

High feed milling cutter

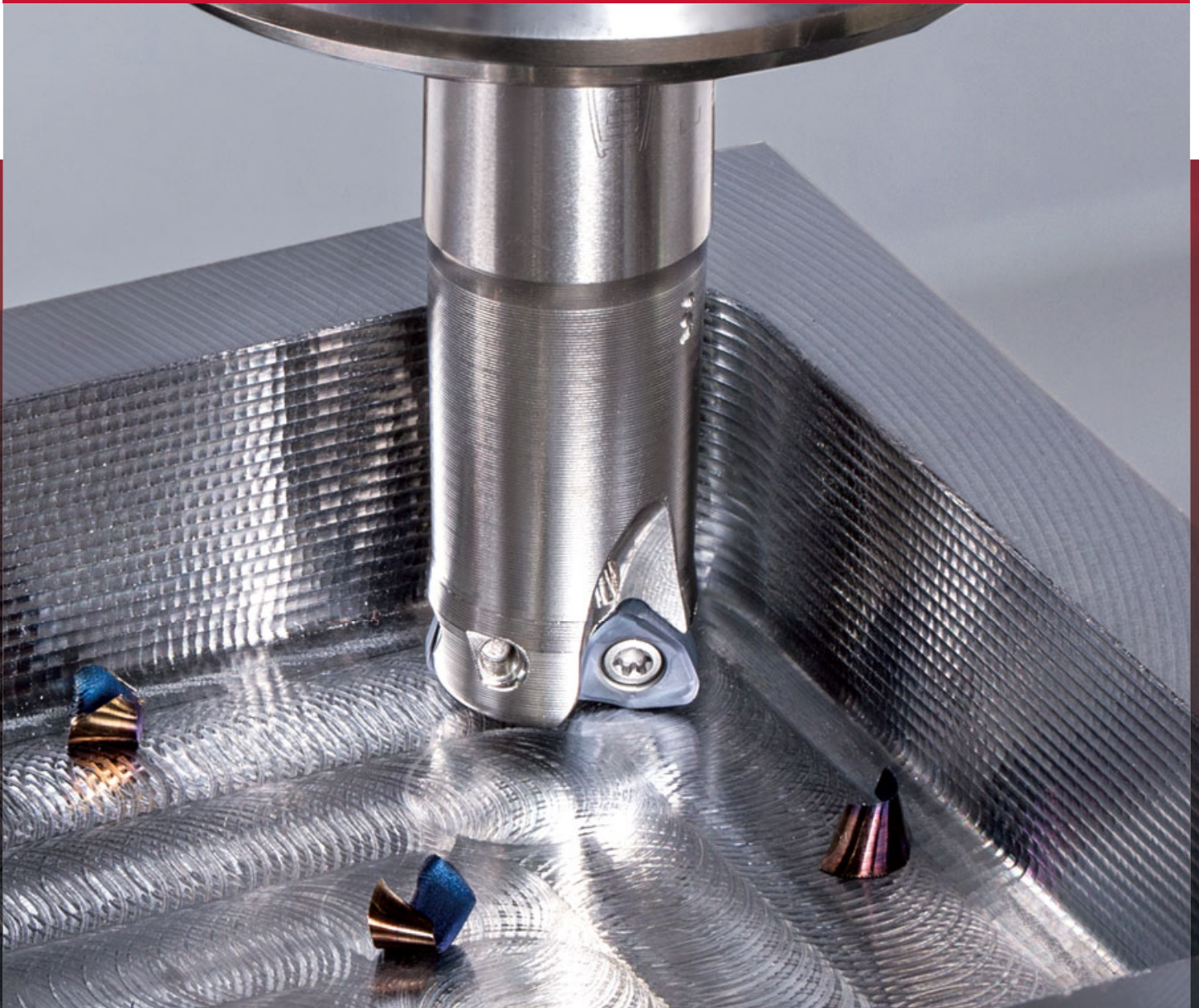
DOF^{6ED}TRI

Tungaloy Report No. 546-G

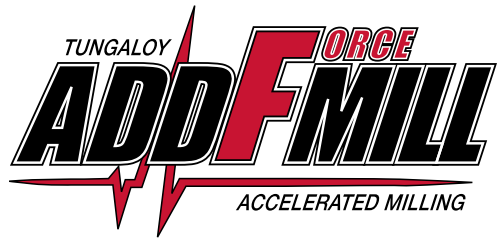


For more information

High-feed milling cutter series with 6-edged inserts
**now offers added cutter size options for pocket
and copy milling operations**







DO^{FEED}FTRI

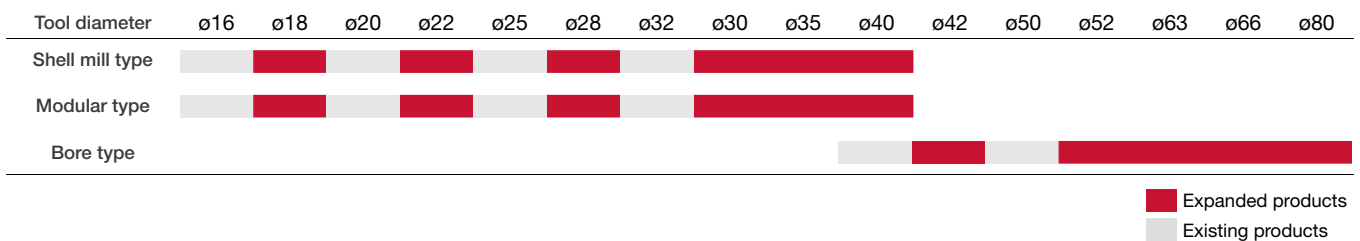


High feed milling cutters featuring strong double-sided inserts with six cutting edges

High feed milling cutter for the best economy and reliability

Cutter body lineup (Shank type, Modular type, and Bore type)

Now offering additional sizes in shank, modular, and bore type bodies to expand application coverage.



Optimal tool diameters for profile machining

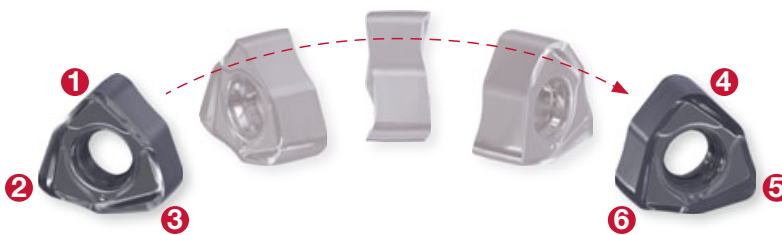
The cutting diameter of the new tools is designed with a minus tolerance. This will prevent over-cutting of the finish stock allowance during such operations as rough pocketing/cavity milling or copy milling.



	Tool diameter tolerance
New E/H/TXWX03**S	0 / -0.45
E/H/TXWX03	+0.15 / -0.3

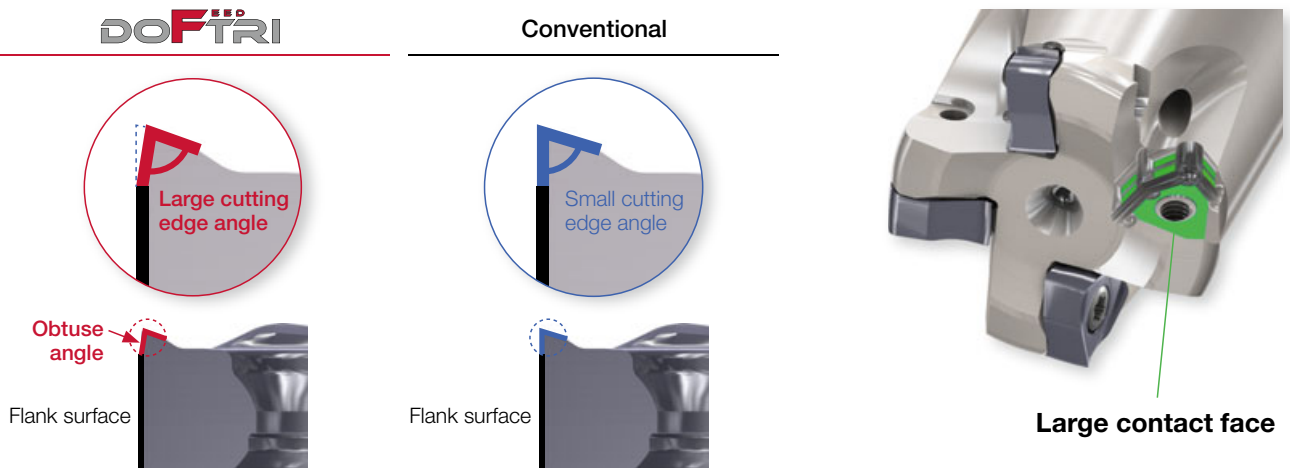
Economical double-sided inserts with six cutting edges

- 1.5 to 3 times greater number of cutting edges per insert compared with conventional high feed milling inserts.
- Reduced cost per insert when machining stainless steels and difficult materials, where inserts demonstrate rapid wear.

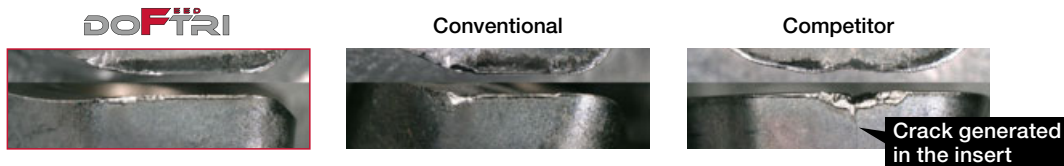


■ Designed for tool reliability and stability

- Robust cutting edge design forms an obtuse angle, eliminating insert fracture during machining.
- A large contact face on the insert seat provides secure insert retention.



