

# F0 – Major Series

## F0 milling systems / Sistema di fresatura F0 / Système de fraisage F0

### Milling

### Fresatura

### Fraisage

|                            |  |                                 |           |
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# 6



# PERFECT EIGHT FOR DIFFICULT MATERIALS.

**Wear-resistant tool holders in diameters ranging from 40 to 250 mm for octagonal indexable inserts: the ARNO FO milling system.**

Copy milling, helical interpolation, pocket milling, slot milling and of course normal face milling including ramping and plunge milling: You can do all this with the FO milling system from ARNO. With five geometries and grades, the octagonal indexable inserts are available for a wide range of applications. The positive mounting position and basic shape of the inserts ensure soft cutting for machining difficult materials. The matching wiper insert gives the final finish to your workpieces in no time.

And as always, you can depend entirely on ARNO quality: The holders are fully nickel-plated and equipped with through tool cooling and Torx Plus® screws to achieve stability and user convenience. Coupled with the unequal pitch of the flutes to minimise vibration, the FO milling system ensures reliable processes and long tool life.



## RIGID BENEFITS

of the FO System

Versatile - high range of milling applications

Tough - nickel-plated tool holders with internal coolant supply

Gentle on materials - first-class service life and smooth running due to differential pitch

## Tool holders

- Shell-type tool holders from Ø 40 to 250 mm for octagonal indexable inserts
- Nickel-plated bodies for high wear resistance and easy handling
- Torx Plus® screws for high torque transmission
- Integrated cooling for long service life
- Differential pitch for reliable vibration reduction



## Indexable inserts

- Positive, soft-cutting, octagonal indexable inserts and special wiper inserts
- 5 geometries and 6 grades for a wide range of applications
- Long service life and high economic efficiency



# UN OTTO PER MATERIALI IMPEGNATIVI

**Corpi fresa nickelati con diametri da 40 a 250 mm per inserti ottagonali:  
il sistema di fresatura FO di ARNO.**

Copiatura, foratura circolare, realizzazione di tasche e scanalature e naturalmente normale sfacciatura inclusa la fresatura in rampa o assiale: Tutto questo è possibile con il sistema di fresatura FO di ARNO. Con cinque geometrie e qualità, gli inserti ottagonali sono pronti per un'ampia gamma di applicazioni. La posizione di montaggio positiva e la forma di base degli inserti garantiscono un taglio morbido durante la lavorazione anche di materiali decisamente impegnativi. Grazie all'inserto di finitura specifico è possibile dare il tocco finale ai propri pezzi in un batter d'occhio.

E come sempre ci si può fidare della qualità di ARNO: Per garantire la stabilità e la facilità d'uso, i corpi fresa sono completamente nichelati, dotati di adduzione interna del refrigerante e di viti Torx Plus®. Insieme al passo differenziato dei taglienti per ridurre al minimo le vibrazioni, con il sistema di fresatura di FO sono garantiti processi sicuri e una lunga durata dell'utensile.



## VANTAGGI STABILI

del sistema ARNO FO

Versatile - ampia gamma di applicazioni di fresatura

Resistente - corpi fresa nichelati con adduzione  
interna di refrigerante

Delicato sui materiali - durata di prima classe e  
scorrevolezza grazie al passo differenziale

## Corpi fresa

- Corpi fresa con attacco a manicotto con Ø da 40 a 250 mm per inserti ottagonali
- Corpi nichelati per un'elevata resistenza all'usura e una piacevole maneggevolezza
- Viti Torx Plus® per trasferimenti di coppia serraggio elevati
- Raffreddamento integrato per una lunga durata
- Divisione differenziale per una riduzione affidabile delle vibrazioni da risonanza



## Inserti

- Inserti positivi, a taglio dolce, ottagonali e inserti specifici per superfiniture
- 5 geometrie e 6 qualità per un'ampia gamma di applicazioni
- Lunga durata e alta economicità

# HUIT POUR LES MATÉRIAUX EXIGEANTS.

**Porte-outils résistants à l'usure dans la plage de diamètres de 40 à 250 mm pour les plaquettes octogonales amovibles : le système de fraisage ARNO FO.**

Le défonçage, le perçage circulaire, le pochage, le rainurage et bien sûr le surfacage normal, y compris la plongée oblique ou axiale : tout cela est possible avec le système de fraisage FO d'ARNO. Avec cinq géométries et variantes, les plaquettes octogonales sont prêtes pour un large éventail d'applications. La position de montage positive et la forme de base des plaquettes garantissent une coupe douce lors de l'usinage de matériaux exigeants. Grâce à la plaque de finition large assortie, vous pouvez apporter la touche finale à vos pièces en un tour de main.

Et comme d'habitude, vous pouvez entièrement vous fier à la qualité ARNO pour vos opérations. Pour plus de stabilité et de confort d'utilisation, les porte-outils sont entièrement nickelés et pourvus d'une alimentation interne en fluide de refroidissement ainsi que de vis Torx Plus®. Associé à la répartition inégale des lames pour minimiser les vibrations, le système de fraisage FO garantit des processus sûrs et une longue durée de vie.



## AVANTAGES STABILITÉ

du système FO

Polyvalence - large éventail d'applications de fraisage

Résistance - porte-outils nickelés avec arrosage interne

Protection des matériaux - durée de vie et fonctionnement silencieux de premier ordre grâce à la division différentielle

## Porte-outils

- Porte-outils à emmancher de Ø 40 à 250 mm pour plaquettes amovibles octogonales
- Châssis nickelé pour une grande résistance à l'usure et une manipulation agréable
- Vis Torx Plus® pour des transmissions de couple élevées
- Refroidissement intégré pour une longue durée de vie
- Pas différentiel pour une réduction fiable des vibrations de résonance



## Plaquettes de coupe amovibles

- Plaquettes octogonales positives, à coupe douce, ainsi que des plaquettes spéciales à finition large
- 5 géométries et 6 nuances pour les domaines d'application les plus divers
- Longue durée de vie et rentabilité élevée



MILLING  
FRESATURA  
FRAISAGE  
**6**


# PRESSURE PLATE PRODUCTION +50% TOOL LIFE QUANTITY

Milling with excellent figures: 50% more tool life quantity, 212% more feed rate.

One customer greatly increased efficiency in his thrust plate production by switching to milling cutters from the FO milling system. ARNO's outstanding quality made it possible to increase feed rate to 212% and cutting speed by 60%. This reduced the customer's machining time from two minutes to roughly one minute and improved tool life quantity by 50%.

## FO MILLING SYSTEM 06 Practical test

| Thrust plate      |                      |                |
|-------------------|----------------------|----------------|
| Material:         | X8CrNiS18-9 (1.4305) |                |
| Tool:             | FOA-145.063.R05-06   |                |
| Indexable insert: | OEMX 060408ZZN-PMR   |                |
| Grade:            | AM5740               |                |
|                   | Competition          | ARNO Werkzeuge |
| V <sub>c</sub>    | 100 m/min            | 160 m/min      |
| Z                 | 5                    | 5              |
| f <sub>z</sub>    | 0.06 mm              | 0.08 mm        |
| v <sub>f</sub>    | 152 mm/min           | 323 mm/min     |
| a <sub>p</sub>    | 3 mm                 | 3 mm           |
| a <sub>e</sub>    | 55 mm                | 55 mm          |



|                                     |             |            |
|-------------------------------------|-------------|------------|
| Feed rate Competitor                | <div></div> | 152 mm/min |
| Feed rate ARNO FO MILLING SYSTEM 06 | <div></div> | 323 mm/min |

Your advantage:

- 50% longer tool life
- Faster processing
- Competitive edge
- 212 % faster feed rate





# PRODUZIONE DI LASTRE DA STAMPA, DURATA MAGGIORE DEL + 50 %

Fresatura con valori ottimali: 50 % di durata in più, 212% di avanzamento in più.

Passando alle frese del sistema di fresatura FO, un cliente è riuscito a rendere molto più efficiente la produzione di lastre da stampa. L'eccezionale qualità di ARNO ha permesso di aumentare l'avanzamento al 212% e la velocità di taglio del 60%. In questo modo il cliente ha ridotto il tempo di lavorazione da due minuti a circa un minuto e ha migliorato la durata del 50%.

## SISTEMA DI FRESATURA FO 06 Prova sul campo

### Piastra di pressione

**Materiale:** X8CrNiS18-9 (1.4305)  
**Utensile:** FOA-145.063.R05-06  
**Inserto:** OEMX 060408ZZN-PMR  
**Qualità:** AM5740

|       | Concorrenza | ARNO Werkzeuge |
|-------|-------------|----------------|
| $V_c$ | 100 m/min   | 160 m/min      |
| $Z$   | 5           | 5              |
| $f_z$ | 0,06 mm     | 0,08 mm        |
| $v_f$ | 152 mm/min  | 323 mm/min     |
| $a_p$ | 3 mm        | 3 mm           |
| $a_e$ | 55 mm       | 55 mm          |



Velocità di avanzamento della concorrenza

152 mm/min

**Velocità di avanzamento SISTEMA DI FRESATURA FO 06 ARNO**

**323 mm/min**

Il vostro vantaggio:



- Durate maggiori del 50%
- Lavorazione più rapida
- Vantaggio competitivo
- 212% velocità di avanzamento più elevata



MILLING  
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# FABRICATION DE PLAQUES DE PRESSION + 50 % DE LA QUANTITÉ/DURÉE DE VIE

Fraiser avec les meilleures valeurs : Quantité/durée de vie augmentée de 50 %, avancée augmentée de 212 %.

En passant aux fraises du système de fraisage FO, un client a pu rendre sa production de plaques de pression beaucoup plus efficace. La qualité exceptionnelle d'ARNO a permis d'augmenter l'avancée de 212 % et la vitesse de coupe de 60 %. Le client a ainsi réduit le temps de traitement de deux minutes à environ une minute et amélioré la quantité/durée de vie de 50 %.

