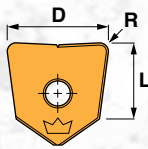
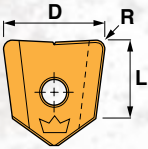
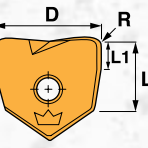
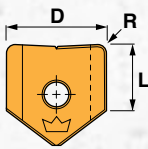
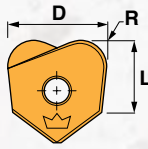
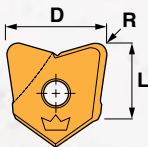


# Copy Milling Program Tools

## Flat Bottom, Back Draft, Toroid

| BD-N   | Tool Ordering Number | Dimensions |       |               | Grade |     |     | Description  |  |
|--|----------------------|------------|-------|---------------|-------|-----|-----|--|--|
|  |                      | D          | L     | R             | XRN   | TLN | HSN |  |  |
|    | BD-0375-N            | 0.375      | 0.357 | 1/32,1/16     | •     | •   | •   | Precision ground with 7° back taper. Used for milling of cores, cavities, fillets with straight or very steep walls of harder materials.   |  |
|  | BD-0500-N            | 0.500      | 0.380 | 1/32,1/16     | •     | •   | •   |  |  |
|  | BD-0625-N            | 0.625      | 0.457 | 1/32,1/16     | •     | •   | •   |  |  |
|  | BD-0750-N            | 0.750      | 0.540 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | BD-1000-N            | 1.000      | 0.740 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | BD-1250-N            | 1.250      | 0.919 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
| BD-R   | Number               | D          | L     | R             | XRN   | TLN | HSN | Description  |  |
|    | BD-0375-R            | 0.375      | 0.340 | 1/32          | •     | •   | •   | Precision ground with positive ground chip-breaker and 7° back taper. Used for milling of cores, cavities, fillets with straight or very steep walls of softer materials.  |  |
|  | BD-0500-R            | 0.500      | 0.380 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | BD-0625-R            | 0.625      | 0.457 | 1/32,1/16     | •     | •   | •   |  |  |
|  | BD-0750-R            | 0.750      | 0.540 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | BD-1000-R            | 1.000      | 0.740 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | BD-1250-R            | 1.250      | 0.919 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
| BDS  | Number               | D          | L     | R             | L1    | XRN | TLN | HSN  | Description  |
|   | BDS-0375-N           | 0.375      | 0.340 | 1/32,1/16     | 0.125 | •   | •   | •  | Precision ground with unique crossover design between flat bottom FB and back draft DB inserts. Allows straight walls with a larger step down than BD. Allows higher cutting speeds and feeds. |
|  | BDS-0500-N           | 0.500      | 0.380 | 015,1/32,1/16 | 0.125 | •   | •   | •  |  |
|  | BDS-0625-N           | 0.625      | 0.457 | 1/32,1/16     | 0.125 | •   | •   | •  |  |
|  | BDS-0750-N           | 0.750      | 0.540 | 1/32,1/16,1/8 | 0.125 | •   | •   | •  |  |
|  | BDS-1000-N           | 1.000      | 0.740 | 1/32,1/16,1/8 | 0.125 | •   | •   | •  |  |
|  | BDS-1250-N           | 1.250      | 0.919 | 1/16          | 0.125 | •   | •   | •  |  |
| FB-R   | Number               | D          | L     | R             | XRN   | TLN | HSN | Description  |  |
|  | FB-0375-R            | 0.375      | 0.341 | 1/32          | •     | •   | •   | Precision ground with positive ground chip-breaker. Flat bottom inserts for shoulder milling, fillet finishing and long reach angular wall finishing of softer materials.  |  |
|  | FB-0500-R            | 0.500      | 0.350 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | FB-0625-R            | 0.625      | 0.421 | 1/32,1/16     | •     | •   | •   |  |  |
|  | FB-0750-R            | 0.750      | 0.496 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | FB-1000-R            | 1.000      | 0.679 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
|  | FB-1250-R            | 1.250      | 0.843 | 1/32,1/16,1/8 | •     | •   | •   |  |  |
| TO   | Number               | D          | L     | R             | XRN   | TLN | HSN | Description  |  |
|  | TO-0375              | 0.375      | 0.349 | 0.125         | •     | •   | •   | Precision ground large corner radius & back taper for spiral and pocket milling. Milling of pre-hard and hardened flat surfaces at higher speeds than tools with smaller corner radii. Good choice for HS milling of Aluminum. |  |
|  | TO-0500              | 0.500      | 0.377 | 0.125         | •     | •   | •   |  |  |
|  | TO-0625              | 0.625      | 0.433 | 0.156         | •     | •   | •   |  |  |
|  | TO-0750              | 0.750      | 0.518 | 0.187         | •     | •   | •   |  |  |
|  | TO-1000              | 1.000      | 0.716 | 0.250         | •     | •   | •   |  |  |
|  | TO-1250              | 1.250      | 0.865 | 0.312         | •     | •   | •   |  |  |
| TOBD-NF  | Number               | D          | L     | R             | XRN   | TLN | HSN | Description  |  |
|  | TOBD-0500-NF         | 0.500      | 0.377 | 0.125         |       |     |     | Millstar inserts designed for high speed high feed roughing of Aluminum, but also has the versatility to be used for fine finishing as well.   |  |
|  | TOBD-0625-NF         | 0.625      | 0.433 | 0.125         |       |     |     |  |  |
|  | TOBD-0750-NF         | 0.750      | 0.518 | 0.125         |       |     |     |  |  |
|  | TOBD-1000-NF         | 1.000      | 0.716 | 0.125         |       |     |     |  |  |