■ Tool life comparisons after pocket milling for 240 min

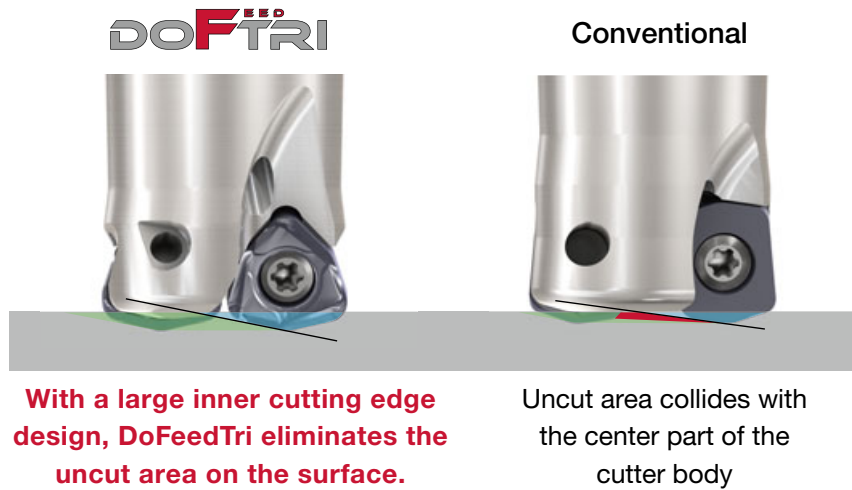


Pocketing

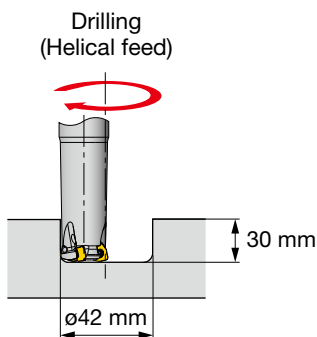
Cutter	: EXWX03M020C20.0R03 (ø20 mm, CICT = 3)
Insert	: WXMU0303ZER-MM AH3225
Workpiece material	: SCM440 / 42CrMo4 (280HB)
Cutting speed	: $V_c = 150$ m/min
Feed per tooth	: $f_z = 0.8$ mm/t
Depth of cut	: $a_p = 0.5$ mm
Width of cut	: $a_e = 10.5$ mm
Coolant	: Internal air
Machine	: Vertical M/C, BT50

■ Excellent ramping capability

- Longer inner cutting edge allows higher ramp-down capabilities to promote higher productivity.
- Increased max ramping angles allow productivity boosts in helical ramping and pocket machining operations.



■ Machining time comparison with helical interpolation



	DOFEEDTRI	Competitor
Feed speed: Vf (mm/min)	3820	3820
Pitch for helical interpolation (mm)	1	0.5
Machining time (seconds)	25	50

Tool diameter : $\varnothing 25$ mm, CICT = 4
 Workpiece material : S55C / C55
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 0.5$ mm/t

Reduced cycle time with a double helical pitch.

■ Excellent chatter-free design

- With 12° entry angle, the cutter directs the cutting force in the axial direction, eliminating chatter.
- Boosts productivity and tool stability for long overhang setups.

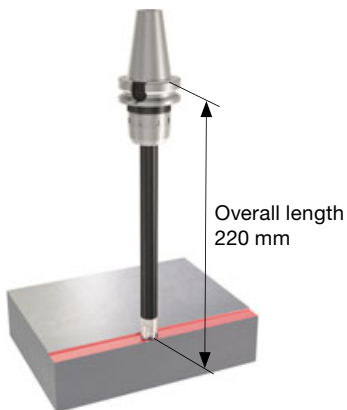
DOFTRI



Common high feed cutter



■ The comparison of anti chattering performance with long overhang setup



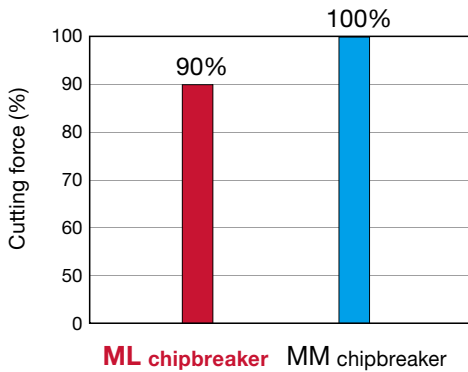
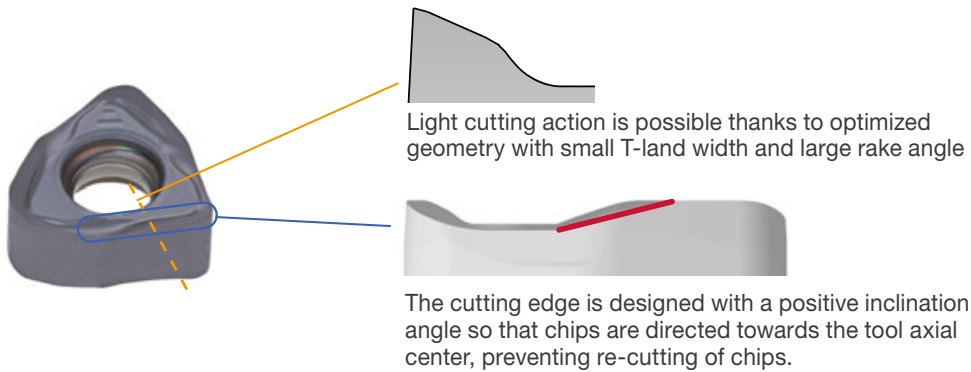
	Feed per tooth: fz (mm/t)		
	1	1.2	1.5
DOFTRI	✓	✓	✓
Competitor A	✓	✗	✗
Competitor B	✓	✗	✗

✓ OK
✗ Chatter

Cutter : HXWX03M020M10R03 (ø20 mm, CICT = 3)
 Insert : WXMU0303ZER-MM AH3225
 Workpiece material : S55C / C55
 Cutting speed : $V_c = 150$ m/min
 Depth of cut : $a_p = 0.5$ mm
 Width of cut : $a_e = 10$ mm
 Coolant : Dry
 Machine : Vertical M/C, BT50
 Overhang length : $L/D = 11$

Introducing ML and MS chipbreakers and additional cutter body sizes

■ ML chipbreaker for low cutting force



P S55C / C55

Cutter : EXWX03M020C20.0R03 (ø20 mm, CICT = 3)
 Insert : WXMU0303ZER-ML AH3225
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 1$ mm/t
 Depth of cut : $a_p = 0.6$ mm
 Width of cut : $a_e = 11.5$ mm
 Coolant : Wet
 Machine : Vertical M/C, BT50

ML chipbreaker provided 10% less cutting force than MM chipbreaker.

■ Excellent chip evacuation

- Prevents re-cutting of chips compared to conventional geometries.
- The chip breaker is designed so as to direct the chips towards the tool's axial center away from the work surface. This allows smooth evacuation while preventing re-cutting of chips.

DOFEEDTRI

Common high feed cutter



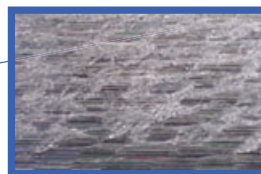
✓
 Chips flow towards the tool axial center away from the wall.



✗
 Chips are prone to hitting the work shoulder surface.



Good surface quality with no scratches on the surface



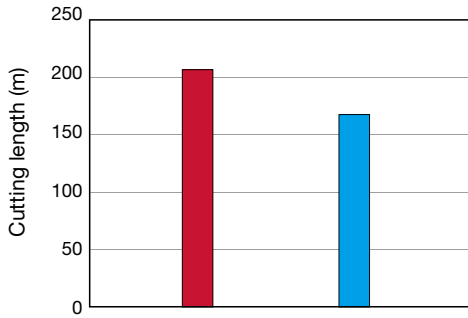
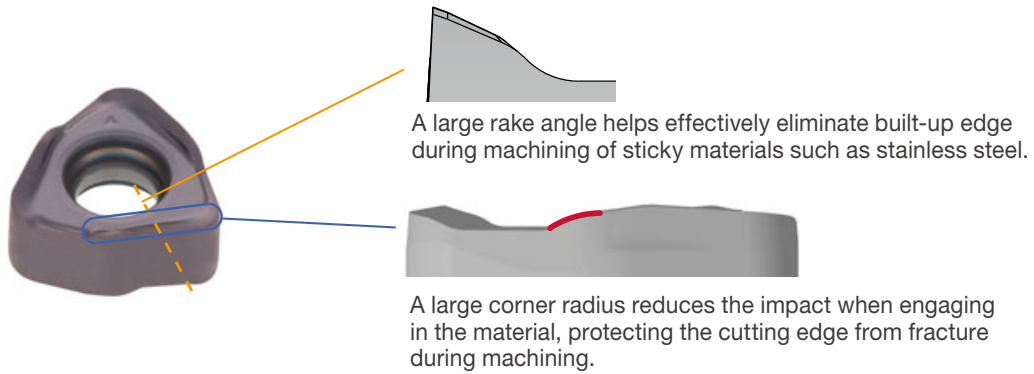
Poor surface finish with scratches

P SS400

Cutter : TXWX03M050B22.0R08 (ø50 mm, CICT = 8)
 Insert : WXMU0303ZER-ML AH3225
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 1.2$ mm/t
 Depth of cut : $a_p = 0.3$ mm
 Width of cut : $a_e = 15$ mm
 Coolant : Wet
 Machine : Vertical M/C, BT50

The ML breaker has an inclination shape that directs chips inward, reducing chip bite.

