

FE – Major Series

FE - Square shoulder and HFC milling system / *FE - Sistema di fresatura ad angolo e HFC* / FE - Système de fraisage d'angle et HFC

Milling

Fresatura

Fraisage

- System presentation
- Inside
- Designation system
- Shell mill cutters
- Cylindrical shank cutters
- Screw shank milling cutter
- Geometry description
- Description of grades
- Indexable inserts
- Recommended cutting data
- Feed determination
- Application notes

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- *Inside*
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- *Fresa a manicotto*
- *Corpi fresa con attacco cilindrico*
- *Fresa con attacco filettato*
- *Descrizione della geometria*
- *Descrizione della qualità*
- *Inserti a fissaggio meccanico*
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FOR CLEANLY MACHINED SQUARE SHOULDERS AND HIGH SPEED.

A tool holder for square shoulder milling and HFC indexable inserts with diameters ranging from 16 to 80 mm; the FE milling system from ARNO.

The ARNO FE system gives you a choice:

you can opt for efficient 90° shoulders or high speed during HFC milling. In both cases you benefit from high feed rates, an extremely smooth cutting action and excellent cutting ability. This makes the system a genuine alternative to solid carbide milling cutters. This is due to the extremely positive mounting position of the indexable inserts and the spiral shape of the flutes, ensuring smooth material cutting. The unequal pitch also minimises vibration reliably.

Further FE system features:

The double-fluted indexable inserts come in five geometries and seven grades and are therefore capable of machining different types of material. The fully nickel-plated holders fixed by Torx Plus® screws offer excellent handling.

In short,

you can rely on the quality and flexibility of the FE system at all times.



RIGID BENEFITS

of the FE System

Gentle on the spindle - very smooth running due to soft-cutting helical flute

Reliable process - efficient 90° shoulders when square shoulder milling.

Economical - two flutes per insert and time-saving handling



Tool holders

- Shell-type, end and screw-in tool holders from Ø 16 to 80 mm for square shoulder milling and HFC indexable inserts
- Highly positive mounting position of the indexable inserts with exact positioning thanks to precise contact surfaces
- Tool holders with optimised chip space
- Nickel-plated bodies for high wear resistance and easy handling
- Torx Plus® screws for high torque transmission
- Integrated cooling for long tool life
- Differential pitch for reliable vibration reduction



Indexable inserts

- 2 flutes for efficient 90° angles or for high feed milling
- 4 geometries for square shoulder milling, 1 geometry for HFC milling and 6 grades for a wide range of applications
- Soft cutting due to spiral flutes

PER ANGOLI PULITI E UNA BUONA VELOCITÀ.

Un utensile di supporto per inserti per spallamenti e per inserti HFC con diametro compreso tra 16 e 80 mm: il sistema di fresatura FE di ARNO.

Con il sistema FE di ARNO potete scegliere:

Potete ottenere spallamenti efficaci a 90° oppure raggiungere una elevata velocità durante la fresatura HFC. In entrambi i casi potrete ottenere elevate velocità di avanzamento, un avanzamento estremamente tranquillo ed una eccellente capacità di taglio, caratteristiche che rendono questo sistema una vera alternativa per la fresatura di metallo duro integrale. Ciò è possibile grazie alla posizione di montaggio particolarmente positiva degli inserti e dalla forma elicoidale tornita dei taglienti, che garantisce un ingresso morbido nel materiale. Grazie alla divisione disuguale inoltre le vibrazioni vengono ridotte al minimo in maniera affidabile.

Ulteriori caratteristiche del sistema FE:

Gli inserti a due taglienti sono disponibili in cinque geometrie e sette tipi sono adattati in maniera ottimale ai diversi materiali. E gli utensili di supporto completamente nichelati, con viti Torx Plus® si distinguono per la ottima maneggevolezza.

In breve:

Potete fidarvi in qualsiasi momento della qualità e della flessibilità del sistema FE.



VANTAGGI STABILI

del sistema ARNO FE

Protezione del mandrino - elevata scorrevolezza
grazie al tagliente elicoidale a taglio dolce

Sicurezza di processo - spalla efficace a 90°
durante la fresatura di spallamenti

Economico - due taglienti per ogni inserto e notevole
maneggevolezza



Utensili di supporto

- Utensili di supporto con attacco, gambo e a vite con Ø da 16 a 80 mm per fresatura di spallamenti e inserti HFC
- Posizione di montaggio particolarmente positiva degli inserti con posizionamento esatto grazie a superfici di contatto precise
- Attrezzi di supporto ottimizzati per il vano di truciolatura
- Corpi base nichelati per un'elevata resistenza all'usura e una piacevole maneggevolezza
- Viti Torx Plus® per trasferimenti di coppia elevati
- Raffreddamento integrato per una lunga durata
- Divisione differenziale per una riduzione affidabile delle oscillazioni di risonanza



Inserti

- 2 taglienti per angoli di 90° efficaci o per la fresatura ad avanzamento elevato
- 4 geometrie per la fresatura di spallamenti, 1 geometria per la fresatura HFC e 7 qualità per un'ampia gamma di applicazioni
- Taglio morbido grazie ai taglienti elicoidali torniti

POUR DES COINS PROPRES ET UNE BONNE VITESSE.

Un porte-outil pour les plaquettes de fraisage d'angle et HFC amovibles dans la plage de diamètres de 16 à 80 mm : le système de fraisage FE d'ARNO.

Avec le système FE d'ARNO, vous avez le choix :

vous pouvez réaliser un épaulement avec un angle effectif de 90° ou atteindre une cadence élevée lors d'un fraisage HFC. Dans les deux cas vous bénéficiez de grandes avances, d'un fonctionnement extrêmement souple et d'une excellente capacité de coupe qui font de ce système une réelle alternative aux fraises en carbure monobloc. Ceci est rendu possible grâce à la position de montage particulièrement positive des plaquettes de coupe amovibles ainsi qu'à la forme hélicoïdale des dents qui assure une pénétration en douceur dans le matériau. Grâce aux pas inégaux, les vibrations sont par ailleurs minimisées de manière fiable.

Autres points forts du système FE :

avec cinq géométries et sept variantes, les plaquettes de coupe amovibles à double tranchant s'adaptent idéalement aux différents matériaux. Et les porte-outils entièrement nickelés dotés de vis Torx Plus® conviennent par leur facilité de manipulation.

En résumé :

Vous pouvez compter à tout moment sur la qualité et la flexibilité du système FE.



AVANTAGES STABILITÉ

du système FE

Protège la broche - fonctionnement très silencieux grâce à l'arête de coupe hélicoïdale douce

Sécurité du processus - épaulement efficace à 90° lors du fraisage d'angle.

Économique - deux lames par plaquette amovible et manipulation rapide



Porte-outils

- Porte-outils à à emmancher, à tige et à visser de Ø 16 à 80 mm pour plaquettes de fraisage d'angle et HFC amovibles
- Position de montage particulièrement avantageuse des plaquettes amovibles avec un positionnement de précision grâce à des surfaces de contact précises
- Porte-outils avec espace de dégagement des copeaux optimisé
- 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

- 2 lames pour un angle effectif de 90° ou pour le fraisage à haute avancée
- 4 géométries pour le fraisage d'angle, 1 géométrie pour le fraisage HFC et 7 nuances pour les domaines d'application les plus divers
- Coupe douce grâce aux lames hélicoïdales torsadées



IMMEDIATE HIGHER PRODUCTIVITY!

Milling cutters with differential pitch – The advantage of the unequal.

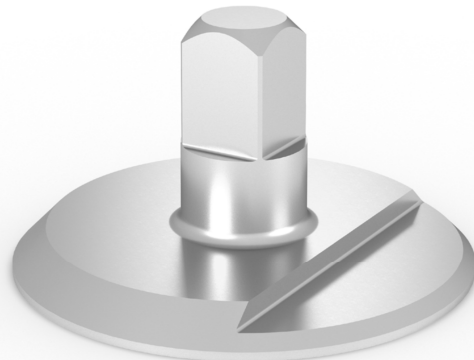
The pitch of milling cutters is one of the key factors to ensure success in production processes. Besides wide, medium or narrow pitch, ARNO also offers milling cutters with differential pitch. This special pitch offers outstanding smooth running because it significantly reduces vibration.

FE System 11 in practical test

Blind gasket

Material: X5CrNi18-9 (1.4301)
Tool: FEA-190.040.R04-11
Indexable insert: XOMT 114008PDSR-PMR
Grade: AM5740

| | Competition | ARNO Werkzeuge |
|-------|-------------|----------------|
| V_c | 126 m/min | 160 m/min |
| Z | 6 | 4 |
| f_z | 0.13 mm | 0.12 mm |
| v_f | 782 mm/min | 611 mm/min |
| a_p | 3 mm | 3 mm |
| a_e | 30 mm | 30 mm |



Competitor components

50 parts

ARNO FE System 11 components

60 parts

Your advantage:



- Process reliability
- Reproducible results
- Smooth running



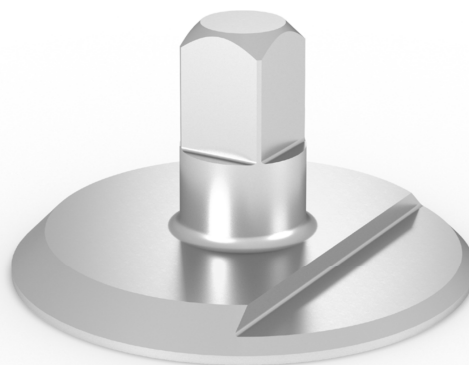
PORTA DIRETTAMENTE A UNA PRODUTTIVITÀ PIÙ ELEVATA!

Fresa a passo differenziato – Il vantaggio dell'irregolarità.

Il passo delle frese è uno dei fattori che contribuiscono al successo del processo produttivo. Oltre ai passi larghi, medi e stretti, ARNO offre anche frese a passo differenziato. Questo passo speciale offre un'eccezionale silenziosità perché riduce notevolmente le vibrazioni.

Il sistema FE 11 nella prova sul campo

| Disco di inserimento | | |
|--|---------------------|----------------|
| Materiale: | X5CrNi18-9 (1.4301) | |
| Utensile: | FEA-190.040.R04-11 | |
| Inserito: | XOMT 114008PDSR-PMR | |
| Qualità: | AM5740 | |
| | Concorrenza | ARNO Werkzeuge |
| V_c | 126 m/min | 160 m/min |
| Z | 6 | 4 |
| f_z | 0,13 mm | 0,12 mm |
| v_f | 782 mm/min | 611 mm/min |
| a_p | 3 mm | 3 mm |
| a_e | 30 mm | 30 mm |
| Componenti della concorrenza | | 50 pezzi |
| Componenti sistema FE 11 ARNO | | 60 pezzi |
| <div> <div>Il vostro vantaggio:</div> <div> <ul style="list-style-type: none"> • Sicurezza di processo • Risultati riproducibili • Silenziosità </div> </div> | | |





CONDUIT DIRECTEMENT À UNE MEILLEURE PRODUCTIVITÉ !

Fraises à pas différentiel - l'avantage de l'irrégularité.

Le pas de fraises est en partie déterminant pour le succès du processus de fabrication. Outre les pas larges, moyens et étroits, ARNO propose également des outils de fraisage à pas différentiel. Ce pas particulier offre un silence de fonctionnement supérieur, car il réduit considérablement les vibrations.

