



***BUCKEYE***

***SAWS & TOOLS***



***SOLID CARBIDE END MILLS***

***Precision Carbide***

# General Purpose

Shank Tolerance: +0.0000"/-0.0004"  
Diameter Tolerance: +0.0000"/-0.0020"

*General Purpose 30 Degree Helix 10% micrograin carbide. All tools honed to improve tool life. Available Uncoated & TiALN Coated.*

## GENERAL PURPOSE

|   |     |
|---|-----|
| Square End 2, 3 & 4 Flute - Fractional .....              | 3-5 |
| Square End 2, 3 & 4 Flute - Metric .....                  | 5-6 |
| Ball Nose 2, 3 & 4 Flute - Fractional .....               | 7-9 |
| Engraving Tools .....                                     | 9   |
| Spot Drills .....   | 9   |
| Ball Nose 2 & 4 Flute - Metric .....                      | 10  |
| 90 Degree Drill/Mills 2 & 4 Flute - Fractional .....      | 10  |
| Double Ended Square End 2 & 4 Flute - Fractional .....    | 11  |
| Double Ended Ball Nose End 2 & 4 Flute - Fractional ..... | 12  |

# High Performance

Shank Tolerance: +0.0000"/-0.0004"  
Diameter Tolerance: +0.0000"/-0.0015"

*High Performance Variable Pitch to reduce chatter. General Purpose 10% micrograin carbide. All tools honed to improve tool life. TiALN Coated for enhanced heat & abrasion resistance providing higher tool life. Special core & heal design to enhance rigidity.*

## HP Variable Pitch

|  |       |
|--|-------|
| Square End & Corner Radius 4 & 5 Flute - Fractional .....                | 14-15 |
| Ball Nose 4 Flute - Fractional .....                                     | 16    |
| Long Reach Neck Relief Square & Corner Radius 4 Flute - Fractional ..... | 16-17 |
| Long Reach Neck Relief Ball Nose 4 Flute - Fractional .....              | 16-17 |

# Ultra High Performance

Shank Tolerance: +0.0000"/-0.0004"  
Diameter Tolerance: +0.0000"/-0.0015"

*Extreme Production Variable Pitch to reduce chatter. Ultra Premium 10% micrograin carbide. All tools honed to improve tool life. TiALN Coated with a unique post coating polishing process to reduce built up edge. Special core & heal design to enhance rigidity. Experience the highest performance & tool life.*

## HP Ultra Variable Pitch - EXTREME PRODUCTION

|  |       |
|--|-------|
| Square End & Corner Radius 4 & 5 Flute - Fractional .....    | 19-20 |
| Ball Nose 4 Flute - Fractional .....                         | 21    |
| Square & Corner Radius HEM 5, 6 & 7 Flute - Fractional ..... | 22-24 |

# Ultra HP Aluminum

Shank Tolerance: +0.0000"/-0.0004"  
Diameter Tolerance: +0.0000"/-0.0004"

*Specifically designed for high performance Aluminum machining. Medium/Finishing applications & Medium/Roughing applications. Unique variable pitch & variable helix combined with a polished surface, chipbreaking geometry & cylindrical margin. Available Uncoated, ZrN Coated & DLC Coated.*

## HP Ultra Variable Pitch for Aluminum - EXTREME PRODUCTION

|  |    |
|--|----|
| Square End & Corner Radius - Fractional Medium/Roughing .....  | 27 |
| Square End & Corner Radius - Fractional Medium/Finishing ..... | 28 |
| Ball Nose - Fractional .....                                   | 29 |

# General Purpose Speeds & Feeds

| Material Classification           | Speed (SFM) |          | Feed Per Tooth By End Mill Diameter (IPT) |       |       |       |       |       |       |       |       |
|-----------------------------------|-------------|----------|---|-------|-------|-------|-------|-------|-------|-------|-------|
|                                   | Uncoated    | TiAlN    | 1/4"                                      | 5/16" | 3/8"  | 7/16" | 1/2"  | 5/8"  | 3/4"  | 1"    |       |
| Aluminum Alloys & Aluminum        | N           | 600-1200 | 900-1800                                  | .0020 | .0025 | .0030 | .0035 | .0040 | .0050 | .0060 | .0080 |
| Copper Alloys & Copper            |             | 350-850  | 525-1275                                  | .0020 | .0025 | .0025 | .0030 | .0030 | .0035 | .0040 | .0060 |
| Bronze & Brass                    |             | 250-400  | 375-600                                   | .0020 | .0025 | .0025 | .0030 | .0030 | .0035 | .0040 | .0050 |
| Graphite                          |             | 500-800  | 500-1200                                  | .0030 | .0035 | .0025 | .0030 | .0030 | .0040 | .0050 | .0070 |
| Plastics                          |             | 600-1100 | 600-1650                                  | .0030 | .0035 | .0040 | .0050 | .0060 | .0080 | .0100 | .0150 |
| Softer Cast Iron                  | K           | 250-450  | 375-650                                   | .0020 | .0022 | .0025 | .0027 | .0030 | .0045 | .0060 | .0080 |
| Harder Cast Iron                  |             | 100-250  | 100-375                                   | .0008 | .0010 | .0015 | .0017 | .0020 | .0025 | .0030 | .0040 |
| Ductile Iron                      |             | 80-400   | 100-600                                   | .0010 | .0012 | .0015 | .0017 | .0020 | .0030 | .0040 | .0060 |
| Malleable Iron                    |             | 150-500  | 225-650                                   | .0010 | .0015 | .0020 | .0025 | .0030 | .0040 | .0050 | .0070 |
| Low Carbon Steels (1020 & Under)  | P           | 200-400  | 300-600                                   | .0010 | .0015 | .0020 | .0025 | .0030 | .0040 | .0050 | .0070 |
| Medium Carbon Steels (1030-1060)  |             | 100-250  | 150-375                                   | .0015 | .0016 | .0017 | .0018 | .0020 | .0030 | .0040 | .0050 |
| Alloy Steels Hardened to 35 Rc    |             | 130-230  | 130-345                                   | .0010 | .0011 | .0012 | .0013 | .0015 | .0017 | .0020 | .0030 |
| Alloy Steels Hardened to 40-50 Rc |             | 70-130   | 70-160                                    | .0007 | .0007 | .0008 | .0009 | .0010 | .0015 | .0020 | .0030 |
| Die Steels Hardened to 51-60 Rc   |             | --       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Tool Steels                       |             | 100-250  | 150-375                                   | .0010 | .0012 | .0015 | .0017 | .0020 | .0025 | .0030 | .0040 |
| Mold Steels                       | 200-350     | 300-525  | .0010                                     | .0012 | .0015 | .0017 | .0020 | .0025 | .0030 | .0040 |       |
| Softer Stainless Steels           | M           | 200-350  | 300-450                                   | .0010 | .0012 | .0015 | .0012 | .0020 | .0030 | .0040 | .0060 |
| Harder Stainless Steels           |             | 100-200  | 150-300                                   | .0005 | .0006 | .0007 | .0008 | .0010 | .0020 | .0030 | .0050 |
| Monel & High Nickel Steel         | S           | 75-175   | 75-200                                    | .0010 | .0012 | .0015 | .0017 | .0020 | .0025 | .0030 | .0040 |
| Softer Titanium                   |             | 125-300  | 125-375                                   | .0010 | .0012 | .0015 | .0017 | .0020 | .0030 | .0040 | .0060 |
| Harder Titanium                   |             | 50-150   | 50-175                                    | .0005 | .0006 | .0007 | .0008 | .0010 | .0015 | .0020 | .0020 |
| Nickel Based High Temp Alloys     |             | 50-100   | 50-125                                    | .0008 | .0008 | .0009 | .0009 | .0010 | .0012 | .0015 | .0020 |

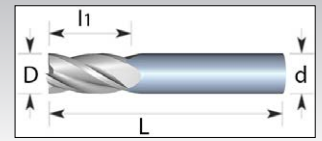
**Note: These are guidelines only & the following points are important to consider:**

- Higher Feed Per Tooth should be used to start for radial depths of cut less than 25% of the tool diameter. Lower Feed Per Tooth should be used to start for radial depths of cut greater than 25% of the tool diameter.
- The above recommendations are for axial lengths of cut not to exceed 1 times the tool diameter for profiling and .5 times the diameter for full slotting.
- The above parameters are recommended starting points only. If the tool is working well, without vibrations or significant noise, increase the SFM and/or Feed Per Tooth in 5-10% increments.
- Optimum speeds & feeds will depend upon material, setup, machine conditions & tool deflection. Higher or lower parameters may be required to achieve optimum machining conditions.
- For Light Radial Depths of cut, make certain to increase the feed rate to compensate for Radial Chip Thinning Factor (RCTF). Consult a formula or app to calculate.
- For Plunging or Ramping the feed rate should be reduced by about 50%.
- Climb Milling is preferred to Conventional Milling.



|                                 |   |                   |
|---------------------------------|---|-------------------|
| P                               | ● | Steel             |
| M                               | ○ | Stainless Steel   |
| K                               | ● | Cast Iron         |
| N                               | ○ | Non-Ferrous       |
| S                               |   | High Temp. Alloys |
| H                               |   | Hardened Steel    |
| ● GOOD    ○ OK    ○ NOT OPTIMAL |   |                   |

- Square End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiAlN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling

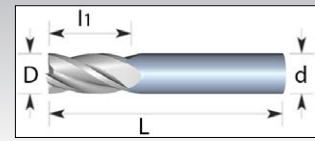


| Square End - Fractional |            |                |              |                        |                        |                        |                        |                        |                        |
|-------------------------|------------|----------------|--------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Cutter<br>D             | Shank<br>d | LOC<br>l1      | Overall<br>L | Uncoated               |                        |                        | TiAlN                  |                        |                        |
|                         |            |                |              | 2 Flute                | 3 Flute                | 4 Flute                | 2 Flute                | 3 Flute                | 4 Flute                |
| 1/32                    | 1/8        | 1/16<br>3/32   | 1-1/2        | BST-45213<br>BST-45309 | BST-45214<br>BST-45310 | BST-45215<br>BST-45311 | BST-45261<br>BST-45498 | BST-45262<br>BST-45499 | BST-45263<br>BST-45500 |
| 3/64                    | 1/8        | 3/32<br>1/8    | 1-1/2        | BST-45216<br>BST-45312 | BST-45217<br>BST-45313 | BST-45218<br>BST-45314 | BST-45264<br>BST-45501 | BST-45265<br>BST-45502 | BST-45266<br>BST-45503 |
| 1/16                    | 1/8        | 1/8<br>3/16    | 1-1/2        | BST-45219<br>BST-45315 | BST-45220<br>BST-45316 | BST-45221<br>BST-45317 | BST-45267<br>BST-45504 | BST-45268<br>BST-45505 | BST-45269<br>BST-45506 |
| 5/64                    | 1/8        | 1/4            | 1-1/2        | BST-45318              | BST-45319              | BST-45320              | BST-45507              | BST-45508              | BST-45509              |
| 3/32                    | 1/8        | 3/16<br>3/8    | 1-1/2        | BST-45222<br>BST-45321 | BST-45223<br>BST-45322 | BST-45224<br>BST-45323 | BST-45270<br>BST-45510 | BST-45271<br>BST-45511 | BST-45272<br>BST-45512 |
| 7/64                    | 1/8        | 3/8            | 1-1/2        | BST-45327              | BST-45328              | BST-45329              | BST-45516              | BST-45517              | BST-45518              |
| 1/8                     | 1/8        | 1/4            | 1-1/2        | BST-45228              | BST-45229              | BST-45230              | BST-45276              | BST-45277              | BST-45278              |
|                         |            | 1/2            | 1-1/2        | BST-45330              | BST-45331              | BST-45332              | BST-45519              | BST-45520              | BST-45521              |
|                         |            | 3/4            | 2-1/2        | BST-45689              | --                     | BST-45690              | BST-45711              | --                     | BST-45712              |
| 9/64                    | 3/16       | 1              | 3            | BST-45736              | --                     | BST-45737              | BST-45768              | --                     | BST-45769              |
|                         |            | 9/16           | 2            | BST-45333              | BST-45334              | BST-45335              | BST-45522              | BST-45523              | BST-45524              |
|                         |            | 5/16<br>9/16   | 2            | BST-45231<br>BST-45336 | BST-45232<br>BST-45337 | BST-45233<br>BST-45338 | BST-45279<br>BST-45525 | BST-45280<br>BST-45526 | BST-45281<br>BST-45527 |
| 11/64                   | 3/16       | 9/16           | 2            | BST-45339              | BST-45340              | BST-45341              | BST-45528              | BST-45529              | BST-45530              |
| 3/16                    | 3/16       | 3/8            | 2            | BST-45234              | BST-45235              | BST-45236              | BST-45282              | BST-45283              | BST-45284              |
|                         |            | 5/8            | 2            | BST-45342              | BST-45343              | BST-45344              | BST-45531              | BST-45532              | BST-45533              |
|                         |            | 3/4<br>1-1/8   | 2-1/2<br>3   | BST-45691<br>BST-45738 | --<br>--               | BST-45692<br>BST-45739 | BST-45713<br>BST-45770 | --<br>--               | BST-45714<br>BST-45771 |
| 13/64                   | 1/4        | 5/8            | 2-1/2        | BST-45345              | BST-45346              | BST-45347              | BST-45534              | BST-45535              | BST-45536              |
| 7/32                    | 1/4        | 7/16           | 2            | BST-45237              | BST-45238              | BST-45239              | BST-45285              | BST-45286              | BST-45287              |
|                         |            | 5/8            | 2-1/2        | BST-45348              | BST-45349              | BST-45350              | BST-45537              | BST-45538              | BST-45539              |
| 15/64                   | 1/4        | 3/4            | 2-1/2        | BST-45351              | BST-45352              | BST-45353              | BST-45540              | BST-45541              | BST-45542              |
| 1/4                     | 1/4        | 1/2            | 2            | BST-45240              | BST-45241              | BST-45242              | BST-45288              | BST-45289              | BST-45290              |
|                         |            | 3/4            | 2-1/2        | BST-45354              | BST-45355              | BST-45356              | BST-45543              | BST-45544              | BST-45545              |
|                         |            | 1-1/8<br>1-1/2 | 3<br>4       | BST-45693<br>BST-45740 | --<br>--               | BST-45694<br>BST-45741 | BST-45715<br>BST-45772 | --<br>--               | BST-45716<br>BST-45773 |
| 17/64                   | 5/16       | 7/8            | 2-1/2        | BST-45357              | BST-45358              | BST-45359              | BST-45546              | BST-45547              | BST-45548              |
| 9/32                    | 5/16       | 7/8            | 2-1/2        | BST-45360              | BST-45361              | BST-45362              | BST-45549              | BST-45550              | BST-45551              |
| 19/64                   | 5/16       | 7/8            | 2-1/2        | BST-45363              | BST-45364              | BST-45365              | BST-45552              | BST-45553              | BST-45554              |
| 5/16                    | 5/16       | 1/2            | 2            | BST-45243              | BST-45244              | BST-45245              | BST-45291              | BST-45292              | BST-45293              |
|                         |            | 7/8            | 2-1/2        | BST-45366              | BST-45367              | BST-45368              | BST-45555              | BST-45556              | BST-45557              |
|                         |            | 1-1/8<br>1-5/8 | 3<br>4       | BST-45695<br>BST-45744 | --<br>--               | BST-45696<br>BST-45745 | BST-45717<br>BST-45776 | --<br>--               | BST-45718<br>BST-45777 |
| 21/64                   | 3/8        | 7/8            | 2-1/2        | BST-45369              | BST-45370              | BST-45371              | BST-45558              | BST-45559              | BST-45560              |

|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ○ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S |   | High Temp. Alloys |
| H |   | Hardened Steel    |

● GOOD ○ OK ○ NOT OPTIMAL

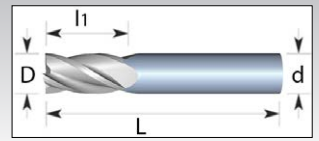
- Square End
- 2, 3, 4 Flute
- Single End
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- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiAlN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



