

MillLine

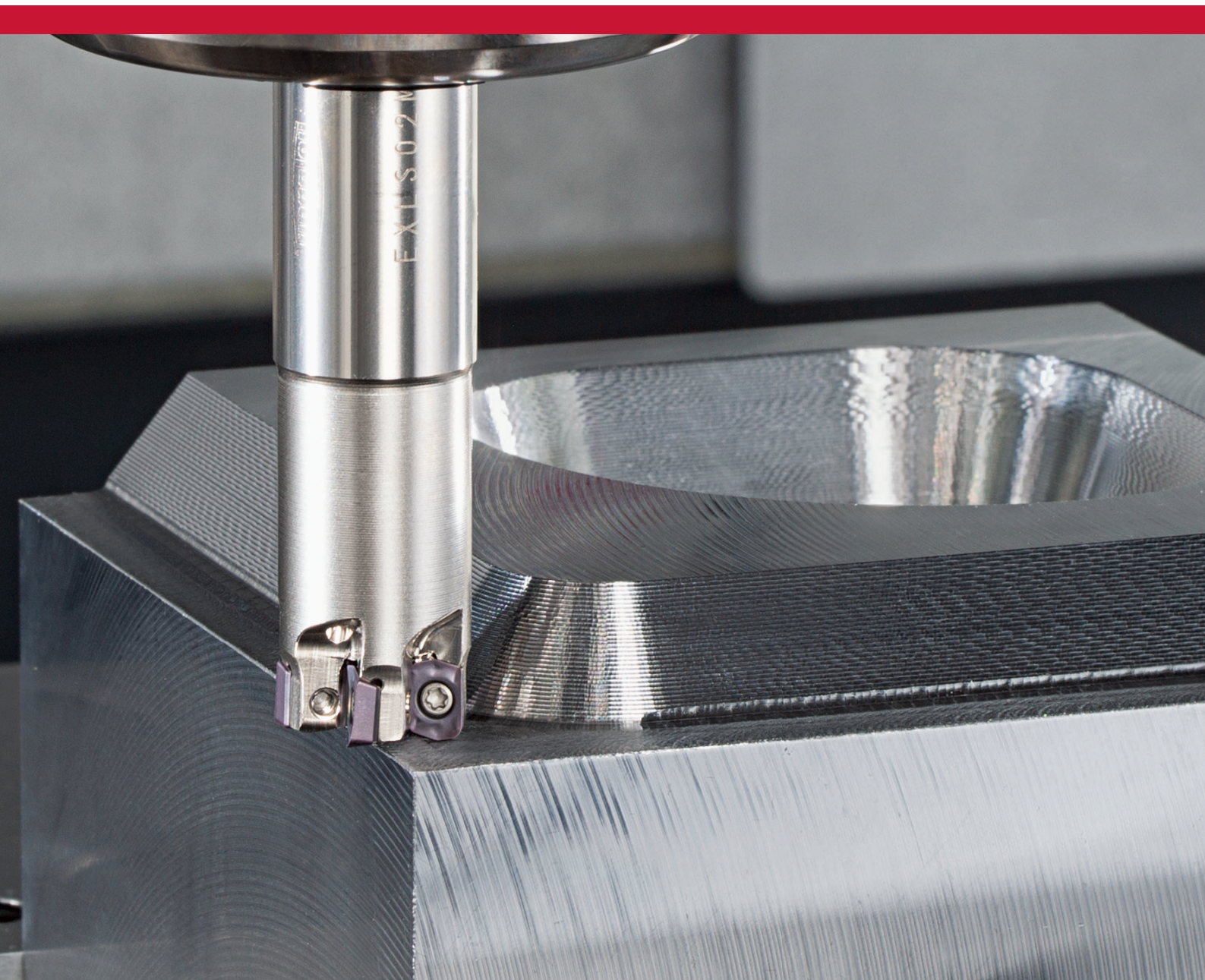


**TUNG**<sup>ORCE</sup>**FEED**

[www.tungaloy.com/it](http://www.tungaloy.com/it)