MS chipbreaker for stainless steel



MS chipbreaker MM chipbreaker

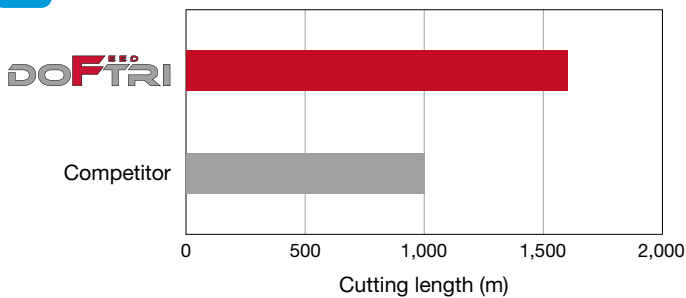
M SUS304 / X5CrNi18-9

Cutter : EXWX03M020C20.0R03 (ø20 mm, CICT = 3)
 Insert : WXMU0303ZER-MS AH130
 Cutting speed : $V_c = 120$ m/min
 Feed per tooth : $f_z = 0.6$ mm/t
 Depth of cut : $a_p = 0.6$ mm
 Width of cut : $a_e = 11.5$ mm
 Coolant : Wet
 Machine : Vertical M/C, BT50

MS chipbreaker provided 1.2 times tool life increase over conventional insert.

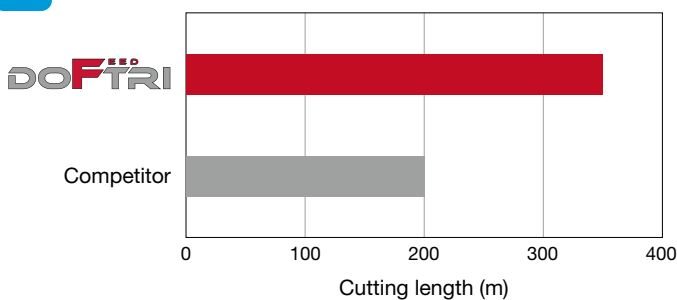
TOOL LIFE

P S55C / C55 (200HB)



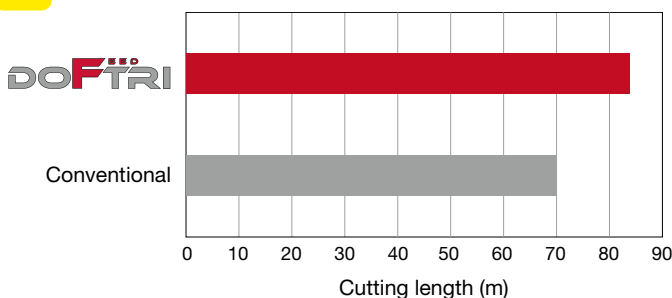
Cutter : EXWX03M020C20.0R03 (ø20 mm, CICT = 3)
 Insert : WXMU0303ZER-MM AH3225
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 1$ mm/t
 Depth of cut : $a_p = 0.6$ mm
 Width of cut : $a_e = 12$ mm
 Coolant : Dry
 Machine : Vertical M/C, BT40

P NAK80 (40HRC)



Cutter : EXWX03M020C20.0R03 (ø20 mm, CICT = 3)
 Insert : WXMU0303ZER-MM AH3225
 Cutting speed : $V_c = 120$ m/min
 Feed per tooth : $f_z = 0.7$ mm/t
 Depth of cut : $a_p = 0.6$ mm
 Width of cut : $a_e = 12$ mm
 Coolant : Dry
 Machine : Vertical M/C, BT40

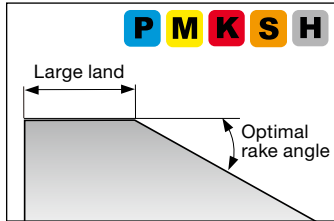
M SUS630 / X5CrNiCuNb16-4 (40HRC)



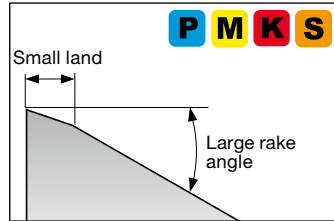
Cutter : EXWX03M020C20.0R03 (ø20 mm, CICT = 3)
 Insert : WXMU0303ZER-MS AH130
 Cutting speed : $V_c = 100$ m/min
 Feed per tooth : $f_z = 0.6$ mm/t
 Depth of cut : $a_p = 0.6$ mm
 Width of cut : $a_e = 11.5$ mm
 Coolant : Wet
 Machine : Vertical M/C, BT40

CHIPBREAKERS

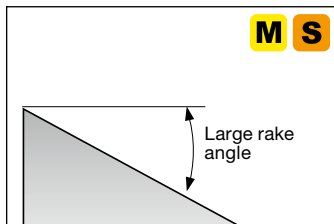
MM General machining



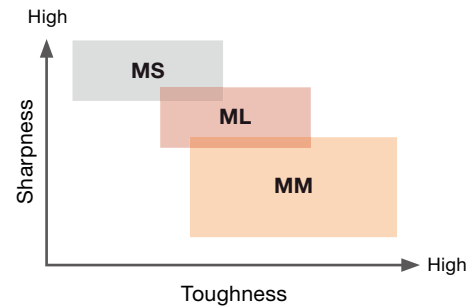
ML Low cutting force



MS For stainless steel



Chipbreaker characteristics



HIGH FEED CUTTER SELECTION GUIDE

Series	DOFEEDTRI	DOFEED 03	ADD FEED	MILLQFEED 09
Tool image				
Tool diameter (mm)	ø16 - ø80	ø16 - ø50	ø8 - ø25	ø25 - ø66
Max. depth of cut (mm)	1	0.9, 1	0.5	1, 1.5
No. of edges per insert	6	4	4	4
Approach angle	12°	ZER type: 17° UER type: 12°	17°	ZER type: 12° UER type: 7°
Efficiency (density)	○	⊙	⊙	○
Tool life	⊙	○	○	⊙
Light cutting	○	⊙	⊙	○
Cutting edge strength	⊙	○	○	○
Chip evacuation	○	⊙	⊙	○
Ramping	⊙	○	○	⊙
Corner radius deviation	⊙	⊙	⊙	○
Long overhang applications	⊙	○	○	⊙

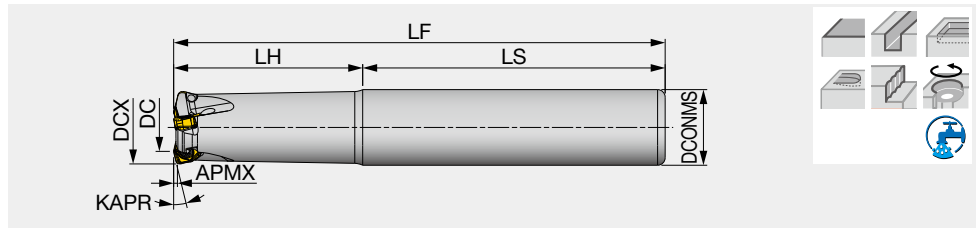
⊙: First choice
○: Supplementary

New

EXWX03S**

High feed endmill, shank type, with screw clamp system

GAMP = +23°, GAMF = -7.9° ~ -6.2°



Designation	APMX	DCX	CICT	DC	DCONMS	LS	LH	LF	KAPR	WT(kg)	Air hole	Insert
EXWX03M016SC16.0R02	1	16	2	8.9	16	70	30	100	12°	0.14	With	WXMU03...
EXWX03M016SC16.0R02L	1	16	2	8.9	16	100	50	150	12°	0.21	With	WXMU03...
EXWX03M018SC16.0R02	1	18	2	10.6	16	70	30	100	12°	0.14	With	WXMU03...
EXWX03M018SC16.0R02L	1	18	2	10.6	16	125	25	150	12°	0.21	With	WXMU03...
EXWX03M020SC20.0R03	1	20	3	12.8	20	80	50	130	12°	0.26	With	WXMU03...
EXWX03M020SC20.0R03L	1	20	3	12.8	20	80	80	160	12°	0.31	With	WXMU03...
EXWX03M022SC20.0R03	1	22	3	14.6	20	80	50	130	12°	0.27	With	WXMU03...
EXWX03M022SC20.0R03L	1	22	3	14.6	20	130	30	160	12°	0.34	With	WXMU03...
EXWX03M025SC25.0R04	1	25	4	17.8	25	80	60	140	12°	0.46	With	WXMU03...
EXWX03M025SC25.0R04L	1	25	4	17.8	25	80	100	180	12°	0.58	With	WXMU03...
EXWX03M028SC25.0R04	1	28	4	20.6	25	80	60	140	12°	0.48	With	WXMU03...
EXWX03M028SC25.0R04L	1	28	4	20.6	25	145	35	180	12°	0.63	With	WXMU03...
EXWX03M030SC25.0R04	1	30	4	22.6	25	80	60	140	12°	0.48	With	WXMU03...
EXWX03M030SC25.0R04L	1	30	4	22.6	25	145	35	180	12°	0.63	With	WXMU03...
EXWX03M032SC32.0R05	1	32	5	24.7	32	80	70	150	12°	0.84	With	WXMU03...
EXWX03M032SC32.0R05L	1	32	5	24.7	32	80	120	200	12°	1.11	With	WXMU03...
EXWX03M035SC32.0R05	1	35	5	27.6	32	115	35	150	12°	0.88	With	WXMU03...
EXWX03M035SC32.0R05L	1	35	5	27.6	32	165	35	200	12°	1.18	With	WXMU03...
EXWX03M040SC32.0R06	1	40	6	32.6	32	105	45	150	12°	0.9	With	WXMU03...
EXWX03M040SC32.0R06L	1	40	6	32.6	32	175	45	220	12°	1.32	With	WXMU03...

