

Tungaloy

Member IMC Group

Keeping the Customer First

Tungaloy Report No. 386-E

MILLLINE Super high feed cutter

DOFEEDMINI

NEW!

Highly efficient milling tools for mid to small range machines



DOFEEDMINI

- The next generation of super high feed milling cutters

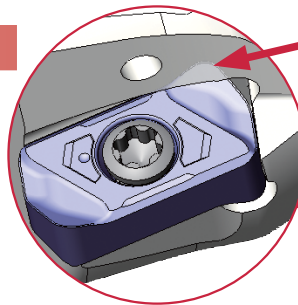
Highly efficient milling tools for mid to small range machines



- ☐ Suitable for high feed milling on small and mid size machines with remarkable anti-chatter characteristics. Exceptional machining efficiency!
- ☐ Economical insert with 4 cutting edges!

Features

Excellent chip evacuation with air hole



Protection for unused edge of insert

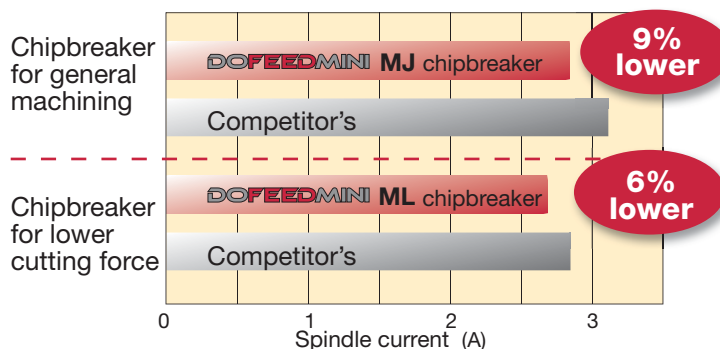
| Tool ϕ | No. of inserts | | Efficiency machining Comparison with competitor |
|-------------|----------------|------------|---|
| | DOFEEDMINI | Competitor | |
| $\phi 16$ | 2 | 2 | 1.0 times |
| $\phi 20$ | 4 | 3 | 1.3 times |
| $\phi 25$ | 5 | 4 | 1.3 times |
| $\phi 30$ | 5 | 4 | 1.3 times |
| $\phi 32$ | 6 | 5 | 1.2 times |

High density for efficient machining

Provides excellent performance on small machines due to the low cutting forces.

Cutting Performance

Comparison of cutting load

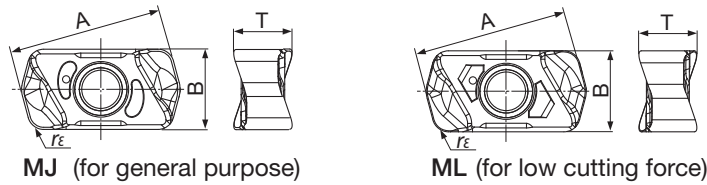


Cutter : EXN03R025M25.0-05 ($\phi 25$)
 Insert : LNMU0303ZER-MJ / ML
 Grade : AH725
 Work material : Carbon steels (S55C / C55E)
 Cutting speed : $V_c = 250$ m/min
 Feed : $f_z = 0.5$ mm/t (1 insert)
 Depth of cut : $a_p = 0.5$ mm
 Width of cut : $a_e = 25$ mm (Grooving)
 Coolant : Dry
 Machine : Vertical machining center BT40

Results: Spindle current of DoFeedMini is lower than competitor.

► **Good for low rigidity machine!**

Insert Specification

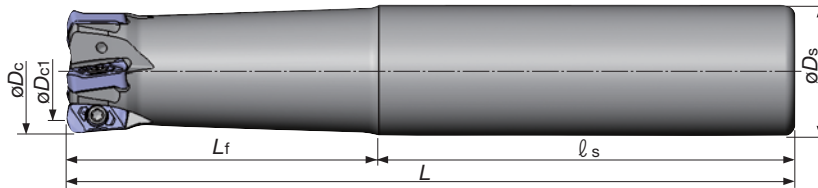


MJ (for general purpose)

ML (for low cutting force)

