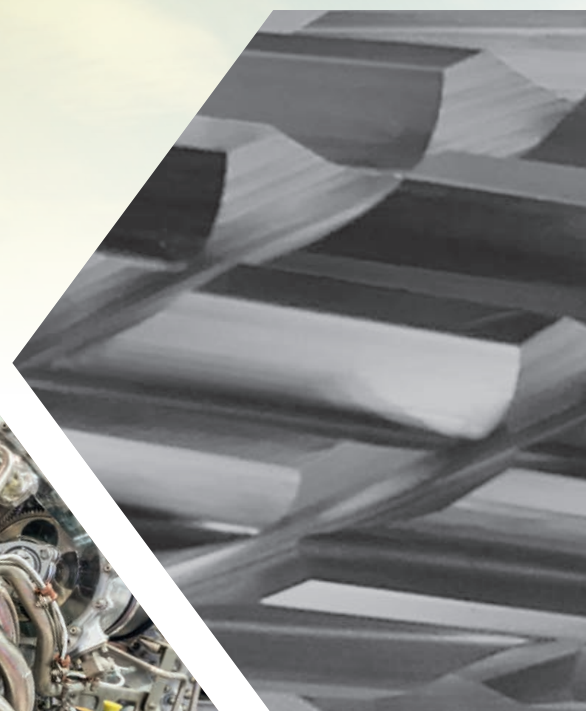
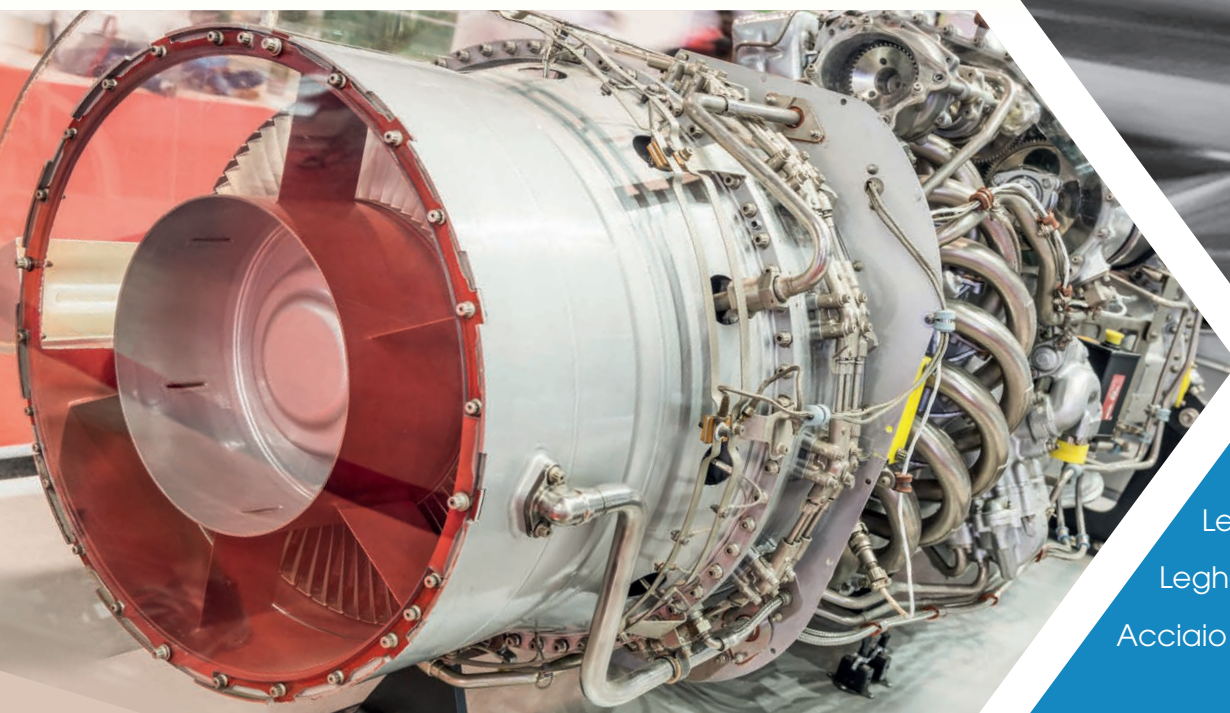


**Cerini**<sup>®</sup>

CUTTING TOOLS MANUFACTURING



# AerospACE



Materiali compositi  
Leghe resistenti al calore  
Leghe di titanio  
Acciaio inox

Gamma completa di prodotti per l'industria aeronautica



MADE IN ITALY



*Sviluppiamo prodotti e processi  
per proporre soluzioni all'avanguardia*

Cerin è fra le eccellenze italiane del settore metalmeccanico di precisione dal 1971. In oltre cinquant'anni di attività l'azienda ha accompagnato da vicino gli sviluppi tecnologici del metallo duro e dei molti settori di applicazione, sia tradizionali che a forte spinta innovativa.

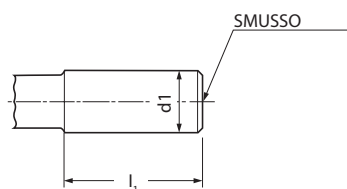
Oggi Cerin mette a disposizione dei suoi clienti i frutti di una lunga esperienza, condensati in una gamma di prodotti ampia, completa e performante, dedicata alle lavorazioni dei materiali aeronautici.



COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV  
ISO 9001

## Versioni del gambo (per utensili di foratura e fresatura) DIN 6535

### Gambo cilindrico liscio - Forma HA

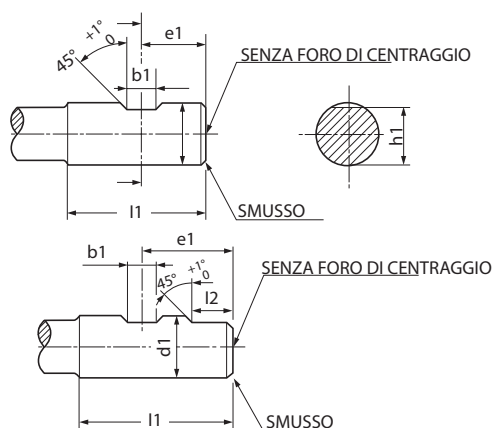


| $d_1$ | $l_1$ | $d_1$ | $l_1$ | $d_1$ | $l_1$ |
|-------|-------|-------|-------|-------|-------|
| h6    | +2/0  | h6    | +2/0  | h6    | +2/0  |
| 2     | 28    | 8     | 36    | 18    | 48    |
| 3     | 28    | 10    | 40    | 20    | 50    |
| 4     | 28    | 12    | 45    | 25    | 56    |
| 5     | 28    | 14    | 45    | 32    | 60    |
| 6     | 36    | 16    | 48    |       |       |

### Gambo cilindrico - Forma HB (Weldon flat)

con un piano Weldon di trascinamento -  $d_1 =$  da 6 a 20 mm

con due piani Weldon di trascinamento -  $d_1 =$  da 25 a 32 mm

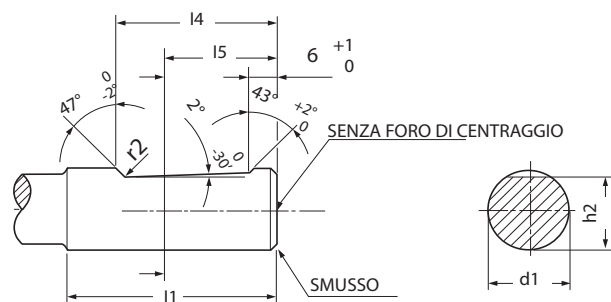


| $d_1$ | $b_1$   | $e_1$ | $h_1$ | $l_1$ | $l_2$ |
|-------|---------|-------|-------|-------|-------|
| h6    | +0,05/0 | 0/-1  | h11   | +2/0  | +1/0  |
| 6     | 4,2     | 18    | 5,1   | 36    |       |
| 8     | 5,5     | 18    | 6,9   | 36    |       |
| 10    | 7       | 20    | 8,5   | 40    |       |
| 12    | 8       | 22,5  | 10,4  | 45    |       |
| 14    | 8       | 22,5  | 12,7  | 45    |       |
| 16    | 10      | 24    | 14,2  | 48    |       |
| 18    | 10      | 24    | 16,2  | 48    |       |
| 20    | 11      | 25    | 18,2  | 50    |       |
| 25    | 12      | 32    | 23    | 56    | 17    |
| 32    | 14      | 36    | 32    | 60    | 19    |

### Gambo cilindrico - Forma HE (Whistle-Notch)

con un piano di serraggio inclinato -  $d_1 =$  da 6 a 20 mm

con un piano di serraggio inclinato -  $d_1 =$  da 25 a 32 mm



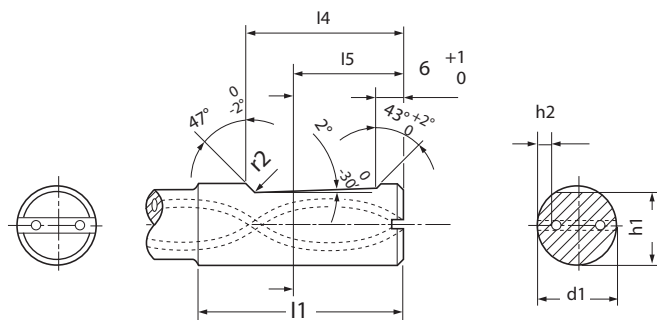
| $d_1$ | $(b_2)$ | $(b_3)$ | $h_2$ | $(h_3)$ | $l_1$ | $l_4$ | $l_5$ | $r_2$ |
|-------|---------|---------|-------|---------|-------|-------|-------|-------|
| 6     | 4,3     |         | 5,1   |         | 36    | 25    | 18    | 1,2   |
| 8     | 5,5     |         | 6,9   |         | 36    | 25    | 18    | 1,2   |
| 10    | 7,1     |         | 8,5   |         | 40    | 28    | 20    | 1,2   |
| 12    | 8,2     |         | 10,4  |         | 45    | 33    | 22,5  | 1,2   |
| 14    | 8,1     |         | 12,7  |         | 45    | 33    | 22,5  | 1,2   |
| 16    | 10,1    |         | 14,2  |         | 48    | 36    | 24    | 1,6   |
| 18    | 10,8    |         | 16,2  |         | 48    | 36    | 24    | 1,6   |
| 20    | 11,4    |         | 18,2  |         | 50    | 38    | 25    | 1,6   |
| 25    | 13,8    | 9,3     | 23    | 24,1    | 56    | 44    | 32    | 1,6   |
| 32    | 15,5    | 9,9     | 30    | 31,2    | 60    | 48    | 35    | 1,6   |

## Versioni del gambo (per utensili di foratura e fresatura) simile a DIN 6535

### Gambo cilindrico - Forma HEK

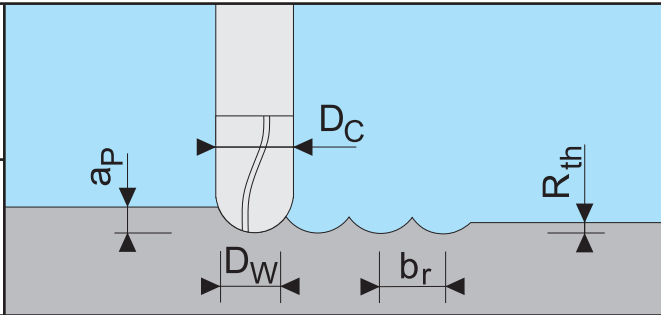
con un piano di serraggio inclinato - d1 = da 6 a 20 mm

con un piano di serraggio inclinato - d1 = da 25 a 32 mm



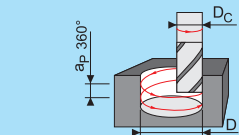
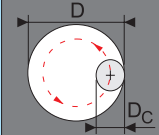
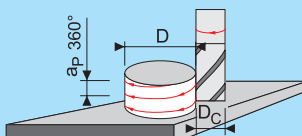
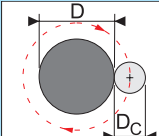
| $d_1$ | $l_1$ | $l_4$ | $l_5$ | $h_1$ | $r_2$ | $h_2$ |
|-------|-------|-------|-------|-------|-------|-------|
| 6     | 36    | 25    | 18    | 5,3   | 1,2   | 1,3   |
| 8     | 36    | 25    | 18    | 7,1   | 1,2   | 1,5   |
| 10    | 40    | 28    | 20    | 8,9   | 1,2   | 1,8   |
| 12    | 45    | 33    | 22,5  | 10,9  | 1,2   | 2     |
| 14    | 45    | 33    | 22,5  | 12,4  | 1,2   | 2,5   |
| 16    | 48    | 36    | 24    | 14,5  | 1,6   | 2,5   |
| 18    | 48    | 36    | 24    | 16,2  | 1,6   | 2,8   |
| 20    | 50    | 38    | 25    | 18,2  | 1,6   | 3     |
| 25    | 56    | 44    | 32    | 23    | 1,6   | 3,7   |
| 32    | 60    | 48    | 35    | 30    | 1,6   | 4,5   |

## Formule di calcolo

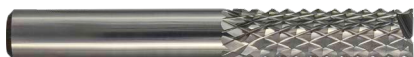
| Frese cilindriche, di copiatura e toriche |                                               | Fresatura in pendolare a copiare                                                   |                                                               |
|-------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Numero di giri                            | $n = \frac{V_c \times 1000}{D_c \times 3,14}$ |  |                                                               |
| Velocità di taglio                        | $V_c = \frac{D_c \times 3,14 \times n}{1000}$ |                                                                                    |                                                               |
| Avanzamento/dente                         | $f_z = \frac{V_f}{Z_n \times n}$              | $R_{th}$ Rugosità<br>$b_r$ Interasse<br>$D_w$ Diametro di lavoro                   |                                                               |
| Avanzamento/giro                          | $f = f_z \times Z_n$                          | Rugosità                                                                           | $R_{th} = \frac{D_c - b_r}{2} \sqrt{\frac{D_c^2 - b_r^2}{4}}$ |
| Velocità di avanzamento                   | $V_f = f \times Z_n \times n$                 | Interasse                                                                          | $b_r = 2 \sqrt{R_{th} (D_c - R_{th})}$                        |
| Spessore medio truciolo                   | $h_m = f_z \times \sqrt{\frac{a_e}{D_c}}$     | Diametro di lavoro                                                                 | $D_w = 2 \sqrt{a_p (D_c - a_p)}$                              |

## Formule di calcolo

Fresatura circolare - Fresatura con foratura  
 Avanzamento basato sul movimento dell'asse della fresa VfM (mm/min)

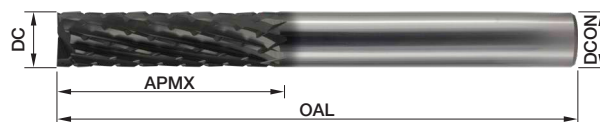
|                                                                                     |                                                                                     |                     |                                           |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------|-------------------------------------------|
|  |  | Lavorazione interna | $V_{fM} = \frac{V_f \times (D - D_c)}{D}$ |
|  |  | Lavorazione esterna | $V_{fM} = \frac{V_f \times (D + D_c)}{D}$ |

## AeroSPACE

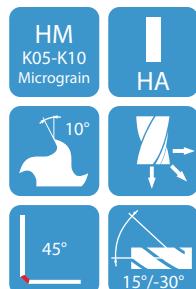
|                                                                                     |                                     | Pag |
|-------------------------------------------------------------------------------------|-------------------------------------|-----|
|    | Frese per CFRP                      | 6   |
|    | Frese per kevlar                    | 13  |
|    | Frese per GFRP                      | 15  |
|    | Frese per materiali a nido d'ape    | 20  |
|  | Punte per CFRP                      | 22  |
|  | Punte per kevlar                    | 23  |
|  | Frese PCD                           | 25  |
|  | Frese per leghe di titanio e nichel | 28  |
|  | Frese per acciaio                   | 32  |
|  | Frese per alluminio                 | 36  |

## FRESATURA HPC DI FIBRA DI CARBONIO

Fresa HPC elica destra

Diamante CVD  
ad alto spessore Cer-DM

## 68DX



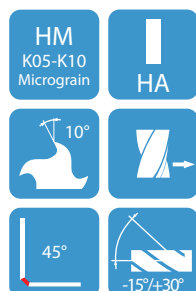
| Cod.              | DC | DC TOL.      | APMX | OAL  | DCON |
|-------------------|----|--------------|------|------|------|
|                   |    |              | 0/+2 | 0/+2 | h6   |
| 68DX.040061660DM  | 4  | +0,01/-0,03  | 16   | 60   | 6    |
| 68DX.060062060DM  | 6  | +0,01/-0,03  | 20   | 60   | 6    |
| 68DX.060063575DM  | 6  | +0,01/-0,03  | 35   | 75   | 6    |
| 68DX.080083275DM  | 8  | +0,005/-0,04 | 32   | 75   | 8    |
| 68DX.0800840100DM | 8  | +0,005/-0,04 | 40   | 100  | 8    |
| 68DX.100103272DM  | 10 | +0,005/-0,04 | 32   | 72   | 10   |
| 68DX.1001050100DM | 10 | +0,005/-0,04 | 50   | 100  | 10   |
| 68DX.120123283DM  | 12 | 0/-0,05      | 32   | 83   | 12   |
| 68DX.1201260120DM | 12 | 0/-0,05      | 60   | 120  | 12   |

