AEROSPACE

Cutting Tools for
Aerospace Industry

SILMAX

SILMAX

Silmax presenta un'ampia gamma di utensili progettati per soddisfare i più elevati standard qualitativi, le tolleranze stringenti e le certificazioni richieste dall'industria aeronautica e aerospaziale.

Silmax svolge una costante e continua attività di ricerca e di sviluppo nei propri stabilimenti, realizzando soluzioni efficienti e proposte innovative volte a soddisfare ogni richiesta.

In questo settore Silmax opera da molti anni come interlocutore specializzato e affidabile, proponendo molteplici soluzioni particolarmente indicate per la lavorazione di leghe resistenti al calore, materiali di elevata durezza e compositi (kevlar, sandwich aeronautici, fibre composite ecc.).

Aerospace

Grazie a queste capacità Silmax collabora con le più importanti aziende aeronautiche italiane ed internazionali nello sviluppo di importanti progetti quali ad esempio, la fornitura di utensili per il **Gruppo Leonardo**, Divisione Velivoli (ex ALENIA), nei programmi EFHA, F35, C27, mentre nella Divisione Strutture è presente nei programmi **Boeing** 767, 777, 787 e ATR, e **Bombardier** nel programma C-Series.

Nella Divisione Elicotteri **Agusta Westland**, siamo partner nella fornitura di utensili per i programmi AW169, AW101, AW189, AW609 e NH90.

Inoltre Silmax è certificata come **Direct Material Supplier** (Critical Tools) per il gruppo **GE Avio**.

Silmax presents a wide range of tools studied to achieve the highest quality standard of production, the stringent tolerances and certifications requested by the aeronautic and aerospace market.

Silmax develops a consistent and continue research activity in its factories, offering effectiveness solutions and innovative proposals to meet all customers' requirements.

In the aerospace industry, where Silmax is for many years a specialized and reliable player, we are able to propose various solutions tailored for machining heat resistant alloys, high hardness and composite materials (such as kevlar, aereonautic sandwich and composite fibers, etc.).

Thanks to this know-how, Silmax works together with the most important Italian and international aeronautical companies in developing relevant projects with **Leonardo Group**, for Aircraft Division (ex ALENIA), supplying cutting tools for EFHA, F35, C27 programs, while for Structures Division is partner in programs **Boeing** 767, 777, 787 and ATR, and **Bombardier** C-Series.

In **Agusta Westland** Helicopter Division of LEONARDO Group, we are partner for the supply of tools for AW169, AW101, AW189, AW609 and NH90 programs.

Furthermore Silmax has been certified as **Direct Material Supplier** (Critical Tools) for **GE Avio Group**.

LEONARDO BOEING BOMBARDIER Avio

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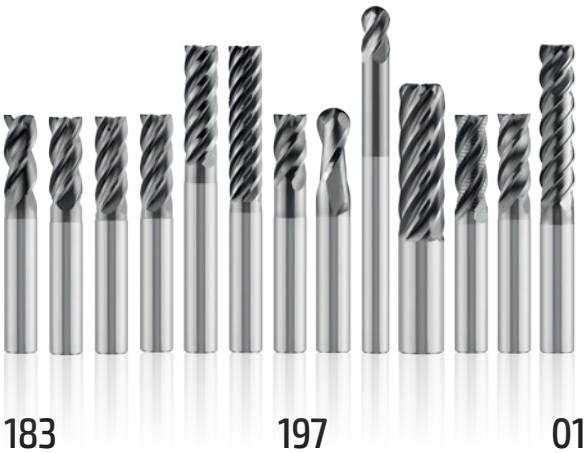

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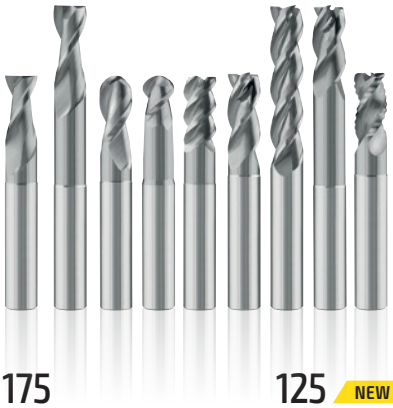

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Parti Motore: Superleghe
Engine Parts: Superalloys

	Codice Code	Ø (D mm)	Z	Cava Slotting	Contornitura Side and face milling	Copiatura 3D 3D Copy	Trocoidale Trochoidal	Assiale Plunging	Rampa Diagonal plunging
	195	4,0 ÷ 16,0	4/5	-	●	-	●	-	-
	197	4,0 ÷ 16,0	4/5	-	●	-	●	-	-
	118	4,0 ÷ 20,0	4	●	●	-	-	-	●
NEW	154	6,0 ÷ 16,0	5	●	●	-	●	-	●
	113EV	3,0 ÷ 20,0	4	●	●	-	●	-	●

Strutture: PH - Inox- Titanio
Structures: PH - Stainless Steel - Titanium

	183	2,0 ÷ 20,0	3	●	●	-	●	●	●
	184	3,0 ÷ 25,0	4	●	●	-	●	-	●
	284	6,0 ÷ 25,0	4	●	●	-	●	-	●
	185	6,0 ÷ 20,0	5	●	●	-	●	-	●
	195	4,0 ÷ 16,0	4/5	-	●	-	●	-	-
	197	4,0 ÷ 16,0	4/5	-	●	-	●	-	-
	119	4,0 ÷ 20,0	4	●	●	-	-	-	●
	737/R	3,0 ÷ 16,0	2	-	-	●	-	-	-
NEW	133	3,0 ÷ 12,0	4	-	-	●	-	-	-
NEW	157	12,0 ÷ 16,0		-	●	-	●	-	●
	013EV	3,0 ÷ 20,0	4	●	●	-	-	-	●
	113EV	3,0 ÷ 20,0	4	●	●	-	●	-	●
	158	3,0 ÷ 16,0	4	●	●	-	●	-	●

	Acciaio Steel 1	**Ghise** Cast iron 2	**Acciai Temprati** Hardened steels 3	**Acciaio Inox** Stainless steel 4	**Titanio** Titanium 5	**Leghe Leggere** Light Alloys 6	**PH Duplex** 7	**Superleghe** Superalloys 8	**Compositi** Composite Materials 9	**Pagina** Page
	-	-	-	●	●	-	●	-	-	13
	-	-	-	●	●	-	●	-	-	13
	-	-	-	-	-	-	-	●	-	15
	-	-	-	-	-	-	-	●	-	17
	●	●	-	●	-	-	●	●	-	19
	●	-	-	●	●	-	●	-	-	23
	●	-	-	●	●	-	●	-	-	25
	●	-	-	●	●	-	●	-	-	27
	●	-	-	●	●	-	●	-	-	29
	-	-	-	●	●	-	●	-	-	31
	-	-	-	●	●	-	●	-	-	31
	-	-	-	-	-	-	●	-	-	33
	●	●	-	●	-	-	●	-	-	35
	●	●	-	●	●	-	●	●	-	37
	-	-	-	-	●	-	-	-	-	39
	●	●	-	●	●	-	●	-	-	41
	●	●	-	●	-	-	●	●	-	43
	●	●	-	●	●	-	●	-	-	45

Alluminio
Aluminum

	Codice Code	Ø (D mm)	Z	Cava Slotting	Contornitura Side and face milling	Copiatura 3D 3D Copy	Trocoidale Trochoidal	Assiale Plunging	Rampa Diagonal plunging
	175	2,0 ÷ 25,0	2	●	●	-	-	●	●
	177	6,0 ÷ 20,0	2	●	●	-	-	●	●
	735	6,0 ÷ 16,0	2	-	-	●	-	-	-
	765	3,0 ÷ 20,0	2	-	-	●	-	-	-
	115	4,0 ÷ 20,0	3/4	-	●	-	-	-	-
	125	3,0 ÷ 20,0	3	●	●	-	●	●	-
	127	6,0 ÷ 16,0	3	●	●	-	●	●	-
	129	10,0 ÷ 16,0	3	●	●	-	●	●	-
	015	10,0 ÷ 20,0	3	●	●	-	-	-	●

Materiali Compositi
Composite Materials

	740	6,00 ÷ 12,70	4/6 7/9	-	●	-	-	-	-
	750	3,00 ÷ 12,70	Multi	-	●	-	-	-	-
	751	3,00 ÷ 12,70	Multi	●	●	-	-	-	-
	752	3,00 ÷ 12,70	Multi	●	●	-	-	●	-
	760	6,00 ÷ 20,00	4	●	●	-	-	-	-
	770	4,76 ÷ 12,70	2	-	●	-	-	-	-
	780	2,00 ÷ 12,00	4	-	-	-	-	●	-
	3050A	0,3 ÷ 16,0	-	-	-	-	-	-	-

	Acciaio Steel 1	**Ghise** Cast iron 2	**Acciai Temprati** Hardened steels 3	**Acciaio Inox** Stainless steel 4	**Titanio** Titanium 5	**Leghe Leggere** Light Alloys 6	**PH Duplex** 7	**Superleghe** Superalloys 8	**Compositi** Composite Materials 9	**Pagina** Page
	-	-	-	-	-	●	-	-	-	49
	-	-	-	-	-	●	-	-	-	49
	-	-	-	-	-	●	-	-	-	51
	-	-	-	-	-	●	-	-	-	51
	-	-	-	-	-	●	-	-	-	53
	-	-	-	-	-	●	-	-	-	55
	-	-	-	-	-	●	-	-	-	57
	-	-	-	-	-	●	-	-	-	57
	-	-	-	-	-	●	-	-	-	59
	-	-	-	-	-	-	-	-	●	63
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	-	-	-	-	-	-	-	-	●	65
	-	-	-	-	-	-	-	-	●	65
	-	-	-	-	-	-	-	-	●	67
	-	-	-	-	-	-	-	-	●	69
	-	-	-	-	-	-	-	-	●	71
	●	●	-	●	●	-	●	●	●	72

Parti Motore Engine Parts

BUSINESS CASE

Fresa a 5 taglienti serie normale per lavorazioni di superleghe
5 flute end mill, regular version for the machining of superalloys

Tool

HMC154160

Material

INCONEL 625

Component

Case Stiffener

Operation

Side Milling

Ap	30 mm
Ae	0,4 mm
Vc	45 m/min
N	900 rpm
Fz	0,06 mm
F	270 mm/min
Tool Life	300 min

154

Una lavorazione di finitura della parete di un listello curvo, detto stiffener, un elemento che serve ad irrobustire altri componenti del motore con pareti sottili (chiamati housing, sorta di "campane" di contenimento). L'inconel 625 è una delle superleghe più lavorabili, da qui la durata molto significativa. Si riporta un vantaggio in termini di numero di listelli lavorati con un utensile.

BUSINESS CASE

Fresa 4 taglienti per lavorazioni di superleghe
4 flute end mill for the machining of superalloys

Tool

HMC118100CR10

Material

INCONEL 718

Component

Ring

Operation

Slotting and Side Milling

Ap	9 mm
Ae	10 mm
Vc	25 m/min
N	800 rpm
Fz	0,022 mm
F	70 mm/min
Tool Life	90 min = 1 Ring

118

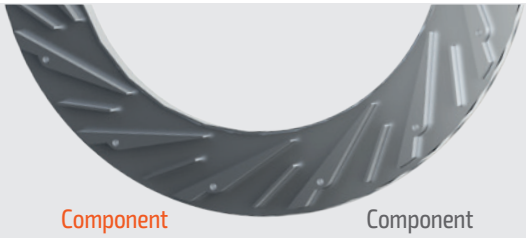
Applicazione pittosto complessa con lavorazione mista di cava e contornatura su inconel 718 (quindi una lavorazione più impegnativa e su un materiale più difficile dell'inconel 625). Sull'anello pieno vengono ricavati vari elementi geometrici sporgenti. Il vantaggio consiste nel realizzare un anello completo con una sola fresa, mentre i competitor non riescono a completare il lavoro e devono sostituire l'utensile.

HMC154
30
components

300 MINUTES

COMPETITORS
22
components

Finishing milling of a long and thin curved part, called s tiffener. Stiffeners are assembled to the engine housings . Inconel 625 is one of the super alloy more workable, hence the very significant tool life. The advantage is given in number of parts worked with one tool.



Component
100%

Component
80%

Complex mix of slotting and face-side milling on Inconel 718 (much more challenging than Inconel 625). On the ring there are some protruding geometric elements to be obtained by milling.The advantage is given by milling the whole ring with one tool: competitors do not reach this results and are forced to change the tool.

Superleghe / Superalloys

Superleghe / Superalloys

Wrknr	Std	DIN
1.4876	Incoloy 800	X10NiCrAlTi32 20
1.4945	-	X6 CrNiWNb16 16
1.4962	-	X12CrNiWTi 16 3
2.4360	Monel 400	NiCu30Fe
2.4375	Monel K500	NiCu30Al
2.4603	Hastelloy X	NiCr30FeMo
2.4617	Hastelloy B-2	-
2.4630	Nimonic 75	NiCr20Ti
2.4631	Nimonic 80A	NiCr20TiAl
2.4634	Nimonic 105	NiCo20Cr15MoAlTi
2.4640	Inconel 600	NiCr15Fe
2.4668	Inconel 718	NiCr19Fe18Nb5Mg
2.4670	Nimocast 713	-
2.4674	Nimocast PK24	-
2.4816	Inconel 600	NiCr15Fe
2.4856	Inconel 625	NiCr22Mo9Nb
2.4858	Inconel 600	NiCr21Mo

Superleghe difficili da lavorare
Superalloys difficult to work

Wrknr	Std	DIN
1.4943	Z6NCTDV	X4NiCrTi 25 15
-	25.15B	-
1.4980	A-286	X5NiCrTi
2.4603	Hastelloy X	NiCr30FeMo
2.4617	Hastelloy B-2	
2.4632	Nimonic 90	NiCr20Co18Ti
2.4668	Inconel 718	NiCr19Fe18Nb5Mg
2.4670	Nimocast 713	-
2.4674	Nimocast PK24	-
2.4812	Hastelloy C	-
2.4856	Inconel 625	NiCr22Mo9Nb
2.4983	Udimet 500	-

Superleghe molto difficili da lavorare
Superalloysvery difficult to work

Wrknr	Std	DIN
-	Alacrite 601	-
-	Alacrite 602	-
-	AMS 5759	-
-	IN-738	-
-	MAR-M200	-
-	MAR-M246	-
-	MAR-M302	-
-	MAR-M322	-
-	MAR-M432	-
-	MAR-M509	-
2.4654	Rene 41	-
-	Rene 77	-
-	Rene 95	-
-	Rene 100	-
-	Rene 220	-
-	Stellite	-
2.6554	Waspaloy	-

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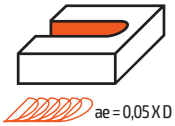
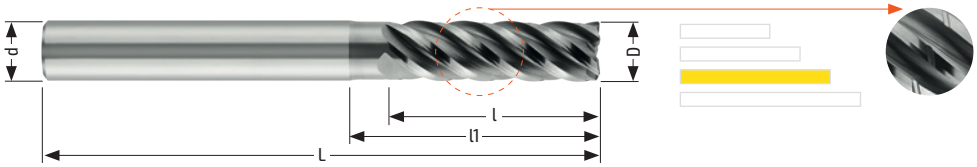
Parametri di lavoro / Working Parameters

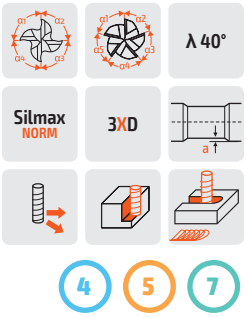


Materiale / Material	Diametro / Diameter						
Inox ferritico / Ferritic stainless steel	m/min	Vc=130			Vc=220		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	745	10345	0,050	3501	17507
	6,0	0,026	897	6897	0,080	4669	11671
	8,0	0,034	879	5173	0,130	5690	8754
	10,0	0,043	890	4138	0,160	5602	7003
	12,0	0,055	948	3448	0,190	5544	5836
	16,0	0,070	905	2586	0,220	4814	4377
	20,0	0,080	1159	2069	0,280	6863	3501
Inox austenitico / Austenitic stainless Steel	m/min	Vc=120			Vc=190		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	688	9549	0,050	3024	15120
	6,0	0,026	828	6366	0,080	4032	10080
	8,0	0,034	812	4775	0,130	4914	7560
	10,0	0,043	821	3820	0,160	4838	6048
	12,0	0,055	875	3183	0,190	4788	5040
	16,0	0,070	836	2387	0,220	4158	3780
	20,0	0,080	1070	1910	0,280	5927	3024
Titanio / Titanium	m/min	Vc=65			Vc=160		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	372	5173	0,050	2546	12732
	6,0	0,026	448	3448	0,080	3395	8488
	8,0	0,034	440	2586	0,130	4138	6366
	10,0	0,043	445	2069	0,160	4074	5093
	12,0	0,055	474	1724	0,190	4032	4244
	16,0	0,070	453	1293	0,220	3501	3183
	20,0	0,080	579	1035	0,280	4991	2546
Acciaio < 800 N/mm² / Steel < 800 N/mm²	m/min	Vc=180			Vc=250		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	1031	14324	0,050	3979	19894
	6,0	0,026	1241	9549	0,080	5305	13263
	8,0	0,034	1218	7162	0,130	6466	9947
	10,0	0,043	1232	5730	0,160	6366	7958
	12,0	0,055	1313	4775	0,190	6300	6631
	16,0	0,070	1253	3581	0,220	5471	4974
	20,0	0,080	1604	2865	0,280	7799	3979
Acciaio <1000 N/mm² - Ghisa / Steel <1000 N/mm² - Cast iron	m/min	Vc=140			Vc=220		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	802	11141	0,050	3501	17507
	6,0	0,026	966	7427	0,080	4669	11671
	8,0	0,034	947	5570	0,130	5690	8754
	10,0	0,043	958	4456	0,160	5602	7003
	12,0	0,055	1021	3714	0,190	5544	5836
	16,0	0,070	975	2785	0,220	4814	4377
	20,0	0,080	1248	2228	0,280	6863	3501

195

Fresa 5 taglienti con divisione irregolare e tagliente lungo
5 flute end mill with unequal flute spacing, long version



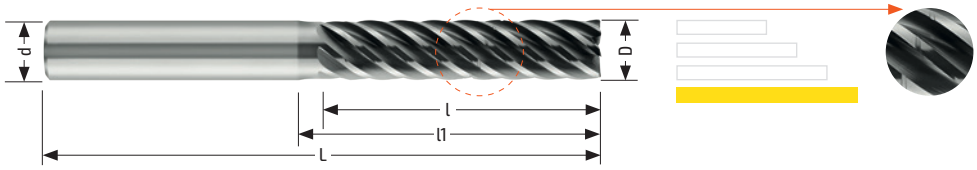


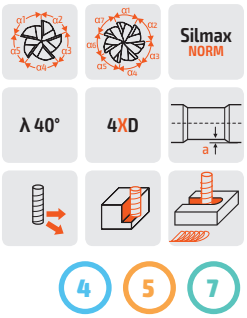
Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
4,0	6	57	12,0	16,0	0,25	0,20	4	HMC195040
6,0	6	63	18,0	24,0	0,25	0,30	5	HMC195060
8,0	8	70	24,0	31,0	0,25	0,50	5	HMC195080
10,0	10	78	30,0	37,0	0,25	0,50	5	HMC195100
12,0	12	92	36,0	46,0	0,25	0,50	5	HMC195120
16,0	16	110	48,0	60,0	0,25	0,50	5	HMC195160
20,0	20	134	60,0	80,0	0,25	0,50	5	HMC195200

197

Fresa 5/7 taglienti con divisione irregolare e tagliente extra lungo
5/7 flute end mill with unequal flute spacing, extra long version





Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
4,0	6	57	16,0	20,0	0,25	0,20	4	HMC197040
6,0	6	70	24,0	30,0	0,25	0,30	5	HMC197060
8,0	8	80	32,0	40,0	0,25	0,50	5	HMC197080
8,0	8	80	32,0	40,0	0,25	0,50	7	HMC197080Z7
10,0	10	87	40,0	46,0	0,25	0,50	5	HMC197100
10,0	10	87	40,0	46,0	0,25	0,50	7	HMC197100Z7
12,0	12	108	48,0	58,0	0,25	0,50	5	HMC197120
12,0	12	108	48,0	58,0	0,25	0,50	7	HMC197120Z7
16,0	16	120	64,0	68,0	0,25	0,50	7	HMC197160Z7
20,0	20	134	80,0	-	-	0,50	7	HMC197200Z7

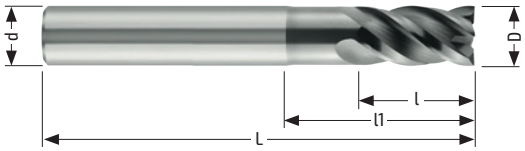
118

Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	1,00 D			0,25 D			0,10 D		
	m/min	Vc=27			Vc=28			Vc=30		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm)	fz mm/z	F mm/min	n rpm
Superleghe Superalloys	4,0	0,010	86	2150	0,012	107	2229	0,014	134	2389
	6,0	0,018	103	1433	0,020	116	1486	0,023	143	1592
	8,0	0,026	110	1075	0,027	120	1115	0,032	150	1194
	10,0	0,035	119	860	0,038	134	892	0,044	166	955
	12,0	0,045	129	717	0,050	147	743	0,057	182	796
	16,0	0,054	116	537	0,060	134	557	0,068	161	597
	20,0	0,060	103	430	0,066	118	446	0,075	143	478
	m/min	Vc=24			Vc=28			Vc=30		
Superleghe difficili da lavorare Hard Machinable Superalloys	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm)	fz mm/z	F mm/min	n rpm
	4,0	0,010	86	2150	0,012	107	2229	0,014	134	2389
	6,0	0,012	61	1274	0,013	77	1486	0,015	96	1592
	8,0	0,017	65	955	0,018	80	1115	0,021	100	1194
	10,0	0,023	70	764	0,025	89	892	0,029	111	955
	12,0	0,030	76	637	0,033	98	743	0,038	121	796
	16,0	0,036	69	478	0,040	89	557	0,045	107	597
	20,0	0,040	61	382	0,044	78	446	0,050	96	478
	m/min	Vc=20			Vc=22			Vc=22		
Superleghe molto difficili Very Hard Machinable Superalloys	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm)	fz mm/z	F mm/min	n rpm
	4,0	0,010	86	2150	0,012	107	2229	0,014	134	2389
	6,0	0,012	51	1062	0,013	61	1168	0,015	70	1168
	8,0	0,017	54	796	0,018	63	876	0,021	74	876
	10,0	0,023	59	637	0,025	70	701	0,029	81	701
	12,0	0,030	64	531	0,033	77	584	0,038	89	584
	16,0	0,036	57	398	0,040	70	438	0,045	79	438
	20,0	0,040	51	318	0,044	62	350	0,050	70	350

118

Fresa 4 taglienti per lavorazioni di superleghe
4 flute end mill for the machining of superalloys