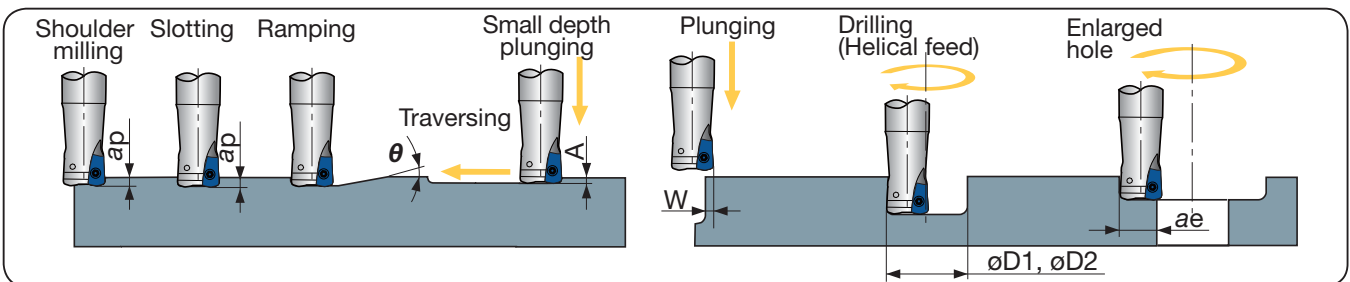
| Cat. No. | Accuracy | Honing | Grades | | Dimensions (mm) | | | |
|----------------|----------|--------|--------|-------|-----------------|-----|------|----------------|
| | | | AH725 | AH130 | A | B | T | r_{ϵ} |
| LNMU0303ZER-MJ | M | with | ● | ● | 11.59 | 6.0 | 4.29 | 1.2 |
| LNMU0303ZER-ML | M | with | ● | ● | | | | |

Cutter Specification



| Type | Cat. No. | Stock | No. of Inserts | Dimensions (mm) | | | | | | Weight (kg) | Air hole | Replacement Parts | |
|----------|--------------------|-------|----------------|-----------------|------------|---------------|-----|-------|-------|-------------|----------|-------------------|--------|
| | | | | ϕD_c | ϕD_s | ϕD_{c1} | L | L_f | l_s | | | Clamping Screw | Wrench |
| Standard | EXN03R016M16.0-02 | ● | 2 | 16 | 16 | 9.5 | 100 | 30 | 70 | 0.05 | with | CSPB-2.5 | IP-8D |
| | EXN03R018M16.0-02 | ● | 2 | 18 | 16 | 11.5 | 100 | 30 | 70 | 0.05 | | | |
| | EXN03R020M20.0-04 | ● | 4 | 20 | 20 | 13.5 | 130 | 50 | 80 | 0.10 | | | |
| | EXN03R022M20.0-04 | ● | 4 | 22 | 20 | 15.5 | 130 | 50 | 80 | 0.10 | | | |
| | EXN03R025M25.0-05 | ● | 5 | 25 | 25 | 18.5 | 140 | 60 | 80 | 0.18 | | | |
| | EXN03R028M25.0-05 | ● | 5 | 28 | 25 | 21.5 | 140 | 60 | 80 | 0.18 | | | |
| | EXN03R030M32.0-05 | ● | 5 | 30 | 32 | 23.5 | 150 | 70 | 80 | 0.31 | | | |
| | EXN03R032M32.0-06 | ● | 6 | 32 | 32 | 25.5 | 150 | 70 | 80 | 0.31 | | | |
| Long | EXN03R016M16.0-02L | ● | 2 | 16 | 16 | 9.5 | 150 | 50 | 100 | 0.08 | | | |
| | EXN03R018M16.0-02L | ● | 2 | 18 | 16 | 11.5 | 150 | 25 | 125 | 0.08 | | | |
| | EXN03R020M20.0-03L | ● | 3 | 20 | 20 | 13.5 | 160 | 80 | 80 | 0.13 | | | |
| | EXN03R022M20.0-03L | ● | 3 | 22 | 20 | 15.5 | 160 | 30 | 130 | 0.13 | | | |
| | EXN03R025M25.0-04L | ● | 4 | 25 | 25 | 18.5 | 180 | 100 | 80 | 0.23 | | | |
| | EXN03R028M25.0-04L | ● | 4 | 28 | 25 | 21.5 | 180 | 35 | 145 | 0.23 | | | |
| | EXN03R030M32.0-04L | ● | 4 | 30 | 32 | 23.5 | 200 | 120 | 80 | 0.41 | | | |
| | EXN03R032M32.0-05L | ● | 5 | 32 | 32 | 25.5 | 200 | 120 | 80 | 0.41 | | | |

