

MillLine

MILLQ^{UAD}FEED

www.tungaloy.com

Tungaloy Report No. 502-G

MILLQUADFEED

Powerful high-feed milling cutter with improved metal removal rate





ACCELERATED MACHINING

MillLine

MILL^{UAD}QFEED
TUNGALOY

TUNG FORCE
MILL
ACCELERATED MACHINING



MillQuadFeed, simple but **powerful high-feed milling cutter** for large depths of cut, boosts performance and productivity.

Highly productive face milling operation of large components

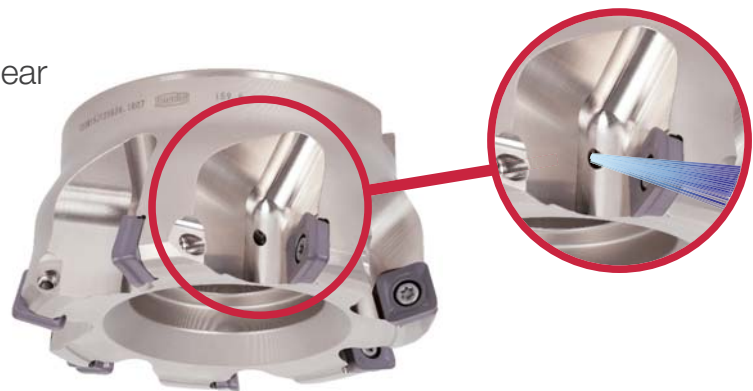
High metal removal rates

- Large depth of cut up to 2.5 mm
- High feed rate up to 2.0 mm/tooth



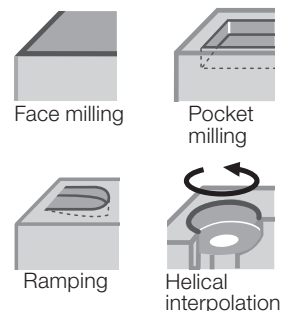
Good chip evacuation

- Wavy cutting edge controls chip formation, quickly removing chips from pockets.
- Large chip gullet on the cutter body assists smooth chip evacuation.
- Air blow to the cutting edge helps clear chips in pocket machining.



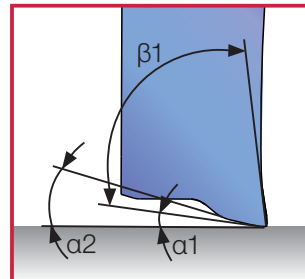
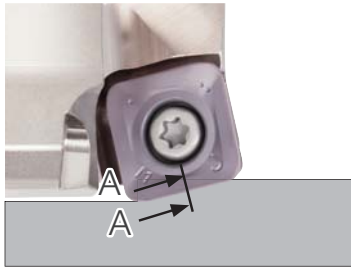
Versatility in machining

- Large ramping & helical interpolation angle due to positive flank.
- Optimized rake angle on the cutting edge reduces cutting force and makes the insert suitable for machining all types of materials with extended tool life.



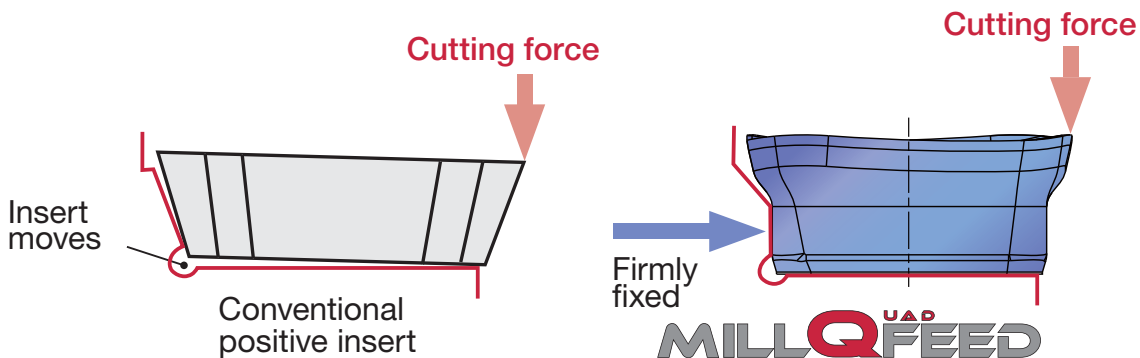
Higher stability in machining

- Optimized relief angles (α_1 & α_2) reduce chattering during high-feed milling.
- Strengthened included angle (β_1) of the cutting edge improves fracture resistance.