### Radius Ordering Numbers:

For .015 use ordering # .015 • For 1/32" use ordering # 02 1/16" use ordering # 04

For 1/8" use ordering # 08

Example: 1/2" BDS-0500N-04-HSN

### NA

Non-coated grade.

### XRN

Multi-layer hybrid coating of AlCrN. This coating has very good heat resistance and also a low friction coefficient. The XRN coating is designed for use in HSM of un-heat treated softer materials such as Titanium, Inconel, Stainless Steels and other gummy materials that require the use of liquid coolant.

### HSN

Millstar's new coating is a multi-layer hybrid Nano coating. This new coating has very good heat resistance and high hardness. The HSN coating is designed for use in HSM of Heat Treated materials up to 72 HRC.

### ALTiN-EXALON (TLN)

Titanium Aluminum Nitride advanced PVD coating. A special, improved ALTiN coating approaching surface hardness of CBN on a tough substrate. Recommended for tough and hard metal machining applications.

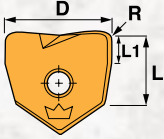
### DMD

Diamond coating. Custom coating for cutting non-ferrous, non-metallic and very abrasive materials at highly elevated speeds. Use on copper, bronze, brass, aluminum-silicon alloys, carbon graphite, solid and fiber-reinforced plastics, ceramics and composite materials.

Custom tool coatings for specific applications are available by request.

## BDS Series in PCD and CBN Tipped

### Back Draft

| BDS   | Tool Ordering Number | Dimensions |       |               |       | Grade |     |     | Description  |
|---|----------------------|------------|-------|---------------|-------|-------|-----|-----|--|
|   |                      | D          | L     | R             | L1    | XRN   | TLN | HSN |  |
|  | BDS-0375-N           | 0.375      | 0.340 | 1/32,1/16     | 0.125 | •     | •   | •   | Precision ground with unique crossover design between flat bottom FB and back draft BD inserts. Allows straight walls with a larger step down than BD. Allows higher cutting speeds and feeds. |
|   | BDS-0500-N           | 0.500      | 0.380 | 015,1/32,1/16 | 0.125 | •     | •   | •   |  |
|   | BDS-0625-N           | 0.625      | 0.457 | 1/32,1/16     | 0.125 | •     | •   | •   |  |
|   | BDS-0750-N           | 0.750      | 0.540 | 1/32,1/16,1/8 | 0.125 | •     | •   | •   |  |
|   | BDS-1000-N           | 1.000      | 0.740 | 1/32,1/16,1/8 | 0.125 | •     | •   | •   |  |

### PCD Tipped

For carbon milling with longer tool life

### CBN Tipped

For high speed machining or milling of high hardness materials with longer tool life and superior finishes.

**NEW!**

Higher cutting speeds and feeds with new Back Draft Tools

### Radius Ordering Numbers:

For .015 use ordering # .015 • For 1/32" use ordering # 02 1/16" use ordering # 04  
For 1/8" use ordering # 08

Example: 1/2" BDS-0500N-04-PCD or CBN

## Copy Milling Program Tools

### NA

Non-coated grade.