## FRESATURA HPC DI FIBRA DI CARBONIO

Fresa HPC elica sinistra

Diamante CVD  
ad alto spessore Cer-DM

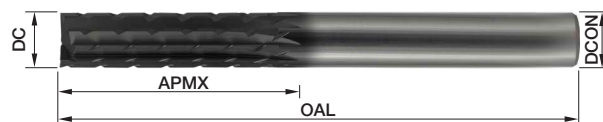
## 68SX



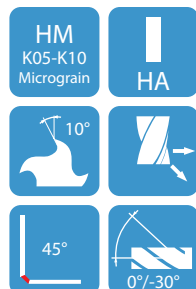
| Cod.              | DC | DC TOL.      | APMX | OAL  | DCON |
|-------------------|----|--------------|------|------|------|
|                   |    |              | 0/+2 | 0/+2 | h6   |
| 68SX.040061680DM  | 4  | +0,01/-0,03  | 16   | 80   | 6    |
| 68SX.060062080DM  | 6  | +0,01/-0,03  | 20   | 80   | 6    |
| 68SX.0600635100DM | 6  | +0,01/-0,03  | 35   | 100  | 6    |
| 68SX.0800832100DM | 8  | +0,005/-0,04 | 32   | 100  | 8    |
| 68SX.0800840120DM | 8  | +0,005/-0,04 | 40   | 120  | 8    |
| 68SX.1001032100DM | 10 | +0,005/-0,04 | 32   | 100  | 10   |
| 68SX.1001050120DM | 10 | +0,005/-0,04 | 50   | 120  | 10   |
| 68SX.1201232100DM | 12 | 0/-0,05      | 32   | 100  | 12   |
| 68SX.1201260150DM | 12 | 0/-0,05      | 60   | 150  | 12   |

## FRESATURA HPC DI FIBRA DI CARBONIO

Fresa HPC a taglienti diritti

Diamante CVD  
ad alto spessore Cer-DM

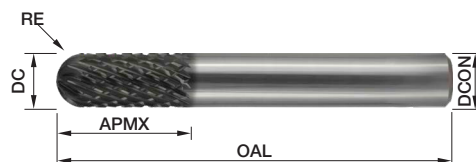
## 68TD



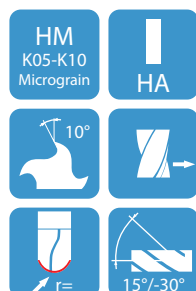
| Cod.              | DC | DC TOL.      | APMX | OAL  | DCON |
|-------------------|----|--------------|------|------|------|
|                   |    |              | 0/+2 | 0/+2 | h6   |
| 68TD.040061680DM  | 4  | +0,01/-0,03  | 16   | 80   | 6    |
| 68TD.060062080DM  | 6  | +0,01/-0,03  | 20   | 80   | 6    |
| 68TD.0600635100DM | 6  | +0,01/-0,03  | 35   | 100  | 6    |
| 68TD.0800832100DM | 8  | +0,005/-0,04 | 32   | 100  | 8    |
| 68TD.0800840120DM | 8  | +0,005/-0,04 | 40   | 120  | 8    |
| 68TD.1001032100DM | 10 | +0,005/-0,04 | 32   | 100  | 10   |
| 68TD.1001050120DM | 10 | +0,005/-0,04 | 50   | 120  | 10   |
| 68TD.1201232100DM | 12 | 0/-0,05      | 32   | 100  | 12   |
| 68TD.1201260150DM | 12 | 0/-0,05      | 60   | 150  | 12   |

## FRESATURA HPC DI FIBRA DI CARBONIO

Fresa HPC raggiata elica destra

Diamante CVD  
ad alto spessore Cer-DM

## 68RDX



| Cod.              | DC | DC TOL.      | APMX | OAL  | DCON | RE           |
|-------------------|----|--------------|------|------|------|--------------|
|                   |    |              | 0/+2 | 0/+2 | h6   | +0,015/-0,01 |
| 68RDX.040061960DM | 4  | +0,01/-0,03  | 19   | 60   | 6    | 2            |
| 68RDX.060062360DM | 6  | +0,01/-0,03  | 23   | 60   | 6    | 3            |
| 68RDX.080083675DM | 8  | +0,005/-0,04 | 36   | 75   | 8    | 4            |
| 68RDX.100103772DM | 10 | +0,005/-0,04 | 37   | 72   | 10   | 5            |
| 68RDX.120123883DM | 12 | 0/-0,05      | 38   | 83   | 12   | 6            |





## FRESATURA DI FIBRA DI CARBONIO

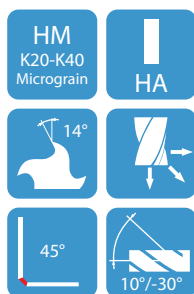
Fresa elica destra

Rivestimento diamante CVD Cer-D

Disponibile anche senza rivestimento



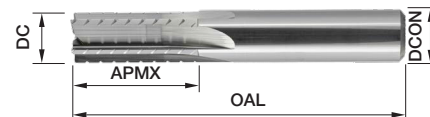
## 68SU



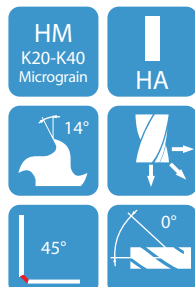
| Cod.             |                 | DC | DC TOL.      | APMX | OAL  | DCON |
|------------------|-----------------|----|--------------|------|------|------|
| Rivestite        | Non rivestite   |    |              | 0/+2 | 0/+2 | h6   |
| 68SU.050061660D  | 68SU.050061660  | 5  | -0,01/-0,04  | 16   | 60   | 6    |
| 68SU.050062875D  | 68SU.050062875  | 5  | -0,01/-0,04  | 28   | 75   | 6    |
| 68SU.060062060D  | 68SU.060062060  | 6  | -0,01/-0,04  | 20   | 60   | 6    |
| 68SU.060063575D  | 68SU.060063575  | 6  | -0,01/-0,04  | 35   | 75   | 6    |
| 68SU.080082263D  | 68SU.080082263  | 8  | -0,015/-0,05 | 22   | 63   | 8    |
| 68SU.0800840100D | 68SU.0800840100 | 8  | -0,015/-0,05 | 40   | 100  | 8    |
| 68SU.100102572D  | 68SU.100102572  | 10 | -0,015/-0,05 | 25   | 72   | 10   |
| 68SU.1001050100D | 68SU.1001050100 | 10 | -0,015/-0,05 | 50   | 100  | 10   |
| 68SU.120123083D  | 68SU.120123083  | 12 | -0,02/-0,07  | 30   | 83   | 12   |
| 68SU.1201250100D | 68SU.1201250100 | 12 | -0,02/-0,07  | 50   | 100  | 12   |
| 68SU.160163592D  | 68SU.160163592  | 16 | -0,02/-0,07  | 35   | 92   | 16   |
| 68SU.1601660125D | 68SU.1601660125 | 16 | -0,02/-0,07  | 60   | 125  | 16   |

## FRESATURA DI FIBRA DI CARBONIO

Fresa elica dritta con rompicrucciolo

Disponibile anche  
con rivestimento Cert-aC

## 65SU



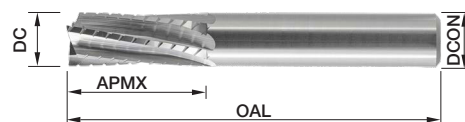
| Cod.              |                | DC | DC TOL. | APMX | OAL  | DCON |
|-------------------|----------------|----|---------|------|------|------|
| Rivestite         | Non rivestite  |    |         | 0/+2 | 0/+2 | h6   |
| 65SU.020060757TAC | 65SU.020060757 | 2  | h10     | 7    | 57   | 6    |
| 65SU.030061257TAC | 65SU.030061257 | 3  | h10     | 12   | 57   | 6    |
| 65SU.040061457TAC | 65SU.040061457 | 4  | h10     | 14   | 57   | 6    |
| 65SU.050061657TAC | 65SU.050061657 | 5  | h10     | 16   | 57   | 6    |
| 65SU.060061857TAC | 65SU.060061857 | 6  | h10     | 18   | 57   | 6    |
| 65SU.080082063TAC | 65SU.080082063 | 8  | h10     | 20   | 63   | 8    |
| 65SU.100102572TAC | 65SU.100102572 | 10 | h10     | 25   | 72   | 10   |
| 65SU.120123083TAC | 65SU.120123083 | 12 | h10     | 30   | 83   | 12   |



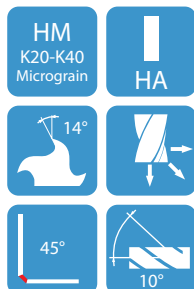
## FRESATURA DI FIBRA DI CARBONIO

Fresa elica destra 10° con rompitruciolo

Disponibile anche  
con rivestimento CerTaC



## 66SU



| Cod.               |                 | DC | DC TOL. | APMX | OAL | DCON |
|--------------------|-----------------|----|---------|------|-----|------|
| Rivestite          | Non rivestite   |    |         |      |     | h6   |
| 66SU.02006075TAC   | 66SU.020060757  | 2  | h10     | 7    | 57  | 6    |
| 66SU.030061257TAC  | 66SU.030061257  | 3  | h10     | 12   | 57  | 6    |
| 66SU.040062057TAC  | 66SU.040062057  | 4  | h10     | 20   | 57  | 6    |
| 66SU.050061657TAC  | 66SU.050061657  | 5  | h10     | 16   | 57  | 6    |
| 66SU.060061857TAC  | 66SU.060061857  | 6  | h10     | 18   | 57  | 6    |
| 66SU.060061857TAC  | 66SU.060061857  | 6  | h10     | 35   | 75  | 6    |
| 66SU.080082063TAC  | 66SU.080082063  | 8  | h10     | 20   | 63  | 8    |
| 66SU.0800840100TAC | 66SU.0800840100 | 8  | h10     | 40   | 100 | 8    |
| 66SU.100102572TAC  | 66SU.100102572  | 10 | h10     | 25   | 72  | 10   |
| 66SU.120123083TAC  | 66SU.120123083  | 12 | h10     | 30   | 83  | 12   |

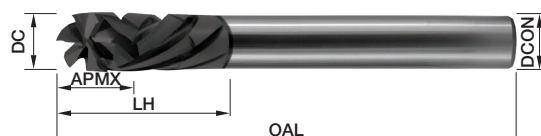




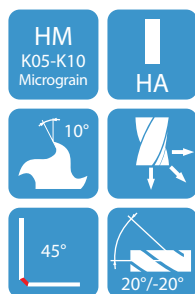
## FRESATURA HPC DI FIBRA DI CARBONIO

Fresa HPC con eliche contrapposte

Diamante CVD  
ad alto spessore Cer-DM



## 104PH



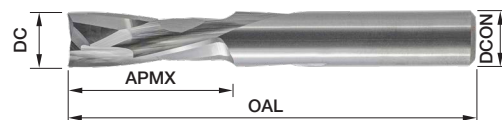
| Cod.               | DC | DC TOL.      | APMX | LH   | OAL  | DCON |
|--------------------|----|--------------|------|------|------|------|
|                    |    |              | 0/+2 | 0/+2 | 0/+2 | h6   |
| 104PH.060061575DM  | 6  | +0,01/-0,03  | 4    | 15   | 75   | 6    |
| 104PH.080082075DM  | 8  | +0,005/-0,04 | 6    | 20   | 75   | 8    |
| 104PH.1001025100DM | 10 | +0,005/-0,04 | 7    | 25   | 100  | 10   |
| 104PH.1201230100DM | 12 | 0/-0,05      | 8    | 30   | 100  | 12   |

# 102PH

## FRESATURA DI FIBRA DI CARBONIO

Fresa con eliche contrapposte

Disponibile anche  
con rivestimento Cer-taC



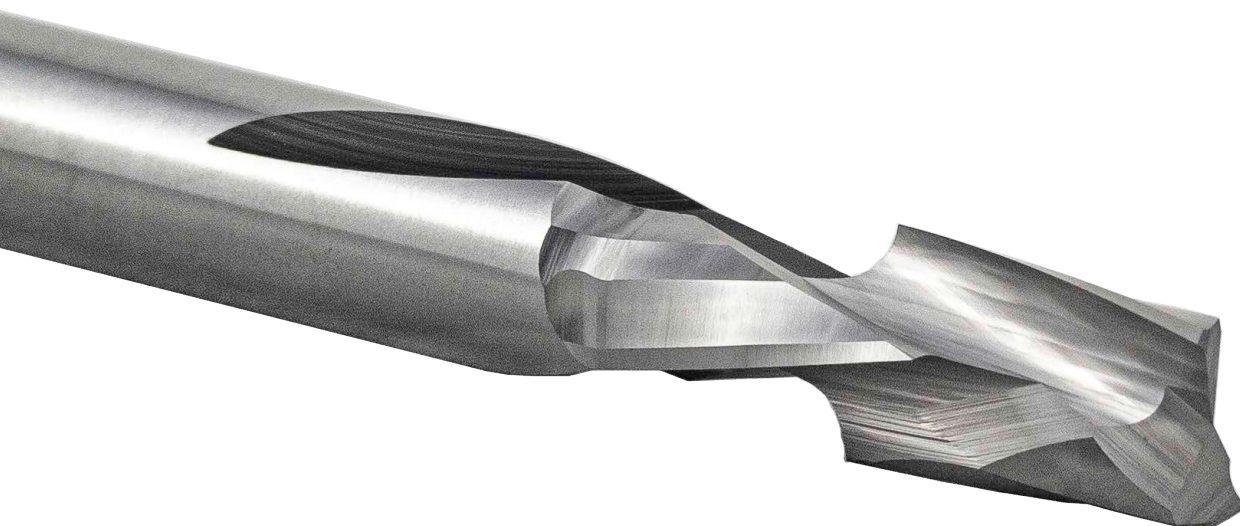
## 102PH

HM  
K20-K40  
Micrograin

HA



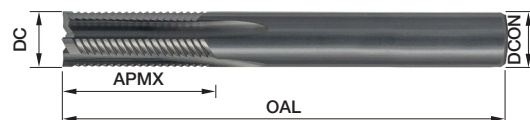
| Cod.               |                 | DC | DC TOL. | APMX | OAL | DCON |
|--------------------|-----------------|----|---------|------|-----|------|
| Rivestite          | Non rivestite   |    |         |      |     | h6   |
| 102PH.020060640TAC | 102PH.020060640 | 2  | h10     | 6    | 40  | 6    |
| 102PH.030031240TAC | 102PH.030031240 | 3  | h10     | 12   | 40  | 3    |
| 102PH.030061250TAC | 102PH.030061250 | 3  | h10     | 12   | 50  | 6    |
| 102PH.040041440TAC | 102PH.040041440 | 4  | h10     | 14   | 40  | 4    |
| 102PH.050051650TAC | 102PH.050051650 | 5  | h10     | 16   | 50  | 5    |
| 102PH.060061850TAC | 102PH.060061850 | 6  | h10     | 18   | 50  | 6    |
| 102PH.080082063TAC | 102PH.080082063 | 8  | h10     | 20   | 63  | 8    |
| 102PH.100102572TAC | 102PH.100102572 | 10 | h10     | 25   | 72  | 10   |
| 102PH.120123083TAC | 102PH.120123083 | 12 | h10     | 30   | 83  | 12   |



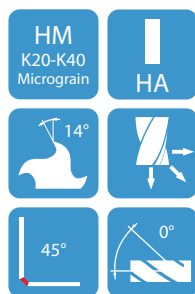


## FRESATURA HPC DI KEVLAR

Fresa HPC a 4 taglienti con romptruciolo alternato



## 419TD



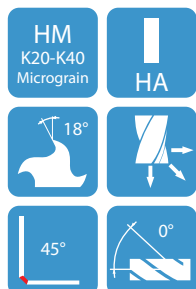
| Cod.             | DC | DC TOL. | APMX | OAL  | DCON |
|------------------|----|---------|------|------|------|
|                  |    |         | 0/+2 | 0/+2 | h6   |
| 419TD.060062060  | 6  | h10     | 20   | 60   | 6    |
| 419TD.060063575  | 6  | h10     | 35   | 75   | 6    |
| 419TD.080083275  | 8  | h10     | 32   | 75   | 8    |
| 419TD.0800840100 | 8  | h10     | 40   | 100  | 8    |
| 419TD.100103272  | 10 | h10     | 32   | 72   | 10   |
| 419TD.1001050100 | 10 | h10     | 50   | 100  | 10   |
| 419TD.120123283  | 12 | h10     | 32   | 83   | 12   |
| 419TD.1201255120 | 12 | h10     | 55   | 120  | 12   |

## FRESATURA STANDARD DI KEVLAR

Fresa a 2 taglianti con rompitruciolo alternato



## 119P



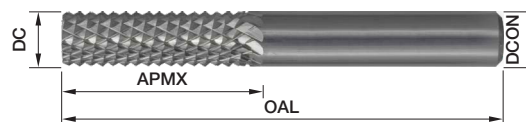
| Cod.            | DC | DC TOL. | APMX | OAL  | DCON |
|-----------------|----|---------|------|------|------|
|                 |    |         | 0/+2 | 0/+2 | h6   |
| 119P.030031250  | 3  | h10     | 12   | 50   | 3    |
| 119P.030061875  | 3  | h10     | 18   | 75   | 6    |
| 119P.040041450  | 4  | h10     | 14   | 50   | 4    |
| 119P.040062075  | 4  | h10     | 20   | 75   | 6    |
| 119P.050051650  | 5  | h10     | 16   | 50   | 5    |
| 119P.050062575  | 5  | h10     | 25   | 75   | 6    |
| 119P.060062060  | 6  | h10     | 20   | 60   | 6    |
| 119P.0600635100 | 6  | h10     | 35   | 100  | 6    |
| 119P.080082263  | 8  | h10     | 22   | 63   | 8    |
| 119P.0800840100 | 8  | h10     | 40   | 100  | 8    |
| 119P.100102572  | 10 | h10     | 25   | 72   | 10   |
| 119P.1001050125 | 10 | h10     | 50   | 125  | 10   |
| 119P.120123083  | 12 | h10     | 30   | 83   | 12   |
| 119P.1201260125 | 12 | h10     | 60   | 125  | 12   |
| 119P.160163592  | 16 | h10     | 35   | 92   | 16   |
| 119P.1601675150 | 16 | h10     | 75   | 150  | 16   |
| 119P.2002045104 | 20 | h10     | 45   | 104  | 20   |
| 119P.2002075150 | 20 | h10     | 75   | 150  | 20   |



