



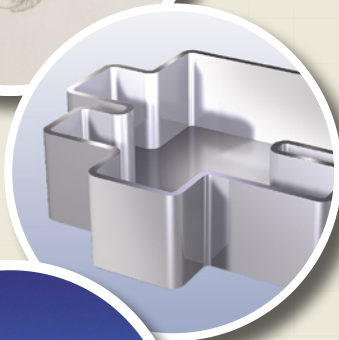
# Diamond Tooling Systems

Diamant Schaftfräser | diamond end mills

PKD  
PCD

ULTRA  
PKD/PCD

CVD-D



## Einsatzgebiete:

Aluminium  
Kupfer-Messing Legierungen  
Graphit  
GFK-CFK  
PEEK  
Keramik  
Zirkon

## application range:

aluminium  
copper-brass alloys  
graphite  
glass-carbon fibre reinforced  
PTFE  
ceramic  
zirconium



Mit Sitz in Kaiserslautern-Deutschland haben wir uns auf die Entwicklung, Herstellung und den Vertrieb von Präzisionswerkzeugen aus ultraharten Schneidstoffen wie CVD-D (CVD-Dickfilm Diamant), PKD (Polykristalliner Diamant) und CBN (Kubisches Bornitrid) spezialisiert und national so wie international erfolgreich am Markt etabliert.

Um diese ultraharten Schneidstoffe wie PKD, CBN und den CVD-Dickfilm Diamant auf Präzisionswerkzeugen wirtschaftlich bearbeiten zu können haben wir schon früh erkannt, dass wir uns von der alten Produktionstechnologie „Schleifen“ hin zu neuen Technologien wie der „Lasertechnologie“ weiterentwickeln müssen.

Ultraharte Hochleistungsschneidstoffe haben eine Schlüssel-funktion in der spanenden Fertigung. Präzisionswerkzeuge aus ultraharten Schneidstoffen sind sehr erklärungsbedürftige Produkte. Der wirtschaftliche Einsatz der Schneidstoffe ist nur sichergestellt, wenn der Zerspanungsprozess und der Schneidstoff aufeinander abgestimmt sind.

Genau hier setzt Diamond Tooling Systems GmbH an, „Unsere Kernkompetenz sind Präzisionswerkzeuge aus ultraharten Schneidstoffen“. Diese Hightech-Werkzeuge müssen zum Zerspanungsprozess mit Anwendungstechnikern genau abgestimmt werden, nur so ist es möglich, das optimale Potenzial auszuschöpfen.

Mit mehr als 25 Jahren Optimierungserfahrung in der verarbeitenden Industrie sehen wir hier unsere Stärke! Während der laufenden Produktion stehen wir Ihnen mit unseren erfahrenen Anwendungstechnikern beratend zur Seite. Diese enge Zusammenarbeit und das gegenseitige Vertrauen ist die Basis unseres Erfolges.



Located in Kaiserslautern, Germany we've specialized and focused ourselves on the development, production and sales of precision tools made out of ultra-hard cutting materials such as CVD-D (CVD-Thickfilm Diamond), PCD (Polycrystalline Diamond) and CBN (Cubic Boron Nitride). Over time we were able to successfully establish our tools within the national and international market.

To be able to economically manufacture these ultra-hard cutting materials for our precision tools, we shortly noticed that we needed to move away from the "old" manufacturing process of grinding, and instead invest in "new" technologies such as the Laser Technology.

Ultra-hard cutting materials are getting a bigger key role in the metal processing industry day by day, but there's still a lot that needs explaining about their usage. Their economic usage is only guaranteed if the process and the material is perfectly coordinated with each other.