Le système FE 11 en test pratique

Rondelle enfichable

Matériau : X5CrNi18-9 (1.4301)

Outil : FEA-190.040.R04-11

Plaquette de coupe amovible : XOMT 114008PDSR-PMR

Version : AM5740

| | Concurrence | Outils ARNO |
|-------|-------------|-------------|
| V_c | 126 m/min | 160 m/min |
| Z | 6 | 4 |
| f_z | 0,13 mm | 0,12 mm |
| v_f | 782 mm/min | 611 mm/min |
| a_p | 3 mm | 3 mm |
| a_e | 30 mm | 30 mm |



Composants concurrent

50 pièces

Composants du système FE 11 de chez ARNO

60 pièces

Votre avantage :



- Sécurité des processus
- Des résultats reproductibles
- Fonctionnement silencieux

Holder / Utensile / Outil



| FE | A | 1 | 90 | 050 | R/L | 05 | 11 |
|-------------------------------------|--|---|---|---|---|---|--|
| System Sistema Système | Type Tipo di attacco Type de tige | Generation Versione Génération | Approach angle Angolo di attacco Angle d'attaque | Diameter Diametro Diamètre | Direction Direzione Direction | No. of teeth Nr. taglienti Nb de dents | Insert size Misura inserto Dimensions plaquette de coupe amovible |
| | A - Shell mill cutter <i>Fresa a manicotto</i> <i>Fraise à enficher</i> C - Cylindrical shank cutters <i>Corpi fresa con attacco cilindrico</i> <i>Fraise à queue</i> G - Screw shank milling cutter <i>Fresa con attacco filettato</i> <i>Fraise à queue filetée</i> | | | | R = Right-hand <i>Destro</i> <i>Droite</i> L = Left-hand <i>Sinistro</i> <i>Gauche</i> | | |

Inserts / Inserti / Plaquettes



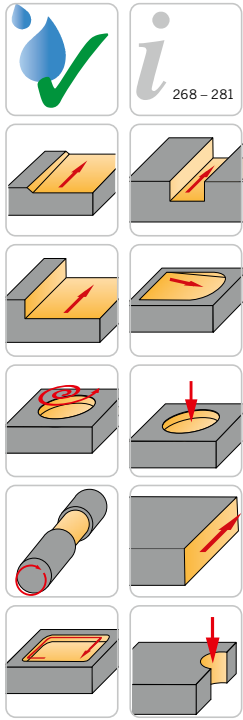
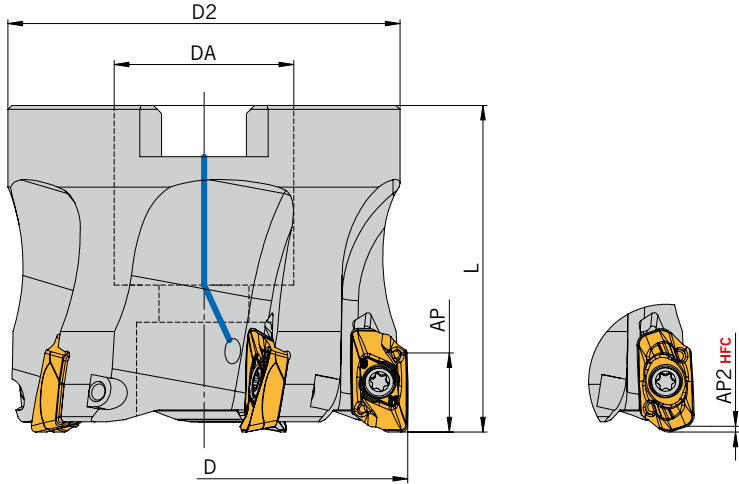
| XOMT | 11 | 40 | 08 | PD | S | R/L | -PMS | AP5440 |
|--|---|--|--|--|--|---|---|-----------------------------------|
| ISO code Codifica ISO Norme ISO | Insert size / Misura inserto / Dimensions plaquette de couple amovible | Insert thickness Spessore dell'inserto Épaisseur de plaquette | Corner radius Raggio di punta Rayon | Face cutting edge Tagliente della faccia Plaquette de coupe | Cutting edge Tagliente Bord tranchant | Direction Direzione Direction | Geometry Geometria Géométrie | Grade Qualità Nuance |
| | | | | | F - Sharp <i>Affilato</i> <i>Tranchant</i> E - Rounded <i>Arrotondato</i> <i>Arrondi</i> T - Chamfered <i>Smussato</i> <i>Chanfreiné</i> S - Chamfered and rounded <i>Smussato e arrotondato</i> <i>Chanfreiné et arrondi</i> | R = Right-hand <i>Destro</i> <i>Droite</i> L = Left-hand <i>Sinistro</i> <i>Gauche</i> | | |

Fresa a manicotto
Fraise à enficher

MILLING
FRESATURA
FRAISAGE
4

FEA-...-11

Square shoulder and HFC milling cutters with bore and keyway / Fresa per spallamenti e HFC con attacco a manicotto / Fraise pour épaulements et HFC avec alésage cylindrique et clavette transversale



Similar to illustration
Simile all'illustrazione
Représentation approximative

Holders / Utensili / Porte-outils

| Article Articolo Article | D | L | D2 | DA | AP | AP2 | Z | Indexable inserts Inserti a fissaggio meccanico Plaquettes de coupe amovibles |
|--------------------------------|----|----|----|----|----|-----|---|---|
| FEA-190.040.R04-11 | 40 | 40 | 35 | 16 | 10 | 0,7 | 4 | XOMT 1140... |
| FEA-190.040.R06-11 | 40 | 40 | 35 | 16 | 10 | 0,7 | 6 | XOMT 1140... |
| FEA-190.050.R05-11 | 50 | 40 | 48 | 22 | 10 | 0,7 | 5 | XOMT 1140... |
| FEA-190.050.R07-11 | 50 | 40 | 48 | 22 | 10 | 0,7 | 7 | XOMT 1140... |
| FEA-190.063.R06-11 | 63 | 40 | 48 | 22 | 10 | 0,7 | 6 | XOMT 1140... |
| FEA-190.063.R08-11 | 63 | 40 | 48 | 22 | 10 | 0,7 | 8 | XOMT 1140... |
| FEA-190.080.R07-11 | 80 | 50 | 60 | 27 | 10 | 0,7 | 7 | XOMT 1140... |

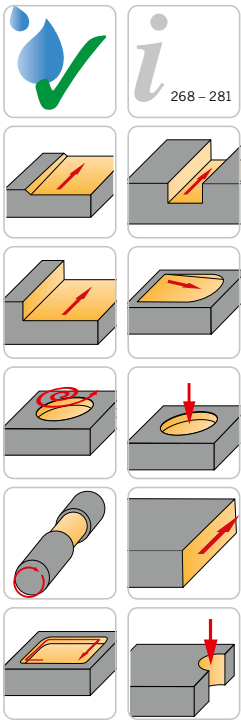
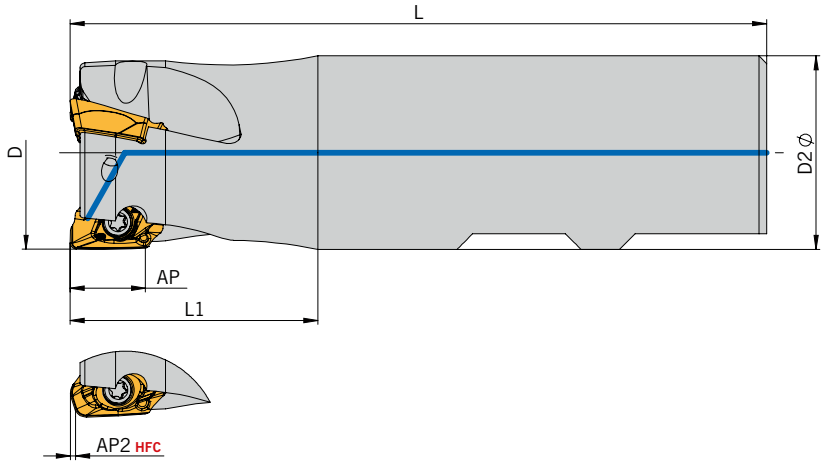
Spare Parts / Ricambi / Pièces de rechange

| Holder Utensile Porte-outil | Screw Vite Vis | Torque Coppia Couple | Key Chiave Clé |
|-----------------------------------|----------------------|----------------------------|----------------------|
| FEA-...-11 | AS 0092 | 1,6 Nm | T5108-IP |

Corpi fresa con attacco cilindrico
Fraise à queue

FEC-...-11

Square shoulder and HFC milling cutters with cylindrical shank / Fresa per spallamenti e HFC con attacco cilindrico / Fraise pour épaulements et HFC avec supports de tiges



Similar to illustration
Simile all'illustrazione
Représentation approximative

Holders / Utensili / Porte-outils

| Article Articolo Article | D | L1 | L | D2 | AP | AP2 | Z | Indexable inserts Inserti a fissaggio meccanico Plaquettes de coupe amovibles |
|--------------------------------|----|----|-----|----|----|-----|---|---|
| FEC-190.016.R02-11 | 16 | 25 | 75 | 16 | 10 | 0,7 | 2 | XOMT 1140... |
| FEC-190.020.R02-11 | 20 | 25 | 80 | 20 | 10 | 0,7 | 2 | XOMT 1140... |
| FEC-190.025.R03-11 | 25 | 32 | 90 | 25 | 10 | 0,7 | 3 | XOMT 1140... |
| FEC-190.032.R04-11 | 32 | 40 | 100 | 32 | 10 | 0,7 | 4 | XOMT 1140... |

Spare Parts / Ricambi / Pièces de rechange

| Holder Utensile Porte-outil | Screw Vite Vis | Torque Coppia Couple | Key Chiave Clé |
|-----------------------------------|----------------------|----------------------------|----------------------|
| FEC-...016 / 020 / 025...-11 | AS 0091 | 1,6 Nm | T5108-IP |
| FEC-...032...-11 | AS 0092 | 1,6 Nm | T5108-IP |

Fresa con attacco filettato

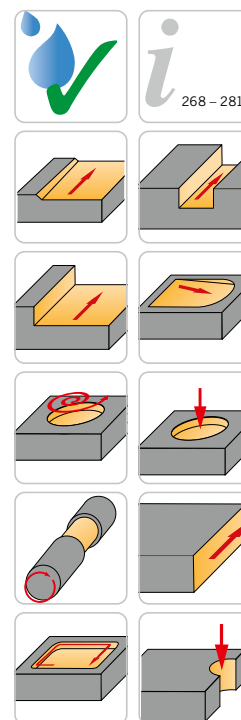
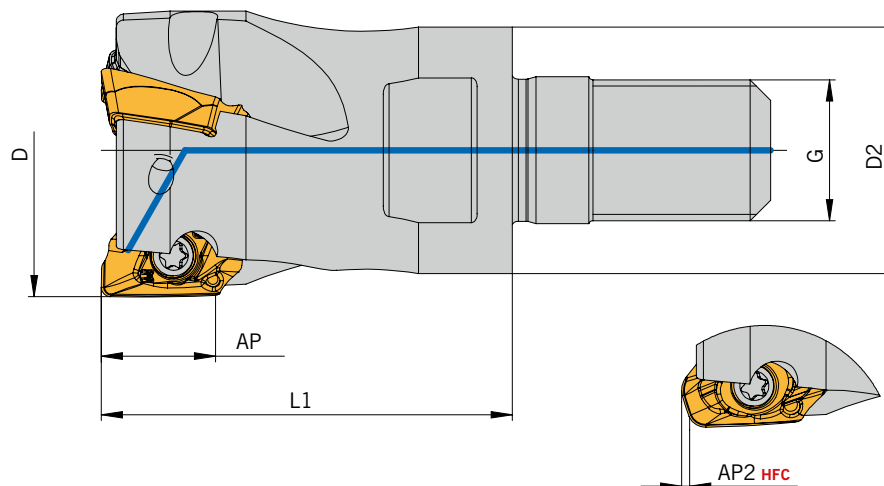
Fraise à queue filetée