| Square End - Fractional |            |                       |              |           |           |           |           |           |           |
|-------------------------|------------|-----------------------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Cutter<br>D             | Shank<br>d | LOC<br>l <sub>1</sub> | Overall<br>L | Uncoated  |           |           | TiAlN     |           |           |
|                         |            |                       |              | 2 Flute   | 3 Flute   | 4 Flute   | 2 Flute   | 3 Flute   | 4 Flute   |
| 11/32                   | 3/8        | 7/8                   | 2-1/2        | BST-45372 | BST-45373 | BST-45374 | BST-45561 | BST-45562 | BST-45563 |
| 23/64                   | 3/8        | 7/8                   | 2-1/2        | BST-45375 | BST-45376 | BST-45377 | BST-45564 | BST-45565 | BST-45566 |
| 3/8                     | 3/8        | 5/8                   | 2            | BST-45246 | BST-45247 | BST-45248 | BST-45294 | BST-45295 | BST-45296 |
|                         |            | 1                     | 2-1/2        | BST-45378 | BST-45379 | BST-45380 | BST-45567 | BST-45568 | BST-45569 |
|                         |            | 1-1/8                 | 3            | BST-45697 | --        | BST-45698 | BST-45719 | --        | BST-45720 |
| 7/16                    | 7/16       | 1-3/4                 | 4            | BST-45750 | --        | BST-45751 | BST-45782 | --        | BST-45783 |
|                         |            | 1                     | 2-1/2        | BST-45381 | BST-45382 | BST-45383 | BST-45570 | BST-45571 | BST-45572 |
|                         |            | 1                     | 2-1/2        | BST-45384 | BST-45385 | BST-45386 | BST-45573 | BST-45574 | BST-45575 |
| 27/64                   | 7/16       | 1                     | 2-1/2        | BST-45387 | BST-45388 | BST-45389 | BST-45576 | BST-45577 | BST-45578 |
| 7/16                    | 7/16       | 5/8                   | 2-1/2        | BST-45249 | BST-45250 | BST-45251 | BST-45297 | BST-45298 | BST-45299 |
|                         |            | 1                     | 2-1/2        | BST-45390 | BST-45391 | BST-45392 | BST-45579 | BST-45580 | BST-45581 |
|                         |            | 2                     | 4            | BST-45699 | --        | BST-45700 | BST-45721 | --        | BST-45722 |
| 29/64                   | 1/2        | 1                     | 3            | BST-45393 | BST-45394 | BST-45395 | BST-45582 | BST-45583 | BST-45584 |
| 15/32                   | 1/2        | 1                     | 3            | BST-45396 | BST-45397 | BST-45398 | BST-45585 | BST-45586 | BST-45587 |
| 31/64                   | 1/2        | 1                     | 3            | BST-45399 | BST-45400 | BST-45401 | BST-45588 | BST-45589 | BST-45590 |
| 1/2                     | 1/2        | 5/8                   | 2-1/2        | BST-45252 | BST-45253 | BST-45254 | BST-45300 | BST-45301 | BST-45302 |
|                         |            | 1                     | 3            | BST-45402 | BST-45403 | BST-45404 | BST-45591 | BST-45592 | BST-45593 |
|                         |            | 1-1/4                 | 3            | --        | --        | BST-47519 | --        | --        | BST-47518 |
|                         |            | 2                     | 4            | BST-45701 | --        | BST-45702 | BST-45723 | --        | BST-45724 |
| 33/64                   | 9/16       | 3                     | 6            | BST-45754 | --        | BST-45755 | BST-45786 | --        | BST-45787 |
|                         |            | 1-1/4                 | 3-1/2        | BST-45405 | BST-45406 | BST-45407 | BST-45594 | BST-45595 | BST-45596 |
|                         |            | 1-1/4                 | 3-1/2        | BST-45408 | BST-45409 | BST-45410 | BST-45597 | BST-45598 | BST-45599 |
| 17/32                   | 9/16       | 1-1/4                 | 3-1/2        | BST-45411 | BST-45412 | BST-45413 | BST-45600 | BST-45601 | BST-45602 |
| 35/64                   | 9/16       | 1-1/4                 | 3-1/2        | BST-45414 | BST-45415 | BST-45416 | BST-45603 | BST-45604 | BST-45605 |
| 9/16                    | 9/16       | 1-1/4                 | 3-1/2        | BST-45417 | BST-45418 | BST-45419 | BST-45606 | BST-45607 | BST-45608 |
| 37/64                   | 5/8        | 1-1/4                 | 3-1/2        | BST-45420 | BST-45421 | BST-45422 | BST-45609 | BST-45610 | BST-45611 |
| 19/32                   | 5/8        | 1-1/4                 | 3-1/2        | BST-45423 | BST-45424 | BST-45425 | BST-45612 | BST-45613 | BST-45614 |
| 39/64                   | 5/8        | 1-1/4                 | 3-1/2        | BST-45255 | BST-45256 | BST-45257 | BST-45303 | BST-45304 | BST-45305 |
| 5/8                     | 5/8        | 3/4                   | 3            | BST-45426 | BST-45427 | BST-45428 | BST-45615 | BST-45616 | BST-45617 |
|                         |            | 1-1/4                 | 3-1/2        | BST-45705 | --        | BST-45706 | BST-45727 | --        | BST-45728 |
|                         |            | 2-1/4                 | 5            | BST-45758 | --        | BST-45759 | BST-45790 | --        | BST-45791 |
| 41/64                   | 3/4        | 1-1/2                 | 4            | BST-45429 | BST-45430 | BST-45431 | BST-45618 | BST-45619 | BST-45620 |
|                         |            | 1-1/2                 | 4            | BST-45432 | BST-45433 | BST-45434 | BST-45621 | BST-45622 | BST-45623 |
|                         |            | 1-1/2                 | 4            | BST-45435 | BST-45436 | BST-45437 | BST-45624 | BST-45625 | BST-45626 |
| 21/32                   | 3/4        | 1-1/2                 | 4            | BST-45438 | BST-45439 | BST-45440 | BST-45627 | BST-45628 | BST-45629 |
| 43/64                   | 3/4        | 1-1/2                 | 4            | BST-45441 | BST-45442 | BST-45443 | BST-45630 | BST-45631 | BST-45632 |
| 11/16                   | 3/4        | 1-1/2                 | 4            | BST-45444 | BST-45445 | BST-45446 | BST-45633 | BST-45634 | BST-45635 |
| 45/64                   | 3/4        | 1-1/2                 | 4            | BST-45447 | BST-45448 | BST-45449 | BST-45636 | BST-45637 | BST-45638 |
| 23/32                   | 3/4        | 1-1/2                 | 4            |           |           |           |           |           |           |
| 47/64                   | 3/4        | 1-1/2                 | 4            |           |           |           |           |           |           |

|                                 |   |                   |
|---------------------------------|---|-------------------|
| P                               | ● | Steel             |
| M                               | ○ | Stainless Steel   |
| K                               | ● | Cast Iron         |
| N                               | ○ | Non-Ferrous       |
| S                               |   | High Temp. Alloys |
| H                               |   | Hardened Steel    |
| ● GOOD    ○ OK    ○ NOT OPTIMAL |   |                   |

- Square End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional & Metric
- General Purpose
- Micrograin Carbide
- Uncoated & TiAlN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



| Square End - Fractional |            |           |              |           |           |           |           |           |           |
|-------------------------|------------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Cutter<br>D             | Shank<br>d | LOC<br>l1 | Overall<br>L | Uncoated  |           |           | TiAlN     |           |           |
|                         |            |           |              | 2 Flute   | 3 Flute   | 4 Flute   | 2 Flute   | 3 Flute   | 4 Flute   |
| 3/4                     | 3/4        | 1         | 3            | BST-45258 | BST-45259 | BST-45260 | BST-45306 | BST-45307 | BST-45308 |
|                         |            | 1-1/2     | 4            | BST-45450 | BST-45451 | BST-45452 | BST-45639 | BST-45640 | BST-45641 |
|                         |            | 2-1/4     | 5            | BST-45707 | --        | BST-45708 | BST-45729 | --        | BST-45730 |
|                         |            | 3         | 6            | BST-45760 | --        | BST-45761 | BST-45792 | --        | BST-45793 |
| 49/64                   | 7/8        | 1-1/2     | 4            | BST-45453 | BST-45454 | BST-45455 | BST-45642 | BST-45643 | BST-45644 |
| 25/32                   | 7/8        | 1-1/2     | 4            | BST-45456 | BST-45457 | BST-45458 | BST-45645 | BST-45646 | BST-45647 |
| 51/64                   | 7/8        | 1-1/2     | 4            | BST-45459 | BST-45460 | BST-45461 | BST-45648 | BST-45649 | BST-45650 |
| 13/16                   | 7/8        | 1-1/2     | 4            | BST-45462 | BST-45463 | BST-45464 | BST-45651 | BST-45652 | BST-45653 |
| 53/64                   | 7/8        | 1-1/2     | 4            | BST-45465 | BST-45466 | BST-45467 | BST-45654 | BST-45655 | BST-45656 |
| 27/32                   | 7/8        | 1-1/2     | 4            | BST-45468 | BST-45469 | BST-45470 | BST-45657 | BST-45658 | BST-45659 |
| 55/64                   | 7/8        | 1-1/2     | 4            | BST-45471 | BST-45472 | BST-45473 | BST-45660 | BST-45661 | BST-45662 |
| 7/8                     | 7/8        | 1-1/2     | 4            | BST-45474 | BST-45475 | BST-45476 | BST-45663 | BST-45664 | BST-45665 |
| 57/64                   | 1          | 1-1/2     | 4            | BST-45477 | BST-45478 | BST-45479 | BST-45666 | BST-45667 | BST-45668 |
| 29/32                   | 1          | 1-1/2     | 4            | BST-45480 | BST-45481 | BST-45482 | BST-45669 | BST-45670 | BST-45671 |
| 59/64                   | 1          | 1-1/2     | 4            | BST-45483 | BST-45484 | BST-45485 | BST-45672 | BST-45673 | BST-45674 |
| 15/16                   | 1          | 1-1/2     | 4            | BST-45486 | BST-45487 | BST-45488 | BST-45675 | BST-45676 | BST-45677 |
| 61/64                   | 1          | 1-1/2     | 4            | BST-45489 | BST-45490 | BST-45491 | BST-45678 | BST-45679 | BST-45680 |
| 31/32                   | 1          | 1-1/2     | 4            | BST-45492 | BST-45493 | BST-45494 | BST-45681 | BST-45682 | BST-45683 |
| 63/64                   | 1          | 1-1/2     | 4            | BST-45495 | BST-45496 | BST-45497 | BST-45684 | BST-45685 | BST-45686 |
| 1                       | 1          | 1         | 3            | BST-45225 | BST-45226 | BST-45227 | BST-45273 | BST-45274 | BST-45275 |
|                         |            | 1-1/2     | 4            | BST-45324 | BST-45325 | BST-45326 | BST-45513 | BST-45514 | BST-45515 |
|                         |            | 2-1/4     | 5            | BST-45687 | --        | BST-45688 | BST-45709 | --        | BST-45710 |
|                         |            | 3         | 6            | BST-45731 | --        | BST-45733 | BST-45764 | --        | BST-45765 |

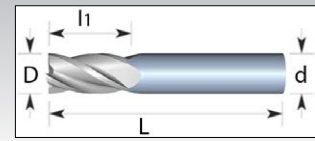


*Precision Grinding with high quality surface finishes for maximum tool life!*

| Square End - Metric |            |           |              |           |           |           |           |           |           |
|---------------------|------------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Cutter<br>D         | Shank<br>d | LOC<br>l1 | Overall<br>L | Uncoated  |           |           | TiAlN     |           |           |
|                     |            |           |              | 2 Flute   | 3 Flute   | 4 Flute   | 2 Flute   | 3 Flute   | 4 Flute   |
| 1                   | 1          | 3         | 38           | BST-46618 | BST-46619 | BST-46620 | BST-46684 | BST-46685 | BST-46686 |
| 1.5                 | 2          | 5         | 38           | BST-46621 | BST-46622 | BST-46623 | BST-46687 | BST-46688 | BST-46689 |
| 2                   | 2          | 6         | 38           | BST-46624 | BST-46625 | BST-46626 | BST-46690 | BST-46691 | BST-46692 |

|        |      |                   |
|--------|------|-------------------|
| P      | ●    | Steel             |
| M      | ○    | Stainless Steel   |
| K      | ●    | Cast Iron         |
| N      | ○    | Non-Ferrous       |
| S      |      | High Temp. Alloys |
| H      |      | Hardened Steel    |
| ● GOOD | ○ OK | ○ NOT OPTIMAL     |

- Square End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Metric Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiAlN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling

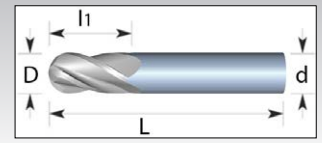


## Square End - Metric

| Cutter<br>D | Shank<br>d | LOC<br>l <sub>1</sub> | Overall<br>L | Uncoated  |           |           | TiAlN     |           |           |
|-------------|------------|-----------------------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|
|             |            |                       |              | 2 Flute   | 3 Flute   | 4 Flute   | 2 Flute   | 3 Flute   | 4 Flute   |
| 3           | 3          | 12                    | 38           | BST-46630 | BST-46631 | BST-46632 | BST-46696 | BST-46697 | BST-46698 |
|             |            | 25                    | 75           | BST-46838 | --        | BST-46839 | BST-46862 | --        | BST-46863 |
|             |            | 25                    | 100          | BST-46886 | --        | BST-46887 | BST-46902 | --        | BST-46903 |
| 3.5         | 4          | 12                    | 50           | BST-46633 | BST-46634 | BST-46635 | BST-46699 | BST-46700 | BST-46701 |
|             |            | 14                    | 50           | BST-46636 | BST-46637 | BST-46638 | BST-46702 | BST-46703 | BST-46704 |
| 4           | 4          | 25                    | 75           | BST-46840 | --        | BST-46841 | BST-46864 | --        | BST-46865 |
|             |            | 50                    | 100          | BST-46888 | --        | BST-46889 | BST-46904 | --        | BST-46905 |
|             |            | 14                    | 50           | BST-46639 | BST-46640 | BST-46641 | BST-46705 | BST-46706 | BST-46707 |
| 5           | 5          | 16                    | 50           | BST-46642 | BST-46643 | BST-46644 | BST-46708 | BST-46709 | BST-46710 |
|             |            | 25                    | 75           | BST-46842 | --        | BST-46843 | BST-46866 | --        | BST-46867 |
|             |            | 30                    | 100          | BST-46890 | --        | BST-46891 | BST-46906 | --        | BST-46907 |
| 6           | 6          | 19                    | 63           | BST-46645 | BST-46646 | BST-46647 | BST-46711 | BST-46712 | BST-46713 |
|             |            | 25                    | 75           | BST-46844 | --        | BST-46845 | BST-46868 | --        | BST-46869 |
|             |            | 50                    | 100          | BST-46892 | --        | BST-46893 | BST-46908 | --        | BST-46909 |
| 7           | 7          | 19                    | 63           | BST-46648 | BST-46649 | BST-46650 | BST-46714 | BST-46715 | BST-46716 |
|             |            | 19                    | 63           | BST-46651 | BST-46652 | BST-46653 | BST-46717 | BST-46718 | BST-46719 |
| 8           | 8          | 30                    | 100          | BST-46846 | --        | BST-46847 | BST-46870 | --        | BST-46871 |
|             |            | 50                    | 150          | BST-46894 | --        | BST-46895 | BST-46910 | --        | BST-46911 |
| 9           | 10         | 22                    | 70           | BST-46654 | BST-46655 | BST-46656 | BST-46720 | BST-46721 | BST-46722 |
|             |            | 22                    | 70           | BST-46657 | BST-46658 | BST-46659 | BST-46723 | BST-46724 | BST-46725 |
| 10          | 10         | 38                    | 100          | BST-46848 | --        | BST-46849 | BST-46872 | --        | BST-46873 |
|             |            | 75                    | 150          | BST-46896 | --        | BST-46897 | BST-46912 | --        | BST-46913 |
| 11          | 12         | 25                    | 70           | BST-46660 | BST-46661 | BST-46662 | BST-46726 | BST-46727 | BST-46728 |
|             |            | 25                    | 75           | BST-46663 | BST-46664 | BST-46665 | BST-46729 | BST-46730 | BST-46731 |
| 12          | 12         | 50                    | 100          | BST-46850 | --        | BST-46851 | BST-46874 | --        | BST-46875 |
|             |            | 75                    | 150          | BST-46898 | --        | BST-46899 | BST-46914 | --        | BST-46915 |
| 14          | 14         | 30                    | 88           | BST-46666 | BST-46667 | BST-46668 | BST-46732 | BST-46733 | BST-46734 |
|             |            | 50                    | 125          | BST-46852 | --        | BST-46853 | BST-46876 | --        | BST-46877 |
| 16          | 16         | 75                    | 150          | BST-46900 | --        | BST-46901 | BST-46916 | --        | BST-46917 |
|             |            | 32                    | 88           | BST-46669 | BST-46670 | BST-46671 | BST-46735 | BST-46736 | BST-46737 |
| 18          | 18         | 75                    | 150          | BST-46854 | --        | BST-46855 | BST-46878 | --        | BST-46879 |
|             |            | 36                    | 100          | BST-46672 | BST-46673 | BST-46674 | BST-46738 | BST-46739 | BST-46740 |
| 20          | 20         | 75                    | 150          | BST-46856 | --        | BST-46857 | BST-46880 | --        | BST-46881 |
|             |            | 38                    | 100          | BST-46675 | BST-46676 | BST-46677 | BST-46741 | BST-46742 | BST-46743 |
| 22          | 25         | 75                    | 150          | BST-46858 | --        | BST-46859 | BST-46882 | --        | BST-46883 |
|             |            | 38                    | 100          | BST-46678 | BST-46679 | BST-46680 | BST-46744 | BST-46745 | BST-46746 |
| 25          | 25         | 38                    | 100          | BST-46681 | BST-46682 | BST-46683 | BST-46747 | BST-46748 | BST-46749 |
|             |            | 75                    | 150          | BST-46860 | --        | BST-46861 | BST-46884 | --        | BST-46885 |

|        |   |                   |
|--------|---|-------------------|
| P      | ● | Steel             |
| M      | ○ | Stainless Steel   |
| K      | ● | Cast Iron         |
| N      | ○ | Non-Ferrous       |
| S      |   | High Temp. Alloys |
| H      |   | Hardened Steel    |
| ● GOOD |   | ○ OK              |
|        |   | ○ NOT OPTIMAL     |

