



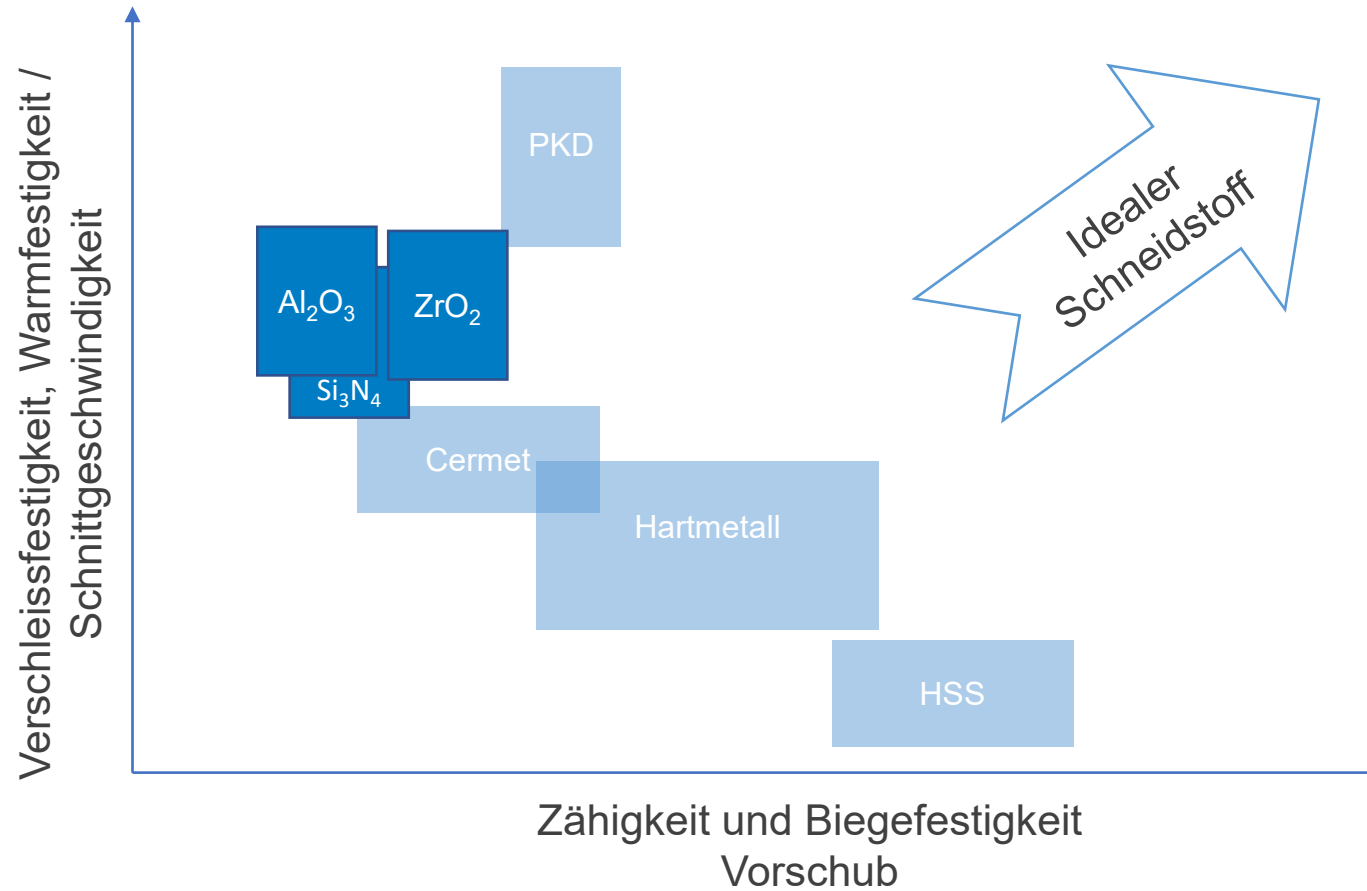
SWISSMEM

DIAMETAL

Die Vorteile von Keramik

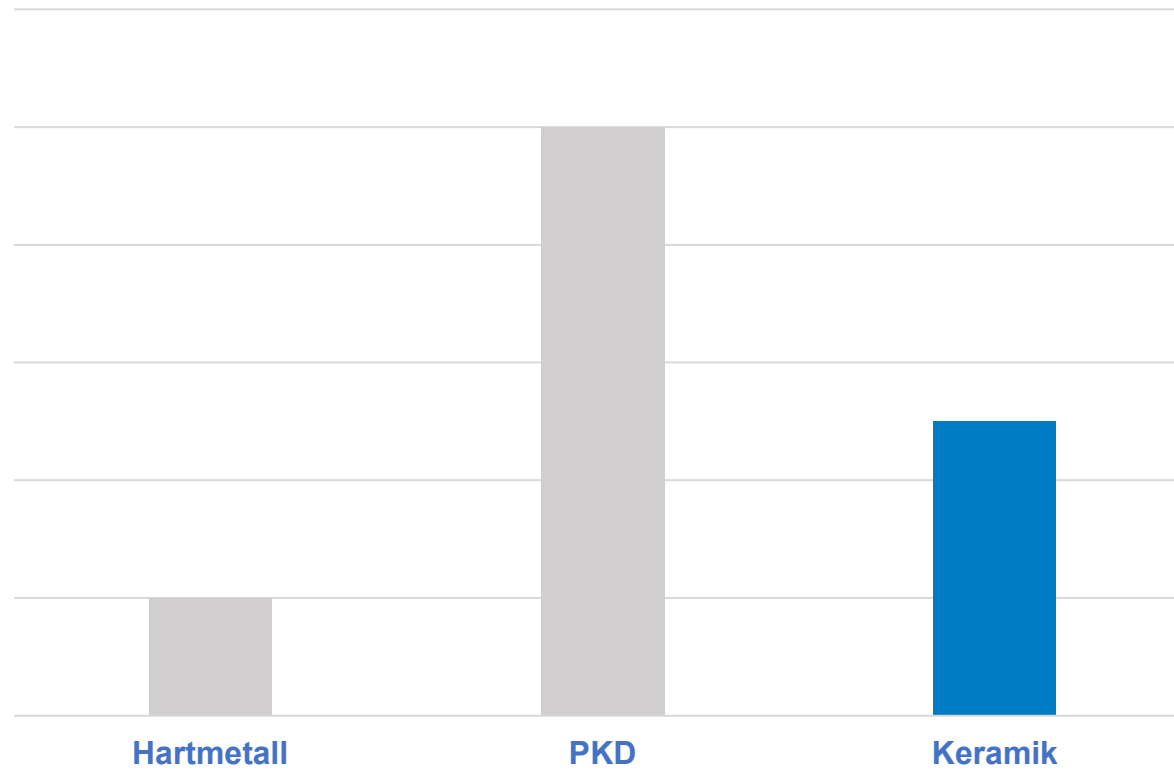


Einordnung der technischen Keramik unter den verschiedenen Materialien

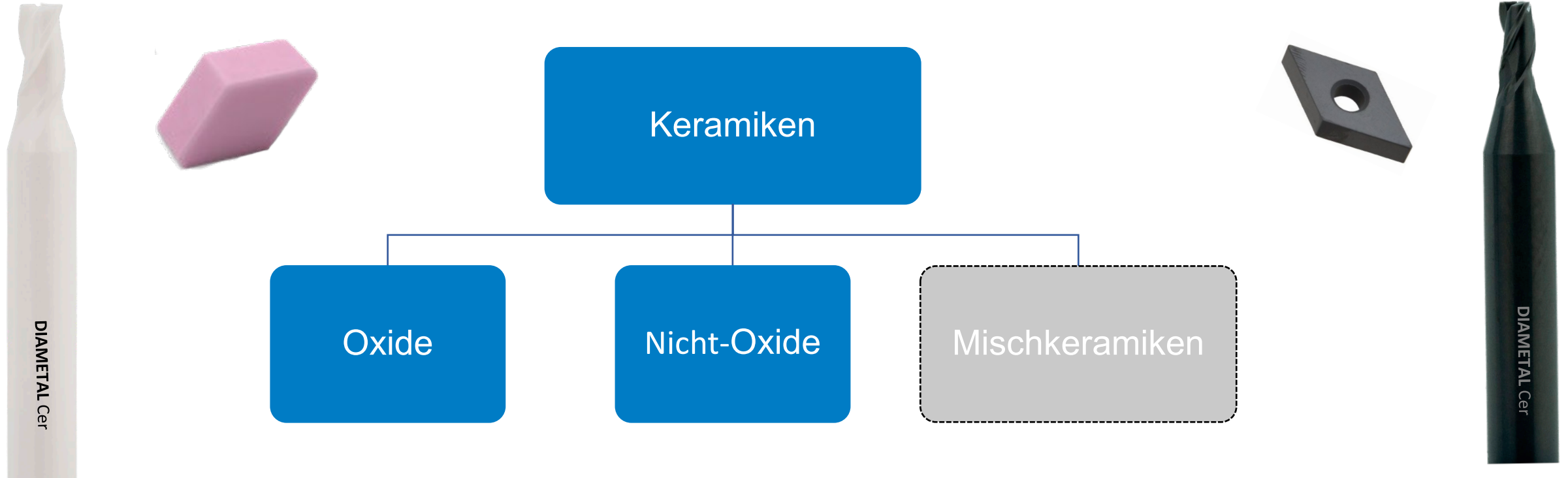


