SPK by CeramTec

For **HRSA & Hardened Materials**

CUTTING TOOLS

For HRSA and
Hardened Materials

High-Feed Milling with Ceramic End Mills

MACHINING MATTERS

High-feed milling with ceramic end mills

Hardened materials (≥ 45 HRC) and heat-resistant superalloys (HRSA) such as Inconel require a milling process that remains repeatable under high thermal load: stable running, defined tool change criteria and high output per machine hour.

This is exactly what the solid-ceramic end mills made of high-performance SiAlON are designed for. Developed for high-feed milling (HFM), these tools deliver high machining performance within the typical HFM process window.

Technical peak performance

SiAlON offers very high hot hardness and toughness. At high cutting temperatures, the cutting material remains stable under load and uses the heat within the process in a targeted manner. The resulting heat also acts in the shear zone, selectively softening the material and thus ensuring an efficient and process-reliable milling operation.

- **High cutting speeds:** SiAlON is designed for high-temperature machining and, in the appropriate process window, enables very high cutting speeds on nickel-based HRSA and hardened materials.
- **Typically high feeds at small axial depths of cut:** High-feed milling means small axial depths of cut (ap) with deliberately high feed per tooth. Tool geometry and cutting material are matched to guide cutting forces steadily and to avoid load peaks.
- **Dry machining:** In suitable applications, machining can be carried out dry or with air support – less ancillary effort around coolant, clean chips, clearly defined processes.

Economy that pays off

In the end, the result is what counts. Our SiAlON end mills offer outstanding economic efficiency:

- **High output:** The combination of high feed per tooth and cutting speed can increases your metal removal rate by up to 20 times. Bottleneck machines can thus be relieved.
- **Process reliability:** The very good wear resistance of SiAlON ensures calculable, repeatable tool life. Compared with carbide, you achieve up to 15 times longer tool life in HRSA roughing.
- **Minimized unit costs:** Fewer tool changes mean less machine downtime. Combined with the elimination of expensive coolant, your costs per component decrease.

Machining operations particularly suited to HFM

The following milling operations have proven particularly suitable for high-feed milling with SiAlON solid-ceramic end mills:

- Face milling – high area performance with stable engagement.
- Trimming / shoulder and side milling – clean contours, well-controllable cutting forces.
- Pocket milling – productive material removal with a defined toolpath strategy.
- Ramping and helical interpolation – process-reliable infeed when engagement is guided uniformly.
- Slot milling – possible and effective when chip evacuation and process stability are properly designed.

Practical tips:

- A rigid, low-vibration clamping of the workpiece.
- Use of shrink-fit or high-precision power chucks with minimized overhang.
- Programming of adaptive toolpaths for a constant chip thickness.

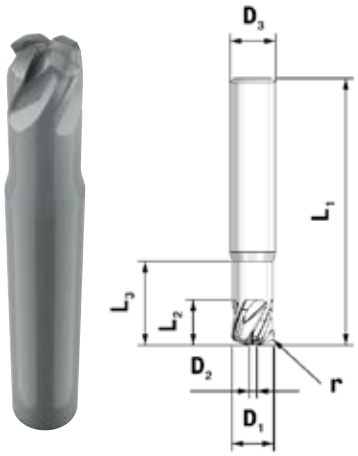
High-feed milling cutters for hardened materials and HRSA

Rough-finishing

6.3 3.2

For hardened materials:
v_c = up to 380 m/min
f_z = 0.10 – 0.18 mm

For HRSA materials:
v_c = up to 750 m/min
f_z = 0.08 – 0.20 mm



Type	SPK-Ref. No.	Dimensions (mm)								
		D_1 Ø	z	a_p	D_2 Ø	D_3 Ø	L1	L2	L3	r
CTH-0900Z04R-BA10 LSM800	771.15.090.06.0	9.00	4	1.0	2.00	10	65	8.0	18.00	1.0
CTH-1100Z04R-CB10 LSM800	771.15.110.06.0	11.00	4	1.0	2.00	12	70	10.0	22.00	1.0
CTH-1500Z05R-DC10 LSM800	771.15.150.06.0	15.00	5	1.5	2.00	16	83	12.0	30.00	1.0
CTH-1900Z05R-ED10 LSM800	771.15.190.06.0	19.00	5	1.5	3.00	20	93	15.0	38.00	1.0

SPK® Cutting Tools
by CeramTec GmbH
Hauptstraße 56
73061 Ebersbach / Fils, Germany

Phone: +49 7163 166-239
info@spk-tools.com
www.spk-tools.com

Website
www.spk-tools.com

YouTube Channel:
SPKCuttingTools

LinkedIn Channel:
SPK-by-ceramtec