Member IMC Group Tungaloy INDUSTRY 4.0

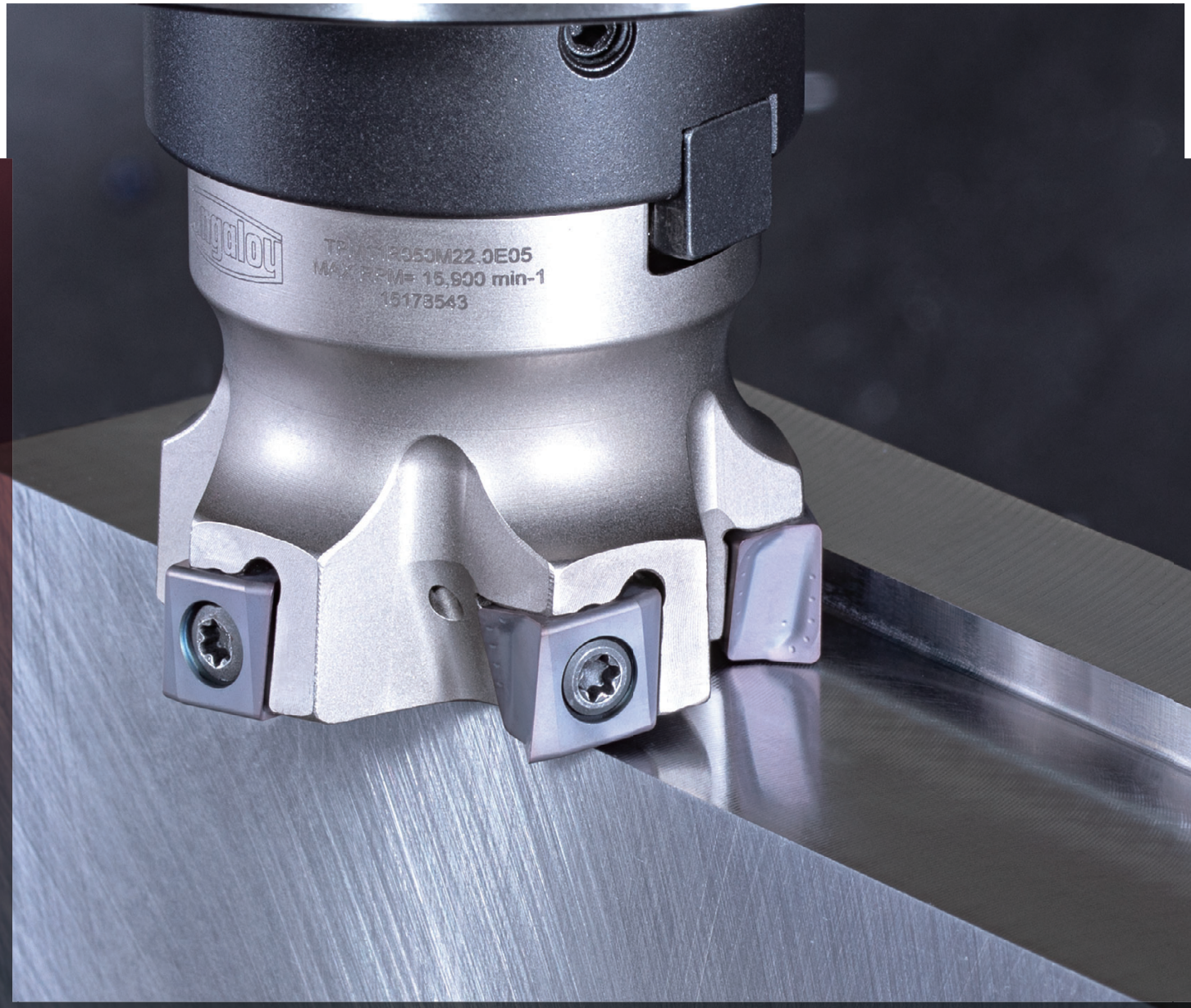
MillLine

Shoulder and face milling cutter

# TECMILL

**Tungaloy Report No. 374S2-G**

## Introducing **the latest insert grades** for steel and hardened steels




TUNGALOY ADDFORCE ACCELERATED LINES

TECMILL

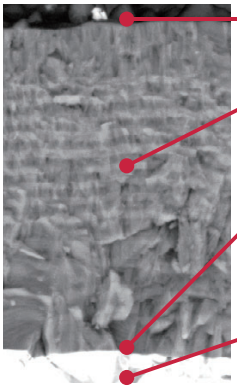
For more information

# PVD grades with high wear and chipping resistance for wider application coverages

New

## AH3225 P

- 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



**Resistance to built-up edge**
The coating surface prevents built-up edge

**Resistance to wear, oxidation, and fracture**
Multi-layered coating is designed to resist wear and oxidation, while preventing micro-cracks from propagating in the coating layer for improved resistance to edge chipping

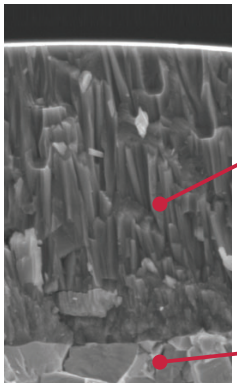
**Strong coating / substrate adhesion**
Coating is optimized for strong adhesion property with substrate to maintain strong cutting edge integrity

**Carbide substrate**
High resistance to fracture

New

## AH8015 S H

- PVD coated grades with high wear and chipping resistancey
- Demonstrates the incredible tool life in the machining of heat resistance alloys

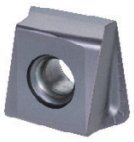


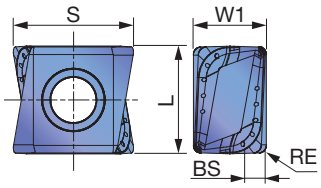