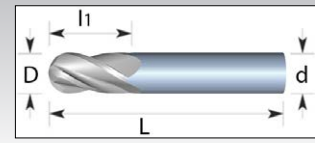
- Ball Nose End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiAlN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



| Ball Nose - Fractional |            |           |              |           |           |           |           |           |           |
|------------------------|------------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Cutter<br>D            | Shank<br>d | LOC<br>h1 | Overall<br>L | Uncoated  |           |           | TiAlN     |           |           |
|                        |            |           |              | 2 Flute   | 3 Flute   | 4 Flute   | 2 Flute   | 3 Flute   | 4 Flute   |
| 1/32                   | 1/8        | 1/16      | 1-1/2        | BST-45796 | BST-45797 | BST-45798 | BST-45844 | BST-45845 | BST-45846 |
|                        |            | 3/32      |              | BST-45892 | BST-45893 | BST-45894 | BST-46081 | BST-46082 | BST-46083 |
| 3/64                   | 1/8        | 3/32      | 1-1/2        | BST-45799 | BST-45800 | BST-45801 | BST-45847 | BST-45848 | BST-45849 |
|                        |            | 1/8       |              | BST-45895 | BST-45896 | BST-45897 | BST-46084 | BST-46085 | BST-46086 |
| 1/16                   | 1/8        | 1/8       | 1-1/2        | BST-45802 | BST-45803 | BST-45804 | BST-45850 | BST-45851 | BST-45852 |
|                        |            | 3/16      |              | BST-45898 | BST-45899 | BST-45900 | BST-46087 | BST-46088 | BST-46089 |
| 5/64                   | 1/8        | 1/4       | 1-1/2        | BST-45901 | BST-45902 | BST-45903 | BST-46090 | BST-46091 | BST-46092 |
| 3/32                   | 1/8        | 3/16      | 1-1/2        | BST-45805 | BST-45806 | BST-45807 | BST-45853 | BST-45854 | BST-45855 |
|                        |            | 3/8       |              | BST-45904 | BST-45905 | BST-45906 | BST-46093 | BST-46094 | BST-46095 |
| 7/64                   | 1/8        | 3/8       | 1-1/2        | BST-45910 | BST-45911 | BST-45912 | BST-46099 | BST-46100 | BST-46101 |
| 1/8                    | 1/8        | 1/4       | 1-1/2        | BST-45811 | BST-45812 | BST-45813 | BST-45859 | BST-45860 | BST-45861 |
|                        |            | 1/2       |              | BST-45913 | BST-45914 | BST-45915 | BST-46102 | BST-46103 | BST-46104 |
|                        |            | 3/4       | 2-1/2        | BST-46272 | --        | BST-46273 | BST-46294 | --        | BST-46295 |
|                        |            | 1         | 3            | BST-46318 | --        | BST-46319 | BST-46350 | --        | BST-46351 |
| 9/64                   | 3/16       | 9/16      | 2            | BST-45916 | BST-45917 | BST-45918 | BST-46105 | BST-46106 | BST-46107 |
| 5/32                   | 3/16       | 5/16      | 2            | BST-45814 | BST-45815 | BST-45816 | BST-45862 | BST-45863 | BST-45864 |
|                        |            | 9/16      |              | BST-45919 | BST-45920 | BST-45921 | BST-46108 | BST-46109 | BST-46110 |
| 11/64                  | 3/16       | 9/16      | 2            | BST-45922 | BST-45923 | BST-45924 | BST-46111 | BST-46112 | BST-46113 |
| 3/16                   | 3/16       | 3/8       | 2            | BST-45817 | BST-45818 | BST-45819 | BST-45865 | BST-45866 | BST-45867 |
|                        |            | 5/8       |              | BST-45925 | BST-45926 | BST-45927 | BST-46114 | BST-46115 | BST-46116 |
|                        |            | 3/4       | 2-1/2        | BST-46274 | --        | BST-46275 | BST-46296 | --        | BST-46297 |
|                        |            | 1-1/8     | 3            | BST-46320 | --        | BST-46321 | BST-46352 | --        | BST-46353 |
| 13/64                  | 1/4        | 5/8       | 2-1/2        | BST-45928 | BST-45929 | BST-45930 | BST-46117 | BST-46118 | BST-46119 |
| 7/32                   | 1/4        | 7/16      | 2            | BST-45820 | BST-45821 | BST-45822 | BST-45868 | BST-45869 | BST-45870 |
|                        |            | 5/8       |              | 2-1/2     | BST-45931 | BST-45932 | BST-45933 | BST-46120 | BST-46121 |
| 15/64                  | 1/4        | 3/4       | 2-1/2        | BST-45934 | BST-45935 | BST-45936 | BST-46123 | BST-46124 | BST-46125 |
| 1/4                    | 1/4        | 1/2       | 2            | BST-45823 | BST-45824 | BST-45825 | BST-45871 | BST-45872 | BST-45873 |
|                        |            | 3/4       |              | 2-1/2     | BST-45937 | BST-45938 | BST-45939 | BST-46126 | BST-46127 |
|                        |            | 1-1/8     | 3            | BST-46276 | --        | BST-46277 | BST-46298 | --        | BST-46299 |
|                        |            | 1-1/2     | 4            | BST-46322 | --        | BST-46323 | BST-46354 | --        | BST-46355 |
| 17/64                  | 5/16       | 7/8       | 2-1/2        | BST-45940 | BST-45941 | BST-45942 | BST-46129 | BST-46130 | BST-46131 |
| 9/32                   | 5/16       | 7/8       | 2-1/2        | BST-45943 | BST-45944 | BST-45945 | BST-46132 | BST-46133 | BST-46134 |
| 19/64                  | 5/16       | 7/8       | 2-1/2        | BST-45946 | BST-45947 | BST-45948 | BST-46135 | BST-46136 | BST-46137 |
| 5/16                   | 5/16       | 1/2       | 2            | BST-45826 | BST-45827 | BST-45828 | BST-45874 | BST-45875 | BST-45876 |
|                        |            | 7/8       |              | 2-1/2     | BST-45949 | BST-45950 | BST-45951 | BST-46138 | BST-46139 |
|                        |            | 1-1/8     | 3            | BST-46278 | --        | BST-46279 | BST-46300 | --        | BST-46301 |
|                        |            | 1-5/8     | 4            | BST-46326 | --        | BST-46327 | BST-46358 | --        | BST-46359 |

|        |      |                   |
|--------|------|-------------------|
| P      | ●    | Steel             |
| M      | ○    | Stainless Steel   |
| K      | ●    | Cast Iron         |
| N      | ○    | Non-Ferrous       |
| S      |      | High Temp. Alloys |
| H      |      | Hardened Steel    |
| ● GOOD | ○ OK | ○ NOT OPTIMAL     |

- Ball Nose End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiAlN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling

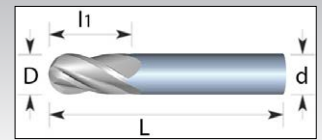


## Ball Nose - Fractional

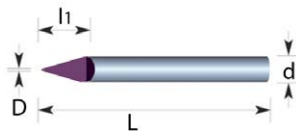
| Cutter<br>D | Shank<br>d | LOC<br>li | Overall<br>L | Uncoated  |           |           | TiAlN     |           |           |           |           |
|-------------|------------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|             |            |           |              | 2 Flute   | 3 Flute   | 4 Flute   | 2 Flute   | 3 Flute   | 4 Flute   |           |           |
| 11/32       | 3/8        | 7/8       | 2-1/2        | BST-45952 | BST-45953 | BST-45954 | BST-46141 | BST-46142 | BST-46143 |           |           |
| 23/64       | 3/8        | 7/8       | 2-1/2        | BST-45955 | BST-45956 | BST-45957 | BST-46144 | BST-46145 | BST-46146 |           |           |
| 3/8         | 3/8        | 5/8       | 2            | BST-45958 | BST-45959 | BST-45960 | BST-46147 | BST-46148 | BST-46149 |           |           |
|             |            | 1         | 2-1/2        | BST-45829 | BST-45830 | BST-45831 | BST-45877 | BST-45878 | BST-45879 |           |           |
|             |            | 1-1/8     | 3            | BST-45961 | BST-45962 | BST-45963 | BST-46150 | BST-46151 | BST-46152 |           |           |
|             |            | 1-3/4     | 4            | BST-46280 | --        | BST-46281 | BST-46302 | --        | BST-46303 |           |           |
|             |            | 25/64     | 7/16         | 1         | 2-1/2     | BST-46332 | --        | BST-46333 | BST-46364 | --        | BST-46365 |
|             |            | 13/32     | 7/16         | 1         | 2-1/2     | BST-45964 | BST-45965 | BST-45966 | BST-46153 | BST-46154 | BST-46155 |
| 27/64       | 7/16       | 1         | 2-1/2        | BST-45967 | BST-45968 | BST-45969 | BST-46156 | BST-46157 | BST-46158 |           |           |
| 7/16        | 7/16       | 5/8       | 2-1/2        | BST-45970 | BST-45971 | BST-45972 | BST-46159 | BST-46160 | BST-46161 |           |           |
|             |            | 1         | 3            | BST-45832 | BST-45833 | BST-45834 | BST-45880 | BST-45881 | BST-45882 |           |           |
|             |            | 2         | 4            | BST-45973 | BST-45974 | BST-45975 | BST-46162 | BST-46163 | BST-46164 |           |           |
| 29/64       | 1/2        | 1         | 3            | BST-46282 | --        | BST-46283 | BST-46304 | --        | BST-46305 |           |           |
| 15/32       | 1/2        | 1         | 3            | BST-45976 | BST-45977 | BST-45978 | BST-46165 | BST-46166 | BST-46167 |           |           |
| 31/64       | 1/2        | 1         | 3            | BST-45979 | BST-45980 | BST-45981 | BST-46168 | BST-46169 | BST-46170 |           |           |
| 1/2         | 1/2        | 5/8       | 2-1/2        | BST-45982 | BST-45983 | BST-45984 | BST-46171 | BST-46172 | BST-46173 |           |           |
|             |            | 1         | 3            | BST-45835 | BST-45836 | BST-45837 | BST-45883 | BST-45884 | BST-45885 |           |           |
|             |            | 1-1/4     | 3            | BST-45985 | BST-45986 | BST-45987 | BST-46174 | BST-46175 | BST-46176 |           |           |
|             |            | 2         | 4            | BST-46284 | --        | BST-46285 | BST-46306 | --        | BST-46307 |           |           |
|             |            | 3         | 6            | BST-46336 | --        | BST-46337 | BST-46368 | --        | BST-46369 |           |           |
|             |            | 33/64     | 9/16         | 1-1/4     | 3-1/2     | BST-45988 | BST-45989 | BST-45990 | BST-46177 | BST-46178 | BST-46179 |
|             |            | 17/32     | 9/16         | 1-1/4     | 3-1/2     | BST-45991 | BST-45992 | BST-45993 | BST-46180 | BST-46181 | BST-46182 |
| 35/64       | 9/16       | 1-1/4     | 3-1/2        | BST-45994 | BST-45995 | BST-45996 | BST-46183 | BST-46184 | BST-46185 |           |           |
| 9/16        | 9/16       | 1-1/4     | 3-1/2        | BST-45997 | BST-45998 | BST-45999 | BST-46186 | BST-46187 | BST-46188 |           |           |
| 37/64       | 5/8        | 1-1/4     | 3-1/2        | BST-46000 | BST-46001 | BST-46002 | BST-46189 | BST-46190 | BST-46191 |           |           |
| 19/32       | 5/8        | 1-1/4     | 3-1/2        | BST-46003 | BST-46004 | BST-46005 | BST-46192 | BST-46193 | BST-46194 |           |           |
| 39/64       | 5/8        | 1-1/4     | 3-1/2        | BST-46006 | BST-46007 | BST-46008 | BST-46195 | BST-46196 | BST-46197 |           |           |
| 5/8         | 5/8        | 3/4       | 3            | BST-45838 | BST-45839 | BST-45840 | BST-45886 | BST-45887 | BST-45888 |           |           |
|             |            | 1-1/4     | 3-1/2        | BST-46009 | BST-46010 | BST-46011 | BST-46198 | BST-46199 | BST-46200 |           |           |
|             |            | 2-1/4     | 5            | BST-46288 | --        | BST-46289 | BST-46310 | --        | BST-46311 |           |           |
|             |            | 3         | 6            | BST-46340 | --        | BST-46341 | BST-46372 | --        | BST-46373 |           |           |
|             |            | 41/64     | 3/4          | 1-1/2     | 4         | BST-46012 | BST-46013 | BST-46014 | BST-46201 | BST-46202 | BST-46203 |
|             |            | 21/32     | 3/4          | 1-1/2     | 4         | BST-46015 | BST-46016 | BST-46017 | BST-46204 | BST-46205 | BST-46206 |
| 43/64       | 3/4        | 1-1/2     | 4            | BST-46018 | BST-46019 | BST-46020 | BST-46207 | BST-46208 | BST-46209 |           |           |
| 11/16       | 3/4        | 1-1/2     | 4            | BST-46021 | BST-46022 | BST-46023 | BST-46210 | BST-46211 | BST-46212 |           |           |
| 45/64       | 3/4        | 1-1/2     | 4            | BST-46024 | BST-46025 | --        | BST-46213 | BST-46214 | BST-46215 |           |           |
| 23/32       | 3/4        | 1-1/2     | 4            | BST-46027 | BST-46028 | BST-46029 | BST-46216 | BST-46217 | BST-46218 |           |           |
| 47/64       | 3/4        | 1-1/2     | 4            | BST-46030 | BST-46031 | BST-46032 | BST-46219 | BST-46220 | BST-46221 |           |           |

|   |   |                           |
|---|---|---------------------------|
| P | ● | Steel                     |
| M | ○ | Stainless Steel           |
| K | ● | Cast Iron                 |
| N | ○ | Non-Ferrous               |
| S |   | High Temp. Alloys         |
| H |   | Hardened Steel            |
|   |   | ● GOOD ○ OK ○ NOT OPTIMAL |

- Ball Nose End
- 2, 3, 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling

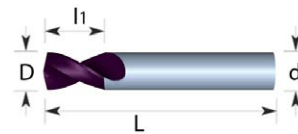


| Ball Nose - Fractional |            |           |              |           |           |           |           |           |           |
|------------------------|------------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Cutter<br>D            | Shank<br>d | LOC<br>l1 | Overall<br>L | Uncoated  |           |           | TiALN     |           |           |
|                        |            |           |              | 2 Flute   | 3 Flute   | 4 Flute   | 2 Flute   | 3 Flute   | 4 Flute   |
| 3/4                    | 3/4        | 1         | 3            | BST-45841 | BST-45842 | BST-45843 | BST-45889 | BST-45890 | BST-45891 |
|                        |            | 1-1/2     | 4            | BST-46033 | BST-46034 | BST-46035 | BST-46222 | BST-46223 | BST-46224 |
|                        |            | 2-1/4     | 5            | BST-46290 | --        | BST-46291 | BST-46312 | --        | BST-46313 |
|                        |            | 3         | 6            | BST-46342 | --        | BST-46343 | BST-46374 | --        | BST-46375 |
| 49/64                  | 7/8        | 1-1/2     | 4            | BST-46036 | BST-46037 | BST-46038 | BST-46225 | BST-46226 | BST-46227 |
| 25/32                  | 7/8        | 1-1/2     | 4            | BST-46039 | BST-46040 | BST-46041 | BST-46228 | BST-46229 | BST-46230 |
| 51/64                  | 7/8        | 1-1/2     | 4            | BST-46042 | BST-46043 | BST-46044 | BST-46231 | BST-46232 | BST-46233 |
| 13/16                  | 7/8        | 1-1/2     | 4            | BST-46045 | BST-46046 | BST-46047 | BST-46234 | BST-46235 | BST-46236 |
| 53/64                  | 7/8        | 1-1/2     | 4            | BST-46048 | BST-46049 | BST-46050 | BST-46237 | BST-46238 | BST-46239 |
| 27/32                  | 7/8        | 1-1/2     | 4            | BST-46051 | BST-46052 | BST-46053 | BST-46240 | BST-46241 | BST-46242 |
| 55/64                  | 7/8        | 1-1/2     | 4            | BST-46054 | BST-46055 | BST-46056 | BST-46243 | BST-46244 | BST-46245 |
| 7/8                    | 7/8        | 1-1/2     | 4            | BST-46057 | BST-46058 | BST-46059 | BST-46246 | BST-46247 | BST-46248 |
| 57/64                  | 1          | 1-1/2     | 4            | BST-46060 | BST-46061 | BST-46062 | BST-46249 | BST-46250 | BST-46251 |
| 29/32                  | 1          | 1-1/2     | 4            | BST-46063 | BST-46064 | BST-46065 | BST-46252 | BST-46253 | BST-46254 |
| 59/64                  | 1          | 1-1/2     | 4            | BST-46066 | BST-46067 | BST-46068 | BST-46255 | BST-46256 | BST-46257 |
| 15/16                  | 1          | 1-1/2     | 4            | BST-46069 | BST-46070 | BST-46071 | BST-46258 | BST-46259 | BST-46260 |
| 61/64                  | 1          | 1-1/2     | 4            | BST-46072 | BST-46073 | BST-46074 | BST-46261 | BST-46262 | BST-46263 |
| 31/32                  | 1          | 1-1/2     | 4            | BST-46075 | BST-46076 | BST-46077 | BST-46264 | BST-46265 | BST-46266 |
| 63/64                  | 1          | 1-1/2     | 4            | BST-46078 | BST-46079 | BST-46080 | BST-46267 | BST-46268 | BST-46269 |
| 1                      | 1          | 1         | 3            | BST-45808 | BST-45809 | BST-45810 | BST-45856 | BST-45857 | BST-45858 |
|                        |            | 1-1/2     | 4            | BST-45907 | BST-45908 | BST-45909 | BST-46096 | BST-46097 | BST-46098 |
|                        |            | 2-1/4     | 5            | BST-46270 | --        | BST-46271 | BST-46292 | --        | BST-46293 |
|                        |            | 3         | 6            | BST-46314 | --        | BST-46315 | BST-46346 | --        | BST-46347 |



- Engraving Tools with 30 Degree angle
- 3 tip sizes to choose from

| Engraving Tools |            |           |              |                  |
|-----------------|------------|-----------|--------------|------------------|
| Tip<br>D        | Shank<br>d | LOC<br>l1 | Overall<br>L | TiALN<br>1 Flute |
| .005            | 1/4        | 1/2       | 2-1/2        | BST-47510        |
| .010            | 1/4        | 1/2       | 2-1/2        | BST-47511        |
| .020            | 1/4        | 1/2       | 2-1/2        | BST-47512        |



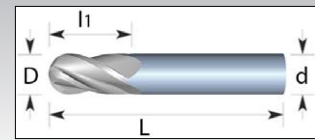
- Allows High Performance drills to center properly without damaging their outside edge
- 145 Degree Point Carbide with honed edges

| Spot Drills |            |           |              |                  |
|-------------|------------|-----------|--------------|------------------|
| Drill<br>D  | Shank<br>d | LOC<br>l1 | Overall<br>L | TiALN<br>2 Flute |
| 1/4         | 1/4        | 1/2       | 3            | BST-47513        |
| 3/8         | 3/8        | 3/4       | 3            | BST-47514        |
| 1/2         | 1/2        | 1         | 4            | BST-47515        |
| 5/8         | 5/8        | 1         | 4            | BST-47516        |
| 3/4         | 3/4        | 1-1/8     | 4            | BST-47517        |

|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ○ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S |   | High Temp. Alloys |
| H |   | Hardened Steel    |