Applications



| Cat. No. | Tool ϕ ϕD_c (mm) | Max. depth of cut a_p (mm) | Max. ramping angle θ | Max. plunging depth A (mm) | Max. cutting width in plunging W (mm) | Min. machinable hole ϕ $\phi D1$ (mm) | Max. machinable hole ϕ $\phi D2$ (mm) | Max. cutting width in enlarged hole a_e (mm) |
|--------------------|--------------------------------|---------------------------------|--------------------------------|-------------------------------|--|---|---|---|
| EXN03R016M16.0-□□□ | $\phi 16$ | 1 | 2.1° | 0.3 | 3.5 | 22 | 30 | 12.5 |
| EXN03R018M16.0-□□□ | $\phi 18$ | 1 | 1.7° | 0.3 | 3.5 | 26 | 34 | 14.5 |
| EXN03R020M20.0-□□□ | $\phi 20$ | 1 | 1.4° | 0.3 | 3.5 | 30 | 38 | 16.5 |
| EXN03R022M20.0-□□□ | $\phi 22$ | 1 | 1.2° | 0.3 | 3.5 | 34 | 42 | 18.5 |
| EXN03R025M25.0-□□□ | $\phi 25$ | 1 | 1.0° | 0.3 | 3.5 | 40 | 48 | 21.5 |
| EXN03R028M25.0-□□□ | $\phi 28$ | 1 | 0.8° | 0.3 | 3.5 | 46 | 54 | 24.5 |
| EXN03R030M32.0-□□□ | $\phi 30$ | 1 | 0.7° | 0.3 | 3.5 | 50 | 58 | 26.5 |
| EXN03R032M32.0-□□□ | $\phi 32$ | 1 | 0.7° | 0.3 | 3.5 | 54 | 62 | 28.5 |

Standard cutting conditions

| Work material | Hardness | Priority | Grades | Chip-breaker | Cutting Speed Vc (m/min) | Feed per tooth: fz (mm/t) | | |
|--|------------------------------------|-----------------------|--------|--------------|-----------------------------|----------------------------------|----------------------------------|----------------|
| | | | | | | Tool- ϕ : $\phi 16 \sim 22$ | Tool- ϕ : $\phi 25 \sim 32$ | Plunging depth |
| Carbon steels (S45C, S55C etc.) (C45E, C55E etc.) | ~ 300HB | First choice | AH725 | MJ | 100 - 200 - 300 | 0.5 - 0.8 - 1.2 | 0.5 - 1.0 - 1.5 | 0.1 |
| | | for low cutting force | AH725 | ML | | 0.5 - 0.6 - 0.7 | 0.5 - 0.8 - 1.0 | |
| | | for impact resistance | AH130 | MJ | | 0.5 - 0.8 - 1.2 | 0.5 - 1.0 - 1.5 | |
| Alloy steels (SCM440, SCr415 etc.) (42CrMo4, 17Cr3 etc.) | ~ 300HB | First choice | AH725 | MJ | 100 - 150 - 200 | 0.5 - 0.8 - 1.2 | 0.5 - 1.0 - 1.5 | 0.1 |
| | | for low cutting force | AH725 | ML | | 0.5 - 0.6 - 0.7 | 0.5 - 0.8 - 1.0 | |
| | | for impact resistance | AH130 | MJ | | 0.5 - 0.8 - 1.2 | 0.5 - 1.0 - 1.5 | |
| Prehardened steels (NAK80, PX5 etc.) | 30 ~ 40HRC | - | AH725 | MJ | 100 - 150 - 200 | 0.5 - 0.6 - 0.7 | 0.5 - 0.8 - 1.0 | 0.1 |
| Stainless steels (SUS304, SUS316 etc.) (X5CrNi18-10, X5CrNiMo17-12-2 etc.) | ~ 200HB | First choice | AH130 | ML | 100 - 120 - 150 | 0.3 - 0.4 - 0.5 | 0.3 - 0.5 - 0.7 | 0.08 |
| | | for impact resistance | AH130 | MJ | | 0.3 - 0.5 - 0.8 | 0.3 - 0.6 - 0.8 | |
| Grey cast irons (FC250, FC300 / GG25, GG30 etc.) Ductile cast irons (FCD400 / GGG40 etc.) | 150 ~ 250HB | - | AH725 | MJ | 100 - 200 - 300 | 0.5 - 0.8 - 1.2 | 0.5 - 1.0 - 1.5 | 0.1 |
| Titanium alloy (Ti-6Al-4V etc.) | ~ 40HRC | - | AH725 | ML | 30 - 40 - 60 | 0.3 - 0.4 - 0.5 | 0.3 - 0.5 - 0.7 | 0.08 |
| Hardened steels | (SKD61 etc.) (X40CrMoV5-1 etc.) | 40 ~ 50HRC | AH725 | MJ | 80 - 100 - 130 | 0.1 - 0.15 - 0.2 | 0.1 - 0.2 - 0.3 | 0.05 |
| | (SKD11 etc.) | 50 ~ 60HRC | | | 50 - 60 - 70 | 0.03 - 0.04 - 0.05 | 0.03 - 0.05 - 0.07 | 0.03 |