**PVD grade featuring high aluminum-content multilayered coating**
A combination of over 20% harder coating surface and multilayered coating structure helps prevent micro-cracks from progressing into catastrophic failure.
Enhanced adhesion of coating and substrate eliminates delamination.

**New dedicated substrate**
Dedicated carbide substrate with excellent fracture resistance

## INSERT

### LMMU11/16-MJ






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

★ : First choice
☆ : Second choice

| Designation | RE | APMX | Coated | | | | | | | | S | L | W1 | BS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AH3225 | AH8015 | AH3135 | AH725 | AH120 | AH140 | T1215 | T3225 | | | | |
| LMMU110708PNER-MJ | 0.8 | 9.7 | ● | ● | ● | ● | ● | ● | ● | ● | 11.7 | 10.5 | 7.1 | 2 |
| LMMU110716PNER-MJ | 1.6 | 9.7 | ● | ● | ● | ● | ● | ● | ● | ● | 11.5 | 10.5 | 7.1 | 1.2 |
| LMMU110724PNER-MJ | 2.4 | 9.7 | | | | ● | ● | ● | | | 11.3 | 10.5 | 7.1 | 0.4 |
| LMMU110732PNER-MJ | 3.2 | 9.7 | ● | ● | | ● | ● | ● | | | 11.1 | 10.5 | 7.1 | - |
| LMMU160908PNER-MJ | 0.8 | 15.1 | ● | ● | ● | ● | ● | ● | ● | ● | 17.3 | 16 | 9.5 | 2.4 |
| LMMU160916PNER-MJ | 1.6 | 15.1 | ● | ● | ● | ● | ● | ● | | | 17.1 | 16 | 9.5 | 1.6 |
| LMMU160924PNER-MJ | 2.4 | 15.1 | | | | ● | ● | ● | | | 16.9 | 16 | 9.5 | 0.8 |
| LMMU160932PNER-MJ | 3.2 | 15.1 | | | | ● | ● | ● | | | 16.8 | 16 | 9.5 | - |