MILLING
FRESATURA
FRAISAGE

4

FEG-...-11


Square shoulder and HFC milling cutters with thread for screw-in holders / Fresa per spallamenti e HFC con attacco filettato / Fraise pour épaulements et HFC avec filetage pour supports filetés



Similar to illustration
Simile all'illustrazione
Représentation approximative

N NEW/NUOVO/
NOUVEAU



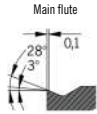
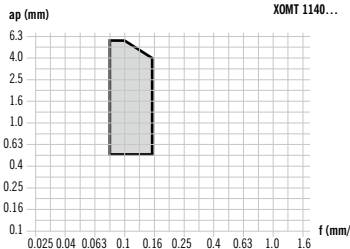


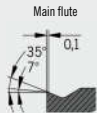
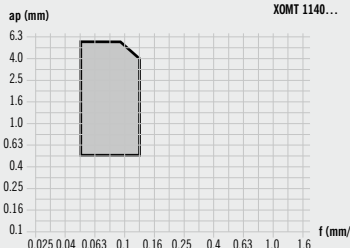


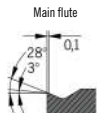
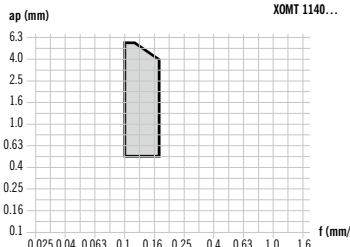


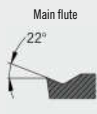
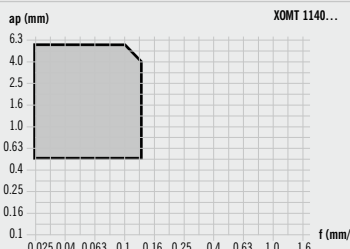


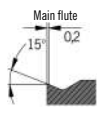
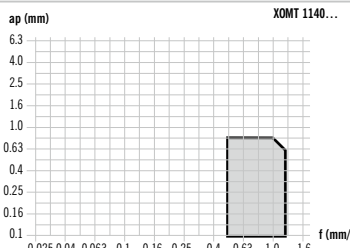
Holders / Utensili / Porte-outils

| Article Articolo Article | D | L1 | D2 | G | AP | AP2 | Z | Indexable inserts Inserti a fissaggio meccanico Plaquettes de coupe amovibles |
|--|----|----|----|-----|----|-----|---|---|
| FEG-190.016.R02-11 | 16 | 25 | 14 | M8 | 10 | 0,7 | 2 | XOMT 1140... |
| FEG-190.020.R02-11 | 20 | 30 | 18 | M10 | 10 | 0,7 | 2 | XOMT 1140... |
| FEG-190.025.R03-11 | 25 | 35 | 21 | M12 | 10 | 0,7 | 3 | XOMT 1140... |
| FEG-190.032.R04-11  | 32 | 35 | 29 | M16 | 10 | 0,7 | 4 | XOMT 1140... |
| FEG-190.035.R04-11 | 35 | 35 | 29 | M16 | 10 | 0,7 | 4 | XOMT 1140... |



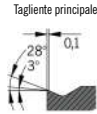
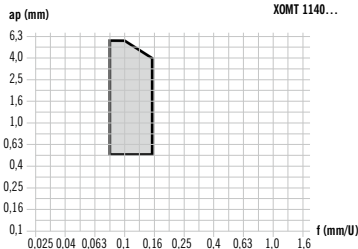



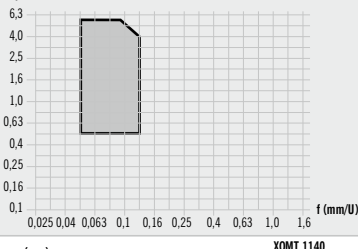


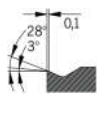
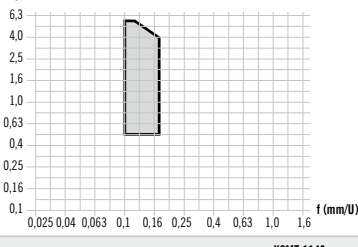



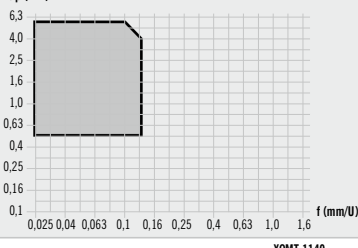


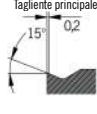
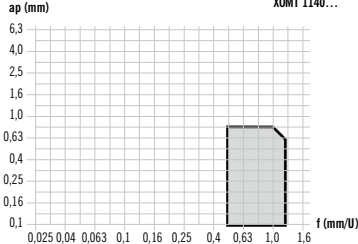
Spare Parts / Ricambi / Pièces de rechange

| Holder Utensile Porte-outil | Screw Vite Vis | Torque Coppia Couple | Key Chiave Clé |
|-----------------------------------|----------------------|----------------------------|----------------------|
| FEG-...016 / 020 / 025...-11 | AS 0091 | 1,6 Nm | T5108-IP |
| FEG-...032 / 035...-11 | AS 0092 | 1,6 Nm | T5108-IP |



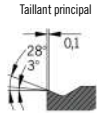


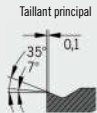


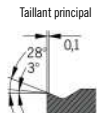


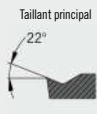


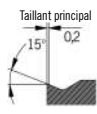
POSITIVE – MEDIUM MACHINING TO ROUGHING

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

























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 | | |
| -PMS   | <ul style="list-style-type: none"> • Adatto per la lavorazione di acciaio • Tagliente robusto • Elevata efficacia | ● | ○ | ○ | ○ | | |  |  |
| -PMR   | <ul style="list-style-type: none"> • Adatto per la lavorazione di acciaio inossidabile • Ridotte forze di taglio • Ridotta tendenza alla formazione di taglienti di riporto | ○ | ● | | ○ | ○ | |  |  |
| -PMG   | <ul style="list-style-type: none"> • Adatto per la lavorazione di fusioni • Ottima robustezza del tagliente • Per inclusioni di sabbia o croste di colata | ○ | | ● | | | |  |  |
| -PMA   | <ul style="list-style-type: none"> • Eccellente per la lavorazione di alluminio e metalli non ferrosi • Tagliente affilato • Ridotta tendenza alla formazione di taglienti di riporto | | | | | ● | |  |  |
| -HFC HFC   | <ul style="list-style-type: none"> • Adatto per la lavorazione di acciaio • Tagliente robusto • Rompitruciolo trucioli per un taglio più morbido | ● | ○ | ○ | ○ | | |  |  |

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

| Géométrie | Caractéristiques | Groupe de matériaux | | | | | | Vue/coupe | Base diagramme des données de coupe |
|---|--|---------------------|---|---|---|---|---|--|-------------------------------------|
| | | P | M | K | N | S | H | | |
| -PMS   | <ul style="list-style-type: none"> • Convient très bien pour l'usinage de l'acier • Arêtes de coupe résistante • Une rentabilité optimale | ● | ○ | ○ | ○ | | |  | |
| -PMR   | <ul style="list-style-type: none"> • Convient très bien pour l'usinage de l'acier inoxydable • Forces de coupe plus faibles • Faible tendance à la formation d'arêtes rapportées | ○ | ● | | ○ | ○ | |  | |
| -PMG   | <ul style="list-style-type: none"> • Convient très bien pour l'usinage de fontes • Très bonne stabilité des bords tranchants • En cas d'inclusions de sable ou de croûtes de coulée | ○ | | ● | | | |  | |
| -PMA   | <ul style="list-style-type: none"> • Excellent pour l'usinage de l'aluminium et des métaux non ferreux • Bord tranchant • Faible tendance à la formation d'arêtes rapportées | | | | | ● | |  | |
| -HFC HFC   | <ul style="list-style-type: none"> • Convient très bien pour l'usinage de l'acier • Arête de coupe résistante • Brise-copeaux pour une coupe plus douce | ● | ○ | ○ | ○ | | |  | |



















HC – SOLID CARBIDE COATED

| Grade | Coating colour | Properties | Material group | | | | | | Scope of application | | | | | | | | | | | | | | |
|---|---|---|----------------|---|---|---|---|---|----------------------|----|----|----|----|----|-----------|----|----|--|--|---------|--|---|---|
| | | | P | M | K | N | S | H | WEAR RESISTANCE | | | | | | TOUGHNESS | | | | | ● ● ● ✕ | | | |
| | | | | | | | | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | | | | | | |
| AP5330  |  | <ul style="list-style-type: none">First choice for machining steelGood interplay between wear resistance and toughnessVery long tool life | ● | | | | | | | | | | | | | | | | | | |  |  |
| AP5430  |  | <ul style="list-style-type: none">For medium and rough machining of steelStable gradeVery good wear detection | ● | | | | | | | | | | | | | | | | | | |  |  |
| AP5440  |  | <ul style="list-style-type: none">For medium and rough machining of steelSuitable for poor machining conditionsVery good wear detection | ● | | | | | | | | | | | | | | | | | | |  |  |
| AM5740  |  | <ul style="list-style-type: none">Suitable for machining stainless steelsOptimised cutting edge preparation for stainless steelGood wear resistance and very good toughness | ● | | | | | ○ | | | | | | | | | | | | | |  |  |
| AK6915  |  | <ul style="list-style-type: none">Suitable for machining grey cast iron and nodular cast ironSuitable for interrupted cutsWear-resistant base substrate | | | ● | | | | | | | | | | | | | | | | |  |  |
| AN2015  |  | <ul style="list-style-type: none">Specially for machining non-ferrous metalsVery good chip evacuationExcellent wear resistance | ○ | ○ | ○ | ● | ○ | | | | | | | | | | | | | | |  |  |













