Member IMC Group Tungaloy

MillLine

For more information

Multifunctional milling cutter with center cutting edge

# ULTI DOMREC

**Tungaloy Report No. 548S2-US**

# Multifunctional cutters with center cutting capability now expanding the tool diameter range

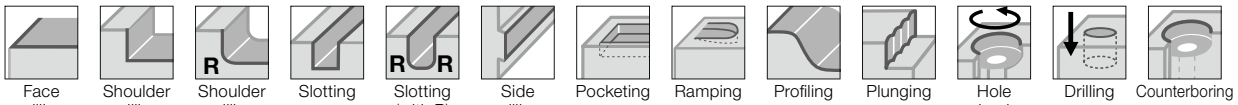
TUNGALOY ADDFORCE ACCELERATED LINES

# Multifunctional tool from flat bottom hole drilling to profiling — now expanding the tool diameter range

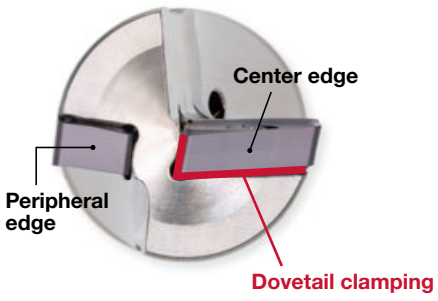
## Insert lineup


| | | | | | | |
|---|---|---|---|---|---|---|
| **Tool dia. DC** | ø0.50" ø12, ø13 mm | ø0.625" ø16, ø17 mm | ø0.787" ø20, ø21 mm | ø1.00" ø25, ø26 mm | ø1.25" ø32, ø33 mm | ø1.50" ø40 mm |
| **APMX** | 0.197" | 0.276" | 0.354" | 0.433" | 0.571" | 0.709" |
| **Insert size** | 06 | 08 | 10 | 12 | 16 | 19 |

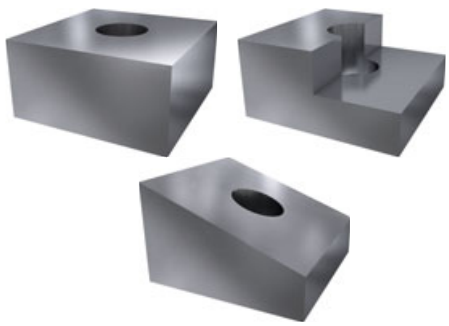
### Applications capabilities with **DoMultiRec**