A-A cross section

- The insert's straight sides secure the insert on the pocket against cutting force.
 - Ensures reliability in heavy machining
 - Replaces top clamp with simple screw clamping



GRADE

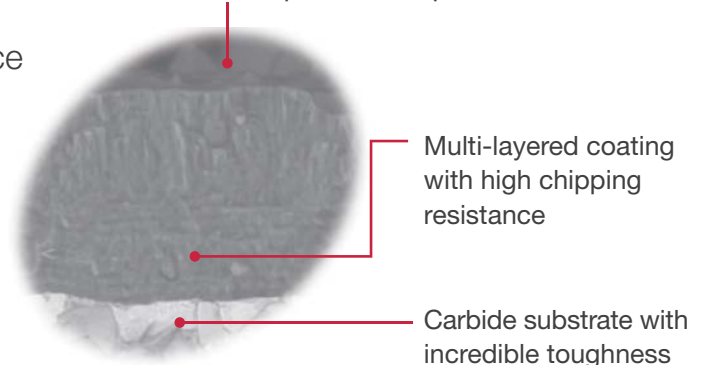
- AH3135 **P** **M**

- New grade for steel and stainless steel
- Improved chipping and fracture resistance

Special Surface Technology

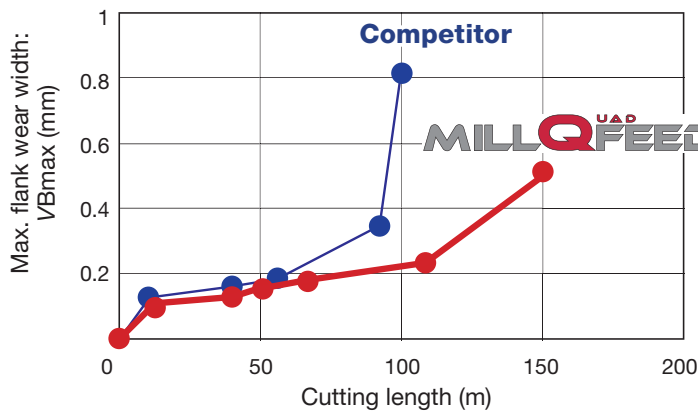


Smooth surface prevents chip adhesion



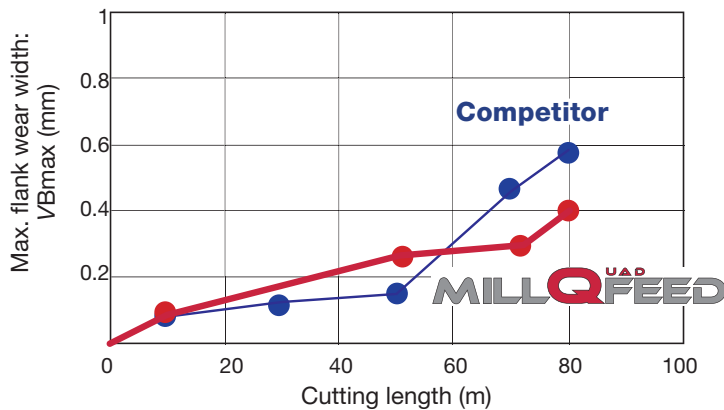
CUTTING PERFORMANCE

Tool life for carbon steel



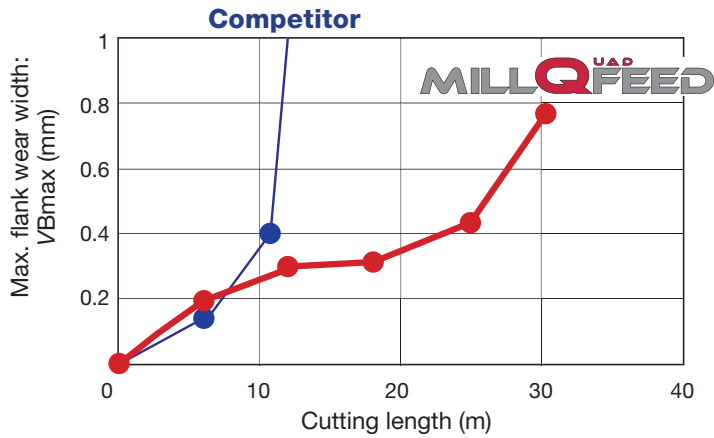
Cutter : TXSW15J080B31.7R05
($\phi D_c = 80$ mm, $z = 1$)
 Insert : SWMT1506ZER-MJ AH3135
 Workpiece material : S55C (194 - 201 HB)
 Cutting speed : $V_c = 150$ m/min
 Feed : $f = 2.0$ mm/tooth
 Depth of cut : $a_p = 2.5$ mm
 Width of cut : $a_e = 65$ mm
 Machine : Vertical M/C, BT50, 37 kw

