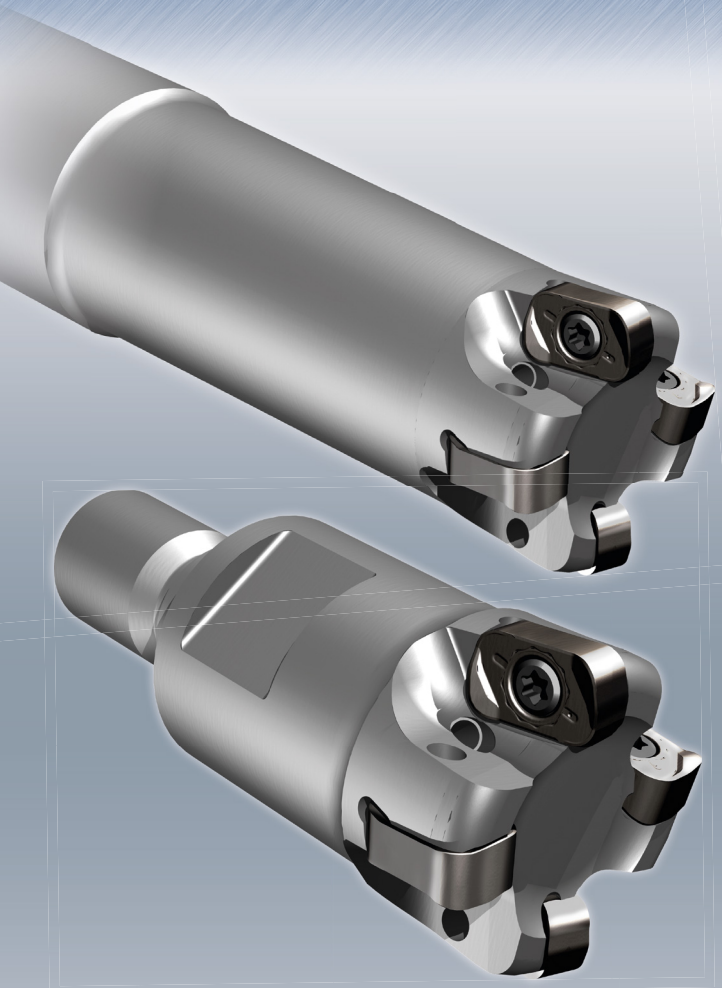
Advanced Engineering

MMC Hitachi Tool

No. 339.2

Indexable Milling +Modular Series

TD4N 4 Corner Super Radius
Modular Type D 16 – 42
Shank Type D 16 – 40

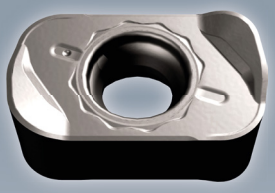


- **Double Face High Feed Insert**
- **Reduce Stock Material**
- **Fits to Mild Steel ~ Hardened Steel up to 55 HRC | Cast iron | Stainless**

Available Grades:

- GX2140
- JM4160
- JS4045
- JP4120

B Type
Lower Cutting Force



C Type
For General Application

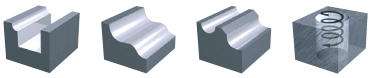
MMC Hitachi Tool Engineering Europe GmbH

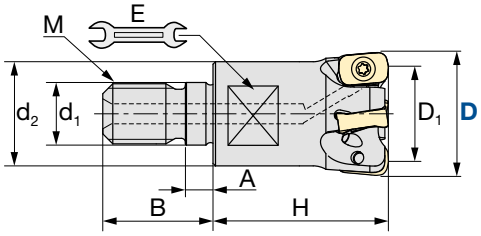
www.high-feed-cutting.com

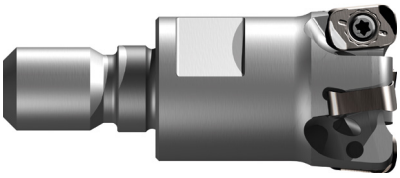
Indexable Milling Tools

TD4N | 4 Corner Super Radius | Modular Type

Q max	▽	▽▽	HRC	No. of Teeth
High Efficient	Roughing	Semi Finishing	55	2–6





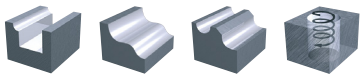


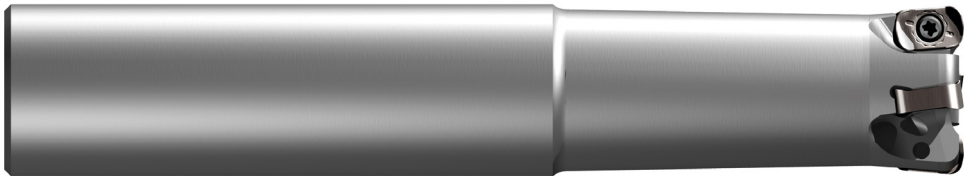
Diameter Tolerance	CAM Radius	Torque on Screw
-0.06 ~ -0.11	2.0 mm	1.1 Nm