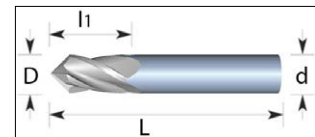
● GOOD ○ OK ○ NOT OPTIMAL

- Ball Nose End
- 2 & 4 Flute
- Single End
- Round Shanks
- Center Cutting
- Metric Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiAlN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



| Ball Nose - Metric |            |           |              |           |         |           |           |         |           |
|--------------------|------------|-----------|--------------|-----------|---------|-----------|-----------|---------|-----------|
| Cutter<br>D        | Shank<br>d | LOC<br>l1 | Overall<br>L | Uncoated  |         |           | TiAlN     |         |           |
|                    |            |           |              | 2 Flute   | 3 Flute | 4 Flute   | 2 Flute   | 3 Flute | 4 Flute   |
| 1                  | 1          | 3         | 38           | BST-46750 | --      | BST-46751 | BST-46794 | --      | BST-46795 |
| 1.5                | 2          | 5         | 38           | BST-46752 | --      | BST-46753 | BST-46796 | --      | BST-46797 |
| 2                  | 2          | 6         | 38           | BST-46754 | --      | BST-46755 | BST-46798 | --      | BST-46799 |
| 3                  | 3          | 12        | 38           | BST-46758 | --      | BST-46759 | BST-46802 | --      | BST-46803 |
| 3.5                | 4          | 12        | 50           | BST-46760 | --      | BST-46761 | BST-46804 | --      | BST-46805 |
| 4                  | 4          | 14        | 50           | BST-46762 | --      | BST-46763 | BST-46806 | --      | BST-46807 |
| 4.5                | 5          | 14        | 50           | BST-46764 | --      | BST-46765 | BST-46808 | --      | BST-46809 |
| 5                  | 5          | 16        | 50           | BST-46766 | --      | BST-46767 | BST-46810 | --      | BST-46811 |
| 6                  | 6          | 19        | 63           | BST-46768 | --      | BST-46769 | BST-46812 | --      | BST-46813 |
| 7                  | 7          | 19        | 63           | BST-46770 | --      | BST-46771 | BST-46814 | --      | BST-46815 |
| 8                  | 8          | 19        | 63           | BST-46772 | --      | BST-46773 | BST-46816 | --      | BST-46817 |
| 9                  | 9          | 22        | 70           | BST-46774 | --      | BST-46775 | BST-46818 | --      | BST-46819 |
| 10                 | 10         | 22        | 70           | BST-46776 | --      | BST-46777 | BST-46820 | --      | BST-46821 |
| 11                 | 11         | 25        | 70           | BST-46778 | --      | BST-46779 | BST-46822 | --      | BST-46823 |
| 12                 | 12         | 25        | 75           | BST-46780 | --      | BST-46781 | BST-46824 | --      | BST-46825 |
| 14                 | 14         | 30        | 88           | BST-46782 | --      | BST-46783 | BST-46826 | --      | BST-46827 |
| 16                 | 16         | 32        | 88           | BST-46784 | --      | BST-46785 | BST-46828 | --      | BST-46829 |
| 18                 | 18         | 36        | 100          | BST-46786 | --      | BST-46787 | BST-46830 | --      | BST-46831 |
| 20                 | 20         | 38        | 100          | BST-46788 | --      | BST-46789 | BST-46832 | --      | BST-46833 |
| 22                 | 25         | 38        | 100          | BST-46790 | --      | BST-46791 | BST-46834 | --      | BST-46835 |
| 25                 | 25         | 38        | 100          | BST-46792 | --      | BST-46793 | BST-46836 | --      | BST-46837 |

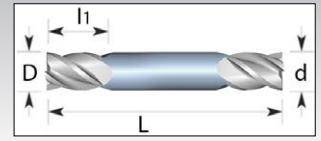
- 90 Degree End
- 2 & 4 Flute
- Center Cutting
- Round Shanks
- Uncoated & TiAlN Coated
- Milling, Drilling
- Countersinking
- Chamfering, De-burring



| Drill/Mill 90 Degree - Fractional |            |           |              |           |         |           |           |         |           |
|-----------------------------------|------------|-----------|--------------|-----------|---------|-----------|-----------|---------|-----------|
| Cutter<br>D                       | Shank<br>d | LOC<br>l1 | Overall<br>L | Uncoated  |         |           | TiAlN     |         |           |
|                                   |            |           |              | 2 Flute   | 3 Flute | 4 Flute   | 2 Flute   | 3 Flute | 4 Flute   |
| 1/8                               | 1/8        | 1/2       | 1-1/2        | BST-46918 | --      | BST-46919 | BST-46936 | --      | BST-46937 |
| 3/16                              | 3/16       | 5/8       | 2            | BST-46920 | --      | BST-46921 | BST-46938 | --      | BST-46939 |
| 1/4                               | 1/4        | 3/4       | 2-1/2        | BST-46922 | --      | BST-46923 | BST-46940 | --      | BST-46941 |
| 5/16                              | 5/16       | 7/8       | 2-1/2        | BST-46924 | --      | BST-46925 | BST-46942 | --      | BST-46943 |
| 3/8                               | 3/8        | 1         | 2-1/2        | BST-46926 | --      | BST-46927 | BST-46944 | --      | BST-46945 |
| 7/16                              | 7/16       | 1         | 2-3/4        | BST-46928 | --      | BST-46929 | BST-46946 | --      | BST-46947 |
| 1/2                               | 1/2        | 1         | 3            | BST-46930 | --      | BST-46931 | BST-46948 | --      | BST-46949 |
| 5/8                               | 5/8        | 1-1/4     | 3-1/2        | BST-46932 | --      | BST-46933 | BST-46950 | --      | BST-46951 |
| 3/4                               | 3/4        | 1-1/2     | 4            | BST-46934 | --      | BST-46935 | BST-46952 | --      | BST-46953 |

|                           |   |                   |
|---------------------------|---|-------------------|
| P                         | ● | Steel             |
| M                         | ○ | Stainless Steel   |
| K                         | ● | Cast Iron         |
| N                         | ○ | Non-Ferrous       |
| S                         |   | High Temp. Alloys |
| H                         |   | Hardened Steel    |
| ● GOOD ○ OK ○ NOT OPTIMAL |   |                   |

- Square End
- 2 & 4 Flute
- Double End
- 1/32-7/32 Round Shanks
- 1/4-3/4 Weldon Shanks
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



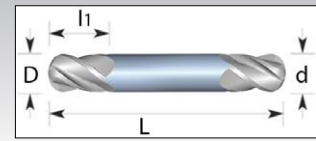
| Square Double End - Fractional |            |                       |              |           |         |           |           |         |           |
|--------------------------------|------------|-----------------------|--------------|-----------|---------|-----------|-----------|---------|-----------|
| Cutter<br>D                    | Shank<br>d | LOC<br>h <sub>1</sub> | Overall<br>L | Uncoated  |         |           | TiALN     |         |           |
|                                |            |                       |              | 2 Flute   | 3 Flute | 4 Flute   | 2 Flute   | 3 Flute | 4 Flute   |
| 1/32                           | 1/8        | 1/16                  | 1-1/2        | BST-46378 | --      | BST-46379 | BST-46414 | --      | BST-46415 |
| 3/64                           | 1/8        | 3/32                  | 1-1/2        | BST-46380 | --      | BST-46381 | BST-46416 | --      | BST-46417 |
| 1/16                           | 1/8        | 1/8                   | 1-1/2        | BST-46382 | --      | BST-46383 | BST-46418 | --      | BST-46419 |
| 3/32                           | 1/8        | 3/16                  | 1-1/2        | BST-46384 | --      | BST-46385 | BST-46420 | --      | BST-46421 |
| 7/64                           | 1/8        | 7/32                  | 1-1/2        | BST-46386 | --      | BST-46387 | BST-46422 | --      | BST-46423 |
| 1/8                            | 1/8        | 1/4                   | 1-1/2        | BST-46388 | --      | BST-46389 | BST-46424 | --      | BST-46425 |
| 5/32                           | 3/16       | 5/16                  | 2            | BST-46390 | --      | BST-46391 | BST-46426 | --      | BST-46427 |
|                                |            | 7/16                  | 3            | BST-46522 | --      | BST-46523 | BST-46546 | --      | BST-46547 |
| 3/16                           | 3/16       | 5/16                  | 2            | BST-46392 | --      | BST-46393 | BST-46428 | --      | BST-46429 |
|                                |            | 1/2                   | 3            | BST-46524 | --      | BST-46525 | BST-46548 | --      | BST-46549 |
| 7/32                           | 1/4        | 3/8                   | 2-1/2        | BST-46394 | --      | BST-46395 | BST-46430 | --      | BST-46431 |
|                                |            | 9/16                  | 4            | BST-46526 | --      | BST-46527 | BST-46550 | --      | BST-46551 |
| 1/4                            | 1/4        | 1/2                   | 2-1/2        | BST-46396 | --      | BST-46397 | BST-46432 | --      | BST-46433 |
|                                |            | 5/8                   | 4            | BST-46528 | --      | BST-46529 | BST-46552 | --      | BST-46553 |
| 9/32                           | 5/16       | 1/2                   | 2-1/2        | BST-46398 | --      | BST-46399 | BST-46434 | --      | BST-46435 |
| 5/16                           | 5/16       | 1/2                   | 2-1/2        | BST-46400 | --      | BST-46401 | BST-46436 | --      | BST-46437 |
|                                |            | 3/4                   | 4            | BST-46530 | --      | BST-46531 | BST-46554 | --      | BST-46555 |
| 3/8                            | 3/8        | 9/16                  | 2-1/2        | BST-46402 | --      | BST-46403 | BST-46438 | --      | BST-46439 |
|                                |            | 3/4                   | 4            | BST-46534 | --      | BST-46535 | BST-46558 | --      | BST-46559 |
| 7/16                           | 1/2        | 9/16                  | 2-3/4        | BST-46404 | --      | BST-46405 | BST-46440 | --      | BST-46441 |
|                                |            | 7/8                   | 4            | BST-46536 | --      | BST-46537 | BST-46560 | --      | BST-46561 |
| 1/2                            | 1/2        | 5/8                   | 3            | BST-46406 | --      | BST-46407 | BST-46442 | --      | BST-46443 |
|                                |            | 1                     | 4            | BST-46538 | --      | BST-46539 | BST-46562 | --      | BST-46563 |
| 9/16                           | 5/8        | 11/16                 | 3-1/2        | BST-46408 | --      | BST-46409 | BST-46444 | --      | BST-46445 |
| 5/8                            | 5/8        | 11/16                 | 3-1/2        | BST-46410 | --      | BST-46411 | BST-46446 | --      | BST-46447 |
|                                |            | 1-1/2                 | 6            | BST-46542 | --      | BST-46543 | BST-46566 | --      | BST-46567 |
| 3/4                            | 3/4        | 7/8                   | 4            | BST-46412 | --      | BST-46413 | BST-46448 | --      | BST-46449 |
|                                |            | 1-1/2                 | 6            | BST-46544 | --      | BST-46545 | BST-46568 | --      | BST-46569 |

\* Double Ended tools under 1/4" diameter have Round Shanks. 1/4" diameter & larger have Weldon Shanks.

|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ○ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S |   | High Temp. Alloys |
| H |   | Hardened Steel    |

● GOOD   ○ OK   ○ NOT OPTIMAL

- Ball Nose End
- 2 & 4 Flute
- Double End
- 1/32-7/32 Round Shanks
- 1/4-3/4 Weldon Shanks
- Fractional Sizes
- General Purpose
- Micrograin Carbide
- Uncoated & TiALN Coated
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



| Ball Nose Double End - Fractional |            |           |              |           |         |           |           |         |           |
|-----------------------------------|------------|-----------|--------------|-----------|---------|-----------|-----------|---------|-----------|
| Cutter<br>D                       | Shank<br>d | LOC<br>l1 | Overall<br>L | Uncoated  |         |           | TiALN     |         |           |
|                                   |            |           |              | 2 Flute   | 3 Flute | 4 Flute   | 2 Flute   | 3 Flute | 4 Flute   |
| 1/32                              | 1/8        | 1/16      | 1-1/2        | BST-46450 | --      | BST-46451 | BST-46486 | --      | BST-46487 |
| 3/64                              | 1/8        | 3/32      | 1-1/2        | BST-46452 | --      | BST-46453 | BST-46488 | --      | BST-46489 |
| 1/16                              | 1/8        | 1/8       | 1-1/2        | BST-46454 | --      | BST-46455 | BST-46490 | --      | BST-46491 |
| 3/32                              | 1/8        | 3/16      | 1-1/2        | BST-46456 | --      | BST-46457 | BST-46492 | --      | BST-46493 |
| 7/64                              | 1/8        | 7/32      | 1-1/2        | BST-46458 | --      | BST-46459 | BST-46494 | --      | BST-46495 |
| 1/8                               | 1/8        | 1/4       | 1-1/2        | BST-46460 | --      | BST-46461 | BST-46496 | --      | BST-46497 |
| 5/32                              | 3/16       | 5/16      | 2            | BST-46462 | --      | BST-46463 | BST-46498 | --      | BST-46499 |
|                                   |            | 7/16      | 3            | BST-46570 | --      | BST-46571 | BST-46594 | --      | BST-46595 |
| 3/16                              | 3/16       | 5/16      | 2            | BST-46464 | --      | BST-46465 | BST-46500 | --      | BST-46501 |
|                                   |            | 1/2       | 3            | BST-46572 | --      | BST-46573 | BST-46596 | --      | BST-46597 |
| 7/32                              | 1/4        | 3/8       | 2-1/2        | BST-46466 | --      | BST-46467 | BST-46502 | --      | BST-46503 |
|                                   |            | 9/16      | 4            | BST-46574 | --      | BST-46575 | BST-46598 | --      | BST-46599 |
| 1/4                               | 1/4        | 1/2       | 2-1/2        | BST-46468 | --      | BST-46469 | BST-46504 | --      | BST-46505 |
|                                   |            | 5/8       | 4            | BST-46576 | --      | BST-46577 | BST-46600 | --      | BST-46601 |
| 9/32                              | 5/16       | 1/2       | 2-1/2        | BST-46470 | --      | BST-46471 | BST-46506 | --      | BST-46507 |
| 5/16                              | 5/16       | 1/2       | 2-1/2        | BST-46472 | --      | BST-46473 | BST-46508 | --      | BST-46509 |
|                                   |            | 3/4       | 4            | BST-46578 | --      | BST-46579 | BST-46602 | --      | BST-46603 |
| 3/8                               | 3/8        | 9/16      | 2-1/2        | BST-46474 | --      | BST-46475 | BST-46510 | --      | BST-46511 |
|                                   |            | 3/4       | 4            | BST-46582 | --      | BST-46583 | BST-46606 | --      | BST-46607 |
| 7/16                              | 1/2        | 9/16      | 2-3/4        | BST-46476 | --      | BST-46477 | BST-46512 | --      | BST-46513 |
|                                   |            | 7/8       | 4            | BST-46584 | --      | BST-46585 | BST-46608 | --      | BST-46609 |
| 1/2                               | 1/2        | 5/8       | 3            | BST-46478 | --      | BST-46479 | BST-46514 | --      | BST-46515 |
|                                   |            | 1         | 4            | BST-46586 | --      | BST-46587 | BST-46610 | --      | BST-46611 |
| 9/16                              | 5/8        | 11/16     | 3-1/2        | BST-46480 | --      | BST-46481 | BST-46516 | --      | BST-46517 |
| 5/8                               | 5/8        | 11/16     | 3-1/2        | BST-46482 | --      | BST-46483 | BST-46518 | --      | BST-46519 |
|                                   |            | 1-1/2     | 6            | BST-46590 | --      | BST-46591 | BST-46614 | --      | BST-46615 |
| 3/4                               | 3/4        | 7/8       | 4            | BST-46484 | --      | BST-46485 | BST-46520 | --      | BST-46521 |
|                                   |            | 1-1/2     | 6            | BST-46592 | --      | BST-46593 | BST-46616 | --      | BST-46617 |

\* Double Ended tools under 1/4" diameter have Round Shanks. 1/4" diameter & larger have Weldon Shanks.

## High Performance Speeds & Feeds

| Material Classification           | Speed<br>SFM | Feed Per Tooth By End Mill Diameter (IPT) |       |       |       |       |       |       |       |
|-----------------------------------|--------------|---|-------|-------|-------|-------|-------|-------|-------|
|                                   |              | 1/4"                                      | 5/16" | 3/8"  | 7/16" | 1/2"  | 5/8"  | 3/4"  | 1"    |
| Aluminum Alloys & Aluminum        | 900-1800     | .0025                                     | .0030 | .0035 | .0040 | .0045 | .0055 | .0065 | .0085 |
| Copper Alloys & Copper            | 525-1275     | .0025                                     | .0030 | .0030 | .0035 | .0035 | .0040 | .0045 | .0065 |
| Bronze & Brass                    | 375-600      | .0025                                     | .0030 | .0030 | .0035 | .0035 | .0040 | .0045 | .0055 |
| Graphite                          | --           | --  | --    | --    | --    | --    | --    | --    | --    |
| Plastics                          | --           | --  | --    | --    | --    | --    | --    | --    | --    |
| Softer Cast Iron                  | 375-650      | .0025                                     | .0027 | .0030 | .0032 | .0035 | .0040 | .0065 | .0085 |
| Harder Cast Iron                  | 100-375      | .0013                                     | .0015 | .0020 | .0022 | .0025 | .0030 | .0035 | .0045 |
| Ductile Iron                      | 100-600      | .0015                                     | .0017 | .0020 | .0022 | .0025 | .0035 | .0045 | .0065 |
| Malleable Iron                    | 225-650      | .0015                                     | .0020 | .0025 | .0030 | .0035 | .0045 | .0055 | .0075 |
| Low Carbon Steels (1020 & Under)  | 300-600      | .0015                                     | .0020 | .0025 | .0030 | .0035 | .0045 | .0055 | .0075 |
| Medium Carbon Steels (1030-1060)  | 150-375      | .0020                                     | .0021 | .0022 | .0023 | .0025 | .0035 | .0045 | .0055 |
| Alloy Steels Hardened to 35 Rc    | 130-345      | .0015                                     | .0016 | .0017 | .0018 | .0020 | .0022 | .0025 | .0035 |
| Alloy Steels Hardened to 40-50 Rc | 70-160       | .0012                                     | .0012 | .0013 | .0014 | .0015 | .0020 | .0025 | .0035 |
| Die Steels Hardened to 51-60 Rc   | --           | --  | --    | --    | --    | --    | --    | --    | --    |
| Tool Steels                       | 150-375      | .0015                                     | .0017 | .0020 | .0022 | .0025 | .0030 | .0035 | .0045 |
| Mold Steels                       | 300-525      | .0015                                     | .0017 | .0020 | .0022 | .0025 | .0030 | .0035 | .0045 |
| Softer Stainless Steels           | 300-450      | .0015                                     | .0017 | .0020 | .0017 | .0025 | .0035 | .0045 | .0065 |
| Harder Stainless Steels           | 150-300      | .0010                                     | .0011 | .0012 | .0013 | .0015 | .0025 | .0035 | .0055 |
| Monel & High Nickel Steel         | 75-200       | .0015                                     | .0017 | .0020 | .0021 | .0025 | .0030 | .0035 | .0045 |
| Softer Titanium                   | 125-375      | .0015                                     | .0017 | .0020 | .0021 | .0025 | .0035 | .0045 | .0065 |
| Harder Titanium                   | 50-175       | .0010                                     | .0011 | .0012 | .0012 | .0014 | .0017 | .0022 | .0023 |
| Nickel Based High Temp Alloys     | 50-125       | .0013                                     | .0012 | .0011 | .0011 | .0014 | .0015 | .0017 | .0023 |