Tool life for cast iron



Cutter : TXSW15J080B31.7R05
($\phi D_c = 80$ mm, $z = 1$)
 Insert : SWMT1506ZER-MJ AH120
 Workpiece material : FCD600 (235 - 250 HB)
 Cutting speed : $V_c = 150$ m/min
 Feed : $f = 2.0$ mm/tooth
 Depth of cut : $a_p = 2.5$ mm
 Width of cut : $a_e = 50$ mm
 Machine : Vertical M/C, BT50, 37 kw

Tool life for stainless steel



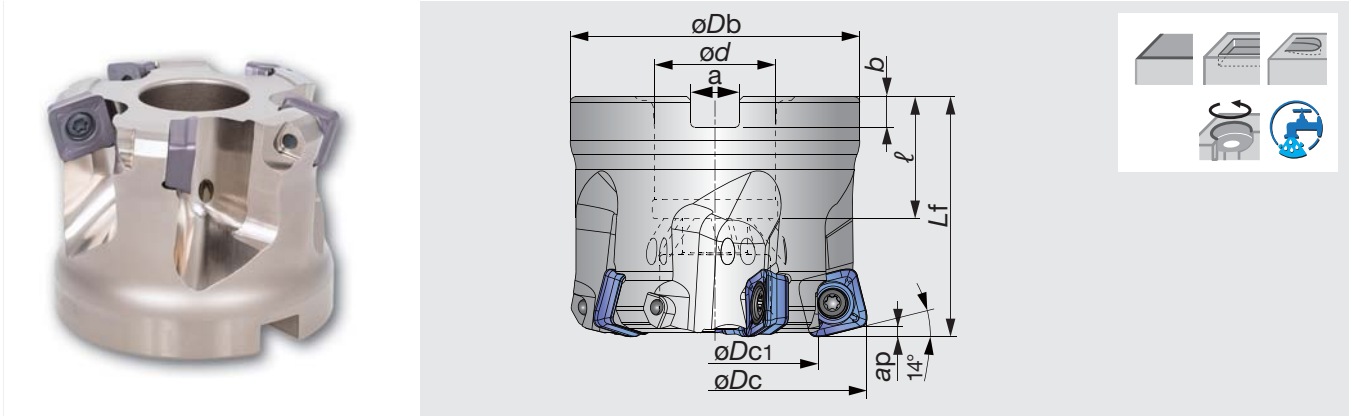
Cutter : TXSW15J080B31.7R05
 ($\phi D_c = 80$ mm, $z = 1$)
 Insert : SWMT1506ZER-MJ AH3135
 Workpiece material : SUS304 (159 - 164 HB)
 Cutting speed : $V_c = 150$ m/min
 Feed : $f = 1.0$ mm/tooth
 Depth of cut : $a_p = 2.5$ mm
 Width of cut : $a_e = 65$ mm
 Machine : Vertical M/C, BT50, 37 kw