### XRN

Multi-layer hybrid coating of AlCrN. This coating has very good heat resistance and also a low friction coefficient. The XRN coating is designed for use in HSM of un-heat treated softer materials such as Titanium, Inconel, Stainless Steels and other gummy materials that require the use of liquid coolant.

### HSN

Millstar's new coating is a multi-layer hybrid Nano coating. This new coating has very good heat resistance and high hardness. The HSN coating is designed for use in HSM of Heat Treated materials up to 72 HRC.

### ALTiN-EXALON (TLN)

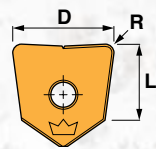
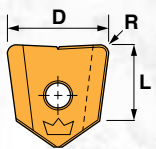
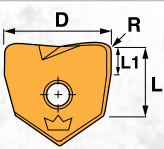
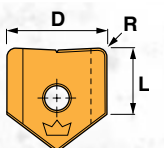
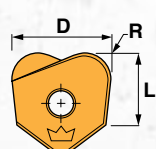
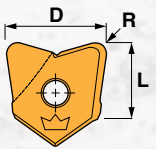
Titanium Aluminum Nitride advanced PVD coating. A special, improved ALTiN coating approaching surface hardness of CBN on a tough substrate. Recommended for tough and hard metal machining applications.

### DMD

Diamond coating. Custom coating for cutting non-ferrous, non-metallic and very abrasive materials at highly elevated speeds. Use on copper, bronze, brass, aluminum-silicon alloys, carbon graphite, solid and fiber-reinforced plastics, ceramics and composite materials.

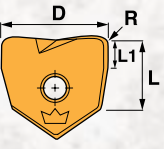
Custom tool coatings for specific applications are available by request.