Einordnung der technischen Keramik unter den verschiedenen Materialien

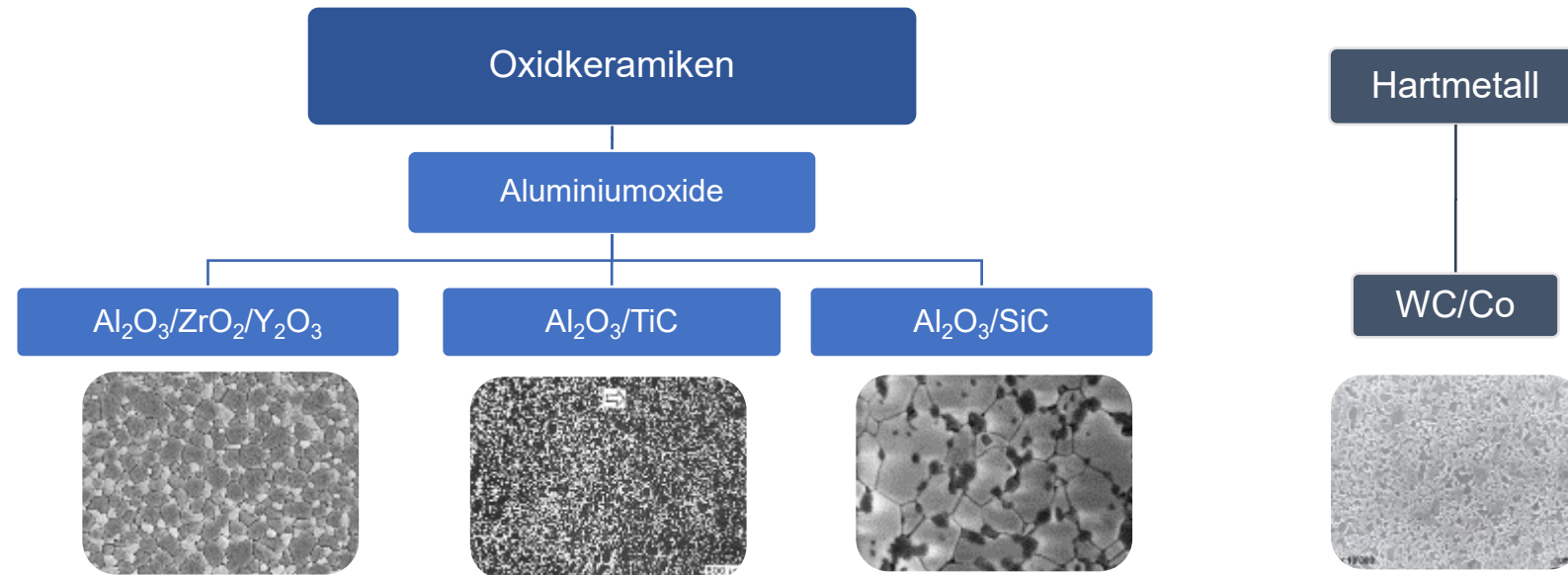
Preis für Werkzeuge je nach Material



Verschiedene Keramiken, die in der Welt der Werkzeuge verwendet werden - State of the art