## **DoMultiRec** Solution




Thick insert design and dovetail interlocking for maximum tool reliability



Drilling on irregular surfaces made easy

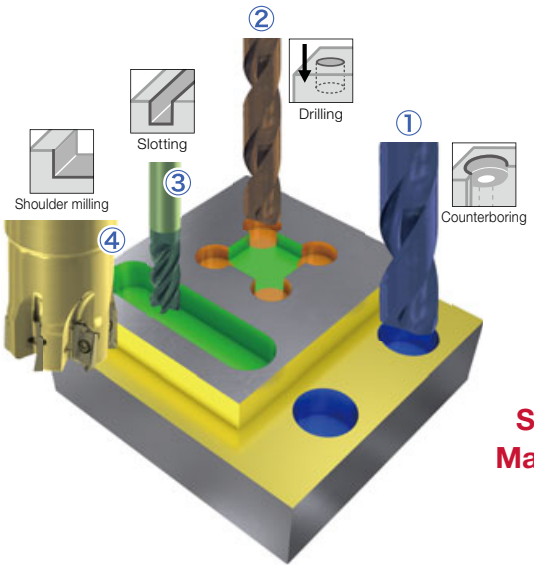
Able to feed in all directions

# Productivity improvement examples using **DoMultiRec**

## Case 1 Reduced costs by combining multiple processes

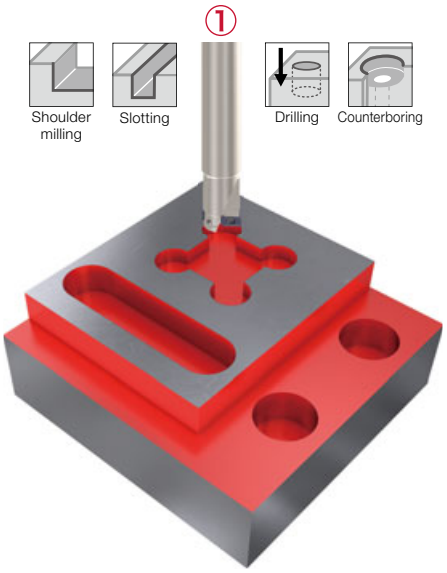
### Conventional operations

Requires 4 different tools




### DoMultiRec operation

Requires just 1 tool for all four processes

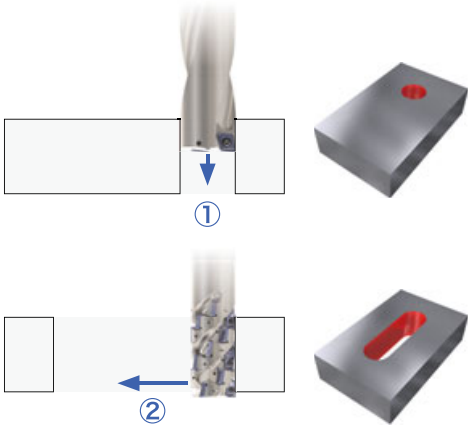



**Reduced tool cost,
Simplified processes,
Maximize ATC utilization**

## Case 2 Improved efficiency due to combining multiple processes

### Conventional operations

①Drilling
②Slot opening using roughing cutter



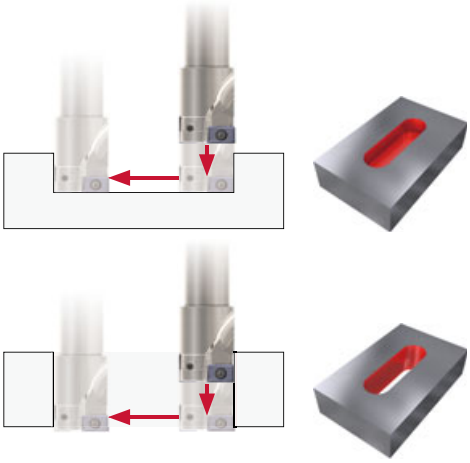

**①Indexable drill**
ø2"
Cutting speed : *Vc* = 330 sfm
Feed per revolution : *f* = 0.004 ipr

**②Roughing cutter**
ø1.25", CICT = 4
Cutting speed : *Vc* = 160 sfm
Feed per tooth : *fz* = 0.002 ipt

**Machining time: 3.2 min.**
(①+②)

### DoMultiRec operation

Drilling + Slotting



DOMULTIREC
ø2", CICT=2

Cutting speed : *Vc* = 660 sfm
Feed per tooth : *fz* = 0.003 ipt

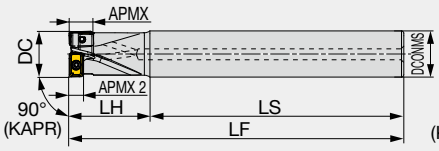
**Machining time: 2.2 min.**

**Reduced machining time,
Minimized setup time,
Simplified machine programming**

## EVLX06/16/19

Multi-functional square shoulder milling cutter,
with screwed-on inserts and center cutting edge

GAMP: Center insert -2.6° ~ -4.4°, Peripheral insert +6.1° ~ +7.1°
GAMF: Center insert +0.2° ~ +1.3°, Peripheral insert -15.7° ~ -15°




Inch Fig. 1

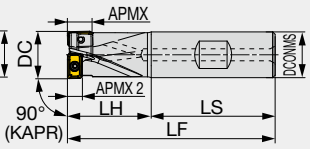
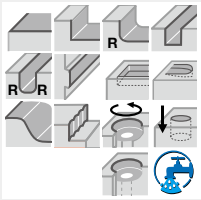



