4×D
- Diameters of 10 | 12 | 16 | 20 | 25 | 32 mm available ex stock

KOMET JEL®

3D-printed HPC PCD milling cutters

The benefits of 3D-printed tools:

- Their unique design affords productivity increases of up to 100% compared to conventional tools
- Lower cutting forces and minimised burring
- Reduced component weight – material is only used where necessary for optimum component functionality
- Optimised cooling channel design for improved chip evacuation and more effective cooling
- Greater design freedom – 3D printing is not restricted by conventional manufacturing rules. Innovative tool solutions thanks to new design freedom

KOMET JEL® HPC face-milling cutter – application-specific versions

3D-printed HPC tools are available in the form of screw-in cutters, end milling cutters, arbour milling cutters and monobloc cutters. The following are tailored to your requirements:

- Connection and dimensions
- Number of cutting edges and cutting edge geometry
- Optimised coolant supply
- Reliable chip evacuation
- Cutting tool materials – tipped with PCD, PCBN or carbide

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3D-printed HPC PCD milling cutters

Face milling into flange using 20 mm dia. tool

The challenge:

Material:	3.2315 (AlSiMgMn)
Workpiece:	Connector
Tool:	Conventional 20 mm diameter tool with four teeth
Machining task:	Producing a 60 mm diameter collar with a flange facing, a_p = 3 mm, a_e = 20 mm
Objective:	Reduce machining time per unit

The solution:
20 mm dia. KOMET JEL® HPC PCD screw-in cutter with six teeth (37310001002000)

Cutting values:
v_c = 1068 m/min
= 17,000 rpm
f_t = 0.1 mm/tooth

Customer benefits:
The milling cutter runs very smoothly and quietly.
Machining time per unit is reduced from 1 min 45 s to 55 s.

Machining time per unit is reduced by 48%

Face milling into filter housing using 32 mm dia. tool

The challenge:

Material:	3.2371 (AlSi7Mg0.3)
Workpiece:	Filter housing
Tool:	Conventional 50 mm diameter tool with seven teeth v_c = 1600 m/min, f_t = 0.03 mm/tooth
Machining task:	Milling various webs, lands, surfaces, reliefs and shoulders a_p = 1-3 mm, a_e = 19-32 mm
Objective:	Reduce machining time per unit

The solution:
32 mm dia. KOMET JEL® HPC PCD screw-in cutter with 10 teeth (37310001003200), A = 129 mm

Cutting values:
v_c = 1206 m/min = 12,000 rpm (max. speed)
f_t = 0.04 mm/tooth

Customer benefits:
Machining time per unit is reduced from 1 min 23 s to 23 s.
100 min machining time saved per day.

Machining time per unit is reduced by 72%

Face milling into cylinder head using 40 mm dia. tool

The challenge:

Material:	3.2371 (G-AlSi7Mg)
Workpiece:	Cylinder head
Tool:	Conventional tool with six teeth for roughing, a_p = 2 mm
Machining task:	Milling the contact surface
Objective:	Increase productivity

The solution:
KOMET JEL®
40 mm dia. PCD arbour milling cutter with 12 teeth

Cutting values:
v_c = 1382 m/min
= 11,000 rpm
f_t = 0.1 mm/tooth = F 13,200 mm/min

Customer benefits:
This tool runs much more smoothly and quietly than conventional tools. No noticeable burr on the edge of the workpiece, unlike when conventional tools are used for machining.

Machining time per unit is reduced by 45%

Face milling into gearbox cover using 40 mm dia. tool

The challenge:

Material:	EN AC-48000 (Al Si12CuNiMg)
Workpiece:	Gearbox cover
Tool:	Conventional 40 mm diameter tool with seven teeth
Machining task:	Milling webs or lands, a_p = 1 mm, requisite max. surface roughness R_a = 1.6 µm
Objective:	Increase productivity

The solution:
KOMET JEL®
40 mm dia. PCD milling cutter with 12 teeth
HSK-A63, A = 200 mm

Cutting values:
v_c = 2000 m/min
= 15,924 rpm
f_t = 0.15 mm/tooth

Customer benefits:
This tool runs much more smoothly and quietly than conventional tools, surface roughness Ra = 1.15 µm
Tool life to date 107,000 parts, still in use.

Machining time per unit is reduced by 30%

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