HC – METALLO DURO RIVESTITO

MILLING
FRESATURA
FRAISAGE

4

| 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 | | | |
| AP5330 |  | <ul style="list-style-type: none">• Prima scelta per la lavorazione di acciaio• Buona interazione tra resistenza all'usura e tenacità• Durate molto elevate | | ● | | | | | | | | | | | | | | | |  |  |
| AP5430 |  | <ul style="list-style-type: none">• Per la lavorazione media e la sgrossatura di acciaio• Qualità stabili• Ottimo riconoscimento dell'usura | | ● | | | | | | | | | | | | | | | |  |  |
| AP5440 |  | <ul style="list-style-type: none">• Per la lavorazione media e la sgrossatura di acciaio• Adatto per condizioni di lavorazione sfavorevoli• Ottimo riconoscimento dell'usura | | ● | | | | | | | | | | | | | | | |  |  |
| AM5740 |  | <ul style="list-style-type: none">• Per la lavorazione di acciai inossidabili• Ottimale preparazione dei taglienti per acciaio inossidabile• Buona resistenza all'usura e ottima tenacità | | ● | | | | ○ | | | | | | | | | | | |  |  |
| AK6915 |  | <ul style="list-style-type: none">• Per la lavorazione di ghisa grigia e ghisa a grafite sferoidale• Adatto a tagli interrotti• Sostrato di base resistente all'usura | | | | ● | | | | | | | | | | | | | |  |  |
| AN2015 |  | <ul style="list-style-type: none">• Specialmente per la lavorazione di metalli non ferrosi• Ottimo comportamento di scorrimento del truciolo• Eccellente resistenza all'usura | | ○ | ○ | ○ | ● | ○ | | | | | | | | | | | |  |  |

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 | ● | ● | ✕ | |
| AP5330  |  | <ul style="list-style-type: none">• Premier choix pour l'usinage de l'acier• Rapport équilibré entre la résistance à l'usure et la ténacité• Très grande durée de vie | ● | | | | | | | | | | | | | | | | | | | |
| AP5430  |  | <ul style="list-style-type: none">• Pour l'usinage de semi-finition et d'ébauche de l'acier• Nuance stable• Très bonne détection de l'usure | ● | | | | | | | | | | | | | | | | | | | |
| AP5440  |  | <ul style="list-style-type: none">• Pour l'usinage de semi-finition et d'ébauche de l'acier• Convient pour des conditions d'usinage défavorables• Très bonne détection de l'usure | ● | | | | | | | | | | | | | | | | | | | |
| AM5740  |  | <ul style="list-style-type: none">• Pour l'usinage d'aciers inoxydables• Préparation optimale des bords tranchants pour l'acier inoxydable• Bonne résistance à l'usure et très bonne ténacité | ● | | | | | ○ | | | | | | | | | | | | | | |
| AK6915  |  | <ul style="list-style-type: none">• Pour l'usinage de la fonte grise et de la fonte à graphite sphéroïdal• Convient pour les coupes interrompues• Substrat de base résistant à l'usure | | | ● | | | | | | | | | | | | | | | | | |
| AN2015  |  | <ul style="list-style-type: none">• Conception spéciale pour l'usinage de métaux non ferreux• Très bon glissement du copeau• Excellente résistance à l'usure | ○ | ○ | ○ | ● | ○ | | | | | | | | | | | | | | | |

Inserti a fissaggio meccanico
Plaquettes de coupe amovibles

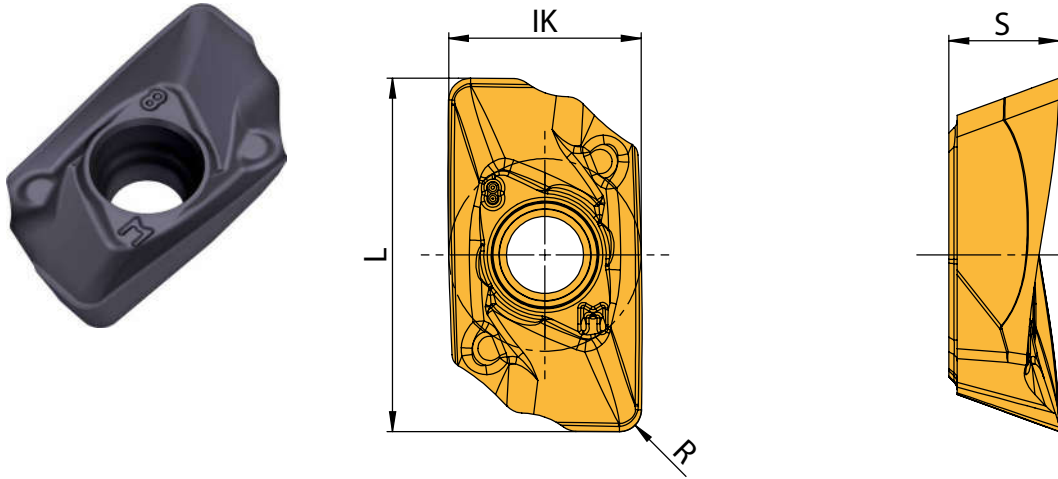
XOMT 1140...

Indexable inserts for square shoulder milling / Inserti indicizzabili per fresatura a spallamento retto / Plaquettes de coupe amovibles pour le fraisage d'épaulements



MILLING
FRESATURA
FRAISAGE
4

Similar to illustration
Simile all'illustrazione
Représentation approximative

**Sintered Execution** / Esecuzione Sinterizzato / Version frittée

| Article Articolo Article | IK | L | S | R | HC | | | HC | HC | HC |
|--------------------------------|----|------|---|-----|--------|--------|--------|--------|--------|--------|
| | | | | | AP5330 | AP5430 | AP5440 | AM5740 | AK6915 | AN2015 |
| XOMT 114008PDSR-PMA | 7 | 12,8 | 4 | 0,8 | | | | | | ◆ |
| XOMT 114008PDSR-PMG | 7 | 12,8 | 4 | 0,8 | | | | | ◆ | |
| XOMT 114008PDSR-PMR | 7 | 12,8 | 4 | 0,8 | | | | ◆ | | |
| XOMT 114008PDSR-PMS | 7 | 12,8 | 4 | 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

Inserti a fissaggio meccanico
Plaquettes de coupe amovibles

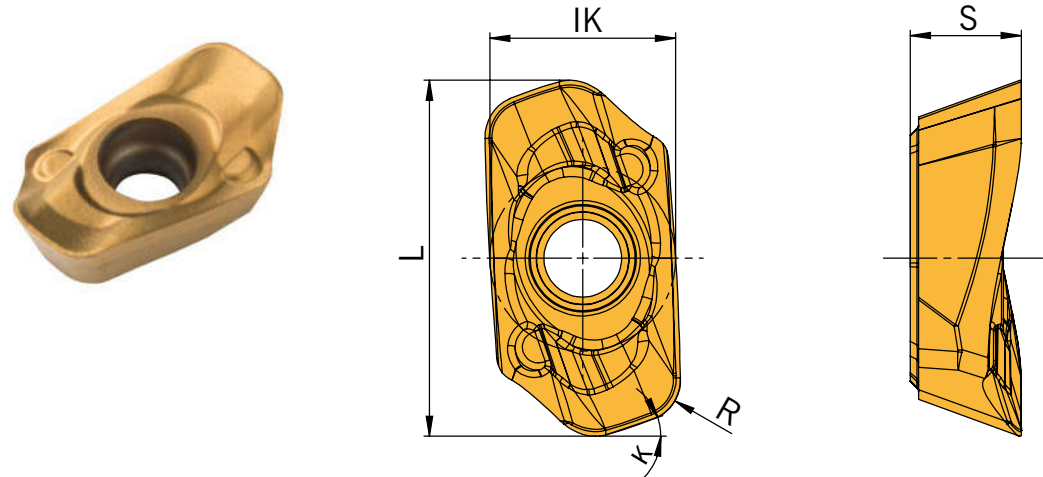
MILLING
FRESATURA
FRAISAGE
4

XOMT 1140...-HFC

Indexable inserts for HFC milling / Inserti per HFC-Fresatura ad alto avanzamento /
Plaquettes de coupe amovibles pour le fraisage HFC



Similar to illustration
Simile all'illustrazione
Représentation approximative



Sintered Execution / Esecuzione Sinterizzato / Version frittée

| Article Articolo Article | IK | L | S | R | HC |
|--------------------------------|----|------|---|-----|--------|
| XOMT 114015SN-HFC | 7 | 12,8 | 4 | 1,5 | AP5430 |

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

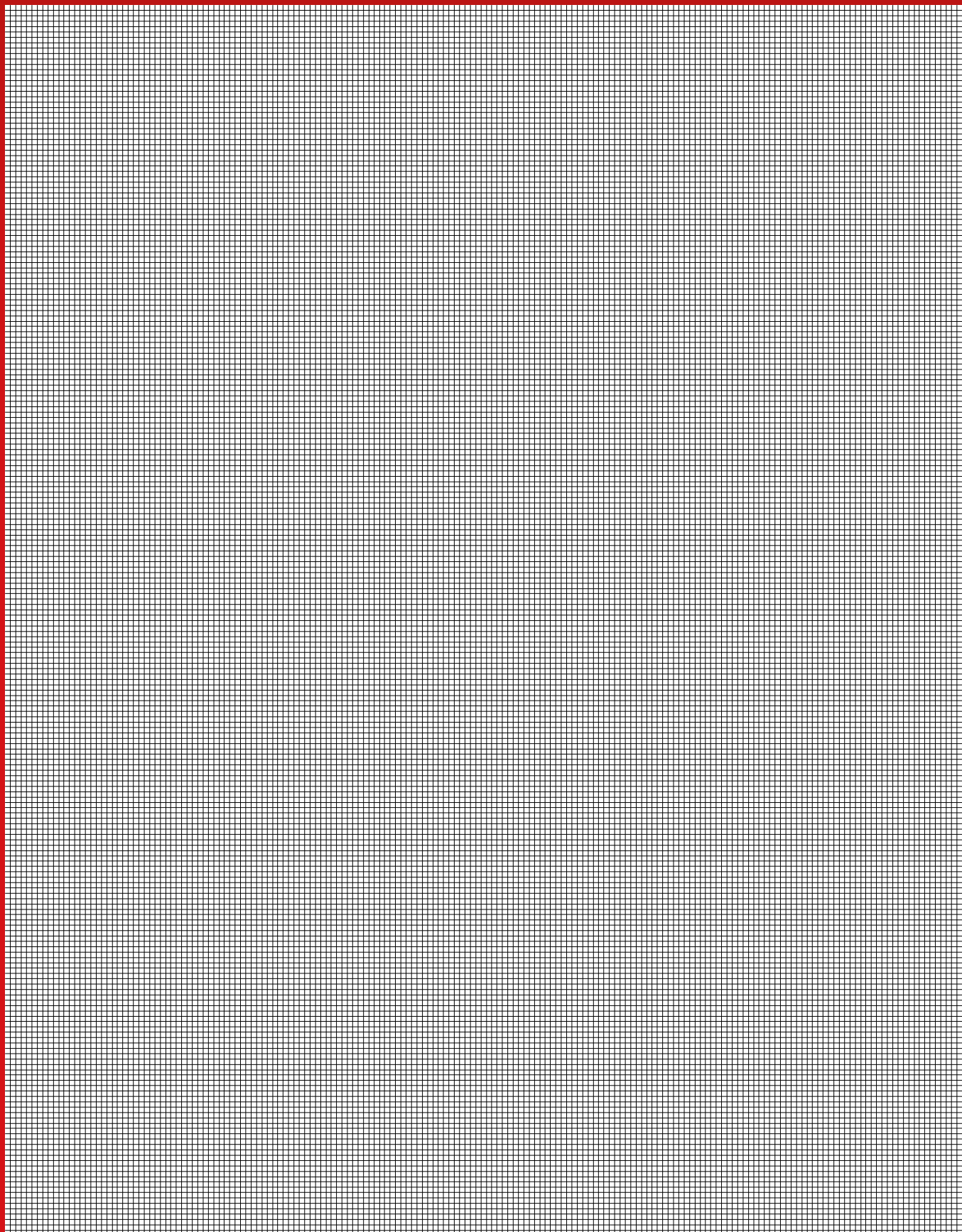
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Recommended cutting data