**Note: These are guidelines only & the following points are important to consider:**

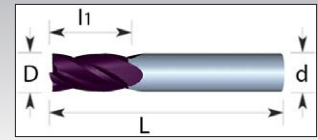
- Higher Feed Per Tooth should be used to start for radial depths of cut less than 25% of the tool diameter.
- The above recommendations are for axial lengths of cut not to exceed 1.25 times the tool diameter for profiling and .75 times the diameter for full slotting.
- The above parameters are recommended starting points only. If the tool is working well, without vibrations or significant noise, increase the SFM and/or Feed Per Tooth in 5-10% increments.
- Optimum speeds & feeds will depend upon material, setup, machine conditions & tool deflection. Higher or lower parameters may be required to achieve optimum machining conditions.
- For Light Radial Depths of cut, make certain to increase the feed rate to compensate for Radial Chip Thinning Factor (RCTF). Consult a formula or app to calculate.
- For Plunging or Ramping the feed rate should be reduced by about 50%.
- Climb Milling is preferred to Conventional Milling.



|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ○ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S | ○ | High Temp. Alloys |
| H | ○ | Hardened Steel    |

● BETTER ○ OK ○ NOT OPTIMAL

- Square & Corner Radius End
- 4 & 5 Flute TiAlN Coated
- Variable Pitch, Reduces Chatter
- Round & Weldon Shanks
- Center Cutting
- Fractional Sizes
- High Performance
- Micrograin Carbide
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping
- Profiling

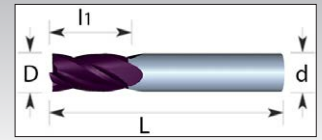


| Square & Corner Radius End - Fractional |       |       |         |        |                     |                      |                     |
|---|-------|-------|---------|--------|---------------------|----------------------|---------------------|
| Cutter                                  | Shank | LOC   | Overall | End    | TiAlN               |                      |                     |
|   |       |       |         |        | 4 Flute Round Shank | 4 Flute Weldon Shank | 5 Flute Round Shank |
| D                                       | d     | l1    | L       | Face   |                     |                      |                     |
| 1/8                                     | 1/8   | 1/2   | 1-1/2   | SQ     | BST-47520           | --                   | --                  |
|   |       | 1/2   | 1-1/2   | .010"R | BST-47521           | --                   | --                  |
| 3/16                                    | 3/16  | 3/8   | 2       | SQ     | BST-47448           | --                   | --                  |
|   |       | 3/8   | 2       | .015"R | BST-47449           | --                   | --                  |
|   |       | 5/8   | 2       | SQ     | BST-47305           | --                   | --                  |
|   |       | 5/8   | 2       | .015"R | BST-47306           | --                   | --                  |
|   |       | 3/4   | 2-1/2   | SQ     | BST-47354           | --                   | --                  |
|   |       | 3/4   | 2-1/2   | .015"R | BST-47355           | --                   | --                  |
|   |       | 1-1/8 | 3       | SQ     | BST-47433           | --                   | --                  |
|   |       | 1-1/8 | 3       | .015"R | BST-47523           | --                   | --                  |
| 1/4                                     | 1/4   | 3/8   | 2       | SQ     | BST-47450           | --                   | --                  |
|   |       | 3/8   | 2       | .015"R | BST-47451           | --                   | --                  |
|   |       | 3/4   | 2-1/2   | SQ     | BST-47307           | BST-47331            | BST-47540           |
|   |       | 3/4   | 2-1/2   | .020"R | BST-47308           | BST-47332            | BST-47541           |
|   |       | 1-1/8 | 3       | SQ     | BST-47356           | BST-47379            | BST-47554           |
|   |       | 1-1/8 | 3       | .020"R | BST-47357           | BST-47380            | BST-47555           |
|   |       | 1-1/2 | 4       | SQ     | BST-47434           | --                   | BST-47568           |
|   |       | 1-1/2 | 4       | .020"R | BST-47524           | --                   | BST-47569           |
| 5/16                                    | 5/16  | 3/8   | 2       | SQ     | BST-47452           | --                   | --                  |
|   |       | 3/8   | 2       | .020"R | BST-47453           | --                   | --                  |
|   |       | 13/16 | 2-1/2   | SQ     | BST-47309           | BST-47333            | BST-47542           |
|   |       | 13/16 | 2-1/2   | .020"R | BST-47310           | BST-47334            | BST-47543           |
|   |       | 1-1/8 | 3       | SQ     | BST-47358           | BST-47381            | BST-47556           |
|   |       | 1-1/8 | 3       | .020"R | BST-47359           | BST-47382            | BST-47557           |
|   |       | 1-5/8 | 4       | SQ     | BST-47435           | --                   | BST-47570           |
|   |       | 1-5/8 | 4       | .020"R | BST-47525           | --                   | BST-47571           |
| 3/8                                     | 3/8   | 1/2   | 2       | SQ     | BST-47454           | --                   | --                  |
|   |       | 1/2   | 2       | .020"R | BST-47455           | --                   | --                  |
|   |       | 7/8   | 2-1/2   | SQ     | BST-47311           | BST-47335            | BST-47544           |
|   |       | 7/8   | 2-1/2   | .020"R | BST-47312           | BST-47336            | BST-47545           |
|   |       | 1-1/8 | 3       | SQ     | BST-47360           | BST-47383            | BST-47558           |
|   |       | 1-1/8 | 3       | .020"R | BST-47361           | BST-47384            | BST-47559           |
|   |       | 1-3/4 | 4       | SQ     | BST-47436           | --                   | BST-47572           |
|   |       | 1-3/4 | 4       | .020"R | BST-47526           | --                   | BST-47573           |
| 7/16                                    | 7/16  | 1     | 2-3/4   | SQ     | BST-47314           | BST-47337            | --                  |
|   |       | 2     | 4       | SQ     | BST-47362           | BST-47385            | --                  |
| 1/2                                     | 1/2   | 5/8   | 2-1/2   | SQ     | BST-47456           | BST-47462            | --                  |
|   |       | 5/8   | 2-1/2   | .030"R | BST-47457           | BST-47463            | --                  |
|   |       | 1-1/4 | 3       | SQ     | BST-47315           | BST-47338            | BST-47546           |
|   |       | 1-1/4 | 3       | .015"R | BST-47316           | BST-47339            | --                  |
|   |       | 1-1/4 | 3       | .030"R | BST-47317           | BST-47340            | BST-47547           |
|   |       | 1-1/4 | 3       | .060"R | BST-47318           | BST-47341            | --                  |

|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ○ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S | ○ | High Temp. Alloys |
| H | ○ | Hardened Steel    |

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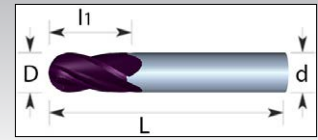
- Square & Corner Radius End
- 4 & 5 Flute TiAlN Coated
- Variable Pitch, Reduces Chatter
- Round & Weldon Shanks
- Center Cutting
- Fractional Sizes
- High Performance
- Micrograin Carbide
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping
- Profiling



| Square & Corner Radius End - Fractional |       |     |         |       |        |   |    |   |           |                     |                      |
|---|-------|-----|---------|-------|--------|---|----|---|-----------|---------------------|----------------------|
| Cutter                                  | Shank | LOC | Overall | End   | TiAlN  |   |    |   |           |                     |                      |
|   |       |     |         |       | D      | d | l1 | L | Face      | 4 Flute Round Shank | 4 Flute Weldon Shank |
| 1/2                                     | 1/2   |     | 2       | 4     | SQ     |   |    |   | BST-47363 | BST-47386           | BST-47560            |
|   |       |     | 2       | 4     | .015"R |   |    |   | BST-47364 | BST-47387           | --                   |
|   |       |     | 2       | 4     | .030"R |   |    |   | BST-47365 | BST-47388           | BST-47561            |
|   |       |     | 2       | 4     | .060"R |   |    |   | BST-47366 | BST-47389           | --                   |
|   |       |     | 3       | 6     | SQ     |   |    |   | BST-47437 | --                  | BST-47574            |
|   |       |     | 3       | 6     | .030"R |   |    |   | BST-47527 | --                  | BST-47575            |
| 5/8                                     | 5/8   |     | 3/4     | 3     | SQ     |   |    |   | BST-47458 | BST-47464           | --                   |
|   |       |     | 3/4     | 3     | .030"R |   |    |   | BST-47459 | BST-47465           | --                   |
|   |       |     | 1-1/4   | 3-1/2 | SQ     |   |    |   | BST-47319 | BST-47342           | BST-47548            |
|   |       |     | 1-1/4   | 3-1/2 | .030"R |   |    |   | BST-47320 | BST-47343           | BST-47549            |
|   |       |     | 1-1/4   | 3-1/2 | .060"R |   |    |   | BST-47321 | BST-47344           | --                   |
|   |       |     | 1-1/4   | 3-1/2 | .125"R |   |    |   | BST-47322 | BST-47345           | --                   |
|   |       |     | 2-1/4   | 5     | SQ     |   |    |   | BST-47367 | BST-47390           | BST-47562            |
|   |       |     | 2-1/4   | 5     | .030"R |   |    |   | BST-47368 | BST-47391           | BST-47563            |
|   |       |     | 2-1/4   | 5     | .060"R |   |    |   | BST-47369 | BST-47392           | --                   |
|   |       |     | 2-1/4   | 5     | .125"R |   |    |   | BST-47370 | BST-47393           | --                   |
|   |       |     | 3       | 6     | SQ     |   |    |   | BST-47438 | --                  | BST-47576            |
|   |       |     | 3       | 6     | .030"R |   |    |   | BST-47528 | --                  | BST-47577            |
| 3/4                                     | 3/4   |     | 1       | 3     | SQ     |   |    |   | BST-47460 | BST-47466           | --                   |
|   |       |     | 1       | 3     | .030"R |   |    |   | BST-47461 | BST-47467           | --                   |
|   |       |     | 1-1/2   | 4     | SQ     |   |    |   | BST-47323 | BST-47346           | BST-47550            |
|   |       |     | 1-1/2   | 4     | .030"R |   |    |   | BST-47324 | BST-47347           | BST-47551            |
|   |       |     | 1-1/2   | 4     | .060"R |   |    |   | BST-47325 | BST-47348           | --                   |
|   |       |     | 1-1/2   | 4     | .125"R |   |    |   | BST-47326 | BST-47349           | --                   |
|   |       |     | 2-1/4   | 5     | SQ     |   |    |   | BST-47371 | BST-47394           | BST-47564            |
|   |       |     | 2-1/4   | 5     | .030"R |   |    |   | BST-47372 | BST-47395           | BST-47565            |
|   |       |     | 2-1/4   | 5     | .060"R |   |    |   | BST-47373 | BST-47396           | --                   |
|   |       |     | 2-1/4   | 5     | .125"R |   |    |   | BST-47374 | BST-47397           | --                   |
|   |       |     | 3       | 6     | SQ     |   |    |   | BST-47439 | --                  | BST-47578            |
|   |       |     | 3       | 6     | .030"R |   |    |   | BST-47529 | --                  | BST-47579            |
| 1                                       | 1     |     | 1-1/2   | 4     | SQ     |   |    |   | BST-47301 | BST-47327           | BST-47538            |
|   |       |     | 1-1/2   | 4     | .030"R |   |    |   | BST-47302 | BST-47328           | BST-47539            |
|   |       |     | 1-1/2   | 4     | .060"R |   |    |   | BST-47303 | BST-47329           | --                   |
|   |       |     | 1-1/2   | 4     | .125"R |   |    |   | BST-47304 | BST-47330           | --                   |
|   |       |     | 2-1/4   | 5     | SQ     |   |    |   | BST-47350 | BST-47375           | BST-47552            |
|   |       |     | 2-1/4   | 5     | .030"R |   |    |   | BST-47351 | BST-47376           | BST-47553            |
|   |       |     | 2-1/4   | 5     | .060"R |   |    |   | BST-47352 | BST-47377           | --                   |
|   |       |     | 2-1/4   | 5     | .125"R |   |    |   | BST-47353 | BST-47378           | --                   |
|   |       |     | 3       | 6     | SQ     |   |    |   | BST-47432 | --                  | BST-47566            |
|   |       |     | 3       | 6     | .030"R |   |    |   | BST-47522 | --                  | BST-47567            |

|                             |   |                   |
|-----------------------------|---|-------------------|
| P                           | ● | Steel             |
| M                           | ○ | Stainless Steel   |
| K                           | ● | Cast Iron         |
| N                           | ○ | Non-Ferrous       |
| S                           | ○ | High Temp. Alloys |
| H                           | ○ | Hardened Steel    |
| ● BETTER ○ OK ○ NOT OPTIMAL |   |                   |

- Ball Nose End
- 4 Flute TiAlN Coated
- Variable Pitch, Reduces Chatter
- Round & Weldon Shanks
- Center Cutting
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- Profiling



High Performance

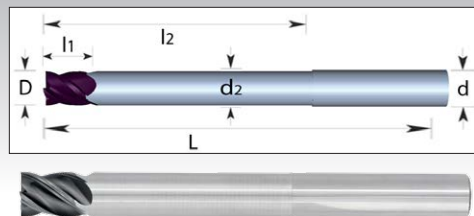
| Ball Nose - Fractional |            |           |              |             |                     |                      |
|------------------------|------------|-----------|--------------|-------------|---------------------|----------------------|
| Cutter<br>D            | Shank<br>d | LOC<br>l1 | Overall<br>L | End<br>Face | TiAlN               |                      |
|                        |            |           |              |             | 4 Flute Round Shank | 4 Flute Weldon Shank |
| 3/16                   | 3/16       | 5/8       | 2            | BN          | BST-47399           | --                   |
|                        |            | 3/4       | 2-1/2        | BN          | BST-47416           | --                   |
|                        |            | 1-1/8     | 3            | BN          | BST-47441           | --                   |
| 1/4                    | 1/4        | 3/4       | 2-1/2        | BN          | BST-47400           | BST-47408            |
|                        |            | 1-1/8     | 3            | BN          | BST-47417           | BST-47425            |
|                        |            | 1-1/2     | 4            | BN          | BST-47442           | --                   |
| 5/16                   | 5/16       | 13/16     | 2-1/2        | BN          | BST-47401           | BST-47409            |
|                        |            | 1-1/8     | 3            | BN          | BST-47418           | BST-47426            |
|                        |            | 1-5/8     | 4            | BN          | BST-47443           | --                   |
| 3/8                    | 3/8        | 7/8       | 2-1/2        | BN          | BST-47402           | BST-47410            |
|                        |            | 1-1/8     | 3            | BN          | BST-47419           | BST-47427            |
|                        |            | 1-3/4     | 4            | BN          | BST-47444           | --                   |
| 7/16                   | 7/16       | 1         | 2-3/4        | BN          | BST-47403           | BST-47411            |
|                        |            | 2         | 4            | BN          | BST-47420           | BST-47428            |
| 1/2                    | 1/2        | 1         | 3            | BN          | BST-47404           | BST-47412            |
|                        |            | 2         | 4            | BN          | BST-47421           | BST-47429            |
|                        |            | 3         | 6            | BN          | BST-47445           | --                   |
| 5/8                    | 5/8        | 1-1/4     | 3-1/2        | BN          | BST-47405           | BST-47413            |
|                        |            | 2-1/4     | 5            | BN          | BST-47422           | BST-47430            |
|                        |            | 3         | 6            | BN          | BST-47446           | --                   |
| 3/4                    | 3/4        | 1-1/2     | 4            | BN          | BST-47406           | BST-47414            |
|                        |            | 2-1/4     | 5            | BN          | BST-47423           | BST-47431            |
|                        |            | 3         | 6            | BN          | BST-47447           | --                   |
| 1                      | 1          | 1-1/2     | 4            | BN          | BST-47398           | BST-47407            |
|                        |            | 2-1/4     | 5            | BN          | BST-47415           | BST-47424            |
|                        |            | 3         | 6            | BN          | BST-47440           | --                   |

| Long Reach Neck Relief - Fractional |            |            |           |             |              |             |                     |
|-------------------------------------|------------|------------|-----------|-------------|--------------|-------------|---------------------|
| Cutter<br>D                         | Shank<br>d | Neck<br>d2 | LOC<br>l1 | L.B.S<br>l2 | Overall<br>L | End<br>Face | TiAlN               |
|                                     |            |            |           |             |              |             | 4 Flute Round Shank |
| 3/16                                | 3/16       | .1775      | 3/8       | 2-1/2       | 4            | SQ          | BST-47474           |
|                                     |            | .1775      | 3/8       | 2-1/2       | 4            | .015"R      | BST-47475           |
|                                     |            | .1775      | 3/8       | 2-1/2       | 4            | BN          | BST-47499           |
| 1/4                                 | 1/4        | .2400      | 3/8       | 2-1/2       | 4            | SQ          | BST-47476           |
|                                     |            | .2400      | 3/8       | 2-1/2       | 4            | .015"R      | BST-47477           |
|                                     |            | .2400      | 3/8       | 2-1/2       | 4            | BN          | BST-47500           |

|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ○ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S | ○ | High Temp. Alloys |
| H | ○ | Hardened Steel    |