Silmax NORM | λ 38° λ 41°

8

45°

D e8	d h6	L	l ap	l1	a	45°	Z	Balinit® Latuma	Balinit® Alnova
4,0	6	57	6,0	-	-	0,05	4	HMC118040	HMY118040
5,0	6	57	7,5	-	-	0,05	4	HMC118050	HMY118050
6,0	6	57	9,0	18,0	0,15	0,05	4	HMC118060	HMY118060
8,0	8	63	12,0	24,0	0,15	0,05	4	HMC118080	HMY118080
10,0	10	72	15,0	30,0	0,15	0,05	4	HMC118100	HMY118100
12,0	12	83	18,0	36,0	0,20	0,05	4	HMC118120	HMY118120
16,0	16	92	24,0	42,0	0,20	0,05	4	HMC118160	HMY118160
20,0	20	104	30,0	52,0	0,20	0,05	4	HMC118200	HMY118200

Cr

D e8	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma	Balinit® Alnova
6,0	6	57	9,0	18,0	0,15	0,50	4	HMC118060CR05	HMY118060CR05
8,0	8	63	12,0	24,0	0,15	0,50	4	HMC118080CR05	HMY118080CR05
10,0	10	72	15,0	30,0	0,15	1,00	4	HMC118100CR10	HMY118100CR10
12,0	12	83	18,0	36,0	0,20	1,00	4	HMC118120CR10	HMY118120CR10
16,0	16	92	24,0	42,0	0,20	1,00	4	HMC118160CR10	HMY118160CR10
20,0	20	104	30,0	52,0	0,20	1,00	4	HMC118200CR10	HMY118200CR10

154

Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	0,25 D			0,10 D			0,05 D		
	m/min	Vc=28			Vc=30			Vc=60		
Superleghe Superalloys	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,020	149	1486	0,023	183	1592	0,046	732	3185
	8,0	0,027	151	1115	0,032	191	1194	0,064	764	2389
	10,0	0,038	169	892	0,044	210	955	0,088	841	1911
	12,0	0,050	186	743	0,057	227	796	0,114	908	1592
	16,0	0,060	167	557	0,068	203	597	0,136	812	1194
	m/min	Vc=28			Vc=30			Vc=60		
Superleghe difficili da lavorare Hard Machinable Superalloys	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,013	97	1486	0,015	119	1592	0,030	478	3185
	8,0	0,018	100	1115	0,021	125	1194	0,042	502	2389
	10,0	0,025	112	892	0,029	138	955	0,058	554	1911
	12,0	0,033	123	743	0,038	151	796	0,076	605	1592
	16,0	0,040	111	557	0,045	134	597	0,090	537	1194
	m/min	Vc=22			Vc=22			Vc=45		
Superleghe molto difficili Very Hard Machinable Superalloys	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,013	76	1168	0,015	88	1168	0,030	358	2389
	8,0	0,018	79	876	0,021	92	876	0,042	376	1791
	10,0	0,025	88	701	0,029	102	701	0,058	416	1433
	12,0	0,033	96	584	0,038	111	584	0,076	454	1194
	16,0	0,040	88	438	0,045	99	438	0,090	403	896

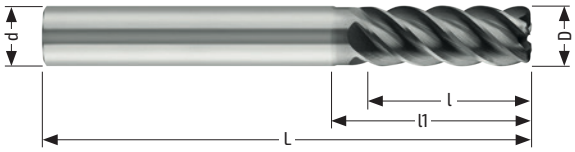
Parametri validi per componenti ricavati dal pieno in condizioni di rigidità elevata
Cutting parameters for components made from solid with high rigidity

Notes

NEW

154

Fresa a 5 taglienti serie normale per lavorazioni di superleghe
5 flute end mill, regular version for the machining of superalloys



Silmax NORM

λ 45°

45°

8

45°

D e8	d h6	L	l ap	l1	a	45° +0,05/+0	Z	Balinit® Latuma	Balinit® Alnova
6,0	6	57	13,0	20,0	0,15	0,10	5	HMC154060	HMY154060
8,0	8	63	19,0	25,0	0,15	0,15	5	HMC154080	HMY154080
10,0	10	72	22,0	30,0	0,15	0,15	5	HMC154100	HMY154100
12,0	12	83	26,0	36,0	0,20	0,15	5	HMC154120	HMY154120
16,0	16	92	32,0	42,0	0,20	0,20	5	HMC154160	HMY154160

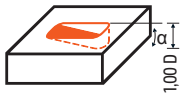
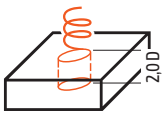
Cr

D e8	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma	Balinit® Alnova
6,0	6	57	13,0	20,0	0,15	0,50	5	HMC154060CR05	HMY154060CR05
6,0	6	57	13,0	20,0	0,15	1,00	5	HMC154060CR10	HMY154060CR10
8,0	8	63	19,0	25,0	0,15	0,50	5	HMC154080CR05	HMY154080CR05
8,0	8	63	19,0	25,0	0,15	1,00	5	HMC154080CR10	HMY154080CR10
8,0	8	63	19,0	25,0	0,15	2,00	5	HMC154080CR20	HMY154080CR20
10,0	10	72	22,0	30,0	0,15	0,50	5	HMC154100CR05	HMY154100CR05
10,0	10	72	22,0	30,0	0,15	1,00	5	HMC154100CR10	HMY154100CR10
10,0	10	72	22,0	30,0	0,15	2,00	5	HMC154100CR20	HMY154100CR20
12,0	12	83	26,0	36,0	0,20	0,50	5	HMC154120CR05	HMY154120CR05
12,0	12	83	26,0	36,0	0,20	1,00	5	HMC154120CR10	HMY154120CR10
12,0	12	83	26,0	36,0	0,20	2,00	5	HMC154120CR20	HMY154120CR20
12,0	12	83	26,0	36,0	0,20	3,00	5	HMC154120CR30	HMY154120CR30
16,0	16	92	32,0	42,0	0,20	1,00	5	HMC154160CR10	HMY154160CR10
16,0	16	92	32,0	42,0	0,20	2,00	5	HMC154160CR20	HMY154160CR20
16,0	16	92	32,0	42,0	0,20	3,00	5	HMC154160CR30	HMY154160CR30
16,0	16	92	32,0	42,0	0,20	4,00	5	HMC154160CR40	HMY154160CR40

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

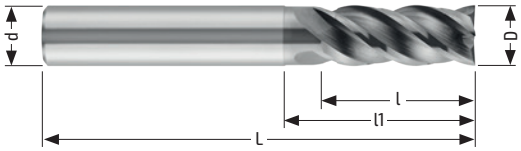
113EV

Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	113EVR						113EVR/113EV					
					 Df = 1,60 D ÷ 1,90 D			1,00 D			0,50 D		
		Rampa lineare/Straight ramp α=24°			Rampa elicoidale/Helical ramp α=20°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=60			Vc=70			Vc=60			Vc=70		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Inox ferritico / Ferritic stainless steel	3,0	-	-	-	-	-	-	0,010	255	6369	0,012	357	7431
	4,0	0,015	286	4775	0,020	446	5570	0,015	286	4775	0,020	446	5570
	5,0	-	-	-	-	-	-	0,019	290	3820	0,030	535	4456
	6,0	0,026	331	3183	0,040	594	3714	0,026	331	3183	0,040	594	3714
	7,0	-	-	-	-	-	-	0,031	338	2728	0,045	573	3183
	8,0	0,035	334	2387	0,050	557	2785	0,035	334	2387	0,050	557	2785
	9,0	-	-	-	-	-	-	0,039	331	2122	0,054	535	2476
	10,0	0,042	321	1910	0,060	535	2228	0,042	321	1910	0,060	535	2228
	12,0	0,047	299	1592	0,067	498	1857	0,047	299	1592	0,067	498	1857
	14,0	-	-	-	-	-	-	0,050	273	1364	0,071	452	1592
	16,0	0,054	258	1194	0,078	434	1393	0,054	258	1194	0,078	434	1393
	20,0	-	-	-	-	-	-	0,058	222	955	0,085	379	1114
		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=15°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=50			Vc=55			Vc=50			Vc=55		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Inox austenitico / Austenitic stainless Steel	3,0	-	-	-	-	-	-	0,010	212	5308	0,012	280	5839
	4,0	0,012	191	3979	0,020	350	4377	0,012	191	3979	0,02	350	4377
	5,0	-	-	-	-	-	-	0,017	216	3183	0,03	420	3501
	6,0	0,022	233	2653	0,040	467	2918	0,022	233	2653	0,04	467	2918
	7,0	-	-	-	-	-	-	0,027	246	2274	0,045	450	2501
	8,0	0,031	247	1989	0,050	438	2188	0,031	247	1989	0,05	438	2188
	9,0	-	-	-	-	-	-	0,035	248	1768	0,054	420	1945
	10,0	0,037	236	1592	0,060	420	1751	0,037	236	1592	0,06	420	1751
	12,0	0,041	218	1326	0,067	391	1459	0,041	218	1326	0,067	391	1459
	14,0	-	-	-	-	-	-	0,046	209	1137	0,071	355	1251
	16,0	0,050	199	995	0,078	341	1094	0,050	199	995	0,078	341	1094
	20,0	-	-	-	-	-	-	0,052	166	796	0,085	298	875
		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=12°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=40			Vc=45			Vc=40			Vc=45		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Titanio / Titanium	3,0	-	-	-	-	-	-	0,010	170	4246	0,012	229	4777
	4,0	0,015	191	3183	0,012	172	3581	0,015	191	3183	0,012	172	3581
	5,0	-	-	-	-	-	-	0,019	194	2546	0,014	160	2865
	6,0	0,026	221	2122	0,017	162	2387	0,026	221	2122	0,017	162	2387
	7,0	-	-	-	-	-	-	0,031	226	1819	0,020	164	2046
	8,0	0,035	223	1592	0,022	158	1790	0,035	223	1592	0,022	158	1790
	9,0	-	-	-	-	-	-	0,039	221	1415	0,024	153	1592
	10,0	0,042	214	1273	0,026	149	1432	0,042	214	1273	0,026	149	1432
	12,0	0,047	199	1061	0,031	148	1194	0,047	199	1061	0,031	148	1194
	14,0	-	-	-	-	-	-	0,050	182	909	0,035	143	1023
	16,0	0,054	172	796	0,040	143	895	0,054	172	796	0,040	143	895
	20,0	-	-	-	-	-	-	0,058	148	637	0,045	129	716
		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=12°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=40			Vc=145			Vc=40			Vc=45		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
PH Duplex	3,0	-	-	-	-	-	-	0,010	170	4246	0,012	229	4777
	4,0	0,012	153	3183	0,020	286	3581	0,012	153	3183	0,020	286	3581
	5,0	-	-	-	-	-	-	0,017	173	2546	0,030	344	2865
	6,0	0,022	187	2122	0,040	382	2387	0,022	187	2122	0,040	382	2387
	7,0	-	-	-	-	-	-	0,027	196	1819	0,045	368	2046
	8,0	0,031	197	1592	0,050	358	1790	0,031	197	1592	0,050	358	1790
	9,0	-	-	-	-	-	-	0,035	198	1415	0,054	344	1592
	10,0	0,037	188	1273	0,060	344	1432	0,037	188	1273	0,060	344	1432
	12,0	0,041	174	1061	0,067	320	1194	0,041	174	1061	0,067	320	1194
	14,0	-	-	-	-	-	-	0,046	167	909	0,071	291	1023
	16,0	0,050	159	796	0,078	279	895	0,050	159	796	0,078	279	895
	20,0	-	-	-	-	-	-	0,052	132	637	0,085	244	716

113EV

Fresa 4 taglienti con eliche differenziate e divisione irregolare
4 flute end mill with variable helix and unequal flute spacing



6527 L
6528

λ 38°
λ 40°

45°

D h10	d h6	L	l ap	l1	a	45° +0,05/+0	Z	Balinit® Alcrona
3,0	6	57	8,0	-	-	0,05	4	HMG113030REV
4,0	4	50	11,0	16,0	0,10	0,05	4	HMG113040EV
4,0	6	57	11,0	-	-	0,05	4	HMG113040REV
5,0	5	50	13,0	18,0	0,10	0,05	4	HMG113050EV
5,0	6	57	13,0	-	-	0,05	4	HMG113050REV
6,0	6	57	13,0	20,0	0,15	0,05	4	HMG113060EV
7,0	7	60	16,0	22,0	0,15	0,05	4	HMG113070EV
8,0	8	63	19,0	25,0	0,15	0,05	4	HMG113080EV
9,0	9	67	19,0	28,0	0,15	0,05	4	HMG113090EV
10,0	10	72	22,0	30,0	0,15	0,05	4	HMG113100EV
12,0	12	83	26,0	36,0	0,20	0,05	4	HMG113120EV
14,0	14	83	26,0	36,0	0,20	0,05	4	HMG113140EV
16,0	16	92	32,0	42,0	0,20	0,05	4	HMG113160EV
20,0	20	104	38,0	52,0	0,20	0,05	4	HMG113200EV

Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Alcrona
3,0	6	57	8,0	-	-	0,30	4	HMG113030REV03
3,0	6	57	8,0	-	-	0,50	4	HMG113030REV05
4,0	4	50	11,0	16,0	0,10	0,30	4	HMG113040EV03
4,0	6	57	11,0	-	-	0,30	4	HMG113040REV03
4,0	6	57	11,0	-	-	0,50	4	HMG113040REV05
5,0	6	57	13,0	-	-	0,30	4	HMG113050REV03
5,0	6	57	13,0	-	-	0,50	4	HMG113050REV05
6,0	6	57	13,0	20,0	0,15	0,50	4	HMG113060EV05
6,0	6	57	13,0	20,0	0,15	1,00	4	HMG113060EV10
8,0	8	63	19,0	25,0	0,15	0,50	4	HMG113080EV05
10,0	10	72	22,0	30,0	0,15	0,50	4	HMG113100EV05
10,0	10	72	22,0	30,0	0,15	1,00	4	HMG113100EV10
12,0	12	83	26,0	36,0	0,20	1,00	4	HMG113120EV10

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

Strutture
Structures

BUSINESS CASE

Fresa a 7 taglienti serie lunga per lavorazioni di titanio
7 flute end mill for the machining of Titanium, long version

Tool

HMC157160LCR30

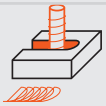
Material

Ti6Al4V

Component

Avionic part

Operation



Dynamic Milling

Ap	40 mm
Ae	2 mm
Vc	90 m/min
N	1800 rpm
Fz	0,08 mm
F	1000 mm/min
Tool Life	7 hours

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Svuotamento dal pieno di componenti avionici strutturali in titanio con strategia dinamica/trocoidale. La combinazione di parametri ap/ae/F portano ad un considerevole volume di truciolo prodotto con un utensile.

BUSINESS CASE

Fresa 3 taglienti per lavorazioni ad elevate asportazioni
3 flute end mill for high chip removal

Tool

HMC183100

Material

Ti6Al4V

Component

Bracket

Operation

Slotting

Ap	10 mm
Ae	10 mm
Vc	90 m/min
N	2870 rpm
Fz	0,032 mm
F	275 mm/min
Tool Life	5 hours

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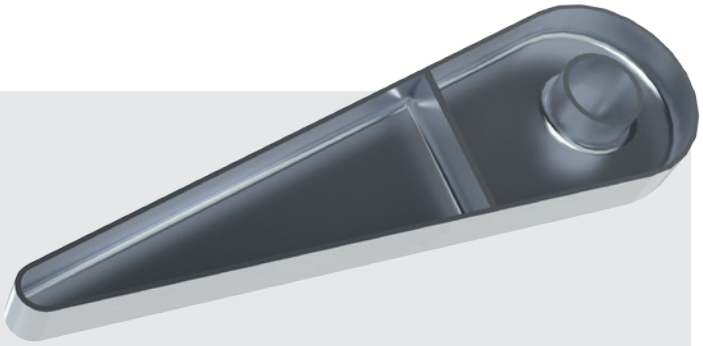
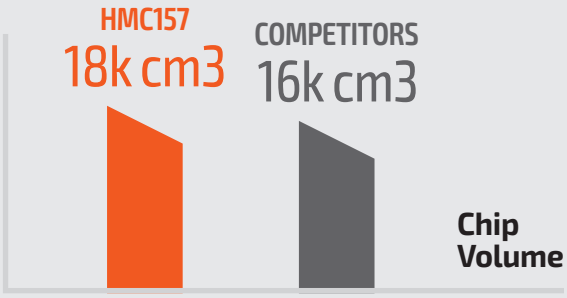
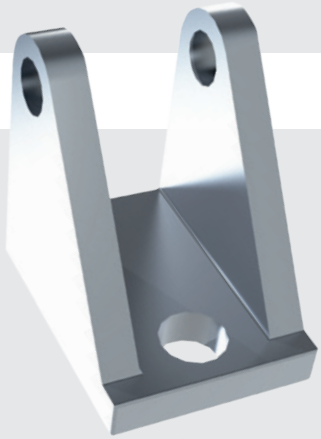
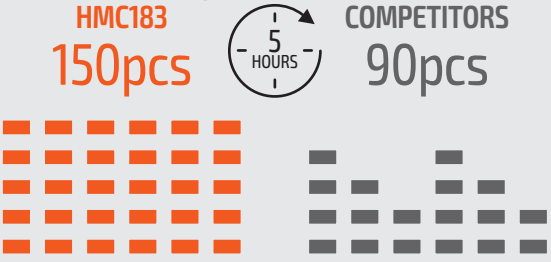
Lavorazione di bracket (giunti meccanici) in titanio. Il pezzo viene lavorato in cava dal pieno. Si riporta un confronto di pezzi prodotti a parità di tempo.





Pocketing of structural avionics components, with a dynamic/trochoidal machining strategy. The combination of the ap/ae/F parameters give us a considerable chip volume produced, with one tool.





Titanium Bracket machining, with slotting operations. It's clear that at the same time there are more pieces produced.

Acciaio inossidabile / Stainless Steel

Ferritico/martensitico / Ferritic/martensitic

Wrknr	Std	DIN
1.4057	AISI 431	X20CrNi17 2
1.4301	AISI 304	X5CrNi18 9
1.4000	AISI 403	X6Cr13
1.4005	AISI 416	X12CrS13
1.4006	AISI 410	X10Cr13
1.4021	AISI 420	X20Cr13
1.4057	AISI 431	X20CrNi17 2
1.4104	AISI 430 F	X12CrMoS17
1.4112	AISI 440 B	X90CrMoV18
1.4113	AISI 434	X6CrMo17
1.4125	AISI 440 C	X105CrMo17
1.4303	AISI 308	X5CrNi18 12
1.4305	AISI 303	X10CrNiS18 9
1.4306	AISI 304 L	X2CrNi19 11
1.4310	AISI 301	X12CrNi17 7
1.4401	AISI 316	ZX5CrNiMo18 10
1.4404	AISI 316 L	X2CrNiMo17 13 2
1.4406	AISI 316 LN	X2CrNiMoN17 12 2
1.4435	AISI 316 L	X2CrNiMo18 14 3
1.4436	AISI 316	X5CrNiMo17 13 3
1.4438	AISI 317 L	X2CrNiMo18 16 4
1.4460	AISI 329	X8CrNiMo27 5
1.4541	AISI 321	X6CrNiTi18 10
1.4550	AISI 347-348	X6CrNiNb18 10
1.4571	AISI 316 Ti	X6CrNiMoTi17 12 2
1.4573	AISI 316 Ti	X10CrNiMoTi18 12
1.4580	AISI 316 Cb	X6CrNiMoNb17 12 2
1.4583	AISI 318	X10CrNiMoNb18 12

PH Duplex

PH

Wrknr	Std	DIN
1.4504	17-7 PH	-
1.4542	AISI630	X5CrNiCuNb17 4
1.4545	15-5 PH	-
1.4564	17-7 PH	-
-	17-4 PH	-

Duplex

-	A240 (S31200)	-
1.4410	-	-
1.4462	-	-

Titanio / Titanium

Leghe di Titanio 340-450HB / Titanium alloys 340-450HB

Wrknr	Std	DIN
3.7124	-	TiCu2
3.7144	-	TiAl6Sn2Zr4Mo2
3.7154	-	TiAl6Zr5
3.7165	-	TiAl6V4
3.7174	-	TiAl6V6Sn2
3.7184	-	TiAl4Mo4Sn2
-	-	Ti6Al6V2Sn
-	-	Ti7Al4Mo
-	-	Ti8Al1Mo1V
-	-	Ti6Al2Sn4Zr2MoSi
-	-	Ti5Al6Sn2Zr1Mo0.25Si
-	-	Ti6Al4VELI
-	-	Ti6Al2Sn4Zr6Mo
-	-	Ti6Al6V2Sn
-	-	Ti7Al4Mo

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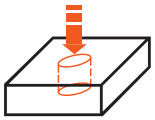
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	1,00 D			0,40 D			 ap = 0,5 D		
	m/min	Vc=130			Vc=130			Vc=130		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Inox ferritico / Ferritic stainless steel	2,0	0,010	621	20690	0,015	931	20690	0,004	248	20690
	4,0	0,020	621	10345	0,025	776	10345	0,008	248	10345
	6,0	0,028	579	6897	0,033	683	6897	0,013	269	6897
	8,0	0,035	543	5173	0,040	621	5173	0,018	279	5173
	10,0	0,044	546	4138	0,049	608	4138	0,023	286	4138
	12,0	0,053	548	3448	0,058	600	3448	0,030	310	3448
	14,0	0,061	541	2956	0,066	585	2956	0,035	310	2956
	16,0	0,070	543	2586	0,075	582	2586	0,035	272	2586
	20,0	0,078	484	2069	0,088	546	2069	0,043	267	2069
	m/min	Vc=110			Vc=110			Vc=110		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Inox austenitico / Austenitic stainless Steel	2,0	0,010	525	17507	0,015	788	17507	0,004	210	17507
	4,0	0,020	525	8754	0,025	657	8754	0,008	210	8754
	6,0	0,028	490	5836	0,033	578	5836	0,013	228	5836
	8,0	0,035	460	4377	0,040	525	4377	0,018	236	4377
	10,0	0,044	462	3501	0,049	515	3501	0,023	242	3501
	12,0	0,053	464	2918	0,058	508	2918	0,030	263	2918
	14,0	0,061	458	2501	0,066	495	2501	0,035	263	2501
	16,0	0,070	460	2188	0,075	492	2188	0,035	230	2188
	20,0	0,078	410	1751	0,088	462	1751	0,043	226	1751
	m/min	Vc=90			Vc=80			Vc=90		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Titanio / Titanium	2,0	0,003	129	14324	0,005	191	12732	0,004	172	14324
	4,0	0,008	172	7162	0,013	248	6366	0,008	172	7162
	6,0	0,016	229	4775	0,021	267	4244	0,013	186	4775
	8,0	0,023	247	3581	0,028	267	3183	0,018	193	3581
	10,0	0,032	275	2865	0,037	283	2546	0,023	198	2865
	12,0	0,041	294	2387	0,046	293	2122	0,030	215	2387
	14,0	0,049	301	2046	0,054	295	1819	0,035	215	2046
	16,0	0,058	312	1790	0,063	301	1592	0,035	188	1790
	20,0	0,066	284	1432	0,076	290	1273	0,043	185	1432
	m/min	Vc=170			Vc=180			Vc=170		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Acciaio < 800 N/mm² / Steel < 800 N/mm²	2,0	0,007	568	27056	0,007	602	28684	0,003	244	27056
	4,0	0,016	649	13528	0,018	773	14324	0,007	284	13528
	6,0	0,024	649	9019	0,027	773	9549	0,011	298	9019
	8,0	0,032	649	6764	0,036	773	7162	0,015	304	6764
	10,0	0,040	649	5411	0,045	773	5730	0,019	308	5411
	12,0	0,048	649	4509	0,054	773	4775	0,022	298	4509
	14,0	0,055	638	3865	0,060	737	4093	0,024	278	3865
	16,0	0,060	609	3382	0,065	698	3581	0,026	264	3382
	20,0	0,075	609	2706	0,080	698	2865	0,028	227	2706
	m/min	Vc=130			Vc=150			Vc=130		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Acciaio <1000 N/mm² - Ghisa / Steel <1000 N/mm² - Cast iron	2,0	0,007	434	20690	0,007	501	23873	0,003	186	20690
	4,0	0,016	497	10345	0,018	645	11937	0,007	217	10345
	6,0	0,024	497	6897	0,027	645	7958	0,011	228	6897
	8,0	0,032	497	5173	0,036	645	5968	0,015	233	5173
	10,0	0,040	497	4138	0,045	645	4775	0,019	236	4138
	12,0	0,048	497	3448	0,054	645	3979	0,022	228	3448
	14,0	0,055	488	2956	0,060	614	3410	0,024	213	2956
	16,0	0,060	466	2586	0,065	582	2984	0,026	202	2586
	20,0	0,075	466	2069	0,080	573	2387	0,028	174	2069