Fig. 2



| Inch | APMX | APMX 2 | DC | CICT | DCONMS | LS | LH | LF | WT (lb) | Air hole | MIID | shank | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EVLX06U0.50W0.50R02 | 0.197 | 0.110 | 0.500 | 2.000 | 0.500 | 1.781 | 0.756 | 2.537 | 0.110 | With | LXMU06... | Weldon | 2 |
| EVLX06U0.50C0.50R02L | 0.197 | 0.110 | 0.500 | 2.000 | 0.500 | 3.000 | 1.500 | 4.500 | 0.220 | With | LXMU06... | Cylindrical | 1 |
| EVLX16U1.25W1.25R02 | 0.571 | 0.276 | 1.250 | 2.000 | 1.250 | 2.281 | 2.000 | 4.281 | 1.210 | With | LXMU16... | Weldon | 2 |
| EVLX16U1.25C1.25R02L | 0.571 | 0.276 | 1.250 | 2.000 | 1.250 | 6.500 | 3.500 | 10.000 | 3.060 | With | LXMU16... | Cylindrical | 1 |
| EVLX19U1.50W1.25R02 | 0.709 | 0.394 | 1.500 | 2.000 | 1.250 | 2.281 | 2.250 | 4.531 | 1.650 | With | LXMU19... | Weldon | 2 |
| EVLX19U1.50C1.25R02L | 0.709 | 0.394 | 1.500 | 2.000 | 1.250 | 7.750 | 2.250 | 10.000 | 3.510 | With | LXMU19... | Cylindrical | 1 |

| Metric | APMX | APMX 2 | DC | CICT | DCONMS | LS | LH | LF | WT (lb) | Air hole | MIID | shank | Fig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EVLX06M012C12.0R02 | 5.000 | 2.800 | 12.000 | 2.000 | 12.000 | 60.000 | 20.000 | 80.000 | 0.060 | With | LXMU06... | Cylindrical | 1 |
| EVLX06M012C12.0R02L | 5.000 | 2.800 | 12.000 | 2.000 | 12.000 | 85.000 | 35.000 | 120.000 | 0.090 | With | LXMU06... | Cylindrical | 1 |
| EVLX06M013C12.0R02L | 5.000 | 2.800 | 13.000 | 2.000 | 12.000 | 95.000 | 25.000 | 120.000 | 0.090 | With | LXMU06... | Cylindrical | 1 |
| EVLX16M032C32.0R02 | 14.500 | 7.000 | 32.000 | 2.000 | 32.000 | 100.000 | 50.000 | 150.000 | 0.830 | With | LXMU16... | Cylindrical | 1 |
| EVLX16M032C32.0R02L | 14.500 | 7.000 | 32.000 | 2.000 | 32.000 | 165.000 | 90.000 | 255.000 | 1.450 | With | LXMU16... | Cylindrical | 1 |
| EVLX16M033C32.0R02L | 14.500 | 7.000 | 33.000 | 2.000 | 32.000 | 205.000 | 50.000 | 255.000 | 1.500 | With | LXMU16... | Cylindrical | 1 |
| EVLX19M040C32.0R02 | 18.000 | 10.000 | 40.000 | 2.000 | 32.000 | 100.000 | 55.000 | 155.000 | 1.030 | With | LXMU19... | Cylindrical | 1 |
| EVLX19M040C32.0R02L | 18.000 | 10.000 | 40.000 | 2.000 | 32.000 | 200.000 | 55.000 | 255.000 | 1.600 | With | LXMU19... | Cylindrical | 1 |

### SPARE PARTS

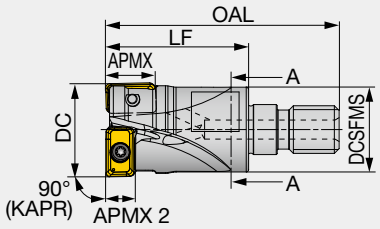

| Designation | Clamping screw | Wrench |
|---|---|---|
| EVLX06... | CSPB-1.8FL4.3 | IP-6DB |
| EVLX16... | CSTB-4L090 | T-15D |
| EVLX19... | CSTB-5 | T-20D |

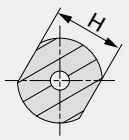
Recommended clamping torque: CSPB-1.8FL4.3 = 0.37 lbf·ft, CSTB-4L090 = 2.58 lbf·ft, CSTB-5 = 3.69 lbf·ft