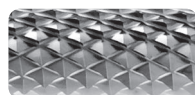
# 106 F, M, G

## FRESATURA DI FIBRA DI VETRO

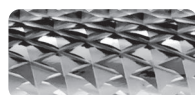
Fresa senza tagliente frontale



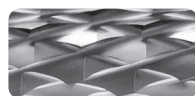
## 106 F, M, G



F



M



G

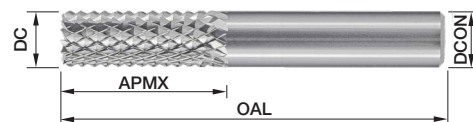
| Cod.            | DC | DC TOL. | APMX | OAL  | DCON |
|-----------------|----|---------|------|------|------|
|                 |    |         | 0/+2 | 0/+2 | h6   |
| 106F.020020740  | 2  | e9      | 7    | 40   | 2    |
| 106F.020060750  | 2  | e9      | 7    | 50   | 6    |
| 106F.030031040  | 3  | e9      | 10   | 40   | 3    |
| 106F.030061250  | 3  | e9      | 12   | 50   | 6    |
| 106F.040041540  | 4  | e9      | 15   | 40   | 4    |
| 106F.040062050  | 4  | e9      | 20   | 50   | 6    |
| 106F.050051650  | 5  | e9      | 16   | 50   | 5    |
| 106F.050062575  | 5  | e9      | 25   | 75   | 6    |
| 106F.060061850  | 6  | e9      | 18   | 50   | 6    |
| 106F.060063575  | 6  | e9      | 35   | 75   | 6    |
| 106F.070072260  | 7  | e9      | 22   | 60   | 7    |
| 106F.080082563  | 8  | e9      | 25   | 63   | 8    |
| 106F.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 106F.100103072  | 10 | e9      | 30   | 72   | 10   |
| 106F.120123283  | 12 | e9      | 32   | 83   | 12   |
| 106M.020020740  | 2  | e9      | 7    | 40   | 2    |
| 106M.020060750  | 2  | e9      | 7    | 50   | 6    |
| 106M.030031040  | 3  | e9      | 10   | 40   | 3    |
| 106M.030061250  | 3  | e9      | 12   | 50   | 6    |
| 106M.040041540  | 4  | e9      | 15   | 40   | 4    |
| 106M.040062050  | 4  | e9      | 20   | 50   | 6    |
| 106M.050051650  | 5  | e9      | 16   | 50   | 5    |
| 106M.050062575  | 5  | e9      | 25   | 75   | 6    |
| 106M.060061850  | 6  | e9      | 18   | 50   | 6    |
| 106M.060063575  | 6  | e9      | 35   | 75   | 6    |
| 106M.080082563  | 8  | e9      | 25   | 63   | 8    |
| 106M.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 106M.100103072  | 10 | e9      | 30   | 72   | 10   |
| 106M.120123283  | 12 | e9      | 32   | 83   | 12   |
| 106G.060061850  | 6  | e9      | 18   | 50   | 6    |
| 106G.060063575  | 6  | e9      | 35   | 75   | 6    |
| 106G.080082563  | 8  | e9      | 25   | 63   | 8    |
| 106G.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 106G.100103072  | 10 | e9      | 30   | 72   | 10   |
| 106G.120123283  | 12 | e9      | 32   | 83   | 12   |



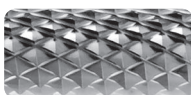
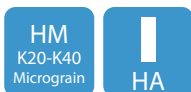
# 107 F, M, G

## FRESATURA DI FIBRA DI VETRO

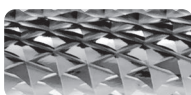
Fresa con taglio frontale



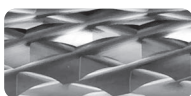
## 107 F, M, G



F



M



G

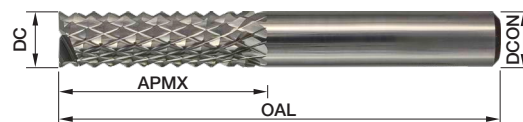
| Cod.            | DC | DC TOL. | APMX | OAL  | DCON |
|-----------------|----|---------|------|------|------|
|                 |    |         | 0/+2 | 0/+2 | h6   |
| 107F.020020740  | 2  | e9      | 7    | 40   | 2    |
| 107F.020060750  | 2  | e9      | 7    | 50   | 6    |
| 107F.030031040  | 3  | e9      | 10   | 40   | 3    |
| 107F.030061250  | 3  | e9      | 12   | 50   | 6    |
| 107F.040041540  | 4  | e9      | 15   | 40   | 4    |
| 107F.040062050  | 4  | e9      | 20   | 50   | 6    |
| 107F.050051650  | 5  | e9      | 16   | 50   | 5    |
| 107F.050062575  | 5  | e9      | 25   | 75   | 6    |
| 107F.060061850  | 6  | e9      | 18   | 50   | 6    |
| 107F.060063575  | 6  | e9      | 35   | 75   | 6    |
| 107F.070072260  | 7  | e9      | 22   | 60   | 7    |
| 107F.080082563  | 8  | e9      | 25   | 63   | 8    |
| 107F.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 107F.100103072  | 10 | e9      | 30   | 72   | 10   |
| 107F.120123283  | 12 | e9      | 32   | 83   | 12   |
| 107M.020020740  | 2  | e9      | 7    | 40   | 2    |
| 107M.020060750  | 2  | e9      | 7    | 50   | 6    |
| 107M.030031040  | 3  | e9      | 10   | 40   | 3    |
| 107M.030061250  | 3  | e9      | 12   | 50   | 6    |
| 107M.040041540  | 4  | e9      | 15   | 40   | 4    |
| 107M.040062050  | 4  | e9      | 20   | 50   | 6    |
| 107M.050051650  | 5  | e9      | 16   | 50   | 5    |
| 107M.050062575  | 5  | e9      | 25   | 75   | 6    |
| 107M.060061850  | 6  | e9      | 18   | 50   | 6    |
| 107M.060063575  | 6  | e9      | 35   | 75   | 6    |
| 107M.080082563  | 8  | e9      | 25   | 63   | 8    |
| 107M.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 107M.100103072  | 10 | e9      | 30   | 72   | 10   |
| 107M.120123283  | 12 | e9      | 32   | 83   | 12   |
| 107G.060061850  | 6  | e9      | 18   | 50   | 6    |
| 107G.060063575  | 6  | e9      | 35   | 75   | 6    |
| 107G.080082563  | 8  | e9      | 25   | 63   | 8    |
| 107G.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 107G.100103072  | 10 | e9      | 30   | 72   | 10   |
| 107G.120123283  | 12 | e9      | 32   | 83   | 12   |



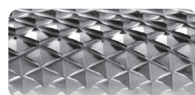
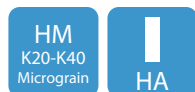
# 108 F, M, G

## FRESATURA DI FIBRA DI VETRO

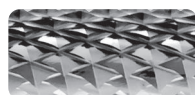
Fresa con taglio frontale Z=2



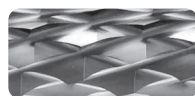
## 108 F, M, G



F



M



G

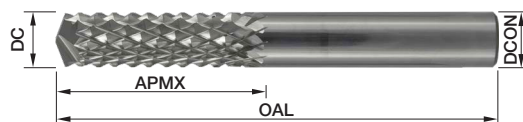
| Cod.            | DC | DC TOL. | APMX | OAL  | DCON |
|-----------------|----|---------|------|------|------|
|                 |    |         | 0/+2 | 0/+2 | h6   |
| 108F.020020740  | 2  | e9      | 7    | 40   | 2    |
| 108F.020060750  | 2  | e9      | 7    | 50   | 6    |
| 108F.030031040  | 3  | e9      | 10   | 40   | 3    |
| 108F.030061250  | 3  | e9      | 12   | 50   | 6    |
| 108F.040041540  | 4  | e9      | 15   | 40   | 4    |
| 108F.040062050  | 4  | e9      | 20   | 50   | 6    |
| 108F.050051650  | 5  | e9      | 16   | 50   | 5    |
| 108F.050062575  | 5  | e9      | 25   | 75   | 6    |
| 108F.060061850  | 6  | e9      | 18   | 50   | 6    |
| 108F.060063575  | 6  | e9      | 35   | 75   | 6    |
| 108F.070072260  | 7  | e9      | 22   | 60   | 7    |
| 108F.080082563  | 8  | e9      | 25   | 63   | 8    |
| 108F.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 108F.100103072  | 10 | e9      | 30   | 72   | 10   |
| 108F.120123283  | 12 | e9      | 32   | 83   | 12   |
| 108M.020020740  | 2  | e9      | 7    | 40   | 2    |
| 108M.020060750  | 2  | e9      | 7    | 50   | 6    |
| 108M.030031040  | 3  | e9      | 10   | 40   | 3    |
| 108M.030061250  | 3  | e9      | 12   | 50   | 6    |
| 108M.040041540  | 4  | e9      | 15   | 40   | 4    |
| 108M.040062050  | 4  | e9      | 20   | 50   | 6    |
| 108M.050051650  | 5  | e9      | 16   | 50   | 5    |
| 108M.050062575  | 5  | e9      | 25   | 75   | 6    |
| 108M.060061850  | 6  | e9      | 18   | 50   | 6    |
| 108M.060063575  | 6  | e9      | 35   | 75   | 6    |
| 108M.080082563  | 8  | e9      | 25   | 63   | 8    |
| 108M.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 108M.100103072  | 10 | e9      | 30   | 72   | 10   |
| 108M.120123283  | 12 | e9      | 32   | 83   | 12   |
| 108G.060061850  | 6  | e9      | 18   | 50   | 6    |
| 108G.060063575  | 6  | e9      | 35   | 75   | 6    |
| 108G.080082563  | 8  | e9      | 25   | 63   | 8    |
| 108G.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 108G.100103072  | 10 | e9      | 30   | 72   | 10   |
| 108G.120123283  | 12 | e9      | 32   | 83   | 12   |



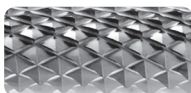
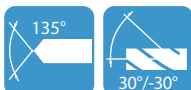
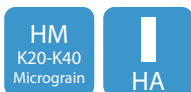
# 109 F, M, G

## FRESATURA DI FIBRA DI VETRO

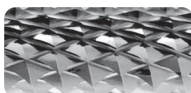
Fresa con punta forante Z=2



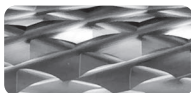
## 109 F, M, G



F



M



G

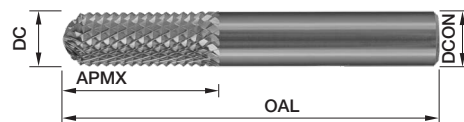
| Cod.            | DC | DC TOL. | APMX | OAL  | DCON |
|-----------------|----|---------|------|------|------|
|                 |    |         | 0/+2 | 0/+2 | h6   |
| 109F.020020740  | 2  | e9      | 7    | 40   | 2    |
| 109F.020060750  | 2  | e9      | 7    | 50   | 6    |
| 109F.030031040  | 3  | e9      | 10   | 40   | 3    |
| 109F.030061250  | 3  | e9      | 12   | 50   | 6    |
| 109F.040041540  | 4  | e9      | 15   | 40   | 4    |
| 109F.040062050  | 4  | e9      | 20   | 50   | 6    |
| 109F.050051650  | 5  | e9      | 16   | 50   | 5    |
| 109F.050062575  | 5  | e9      | 25   | 75   | 6    |
| 109F.060061850  | 6  | e9      | 18   | 50   | 6    |
| 109F.060063575  | 6  | e9      | 35   | 75   | 6    |
| 109F.070072260  | 7  | e9      | 22   | 60   | 7    |
| 109F.080082563  | 8  | e9      | 25   | 63   | 8    |
| 109F.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 109F.100103072  | 10 | e9      | 30   | 72   | 10   |
| 109F.120123283  | 12 | e9      | 32   | 83   | 12   |
| 109M.020020740  | 2  | e9      | 7    | 40   | 2    |
| 109M.020060750  | 2  | e9      | 7    | 50   | 6    |
| 109M.030031040  | 3  | e9      | 10   | 40   | 3    |
| 109M.030061250  | 3  | e9      | 12   | 50   | 6    |
| 109M.040041540  | 4  | e9      | 15   | 40   | 4    |
| 109M.040062050  | 4  | e9      | 20   | 50   | 6    |
| 109M.050051650  | 5  | e9      | 16   | 50   | 5    |
| 109M.050062575  | 5  | e9      | 25   | 75   | 6    |
| 109M.060061850  | 6  | e9      | 18   | 50   | 6    |
| 109M.060063575  | 6  | e9      | 35   | 75   | 6    |
| 109M.080082563  | 8  | e9      | 25   | 63   | 8    |
| 109M.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 109M.100103072  | 10 | e9      | 30   | 72   | 10   |
| 109M.120123283  | 12 | e9      | 32   | 83   | 12   |
| 109G.060061850  | 6  | e9      | 18   | 50   | 6    |
| 109G.060063575  | 6  | e9      | 35   | 75   | 6    |
| 109G.080082563  | 8  | e9      | 25   | 63   | 8    |
| 109G.0800840100 | 8  | e9      | 40   | 100  | 8    |
| 109G.100103072  | 10 | e9      | 30   | 72   | 10   |
| 109G.120123283  | 12 | e9      | 32   | 83   | 12   |



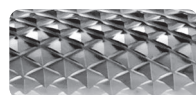
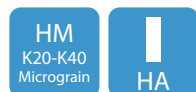
# 106R F, M

FRESATURA DI FIBRA DI VETRO

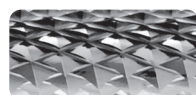
Fresa raggiata



## 106R F, M

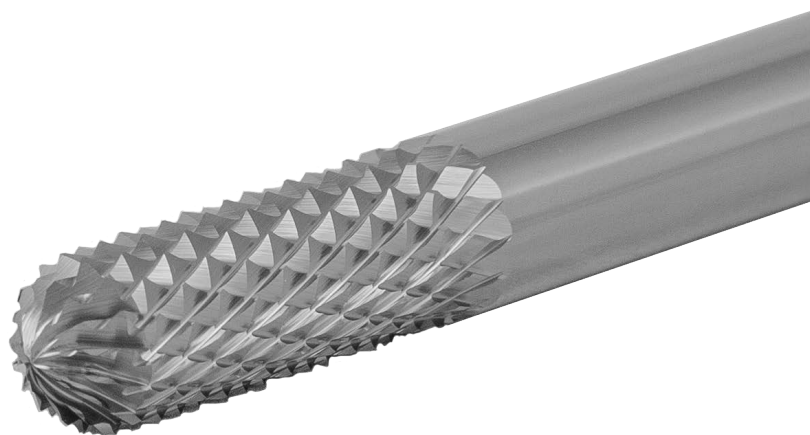


F



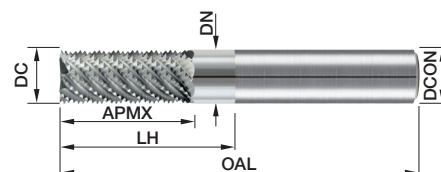
M

| Cod.             | DC | DC TOL. | APMX | OAL  | DCN | RE           |
|------------------|----|---------|------|------|-----|--------------|
|                  |    |         | 0/+2 | 0/+2 | h6  | +0,015/-0,01 |
| 106RF.030031040  | 3  | e9      | 10   | 40   | 3   | 1,5          |
| 106RF.030061250  | 3  | e9      | 12   | 50   | 6   | 1,5          |
| 106RF.040041540  | 4  | e9      | 15   | 40   | 4   | 2            |
| 106RF.040062050  | 4  | e9      | 20   | 50   | 6   | 2            |
| 106RF.050051650  | 5  | e9      | 16   | 50   | 5   | 2,5          |
| 106RF.050062575  | 5  | e9      | 25   | 75   | 6   | 2,5          |
| 106RF.060061850  | 6  | e9      | 18   | 50   | 6   | 3            |
| 106RF.060063575  | 6  | e9      | 35   | 75   | 6   | 3            |
| 106RF.080082563  | 8  | e9      | 25   | 63   | 8   | 4            |
| 106RF.0800840100 | 8  | e9      | 40   | 100  | 8   | 4            |
| 106RF.100103072  | 10 | e9      | 30   | 72   | 10  | 5            |
| 106RF.120123283  | 12 | e9      | 32   | 83   | 12  | 6            |
| 106RF.160163692  | 16 | e9      | 36   | 92   | 16  | 8            |
| 106RF.2002045104 | 20 | e9      | 45   | 104  | 20  | 10           |
| 106RM.030031040  | 3  | e9      | 10   | 40   | 3   | 1,5          |
| 106RM.030061250  | 3  | e9      | 12   | 50   | 6   | 1,5          |
| 106RM.040041540  | 4  | e9      | 15   | 40   | 4   | 2            |
| 106RM.040062050  | 4  | e9      | 20   | 50   | 6   | 2            |
| 106RM.050051650  | 5  | e9      | 16   | 50   | 5   | 2,5          |
| 106RM.050062575  | 5  | e9      | 25   | 75   | 6   | 2,5          |
| 106RM.060061850  | 6  | e9      | 18   | 50   | 6   | 3            |
| 106RM.060063575  | 6  | e9      | 35   | 75   | 6   | 3            |
| 106RM.080082563  | 8  | e9      | 25   | 63   | 8   | 4            |
| 106RM.0800840100 | 8  | e9      | 40   | 100  | 8   | 4            |
| 106RM.100103072  | 10 | e9      | 30   | 72   | 10  | 5            |
| 106RM.120123283  | 12 | e9      | 32   | 83   | 12  | 6            |
| 106RM.160163692  | 16 | e9      | 36   | 92   | 16  | 8            |
| 106RM.2002045104 | 20 | e9      | 45   | 104  | 20  | 10           |