			Size									
ID Code	Item Code	Z	D	D_1	H	A	B	d_1	d_2	M	E	Inserts
FH603	**TD4N-2016M-2**	2	**16**	10	25	5.5	17	8.5	12.8	M8	10	ENMU0603ER-B ENMU0603ER-C
FH604	**TD4N-2020M-3**	3	**20**	14	30		19	10.5	17.8	M10	15	
FH605	**TD4N-2025M-4**	4	**25**	19	35		22	12.5	20.8	M12	17	
FH606	**TD4N-2032M-5**	5	**32**	26	40	6	23	17	28.8	M16	22	
FH607	**TD4N-2035M-5**		**35**	29								
FH608	**TD4N-2040M-6**	6	**40**	34								
FH609	**TD4N-2042M-6**		**42**	36								

TD4N | 4 Corner Super Radius | Shank Type

Q max	▽	▽▽	HRC	No. of Teeth
High Efficient	Roughing	Semi Finishing	55	2–6





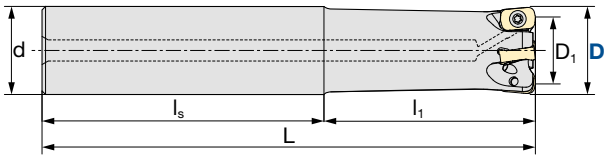


Fig. 1: Standard Type

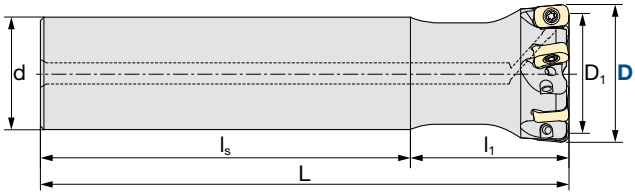


Fig. 2: Undercut Type

Diameter Tolerance	CAM Radius	Torque on Screw
-0.06 ~ -0.11	2.0 mm	1.1 Nm

			Size							
ID Code	Item Code	Z	D	D_1	L	l_1	ls	d	Shape	Inserts
FH610	**TD4N-2016S-2**	2	**16**	10	100	30	70	16	Fig.1	ENMU0603ER-B ENMU0603ER-C
FH615	**TD4N-2016L-2**				150	50	100			
FH611	**TD4N-2020S-3**	3	**20**	14	130		80	20		
FH616	**TD4N-2020L-3**				160	80				
FH612	**TD4N-2025S-4**	4	**25**	19	140	60		25		
FH617	**TD4N-2025L-4**				180	100				
FH613	**TD4N-2032S-5**	5	**32**	26	150	70		32		
FH618	**TD4N-2032L-5**				200	120				
FH614	**TD4N-2040S32-6**	6	**40**	34	150	45	105		Fig.2	
FH619	**TD4N-2040L32-6**				220		175			

※ **S** = Short · **L** = Long

Parts	Clamp Screw			Wrench	
	ID-Code	Item-Code	Torque	ID-Code	Item-Code
	ET175	**250-141(A)**	1.1 Nm	ET013	**104-T8**

Cutting Conditions | Schnittwerte | Condizioni di taglio | Condiciones de Corte | Conditions de coupe | Valores de corte: Page 6

INSERTS | TD4N

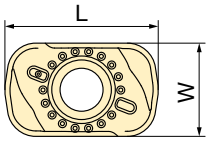


Fig. 1: ENMU0603ER-B
Low cutting force geometry
For SUS and sticky materials

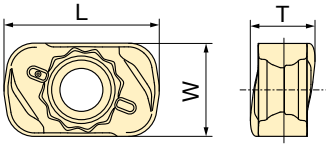


Fig. 2: ENMU0603ER-C
Reinforced edge geometry
For general use
For hard material, interrupt milling