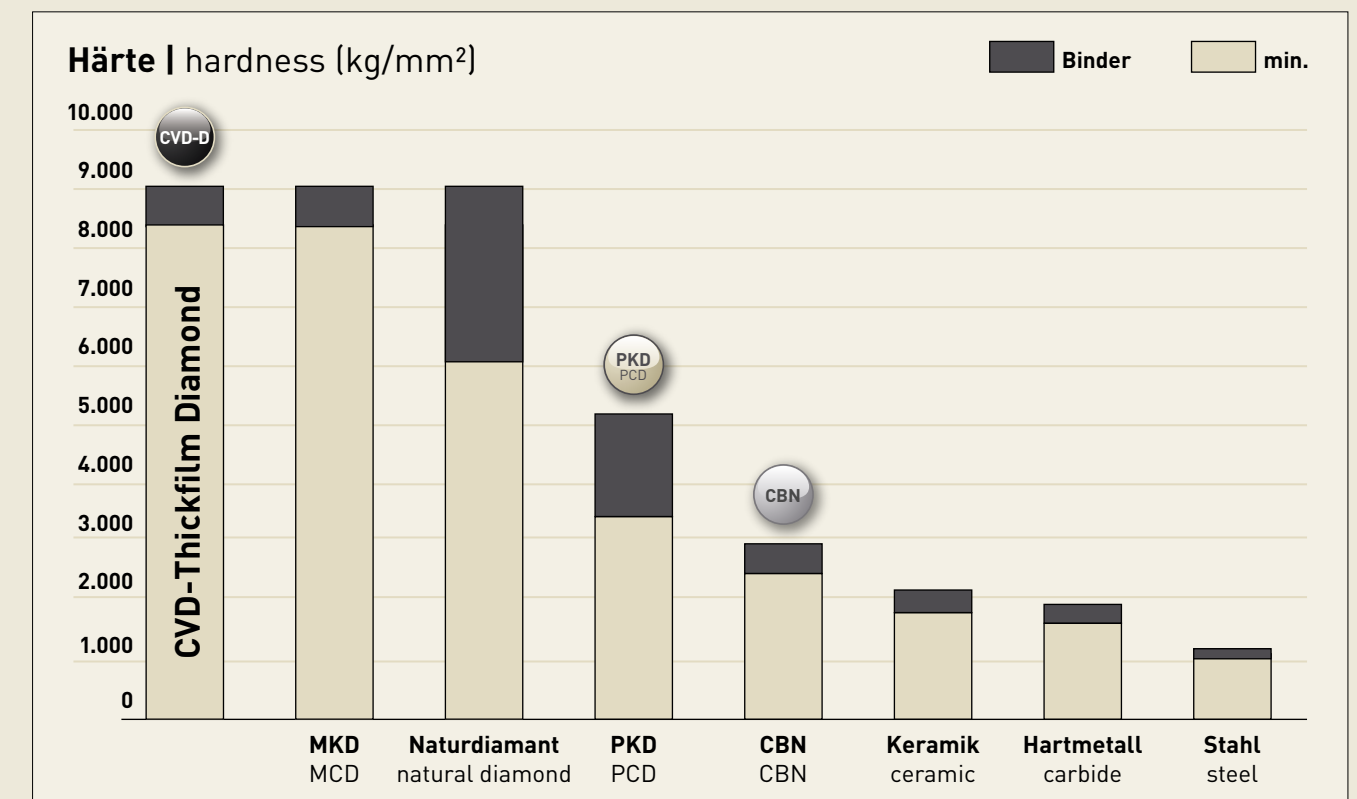
By handling this coordination is where Diamond Tooling Systems GmbH shines. To get the most out of what our high-tech tools can accomplish, the whole machining process needs to get perfectly optimized with the help of application engineers.

With more than 25 years of experience in optimization in the metal processing industry, this is our strength. Our specialized engineers will be at your side during the first stages of your production and our ongoing professional consultation service will support you further down your production line. This close work alongside one another and the mutual trust that comes with it, is the keystone of our success.



|                                                                                                       |           |
|-------------------------------------------------------------------------------------------------------|-----------|
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## Schneidstoffgruppen | groups of cuttingmaterial



### CVD Dickfilm Diamant – der härteste Schneidstoff der Welt!

Der ultraharte Schneidstoff „CVD-Dickfilm Diamant“ besitzt die höchste Härte und den höchsten Verschleißwiderstand aller untersuchten Schneidstoffe.

Der „PKD Schneidstoff“ hat im Gegensatz zum „CVD-Dickfilm Diamant“ deutliche Nachteile aufgrund seiner weichen metallischen Bindephase. In zahlreichen Versuchen konnte nachgewiesen werden, dass vor allem die weiche Bindephase des PKD durch die abrasiven Partikel geschädigt wird. Die Folge ist ein Ausbrechen der Diamantkristalle aufgrund einer verminderten Verankerung in der Schneidstoffmatrix.

Bei richtigem Einsatz von CVD-Dickfilm Diamant können die Standzeiten gegenüber PKD um das 3-10fache erhöht werden!