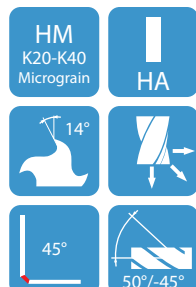


## FRESATURA DI MATERIALI A NIDO D'APE

Fresa multitagliente con rompitruciolo

Disponibile anche  
con rivestimento Cer-taC

## 77SU

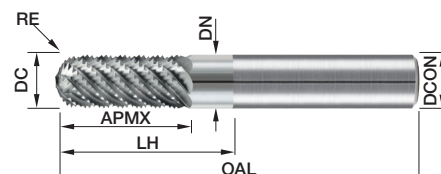


| Cod.               | DC  | DC TOL. | APMX | LH   | OAL  | DCON | DN      |
|--------------------|-----|---------|------|------|------|------|---------|
|                    |     |         | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,05 |
| 77SU.060061650     | 6   | e9      | 16   | 16   | 50   | 6    | 6       |
| 77SU.060061650TAC  | 6   | e9      | 16   | 16   | 50   | 6    | 6       |
| 77SU.080081963     | 8   | e9      | 19   | 26   | 63   | 8    | 7,9     |
| 77SU.080081963TAC  | 8   | e9      | 19   | 26   | 63   | 8    | 7,9     |
| 77SU.100102272     | 10  | e9      | 22   | 32   | 72   | 10   | 9,8     |
| 77SU.100102272TAC  | 10  | e9      | 22   | 32   | 72   | 10   | 9,8     |
| 77SU.120122683     | 12  | e9      | 26   | 37   | 83   | 12   | 11,8    |
| 77SU.120122683TAC  | 12  | e9      | 26   | 37   | 83   | 12   | 11,8    |
| 77SU.1401217100    | 14  | e9      | 17   | 17   | 100  | 12   | 12      |
| 77SU.1401217100TAC | 14  | e9      | 17   | 17   | 100  | 12   | 12      |
| 77SU.1601217100    | 16  | e9      | 17   | 24   | 100  | 12   | 14      |
| 77SU.1601217100TAC | 16  | e9      | 17   | 24   | 100  | 12   | 14      |
| 77SU.2001217100    | 20  | e9      | 17   | 24   | 100  | 12   | 16,5    |
| 77SU.2001217100TAC | 20  | e9      | 17   | 24   | 100  | 12   | 16,5    |
| 77SU.2401210100    | 24  | e9      | 10   | 17   | 100  | 12   | 17,5    |
| 77SU.2401210100TAC | 24  | e9      | 10   | 17   | 100  | 12   | 17,5    |
| 77SU.2401217100    | 24  | e9      | 17   | 24   | 100  | 12   | 17,5    |
| 77SU.2401217100TAC | 24  | e9      | 17   | 24   | 100  | 12   | 17,5    |
| 77SU.4401217100    | 44* | e9      | 17   | 28   | 100  | 12   | 20      |
| 77SU.4401217100TAC | 44* | e9      | 17   | 28   | 100  | 12   | 20      |

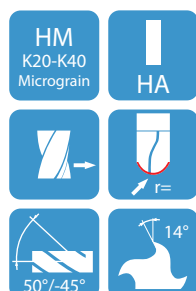
\* Lavorazione verticale non consentita

## FRESATURA DI MATERIALI A NIDO D'APE

Fresa raggiata multitagliente con rompitruciolo



## 77RSU



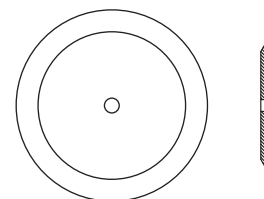
| Cod.             | DC | DC TOL. | APMX | LH   | OAL  | DCON | DN      | RE      |
|------------------|----|---------|------|------|------|------|---------|---------|
|                  |    |         | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,05 | +/-0,05 |
| 77RSU.100102272  | 10 | e9      | 22   | 32   | 72   | 10   | 9,8     | 5       |
| 77RSU.120122683  | 12 | e9      | 26   | 37   | 83   | 12   | 11,8    | 6       |
| 77RSU.1601217100 | 16 | e9      | 17   | 24   | 100  | 12   | 14      | 8       |

## FRESATURA DI MATERIALI A NIDO D'APE

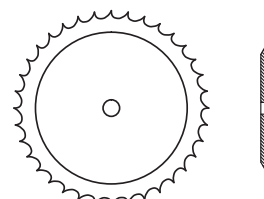
Fresa assemblata multitagliente con disco da taglio



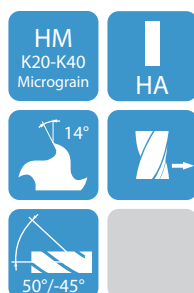
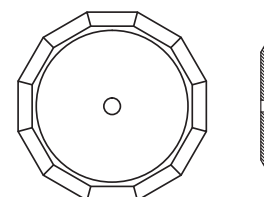
|         | Articolo    | Disco          | Codolo       | Testina    |
|---------|-------------|----------------|--------------|------------|
| 77SUPL. | .120122683  | OGD130390°L    | OC12078023M4 | 77SUP.1226 |
|         | .2001220100 | OGDCON103120°L | OC12089717M4 | 77SUP.2020 |
|         | .2401217100 | OGDCON503120°L | OC12089714M4 | 77SUP.2417 |
|         | .4401217100 | OGD4703120°L   | OC12089714M4 | 77SUP.4417 |



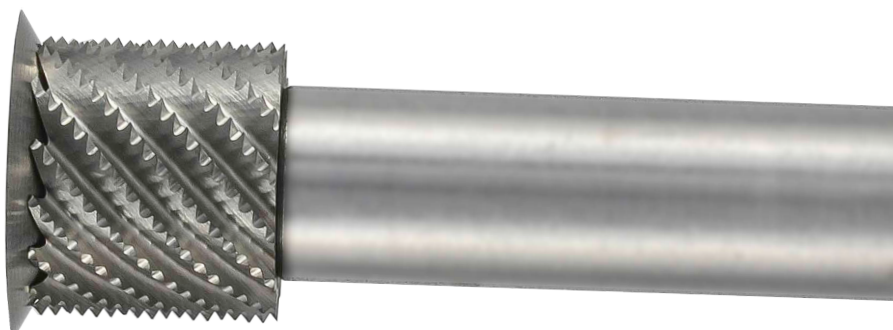
|         | Articolo    | Disco          | Codolo       | Testina    |
|---------|-------------|----------------|--------------|------------|
| 77SUPD. | .120122683  | OGD130390°D    | OC12078023M4 | 77SUP.1226 |
|         | .2001220100 | OGDCON103120°D | OC12089717M4 | 77SUP.2020 |
|         | .2401217100 | OGDCON503120°D | OC12089714M4 | 77SUP.2417 |
|         | .4401217100 | OGD4703120°D   | OC12089714M4 | 77SUP.4417 |



|         | Articolo    | Disco          | Codolo       | Testina    |
|---------|-------------|----------------|--------------|------------|
| 77SUPP. | .120122683  | OGD130390°P    | OC12078023M4 | 77SUP.1226 |
|         | .2001220100 | OGDCON103120°P | OC12089717M4 | 77SUP.2020 |
|         | .2401217100 | OGDCON503120°P | OC12089714M4 | 77SUP.2417 |
|         | .4401217100 | OGD4703120°P   | OC12089714M4 | 77SUP.4417 |



| Cod.        | DC | DC TOL. | APMX | OAL  | DCON |
|-------------|----|---------|------|------|------|
|             |    |         | 0/+2 | 0/+2 | h6   |
| .120122683  | 12 | e9      | 26   | 83   | 26   |
| .2001220100 | 20 | e9      | 20   | 100  | 20   |
| .2401217100 | 24 | e9      | 17   | 100  | 17   |
| .4401217100 | 44 | e9      | 17   | 100  | 17   |



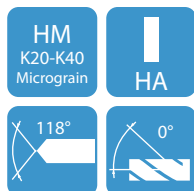
## FORATURA STANDARD DI FIBRA DI CARBONIO

Punta a taglienti diritti Z=4 per foratura manuale e CNC

Disponibile anche  
con rivestimento DLC



## 217

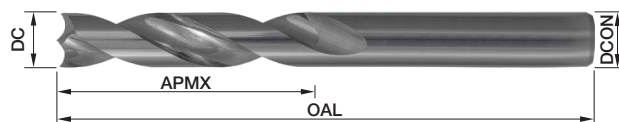


| Cod.       |               | DC   | DC TOL. | APMX | OAL  | DCON |
|------------|---------------|------|---------|------|------|------|
| Rivestite  | Non rivestite |      |         | 0/+2 | 0/+2 | H7   |
| 217.020DL  | 217.020       | 2    | H7      | 50   | 100  | 2    |
| 217.0248DL | 217.0248      | 2,48 | H7      | 50   | 100  | 2,48 |
| 217.030DL  | 217.030       | 3    | H7      | 50   | 100  | 3    |
| 217.0317DL | 217.0317      | 3,17 | H7      | 50   | 100  | 3,17 |
| 217.040DL  | 217.040       | 4    | H7      | 50   | 100  | 4    |
| 217.0421DL | 217.0421      | 4,21 | H7      | 50   | 100  | 4,21 |
| 217.0482DL | 217.0482      | 4,82 | H7      | 50   | 100  | 4,82 |
| 217.0505DL | 217.0505      | 5,05 | H7      | 50   | 100  | 5,05 |
| 217.0553DL | 217.0553      | 5,53 | H7      | 50   | 100  | 5,53 |
| 217.060DL  | 217.060       | 6    | H7      | 50   | 100  | 6    |
| 217.0635DL | 217.0635      | 6,35 | H7      | 50   | 100  | 6,35 |
| 217.066DL  | 217.066       | 6,6  | H7      | 50   | 100  | 6,6  |
| 217.070DL  | 217.070       | 7    | H7      | 50   | 100  | 7    |
| 217.0792DL | 217.0792      | 7,92 | H7      | 50   | 100  | 7,92 |
| 217.080DL  | 217.080       | 8    | H7      | 50   | 100  | 8    |
| 217.0863DL | 217.0863      | 8,63 | H7      | 50   | 100  | 8,63 |
| 217.090DL  | 217.090       | 9    | H7      | 50   | 100  | 9    |
| 217.100DL  | 217.100       | 10   | H7      | 50   | 100  | 10   |
| 217.120DL  | 217.120       | 12   | H7      | 50   | 100  | 12   |

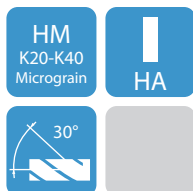


## FORATURA DI KEVLAR

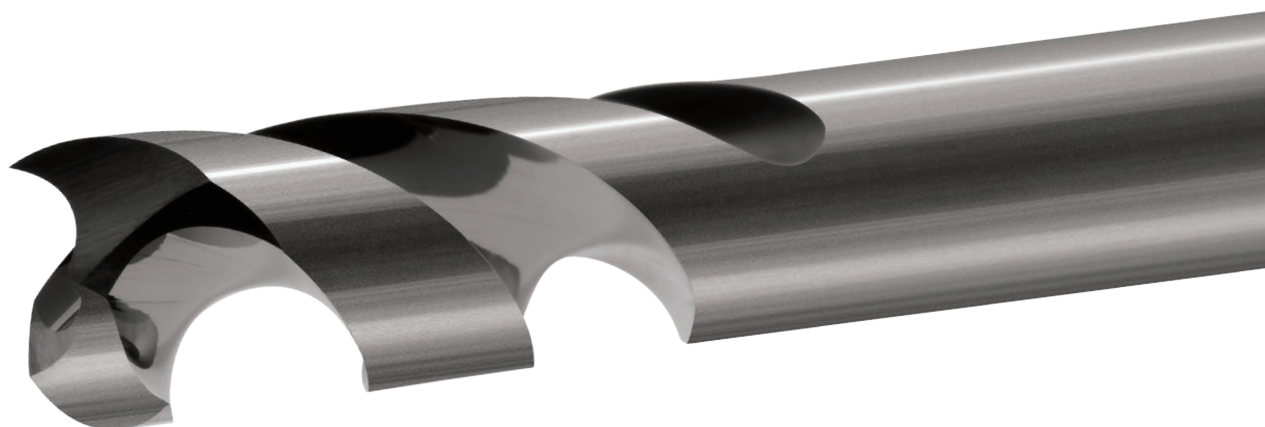
Punta elicoidale per foratura manuale e CNC



## 118



| Cod.     | DC   | DC TOL. | APMX | OAL  | DCON |
|----------|------|---------|------|------|------|
|          |      |         | 0/+2 | 0/+2 | h6   |
| 118.030  | 3    | h6      | 12   | 40   | 3    |
| 118.0317 | 3,17 | h6      | 12   | 40   | 3,17 |
| 118.040  | 4    | h6      | 18   | 55   | 4    |
| 118.050  | 5    | h6      | 26   | 62   | 5    |
| 118.060  | 6    | h6      | 28   | 66   | 6    |
| 118.0635 | 6,35 | h6      | 31   | 70   | 6,35 |
| 118.065  | 6,5  | h6      | 31   | 70   | 6,5  |
| 118.070  | 7    | h6      | 34   | 74   | 7    |
| 118.0793 | 7,93 | h6      | 37   | 79   | 7,93 |
| 118.080  | 8    | h6      | 37   | 79   | 8    |
| 118.085  | 8,5  | h6      | 37   | 79   | 8,5  |
| 118.090  | 9    | h6      | 40   | 84   | 9    |
| 118.100  | 10   | h6      | 48   | 89   | 10   |
| 118.120  | 12   | h6      | 50   | 102  | 12   |

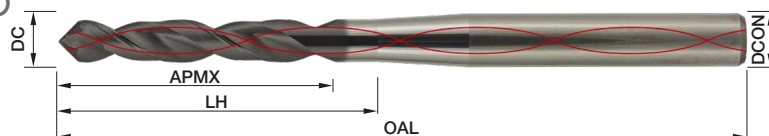


## FORATURA HPC DI FIBRA DI CARBONIO

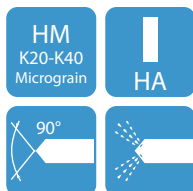
Punta HPC per CNC

Diamante CVD Cer-DA

Adduzione interna



## 165C



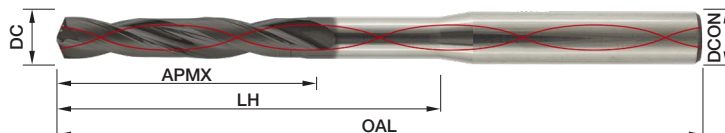
| Cod.               | DC    | DC TOL. | APMX | LH   | OAL  | DCON |
|--------------------|-------|---------|------|------|------|------|
|                    |       |         | 0/+2 | 0/+2 | 0/+2 | h6   |
| 165C.0248062366DA  | 2,48  | h6      | 23   | 28   | 66   | 6    |
| 165C.030062366DA   | 3     | h6      | 23   | 28   | 66   | 6    |
| 165C.03175062366DA | 3,175 | h6      | 23   | 28   | 66   | 6    |
| 165C.040062974DA   | 4     | h6      | 29   | 36   | 74   | 6    |
| 165C.04826063682DA | 4,826 | h6      | 36   | 44   | 82   | 6    |
| 165C.060063582DA   | 6     | h6      | 35   | 44   | 82   | 6    |
| 165C.0635084391DA  | 6,35  | h6      | 43   | 53   | 91   | 8    |
| 165C.0793084391DA  | 7,93  | h6      | 43   | 53   | 91   | 8    |
| 165C.080084391DA   | 8     | h6      | 43   | 53   | 91   | 8    |
| 165C.09521049103DA | 9,52  | h6      | 49   | 61   | 103  | 10   |
| 165C.1001049103DA  | 10    | h6      | 49   | 61   | 103  | 10   |

## FORATURA HPC DI FIBRA DI CARBONIO

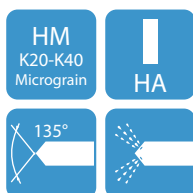
Punta HPC per pannelli CFRP+Ti o CFRP+Al

Diamante CVD Cer-DA

Adduzione interna



## 165ST



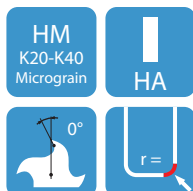
| Cod.                | DC    | DC TOL. | APMX | LH   | OAL  | DCON |
|---------------------|-------|---------|------|------|------|------|
|                     |       |         | 0/+2 | 0/+2 | 0/+2 | h6   |
| 165ST.0248062366DA  | 2,48  | h6      | 23   | 28   | 66   | 6    |
| 165ST.030062366DA   | 3     | h6      | 23   | 28   | 66   | 6    |
| 165ST.03175062366DA | 3,175 | h6      | 23   | 28   | 66   | 6    |
| 165ST.040062974DA   | 4     | h6      | 29   | 36   | 74   | 6    |
| 165ST.04826063682DA | 4,826 | h6      | 36   | 44   | 82   | 6    |
| 165ST.060063582DA   | 6     | h6      | 35   | 44   | 82   | 6    |
| 165ST.0635084391DA  | 6,35  | h6      | 43   | 53   | 91   | 8    |
| 165ST.0793084391DA  | 7,93  | h6      | 43   | 53   | 91   | 8    |
| 165ST.080084391DA   | 8     | h6      | 43   | 53   | 91   | 8    |
| 165ST.09521049103DA | 9,52  | h6      | 49   | 61   | 103  | 10   |
| 165ST.1001049103DA  | 10    | h6      | 49   | 61   | 103  | 10   |