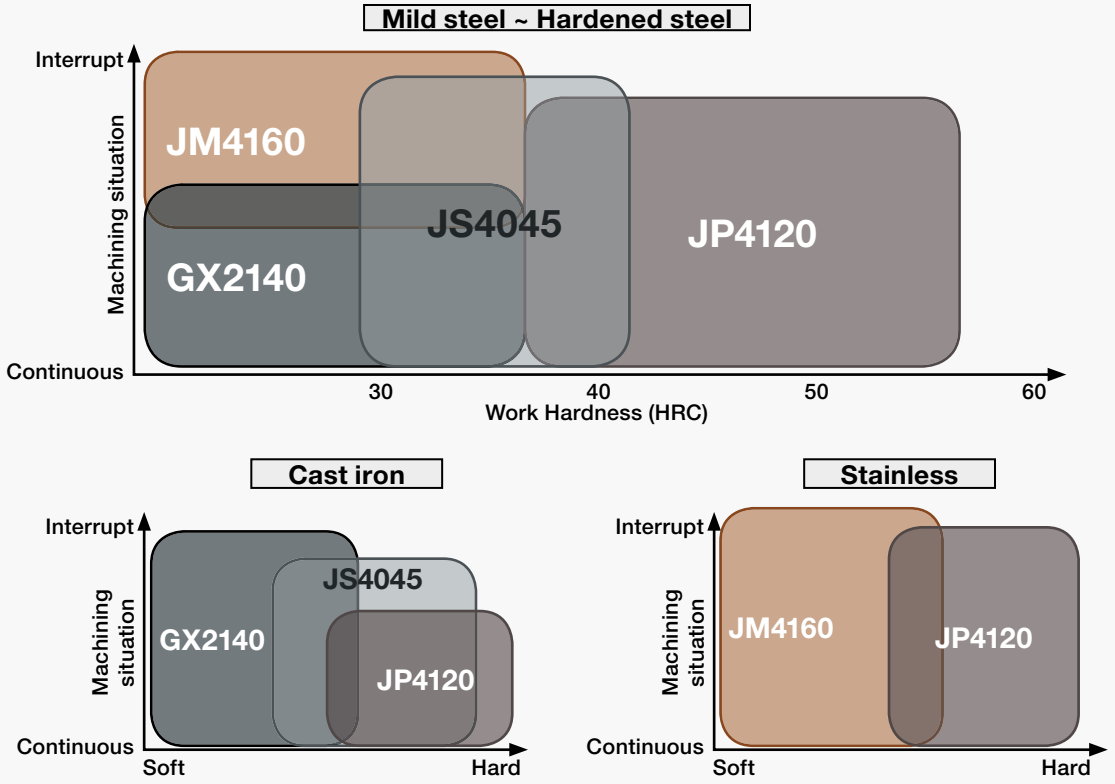
Soft — Target Hardness of Workpiece — Hard

Inserts	Grade				Tolerance Class	Size (mm)				Insert Shape
	GX2140	JM4160	JS4045	JP4120		L	W	T	CAM R	
Item code	ID-Code									
ENMU0603ER-B	WF785	WF784	WF783	WF782	M	10	6	4.2	2.0	Fig. 1
ENMU0603ER-C	WF781	WF780	WF779	WF778						Fig. 2

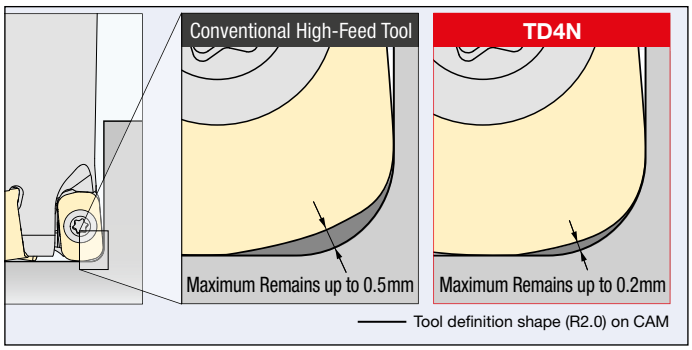
B Type
For lower cutting force.
Recommended for sticky material like Stainless Steel

C Type
For general usage.
Same strength as high feed item.
Against chip biting, vibration, crater wear