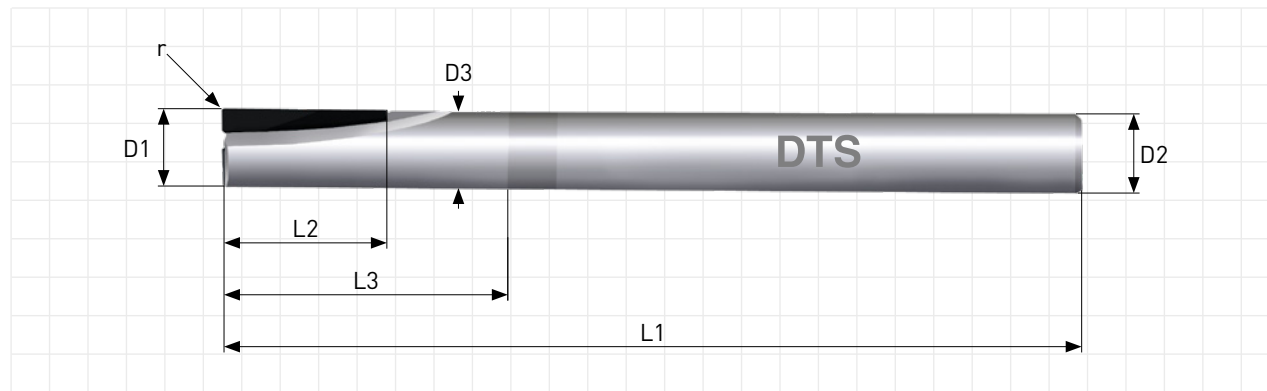
### CVD thickfilm diamond – the hardest cutting material of the world!

The mostly used "PCD cutting material" has in comparison to the "CVD-thickfilm diamond" clear drawbacks due to its soft metallic binder. In several tests it has been proven that especially the soft binder of the PCD is damaged through abrasive particles.

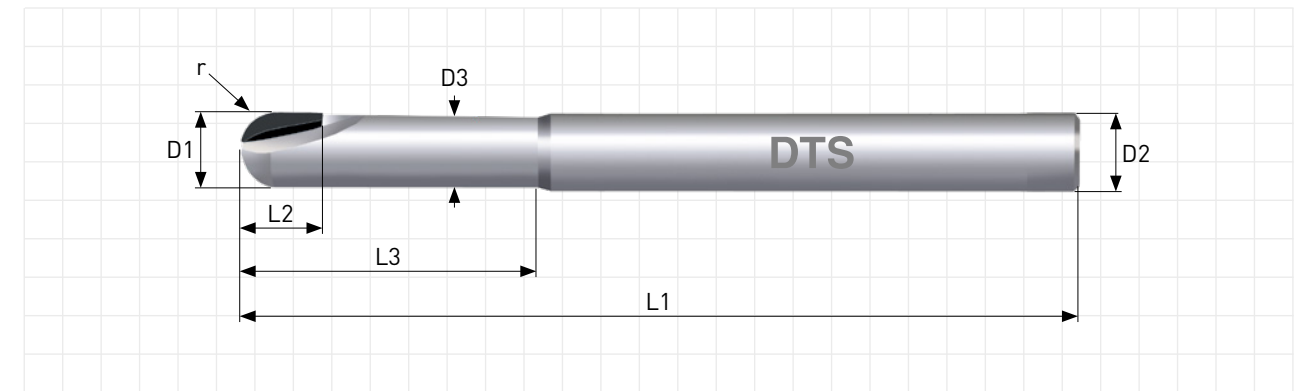
The consequence is a break out of the diamond crystals due to a reduced anchorage in the cutting material matrix.

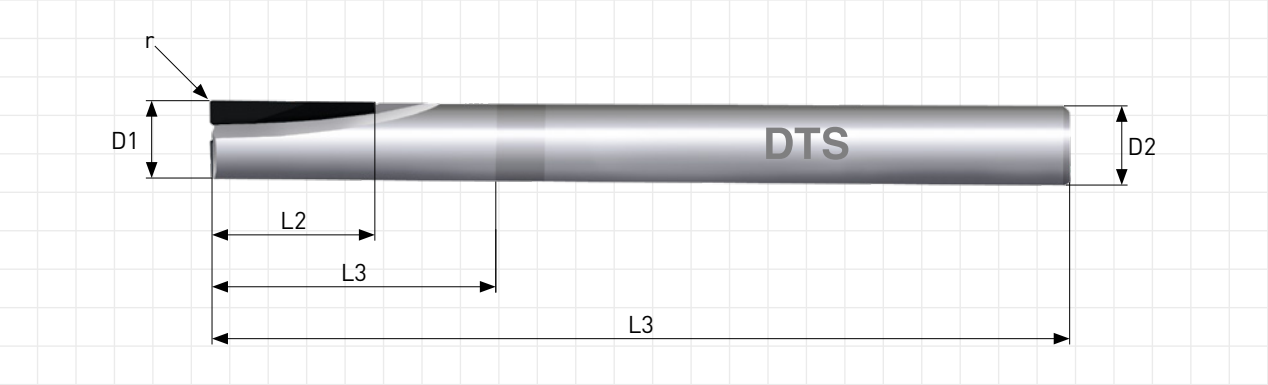
The consequence of this is that by the machining of aluminum – and magnesium alloys and also non ferrous materials preferably diamond is used as cutting material. The clean diamond segments, which in most cases are brazed onto a carbide insert. The tool life can be increased with CVD thickfilm diamond approx 3 to 10 times vs. PCD.