SPARE PARTS



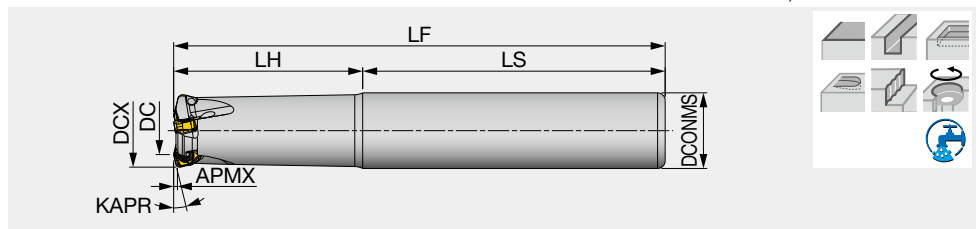
Designation	Clamping screw	Wrench	Tool diameter tolerance	
EXWX03...	CSPB-2.5SH	IP-7D	Tool diameter	EXWX03M**SC... 0 / -0.45

Recommended clamping torque: CSPB-2.5SH = 1.1 N·m

EXWX03

High feed endmill, shank type, with screw clamp system

GAMP = +23°, GAMF = -7.9° ~ -6.2°



Designation	APMX	DCX	CICT	DC	DCONMS	LS	LH	LF	KAPR	WT(kg)	Air hole	Insert
EXWX03M016C16.0R02	1	16	2	8.9	16	70	30	100	12°	0.14	With	WXMU03...
EXWX03M016C16.0R02L	1	16	2	8.9	16	100	50	150	12°	0.21	With	WXMU03...
EXWX03M020C20.0R03	1	20	3	12.8	20	80	50	130	12°	0.26	With	WXMU03...
EXWX03M020C20.0R03L	1	20	3	12.8	20	80	80	160	12°	0.31	With	WXMU03...
EXWX03M025C25.0R04	1	25	4	17.8	25	80	60	140	12°	0.46	With	WXMU03...
EXWX03M025C25.0R04L	1	25	4	17.8	25	80	100	180	12°	0.58	With	WXMU03...
EXWX03M032C32.0R05	1	32	5	24.7	32	80	70	150	12°	0.84	With	WXMU03...
EXWX03M032C32.0R05L	1	32	5	24.7	32	80	120	200	12°	1.11	With	WXMU03...

SPARE PARTS



Designation	Clamping screw	Wrench	Tool diameter tolerance	
EXWX03...	CSPB-2.5SH	IP-7D	Tool diameter	EXWX03M**C... +0.15 / -0.3

Recommended clamping torque: CSPB-2.5SH = 1.1 N·m

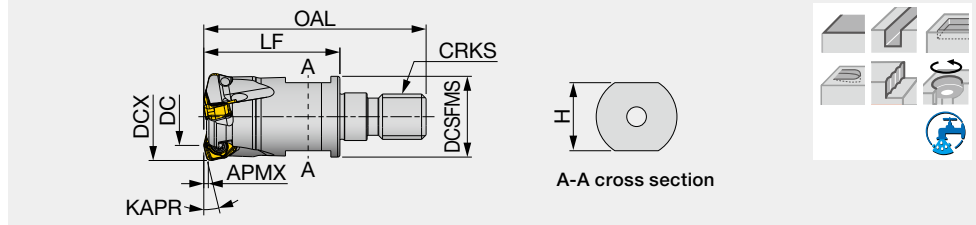
New

TUNGFLEX

HXWX03**SM

High feed endmill, modular type (TungFlex)

GAMP = +23°, GAMF = -7.9° ~ -6.2°



Designation	APMX	DCX	CICT	DC	OAL	LF	H	DCSFMS	KAPR	CRKS	WT(kg)	Air hole	Insert
HXWX03M016SM08R02	1	16	2	8.9	42	25	10	12.8	12°	M8	0.03	With	WXMU03...
HXWX03M018SM08R02	1	18	2	10.6	42	25	10	14.5	12°	M8	0.03	With	WXMU03...
HXWX03M020SM10R03	1	20	3	12.8	49	30	15	17.8	12°	M10	0.06	With	WXMU03...
HXWX03M022SM10R03	1	22	3	14.6	49	30	15	17.8	12°	M10	0.06	With	WXMU03...
HXWX03M025SM12R04	1	25	4	17.8	57	35	17	20.8	12°	M12	0.10	With	WXMU03...
HXWX03M028SM12R04	1	28	4	20.6	57	35	17	23	12°	M12	0.11	With	WXMU03...
HXWX03M030SM12R04	1	30	4	20.6	57	35	17	23	12°	M12	0.12	With	WXMU03...
HXWX03M032SM16R05	1	32	5	24.7	63	40	22	28.8	12°	M16	0.21	With	WXMU03...
HXWX03M035SM16R05	1	35	5	27.6	63	40	22	28.8	12°	M16	0.21	With	WXMU03...
HXWX03M040SM16R06	1	40	6	32.6	63	40	22	28.8	12°	M16	0.23	With	WXMU03...

SPARE PARTS



Designation	Clamping screw	Wrench	Tool diameter tolerance	
HXWX03M...	CSPB-2.5SH	IP-7D	Tool diameter	HXWX03M***SM... 0 / -0.45

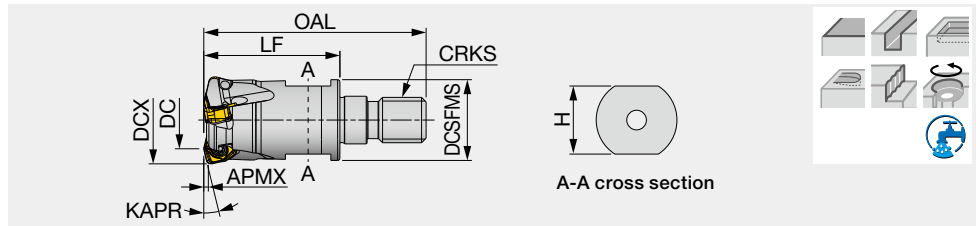
Recommended clamping torque: CSPB-2.5SH = 1.1 N·m

TUNGFLEX

HXWX03-M

High feed endmill, modular type (TungFlex)

GAMP = +23°, GAMF = -7.9° ~ -6.2°



Designation	APMX	DCX	CICT	DC	OAL	LF	H	DCSFMS	KAPR	CRKS	WT(kg)	Air hole	Insert
HXWX03M016M08R02	1	16	2	8.9	42	25	10	12.8	12°	M8	0.03	With	WXMU03...
HXWX03M020M10R03	1	20	3	12.8	49	30	15	17.8	12°	M10	0.06	With	WXMU03...
HXWX03M025M12R04	1	25	4	17.8	57	35	17	20.8	12°	M12	0.10	With	WXMU03...
HXWX03M032M16R05	1	32	5	24.7	63	40	22	28.8	12°	M16	0.21	With	WXMU03...

SPARE PARTS



Designation	Clamping screw	Wrench	Tool diameter tolerance	
HXWX03M...	CSPB-2.5SH	IP-7D	Tool diameter	HXWX03M***M... +0.15 / -0.3

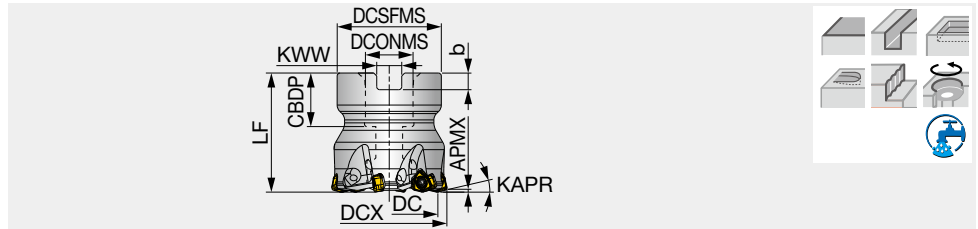
Recommended clamping torque: CSPB-2.5SH = 1.1 N·m

New

TXWX03**S

High feed bore type milling with screw clamp system

GAMP = +23°, GAMF = -6.2° ~ -6.1°



Designation	APMX	DCX	CICT	DC	DCSFMS	DCONMS	CBDP	LF	b	KWW	KAPR	WT(kg)	Air hole	Insert
TXWX03M040SB16.0R06	1	40	6	32.7	35	16	18	40	5.6	8.4	12°	0.22	With	WXMU03...
TXWX03M042SB16.0R06	1	42	6	34.7	35	16	18	40	5.6	8.4	12°	0.24	With	WXMU03...
TXWX03M050SB22.0R08	1	50	8	42.7	47	22	20	50	6.3	10.4	12°	0.46	With	WXMU03...
TXWX03M052SB22.0R08	1	52	8	44.7	49	22	20	50	6.3	10.4	12°	0.5	With	WXMU03...
TXWX03M063SB22.0R08	1	63	8	55.7	59	22	20	50	6.3	10.4	12°	0.86	With	WXMU03...
TXWX03M066SB22.0R10	1	66	10	58.7	60	22	20	50	7	10.4	12°	0.97	With	WXMU03...
TXWX03M080SB27.0R12	1	80	12	72.7	76	27	22	50	7	12.4	12°	1.77	With	WXMU03...