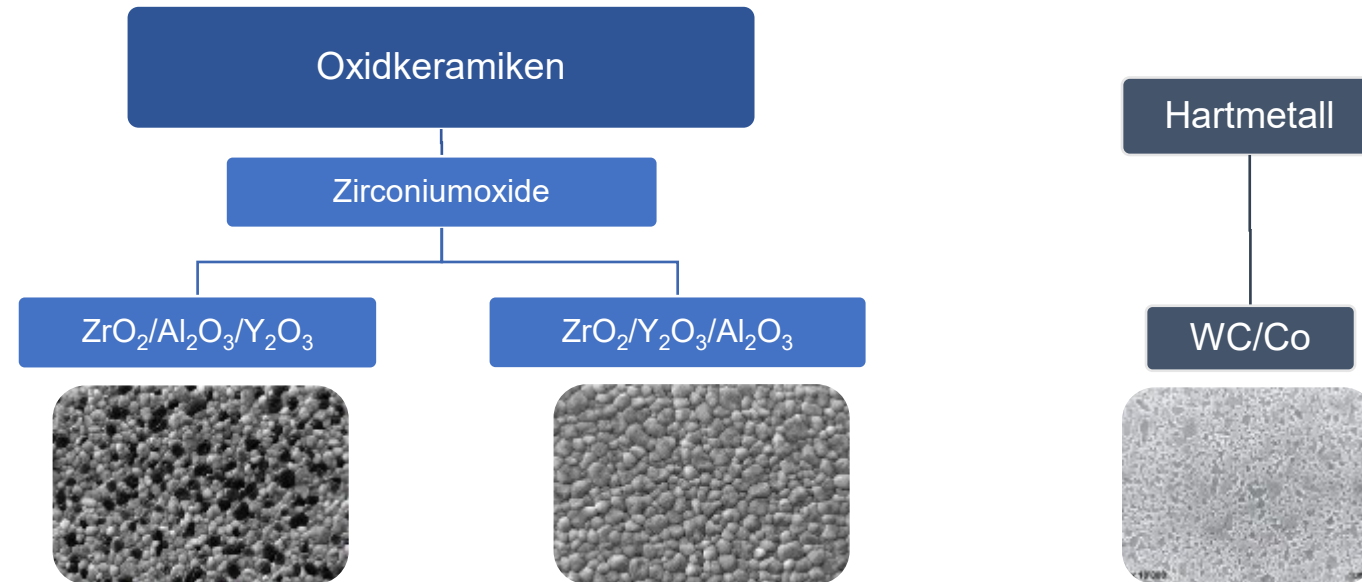


Verschiedene Keramiken, die in der Welt der Werkzeuge verwendet werden - State of the art



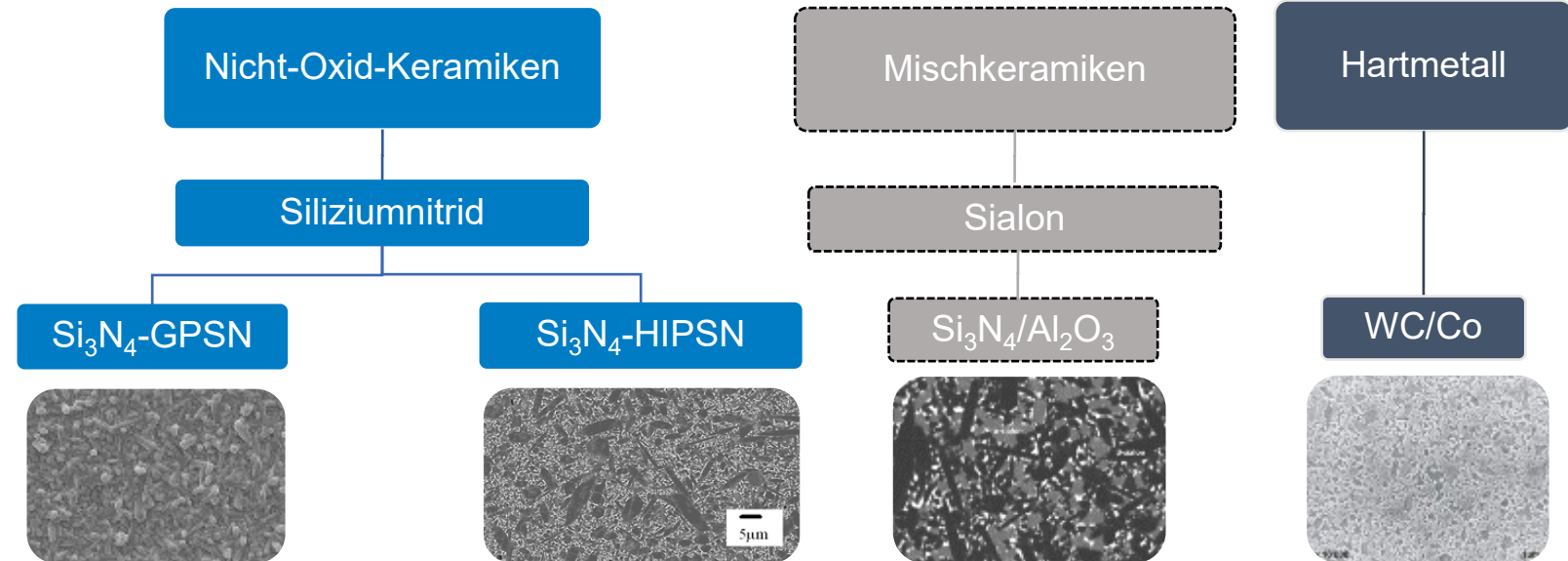
Härte [HV]	1700	2100	2000	1700
Wärmeleitfähigkeit [W·m ⁻¹ ·k ⁻¹]	5	21	35	80
Absorption von Vibrationen	😊	😞	😞	😊
Stabilität der Schneidkanten	😊	😞	😞	😊

Verschiedene Keramiken, die in der Welt der Werkzeuge verwendet werden - State of the art