## HVLX06/16/19-M

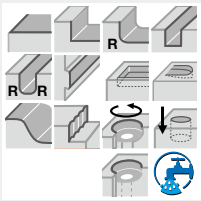
Multi-functional square shoulder modular milling cutter
(TungFlex), with screwed-on inserts and center cutting edge

GAMP: Center insert -2.6° ~ -4.4°, Peripheral insert +6.1° ~ +7.1°
GAMF: Center insert +0.2° ~ +1.3°, Peripheral insert -15.7° ~ -15°




A-A cross section



| Metric | APMX | APMX 2 | DC | CICT | OAL | LF | H | DCSFMS | CRKS | WT(kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HVLX06M012M06R02 | 5.000 | 2.800 | 12.000 | 2.000 | 34.500 | 20.000 | 7.000 | 10.000 | M6 | 0.020 | With | LXMU06... |
| HVLX06M013M06R02 | 5.000 | 2.800 | 13.000 | 2.000 | 34.500 | 20.000 | 7.000 | 10.000 | M6 | 0.020 | With | LXMU06... |
| HVLX16M032M16R02 | 14.500 | 7.000 | 32.000 | 2.000 | 63.000 | 40.000 | 22.000 | 28.800 | M16 | 0.210 | With | LXMU16... |
| HVLX16M033M16R02 | 14.500 | 7.000 | 33.000 | 2.000 | 63.000 | 40.000 | 22.000 | 28.800 | M16 | 0.210 | With | LXMU16... |

### SPARE PARTS

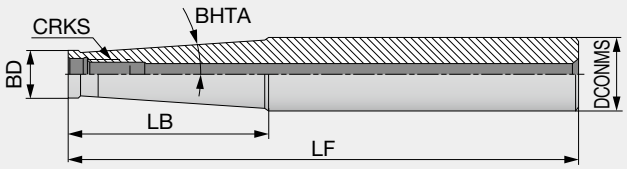

| Designation | Clamping screw | Wrench |
|---|---|---|
| HVLX06... | CSPB-1.8FL4.3 | IP-6DB |
| HVLX16... | CSTB-4L090 | T-15D |

Recommended clamping torque: CSPB-1.8FL4.3 = 0.37 lbf·ft, CSTB-4L090 = 2.58 lbf·ft

TUNGFLEX

## SM

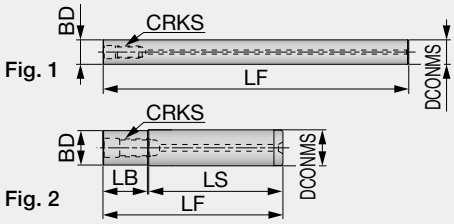
### Steel modular shank

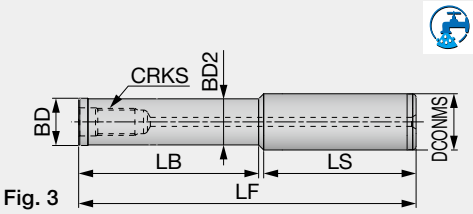



| Designation | CRKS | DCONMS | LF | LB | BD | BHTA | Shank type |
|---|---|---|---|---|---|---|---|
| SM06-L60C10 | M6 | 0.394 | 2.362 | 0.787 | 0.382 | 0° | Cylindrical |
| SM06-L105-C12 | M6 | 0.472 | 4.134 | 2.362 | 0.382 | 1.2° | Cylindrical |
| SM06-L125-C16 | M6 | 0.630 | 4.921 | 2.362 | 0.382 | 3.3° | Cylindrical |
| SM16-L95-C32 | M16 | 1.260 | 3.740 | 1.378 | 1.142 | 1.7° | Cylindrical |
| SM16-L230-C32 | M16 | 1.260 | 9.055 | 1.969 | 1.142 | 1.8° | Cylindrical |