## SYSTÈME DE FRAISAGE FO 06 Test pratique

| Plaque de pression                            |  |             |
|---|--|-------------|
| Matériau :                                    | X8CrNiS18-9 (1.4305)   |             |
| Outil :                                       | FOA-145.063.R05-06   |             |
| Plaquette de coupe amovible :                 | OEMX 060408ZZN-PMR   |             |
| Version :                                     | AM5740   |             |
|   | Concurrence  | Outils ARNO |
| V <sub>c</sub>                                | 100 m/min  | 160 m/min   |
| Z   | 5  | 5           |
| f <sub>z</sub>                                | 0,06 mm  | 0,08 mm     |
| v <sub>f</sub>                                | 152 mm/min   | 323 mm/min  |
| a <sub>p</sub>                                | 3 mm   | 3 mm        |
| a <sub>e</sub>                                | 55 mm  | 55 mm       |
| Vitesse d'avance Concurrent                   |  | 152 mm/min  |
| Vitesse d'avance du SYSTÈME DE FRAISAGE FO 06 |  | 323 mm/min  |
| Votre avantage :                              | <ul style="list-style-type: none"> <li>• Durée de vie supérieure de 50 %</li> <li>• Traitement plus rapide</li> <li>• Avantage concurrentiel</li> <li>• Vitesse d'avance augmentée de 212 %</li> </ul> |             |



## Holder / Utensile / Outil



| FO                                  | A  | 1   | 45  | 050                                     | R/L  | 05  | 06   |
|-------------------------------------|--|---|---|---|--|---|--|
| <b>System</b><br>Sistema<br>Système | <b>Type</b><br>Tipo di attacco<br>Type de tige   | <b>Generation</b><br>Versione<br>Génération | <b>Approach angle</b><br>Angolo di attacco<br>Angle d'attaque | <b>Diameter</b><br>Diametro<br>Diamètre | <b>Direction</b><br>Direzione<br>Direction | <b>No. of teeth</b><br>Nr. taglienti<br>Nb de dents | <b>Insert size</b><br>Misura inserto<br>Dimensions plaquette de coupe amovible |
|                                     | <b>A - Shell mill cutter</b><br>Fresa a manicotto<br>Fraise à enficher                         |   |   |   | <b>R = Right-hand</b><br>Destro<br>Droite  |   |  |
|                                     | <b>C - Cylindrical shank cutters</b><br>Corpi fresa con attacco cilindrico<br>Fraise à queue   |   |   |   | <b>L = Left-hand</b><br>Sinistro<br>Gauche |   |  |
|                                     | <b>G - Screw shank milling cutter</b><br>Fresa con attacco filettato<br>Fraise à queue filetée |   |   |   |  |   |  |

## Inserts / Inserti / Plaquettes



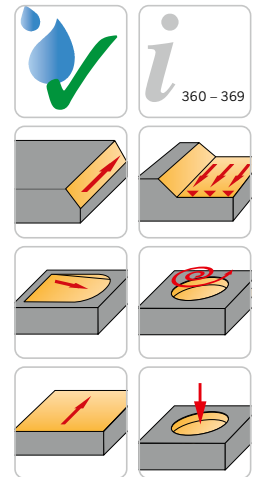
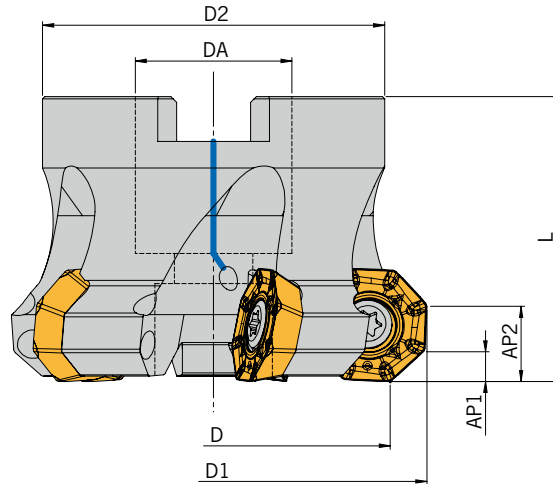
| OEMX   | 06   | 04   | 08   | ZZ   | R/L/N                                      | -PMS                                      | AP5440                            |
|--|--|--|--|--|--|---|-----------------------------------|
| <b>ISO code</b><br>Codifica ISO<br>Norme ISO | <b>Insert size</b><br>Misura inserto<br>Dimensions plaquette de coupe amovible | <b>Insert thickness</b><br>Spessore dell'inserto<br>Épaisseur de plaquette | <b>Corner radius</b><br>Raggio di punta<br>Rayon | <b>Face cutting edge</b><br>Tagliente della faccia<br>Plaquette de coupe | <b>Direction</b><br>Direzione<br>Direction | <b>Geometry</b><br>Geometria<br>Géométrie | <b>Grade</b><br>Qualità<br>Nuance |
|  |  |  |  |  | <b>R = Right-hand</b><br>Destro<br>Droite  |   |                                   |
|  |  |  |  |  | <b>L = Left-hand</b><br>Sinistro<br>Gauche |   |                                   |
|  |  |  |  |  | <b>N - Neutral</b><br>Neutro<br>Neutre     |   |                                   |

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**6**

Fresa a manicotto  
Fraise à enficher

## FOA-...-06

Face milling cutter with bore and transverse keyway / Fresa a spianare con attacco a manicotto / Fraise à surfacer avec alésage cylindrique et clavette transversale



Similar to illustration  
Simile all'illustrazione  
Représentation approximative

## Holders / Utensili / Porte-outils

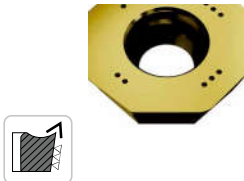

| Article<br>Articolo<br>Article   | L  | D   | D1    | D2  | DA | AP | AP2 | Z  | Indexable inserts<br>Inserti a fissaggio meccanico<br>Plaquettes de coupe amovibles |
|----------------------------------|----|-----|-------|-----|----|----|-----|----|---|
| FOA-145.040.R04-06               | 40 | 40  | 47,2  | 35  | 16 | 4  | 10  | 4  | OE... 06...   |
| FOA-145.042.R05-06               | 40 | 42  | 49,1  | 40  | 16 | 4  | 10  | 5  | OE... 06...   |
| FOA-145.050.R05-06               | 40 | 50  | 57,0  | 48  | 22 | 4  | 10  | 5  | OE... 06...   |
| FOA-145.052.R06-06               | 40 | 52  | 59,0  | 48  | 22 | 4  | 10  | 6  | OE... 06...   |
| FOA-145.056.R06-06               | 50 | 56  | 63,1  | 60  | 27 | 4  | 10  | 6  | OE... 06...   |
| FOA-145.063.R05-06               | 50 | 63  | 69,7  | 60  | 27 | 4  | 10  | 5  | OE... 06...   |
| FOA-145.063.R06-06               | 40 | 63  | 69,7  | 48  | 22 | 4  | 10  | 6  | OE... 06...   |
| FOA-145.066.R06-06               | 50 | 66  | 72,7  | 60  | 27 | 4  | 10  | 6  | OE... 06...   |
| FOA-145.075.R07-06               | 50 | 75  | 81,6  | 60  | 27 | 4  | 10  | 7  | OE... 06...   |
| FOA-145.080.R07-06               | 50 | 80  | 86,7  | 60  | 27 | 4  | 10  | 7  | OE... 06...   |
| FOA-145.085.R07-06               | 50 | 85  | 91,7  | 60  | 27 | 4  | 10  | 7  | OE... 06...   |
| FOA-145.100.R10-06               | 50 | 100 | 106,6 | 78  | 32 | 4  | 10  | 10 | OE... 06...   |
| FOA-145.125.R11-06               | 60 | 125 | 131,4 | 90  | 40 | 4  | 10  | 11 | OE... 06...   |
| FOA-145.160.R13-06 <sup>1)</sup> | 60 | 160 | 166,3 | 104 | 40 | 4  | 10  | 13 | OE... 06...   |
| FOA-145.250.R16-06 <sup>1)</sup> | 60 | 250 | 256,4 | 194 | 60 | 4  | 10  | 16 | OE... 06...   |

1) Without internal coolant  
Senza adduzione interna  
Sans refroidissement interne

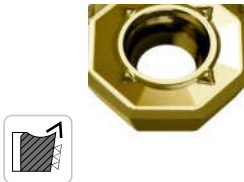

## Spare Parts / Ricambi / Pièces de rechange

| Holder<br>Utensile<br>Porte-outil | Screw<br>Vite<br>Vis | Torque<br>Coppia<br>Couple | Key<br>Chiave<br>Clé |
|-----------------------------------|----------------------|----------------------------|----------------------|
| FOA-...-06                        | AS 0046              | 5,0 Nm                     | T5120-IP             |

# POSITIVE – FINISH MACHINING



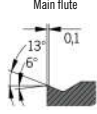
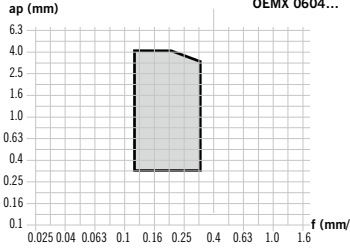


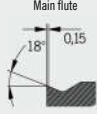
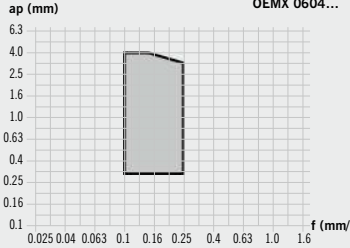


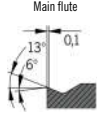
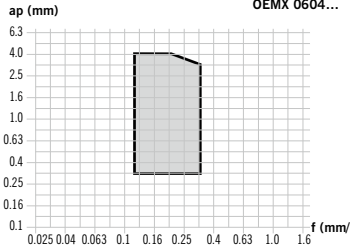
| Geometry  | Properties  | Material group   | View/Cut   | Basic cutting data diagram  |
|---|---|--|--|---|
| <b>-ZZ WIPER</b><br> | <ul style="list-style-type: none"> <li>• Wiper insert for finishing</li> <li>• Sharp insert</li> <li>• Four ground and marked flutes</li> </ul> | <div> <div>P M K N S H</div> <div> <div></div> <div>●</div> <div>○</div> <div>○</div> <div>○</div> <div></div> </div> </div> |  | <p>ap (mm) OEHX 0604</p> <p>Note the feed rate for WIPER.</p> <p>f (mm/r)</p> |

# POSITIVE – FINISHING TO MEDIUM MACHINING

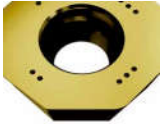

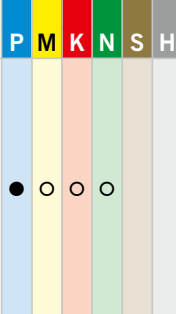
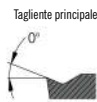
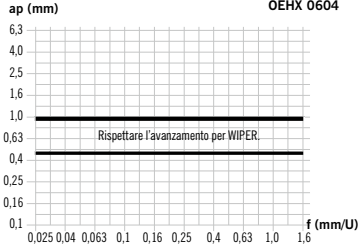
| Geometry   | Properties   | Material group  | View/Cut   | Basic cutting data diagram               |
|--|--|---|--|--|
| <b>-PMA</b><br> | <ul style="list-style-type: none"> <li>• Excellent for machining aluminium and non-ferrous metals</li> <li>• Sharp insert</li> <li>• Good resistance to edge build-up</li> </ul> | <div> <div>P M K N S H</div> <div> <div></div> <div></div> <div></div> <div>●</div> <div></div> <div></div> </div> </div> |  | <p>ap (mm) OEHX 0604</p> <p>f (mm/r)</p> |

# POSITIVE – MEDIUM MACHINING TO ROUGHING

MILLING  
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**6**



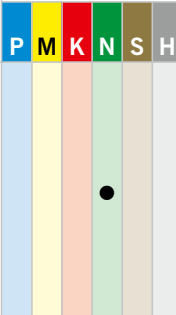

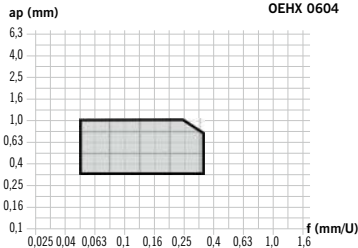
| Geometry  | Properties  | Material group |   |   |   |   |   | View/Cut   | Basic cutting data diagram  |
|---|---|----------------|---|---|---|---|---|--|---|
|   |   | P              | M | K | N | S | H |  |   |
| <b>-PMS</b><br><br>     | <ul style="list-style-type: none"> <li>• Very well suited for machining steel</li> <li>• Stable insert</li> <li>• Optimum efficiency</li> </ul>   | ●              | ○ | ○ | ○ |   |   |    |    |
| <b>-PMR</b><br><br>    | <ul style="list-style-type: none"> <li>• Very well suited for machining stainless steel</li> <li>• Low cutting forces</li> <li>• Good resistance to edge build-up</li> </ul>                    | ○              | ● |   | ○ | ○ |   |    |   |
| <b>-PMG</b><br><br> | <ul style="list-style-type: none"> <li>• Very well suited for machining cast materials</li> <li>• Very good insert stability</li> <li>• Suitable for sand inclusions or casting skin</li> </ul> | ○              |   | ● |   |   |   |  |  |