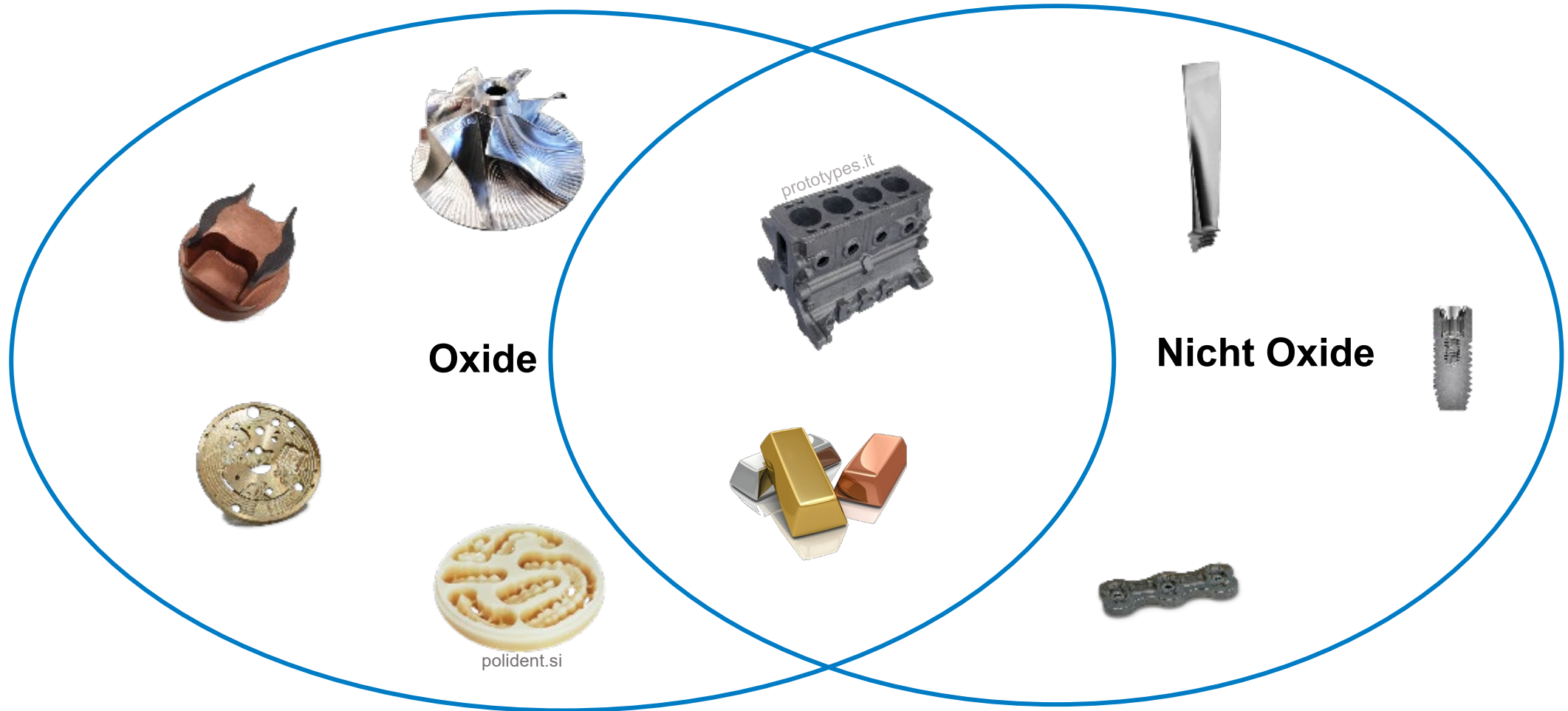
Härte [HV]	1400	1200	1700
Wärmeleitfähigkeit [W·m ⁻¹ ·k ⁻¹]	10	2,5	80
Absorption von Vibrationen	😊	😊	😊
Stabilität der Schneidkanten	😊	😞	😊

Unterschiedliche Keramiken, die in der Welt der Werkzeuge verwendet werden - State of the art

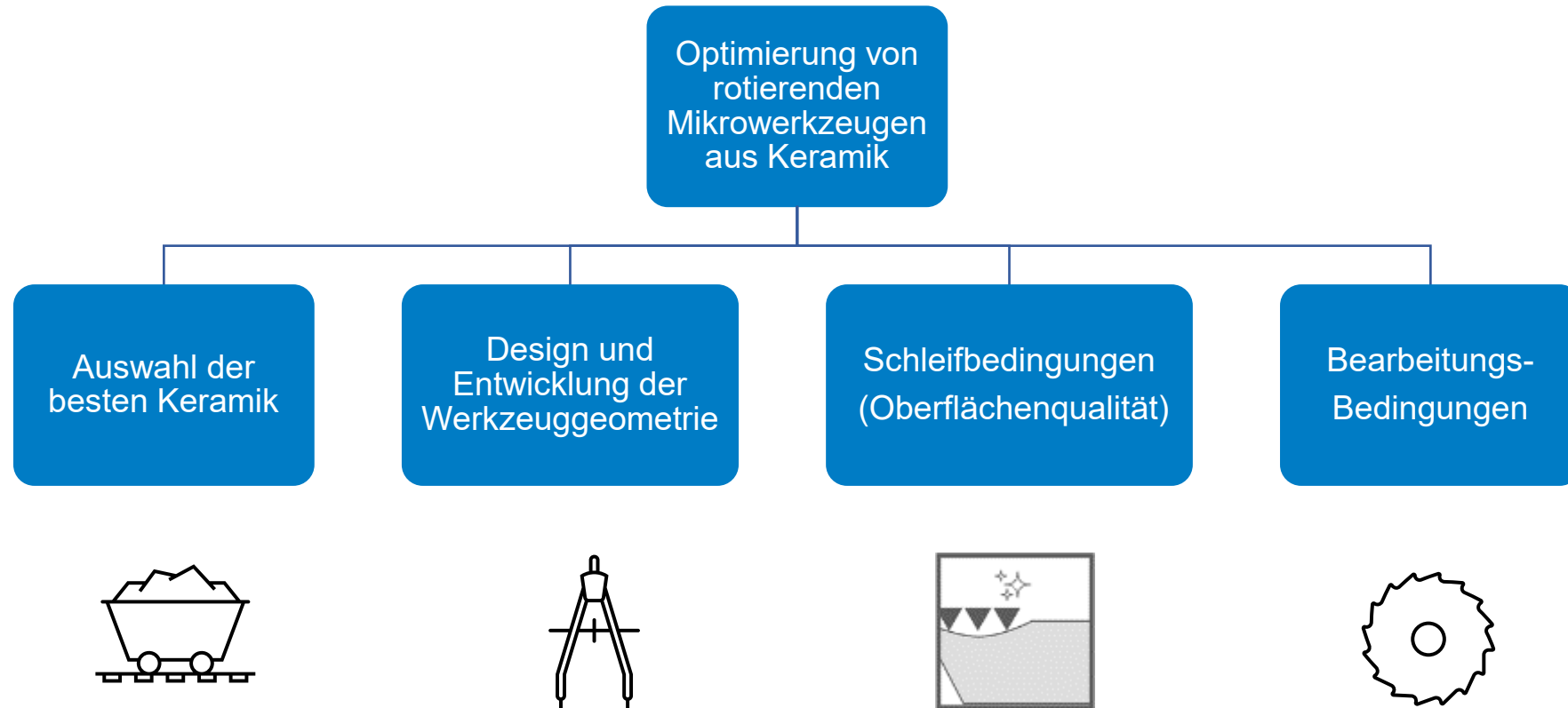


Härte [HV]	1500	1500	1870	1700
Wärmeleitfähigkeit [W-m-1-k-1]	24	21	19	80
Absorption von Vibrationen	☹️	☹️	☹️	😊
Stabilität der Schneidekanten	☹️	☹️	☹️	😊

Welche Keramik, um welches Material zu bearbeiten?