● BETTER ○ OK ○ NOT OPTIMAL

- Long Reach & Neck Relieved
- Same design features as all HP End Mills
- Square, Corner Radius & Ball Nose
- 4 Flute TiALN Coated
- Center Cutting, Fractional Sizes
- Long Reach with side wall clearance



| Long Reach Neck Relief - Fractional |       |       |       |       |         |        |                     |
|-------------------------------------|-------|-------|-------|-------|---------|--------|---------------------|
| Cutter                              | Shank | Neck  | LOC   | L.B.S | Overall | End    | TiALN               |
| D                                   | d     | d2    | l1    | l2    | L       | Face   | 4 Flute Round Shank |
| 5/16                                | 5/16  | .3025 | 7/16  | 2-1/2 | 4       | SQ     | BST-47478           |
|                                     |       | .3025 | 7/16  | 2-1/2 | 4       | .015"R | BST-47479           |
|                                     |       | .3025 | 7/16  | 2-1/2 | 4       | BN     | BST-47501           |
| 3/8                                 | 3/8   | .3650 | 1/2   | 2-1/2 | 4       | SQ     | BST-47480           |
|                                     |       | .3650 | 1/2   | 2-1/2 | 4       | .015"R | BST-47481           |
|                                     |       | .3650 | 1/2   | 2-1/2 | 4       | BN     | BST-47502           |
| 1/2                                 | 1/2   | .4800 | 5/8   | 3     | 5       | SQ     | BST-47482           |
|                                     |       | .4800 | 5/8   | 3     | 5       | .020"R | BST-47483           |
|                                     |       | .4800 | 5/8   | 3     | 5       | BN     | BST-47503           |
|                                     |       | .4800 | 5/8   | 4     | 6       | SQ     | BST-47485           |
|                                     |       | .4800 | 5/8   | 4     | 6       | .020"R | BST-47484           |
|                                     |       | .4800 | 5/8   | 4     | 6       | BN     | BST-47504           |
| 5/8                                 | 5/8   | .6050 | 3/4   | 3     | 5       | SQ     | BST-47486           |
|                                     |       | .6050 | 3/4   | 3     | 5       | .020"R | BST-47487           |
|                                     |       | .6050 | 3/4   | 3     | 5       | BN     | BST-47505           |
|                                     |       | .6050 | 3/4   | 4     | 6       | SQ     | BST-47489           |
|                                     |       | .6050 | 3/4   | 4     | 6       | .020"R | BST-47488           |
| 3/4                                 | 3/4   | .7300 | 1     | 3     | 5       | BN     | BST-47507           |
|                                     |       | .7300 | 1     | 3     | 5       | SQ     | BST-47490           |
|                                     |       | .7300 | 1     | 3     | 5       | .020"R | BST-47491           |
|                                     |       | .7300 | 1     | 4     | 6       | SQ     | BST-47494           |
|                                     |       | .7300 | 1     | 4     | 6       | .020"R | BST-47492           |
|                                     |       | .7300 | 1     | 4     | 6       | BN     | BST-47508           |
|                                     |       | .7300 | 1     | 5     | 7       | SQ     | BST-47495           |
|                                     |       | .7300 | 1     | 5     | 7       | .020"R | BST-47493           |
|                                     |       | .7300 | 1     | 5     | 7       | BN     | BST-47509           |
| 1                                   | 1     | .9800 | 1-1/4 | 3     | 5       | SQ     | BST-47468           |
|                                     |       | .9800 | 1-1/4 | 3     | 5       | .020"R | BST-47469           |
|                                     |       | .9800 | 1-1/4 | 3     | 5       | BN     | BST-47496           |
|                                     |       | .9800 | 1-1/4 | 4     | 6       | SQ     | BST-47472           |
|                                     |       | .9800 | 1-1/4 | 4     | 6       | .020"R | BST-47470           |
|                                     |       | .9800 | 1-1/4 | 4     | 6       | BN     | BST-47497           |
|                                     |       | .9800 | 1-1/4 | 5     | 7       | SQ     | BST-47473           |
|                                     |       | .9800 | 1-1/4 | 5     | 7       | .020"R | BST-47471           |
|                                     |       | .9800 | 1-1/4 | 5     | 7       | BN     | BST-47498           |



# Ultra High Performance Speeds & Feeds

| Material Classification           | Speed<br>SFM | Feed Per Tooth By End Mill Diameter (IPT) |       |       |       |       |       |       |       |
|-----------------------------------|--------------|---|-------|-------|-------|-------|-------|-------|-------|
|                                   |              | 1/4"                                      | 5/16" | 3/8"  | 7/16" | 1/2"  | 5/8"  | 3/4"  | 1"    |
| Aluminum Alloys & Aluminum        | 900-1800     | .0025                                     | .0030 | .0035 | .0040 | .0045 | .0055 | .0065 | .0085 |
| Copper Alloys & Copper            | 525-1275     | .0025                                     | .0030 | .0030 | .0035 | .0035 | .0040 | .0045 | .0065 |
| Bronze & Brass                    | 375-600      | .0025                                     | .0030 | .0030 | .0035 | .0035 | .0040 | .0045 | .0055 |
| Graphite                          | --           | --  | --    | --    | --    | --    | --    | --    | --    |
| Plastics                          | --           | --  | --    | --    | --    | --    | --    | --    | --    |
| Softer Cast Iron                  | 375-650      | .0030                                     | .0032 | .0035 | .0037 | .0040 | .0045 | .0070 | .0090 |
| Harder Cast Iron                  | 100-375      | .0018                                     | .0020 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Ductile Iron                      | 100-600      | .0020                                     | .0022 | .0025 | .0027 | .0030 | .0040 | .0050 | .0070 |
| Malleable Iron                    | 225-650      | .0020                                     | .0025 | .0030 | .0035 | .0040 | .0050 | .0060 | .0080 |
| Low Carbon Steels (1020 & Under)  | 300-600      | .0020                                     | .0025 | .0030 | .0035 | .0040 | .0050 | .0060 | .0080 |
| Medium Carbon Steels (1030-1060)  | 150-375      | .0025                                     | .0026 | .0027 | .0028 | .0030 | .0040 | .0050 | .0060 |
| Alloy Steels Hardened to 35 Rc    | 130-345      | .0020                                     | .0021 | .0022 | .0023 | .0025 | .0027 | .0030 | .0040 |
| Alloy Steels Hardened to 40-50 Rc | 70-160       | .0012                                     | .0012 | .0013 | .0014 | .0015 | .0026 | .0030 | .0035 |
| Die Steels Hardened to 51-60 Rc   | --           | --  | --    | --    | --    | --    | --    | --    | --    |
| Tool Steels                       | 150-375      | .0020                                     | .0022 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Mold Steels                       | 300-525      | .0020                                     | .0022 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Softer Stainless Steels           | 300-450      | .0020                                     | .0022 | .0025 | .0022 | .0030 | .0040 | .0050 | .0070 |
| Harder Stainless Steels           | 150-300      | .0015                                     | .0016 | .0017 | .0018 | .0020 | .0030 | .0040 | .0060 |
| Monel & High Nickel Steel         | 75-200       | .0015                                     | .0022 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Softer Titanium                   | 125-375      | .0015                                     | .0022 | .0025 | .0027 | .0030 | .0040 | .0050 | .0070 |
| Harder Titanium                   | 50-175       | .0010                                     | .0016 | .0017 | .0018 | .0020 | .0022 | .0026 | .0030 |
| Nickel Based High Temp Alloys     | 50-125       | .0014                                     | .0014 | .0015 | .0016 | .0017 | .0018 | .0020 | .0023 |

**Note: These are guidelines only & the following points are important to consider:**

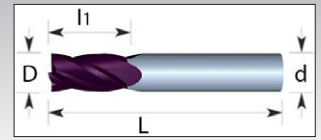
- Higher Feed Per Tooth should be used to start for radial depths of cut less than 25% of the tool diameter.
- The above recommendations are for axial lengths of cut not to exceed 1.5 times the tool diameter for profiling and 1 times the diameter for full slotting.
- The above parameters are recommended starting points only. If the tool is working well, without vibrations or significant noise, increase the SFM and/or Feed Per Tooth in 5-10% increments.
- Optimum speeds & feeds will depend upon material, setup, machine conditions & tool deflection. Higher or lower parameters may be required to achieve optimum machining conditions.
- For Light Radial Depths of cut, make certain to increase the feed rate to compensate for Radial Chip Thinning Factor (RCTF). Consult a formula or app to calculate.
- For Plunging or Ramping the feed rate should be reduced by about 50%.
- Climb Milling is preferred to Conventional Milling.



|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ○ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S | ○ | High Temp. Alloys |
| H | ○ | Hardened Steel    |

● BEST   ○ OK   ○ NOT OPTIMAL

- Square & Corner Radius End
- 4 & 5 Flute TiALN Coated
- Variable Pitch, Reduces Chatter
- Round & Weldon Shanks
- Center Cutting
- Fractional Sizes
- Extreme Production
- Unique Polishing Process
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping, Profiling
- Ultra Premium Micrograin Carbide



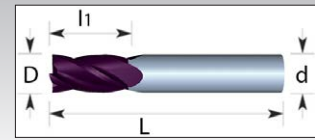
| Square & Corner Radius End - Fractional |            |           |              |             |                     |                      |                     |  |
|---|------------|-----------|--------------|-------------|---------------------|----------------------|---------------------|--|
| Cutter<br>D                             | Shank<br>d | LOC<br>l1 | Overall<br>L | End<br>Face | TiALN               |                      |                     |  |
|   |            |           |              |             | 4 Flute Round Shank | 4 Flute Weldon Shank | 5 Flute Round Shank |  |
| 1/8                                     | 1/8        | 1/2       | 1-1/2        | SQ          | BST-45006           | --                   | --                  |  |
|   |            | 1/2       | 1-1/2        | .010"R      | BST-45007           | --                   | --                  |  |
| 3/16                                    | 3/16       | 3/8       | 2            | SQ          | BST-45177           | --                   | --                  |  |
|   |            | 3/8       | 2            | .015"R      | BST-45178           | --                   | --                  |  |
|   |            | 5/8       | 2            | SQ          | BST-45009           | --                   | --                  |  |
|   |            | 5/8       | 2            | .015"R      | BST-45010           | --                   | --                  |  |
|   |            | 3/4       | 2-1/2        | SQ          | BST-45081           | --                   | --                  |  |
|   |            | 3/4       | 2-1/2        | .015"R      | BST-45082           | --                   | --                  |  |
|   |            | 1-1/8     | 3            | SQ          | BST-45161           | --                   | --                  |  |
|   |            | 1-1/8     | 3            | .015"R      | BST-47531           | --                   | --                  |  |
| 1/4                                     | 1/4        | 3/8       | 2            | SQ          | BST-45179           | --                   | --                  |  |
|   |            | 3/8       | 2            | .015"R      | BST-45180           | --                   | --                  |  |
|   |            | 3/4       | 2-1/2        | SQ          | BST-45012           | BST-45053            | BST-45015           |  |
|   |            | 3/4       | 2-1/2        | .020"R      | BST-45014           | BST-45055            | BST-45016           |  |
|   |            | 1-1/8     | 3            | SQ          | BST-45083           | BST-45106            | BST-47582           |  |
|   |            | 1-1/8     | 3            | .020"R      | BST-45084           | BST-45107            | BST-47583           |  |
|   |            | 1-1/2     | 4            | SQ          | BST-45162           | --                   | BST-47596           |  |
|   |            | 1-1/2     | 4            | .020"R      | BST-47532           | --                   | BST-47597           |  |
| 5/16                                    | 5/16       | 3/8       | 2            | SQ          | BST-45181           | --                   | --                  |  |
|   |            | 3/8       | 2            | .020"R      | BST-45182           | --                   | --                  |  |
|   |            | 13/16     | 2-1/2        | SQ          | BST-45017           | BST-45056            | BST-45019           |  |
|   |            | 13/16     | 2-1/2        | .020"R      | BST-45018           | BST-45057            | BST-45020           |  |
|   |            | 1-1/8     | 3            | SQ          | BST-45085           | BST-45108            | BST-47584           |  |
|   |            | 1-1/8     | 3            | .020"R      | BST-45086           | BST-45109            | BST-47585           |  |
|   |            | 1-5/8     | 4            | SQ          | BST-45163           | --                   | BST-47598           |  |
|   |            | 1-5/8     | 4            | .020"R      | BST-47533           | --                   | BST-47599           |  |
| 3/8                                     | 3/8        | 1/2       | 2            | SQ          | BST-45183           | --                   | --                  |  |
|   |            | 1/2       | 2            | .020"R      | BST-45184           | --                   | --                  |  |
|   |            | 7/8       | 2-1/2        | SQ          | BST-45021           | BST-45058            | BST-45025           |  |
|   |            | 7/8       | 2-1/2        | .020"R      | BST-45023           | BST-45060            | BST-45026           |  |
|   |            | 7/8       | 2-1/2        | .030"R      | BST-45024           | BST-45061            | --                  |  |
|   |            | 1-1/8     | 3            | SQ          | BST-45087           | BST-45110            | BST-47586           |  |
|   |            | 1-1/8     | 3            | .020"R      | BST-45088           | BST-45111            | BST-47587           |  |
|   |            | 1-3/4     | 4            | SQ          | BST-45164           | --                   | BST-47600           |  |
| 1-3/4                                   | 4          | .020"R    | BST-47534    | --          | BST-47601           |                      |                     |  |
| 7/16                                    | 7/16       | 1         | 2-3/4        | SQ          | BST-45028           | BST-45062            | --                  |  |
|   |            | 2         | 4            | SQ          | BST-45089           | BST-45112            | --                  |  |
| 1/2                                     | 1/2        | 5/8       | 2-1/2        | SQ          | BST-45185           | BST-45191            | --                  |  |
|   |            | 5/8       | 2-1/2        | .030"R      | BST-45186           | BST-45192            | --                  |  |
|   |            | 1-1/4     | 3            | SQ          | BST-45029           | BST-45063            | BST-45033           |  |
|   |            | 1-1/4     | 3            | .015"R      | BST-45030           | BST-45064            | --                  |  |
|   |            | 1-1/4     | 3            | .030"R      | BST-45031           | BST-45065            | BST-45034           |  |
|   |            | 1-1/4     | 3            | .060"R      | BST-45032           | BST-45066            | --                  |  |

|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ◐ | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S | ○ | High Temp. Alloys |
| H |   | Hardened Steel    |

● BEST ◐ OK ○ NOT OPTIMAL

- Square & Corner Radius End
- 4 & 5 Flute TiAlN Coated
- Variable Pitch, Reduces Chatter
- Round & Weldon Shanks
- Center Cutting
- Fractional Sizes

- Extreme Production
- Unique Polishing Process
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping, Profiling
- Ultra Premium Micrograin Carbide

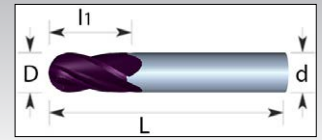


## Square & Corner Radius End - Fractional

| Cutter<br>D | Shank<br>d | LOC<br>l1 | Overall<br>L | End<br>Face | TiAlN               |                      |                     |
|-------------|------------|-----------|--------------|-------------|---------------------|----------------------|---------------------|
|             |            |           |              |             | 4 Flute Round Shank | 4 Flute Weldon Shank | 5 Flute Round Shank |
| 1/2         | 1/2        | 2         | 4            | SQ          | BST-45090           | BST-45113            | BST-47588           |
|             |            | 2         | 4            | .015"R      | BST-45091           | BST-45114            | --                  |
|             |            | 2         | 4            | .030"R      | BST-45092           | BST-45115            | BST-47589           |
|             |            | 2         | 4            | .060"R      | BST-45093           | BST-45116            | --                  |
|             |            | 3         | 6            | SQ          | BST-45165           | --                   | BST-47602           |
|             |            | 3         | 6            | .030"R      | BST-47535           | --                   | BST-47603           |
| 5/8         | 5/8        | 3/4       | 3            | SQ          | BST-45187           | BST-45193            | --                  |
|             |            | 3/4       | 3            | .030"R      | BST-45188           | BST-45194            | --                  |
|             |            | 1-1/4     | 3-1/2        | SQ          | BST-45035           | BST-45067            | BST-45039           |
|             |            | 1-1/4     | 3-1/2        | .030"R      | BST-45036           | BST-45068            | BST-45040           |
|             |            | 1-1/4     | 3-1/2        | .060"R      | BST-45037           | BST-45069            | --                  |
|             |            | 1-1/4     | 3-1/2        | .125"R      | BST-45038           | BST-45070            | --                  |
|             |            | 2-1/4     | 5            | SQ          | BST-45094           | BST-45117            | BST-47590           |
|             |            | 2-1/4     | 5            | .030"R      | BST-45095           | BST-45118            | BST-47591           |
|             |            | 2-1/4     | 5            | .060"R      | BST-45096           | BST-45119            | --                  |
|             |            | 2-1/4     | 5            | .125"R      | BST-45097           | BST-45120            | --                  |
|             |            | 3         | 6            | SQ          | BST-45166           | --                   | BST-47604           |
|             |            | 3         | 6            | .030"R      | BST-47536           | --                   | BST-47605           |
| 3/4         | 3/4        | 1         | 3            | SQ          | BST-45189           | BST-45195            | --                  |
|             |            | 1         | 3            | .030"R      | BST-45190           | BST-45196            | --                  |
|             |            | 1-1/2     | 4            | SQ          | BST-45041           | BST-45071            | BST-45045           |
|             |            | 1-1/2     | 4            | .030"R      | BST-45042           | BST-45073            | BST-45046           |
|             |            | 1-1/2     | 4            | .060"R      | BST-45043           | BST-45074            | --                  |
|             |            | 1-1/2     | 4            | .125"R      | BST-45044           | BST-45075            | --                  |
|             |            | 2-1/4     | 5            | SQ          | BST-45098           | BST-45121            | BST-47592           |
|             |            | 2-1/4     | 5            | .030"R      | BST-45099           | BST-45122            | BST-47593           |
|             |            | 2-1/4     | 5            | .060"R      | BST-45100           | BST-45123            | --                  |
|             |            | 2-1/4     | 5            | .125"R      | BST-45101           | BST-45124            | --                  |
|             |            | 3         | 6            | SQ          | BST-45167           | --                   | BST-47606           |
|             |            | 3         | 6            | .030"R      | BST-47537           | --                   | BST-47607           |
| 1           | 1          | 1-1/2     | 4            | SQ          | BST-45000           | BST-45047            | BST-45004           |
|             |            | 1-1/2     | 4            | .030"R      | BST-45001           | BST-45048            | BST-45005           |
|             |            | 1-1/2     | 4            | .060"R      | BST-45002           | BST-45049            | --                  |
|             |            | 1-1/2     | 4            | .125"R      | BST-45003           | BST-45050            | --                  |
|             |            | 2-1/4     | 5            | SQ          | BST-45076           | BST-45102            | BST-47580           |
|             |            | 2-1/4     | 5            | .030"R      | BST-45077           | BST-45103            | BST-47581           |
|             |            | 2-1/4     | 5            | .060"R      | BST-45078           | BST-45104            | --                  |
|             |            | 2-1/4     | 5            | .125"R      | BST-45079           | BST-45105            | --                  |
|             |            | 3         | 6            | SQ          | BST-45160           | --                   | BST-47594           |
|             |            | 3         | 6            | .030"R      | BST-47530           | --                   | BST-47595           |

|   |             |                   |
|---|-------------|-------------------|
| P | ●           | Steel             |
| M | ○           | Stainless Steel   |
| K | ●           | Cast Iron         |
| N | ○           | Non-Ferrous       |
| S | ○           | High Temp. Alloys |
| H | ○           | Hardened Steel    |
| ● | BEST        |                   |
| ○ | OK          |                   |
| ○ | NOT OPTIMAL |                   |