# FINITURA **POSITIVA**



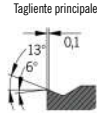
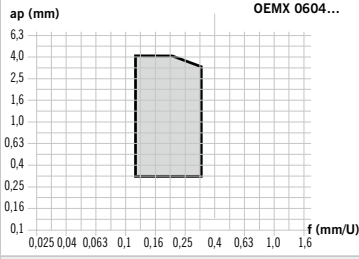



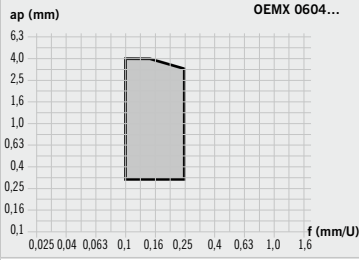



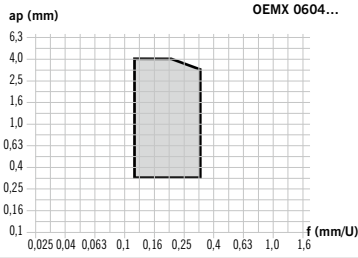
| Geometria  | Caratteristiche  | Gruppo materiale  | Vista/taglio   | Base diagramma dati di taglio   |
|--|--|---|--|---|
|  |  | P M K N S H   |  |   |
| <b>-ZZ WIPER</b><br><br> | <ul style="list-style-type: none"> <li>Piano con geometria raschiante per la finitura</li> <li>Tagliente affilato</li> <li>Quattro taglienti rettificati e contrassegnati</li> </ul> |  |  | <p>ap (mm) OEHX 0604</p>  <p>Rispettare l'avanzamento per WIPER.</p> |

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FRESATURA  
FRAISAGE  
**6**

# DA FINITURA **POSITIVA** A LAVORAZIONE MEDIA

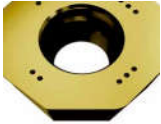
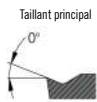
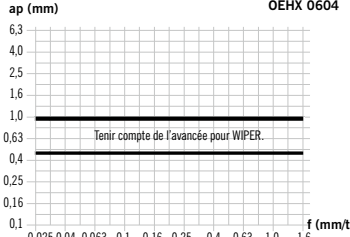
| Geometria   | Caratteristiche  | Gruppo materiale  | Vista/taglio   | Base diagramma dati di taglio  |
|---|--|---|--|--|
|   |  | P M K N S H   |  |  |
| <b>-PMA</b><br><br> | <ul style="list-style-type: none"> <li>Eccellente per la lavorazione di alluminio e metalli non ferrosi</li> <li>Tagliente affilato</li> <li>Ridotta tendenza alla formazione di taglienti di riporto</li> </ul> |  |  | <p>ap (mm) OEHX 0604</p>  |

# DA LAVORAZIONE MEDIA - **POSITIVA** A LAVORAZIONE DI SGROSSATURA


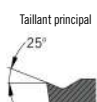
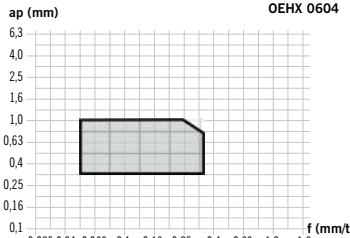
| Geometria   | Caratteristiche  | Gruppo materiale |   |   |   |   |   | Vista/taglio   | Base diagramma dati di taglio   |
|---|--|------------------|---|---|---|---|---|--|---|
|   |  | P                | M | K | N | S | H |  |   |
| <b>-PMS</b><br><br>     | <ul style="list-style-type: none"> <li>• Adatto per la lavorazione di acciaio</li> <li>• Tagliente robusto</li> <li>• Elevata efficacia</li> </ul>   | ●                | ○ | ○ | ○ |   |   |    |    |
| <b>-PMR</b><br><br>  | <ul style="list-style-type: none"> <li>• Adatto per la lavorazione di acciaio inossidabile</li> <li>• Forze di taglio ridotte</li> <li>• Ridotta tendenza alla formazione di taglienti di riporto</li> </ul> | ○                | ● |   | ○ | ○ |   |   |   |
| <b>-PMG</b><br><br> | <ul style="list-style-type: none"> <li>• Adatto per la lavorazione di fusioni</li> <li>• Ottima robustezza del tagliente</li> <li>• Per inclusioni di sabbia o croste di colata</li> </ul>                   | ○                |   | ● |   |   |   |  |  |



# FINITION POSITIVE

| Géométrie   | Caractéristiques  | Groupe de maté-<br>riaux  | Vue/coupe  | Base diagramme des données de<br>coupe   |
|---|---|---|--|--|
| <b>-ZZ WIPER</b><br> | <ul style="list-style-type: none"><li>• Plaquette Wiper pour la finition</li><li>• Arête de coupe rectifiée</li><li>• Quatre lames affûtées et marquées</li></ul> | <div><div>P</div><div>M</div><div>K</div><div>N</div><div>S</div><div>H</div></div> |  | <p>ap (mm) OEHX 0604</p>  <p>Tenir compte de l'avancée pour WIPER.</p> <p>f (mm/tr)</p> |



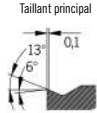
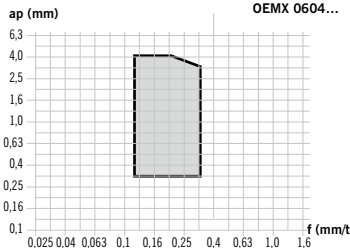


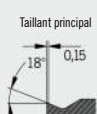
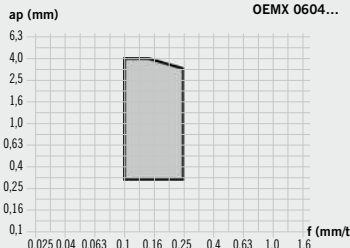


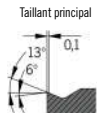
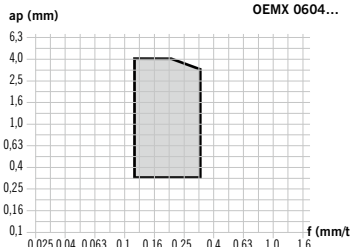
# FINITION POSITIVE À L'USINAGE DE SEMI-FINITION

| Géométrie  | Caractéristiques   | Groupe de maté-<br>riaux  | Vue/coupe  | Base diagramme des données de<br>coupe  |
|--|--|---|--|---|
| <b>-PMA</b><br> | <ul style="list-style-type: none"><li>• Excellent pour l'usinage de l'aluminium et des métaux non ferreux</li><li>• Fort taillant</li><li>• Faible tendance à la formation d'arêtes rapportées</li></ul> | <div><div>P</div><div>M</div><div>K</div><div>N</div><div>S</div><div>H</div></div> |  | <p>ap (mm) OEHX 0604</p>  <p>f (mm/tr)</p> |










































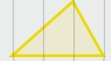







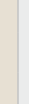

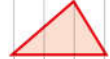

# USINAGE DE SEMI FINITION **POSITIVE** JUSQU'À L'ÉBAUCHE

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| Géométrie   | Caractéristiques  | Groupe de matériaux |   |   |   |   |   | Vue/coupe  | Base diagramme des données de coupe   |
|---|---|---------------------|---|---|---|---|---|--|---|
|   |   | P                   | M | K | N | S | H |  |   |
| <b>-PMS</b><br><br>     | <ul style="list-style-type: none"> <li>• Convient très bien pour l'usinage de l'acier</li> <li>• Arête de coupe résistante</li> <li>• Une rentabilité optimale</li> </ul>   | ●                   | ○ | ○ | ○ |   |   |    |    |
| <b>-PMR</b><br><br>  | <ul style="list-style-type: none"> <li>• Convient très bien pour l'usinage de l'acier inoxydable</li> <li>• Forces de coupe plus faibles</li> <li>• Faible tendance à la formation d'arêtes rapportées</li> </ul> | ○                   | ● |   | ○ | ○ |   |   |   |
| <b>-PMG</b><br><br> | <ul style="list-style-type: none"> <li>• Convient très bien pour l'usinage de fontes</li> <li>• Très bonne stabilité des fort taillant</li> <li>• En cas d'inclusions de sable ou de croûtes de coulée</li> </ul> | ○                   |   | ● |   |   |   |  |  |

# HC – SOLID CARBIDE COATED

| Grade   | Coating colour  | Properties  | Material group  | Scope of application  |   |   |   |   |   |   |    |    |    |    |           |    |    |    |  |  |   |
|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|-----------|----|----|----|--|--|---|
|   |   |   |   | WEAR RESISTANCE   |   |   |   |   |   |   |    |    |    |    | TOUGHNESS |    |    |    |  |  |    |
|   |   |   |   | P   | M   | K | N | S | H | 5 | 10 | 15 | 20 | 25 | 30        | 35 | 40 | 45 |  |  |   |
| AP2130<br>   |    | <ul style="list-style-type: none"><li>• High process reliability</li><li>• Specially suitable for dry machining</li><li>• Good wear resistance</li></ul>                                  |                   |    |    |   |   |   |   |   |    |    |    |    |           |    |    |    |  |  |   |
| AP5230<br>   |    | <ul style="list-style-type: none"><li>• Universally applicable grade</li><li>• High heat and oxidation resistance</li><li>• Very well suited for rough machining</li></ul>                |                   |    |    |   |   |   |   |   |    |    |    |    |           |    |    |    |  |  |   |
| AP5440<br>   |    | <ul style="list-style-type: none"><li>• For medium and rough machining of steel</li><li>• Suitable for poor machining conditions</li><li>• Very good wear detection</li></ul>             |                   |    |    |   |   |   |   |   |    |    |    |    |           |    |    |    |  |  |   |
| AM5740<br>   |    | <ul style="list-style-type: none"><li>• Suitable for machining stainless steels</li><li>• For applications at medium to high cutting speeds</li><li>• High oxidation resistance</li></ul> |                   |    |    |   |   |   |   |   |    |    |    |    |           |    |    |    |  |  |   |
| AK5915<br> |  | <ul style="list-style-type: none"><li>• Particularly wear-resistant coating</li><li>• Suitable for high cutting speeds</li><li>• Very well suited for machining ISO K materials</li></ul> |       |  |  |   |   |   |   |   |    |    |    |    |           |    |    |    |  |  |   |

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# HU – SOLID CARBIDE UNCOATED

| Grade      | Coating colour | Properties   | Material group | Scope of application |   |   |   |   |   |    |    |    |    |    |           |    |    |  |  |  |
|------------|----------------|--|----------------|----------------------|---|---|---|---|---|----|----|----|----|----|-----------|----|----|--|--|--|
|            |                |  |                | WEAR RESISTANCE      |   |   |   |   |   |    |    |    |    |    | TOUGHNESS |    |    |  |  |  |
|            |                |  | P              | M                    | K | N | S | H | 5 | 10 | 15 | 20 | 25 | 30 | 35        | 40 | 45 |  |  |  |
| AN1015<br> |                | <ul style="list-style-type: none"><li>Excellent for machining ISO N materials</li><li>Good resistance to edge build-up</li><li>Wear-resistant and heat-resistant substrate</li></ul> |                |                      |   | ○ | ● |   |   |    |    |    |    |    |           |    |    |  |  |  |

