SPARE PARTS



Designation	Clamping screw	Shell locking bolt	Wrench
TXWX03M040.../TXWX03M042...	CSPB-2.5SH	CM8X30H	IP-7D
TXWX03M050.../TXWX03M052... TXWX03M063.../TXWX03M066...	CSPB-2.5SH	CM10X30H	IP-7D
TXWX03M080SB27.0R12	CSPB-2.5SH	CM12X30H	IP-7D

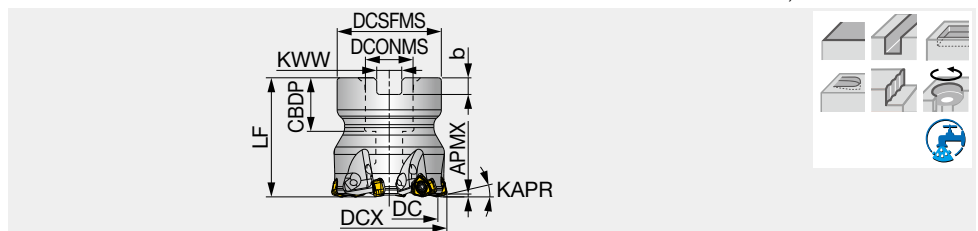
Tool diameter tolerance		
Tool diameter	TXWX03M***SB...	0 / -0.45

Recommended clamping torque: CSPB-2.5SH = 1.1 N·m

TXWX03

High feed bore type milling with screw clamp system

GAMP = +23°, GAMF = -6.2° ~ -6.1°



Designation	APMX	DCX	CICT	DC	DCSFMS	DCONMS	CBDP	LF	b	KWW	KAPR	WT(kg)	Air hole	Insert
TXWX03M040B16.0R06	1	40	6	32.7	35	16	18	40	5.6	8.4	12°	0.22	With	WXMU03...
TXWX03M050B22.0R08	1	50	8	42.7	47	22	20	50	6.3	10.4	12°	0.46	With	WXMU03...

SPARE PARTS



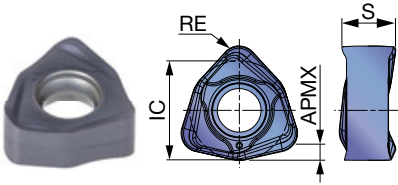
Designation	Clamping screw	Shell locking bolt	Wrench
TXWX03M040B16.0R06	CSPB-2.5SH	CM8X30H	IP-7D
TXWX03M050B22.0R08	CSPB-2.5SH	CM10X30H	IP-7D

Tool diameter tolerance		
Tool diameter	TXWX03M***B...	+0.15 / -0.3

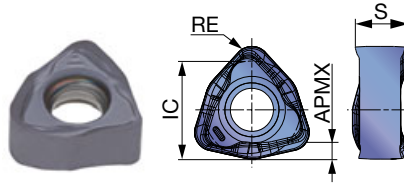
Recommended clamping torque: CSPB-2.5SH = 1.1 N·m

INSERT

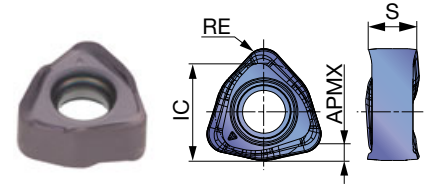
WXMU0303-MM



WXMU0303-ML



WXMU0303-MS



P Steel	★	☆																		
M Stainless	★	☆																		
K Cast iron		☆	★																	
N Non-ferrous																				
S Superalloy	★		★																	
H Hard materials		☆	★																	

★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated			IC	S
			AH130	AH3225	AH8015		
WXMU0303ZER-MM	1.2	1	●	●	●	6.35	3.64
WXMU0303ZER-ML	1.2	1	●	●	●	6.35	3.6
WXMU0303ZER-MS	1.2	1	●			6.35	3.5

● : Line up

GRADES

AH130 **M S**

- High chipping resistance
- Ideal for titanium alloy machining

AH3225 **P M**

- Nano multi-layer coating technology with three major properties for optimal cutting edge integrity
- Increased resistance to wear, fracture, oxidation, built-up edge, and delamination

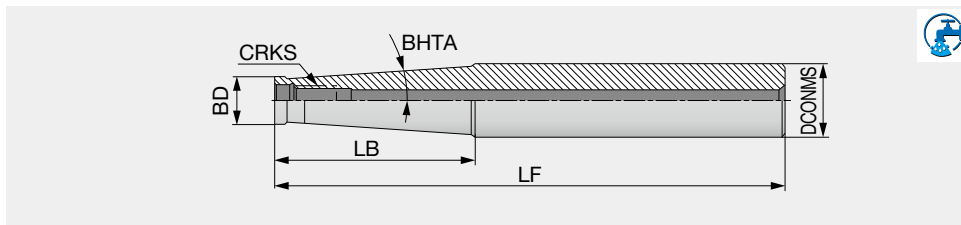
AH8015 **H K S**

- Incorporates a hard coating layer and carbide substrate
- Strong resistance to wear, heat, and built-up edge, ideal for machining hard or difficult materials

TUNGFLEX

SM

TungFlex - Modular shank

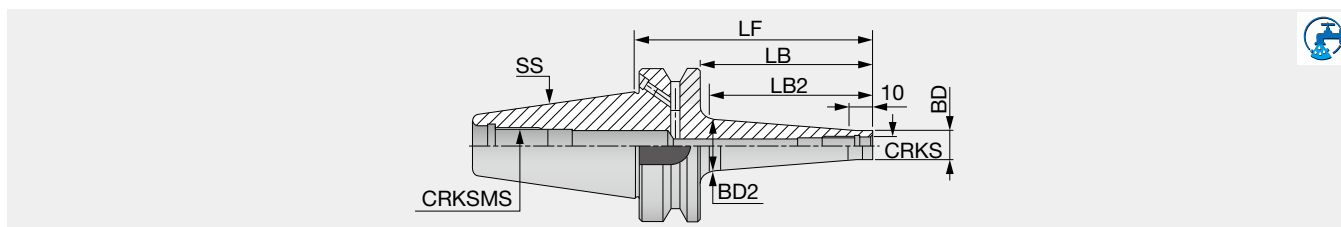


Designation	DCONMS	BD	LF	LB	BHTA	CRKS
SM08-L73C16	16	13	73	25	0°	M8
SM08-L128-C16	16	13	128	80	0.9°	M8
SM08-L170-C20	20	13	170	66.8	3.3°	M8
SM10-L80-C20	20	18	80	30	0°	M10
SM10-L130-C20	20	18	130	80	0.6°	M10
SM10-L200-C25	25	19	200	57.2	3.3°	M10
SM12-L86-C25	25	21	86	30	5.1°	M12
SM12-L200-C32	32	21	200	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 (Screw clamping head holder)

TungFlex modular tooling system with BT shank



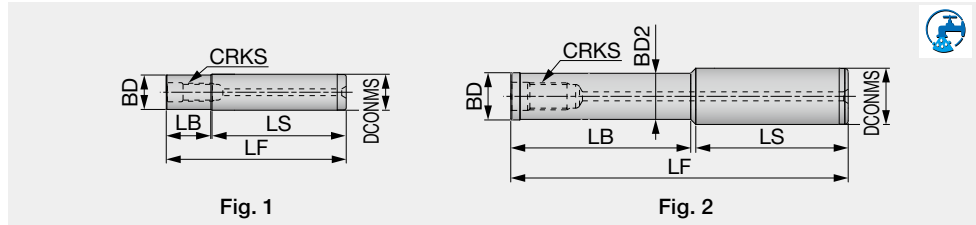
Designation	SS	CRKS	BD	BD2	LF	LB	LB2	CRKSMS
BT40ODP8X66	40	M8	13	15	66	39	30	M16
BT40ODP8X106	40	M8	13	23	106	79	70	M16
BT40ODP10X66	40	M10	18	20	66	39	30	M16
BT40ODP10X106	40	M10	18	28	106	79	70	M16
BT40ODP12X66	40	M12	21	24	66	39	30	M16
BT40ODP12X106	40	M12	21	31	106	79	70	M16
BT40ODP16X66	40	M16	29	28.6	66	39	-	M16
BT40ODP16X106	40	M16	29	34	106	79	70	M16