Tungaloy Report No. 82S1-I

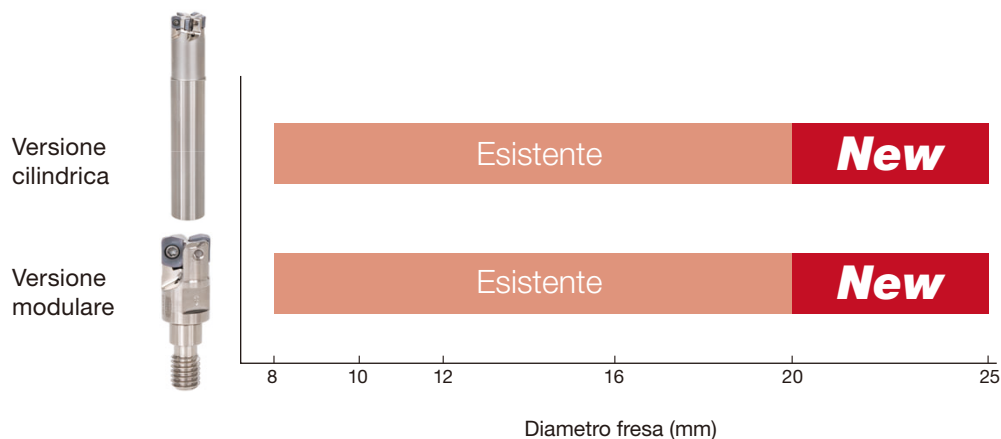
**TungForceFeed** ora disponibile  
da diametro **ø8 a ø25 mm**



**INDUSTRY 4.0**  
*FEED the SPEED!*

## Espansione gamma $\varnothing 20$ - $\varnothing 25$ mm

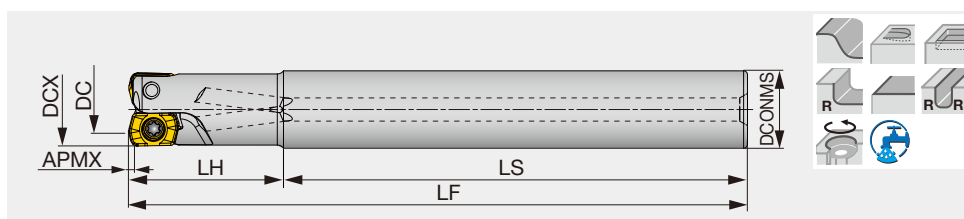
Maggiore avanzamento tavola grazie alla densità di inserti



### EXLS

Fresa ad inserti per alto avanzamento con codolo cilindrico

GAMP = +4°, GAMF = -21° ~ -17°



Denominazione	APMX	DCX	CICT	DC	DCONMS	LS	LH	LF	WT (kg)	Foro refr.	Inserto
EXLS02M008C08.0LH16R01	0.5	8	1	4.29	8	59	16	75	0.02	Con	LSMT02...
EXLS02M008C08.0LH30R01	0.5	8	1	4.29	8	59	31	90	0.03	Con	LSMT02...
EXLS02M010C10.0LH20R02	0.5	10	2	6.28	10	60	20	80	0.04	Con	LSMT02...
EXLS02M010C10.0LH40R02	0.5	10	2	6.28	10	60	40	100	0.05	Con	LSMT02...
EXLS02M010C08.0LH20R02	0.5	10	2	6.28	8	60	20	80	0.03	Con	LSMT02...
EXLS02M012C12.0LH20R03	0.5	12	3	8.31	12	60	20	80	0.06	Con	LSMT02...
EXLS02M012C12.0LH50R02	0.5	12	2	8.31	12	60	50	110	0.08	Con	LSMT02...
EXLS02M012C10.0LH20R03	0.5	12	3	8.31	10	60	20	80	0.04	Con	LSMT02...
EXLS02M016C16.0LH30R05	0.5	16	5	12.31	16	70	30	100	0.14	Con	LSMT02...
EXLS02M016C16.0LH50R03	0.5	16	3	12.31	16	70	50	120	0.17	Con	LSMT02...
<b>New</b> EXLS02M020C20.0LH50R05	0.5	20	5	16.31	20	80	50	130	0.27	Con	LSMT02...
<b>New</b> EXLS02M020C20.0LH50R06	0.5	20	6	16.31	20	80	50	130	0.27	Con	LSMT02...
<b>New</b> EXLS02M020C20.0LH80R05	0.5	20	5	16.31	20	80	80	160	0.33	Con	LSMT02...
<b>New</b> EXLS02M025C25.0LH60R06	0.5	25	6	21.31	25	80	60	140	0.45	Con	LSMT02...
<b>New</b> EXLS02M025C25.0LH60R08	0.5	25	8	21.31	25	80	60	140	0.47	Con	LSMT02...
<b>New</b> EXLS02M025C25.0LH100R06	0.5	25	6	21.31	25	80	100	180	0.57	Con	LSMT02...