# HC - METALLO DURO RIVESTITO

| Qualità           | Colore rivestimento | Caratteristiche   | Gruppo materiale | Campo di applicazione |   |   |   |   |   |   |    |    |          |    |    |    |    |    |  |  |  |
|-------------------|---------------------|---|------------------|-----------------------|---|---|---|---|---|---|----|----|----------|----|----|----|----|----|--|--|--|
|                   |                     |   |                  | RESISTENZA ALL'USURA  |   |   |   |   |   |   |    |    | TENACITÀ |    |    |    |    |    |  |  |  |
|                   |                     |   |                  | P                     | M | K | N | S | H | 5 | 10 | 15 | 20       | 25 | 30 | 35 | 40 | 45 |  |  |  |
| <b>AP2130</b><br> |                     | <ul style="list-style-type: none"><li>Elevata sicurezza di processo</li><li>Particolarmente adatto alla lavorazione a secco</li><li>Buona resistenza all'usura</li></ul>  |                  |                       |   |   |   |   |   |   |    |    |          |    |    |    |    |    |  |  |  |
| <b>AP5230</b><br> |                     | <ul style="list-style-type: none"><li>Qualità utilizzabile universalmente</li><li>Elevata resistenza al calore e all'ossidazione</li><li>La soluzione ottimale per la finitura</li></ul>                            |                  |                       |   |   |   |   |   |   |    |    |          |    |    |    |    |    |  |  |  |
| <b>AP5440</b><br> |                     | <ul style="list-style-type: none"><li>Per la lavorazione media e la sgrossatura di acciaio</li><li>Adatto per condizioni di lavorazione sfavorevoli</li><li>Ottimo riconoscimento dell'usura</li></ul>              |                  |                       |   |   |   |   |   |   |    |    |          |    |    |    |    |    |  |  |  |
| <b>AM5740</b><br> |                     | <ul style="list-style-type: none"><li>Per la lavorazione di acciai inossidabili</li><li>Utilizzabile a velocità di taglio medio-alte</li><li>Elevata resistenza all'ossidazione</li></ul>                           |                  |                       |   |   |   |   |   |   |    |    |          |    |    |    |    |    |  |  |  |
| <b>AK5915</b><br> |                     | <ul style="list-style-type: none"><li>Rivestimento particolarmente resistente all'usura</li><li>Adatto per velocità di taglio elevate</li><li>La soluzione ottimale per la lavorazione di materiali ISO K</li></ul> |                  |                       |   |   |   |   |   |   |    |    |          |    |    |    |    |    |  |  |  |

# HU - METALLO DURO NON RIVESTITO

| Qualità | Colore rivestimento   | Caratteristiche   | Gruppo materiale | Campo di applicazione |   |   |   |   |   |                      |    |    |    |    |          |    |    |  |   |  |  |
|---------|---|---|------------------|-----------------------|---|---|---|---|---|----------------------|----|----|----|----|----------|----|----|--|---|--|--|
|         |   |   |                  |                       |   |   |   |   |   | RESISTENZA ALL'USURA |    |    |    |    | TENACITÀ |    |    |  |   |  |  |
|         |   |   | P                | M                     | K | N | S | H | 5 | 10                   | 15 | 20 | 25 | 30 | 35       | 40 | 45 |  |   |  |  |
| AN1015  |  | <ul style="list-style-type: none"><li>Eccellente per la lavorazione di materiali ISO N</li><li>Ridotta tendenza alla formazione di taglianti riportati</li><li>Substrato resistente all'usura e al calore</li></ul> |                  |                       |   | ○ | ● |   |   |                      |    |    |    |    |          |    |    |  |  |  |  |
|         |   |   |                  |                       |   |   |   |   |   |                      |    |    |    |    |          |    |    |  |  |  |  |

# HC – CARBURE AVEC REVÊTEMENT

| Nuance  | Couleur de revêtement   | Caractéristiques   | Groupe de matériaux   | Champ d'application   |   |   |   |   |   |   |    |    |    |    |          |    |    |    |   |   |   |
|---|---|--|---|---|---|---|---|---|---|---|----|----|----|----|----------|----|----|----|---|---|---|
|   |   |  |   | RÉSISTANCE À L'USURE  |   |   |   |   |   |   |    |    |    |    | TÉNACITÉ |    |    |    |   |   |   |
|   |   |  |   | P   | M   | K | N | S   | H | 5 | 10 | 15 | 20 | 25 | 30       | 35 | 40 | 45 |    |    |  |
| AP2130<br>   |    | <ul style="list-style-type: none"><li>Grande sécurité de processus</li><li>Nuance particulièrement adaptée au travail à sec</li><li>Bonne résistance à l'usure</li></ul>                                     |  |    |   |   |   |   |   |   |    |    |    |    |          |    |    |    |    |    |   |
| AP5230<br>   |    | <ul style="list-style-type: none"><li>Nuance à usage universel</li><li>Haute résistance à la chaleur et à l'oxydation</li><li>Convient très bien pour la finition</li></ul>                                  |  |    |  |   |   |   |   |   |    |    |    |    |          |    |    |    |    |    |   |
| AP5440<br>   |    | <ul style="list-style-type: none"><li>Pour l'usinage de semi-finition et d'ébauche de l'acier</li><li>Convient pour des conditions d'usinage défavorables</li><li>Très bonne détection de l'usure</li></ul>  |  |   |   |   |   |   |   |   |    |    |    |    |          |    |    |    |    |    |   |
| AM5740<br>   |    | <ul style="list-style-type: none"><li>Pour l'usinage d'aciers inoxydables</li><li>Utilisable pour des vitesses de coupe moyennes à élevées</li><li>Grande résistance à l'oxydation</li></ul>                 |  |   |   |   |   |  |   |   |    |    |    |    |          |    |    |    |    |    |   |
| AK5915<br> |  | <ul style="list-style-type: none"><li>Revêtement particulièrement résistant à l'usure</li><li>Pour des vitesses de coupe élevées</li><li>Convient très bien pour le traitement des matériaux ISO K</li></ul> |   |  |   |   |   |   |   |   |    |    |    |    |          |    |    |    |  |  |   |

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# HU – CARBURE SANS REVÊTEMENT

| Nuance | Couleur de revêtement   | Caractéristiques   | Groupe de matériaux | Champ d'application  |   |   |   |   |   |   |    |    |    |          |    |    |    |    |  |  |  |
|--------|---|--|---------------------|----------------------|---|---|---|---|---|---|----|----|----|----------|----|----|----|----|--|--|--|
|        |   |  |                     | RÉSISTANCE À L'USURE |   |   |   |   |   |   |    |    |    | TÉNACITÉ |    |    |    |    |  |  |  |
|        |   |  |                     | P                    | M | K | N | S | H | 5 | 10 | 15 | 20 | 25       | 30 | 35 | 40 | 45 |  |  |  |
| AN1015 |  | <ul style="list-style-type: none"><li>Excellente nuance pour le traitement des matériaux ISO N</li><li>Faible tendance à la formation d'arêtes rapportées</li><li>Substrat résistant à l'usure et à la chaleur</li></ul> |                     |                      |   |   |   |   |   |   |    |    |    |          |    |    |    |    |  |  |  |

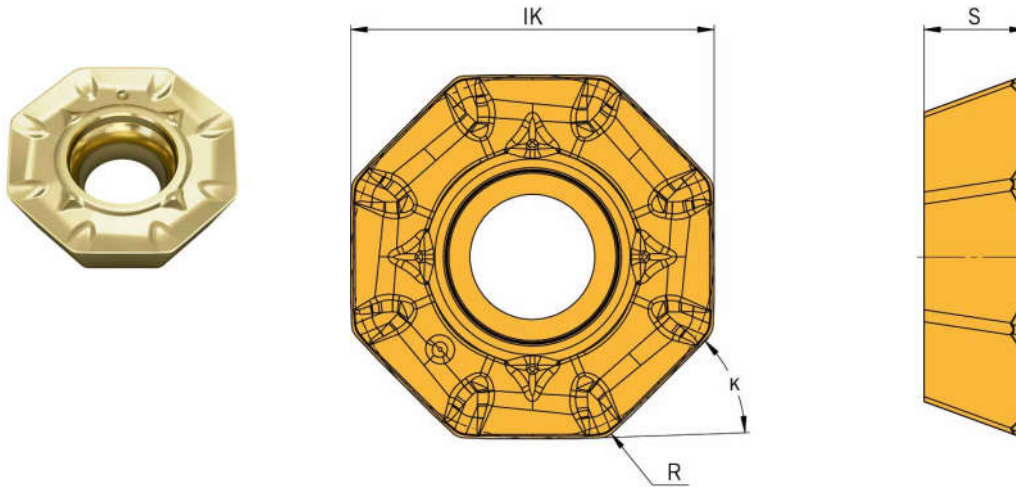
Inserti a fissaggio meccanico  
Plaquettes de coupe amovibles

## OE... 06...

Indexable inserts for face milling / Inserti per spianatura / Plaquettes de coupe amovibles pour le surfacage



Similar to illustration  
Simile all'illustrazione  
Représentation approximative



## Sintered Execution / Esecuzione Sinterizzato / Version frittée

| Article<br>Articolo<br>Article | IK | S   | R   | HC     | HC     | HC     |
|--------------------------------|----|-----|-----|--------|--------|--------|
|                                |    |     |     | AP2130 | AP5440 | AM5740 |
| OEMX 060408ZZN-PMG             | 16 | 4,5 | 0,8 |        |        | ◆      |
| OEMX 060408ZZN-PMR             | 16 | 4,5 | 0,8 |        | ◆      |        |
| OEMX 060408ZZN-PMS             | 16 | 4,5 | 0,8 | ◆      | ◆      |        |

HC = Carbide coated / Metallo duro rivestito / Carbure avec revêtement

|   |   |   |   |
|---|---|---|---|
| P | ● | ● |   |
| M | ○ | ● |   |
| K |   |   | ● |
| N |   |   |   |
| S |   | ○ |   |
| H |   |   |   |

● Main application  
Applicazione principale  
Application principale

○ Secondary application  
Applicazione secondaria  
Application secondaire

## Precision ground execution / Esecuzione rettifica di precisione / Plaquettes pour gorges de précision

| Article<br>Articolo<br>Article | IK | S   | R   | HU      |
|--------------------------------|----|-----|-----|---------|
|                                |    |     |     | AN 1015 |
| OEHX 060408FN-PMA              | 16 | 4,5 | 0,8 | ◆       |

HU = Carbide uncoated / Metallo duro non rivestito / Carbure sans revêtement

|   |   |
|---|---|
| P |   |
| M |   |
| K | ○ |
| N | ● |
| S |   |
| H |   |

● Main application  
Applicazione principale  
Application principale

○ Secondary application  
Applicazione secondaria  
Application secondaire

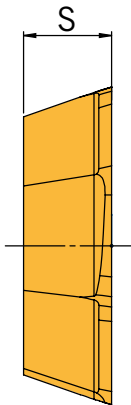
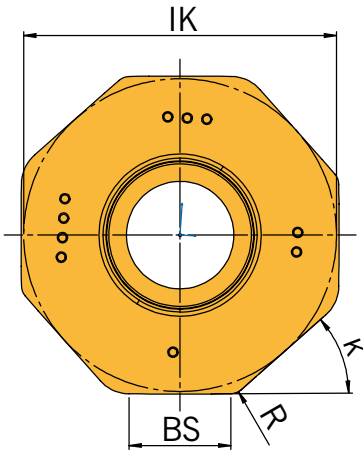
Inserti a fissaggio meccanico  
Plaquettes de coupe amovibles

OE... 06...