## SM-C-H

### Carbide modular shank



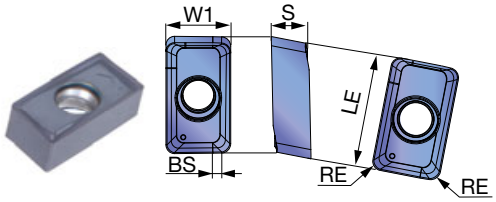

| Designation | CRKS | DCONMS | LF | LB | LS | BD | BD2 | Fig. |
|---|---|---|---|---|---|---|---|---|
| SM06-L100-C10-C-H | M6 | 0.394 | 3.937 | - | - | 0.394 | - | 1 |
| SM06-L150-C10-C-H | M6 | 0.394 | 5.906 | - | - | 0.394 | - | 1 |
| SM06-L100-C12-C-H | M6 | 0.472 | 3.937 | - | - | 0.472 | - | 1 |
| SM06-L150-C12-C-H | M6 | 0.472 | 5.906 | - | - | 0.472 | - | 1 |
| SM16-L100-40-C32-C-H | M16 | 1.260 | 3.937 | 1.575 | 2.303 | 1.142 | - | 2 |
| SM16-L150-80-C32-C-H | M16 | 1.260 | 5.906 | 3.150 | 2.697 | 1.142 | - | 2 |
| SM16-L200-100-C32-C-H | M16 | 1.260 | 7.874 | 3.937 | 3.878 | 1.142 | - | 2 |
| SM16-L200-140-C32-C-H | M16 | 1.260 | 7.874 | 5.512 | 2.303 | 1.142 | - | 2 |
| SM16-L250-130-C32-C-H | M16 | 1.260 | 9.843 | 5.118 | 4.665 | 1.142 | - | 2 |
| SM16-L250-180-C32-C-H | M16 | 1.260 | 9.843 | 7.087 | 2.697 | 1.142 | - | 2 |
| SM16-L300-180-C32-C-H | M16 | 1.260 | 11.811 | 7.087 | 4.665 | 1.142 | - | 2 |
| SM16-L300-230-C32-C-H | M16 | 1.260 | 11.811 | 9.055 | 2.697 | 1.142 | - | 2 |
| SM16-L350-230-C32-C-H | M16 | 1.260 | 13.780 | 9.055 | 4.665 | 1.142 | - | 2 |
| SM16-L350-280-C32-C-H | M16 | 1.260 | 13.780 | 11.024 | 2.697 | 1.142 | - | 2 |

**For more modular products.**

e-catalog

## INSERT

### LXMU-MM




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

★ : First choice
☆ : Second choice

| Designation | RE | APMX | Coated AH3225 | Coated AH8015 | LE | W1 | S | BS |
|---|---|---|---|---|---|---|---|---|
| LXMU060204PER-MM | 0.0157 | 0.197 | ● | ● | 0.236 | 0.154 | 0.091 | 0.024 |
| LXMU160504PER-MM | 0.0157 | 0.591 | ● | ● | 0.618 | 0.370 | 0.206 | 0.063 |
| LXMU160508PER-MM | 0.0315 | 0.591 | ● | ● | 0.618 | 0.370 | 0.207 | 0.047 |
| LXMU190608PER-MM | 0.0315 | 0.709 | ● | ● | 0.748 | 0.492 | 0.269 | 0.047 |