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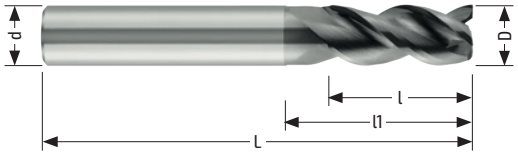
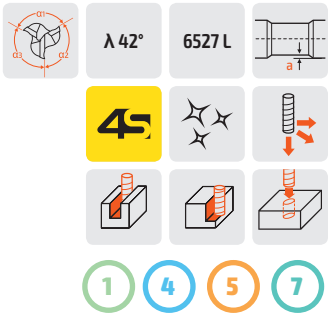
Fresa 3 taglienti per lavorazioni ad elevate asportazioni
3 flute end mill for high chip removal





45°

D h10	d h6	L	l ap	l1	a	45°	Z	Balinit® Latuma
2,0	6	57	5,0	8,0	0,10	0,05	3	HMC183020
2,5	6	57	6,0	9,0	0,10	0,05	3	HMC183025
3,0	6	57	8,0	11,0	0,10	0,10	3	HMC183030
3,5	6	57	8,0	13,0	0,10	0,10	3	HMC183035
4,0	6	57	9,0	16,0	0,10	0,10	3	HMC183040
4,5	6	57	10,0	16,0	0,10	0,10	3	HMC183045
5,0	6	57	13,0	18,0	0,10	0,10	3	HMC183050
6,0	6	57	13,0	20,0	0,15	0,10	3	HMC183060
8,0	8	63	19,0	25,0	0,15	0,15	3	HMC183080
10,0	10	72	22,0	30,0	0,15	0,15	3	HMC183100
12,0	12	83	26,0	36,0	0,20	0,15	3	HMC183120
16,0	16	92	32,0	42,0	0,20	0,20	3	HMC183160
20,0	20	104	38,0	52,0	0,20	0,20	3	HMC183200

90°

D h10	d h6	L	l ap	l1	a	90°	Z	Balinit® Latuma
2,0	6	57	5,0	8,0	0,10	-	3	HMC183020X
2,5	6	57	6,0	9,0	0,10	-	3	HMC183025X
3,0	6	57	8,0	11,0	0,10	-	3	HMC183030X
3,5	6	57	8,0	13,0	0,10	-	3	HMC183035X
4,0	6	57	9,0	16,0	0,10	-	3	HMC183040X
4,5	6	57	10,0	16,0	0,10	-	3	HMC183045X
5,0	6	57	13,0	18,0	0,10	-	3	HMC183050X
6,0	6	57	13,0	20,0	0,15	-	3	HMC183060X
7,0	8	63	19,0	25,0	0,15	-	3	HMC183070X
8,0	8	63	19,0	25,0	0,15	-	3	HMC183080X
9,0	10	72	22,0	30,0	0,15	-	3	HMC183090X
10,0	10	72	22,0	30,0	0,15	-	3	HMC183100X
12,0	12	83	26,0	36,0	0,20	-	3	HMC183120X
14,0	14	83	30,0	40,0	0,20	-	3	HMC183140X
16,0	16	92	32,0	42,0	0,20	-	3	HMC183160X
20,0	20	104	38,0	52,0	0,20	-	3	HMC183200X

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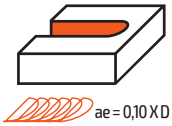
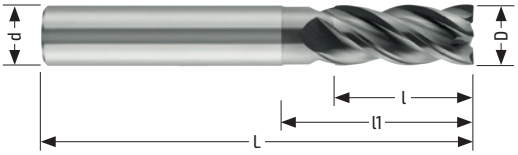
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	1,00 D			0,40 D			 ae = 0,10 X D		
Inox ferritico Ferritic stainless steel	m/min	Vc=140			Vc=130			Vc=170		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,013	772	14854	0,013	717	13793	0,020	1443	18038
	4,0	0,020	891	11141	0,020	828	10345	0,060	3247	13528
	6,0	0,030	891	7427	0,030	828	6897	0,130	4690	9019
	8,0	0,040	891	5570	0,040	828	5173	0,160	4329	6764
	10,0	0,050	891	4456	0,050	828	4138	0,190	4113	5411
	12,0	0,060	891	3714	0,060	828	3448	0,220	3968	4509
	14,0	0,065	828	3183	0,065	768	2956	0,250	3865	3865
	16,0	0,070	780	2785	0,070	724	2586	0,250	3382	3382
	20,0	0,080	713	2228	0,080	662	2069	0,300	3247	2706
	25,0	0,090	642	1783	0,090	596	1655	0,350	3030	2165
Inox austenitico Austenitic stainless Steel	m/min	Vc=120			Vc=110			Vc=150		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,013	662	12732	0,013	607	11671	0,020	1273	15915
	4,0	0,020	764	9549	0,020	700	8754	0,060	2865	11937
	6,0	0,030	764	6366	0,030	700	5836	0,130	4138	7958
	8,0	0,040	764	4775	0,040	700	4377	0,160	3820	5968
	10,0	0,050	764	3820	0,050	700	3501	0,190	3629	4775
	12,0	0,060	764	3183	0,060	700	2918	0,220	3501	3979
	14,0	0,065	709	2728	0,065	650	2501	0,250	3410	3410
	16,0	0,070	668	2387	0,070	613	2188	0,250	2984	2984
	20,0	0,080	611	1910	0,080	560	1751	0,300	2865	2387
	25,0	0,090	550	1528	0,090	504	1401	0,350	2674	1910
Titanio Titanium	m/min	Vc=80			Vc=80			Vc=100		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,004	136	8488	0,011	373	8488	0,020	849	10610
	4,0	0,006	153	6366	0,015	382	6366	0,060	1910	7958
	6,0	0,009	153	4244	0,023	390	4244	0,130	2759	5305
	8,0	0,012	153	3183	0,030	382	3183	0,160	2546	3979
	10,0	0,015	153	2546	0,040	407	2546	0,190	2419	3183
	12,0	0,020	170	2122	0,050	424	2122	0,220	2334	2653
	14,0	0,025	182	1819	0,055	400	1819	0,250	2274	2274
	16,0	0,030	191	1592	0,060	382	1592	0,250	1989	1989
	20,0	0,040	204	1273	0,075	382	1273	0,300	1910	1592
	25,0	0,050	204	1019	0,090	367	1019	0,350	1783	1273
Acciaio < 800 N/mm² Steel < 800 N/mm²	m/min	Vc=195			Vc=210			Vc=220		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,008	662	20690	0,008	713	22282	0,020	1867	23343
	4,0	0,012	745	15518	0,012	802	16711	0,060	4202	17507
	6,0	0,020	828	10345	0,020	891	11141	0,130	6069	11671
	8,0	0,030	931	7759	0,030	1003	8356	0,160	5602	8754
	10,0	0,040	993	6207	0,040	1070	6685	0,190	5322	7003
	12,0	0,050	1035	5173	0,050	1114	5570	0,220	5135	5836
	14,0	0,055	975	4434	0,055	1050	4775	0,250	5002	5002
	16,0	0,060	931	3879	0,060	1003	4178	0,250	4377	4377
	20,0	0,070	869	3104	0,070	936	3342	0,300	4202	3501
	25,0	0,080	795	2483	0,080	856	2674	0,350	3922	2801
Acciaio <1000 N/mm² - Ghisa Steel <1000 N/mm² - Cast iron	m/min	Vc=140			Vc=150			Vc=180		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,008	475	14854	0,008	509	15915	0,020	1528	19099
	4,0	0,012	535	11141	0,012	573	11937	0,060	3438	14324
	6,0	0,020	594	7427	0,020	637	7958	0,130	4966	9549
	8,0	0,030	668	5570	0,030	716	5968	0,160	4584	7162
	10,0	0,040	713	4456	0,040	764	4775	0,190	4354	5730
	12,0	0,050	743	3714	0,050	796	3979	0,220	4202	4775
	14,0	0,055	700	3183	0,055	750	3410	0,250	4093	4093
	16,0	0,060	668	2785	0,060	716	2984	0,250	3581	3581
	20,0	0,070	624	2228	0,070	668	2387	0,300	3438	2865
	25,0	0,080	570	1783	0,080	611	1910	0,350	3209	2292

184

Fresa 4 taglienti per lavorazioni ad elevate asportazioni
4 flute end mill for high chip removal



λ 38° | 6527 L

1 4 5 7

45°

D h10	d h6	L	l ap	l1	a	45°	Z	Balinit® Latuma
3,0	6	57	8,0	11,0	0,10	0,10	4	HMC184030
4,0	6	57	9,0	16,0	0,10	0,10	4	HMC184040
5,0	6	57	13,0	18,0	0,10	0,10	4	HMC184050
6,0	6	57	13,0	20,0	0,15	0,10	4	HMC184060
8,0	8	63	19,0	25,0	0,15	0,15	4	HMC184080
10,0	10	72	22,0	30,0	0,15	0,15	4	HMC184100
12,0	12	83	26,0	36,0	0,20	0,15	4	HMC184120
16,0	16	92	32,0	42,0	0,20	0,20	4	HMC184160
20,0	20	104	38,0	52,0	0,20	0,20	4	HMC184200
25,0	25	125	45,0	65,0	0,25	0,20	4	HMC184250

Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
6,0	6	57	13,0	20,0	0,15	0,50	4	HMC184060CR05
6,0	6	57	13,0	20,0	0,15	1,00	4	HMC184060CR10
8,0	8	63	19,0	25,0	0,15	0,50	4	HMC184080CR05
8,0	8	63	19,0	25,0	0,15	1,00	4	HMC184080CR10
8,0	8	63	19,0	25,0	0,15	2,00	4	HMC184080CR20
10,0	10	72	22,0	30,0	0,20	0,50	4	HMC184100CR05
10,0	10	72	22,0	30,0	0,20	1,00	4	HMC184100CR10
10,0	10	72	22,0	30,0	0,20	2,00	4	HMC184100CR20
12,0	12	83	26,0	36,0	0,20	0,50	4	HMC184120CR05
12,0	12	83	26,0	36,0	0,20	1,00	4	HMC184120CR10
12,0	12	83	26,0	36,0	0,20	2,00	4	HMC184120CR20
12,0	12	83	26,0	36,0	0,20	3,00	4	HMC184120CR30
16,0	16	92	32,0	42,0	0,20	1,00	4	HMC184160CR10
16,0	16	92	32,0	42,0	0,20	2,00	4	HMC184160CR20
16,0	16	92	32,0	42,0	0,20	3,00	4	HMC184160CR30
16,0	16	92	32,0	42,0	0,20	4,00	4	HMC184160CR40
20,0	20	104	38,0	52,0	0,20	1,00	4	HMC184200CR10
20,0	20	104	38,0	52,0	0,20	2,00	4	HMC184200CR20
20,0	20	104	38,0	52,0	0,20	3,00	4	HMC184200CR30
20,0	20	104	38,0	52,0	0,20	4,00	4	HMC184200CR40
25,0	25	124	45,0	65,0	0,22	2,00	4	HMC184250CR20
25,0	25	124	45,0	65,0	0,25	3,00	4	HMC184250CR30
25,0	25	124	45,0	65,0	0,25	4,00	4	HMC184250CR40

90°

D h10	d h6	L	l ap	l1	a	90°	Z	Balinit® Latuma
3,0	6	57	8,0	11,0	0,10	-	4	HMC184030X
4,0	6	57	9,0	16,0	0,10	-	4	HMC184040X
5,0	6	57	13,0	18,0	0,10	-	4	HMC184050X
6,0	6	57	13,0	20,0	0,15	-	4	HMC184060X
8,0	8	63	19,0	25,0	0,15	-	4	HMC184080X
10,0	10	72	22,0	30,0	0,15	-	4	HMC184100X
12,0	12	83	26,0	36,0	0,20	-	4	HMC184120X
16,0	16	92	32,0	42,0	0,20	-	4	HMC184160X
20,0	20	104	38,0	52,0	0,20	-	4	HMC184200X
25,0	25	124	45,0	65,0	0,25	-	4	HMC184250X

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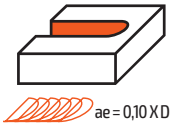
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	1,00 D			0,40 D			 ae = 0,10 X D		
Inox ferritico Ferritic stainless steel	m/min	Vc=140			Vc=130			Vc=170		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,030	891	7427	0,030	828	6897	0,130	4690	9019
	8,0	0,040	891	5570	0,040	828	5173	0,160	4329	6764
	10,0	0,050	891	4456	0,050	828	4138	0,190	4113	5411
	12,0	0,060	891	3714	0,060	828	3448	0,220	3968	4509
	16,0	0,070	780	2785	0,070	724	2586	0,250	3382	3382
	20,0	0,080	713	2228	0,080	662	2069	0,300	3247	2706
	25,0	0,090	642	1783	0,090	596	1655	0,350	3030	2165
Inox austenitico Austenitic stainless Steel	m/min	Vc=120			Vc=110			Vc=150		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,030	764	6366	0,030	700	5836	0,130	4138	7958
	8,0	0,040	764	4775	0,040	700	4377	0,160	3820	5968
	10,0	0,050	764	3820	0,050	700	3501	0,190	3629	4775
	12,0	0,060	764	3183	0,060	700	2918	0,220	3501	3979
	16,0	0,070	668	2387	0,070	613	2188	0,250	2984	2984
	20,0	0,080	611	1910	0,080	560	1751	0,300	2865	2387
	25,0	0,090	550	1528	0,090	504	1401	0,350	2674	1910
Titanio Titanium	m/min	Vc=80			Vc=80			Vc=100		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,009	153	4244	0,023	390	4244	0,130	2759	5305
	8,0	0,012	153	3183	0,030	382	3183	0,160	2546	3979
	10,0	0,015	153	2546	0,040	407	2546	0,190	2419	3183
	12,0	0,020	170	2122	0,050	424	2122	0,220	2334	2653
	16,0	0,030	191	1592	0,060	382	1592	0,250	1989	1989
	20,0	0,040	204	1273	0,075	382	1273	0,300	1910	1592
	25,0	0,050	204	1019	0,090	367	1019	0,350	1783	1273
Acciaio < 800 N/mm² Steel < 800 N/mm²	m/min	Vc=195			Vc=210			Vc=220		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,020	828	10345	0,020	891	11141	0,130	6069	11671
	8,0	0,030	931	7759	0,030	1003	8356	0,160	5602	8754
	10,0	0,040	993	6207	0,040	1070	6685	0,190	5322	7003
	12,0	0,050	1035	5173	0,050	1114	5570	0,220	5135	5836
	16,0	0,060	931	3879	0,060	1003	4178	0,250	4377	4377
	20,0	0,070	869	3104	0,070	936	3342	0,300	4202	3501
	25,0	0,080	795	2483	0,080	856	2674	0,350	3922	2801
Acciaio <1000 N/mm² - Ghisa Steel <1000 N/mm² - Cast iron	m/min	Vc=140			Vc=150			Vc=180		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,020	594	7427	0,020	637	7958	0,130	4966	9549
	8,0	0,030	668	5570	0,030	716	5968	0,160	4584	7162
	10,0	0,040	713	4456	0,040	764	4775	0,190	4354	5730
	12,0	0,050	743	3714	0,050	796	3979	0,220	4202	4775
	16,0	0,060	668	2785	0,060	716	2984	0,250	3581	3581
	20,0	0,070	624	2228	0,070	668	2387	0,300	3438	2865
	25,0	0,080	570	1783	0,080	611	1910	0,350	3209	2292

Notes

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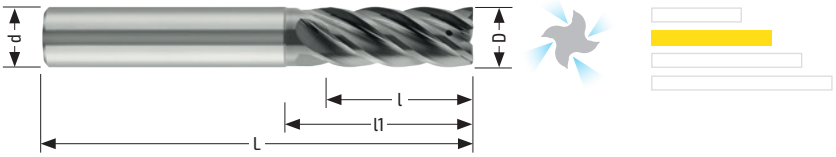
Fresa 4 taglienti per lavorazioni ad elevate asportazioni con fori di lubrificazione
4 flute end mill for high chip removal with internal coolant



λ 38°

6527 L

45°

1 4 5 7

45°

D h10	d h6	L	l ap	l1	a	45°	Z	Balinit® Latuma
6,0	6	57	13,0	20,0	0,15	0,10	4	HMC284060
8,0	8	63	19,0	25,0	0,15	0,15	4	HMC284080
10,0	10	72	22,0	30,0	0,15	0,15	4	HMC284100
12,0	12	83	26,0	36,0	0,20	0,15	4	HMC284120
16,0	16	92	32,0	42,0	0,20	0,20	4	HMC284160
20,0	20	104	38,0	52,0	0,20	0,20	4	HMC284200
25,0	25	124	45,0	65,0	0,25	0,20	4	HMC284250

Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
6,0	6	63	13,0	20,0	0,15	0,50	4	HMC284060CR05
6,0	6	63	13,0	20,0	0,15	1,00	4	HMC284060CR10
8,0	8	63	19,0	25,0	0,15	0,50	4	HMC284080CR05
8,0	8	63	19,0	25,0	0,15	1,00	4	HMC284080CR10
8,0	8	63	19,0	25,0	0,15	2,00	4	HMC284080CR20
10,0	10	72	22,0	30,0	0,15	0,50	4	HMC284100CR05
10,0	10	72	22,0	30,0	0,15	1,00	4	HMC284100CR10
10,0	10	72	22,0	30,0	0,15	2,00	4	HMC284100CR20
12,0	12	83	26,0	36,0	0,20	0,50	4	HMC284120CR05
12,0	12	83	26,0	36,0	0,20	1,00	4	HMC284120CR10
12,0	12	83	26,0	36,0	0,20	2,00	4	HMC284120CR20
12,0	12	83	26,0	36,0	0,20	3,00	4	HMC284120CR30
16,0	16	92	32,0	42,0	0,20	1,00	4	HMC284160CR10
16,0	16	92	32,0	42,0	0,20	2,00	4	HMC284160CR20
16,0	16	92	32,0	42,0	0,20	3,00	4	HMC284160CR30
16,0	16	92	32,0	42,0	0,20	4,00	4	HMC284160CR40
20,0	20	104	38,0	52,0	0,20	2,00	4	HMC284200CR20
20,0	20	104	38,0	52,0	0,20	3,00	4	HMC284200CR30
20,0	20	104	38,0	52,0	0,20	4,00	4	HMC284200CR40
25,0	25	124	45,0	65,0	0,25	2,00	4	HMC284250CR20
25,0	25	124	45,0	65,0	0,25	3,00	4	HMC284250CR30
25,0	25	124	45,0	65,0	0,25	4,00	4	HMC284250CR40

90°

D h10	d h6	L	l ap	l1	a	90°	Z	Balinit® Latuma
6,0	6	57	13,0	20,0	0,15	-	4	HMC284060X
8,0	8	63	19,0	25,0	0,15	-	4	HMC284080X
10,0	10	72	22,0	30,0	0,15	-	4	HMC284100X
12,0	12	83	26,0	36,0	0,20	-	4	HMC284120X
16,0	16	92	32,0	42,0	0,20	-	4	HMC284160X
20,0	20	104	38,0	52,0	0,20	-	4	HMC284200X
25,0	25	124	45,0	65,0	0,25	-	4	HMC284250X

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

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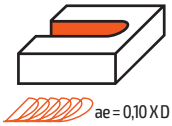
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	1,00 D			0,40 D			 ae = 0,10 X D		
	m/min	Vc=130			Vc=130			Vc=170		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Inox ferritico / Ferritic stainless steel	6,0	0,015	517	6897	0,030	1035	6897	0,130	5862	9019
	8,0	0,025	647	5173	0,040	1035	5173	0,160	5411	6764
	10,0	0,035	724	4138	0,050	1035	4138	0,190	5141	5411
	12,0	0,045	776	3448	0,060	1035	3448	0,220	4960	4509
	16,0	0,055	711	2586	0,070	905	2586	0,250	4228	3382
	20,0	0,060	621	2069	0,080	828	2069	0,300	4058	2706
	m/min	Vc=110			Vc=110			Vc=150		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Inox austenitico / Austenitic stainless Steel	6,0	0,015	438	5836	0,030	875	5836	0,130	5173	7958
	8,0	0,025	547	4377	0,040	875	4377	0,160	4775	5968
	10,0	0,035	613	3501	0,050	875	3501	0,190	4536	4775
	12,0	0,045	657	2918	0,060	875	2918	0,220	4277	3979
	16,0	0,055	602	2188	0,070	766	2188	0,250	3730	2984
	20,0	0,060	525	1751	0,080	700	1751	0,300	3581	2387
	m/min	Vc=80			Vc=80			Vc=80		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Titanio / Titanium	6,0	0,006	127	4244	0,023	477	4244	0,130	2759	4244
	8,0	0,008	127	3183	0,030	477	3183	0,160	2546	3183
	10,0	0,010	127	2546	0,040	509	2546	0,190	2419	2546
	12,0	0,012	127	2122	0,050	531	2122	0,220	2334	2122
	16,0	0,016	127	1592	0,060	477	1592	0,250	1989	1592
	20,0	0,024	153	1273	0,070	446	1273	0,300	1910	1273
	m/min	Vc=170			Vc=195			Vc=220		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Acciaio < 800 N/mm² / Steel < 800 N/mm²	6,0	0,020	902	9019	0,030	1552	10345	0,130	7586	11671
	8,0	0,030	1051	6764	0,040	1552	7759	0,160	7003	8754
	10,0	0,040	1082	5411	0,050	1552	6207	0,190	6653	7003
	12,0	0,045	1015	4509	0,060	1552	5173	0,220	6419	5836
	16,0	0,055	930	3382	0,068	1319	3879	0,250	5471	4377
	20,0	0,065	879	2706	0,075	1164	3104	0,300	5252	3501
	m/min	Vc=130			Vc=150			Vc=180		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Acciaio <1000 N/mm² - Ghisa / Steel <1000 N/mm² - Cast iron	6,0	0,020	690	6897	0,030	1194	7958	0,130	6207	9549
	8,0	0,030	776	5173	0,040	1194	5968	0,160	5730	7162
	10,0	0,040	828	4138	0,050	1194	4775	0,190	5443	5730
	12,0	0,045	776	3448	0,060	1194	3979	0,220	5252	4775
	16,0	0,055	711	2586	0,068	1015	2984	0,250	4476	3581
	20,0	0,065	621	2069	0,075	895	2387	0,300	4297	2865

