



**NIAGARA
CUTTER™
SOLID
CARBIDE
HIGH FEED
END MILLS**

MZN410R & MZN510R

The MZN410R and MZN510R are designed to maximize productivity in hardened steels and superalloys. These end mills feature optimized substrate, geometry and coating to offer superior performance and process reliability.

These high feed end mills are available in 1/8" to 5/8" diameters, in four or five flute options, depending on the diameter. This range also features a short and long reach option to fit various work piece requirements.

The MZN410R and MZN510R are effective in hardened steels, cast irons and nickel-based super alloys. A typical application for this end mill is when machining hardened tool steels used in mold & die components.



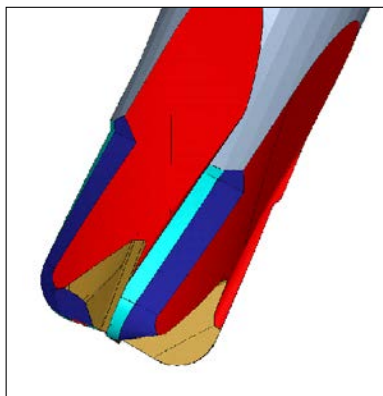
Niagara Cutter

MOLD AND DIE

MZN410R / MZN510R

High Feed Milling (HFM) can reduce machining times and cut costs allowing one tool to be used in a wide range of operations & strategies. Reduce component costs by maximizing material removal rates and reduce processing time by allowing close-to-profile pocketing of 90° walls. HFM can also minimize semi-finishing operations, thus further increasing efficiency.

The open end tooth design provides superior chip evacuation. This provides process reliability because chips are effectively removed from the cutting zone and not being “re-cut” which leads to edge chipping.



PRODUCT OVERVIEW

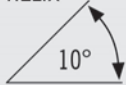
- End tooth design - Improved surface quality
- Open flute cavity and relief length - Improved chip evacuation
- Full form radius - More stability
- Edge preparation - Increases tool life

THE NIAGARA CUTTER BENEFIT

- Added strength to the cutting edge
- Improved process reliability and performance due to enhanced chip evacuation
- Allows for machining to near net shape on forms and corners
- Strengthens and protects the cutting edge with improved wear resistance

SOLID
CARBIDE

HELIX



HIGH FEED



CENTER
CUTTING



- High wear resistant AlTiN coating
- Strong end tooth design
- Designed for high feed milling of hardened steels, cast irons and nickel based super alloys such as Inconel
- Edge preparation for increased cutting edge strength, 2° back taper with reduced neck for workpiece clearance
- End mills are available in both a tapered neck and reduced neck designs.
- For additional technical data, please see page 10 in the Niagara Cutter Solid End Milling Product Catalog.

| EDP | DESCRIPTION | FLUTE DIA | SHANK DIA | LENGTH OF CUT | OVERALL LENGTH | NO. OF FLUTES | COATING | RADIUS | REACH | NECK DIA |
|--------|----------------------------|-----------|-----------|---------------|----------------|---------------|---------|--------|-------|----------|
| N00305 | MZN410R-0.125-J1-R030.0-Z4 | 1/8 | 1/4 | 1/8 | 2-1/2 | 4 | AlTiN | 0.030 | 0.375 | 0.112 |
| N00001 | MZN410R-0.125-J2-R030.0-Z4 | 1/8 | 1/4 | 1/8 | 2-1/2 | 4 | AlTiN | 0.030 | 0.625 | 0.112 |
| N00002 | MZN410R-0.188-J1-R050.0-Z4 | 3/16 | 1/4 | 3/16 | 2-1/2 | 4 | AlTiN | 0.050 | 0.562 | 0.172 |
| N00003 | MZN410R-0.188-J2-R050.0-Z4 | 3/16 | 1/4 | 3/16 | 2-1/2 | 4 | AlTiN | 0.050 | 0.937 | 0.172 |
| N00004 | MZN410R-0.250-E1-R060.0-Z4 | 1/4 | 1/4 | 1/4 | 2-1/2 | 4 | AlTiN | 0.060 | 0.750 | 0.230 |
| N00005 | MZN410R-0.250-E2-R060.0-Z4 | 1/4 | 1/4 | 1/4 | 2-1/2 | 4 | AlTiN | 0.060 | 1.250 | 0.230 |
| N00006 | MZN410R-0.313-G1-R080.0-Z4 | 5/16 | 3/8 | 5/16 | 3 | 4 | AlTiN | 0.080 | 0.750 | 0.290 |
| N00007 | MZN410R-0.313-G2-R080.0-Z4 | 5/16 | 3/8 | 5/16 | 3 | 4 | AlTiN | 0.080 | 1.250 | 0.290 |
| N00008 | MZN410R-0.375-E1-R080.0-Z4 | 3/8 | 3/8 | 3/8 | 3 | 4 | AlTiN | 0.080 | 1.125 | 0.348 |
| N00009 | MZN510R-0.375-E2-R080.0-Z5 | 3/8 | 3/8 | 3/8 | 3 | 5 | AlTiN | 0.080 | 1.125 | 0.348 |
| N00010 | MZN410R-0.375-E3-R080.0-Z4 | 3/8 | 3/8 | 3/8 | 3 | 4 | AlTiN | 0.080 | 1.875 | 0.348 |
| N00011 | MZN410R-0.500-E1-R120.0-Z4 | 1/2 | 1/2 | 1/2 | 4 | 4 | AlTiN | 0.120 | 1.500 | 0.468 |
| N00012 | MZN510R-0.500-E2-R120.0-Z5 | 1/2 | 1/2 | 1/2 | 4 | 5 | AlTiN | 0.120 | 1.500 | 0.468 |
| N00013 | MZN510R-0.625-E1-R120.0-Z5 | 5/8 | 5/8 | 5/8 | 4 | 5 | AlTiN | 0.120 | 1.875 | 0.584 |