- Ball Nose End
- 4 Flute TiAlN Coated
- Variable Pitch, Reduces Chatter
- Round & Weldon Shanks
- Center Cutting
- Fractional Sizes
- Extreme Production
- Unique Polishing Process
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping, Profiling
- Ultra Premium Micrograin Carbide



| Ball Nose - Fractional |            |           |              |             |                     |                      |
|------------------------|------------|-----------|--------------|-------------|---------------------|----------------------|
| Cutter<br>D            | Shank<br>d | LOC<br>l1 | Overall<br>L | End<br>Face | TiAlN               |                      |
|                        |            |           |              |             | 4 Flute Round Shank | 4 Flute Weldon Shank |
| 3/16                   | 3/16       | 5/8       | 2            | BN          | BST-45127           | --                   |
|                        |            | 3/4       | 2-1/2        | BN          | BST-45144           | --                   |
|                        |            | 1-1/8     | 3            | BN          | BST-45170           | --                   |
| 1/4                    | 1/4        | 3/4       | 2-1/2        | BN          | BST-45128           | BST-45136            |
|                        |            | 1-1/8     | 3            | BN          | BST-45145           | BST-45153            |
|                        |            | 1-1/2     | 4            | BN          | BST-45171           | --                   |
| 5/16                   | 5/16       | 13/16     | 2-1/2        | BN          | BST-45129           | BST-45137            |
|                        |            | 1-1/8     | 3            | BN          | BST-45146           | BST-45154            |
|                        |            | 1-5/8     | 4            | BN          | BST-45172           | --                   |
| 3/8                    | 3/8        | 7/8       | 2-1/2        | BN          | BST-45130           | BST-45138            |
|                        |            | 1-1/8     | 3            | BN          | BST-45147           | BST-45155            |
|                        |            | 1-3/4     | 4            | BN          | BST-45173           | --                   |
| 7/16                   | 7/16       | 1         | 2-3/4        | BN          | BST-45131           | BST-45139            |
|                        |            | 2         | 4            | BN          | BST-45148           | BST-45156            |
| 1/2                    | 1/2        | 1         | 3            | BN          | BST-45132           | BST-45140            |
|                        |            | 2         | 4            | BN          | BST-45149           | BST-45157            |
|                        |            | 3         | 6            | BN          | BST-45174           | --                   |
| 5/8                    | 5/8        | 1-1/4     | 3-1/2        | BN          | BST-45133           | BST-45141            |
|                        |            | 2-1/4     | 5            | BN          | BST-45150           | BST-45158            |
|                        |            | 3         | 6            | BN          | BST-45175           | --                   |
| 3/4                    | 3/4        | 1-1/2     | 4            | BN          | BST-45134           | BST-45142            |
|                        |            | 2-1/4     | 5            | BN          | BST-45151           | BST-45159            |
|                        |            | 3         | 6            | BN          | BST-45176           | --                   |
| 1                      | 1          | 1-1/2     | 4            | BN          | BST-45125           | BST-45135            |
|                        |            | 2-1/4     | 5            | BN          | BST-45143           | BST-45152            |
|                        |            | 3         | 6            | BN          | BST-45168           | --                   |

*Use On-Size Hydraulic Holders or Shrink Fit for best performance!*

# A Complete Range Of Tools For High Efficiency Milling (HEM), Dynamic And Trochoidal Milling

- Square & Corner Radius End
- 5, 6 & 7 Flute ALL4 Coated
- Variable Pitch, Reduces Chatter
- Round Shanks
- Center Cutting, Fractional Sizes
- Trochoidal & Dynamic Milling

|   |   |                   |
|---|---|-------------------|
| P | ● | Steel             |
| M | ● | Stainless Steel   |
| K | ● | Cast Iron         |
| N | ○ | Non-Ferrous       |
| S | ● | High Temp. Alloys |
| H | ◐ | Hardened Steel    |

● BEST   ◐ OK   ○ NOT OPTIMAL

- HEM (High Efficiency Milling)
- Chipbreakers Available
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping, Profiling
- Ultra Premium Micrograin Carbide

## Finisher

Unique Honing Process

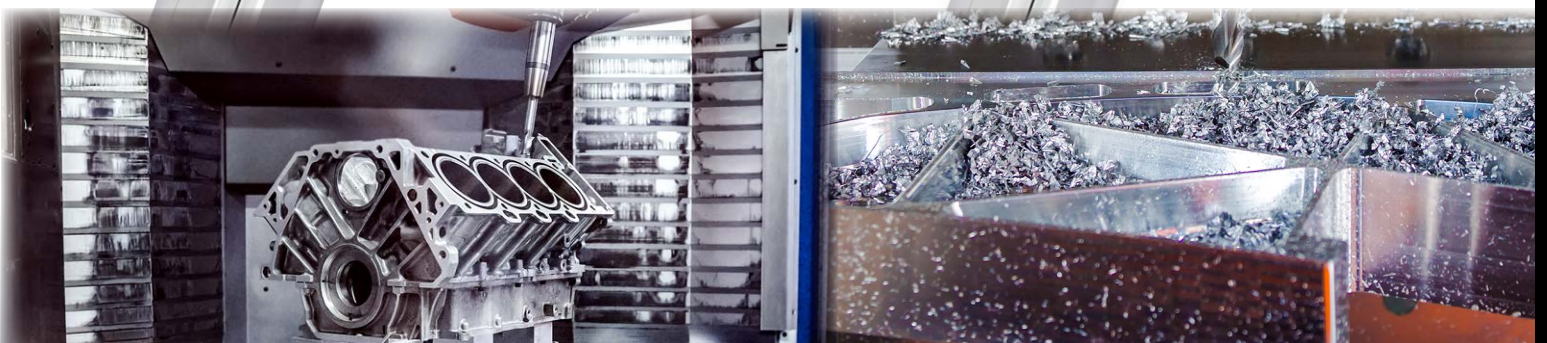
ALL4 Premium Coating

## Chipbreaker

Chip Management Geometry

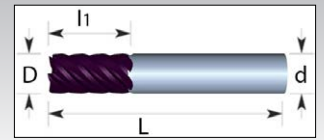
# NEW!

Ultra Premium Micrograin Carbide



|        |   |                   |
|--------|---|-------------------|
| P      | ● | Steel             |
| M      | ● | Stainless Steel   |
| K      | ● | Cast Iron         |
| N      | ○ | Non-Ferrous       |
| S      | ● | High Temp. Alloys |
| H      | ● | Hardened Steel    |
| ● BEST |   | ○ OK              |
|        |   | ○ NOT OPTIMAL     |

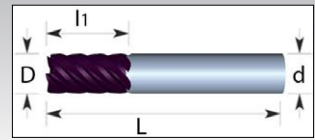
- Square & Corner Radius End
- 5, 6 & 7 Flute ALL4 Coated
- Variable Pitch, Reduces Chatter
- Round Shanks
- Center Cutting, Fractional Sizes
- Trochoidal & Dynamic Milling
- HEM (High Efficiency Milling)
- Chipbreakers Available
- Unique Honing Process
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- Slotting, Ramping, Profiling
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| HEM Square & Corner Radius End - Fractional |       |        |           |           |           |                     |           |           |                     |
|---|-------|--------|-----------|-----------|-----------|---------------------|-----------|-----------|---------------------|
| Cutter                                      | Shank | LOC    | Overall   | End       | ALL4      |                     |           |           |                     |
|   |       |        |           |           | 5 Flute   | 5 Flute Chipbreaker | 6 Flute   | 7 Flute   | 7 Flute Chipbreaker |
| D   | d     | l1     | L         | Face      |           |                     |           |           |                     |
| 1/4   | 1/4   | 3/4    | 2-1/2     | SQ        | BST-47608 | --                  | BST-45199 | --        | --                  |
|   |       | 3/4    | 2-1/2     | .015CR    | BST-47609 | --                  | --        | --        | --                  |
|   |       | 3/4    | 2-1/2     | .030CR    | BST-47610 | --                  | BST-45200 | --        | --                  |
|   |       | 1-1/8  | 3         | SQ        | BST-47611 | --                  | --        | --        | --                  |
|   |       | 1-1/8  | 3         | .015CR    | BST-47612 | --                  | --        | --        | --                  |
|   |       | 1-1/8  | 3         | .030CR    | BST-47613 | --                  | --        | --        | --                  |
| 5/16  | 5/16  | 13/16  | 2-1/2     | SQ        | BST-47614 | --                  | --        | --        | --                  |
|   |       | 13/16  | 2-1/2     | .015CR    | BST-47615 | --                  | --        | --        | --                  |
|   |       | 13/16  | 2-1/2     | .030CR    | BST-47616 | --                  | --        | --        | --                  |
|   |       | 1-1/4  | 3         | SQ        | BST-47617 | --                  | --        | --        | --                  |
|   |       | 1-1/4  | 3         | .015CR    | BST-47618 | --                  | --        | --        | --                  |
|   |       | 1-1/4  | 3         | .030CR    | BST-47619 | --                  | --        | --        | --                  |
|   |       | 2-1/8  | 4         | SQ        | BST-47620 | --                  | --        | --        | --                  |
|   |       | 2-1/8  | 4         | .015CR    | BST-47621 | --                  | --        | --        | --                  |
|   |       | 2-1/8  | 4         | .030CR    | BST-47622 | --                  | --        | --        | --                  |
| 3/8   | 3/8   | 1      | 2-1/2     | SQ        | BST-47623 | BST-47638           | BST-45201 | BST-47632 | BST-47647           |
|   |       | 1      | 2-1/2     | .015CR    | BST-47624 | BST-47639           | --        | BST-47633 | BST-47648           |
|   |       | 1      | 2-1/2     | .030CR    | BST-47625 | BST-47640           | BST-45202 | BST-47634 | BST-47649           |
|   |       | 1-1/4  | 3         | SQ        | BST-47626 | BST-47641           | --        | BST-47635 | BST-47650           |
|   |       | 1-1/4  | 3         | .015CR    | BST-47627 | BST-47642           | --        | BST-47636 | BST-47651           |
|   |       | 1-1/4  | 3         | .030CR    | BST-47628 | BST-47643           | --        | BST-47637 | BST-47652           |
|   |       | 2-1/8  | 4         | SQ        | BST-47629 | BST-47644           | --        | --        | --                  |
|   |       | 2-1/8  | 4         | .015CR    | BST-47630 | BST-47645           | --        | --        | --                  |
|   |       | 2-1/8  | 4         | .030CR    | BST-47631 | BST-47646           | --        | --        | --                  |
| 1/2   | 1/2   | 1-1/4  | 3         | SQ        | BST-47653 | BST-47685           | BST-45203 | BST-47669 | BST-47701           |
|   |       | 1-1/4  | 3         | .015CR    | BST-47654 | BST-47686           | --        | BST-47670 | BST-47702           |
|   |       | 1-1/4  | 3         | .030CR    | BST-47655 | BST-47687           | BST-45204 | BST-47671 | BST-47703           |
|   |       | 1-1/4  | 3         | .060CR    | BST-47656 | BST-47688           | --        | BST-47672 | --                  |
|   |       | 2-1/8  | 4         | SQ        | BST-47657 | BST-47689           | --        | BST-47673 | BST-47704           |
|   |       | 2-1/8  | 4         | .015CR    | BST-47658 | BST-47690           | --        | BST-47674 | BST-47705           |
|   |       | 2-1/8  | 4         | .030CR    | BST-47659 | BST-47691           | --        | BST-47675 | BST-47706           |
|   |       | 2-1/8  | 4         | .060CR    | BST-47660 | BST-47692           | --        | BST-47676 | --                  |
|   |       | 2-5/8  | 5         | SQ        | BST-47661 | BST-47693           | --        | BST-47677 | BST-47707           |
|   |       | 2-5/8  | 5         | .015CR    | BST-47662 | BST-47694           | --        | BST-47678 | BST-47708           |
|   |       | 2-5/8  | 5         | .030CR    | BST-47663 | BST-47695           | --        | BST-47679 | BST-47709           |
|   |       | 2-5/8  | 5         | .060CR    | BST-47664 | BST-47696           | --        | BST-47680 | --                  |
|   |       | 3-1/4  | 6         | SQ        | BST-47665 | BST-47697           | --        | BST-47681 | BST-47710           |
|   |       | 3-1/4  | 6         | .015CR    | BST-47666 | BST-47698           | --        | BST-47682 | BST-47711           |
|   |       | 3-1/4  | 6         | .030CR    | BST-47667 | BST-47699           | --        | BST-47683 | BST-47712           |
| 3-1/4                                       | 6     | .060CR | BST-47668 | BST-47700 | --        | BST-47684           | --        |           |                     |

|   |      |                    |
|---|------|--------------------|
| P | ●    | Steel              |
| M | ●    | Stainless Steel    |
| K | ●    | Cast Iron          |
| N | ○    | Non-Ferrous        |
| S | ●    | High Temp. Alloys  |
| H | ○    | Hardened Steel     |
| ● | BEST | ○ OK ○ NOT OPTIMAL |

- Square & Corner Radius End
- 5, 6 & 7 Flute ALL4 Coated
- Variable Pitch, Reduces Chatter
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- Ultra Premium Micrograin Carbide



Ultra High Performance

## HEM Square & Corner Radius End - Fractional

| Cutter | Shank | LOC   | Overall | End    | ALL4      |                     |           |           |                     |
|--------|-------|-------|---------|--------|-----------|---------------------|-----------|-----------|---------------------|
|        |       |       |         |        | 5 Flute   | 5 Flute Chipbreaker | 6 Flute   | 7 Flute   | 7 Flute Chipbreaker |
| D      | d     | Li    | L       | Face   |           |                     |           |           |                     |
| 5/8    | 5/8   | 1-1/2 | 3-1/2   | SQ     | BST-47713 | BST-47731           | BST-45205 | BST-47722 | BST-47740           |
|        |       | 1-1/2 | 3-1/2   | .030CR | BST-47714 | BST-47732           | BST-45206 | BST-47723 | BST-47741           |
|        |       | 1-1/2 | 3-1/2   | .060CR | BST-47715 | BST-47733           | --        | BST-47724 | --                  |
|        |       | 2-1/2 | 5       | SQ     | BST-47716 | BST-47734           | --        | BST-47725 | BST-47742           |
|        |       | 2-1/2 | 5       | .030CR | BST-47717 | BST-47735           | --        | BST-47726 | BST-47743           |
|        |       | 2-1/2 | 5       | .060CR | BST-47718 | BST-47736           | --        | BST-47727 | --                  |
|        |       | 3-1/4 | 6       | SQ     | BST-47719 | BST-47737           | --        | BST-47728 | BST-47744           |
|        |       | 3-1/4 | 6       | .030CR | BST-47720 | BST-47738           | --        | BST-47729 | BST-47745           |
|        |       | 3-1/4 | 6       | .060CR | BST-47721 | BST-47739           | --        | BST-47730 | --                  |
| 3/4    | 3/4   | 1-1/2 | 4       | SQ     | BST-47746 | BST-47764           | BST-45207 | BST-47755 | BST-47770           |
|        |       | 1-1/2 | 4       | .030CR | BST-47747 | BST-47765           | BST-45208 | BST-47756 | BST-47771           |
|        |       | 1-1/2 | 4       | .060CR | BST-47748 | --                  | --        | BST-47757 | --                  |
|        |       | 2-1/2 | 5       | SQ     | BST-47749 | BST-47766           | --        | BST-47758 | BST-47772           |
|        |       | 2-1/2 | 5       | .030CR | BST-47750 | BST-47767           | --        | BST-47759 | BST-47773           |
|        |       | 2-1/2 | 5       | .060CR | BST-47751 | --                  | --        | BST-47760 | --                  |
|        |       | 3-1/4 | 6       | SQ     | BST-47752 | BST-47768           | --        | BST-47761 | BST-47774           |
|        |       | 3-1/4 | 6       | .030CR | BST-47753 | BST-47769           | --        | BST-47762 | BST-47775           |
|        |       | 3-1/4 | 6       | .060CR | BST-47754 | --                  | --        | BST-47763 | --                  |
| 1      | 1     | 1-1/2 | 4       | SQ     | BST-47776 | BST-47794           | BST-45197 | BST-47785 | BST-47800           |
|        |       | 1-1/2 | 4       | .030CR | BST-47777 | BST-47795           | BST-45198 | BST-47786 | BST-47801           |
|        |       | 1-1/2 | 4       | .060CR | BST-47778 | --                  | --        | BST-47787 | --                  |
|        |       | 2-5/8 | 5       | SQ     | BST-47779 | BST-47796           | --        | BST-47788 | BST-47802           |
|        |       | 2-5/8 | 5       | .030CR | BST-47780 | BST-47797           | --        | BST-47789 | BST-47803           |
|        |       | 2-5/8 | 5       | .060CR | BST-47781 | --                  | --        | BST-47790 | --                  |
|        |       | 3-1/4 | 6       | SQ     | BST-47782 | BST-47798           | --        | BST-47791 | BST-47804           |
|        |       | 3-1/4 | 6       | .030CR | BST-47783 | BST-47799           | --        | BST-47792 | BST-47805           |
|        |       | 3-1/4 | 6       | .060CR | BST-47784 | --                  | --        | BST-47793 | --                  |



## Ultra High Performance HEM Speeds & Feeds

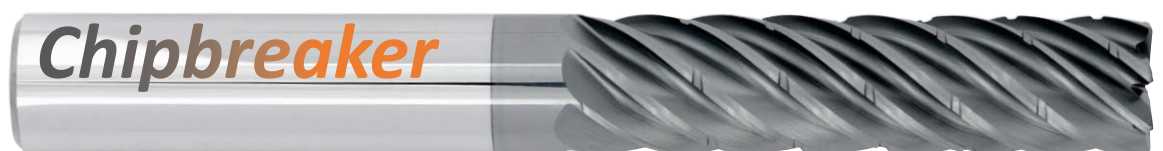
| Material Classification           | Speed<br>SFM | Feed Per Tooth By End Mill Diameter (IPT) |       |       |       |       |       |       |       |       |
|-----------------------------------|--------------|---|-------|-------|-------|-------|-------|-------|-------|-------|
|                                   |              | 1/4"                                      | 5/16" | 3/8"  | 7/16" | 1/2"  | 5/8"  | 3/4"  | 1"    |       |
| Softer Cast Iron                  | K            | 375-950                                   | .0030 | .0032 | .0035 | .0037 | .0040 | .0045 | .0070 | .0090 |
| Harder Cast Iron                  |              | 150-475                                   | .0018 | .0020 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Ductile Iron                      |              | 200-900                                   | .0020 | .0022 | .0025 | .0027 | .0030 | .0040 | .0050 | .0070 |
| Malleable Iron                    |              | 275-850                                   | .0020 | .0025 | .0030 | .0035 | .0040 | .0050 | .0060 | .0080 |
| Low Carbon Steels (1020 & Under)  | P            | 350-900                                   | .0020 | .0025 | .0030 | .0035 | .0040 | .0050 | .0060 | .0080 |
| Medium Carbon Steels (1030-1060)  |              | 200-675                                   | .0025 | .0026 | .0027 | .0028 | .0030 | .0040 | .0050 | .0060 |
| Alloy Steels Hardened to 35 Rc    |              | 190-545                                   | .0020 | .0021 | .0022 | .0023 | .0025 | .0027 | .0030 | .0040 |
| Alloy Steels Hardened to 40-50 Rc |              | 90-275                                    | .0012 | .0012 | .0013 | .0014 | .0015 | .0026 | .0030 | .0035 |
| Die Steels Hardened to 51-60 Rc   |              | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Tool Steels                       | P            | 175-525                                   | .0020 | .0022 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Mold Steels                       |              | 300-725                                   | .0020 | .0022 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Softer Stainless Steels           | M            | 300-520                                   | .0020 | .0022 | .0025 | .0022 | .0030 | .0040 | .0050 | .0070 |
| Harder Stainless Steels           |              | 150-475                                   | .0015 | .0016 | .0017 | .0018 | .0020 | .0030 | .0040 | .0060 |
| Monel & High Nickel Steel         | S            | 75-250                                    | .0015 | .0022 | .0025 | .0027 | .0030 | .0035 | .0040 | .0050 |
| Softer Titanium                   |              | 125-425                                   | .0015 | .0022 | .0025 | .0027 | .0030 | .0040 | .0050 | .0070 |
| Harder Titanium                   |              | 50-195                                    | .0010 | .0016 | .0017 | .0018 | .0020 | .0022 | .0026 | .0030 |
| Nickel Based High Temp Alloys     |              | 50-175                                    | .0014 | .0014 | .0015 | .0016 | .0017 | .0018 | .0020 | .0023 |

**Note: These are guidelines only & the following points are important to consider:**

- High Efficiency Milling (HEM) utilizes high axial depths of cut with low radial depths of cut. Make certain to increase the programmed feed rate to compensate for Radial Chip Thinning Factor (RCTF). Consult a formula or app to calculate.
- The above parameters are recommended starting points only. If the tool is working well, without vibrations or significant noise, increase the SFM and/or Feed Per Tooth in 5-10% increments.
- Optimum speeds & feeds will depend upon material, setup, machine conditions & tool deflection. Higher or lower parameters may be required to achieve optimum machining conditions.
- For Plunging or Ramping the feed rate should be reduced by about 50%.
- Climb Milling is preferred to Conventional Milling.