#### PARTI DI RICAMBIO

Denominazione	Vite inserto	Lubrificante	Chiave
EXLS02M...	CSPB-2H	M-1000	IP-6DB

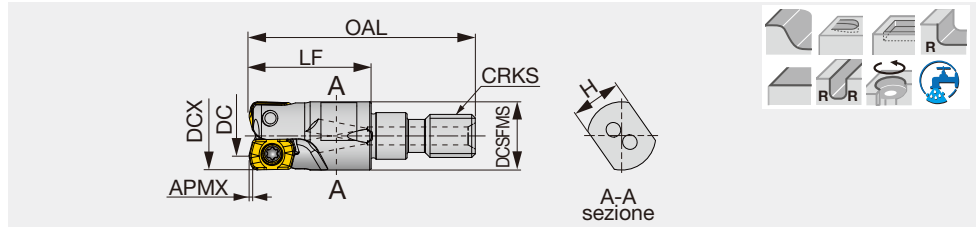
\*Coppia di serraggio consigliata (N·m): CSPB-2H=0.7

## TUNGFLEX

### HXLS

Fresa ad inserti per alto avanzamento con attacco filettato (TungFlex)

GAMP = +4°, GAMF = -21° ~ -17°



Denominazione	APMX	DCX	CICT	DC	OAL	LF	H	DCSFMS	CRKS	WT (kg)	Foro refr.	Inserto
HXLS02M008M06R01	0.5	8	1	4.29	33.5	19	7	9.5	M6	0.01	Con	LSMT02...
HXLS02M010M06R02	0.5	10	2	6.28	31.5	17	7	9.5	M6	0.01	Con	LSMT02...
HXLS02M012M06R03	0.5	12	3	8.31	31.5	17	7	10	M6	0.01	Con	LSMT02...
HXLS02M012M06R02	0.5	12	2	8.31	31.5	17	7	10	M6	0.01	Con	LSMT02...
HXLS02M016M08R05	0.5	16	5	12.31	40	23	10	13	M8	0.03	Con	LSMT02...
HXLS02M016M08R03	0.5	16	3	12.31	40	23	10	13	M8	0.03	Con	LSMT02...
<b>New</b> HXLS02M020M10R05	0.5	20	5	16.31	49	30	15	17.8	M10	0.05	Con	LSMT02...
<b>New</b> HXLS02M020M10R06	0.5	20	6	16.31	49	30	15	17.8	M10	0.05	Con	LSMT02...
<b>New</b> HXLS02M025M12R06	0.5	25	6	21.31	57	30	17	20.8	M12	0.08	Con	LSMT02...
<b>New</b> HXLS02M025M12R08	0.5	25	8	21.31	57	30	17	20.8	M12	0.08	Con	LSMT02...