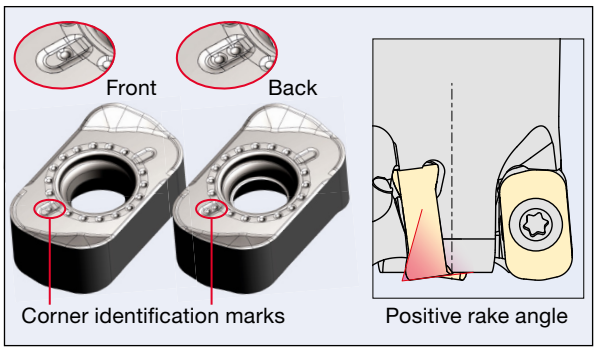
TD4N | Insert grade – target material



Reduces uncut Remnants on Workpieces

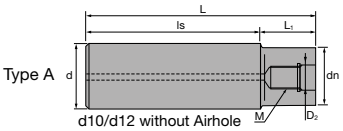


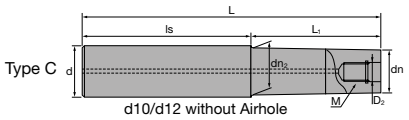
Economical 4-Corner-Use Inserts



Indexable Milling Tools

ASC | Carbide Shanks for TD4N





Fits Modular	ID Code	Item Code	D_2	M	L	L_1	ls	dn	dn_2	d	Type
D16	FH141	**ASC16-8.5-95-30**	8.5	M8	95	30	65	14.5	15.5	16	C
	FH258	**ASC16-8.5-120-55**			120	55					
	FH142	**ASC16-8.5-140-75**			140	75					
	FH259	**ASC16-8.5-160-95**			160	95					
	FH260	**ASC16-8.5-160-30**				30	130				
D20	FH143	**ASC20-10.5-120-50Z**	10.5	M10	120	50	70	18	–	20	A
	FH261	**ASC20-10.5-170-90Z**			170	90	80	18.5	19.5		C
	FH262	**ASC20-10.5-220-120Z**			220	120	100				
	FH263	**ASC20-10.5-270-150Z**			270	150	120				
	FH144	**ASC20-10.5-220-50Z**			220	50	170	18	–		A
	FH264	**ASC20-10.5-270-50Z**			270		220	18.5	19.5		C
D25	FH145	**ASC25-12.5-145-65**	12.5	M12	145	65	80	23	–	25	A
	FH265	**ASC25-12.5-215-115**			215	115	100				
	FH266	**ASC25-12.5-265-145**			265	145	120				
	FH267	**ASC25-12.5-315-195**			315	195					
	FH146	**ASC25-12.5-265-65**			265	65	200				A
	FH268	**ASC25-12.5-315-65**			315		250				
D32	FH147	**ASC32-17-160-80**	17	M16	160	80	80	28	–	32	A
	FH269	**ASC32-17-260-140**			260	140	120				
	FH270	**ASC32-17-360-240**			360	240					
	FH148	**ASC32-17-310-80**			310	80	230				

SUPER Lock milling chucks or shrink-fit holders can be used.
SUPER Lock Aufnahmen oder Schrumpffutter können verwendet werden.
Possono essere utilizzati mandrini a forte serraggio SUPER Lock.
Aptos para amarrar en portapinzas SUPER Lock.
Les attachements SUPER Lock peuvent être utilisés.
Cones hidráulicos de grande aperto e aperto térmico podem ser usados.

For further information about modular chucks please see our brochure *Indexable Modular Series No. 328*

Weitere Informationen über modulare Werkzeugaufnahmen finden Sie in unserem Prospekt: *Indexable Modular Series No. 328*

Para obtener más información sobre conos modulares consulte nuestro folleto *Indexable Modular Series No. 328*

Per maggiori informazioni riguardanti la gamma dei mandrini avvitabili consultate il catalogo *Indexable Modular Series No. 328*

Pour de plus amples informations concernant les attachements modulaires, voyez SVP notre brochure *Indexable Modular Series No. 328*

Para mais informações sobre Cones Modulares consulte o nosso folheto *Indexable Modular Series No. 328*

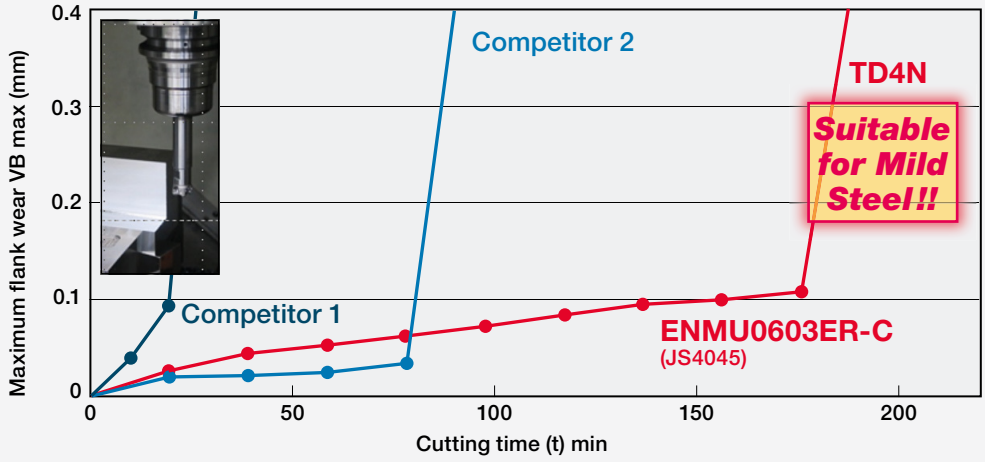
HSK 63 MD | DIN 69893 HSK

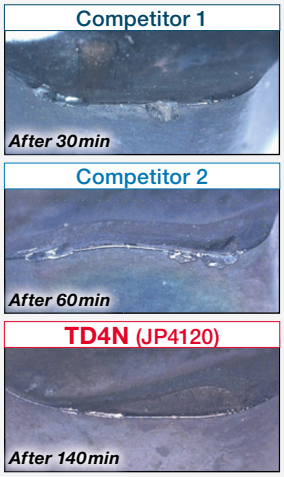
SK 40 MD | DIN 69871

TD4N | Technical Data | Machining Examples

Tool life: Mild steel (C45S – 200HB)