Schlüsselfaktoren für den Erfolg von Mikrowerkzeugen aus Keramik



Auswahl der besten Keramiken



A



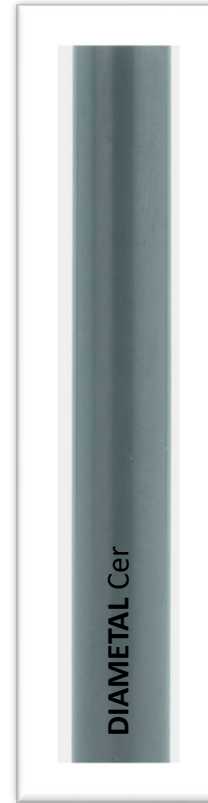
B



C



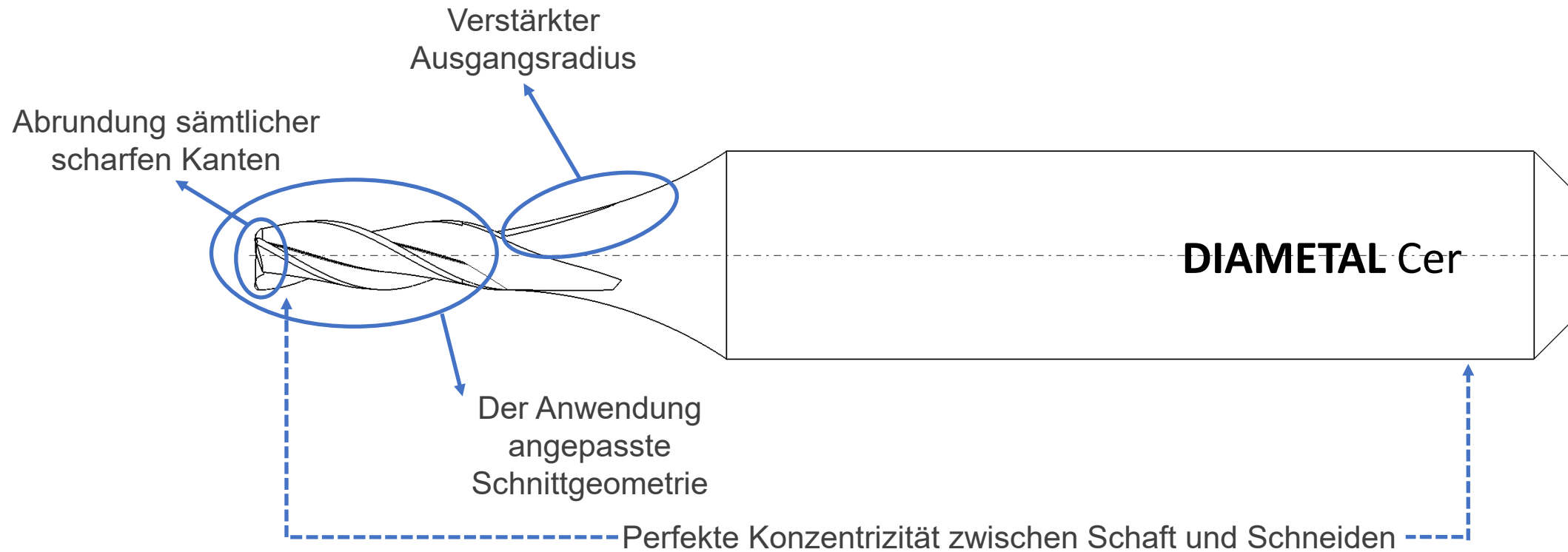
D



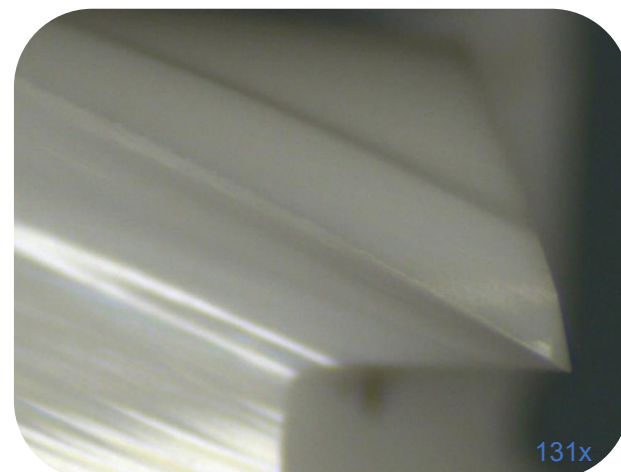
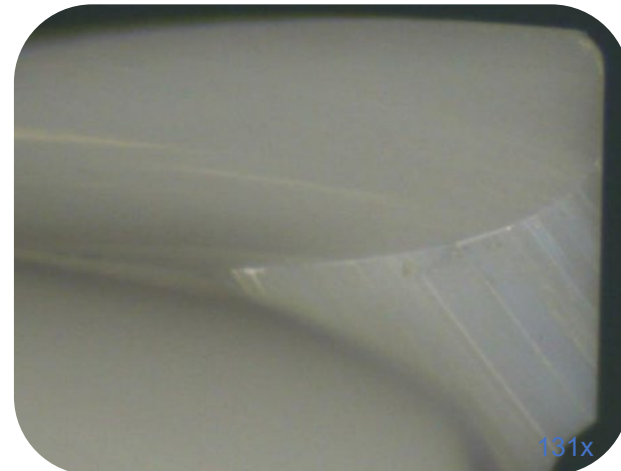
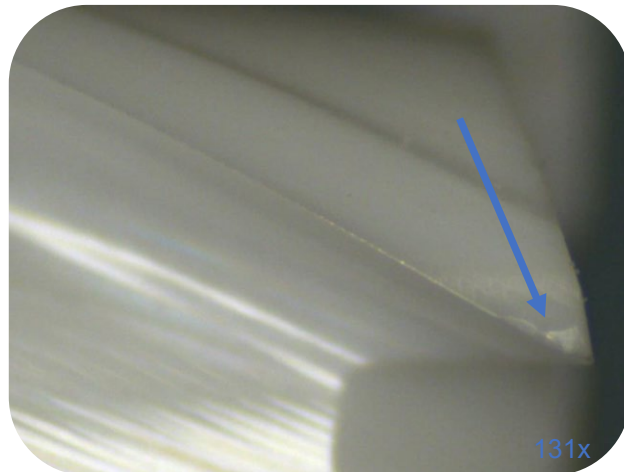
E



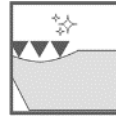
Design und Entwicklung der Werkzeuggeometrie