Notes

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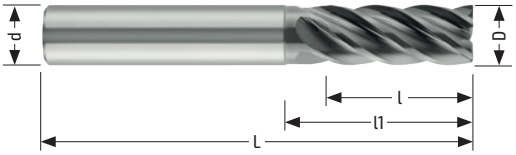
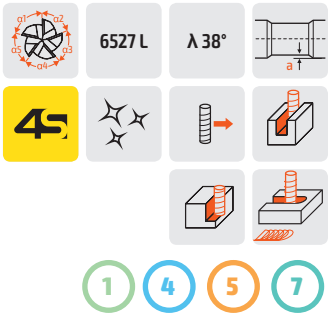
Fresa 5 taglienti per lavorazioni ad elevate asportazioni
5 flute end mill for high chip removal





45°

D h10	d h6	L	l ap	l1	a	45°	Z	Balinit® Latuma
6,0	6	57	13,0	20,0	0,15	0,10	5	HMC185060
8,0	8	63	19,0	25,0	0,15	0,15	5	HMC185080
10,0	10	72	22,0	30,0	0,15	0,15	5	HMC185100
12,0	12	83	26,0	36,0	0,20	0,15	5	HMC185120
16,0	16	92	32,0	42,0	0,20	0,20	5	HMC185160
20,0	20	104	38,0	52,0	0,20	0,20	5	HMC185200

Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
6,0	6	57	13,0	20,0	0,15	0,50	5	HMC185060CR05
6,0	6	57	13,0	20,0	0,15	1,00	5	HMC185060CR10
8,0	8	63	19,0	25,0	0,15	0,50	5	HMC185080CR05
8,0	8	63	19,0	25,0	0,15	1,00	5	HMC185080CR10
8,0	8	63	19,0	25,0	0,15	2,00	5	HMC185080CR20
10,0	10	72	22,0	30,0	0,15	0,50	5	HMC185100CR05
10,0	10	72	22,0	30,0	0,15	1,00	5	HMC185100CR10
10,0	10	72	22,0	30,0	0,15	2,00	5	HMC185100CR20
12,0	12	83	26,0	36,0	0,20	0,50	5	HMC185120CR05
12,0	12	83	26,0	36,0	0,20	1,00	5	HMC185120CR10
12,0	12	83	26,0	36,0	0,20	2,00	5	HMC185120CR20
12,0	12	83	26,0	36,0	0,20	3,00	5	HMC185120CR30
16,0	16	92	32,0	42,0	0,20	1,00	5	HMC185160CR10
16,0	16	92	32,0	42,0	0,20	2,00	5	HMC185160CR20
16,0	16	92	32,0	42,0	0,20	3,00	5	HMC185160CR30
16,0	16	92	32,0	42,0	0,20	4,00	5	HMC185160CR40
20,0	20	104	38,0	52,0	0,20	2,00	5	HMC185200CR20
20,0	20	104	38,0	52,0	0,20	3,00	5	HMC185200CR30
20,0	20	104	38,0	52,0	0,20	4,00	5	HMC185200CR40

90°

D h10	d h6	L	l ap	l1	a	90°	Z	Balinit® Latuma
6,0	6	57	13,0	20,0	0,15	-	5	HMC185060X
8,0	6	63	19,0	25,0	0,15	-	5	HMC185080X
10,0	10	72	22,0	30,0	0,20	-	5	HMC185100X
12,0	12	83	26,0	36,0	0,20	-	5	HMC185120X
16,0	16	92	32,0	42,0	0,20	-	5	HMC185160X
20,0	20	104	38,0	52,0	0,20	-	5	HMC185200X

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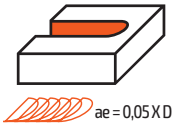
Parametri di lavoro / Working Parameters

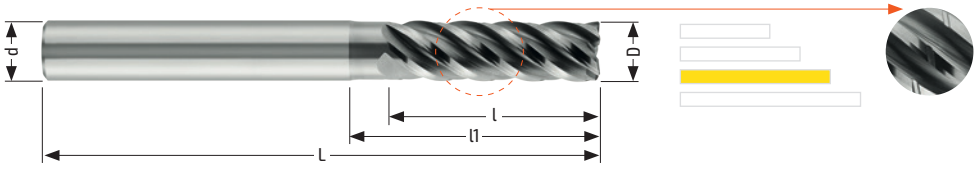


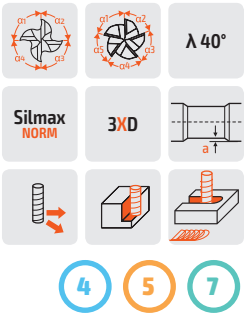
Materiale / Material	Diametro / Diameter						
Inox ferritico / Ferritic stainless steel	m/min	Vc=130			Vc=220		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	745	10345	0,050	3501	17507
	6,0	0,026	897	6897	0,080	4669	11671
	8,0	0,034	879	5173	0,130	5690	8754
	10,0	0,043	890	4138	0,160	5602	7003
	12,0	0,055	948	3448	0,190	5544	5836
	16,0	0,070	905	2586	0,220	4814	4377
	20,0	0,080	1159	2069	0,280	6863	3501
Inox austenitico / Austenitic stainless Steel	m/min	Vc=120			Vc=190		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	688	9549	0,050	3024	15120
	6,0	0,026	828	6366	0,080	4032	10080
	8,0	0,034	812	4775	0,130	4914	7560
	10,0	0,043	821	3820	0,160	4838	6048
	12,0	0,055	875	3183	0,190	4788	5040
	16,0	0,070	836	2387	0,220	4158	3780
	20,0	0,080	1070	1910	0,280	5927	3024
Titanio / Titanium	m/min	Vc=65			Vc=160		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	372	5173	0,050	2546	12732
	6,0	0,026	448	3448	0,080	3395	8488
	8,0	0,034	440	2586	0,130	4138	6366
	10,0	0,043	445	2069	0,160	4074	5093
	12,0	0,055	474	1724	0,190	4032	4244
	16,0	0,070	453	1293	0,220	3501	3183
	20,0	0,080	579	1035	0,280	4991	2546
Acciaio < 800 N/mm² / Steel < 800 N/mm²	m/min	Vc=180			Vc=250		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	1031	14324	0,050	3979	19894
	6,0	0,026	1241	9549	0,080	5305	13263
	8,0	0,034	1218	7162	0,130	6466	9947
	10,0	0,043	1232	5730	0,160	6366	7958
	12,0	0,055	1313	4775	0,190	6300	6631
	16,0	0,070	1253	3581	0,220	5471	4974
	20,0	0,080	1604	2865	0,280	7799	3979
Acciaio <1000 N/mm² - Ghisa / Steel <1000 N/mm² - Cast iron	m/min	Vc=140			Vc=220		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	0,018	802	11141	0,050	3501	17507
	6,0	0,026	966	7427	0,080	4669	11671
	8,0	0,034	947	5570	0,130	5690	8754
	10,0	0,043	958	4456	0,160	5602	7003
	12,0	0,055	1021	3714	0,190	5544	5836
	16,0	0,070	975	2785	0,220	4814	4377
	20,0	0,080	1248	2228	0,280	6863	3501

Notes

195

Fresa 5 taglienti con divisione irregolare e tagliente lungo
5 flute end mill with unequal flute spacing, long version



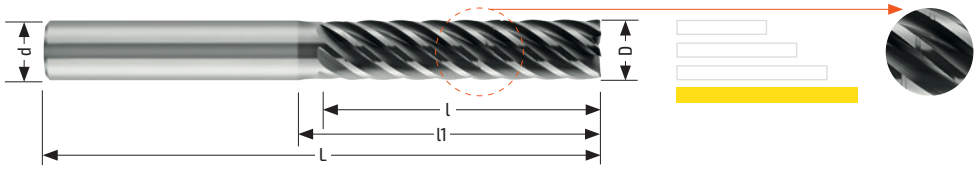


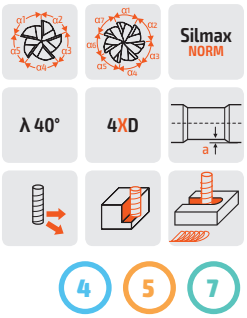
Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
4,0	6	57	12,0	16,0	0,25	0,20	4	HMC195040
6,0	6	63	18,0	24,0	0,25	0,30	5	HMC195060
8,0	8	70	24,0	31,0	0,25	0,50	5	HMC195080
10,0	10	78	30,0	37,0	0,25	0,50	5	HMC195100
12,0	12	92	36,0	46,0	0,25	0,50	5	HMC195120
16,0	16	110	48,0	60,0	0,25	0,50	5	HMC195160
20,0	20	134	60,0	80,0	0,25	0,50	5	HMC195200

197

Fresa 5/7 taglienti con divisione irregolare e tagliente extra lungo
5/7 flute end mill with unequal flute spacing, extra long version





Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
4,0	6	57	16,0	20,0	0,25	0,20	4	HMC197040
6,0	6	70	24,0	30,0	0,25	0,30	5	HMC197060
8,0	8	80	32,0	40,0	0,25	0,50	5	HMC197080
8,0	8	80	32,0	40,0	0,25	0,50	7	HMC197080Z7
10,0	10	87	40,0	46,0	0,25	0,50	5	HMC197100
10,0	10	87	40,0	46,0	0,25	0,50	7	HMC197100Z7
12,0	12	108	48,0	58,0	0,25	0,50	5	HMC197120
12,0	12	108	48,0	58,0	0,25	0,50	7	HMC197120Z7
16,0	16	120	64,0	68,0	0,25	0,50	7	HMC197160Z7
20,0	20	134	80,0	-	-	0,50	7	HMC197200Z7

119

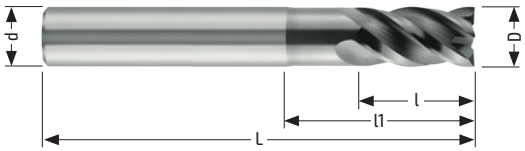
Parametri di lavoro / Working Parameters

Materiale Material	Diametro Diameter	1,00 D			0,25 D			0,10 D		
	m/min	Vc=60			Vc=60			Vc=60		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Ph/Duplex	4,0	0,009	172	4775	0,009	172	4775	0,012	229	4775
	6,0	0,016	205	3180	0,015	190	3180	0,020	255	3180
	8,0	0,022	210	2390	0,022	210	2390	0,030	285	2390
	10,0	0,030	230	1910	0,029	220	1910	0,040	305	1910
	12,0	0,040	255	1590	0,038	240	1590	0,050	320	1590
	16,0	0,047	225	1190	0,045	215	1190	0,060	285	1190
	20,0	0,052	200	960	0,050	190	950	0,065	250	950

Notes

119

Fresa 4 taglienti per lavorazioni di duplex
4 flute end mill for the machining of duplex



Silmax NORM | λ 38° λ 41°

7

45°

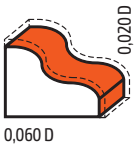
D e8	d h6	L	l ap	l1	a	45°	Z	Balinit® Latuma
4,0	6	57	6,0	-	-	0,05	4	HMC119040
5,0	6	57	7,5	-	-	0,05	4	HMC119050
6,0	6	57	9,0	18,0	0,15	0,05	4	HMC119060
8,0	8	63	12,0	24,0	0,15	0,05	4	HMC119080
10,0	10	72	15,0	30,0	0,15	0,05	4	HMC119100
12,0	12	83	18,0	36,0	0,20	0,05	4	HMC119120
16,0	16	92	24,0	42,0	0,20	0,05	4	HMC119160
20,0	20	104	30,0	52,0	0,20	0,05	4	HMC119200

Cr

D e8	d h6	L	l ap	l1	a	Cr	Z	Balinit® Latuma
6,0	6	57	9,0	18,0	0,15	0,50	4	HMC119060CR05
8,0	8	63	12,0	24,0	0,15	0,50	4	HMC119080CR05
10,0	10	72	15,0	30,0	0,15	1,00	4	HMC119100CR10
12,0	12	83	18,0	36,0	0,20	1,00	4	HMC119120CR10
16,0	16	92	24,0	42,0	0,20	1,00	4	HMC119160CR10
20,0	20	104	30,0	52,0	0,20	1,00	4	HMC119200CR10

737

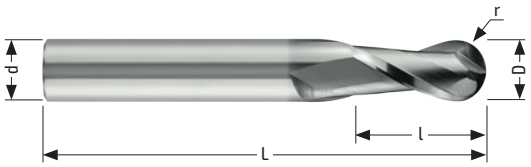
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter			
	m/min	Vc=60		
Ph/Duplex	**D** mm	**fz** mm/z	**F** mm/min	**n** rpm
	3,0	0,116	1477	6366
	4,0	0,149	1420	4775
	6,0	0,191	1218	3183
	8,0	0,234	1116	2387
	10,0	0,268	1023	1910
	12,0	0,310	988	1592
	16,0	0,353	842	1194
	m/min	Vc=55		
Leghe di titanio Titanium Alloys	**D** mm	**fz** mm/z	**F** mm/min	**n** rpm
	3,0	0,116	1354	5836
	4,0	0,149	1302	4377
	6,0	0,191	1116	2918
	8,0	0,234	1023	2188
	10,0	0,268	938	1751
	12,0	0,310	905	1459
	16,0	0,353	772	1094
	m/min	Vc=120		
Inox martensitici Ferritic/Martensitic Inox	**D** mm	**fz** mm/z	**F** mm/min	**n** rpm
	3,0	0,160	4074	12732
	4,0	0,200	3822	9554
	6,0	0,250	3185	6369
	8,0	0,300	2866	4777
	10,0	0,340	2599	3822
	12,0	0,390	2484	3185
	16,0	0,440	2102	2389
	m/min	Vc=90		
Inox austenitici Austenitic Inox	**D** mm	**fz** mm/z	**F** mm/min	**n** rpm
	3,0	0,140	2674	9550
	4,0	0,175	2508	7166
	6,0	0,225	2150	4777
	8,0	0,275	1971	3583
	10,0	0,315	1806	2866
	12,0	0,365	1744	2389
	16,0	0,415	1487	1791
	m/min	Vc=35		
Superleghe Superalloys	**D** mm	**fz** mm/z	**F** mm/min	**n** rpm
	3,0	0,085	654	3714
	4,0	0,110	613	2787
	6,0	0,150	557	1858
	8,0	0,180	501	1393
	10,0	0,210	468	1115
	12,0	0,240	446	929
	16,0	0,280	390	697

Notes

737

Fresa 2 taglienti semisferica serie normale
2 flute ball nose end mill, regular version



Silmax NORM | λ 30°

1 2 4 5 7 8

D h10	d h6	L	l ap	r	Z	Balinit® Latuma	Balinit® Alnova
3,0	3	38	7,0	1,50	2	HMC737030	HMY737030
4,0	4	50	8,0	2,00	2	HMC737040	HMY737040
5,0	5	50	10,0	2,50	2	HMC737050	HMY737050
6,0	6	57	10,0	3,00	2	HMC737060	HMY737060
8,0	8	63	16,0	4,00	2	HMC737080	HMY737080
10,0	10	72	19,0	5,00	2	HMC737100	HMY737100
12,0	12	83	22,0	6,00	2	HMC737120	HMY737120
16,0	16	92	26,0	8,00	2	HMC737160	HMY737160

737R

Fresa 2 taglienti serie normale semisferica con gambo rinforzato
2 flute ball nose end mill regular version with reinforced shank

Silmax NORM | λ 30°

1 2 4 5 7 8

D h10	d h6	L	l ap	r	Z	Balinit® Latuma	Balinit® Alnova
1,0	6	53	3,0	0,50	2	HMC737010R	HMY737010R
1,5	6	53	4,0	0,75	2	HMC737015R	HMY737015R
2,0	6	53	5,0	1,00	2	HMC737020R	HMY737020R
2,5	6	53	7,0	1,25	2	HMC737025R	HMY737025R
3,0	6	53	7,0	1,50	2	HMC737030R	HMY737030R

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

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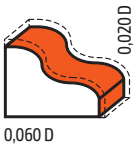
Parametri di lavoro / Working Parameters

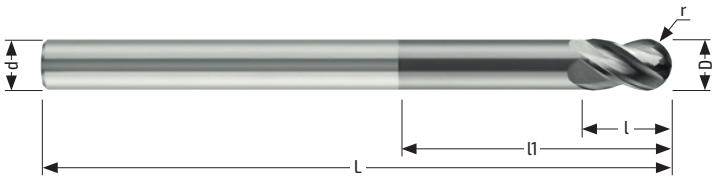
Materiale / Material	Diametro / Diameter			
Ph/Duplex	m/min	Vc=60		
	D mm	fz mm/z	F mm/min	n rpm
	3,0	0,075	1910	6366
	4,0	0,100	1910	4775
	6,0	0,127	1617	3183
	8,0	0,155	1480	2387
	10,0	0,178	1360	1910
	12,0	0,205	1305	1592
Titanio Titanium	m/min	Vc=55		
	D mm	fz mm/z	F mm/min	n rpm
	3,0	0,075	1751	5836
	4,0	0,100	1751	4377
	6,0	0,127	1482	2918
	8,0	0,155	1357	2188
	10,0	0,178	1247	1751
	12,0	0,205	1196	1459
Inox martensitici Ferritic/Martensitic Inox	m/min	Vc=120		
	D mm	fz mm/z	F mm/min	n rpm
	3,0	0,105	5348	12732
	4,0	0,133	5083	9554
	6,0	0,166	4229	6369
	8,0	0,200	3822	4777
	10,0	0,225	3440	3822
	12,0	0,260	3312	3185
Inox austenitici Austenitic Stainless Steel	m/min	Vc=90		
	D mm	fz mm/z	F mm/min	n rpm
	3,0	0,080	3056	9550
	4,0	0,116	3325	7166
	6,0	0,150	2866	4777
	8,0	0,183	2623	3583
	10,0	0,210	2407	2866
	12,0	0,243	2322	2389
Superleghe Superalloys	m/min	Vc=35		
	D mm	fz mm/z	F mm/min	n rpm
	3,0	0,050	743	3714
	4,0	0,070	780	2787
	6,0	0,100	743	1858
	8,0	0,120	669	1393
	10,0	0,140	624	1115
	12,0	0,160	595	929

Notes

NEW

133

Fresa 4 taglienti semisferica serie lunga
4 flute ball nose end mill, long version



Silmax NORM
λ 35°
γ 38°

1 2 4 5 7 8

D +0/-0,03	d h6	L	l ap	l1	a	r	Z	Balinit® Latuma	Balinit® Alnova
3,0	6	78	7,0	16,0	0,10	1,50	4,00	HMC133030	HMY133030
4,0	6	78	8,0	21,0	0,10	2,00	4,00	HMC133040	HMY133040
5,0	6	105	10,0	26,0	0,10	2,50	4,00	HMC133050	HMY133050
6,0	6	105	10,0	31,0	0,15	3,00	4,00	HMC133060	HMY133060
8,0	8	105	16,0	41,0	0,15	4,00	4,00	HMC133080	HMY133080
10,0	10	120	19,0	52,0	0,15	5,00	4,00	HMC133100	HMY133100
12,0	12	125	22,0	62,0	0,20	6,00	4,00	HMC133120	HMY133120

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Parametri di lavoro / Working Parameters

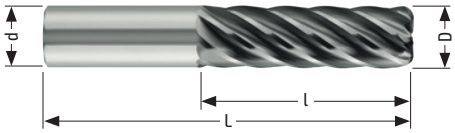
Materiale Material	Diametro Diameter	0,15 D			0,05 D		
	m/min	Vc=80			Vc=80		
Titanio Titanium	**D** mm	**fz** mm/z	**F** mm/min	**n** rpm	**fz** mm/z	**F** mm/min	**n** rpm
	12,0	0,055	817	2122	0,065	966	2122
	16,0	0,072	802	1592	0,085	947	1592

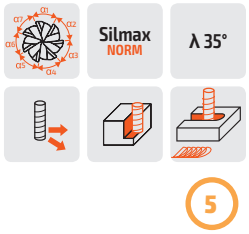
Notes

NEW

157

Fresa a 7 taglienti serie lunga per lavorazioni di titanio
7 flute end mill for the machining of Titanium, long version





45°

D h10	d h6	L	l ap	45°	Z	Balinit® Latuma
12,0	12	83	32	0,25	7	HMC157120M
16,0	16	82	40	0,30	7	HMC157160S
16,0	16	92	50	0,30	7	HMC157160M
16,0	16	104	60	0,30	7	HMC157160L

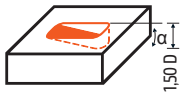
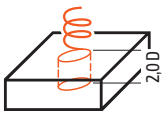
Cr

D h10	d h6	L	l ap	Cr	Z	Balinit® Latuma
12,0	12	83	32	1,00	7	HMC157120MCR10
12,0	12	83	32	2,00	7	HMC157120MCR20
12,0	12	83	32	3,00	7	HMC157120MCR30
12,0	12	83	32	4,00	7	HMC157120MCR40
16,0	16	82	40	1,00	7	HMC157160SCR10
16,0	16	82	40	2,00	7	HMC157160SCR20
16,0	16	82	40	3,00	7	HMC157160SCR30
16,0	16	82	40	4,00	7	HMC157160SCR40
16,0	16	82	40	5,00	7	HMC157160SCR50
16,0	16	92	50	1,00	7	HMC157160MCR10
16,0	16	92	50	2,00	7	HMC157160MCR20
16,0	16	92	50	3,00	7	HMC157160MCR30
16,0	16	92	50	4,00	7	HMC157160MCR40
16,0	16	92	50	5,00	7	HMC157160MCR50
16,0	16	104	60	1,00	7	HMC157160LCR10
16,0	16	104	60	2,00	7	HMC157160LCR20
16,0	16	104	60	3,00	7	HMC157160LCR30
16,0	16	104	60	4,00	7	HMC157160LCR40
16,0	16	104	60	5,00	7	HMC157160LCR50