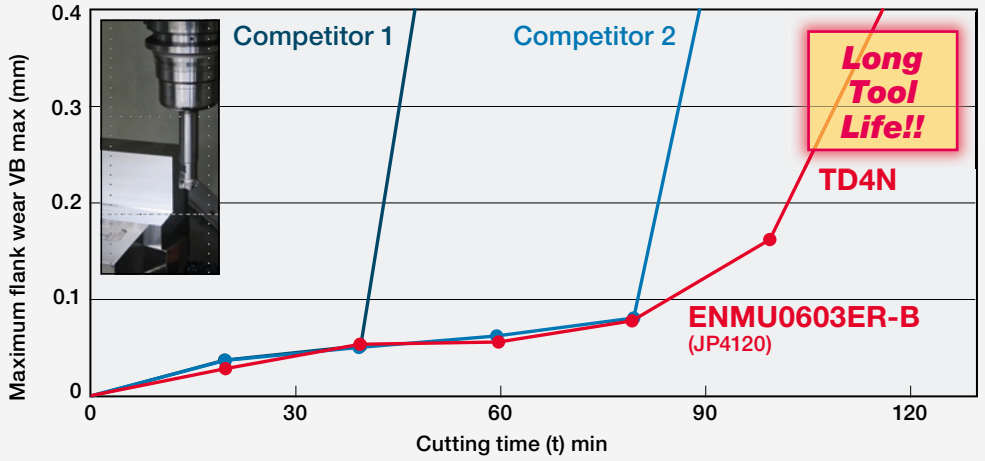
Tool Diameter 25 mm | Spindle: HSK-A100 | CCs: V_c = 100m/min | f_z = 1.0 mm/t | a_p x a_e = 0.6 x 16 mm | OH = 80 mm | Dry

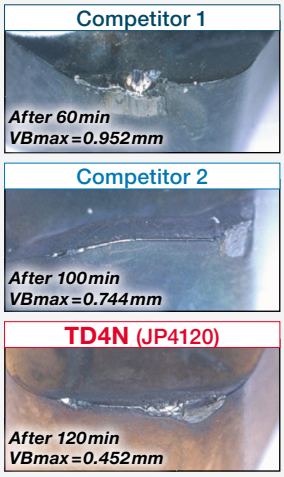




Tool life: Pre-hardened steel (1.2344 – 45 HRC)

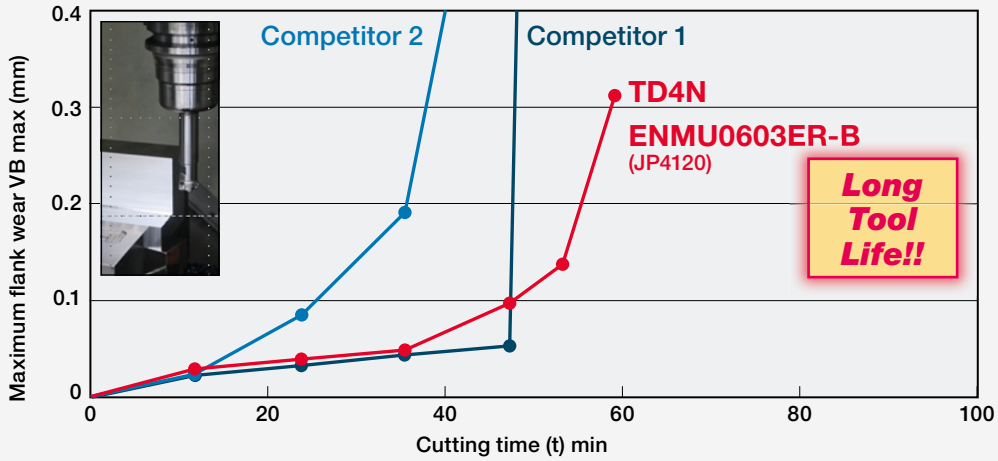
Tool Diameter 25 mm | Spindle: HSK-A100 | CCs: V_c = 100m/min | f_z = 0.8 mm/t | a_p x a_e = 0.6 x 16 mm | OH = 80 mm | Dry





Tool life: Hardened steel (1.2083 – 50 HRC)

Tool Diameter 25 mm | Spindle: HSK-A100 | CCs: V_c = 100m/min | f_z = 1.0 mm/t | a_p x a_e = 0.6 x 16 mm | OH = 80 mm | Dry