### Kurze und stabile Ausführung | short and stable version

[illegible]

**Kurze und stabile Ausführung** | short and stable version

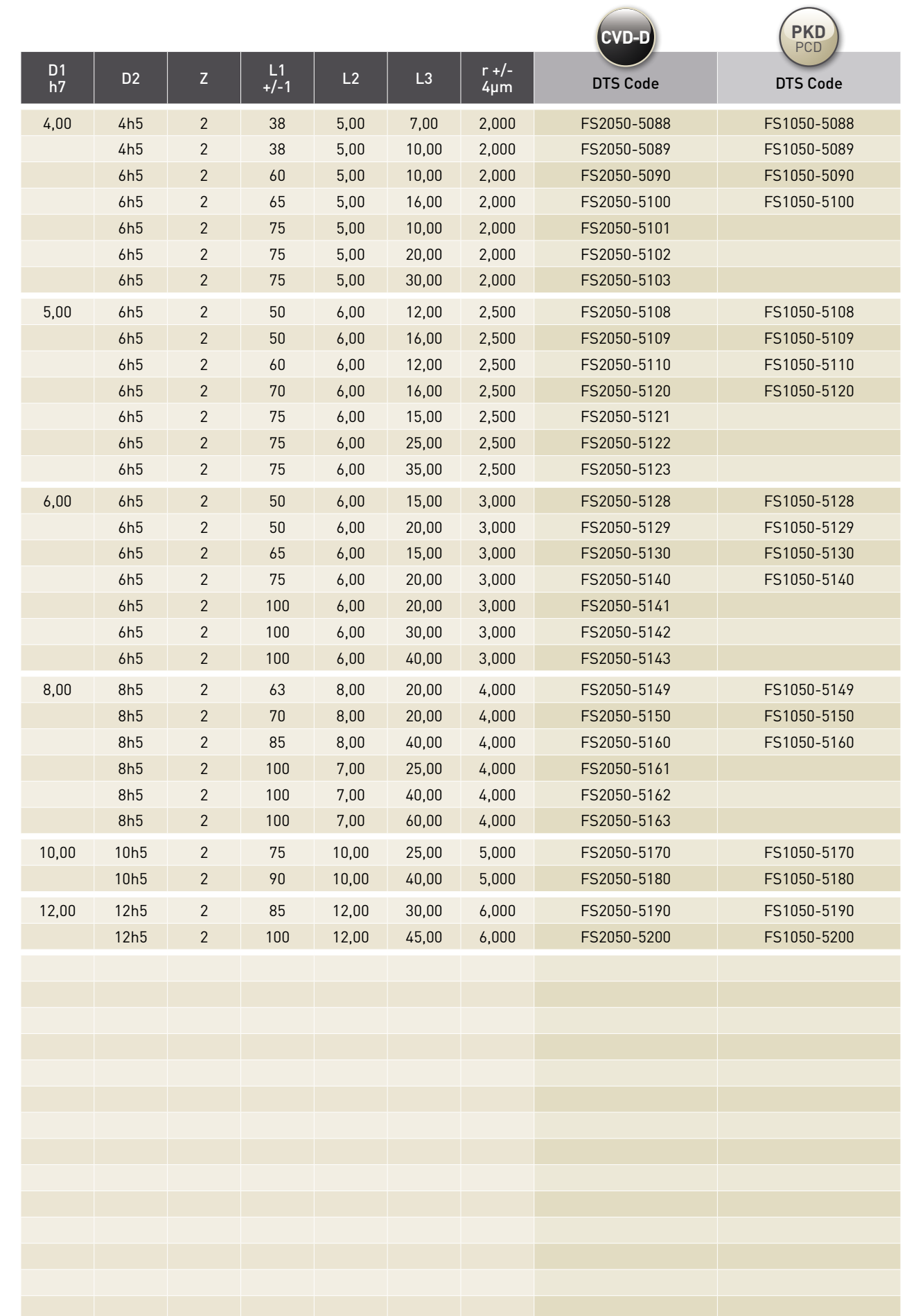
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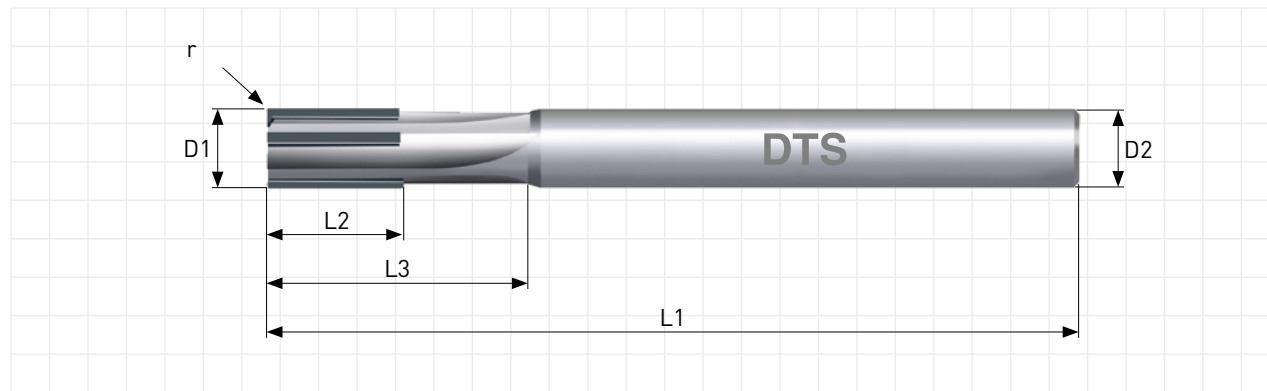