#### PARTI DI RICAMBIO



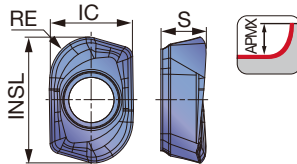
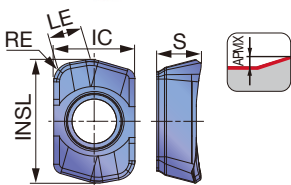
Denominazione	Vite inserto	Lubrificante	Chiave
HXLS02M...	CSPB-2H	M-1000	IP-6DB

\*Coppia di serraggio consigliata (N·m): CSPB-2H=0.7

## INSERTI

#### LSMT-HM (Alto avanzamento)

#### LSMT-MM (Raggiato)



P	Acciaio	★	☆									
M	Inossidabile	★										
K	Ghisa	☆	★									
N	Non ferrosi											
S	Superleghe	☆	★									
H	Materiali duri		★									

★ : Prima scelta  
☆ : In alternativa

Denominazione	RE	APMX	Rivestiti								LE	INSL	IC	S	
			AH3225	AH8015											
LSMT0202ZER-HM	1	0.5	●	●								1.7	6.4	4.2	2.3
LSMT0202R2-MM	2	2	●	●								-	6.4	4.3	2.3

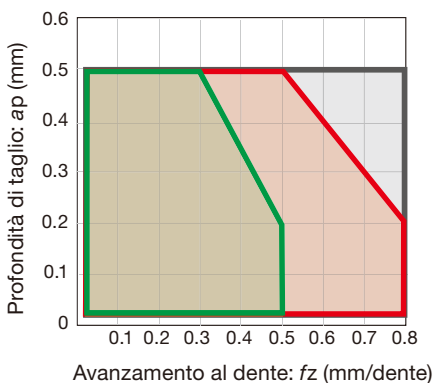
● : Standard a stock

## PARAMETRI DI TAGLIO CONSIGLIATI

ISO	Materiale da lavorare	Durezza	Priorità	Gradi	Velocità di taglio Vc (m/min)	Avanzamento dente fz (mm/dente)
<b>P</b>	Acciai al carbonio (S45C / C45, S55C / C55, ecc.)	- 300HB	Prima scelta	AH3225	100 - 300	0.2 - 0.8
		- 300HB	Resistenza all'usura	AH8015	100 - 300	0.2 - 0.8
	Acciai legati (SCM440 / 42CrMo4, ecc.)	- 300HB	Prima scelta	AH3225	100 - 300	0.2 - 0.8
		- 300HB	Resistenza all'usura	AH8015	100 - 300	0.2 - 0.8
	Acciai pretempra (NAK80, PX5, ecc.)	30 - 40HRC	Prima scelta	AH8015	100 - 200	0.2 - 0.5
		30 - 40HRC	Resistenza agli urti	AH3225	100 - 200	0.2 - 0.5
<b>M</b>	Acciai inossidabili (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, ecc.)	- 200HB	Prima scelta	AH3225	100 - 150	0.2 - 0.5
<b>K</b>	Ghisa grigia (FC250 / 250 / GG25, FC300 / 300 / GG30, ecc.)	150 - 250HB	Prima scelta	AH8015	100 - 300	0.2 - 0.8
		150 - 250HB	Resistenza agli urti	AH3225	100 - 300	0.2 - 0.8
	Ghisa sferoidale (FCD600 / 600-3 / GGG60, ecc.)	150 - 250HB	Prima scelta	AH8015	80 - 200	0.2 - 0.8
		150 - 250HB	Resistenza agli urti	AH3225	80 - 200	0.2 - 0.8
<b>S</b>	Leghe di titanio (Ti-6Al-4V, ecc.)	- 40HRC	Prima scelta	AH3225	30 - 60	0.1 - 0.3
		- 40HRC	Resistenza all'usura	AH8015	30 - 60	0.1 - 0.3
	Leghe resistenti al calore (Inconel, Hastelloy, ecc.)	- 40HRC	Prima scelta	AH8015	20 - 50	0.1 - 0.3
		- 40HRC	Resistenza agli urti	AH3225	20 - 50	0.1 - 0.3
<b>H</b>	Acciai temprati	SKD61 / X40CrMoV5-1, ecc.	40 - 50HRC	Prima scelta	AH8015	80 - 150
		SKD11 / X153CrMoV12, ecc.	50-60HRC	Prima scelta	AH8015	50 - 70