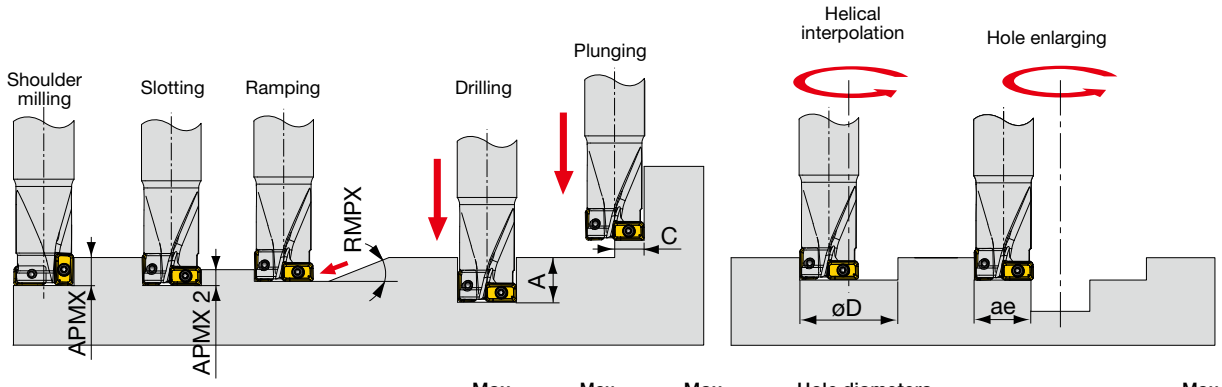
● : Line up

## STANDARD CUTTING CONDITIONS

| ISO | Workpiece materials | | Hardness | Grades | Cutting speed *Vc* (sfm) | Drilling (ZEFP = 1)* Feed per revolution *f* (ipr) | Shouldering / Helical interpolation* Feed per tooth *fz* (ipt) 06 | Shouldering / Helical interpolation* Feed per tooth *fz* (ipt) 16 / 19 |
|---|---|---|---|---|---|---|---|---|
| P | Low carbon steel 1015, etc. | | - 200 HB | AH3225 | 330 - 980 | 0.001 - 0.003 | 0.002 - 0.008 | 0.002 - 0.012 |
| P | Carbon steel and alloy steel 1055, 4140, etc. | | - 300 HB | AH3225 | 330 - 820 | 0.001 - 0.003 | 0.002 - 0.008 | 0.002 - 0.012 |
| P | Prehardened steel NAK80, PX5, etc. | | 30 - 40 HRC | AH3225 | 330 - 660 | 0.001 - 0.002 | 0.002 - 0.006 | 0.002 - 0.010 |
| M | Stainless steel 304, 316, etc. | | - | AH3225 | 260 - 590 | 0.001 - 0.003 | 0.002 - 0.006 | 0.002 - 0.009 |
| K | Grey cast iron No.250B, No.300B, etc. | | 150 - 250 HB | AH8015 | 330 - 980 | 0.001 - 0.004 | 0.002 - 0.008 | 0.002 - 0.012 |
| K | Ductile cast iron 65-45-12, 80-55-06, etc. | | 150 - 250 HB | AH8015 | 330 - 820 | 0.001 - 0.003 | 0.002 - 0.006 | 0.002 - 0.010 |
| S | Titanium alloys Ti-6Al-4V, etc. | | - | AH3225 | 70 - 200 | 0.001 - 0.002 | 0.002 - 0.004 | 0.002 - 0.006 |
| S | Superalloys Inconel 718, etc. | | - | AH8015 | 70 - 130 | 0.001 - 0.002 | 0.002 - 0.004 | 0.002 - 0.006 |
| H | Hardened steel | H13, etc. | 40 - 50 HRC | AH8015 | 160 - 490 | 0.001 - 0.002 | 0.002 - 0.004 | 0.002 - 0.006 |
| H | Hardened steel | D2, etc. | 50 - 60 HRC | AH8015 | 130 - 230 | 0.001 - 0.002 | 0.002 - 0.004 | 0.002 - 0.006 |

*In the following cases, feed as if the cutter has a single effective cutting edge (ZEFP = 1):
- Hole making
- Helical interpolating for holes with a hole diameter (øD) ≤ 1.25x the tool diameter (DC)
- The axial D.O.C. exceeds APMX2 (See below for APMX2)