CUTTING DATA

| SLOTTING | | | | | | | | | | | | | |
|----------------------|-------------------------|------------------|--|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| SMG | ae x Dc ² | vc [sf / min] | | | Zn = 4 | | | | | | Zn = 5 | | |
| | | | | | 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 1/2 | 5/8 | 1/2 | 5/8 |
| E / M / A 5 - 6 | 1.00 | 740 | | RPM | 22614 | 15076 | 11967 | 9046 | 7538 | 5654 | 4523 | 5654 | 4523 |
| | | | | CPT | 0.0031 | 0.0047 | 0.0059 | 0.0078 | 0.0094 | 0.0125 | 0.0156 | 0.0125 | 0.0156 |
| | | 690 - 790 | | Feedrate [in / min] | 283 | 283 | 283 | 283 | 283 | 283 | 283 | 353 | 353 |
| | | | | max adoc (ap) | 0.0059 | 0.0079 | 0.0098 | 0.0138 | 0.0157 | 0.0177 | 0.0197 | 0.0217 | 0.0217 |
| 7a > 48-56 HRC | 1.00 | 440 | | RPM | 13446 | 8964 | 7115 | 5379 | 4482 | 3362 | 2689 | 3362 | 2689 |
| | | | | CPT | 0.0031 | 0.0047 | 0.0059 | 0.0078 | 0.0094 | 0.0125 | 0.0156 | 0.0125 | 0.0156 |
| | | 390 - 490 | | Feedrate [in / min] | 168 | 168 | 168 | 168 | 168 | 168 | 168 | 210 | 210 |
| | | | | max adoc (ap) | 0.0059 | 0.0079 | 0.0098 | 0.0138 | 0.0157 | 0.0177 | 0.0197 | 0.0217 | 0.0217 |
| 7b > 56-62 HRC | 1.00 | 230 | | RPM | 7029 | 4686 | 3719 | 2812 | 2343 | 1757 | 1406 | 1757 | 1406 |
| | | | | CPT | 0.0025 | 0.0038 | 0.0047 | 0.0063 | 0.0075 | 0.0100 | 0.0125 | 0.0100 | 0.0125 |
| | | 200 - 260 | | Feedrate [in / min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 88 | 88 |
| | | | | max adoc (ap) | 0.0030 | 0.0039 | 0.0049 | 0.0069 | 0.0079 | 0.0089 | 0.0098 | 0.0108 | 0.0108 |
| E / M / A 12 - 13 | 1.00 | 570 | | RPM | 17419 | 11610 | 9220 | 6970 | 5810 | 4350 | 3480 | 4350 | 3480 |
| | | | | CPT | 0.0030 | 0.0045 | 0.0057 | 0.0075 | 0.0090 | 0.0120 | 0.0150 | 0.0120 | 0.0150 |
| | | 490 - 660 | | Feedrate [in / min] | 209 | 209 | 209 | 209 | 209 | 209 | 209 | 261 | 261 |
| | | | | max adoc (ap) | 0.0059 | 0.0079 | 0.0098 | 0.0138 | 0.0157 | 0.0177 | 0.0197 | 0.0217 | 0.0217 |
| E / M / A 14 - 15 | 1.00 | 410 | | RPM | 12530 | 8353 | 6630 | 5012 | 4177 | 3132 | 2506 | 3132 | 2506 |
| | | | | CPT | 0.0023 | 0.0034 | 0.0043 | 0.0056 | 0.0068 | 0.0090 | 0.0113 | 0.0090 | 0.0113 |
| | | 330 - 490 | | Feedrate [in / min] | 113 | 113 | 113 | 113 | 113 | 113 | 113 | 141 | 141 |
| | | | | max adoc (ap) | 0.0059 | 0.0079 | 0.0098 | 0.0138 | 0.0157 | 0.0177 | 0.0197 | 0.0217 | 0.0217 |
| E 21 | 1.00 | 100 | | RPM | 3056 | 2037 | 1617 | 1222 | 1019 | 764 | 611 | 764 | 611 |
| | | | | CPT | 0.0017 | 0.0026 | 0.0033 | 0.0042 | 0.0051 | 0.0070 | 0.0087 | 0.0070 | 0.0087 |
| | | 90 - 110 | | Feedrate [in / min] | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 27 | 27 |
| | | | | max adoc (ap) | 0.0038 | 0.0050 | 0.0070 | 0.0077 | 0.0100 | 0.0150 | 0.0150 | 0.0150 | 0.0150 |