Indexable Milling Tools

TD4N | Recommended Cutting Conditions

Work piece material		Recommend grade & Target hardness (HRC)			Emulsion	Mist	Air	Parameter		D16–2NT			D20–3NT			D25–4NT			D32 & D35–5NT			D40 & D42–6NT		
		30	40	50						3D–5D	5D–7D	> 7D	3D–5D	5D–7D	> 7D	3D–5D	5D–7D	> 7D	3D–5D	5D–7D	> 7D	3D–5D	5D–7D	> 7D
I	Carbon-Steel Alloy-Steel <30HRC							V_c	(m/min)	180	160	140	180	160	140	180	160	140	180	160	140	180	160	140
		GX2140					•	n	(min^{-1})	3581	3183	2785	2865	2546	2228	2292	2037	1783	1790	1592	1393	1432	1273	1114
		JM4160			•	•	•	f_z	feed/tooth	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8
		JS4045					•	V_f	(mm/min)	8594	6366	4456	10313	7639	5348	11001	8149	5704	10743	7958	5570	10313	7639	5348
								a_p	(mm)	0.8	0.6	0.4	0.8	0.6	0.5	0.8	0.6	0.5	0.8	0.6	0.5	0.8	0.6	0.5
								a_e	(mm)	10	10	10	14	14	14	19	19	19	22	22	22	28	28	28
								Q	(cm^3/min)	68.8	38.2	17.8	115.5	64.2	37.4	167.2	92.9	54.2	189.1	105.0	61.3	231.0	128.3	74.9
II	Pre-Hard-ened Steel 30–40 HRC							V_c	(m/min)	150	130	110	150	130	110	150	130	110	150	130	110	150	130	110
		GX2140					•	n	(min^{-1})	2984	2586	2188	2387	2069	1751	1910	1655	1401	1492	1293	1094	1194	1035	875
		JM4160			•	•	•	f_z	feed/tooth	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6
		JS4045					•	V_f	(mm/min)	5968	4138	2626	7162	4966	3151	7639	5297	3361	7460	5173	3283	7162	4966	3151
								a_p	(mm)	0.8	0.6	0.4	0.8	0.6	0.5	0.8	0.6	0.5	0.8	0.6	0.5	0.8	0.6	0.5
								a_e	(mm)	10	10	10	14	14	14	19	19	19	22	22	22	28	28	28
								Q	(cm^3/min)	47.7	24.8	10.5	80.2	41.7	22.1	116.1	60.4	31.9	131.3	68.3	36.1	160.4	83.4	44.1
III	Hardened Steel 40–55 HRC							V_c	(m/min)	100	85	70	100	85	70	100	85	70	100	85	70	100	85	70
								n	(min^{-1})	1989	1691	1393	1592	1353	1114	1273	1082	891	995	846	696	796	676	557
								f_z	feed/tooth	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6
		JS4045					•	V_f	(mm/min)	3979	2706	1671	4775	3247	2005	5093	3463	2139	4974	3382	2089	4775	3247	2005
			JP4120		•	•	•	a_p	(mm)	0.6	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.4
								a_e	(mm)	10	10	10	14	14	14	19	19	19	22	22	22	28	28	28
								Q	(cm^3/min)	23.9	13.5	6.7	40.1	22.7	11.2	58.1	32.9	16.3	65.7	37.2	18.4	80.2	45.5	22.5
IV	Stainless Steels SUS							V_c	(m/min)	120	100	80	120	100	80	120	100	80	120	100	80	120	100	80
								n	(min^{-1})	2387	1989	1592	1910	1592	1273	1528	1273	1019	1194	995	796	955	796	637
		JM4160			•	•	•	f_z	feed/tooth	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6
								V_f	(mm/min)	4775	3183	1910	5730	3820	2292	6112	4074	2445	5968	3979	2387	5730	3820	2292
			JP4120		•	•	•	a_p	(mm)	0.6	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.4
								a_e	(mm)	10	10	10	14	14	14	19	19	19	22	22	22	28	28	28
								Q	(cm^3/min)	28.6	15.9	7.6	48.1	26.7	12.8	69.7	38.7	18.6	78.8	43.8	21.0	96.3	53.5	25.7
V	Cast-Iron GG EN-JL10** EN-GJL-***							V_c	(m/min)	200	180	160	200	180	160	200	180	160	200	180	160	200	180	160
		GX2140					•	n	(min^{-1})	3979	3581	3183	3183	2865	2546	2546	2292	2037	1989	1790	1592	1592	1432	1273
		JM4160			•	•	•	f_z	feed/tooth	1.5	1.3	1.1	1.5	1.3	1.1	1.5	1.3	1.1	1.5	1.3	1.1	1.5	1.3	1.1
		JS4045					•	V_f	(mm/min)	11937	9311	7003	14324	11173	8403	15279	11918	8964	14921	11638	8754	14324	11173	8403
			JP4120		•	•	•	a_p	(mm)	0.8	0.6	0.5	0.8	0.6	0.5	0.8	0.6	0.5	0.8	0.6	0.5	0.8	0.6	0.5
								a_e	(mm)	10	10	10	14	14	14	19	19	19	22	22	22	28	28	28
								Q	(cm^3/min)	95.5	55.9	35.0	160.4	93.9	58.8	232.2	135.9	85.2	262.6	153.6	96.3	320.9	187.7	117.6
	Cast-Iron GGG EN-JS10** EN-GJS-***							V_c	(m/min)	160	140	120	160	140	120	160	140	120	160	140	120	160	140	120
								n	(min^{-1})	3183	2785	2387	2546	2228	1910	2037	1783	1528	1592	1393	1194	1273	1114	955
								f_z	feed/tooth	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6	1	0.8	0.6
		JS4045					•	V_f	(mm/min)	6366	4456	2865	7639	5348	3438	8149	5704	3667	7958	5570	3581	7639	5348	3438
			JP4120		•	•	•	a_p	(mm)	0.8	0.6	0.4	0.8	0.6	0.4	0.8	0.6	0.4	0.8	0.6	0.4	0.8	0.6	0.4
								a_e	(mm)	10	10	10	14	14	14	19	19	19	22	22	22	28	28	28
								Q	(cm^3/min)	50.9	26.7	11.5	85.6	44.9	19.3	123.9	65.0	27.9	140.1	73.5	31.5	171.1	89.8	38.5