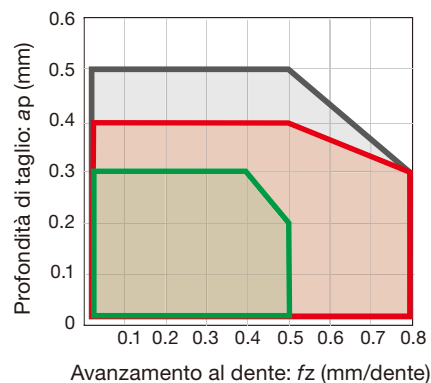
## CAMPO DI IMPIEGO

### LSMT02-HM



- Codoli standard  $\leq 3xD$
- Codoli lunghi  $\geq 4xD$
- Codoli per testine modulari  $\geq 7xD$

### LSMT02-MM



- Codoli standard  $\leq 3xD$
- Codoli lunghi  $\geq 4xD$
- Codoli per testine modulari  $\geq 7xD$

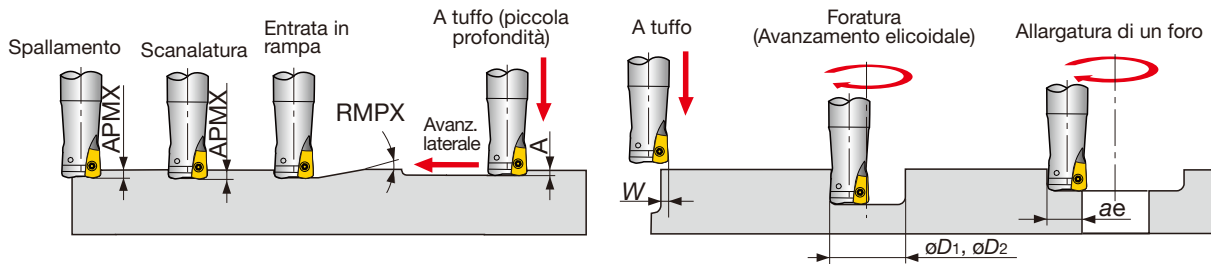
\* Con valore di  $ap \geq 0.5$  mm, si consiglia un avanzamento inferiore a 0.15 mm/dente.



Fresa dia.:  $\phi D_c$  (mm), Numero di giri:  $n$  (min<sup>-1</sup>), Avanz. tavole:  $V_f$  (mm/min), Max. prof. di taglio:  $a_p = 0.5$  mm, Numero di denti: CICT