Indexable insert for face milling - wiper insert / *Inserto di spianatura - inserto raschiante* / *Plaquette de coupe amovible pour le surfacage - plaquette Wiper*



Similar to illustration  
*Simile all'illustrazione*  
*Représentation approximative*



Precision ground execution / *Esecuzione rettifica di precisione* / *Plaquettes pour gorges de précision*

| Article<br><i>Articolo</i><br><i>Article</i> | IK | BS | S   | R   | HC     |
|--|----|----|-----|-----|--------|
|  |    |    |     |     | AP5230 |
| OEHX 0604ZZ <sup>1)</sup>                    | 16 | 5  | 4,5 | 0,8 | ◆      |

HC = Carbide coated / *Metallo duro rivestito* / *Carbure avec revêtement*

1) Wiper insert  
*Inserto raschiante*  
*Plaquette Wiper*

|   |   |
|---|---|
| P | ● |
| M | ● |
| K | ● |
| N |   |
| S |   |
| H |   |

● Main application  
*Applicazione principale*  
*Application principale*  
○ Secondary application  
*Applicazione secondaria*  
*Application secondaire*



## Determination of cutting speed &amp; feed rate – Face milling

| Material group | Structure of the material groups and identification letters |   | Brinell hardness HB | Tensile strength Rm (N/mm <sup>2</sup> ) | Chipping group | Cutting speed V <sub>c</sub> (m/min) |                 |                 |  |
|----------------|---|---|---------------------|--|----------------|--------------------------------------|-----------------|-----------------|--|
|                |   |   |                     |  |                | HC                                   |                 |                 |  |
|                |   |   |                     |  |                | AP2130                               | AP5230          | AP5440          |  |
| <b>P</b>       | Unalloyed steel   | C ≤ 0.25 % annealed                             | 125                 | 428                                      | P1             | 210 - 280 - 350                      | 250 - 305 - 360 | 200 - 240 - 275 |  |
|                |   | C > 0.25 ... ≤ 0.55 % annealed                  | 190                 | 639                                      | P2             | 170 - 245 - 320                      | 200 - 260 - 320 | 170 - 210 - 250 |  |
|                |   | C > 0.25 ... ≤ 0.55 % hardened and tempered     | 210                 | 708                                      | P3             | 170 - 245 - 320                      | 200 - 260 - 320 | 170 - 210 - 250 |  |
|                |   | C > 0.55 % annealed                             | 190                 | 639                                      | P4             | 150 - 215 - 280                      | 200 - 250 - 300 | 150 - 200 - 250 |  |
|                |   | C > 0.55 % hardened and tempered                | 300                 | 1013                                     | P5             | 150 - 215 - 280                      | 200 - 250 - 300 | 150 - 200 - 250 |  |
|                | Low alloyed steel   | Machinig steel (short-chipping) annealed        | 220                 | 745                                      | P6             | 150 - 215 - 280                      | 200 - 250 - 300 | 150 - 200 - 250 |  |
|                |   | annealed  | 175                 | 591                                      | P7             | 150 - 200 - 250                      | 200 - 240 - 280 | 150 - 200 - 250 |  |
|                |   | hardened and tempered                           | 300                 | 1013                                     | P8             | 140 - 175 - 210                      | 200 - 240 - 280 | 140 - 170 - 200 |  |
|                |   | hardened and tempered                           | 380                 | 1282                                     | P9             | 100 - 140 - 180                      | 200 - 250 - 300 | 100 - 140 - 180 |  |
|                |   | hardened and tempered                           | 430                 | 1477                                     | P10            | 100 - 140 - 180                      | 200 - 250 - 300 | 100 - 140 - 180 |  |
|                | High alloyed steel and high alloyed tool steel              | annealed  | 200                 | 675                                      | P11            | 140 - 175 - 210                      | -               | 140 - 175 - 210 |  |
|                |   | hardened  | 300                 | 1013                                     | P12            | 80 - 125 - 170                       | 200 - 225 - 250 | 100 - 135 - 170 |  |
|                |   | hardened  | 400                 | 1361                                     | P13            | 80 - 125 - 170                       | 200 - 225 - 250 | 100 - 135 - 170 |  |
|                | Stainless steel   | ferretic / martensitic, annealed                | 200                 | 675                                      | P14            | 140 - 165 - 190                      | 200 - 225 - 250 | 140 - 165 - 190 |  |
|                |   | martensitic, hardened and tempered              | 330                 | 1114                                     | P15            | 100 - 135 - 170                      | -               | 140 - 165 - 190 |  |
| <b>M</b>       | Stainless steel   | austenitic, chilled                             | 200                 | 675                                      | M1             | 90 - 120 - 150                       | 150 - 200 - 250 | -               |  |
|                |   | austenitic, precipitation-hardened (PH)         | 300                 | 1013                                     | M2             | 70 - 105 - 140                       | -               | -               |  |
|                |   | austenitic-ferritic, Duplex                     | 230                 | 778                                      | M3             | 70 - 105 - 140                       | -               | -               |  |
|                |   |   | 200                 | 675                                      | K1             | -                                    | 250 - 275 - 300 | -               |  |
| <b>K</b>       | Malleable cast iron   | pearlitic                                       | 260                 | 867                                      | K2             | -                                    | 250 - 275 - 300 | -               |  |
|                |   |   | 180                 | 602                                      | K3             | -                                    | 300 - 350 - 400 | -               |  |
|                | Cast iron   | low tensile strength                            | 180                 | 602                                      | K3             | -                                    | 300 - 350 - 400 | -               |  |
|                |   | high tensile strength / austenitic              | 245                 | 825                                      | K4             | -                                    | 300 - 350 - 400 | -               |  |
|                | Cast iron with nodular graphite                             | ferritic  | 155                 | 518                                      | K5             | -                                    | 250 - 275 - 300 | -               |  |
|                |   | pearlitic                                       | 265                 | 885                                      | K6             | -                                    | 250 - 275 - 300 | -               |  |
| <b>N</b>       | GGV (CGI)   |   | 200                 | 675                                      | K7             | -                                    | 300 - 350 - 400 | -               |  |
|                | Aluminium alloys long chipping                              | not heat treatable                              | 30                  | -  | N1             | -                                    | -               | -               |  |
|                |   | heat treatable, heat treated                    | 100                 | 343                                      | N2             | -                                    | -               | -               |  |
|                |   | ≤ 12 % Si, not heat treatable                   | 75                  | 260                                      | N3             | -                                    | -               | -               |  |
|                | Casted aluminium alloys                                     | ≤ 12 % Si, heat treatable, heat treated         | 90                  | 314                                      | N4             | -                                    | -               | -               |  |
|                |   | > 12 % Si, not heat treatable                   | 130                 | 447                                      | N5             | -                                    | -               | -               |  |
|                | Magnesium alloys  | > 12 % Si, not heat treatable                   | 70                  | 250                                      | N6             | -                                    | -               | -               |  |
|                |   |   | 100                 | 343                                      | N7             | -                                    | -               | -               |  |
|                | Copper and copper alloys (Brass / Bronze)                   | Unalloyed, electrolyte copper                   | 100                 | 343                                      | N7             | -                                    | -               | -               |  |
|                |   | Brass, Bronze                                   | 90                  | 314                                      | N8             | -                                    | -               | -               |  |
|                |   | Cu-alloys, short-chipping                       | 110                 | 382                                      | N9             | -                                    | -               | -               |  |
|                |   |   | 300                 | 1013                                     | N10            | -                                    | -               | -               |  |
|                | Non-ferrous materials                                       | Lead alloys (without abrasive filling material) | -                   | -  | N11            | -                                    | -               | -               |  |
|                |   | Duroplastic (without abrasive filling material) | -                   | -  | N12            | -                                    | -               | -               |  |
|                |   | Plastic glas fibre reinforced GFRP              | -                   | -  | N13            | -                                    | -               | -               |  |
|                |   | Plastic carbon fibre reinforced CFRP            | -                   | -  | N14            | -                                    | -               | -               |  |
|                |   | Plastic aramid fibre reinforced AFRP            | -                   | -  | N15            | -                                    | -               | -               |  |
|                |   | Graphite (tech.)                                | 80 Shore            | -  | N16            | -                                    | -               | -               |  |
| <b>S</b>       | High temperature resistant alloys                           | Fe-based annealed                               | 200                 | 675                                      | S1             | -                                    | -               | -               |  |
|                |   | Fe-based heat treated                           | 280                 | 943                                      | S2             | -                                    | -               | -               |  |
|                |   | Ni- or Co-alloyed annealed                      | 250                 | 839                                      | S3             | -                                    | -               | -               |  |
|                |   | Ni- or Co-alloyed heat treated                  | 350                 | 1177                                     | S4             | -                                    | -               | -               |  |
|                |   | Ni- or Co-alloyed casting                       | 320                 | 1076                                     | S5             | -                                    | -               | -               |  |
|                | Titanium alloys   | Pure titan                                      | 200                 | 675                                      | S6             | -                                    | -               | -               |  |
|                |   | α- and β-alloys, heat treated                   | 375                 | 1262                                     | S7             | -                                    | -               | -               |  |
|                |   | β-alloys  | 410                 | 1396                                     | S8             | -                                    | -               | -               |  |
|                | Wolfram alloys  |   | 300                 | 1013                                     | S9             | -                                    | -               | -               |  |
|                | Molybdän alloys   |   | 300                 | 1013                                     | S10            | -                                    | -               | -               |  |
| <b>H</b>       | Hardened steel  | hardened  | 50 HRC              | -  | H1             | -                                    | -               | -               |  |
|                |   | hardened  | 55 HRC              | -  | H2             | -                                    | -               | -               |  |
|                |   | hardened  | 60 HRC              | -  | H3             | -                                    | -               | -               |  |
|                | Hardened cast iron  | hardened  | 55 HRC              | -  | H4             | -                                    | -               | -               |  |

The recommended cutting data are only approximate values.

It may be necessary to adjust them to each individual machining application.