MILLING
FRESATURA
FRAISAGE
4

Determination cutting speed - Square shoulder milling

| Material group | Structure of the material groups and identification letters | | Brinell hardness HB | Tensile strength Rm (N/mm ²) | Chipping group | Cutting speed V _c (m/min) | | | |
|----------------|---|---|---------------------|--|----------------|--------------------------------------|-----------------|-----------------|--|
| | | | | | | HC | | | |
| | | | | | | AP5330 | AP5430 | AP5440 | |
| P | Unalloyed steel | C ≤ 0.25 % annealed | 125 | 428 | P1 | 100 - 160 - 220 | 100 - 160 - 220 | 200 - 240 - 275 | |
| | | C > 0.25 ... ≤ 0.55 % annealed | 190 | 639 | P2 | 100 - 160 - 220 | 100 - 160 - 220 | 170 - 210 - 250 | |
| | | C > 0.25 ... ≤ 0.55 % hardened and tempered | 210 | 708 | P3 | 100 - 160 - 220 | 100 - 160 - 220 | 170 - 210 - 250 | |
| | | C > 0.55 % annealed | 190 | 639 | P4 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 | |
| | | C > 0.55 % hardened and tempered | 300 | 1013 | P5 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 | |
| | | Machinig steel (short-clipping) annealed | 220 | 745 | P6 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 | |
| | Low alloyed steel | annealed | 175 | 591 | P7 | 80 - 150 - 220 | 80 - 150 - 220 | 150 - 200 - 250 | |
| | | hardened and tempered | 300 | 1013 | P8 | 80 - 150 - 220 | 80 - 150 - 220 | 140 - 170 - 200 | |
| | | hardened and tempered | 380 | 1282 | P9 | 80 - 150 - 220 | 80 - 150 - 220 | 100 - 140 - 180 | |
| | | hardened and tempered | 430 | 1477 | P10 | 80 - 150 - 220 | 80 - 150 - 220 | 100 - 140 - 180 | |
| | High alloyed steel and high alloyed tool steel | annealed | 200 | 675 | P11 | 80 - 130 - 180 | 80 - 130 - 180 | 140 - 175 - 210 | |
| | | hardened | 300 | 1013 | P12 | 80 - 130 - 180 | 80 - 130 - 180 | 100 - 135 - 170 | |
| | | hardened | 400 | 1361 | P13 | 80 - 130 - 180 | 80 - 130 - 180 | 100 - 135 - 170 | |
| | Stainless steel | ferretic / martensitic, annealed | 200 | 675 | P14 | 70 - 125 - 180 | 70 - 125 - 180 | 140 - 165 - 190 | |
| | | martensitic, hardened and tempered | 330 | 1114 | P15 | 70 - 125 - 180 | 70 - 125 - 180 | 140 - 165 - 190 | |
| | | austenitic, chilled | 200 | 675 | M1 | - | - | - | |
| M | Stainless steel | austenitic, precipitation-hardened (PH) | 300 | 1013 | M2 | - | - | - | |
| | | austenitic-ferritic, Duplex | 230 | 778 | M3 | - | - | - | |
| | | ferretic | 200 | 675 | K1 | - | - | - | |
| K | Malleable cast iron | pearlitic | 260 | 867 | K2 | - | - | - | |
| | | low tensile strength | 180 | 602 | K3 | - | - | - | |
| | Cast iron | high tensile strength / austenitic | 245 | 825 | K4 | - | - | - | |
| | | ferretic | 155 | 518 | K5 | - | - | - | |
| | Cast iron with nodular graphite | pearlitic | 265 | 885 | K6 | - | - | - | |
| | | GGV (CGI) | 200 | 675 | K7 | - | - | - | |
| N | 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 | - | - | - | |
| | | Unalloyed, electrolyte copper | 100 | 343 | N7 | - | - | - | |
| | Copper and copper alloys (Brass / Bronze) | 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 | - | - | - | |
| S | 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 | - | - | - | |
| H | 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

| | | | |
|--|----------------|-----------------|------------------|
| | | | |
| | | | |
| | | | |
| | AM5740 | AK6915 | AN2015 |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | 60 - 130 - 200 | - | - |
| | 60 - 130 - 200 | - | - |
| | 60 - 130 - 200 | - | - |
| | - | 150 - 235 - 320 | - |
| | - | 120 - 185 - 250 | - |
| | - | 180 - 265 - 350 | - |
| | - | 140 - 210 - 280 | - |
| | - | 130 - 190 - 250 | - |
| | - | 100 - 150 - 200 | - |
| | - | 180 - 265 - 350 | - |
| | - | - | 440 - 970 - 1500 |
| | - | - | 440 - 970 - 1500 |
| | - | - | 440 - 970 - 1500 |
| | - | - | 330 - 765 - 1200 |
| | - | - | 100 - 160 - 220 |
| | - | - | - |
| | - | - | 330 - 565 - 800 |
| | - | - | 275 - 640 - 1000 |
| | - | - | 220 - 410 - 600 |
| | - | - | - |
| | - | - | 90 - 545 - 1000 |
| | - | - | 90 - 545 - 1000 |
| | - | - | 85 - 295 - 500 |
| | - | - | 85 - 295 - 500 |
| | - | - | 85 - 295 - 500 |
| | - | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 25 - 30 | - | - |
| | 20 - 25 - 30 | - | - |
| | 40 - 55 - 70 | - | - |
| | 20 - 30 - 40 | - | - |
| | 20 - 30 - 40 | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |

Determinazione della velocità di taglio - Fresatura a spallamento retto

| Gruppo materiale | Struttura dei gruppi di materiali e lettere di riferimento | | Durezza Brinell | Resistenza Rm (N/mm ²) | Gruppo di lavoro | Velocità di taglio V _c (m/min) | | | |
|------------------|--|--------------------------|---|------------------------------------|------------------|---|-----------------|-----------------|-----------------|
| | | | | | | HC | | | |
| | | | | | | AP5330 | AP5430 | AP5440 | |
| P | Acciai non legato | C ≤ 0,25 % | ricotto | 125 | 428 | P1 | 100 - 160 - 220 | 100 - 160 - 220 | 200 - 240 - 275 |
| | | C > 0,25 ... ≤ 0,55 % | ricotto | 190 | 639 | P2 | 100 - 160 - 220 | 100 - 160 - 220 | 170 - 210 - 250 |
| | | C > 0,25 ... ≤ 0,55 % | bonificato | 210 | 708 | P3 | 100 - 160 - 220 | 100 - 160 - 220 | 170 - 210 - 250 |
| | | C > 0,55 % | ricotto | 190 | 639 | P4 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 |
| | | C > 0,55 % | bonificato | 300 | 1013 | P5 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 |
| | Acciai debolmente legati | Acciaio (truciolo corto) | ricotto | 220 | 745 | P6 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 |
| | | | ricotto | 175 | 591 | P7 | 80 - 150 - 220 | 80 - 150 - 220 | 150 - 200 - 250 |
| | | | bonificato | 300 | 1013 | P8 | 80 - 150 - 220 | 80 - 150 - 220 | 140 - 170 - 200 |
| | | | bonificato | 380 | 1282 | P9 | 80 - 150 - 220 | 80 - 150 - 220 | 100 - 140 - 180 |
| | | | bonificato | 430 | 1477 | P10 | 80 - 150 - 220 | 80 - 150 - 220 | 100 - 140 - 180 |
| | Acciai fortemente legati e acciai da utensili | | ricotto | 200 | 675 | P11 | 80 - 130 - 180 | 80 - 130 - 180 | 140 - 175 - 210 |
| | | | temprato e rinvenuto | 300 | 1013 | P12 | 80 - 130 - 180 | 80 - 130 - 180 | 100 - 135 - 170 |
| | | | temprato e rinvenuto | 400 | 1361 | P13 | 80 - 130 - 180 | 80 - 130 - 180 | 100 - 135 - 170 |
| | Acciai inossidabili | | ferritico / martensitico, ricotto | 200 | 675 | P14 | 70 - 125 - 180 | 70 - 125 - 180 | 140 - 165 - 190 |
| | | | martensitico, bonificato | 330 | 1114 | P15 | 70 - 125 - 180 | 70 - 125 - 180 | 140 - 165 - 190 |
| M | Acciai inossidabili | | austenitico, trattato o temoerato | 200 | 675 | M1 | - | - | - |
| | | | austenitico, indurimento per precipitazione (PH) | 300 | 1013 | M2 | - | - | - |
| | | | austenitico-ferritico, Duplex | 230 | 778 | M3 | - | - | - |
| K | Ghisa temprata | | ferritico | 200 | 675 | K1 | - | - | - |
| | | | perlitica | 260 | 867 | K2 | - | - | - |
| | Ghisa grigia | | bassa resistenza | 180 | 602 | K3 | - | - | - |
| | | | alta resistenza / austenitico | 245 | 825 | K4 | - | - | - |
| | Ghisa sferoidale | | ferritico | 155 | 518 | K5 | - | - | - |
| | | | perlitica | 265 | 885 | K6 | - | - | - |
| | GGV (CGI) | | | 200 | 675 | K7 | - | - | - |
| N | Leghe di Alluminio stampato | | non invecchiato | 30 | - | N1 | - | - | - |
| | | | rinvenuto, invecchiato | 100 | 343 | N2 | - | - | - |
| | | | ≤ 12 % Si, non invecchiato | 75 | 260 | N3 | - | - | - |
| | Leghe di Alluminio da fusione | | ≤ 12 % Si, rinvenuto, invecchiato | 90 | 314 | N4 | - | - | - |
| | | | > 12 % Si, non invecchiato | 130 | 447 | N5 | - | - | - |
| | Leghe di magnesio | | > 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

| | | | |
|--|----------------|-----------------|------------------|
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| | AM5740 | AK6915 | AN2015 |
| | - | - | - |
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| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | 60 - 130 - 200 | - | - |
| | 60 - 130 - 200 | - | - |
| | 60 - 130 - 200 | - | - |
| | - | 150 - 235 - 320 | - |
| | - | 120 - 185 - 250 | - |
| | - | 180 - 265 - 350 | - |
| | - | 140 - 210 - 280 | - |
| | - | 130 - 190 - 250 | - |
| | - | 100 - 150 - 200 | - |
| | - | 180 - 265 - 350 | - |
| | - | - | 440 - 970 - 1500 |
| | - | - | 440 - 970 - 1500 |
| | - | - | 440 - 970 - 1500 |
| | - | - | 330 - 765 - 1200 |
| | - | - | 100 - 160 - 220 |
| | - | - | - |
| | - | - | 330 - 565 - 800 |
| | - | - | 275 - 640 - 1000 |
| | - | - | 220 - 410 - 600 |
| | - | - | - |
| | - | - | 90 - 545 - 1000 |
| | - | - | 90 - 545 - 1000 |
| | - | - | 85 - 295 - 500 |
| | - | - | 85 - 295 - 500 |
| | - | - | 85 - 295 - 500 |
| | - | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 25 - 30 | - | - |
| | 20 - 25 - 30 | - | - |
| | 40 - 55 - 70 | - | - |
| | 20 - 30 - 40 | - | - |
| | 20 - 30 - 40 | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |