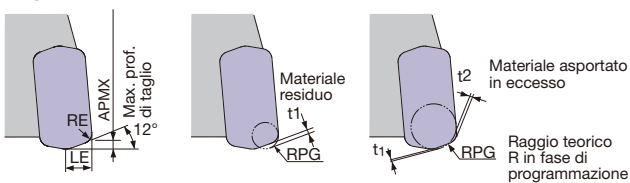
$\phi 8$ , CICT = 1		$\phi 10$ , CICT = 2		$\phi 12$		$\phi 16$			$\phi 20$		$\phi 25$				
$n$	$V_f$	$n$	$V_f$	$n$	$V_f$		$n$	$V_f$		$n$	$V_f$				
					CICT = 2	CICT = 3		CICT = 3	CICT = 5		CICT = 5	CICT = 6	$n$	$V_f$	
														CICT = 6	CICT = 8
7,960	3,980	6,370	6,370	5,310	5,310	7,970	3,980	5,970	9,950	3,180	7,950	9,540	2,550	7,650	10,200
$V_c = 200$ m/min, $f_z = 0.5$ mm/t															
7,960	3,980	6,370	6,370	5,310	5,310	7,970	3,980	5,970	9,950	3,180	7,950	9,540	2,550	7,650	10,200
$V_c = 200$ m/min, $f_z = 0.5$ mm/t															
5,970	2,390	4,780	3,820	3,980	3,180	4,780	2,990	3,590	5,980	2,390	4,780	5,740	1,910	4,590	6,120
$V_c = 150$ m/min, $f_z = 0.4$ mm/t															
4,780	1,910	3,820	3,060	3,190	2,550	3,830	2,390	2,870	4,780	1,910	3,820	4,590	1,530	3,680	4,900
$V_c = 120$ m/min, $f_z = 0.4$ mm/t															
7,960	3,980	6,370	6,370	5,310	5,310	7,970	3,980	5,970	9,950	3,180	7,950	9,540	2,550	7,650	10,200
$V_c = 200$ m/min, $f_z = 0.5$ mm/t															
5,970	2,990	4,780	4,780	3,980	3,980	5,970	2,990	4,490	7,480	2,390	5,980	7,170	1,530	4,590	6,120
$V_c = 150$ m/min, $f_z = 0.5$ mm/t															
1,590	320	1,270	510	1,060	420	640	800	480	800	640	640	770	510	620	820
$V_c = 40$ m/min, $f_z = 0.2$ mm/t															
1,190	240	1,000	400	800	320	480	600	360	600	480	480	580	380	460	460
$V_c = 30$ m/min, $f_z = 0.2$ mm/t															
4,780	1,430	3,820	2,290	3,190	1,910	2,870	2,390	2,150	3,590	1,910	2,870	3,440	1,530	2,760	3,680
$V_c = 120$ m/min, $f_z = 0.3$ mm/t															
2,390	480	1,910	760	1,590	640	950	1,190	710	1,190	950	950	1,140	760	920	1,220
$V_c = 60$ m/min, $f_z = 0.2$ mm/t															

## CAMPO DI IMPIEGO



Denominazione	DC	Max. prof. di taglio APMX	Max. angolo di rampa RMPX	Max. prof. a tuffo A	Max. larghezza di taglio a tuffo W	Dia. min. in interpolazione $\phi D_1$	Dia. max. in interpolazione $\phi D_2$	Max. largh. di taglio nell'allargatura di un foro ae
E/HXLS02M008...	8	0.5	4°	0.2	2	10	15	5.9
E/HXLS02M010...	10	0.5	3.3°	0.2	2	14	19	7.9
E/HXLS02M012...	12	0.5	2°	0.2	2	18	23	9.9
E/HXLS02M016...	16	0.5	1.3°	0.2	2	26	31	13.9
E/HXLS02M020...	20	0.5	1.2°	0.2	2	34	39	17.9
E/HXLS02M025...	25	0.5	1°	0.2	2	44	49	22.9

### Programmazione CAD/CAM

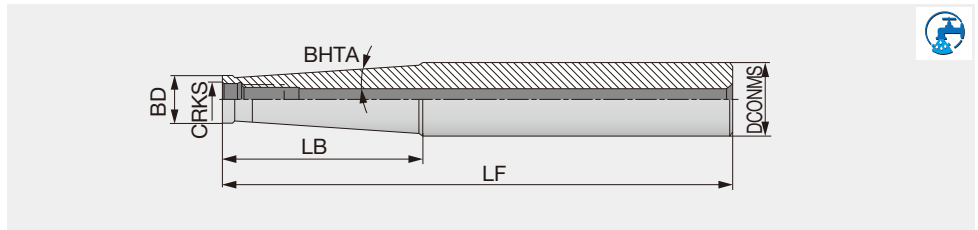


### LSMT02...-HM

Raggio teorico R in fase di programmazione: RPG	Materiale residuo t1 (mm)	Materiale asportato in eccesso t2 (mm)
1	*Consigliato 0.162	0
1.5	0.07	0.14
2	0	0.34