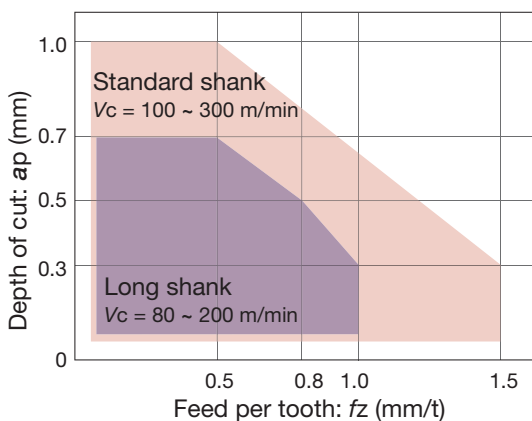
- When chips stay in the cutting zone during slotting or pocketing, use air to remove chips from the work area.
- Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed.

- Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the standard cutting conditions and then increase the value gradually while making sure the machine is running normally.

Cautionary points in use

The usage of a standard & long shank

When using a long shank, please lower the cutting condition (Vc, fz, ap) to 70% of the standard shank.



Tool- ϕ : $\phi 16 \sim 32$

Work material: Carbon steels
S55C / C55E (200HB)

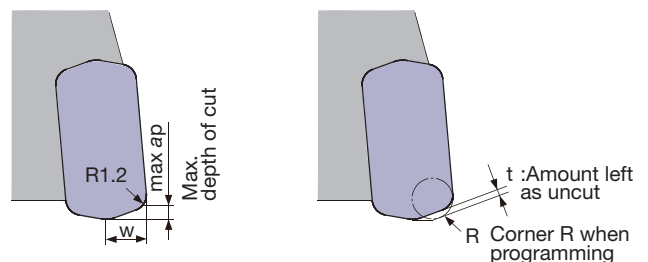
L/D ratio of overhang

Standard shank: L/D ≤ 3

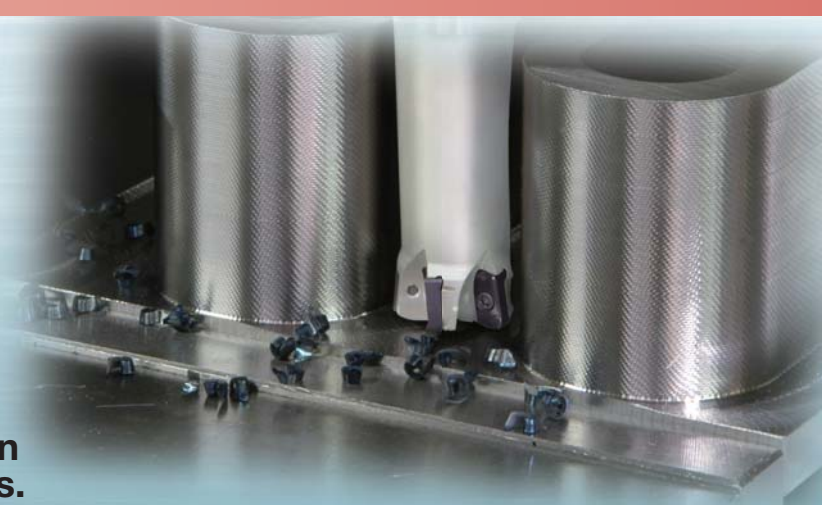
Long shank: L/D = 4

Tool geometry on programming

When programming for CAD/CAM, the tool should be assumed to be a radius cutter as shown in the below table. In this case, the amount left as uncut (t) is shown in the below table.