## FRESATURA PCD

Fresa PCD a taglienti diritti con raggio torico



## PK62TDT



| Cod.               | DC | DC TOL. | APMX | OAL  | DCON | RE      |
|--------------------|----|---------|------|------|------|---------|
|                    |    |         | 0/+2 | 0/+2 | h6   | +/-0,03 |
| PK62TDT.060060660  | 6  | h10     | 6    | 60   | 6    | 0,5     |
| PK62TDT.0600612100 | 6  | h10     | 12   | 100  | 6    | 0,5     |
| PK62TDT.080080863  | 8  | h10     | 8    | 63   | 8    | 0,5     |
| PK62TDT.0800816100 | 8  | h10     | 16   | 100  | 8    | 0,5     |
| PK62TDT.100101072  | 10 | h10     | 10   | 72   | 10   | 1       |
| PK62TDT.1001020100 | 10 | h10     | 20   | 100  | 10   | 1       |
| PK62TDT.120121283  | 12 | h10     | 12   | 83   | 12   | 1       |
| PK62TDT.1201224100 | 12 | h10     | 24   | 100  | 12   | 1       |

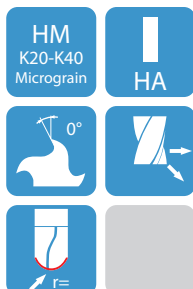


## FRESATURA PCD

Fresa raggiata PCD a taglienti diritti



## PK62TDR



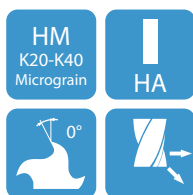
| Cod.               | DC | DC TOL. | APMX | OAL  | DCON | RE      |
|--------------------|----|---------|------|------|------|---------|
|                    |    |         | 0/+2 | 0/+2 | h6   | +/-0,03 |
| PK62TDR.0600606100 | 6  | h10     | 6    | 100  | 6    | 3       |
| PK62TDR.0800808100 | 8  | h10     | 8    | 100  | 8    | 4       |
| PK62TDR.1001010100 | 10 | h10     | 10   | 100  | 10   | 5       |
| PK62TDR.1201212100 | 12 | h10     | 12   | 100  | 12   | 6       |

## FRESATURA PCD

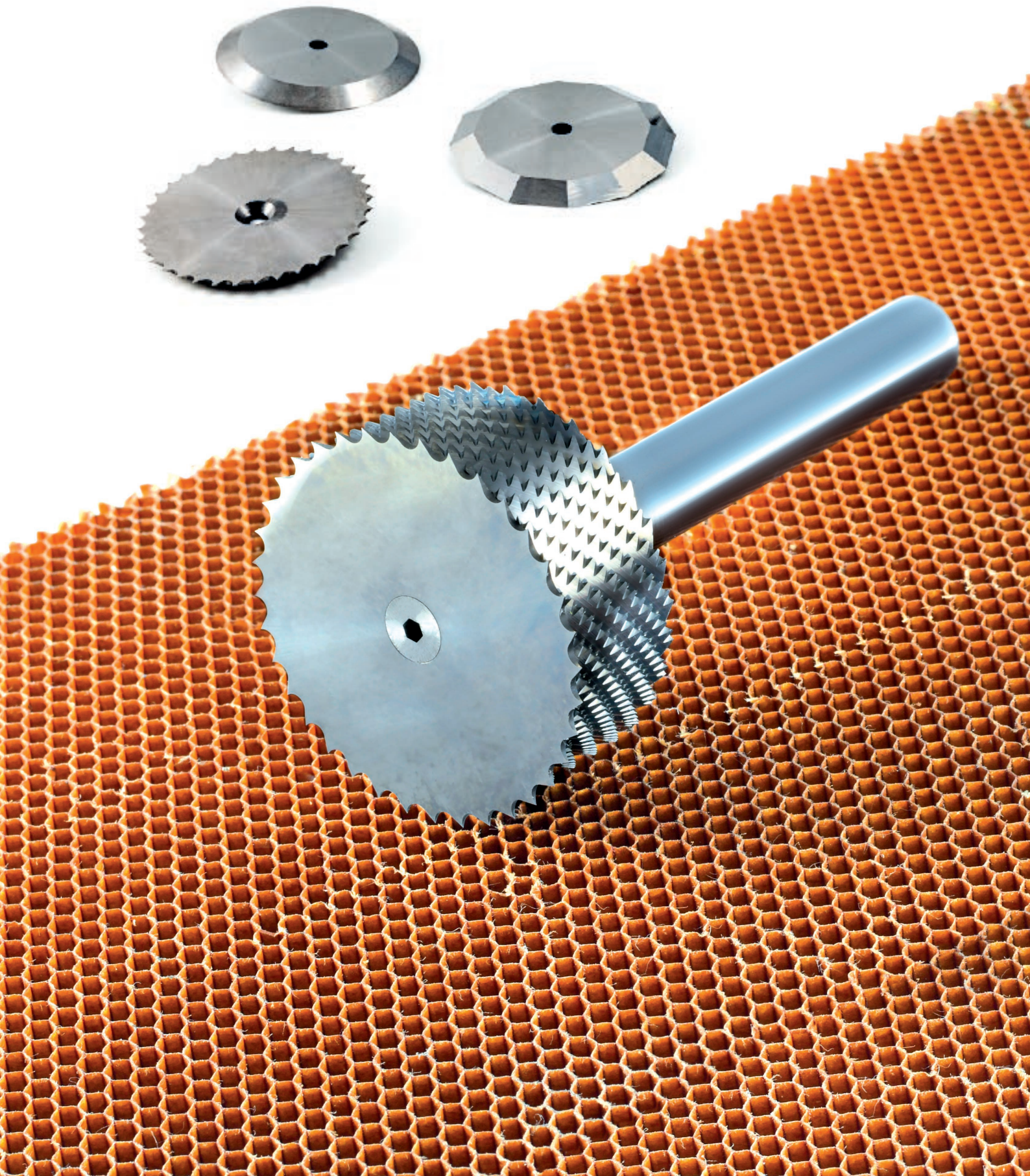
Fresa multitagliente PCD a taglienti diritti



## PK66TD



| Cod.             | DC | DC TOL. | APMX | OAL  | DCON |
|------------------|----|---------|------|------|------|
|                  |    |         | 0/+2 | 0/+2 | h6   |
| PK66TD.080081063 | 8  | h10     | 10   | 63   | 8    |
| PK66TD.100101272 | 10 | h10     | 12   | 72   | 10   |
| PK66TD.120121583 | 12 | h10     | 15   | 83   | 12   |

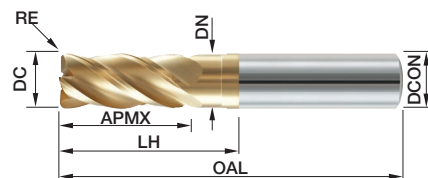


# 641

## FRESATURA DI TITANIO

Fresa a 4 taglienti con raggio torico

PVD Zirconio Cer-Ni



# 641



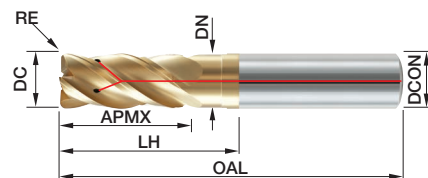
| Cod.                | DC | DC TOL. | APMX | LH   | OAL  | DCON | RE      | DN      |
|---------------------|----|---------|------|------|------|------|---------|---------|
|                     |    |         | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,04 | 0/-0,05 |
| 641.030060857R030N  | 3  | h10     | 8    | 12   | 57   | 6    | 0,3     | 2,8     |
| 641.040061157R030N  | 4  | h10     | 11   | 15   | 57   | 6    | 0,3     | 3,8     |
| 641.050061357R030N  | 5  | h10     | 13   | 17   | 57   | 6    | 0,3     | 4,8     |
| 641.060061357R050N  | 6  | h10     | 13   | 21   | 57   | 6    | 0,5     | 5,8     |
| 641.060061357R100N  | 6  | h10     | 13   | 21   | 57   | 6    | 1       | 5,8     |
| 641.060061357R150N  | 6  | h10     | 13   | 21   | 57   | 6    | 1,5     | 5,8     |
| 641.080081963R050N  | 8  | h10     | 19   | 27   | 63   | 8    | 0,5     | 7,6     |
| 641.080081963R100N  | 8  | h10     | 19   | 27   | 63   | 8    | 1       | 7,6     |
| 641.080081963R150N  | 8  | h10     | 19   | 27   | 63   | 8    | 1,5     | 7,6     |
| 641.100102272R050N  | 10 | h10     | 22   | 32   | 72   | 10   | 0,5     | 9,3     |
| 641.100102272R100N  | 10 | h10     | 22   | 32   | 72   | 10   | 1       | 9,3     |
| 641.100102272R150N  | 10 | h10     | 22   | 32   | 72   | 10   | 1,5     | 9,3     |
| 641.120122683R100N  | 12 | h10     | 26   | 38   | 83   | 12   | 1       | 11,3    |
| 641.120122683R200N  | 12 | h10     | 26   | 38   | 83   | 12   | 2       | 11,3    |
| 641.120122683R300N  | 12 | h10     | 26   | 38   | 83   | 12   | 3       | 11,3    |
| 641.160163292R100N  | 16 | h10     | 32   | 44   | 92   | 16   | 1       | 15,3    |
| 641.160163292R200N  | 16 | h10     | 32   | 44   | 92   | 16   | 2       | 15,3    |
| 641.160163292R400N  | 16 | h10     | 32   | 44   | 92   | 16   | 4       | 15,3    |
| 641.2002038104R200N | 20 | h10     | 38   | 54   | 104  | 20   | 2       | 19,5    |
| 641.2002038104R300N | 20 | h10     | 38   | 54   | 104  | 20   | 3       | 19,5    |
| 641.2002038104R500N | 20 | h10     | 38   | 54   | 104  | 20   | 5       | 19,5    |



## FRESATURA DI TITANIO

Fresa a 4 taglienti con raggio torico e adduzione interna

PVD Zirconio Cer-Ni



## 641F



| Cod.                 | DC | DC TOL. | APMX | LH   | OAL  | DCON | RE      | DN      |
|----------------------|----|---------|------|------|------|------|---------|---------|
|                      |    |         | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,04 | 0/-0,05 |
| 641F.060061357R050N  | 6  | h10     | 13   | 21   | 57   | 6    | 0,5     | 5,8     |
| 641F.060061357R100N  | 6  | h10     | 13   | 21   | 57   | 6    | 1       | 5,8     |
| 641F.060061357R150N  | 6  | h10     | 13   | 21   | 57   | 6    | 1,5     | 5,8     |
| 641F.080081963R050N  | 8  | h10     | 19   | 27   | 63   | 8    | 0,5     | 7,6     |
| 641F.080081963R100N  | 8  | h10     | 19   | 27   | 63   | 8    | 1       | 7,6     |
| 641F.080081963R150N  | 8  | h10     | 19   | 27   | 63   | 8    | 1,5     | 7,6     |
| 641F.100102272R050N  | 10 | h10     | 22   | 32   | 72   | 10   | 0,5     | 9,3     |
| 641F.100102272R100N  | 10 | h10     | 22   | 32   | 72   | 10   | 1       | 9,3     |
| 641F.100102272R150N  | 10 | h10     | 22   | 32   | 72   | 10   | 1,5     | 9,3     |
| 641F.120122683R100N  | 12 | h10     | 26   | 38   | 83   | 12   | 1       | 11,3    |
| 641F.120122683R200N  | 12 | h10     | 26   | 38   | 83   | 12   | 2       | 11,3    |
| 641F.120122683R300N  | 12 | h10     | 26   | 38   | 83   | 12   | 3       | 11,3    |
| 641F.160163292R100N  | 16 | h10     | 32   | 44   | 92   | 16   | 1       | 15,3    |
| 641F.160163292R200N  | 16 | h10     | 32   | 44   | 92   | 16   | 2       | 15,3    |
| 641F.160163292R400N  | 16 | h10     | 32   | 44   | 92   | 16   | 4       | 15,3    |
| 641F.2002038104R200N | 20 | h10     | 38   | 54   | 104  | 20   | 2       | 19,5    |
| 641F.2002038104R300N | 20 | h10     | 38   | 54   | 104  | 20   | 3       | 19,5    |
| 641F.2002038104R500N | 20 | h10     | 38   | 54   | 104  | 20   | 5       | 19,5    |

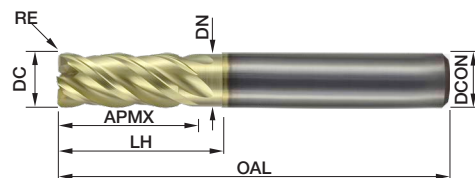


# 642

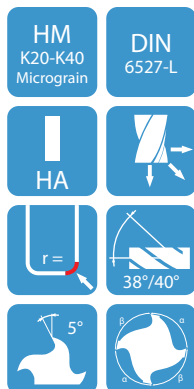
## FRESATURA DI LEGHE DI TITANIO E NICHEL

Fresa a 4 taglienti con raggio torico

PVD Zirconio Cer-Ni



# 642



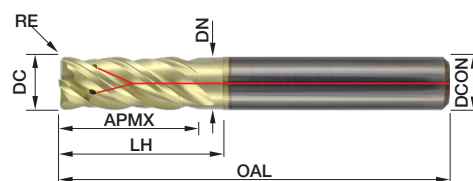
| Cod.                | DC | DC TOL. | APMX | LH   | OAL  | DCON | RE      | DN      |
|---------------------|----|---------|------|------|------|------|---------|---------|
|                     |    |         | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,04 | 0/-0,05 |
| 642.030060857R030N  | 3  | h10     | 8    | 12   | 57   | 6    | 0,3     | 2,9     |
| 642.040061157R030N  | 4  | h10     | 11   | 15   | 57   | 6    | 0,3     | 3,8     |
| 642.050061357R030N  | 5  | h10     | 13   | 17   | 57   | 6    | 0,3     | 4,8     |
| 642.060061357R050N  | 6  | h10     | 13   | 19   | 57   | 6    | 0,5     | 5,7     |
| 642.060061357R100N  | 6  | h10     | 13   | 19   | 57   | 6    | 1       | 5,7     |
| 642.060061357R150N  | 6  | h10     | 13   | 19   | 57   | 6    | 1,5     | 5,7     |
| 642.080081963R050N  | 8  | h10     | 19   | 25   | 63   | 8    | 0,5     | 7,7     |
| 642.080081963R100N  | 8  | h10     | 19   | 25   | 63   | 8    | 1       | 7,7     |
| 642.080081963R150N  | 8  | h10     | 19   | 25   | 63   | 8    | 1,5     | 7,7     |
| 642.100102272R050N  | 10 | h10     | 22   | 30   | 72   | 10   | 0,5     | 9,7     |
| 642.100102272R100N  | 10 | h10     | 22   | 30   | 72   | 10   | 1       | 9,7     |
| 642.100102272R150N  | 10 | h10     | 22   | 30   | 72   | 10   | 1,5     | 9,7     |
| 642.120122683R100N  | 12 | h10     | 26   | 34   | 83   | 12   | 1       | 11,5    |
| 642.120122683R200N  | 12 | h10     | 26   | 34   | 83   | 12   | 2       | 11,5    |
| 642.120122683R300N  | 12 | h10     | 26   | 34   | 83   | 12   | 3       | 11,5    |
| 642.160163292R100N  | 16 | h10     | 32   | 47   | 92   | 16   | 1       | 15,5    |
| 642.160163292R200N  | 16 | h10     | 32   | 47   | 92   | 16   | 2       | 15,5    |
| 642.160163292R400N  | 16 | h10     | 32   | 47   | 92   | 16   | 4       | 15,5    |
| 642.2002038104R200N | 20 | h10     | 38   | 53   | 104  | 20   | 2       | 19,5    |
| 642.2002038104R300N | 20 | h10     | 38   | 53   | 104  | 20   | 3       | 19,5    |
| 642.2002038104R500N | 20 | h10     | 38   | 53   | 104  | 20   | 5       | 19,5    |



## FRESATURA DI LEGHE DI TITANIO E NICHEL

Fresa a 4 taglienti con raggio torico e adduzione interna

PVD Zirconio Cer-Ni



## 642F



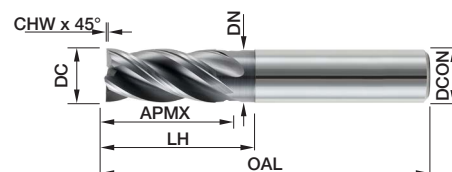
| Cod.                 | DC | DC TOL. | APMX | LH   | OAL  | DCON | RE      | DN      |
|----------------------|----|---------|------|------|------|------|---------|---------|
|                      |    |         | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,04 | 0/-0,05 |
| 642F.060061357R050N  | 6  | h10     | 13   | 19   | 57   | 6    | 0,5     | 5,7     |
| 642F.060061357R100N  | 6  | h10     | 13   | 19   | 57   | 6    | 1       | 5,7     |
| 642F.060061357R150N  | 6  | h10     | 13   | 19   | 57   | 6    | 1,5     | 5,7     |
| 642F.080081963R050N  | 8  | h10     | 19   | 25   | 63   | 8    | 0,5     | 7,7     |
| 642F.080081963R100N  | 8  | h10     | 19   | 25   | 63   | 8    | 1       | 7,7     |
| 642F.080081963R200N  | 8  | h10     | 19   | 25   | 63   | 8    | 1,5     | 7,7     |
| 642F.100102272R050N  | 10 | h10     | 22   | 30   | 72   | 10   | 0,5     | 9,7     |
| 642F.100102272R100N  | 10 | h10     | 22   | 30   | 72   | 10   | 1       | 9,7     |
| 642F.100102272R250N  | 10 | h10     | 22   | 30   | 72   | 10   | 1,5     | 9,7     |
| 642F.120122683R100N  | 12 | h10     | 26   | 34   | 83   | 12   | 1       | 11,5    |
| 642F.120122683R200N  | 12 | h10     | 26   | 34   | 83   | 12   | 2       | 11,5    |
| 642F.120122683R300N  | 12 | h10     | 26   | 34   | 83   | 12   | 3       | 11,5    |
| 642F.160163292R100N  | 16 | h10     | 32   | 47   | 92   | 16   | 1       | 15,5    |
| 642F.160163292R200N  | 16 | h10     | 32   | 47   | 92   | 16   | 2       | 15,5    |
| 642F.160163292R400N  | 16 | h10     | 32   | 47   | 92   | 16   | 4       | 15,5    |
| 642F.2002038104R200N | 20 | h10     | 38   | 53   | 104  | 20   | 2       | 19,5    |
| 642F.2002038104R300N | 20 | h10     | 38   | 53   | 104  | 20   | 3       | 19,5    |
| 642F.2002038104R500N | 20 | h10     | 38   | 53   | 104  | 20   | 5       | 19,5    |