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

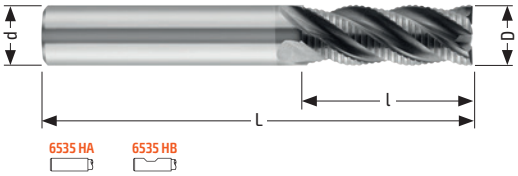
013EV

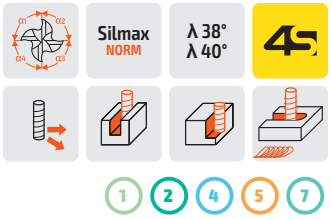
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	013EVR						013EVR/013EV					
					 Df = 1,60 D ÷ 1,90 D			1,00 D			0,50 D		
Inox ferritico / Ferritic stainless steel		Rampa lineare/Straight ramp α=24°			Rampa elicoidale/Helical ramp α=20°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=60			Vc=70			Vc=60			Vc=70		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,009	229	6366	0,010	297	7427
	4,0	-	-	-	-	-	-	0,012	229	4775	0,016	357	5570
	5,0	-	-	-	-	-	-	0,017	260	3820	0,021	374	4456
	6,0	0,022	280	3183	0,026	386	3714	0,022	280	3183	0,026	386	3714
	7,0	-	-	-	-	-	-	0,033	360	2728	0,037	471	3183
	8,0	0,038	363	2387	0,042	468	2785	0,038	363	2387	0,042	468	2785
	9,0	-	-	-	-	-	-	0,041	348	2122	0,045	446	2476
	10,0	0,041	313	1910	0,045	401	2228	0,041	313	1910	0,045	401	2228
	12,0	0,045	286	1592	0,049	364	1857	0,045	286	1592	0,049	364	1857
	14,0	-	-	-	-	-	-	0,048	262	1364	0,052	331	1592
	16,0	0,052	248	1194	0,056	312	1393	0,052	248	1194	0,056	312	1393
	20,0	-	-	-	-	-	-	0,062	237	955	0,066	294	1114
Inox austenitico / Austenitic stainless Steel		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=15°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=50			Vc=55			Vc=50			Vc=55		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,009	191	5305	0,010	233	5836
	4,0	-	-	-	-	-	-	0,012	191	3979	0,016	280	4377
	5,0	-	-	-	-	-	-	0,017	216	3183	0,021	294	3501
	6,0	0,022	233	2653	0,026	303	2918	0,022	233	2653	0,026	303	2918
	7,0	-	-	-	-	-	-	0,033	300	2274	0,037	370	2501
	8,0	0,038	302	1989	0,042	368	2188	0,038	302	1989	0,042	368	2188
	9,0	-	-	-	-	-	-	0,041	290	1768	0,045	350	1945
	10,0	0,041	261	1592	0,045	315	1751	0,041	261	1592	0,045	315	1751
	12,0	0,045	239	1326	0,049	286	1459	0,045	239	1326	0,049	286	1459
	14,0	-	-	-	-	-	-	0,048	218	1137	0,052	260	1251
	16,0	0,052	207	995	0,056	245	1094	0,052	207	995	0,056	245	1094
	20,0	-	-	-	-	-	-	0,062	197	796	0,066	231	875
Titanio / Titanium		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=12°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=40			Vc=45			Vc=40			Vc=45		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,012	204	4244	0,014	267	4775
	4,0	-	-	-	-	-	-	0,018	229	3183	0,020	286	3581
	5,0	-	-	-	-	-	-	0,024	244	2546	0,030	344	2865
	6,0	0,032	272	2122	0,040	382	2387	0,032	272	2122	0,040	382	2387
	7,0	-	-	-	-	-	-	0,037	269	1819	0,045	368	2046
	8,0	0,042	267	1592	0,050	358	1790	0,042	267	1592	0,050	358	1790
	9,0	-	-	-	-	-	-	0,045	255	1415	0,054	344	1592
	10,0	0,049	250	1273	0,060	344	1432	0,049	250	1273	0,060	344	1432
	12,0	0,054	229	1061	0,067	320	1194	0,054	229	1061	0,067	320	1194
	14,0	-	-	-	-	-	-	0,060	218	909	0,071	291	1023
	16,0	0,063	201	796	0,078	279	895	0,063	201	796	0,078	279	895
	20,0	-	-	-	-	-	-	0,067	171	637	0,085	244	716
PH Duplex		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=12°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=40			Vc=45			Vc=40			Vc=45		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,009	153	4244	0,010	191	4775
	4,0	-	-	-	-	-	-	0,012	153	3183	0,016	229	3581
	5,0	-	-	-	-	-	-	0,017	173	2546	0,021	241	2865
	6,0	0,022	187	2122	0,026	248	2387	0,022	187	2122	0,026	248	2387
	7,0	-	-	-	-	-	-	0,033	240	1819	0,037	303	2046
	8,0	0,038	242	1592	0,042	301	1790	0,038	242	1592	0,042	301	1790
	9,0	-	-	-	-	-	-	0,041	232	1415	0,045	286	1592
	10,0	0,041	209	1273	0,045	258	1432	0,041	209	1273	0,045	258	1432
	12,0	0,045	191	1061	0,049	234	1194	0,045	191	1061	0,049	234	1194
	14,0	-	-	-	-	-	-	0,048	175	909	0,052	213	1023
	16,0	0,052	166	796	0,056	201	895	0,052	166	796	0,056	201	895
	20,0	-	-	-	-	-	-	0,062	158	637	0,066	189	716

013EV

Fresa 4 taglienti a rompitruciolo con eliche differenziate e divisione irregolare
4 flute roughing end mill with chip breaker, variable helix and unequal flute spacing



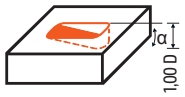
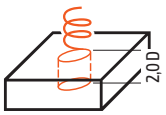


45°

D h10	d h6	L	l ap	45°	6535	Z	Balinit® Alcrona
3,0	6	57	6,0	0,15	HA	3	HMG013F03EV
4,0	6	57	8,0	0,15	HA	3	HMG013F04EV
5,0	6	57	10,0	0,15	HA	3	HMG013F05EV
6,0	6	57	15,0	0,15	HA	4	HMG013F06EV
8,0	8	63	20,0	0,20	HA	4	HMG013F08EV
10,0	10	72	25,0	0,30	HA	4	HMG013F10EV
12,0	12	83	30,0	0,40	HB	4	HMG013F12EV
14,0	14	92	35,0	0,45	HB	4	HMG013F14EV
16,0	16	104	40,0	0,50	HB	4	HMG013F16EV
20,0	20	104	40,0	0,60	HB	4	HMG013F20EV
16,0	16	104	48,0	0,50	HA	6	HMG013F16EVZ6
20,0	20	134	60,0	0,60	HA	6	HMG013F20EVZ6

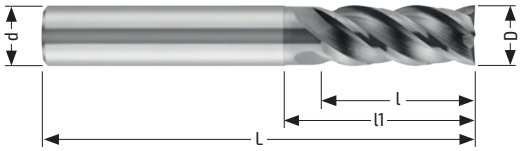
113EV

Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter	113EVR						113EVR/113EV					
					 Df = 1,60 D ÷ 1,90 D			1,00 D			0,50 D		
Inox ferritico Ferritic stainless steel		Rampa lineare/Straight ramp α=24°			Rampa elicoidale/Helical ramp α=20°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=60			Vc=70			Vc=60			Vc=70		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,010	255	6369	0,012	357	7431
	4,0	0,015	286	4775	0,020	446	5570	0,015	286	4775	0,020	446	5570
	5,0	-	-	-	-	-	-	0,019	290	3820	0,030	535	4456
	6,0	0,026	331	3183	0,040	594	3714	0,026	331	3183	0,040	594	3714
	7,0	-	-	-	-	-	-	0,031	338	2728	0,045	573	3183
	8,0	0,035	334	2387	0,050	557	2785	0,035	334	2387	0,050	557	2785
	9,0	-	-	-	-	-	-	0,039	331	2122	0,054	535	2476
	10,0	0,042	321	1910	0,060	535	2228	0,042	321	1910	0,060	535	2228
	12,0	0,047	299	1592	0,067	498	1857	0,047	299	1592	0,067	498	1857
	14,0	-	-	-	-	-	-	0,050	273	1364	0,071	452	1592
	16,0	0,054	258	1194	0,078	434	1393	0,054	258	1194	0,078	434	1393
	20,0	-	-	-	-	-	-	0,058	222	955	0,085	379	1114
Inox austenitico Austenitic stainless Steel		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=15°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=50			Vc=55			Vc=50			Vc=55		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,010	212	5308	0,012	280	5839
	4,0	0,012	191	3979	0,020	350	4377	0,012	191	3979	0,02	350	4377
	5,0	-	-	-	-	-	-	0,017	216	3183	0,03	420	3501
	6,0	0,022	233	2653	0,040	467	2918	0,022	233	2653	0,04	467	2918
	7,0	-	-	-	-	-	-	0,027	246	2274	0,045	450	2501
	8,0	0,031	247	1989	0,050	438	2188	0,031	247	1989	0,05	438	2188
	9,0	-	-	-	-	-	-	0,035	248	1768	0,054	420	1945
	10,0	0,037	236	1592	0,060	420	1751	0,037	236	1592	0,06	420	1751
	12,0	0,041	218	1326	0,067	391	1459	0,041	218	1326	0,067	391	1459
	14,0	-	-	-	-	-	-	0,046	209	1137	0,071	355	1251
	16,0	0,050	199	995	0,078	341	1094	0,050	199	995	0,078	341	1094
	20,0	-	-	-	-	-	-	0,052	166	796	0,085	298	875
Titanio Titanium		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=12°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=40			Vc=45			Vc=40			Vc=45		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,010	170	4246	0,012	229	4777
	4,0	0,015	191	3183	0,012	172	3581	0,015	191	3183	0,012	172	3581
	5,0	-	-	-	-	-	-	0,019	194	2546	0,014	160	2865
	6,0	0,026	221	2122	0,017	162	2387	0,026	221	2122	0,017	162	2387
	7,0	-	-	-	-	-	-	0,031	226	1819	0,020	164	2046
	8,0	0,035	223	1592	0,022	158	1790	0,035	223	1592	0,022	158	1790
	9,0	-	-	-	-	-	-	0,039	221	1415	0,024	153	1592
	10,0	0,042	214	1273	0,026	149	1432	0,042	214	1273	0,026	149	1432
	12,0	0,047	199	1061	0,031	148	1194	0,047	199	1061	0,031	148	1194
	14,0	-	-	-	-	-	-	0,050	182	909	0,035	143	1023
	16,0	0,054	172	796	0,040	143	895	0,054	172	796	0,040	143	895
	20,0	-	-	-	-	-	-	0,058	148	637	0,045	129	716
PH Duplex		Rampa lineare/Straight ramp α=18°			Rampa elicoidale/Helical ramp α=12°			Cava/Slot			Contornitura/Side milling		
	m/min	Vc=40			Vc=145			Vc=40			Vc=45		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	-	-	-	0,010	170	4246	0,012	229	4777
	4,0	0,012	153	3183	0,020	286	3581	0,012	153	3183	0,020	286	3581
	5,0	-	-	-	-	-	-	0,017	173	2546	0,030	344	2865
	6,0	0,022	187	2122	0,040	382	2387	0,022	187	2122	0,040	382	2387
	7,0	-	-	-	-	-	-	0,027	196	1819	0,045	368	2046
	8,0	0,031	197	1592	0,050	358	1790	0,031	197	1592	0,050	358	1790
	9,0	-	-	-	-	-	-	0,035	198	1415	0,054	344	1592
	10,0	0,037	188	1273	0,060	344	1432	0,037	188	1273	0,060	344	1432
	12,0	0,041	174	1061	0,067	320	1194	0,041	174	1061	0,067	320	1194
	14,0	-	-	-	-	-	-	0,046	167	909	0,071	291	1023
	16,0	0,050	159	796	0,078	279	895	0,050	159	796	0,078	279	895
	20,0	-	-	-	-	-	-	0,052	132	637	0,085	244	716

113EV

Fresa 4 taglienti con eliche differenziate e divisione irregolare
4 flute end mill with variable helix and unequal flute spacing



6527 L
6528

λ 38°
λ 40°

45°

D h10	d h6	L	l ap	l1	a	45° +0,05/+0	Z	Balinit® Alcrona
3,0	6	57	8,0	-	-	0,05	4	HMG113030REV
4,0	4	50	11,0	16,0	0,10	0,05	4	HMG113040EV
4,0	6	57	11,0	-	-	0,05	4	HMG113040REV
5,0	5	50	13,0	18,0	0,10	0,05	4	HMG113050EV
5,0	6	57	13,0	-	-	0,05	4	HMG113050REV
6,0	6	57	13,0	20,0	0,15	0,05	4	HMG113060EV
7,0	7	60	16,0	22,0	0,15	0,05	4	HMG113070EV
8,0	8	63	19,0	25,0	0,15	0,05	4	HMG113080EV
9,0	9	67	19,0	28,0	0,15	0,05	4	HMG113090EV
10,0	10	72	22,0	30,0	0,15	0,05	4	HMG113100EV
12,0	12	83	26,0	36,0	0,20	0,05	4	HMG113120EV
14,0	14	83	26,0	36,0	0,20	0,05	4	HMG113140EV
16,0	16	92	32,0	42,0	0,20	0,05	4	HMG113160EV
20,0	20	104	38,0	52,0	0,20	0,05	4	HMG113200EV

Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Balinit® Alcrona
3,0	6	57	8,0	-	-	0,30	4	HMG113030REV03
3,0	6	57	8,0	-	-	0,50	4	HMG113030REV05
4,0	4	50	11,0	16,0	0,10	0,30	4	HMG113040EV03
4,0	6	57	11,0	-	-	0,30	4	HMG113040REV03
4,0	6	57	11,0	-	-	0,50	4	HMG113040REV05
5,0	6	57	13,0	-	-	0,30	4	HMG113050REV03
5,0	6	57	13,0	-	-	0,50	4	HMG113050REV05
6,0	6	57	13,0	20,0	0,15	0,50	4	HMG113060EV05
6,0	6	57	13,0	20,0	0,15	1,00	4	HMG113060EV10
8,0	8	63	19,0	25,0	0,15	0,50	4	HMG113080EV05
10,0	10	72	22,0	30,0	0,15	0,50	4	HMG113100EV05
10,0	10	72	22,0	30,0	0,15	1,00	4	HMG113100EV10
12,0	12	83	26,0	36,0	0,20	1,00	4	HMG113120EV10

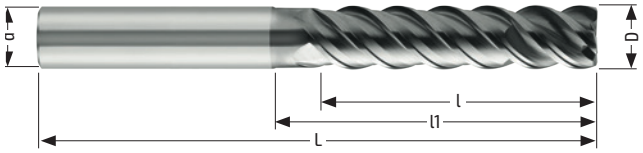
Materiale / Material	Diametro / Diameter	1,00 D 1,00 D			FULL l 0,05 D		
Acciaio <800 N/mm² Steel <800 N/mm²	m/min	Vc=130			Vc=250		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,004	221	13800	0,030	3185	26539
	4,0	0,010	414	10350	0,060	4777	19904
	6,0	0,015	414	6900	0,090	4777	13270
	8,0	0,020	414	5175	0,150	5971	9952
	10,0	0,030	497	4140	0,200	6369	7962
	12,0	0,035	483	3450	0,250	6635	6635
	16,0	0,040	414	2588	0,250	4976	4976
Acciaio <1000 N/mm² - Ghisa Steel <1000 N/mm² - Cast iron	m/min	Vc=100			Vc=190		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,004	170	10616	0,030	2420	20170
	4,0	0,010	318	7962	0,060	3631	15127
	6,0	0,015	318	5308	0,090	3631	10085
	8,0	0,020	318	3981	0,150	4538	7564
	10,0	0,030	382	3185	0,200	4841	6051
	12,0	0,035	372	2654	0,250	5042	5042
	16,0	0,040	318	1990	0,250	3782	3782
Acciaio <1300 N/mm² Steel <1300 N/mm²	m/min	Vc=80			Vc=160		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,004	136	8493	0,030	2038	16985
	4,0	0,010	255	6369	0,060	3057	12739
	6,0	0,015	255	4246	0,090	3057	8493
	8,0	0,020	255	3185	0,150	3822	6369
	10,0	0,030	306	2548	0,200	4076	5096
	12,0	0,035	297	2123	0,250	4246	4246
	16,0	0,040	255	1592	0,250	3185	3185
Acciai inossidabili Stainless Steels	m/min	Vc=60			Vc=110		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,004	102	6369	0,030	1401	11677
	4,0	0,010	191	4777	0,060	2102	8758
	6,0	0,015	191	3185	0,090	2102	5839
	8,0	0,020	191	2389	0,150	2627	4379
	10,0	0,030	229	1911	0,200	2803	3503
	12,0	0,035	223	1592	0,250	2919	2919
	16,0	0,040	191	1194	0,250	2189	2189
Titanio Titanium	m/min	Vc=60			Vc=90		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	0,004	102	6369	0,030	1146	9554
	4,0	0,010	191	4777	0,060	1720	7166
	6,0	0,015	191	3185	0,090	1720	4777
	8,0	0,020	191	2389	0,150	2150	3583
	10,0	0,030	229	1911	0,200	2293	2866
	12,0	0,035	223	1592	0,250	2389	2389
	16,0	0,040	191	1194	0,250	1791	1791

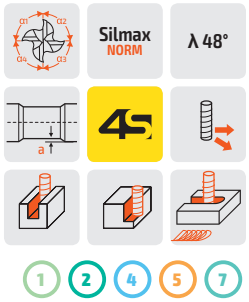
Notes

NEW

158

Fresa 4 taglienti con divisione irregolare e tagliente extra lungo
4 flute end mill with unequal flute spacing extra long version

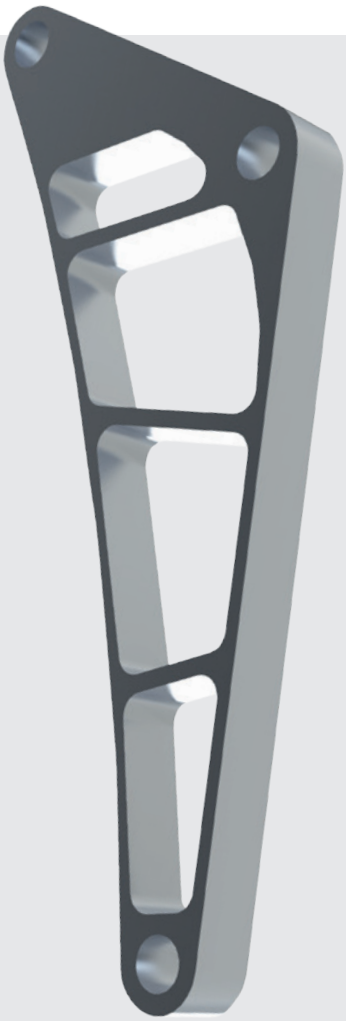




45°

D e8	d h6	L	l ap	l1	a	45°	Z	Balinit® Alcrona
3,0	6	57	12,0	15,0	0,10	0,05	4	HMG158030
4,0	6	63	16,0	20,0	0,10	0,05	4	HMG158040
5,0	6	70	20,0	25,0	0,10	0,05	4	HMG158050
6,0	6	70	24,0	30,0	0,15	0,05	4	HMG158060
8,0	8	80	32,0	40,0	0,15	0,10	4	HMG158080
10,0	10	87	40,0	46,0	0,15	0,15	4	HMG158100
12,0	12	108	48,0	58,0	0,20	0,15	4	HMG158120
16,0	16	120	64,0	68,0	0,20	0,20	4	HMG158160

Alluminio
Aluminium



Fresa 3 taglienti serie normale con divisone irregolare
3 flute end mill, regular version with unequal flute spacing

Tool	Material	Component	Operation
HMA125120	7075	Cinematic Part	Slotting

Ap	14 mm
Ae	12 mm
Vc	547 m/min
N	14500 rpm
Fz	0,100 mm
F	4350 mm/min

Rz / 15 h Surface Quality Consistency

● COMPETITORS ● HMA125

Tool N

125

Si ricavano varie tasche passanti su un elemento cinematico (trasmette movimento). Si riporta un grafico che sottolinea come la qualità superficiale (rappresentata dal valore Rz misurato dopo 15 ore di lavoro), risulta più ripetitiva rispetto al competitor che ha una dispersione di valori più ampia.

On a cinematic element are obtained various bottomless pockets. The graph underlines how the surface quality (indicated with RZ value measured after 15 machining hours) appears more consistent than the competitor's one which has a wider scattering of values.

Alluminio e leghe/ Aluminium and Alloys

Alluminio puro / Pure Aluminum

Wrknr	DIN
3.0205	Al99

Leghe malleabili non indurite (30-80HB)
Non-hardened malleable alloys (30-80HB)

Wrknr	DIN
3.0505	AlMn0.5Mg0.5
3.0506	AlMn0.6
3.0515	AlMn1
3.0517	AlMnCu
3.0525	AlMn1Mg0.5
3.0526	AlMn1Mg1
3.0915	AlFeSi
3.3307	Al99.85Mg0.5
3.3308	Al99.5Mg0.5
3.3315	AlMg1
3.3316	AlMg1.5
3.3317	Al99.85Mg1
3.3318	Al99.9Mg1
3.3326	AlMg1.8
3.3345	AlMg4.5
3.3523	AlMg2.5
3.3525	AlMg2Mn03
3.3527	AlMg2Mn0.8
3.3535	AlMg3
3.3537	AlMg2.7Mn
3.3545	AlMg4Mn
3.3547	AlMg4.5Mn
3.3549	AlMg5Mn
3.3555	AlMg5

Leghe malleabili indurite (70-150HB)
Hardened malleable alloys (70-150HB)

Wrknr	DIN
3.0615	AlMgSiPb
3.1255	AlCuSiMn
3.1305	AlCu2.5Mg0.5
3.1325	AlCuMg1
3.1355	AlCuMg2
3.1645	AlCuMgPb
3.1655	AlCuBiPb
3.2307	Al99.85MgSi
3.2315	AlMgSi1
3.3206	AlMgSi0.5
3.3208	Al99.9MgSi
3.3210	AlMgSi0.7
3.3211	AlMg1SiCu
3.4335	AlZn4.5Mg1
3.4337	Al99.8ZnMg
3.4345	AlZnMgCu0.5
3.4365	AlZnMgCu1.5
3.1371	G-AlCu4TiMg

Rame e leghe/ Copper and Alloys

Non Legati / Unalloyed

Wrknr	DIN
2.0040	OF-Cu

Leghe malleabili non indurite
Non-hardened malleable alloys

Wrknr	DIN
2.0205	CuZn0.5

Leghe malleabili indurite
Hardened malleable alloys

Wrknr	DIN
2.0850	CuNi2Be

A truciolo lungo
Long-chip

Wrknr	DIN
2.0220	CuZn5

A truciolo corto
Short-chip

Wrknr	DIN
2.0331	CuZn36Pb1.5

Leghe CuNiZn a truciolo corto
Short-chip CuNiZn alloys

Wrknr	DIN
2.0730	CuNi12Zn24

Leghe a base CuNi
CuNi-based alloys

Wrknr	DIN
2.0830	CuNi25

Resina Termo Plastica/ Thermoplastics

Leghe malleabili non indurite (30-80HB)
Non-hardened malleable alloys (30-80HB)

Wrknr	DIN
PE	Baylon
PP	Daplen
PVC	Coroplast
PS	Hostyron
PMMA	Acrylglas
PTFE	Hostaflon
PA	Akulon
PC	Makralon
PI	-
PF	Alberit
MF	Albanit
UF	Bakelite
PUR	Baydur
SI	Baysilon
UP	Alpolit
UP	Viapal
EP	Araldit
BFK	-
CFK	-
GFK	-
MFK	-
SFK	-

175/177* (*) Parametri di lavoro da ridurre del 15% / Working parameters to be reduced by 15%