Paramètres de coupe suggérés

Définition de la vitesse de coupe - Fraisage d'épaulement carré

| Groupe de matériaux | Structure des groupes de matériaux et des lettres de référence | | Dureté Brinell | Résistance RM (N/mm²) | Groupe de travail | Vitesse de coupe V _c (m/min) | | | |
|---------------------|--|---|----------------|-----------------------|-------------------|---|-----------------|-----------------|--|
| | | | | | | HC | | | |
| | | | | | | AP5330 | AP5430 | AP5440 | |
| P | Acier non allié | C ≤ 0,25 % recuit | 125 | 428 | P1 | 100 - 160 - 220 | 100 - 160 - 220 | 200 - 240 - 275 | |
| | | C > 0,25 ... ≤ 0,55 % recuit | 190 | 639 | P2 | 100 - 160 - 220 | 100 - 160 - 220 | 170 - 210 - 250 | |
| | | C > 0,25 ... ≤ 0,55 % traité | 210 | 708 | P3 | 100 - 160 - 220 | 100 - 160 - 220 | 170 - 210 - 250 | |
| | | C > 0,55 % recuit | 190 | 639 | P4 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 | |
| | | C > 0,55 % traité | 300 | 1013 | P5 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 | |
| | Acier faiblement allié | Aciers de décolletage (à copeaux courts) recuit | 220 | 745 | P6 | 100 - 160 - 220 | 100 - 160 - 220 | 150 - 200 - 250 | |
| | | recuit | 175 | 591 | P7 | 80 - 150 - 220 | 80 - 150 - 220 | 150 - 200 - 250 | |
| | | traité | 300 | 1013 | P8 | 80 - 150 - 220 | 80 - 150 - 220 | 140 - 170 - 200 | |
| | | traité | 380 | 1282 | P9 | 80 - 150 - 220 | 80 - 150 - 220 | 100 - 140 - 180 | |
| | | traité | 430 | 1477 | P10 | 80 - 150 - 220 | 80 - 150 - 220 | 100 - 140 - 180 | |
| | Acier allié et acier outil allié | recuit | 200 | 675 | P11 | 80 - 130 - 180 | 80 - 130 - 180 | 140 - 175 - 210 | |
| | | trempe et revenu | 300 | 1013 | P12 | 80 - 130 - 180 | 80 - 130 - 180 | 100 - 135 - 170 | |
| | | trempe et revenu | 400 | 1361 | P13 | 80 - 130 - 180 | 80 - 130 - 180 | 100 - 135 - 170 | |
| | Acier inox | ferritique, martensitique, recuit | 200 | 675 | P14 | 70 - 125 - 180 | 70 - 125 - 180 | 140 - 165 - 190 | |
| | | martensitique, traité | 330 | 1114 | P15 | 70 - 125 - 180 | 70 - 125 - 180 | 140 - 165 - 190 | |
| M | Acier inox | austénitique | 200 | 675 | M1 | - | - | - | |
| | | austénitique | 300 | 1013 | M2 | - | - | - | |
| | | austénitique-ferritique, Duplex | 230 | 778 | M3 | - | - | - | |
| K | Fonte malléable | ferritique | 200 | 675 | K1 | - | - | - | |
| | | perlitique | 260 | 867 | K2 | - | - | - | |
| | Fonte grise | faible résistance | 180 | 602 | K3 | - | - | - | |
| | | haute résistance / austénitique | 245 | 825 | K4 | - | - | - | |
| | Fonte à Graphite sphéroïdale | ferritique | 155 | 518 | K5 | - | - | - | |
| | | perlitique | 265 | 885 | K6 | - | - | - | |
| | GGV (CGI) | | 200 | 675 | K7 | - | - | - | |
| N | Alliages de fonde- rie 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 recuit | 200 | 675 | S1 | - | - | - | |
| | | à base de Fe durci | 280 | 943 | S2 | - | - | - | |
| | | à base Ni ou Co recuit | 250 | 839 | S3 | - | - | - | |
| | | à base Ni ou Co durci | 350 | 1177 | S4 | - | - | - | |
| | | à base Ni ou Co 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

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| | | | |
| | AM5740 | AK6915 | AN2015 |
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| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | 60 - 130 - 200 | - | - |
| | 60 - 130 - 200 | - | - |
| | 60 - 130 - 200 | - | - |
| | - | 150 - 235 - 320 | - |
| | - | 120 - 185 - 250 | - |
| | - | 180 - 265 - 350 | - |
| | - | 140 - 210 - 280 | - |
| | - | 130 - 190 - 250 | - |
| | - | 100 - 150 - 200 | - |
| | - | 180 - 265 - 350 | - |
| | - | - | 440 - 970 - 1500 |
| | - | - | 440 - 970 - 1500 |
| | - | - | 440 - 970 - 1500 |
| | - | - | 330 - 765 - 1200 |
| | - | - | 100 - 160 - 220 |
| | - | - | - |
| | - | - | 330 - 565 - 800 |
| | - | - | 275 - 640 - 1000 |
| | - | - | 220 - 410 - 600 |
| | - | - | - |
| | - | - | 90 - 545 - 1000 |
| | - | - | 90 - 545 - 1000 |
| | - | - | 85 - 295 - 500 |
| | - | - | 85 - 295 - 500 |
| | - | - | 85 - 295 - 500 |
| | - | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 40 - 60 | - | - |
| | 20 - 25 - 30 | - | - |
| | 20 - 25 - 30 | - | - |
| | 40 - 55 - 70 | - | - |
| | 20 - 30 - 40 | - | - |
| | 20 - 30 - 40 | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |
| | - | - | - |

Determination cutting speed - HFC milling

| Material group | Structure of the material groups and identification letters | | Brinell hardness HB | Tensile strength Rm (N/mm ²) | Chipping group | Cutting speed V _c (m/min) |
|----------------|---|---|---------------------|--|----------------|--------------------------------------|
| | | | | | | HC |
| | | | | | | AP5430 |
| P | Unalloyed steel | C ≤ 0.25 % annealed | 125 | 428 | P1 | 200 - 250 - 300 |
| | | C > 0.25 ... ≤ 0.55 % annealed | 190 | 639 | P2 | 200 - 250 - 300 |
| | | C > 0.25 ... ≤ 0.55 % hardened and tempered | 210 | 708 | P3 | 200 - 240 - 275 |
| | | C > 0.55 % annealed | 190 | 639 | P4 | 200 - 240 - 275 |
| | | C > 0.55 % hardened and tempered | 300 | 1013 | P5 | 200 - 240 - 275 |
| | | Machinig steel (short-clipping) annealed | 220 | 745 | P6 | 200 - 240 - 275 |
| | Low alloyed steel | annealed | 175 | 591 | P7 | 200 - 240 - 275 |
| | | hardened and tempered | 300 | 1013 | P8 | 200 - 240 - 275 |
| | | hardened and tempered | 380 | 1282 | P9 | 200 - 240 - 275 |
| | | hardened and tempered | 430 | 1477 | P10 | 200 - 240 - 275 |
| | High alloyed steel and high alloyed tool steel | annealed | 200 | 675 | P11 | 180 - 210 - 235 |
| | | hardened | 300 | 1013 | P12 | 180 - 210 - 235 |
| | | hardened | 400 | 1361 | P13 | 180 - 210 - 235 |
| | Stainless steel | ferretic / martensitic, annealed | 200 | 675 | P14 | 180 - 200 - 220 |
| | | martensitic, hardened and tempered | 330 | 1114 | P15 | 180 - 200 - 220 |
| M | Stainless steel | austenitic, chilled | 200 | 675 | M1 | - |
| | | austenitic, precipitation-hardened (PH) | 300 | 1013 | M2 | - |
| | | austenitic-ferritic, Duplex | 230 | 778 | M3 | - |
| K | Malleable cast iron | ferritic | 200 | 675 | K1 | - |
| | | pearlitic | 260 | 867 | K2 | - |
| | Cast iron | low tensile strength | 180 | 602 | K3 | - |
| | | high tensile strength / austenitic | 245 | 825 | K4 | - |
| | Cast iron with nodular graphite | ferritic | 155 | 518 | K5 | - |
| | | pearlitic | 265 | 885 | K6 | - |
| | GGV (CGI) | | 200 | 675 | K7 | - |
| N | Aluminium alloys long chipping | not heat treatable | 30 | - | N1 | - |
| | | heat treatable, heat treated | 100 | 343 | N2 | - |
| | Casted aluminium alloys | ≤ 12 % Si, not heat treatable | 75 | 260 | N3 | - |
| | | ≤ 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 | - |
| | | Unalloyed, elektrolyte copper | 100 | 343 | N7 | - |
| | Copper and copper alloys (Brass / Bronze) | 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 | - |
| S | 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 | - |
| H | 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

Determinazione della velocità di taglio - Fresatura HFC

| Gruppo materiale | Struttura dei gruppi di materiali e lettere di riferimento | | Durezza Brinell | Resistenza Rm (N/mm²) | Gruppo di lavoro | Velocità di taglio V _c (m/min) |
|-------------------|--|---|-----------------|--------------------------|------------------|--|
| | | | | | | HC |
| | | | | | | AP5430 |
| P | Acciai non legato | C ≤ 0,25 % ricotto | 125 | 428 | P1 | 200 - 250 - 300 |
| | | C > 0,25 ... ≤ 0,55 % ricotto | 190 | 639 | P2 | 200 - 250 - 300 |
| | | C > 0,25 ... ≤ 0,55 % bonificato | 210 | 708 | P3 | 200 - 240 - 275 |
| | | C > 0,55 % ricotto | 190 | 639 | P4 | 200 - 240 - 275 |
| | | C > 0,55 % bonificato | 300 | 1013 | P5 | 200 - 240 - 275 |
| | | Acciaio (truciolo corto) ricotto | 220 | 745 | P6 | 200 - 240 - 275 |
| | Acciai debolmente legati | ricotto | 175 | 591 | P7 | 200 - 240 - 275 |
| | | bonificato | 300 | 1013 | P8 | 200 - 240 - 275 |
| | | bonificato | 380 | 1282 | P9 | 200 - 240 - 275 |
| | | bonificato | 430 | 1477 | P10 | 200 - 240 - 275 |
| | Acciai fortemente legati e acciai da utensili | ricotto | 200 | 675 | P11 | 180 - 210 - 235 |
| | | temprato e rinvenuto | 300 | 1013 | P12 | 180 - 210 - 235 |
| | | temprato e rinvenuto | 400 | 1361 | P13 | 180 - 210 - 235 |
| | Acciai inossidabili | ferritico / martensitico, ricotto | 200 | 675 | P14 | 180 - 200 - 220 |
| | | martensitico, bonificato | 330 | 1114 | P15 | 180 - 200 - 220 |
| M | Acciai inossidabili | austenitico, trattato o temoerato | 200 | 675 | M1 | - |
| | | austenitico, indurimento per precipitazione (PH) | 300 | 1013 | M2 | - |
| | | austenitico-ferritico, Duplex | 230 | 778 | M3 | - |
| | | | | | | |
| K | Ghisa temprata | ferritico | 200 | 675 | K1 | - |
| | | perlitica | 260 | 867 | K2 | - |
| | Ghisa grigia | bassa resistenza | 180 | 602 | K3 | - |
| | | alta resistenza / austenitico | 245 | 825 | K4 | - |
| | Ghisa sferoidale | ferritico | 155 | 518 | K5 | - |
| | | perlitica | 265 | 885 | K6 | - |
| | GGV (CGI) | | 200 | 675 | K7 | - |
| N | Leghe di Alluminio stampato | non invecchiato | 30 | - | N1 | - |
| | | rinvenuto, invecchiato | 100 | 343 | N2 | - |
| | | ≤ 12 % Si, non invecchiato | 75 | 260 | N3 | - |
| | Leghe di Alluminio da fusione | ≤ 12 % Si, rinvenuto, invecchiato | 90 | 314 | N4 | - |
| | | > 12 % Si, non invecchiato | 130 | 447 | N5 | - |
| | Leghe di magnesio | > 12 % Si, non invecchiato | 70 | 250 | N6 | - |
| | | Non legati, Rame Elettrolitico | 100 | 343 | N7 | - |
| | Rame e Leghe di Rame (Bronzo / Ottone) | 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 ricotto | 200 | 675 | S1 | - |
| | | Base-Fe invecchiato | 280 | 943 | S2 | - |
| | | Base Ni o Co ricotto | 250 | 839 | S3 | - |
| | | Base Ni o Co invecchiato | 350 | 1177 | S4 | - |
| | | Base Ni o Co da fusione | 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