High-feed milling cutter for large depth of cut

CUTTER - BORE TYPE

MillQuadFeed TXSW



| Designation | Max. ap | ϕDc | z | $\phi Dc1$ | ϕDb | L_f | ϕd | ℓ | a | b | Kg | C.bolt | Insert |
|--------------------|-----------|-----------|-----|------------|-----------|-------|----------|--------|-------|-------|------|----------------|----------|
| TXSW15M050B22.0R03 | 2.5 | 50.00 | 3 | 24.1 | 47 | 50.0 | 22.000 | 20.00 | 8.00 | 5.00 | 0.40 | SR PS 118-0273 | SWMT15** |
| TXSW15M063B22.0R04 | 2.5 | 63.00 | 4 | 37.1 | 59 | 50.0 | 22.000 | 20.00 | 8.00 | 5.00 | 0.66 | FSHM10-40H | SWMT15** |
| TXSW15J080B31.7R05 | 2.5 | 80.00 | 5 | 54.1 | 76 | 63.0 | 31.750 | 32.00 | 12.70 | 8.00 | 1.31 | CM16X40H | SWMT15** |
| TXSW15M080B27.0R05 | 2.5 | 80.00 | 5 | 54.1 | 76 | 63.0 | 27.000 | 22.00 | 12.40 | 7.00 | 1.41 | CM12X30H | SWMT15** |
| TXSW15J100B31.7R06 | 2.5 | 100.00 | 6 | 74.1 | 96 | 63.0 | 31.750 | 32.00 | 12.70 | 8.00 | 2.25 | CM16X40H | SWMT15** |
| TXSW15M100B32.0R06 | 2.5 | 100.00 | 6 | 74.1 | 96 | 63.0 | 32.000 | 25.00 | 14.40 | 8.00 | 2.26 | CM16X40H | SWMT15** |
| TXSW15J125B38.1R07 | 2.5 | 125.00 | 7 | 99.1 | 100 | 63.0 | 38.100 | 38.00 | 15.90 | 10.00 | 2.91 | TMBA-M20H | SWMT15** |
| TXSW15M125B40.0R07 | 2.5 | 125.00 | 7 | 99.1 | 100 | 63.0 | 40.000 | 32.00 | 16.40 | 9.00 | 2.83 | TMBA-M20H | SWMT15** |
| TXSW15J160B50.8R08 | 2.5 | 160.00 | 8 | 134.1 | 100 | 63.0 | 50.800 | 46.00 | 19.00 | 11.00 | 3.93 | TMBA-M24H | SWMT15** |
| TXSW15M160B40.0R08 | 2.5 | 160.00 | 8 | 134.1 | 100 | 63.0 | 40.000 | 32.00 | 16.40 | 9.00 | 4.23 | TMBA-M20H | SWMT15** |

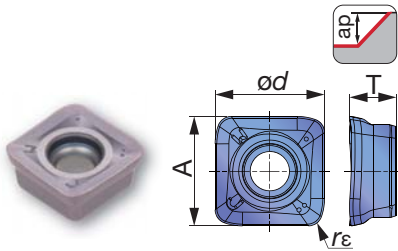
SPARE PARTS



| ϕDc | Clamping Screw | Wrench | |
|-----------------|----------------|----------|--------|
| | | Torx Bit | Handle |
| $\leq \phi 100$ | TS50115I | BT20S | H-TB2W |
| $\phi 125, 160$ | TS50115I | BT20M | H-TB2W |

INSERT

SWMT-MJ



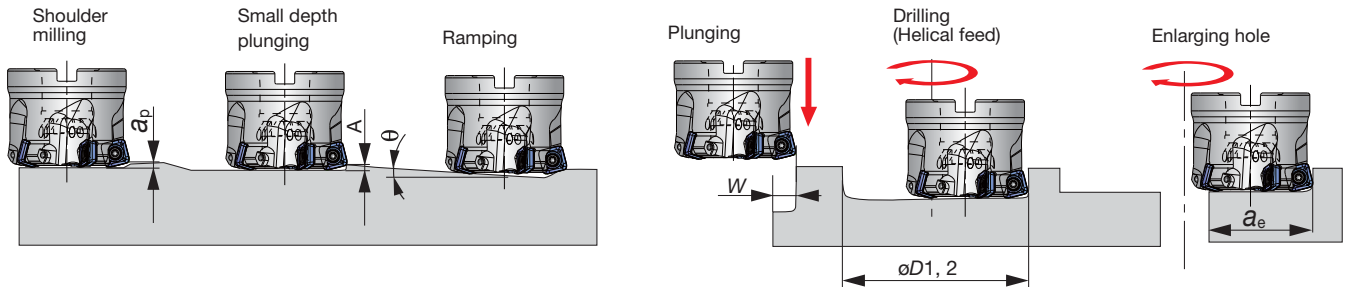
| Designation | Max. ap | A | ød | T | rε | AH3135 | | | | | AH120 | | | | |
|----------------|---------|--------|--------|-----|----|--------|---|---|---|---|-------|---|---|---|---|
| | | | | | | P | M | K | S | H | P | M | K | S | H |
| SWMT1506ZER-MJ | 2.5 | 15.875 | 15.875 | 6.8 | 2 | ● | ● | ● | ● | ● | ○ | ● | ● | ● | ● |