## APPLICATION RANGE




| | | Max. depth of cut | | Max. drilling depth* | Max. cutting width in plunging | Max. ramping angle | Hole diameters (w/ flat bottom) machinable | | Hole diameters machinable | | Max. cutting width engagement |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Metric** | **DC** | **APMX** | **APMX 2** | **A** | **C** | **RMPX** | **øDmin** | **øDmax** | **øDmin** | **øDmax** | ***ae*** |
| E/HVLX06M012… | 0.472 | 0.197 | 0.11 | 0.236 | 0.236 | 90° | 0.512 | 0.896 | 0.472 | 0.935 | 0.394 |
| EVLX06M013… | 0.512 | 0.197 | 0.11 | 0.236 | 0.256 | 90° | 0.591 | 0.974 | 0.512 | 1.014 | 0.433 |
| E/HVLX08M016… | 0.63 | 0.276 | 0.157 | 0.472 | 0.315 | 90° | 0.669 | 1.211 | 0.63 | 1.25 | 0.551 |
| EVLX08M017… | 0.669 | 0.276 | 0.157 | 0.472 | 0.335 | 90° | 0.748 | 1.289 | 0.669 | 1.329 | 0.591 |
| E/HVLX10M020... | 0.787 | 0.354 | 0.157 | 0.591 | 0.394 | 90° | 0.866 | 1.494 | 0.787 | 1.541 | 0.709 |
| EVLX10M021… | 0.827 | 0.354 | 0.157 | 0.591 | 0.413 | 90° | 0.919 | 1.573 | 0.827 | 1.612 | 0.748 |
| E/HVLX12M025... | 0.984 | 0.433 | 0.236 | 0.728 | 0.492 | 90° | 1.049 | 1.884 | 0.984 | 1.927 | 0.906 |
| EVLX12M026… | 1.024 | 0.433 | 0.236 | 0.728 | 0.512 | 90° | 1.128 | 1.963 | 1.024 | 2.006 | 0.945 |
| E/HVLX16M032... | 1.26 | 0.571 | 0.276 | 0.63 | 0.63 | 90° | 1.325 | 2.435 | 1.26 | 2.478 | 1.181 |
| EVLX16M033… | 1.299 | 0.571 | 0.276 | 0.63 | 0.65 | 90° | 1.404 | 2.514 | 1.299 | 2.557 | 1.22 |
| EVLX19M040... | 1.575 | 0.709 | 0.394 | 0.787 | 0.787 | 90° | 1.675 | 3.065 | 1.575 | 3.108 | 1.496 |

*Use pecking or dwelling method when drilling holes deeper than 0.197"

| | | Max. depth of cut | | Max. drilling depth* | Max. cutting width in plunging | Max. ramping angle | Hole diameters (w/ flat bottom) machinable | | Hole diameters machinable | | Max. cutting width engagement |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inch** | **DC** | **APMX** | **APMX 2** | **A** | **C** | **RMPX** | **øDmin** | **øDmax** | **øDmin** | **øDmax** | ***ae*** |
| EVLX06U0.50 | 0.500 | 0.197 | 0.110 | 0.236 | 0.250 | 90° | 0.577 | 0.951 | 0.500 | 0.990 | 0.421 |
| EVLX08U0.62… | 0.625 | 0.276 | 0.157 | 0.469 | 0.313 | 90° | 0.667 | 1.200 | 0.625 | 1.233 | 0.546 |
| EVLX10U0.787… | 0.780 | 0.354 | 0.157 | 0.590 | 0.394 | 90° | 0.866 | 1.494 | 0.787 | 1.541 | 0.708 |
| EVLX12U1.00… | 1.000 | 0.433 | 0.236 | 0.750 | 0.500 | 90° | 1.081 | 1.915 | 1.000 | 1.959 | 0.921 |
| EVLX16U1.25 | 1.250 | 0.571 | 0.276 | 0.630 | 0.625 | 90° | 1.315 | 2.415 | 1.250 | 2.461 | 1.171 |
| EVLX19U1.50 | 1.500 | 0.709 | 0.394 | 0.787 | 0.750 | 90° | 1.537 | 2.915 | 1.500 | 2.959 | 1.421 |

*Use pecking or dwelling method when drilling holes deeper than 0.197"

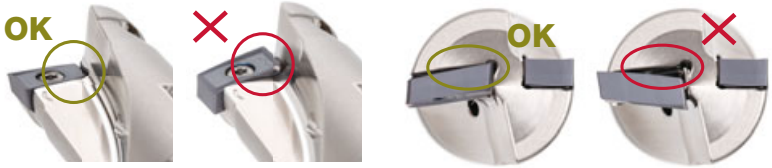
## CAUTION WHEN INSTALLING THE INSERTS

Ensure that the insert is not lifted in the seat and there is no gap between the insert and seat.