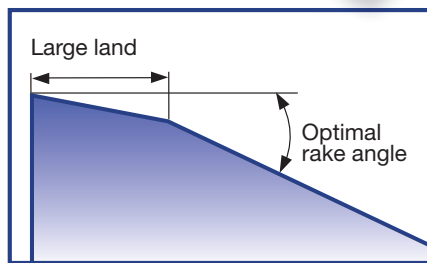
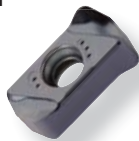
| Max. depth of cut max ap (mm) | W (mm) | Amount left as uncut t (mm) | Corner R when programming |
|----------------------------------|--------|--------------------------------|---------------------------|
| 1.0 | 3.0 | 0.6 | R 1.0 |
| | | 0.5 | R 1.5 |



DoFeedMini is one of the best tools for roughing operations on carbon and pre-hardened steels. It is ideal for highly efficient milling of titanium, as used in the aerospace industry.

Chipbreaker

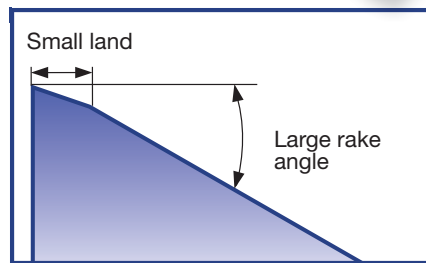
MJ Chipbreaker
(general purpose)



P Steel
K Cast iron
H Hard materials

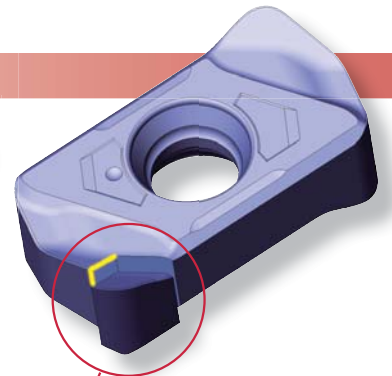
- Excellent combination of sharpness and strength
- Recommended for steel and cast iron machining

ML Chipbreaker
(lower cutting force)



M Stainless
S Super alloy

- Good sharpness
- Suitable for stainless steel and titanium
- Reduced chattering

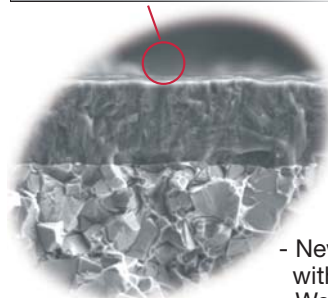


Grades

Special surface technology

PREMIUMTEC

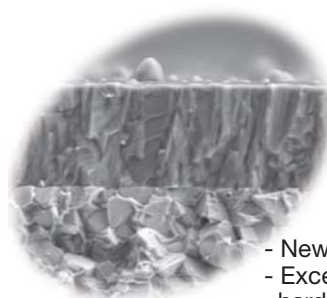
TUNGALOY



AH725

P Steel
K Cast iron
S Super alloy
H Hard materials

- Newly developed coating layer with a unique substrate
- Well balanced wear and chipping resistance
- Suitable for steels and cast irons



AH130

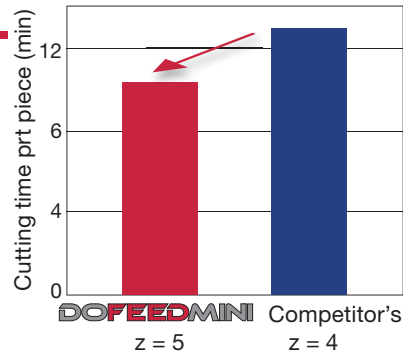
M Stainless
P Steel

- Newly developed substrate
- Excellent balanced between hardness and toughness
- Suitable for stainless steels

Practical examples

Pocket milling of die & mold

Cutter : EXN03R025M25.0-05 ($\phi 25$ mm, $z = 5$)
 Insert : LNMU0303ZER-MJ
 Grade : AH725
 Work material : S55C (200HB) / C55E
 Cutting speed : $V_c = 250$ m/min
 Feed : $f_z = 1.0$ mm/t
 Depth of cut : $a_p = 0.5$ mm
 Width of cut : $a_e = 15 \sim 25$ mm
 Coolant : Dry (air)
 Machine : Vertical machining center BT40

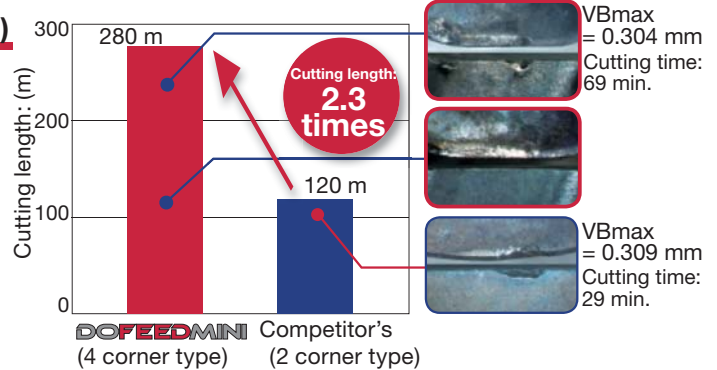


Results: High density of close pitch cutter delivers long tool life when combined with PremiumTec

20% reduction of machining time, Tool life is Doubled!