HC = Carbide coated

HU = Carbide uncoated



|  |                |                 | HU                |
|--|----------------|-----------------|-------------------|
|  | AM5740         | AK5915          | AN1015            |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | 85 - 130 - 170 | -               | -                 |
|  | 80 - 120 - 160 | -               | -                 |
|  | 80 - 120 - 160 | -               | -                 |
|  | -              | 170 - 205 - 240 | -                 |
|  | -              | 150 - 185 - 220 | -                 |
|  | -              | 230 - 315 - 400 | -                 |
|  | -              | 180 - 250 - 320 | -                 |
|  | -              | 200 - 255 - 310 | -                 |
|  | -              | -               | -                 |
|  | -              | 230 - 315 - 400 | -                 |
|  | -              | -               | 400 - 1200 - 2000 |
|  | -              | -               | 400 - 1200 - 2000 |
|  | -              | -               | 600 - 690 - 780   |
|  | -              | -               | 530 - 565 - 600   |
|  | -              | -               | 290 - 320 - 350   |
|  | -              | -               | -                 |
|  | -              | -               | 200 - 250 - 300   |
|  | -              | -               | 250 - 375 - 500   |
|  | -              | -               | 200 - 400 - 600   |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | 60 - 70 - 75   | -               | -                 |
|  | 60 - 65 - 65   | -               | -                 |
|  | 60 - 65 - 70   | -               | -                 |
|  | -              | -               | -                 |
|  | 40 - 50 - 60   | -               | -                 |
|  | 60 - 70 - 75   | -               | -                 |
|  | 45 - 55 - 60   | -               | -                 |
|  | 45 - 55 - 60   | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |

Determinazione della velocità di taglio e dell'avanzamento – Fresatura a spianare

| Gruppo materiale | Struttura dei gruppi di materiali e lettere di riferimento |                          | Durezza Brinell   | Resistenza Rm (N/mm²) | Gruppo di lavoro | Velocità di taglio V <sub>c</sub> (m/min) |                 |                 |                 |
|------------------|--|--------------------------|---|-----------------------|------------------|---|-----------------|-----------------|-----------------|
|                  |  |                          |   |                       |                  | HC  |                 |                 |                 |
|                  |  |                          |   |                       |                  | AP2130                                    | AP5230          | AP5440          |                 |
| P                | Acciai non legato  | C ≤ 0,25 %               | ricotto   | 125                   | 428              | P1  | 210 - 280 - 350 | 250 - 305 - 360 | 200 - 240 - 275 |
|                  |  | C > 0,25 ... ≤ 0,55 %    | ricotto   | 190                   | 639              | P2  | 170 - 245 - 320 | 200 - 260 - 320 | 170 - 210 - 250 |
|                  |  | C > 0,25 ... ≤ 0,55 %    | bonificato  | 210                   | 708              | P3  | 170 - 245 - 320 | 200 - 260 - 320 | 170 - 210 - 250 |
|                  |  | C > 0,55 %               | ricotto   | 190                   | 639              | P4  | 150 - 215 - 280 | 200 - 250 - 300 | 150 - 200 - 250 |
|                  |  | C > 0,55 %               | bonificato  | 300                   | 1013             | P5  | 150 - 215 - 280 | 200 - 250 - 300 | 150 - 200 - 250 |
|                  | Acciai debolmente legati                                   | Acciaio (truciolo corto) | ricotto   | 220                   | 745              | P6  | 150 - 215 - 280 | 200 - 250 - 300 | 150 - 200 - 250 |
|                  |  |                          | ricotto   | 175                   | 591              | P7  | 150 - 200 - 250 | 200 - 240 - 280 | 150 - 200 - 250 |
|                  |  |                          | bonificato  | 300                   | 1013             | P8  | 140 - 175 - 210 | 200 - 240 - 280 | 140 - 170 - 200 |
|                  |  |                          | bonificato  | 380                   | 1282             | P9  | 100 - 140 - 180 | 200 - 250 - 300 | 100 - 140 - 180 |
|                  |  |                          | bonificato  | 430                   | 1477             | P10                                       | 100 - 140 - 180 | 200 - 250 - 300 | 100 - 140 - 180 |
|                  | Acciai fortemente legati e acciai da utensili              |                          | ricotto   | 200                   | 675              | P11                                       | 140 - 175 - 210 | -               | 140 - 175 - 210 |
|                  |  |                          | temprato e rinvenuto                                      | 300                   | 1013             | P12                                       | 80 - 125 - 170  | 200 - 225 - 250 | 100 - 135 - 170 |
|                  |  |                          | temprato e rinvenuto                                      | 400                   | 1361             | P13                                       | 80 - 125 - 170  | 200 - 225 - 250 | 100 - 135 - 170 |
|                  | Acciai inossidabili  |                          | ferritico / martensitico, ricotto                         | 200                   | 675              | P14                                       | 140 - 165 - 190 | 200 - 225 - 250 | 140 - 165 - 190 |
|                  |  |                          | martensitico, bonificato                                  | 330                   | 1114             | P15                                       | 100 - 135 - 170 | -               | 140 - 165 - 190 |
| M                | Acciai inossidabili  |                          | austenitico, trattato o temperato                         | 200                   | 675              | M1  | 90 - 120 - 150  | 150 - 200 - 250 | -               |
|                  |  |                          | austenitico, indurimento per precipitazione (PH)          | 300                   | 1013             | M2  | 70 - 105 - 140  | -               | -               |
|                  |  |                          | austenitico-ferritico, Duplex                             | 230                   | 778              | M3  | 70 - 105 - 140  | -               | -               |
| K                | Ghisa temprata   |                          | ferritico   | 200                   | 675              | K1  | -               | 250 - 275 - 300 | -               |
|                  |  |                          | perlitica   | 260                   | 867              | K2  | -               | 250 - 275 - 300 | -               |
|                  | Ghisa grigia   |                          | bassa resistenza  | 180                   | 602              | K3  | -               | 300 - 350 - 400 | -               |
|                  |  |                          | alta resistenza / austenitico                             | 245                   | 825              | K4  | -               | 300 - 350 - 400 | -               |
|                  | Ghisa sferoidale   |                          | ferritico   | 155                   | 518              | K5  | -               | 250 - 275 - 300 | -               |
|                  |  |                          | perlitica   | 265                   | 885              | K6  | -               | 250 - 275 - 300 | -               |
| N                | GGV (CGI)  |                          |   | 200                   | 675              | K7  | -               | 300 - 350 - 400 | -               |
|                  | Leghe di Alluminio stampato                                |                          | non invecchiato   | 30                    | -                | N1  | -               | -               | -               |
|                  |  |                          | rinvenuto, invecchiato                                    | 100                   | 343              | N2  | -               | -               | -               |
|                  | Leghe di Alluminio da fusione                              |                          | ≤ 12 % Si, non invecchiato                                | 75                    | 260              | N3  | -               | -               | -               |
|                  |  |                          | ≤ 12 % Si, rinvenuto, invecchiato                         | 90                    | 314              | N4  | -               | -               | -               |
|                  | Leghe di magnesio  |                          | > 12 % Si, non invecchiato                                | 130                   | 447              | N5  | -               | -               | -               |
|                  |  |                          | > 12 % Si, non invecchiato                                | 70                    | 250              | N6  | -               | -               | -               |
|                  | Rame e Leghe di Rame (Bronzo / Ottone)                     |                          | Non legati, Rame Elettrolitico                            | 100                   | 343              | N7  | -               | -               | -               |
|                  |  |                          | Ottone, Bronzo  | 90                    | 314              | N8  | -               | -               | -               |
|                  |  |                          | Leghe Cu, truciolo corto                                  | 110                   | 382              | N9  | -               | -               | -               |
|                  |  |                          |   | 300                   | 1013             | N10                                       | -               | -               | -               |
|                  | Materiali non metallici                                    |                          | Leghe al piombo (senza materiale di riempimento abrasivo) | -                     | -                | N11                                       | -               | -               | -               |
|                  |  |                          | Duroplastico (senza materiale di riempimento abrasivo)    | -                     | -                | N12                                       | -               | -               | -               |
|                  |  |                          | Plastica rinforzata in fibra di vetro GFRP                | -                     | -                | N13                                       | -               | -               | -               |
|                  |  |                          | Plastica rinforzata in fibra di carbonio CFRP             | -                     | -                | N14                                       | -               | -               | -               |
|                  |  |                          | Plastica rinforzata in fibra aramidica AFRP               | -                     | -                | N15                                       | -               | -               | -               |
|                  |  |                          | Grafite (tecnico)   | 80 Shore              | -                | N16                                       | -               | -               | -               |
| S                | Leghe resistenti al calore                                 |                          | Base-Fe   | 200                   | 675              | S1  | -               | -               | -               |
|                  |  |                          | Base-Fe   | 280                   | 943              | S2  | -               | -               | -               |
|                  |  |                          | Base Ni o Co  | 250                   | 839              | S3  | -               | -               | -               |
|                  |  |                          | Base Ni o Co  | 350                   | 1177             | S4  | -               | -               | -               |
|                  |  |                          | Base Ni o Co  | 320                   | 1076             | S5  | -               | -               | -               |
|                  | Leghe di Titanio   |                          | Titanio puro  | 200                   | 675              | S6  | -               | -               | -               |
|                  |  |                          | Leghe α e β, invecchiato                                  | 375                   | 1262             | S7  | -               | -               | -               |
|                  |  |                          | Leghe β   | 410                   | 1396             | S8  | -               | -               | -               |
|                  | Leghe di tungsteno   |                          |   | 300                   | 1013             | S9  | -               | -               | -               |
|                  | Leghe di molibdeno   |                          |   | 300                   | 1013             | S10                                       | -               | -               | -               |
| H                | Acciaio Temprato   |                          | temprato e rinvenuto                                      | 50 HRC                | -                | H1  | -               | -               | -               |
|                  |  |                          | temprato e rinvenuto                                      | 55 HRC                | -                | H2  | -               | -               | -               |
|                  |  |                          | temprato e rinvenuto                                      | 60 HRC                | -                | H3  | -               | -               | -               |
|                  | Ghisa Temprata   |                          | temprato e rinvenuto                                      | 55 HRC                | -                | H4  | -               | -               | -               |

I dati indicati in tabella sono valori approssimati.  
Può essere necessario adattarli alle singole applicazioni di lavorazione.  
HC = Metallo duro rivestito  
HU = Metallo duro non rivestito

[illegible]