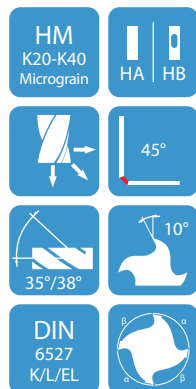
# 640

## FRESATURA HPC Fresa HPC a 4 taglienti

PVD TiAlCrN Cer-Y



# 640

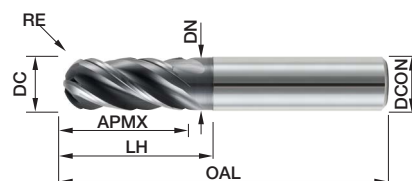


| Cod.            |                  | DC  | APMX | LH   | OAL  | APMX | DN      | CHW     |
|-----------------|------------------|-----|------|------|------|------|---------|---------|
| Gambo HA        | Gambo HB         | h10 | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,05 | +/-0,05 |
| 640.030060550Y  | 640W.030060550Y  | 3   | 5    |      | 50   | 6    |         | 0,15    |
| 640.030060857Y  | 640W.030060857Y  | 3   | 8    | 12   | 57   | 6    | 2,8     | 0,15    |
| 640.030060870Y  | 640W.030060870Y  | 3   | 8    | 15   | 70   | 6    | 2,8     | 0,15    |
| 640.040060854Y  | 640W.040060854Y  | 4   | 8    |      | 54   | 6    |         | 0,15    |
| 640.040061157Y  | 640W.040061157Y  | 4   | 11   | 15   | 57   | 6    | 3,8     | 0,15    |
| 640.040061170Y  | 640W.040061170Y  | 4   | 11   | 20   | 70   | 6    | 3,8     | 0,15    |
| 640.050060954Y  | 640W.050060954Y  | 5   | 9    |      | 54   | 6    |         | 0,15    |
| 640.050061357Y  | 640W.050061357Y  | 5   | 13   | 17   | 57   | 6    | 4,8     | 0,15    |
| 640.050061370Y  | 640W.050061370Y  | 5   | 13   | 25   | 70   | 6    | 4,8     | 0,15    |
| 640.060061054Y  | 640W.060061054Y  | 6   | 10   |      | 54   | 6    |         | 0,15    |
| 640.060061357Y  | 640W.060061357Y  | 6   | 13   | 21   | 57   | 6    | 5,8     | 0,15    |
| 640.060061370Y  | 640W.060061370Y  | 6   | 13   | 30   | 70   | 6    | 5,8     | 0,15    |
| 640.080081258Y  | 640W.080081258Y  | 8   | 12   |      | 58   | 8    |         | 0,25    |
| 640.080081963Y  | 640W.080081963Y  | 8   | 19   | 27   | 63   | 8    | 7,7     | 0,25    |
| 640.080081980Y  | 640W.080081980Y  | 8   | 19   | 40   | 80   | 8    | 7,7     | 0,25    |
| 640.100101466Y  | 640W.100101466Y  | 10  | 14   |      | 66   | 10   |         | 0,25    |
| 640.100102272Y  | 640W.100102272Y  | 10  | 22   | 32   | 72   | 10   | 9,7     | 0,25    |
| 640.100102294Y  | 640W.100102294Y  | 10  | 22   | 50   | 94   | 10   | 9,7     | 0,25    |
| 640.120121673Y  | 640W.120121673Y  | 12  | 16   |      | 73   | 12   |         | 0,35    |
| 640.120122683Y  | 640W.120122683Y  | 12  | 26   | 38   | 83   | 12   | 11,6    | 0,35    |
| 640.1201226109Y | 640W.1201226109Y | 12  | 26   | 64   | 109  | 12   | 11,6    | 0,35    |
| 640.160162282Y  | 640W.160162282Y  | 16  | 22   |      | 82   | 16   |         | 0,35    |
| 640.160163292Y  | 640W.160163292Y  | 16  | 32   | 44   | 92   | 16   | 15,5    | 0,35    |
| 640.1601632132Y | 640W.1601632132Y | 16  | 32   | 80   | 132  | 16   | 15,5    | 0,35    |
| 640.200202692Y  | 640W.200202692Y  | 20  | 26   |      | 92   | 20   |         | 0,35    |
| 640.2002038104Y | 640W.2002038104Y | 20  | 38   | 54   | 104  | 20   | 19,5    | 0,35    |
| 640.2002038154Y | 640W.2002038154Y | 20  | 38   | 100  | 154  | 20   | 19,5    | 0,35    |

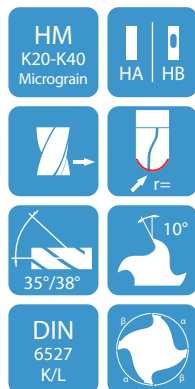
## FRESATURA HPC

Fresa HPC raggiata a 4 taglienti

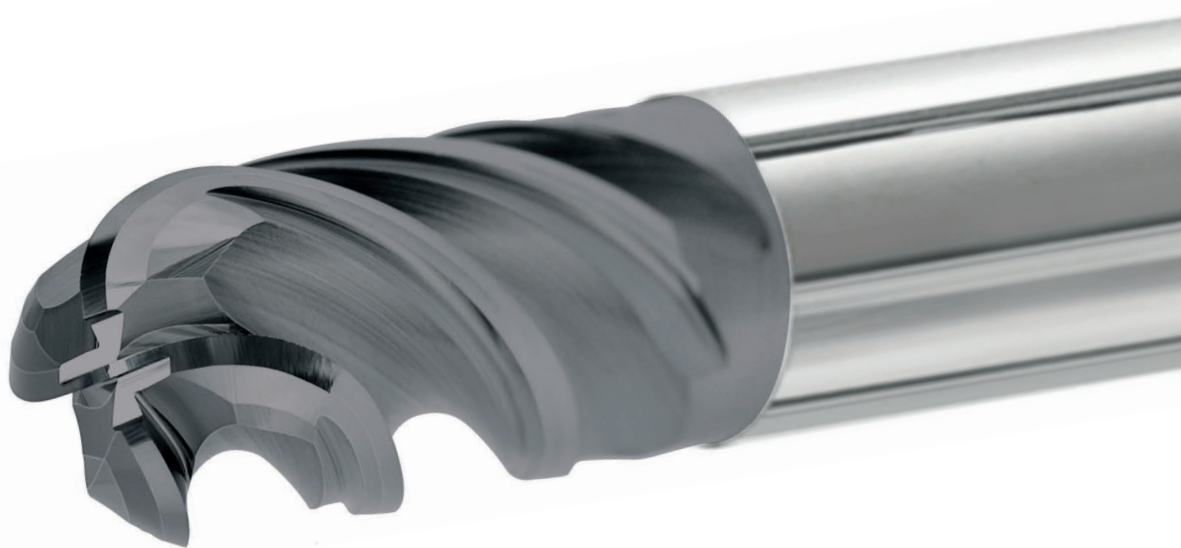
PVD TiAlCrN Cer-Y



## 640R



| Cod.             |                   | DC  | APMX | LH   | OAL  | DCON | DN      | RE      |
|------------------|-------------------|-----|------|------|------|------|---------|---------|
| Gambo HA         | Gambo HB          | h10 | 0/+2 | 0/+2 | 0/+2 | h6   | 0/-0,05 | +/-0,05 |
| 640R.030060550Y  | 640WR.030060550Y  | 3   | 5    |      | 50   | 6    |         | 1,5     |
| 640R.030060857Y  | 640WR.030060857Y  | 3   | 8    | 12   | 57   | 6    | 2,8     | 1,5     |
| 640R.040060854Y  | 640WR.040060854Y  | 4   | 8    |      | 54   | 6    |         | 2       |
| 640R.040061157Y  | 640WR.040061157Y  | 4   | 11   | 15   | 57   | 6    | 3,8     | 2       |
| 640R.050060954Y  | 640WR.050060954Y  | 5   | 9    |      | 54   | 6    |         | 2,5     |
| 640R.050061357Y  | 640WR.050061357Y  | 5   | 13   | 17   | 57   | 6    | 4,8     | 2,5     |
| 640R.060061054Y  | 640WR.060061054Y  | 6   | 10   |      | 54   | 6    |         | 3       |
| 640R.060061357Y  | 640WR.060061357Y  | 6   | 13   | 21   | 57   | 6    | 5,8     | 3       |
| 640R.080081258Y  | 640WR.080081258Y  | 8   | 12   |      | 58   | 8    |         | 4       |
| 640R.080081963Y  | 640WR.080081963Y  | 8   | 19   | 27   | 63   | 8    | 7,7     | 4       |
| 640R.100101466Y  | 640WR.100101466Y  | 10  | 14   |      | 66   | 10   |         | 5       |
| 640R.100102272Y  | 640WR.100102272Y  | 10  | 22   | 32   | 72   | 10   | 9,7     | 5       |
| 640R.120121673Y  | 640WR.120121673Y  | 12  | 16   |      | 73   | 12   |         | 6       |
| 640R.120122683Y  | 640WR.120122683Y  | 12  | 26   | 38   | 83   | 12   | 11,6    | 6       |
| 640R.160162282Y  | 640WR.160162282Y  | 16  | 22   |      | 82   | 16   |         | 8       |
| 640R.160163292Y  | 640WR.160163292Y  | 16  | 32   | 44   | 92   | 16   | 15,5    | 8       |
| 640R.200202692Y  | 640WR.200202692Y  | 20  | 26   |      | 92   | 20   |         | 10      |
| 640R.2002038104Y | 640WR.2002038104Y | 20  | 38   | 54   | 104  | 20   | 19,5    | 10      |

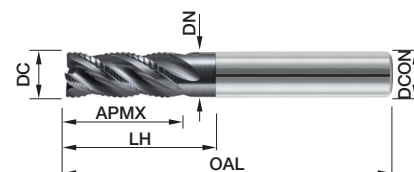


# 640

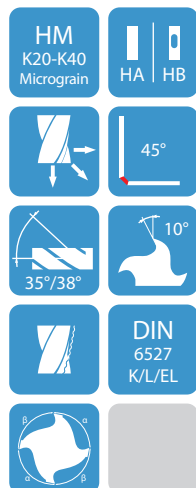
## FRESATURA HPC

Fresa HPC a 4 taglienti con profilo da sgrossatura

PVD TiAlCrN Cer-Y



## 640SP

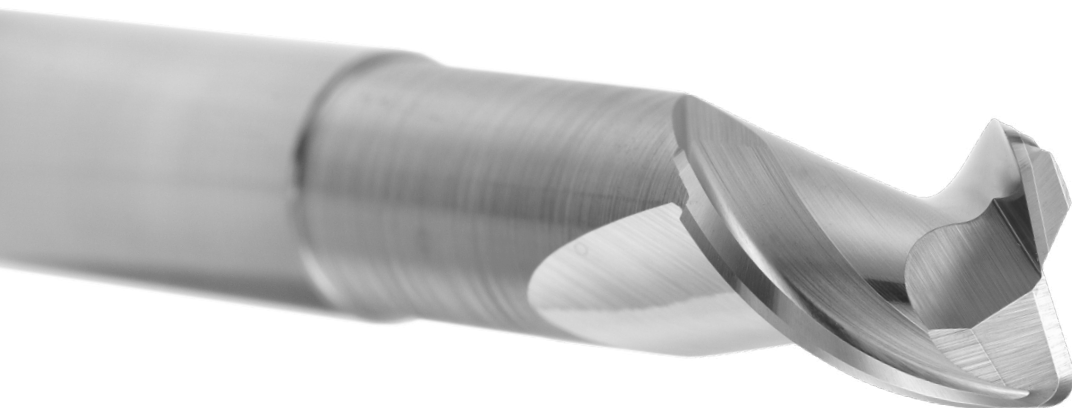


| Cod.             |                   | DC  | APMX | LH   | OAL  | DCON | DN      |
|------------------|-------------------|-----|------|------|------|------|---------|
| Gambo HA         | Gambo HB          | h10 | 0/+1 | 0/+1 | 0/+2 | h6   | 0/-0,05 |
| 640SP030060550Y  | 640WSP030060550Y  | 3   | 5    |      | 50   | 6    |         |
| 640SP030060857Y  | 640WSP030060857Y  | 3   | 8    | 12   | 57   | 6    | 2,8     |
| 640SP030060870Y  | 640WSP030060870Y  | 3   | 8    | 15   | 70   | 6    | 2,8     |
| 640SP040060854Y  | 640WSP040060854Y  | 4   | 8    |      | 54   | 6    |         |
| 640SP040061157Y  | 640WSP040061157Y  | 4   | 11   | 15   | 57   | 6    | 3,8     |
| 640SP040061170Y  | 640WSP040061170Y  | 4   | 11   | 20   | 70   | 6    | 3,8     |
| 640SP050060954Y  | 640WSP050060954Y  | 5   | 9    |      | 54   | 6    |         |
| 640SP050061357Y  | 640WSP050061357Y  | 5   | 13   | 17   | 57   | 6    | 4,8     |
| 640SP050061370Y  | 640WSP050061370Y  | 5   | 13   | 25   | 70   | 6    | 4,8     |
| 640SP060061054Y  | 640WSP060061054Y  | 6   | 10   |      | 54   | 6    |         |
| 640SP060061357Y  | 640WSP060061357Y  | 6   | 13   | 21   | 57   | 6    | 5,8     |
| 640SP060061370Y  | 640WSP060061370Y  | 6   | 13   | 30   | 70   | 6    | 5,8     |
| 640SP080081258Y  | 640WSP080081258Y  | 8   | 12   |      | 58   | 8    |         |
| 640SP080081963Y  | 640WSP080081963Y  | 8   | 19   | 27   | 63   | 8    | 7,7     |
| 640SP080081980Y  | 640WSP080081980Y  | 8   | 19   | 40   | 80   | 8    | 7,7     |
| 640SP100101466Y  | 640WSP100101466Y  | 10  | 14   |      | 66   | 10   |         |
| 640SP100102272Y  | 640WSP100102272Y  | 10  | 22   | 32   | 72   | 10   | 9,7     |
| 640SP100102294Y  | 640WSP100102294Y  | 10  | 22   | 50   | 94   | 10   | 9,7     |
| 640SP120121673Y  | 640WSP120121673Y  | 12  | 16   |      | 73   | 12   |         |
| 640SP120122683Y  | 640WSP120122683Y  | 12  | 26   | 38   | 83   | 12   | 11,6    |
| 640SP1201226109Y | 640WSP1201226109Y | 12  | 26   | 64   | 109  | 12   | 11,6    |
| 640SP160162282Y  | 640WSP160162282Y  | 16  | 22   |      | 82   | 16   |         |
| 640SP160163292Y  | 640WSP160163292Y  | 16  | 32   | 44   | 92   | 16   | 15,5    |
| 640SP1601632132Y | 640WSP1601632132Y | 16  | 32   | 80   | 132  | 16   | 15,5    |
| 640SP200202692Y  | 640WSP200202692Y  | 20  | 26   |      | 92   | 20   |         |
| 640SP2002038104Y | 640WSP2002038104Y | 20  | 38   | 54   | 104  | 20   | 19,5    |
| 640SP2002038154Y | 640WSP2002038154Y | 20  | 38   | 100  | 154  | 20   | 19,5    |





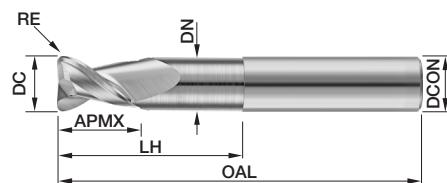
# 102TC/TCL



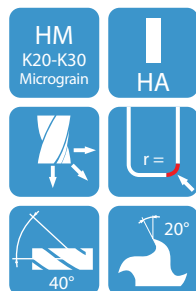
## FINITURA DI ALLUMINIO

Fresa a 2 taglienti con raggio torico

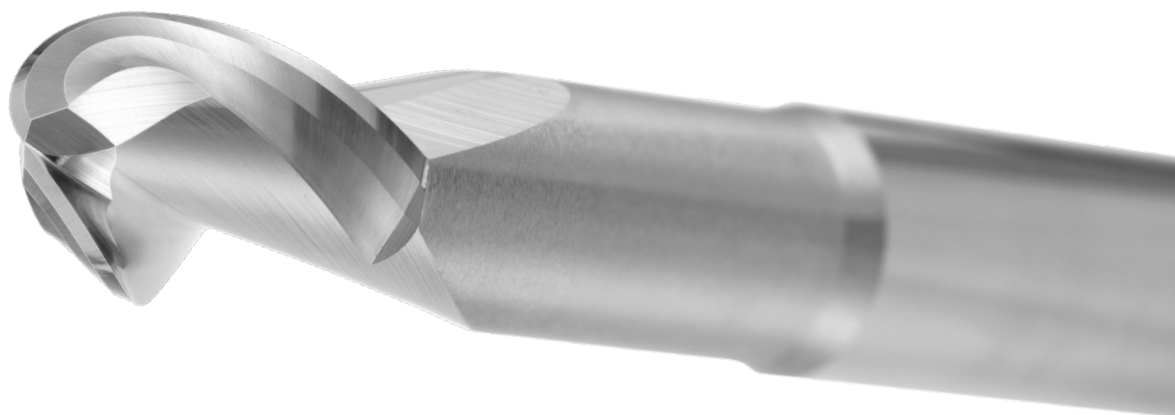
Disponibile anche  
con rivestimento Cer-taC