Machining of prehardened steels (40HRC)

Cutter : EXN03R025M25.0-05 ($\phi 25$ mm, $z = 5$)
 Insert : LNMU0303ZER-MJ
 Grade : AH725
 Work material : Prehardened steels (40HRC)
 Cutting speed : $V_c = 100$ m/min
 Feed : $f_z = 0.8$ mm/t
 Depth of cut : $a_p = 0.5$ mm
 Width of cut : $a_e = 18$ mm
 Coolant : Dry (air)
 Machine : Vertical machining center BT40



Results: 2.3 time improvement of cutting time

Saving 75% of tool cost!



Tungaloy Corporation

Tungaloy Corporation (Head office)

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

Tungaloy America, Inc.

Phone: +1-630-227-3700 Fax: +1-630-227-0690
<http://www.tungaloyamerica.com/>

Tungaloy Canada

Phone: +1-519-758-5779 Fax: +1-519-758-5791
<http://www.tungaloyamerica.com/>

Tungaloy de Mexico S.A.

Phone: +52-449-929-5410 Fax: +52-449-929-5411
<http://www.tungaloyamerica.com/>

Tungaloy do Brasil Comercio de Feramentas de Corte Ltda.

Phone: +55-19-38262757 Fax: +55-19-38262757
<http://www.tungaloy.co.jp/br/>

Tungaloy Germany GmbH

Phone: +49-2173-90420-0 Fax: +49-2173-90420-19
<http://www.tungaloy-eu.com/>

Tungaloy France S.a.r.l.

Phone: +33-1-6486-4300 Fax: +33-1-6907-7817
<http://www.tungaloy-eu.com/>

Tungaloy Italia S.p.A.

Phone: +39-02-252012-1 Fax: +39-02-252012-65
<http://www.tungaloy-eu.com/>

Tungaloy Czech s.r.o

Phone: +420 532 123 391 Fax: +420 532 123 392
<http://www.tungaloy.co.jp/cz/>

Tungaloy Ibérica S.L.

Phone: +34 93 1131360 Fax: +34 93 1131361
<http://www.tungaloy.co.jp/es/>

Tungaloy Scandinavia AB

Phone: +46-462119201 Fax: +46-462119207
<http://www.tungaloy.co.jp/se/>

LLC Tungaloy Rus

Phone: +7 4722 33 97 23 Fax: +7 4722 33 97 23
<http://www.tungaloy.co.jp/ru/>

Tungaloy Polska Sp. z o.o

Phone: +48-22-617-0890 Fax: +48-22-617-0890
<http://www.tungaloy.co.jp/pl/>

Tungaloy Cutting Tool (Shanghai) Co.,Ltd.

Phone: +86-21-3632-1880 Fax: +86-21-3621-1918
<http://www.tungaloy.co.jp/tcs/>

Tungaloy Cutting Tool (Thailand) Co.,Ltd.

Phone: +66-2-714-3130 Fax: +66-2-714-3134
<http://www.tungaloy.co.th/>

Tungaloy Singapore(Pte.),Ltd.

Phone: +65-6391-1833 Fax: +65-6299-4557
<http://www.tungaloy.co.jp/tspi/>

Tungaloy India Pvt. Ltd.

Phone: +91-11-4707-1111 Fax: +91-11-4707-1100
<http://www.tungaloy.co.jp/in/>

Tungaloy Korea Co., Ltd

Phone: +82-2-6393-8930 Fax: +82-2-6393-8952
<http://www.tungaloy.co.jp/kr/>

Tungaloy Malaysia Sdn Bhd

Phone: +603-7805-3222 Fax: +603-7804-8563
<http://www.tungaloy.co.jp/my/>

Distributed by:



ISO 9001 certified
 QC00J0056
 Tungaloy Corporation
 18/10/1996

ISO 14001 certified
 EC97J1123
 Tungaloy Group
 Japan site and Asian
 production site
 26/11/1997