● First choice

STANDARD CUTTING CONDITIONS

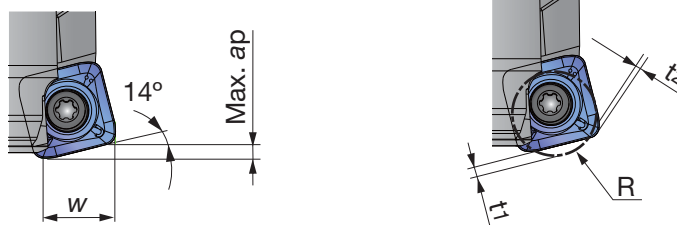
| ISO | Workpiece materials | Hardness | Priority | Grades | Chip-breaker | Cutting speed Vc (m/min) | Feed per tooth fz (mm/t) | |
|-----|--|-----------------------------|---------------|--------------|--------------|--------------------------|--------------------------|-------------|
| P | Low carbon steel (S15C / C15E4, SS400 / E275A, etc.) | - 300 HB | First choice | AH3135 | MJ | 100 - 300 | 0.5 - 2.0 | |
| | | - 300 HB | Second choice | AH120 | MJ | 100 - 300 | 0.5 - 2.0 | |
| | Carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4, etc.) | - 300 HB | First choice | AH3135 | MJ | 100 - 200 | 0.5 - 2.0 | |
| | | - 300 HB | Second choice | AH120 | MJ | 100 - 200 | 0.5 - 2.0 | |
| M | Prehardened steel (NAK80, PX5, etc.) | 30 - 40 HRC | First choice | AH3135 | MJ | 100 - 200 | 0.5 - 1.5 | |
| | | 30 - 40 HRC | Second choice | AH120 | MJ | 100 - 200 | 0.5 - 1.5 | |
| M | Stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.) | - 200 HB | First choice | AH3135 | MJ | 100 - 150 | 0.3 - 1.0 | |
| K | Grey cast iron (FC250 / 250, FC300 / 300, etc.) | 150 - 250 HB | First choice | AH120 | MJ | 100 - 300 | 0.5 - 2.0 | |
| | Ductile cast iron (FC400, FCD600 / 600-3, etc.) | 150 - 250 HB | First choice | AH120 | MJ | 80 - 200 | 0.5 - 2.0 | |
| S | Titanium alloys (Ti-6Al-4V, etc.) | - 40 HRC | First choice | AH3135 | MJ | 30 - 60 | 0.3 - 0.7 | |
| | Superalloys (Inconel718, etc.) | - 40 HRC | First choice | AH120 | MJ | 20 - 50 | 0.1 - 0.3 | |
| H | Hardened steel | (SKD61 / X40CrMoV5-1, etc.) | 40 - 50 HRC | First choice | AH3135 | MJ | 80 - 130 | 0.1 - 0.3 |
| | | (SKD11 / X153CrMoV12, etc.) | 50 - 60 HRC | First choice | AH120 | MJ | 50 - 70 | 0.03 - 0.07 |

APPLICATION RANGE



| Designation | ϕD_c | Max. depth of cut ap | Max. plunging A | Max. ramping angle θ | Max. cutting width in plunging W | Min. machining dia. ϕD_1 | Max. machining dia. ϕD_2 | Max. cutting width in enlarging ae |
|----------------|------------|---------------------------|----------------------|--------------------------------|---------------------------------------|-----------------------------------|-----------------------------------|---|
| TXSW15M063B*** | 63 | 2.5 | 0.7 | 2.9° | 15 | 96 | 121 | 49 |
| TXSW15J080B*** | 80 | 2.5 | 0.7 | 2° | 15 | 130 | 155 | 66 |
| TXSW15J100B*** | 100 | 2.5 | 0.7 | 1.4° | 15 | 170 | 195 | 86 |
| TXSW15J125B*** | 125 | 2.5 | 0.7 | 1° | 15 | 220 | 245 | 111 |
| TXSW15J160B*** | 160 | 2.5 | 0.7 | 0.7° | 15 | 290 | 315 | 146 |