Détermination de la vitesse de coupe et de l'avance – Surfaçage

| Groupe de matériaux | Structure des groupes de matériaux et des lettres de référence |   | Dureté Brinell | Résistance RM (N/mm²) | Groupe de travail | Cutting speed V <sub>c</sub> (m/min) |                 |                 |  |
|---------------------|--|---|----------------|-----------------------|-------------------|--------------------------------------|-----------------|-----------------|--|
|                     |  |   |                |                       |                   | HC                                   |                 |                 |  |
|                     |  |   |                |                       |                   | AP2130                               | AP5230          | AP5440          |  |
| P                   | Acier non allié  | C ≤ 0,25 %<br>recuit                                | 125            | 428                   | P1                | 210 - 280 - 350                      | 250 - 305 - 360 | 200 - 240 - 275 |  |
|                     |  | C > 0,25 ... ≤ 0,55 %<br>recuit                     | 190            | 639                   | P2                | 170 - 245 - 320                      | 200 - 260 - 320 | 170 - 210 - 250 |  |
|                     |  | C > 0,25 ... ≤ 0,55 %<br>traité                     | 210            | 708                   | P3                | 170 - 245 - 320                      | 200 - 260 - 320 | 170 - 210 - 250 |  |
|                     |  | C > 0,55 %<br>recuit                                | 190            | 639                   | P4                | 150 - 215 - 280                      | 200 - 250 - 300 | 150 - 200 - 250 |  |
|                     |  | C > 0,55 %<br>traité                                | 300            | 1013                  | P5                | 150 - 215 - 280                      | 200 - 250 - 300 | 150 - 200 - 250 |  |
|                     | Acier faiblement allié   | Aciers de décolletage (à copeaux courts)<br>recuit  | 220            | 745                   | P6                | 150 - 215 - 280                      | 200 - 250 - 300 | 150 - 200 - 250 |  |
|                     |  | recuit  | 175            | 591                   | P7                | 150 - 200 - 250                      | 200 - 240 - 280 | 150 - 200 - 250 |  |
|                     |  | traité  | 300            | 1013                  | P8                | 140 - 175 - 210                      | 200 - 240 - 280 | 140 - 170 - 200 |  |
|                     |  | traité  | 380            | 1282                  | P9                | 100 - 140 - 180                      | 200 - 250 - 300 | 100 - 140 - 180 |  |
|                     |  | traité  | 430            | 1477                  | P10               | 100 - 140 - 180                      | 200 - 250 - 300 | 100 - 140 - 180 |  |
|                     | Acier allié et acier outil allié                               | recuit  | 200            | 675                   | P11               | 140 - 175 - 210                      | -               | 140 - 175 - 210 |  |
|                     |  | trempe et revenu                                    | 300            | 1013                  | P12               | 80 - 125 - 170                       | 200 - 225 - 250 | 100 - 135 - 170 |  |
|                     |  | trempe et revenu                                    | 400            | 1361                  | P13               | 80 - 125 - 170                       | 200 - 225 - 250 | 100 - 135 - 170 |  |
|                     | Acier inox   | ferritique, martensitique, recuit                   | 200            | 675                   | P14               | 140 - 165 - 190                      | 200 - 225 - 250 | 140 - 165 - 190 |  |
|                     |  | martensitique, traité                               | 330            | 1114                  | P15               | 100 - 135 - 170                      | -               | 140 - 165 - 190 |  |
| M                   | Acier inox   | austénitique  | 200            | 675                   | M1                | 90 - 120 - 150                       | 150 - 200 - 250 | -               |  |
|                     |  | austénitique  | 300            | 1013                  | M2                | 70 - 105 - 140                       | -               | -               |  |
|                     |  | austénitique-ferritique, Duplex                     | 230            | 778                   | M3                | 70 - 105 - 140                       | -               | -               |  |
|                     |  |   |                |                       |                   |                                      |                 |                 |  |
| K                   | Fonte malléable  | ferritique  | 200            | 675                   | K1                | -                                    | 250 - 275 - 300 | -               |  |
|                     |  | perlitique  | 260            | 867                   | K2                | -                                    | 250 - 275 - 300 | -               |  |
|                     | Fonte grise  | faible résistance                                   | 180            | 602                   | K3                | -                                    | 300 - 350 - 400 | -               |  |
|                     |  | haute résistance / austénitique                     | 245            | 825                   | K4                | -                                    | 300 - 350 - 400 | -               |  |
|                     | Fonte à Graphite sphéroïdale                                   | ferritique  | 155            | 518                   | K5                | -                                    | 250 - 275 - 300 | -               |  |
|                     |  | perlitique  | 265            | 885                   | K6                | -                                    | 250 - 275 - 300 | -               |  |
|                     | GGV (CGI)  |   | 200            | 675                   | K7                | -                                    | 300 - 350 - 400 | -               |  |
| N                   | Alliages de fonderie d'aluminium                               | ne pouvant pas subir un durcissement                | 30             | -                     | N1                | -                                    | -               | -               |  |
|                     |  | pouvant subir un durcissement, durci                | 100            | 343                   | N2                | -                                    | -               | -               |  |
|                     |  | ≤ 12 % Si, ne pouvant pas subir de durcissement     | 75             | 260                   | N3                | -                                    | -               | -               |  |
|                     | Alliage de fonte d'aluminium                                   | ≤ 12 % Si, pouvant subir un durcissement, durci     | 90             | 314                   | N4                | -                                    | -               | -               |  |
|                     |  | > 12 % Si, ne pouvant pas subir de durcissement     | 130            | 447                   | N5                | -                                    | -               | -               |  |
|                     | Alliage de Magnésium   | > 12 % Si, ne pouvant pas subir de durcissement     | 70             | 250                   | N6                | -                                    | -               | -               |  |
|                     |  | non allié, cuivre électrolytique                    | 100            | 343                   | N7                | -                                    | -               | -               |  |
|                     | Cuivre et alliage de cuivre (bronze / laiton)                  | Laiton, bronze, fonte rouge                         | 90             | 314                   | N8                | -                                    | -               | -               |  |
|                     |  | Alliage de cuivre à copeaux courts                  | 110            | 382                   | N9                | -                                    | -               | -               |  |
|                     |  | forte résistance, Ampco                             | 300            | 1013                  | N10               | -                                    | -               | -               |  |
|                     |  |   |                |                       |                   |                                      |                 |                 |  |
|                     | Matériaux non métalliques                                      | Thermoplaste (sans agents de charge abrasives)      | -              | -                     | N11               | -                                    | -               | -               |  |
|                     |  | Duroplaste (sans agents de charge abrasives)        | -              | -                     | N12               | -                                    | -               | -               |  |
|                     |  | Matière plastique renforcée de fibres de verre GFRP | -              | -                     | N13               | -                                    | -               | -               |  |
|                     |  | Matière plastique renforcé composite CFRP           | -              | -                     | N14               | -                                    | -               | -               |  |
|                     |  | Plastique renforcé fibre aramide AFRP               | -              | -                     | N15               | -                                    | -               | -               |  |
|                     |  | Graphite  | 80 Shore       | -                     | N16               | -                                    | -               | -               |  |
| S                   | Alliages réfractaires  | à base de Fe<br>recuit                              | 200            | 675                   | S1                | -                                    | -               | -               |  |
|                     |  | à base de Fe<br>durci                               | 280            | 943                   | S2                | -                                    | -               | -               |  |
|                     |  | à base Ni ou Co<br>recuit                           | 250            | 839                   | S3                | -                                    | -               | -               |  |
|                     |  | à base Ni ou Co<br>durci                            | 350            | 1177                  | S4                | -                                    | -               | -               |  |
|                     |  | à base Ni ou Co<br>jeter                            | 320            | 1076                  | S5                | -                                    | -               | -               |  |
|                     | Alliage de titane  | Titane pur  | 200            | 675                   | S6                | -                                    | -               | -               |  |
|                     |  | Alliages Alpha + Beta, trempé                       | 375            | 1262                  | S7                | -                                    | -               | -               |  |
|                     |  | Alliages Beta                                       | 410            | 1396                  | S8                | -                                    | -               | -               |  |
|                     | Alliage de tungstène   |   | 300            | 1013                  | S9                | -                                    | -               | -               |  |
|                     | Alliage de molybdène   |   | 300            | 1013                  | S10               | -                                    | -               | -               |  |
| H                   | Acier trempé   | trempe et revenu                                    | 50 HRC         | -                     | H1                | -                                    | -               | -               |  |
|                     |  | trempe et revenu                                    | 55 HRC         | -                     | H2                | -                                    | -               | -               |  |
|                     |  | trempe et revenu                                    | 60 HRC         | -                     | H3                | -                                    | -               | -               |  |
|                     | Fonte durci  | trempe et revenu                                    | 55 HRC         | -                     | H4                | -                                    | -               | -               |  |

Les données affichées dans le tableau sont des valeurs approximatives.  
Il peut être nécessaire de les adapter à des applications d'usinage individuelles.  
HC = Carbure avec revêtement  
HU = Carbure sans revêtement

|  |                |                 | HU                |
|--|----------------|-----------------|-------------------|
|  | AM5740         | AK5915          | AN1015            |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | 85 - 130 - 170 | -               | -                 |
|  | 80 - 120 - 160 | -               | -                 |
|  | 80 - 120 - 160 | -               | -                 |
|  | -              | 170 - 205 - 240 | -                 |
|  | -              | 150 - 185 - 220 | -                 |
|  | -              | 230 - 315 - 400 | -                 |
|  | -              | 180 - 250 - 320 | -                 |
|  | -              | 200 - 255 - 310 | -                 |
|  | -              | -               | -                 |
|  | -              | 230 - 315 - 400 | -                 |
|  | -              | -               | 400 - 1200 - 2000 |
|  | -              | -               | 400 - 1200 - 2000 |
|  | -              | -               | 600 - 690 - 780   |
|  | -              | -               | 530 - 565 - 600   |
|  | -              | -               | 290 - 320 - 350   |
|  | -              | -               | -                 |
|  | -              | -               | 200 - 250 - 300   |
|  | -              | -               | 250 - 375 - 500   |
|  | -              | -               | 200 - 400 - 600   |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | 60 - 70 - 75   | -               | -                 |
|  | 60 - 65 - 65   | -               | -                 |
|  | 60 - 65 - 70   | -               | -                 |
|  | -              | -               | -                 |
|  | 40 - 50 - 60   | -               | -                 |
|  | 60 - 70 - 75   | -               | -                 |
|  | 45 - 55 - 60   | -               | -                 |
|  | 45 - 55 - 60   | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |
|  | -              | -               | -                 |

## FEED DETERMINATION - FACE MILLING 06

## SCELTA DELL'AVANZAMENTO - FRESATURA A SPIANARE 06

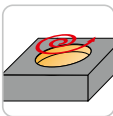
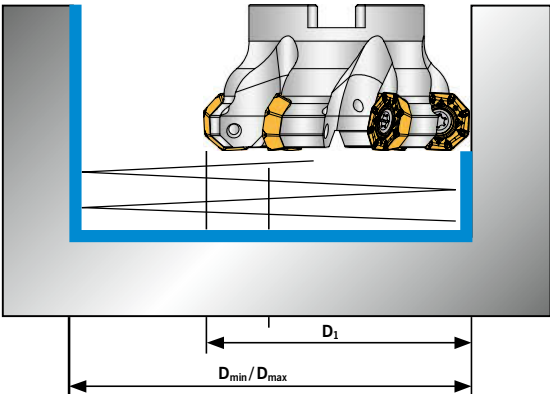
## DÉTERMINATION DE L'AVANCE - SURFAÇAGE 06



| Material group / Gruppo materiale / Groupe de matériaux | System / Sistema / Système  | 06             |      |      |
|---|---|----------------|------|------|
|   |   |                |      |      |
|   | Approach angle / Angolo di attacco / Angle d'attaque - K  | 45°            |      |      |
|   | Tool diameter / Diametro dell'utensile / Diamètre de l'outil - D [mm]   | 40 - 250       |      |      |
|   | Maximum cutting depth / Massimo profondità di taglio / Max. profondeur de coupe - AP [mm]   | 4,0            |      |      |
|   | Feed per tooth / Avanzamento al tagliente / Avance jusqu'au tranchant [mm]  | f <sub>z</sub> |      |      |
| P   | Unalloyed steel / Acciai non legato / Acier non allié   | 0,14           | 0,25 | 0,35 |
|   | Low alloyed steel / Acciai debolmente legati / Acier faiblement allié   | 0,14           | 0,25 | 0,35 |
|   | High alloyed steel and high alloyed tool steel / Acciai fortemente legati e acciai da utensili / Acier allié et acier outil allié | 0,12           | 0,24 | 0,35 |
|   | Stainless steel / Acciai inossidabili / Acier inox  | 0,12           | 0,24 | 0,35 |
| M   | Stainless steel / Acciai inossidabili / Acier inox  | 0,10           | 0,20 | 0,30 |
| K   | Malleable cast iron / Ghisa temprata / Fonte malléable  | 0,15           | 0,28 | 0,40 |
|   | Cast iron / Ghisa grigia / Fonte grise  | 0,15           | 0,28 | 0,40 |
|   | Cast iron with nodular graphite / Ghisa sferoidale / Fonte à Graphite sphéroïdale   | 0,15           | 0,28 | 0,40 |
|   | GGV (CGI) / GGV (CGI) / GGV (CGI)   | 0,12           | 0,26 | 0,40 |
| N   | Aluminium alloys long chipping / Leghe di Alluminio stampato / Alliages de fonderie d'aluminium                                   | 0,10           | 0,30 | 0,50 |
|   | Casted aluminium alloys / Leghe di Alluminio da fusione / Alliage de fonte d'aluminium  | 0,10           | 0,30 | 0,50 |
|   | Magnesium alloys / Leghe di magnesio / Alliage de Magnésium   | –              | –    | –    |
|   | Copper and copper alloys (Brass/Bronze) / Rame e Leghe di Rame (Bronzo/Ottone) / Cuivre et alliage de cuivre (bronze/laiton)      | 0,10           | 0,15 | 0,20 |
|   | Non-ferrous materials / Materiali non metallici / Matériaux non métalliques   | 0,10           | 0,15 | 0,20 |
| S   | High temperature resistant alloys / Leghe resistenti al calore / Alliages réfractaires  | 0,10           | 0,18 | 0,25 |
|   | Titanium alloys / Leghe di Titanio / Alliage de titane  | 0,10           | 0,18 | 0,25 |
|   | Wolfram alloys / Leghe di tungsteno / Alliage de tungstène  | –              | –    | –    |
|   | Molybdän alloys / Leghe di molibdeno / Alliage de molybdène   | –              | –    | –    |
| H   | Hardened steel / Acciaio Temprato / Acier trempé  | –              | –    | –    |
|   | Hardened cast iron / Acciaio Temprato / Fonte durci   | –              | –    | –    |