Définition de la vitesse de coupe - Fraisage HFC

| Groupe de matériaux | Structure des groupes de matériaux et des lettres de référence | | Dureté Brinell | Résistance RM (N/mm ²) | Groupe de travail | Vitesse de coupe V _c (m/min) |
|---------------------|--|---|----------------|------------------------------------|-------------------|---|
| | | | | | | HC |
| | | | | | | AP5430 |
| P | Acier non allié | C ≤ 0,25 % recuit | 125 | 428 | P1 | 200 - 250 - 300 |
| | | C > 0,25 ... ≤ 0,55 % recuit | 190 | 639 | P2 | 200 - 250 - 300 |
| | | C > 0,25 ... ≤ 0,55 % traité | 210 | 708 | P3 | 200 - 240 - 275 |
| | | C > 0,55 % recuit | 190 | 639 | P4 | 200 - 240 - 275 |
| | | C > 0,55 % traité | 300 | 1013 | P5 | 200 - 240 - 275 |
| | | Aciers de décolletage (à copeaux courts) recuit | 220 | 745 | P6 | 200 - 240 - 275 |
| | Acier faiblement allié | recuit | 175 | 591 | P7 | 200 - 240 - 275 |
| | | traité | 300 | 1013 | P8 | 200 - 240 - 275 |
| | | traité | 380 | 1282 | P9 | 200 - 240 - 275 |
| | | traité | 430 | 1477 | P10 | 200 - 240 - 275 |
| | Acier allié et acier outil allié | recuit | 200 | 675 | P11 | 180 - 210 - 235 |
| | | trempe et revenu | 300 | 1013 | P12 | 180 - 210 - 235 |
| | | trempe et revenu | 400 | 1361 | P13 | 180 - 210 - 235 |
| | Acier inox | ferritique, martensitique, recuit | 200 | 675 | P14 | 180 - 200 - 220 |
| | | martensitique, traité | 330 | 1114 | P15 | 180 - 200 - 220 |
| M | Acier inox | austénitique | 200 | 675 | M1 | - |
| | | austénitique | 300 | 1013 | M2 | - |
| | | austénitique-ferritique, Duplex | 230 | 778 | M3 | - |
| K | Fonte malléable | ferritique | 200 | 675 | K1 | - |
| | | perlitique | 260 | 867 | K2 | - |
| | Fonte grise | faible résistance | 180 | 602 | K3 | - |
| | | haute résistance / austénitique | 245 | 825 | K4 | - |
| | Fonte à Graphite sphéroïdale | ferritique | 155 | 518 | K5 | - |
| | | perlitique | 265 | 885 | K6 | - |
| | GGV (CGI) | | 200 | 675 | K7 | - |
| 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 | - |
| | | Matériau plastique renforcé de fibres de verre GFRP | - | - | N13 | - |
| | | Matériau plastique renforcé composite CFRP | - | - | N14 | - |
| | | Plastique renforcé fibre aramide AFRP | - | - | N15 | - |
| | | Graphite | 80 Shore | - | N16 | - |
| S | Alliages réfractaires | à base de Fe recuit | 200 | 675 | S1 | - |
| | | à base de Fe durci | 280 | 943 | S2 | - |
| | | à base Ni ou Co recuit | 250 | 839 | S3 | - |
| | | à base Ni ou Co durci | 350 | 1177 | S4 | - |
| | | à base Ni ou Co jeter | 320 | 1076 | S5 | - |
| | | Titane pur | 200 | 675 | S6 | - |
| | Alliage de titane | 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.

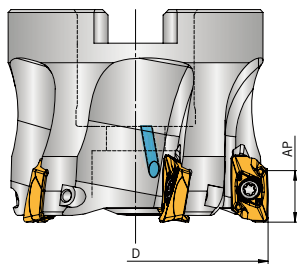
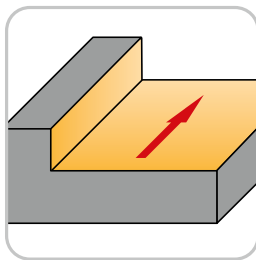
Il peut être nécessaire de les adapter à des applications d'usinage individuelles.

HC = Carbure avec revêtement

FEED DETERMINATION - SQUARE SHOULDER MILLING 11

SCELTA DELL'AVANZAMENTO - FRESATURA A SPALLAMENTO RETTO 11

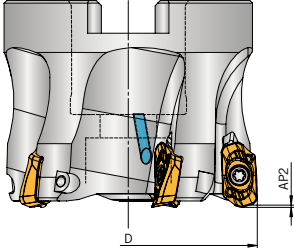
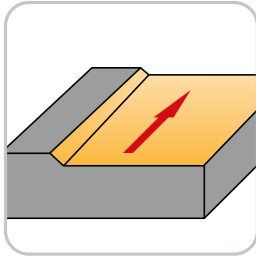
DÉFINITION DE L'AVANCE - FRAISAGE D'ÉPAULEMENT CARRÉ 11

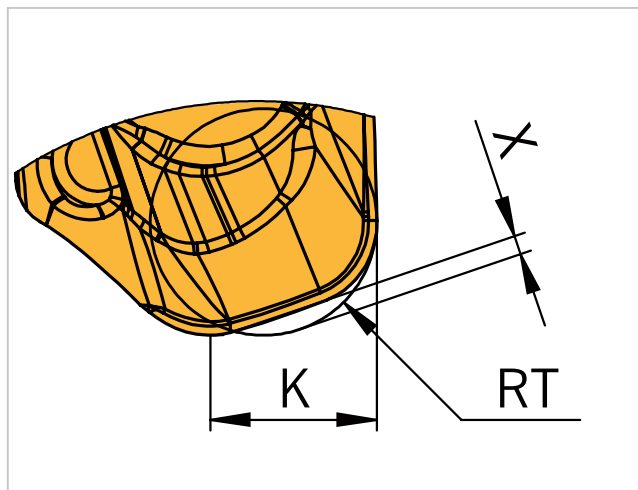
| | | | | |
|---|--|---|------|------|
| Material group / Gruppo materiale / Groupe de matériaux | System / Sistema / Système | 11 | | |
| |  |  | | |
| | Approach angle / Angolo di attacco / Angle d'attaque - K | 90° | | |
| | Tool diameter / Diametro dell'utensile / Diamètre de l'outil - D [mm] | 16 - 80 | | |
| | Maximum cutting depth / Massimo profondità di taglio / Maximum profondeur de coupe - AP [mm] | 10,0 | | |
| | Feed per tooth / Avanzamento al tagliente / Avance jusqu'au tranchant [mm] | f _z | | |
| P | Unalloyed steel / Acciai non legato / Acier non allié | 0,15 | 0,22 | 0,28 |
| | Low alloyed steel / Acciai debolmente legati / Acier faiblement allié | 0,12 | 0,18 | 0,24 |
| | High alloyed steel and high alloyed tool steel / Acciai fortemente legati e acciai da utensili / Acier allié et acier outil allié | 0,12 | 0,18 | 0,24 |
| | Stainless steel / Acciai inossidabili / Acier inox | 0,10 | 0,15 | 0,20 |
| M | Stainless steel / Acciai inossidabili / Acier inox | 0,08 | 0,12 | 0,15 |
| K | Malleable cast iron / Ghisa temprata / Fonte malléable | 0,15 | 0,23 | 0,30 |
| | Cast iron / Ghisa grigia / Fonte grise | 0,20 | 0,23 | 0,25 |
| | Cast iron with nodular graphite / Ghisa sferoidale / Fonte à Graphite sphéroïdale | 0,15 | 0,20 | 0,25 |
| | GGV (CGI) / GGV (CGI) / GGV (CGI) | 0,12 | 0,16 | 0,20 |
| N | Aluminium alloys long chipping / Leghe di Alluminio stampato / Alliages de fonderie d'aluminium | 0,10 | 0,20 | 0,30 |
| | Casted aluminium alloys / Leghe di Alluminio da fusione / Alliage de fonte d'aluminium | 0,10 | 0,20 | 0,30 |
| | 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 | 0,13 | 0,16 |
| | Non-ferrous materials / Materiali non metallici / Matériaux non métalliques | 0,10 | 0,13 | 0,16 |
| S | High temperature resistant alloys / Leghe resistenti al calore / Alliages réfractaires | 0,04 | 0,08 | 0,12 |
| | Titanium alloys / Leghe di Titanio / Alliage de titane | 0,04 | 0,08 | 0,12 |
| | 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 | – | – | – |

FEED DETERMINATION - HFC MILLING 11

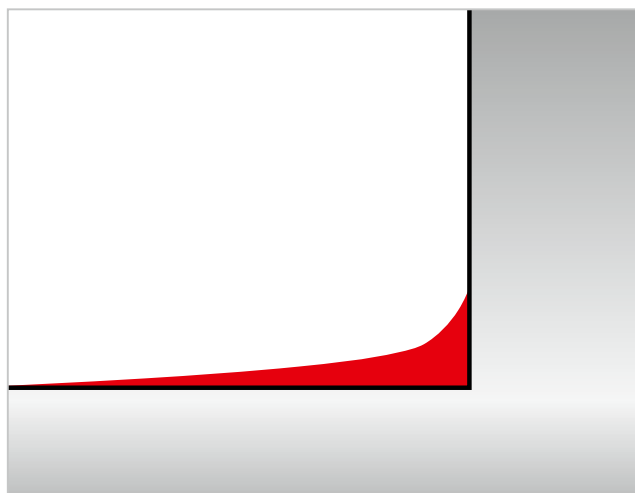
SCELTA DELL'AVANZAMENTO - FRESATURA HFC 11