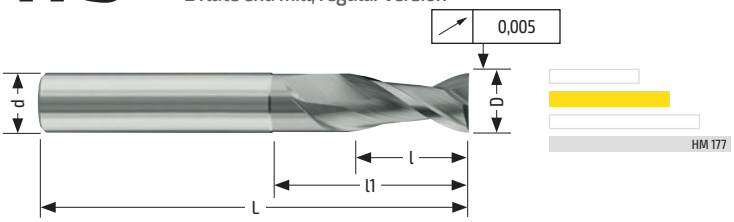
Parametri di lavoro / Working Parameters

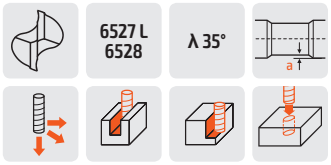
Materiale / Material	Diametro / Diameter	1,00 D 0,50 D			0,50 D 1,50 D		
	m/min	Vc=600			Vc=800		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Alluminio e leghe / Aluminium & Alloys	2,0	0,010	1910	95493	0,010	2546	127324
	3,0	0,016	2037	63662	0,016	2716	84883
	4,0	0,025	2387	47746	0,025	3183	63662
	5,0	0,040	3056	38197	0,040	4074	50930
	6,0	0,060	3820	31831	0,060	5093	42441
	8,0	0,075	3581	23873	0,075	4775	31831
	10,0	0,100	3820	19099	0,100	5093	25465
	12,0	0,120	3820	15915	0,120	5093	21221
	14,0	0,135	3683	13642	0,135	4911	18189
	16,0	0,150	3581	11937	0,150	4775	15915
	20,0	0,175	3342	9549	0,175	4456	12732
	25,0	0,200	3056	7639	0,200	4074	10186
	m/min	Vc=370			Vc=500		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Rame e leghe / Copper & Alloys	2,0	0,010	1178	58887	0,010	1592	79577
	3,0	0,016	1256	39258	0,016	1698	53052
	4,0	0,025	1472	29444	0,025	1989	39789
	5,0	0,040	1884	23555	0,040	2546	31831
	6,0	0,060	2355	19629	0,060	3183	26526
	8,0	0,075	2208	14722	0,075	2984	19894
	10,0	0,100	2355	11777	0,100	3183	15915
	12,0	0,120	2355	9815	0,120	3183	13263
	14,0	0,135	2271	8412	0,135	3069	11368
	16,0	0,150	2208	7361	0,150	2984	9947
	20,0	0,175	2061	5889	0,175	2785	7958
	25,0	0,200	1884	4711	0,200	2546	6366
	m/min	Vc=450			Vc=600		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
Resina termoplastica / Thermoplastics	2,0	0,010	1432	71620	0,010	1910	95493
	3,0	0,016	1528	47746	0,016	2037	63662
	4,0	0,025	1790	35810	0,025	2387	47746
	5,0	0,040	2292	28648	0,040	3056	38197
	6,0	0,060	2865	23873	0,060	3820	31831
	8,0	0,075	2686	17905	0,075	3581	23873
	10,0	0,100	2865	14324	0,100	3820	19099
	12,0	0,120	2865	11937	0,120	3820	15915
	14,0	0,135	2762	10231	0,135	3683	13642
	16,0	0,150	2686	8952	0,150	3581	11937
	20,0	0,175	2507	7162	0,175	3342	9549
	20,0	0,175	2507	7162	0,175	3342	9549

Notes

175

Fresa 2 taglienti serie normale
2 flute end mill, regular version





6

90°

D h6	d h6	L	l ap	l1	a	90°	Z	Non rivestito Uncoated	AluSpeed®
2,0	3	50	6,0	-	-	-	2	HM0175020	HMA175020
3,0	3	50	7,0	18,0	0,10	-	2	HM0175030	HMA175030
4,0	4	50	8,0	19,0	0,10	-	2	HM0175040	HMA175040
5,0	5	50	10,0	21,0	0,10	-	2	HM0175050	HMA175050
6,0	6	57	10,0	21,0	0,15	-	2	HM0175060	HMA175060
8,0	8	63	16,0	27,0	0,15	-	2	HM0175080	HMA175080
10,0	10	72	19,0	30,0	0,15	-	2	HM0175100	HMA175100
12,0	12	83	22,0	38,0	0,20	-	2	HM0175120	HMA175120
14,0	14	83	22,0	38,0	0,20	-	2	HM0175140	HMA175140
16,0	16	92	26,0	42,0	0,20	-	2	HM0175160	HMA175160
20,0	20	104	32,0	54,0	0,20	-	2	HM0175200	HMA175200
25,0	25	121	40,0	68,0	0,20	-	2	HM0175250	HMA175250

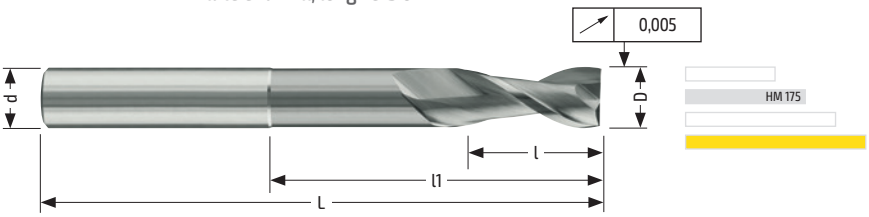
Cr

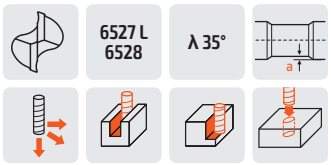
D h10	d h6	L	l ap	l1	a	Cr	Z	Non rivestito Uncoated	AluSpeed®
2,0	3	50	6,0	-	-	0,30	2	HM0175020CR03	HMA175020CR03
3,0	3	50	7,0	18,0	0,10	0,30	2	HM0175030CR03	HMA175030CR03
4,0	4	50	8,0	19,0	0,10	0,30	2	HM0175040CR03	HMA175040CR03
4,0	4	50	8,0	19,0	0,10	0,50	2	HM0175040CR05	HMA175040CR05
5,0	5	50	10,0	21,0	0,10	0,50	2	HM0175050CR05	HMA175050CR05
6,0	6	57	10,0	21,0	0,15	0,50	2	HM0175060CR05	HMA175060CR05
8,0	8	63	16,0	27,0	0,15	0,50	2	HM0175080CR05	HMA175080CR05
8,0	8	63	16,0	27,0	0,15	0,80	2	HM0175080CR08	HMA175080CR08
10,0	10	72	19,0	30,0	0,15	0,50	2	HM0175100CR05	HMA175100CR05
10,0	10	72	19,0	30,0	0,15	1,00	2	HM0175100CR10	HMA175100CR10
12,0	12	83	22,0	38,0	0,20	1,00	2	HM0175120CR10	HMA175120CR10
12,0	12	83	22,0	38,0	0,20	1,50	2	HM0175120CR15	HMA175120CR15
14,0	14	83	22,0	38,0	0,20	1,50	2	HM0175140CR15	HMA175140CR15
16,0	16	92	26,0	42,0	0,20	1,00	2	HM0175160CR10	HMA175160CR10
16,0	16	92	26,0	42,0	0,20	1,50	2	HM0175160CR15	HMA175160CR15
20,0	20	104	32,0	54,0	0,20	2,00	2	HM0175200CR20	HMA175200CR20

NEW

177

Fresa 2 taglienti serie lunga
2 flute end mill, long version





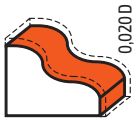
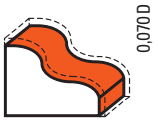
6

90°

D h10	d h6	L	l ap	l1	a	Z	Non rivestito Uncoated	AluSpeed®
6,0	6	75	13,0	32,0	0,15	2	HM0177060	HMA177060
8,0	8	78	19,0	42,0	0,15	2	HM0177080	HMA177080
10,0	10	104	22,0	55,0	0,15	2	HM0177100	HMA177100
12,0	12	110	26,0	64,0	0,20	2	HM0177120	HMA177120
16,0	16	130	32,0	75,0	0,20	2	HM0177160	HMA177160
20,0	20	150	38,0	90,0	0,20	2	HM0177200	HMA177200

735/765

Parametri di lavoro / Working Parameters

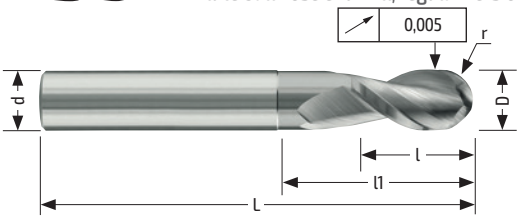
Materiale / Material	Diametro / Diameter	735			765		
							
Alluminio e leghe / Aluminium & Alloys	m/min	Vc=650			Vc=800		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	0,022	3737	84926
	4,0	-	-	-	0,035	4459	63694
	6,0	0,055	3793	34484	0,055	4669	42441
	8,0	0,080	4138	25863	0,080	5093	31831
	10,0	0,100	4138	20690	0,100	5093	25465
	12,0	0,120	4138	17242	0,120	5093	21221
	16,0	0,130	3362	12931	0,130	4138	15915
	20,0	-	-	-	0,180	4584	12732
Rame e leghe / Copper & Alloys	m/min	Vc=450			Vc=500		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	0,022	2335	53079
	4,0	-	-	-	0,035	2787	39809
	6,0	0,055	2626	23873	0,055	2918	26526
	8,0	0,080	2865	17905	0,080	3183	19894
	10,0	0,100	2865	14324	0,100	3183	15915
	12,0	0,120	2865	11937	0,120	3183	13263
	16,0	0,130	2328	8952	0,130	2586	9947
	20,0	-	-	-	0,180	2865	7958
Resina termoplastica / Thermoplastics	m/min	Vc=500			Vc=600		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	3,0	-	-	-	0,022	2803	63694
	4,0	-	-	-	0,035	3344	47771
	6,0	0,055	2918	26526	0,055	3501	31831
	8,0	0,080	3183	19894	0,080	3820	23873
	10,0	0,100	3183	15915	0,100	3820	19099
	12,0	0,120	3183	13263	0,120	3820	15915
	16,0	0,130	2586	9947	0,130	3104	11937
	20,0	-	-	-	0,180	3438	9549

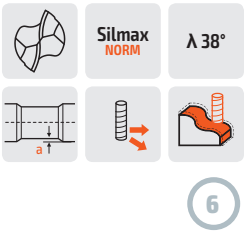
Notes

NEW

735

Fresa 2 taglienti serie normale semisferica
2 flute ball nose end mill, regular version



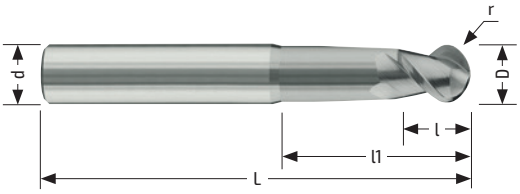


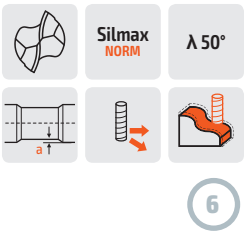
6

D h6	d h6	L	l ap	l1	a	r +/- 0,01	Z	Non rivestito Uncoated	AluSpeed®
6,0	6	57	10,0	21,0	0,15	3,00	2	HM0735060	HMA735060
8,0	8	63	16,0	27,0	0,15	4,00	2	HM0735080	HMA735080
10,0	10	72	19,0	30,0	0,15	5,00	2	HM0735100	HMA735100
12,0	12	83	22,0	38,0	0,20	6,00	2	HM0735120	HMA735120
16,0	16	92	26,0	42,0	0,20	8,00	2	HM0735160	HMA735160

765

Fresa 2 taglienti semisferica per elevate asportazioni
2 flute ball nose end mill, for high chip removal





6

D h10	d h6	L	l ap	l1	a	r f8	Z	Non rivestito Uncoated	AluSpeed®
3,0	3	50	3,0	22,0	0,15	1,50	2	HM0765030	HMA765030
4,0	4	50	4,0	22,0	0,20	2,00	2	HM0765040	HMA765040
5,0	5	50	5,0	22,0	0,20	2,50	2	HM0765050	HMA765050
6,0	6	57	6,0	21,0	0,25	3,00	2	HM0765060	HMA765060
8,0	8	63	8,0	27,0	0,35	4,00	2	HM0765080	HMA765080
10,0	10	72	10,0	32,0	0,50	5,00	2	HM0765100	HMA765100
12,0	12	83	12,0	38,0	0,50	6,00	2	HM0765120	HMA765120
16,0	16	92	16,0	44,0	0,80	8,00	2	HM0765160	HMA765160
20,0	20	104	20,0	54,0	0,90	10,00	2	HM0765200	HMA765200

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

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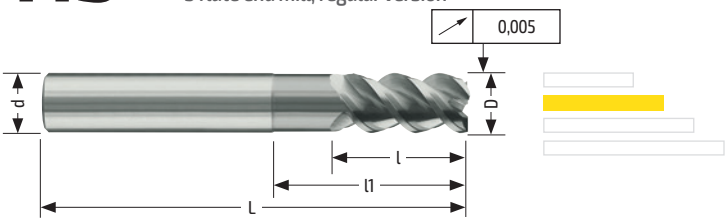
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter			
Alluminio e leghe / Aluminium & Alloys	m/min	Vc=800		
	D mm	fz mm/z	F mm/min	n rpm
	4,0	0,020	3820	63662
	5,0	0,035	5348	50930
	6,0	0,050	6366	42441
	8,0	0,070	6685	31831
	10,0	0,090	6875	25465
	12,0	0,105	6685	21221
	14,0	0,110	6002	18189
	16,0	0,130	6207	15915
	20,0	0,160	6112	12732
Rame e leghe / Copper & Alloys	m/min	Vc=500		
	D mm	fz mm/z	F mm/min	n rpm
	4,0	0,020	2387	39789
	5,0	0,035	3342	31831
	6,0	0,050	3979	26526
	8,0	0,070	4178	19894
	10,0	0,090	4297	15915
	12,0	0,105	4178	13263
	14,0	0,110	3752	11368
	16,0	0,130	3879	9947
	20,0	0,160	3820	7958
Resina termoplastica / Thermoplastics	m/min	Vc=600		
	D mm	fz mm/z	F mm/min	n rpm
	4,0	0,020	2865	47746
	5,0	0,035	4011	38197
	6,0	0,050	4775	31831
	8,0	0,070	5013	23873
	10,0	0,090	5157	19099
	12,0	0,105	5013	15915
	14,0	0,110	4502	13642
	16,0	0,130	4655	11937
	20,0	0,160	4584	9549

Notes

115

Fresa 3 taglienti serie normale
3 flute end mill, regular version



6527 L
6528

λ 55°

6

90°

D h6	d h6	L	l ap	l1	a	90°	Z	Non rivestito Uncoated	AluSpeed®
4,0	4	50	8,0	19,0	0,10	-	3	HM0115040	HMA115040
5,0	5	50	10,0	21,0	0,10	-	3	HM0115050	HMA115050
6,0	6	57	10,0	21,0	0,15	-	3	HM0115060	HMA115060
7,0	7	60	13,0	24,0	0,15	-	3	HM0115070	HMA115070
8,0	8	63	16,0	27,0	0,15	-	3	HM0115080	HMA115080
9,0	9	67	16,0	27,0	0,15	-	3	HM0115090	HMA115090
10,0	10	72	19,0	30,0	0,15	-	3	HM0115100	HMA115100
12,0	12	83	22,0	38,0	0,20	-	3	HM0115120	HMA115120
14,0	14	83	22,0	38,0	0,20	-	3	HM0115140	HMA115140
16,0	16	92	26,0	42,0	0,20	-	3	HM0115160	HMA115160
20,0	20	104	32,0	54,0	0,20	-	4	HM0115200	HMA115200

Cr

D h10	d h6	L	l ap	l1	a	Cr	Z	Non rivestito Uncoated	AluSpeed®
4,0	4	50	8,0	19,0	0,10	0,30	3	HM0115040CR03	HMA115040CR03
5,0	5	50	10,0	21,0	0,10	0,30	3	HM0115050CR03	HMA115050CR03
6,0	6	57	10,0	21,0	0,15	0,30	3	HM0115060CR03	HMA115060CR03
7,0	7	60	13,0	24,0	0,15	0,30	3	HM0115070CR03	HMA115070CR03
8,0	8	63	16,0	27,0	0,15	0,30	3	HM0115080CR03	HMA115080CR03
9,0	9	67	16,0	27,0	0,15	0,50	3	HM0115090CR05	HMA115090CR05
10,0	10	72	19,0	30,0	0,15	0,50	3	HM0115100CR05	HMA115100CR05
12,0	12	83	22,0	38,0	0,20	0,50	3	HM0115120CR05	HMA115120CR05
14,0	14	83	22,0	38,0	0,20	1,00	3	HM0115140CR10	HMA115140CR10
16,0	16	92	26,0	42,0	0,20	1,00	3	HM0115160CR10	HMA115160CR10
20,0	20	104	32,0	54,0	0,20	1,00	4	HM0115200CR10	HMA115200CR10

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

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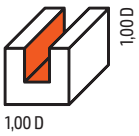
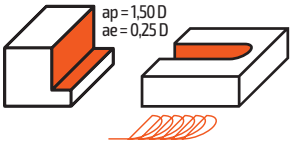
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter						
	m/min	Vc=600			Vc=800		
	D mm	**fz** mm/z	**F** mm/min	**n** rpm	**fz** mm/z	**F** mm/min	**n** rpm
Alluminio e leghe / Aluminium & Alloys	3,0	0,012	2292	63662	0,012	3056	84883
	4,0	0,020	2865	47746	0,020	3820	63662
	5,0	0,035	4011	38197	0,035	5348	50930
	6,0	0,050	4775	31831	0,050	6366	42441
	8,0	0,070	5013	23873	0,070	6685	31831
	10,0	0,090	5157	19099	0,090	6875	25465
	12,0	0,105	5013	15915	0,105	6685	21221
	14,0	0,110	4502	13642	0,110	6002	18189
	16,0	0,130	4655	11937	0,130	6207	15915
	20,0	0,160	4584	9549	0,160	6112	12732
	m/min	Vc=350			Vc=500		
	D mm	**fz** mm/z	**F** mm/min	**n** rpm	**fz** mm/z	**F** mm/min	**n** rpm
Rame e leghe / Copper & Alloys	3,0	0,012	1337	37136	0,012	1910	53052
	4,0	0,020	1671	27852	0,020	2387	39789
	5,0	0,035	2340	22282	0,035	3342	31831
	6,0	0,050	2785	18568	0,050	3979	26526
	8,0	0,070	2924	13926	0,070	4178	19894
	10,0	0,090	3008	11141	0,090	4297	15915
	12,0	0,105	2924	9284	0,105	4178	13263
	14,0	0,110	2626	7958	0,110	3752	11368
	16,0	0,130	2716	6963	0,130	3879	9947
	20,0	0,160	2674	5570	0,160	3820	7958
	m/min	Vc=450			Vc=600		
	D mm	**fz** mm/z	**F** mm/min	**n** rpm	**fz** mm/z	**F** mm/min	**n** rpm
Resina termoplastica / Thermoplastics	3,0	0,012	1719	47746	0,012	2292	63662
	4,0	0,020	2149	35810	0,020	2865	47746
	5,0	0,035	3008	28648	0,035	4011	38197
	6,0	0,050	3581	23873	0,050	4775	31831
	8,0	0,070	3760	17905	0,070	5013	23873
	10,0	0,090	3867	14324	0,090	5157	19099
	12,0	0,105	3760	11937	0,105	5013	15915
	14,0	0,110	3376	10231	0,110	4502	13642
	16,0	0,130	3491	8952	0,130	4655	11937
	20,0	0,160	3438	7162	0,160	4584	9549

Notes

NEW

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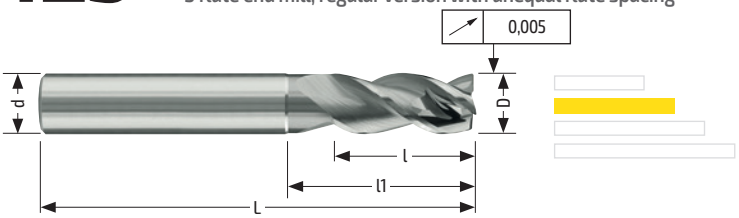
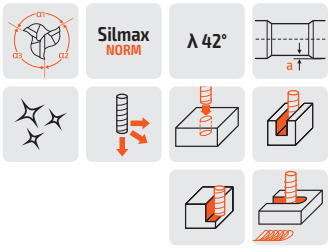
Fresa 3 taglienti serie normale con divisone irregolare
3 flute end mill, regular version with unequal flute spacing





6

45°

D h6	d h6	L	l ap	l1	a	45° +0,05/+0	Z	Non rivestito Uncoated	AluSpeed®
3,0	6	57	8,0	-	-	0,05	3	HM0125030	HMA125030
4,0	6	57	11,0	-	-	0,05	3	HM0125040	HMA125040
5,0	6	57	13,0	-	-	0,10	3	HM0125050	HMA125050
6,0	6	57	13,0	20,0	0,15	0,10	3	HM0125060	HMA125060
8,0	8	63	19,0	25,0	0,15	0,15	3	HM0125080	HMA125080
10,0	10	72	22,0	30,0	0,15	0,20	3	HM0125100	HMA125100
12,0	12	83	26,0	36,0	0,20	0,25	3	HM0125120	HMA125120
16,0	16	92	32,0	42,0	0,20	0,30	3	HM0125160	HMA125160
20,0	20	104	38,0	52,0	0,20	0,35	3	HM0125200	HMA125200

Cr

D h6	d h6	L	l ap	l1	a	Cr	Z	Non rivestito Uncoated	AluSpeed®
6,0	6	57	13,0	20,0	0,15	0,50	3	HM0125060CR05	HMA125060CR05
8,0	8	63	19,0	25,0	0,15	0,50	3	HM0125080CR05	HMA125080CR05
8,0	8	63	19,0	25,0	0,15	1,00	3	HM0125080CR10	HMA125080CR10
10,0	10	72	22,0	30,0	0,15	1,00	3	HM0125100CR10	HMA125100CR10
10,0	10	72	22,0	30,0	0,15	1,50	3	HM0125100CR15	HMA125100CR15
10,0	10	72	22,0	30,0	0,15	2,00	3	HM0125100CR20	HMA125100CR20
12,0	12	83	26,0	36,0	0,20	1,00	3	HM0125120CR10	HMA125120CR10
12,0	12	83	26,0	36,0	0,20	1,50	3	HM0125120CR15	HMA125120CR15
12,0	12	83	26,0	36,0	0,20	2,00	3	HM0125120CR20	HMA125120CR20
16,0	16	92	32,0	42,0	0,20	1,00	3	HM0125160CR10	HMA125160CR10
16,0	16	92	32,0	42,0	0,20	2,00	3	HM0125160CR20	HMA125160CR20
16,0	16	92	32,0	42,0	0,20	3,00	3	HM0125160CR30	HMA125160CR30
20,0	20	104	38,0	52,0	0,20	2,00	3	HM0125200CR20	HMA125200CR20
20,0	20	104	38,0	52,0	0,20	3,00	3	HM0125200CR30	HMA125200CR30

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

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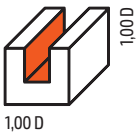
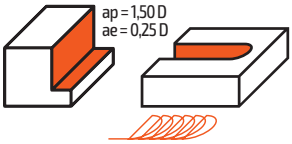
Parametri di lavoro / Working Parameters