# APPLICATION DATA: MILLING - 06

## Circular plunge

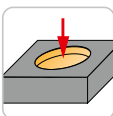
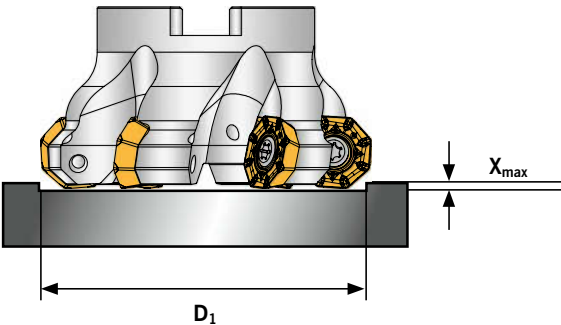


| Milling cutter | D <sub>1</sub> | D <sub>min</sub> | D <sub>max</sub> |
|----------------|----------------|------------------|------------------|
| FOA-145,040    | 50             | 77               | 90               |
| FOA-145,050    | 60             | 97               | 110              |
| FOA-145,063    | 73             | 123              | 136              |
| FOA-145,080    | 90             | 157              | 170              |
| FOA-145,100    | 110            | 197              | 210              |
| FOA-145,125    | 135            | 247              | 260              |
| FOA-145,160    | 170            | 317              | 330              |

D<sub>min</sub> = smallest hole diameter

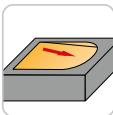
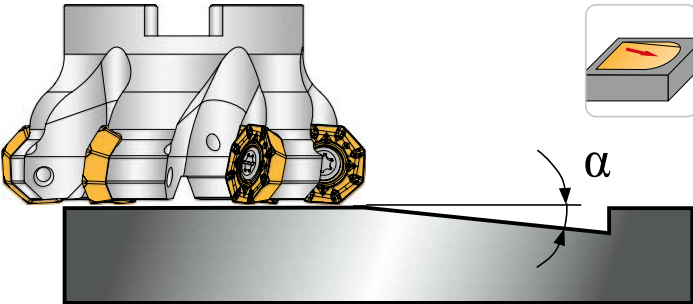
D<sub>max</sub> = largest hole diameter for flat bottom surfaces

## Axial plunge



| D <sub>1</sub> | X <sub>max</sub> |
|----------------|------------------|
| FOA-145.....   | 5.5              |

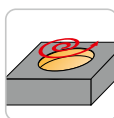
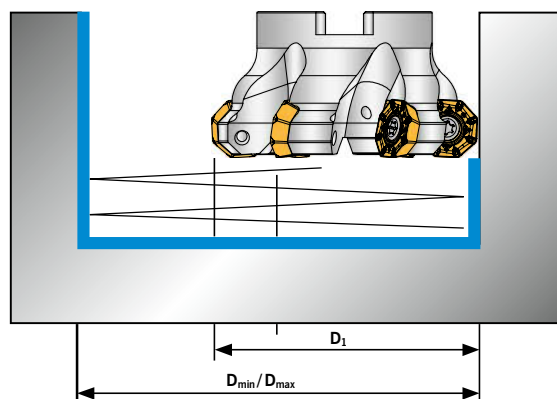
## Oblique plunge



| Milling cutter | α    | Minimum travel |
|----------------|------|----------------|
| FOA-145,040    | 10.7 | 29 mm          |
| FOA-145,050    | 8.7  | 36 mm          |
| FOA-145,063    | 6.0  | 52 mm          |
| FOA-145,080    | 4.5  | 69 mm          |
| FOA-145,100    | 3.5  | 89 mm          |
| FOA-145,125    | 2.7  | 114 mm         |
| FOA-145,160    | 2.1  | 149 mm         |

# DATI APPLICATIVI FRESATURA - 06

## Immersione circolare

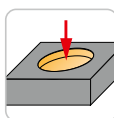
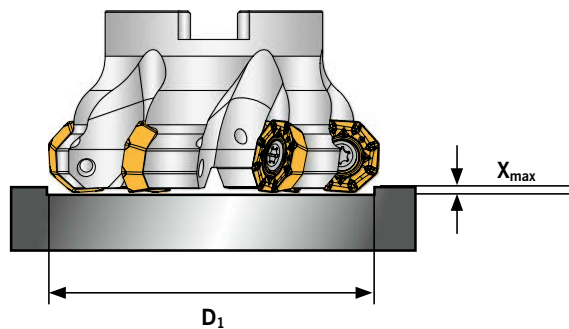


| Fresa       | D <sub>1</sub> | D <sub>min</sub> | D <sub>max</sub> |
|-------------|----------------|------------------|------------------|
| FOA-145.040 | 50             | 77               | 90               |
| FOA-145.050 | 60             | 97               | 110              |
| FOA-145.063 | 73             | 123              | 136              |
| FOA-145.080 | 90             | 157              | 170              |
| FOA-145.100 | 110            | 197              | 210              |
| FOA-145.125 | 135            | 247              | 260              |
| FOA-145.160 | 170            | 317              | 330              |

D<sub>min</sub> = diametro minimo del foro

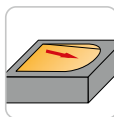
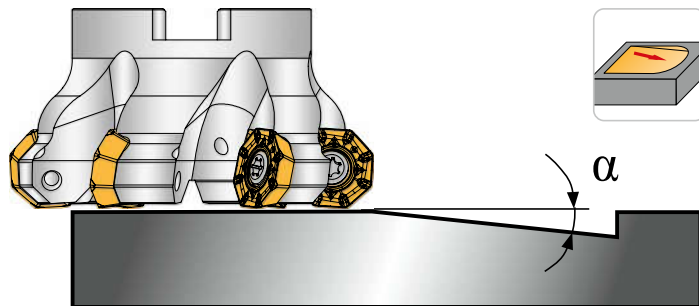
D<sub>max</sub> = diametro massimo del foro per superfici piane

## Immersione assiale



| D <sub>1</sub> | X <sub>max</sub> |
|----------------|------------------|
| FOA-145.....   | 5,5              |

## Immersione obliqua

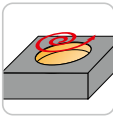
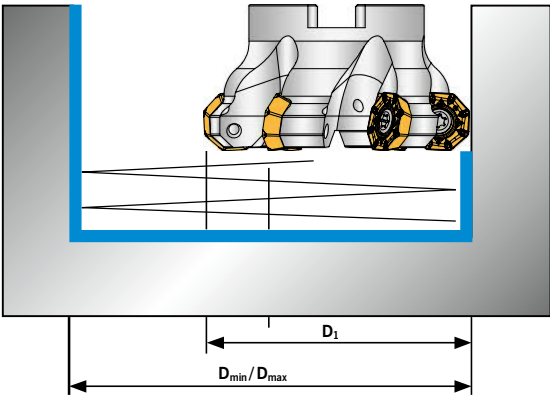


| Fresa       | α    | Corsa minima |
|-------------|------|--------------|
| FOA-145.040 | 10,7 | 29 mm        |
| FOA-145.050 | 8,7  | 36 mm        |
| FOA-145.063 | 6,0  | 52 mm        |
| FOA-145.080 | 4,5  | 69 mm        |
| FOA-145.100 | 3,5  | 89 mm        |
| FOA-145.125 | 2,7  | 114 mm       |
| FOA-145.160 | 2,1  | 149 mm       |



# DONNÉES DE PERFORMANCE DU FRAISAGE - 06

## Plongée circulaire

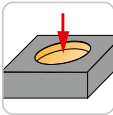
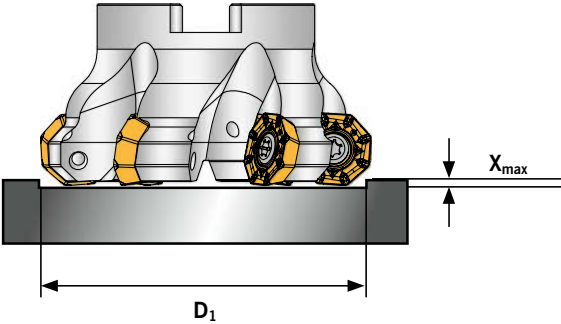


| Fraise      | D <sub>1</sub> | D <sub>min</sub> | D <sub>max</sub> |
|-------------|----------------|------------------|------------------|
| FOA-145 040 | 50             | 77               | 90               |
| FOA-145 050 | 60             | 97               | 110              |
| FOA-145 063 | 73             | 123              | 136              |
| FOA-145 080 | 90             | 157              | 170              |
| FOA-145 100 | 110            | 197              | 210              |
| FOA-145 125 | 135            | 247              | 260              |
| FOA-145 160 | 170            | 317              | 330              |

D<sub>min</sub> = le plus petit diamètre de perçage

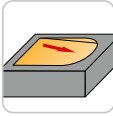
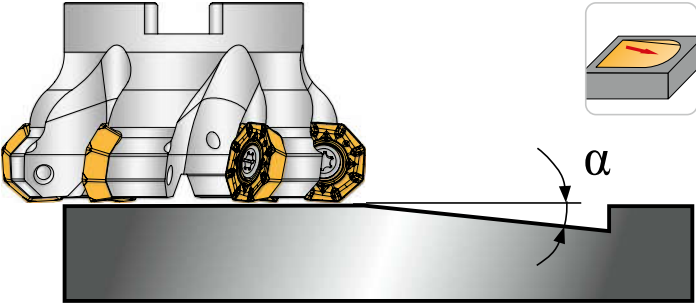
D<sub>max</sub> = le plus grand diamètre de perçage pour les surfaces de sol planes

## Plongée axiale



| D <sub>1</sub> | X <sub>max</sub> |
|----------------|------------------|
| FOA-145.....   | 5,5              |

## Plongée inclinée



| Fraise      | α    | Course minimale |
|-------------|------|-----------------|
| FOA-145 040 | 10,7 | 29 mm           |
| FOA-145 050 | 8,7  | 36 mm           |
| FOA-145 063 | 6,0  | 52 mm           |
| FOA-145 080 | 4,5  | 69 mm           |
| FOA-145 100 | 3,5  | 89 mm           |
| FOA-145 125 | 2,7  | 114 mm          |
| FOA-145 160 | 2,1  | 149 mm          |