| D1<br>h7 | D2  | Z | L1<br>+/-1 | L2   | L3    | r +/-<br>4µm | <div>CVD-D</div> | <div>PKD<br/>PCD</div> |
|----------|-----|---|------------|------|-------|--------------|------------------|------------------------|
|          |     |   |            |      |       |              | DTS Code         | DTS Code               |
| 1,00     | 4h5 | 1 | 38         | 3,00 | 4,00  | 0,050        | FS2050-4009      | FS1050-4009            |
|          | 4h5 | 1 | 50         | 3,00 | 4,00  | 0,050        | FS2050-4010      | FS1050-4010            |
|          | 6h5 | 1 | 50         | 2,00 | 5,00  | 0,100        | FS2050-4011      |                        |
|          | 6h5 | 1 | 50         | 2,00 | 10,00 | 0,100        | FS2050-4012      |                        |
|          | 6h5 | 1 | 50         | 2,00 | 20,00 | 0,100        | FS2050-4013      |                        |
| 1,50     | 4h5 | 2 | 38         | 2,00 | 3,00  | 0,005        | FS2050-4018      |                        |
|          | 4h5 | 2 | 38         | 3,00 | 4,00  | 0,050        | FS2050-4019      | FS1050-4019            |
|          | 4h5 | 2 | 50         | 3,00 | 4,00  | 0,050        | FS2050-4020      | FS1050-4020            |
|          | 6h5 | 2 | 50         | 2,00 | 5,00  | 0,150        | FS2050-4021      |                        |
|          | 6h5 | 2 | 50         | 2,00 | 10,00 | 0,150        | FS2050-4022      |                        |
|          | 6h5 | 2 | 50         | 2,00 | 20,00 | 0,150        | FS2050-4023      |                        |
| 2,00     | 4h5 | 2 | 38         | 2,00 | 3,00  | 0,005        | FS2050-4027      |                        |
|          | 4h5 | 2 | 38         | 4,00 | 6,00  | 0,005        | FS2050-4028      |                        |
|          | 4h5 | 2 | 38         | 3,00 | 6,00  | 0,050        | FS2050-4029      | FS1050-4029            |
|          | 4h5 | 2 | 50         | 3,00 | 5,00  | 0,100        | FS2050-4030      | FS1050-4030            |
|          | 4h5 | 2 | 50         | 3,00 | 8,00  | 0,100        | FS2050-4040      | FS1050-4040            |
|          | 6h5 | 2 | 50         | 3,00 | 5,00  | 0,150        | FS2050-4041      |                        |
|          | 6h5 | 2 | 50         | 3,00 | 10,00 | 0,150        | FS2050-4042      |                        |
|          | 6h5 | 2 | 50         | 3,00 | 20,00 | 0,150        | FS2050-4043      |                        |
| 2,50     | 4h5 | 2 | 38         | 5,00 | 7,00  | 0,005        | FS2050-4048      |                        |
|          | 4h5 | 2 | 38         | 4,00 | 6,00  | 0,100        | FS2050-4049      | FS1050-4049            |
|          | 4h5 | 2 | 50         | 4,00 | 6,00  | 0,100        | FS2050-4050      | FS1050-4050            |
|          | 4h5 | 2 | 50         | 4,00 | 10,00 | 0,100        | FS2050-4060      | FS1050-4060            |
| 3,00     | 4h5 | 2 | 38         | 3,00 | 5,00  | 0,005        | FS2050-4068      |                        |
|          | 4h5 | 2 | 38         | 6,00 | 9,00  | 0,005        | FS2050-4069      |                        |
|          | 6h5 | 2 | 50         | 5,00 | 8,00  | 0,100        | FS2050-4070      | FS1050-4070            |
|          | 6h5 | 2 | 50         | 5,00 | 8,00  | 0,200        | FS2050-4071      | FS1050-4071            |
|          | 6h5 | 2 | 50         | 5,00 | 8,00  | 0,500        | FS2050-4072      | FS1050-4072            |
|          | 6h5 | 2 | 60         | 5,00 | 12,00 | 0,100        | FS2050-4080      | FS1050-4080            |
|          | 6h5 | 2 | 75         | 4,00 | 10,00 | 0,300        | FS2050-4081      |                        |
|          | 6h5 | 2 | 75         | 4,00 | 15,00 | 0,300        | FS2050-4082      |                        |
|          | 6h5 | 2 | 75         | 4,00 | 20,00 | 0,300        | FS2050-4083      |                        |