Applicable for 10 MPa pressure coolant

(1) Balanced to G6.3 at 12,000 min⁻¹

SM-C-H

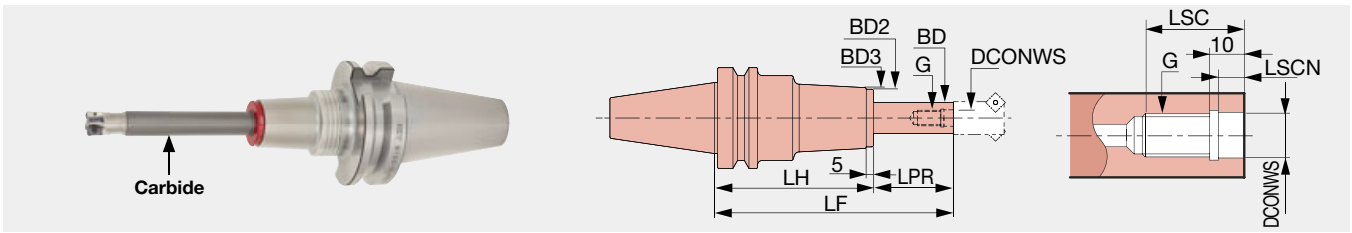
Carbide modular shank



Designation	CRKS	DCONMS	LF	LB	LS	BD	BD2	Fig.
SM08-L80-20-C16-C-H	M8	16	80	20	59.6	15.3	-	1
SM08-L100-40-C16-C-H	M8	16	100	40	59.6	15.3	-	1
SM08-L150-80-C16-C-H	M8	16	150	80	69.6	15.3	-	1
SM08-L200-100-C16-C-H	M8	16	200	100	98.2	13	12.5	2
SM08-L200-140-C16-C-H	M8	16	200	140	59.6	15.3	-	1
SM08-L250-180-C16-C-H	M8	16	250	180	69.6	15.3	-	1
SM10-L80-20-C20-C-H	M10	20	80	20	59.2	18.5	-	1
SM10-L100-40-C20-C-H	M10	20	100	40	59.2	18.5	-	1
SM10-L150-80-C20-C-H	M10	20	150	80	69.2	18.5	-	1
SM10-L200-100-C20-C-H	M10	20	200	100	99.2	18.5	-	1
SM10-L200-140-C20-C-H	M10	20	200	140	58.7	18	17.5	2
SM10-L200-140-C20-C-H-N	M10	20	200	140	59.2	18.5	-	1
SM10-L250-130-C20-C-H	M10	20	250	130	118.7	18	17.5	2
SM10-L250-180-C20-C-H	M10	20	250	180	68.7	18	17.5	2
SM10-L250-180-C20-C-H-N	M10	20	250	180	69.2	18.5	-	1
SM10-L300-180-C20-C-H	M10	20	300	180	118.7	18	17.5	2
SM10-L300-230-C20-C-H	M10	20	300	230	68.7	18	17.5	2
SM12-L100-40-C25-C-H	M12	25	100	40	59.5	24	-	1
SM12-L150-80-C25-C-H	M12	25	150	80	67.7	21	20.5	2
SM12-L150-80-C25-C-H-N	M12	25	150	80	69.5	24	-	1
SM12-L200-100-C25-C-H	M12	25	200	100	97.7	21	20.5	2
SM12-L200-100-C25-C-H-N	M12	25	200	100	99.5	24	-	1
SM12-L200-140-C25-C-H	M12	25	200	140	57.7	21	20.5	2
SM12-L250-130-C25-C-H	M12	25	250	130	117.7	21	20.5	2
SM12-L250-180-C25-C-H	M12	25	250	180	69.5	24	-	1
SM12-L300-180-C25-C-H	M12	25	300	180	117.7	21	20.5	2
SM12-L300-180-C25-C-H-N	M12	25	300	180	119.5	24	-	1
SM12-L300-230-C25-C-H	M12	25	300	230	67.7	21	20.5	2
SM16-L100-40-C32-C-H	M16	32	100	40	58.5	29	-	1
SM16-L150-80-C32-C-H	M16	32	150	80	68.5	29	-	1
SM16-L200-100-C32-C-H	M16	32	200	100	98.5	29	-	1
SM16-L200-140-C32-C-H	M16	32	200	140	58.5	29	-	1
SM16-L250-130-C32-C-H	M16	32	250	130	118.5	29	-	1
SM16-L250-180-C32-C-H	M16	32	250	180	68.5	29	-	1
SM16-L300-180-C32-C-H	M16	32	300	180	118.5	29	-	1
SM16-L300-230-C32-C-H	M16	32	300	230	68.5	29	-	1
SM16-L350-230-C32-C-H	M16	32	350	230	118.5	29	-	1
SM16-L350-280-C32-C-H	M16	32	350	280	68.5	29	-	1

BT-RSG (Screw clamping head holder)

TungFlex modular tooling system with BT shank

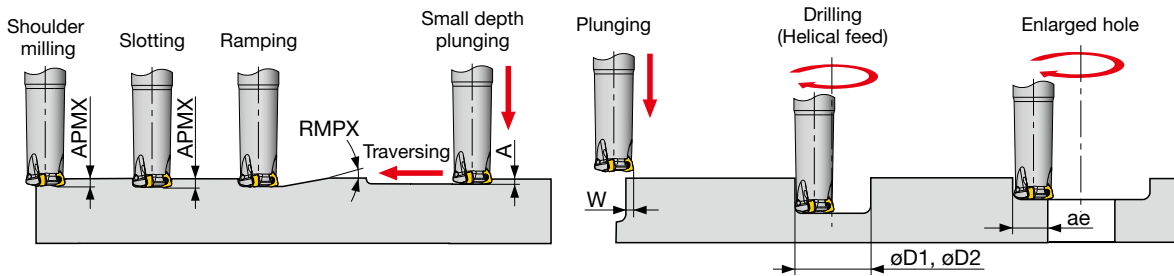


Designation	DCONWS	LSC	LSCN	BD	LF	LPR	LH	BD2	BD3	WT (kg)	G
BT40-RSG 8-105-M 25	8.5	18	6.5	15	105	25	80	30	32	1.4	M8
BT40-RSG 8-135-M 25	8.5	18	6.5	15	135	25	110	30	32	1.8	M8
BT40-RSG 8-130-M 50	8.5	18	6.5	15	130	50	80	30	32	1.4	M8
BT40-RSG 8-160-M 50	8.5	18	6.5	15	160	50	110	30	32	1.8	M8
BT40-RSG 8-155-M 75	8.5	18	6.5	15	155	75	80	30	32	1.5	M8
BT40-RSG 8-185-M 75	8.5	18	6.5	15	185	75	110	30	32	1.9	M8
BT40-RSG 10-125-M 25	10.5	22	6.5	19	125	25	100	36	38	1.8	M10
BT40-RSG 10-155-M 25	10.5	22	6.5	19	155	25	130	36	38	2.2	M10
BT40-RSG 10-150-M 50	10.5	22	6.5	19	150	50	100	36	38	1.9	M10
BT40-RSG 10-180-M 50	10.5	22	6.5	19	180	50	130	36	38	2.3	M10
BT40-RSG 10-175-M 75	10.5	22	6.5	19	175	75	100	36	38	2	M10
BT40-RSG 10-205-M 75	10.5	22	6.5	19	205	75	130	36	38	2.4	M10
BT40-RSG 10-200-M100	10.5	22	6.5	19	200	100	100	36	38	2	M10
BT40-RSG 10-230-M100	10.5	22	6.5	19	230	100	130	36	38	2.4	M10
BT40-RSG 12-125-M 25	12.5	22	6	24	125	25	100	43	45	2	M12
BT40-RSG 12-155-M 25	12.5	22	6	24	155	25	130	43	45	2.4	M12
BT40-RSG 12-150-M 50	12.5	22	6	24	150	50	100	43	45	2.1	M12
BT40-RSG 12-180-M 50	12.5	22	6	24	180	50	130	43	45	2.5	M12
BT40-RSG 12-175-M 75	12.5	22	6	24	175	75	100	43	45	2.3	M12
BT40-RSG 12-205-M 75	12.5	22	6	24	205	75	130	43	45	2.7	M12
BT40-RSG 12-200-M100	12.5	22	6	24	200	100	100	43	45	2.4	M12
BT40-RSG 12-230-M100	12.5	22	6	24	230	100	130	43	45	2.8	M12
BT50-RSG 8-120-M 25	8.5	18	6.5	15	120	25	95	30	32	4	M8
BT50-RSG 8-150-M 25	8.5	18	6.5	15	150	25	125	30	32	4.3	M8
BT50-RSG 8-145-M 50	8.5	18	6.5	15	145	50	95	30	32	4	M8
BT50-RSG 8-175-M 50	8.5	18	6.5	15	175	50	125	30	32	4.3	M8
BT50-RSG 8-170-M 75	8.5	18	6.5	15	170	75	95	30	32	4.1	M8
BT50-RSG 8-200-M 75	8.5	18	6.5	15	200	75	125	30	32	4.4	M8
BT50-RSG 10-140-M 25	10.5	22	6.5	19	140	25	115	36	38	4.3	M10
BT50-RSG 10-170-M 25	10.5	22	6.5	19	170	25	145	36	38	4.6	M10
BT50-RSG 10-165-M 50	10.5	22	6.5	19	165	50	115	36	38	4.4	M10
BT50-RSG 10-195-M 50	10.5	22	6.5	19	195	50	145	36	38	4.7	M10
BT50-RSG 10-190-M 75	10.5	22	6.5	19	190	75	115	36	38	4.5	M10
BT50-RSG 10-220-M 75	10.5	22	6.5	19	220	75	145	36	38	4.8	M10
BT50-RSG 10-215-M100	10.5	22	6.5	19	215	100	115	36	38	4.5	M10
BT50-RSG 10-245-M100	10.5	22	6.5	19	245	100	145	36	38	4.8	M10
BT50-RSG 12-140-M 25	12.5	22	6	24	140	25	115	43	45	4.6	M12
BT50-RSG 12-170-M 25	12.5	22	6	24	170	25	145	43	45	5	M12
BT50-RSG 12-165-M 50	12.5	22	6	24	165	50	115	43	45	4.7	M12
BT50-RSG 12-195-M 50	12.5	22	6	24	195	50	145	43	45	5.1	M12
BT50-RSG 12-190-M 75	12.5	22	6	24	190	75	115	43	45	4.9	M12
BT50-RSG 12-220-M 75	12.5	22	6	24	220	75	145	43	45	5.3	M12
BT50-RSG 12-215-M100	12.5	22	6	24	215	100	115	43	45	5	M12
BT50-RSG 12-245-M100	12.5	22	6	24	245	100	145	43	45	5.4	M12
BT50-RSG 12-240-M125	12.5	22	6	24	240	125	115	43	45	5.2	M12
BT50-RSG 16-140-M 25	17	25	6	29	140	25	115	52	54	5.4	M16
BT50-RSG 16-165-M 50	17	25	6	29	165	50	115	52	54	5.6	M16
BT50-RSG 16-190-M 75	17	25	6	29	190	75	115	52	54	5.8	M16
BT50-RSG 16-215-M100	17	25	6	29	215	100	115	52	54	6	M16
BT50-RSG 16-240-M125	17	25	6	29	240	125	115	52	54	6.2	M16