### Flat Bottom, Back Draft, Toroid

| BD-N  | Tool Ordering Number | Dimensions |       |                     | Grade |     |     | Description  |  |
|---|----------------------|------------|-------|---------------------|-------|-----|-----|--|--|
|   |                      | D          | L     | R                   | XRN   | TLN | HSN |  |  |
|    | BD-10-N              | 10         | 8,5   | 0,5/0,8/1,0         | •     | •   | •   | Precision ground with 7° back taper. Used for milling of cores, cavities, fillets with straight or very steep walls of harder materials.   |  |
|   | BD-12-N              | 12         | 9,95  | 0,5/1,0/2,0         | •     | •   | •   |  |  |
|   | BD-16-N              | 16         | 11,55 | 0,5/1,0/1,3/2,0/3,0 | •     | •   | •   |  |  |
|   | BD-20-N              | 20         | 13,35 | 0,5/1,0/1,6/2,0/3,0 | •     | •   | •   |  |  |
|   | BD-25-N              | 25         | 19,95 | 1,0/2,0             | •     | •   | •   |  |  |
|   | BD-32-N              | 32         | 8,5   | 1,0/2,6             | •     | •   | •   |  |  |
| BD-R  | Number               | D          | L     | R                   | XRN   | TLN | HSN | Description  |  |
|    | BD-10-R              | 10         | 8,5   | 0,5/0,8/1,0         | •     | •   | •   | Precision ground with positive ground chip-breaker and 7° back taper. Used for milling of cores, cavities, fillets with straight or very steep walls of softer materials.  |  |
|   | BD-12-R              | 12         | 9,95  | 0,5/1,0             | •     | •   | •   |  |  |
|   | BD-16-R              | 16         | 11,55 | 0,5/1,0/1,3         | •     | •   | •   |  |  |
|   | BD-20-R              | 20         | 13,35 | 0,5/1,0/1,6         | •     | •   | •   |  |  |
|   | BD-25-R              | 25         | 19,95 | 1,0/2,0             | •     | •   | •   |  |  |
|   | BD-32-R              | 32         | 23,35 | 2,6                 | •     | •   | •   |  |  |
| BDS   | Number               | D          | L     | R                   | L1    | XRN | TLN | HSN  | Description  |
|   | BDS-10-N             | 10         | 8,5   | 0,1/0,8/1,0         | 3     | •   | •   | •  | Precision ground with unique crossover design between flat bottom FB and back draft DB inserts. Allows straight walls with a larger step down than BD. Allows higher cutting speeds and feeds. |
|   | BDS-12-N             | 12         | 9,95  | 0,1/1,0             | 3     | •   | •   | •  |  |
|   | BDS-16-N             | 16         | 11,55 | 0,1/1,0/1,3         | 3     | •   | •   | •  |  |
|   | BDS-20-N             | 20         | 13,35 | 0,1/1,0/1,6         | 3     | •   | •   | •  |  |
|   | BDS-25-N             | 25         | 19,95 | 1,0/2,0             | 3     | •   | •   | •  |  |
|   | BDS-32-N             | 32         | 23,35 | 1,0/2,0             | 3     | •   | •   | •  |  |
| FB-R  | Number               | D          | L     | R                   | XRN   | TLN | HSN | Description  |  |
|  | FB-10-R              | 10         | 8,5   | 0,8                 | •     | •   | •   | Precision ground with positive ground chip-breaker. Flat bottom inserts for shoulder milling, fillet finishing and long reach angular wall finishing of softer materials.  |  |
|   | FB-12-R              | 12         | 9,15  | 1,0                 | •     | •   | •   |  |  |
|   | FB-16-R              | 16         | 10,65 | 0,5/1,3             | •     | •   | •   |  |  |
|   | FB-20-R              | 20         | 12,25 | 1,6                 | •     | •   | •   |  |  |
|   | FB-25-R              | 25         | 16,35 | 2,0                 | •     | •   | •   |  |  |
|   | FB-32-R              | 32         | 21,3  | 2,6                 | •     | •   | •   |  |  |
| TO  | Number               | D          | L     | R                   | XRN   | TLN | HSN | Description  |  |
|  | TO-10                | 10         | 8,65  | 3,0                 | •     | •   | •   | Precision ground large corner radius & back taper for spiral and pocket milling. Milling of pre-hard and hardened flat surfaces at higher speeds than tools with smaller corner radii. Good choice for HS milling of Aluminum. |  |
|   | TO-12                | 12         | 9,20  | 3,0                 | •     | •   | •   |  |  |
|   | TO-16                | 16         | 11,25 | 4,0                 | •     | •   | •   |  |  |
|   | TO-20                | 20         | 13,15 | 5,0                 | •     | •   | •   |  |  |
|   | TO-25                | 25         | 18,25 | 6,0                 | •     | •   | •   |  |  |
|   | TO-30                | 30         | 22,15 | 7,5                 | •     | •   | •   |  |  |
|   | TO-32                | 32         | 21,95 | 8,0                 | •     | •   | •   |  |  |
| TOBD-NF   | Number               | D          | L     | R                   | XRN   | TLN | HSN | Description  |  |
|  | TOBD-12-NF           | 12         | 9,2   | 3,0                 | •     | •   | •   | Millstar inserts designed for high speed high feed roughing of Aluminum, but also has the versatility to be used for fine finishing as well.   |  |
|   | TOBD-16-NF           | 16         | 11,25 | 3,0                 | •     | •   | •   |  |  |
|   | TOBD-20-NF           | 20         | 13,15 | 3,0                 | •     | •   | •   |  |  |
|   | TOBD-25-NF           | 25         | 18,25 | 3,0                 | •     | •   | •   |  |  |

## BDS Series in PCD and CBN Tipped

### Back Draft

| BDS   | Tool Ordering Number | Dimensions |       |             |    | Grade |     |     | Description  |
|---|----------------------|------------|-------|-------------|----|-------|-----|-----|--|
|   |                      | D          | L     | R           | L1 | XRN   | TLN | HSN |  |
|  | BDS-10-N             | 10         | 8,5   | 0,1/0,8/1,0 | 3  | •     | •   | •   | Precision ground with unique crossover design between flat bottom FB and back draft BD inserts. Allows straight walls with a larger step down than BD. Allows higher cutting speeds and feeds. |
|   | BDS-12-N             | 12         | 9,95  | 0,1/1       | 3  | •     | •   | •   |  |
|   | BDS-16-N             | 16         | 11,55 | 0,1/1/1,3   | 3  | •     | •   | •   |  |
|   | BDS-20-N             | 20         | 13,35 | 0,1/1/1,6   | 3  | •     | •   | •   |  |
|   | BDS-25-N             | 25         | 19,95 | 1/2         | 3  | •     | •   | •   |  |

### PCD Tipped

For carbon milling with longer tool life

### CBN Tipped

For high speed machining or milling of high hardness materials with longer tool life and superior finishes.

**NEW!**

Higher cutting speeds and feeds with new Back Draft Tools

### Radius Ordering Numbers:

For .015 use ordering # .015 • For 1/32" use ordering # 02 1/16" use ordering # 04  
For 1/8" use ordering # 08

Example: 1/2" BDS-0500N-04-PCD or CBN