## 102TC/TCL



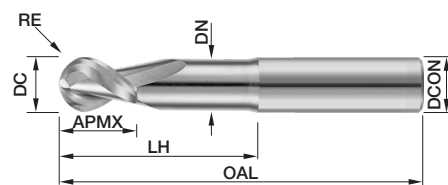
| Cod.              |                | DC | APMX | LH   | OAL  | DCON | RE       | DN      |
|-------------------|----------------|----|------|------|------|------|----------|---------|
| Rivestite         | Non rivestite  | e8 | 0/+2 | 0/+2 | 0/+2 | h6   | +0,03/+0 | 0/-0,05 |
| 102TC.020-40°TAC  | 102TC.020-40°  | 2  | 4    | 6    | 57   | 6    | 0,5      | 1,8     |
| 102TC.030-40°TAC  | 102TC.030-40°  | 3  | 5    | 9    | 57   | 6    | 0,5      | 2,8     |
| 102TCL.030-40°TAC | 102TCL.030-40° | 3  | 6    | 50   | 100  | 6    | 0,5      | 2,8     |
| 102TC.040-40°TAC  | 102TC.040-40°  | 4  | 6    | 12   | 57   | 6    | 0,5      | 3,7     |
| 102TCL.040-40°TAC | 102TCL.040-40° | 4  | 8    | 50   | 100  | 6    | 0,5      | 3,7     |
| 102TC.050-40°TAC  | 102TC.050-40°  | 5  | 7    | 15   | 57   | 6    | 0,5      | 4,6     |
| 102TCL.050-40°TAC | 102TCL.050-40° | 5  | 10   | 50   | 100  | 6    | 0,5      | 4,6     |
| 102TC.060-40°TAC  | 102TC.060-40°  | 6  | 8    | 20   | 57   | 6    | 1        | 5,5     |
| 102TCL.060-40°TAC | 102TCL.060-40° | 6  | 12   | 50   | 100  | 6    | 1        | 5,5     |
| 102TC.080-40°TAC  | 102TC.080-40°  | 8  | 10   | 26   | 63   | 8    | 1        | 7,4     |
| 102TCL.080-40°TAC | 102TCL.080-40° | 8  | 16   | 50   | 100  | 8    | 1        | 7,4     |
| 102TC.100-40°TAC  | 102TC.100-40°  | 10 | 12   | 31   | 72   | 10   | 1,5      | 9,2     |
| 102TCL.100-40°TAC | 102TCL.100-40° | 10 | 20   | 70   | 120  | 10   | 1,5      | 9,2     |
| 102TC.120-40°TAC  | 102TC.120-40°  | 12 | 14   | 37   | 83   | 12   | 1,5      | 11      |
| 102TCL.120-40°TAC | 102TCL.120-40° | 12 | 24   | 100  | 150  | 12   | 1,5      | 11      |
| 102TC.140-40°TAC  | 102TC.140-40°  | 14 | 16   | 41   | 83   | 14   | 2        | 13      |
| 102TCL.140-40°TAC | 102TCL.140-40° | 14 | 28   | 100  | 150  | 14   | 2        | 13      |
| 102TC.160-40°TAC  | 102TC.160-40°  | 16 | 18   | 43   | 92   | 16   | 2        | 15      |
| 102TCL.160-40°TAC | 102TCL.160-40° | 16 | 32   | 100  | 150  | 16   | 2        | 15      |
| 102TC.200-40°TAC  | 102TC.200-40°  | 20 | 22   | 53   | 104  | 20   | 2,5      | 19      |
| 102TCL.200-40°TAC | 102TCL.200-40° | 20 | 40   | 100  | 150  | 20   | 2,5      | 19      |



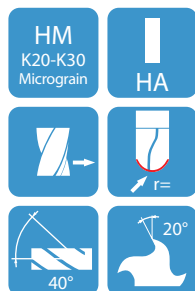
## FINITURA DI ALLUMINIO

Fresa raggiata a 2 taglienti

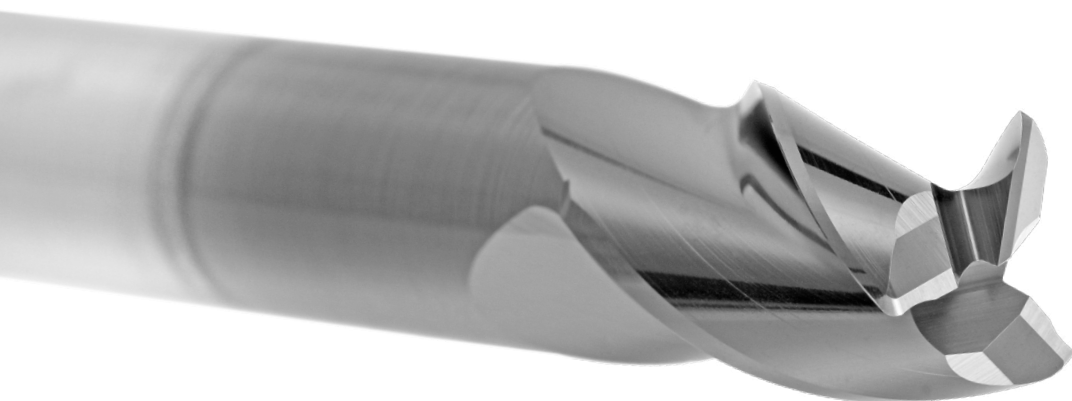
Disponibile anche  
con rivestimento Cer-taC



## 102RC/RCL



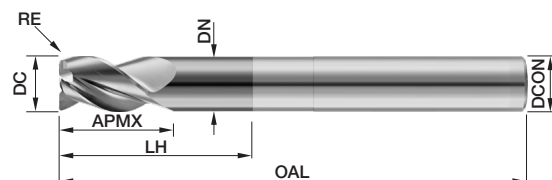
| Cod.              |                | DC | DC TOL.       | APMX | LH   | OAL  | DCON | RE  | DN      |
|-------------------|----------------|----|---------------|------|------|------|------|-----|---------|
| Riveste           | Non riveste    |    |               | 0/+2 | 0/+2 | 0/+2 | h6   | f8  | 0/-0,05 |
| 102RC.020-40°TAC  | 102RC.020-40°  | 2  | -0,012/-0,040 | 4    | 6    | 57   | 6    | 1   | 1,8     |
| 102RC.030-40°TAC  | 102RC.030-40°  | 3  | -0,012/-0,040 | 5    | 9    | 57   | 6    | 1,5 | 2,8     |
| 102RCL.030-40°TAC | 102RCL.030-40° | 3  | -0,012/-0,040 | 6    | 50   | 100  | 6    | 1,5 | 2,8     |
| 102RC.040-40°TAC  | 102RC.040-40°  | 4  | -0,012/-0,040 | 6    | 12   | 57   | 6    | 2   | 3,7     |
| 102RCL.040-40°TAC | 102RCL.040-40° | 4  | -0,012/-0,040 | 8    | 50   | 100  | 6    | 2   | 3,7     |
| 102RC.050-40°TAC  | 102RC.050-40°  | 5  | -0,012/-0,040 | 7    | 15   | 57   | 6    | 2,5 | 4,6     |
| 102RCL.050-40°TAC | 102RCL.050-40° | 5  | -0,012/-0,040 | 10   | 50   | 100  | 6    | 2,5 | 4,6     |
| 102RC.060-40°TAC  | 102RC.060-40°  | 6  | -0,012/-0,040 | 8    | 20   | 57   | 6    | 3   | 5,5     |
| 102RCL.060-40°TAC | 102RCL.060-40° | 6  | -0,012/-0,040 | 12   | 50   | 100  | 6    | 3   | 5,5     |
| 102RC.080-40°TAC  | 102RC.080-40°  | 8  | -0,020/-0,056 | 10   | 26   | 63   | 8    | 4   | 7,4     |
| 102RCL.080-40°TAC | 102RCL.080-40° | 8  | -0,020/-0,056 | 16   | 50   | 100  | 8    | 4   | 7,4     |
| 102RC.100-40°TAC  | 102RC.100-40°  | 10 | -0,020/-0,056 | 12   | 31   | 72   | 10   | 5   | 9,2     |
| 102RCL.100-40°TAC | 102RCL.100-40° | 10 | -0,020/-0,056 | 20   | 70   | 120  | 10   | 5   | 9,2     |
| 102RC.120-40°TAC  | 102RC.120-40°  | 12 | -0,020/-0,056 | 14   | 37   | 83   | 12   | 6   | 11      |
| 102RCL.120-40°TAC | 102RCL.120-40° | 12 | -0,020/-0,056 | 24   | 100  | 150  | 12   | 6   | 11      |
| 102RC.140-40°TAC  | 102RC.140-40°  | 14 | -0,026/-0,070 | 16   | 41   | 83   | 14   | 7   | 13      |
| 102RCL.140-40°TAC | 102RCL.140-40° | 14 | -0,026/-0,070 | 28   | 100  | 150  | 14   | 7   | 13      |
| 102RC.160-40°TAC  | 102RC.160-40°  | 16 | -0,026/-0,070 | 18   | 43   | 92   | 16   | 8   | 15      |
| 102RCL.160-40°TAC | 102RCL.160-40° | 16 | -0,026/-0,070 | 32   | 100  | 150  | 16   | 8   | 15      |
| 102RC.200-40°TAC  | 102RC.200-40°  | 20 | -0,026/-0,070 | 22   | 53   | 104  | 20   | 10  | 19      |
| 102RCL.200-40°TAC | 102RCL.200-40° | 20 | -0,026/-0,070 | 40   | 100  | 150  | 20   | 10  | 19      |



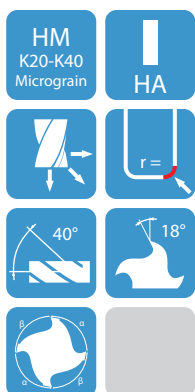
## FRESATURA DI ALLUMINIO AD ELEVATA ASPORTAZIONE

Fresa a 3 taglienti con raggio torico

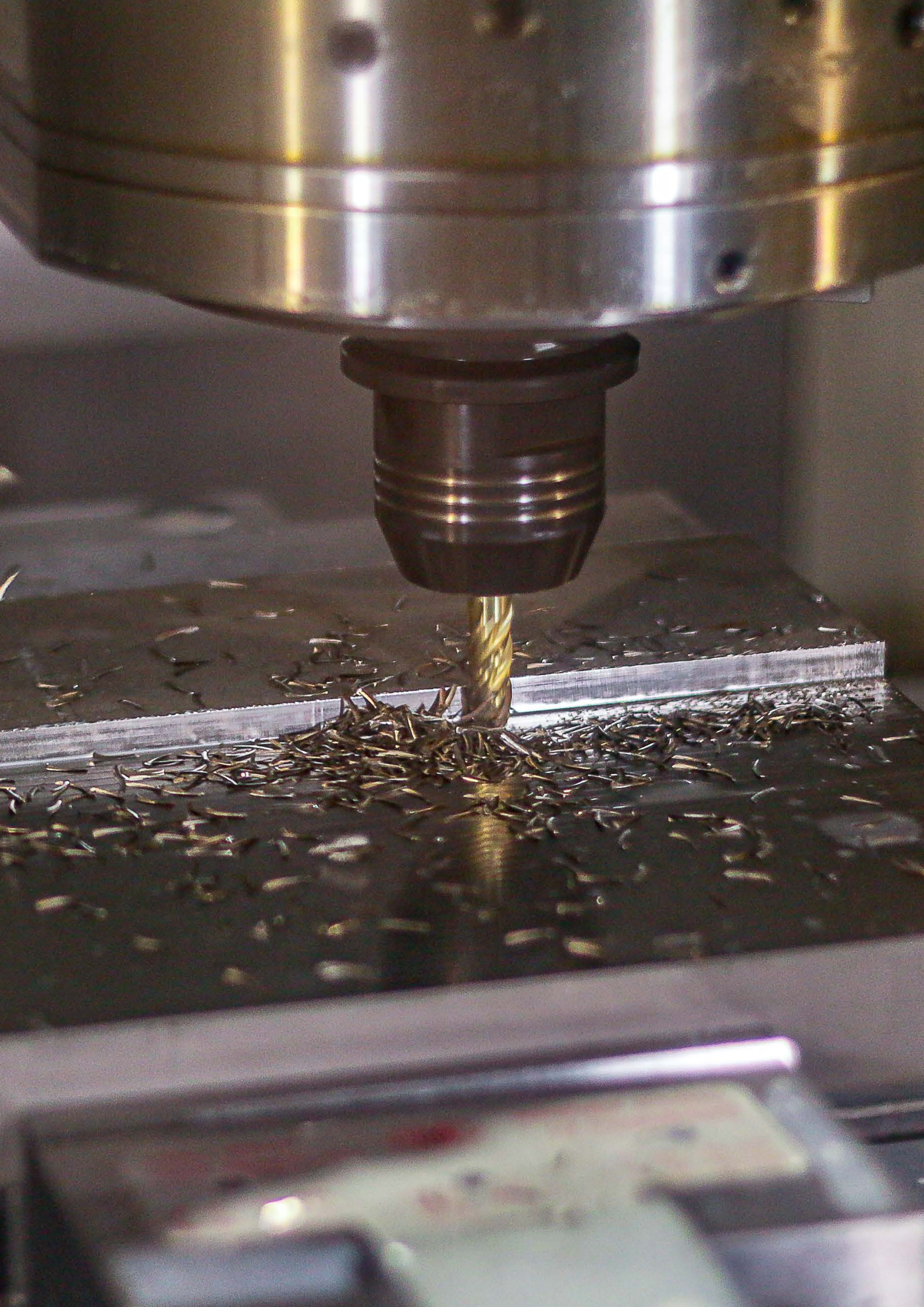
CVD DLC Cer-DL



## 303



| Cod.                | DC | APMX | LH   | OAL  | DCON | RE      | DN      |
|---------------------|----|------|------|------|------|---------|---------|
|                     | h6 | 0/+2 | 0/+2 | 0/+2 | h6   | +/-0,03 | 0/-0,05 |
| 303.040060657R02DL  | 4  | 6    | 12   | 57   | 6    | 0,2     | 3,9     |
| 303.040060670R02DL  | 4  | 6    | 20   | 70   | 6    | 0,2     | 3,9     |
| 303.060060957R03DL  | 6  | 9    | 18   | 57   | 6    | 0,3     | 5,8     |
| 303.060060970R03DL  | 6  | 9    | 30   | 70   | 6    | 0,3     | 5,8     |
| 303.080081263R04DL  | 8  | 12   | 24   | 63   | 8    | 0,4     | 7,8     |
| 303.080081280R04DL  | 8  | 12   | 40   | 80   | 8    | 0,4     | 7,8     |
| 303.100101572R05DL  | 10 | 15   | 30   | 72   | 10   | 0,5     | 9,8     |
| 303.100101590R05DL  | 10 | 15   | 50   | 90   | 10   | 0,5     | 9,8     |
| 303.120121883R06DL  | 12 | 18   | 36   | 83   | 12   | 0,6     | 11,8    |
| 303.1201218100R06DL | 12 | 18   | 60   | 100  | 12   | 0,6     | 11,8    |
| 303.160162493R08DL  | 16 | 24   | 48   | 93   | 16   | 0,8     | 15,8    |
| 303.1601624120R08DL | 16 | 24   | 80   | 120  | 16   | 0,8     | 15,8    |
| 303.2002030104R10DL | 20 | 30   | 60   | 104  | 20   | 1       | 19,8    |
| 303.2002030150R10DL | 20 | 30   | 100  | 150  | 20   | 1       | 19,8    |



# Fresatura compositi - parametri di taglio

| Tipo                                    | ISO | Materiale                    | Tipo corto | Tipo lungo | ap max x DC | DC = 2 mm          |                    |                    | DC = 3 mm          |                    |                    | DC = 4 mm          |                    |                    | DC = 5 mm          |                    |                    | DC = 6 mm          |                    |
|-----------------------------------------|-----|------------------------------|------------|------------|-------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                         |     |                              |            |            |             | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC |
|                                         |     |                              |            |            |             | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |
| 68DX/68SX<br>68TD/68RDX**<br>68SU/104PH | N   | Materiali termoindurenti     | 150        | 120        | 1,5         |                    |                    |                    |                    |                    |                    | 0,167              | 0,125              | 0,050              | 0,208              | 0,156              | 0,063              | 0,250              | 0,188              |
|                                         |     | Fibra di carbonio CFRP / CFC | 120        | 100        | 1,5         |                    |                    |                    |                    |                    |                    | 0,167              | 0,125              | 0,050              | 0,208              | 0,156              | 0,063              | 0,250              | 0,188              |
| PK62TDT<br>PK62TDR**<br>PK66TD          |     |                              | 300        | 200        | 1,5         |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    | 0,0015             | 0,0011             |
| 119P                                    |     | Fibra aramidica/Kevlar       | 150        | 120        | 1,5         |                    |                    |                    | 0,158              | 0,095              | 0,047              | 0,210              | 0,126              | 0,063              | 0,263              | 0,158              | 0,079              | 0,315              | 0,189              |
| 419TD                                   |     |                              | 300        | 200        | 1,5         |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    | 0,220              | 0,132              |
| 77SU<br>77RSU**<br>77SUP                |     | Honeycomb/Nomex              | 1000       |            | 1,5         |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    | 0,0020             | 0,0015             |
| 106/108/109<br>(FM,G)                   |     | Materiali termoindurenti     | 150        | 120        | 1,5         | 0,067              | 0,050              | 0,020              | 0,100              | 0,075              | 0,030              | 0,133              | 0,100              | 0,040              |                    |                    |                    | 0,200              | 0,150              |
| 65SU/66SU                               |     | Fibra di vetro GFRP / GFK    | 250        | 200        | 1,5         | 0,067              | 0,050              | 0,020              | 0,100              | 0,075              | 0,030              | 0,133              | 0,100              | 0,040              |                    |                    |                    | 0,200              | 0,150              |