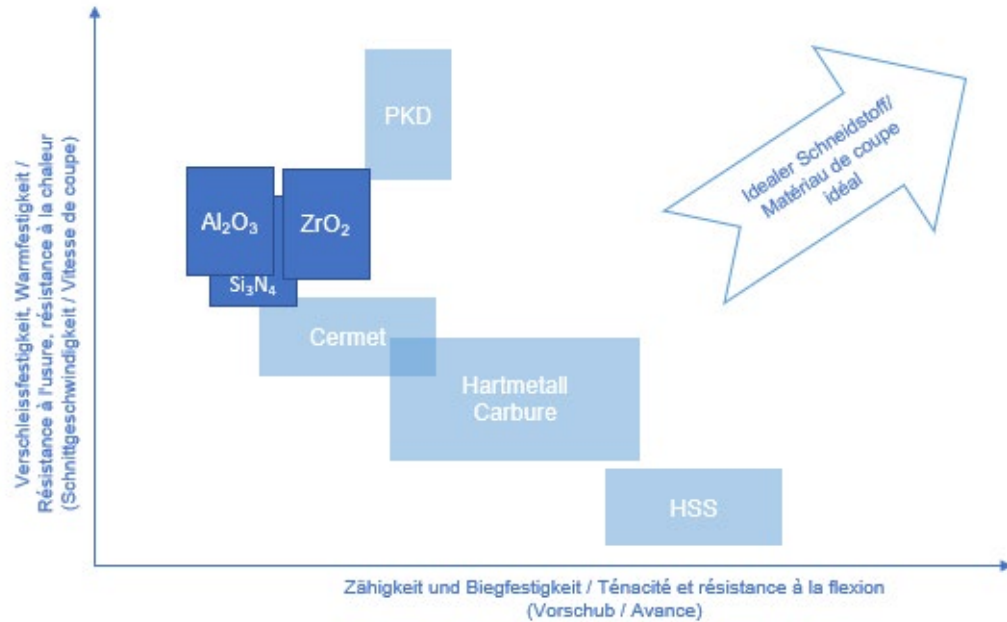
Design und Entwicklung der Werkzeuggeometrie - Beispiel



Schleifbedingungen (Oberflächengüte)



Bearbeitungsbedingungen









Praktische Versuche - Application Center (Biel)

Maschine Modell	Fehlmann Versa 645 Linear
Werkzeughalterung	HSK-E40
Spindel	42'000 U/min
Elektrospindel	80'000 U/min.
Kühlmittel	Druck 80 bar
Kühlmittel	Blaser B-Cool MC 610



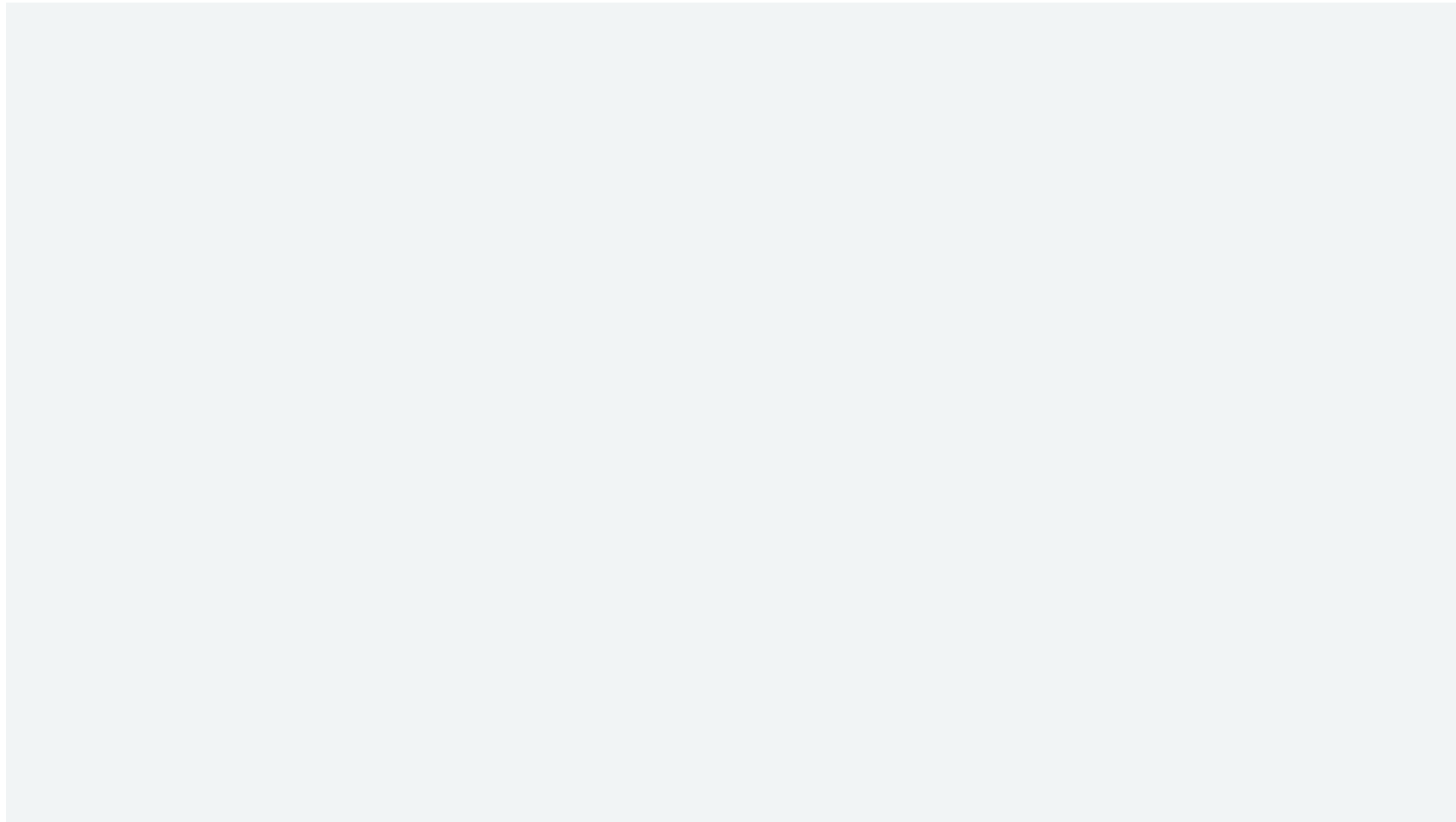
Praktische Versuche

DIA_{mill}

	Bleifreies Messing
Keramik A	
Keramik B	
Keramik C	
Keramik D	
Keramik E	
Hartmetall	