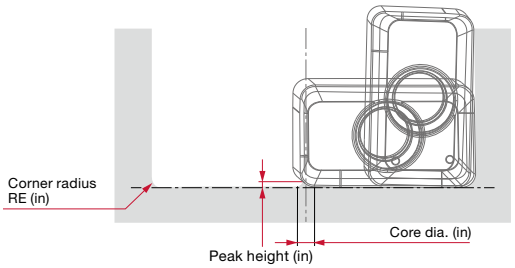
For more information

**Peripheral edge**


**Center edge**

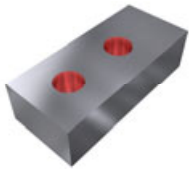
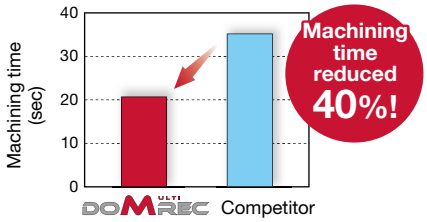
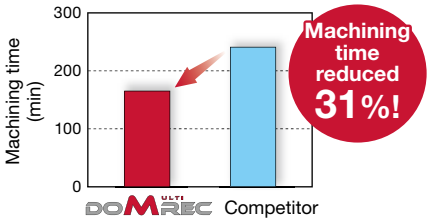



## HOLE BOTTOM PROFILE AFTER DRILLING




| DC (in) | 0.472 | 0.5 | 0.512 | 1.25 | | 1.26 | | 1.299 | | 1.5 | 1.575 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Insert | LXMU06... | | | LXMU16... | | | | | | LXMU19... | |
| RE (in) | 0.016 | | | 0.016 | 0.031 | 0.016 | 0.031 | 0.016 | 0.031 | 0.031 | 0.016 |
| Peak height (in) | 0.002 | 0.016 | 0.016 | 0.007 | 0.009 | 0.007 | 0.013 | 0.022 | 0.037 | 0.006 | 0.038 |
| Core dia. (in) | 0.015 | 0.041 | 0.053 | 0.017 | 0.035 | 0.02 | 0.044 | 0.053 | 0.083 | 0.019 | 0.09 |

## PRACTICAL EXAMPLES

| Workpiece type | | Machine part | | Cylinder liner | |
|---|---|---|---|---|---|
| Cutter | | EVLX06U0.50C0.50R02L (ø0.5", CICT = 2) | | EVLX19U1.50C1.25R02L (ø1.5", CICT = 2) | |
| Insert | | LXMU060204PER-MM | | LXMU190608PER-MM | |
| Grade | | AH3225 | | AH8015 | |
| Workpiece material | | 1045 | | No.250B | |
| | | Size 06  P | | Size 19  K | |
| Cutting conditions | Machining | Drilling | Hole enlarging | Drilling | Shoulder milling |
| | Cutting speed: *Vc* (sfm) | 320 | 320 | 260 | 260 |
| | Feed per revolution: *f* (ipr) | 0.002 | - | 0.003 | - |
| | Feed per tooth: *fz* (ipt) | - | 0.004 | - | 0.006 |
| | Depth of cut : *ap* (in) | 0.118 | 0.118 | 0.394 | 0.394 |
| | Width of cut : *ae* (in) | - | 0.098 | - | 1.575 |
| | Coolant | Wet | | Dry | |
| | Overhang length (in) | 1.969 | | 3.937 | |
| | Machine | Horizontal M/C, BT40 | | Horizontal M/C, BT50 | |
| Results | |   **DoMultiRec** enabled a single tool to perform multiple operations, significantly reducing tool cost. Increased cutting data achieved 40% machining time reduction. | |   **DoMultiRec** enabled a single tool to perform multiple operations, significantly reducing tool cost. Increased cutting data achieved 31% machining time reduction. | |

Member IMC Group Tungaloy

**tungaloy.com/us**
follow us at:
facebook.com/tungaloyamerica
instagram.com/tungaloyamerica
linkedin.com/company/tungaloy-america

Distributed by:

Explore the Tungaloy world!
Tungaloy APP & SNS

FIND US ON THE CLOUD!
machiningcloud.com

AS9100 Certified
78006
2015.11.04

ISO 14001 Certified
EC97J1123
1997.11.26

Produced from Recycled paper Oct. 2024 (TJ)