This is a recommended Cutting condition, please adjust cutting condition for your machining situation.

CAM Radius

In CAM, define the tool shape as an R 2.0 radius shape. Use with axial-direction cutting depths a_p of 1.0 mm or less.

Definieren Sie die Werkzeugform im CAM-Programm als R2.0-Torusfräser. Axiale Schnitttiefe a_p: 1.0 mm oder weniger.

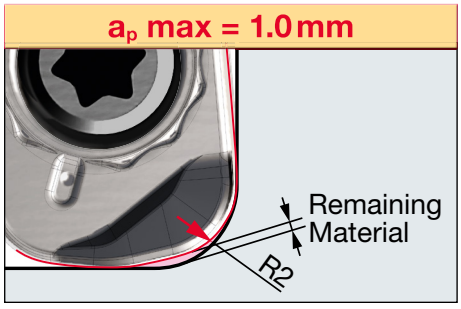
Definire in tabella utensili CAM profilo torico con raggio di programmazione = 2.0 . Utilizzare profondità di passata “Z” di 1.0 mm o minor

En CAM , definir el perfil de la herramienta como radio R 2.0 . Al mecanizar axialmente utilizar un ap máxima de 1 mm.

Programmez un rayon de coin d’outil de R2. Prendre une profondeur de passe de 1.0 mm maximum.

No CAM, definir a forma da ferramenta como uma forma de raio R 2.0. Use profundidades de corte ap de 1,0 mm ou menos, com direção axial.

Tool definition shape on CAM	Remains (mm)	Over Cut (mm)
R 3.0	0	0.4
R 2.0	0.2	0
R 1.5	0.3	0



TD4N | Recommended Cutting Conditions

1. Use the appropriate coolant for the work material and machining shape.
2. These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and workpiece conditions.
3. Please note that the GX2140 does not cause a reaction in conductive touch sensors.
4. To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
5. Exchange inserts at the correct time to ensure safety of the tool holder.
6. The following equation can be used to determine the metal removal rate per unit time Q:

$$Q\ (cm^3/min) = \frac{a_p\ (mm) \cdot a_e\ (mm) \cdot V_f\ (mm/min)}{1000}$$

Do not set values higher than the maximum value.

1. Benutzen Sie das für das jeweilige Material und die Form passende Kühlmittel.
2. Diese Schnittwerte sind lediglich allgemeine Empfehlungen und müssen den Bearbeitungsbedingungen entsprechend der Maschine und dem Werkstück angepasst werden.
3. Bitte beachten Sie dass die GX2140-Beschichtung keine Reaktionen in leitfähigen Touch-Sensoren verursacht.
4. Um Beschädigungen des Werkzeugs durch Späneansammlungen zu vermeiden, ist die Anwendung einer entsprechenden Späneabfuhr-Methode wie z.B. mittels Druckluft o.ä. erforderlich.
5. Rechtzeitiges Wechseln der Schneidplatten gewährleistet den Schutz des Halters.
6. Die folgende Formel kann zur Berechnung der Materialabtragsrate pro Zeiteinheit Q verwendet werden:

$$Q\ (cm^3/min) = \frac{a_p\ (mm) \cdot a_e\ (mm) \cdot V_f\ (mm/min)}{1000}$$

Die Werte sollten nicht über den Maximalwert hinaus erhöht werden.