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Chipbreaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Low carbon steel S15C, SS400, etc. C15E4, E275A, etc.	- 300HB	First choice	AH3225	MM	100 - 300	0.5 - 1.5
			For wear resistance	AH8015			
			Low cutting force	AH3225	ML		
	Carbon steel, Alloy steel S55C, SCM440, etc. C55, 42CrMoS4, etc.	- 300HB	First choice	AH3225	MM	100 - 250	0.5 - 1.5
			For wear resistance	AH8015			
			Low cutting force	AH3225	ML		
Prehardened steel NAK80, PX5, etc.	30 - 40HRC	First choice	AH3225	MM	100 - 200	0.5 - 1.2	
		For wear resistance	AH8015				
		Low cutting force	AH3225	ML			0.5 - 1
M	Austenitic Stainless steel SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200HB	First choice	AH130	MS	80 - 150	0.5 - 1
			Low cutting force	AH130	ML		0.5 - 0.8
	Martensitic Stainless steel SUS410, SUS420J1, etc. X12Cr13, X20Cr13, etc.	- 200HB	First choice	AH130	MS	50 - 120	0.3 - 1
			Low cutting force	AH130	ML		0.3 - 0.8
K	Grey cast iron FC250, FC300, etc. 250, 300, etc.	150 - 250HB	First choice	AH8015	MM	100 - 300	0.5 - 1.5
			For impact resistance	AH3225			
			Low cutting force	AH8015	ML		
	Ductile cast iron FCD400, etc. 400-15, 600-3, etc.	150 - 250HB	First choice	AH8015	MM	80 - 200	0.5 - 1.5
For impact resistance			AH3225				
S	Titanium alloy Ti-6Al-4V, etc.	- 40HRC	First choice	AH130	MS	30 - 60	0.3 - 0.7
			For impact resistance	AH130	MM		
	Superalloys Inconel718, etc.	- 40HRC	First choice	AH8015	MM	20 - 50	0.1 - 0.3
			Low cutting force	AH8015	ML		0.1 - 0.25
H	Hardened steel SKD61, etc. X40CrMoV5-1, etc.	40 - 50HRC	First choice	AH8015	MM	80 - 150	0.1 - 0.5
			For impact resistance	AH3225			
	SKD11, etc. X153CrMoV12, etc.	50 - 60HRC	First choice	AH8015	MM		

APPLICATION RANGE



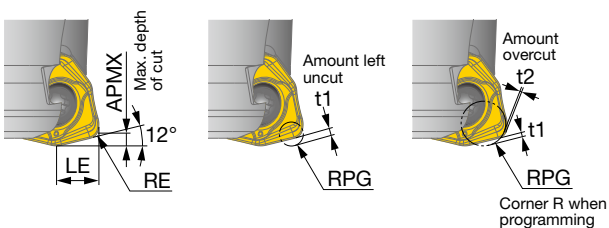
Designation	DCX	Max. depth of cut APMX	Max. ramping angle RMPX	Max. plunging depth A	Max. cutting width in plunging W	Min. machinable hole dia. øD1	Max. machinable hole dia. øD2	Max. cutting width in enlarged hole ae
E/HXWX03M016...	16	1	3	0.3	4	25	30	12
E/HXWX03M018...	18	1	2	0.3	4	28	34	14
E/HXWX03M020...	20	1	2	0.3	4	31	38	16
E/HXWX03M022...	22	1	1.7	0.3	4	36	42	18
E/HXWX03M025...	25	1	1.4	0.3	4	41	48	21
E/HXWX03M028...	28	1	1.3	0.3	4	47	54	24
E/HXWX03M030...	30	1	1.3	0.3	4	51	58	26
E/HXWX03M032...	32	1	1	0.3	4	54	62	28
E/HXWX03M035...	35	1	0.8	0.3	4	60	68	31
E/H/TXWX03M040...	40	1	0.7	0.3	4	71	78	36
TXWX03M042...	42	1	0.7	0.3	4	73	82	38
TXWX03M050...	50	1	0.6	0.3	4	87	98	46
TXWX03M052...	52	1	0.5	0.3	4	92	102	48
TXWX03M063...	63	1	0.4	0.3	4	112	124	59
TXWX03M066...	66	1	0.4	0.3	4	118	130	62
TXWX03M080...	80	1	0.3	0.3	4	144	158	76

Tool diameter: DCX (mm), Number of revolution: n (min^{-1}), Feed speed: V_f (mm/min), Max. depth of cut: $APMX = 1$ mm, Number of teeth: CICT

$\phi 16$, CICT = 2		$\phi 20$, CICT = 3		$\phi 25$, CICT = 4		$\phi 32$, CICT = 5		$\phi 40$, CICT = 6		$\phi 50$, CICT = 8	
n	V_f	n	V_f	n	V_f	n	V_f	n	V_f	n	V_f
3,981	7,962	3,185	9,554	2,548	10,191	1,990	9,952	1,592	9,554	1,274	10,191
$V_c = 200$ m/min, $f_z = 1$ mm/t											
3,981	7,962	3,185	9,554	2,548	10,191	1,990	9,952	1,592	9,554	1,274	10,191
$V_c = 200$ m/min, $f_z = 1$ mm/t											
2,986	4,180	2,389	5,016	1,911	5,350	1,493	5,225	1,194	5,016	955	5,350
$V_c = 150$ m/min, $f_z = 0.7$ mm/t											
2,389	2,389	1,911	2,866	1,529	3,057	1,194	2,986	955	2,866	764	3,057
$V_c = 120$ m/min, $f_z = 0.5$ mm/t											
1,990	1,194	1,592	1,433	1,274	1,529	995	1,493	796	1,433	637	1,529
$V_c = 100$ m/min, $f_z = 0.3$ mm/t											
3,981	7,962	3,185	9,554	2,548	10,191	1,990	9,952	1,592	9,554	1,274	10,191
$V_c = 200$ m/min, $f_z = 1$ mm/t											
2,986	5,971	2,389	7,166	1,911	7,643	1,493	7,464	1,194	7,166	955	7,643
$V_c = 150$ m/min, $f_z = 1$ mm/t											
796	637	637	764	510	815	398	796	318	764	255	815
$V_c = 40$ m/min, $f_z = 0.4$ mm/t											
597	239	478	287	382	306	299	299	239	287	191	306
$V_c = 30$ m/min, $f_z = 0.2$ mm/t											
2,389	1,433	1,911	1,720	1,529	1,834	1,194	1,791	955	1,720	764	1,834
$V_c = 120$ m/min, $f_z = 0.3$ mm/t											
1,194	239	955	287	764	306	597	299	478	287	382	306
$V_c = 60$ m/min, $f_z = 0.1$ mm/t											

TOOL GEOMETRY ON PROGRAMMING

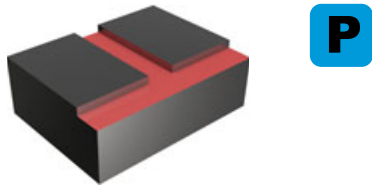
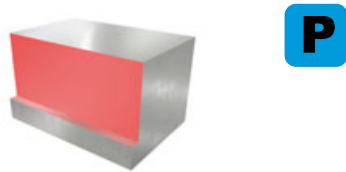
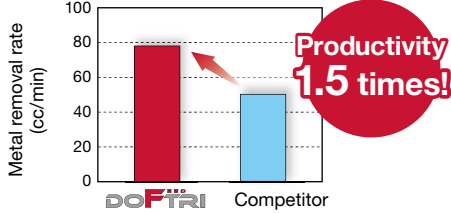


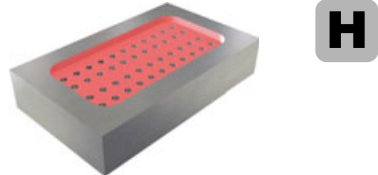
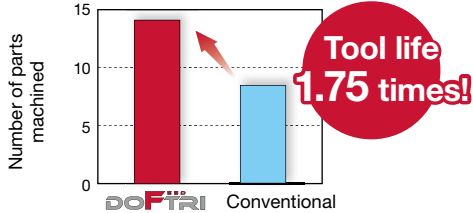
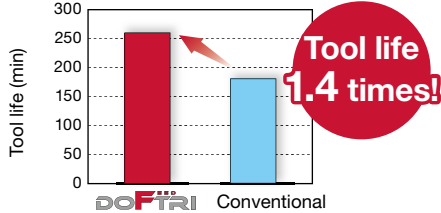
When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as $R = 1.5$ mm. If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t_1) and overcut (t_2).



Max. depth of cut APMX (mm)	Corner radius RE (mm)	LE (mm)	Corner R when programming RPG	Amount left uncut t_1 (mm)	Amount overcut t_2 (mm)
1	1.2	3.5	1	0.56	-
1	1.2	3.5	1.5	0.46	-
1	1.2	3.5	2	0.35	0.16
1	1.2	3.5	2.5	0.2	0.5

Please refer to the values in the table regardless of the tool diameter tolerance.