Praktische Versuche

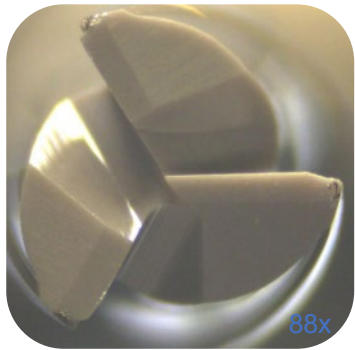
DIAmill



Praktische Versuche

DIA_{mill}

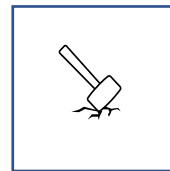
Fräser	Ø2
Material	Bleifreies Messing CuZn42
V _c	251 m/min
s	40'000 1/min
f _z	0,01 mm
F	1200 mm/min
Schmierung	Emulsion 8%



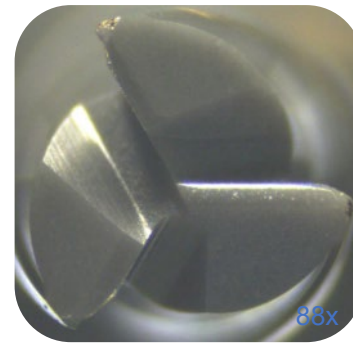
Keramik A



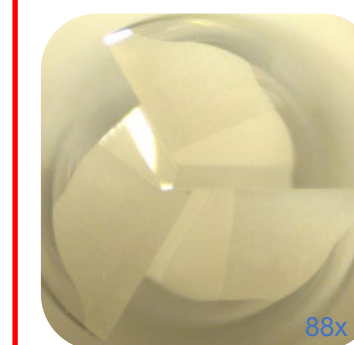
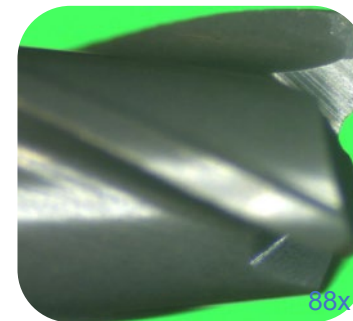
Keramik B



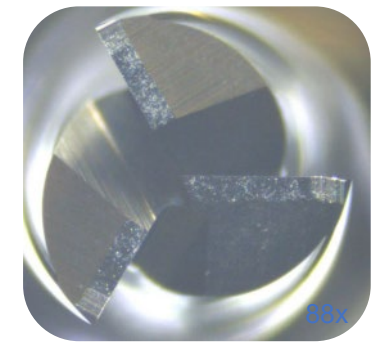
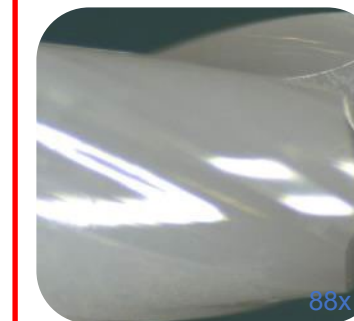
Keramik C



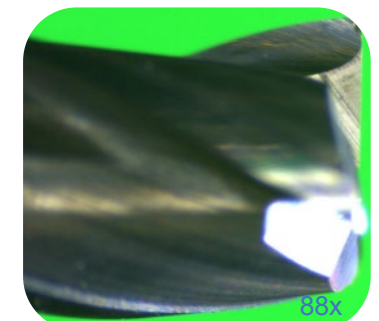
Keramik D



Keramik E

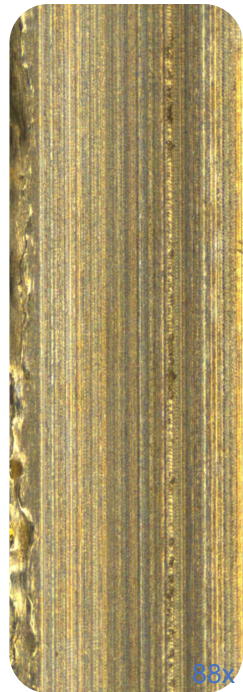


Hartmetall

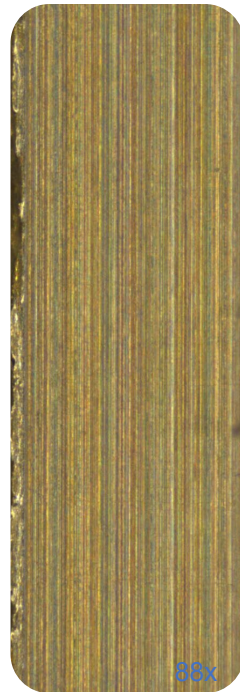


Praktische Versuche - Oberflächengüten

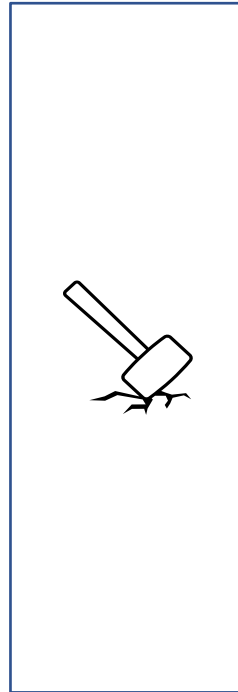
DIA_{mill}



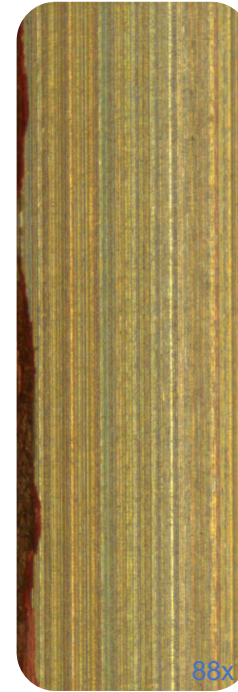
Keramik A
Ra 0,34



Keramik B
Ra 0,18



Keramik C



Keramik D
Ra 0,23






Keramik E
Ra 0,20



Hartmetall
Ra 0,21

Praktische Versuche

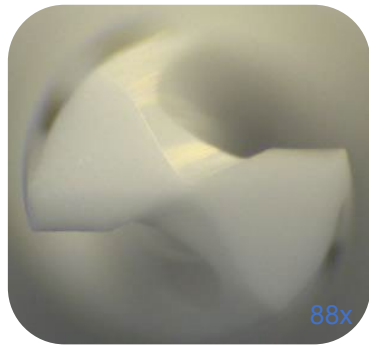
DIA^{drill}

	Bleifreies Messing
Keramik B	 <p>DIAMETAL Cer</p>
Keramik E	 <p>DIAMETAL Cer</p>
Hartmetall	 <p>DIAMETAL</p>