## TUNGFLEX SM

TungFlex - Stelo modulare

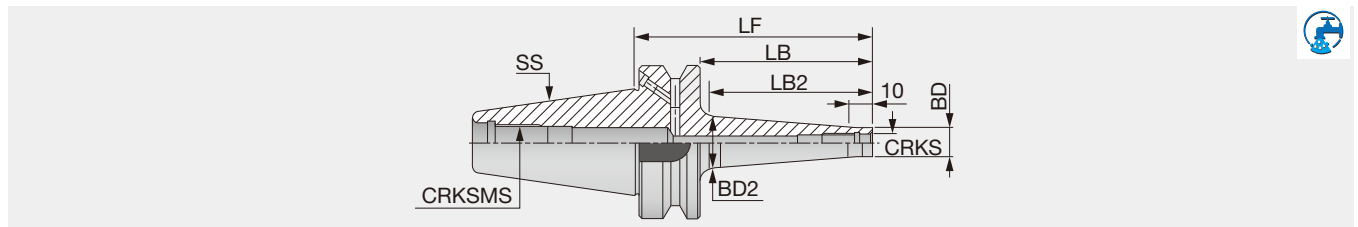


Denominazione	DCONMS	BD	LF	LB	BHTA	CRKS
SM06-L60C10	10	9.7	60	20	0°	M6
SM06-L105-C12	12	9.7	105	60	1.2°	M6
SM06-L125-C16	16	9.7	125	60	3.3°	M6
SM08-L73C16	16	13	73	25	0°	M8
SM08-L128-C16	16	13	128	80	0.9°	M8
SM08-L170-C20	20	13	170	66.8	3.3°	M8
SM10-L80-C20	20	18	80	30	0°	M10
SM10-L130-C20	20	18	130	80	0.6°	M10
SM10-L200-C25	25	19	200	57.2	3.3°	M10
SM12-L86-C25	25	21	86	30	5.1°	M12
SM12-L200-C32	32	21	200	78	4.4°	M12
SM16-L95-C32	32	29	95	35	1.7°	M16
SM16-L230-C32	32	29	230	50	1.8°	M16

## TUNGFLEX

### BT-ODP(Mandrino per testine modulari)

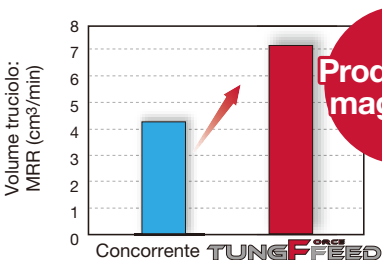
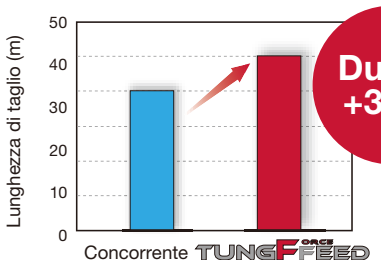
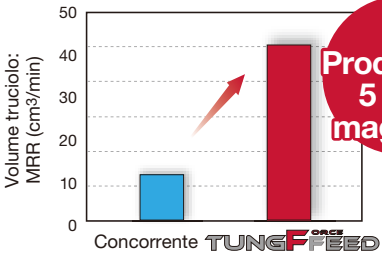
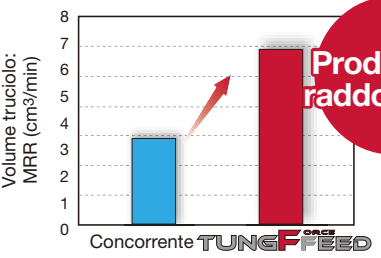
TungFlex sistema modulare con attacco BT