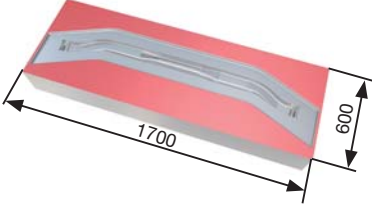
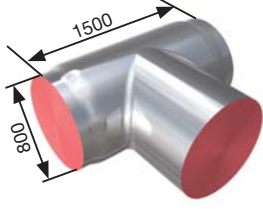
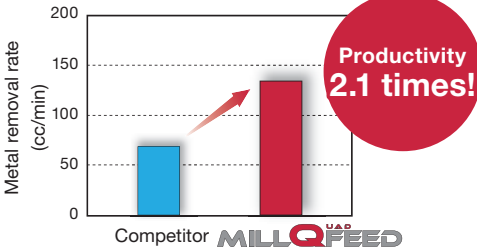
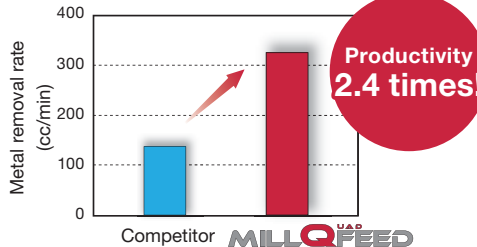
TOOL GEOMETRY ON PROGRAM



| Max. ap (mm) | Actual corner radius r_s (mm) | W (mm) | Programmed corner radius R (mm) | Uncut amount t_1 (mm) | Overcut amount t_2 (mm) |
|----------------|---------------------------------|----------|-----------------------------------|-------------------------|---------------------------|
| 2.5 | 2 | 12.7 | 4 | 1.99 | - |
| 2.5 | 2 | 12.7 | 4.5 | 1.88 | - |
| 2.5 | 2 | 12.7 | 5 | 1.78 | 0.01 |

- When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set in $R = 4.5$ mm. If a larger radius is used, overcutting may occur. The above table shows the uncut (t_1) and overcut (t_2) amounts for the programmed corner radius.

PRACTICAL EXAMPLES

| Workpiece type | Forging mold (Axle) | Joint for thermal power part | |
|---------------------------|--|--|----------------------------------|
| Cutter | TXSW15J100B31.7R06 ($\phi 100$, $z = 6$) | TXSW15J100B31.7R06 ($\phi 100$, $z = 6$) | |
| Insert | SWMT1506ZER-MJ | SWMT1506ZER-MJ | |
| Grade | AH3135 | AH3135 | |
| | SKT4 (JIS, Mold steel) 35HRC | 9Cr-1Mo | |
| Workpiece material |  |  | |
| Cutting conditions | Cutting speed: V_c (m/min) | 100 | 120 (Competitor: $V_c = 100$) |
| | Feed per tooth: f_z (mm/t) | 0.40 (Competitor: $f = 0.33$) | 1.0 |
| | Feed speed: V_f (m/min) | 763 (Competitor: $V_f = 600$) | 2280 (Competitor: $V_f = 1920$) |
| | Depth of cut: a_p (mm) | 2.5 (Competitor: $a_p = 2.5$) | 2.0 (Competitor: $a_p = 1.0$) |
| | Width of cut: a_e (mm) | 70 | 70 |
| | Machining | Face milling (Re-sinking) | Face milling |
| | Coolant | Dry | Air |
| Machine | Vertical M/C, BT50 | Vertical M/C, BT40 | |
| Results |  <p>Capability of machining large depth at high-feed improves productivity in mold machining.</p> |  <p>Outstanding cutting performance of MillQuadFeed allows depth of cut to be increased even in high-feed machining.</p> | |

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 America, Inc.

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

Tungaloy Canada

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

Tungaloy 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.co.jp/mx

Tungaloy do Brasil Ltda.

Rua dos Sabias N.104
13280-000 Vinhedo, São Paulo, Brazil
Phone: +55-19-38262757
Fax: +55-19-38262757
www.tungaloy.com/br

Tungaloy Germany GmbH

An der Alten Ziegelei 1
D-40789 Monheim, Germany
Phone: +49-2173-90420-0
Fax: +49-2173-90420-19
www.tungaloy.de

Tungaloy France S.A.S.