Materiale / Material	Diametro / Diameter						
Alluminio e leghe / Aluminium & Alloys	m/min	Vc=600			Vc=800		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,060	5730	31831	0,060	7639	42441
	8,0	0,075	5371	23873	0,075	7162	31831
	10,0	0,100	5730	19099	0,100	7639	25465
	12,0	0,120	5730	15915	0,120	7639	21221
	16,0	0,150	5371	11937	0,150	7162	15915
Rame e leghe / Copper & Alloys	m/min	Vc=350			Vc=500		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,060	3342	18568	0,060	4775	26526
	8,0	0,075	3133	13926	0,075	4476	19894
	10,0	0,100	3342	11141	0,100	4775	15915
	12,0	0,120	3342	9284	0,120	4775	13263
	16,0	0,150	3133	6963	0,150	4476	9947
Resina termoplastica / Thermoplastics	m/min	Vc=450			Vc=600		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,060	4297	23873	0,060	5730	31831
	8,0	0,075	4029	17905	0,075	5371	23873
	10,0	0,100	4297	14324	0,100	5730	19099
	12,0	0,120	4297	11937	0,120	5730	15915
	16,0	0,150	4029	8952	0,150	5371	11937

Notes

NEW

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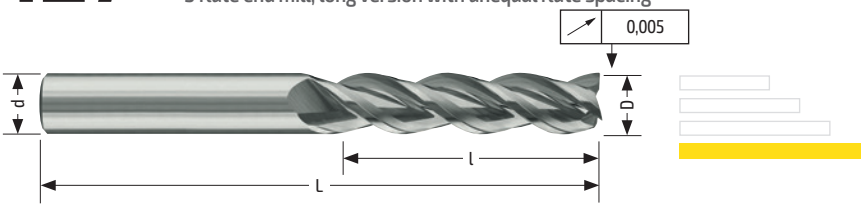
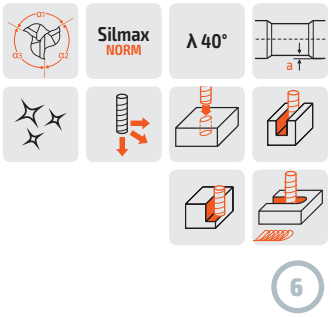
Fresa 3 taglienti serie lunga con divisone irregolare
3 flute end mill, long version with unequal flute spacing





6

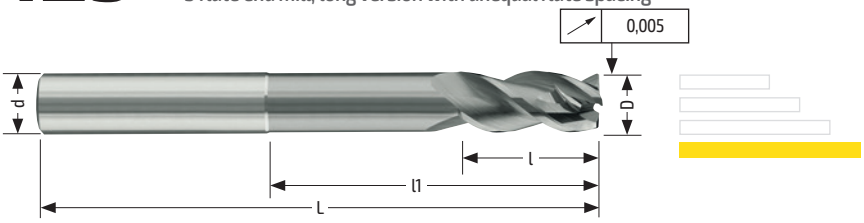
45°

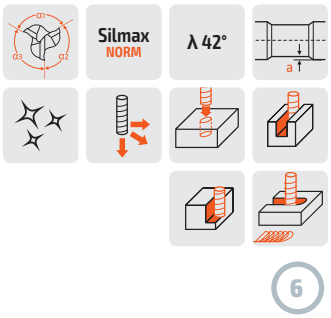
D h6	d h6	L	l ap	45° +0,05/+0	Z	Non rivestito Uncoated	AluSpeed®
6,0	6	75	26,0	0,10	3	HM0127060	HMA127060
8,0	8	78	36,0	0,15	3	HM0127080	HMA127080
10,0	10	104	45,0	0,20	3	HM0127100	HMA127100
12,0	12	110	53,0	0,25	3	HM0127120	HMA127120
16,0	16	130	63,0	0,30	3	HM0127160	HMA127160

NEW

129

Fresa 3 taglienti serie lunga con divisone irregolare
3 flute end mill, long version with unequal flute spacing





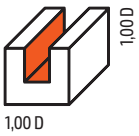
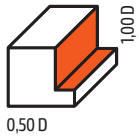
6

45°

D h6	d h6	L	l ap	l1	a	45° +0,05/+0	Z	Non rivestito Uncoated	AluSpeed®
10,0	10	104	22,0	55,0	0,15	0,20	3	HM0129100	HMA129100
12,0	12	110	26,0	64,0	0,20	0,25	3	HM0129120	HMA129120
16,0	16	130	32,0	75,0	0,20	0,30	3	HM0129160	HMA129160

015

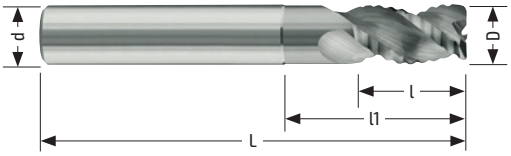
Parametri di lavoro / Working Parameters

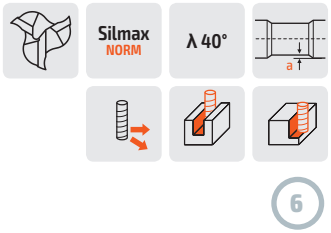
Materiale / Material	Diametro / Diameter	 1,00 D / 1,00 D			 1,00 D / 0,50 D		
Allumino e leghe / Aluminium & Alloys	m/min	Vc=600			Vc=880		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	8,0	0,120	8594	23873	0,110	11555	35014
	10,0	0,150	8594	19099	0,135	11345	28011
	12,0	0,170	8117	15915	0,155	10854	23343
	16,0	0,200	7162	11937	0,185	9716	17507
	20,0	0,230	6589	9549	0,215	9034	14006
Rame e leghe / Copper & Alloys	m/min	Vc=350			Vc=500		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	8,0	0,120	5013	13926	0,110	6565	19894
	10,0	0,150	5013	11141	0,140	6685	15915
	12,0	0,170	4735	9284	0,160	6366	13263
	16,0	0,200	4178	6963	0,190	5670	9947
	20,0	0,230	3844	5570	0,220	5252	7958
Resina termoplastica / Thermoplastics	m/min	Vc=300			Vc=400		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	8,0	0,120	4297	11937	0,110	5252	15915
	10,0	0,150	4297	9549	0,140	5348	12732
	12,0	0,170	4058	7958	0,160	5093	10610
	16,0	0,200	3581	5968	0,190	4536	7958
	20,0	0,230	3295	4775	0,220	4202	6366

Notes

015

Fresa 3 taglienti a sgrossare serie normale con rompitruciolo
3 flute roughing end mill with chip breaker, regular version



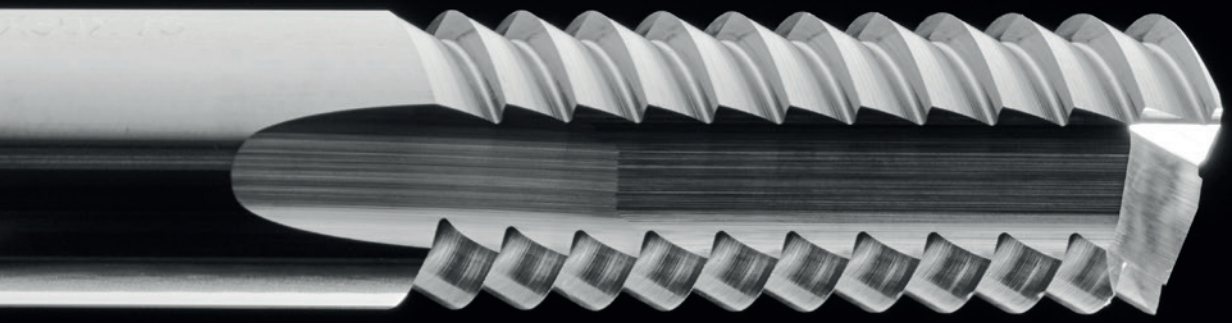


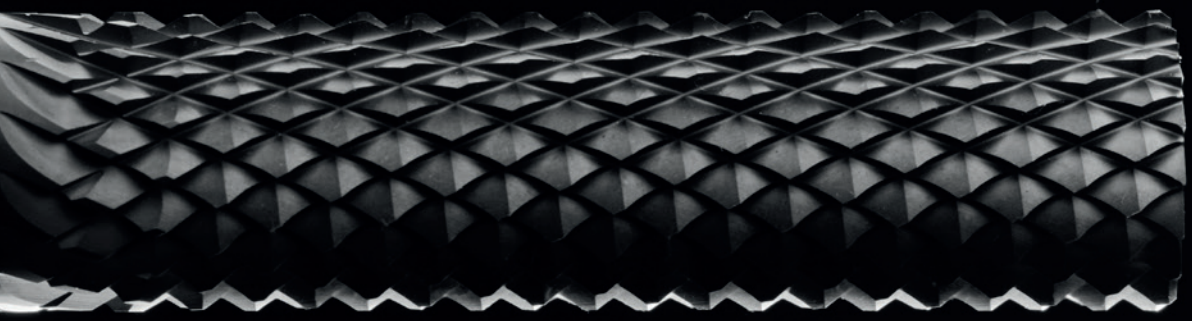
6

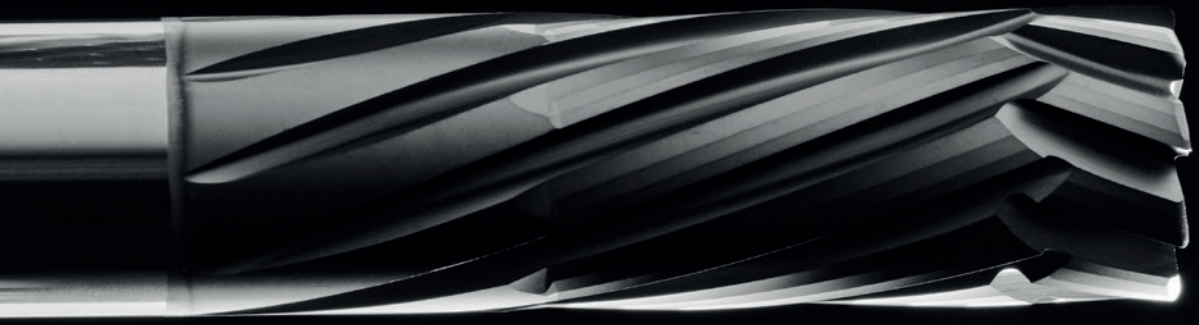
Cr

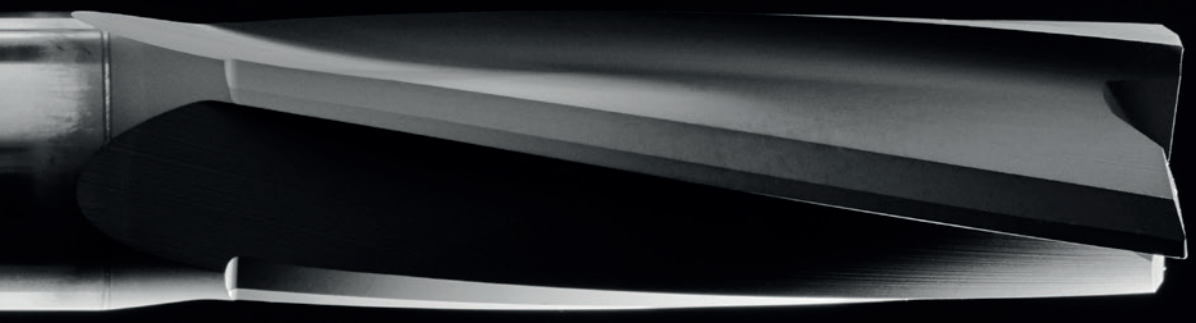
D h10	d h6	L	l ap	l1	a	Cr	Z	Non rivestito Uncoated	AluSpeed®
8,0	8	63	12,0	24,0	0,15	1,00	3	HM0015080	HMA015080
10,0	10	72	15,0	30,0	0,15	1,00	3	HM0015100	HMA015100
12,0	12	83	18,0	36,0	0,20	1,00	3	HM0015120	HMA015120
16,0	16	92	24,0	42,0	0,20	1,00	3	HM0015160	HMA015160
20,0	20	104	30,0	52,0	0,20	1,00	3	HM0015200	HMA015200

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend





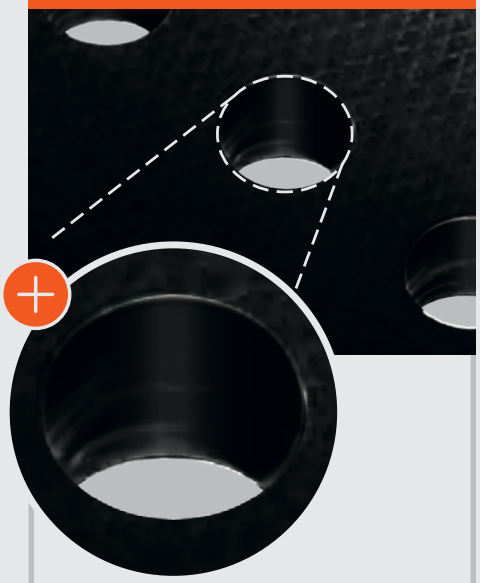




Materiali Compositi
Composite Materials

BUSINESS CASE

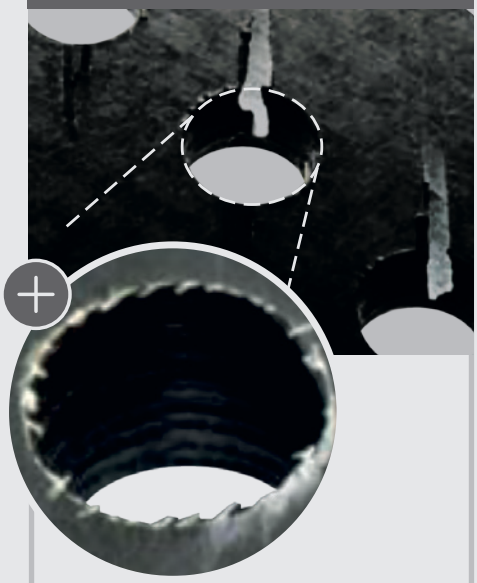
HMC780 **Non delaminato** / Non delaminated



Ottima finitura superficiale del foro

Good quality hole

COMPETITORS **Delaminato** / Delaminated



Scarsa finitura superficiale del foro

Poor quality hole

Tool	Material	Component	Operation
HM0780063	CFRP	Panel	Plunging

780

Punta a geometria frontale

Foratura di pannelli in fibra di carbonio. L'utensile specifico garantisce l'esecuzione dei fori con bordi netti, privi di delaminazioni e fibre non tagliate.

Front geometry drill

Drilling of carbon fiber panels. The drill guarantees clean holes with sharp corners, without delaminations or uncut fibers.

Caratteristiche Geometriche

La geometria a tagli incrociati determina forze di taglio dirette verso l'interno del pannello, eliminando il fenomeno della delaminazione su entrambi i lati.

Geometrical Features

Its cross-cut geometry generates cutting forces directed to the inside of the panel, thus preventing delamination on both sides.

740

Parametri di lavoro / Working Parameters

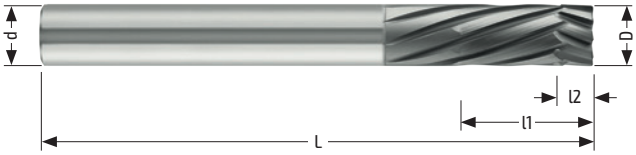
	Diametro / Diameter	CFRP / CFRP Sandwich (Al) / CFRP Sandwich (Ti)								
CFRP		1,00 D / 1,00 D			0,40 D / 1,00 D			0,02 D / 1,00 D		
	m/min	Vc=100			Vc=150			Vc=200		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,018	380	5310	0,036	1145	7960	0,048	2035	10610
	8,0	0,024	575	3980	0,048	1720	5970	0,064	3055	7960
	10,0	0,030	670	3180	0,060	2005	4770	0,080	3565	6370
	12,0	0,036	860	2650	0,072	2580	3980	0,096	4590	5310

	Diametro / Diameter	GRP / GRP Sandwich (Al) / GRP Sandwich (Ti)								
GRP		1,00 D / 0,80 D			0,40 D / 1,00 D			0,20 D / 1,00 D		
	m/min	Vc=50			Vc=75			Vc=100		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	6,0	0,018	190	2650	0,024	380	3980	0,036	765	5310
	8,0	0,024	285	1990	0,032	570	2980	0,048	1145	3980
	10,0	0,030	285	1590	0,040	670	2390	0,060	1335	3180
	12,0	0,036	430	1330	0,048	860	1990	0,072	1715	2650

Notes

740

Fresa ad eliche incrociate
Left / right helix end mill



Silmax NORM

λ 20°
λ' 20°

9

Cr

D h10	d h6	L	l1 ap1	l2 ap2	r	Z	Diamond
6,00	6,00	64	12,0	3,0	0,50	4	HMD740060
6,35	6,35	64	13,0	3,2	0,40	4	HMD740063
8,00	8,00	78	20,0	4,0	0,50	6	HMD740080
9,53	9,53	78	19,0	4,8	0,40	7	HMD740095
10,00	10,00	85	20,0	5,0	0,50	7	HMD740100
12,00	12,00	104	24,0	6,0	0,50	9	HMD740120
12,70	12,70	104	26,0	6,4	0,40	9	HMD740127

1 Acciaio Steel | 2 Ghise Cast Iron | 3 Acciai Temprati Hardened Steel | 4 Acciaio Inox Stainless Steel | 5 Titanio Titanium | 6 Leghe Leggere Light Alloys | 7 PH Duplex | 8 Superleghe Superalloys | 9 Compositi Composite Materials | → 16 Guida alla lettura Reading guide | → 18 Legenda Legend

Caratteristiche Geometriche

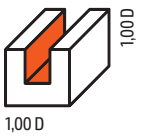
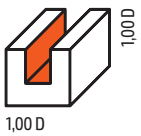
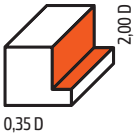
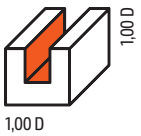
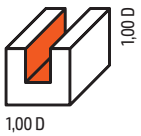
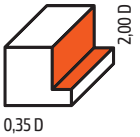
Fresa multi tagliente sviluppata per la lavorazione di pannelli CFRP. La sua geometria di taglio consente l'eliminazione dei fenomeni di delaminazione e sfilacciamento.

Geometrical Features

Multi-flute end mill developed for machining CFRP panels. Its cutting geometry prevents delamination and unravelling.

750/751/752

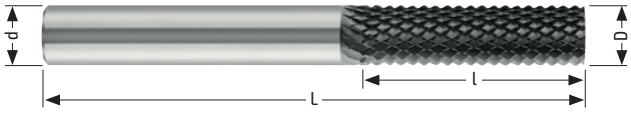
Parametri di lavoro / Working Parameters

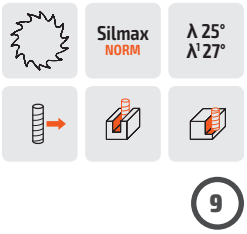
	Diametro Diameter	CFRP / CFRP Sandwich (Al) / CFRP Sandwich (Ti)						Honeycomb					
													
CFRP	m/min	Vc=100			Vc=200			Vc=150			Vc=200		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	-	510	7960	-	1530	15920	-	765	11940	-	1530	15920
	5,0	-	635	6370	-	1910	12730	-	955	9550	-	1910	12730
	6,0	-	765	5310	-	2290	10610	-	1145	7960	-	2290	10610
	8,0	-	890	3980	-	2675	7960	-	1335	5970	-	2675	7960
	10,0	-	1020	3180	-	3060	6370	-	1525	4770	-	3070	6370
	12,0	-	1145	2650	-	3440	5310	-	1720	3980	-	3440	5310
	Diametro Diameter	GRP / GRP Sandwich (Al) / GRP Sandwich (Ti)						Honeycomb					
													
GRP	m/min	Vc=50			Vc=100			Vc=150			Vc=200		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
	4,0	-	255	3980	-	765	7960	-	765	11940	-	1530	15920
	5,0	-	320	3180	-	955	6370	-	955	9550	-	1910	12730
	6,0	-	380	2650	-	1145	5310	-	1145	7960	-	2290	10610
	8,0	-	445	1990	-	1335	3980	-	1335	5970	-	2675	7960
	10,0	-	510	1590	-	1525	3180	-	1525	4770	-	3060	6370
	12,0	-	575	1330	-	1715	2650	-	1720	3980	-	3440	5310

Notes

750

Fresa multitagliente
Multi-flute end mill



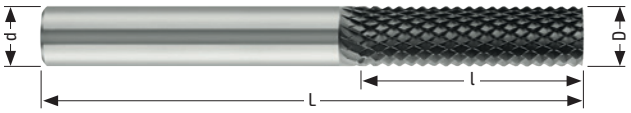


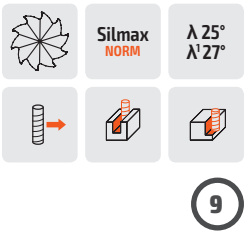
90°

D h10	d h6	L	l ap	Non rivestito Uncoated	Diamond
3,00	3,00	50	9,0	HM0750030	HMD750030
4,00	4,00	50	12,0	HM0750040	HMD750040
5,00	5,00	50	15,0	HM0750050	HMD750050
6,00	6,00	64	18,0	HM0750060	HMD750060
6,35	6,35	64	19,0	HM0750063	HMD750063
8,00	8,00	75	24,0	HM0750080	HMD750080
9,53	9,53	89	29,0	HM0750095	HMD750095
10,00	10,00	85	30,0	HM0750100	HMD750100
12,00	12,00	104	36,0	HM0750120	HMD750120
12,70	12,70	104	38,0	HM0750127	HMD750127

751

Fresa multitagliente con frontale a lamare
Multi-flute end mill with spot-facing end



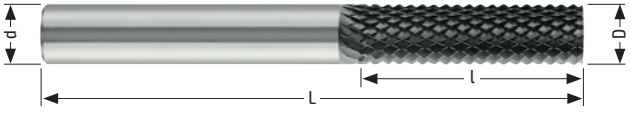


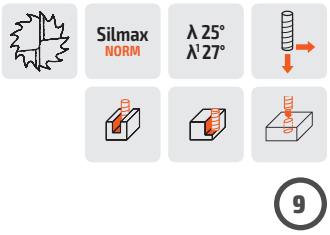
90°

D h10	d h6	L	l ap	Non rivestito Uncoated	Diamond
3,00	3,00	50	9,0	HM0751030	HMD751030
4,00	4,00	50	12,0	HM0751040	HMD751040
5,00	5,00	50	15,0	HM0751050	HMD751050
6,00	6,00	64	18,0	HM0751060	HMD751060
6,35	6,35	64	19,0	HM0751063	HMD751063
8,00	8,00	75	24,0	HM0751080	HMD751080
9,53	9,53	89	29,0	HM0751095	HMD751095
10,00	10,00	85	30,0	HM0751100	HMD751100
12,00	12,00	104	36,0	HM0751120	HMD751120
12,70	12,70	104	38,0	HM0751127	HMD751127

752

Fresa multitagliente con frontale a forare
Multi-flute end mill with drilling end





90°

D h10	d h6	L	l ap	Non rivestito Uncoated	Diamond
3,00	3,00	50	9,0	HM0752030	HMD752030
4,00	4,00	50	12,0	HM0752040	HMD752040
5,00	5,00	50	15,0	HM0752050	HMD752050
6,00	6,00	64	18,0	HM0752060	HMD752060
6,35	6,35	64	19,0	HM0752063	HMD752063
8,00	8,00	75	24,0	HM0752080	HMD752080
9,53	9,53	89	29,0	HM0752095	HMD752095
10,00	10,00	85	30,0	HM0752100	HMD752100
12,00	12,00	104	36,0	HM0752120	HMD752120
12,70	12,70	104	38,0	HM0752127	HMD752127

Caratteristiche Geometriche

Geometria a taglio continuo con basso valore di elica sviluppata per la lavorazione in contornatura e per l'apertura di tasche.