PRACTICAL EXAMPLES

Workpiece type		Machine structural part	Machine part
Cutter		EXWX03M020C20.0R03 (ø20 mm, CICT = 3)	TXWX03M050B22.0R08 (ø50 mm, CICT = 8)
Insert		WXMU0303ZER-MM	WXMU0303ZER-ML
Grade		AH3225	AH3225
		SS400 / E275A	SS400 / E275A
Workpiece material			
Cutting conditions	Cutting speed: V_c (m/min)	180	180
	Feed per tooth: f_z (mm/t)	0.9	0.55
	Depth of cut : a_p (mm)	0.5	0.65
	Width of cut : a_e (mm)	20	40
	Machining	Slotting, Shoulder milling	Shoulder milling
	Coolant	Dry	Dry
Machine		Vertical M/C, BT40	Vertical M/C, BT40
Results		 <p>Generating low cutting forces, DoFeedTri eliminated chatter, providing machining stability and 1.5 times productivity.</p>	 <p>Thanks to the superior chip evacuation and control of the ML chipbreaker, DoForceTri eliminated chip re-cutting—which was common with conventional chipbreakers and often caused scratches on the work surface—while ensuring process security.</p>
Workpiece type		Machine part	Die and mold
Cutter		TXWX03M050B22.0R08 (ø50 mm, CICT = 8)	EXWX03M032C32.0R05 (ø32 mm, CICT = 5)
Insert		WXMU0303ZER-MS	WXMU0303ZER-MM
Grade		AH130	AH3225
		SUS316 / X5CrNiMo17-12-2	SKD61 / X40CrMoV5-1
Workpiece material			
Cutting conditions	Cutting speed: V_c (m/min)	100	120
	Feed per tooth: f_z (mm/t)	0.65	0.67
	Depth of cut : a_p (mm)	0.6	0.7
	Width of cut : a_e (mm)	- 32	- 32
	Machining	Face milling	Pocketing
	Coolant	Wet	Wet
Machine		Vertical M/C, BT40	Vertical M/C, BT50
Results		 <p>MS geometry provided 1.75 times tool life increase in stainless steel.</p>	 <p>With its strong cutting edge design, DoFeedTri provided 1.4 times tool life while machining parts with heavy interruptions</p>

SOLIDFIXWRENCH



Features and benefits of the new key wrench

- Ease-of-use

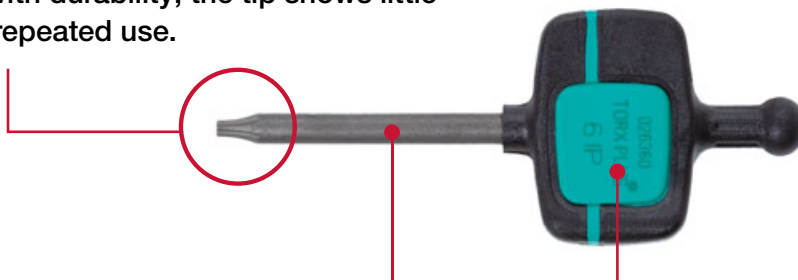
Designed for precision, durability, and rigidity, the key shaft provides easy handling and long service life.

- Extended service life of screws

The key also helps extend service life of screws by preventing stripped screws and eliminating the risk of cam-out.

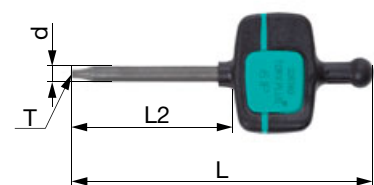
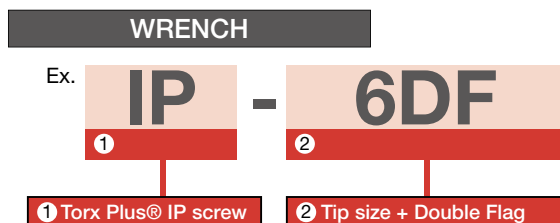
- Designed with precision, the tip allows for a full engagement with a screw head.

- Designed with durability, the tip shows little wear after repeated use.



A thick shaft that fully transfers the driving torque.

Ergonomic grip design that can prevent excessive torque from being applied to the screw.



Designation	T	L	L2	d
IP-6DF	6IP	62	33	3
IP-7DF	7IP	62	33	3

Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi
Iwaki-city, Fukushima 970-1144 Japan
Phone: +81-246-36-8501
Fax: +81-246-36-8542
www.tungaloy.co.jp

Tungaloy-NTK America Inc.

3726 N Ventura Drive
Arlington Heights, IL 60004, U.S.A.
Phone: +1-888-554-8394
Fax: +1-888-554-8392
www.tungaloy.com/us

Tungaloy Canada

432 Elgin St. Unit 3
Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779
Fax: +1-519-758-5791
www.tungaloy.com/ca

Tungaloy-NTK De Mexico S.A.

C. Los Arellano 113,
Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone: +52-449-929-5410
Fax: +52-449-929-5411
www.tungaloy.com/mx

Tungaloy-NTK do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora
13280-000 Vinhedo, São Paulo, Brasil
Phone: +55-19-38262757
Fax: +55-19-38262757
www.tungaloy.com/br

Tungaloy-NTK Germany GmbH.

Katzbergstr. 3a
D-40764 Langenfeld, Germany
Phone: +49-2173-90420-0
Fax: +49-2173-90420-19
www.tungaloy.com/de

Tungaloy France s.a.s

Les Fjords
19 avenue de Norvège
91140 Villebon Sur Yvette, France
Phone: +33-1-6486-4300
Fax: +33-1-6907-7817
www.tungaloy.com/fr

Tungaloy Italia S.r.l.

Viale Sarca 336/Edificio 13
20126 Milano, Italy
Phone: +39-02-252012-1
Fax: +39-02-252012-65
www.tungaloy.com/it

Tungaloy Czech s.r.o.

Turanka 1583/115g,
627 00 Brno, Czech Republic
Phone: +420-532 123 391
www.tungaloy.com/cz

Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7
Pol. Ind. Bufalvent
ES-08243 Manresa (BCN), Spain
Phone: +34 93 113 1360
www.tungaloy.com/es

Tungaloy Scandinavia AB

Bultgatan 38
442 40 Kungälv, Sweden
Phone: +46-462119200
Fax: +46-462119207
www.tungaloy.com/se

Tungaloy Rus, LLC

Andropova avenue, h.18/7,
11 floor, office 3, 115432,
Moscow, Russia
Phone: +7-499-683-01-80
Fax: +7-499-683-01-81
www.tungaloy.com/ru

Tungaloy Polska Sp. z o.o.

Ul. Irysowa 1, 55-040 Bielany
Wroclawskie, Poland
Phone: +48 607 907 237
www.tungaloy.com/pl

Tungaloy-NTK UK Ltd.

Suite 3, Pioneer House, Mill Street,
Cannock, WS11 0EF, UK
Phone: +44 121 4000 231
Fax: +44 121 270 9694
www.tungaloy.com/uk

Tungaloy Hungary Kft

Erzsébet királyné útja 125
H-1142 Budapest, Hungary
Phone: +36 1 781-6846
Fax: +36 1 781-6866
www.tungaloy.com/hu

Tungaloy Turkey

Serifali Mah.bayraktar Bulvari Kule Sk. No:26
34775 Umraniye / Istanbul / Turkey
Phone: +90 216 540 04 67
Fax: +90 216 540 04 87
www.tungaloy.com/tr

Tungaloy Benelux b.v.

Tjalk 70
NL-2411 NZ Bodegraven, Netherlands
Phone: +31 172 630 420
Fax: +31 172 630 429
www.tungaloy.com/nl

Tungaloy Croatia

Ulica bana Josipa Jelačića 87,
10430, Samobor, Croatia
Phone: +385 1 3326 604
Fax: +385 1 3327 683
www.tungaloy.com/hr

Tungaloy Cutting Tool (Shanghai) Co. Ltd.

Room 701, 7th Floor,
No.1 Lane 388 Kang'an Road,
Pudong New Area, Shanghai, China
Phone: +86-21-3632-1880
Fax: +86-21-3621-1918
www.tungaloy.com/cn

Tungaloy Cutting Tools Taiwan Co. Ltd.

9F. No.293, Zhongyang Rd,
Xinzhuang Dist, New Taipei City,
24251 Taiwan
Phone: +886-2-8521-9986
Fax: +886-2-8521-8935
www.tungaloy.com/tw

Tungaloy-NTK Cutting Tool (Thailand) Co.,Ltd.

Interlink tower 4th Fl.
1858/5-7 Bangna-Trad Road
km.5 Bangna, Bangna, Bangkok 10260
Thailand
Phone: +66-2-751-5711
Fax: +66-2-751-5715
www.tungaloy.com/th

Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #08-09 Oxley BizHub 2
Singapore 408734
Phone: +65-6391-1833
Fax: +65-6299-4557
www.tungaloy.com/sg

Tungaloy-NTK Vietnam LLC

Floor 3, Licogi 13 Tower, No.164 Khuat Duy
Tien Street, Thanh Xuan Ward, Ha Noi,
Vietnam
Phone: +84 24 63282086
www.tungaloy.com/vn

Tungaloy India Pvt. Ltd.

One International Center,
Unit # 902-A, 9th Floor,
Tower 1, Senapati Bapat Marg,
Elphinstone Road (West),
Mumbai 400013, India
Phone: +91-22-6124-8803
Fax: +91-22-6124-8899
www.tungaloy.com/in

Tungaloy-NTK Korea

1040 Gachang-ro, Gachang-myeon,
Dalseong-gun, Daegu, 42936, Korea
Phone: +82-53-760-7698
Fax: +82-53-768-9912
www.tungaloy.com/kr

Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14
Kelana Jaya, 47301
Petaling Jaya, Selangor Darul Ehsan
Malaysia
Phone: +603-7805-3222
Fax: +603-7804-8563
www.tungaloy.com/my

Tungaloy Australia Pty Ltd

Unit 68 1470 Ferntree Gully Road
Knoxfield 3180 Victoria, Australia
Phone: +61-3-9755-8147
Fax: +61-3-9755-6070
www.tungaloy.com/au

PT. Tungaloy Indonesia

Ruko Blok AA.10 No3&5, Grand Wisata,
Lembangjaya, Tambun Selatan, Bekasi,
17510 Indonesia
Phone: +62-21-8261-5808
Fax: +62-21-8261-5809
www.tungaloy.com/id



tungaloy.com

follow us at:

facebook.com/tungaloyjapan

twitter.com/tungaloyjapan

www.youtube.com/tungaloycorporation

Distributed by:



Tungaloy APP & SNS

FIND US ON THE CLOUD!
machingcloud.com



AS9100 Certified
78006
2015.11.04
ISO 14001 Certified
EC97J1123
1997.11.26