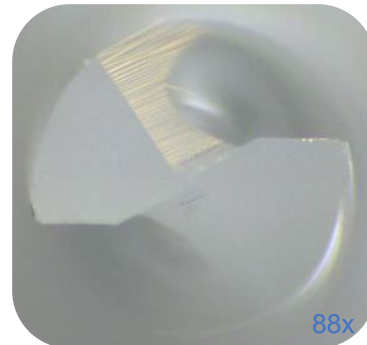
Praktische Versuche

DIAdrill Bohren
Material
V_c
s
f_u
F
Kühlmittel

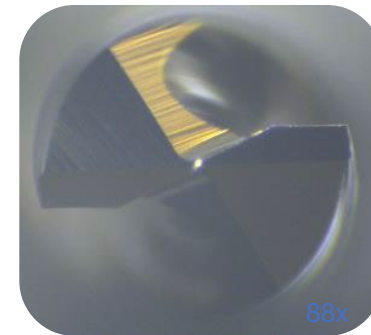
Ø1,18
 Bleifreies Messing CuZn42
 278 m/min
 75'000 1/min
 0,012 mm
 900 mm/min
 Emulsion 8%



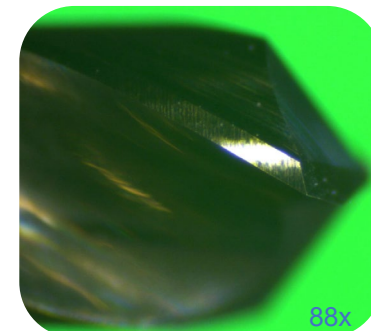
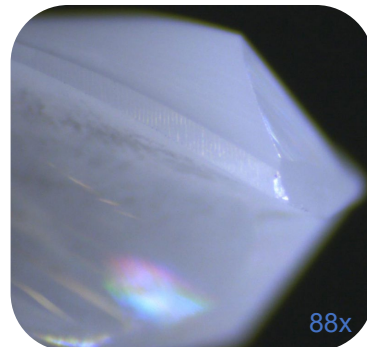
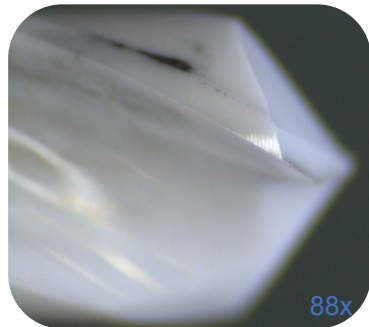
Keramik B



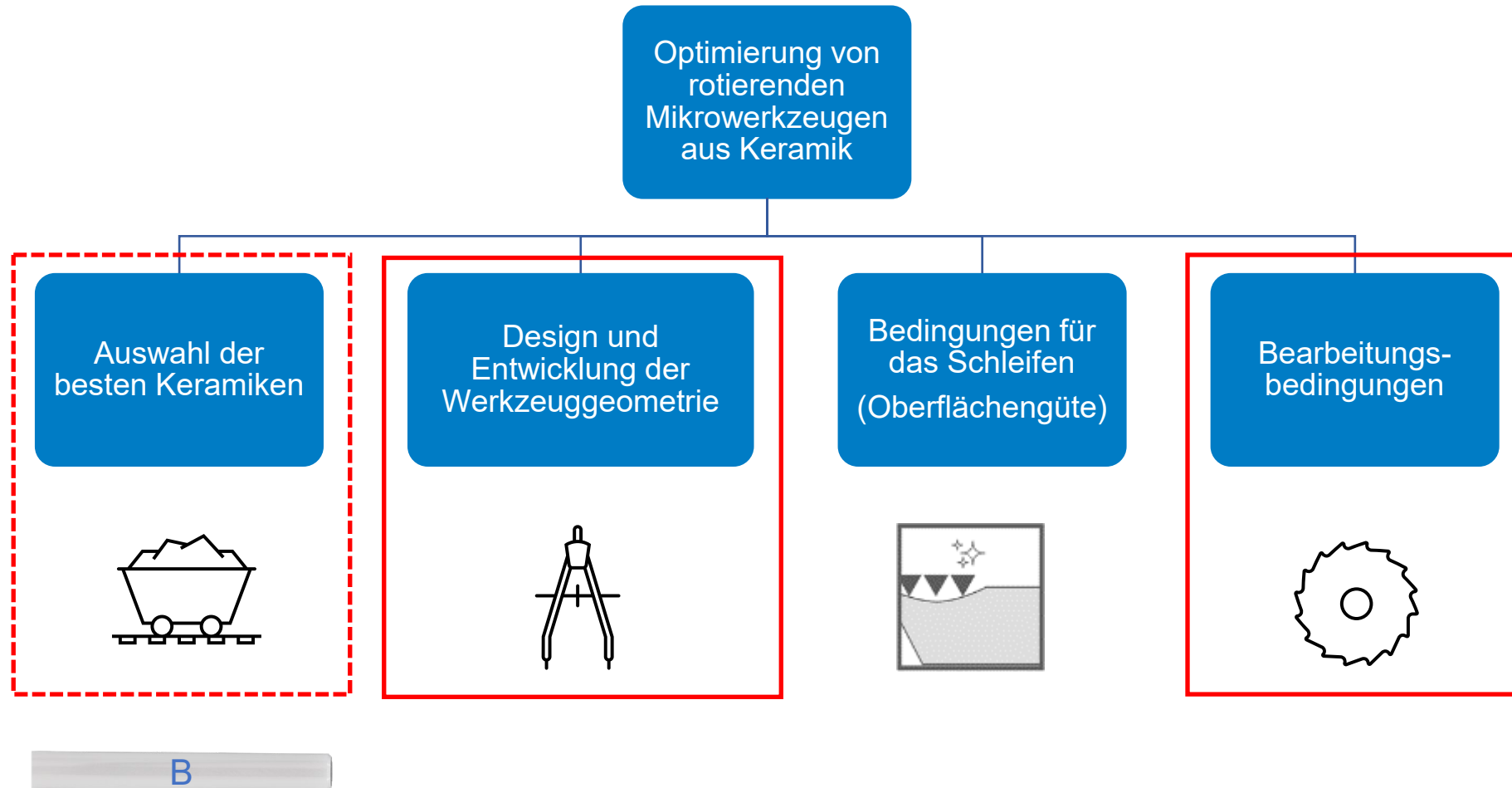
Keramik E



Hartmetall



Aktuelle Entwicklungsarbeiten bei Diametal



Erfolgsgeschichten Diametal



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