| D1<br>h7 | D2   | Z | L1<br>+/-1 | L2    | L3    | r +/-<br>4µm | <div>CVD-D</div> | <div>PKD<br/>PCD</div> |
|----------|------|---|------------|-------|-------|--------------|------------------|------------------------|
|          |      |   |            |       |       |              | DTS Code         | DTS Code               |
| 4,00     | 4h5  | 2 | 38         | 6,00  | 10,00 | 0,010        | FS2050-4089      |                        |
|          | 6h5  | 2 | 60         | 5,00  | 10,00 | 0,100        | FS2050-4090      | FS1050-4090            |
|          | 6h5  | 2 | 60         | 5,00  | 10,00 | 0,300        | FS2050-4091      | FS1050-4091            |
|          | 6h5  | 2 | 60         | 5,00  | 10,00 | 0,500        | FS2050-4092      | FS1050-4092            |
|          | 6h5  | 2 | 65         | 5,00  | 16,00 | 0,100        | FS2050-4100      | FS1050-4100            |
|          | 6h5  | 2 | 75         | 5,00  | 10,00 | 0,300        | FS2050-4101      |                        |
|          | 6h5  | 2 | 75         | 5,00  | 20,00 | 0,300        | FS2050-4102      |                        |
|          | 6h5  | 2 | 75         | 5,00  | 30,00 | 0,300        | FS2050-4103      |                        |
| 5,00     | 6h5  | 2 | 50         | 6,00  | 12,00 | 0,010        | FS2050-4109      |                        |
|          | 6h5  | 2 | 60         | 6,00  | 12,00 | 0,200        | FS2050-4110      | FS1050-4110            |
|          | 6h5  | 2 | 60         | 6,00  | 12,00 | 0,500        | FS2050-4111      | FS1050-4111            |
|          | 6h5  | 2 | 70         | 6,00  | 16,00 | 0,200        | FS2050-4120      | FS1050-4120            |
|          | 6h5  | 2 | 80         | 6,00  | 25,00 | 0,200        | FS2050-4130      | FS1050-4130            |
|          | 6h5  | 2 | 75         | 6,00  | 15,00 | 0,500        | FS2050-4131      |                        |
|          | 6h5  | 2 | 75         | 6,00  | 25,00 | 0,500        | FS2050-4132      |                        |
|          | 6h5  | 2 | 75         | 6,00  | 35,00 | 0,500        | FS2050-4133      |                        |
| 6,00     | 6h5  | 2 | 50         | 8,00  | 15,00 | 0,010        | FS2050-4139      |                        |
|          | 6h5  | 2 | 65         | 6,00  | 15,00 | 0,200        | FS2050-4140      | FS1050-4140            |
|          | 6h5  | 2 | 65         | 6,00  | 15,00 | 0,500        | FS2050-4141      | FS1050-4141            |
|          | 6h5  | 2 | 65         | 6,00  | 15,00 | 1,000        | FS2050-4142      | FS1050-4142            |
|          | 6h5  | 2 | 75         | 8,00  | 20,00 | 0,200        | FS2050-4150      | FS1050-4150            |
|          | 6h5  | 2 | 85         | 10,00 | 30,00 | 0,200        | FS2050-4160      | FS1050-4160            |
|          | 6h5  | 2 | 100        | 6,00  | 20,00 | 0,300        | FS2050-4161      |                        |
|          | 6h5  | 2 | 100        | 6,00  | 30,00 | 0,300        | FS2050-4162      |                        |
| 8,00     | 6h5  | 2 | 100        | 6,00  | 40,00 | 0,300        | FS2050-4163      |                        |
|          | 8h5  | 2 | 70         | 8,00  | 20,00 | 0,300        | FS2050-4170      | FS1050-4170            |
|          | 8h5  | 2 | 70         | 8,00  | 20,00 | 0,500        | FS2050-4171      | FS1050-4171            |
|          | 8h5  | 2 | 70         | 8,00  | 20,00 | 1,000        | FS2050-4172      | FS1050-4172            |
|          | 8h5  | 2 | 85         | 16,00 | 40,00 | 0,300        | FS2050-4180      | FS1050-4180            |
|          | 8h5  | 2 | 100        | 7,00  | 25,00 | 1,000        | FS2050-4181      |                        |
|          | 8h5  | 2 | 100        | 7,00  | 40,00 | 1,000        | FS2050-4182      |                        |
|          | 8h5  | 2 | 100        | 7,00  | 60,00 | 1,000        | FS2050-4183      |                        |
| 10,00    | 10h5 | 2 | 75         | 8,00  | 25,00 | 0,300        | FS2050-4189      | FS1050-4189            |
|          | 10h5 | 2 | 75         | 8,00  | 25,00 | 0,500        | FS2050-4190      | FS1050-4190            |
|          | 10h5 | 2 | 75         | 8,00  | 25,00 | 1,000        | FS2050-4191      | FS1050-4191            |
|          | 10h5 | 2 | 105        | 16,00 | 50,00 | 0,300        | FS2050-4192      | FS1050-4192            |
|          | 10h5 | 2 | 105        | 16,00 | 50,00 | 0,500        | FS2050-4193      | FS1050-4193            |
|          | 10h5 | 2 | 105        | 16,00 | 50,00 | 1,000        | FS2050-4200      | FS1050-4200            |
| 12,00    | 12h5 | 2 | 80         | 8,00  | 30,00 | 0,500        | FS2050-4210      | FS1050-4210            |
|          | 12h5 | 2 | 80         | 8,00  | 30,00 | 1,000        | FS2050-4211      | FS1050-4211            |
|          | 12h5 | 2 | 105        | 16,00 | 60,00 | 0,500        | FS2050-4212      | FS1050-4212            |
|          | 12h5 | 2 | 105        | 16,00 | 60,00 | 1,000        | FS2050-4220      | FS1050-4220            |
| 16,00    | 16h5 | 2 | 105        | 20,00 | 30,00 | 0,500        | FS2050-4229      | FS1050-4229            |
|          | 16h5 | 2 | 105        | 20,00 | 30,00 | 1,000        | FS2050-4230      | FS1050-4230            |
| 20,00    | 20h5 | 2 | 105        | 20,00 | 30,00 | 1,000        | FS2050-4240      | FS1050-4240            |