Denominazione	SS	CRKS	BD	BD2	LF	LB	LB2	CRKSMS
BT40ODP6X66	40	M6	9.8	13	66	39	30	M16
BT40ODP6X106	40	M6	9.8	23	106	79	70	M16
BT40ODP8X66	40	M8	13	15	66	39	30	M16
BT40ODP8X106	40	M8	13	23	106	79	70	M16
BT40ODP10X66	40	M10	18	20	66	39	30	M16
BT40ODP10X106	40	M10	18	28	106	79	70	M16
BT40ODP12X66	40	M12	21	24	66	39	30	M16
BT40ODP12X106	40	M12	21	31	106	79	70	M16
BT40ODP16X66	40	M16	29	28.6	66	39	-	M16
BT40ODP16X106	40	M16	29	34	106	79	70	M16
BT50ODP12X94	50	M12	23	30	94	56	50	M24
BT50ODP12X144 (1)	50	M12	23	40	144	106	100	M24
BT50ODP12X194 (1)	50	M12	23	40	194	156	150	M24
BT50ODP12X244 (1)	50	M12	23	46	244	206	200	M24
BT50ODP16X94 (1)	50	M16	29	34	94	56	50	M24
BT50ODP16X144 (1)	50	M16	29	40	144	106	100	M24
BT50ODP16X194 (1)	50	M16	29	55	194	156	150	M24
BT50ODP16X244 (1)	50	M16	29	60	244	206	200	M24

• Applicabile con pressione del refrigerante fino a 10 MPa (1) Bilanciato fino a G6.3 a 12,000 min<sup>-1</sup>

## ESEMPI DI LAVORAZIONE

Pezzo		Gambo statore	Stampo
Fresa		EXLS02M008C8.0LH16R01 (ø8, CICT = 1)	HXLS02M010M06R02 (ø10, CICT = 2)
Inserto		LSMT0202ZER-HM	LSMT0202ZER-HM
Grado		AH3225	AH3225
Materiale da lavorare		S45C / C45	SKD11 / X153CrMoV12 (pre-trattamento termico)
Parametri di taglio			
Vel. di taglio: Vc (m/min)		150	120
Avanz. dente: fz (mm/dente)		0.5 (Concorrente : fz = 0.3)	0.6
Prof. di taglio: ap (mm)		0.3	0.3
Largh. di taglio: ae (mm)		8	5
Operazione		Scanalature	Svuotamento
Refrigerante		Sì	A secco
Macchina		Centro verticale, BT30	Centro verticale, BT40
Risultato		 <p><b>Produttività maggiore!</b></p> <p>L'azione di taglio dolce dell'inserto TungForceFeed ha assicurato un'operazione ad alto avanzamento affidabile e migliorato il volume truciolo.</p>	 <p><b>Durata +30%!</b></p> <p>AH3225 previene usura e scheggiatura e migliora la vita inserto del 30%.</p>
Pezzo		Stampo	Pala di turbina
Fresa		EXLS02M012C12.0LH50R02 (ø12, CICT = 2)	EXLS02M008C8.0LH16R01 (ø8, CICT = 1)
Inserto		LSMT0202ZER-HM	LSMT0202ZER-HM
Grado		AH3225	AH8015
Materiale da lavorare		SKD61 / X40CrMoV5-1 (45HRC)	Inconel 939
Parametri di taglio			
Vel. di taglio: Vc (m/min)		113	30
Avanz. dente: fz (mm/dente)		0.5 (Concorrente : fz = 0.1)	0.2 (Concorrente : fz = 0.05)
Prof. di taglio: ap (mm)		0.3	0.3
Largh. di taglio: ae (mm)		12	8
Operazione		Spianatura	Scanalature
Refrigerante		Aria	A secco
Macchina		Centro verticale, BT50	Centro verticale, BT50
Risultato		 <p><b>Produttività 5 volte maggiore!</b></p> <p>Gli inserti robusti della TungForceFeed hanno garantito sicurezza operativa nella lavorazione di acciaio temprato e migliorato notevolmente il volume truciolo.</p>	 <p><b>Produttività raddoppiata!</b></p> <p>L'avanzamento dente più elevato ha raddoppiato il volume truciolo e ridotto il costo utensile (fresa a inserti contro fresa integrale).</p>

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