DÉFINITION DE L'AVANCE - FRAISAGE HFC 11

| Material group / Gruppo materiale / Groupe de matériaux | System / Sistema / Système | 11 | | |
|---|--|---|------|------|
| |  |  | | |
| | Approach angle / Angolo di attacco / Angle d'attaque - K | 17° | | |
| | Tool diameter / Diametro dell'utensile / Diamètre de l'outil - D [mm] | 16 - 80 | | |
| | Maximum cutting depth / Massimo profondità di taglio / Maximum profondeur de coupe - AP [mm] | 0,7 | | |
| | Feed per tooth / Avanzamento al tagliente / Avance jusqu'au tranchant [mm] | f _z | | |
| | Unalloyed steel / Acciai non legato / Acier non allié | 0,80 | 1,03 | 1,25 |
| | Low alloyed steel / Acciai debolmente legati / Acier faiblement allié | 0,60 | 0,93 | 1,25 |
| | High alloyed steel and high alloyed tool steel / Acciai fortemente legati e acciai da utensili / Acier allié et acier outil allié | 0,60 | 0,93 | 1,25 |
| P | Stainless steel / Acciai inossidabili / Acier inox | 0,50 | 0,88 | 1,25 |
| | M | Stainless steel / Acciai inossidabili / Acier inox | – | – |
| | K | Malleable cast iron / Ghisa temprata / Fonte malléable | – | – |
| | K | Cast iron / Ghisa grigia / Fonte grise | – | – |
| K | Cast iron with nodular graphite / Ghisa sferoidale / Fonte à Graphite sphéroïdale | – | – | – |
| | GGV (CGI) / GGV (CGI) / GGV (CGI) | – | – | – |
| N | Aluminium alloys long chipping / Leghe di Alluminio stampato / Alliages de fonderie d'aluminium | – | – | – |
| | Casted aluminium alloys / Leghe di Alluminio da fusione / Alliage de fonte d'aluminium | – | – | – |
| | 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) | – | – | – |
| S | Non-ferrous materials / Materiali non metallici / Matériaux non métalliques | – | – | – |
| | High temperature resistant alloys / Leghe resistenti al calore / Alliages réfractaires | – | – | – |
| | Titanium alloys / Leghe di Titanio / Alliage de titane | – | – | – |
| | Wolfram alloys / Leghe di tungsteno / Alliage de tungstène | – | – | – |
| H | Molybdän alloys / Leghe di molibdeno / Alliage de molybdène | – | – | – |
| | Hardened steel / Acciaio Temprato / Acier trempé | – | – | – |
| H | Hardened cast iron / Acciaio Temprato / Fonte durci | – | – | – |

PROGRAMMING INFORMATION: HFC MILLING**INFORMAZIONE PER LA PROGRAMMAZIONE DI FRESE AD ALTO AVANZAMENTO****INFORMATION DE PROGRAMMATION FRAISAGE HFC****Theoretical tool data***Dati utensile teorici**Données d'outils théoriques*

RT = 2 mm
K = 3.08 mm
X = 0.35 mm

**Residual material***Materiale residuo**Matériau résiduel*

Due to the special insert geometry for milling at high feed rates, roughing produces a minimum of residual material.

Grazie alla speciale geometria degli inserti per la fresatura ad alto avanzamento, durante la sgrossatura viene lasciato un minimo di materiale residuo, che viene rimosso con la successiva lavorazione di finitura.

Grâce à la géométrie particulière des plaquettes amovibles pour le fraisage à grande avancée, l'ébauche ne produit que très peu de matériau résiduel qui est ensuite éliminée lors de l'usinage de finition.

Cutting width*Larghezza di taglio**Largeur de coupe*

To obtain the best possible results and ensure good productivity, it is recommended to adapt the cutting width accordingly.

Per ottenere il miglior risultato possibile e per garantire una buona produttività, si raccomanda di regolare di conseguenza la larghezza di taglio.

Afin d'obtenir le meilleur résultat possible et de garantir une bonne productivité, il est recommandé d'adapter la largeur de coupe en conséquence.

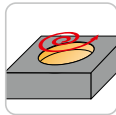
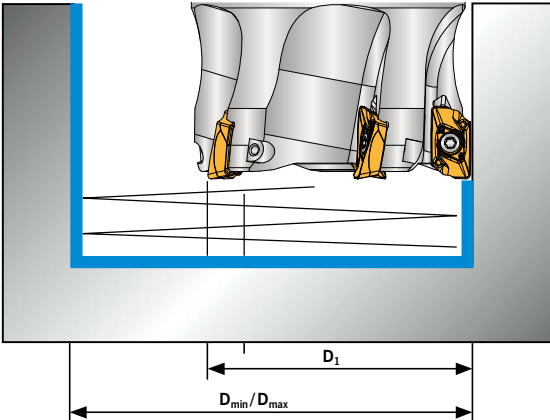
$$D - K = AE$$

APPLICATION DATA: CORNER MILLING - 11

DATI APPLICATIVI FRESATURA DI SPALLAMENTI - 11

DONNÉES DE PERFORMANCE POUR LE FRAISAGE D'ANGLES - 11

Circular plunge / Immersione circolare / Plongée circulaire

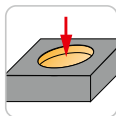
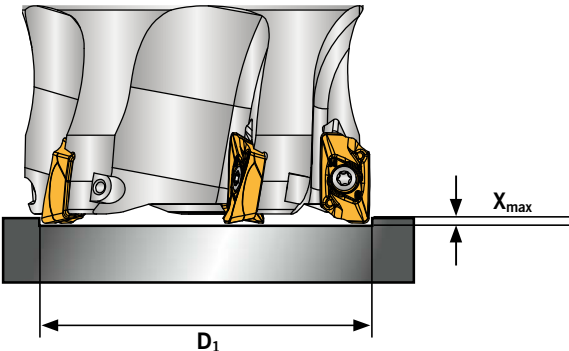


| D ₁ | D _{min} | D _{max} |
|----------------|------------------|------------------|
| 16 | 27.2 | 30 |
| 20 | 35.2 | 38 |
| 25 | 45.2 | 48 |
| 32 | 59.2 | 62 |
| 35 | 65.2 | 68 |
| 40 | 75.2 | 78 |
| 50 | 95.2 | 98 |
| 63 | 121.2 | 124 |
| 80 | 155.2 | 158 |

D_{min} = smallest hole diameter / diametro minimo del foro / le plus petit diamètre de perçage smallest hole diameter

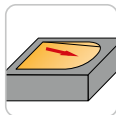
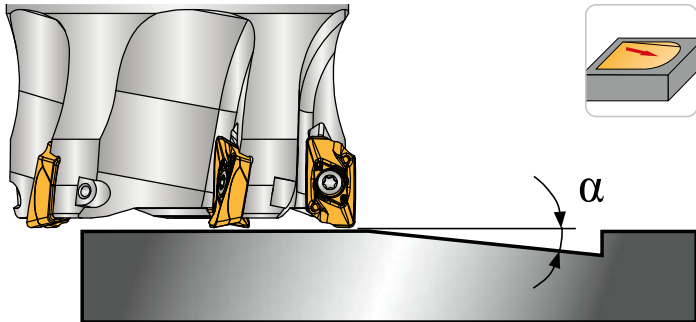
D_{max} = largest hole diameter for flat bottom surfaces / diametro massimo del foro per superfici piane / le plus grand diamètre de perçage pour les surfaces de sol planes

Axial plunge / Immersione assiale / Plongée axiale



| D ₁ | X _{max} |
|----------------|------------------|
| 16–80 | 2.5 mm |

Oblique plunge / Immersione obliqua / Plongée inclinée



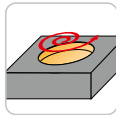
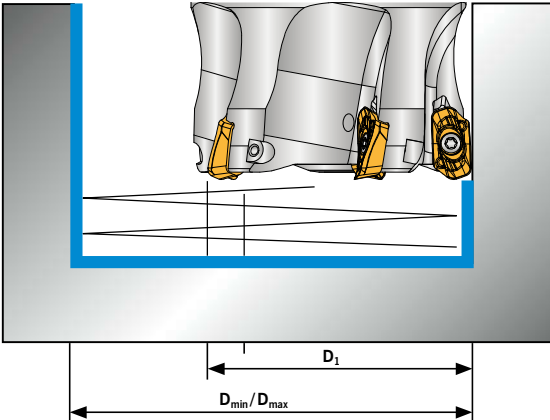
| D ₁ | α |
|----------------|-------|
| 16 | 11.0° |
| 20 | 8.4° |
| 25 | 6.5° |
| 32 | 4.9° |
| 35 | 4.5° |
| 40 | 3.8° |
| 50 | 3.0° |
| 63 | 2.3° |
| 80 | 1.8° |

APPLICATION DATA: HFC MILLING - 11

DATI APPLICATIVI FRESATURA HFC - 11

DONNÉES DE PERFORMANCE POUR LE FRAISAGE HFC - 11

Circular plunge / Immersione circolare / Plongée circulaire

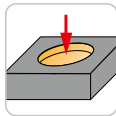
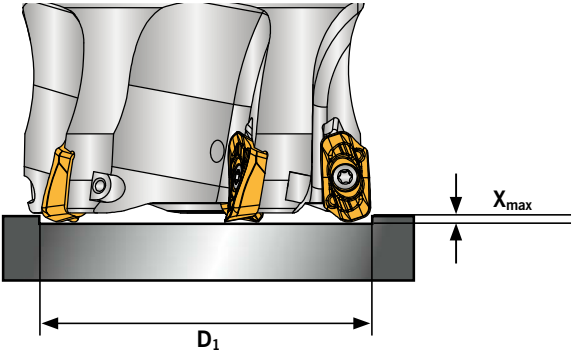


| D ₁ | D _{min} | D _{max} |
|----------------|------------------|------------------|
| 16 | 19.56 | 30 |
| 20 | 27.56 | 38 |
| 25 | 37.56 | 48 |
| 32 | 51.56 | 62 |
| 35 | 57.56 | 68 |
| 40 | 67.56 | 78 |
| 50 | 87.56 | 98 |
| 63 | 113.56 | 124 |
| 80 | 147.56 | 158 |

D_{min} = **smallest hole diameter** / *diametro minimo del foro* / le plus petit diamètre de perçage smallest hole diameter

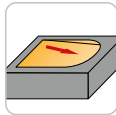
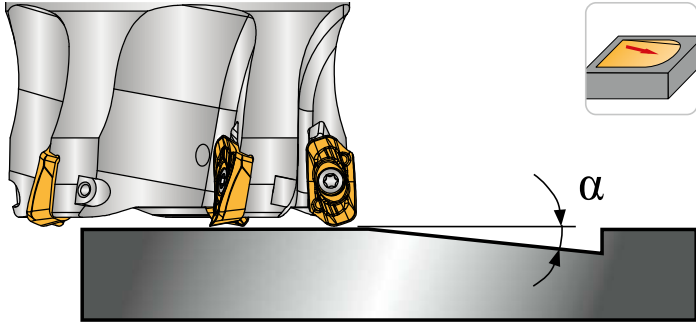
D_{max} = **largest hole diameter for flat bottom surfaces** / *diametro massimo del foro per superfici piane* / le plus grand diamètre de perçage pour les surfaces de sol planes

Axial plunge / Immersione assiale / Plongée axiale



| D ₁ | X _{max} |
|----------------|------------------|
| 16–80 | 2.5 mm |

Oblique plunge / Immersione obliqua / Plongée inclinée



| D ₁ | α |
|----------------|-------|
| 16 | 11.0° |
| 20 | 8.4° |
| 25 | 6.5° |
| 32 | 4.9° |
| 35 | 4.5° |
| 40 | 3.8° |
| 50 | 3.0° |
| 63 | 2.3° |
| 80 | 1.8° |