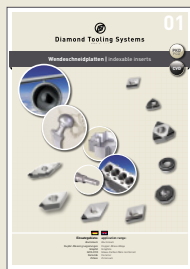
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| Material                                                 | Schnittgeschw.<br>cutting speed<br>VC (m/min) | Vorschub   feed rate<br>(fz /mm/U) |             |             |            | Kühlung<br>coolant                            |
|----------------------------------------------------------|-----------------------------------------------|------------------------------------|-------------|-------------|------------|-----------------------------------------------|
|                                                          |                                               | Ø 1 - 3                            | Ø 4 - 6     | Ø 7 - 11    | Ø 12 - 20  |                                               |
| Aluminium Legierungen   Al-alloys Si < 1 %               | 150 - 6000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Aluminium Legierungen   Al-alloys Si < 12 %              | 150 - 4000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Aluminium Legierungen   Al-alloys Si > 12 %              | 150 - 2000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Magnesium   magnesium alloys                             | 150 - 6000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Kupfer Legierungen   copper alloys                       | 150 - 5000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Messing Legierungen   brass alloys                       | 150 - 4000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Ti-Legierungen   Ti-alloys                               | 50 - 400                                      | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Graphit   graphite                                       | 150 - 3000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| GFK   GFRP glass fibre composites                        | 150 - 3000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | trocken, nass, Luft<br>dry, wet, air pressure |
| CFK   CFRP carbon fibre composites                       | 150 - 4000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | trocken, Pressluft<br>dry, air pressure       |
| PEEK   PTFE                                              | 150 - 2000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Acryl   acrylic                                          | 150 - 1800                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Thermoplaste, Duroplaste<br>thermoplastics, duroplastics | 150 - 4000                                    | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Keramik   ceramic                                        | 75 - 300                                      | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | Emulsion, MMS<br>emulsion, MQL                |
| Zirkon   zirconium                                       | 75 - 300                                      | 0,007 - 0,05                       | 0,02 - 0,15 | 0,02 - 0,20 | 0,04 - 0,3 | trocken, Pressluft<br>dry, air pressure       |