| SIDE MILLING - ROUGHING | | | | | | | | | | | | | |
|-------------------------|-------------------------|------------------|--|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| SMG | ae x Dc ² | vc [sf / min] | | | Zn = 4 | | | | | | Zn = 5 | | |
| | | | | | 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 1/2 | 5/8 | 1/2 | 5/8 |
| E / M / A 5 - 6 | 0.30 | 740 | | RPM | 22614 | 15076 | 11967 | 9046 | 7538 | 5654 | 4523 | 5654 | 4523 |
| | | | | CPT | 0.0050 | 0.0075 | 0.0094 | 0.0125 | 0.0150 | 0.0200 | 0.0250 | 0.0200 | 0.0250 |
| | | 690 - 790 | | Feedrate [in/min] | 452 | 452 | 452 | 452 | 452 | 452 | 452 | 565 | 565 |
| | | | | max adoc (ap) | 0.0047 | 0.0063 | 0.0079 | 0.0110 | 0.0126 | 0.0142 | 0.0157 | 0.0173 | 0.0173 |
| 7a > 48-56 HRC | 0.30 | 480 | | RPM | 14669 | 9779 | 7762 | 5868 | 4890 | 3667 | 2934 | 3667 | 2934 |
| | | | | CPT | 0.0050 | 0.0075 | 0.0094 | 0.0125 | 0.0150 | 0.0200 | 0.0250 | 0.0200 | 0.0250 |
| | | 430 - 520 | | Feedrate [in/min] | 293 | 293 | 293 | 293 | 293 | 293 | 293 | 367 | 367 |
| | | | | max adoc (ap) | 0.0047 | 0.0063 | 0.0079 | 0.0110 | 0.0126 | 0.0142 | 0.0157 | 0.0173 | 0.0173 |
| 7b > 56-62 HRC | 0.30 | 260 | | RPM | 7946 | 5297 | 4205 | 3178 | 2649 | 1986 | 1589 | 1986 | 1589 |
| | | | | CPT | 0.0038 | 0.0056 | 0.0071 | 0.0094 | 0.0113 | 0.0150 | 0.0188 | 0.0150 | 0.0188 |
| | | 230 - 300 | | Feedrate [in/min] | 119 | 119 | 119 | 119 | 119 | 119 | 119 | 149 | 149 |
| | | | | max adoc (ap) | 0.0047 | 0.0063 | 0.0079 | 0.0110 | 0.0126 | 0.0142 | 0.0157 | 0.0173 | 0.0173 |
| E / M / A 12 - 13 | 0.30 | 570 | | RPM | 17419 | 11613 | 9218 | 6968 | 5806 | 4355 | 3484 | 4355 | 3484 |
| | | | | CPT | 0.0050 | 0.0075 | 0.0094 | 0.0125 | 0.0150 | 0.0200 | 0.0250 | 0.0200 | 0.0250 |
| | | 490 - 660 | | Feedrate [in/min] | 348 | 348 | 348 | 348 | 348 | 348 | 348 | 435 | 435 |
| | | | | max adoc (ap) | 0.0059 | 0.0079 | 0.0098 | 0.0138 | 0.0157 | 0.0177 | 0.0197 | 0.0217 | 0.0217 |
| E / M / A 14 - 15 | 0.30 | 410 | | RPM | 12530 | 8353 | 6630 | 5012 | 4177 | 3132 | 2506 | 3132 | 2506 |
| | | | | CPT | 0.0038 | 0.0056 | 0.0071 | 0.0094 | 0.0113 | 0.0150 | 0.0188 | 0.0150 | 0.0188 |
| | | 330 - 490 | | Feedrate [in/min] | 188 | 188 | 188 | 188 | 188 | 188 | 188 | 235 | 235 |
| | | | | max adoc (ap) | 0.0059 | 0.0079 | 0.0098 | 0.0138 | 0.0157 | 0.0177 | 0.0197 | 0.0217 | 0.0217 |
| E 21 | 0.30 | 100 | | RPM | 3056 | 2037 | 1617 | 1222 | 1019 | 764 | 611 | 764 | 611 |
| | | | | CPT | 0.0026 | 0.0039 | 0.0049 | 0.0065 | 0.0078 | 0.0105 | 0.0130 | 0.0105 | 0.0130 |
| | | 90 - 110 | | Feedrate [in/min] | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 40 | 40 |
| | | | | max adoc (ap) | 0.0038 | 0.0050 | 0.0070 | 0.0077 | 0.0100 | 0.0150 | 0.0150 | 0.0150 | 0.0150 |

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1-248-528-5220

For technical assistance, call:
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