Geometrical Features

Continuous-cut geometry with low helix value for front and side milling and pocketing.

760

Parametri di lavoro / Working Parameters

CFRP

Diametro / Diameter	CFRP / CFRP Sandwich (Al) / CFRP Sandwich (Ti)								
	1,00 D / 1,00 D			0,40 D / 2,00 D			0,10 D / 2,00 D		
m/min	Vc=100			Vc=200			Vc=200		
D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
6,0	0,036	765	5310	0,036	1530	10610	0,030	1275	10610
8,0	0,048	765	3980	0,048	1530	7960	0,040	1275	7960
10,0	0,060	765	3180	0,060	1530	6370	0,050	1275	6370
12,0	0,072	765	2650	0,072	1530	5310	0,060	1275	5310
16,0	0,096	765	1990	0,096	1530	3980	0,080	1275	3980
20,0	0,120	765	1590	0,120	1525	3180	0,100	1270	3180

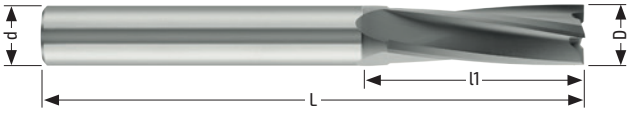
GRP

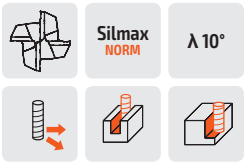
Diametro / Diameter	GRP / GRP Sandwich (Al) / GRP Sandwich (Ti)								
	1,00 D / 0,70 D			0,30 D / 2,00 D			0,10 D / 2,00 D		
m/min	Vc=50			Vc=100			Vc=100		
D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
6,0	0,024	255	2650	0,024	510	5310	0,018	380	5310
8,0	0,032	255	1990	0,032	510	3980	0,024	380	3980
10,0	0,040	255	1590	0,040	510	3180	0,030	380	3180
12,0	0,048	255	1330	0,048	510	2650	0,036	380	2650
16,0	0,064	255	990	0,064	510	1990	0,048	380	1990
20,0	0,080	255	800	0,080	510	1590	0,060	380	1590

Notes

760

Fresa con geometria a taglio continuo
End mill with continuous cutting geometry





9

Cr

D h10	d h6	L	l1 ap	Cr	Z	Diamond
6,00	6,00	64	18,0	0,20	4	HMD760060
8,00	8,00	78	24,0	0,20	4	HMD760080
10,00	10,00	78	30,0	0,20	4	HMD760100
12,00	12,00	104	36,0	0,20	4	HMD760120
16,00	16,00	104	48,0	0,20	4	HMD760160
20,00	20,00	134	60,0	0,20	4	HMD760200

Caratteristiche Geometriche

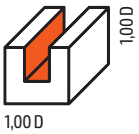
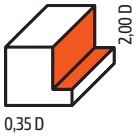
Affilatura progettata con un'innovativa geometria di taglio combinato. Studiata specificatamente per la lavorazione dei materiali AFRP e le strutture a nido d'ape.

Geometrical Features

Sharpening designed with an innovative combined-cut geometry. Specifically developed for machining AFRP materials and honeycomb structures.

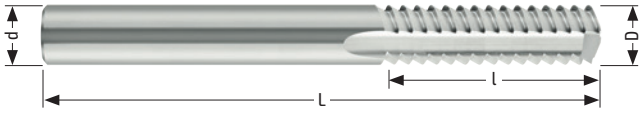
770

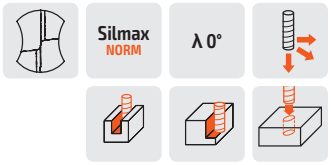
Parametri di lavoro / Working Parameters

	Diametro Diameter	Honeycomb					
							
	m/min	Vc=200			Vc=250		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
CFRP	5,0	-	1146	12739	-	2292	145987
	6,0	-	1374	10616	-	2748	121656
	8,0	-	1602	7962	-	3210	91242
	10,0	-	1830	6369	-	3684	72994
	12,0	-	2064	5308	-	4128	60828
	Diametro Diameter	Honeycomb					
	m/min	Vc=200			Vc=250		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
GRP	5,0	-	1146	12739	-	2292	145987
	6,0	-	1374	10616	-	2748	121656
	8,0	-	1602	7962	-	3210	91242
	10,0	-	1830	6369	-	3684	72994
	12,0	-	2064	5308	-	4128	60828
	Diametro Diameter	Kevlar					
	m/min	Vc=200			Vc=250		
	D mm	fz mm/z	F mm/min	n rpm	fz mm/z	F mm/min	n rpm
AFRP	5,0	-	1242	15924	-	2483	22293
	6,0	-	1489	13270	-	2977	18577
	8,0	-	1736	9952	-	3478	13933
	10,0	-	1983	7962	-	3978	11146
	12,0	-	2236	6635	-	4472	9289

770

Fresa a geometria di taglio combinata
End mill with combined cutting edge geometry





9

90°

D h10	d h6	L	l ap	Z	Non rivestito Uncoated
4,76	4,76	75	25,0	2	HM0760047
5,00	5,00	75	25,0	2	HM0760050
6,00	6,00	75	30,0	2	HM0760060
6,35	6,35	75	30,0	2	HM0760063
8,00	8,00	75	30,0	2	HM0760080
9,53	9,53	75	30,0	2	HM0760095
10,00	10,00	75	30,0	2	HM0760100
12,00	12,00	75	30,0	2	HM0760120
12,70	12,70	75	30,0	2	HM0760127

Caratteristiche Geometriche

Geometria frontale sviluppata in particolare per la foratura manuale. Garantisce un grado di finitura eccezionale eliminando i fenomeni di delaminazione. Utensile particolarmente indicato per la lavorazione dei materiali compositi a base di carbonio di difficile lavorabilità.

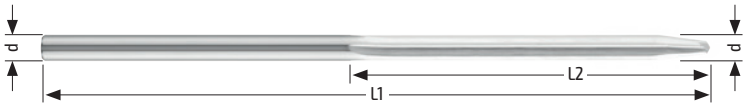
Geometrical Features

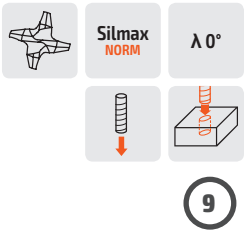
Front geometry specifically developed for manual drilling. It ensures an exceptional finishing grade, preventing delamination. A tool that is particularly suitable for machining carbon-based composite materials of difficult machinability.

Notes

780

Punta a geometria frontale
Front geometry drill





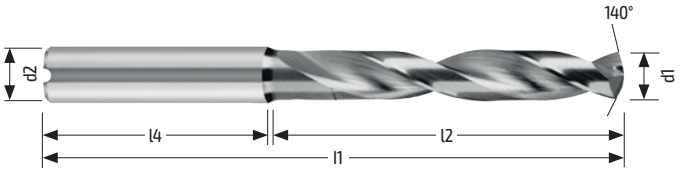
D h6	d h6	L	l2 ap	Z	Non rivestito Uncoated
2,00	2,00	100	50,0	4	HM0780020
2,48	2,48	100	50,0	4	HM0780024
3,00	3,00	100	50,0	4	HM0780030
3,17	3,17	100	50,0	4	HM0780031
4,00	4,00	100	50,0	4	HM0780040
4,21	4,21	100	50,0	4	HM0780042
4,82	4,82	100	50,0	4	HM0780048
5,05	5,05	100	50,0	4	HM0780050
5,53	5,53	100	50,0	4	HM0780055
6,00	6,00	100	50,0	4	HM0780060
6,35	6,35	100	50,0	4	HM0780063
6,60	6,60	100	50,0	4	HM0780066
7,00	7,00	100	50,0	4	HM0780070
7,92	7,92	100	50,0	4	HM0780079
8,00	8,00	100	50,0	4	HM0780080
8,63	8,63	100	50,0	4	HM0780086
9,00	9,00	100	50,0	4	HM0780090
10,00	10,00	100	50,0	4	HM0780100
12,00	12,00	100	50,0	4	HM0780120

1 **Acciaio** Steel | 2 **Ghise** Cast Iron | 3 **Acciai Temprati** Hardened Steel | 4 **Acciaio Inox** Stainless Steel | 5 **Titanio** Titanium | 6 **Leghe Leggere** Light Alloys | 7 **PH Duplex** | 8 **Superleghe** Superalloys | 9 **Compositi** Composite Materials | → 16 **Guida alla lettura** Reading guide | → 18 **Legenda** Legend

3050A

Punta 5xD senza fori

5xD drill without internal coolant



DIN 6537L

DIN 6535 HA (Standard)

WIN DIN 6535 HE (On request)

1 2 4 5 7 8 9

140°

Balinit® X-Pro	d1 m7	d2 h6	l2	l4	l1
HMX3050A003	0,3	3	1,5	-	38
HMX3050A004	0,4		2,0		
HMX3050A005	0,5		4,0		
HMX3050A006	0,6		4,5		
HMX3050A007	0,7		5,6		
HMX3050A008	0,8		6,5		
HMX3050A009	0,9		7,0		
HMX3050A010	1,0		9		
HMX3050A011	1,1				
HMX3050A012	1,2		10		
HMX3050A013	1,3				
HMX3050A014	1,4		12		
HMX3050A015	1,5				
HMX3050A016	1,6		11,5		
HMX3050A017	1,7				
HMX3050A018	1,8				
HMX3050A019	1,9				
HMX3050A004	0,4		2,0		
HMX3050A005	0,5		4,0		
HMX3050A006	0,6		4,5		
HMX3050A007	0,7		5,6		
HMX3050A008	0,8		6,5		
HMX3050A009	0,9		7,0		
HMX3050A010	1,0		9		
HMX3050A011	1,1				
HMX3050A020	2,0	3	13	-	50
HMX3050A021	2,1				
HMX3050A022	2,2		14		
HMX3050A023	2,3				
HMX3050A024	2,4		15		
HMX3050A025	2,5				
HMX3050A026	2,6	6	28	36	66
HMX3050A027	2,7				
HMX3050A028	2,8				
HMX3050A029	2,9				
HMX3050A030	3,0				
HMX3050A031	3,1				
HMX3050A032	3,2				
HMX3050A033	3,3				
HMX3050A034	3,4				
HMX3050A035	3,5				
HMX3050A036	3,6				
HMX3050A037	3,7				
HMX3050A038	3,8	6	36	36	74
HMX3050A039	3,9				
HMX3050A040	4,0				
HMX3050A041	4,1				
HMX3050A042	4,2				
HMX3050A043	4,3				
HMX3050A044	4,4				
HMX3050A045	4,5				
HMX3050A046	4,6				
HMX3050A047	4,7				

3050A

Punta 5xD senza fori
5xD drill without internal coolant

140°

Balinit® X-Pro	d1 m7	d2 h6	l2	l4	l1
HMX3050A048	4,8	6	44	36	82
HMX3050A049	4,9				
HMX3050A050	5,0				
HMX3050A051	5,1				
HMX3050A052	5,2				
HMX3050A053	5,3				
HMX3050A054	5,4				
HMX3050A055	5,5				
HMX3050A056	5,6				
HMX3050A057	5,7				
HMX3050A058	5,8				
HMX3050A059	5,9				
HMX3050A060	6,0				
HMX3050A061	6,1	8	53	36	91
HMX3050A063	6,3				
HMX3050A065	6,5				
HMX3050A068	6,8				
HMX3050A069	6,9				
HMX3050A070	7,0				
HMX3050A074	7,4				
HMX3050A075	7,5				
HMX3050A078	7,8				
HMX3050A080	8,0				
HMX3050A085	8,5	10	61	40	103
HMX3050A086	8,6				
HMX3050A087	8,7				
HMX3050A088	8,8				
HMX3050A090	9,0				
HMX3050A093	9,3				
HMX3050A095	9,5				
HMX3050A098	9,8				
HMX3050A100	10,0				
HMX3050A102	10,2	12	71	45	118
HMX3050A105	10,5				
HMX3050A106	10,6				
HMX3050A108	10,8				
HMX3050A110	11,0				
HMX3050A112	11,2				
HMX3050A115	11,5				
HMX3050A118	11,8				
HMX3050A119	11,9				
HMX3050A120	12,0				
HMX3050A122	12,2	14	77	45	124
HMX3050A125	12,5				
HMX3050A126	12,6				
HMX3050A127	12,7				
HMX3050A128	12,8				
HMX3050A130	13,0				
HMX3050A135	13,5				
HMX3050A138	13,8				
HMX3050A140	14,0				
HMX3050A145	14,5	16	83	48	133
HMX3050A148	14,8				
HMX3050A150	15,0				
HMX3050A155	15,5				
HMX3050A158	15,8				
HMX3050A160	16,0				

Utensili speciali

Silmax ha maturato, grazie ad un'esperienza pluridecennale, una forte propensione alla risoluzione di progetti complessi, realizzando, un'ampia gamma di utensili speciali, sia in metallo duro che in acciaio super rapido.

Lo sviluppo di un utensile speciale, utilizzando le conoscenze acquisite con le attività di Ricerca e Sviluppo, permette di realizzare un prodotto ottimizzato in termini di materiale di base, geometria dell'utensile, trattamento delle superfici e ricopertura PVD.

L'attività di consulenza svolta si concretizza nella preparazione di un'offerta inclusiva di disegni tecnici, indicazione dei parametri di taglio per un efficacie utilizzo dell'utensile e dei tempi di consegna che generalmente non superano le 3-4 settimane

Le nostre applicazioni sono utilizzate con grande soddisfazione in numerosi settori industriali: dall'energia all'aeronautico, alla meccanica di precisione, oleodinamica, ed in generale in tutte le lavorazioni con asportazione di truciolo.

Special tools

Thanks to its long-standing experience, Silmax developed a strong propensity to find solutions for complex projects, creating a wide range of special tools, both in carbide and in high-speed steel, studying the technical drawing and proceeding with the analysis of the specific application.

The development of a special tool by using the know-how acquired through the R&D activities allows the manufacture of a product that is optimised with regard to raw material, tool geometry, surface treatment and PVD coating.

Our consulting activity focuses on the preparation of an exclusive offer including technical drawings, indication of cutting parameters for an effective use of tools. Lead-time usually does not exceed 3-4 weeks.

Our tool applications are successfully used in many industrial sectors: energy, aerospace, precision mechanics, oil-hydraulics and, in general, for all types of machining requiring chip removal.

SIL SERVICE

Silmax, consapevole della fondamentale importanza di offrire un servizio post vendita di qualità e di affidabilità, propone, già da diversi anni, alla propria Clientela, **Silservice** un servizio di rigenerazione di utensili che include la riaffilatura, la ricopertura e lo speciale trattamento 4S di propria concezione per la super finitura della superficie del filo tagliente degli utensili

L'utilizzo di macchine affilatrici CNC di ultima generazione, di sistemi di misurazione micrometrica, di un proprio impianto di ricopertura PVD, unitamente ad una comprovata esperienza nel trattamento di utensili da taglio permettono a Silmax di garantire elevata qualità ed estrema rapidità nei tempi di esecuzione.

Silmax, being aware of the importance of proposing a reliable and high-quality after-sale service, for several years has been offering its Customers **Silservice**, a service of tool reconditioning, including re-sharpening, recoating and the special 4S treatment, specially conceived by Silmax itself for a super-finishing of tool surface and cutting-edge.

The use of CNC sharpening machines of the latest generation of micrometric measuring systems, of the company-owned PVD-coating plant, along with proven experience in cutting-tool treatments enable Silmax to guarantee top quality and high speed of execution.

Riaffilatura e rigenerazione

Riaffilatura e rigenerazione di frese, punte e alesatori nelle versioni normali e speciali utilizzando gli stessi impianti a 5 assi usati per la loro produzione.

Esecuzione perfetta

Esecuzione perfetta con la garanzia del produttore e collaudo effettuato su strumenti di controllo di alta precisione Zoller Genius e Walter Helicheck con emissione di certificato su richiesta.

Rivestimento PVD

Rivestimento PVD eseguito nel nostro centro di rivestimento interno in Lanzo Torinese con la tecnologia Balzers sia per HSS che HM come Alcrona, Futura, Alnova, Latuma e TiN.

Trattamento 4S

Trattamento 4S di super finitura superficiale del filo tagliente pre e post rivestimento, eseguito con impianto OTEC e verificato con strumento di misura Alicona.

Consegna rapida

Consegna rapida entro **10 giorni lavorativi** dal ricevimento degli utensili.

Re-sharpening and re-conditioning

Re-sharpening and re-conditioning of end mills, drills and reamers in standard and special versions are carried out on the same 5-axis plants used for their production.

Perfect execution

A perfect execution with the manufacturer's warranty and testing carried out with high-precision measurement instruments of Zoller Genius and Walter Helicheck, with issuing of certificate on request.

PVD Coating

PVD coating in our in-house coating centre in Lanzo Torinese is carried out using Balzers technology, such as Alcrona, Futura, Alnova, Latuma e TiN, both for HSS and HM tools.

4S Treatment

4S super-finishing surface treatment of cutting edge before and after the coating process, is carried out using an OTEC system and checked with an Alicona measuring instrument.

Fast delivery

Fast delivery within **10 working days** from receipt of tools.

Opzioni a richiesta

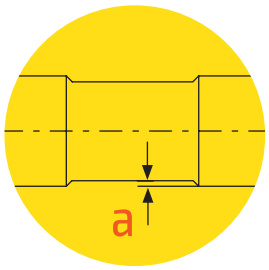
Silmax studia, sviluppa e produce un'ampia gamma di utensili speciali sia in metallo duro sia in acciaio super rapido sia su richiesta del cliente sia su specifico design.

Risulta inoltre possibile ottimizzare gli utensili standard a catalogo secondo le esigenze del cliente, assicurando una soluzione qualitativamente superiore. Le diverse opzioni disponibili a richiesta sono:

Options upon request

Silmax studies, develops and produces a wide range of special tools, both in carbide and high-speed steel, upon customer's request or made to customer's design.

In addition, it is possible to adapt standard tools available in our catalogue according to the customer's requirements, thus ensuring a higher-quality solution. The different options available upon request are:

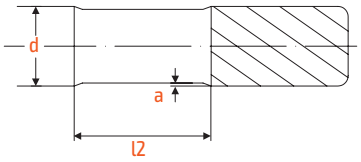


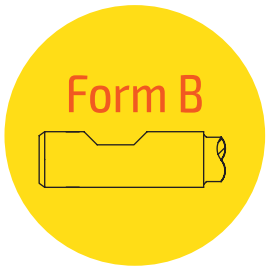
Ribassamento dopo il tagliente

Realizziamo ribassamenti
tra la parte tagliente e il codolo.

Neck relief

It is possible to have a diameter reduction between the cutting edge and the shank.



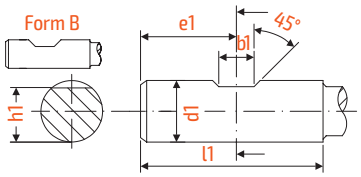


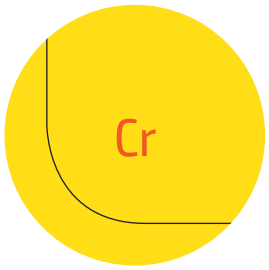
Attacco Weldon

A richiesta è possibile eseguire attacco Weldon.

Weldon Shank (DIN)

Weldon shank upon request.



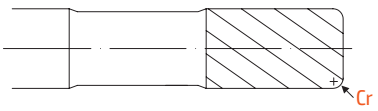


Raggi di raccordo

Si eseguono su richiesta anche raggi diversi dallo standard presentati a catalogo.

Corner radiuses

It is possible to have corner radiuses different from the standard ones shown in the catalogue.



Assistenza tecnica

Il reparto di Assistenza Tecnica, uno dei punti di forza di Silmax, è costantemente al servizio del cliente. Ingegneri altamente qualificati sono in grado di offrire una consulenza personalizzata, dopo aver analizzato le esigenze e le problematiche di lavorazione del cliente, fornendo le migliori strategie di utilizzo degli utensili Silmax.

Modulo di richiesta Informazioni

Per rispondere meglio alle vostre richieste è stato predisposto un modulo tecnico di richiesta informazioni, che può essere facilmente scaricato dal sito Web (www.silmax.it) ed inviato all' Assistenza Tecnica.

Technical assistance

The Department of Technical Assistance is one of the strong points at Silmax and it is always at the customer's disposal. Highly qualified engineers are able to offer customized consulting, after analysing the customer's needs and machining problems, providing the best strategies of use for Silmax tools.

Information application form

To better reply to your requests, we have produced a technical form for information inquiry, which can be downloaded from the website (www.silmax.it) and forwarded to the Technical Assistance Department.

Tel. +39.0123.940349
assistenza@silmax.it
silmax.it/assistance

Rivestimenti / Coatings

Tipologie / Types

	Balinit® Futura Nano	Balinit® Alcrona Pro	Balinit® Latuma	X-Hard	Balinit® Alnova	Diamond	AluSpeed® by Cemecon	Balinit® X-Pro
	HMF	HMG/NIG	HMC	HMH	HMY	HMD	HMA	HMX
Composizione chimica Chemical Composition	TiAlN	AlCrN	AlTiN	TiSiN	AlCrN	Diamond	TiB_2	AlCrN
Durezza (HV05) Hardness (HV05)	3300	3200	3300	3600	3200	8000-10000	3000	3200
Spessore (µm) Thickness (µm)	1-4	2-4	1-4	2-4	2-4	6-12	2-4	2-4
Temperatura massima di servizio (°C) Max. Service temperature (°C)	900	1200	900	1200	1200	600	800	1200
Applicazione Application	UNV	HPC UNV	HRC TIS	HRC	TIS	CMP	ALU	PHM

Lavorazioni / Machining

	Balinit® Futura Nano	Balinit® Alcrona Pro	Balinit® Latuma	X-Hard	Balinit® Alnova	Diamond	AluSpeed® by Cemecon	Balinit® X-Pro
	HMF	HMG/NIG	HMC	HMH	HMY	HMD	HMA	HMX
Acciaio Steel	●●	●●●	●●●	●●	●	-	-	●●●
Acciaio Temprato Hardened Steel	-	●	●●● <=58HRC	●●● >58HRC	-	-	-	●●
Acciaio Inossidabile Stainless Steel	-	●●	●●●	-	●●	-	-	●●●
Superleghe Superalloys	●	●	●●	-	●●●	-	-	●●
Alluminio e leghe Aluminium & Alloys	-	●	-	-	-	●●	●●●	●●
Resina termoplastica Thermoplastics	●	●	●	-	-	●●●	●●	●●

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