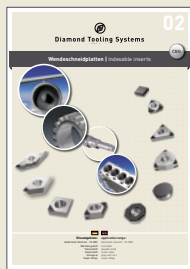
## Formeln | formulas

|                                               | metrisch   metric                                                   |                   | Zoll   inch                                                         |                        |
|-----------------------------------------------|---------------------------------------------------------------------|-------------------|---------------------------------------------------------------------|------------------------|
|                                               | Formel   formula                                                    | Einheiten   units | Formel   formula                                                    | Einheiten   units      |
| Vorschubgeschwindigkeit<br>feed rate          | $V_f = f_n \times n \times Z_{eff}$                                 | mm/min            | $V_f = f_n \times n \times Z_{eff}$                                 | Zoll/min<br>inch/min   |
| Schnittgeschwindigkeit<br>cutting speed       | $V_c = \frac{\pi \times D_{ap} \times n}{1000}$                     | m/min             | $V_c = \frac{\pi \times D_{ap} \times n}{12}$                       | Fuß/min<br>ft/min      |
| Spindeldrehzahl<br>spindle speed              | $n = \frac{V_c \times 1000}{\pi \times DC_{ap}}$                    | U/min<br>rev/min  | $n = \frac{V_c \times 12}{\pi \times DC_{ap}}$                      | U/min<br>rev/min       |
| Vorschub pro Zahn<br>feed per tooth           | $f_z = \frac{V_f}{n \times Z_{eff}}$                                | mm                | $f_z = \frac{V_f}{n \times Z_{eff}}$                                | Zoll<br>inch           |
| Vorschub pro Umdrehung<br>feed per revolution | $f_n = \frac{V_f}{n}$                                               | mm/U<br>mm/rev    | $f_n = \frac{V_f}{n}$                                               | Zoll/U<br>inch/rev     |
| Zeitspanvolumen<br>stock removal rate         | $Q = \frac{a_p \times a_e \times V_f}{1000}$                        | cm³/min           | $Q = a_p \times a_e \times f_n \times 12$                           | Zoll³/min<br>inch³/min |
| Schnittleistung<br>cutting rate               | $P_c = \frac{a_e \times a_p \times V_f \times k_c}{60 \times 10^5}$ | kW                | $P_c = \frac{V_c \times a_p \times f_n \times k_c}{33 \times 10^3}$ | PS<br>hp               |
| Drehmoment<br>torque                          | $M_c = \frac{P_c \times 30 \times 10^3}{\pi \times n}$              | Nm                | $M_c = \frac{P_c \times 16501}{\pi \times n}$                       | Lbf/Fuß<br>lbf/ft      |

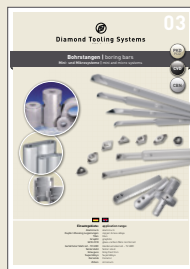
# Komplette DTS-Produktgruppen | Complete DTS product ranges



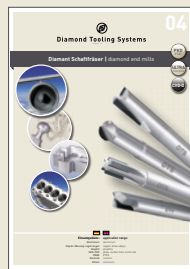
**PKD/CVD-D  
Schneidplatten**  
PCD/CVD-D Inserts



**CBN Schneidplatten**  
CBN Inserts



**CBN/PKD/CVD-D  
Bohrstangen**  
CBN/PCD/CVD-D  
Boring bars



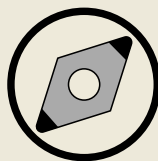
**Schaftfräser**  
**PKD/Ultra-PKD/CVD-D**  
End mills  
PCD/Ultra-PCD/CVD-D



**Fräskopf-Systeme**  
Milling cutter systems



**ISO Klemmhalter**  
ISO Tool holders



**PASSION FOR DIAMOND**



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Diamond Tooling Systems

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