● : New product
● : Line up

# STANDARD CUTTING CONDITIONS

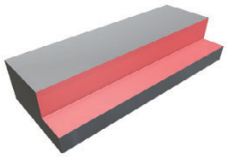
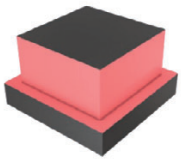
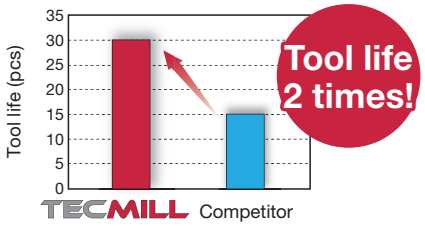
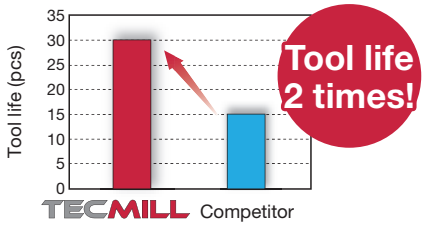
## Bore, shank type

| ISO | Workpiece materials | | Hardness | Priority | Grades | Cutting speed *Vc* (m/min) | Feed per tooth *fz* (mm/t) |
|---|---|---|---|---|---|---|---|
| P | Low carbon steel<br>S15C, SS400, etc.<br>C15E4, E275A, etc. | | - 200 HB | First choice | AH3225 | 100 - 300 | 0.12 - 0.3 |
| | | | - 200 HB | Wear resistance | T3225 | 150 - 350 | 0.08 - 0.2 |
| | | | - 200 HB | Fracture resistance | AH3135 | 100 - 250 | 0.12 - 0.3 |
| | Carbon steel and alloy steel<br>S55C, SCM440, etc.<br>C55,42CrMo4, etc. | | - 300 HB | First choice | AH3225 | 100 - 250 | 0.1 - 0.25 |
| | | | - 300 HB | Wear resistance | T3225 | 150 - 350 | 0.08 - 0.2 |
| | | | - 300 HB | Fracture resistance | AH3135 | 100 - 230 | 0.1 - 0.25 |
| | Prehardend steel<br>NAK80, etc.<br>PX5, etc. | | 30 - 40 HRC | First choice | AH3225 | 100 - 230 | 0.1 - 0.25 |
| | | | 30 - 40 HRC | Wear resistance | T3225 | 120 - 350 | 0.08 - 0.2 |
| | | | 30 - 40 HRC | Fracture resistance | AH3135 | 100 - 230 | 0.1 - 0.25 |
| M | Stainless steel<br>SUS304, etc.<br>X5CrNi18-9, etc. | | - | First choice | AH3135 | 90 - 180 | 0.1 - 0.25 |
| K | Grey cast iron<br>FC250, etc.<br>250, etc. | | 150 - 250 HB | First choice | AH8015 | 100 - 300 | 0.12 - 0.3 |
| | | | 150 - 250 HB | Wear resistance | T1215 | 120 - 350 | 0.08 - 0.2 |
| | Ductile cast iron<br>FCD400, FCD600, etc.<br>600-3, etc. | | 150 - 250 HB | First choice | AH8015 | 100 - 200 | 0.12- 0.3 |
| | | | 150 - 250 HB | Wear resistance | T1215 | 120 - 350 | 0.08 - 0.2 |
| S | Titanium alloys<br>Ti-6Al-4V, etc. | | - | First choice | AH3135 | 30 - 60 | 0.06 - 0.2 |
| | Superalloys<br>Inconel718, etc. | | - | First choice | AH8015 | 20 - 50 | 0.06 - 0.1 |
| H | Hardened steel | SKD61 /<br>X40CrMoV5-1, etc. | 40 - 50 HRC | First choice | AH8015 | 45 - 70 | 0.08 - 0.15 |
| | | SKD11 /<br>X153CrMoV12, etc. | 50 - 60 HRC | First choice | AH8015 | 40 - 65 | 0.06 - 0.1 |