ZA Courtaboeuf - Le Rio
1 rue de la Terre de feu
F-91952 Courtaboeuf Cedex, France
Phone: +33-1-6486-4300
Fax: +33-1-6907-7817
www.tungaloy.fr

Tungaloy Italia S.r.l.

Via E. Andolfato 10
I-20126 Milano, Italy
Phone: +39-02-252012-1
Fax: +39-02-252012-65
www.tungaloy.it

Tungaloy Czech s.r.o.

Turanka 115
CZ-627 00 Brno, Czech Republic
Phone: +420-532 123 391
Fax: +420-532 123 392
www.tungaloy.cz

Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7
Pol. Ind. Bufalvent
ES-08243 Manresa (BCN), Spain
Phone: +34 93 113 1360
Fax: +34 93 876 2798
www.tungaloy.es

Tungaloy Scandinavia AB

S:t Lars Väg 42A
SE-22270 Lund, Sweden
Phone: +46-462119200
Fax: +46-462119207
www.tungaloy.se

Tungaloy Rus, LLC

36-D Harkovsky Lane
308009 Belgorod, Russia
Phone: +7 4722 24 00 07
Fax: +7 4722 24 00 08
www.tungaloy.co.jp/ru

Tungaloy East LLC

Stachek str., h.4, office 2, Ekaterinburg,
620017, Russia
Phone: +7-343-389-13-22
Fax: +7-343-278-94-35
www.tungaloy.co.jp/rue

Tungaloy Polska Sp. z o.o.

ul. Genewska 24
03-963 Warszawa, Poland
Phone: +48-22-617-0890
Fax: +48-22-617-0890
www.tungaloy.co.jp/pl

Tungaloy U.K. Ltd

The Technology Centre,
Wolverhampton Science Park
Glaisher Drive, Wolverhampton
West Midlands WV10 9RU, UK
Phone: +44 121 4000 231
Fax: +44 121 270 9694
www.tungaloy.co.jp/uk
salesinfo@tungaloyuk.co.uk

Tungaloy Hungary Kft

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

Tungaloy Turkey

Dudullu OSB 4. Cad No:4
34776 Umranıye İstanbul, TURKEY
Phone: +90 216 540 04 67
Fax: +90 216 540 04 87
www.tungaloy.com.tr
info@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-benelux.com

Tungaloy Croatia

Josipa Kozarca 4
10432 Bregana, Croatia
Phone: +385 1 3326 604
Fax: +385 1 3327 683
www.tungaloy.hr

Tungaloy Cutting Tool (Shanghai) Co.,Ltd.

Rm No 401 No.88 Zhabei
Jiangchang No.3 Rd
Shanghai 200436, China
Phone: +86-21-3632-1880
Fax: +86-21-3621-1918
www.tungaloy.co.jp/tcts

Tungaloy 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.co.th

Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2
Singapore 408734
Phone: +65-6391-1833
Fax: +65-6299-4557
www.tungaloy.co.jp/tspl

Tungaloy Vietnam

Unit 18, 4th Fl. Saigon Centre Building
65 Le Loi Blvd.
Dist 1, Ho Chi Minh City, Vietnam
Phone: +84-8-3827-0201
Fax: +84-8-3827-0203
www.tungaloy.co.jp/tspl

Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,
Unit # 902-A, 9th Floor,
Tower 1, Senapati Bapat Marg,
Elphinstone Road (West),
Mumbai -400013, India
Phone: +91-22-6124-8804
Fax: +91-22-6124-8899
www.tungaloy.co.jp/in

Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha
Beotkkot-ro 244, Geumcheon-gu
153-788 Seoul, Korea
Phone: +82-2-2621-6161
Fax: +82-2-6393-8952
www.tungaloy.co.jp/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.co.jp/my

Tungaloy Australia Pty Ltd

PO Box 2232, Rowville,
Victoria 3178, Australia
Phone: +61-3-9755-8147
Fax: +61-3-9755-6070
www.tungaloy.com.au

PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5
Cibitung
Bekasi 17510, Indonesia
Phone: +62-21-8261-5808
Fax: +62-21-8261-5809
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