\* f in mm per giro

\*\* Frese raggiate: calcolare n[rpm] secondo Tab.K

# Foratura compositi - parametri di taglio

| Tipo        | ISO                                               | Materiale                               | Resistenza [MPa] | Nr.           | Designazione       | Vc [m/min] |
|-------------|---------------------------------------------------|-----------------------------------------|------------------|---------------|--------------------|------------|
| 165C<br>217 | N                                                 | Materiali termoplastici                 |                  |               | Delrin, Hostalen   | 200        |
|             |                                                   | Duroplasti                              |                  |               | Ferrozelf, Bakelit | 200        |
|             |                                                   | Fibra di carbonio                       |                  |               | CFC - CFK          | 120        |
|             |                                                   | Plastica con fibra rinforzata           |                  |               | GFK*               | 200        |
| 118         |                                                   | Materiali termoplastici                 |                  |               | Delrin, Hostalen   | 150        |
|             |                                                   | Fibra aramidica/Kevlar                  |                  |               |                    | 150        |
| 165ST       |                                                   | Alluminio (non legato, a basso legante) | < 350            | 3,0255        | A199,5             | 200        |
|             |                                                   | Leghe di alluminio <0,5% Si             | < 500            | 3,0515        | AlMni              | 160        |
|             |                                                   | Leghe di alluminio 0,5 - 10% Si         | < 400            | 3,2152        | GD-AIS16Cu4        | 160        |
|             |                                                   | Leghe di alluminio 10-15% Si            | < 400            | 3,2381        | G-AISi10Mg         | 150        |
|             |                                                   | Leghe di alluminio > 15%Si              | < 400            |               | G-AISi17Cu4        | 150        |
|             |                                                   | Rame (non legato, a basso legante)      | < 350            | 2,0060        | E-Cu57             | 90         |
|             | Leghe di rame fuso                                | < 700                                   | 2,0240           | CuZn15        | 90                 |            |
|             | Leghe speciali di rame                            | < 200 HE                                | 2,0916           | CuAl5         | 70                 |            |
|             | Leghe speciali di rame                            | < 300 HB                                | 2,0978           | CuAl11Ni6Fe5  | 70                 |            |
|             | Leghe speciali di rame                            | > 300 HE                                | 2,1247           | CuI3e2F1 25   | 70                 |            |
|             | Ottone e truciolo corto, bronzo, bronzo per getti | < 600                                   | 2,0360           | CuZn40 (Ms60) | 70                 |            |
|             | Ottone a truciolo lungo                           | < 600                                   | 2,0335           | CuZn36 (Ms63) | 70                 |            |
|             | S                                                 | Titanio puro                            | < 900            | 3,7025        | Ti99,8             | 25         |
|             |                                                   | Leghe di titanio                        | < 700            | 3,7114        | TiA15Sn2           | 20         |
|             |                                                   | Leghe di titanio                        | < 1200           | 3,7164        | TiAl5V4            | 15         |

\* fz in mm per giro

## Tab. K

| Tab. K |           |          |           |          |           |          |          |          |
|--------|-----------|----------|-----------|----------|-----------|----------|----------|----------|
| ap     | DC x 0,05 | DC x 0,1 | DC x 0,15 | DC x 0,2 | DC x 0,25 | DC x 0,3 | DC x 0,4 | DC x 0,5 |
| K      | 2,3       | 1,7      | 1,4       | 1,3      | 1,2       | 1,1      | 1,0      | 1,0      |

$$n[rpm] = K \times Vc[m/min] \times 1000 / (Dc[mm] \times 3,14)$$

|                    | DC = 8 mm          |                    |                    | DC = 10 mm         |                    |                    | DC = 12 mm         |                    |                    | DC = 14 mm         |                    |                    | DC = 16 mm         |                    |                    | DC = 20 mm         |                    |                    | DC = 24 mm         |                    |                    | DC = 44 mm         |                    |                    |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC |
|                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    | f* [mm]            |                    |                    |
| 0,075              | 0,333              | 0,250              | 0,100              | 0,417              | 0,313              | 0,125              | 0,500              | 0,375              | 0,150              |                    |                    |                    | 0,667              | 0,500              | 0,200              |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| 0,075              | 0,333              | 0,250              | 0,100              | 0,410              | 0,310              | 0,125              | 0,500              | 0,375              | 0,150              |                    |                    |                    | 0,667              | 0,500              | 0,200              |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| 0,0005             | 0,0020             | 0,0015             | 0,0006             | 0,0025             | 0,0019             | 0,0008             | 0,0030             | 0,0023             | 0,0009             |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| 0,095              | 0,420              | 0,252              | 0,126              | 0,525              | 0,315              | 0,158              | 0,630              | 0,378              | 0,189              |                    |                    |                    | 0,840              | 0,504              | 0,252              | 1,050              | 0,630              | 0,315              |                    |                    |                    |                    |                    |                    |
| 0,066              | 0,293              | 0,176              | 0,088              | 0,367              | 0,220              | 0,110              | 0,440              | 0,264              | 0,132              |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| 0,0006             | 0,0027             | 0,0020             | 0,0008             | 0,0033             | 0,0025             | 0,0010             | 0,0040             | 0,0030             | 0,0012             | 0,0047             | 0,0035             | 0,0014             | 0,0053             | 0,0040             | 0,0016             | 0,0067             | 0,0050             | 0,0020             | 0,0080             | 0,0060             | 0,0024             | 0,0147             | 0,0110             | 0,0044             |
| 0,060              | 0,267              | 0,200              | 0,080              | 0,333              | 0,250              | 0,100              | 0,400              | 0,300              | 0,120              |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
| 0,060              | 0,267              | 0,200              | 0,080              | 0,333              | 0,250              | 0,100              | 0,400              | 0,300              | 0,120              |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |

| DC = 2 ÷ 2,9 | DC = 3 ÷ 5,9 | DC = 6 ÷ 8,9 | DC = 9 ÷ 12 |
|--------------|--------------|--------------|-------------|
| f* [mm]      | f* [mm]      | f* [mm]      | f* [mm]     |
| 0,035        | 0,050        | 0,070        | 0,090       |
| 0,035        | 0,050        | 0,070        | 0,090       |
| 0,035        | 0,050        | 0,070        | 0,090       |
| 0,035        | 0,050        | 0,070        | 0,090       |
| 0,045        | 0,060        | 0,080        | 0,100       |
| 0,045        | 0,060        | 0,080        | 0,100       |
| 0,150        | 0,200        | 0,300        | 0,380       |
| 0,150        | 0,200        | 0,300        | 0,380       |
| 0,150        | 0,200        | 0,300        | 0,380       |
| 0,150        | 0,200        | 0,300        | 0,380       |
| 0,150        | 0,200        | 0,300        | 0,380       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,100        | 0,150        | 0,200        | 0,250       |
| 0,025        | 0,030        | 0,040        | 0,048       |
| 0,025        | 0,030        | 0,040        | 0,048       |
| 0,025        | 0,030        | 0,040        | 0,048       |

# Fresatura - parametri di taglio

| Tipo                                          | ISO | Materiale                                      | Resistenza [MPa] | Nr.    | Denominazione           | Vc [m/min]          | ap max x DC        | DC = 2 mm           |                    |                    | DC = 3 mm          |                    |                    |
|-----------------------------------------------|-----|------------------------------------------------|------------------|--------|-------------------------|---------------------|--------------------|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                               |     |                                                |                  |        |                         |                     |                    | ae<br>0,1-0,2 x DC  | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC | ae<br>0,1-0,2 x DC | ae<br>0,3-0,4 x DC | ae<br>0,6-1,0 x DC |
|                                               |     |                                                |                  |        |                         | Tipo<br>corfo/lungo | Tipo<br>extralungo | Tipo<br>corfo/lungo | Tipo<br>extralungo | fz [mm]            | fz [mm]            | fz [mm]            | fz [mm]            |
|                                               |     |                                                |                  |        |                         |                     |                    |                     |                    |                    |                    |                    |                    |
| 640<br>640R*<br>640SP                         | P   | Acciaio da costruzione generale                | < 800            | 1,0037 | St37-2                  | 200                 | 160                | 1,0                 | 0,5                |                    | 0,024              | 0,019              | 0,014              |
|                                               |     | Acciaio automatico                             | < 800            | 1,0719 | 9SMnPb28                | 210                 | 170                | 1,0                 | 0,5                |                    | 0,024              | 0,019              | 0,014              |
|                                               |     | Acciaio da cementazione non legato             | < 800            | 1,0401 | C15                     | 180                 | 140                | 1,0                 | 0,5                |                    | 0,017              | 0,013              | 0,010              |
|                                               |     | Acciaio da cementazione legato                 | < 1000           | 1,7331 | 16MnCr5 (EC80)          | 160                 | 130                | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio bonificato non legato                  | < 850            | 1,0503 | C45                     | 170                 | 135                | 1,0                 | 0,5                |                    | 0,017              | 0,013              | 0,010              |
|                                               |     | Acciaio bonificato non legato                  | < 1000           | 1,0601 | C60                     | 160                 | 130                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Acciaio bonificato legato                      | < 800            | 1,5131 | 50MnS14                 | 160                 | 130                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Acciaio bonificato legato                      | < 1300           | 1,5755 | 31NiCr14                | 140                 | 115                | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio per getti                              | < 850            | 0,9650 | G-X260Cr27              | 140                 | 110                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Acciaio da nitrurazione                        | < 1000           | 1,8504 | 34CrA16                 | 160                 | 130                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Acciaio da nitrurazione                        | < 1200           | 1,8515 | 31CrMo12                | 140                 | 115                | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio per cuscinetti                         | < 1200           | 1,3505 | 100Cr6 (W3)             | 160                 | 130                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               | M   | Acciaio per utensili (lavorazione a freddo)    | < 1300           | 1,2312 | 40CrMnMoS8 6            | 150                 | 120                | 1,0                 | 0,5                |                    | 0,017              | 0,013              | 0,010              |
|                                               |     | Acciaio per utensili (lavorazione a caldo)     | < 1300           | 1,2343 | X38CrMoV 51             | 130                 | 100                | 1,0                 | 0,5                |                    | 0,017              | 0,013              | 0,010              |
|                                               |     | Acciaio e acciaio fuso inossidabile sulfurato  | < 850            | 1,4305 | X8CrNiS18-9             | 110                 | 90                 | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio inossidabile ferritico                 | < 750            | 1,4510 | X3CrTi17                | 100                 | 80                 | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio inossidabile martensitico              | < 900            | 1,4034 | X46Cr13                 | 85                  | 70                 | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio inossidabile, ferritico / martensitico | < 1100           | 1,4313 | X3CrNi113.4             | 100                 | 80                 | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio inossidabile, austenitico / ferritico  | < 850            | 1,4460 | X8CrNiMo27 5            | 100                 | 80                 | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
|                                               |     | Acciaio inossidabile austenitico               | < 750            | 1,4301 | X5CrNi18-10             | 100                 | 80                 | 1,0                 | 0,5                |                    | 0,012              | 0,009              | 0,007              |
| 642(F)                                        | M   | Resistente al calore                           | < 1100           | 1,4747 | X80CrNiS120             | 26                  | 20                 | 1,0                 |                    |                    |                    | 0,007              | 0,005              |
| 640<br>640R*<br>640SP                         | K   | Ghisa grigia con grafite lamellare             | 100-350          | 0,6010 | GG10                    | 170                 | 135                | 1,0                 | 0,5                |                    | 0,024              | 0,019              | 0,014              |
|                                               |     | Ghisa grigia con grafite lamellare             | 300-1000         | 0,6030 | GG30                    | 140                 | 110                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Ghisa sferoidale                               | 300-500          | 0,7040 | GGG40                   | 160                 | 130                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Ghisa sferoidale                               | 550-800          | 0,7060 | GGG60                   | 130                 | 100                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Ghisa temprata bianca                          | 350-450          | 0,8035 | GTW35                   | 150                 | 120                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Ghisa temprata bianca                          | 500-650          | 0,8055 | GTW55                   | 140                 | 110                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Ghisa temprata nera                            | 350-450          | 0,8135 | GTS35                   | 150                 | 120                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
|                                               |     | Ghisa temprata nera                            | 500-700          | 0,8155 | GTS55                   | 135                 | 110                | 1,0                 | 0,5                |                    | 0,018              | 0,014              | 0,010              |
| 102PH<br>102TC<br>102TCL<br>102RC*<br>102RCL* | N   | Alluminio (non legato, a basso legante)        | < 350            | 3,0255 | A199,5                  | 300                 | 240                | 0,5                 |                    | 0,097              | 0,073              | 0,029              | 0,117              |
|                                               |     | Leghe di alluminio <0,5% Si                    | < 500            | 3,0515 | AlMn                    | 300                 | 240                | 0,5                 |                    | 0,097              | 0,073              | 0,029              | 0,117              |
|                                               |     | Leghe di alluminio 0,5 - 10% Si                | < 400            | 3,2152 | GD-AlSi16Cu4            | 300                 | 240                | 0,5                 |                    | 0,097              | 0,073              | 0,029              | 0,117              |
|                                               |     | Leghe di alluminio 10-15% Si                   | < 400            | 3,2381 | G-AlSi10Mg              | 150                 | 120                | 0,5                 |                    | 0,049              | 0,036              | 0,015              | 0,058              |
|                                               |     | Leghe di alluminio > 15%Si                     | < 400            |        | G-AlSi17Cu4             |                     |                    |                     |                    |                    |                    |                    |                    |
| 303                                           | N   | Alluminio (non legato, a basso legante)        | < 350            | 3,0255 | A199,5                  | 500                 | 400                | 1,0                 |                    |                    |                    |                    | 0,140              |
|                                               |     | Leghe di alluminio <0,5% Si                    | < 500            | 3,0515 | AlMn                    | 500                 | 400                | 1,0                 |                    |                    |                    |                    | 0,140              |
|                                               |     | Leghe di alluminio 0,5 - 10% Si                | < 400            | 3,2152 | GD-AlSi16Cu4            | 500                 | 400                | 1,0                 |                    |                    |                    |                    | 0,140              |
|                                               |     | Leghe di alluminio 10-15% Si                   | < 400            | 3,2381 | G-AlSi10Mg              | 300                 | 240                | 1,0                 |                    |                    |                    |                    | 0,070              |
|                                               |     | Leghe di alluminio > 15%Si                     | < 400            |        | G-AlSi17Cu4             |                     |                    |                     |                    |                    |                    |                    |                    |
| 642(F)                                        | S   | Nickel puro                                    |                  | 1,3911 | RNi24                   |                     |                    |                     |                    |                    | 0,011              | 0,008              | 0,006              |
|                                               |     | Leghe di nickel                                |                  | 1,3912 | Ni36 (Invar)            |                     |                    |                     |                    |                    | 0,011              | 0,008              | 0,006              |
|                                               |     | Leghe di nickel                                | < 850            | 2,4360 | S-NiCu 30 Fe            | 25                  | 20                 | 0,5                 |                    |                    | 0,011              | 0,008              | 0,006              |
|                                               |     | Leghe di nickel e cromo                        |                  | 2,4886 | SG-NiMo16Cr16W          | 25                  | 20                 | 0,5                 |                    |                    | 0,011              | 0,008              | 0,006              |
|                                               |     | Leghe di nickel e cobalto                      | < 1300           | 2,4632 | NiCr20Co18Ti            | 25                  | 20                 | 0,5                 |                    |                    | 0,011              | 0,008              | 0,006              |
|                                               |     | Leghe di nickel e cobalto                      | < 1300           | 2,4634 | NiCo20Cr15, MoAlTi      | 25                  | 20                 | 0,5                 |                    |                    | 0,011              | 0,008              | 0,006              |
|                                               |     | Leghe resistenti al calore                     | < 1300           |        | Hardox 400              | 25                  | 20                 | 0,5                 |                    |                    | 0,011              | 0,008              | 0,006              |
|                                               |     | Leghe di nickel, cromo e cobalto               | < 1400           | 2,4806 | SG-NiCr2ONb, Inconel 82 | 25                  | 20                 | 0,5                 |                    |                    | 0,011              | 0,008              | 0,006              |
| 641(F)                                        |     | Titanio puro                                   | < 900            | 3,7025 | Ti99,8                  | 135                 | 110                | 1,0                 |                    |                    | 0,021              | 0,017              | 0,012              |
|                                               |     | Leghe di titanio                               | < 700            | 3,7114 | TiAl5Sn2                | 45                  | 45                 | 1,0                 |                    |                    | 0,007              | 0,009              | 0,023              |
|                                               |     | Leghe di titanio                               | < 1200           | 3,7164 | TiAl5V4                 | 45                  | 45                 | 1,0                 |                    |                    | 0,007              | 0,009              | 0,023              |

\* Frese raggrate: calcolare n[rpm] secondo Tab.K a pag. 36

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# AerospACE



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