## Roughing type

| ISO | Workpiece materials | | Hardness | Priority | Grades | Cutting speed *Vc* (m/min) | Feed per tooth *fz* (mm/t) |
|---|---|---|---|---|---|---|---|
| P | Low carbon steel<br>S15C, SS400, etc.<br>C15E4, E275A, etc. | | - 200 HB | First choice | AH3225 | 100 - 300 | 0.1 - 0.25 |
| | | | - 200 HB | Wear resistance | T3225 | 150 - 350 | 0.1 - 0.2 |
| | | | - 200 HB | Fracture resistance | AH3135 | 100 - 250 | 0.1 - 0.25 |
| | Carbon steel and alloy steel<br>S55C, SCM440, etc.<br>C55,42CrMo4, etc. | | - 300 HB | First choice | AH3225 | 100 - 250 | 0.1 - 0.2 |
| | | | - 300 HB | Wear resistance | T3225 | 150 - 350 | 0.1 - 0.2 |
| | | | - 300 HB | Fracture resistance | AH3135 | 100 - 230 | 0.1 - 0.25 |
| | Prehardend steel<br>NAK80, etc.<br>PX5, etc. | | 30 - 40 HRC | First choice | AH3225 | 100 - 230 | 0.1 - 0.2 |
| | | | 30 - 40 HRC | Wear resistance | T3225 | 120 - 350 | 0.1 - 0.2 |
| | | | 30 - 40 HRC | Fracture resistance | AH3135 | 100 - 230 | 0.1 - 0.25 |
| M | Stainless steel<br>SUS304, etc.<br>X5CrNi18-9, etc. | | - | First choice | AH3135 | 90 - 180 | 0.1 - 0.25 |
| K | Grey cast iron<br>FC250, etc.<br>250, etc. | | 150 - 250 HB | First choice | AH8015 | 100 - 300 | 0.1 - 0.25 |
| | | | 150 - 250 HB | Wear resistance | T1215 | 120 - 350 | 0.1 - 0.25 |
| | Ductile cast iron<br>FCD400, FCD600, etc.<br>600-3, etc. | | 150 - 250 HB | First choice | AH8015 | 100 - 200 | 0.1 - 0.25 |
| | | | 150 - 250 HB | Wear resistance | T1215 | 120 - 350 | 0.1 - 0.25 |
| S | Titanium alloys<br>Ti-6Al-4V, etc. | | - | First choice | AH3135 | 30 - 60 | 0.06 - 0.15 |
| | Superalloys<br>Inconel718, etc. | | - | First choice | AH8015 | 20 - 50 | 0.06 - 0.1 |
| H | Hardened steel | SKD61 /<br>X40CrMoV5-1, etc. | 40 - 50 HRC | First choice | AH8015 | 30 - 60 | 0.06 - 0.15 |
| | | SKD11 /<br>X153CrMoV12, etc. | 50 - 60 HRC | First choice | AH8015 | 25 - 55 | 0.06 - 0.1 |

## PRACTICAL EXAMPLES

| Workpiece type | | Machine part | Machine part |
|---|---|---|---|
| Toolholder | | TPM11R050M22.0E05 (ø50 mm, z = 5) | TPM11R050M22.0E05 (ø50 mm, z = 5) |
| Insert | | LMMU110708PNER-MJ | LMMU110708PNER-MJ |
| Grade | | AH3225 | AH8015 |
| Workpiece material | | Austenitic stainless steel  M | Gray cast iron  K |
| Cutting conditions | Cutting speed: *Vc* (m/min) | 150 | 250 |
| | Feed per tooth: *fz* (mm/t) | 0.2 | 0.2 |
| | Feed : *f* (mm/rev) | 955 | 1592 |
| | Depth of cut : *ap* (mm) | 6 | 5 |
| | Width of cut : *ae* (mm) | 15 | 20 |
| | Machining | Shoulder milling | Shoulder milling |
| | Coolant | Air blow | Air blow |
| | Machine | Vertical M/C, CAT50 | Vertical M/C, CAT50 |
| Results | |   AH3225 offered stable and long tool life thanks to its high anti-chipping performance. |   AH8015 offered stable and long tool life thanks to its high heat resistance and anti-chipping performance even in high speed condition. |

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