1. Utilizzare appropiato refrigerante per il material lavorato ed il profile da realizzare.
2. Le condizioni di lavorazione consigliate sono per impiego generico; adattare i parametri a seconda della lavorazione effettuate e la stabilità del pezzo
3. Il grado insert GX2140 non causa anomalie di funzionamento con tastatori Conduttori di corrente elettrica
4. Al fine di prevenire danni dovuti a ri-taglio o scheggiatura fare in modo di evacuare il truciolo mediante soffio d'aria, ecc..
5. Sostituire gli inserti usurati per preservare integrità del corpo utensile
6. La seguente formula può essere impiegata per calcolare il volume di Truciolo asportato "Q":

$$Q\ (cm^3/min) = \frac{a_p\ (mm) \cdot a_e\ (mm) \cdot V_f\ (mm/min)}{1000}$$

Non impostare valore eccedenti I massimi consigliati.

1. Utilisez le lubrifiant adapté à la matière et à la forme usinées.
2. Ces conditions sont des directives générales ; adaptez-les en fonction de votre machine et de
3. Veuillez noter que le GX2140 ne fait pas réagir les détecteurs de contact conducteurs.
4. Employez systématiquement un moyen d'évacuation des copeaux tel que l'air afin d'éviter les dégradations qu'ils pourraient causer à votre outil.
5. Procédez au changement des plaquettes au moment opportun, afin d'assurer la sécurité du porte outil.
6. Cette équation vous permet de calculer le débit copeau/temps Q :

$$Q\ (cm^3/min) = \frac{a_p\ (mm) \cdot a_e\ (mm) \cdot V_f\ (mm/min)}{1000}$$

N'augmentez pas les valeur au-dessus du maximum préconisé.

1. Utilizar la refrigeración adecuada al material y al perfil a mecanizar.
2. Estas condiciones son una guía general ; en condiciones de mecanizado reales ajustar los parámetros de acuerdo a la máquina y condiciones de la pieza a mecanizar.
3. Tenga en cuenta que la GX2140 no cause una reacción en sensores conductores táctiles.
4. Para evitar daños en la herramienta debido a la acumulación de viruta, utilice siempre un método de evacuación de viruta como por ejemplo aire.
5. Cambie las placas a su debido tiempo para garantizar la vida del portaherramientas.
6. La siguiente ecuación se puede usar para determinar el caudal de viruta extraído por unidad de tiempo Q:

$$Q\ (cm^3/min) = \frac{a_p\ (mm) \cdot a_e\ (mm) \cdot V_f\ (mm/min)}{1000}$$

No trabajar por encima de los valores máximos.

1. Use o modo de refrigeração apropriado para o material e para a forma a maquinar.
2. As presentes condições são para orientação geral; em condições de maquinação reais devem ajustar-se os parâmetros de acordo com a máquina e as condições da peça.
3. Queira notar que o GX2140 não causa uma reação nos sensores de toque condutores.
4. Para evitar danos na ferramenta decorrentes do entupimento por limalhas, use sempre um método de remoção de limalhas, como sopro de ar, etc.
5. Efetue a troca das plaquetes no momento correto para garantir a segurança do cone.
6. A seguinte equação pode ser usada para determinar a taxa de remoção de metal por unidade de tempo Q:

$$Q\ (cm^3/min) = \frac{a_p\ (mm) \cdot a_e\ (mm) \cdot V_f\ (mm/min)}{1000}$$

Não defina valores acima do valor máximo.

Ramping / Helical Milling

Ramping

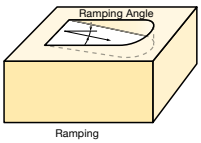
Ramping is possible please use the following data for direct milling without pre-drilling any starter holes.

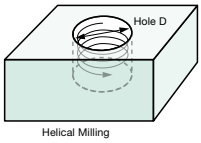
Eintauchwinkel

Um den richtigen Eintauchwinkel und Helixdurchmesser zu bestimmen, orientieren Sie sich bitte an der nachfolgenden Tabelle.

Lavorazioni in rampa

È possibile lavorare in rampa senza alcun preforo. Usate per questa lavorazione i seguenti dati.





Rampa

El mecanizado en rampa es posible. Por favor, utilizar las condiciones siguientes para mecanizado directo sin pretaladrado.

Usinage de rampes

Cette application est possible, utilisez, les données suivantes pour un fraisage direct, sans avant trou.

Rampa

A fresagem em rampa é possível. Por favor utilizar as condições seguintes em maquinação directa sem pré-furo.

Tool Diameter D mm	D 16	D 20	D 25	D 32	D 35	D 40	D 42
Max. Ramping Angle°	0.8	0.8	0.8	0.5	0.5	0.3	0.3
Recommended Ramping Angle°	0.5	0.5	0.5	0.4	0.4	0.2	0.2
Hole D (mm)	24–30	32–38	42–48	56–62	62–68	72–78	76–82

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