- Finisher design provides the best surface finish
- Use when chip management isn't an issue such as periphery milling applications



- Chipbreaker design allows for chip size management
- With managed chip sizes, chip augers and conveyors are kept clean
- Chips are easily flushed or blown away from being re-cut & damaging the tool
- Excellent for slotting & pocketing applications

# Precision Carbide Custom Order

## End Face:

- Square
- Ball Nose
- Corner Radius Size: \_\_\_\_\_
- Chamfer Size: \_\_\_\_\_

## Dimensions:

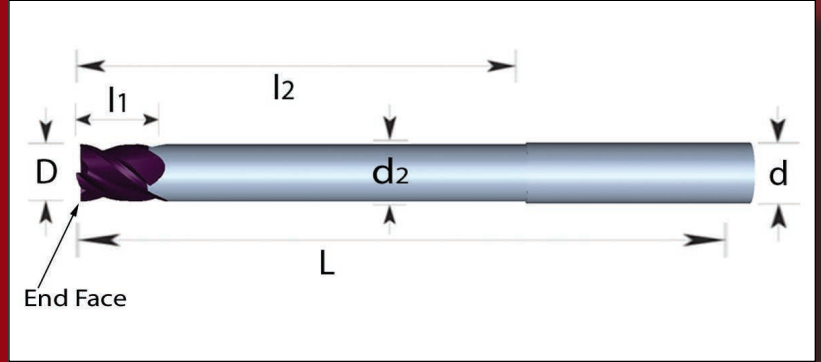
- L** - Overall Length (OAL): \_\_\_\_\_
- d** - Shank Diameter: \_\_\_\_\_
- l<sub>1</sub>** - Length of Cut (LOC): \_\_\_\_\_
- D** - Tool Diameter: \_\_\_\_\_
- Number of Flutes: \_\_\_\_\_

## Shank:

- Round
- Weldon Flat

## Coating:

- Uncoated
- ALL4 (Aluminum Chromium Titanium Nitride)
- ZrN (Zirconium Nitride)
- DLC (Diamond Like Carbon)



## Neck Relief:

- No
- Yes
- d<sub>2</sub>** - Neck Relief Diameter: \_\_\_\_\_
- l<sub>2</sub>** - Length below Shank (LBS): \_\_\_\_\_

## Tapered:

- No
- Yes
- Taper Angle Per Side: \_\_\_\_\_
- D** - Tip Diameter: \_\_\_\_\_

Quantity Required *(Note: minimums will apply based on size & style):* \_\_\_\_\_

Material(s) being machined: \_\_\_\_\_

## Series:

- General Purpose**
- High Performance**
- Ultra High Performance**
- Ultra HP Aluminum**

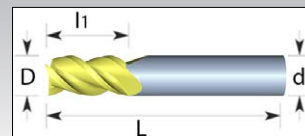


|   |                   |
|---|-------------------|
| P | Steel             |
| M | Stainless Steel   |
| K | Cast Iron         |
| N | ● Non-Ferrous     |
| S | High Temp. Alloys |
| H | Hardened Steel    |

● **BEST**

- Square & Corner Radius End
- 3 Flute Uncoated & ZrN
- Variable Pitch, Reduces Chatter
- Round Shanks, Center Cutting
- With or Without Chipbreakers
- Fractional Sizes

- 36 Degree Helix
- Unique Polishing Process
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping, Profiling
- Ultra Premium Micrograin Carbide

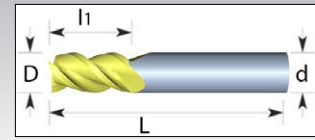


| Square & Corner Radius - 3 Flute Medium/Roughing |       |       |         |        |                  |                  |                  |                  |  |
|--|-------|-------|---------|--------|------------------|------------------|------------------|------------------|--|
| Cutter   | Shank | LOC   | Overall | End    | Uncoated         |                  | ZrN              |                  |  |
|  |       |       |         |        | D                | d                | l1               | L                |  |
| 1/4  | 1/4   | 3/4   | 2-1/2   | SQ     | <b>BST-47214</b> | --               | <b>BST-47265</b> | --               |  |
|  |       | 3/4   | 2-1/2   | .015CR | <b>BST-47215</b> | --               | <b>BST-47266</b> | --               |  |
|  |       | 3/4   | 2-1/2   | .030CR | <b>BST-47217</b> | --               | --               | --               |  |
|  |       | 3/4   | 2-1/2   | .060CR | <b>BST-47218</b> | --               | --               | --               |  |
| 5/16   | 5/16  | 13/16 | 2-1/2   | SQ     | <b>BST-47220</b> | --               | <b>BST-47269</b> | --               |  |
|  |       | 13/16 | 2-1/2   | .030CR | <b>BST-47221</b> | --               | <b>BST-47270</b> | --               |  |
|  |       | 13/16 | 2-1/2   | .060CR | <b>BST-47222</b> | --               | --               | --               |  |
| 3/8  | 3/8   | 1     | 2-1/2   | SQ     | <b>BST-47223</b> | --               | <b>BST-47271</b> | --               |  |
|  |       | 1     | 2-1/2   | .030CR | <b>BST-47224</b> | <b>BST-47226</b> | <b>BST-47272</b> | <b>BST-47273</b> |  |
|  |       | 1     | 2-1/2   | .060CR | <b>BST-47225</b> | --               | --               | --               |  |
|  |       | 1-1/8 | 3       | SQ     | <b>BST-47227</b> | --               | <b>BST-47274</b> | --               |  |
|  |       | 1-1/8 | 3       | .030CR | <b>BST-47228</b> | <b>BST-47229</b> | <b>BST-47275</b> | <b>BST-47276</b> |  |
| 1/2  | 1/2   | 1-1/4 | 3       | SQ     | <b>BST-47230</b> | --               | <b>BST-47277</b> | --               |  |
|  |       | 1-1/4 | 3       | .030CR | <b>BST-47231</b> | <b>BST-47235</b> | <b>BST-47278</b> | <b>BST-47279</b> |  |
|  |       | 1-1/4 | 3       | .060CR | <b>BST-47232</b> | --               | --               | --               |  |
|  |       | 1-1/4 | 3       | .090CR | <b>BST-47233</b> | --               | --               | --               |  |
|  |       | 1-1/4 | 3       | .120CR | <b>BST-47234</b> | --               | --               | --               |  |
|  |       | 2     | 4       | SQ     | <b>BST-47236</b> | --               | <b>BST-47280</b> | --               |  |
|  |       | 2     | 4       | .030CR | <b>BST-47237</b> | <b>BST-47238</b> | <b>BST-47281</b> | <b>BST-47282</b> |  |
| 5/8  | 5/8   | 1-1/4 | 3-1/2   | SQ     | <b>BST-47239</b> | --               | <b>BST-47283</b> | --               |  |
|  |       | 1-1/4 | 3-1/2   | .030CR | <b>BST-47240</b> | <b>BST-47244</b> | <b>BST-47284</b> | <b>BST-47285</b> |  |
|  |       | 1-1/4 | 3-1/2   | .060CR | <b>BST-47241</b> | --               | --               | --               |  |
|  |       | 1-1/4 | 3-1/2   | .090CR | <b>BST-47242</b> | --               | --               | --               |  |
|  |       | 1-1/4 | 3-1/2   | .120CR | <b>BST-47243</b> | --               | --               | --               |  |
|  |       | 2-1/4 | 5       | SQ     | <b>BST-47245</b> | --               | <b>BST-47286</b> | --               |  |
| 3/4  | 3/4   | 2-1/4 | 5       | .030CR | <b>BST-47246</b> | <b>BST-47247</b> | <b>BST-47287</b> | <b>BST-47288</b> |  |
|  |       | 1-5/8 | 4       | SQ     | <b>BST-47248</b> | --               | <b>BST-47289</b> | --               |  |
|  |       | 1-5/8 | 4       | .030CR | <b>BST-47249</b> | <b>BST-47253</b> | <b>BST-47290</b> | <b>BST-47291</b> |  |
|  |       | 1-5/8 | 4       | .060CR | <b>BST-47250</b> | --               | --               | --               |  |
|  |       | 1-5/8 | 4       | .090CR | <b>BST-47251</b> | --               | --               | --               |  |
|  |       | 1-5/8 | 4       | .120CR | <b>BST-47252</b> | --               | --               | --               |  |
| 1  | 1     | 2-1/4 | 5       | SQ     | <b>BST-47254</b> | --               | <b>BST-47292</b> | --               |  |
|  |       | 2-1/4 | 5       | .030CR | <b>BST-47255</b> | <b>BST-47256</b> | <b>BST-47293</b> | <b>BST-47294</b> |  |
|  |       | 1-1/2 | 4       | SQ     | <b>BST-47257</b> | --               | <b>BST-47295</b> | --               |  |
|  |       | 1-1/2 | 4       | .030CR | <b>BST-47258</b> | <b>BST-47261</b> | <b>BST-47296</b> | <b>BST-47297</b> |  |
|  |       | 1-1/2 | 4       | .060CR | <b>BST-47259</b> | --               | --               | --               |  |
| 1  | 1     | 1-1/2 | 4       | .120CR | <b>BST-47260</b> | --               | --               | --               |  |
|  |       | 2-1/4 | 5       | SQ     | <b>BST-47262</b> | --               | <b>BST-47298</b> | --               |  |
|  |       | 2-1/4 | 5       | .030CR | <b>BST-47263</b> | <b>BST-47264</b> | <b>BST-47299</b> | <b>BST-47300</b> |  |

|   |                   |
|---|-------------------|
| P | Steel             |
| M | Stainless Steel   |
| K | Cast Iron         |
| N | Non-Ferrous       |
| S | High Temp. Alloys |
| H | Hardened Steel    |

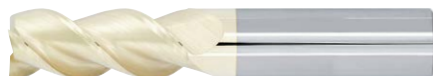
● **BEST**

- Square & Corner Radius End
- 2 & 3 Flute Uncoated, ZrN & DLC
- Variable Pitch, Reduces Chatter
- Round Shanks
- Center Cutting
- Fractional Sizes
- 45 Degree Helix
- Unique Polishing Process
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping, Profiling
- Ultra Premium Micrograin Carbide



## Square & Corner Radius - 2 & 3 Flute Medium/Finishing

| Cutter<br>D | Shank<br>d | LOC<br>l1 | Overall<br>L | End<br>Face | Uncoated  |           | ZrN       |           | DLC       |           |
|-------------|------------|-----------|--------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|
|             |            |           |              |             | 2 Flute   | 3 Flute   | 2 Flute   | 3 Flute   | 2 Flute   | 3 Flute   |
| 1/8         | 1/8        | 1/2       | 1-1/2        | SQ          | BST-47072 | BST-47073 | --        | --        | --        | --        |
| 3/16        | 3/16       | 5/8       | 2            | SQ          | BST-47074 | BST-47076 | BST-46958 | BST-46960 | BST-47188 | BST-47189 |
|             |            | 3/4       | 2-1/2        | SQ          | BST-47106 | BST-47107 | BST-46990 | BST-46991 | --        | --        |
|             |            | 1-1/8     | 3            | SQ          | BST-47154 | BST-47155 | BST-47038 | BST-47039 | --        | --        |
| 1/4         | 1/4        | 3/4       | 2-1/2        | SQ          | BST-47077 | BST-47079 | BST-46961 | BST-46963 | BST-47190 | BST-47192 |
|             |            | 3/4       | 2-1/2        | .020"R      | BST-47078 | BST-47080 | BST-46962 | BST-46964 | BST-47191 | BST-47193 |
|             |            | 1-1/8     | 3            | SQ          | BST-47108 | BST-47109 | BST-46992 | BST-46993 | --        | --        |
|             |            | 1-1/2     | 4            | SQ          | BST-47156 | BST-47157 | BST-47040 | BST-47041 | --        | --        |
|             |            | 13/16     | 2-1/2        | SQ          | BST-47082 | BST-47084 | BST-46966 | BST-46968 | BST-47194 | BST-47196 |
| 5/16        | 5/16       | 13/16     | 2-1/2        | .020"R      | BST-47083 | BST-47086 | BST-46967 | BST-46970 | BST-47195 | BST-47197 |
|             |            | 1-1/8     | 3            | SQ          | BST-47110 | BST-47111 | BST-46994 | BST-46995 | --        | --        |
|             |            | 1-5/8     | 4            | SQ          | BST-47158 | BST-47159 | BST-47042 | BST-47043 | --        | --        |
| 3/8         | 3/8        | 1         | 2-1/2        | SQ          | BST-47088 | BST-47090 | BST-46972 | BST-46974 | BST-47198 | BST-47200 |
|             |            | 1         | 2-1/2        | .020"R      | BST-47089 | BST-47091 | BST-46973 | BST-46975 | BST-47199 | BST-47201 |
|             |            | 1-1/8     | 3            | SQ          | BST-47112 | BST-47113 | BST-46996 | BST-46997 | --        | --        |
| 1/2         | 1/2        | 1-3/4     | 4            | SQ          | BST-47160 | BST-47161 | BST-47044 | BST-47045 | --        | --        |
|             |            | 1-1/4     | 3            | SQ          | BST-47092 | BST-47094 | BST-46976 | BST-46978 | BST-47202 | BST-47204 |
|             |            | 1-1/4     | 3            | .030"R      | BST-47093 | BST-47095 | BST-46977 | BST-46979 | BST-47203 | BST-47205 |
|             |            | 2         | 4            | SQ          | BST-47114 | BST-47115 | BST-46998 | BST-46999 | --        | --        |
| 5/8         | 5/8        | 3         | 6            | SQ          | BST-47162 | BST-47163 | BST-47046 | BST-47047 | --        | --        |
|             |            | 1-1/4     | 3-1/2        | SQ          | BST-47096 | BST-47098 | BST-46980 | BST-46982 | BST-47206 | BST-47208 |
|             |            | 1-1/4     | 3-1/2        | .030"R      | BST-47097 | BST-47099 | BST-46981 | BST-46983 | BST-47207 | BST-47209 |
|             |            | 2-1/4     | 5            | SQ          | BST-47116 | BST-47117 | BST-47000 | BST-47001 | --        | --        |
| 3/4         | 3/4        | 3         | 6            | SQ          | BST-47164 | BST-47165 | BST-47048 | BST-47049 | --        | --        |
|             |            | 1-1/2     | 4            | SQ          | BST-47100 | BST-47102 | BST-46984 | BST-46986 | BST-47210 | BST-47212 |
|             |            | 1-1/2     | 4            | .030"R      | BST-47101 | BST-47103 | BST-46985 | BST-46987 | BST-47211 | BST-47213 |
| 1           | 1          | 2-1/4     | 5            | SQ          | BST-47118 | BST-47119 | BST-47002 | BST-47003 | --        | --        |
|             |            | 3         | 6            | SQ          | BST-47166 | BST-47167 | BST-47050 | BST-47051 | --        | --        |
|             |            | 1-1/2     | 4            | SQ          | BST-47068 | BST-47070 | BST-46954 | BST-46956 | BST-47184 | BST-47186 |
|             |            | 1-1/2     | 4            | .030"R      | BST-47069 | BST-47071 | BST-46955 | BST-46957 | BST-47185 | BST-47187 |
| 1           | 1          | 2-1/4     | 5            | SQ          | BST-47104 | BST-47105 | BST-46988 | BST-46989 | --        | --        |
|             |            | 3         | 6            | SQ          | BST-47152 | BST-47153 | BST-47036 | BST-47037 | --        | --        |

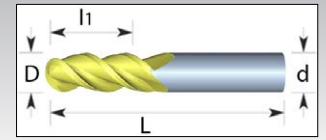


|   |                   |
|---|-------------------|
| P | Steel             |
| M | Stainless Steel   |
| K | Cast Iron         |
| N | ● Non-Ferrous     |
| S | High Temp. Alloys |
| H | Hardened Steel    |

● **BEST**

- Ball Nose End
- 2 & 3 Flute Uncoated & ZrN
- Variable Pitch, Reduces Chatter
- Round Shanks
- Center Cutting
- Fractional Sizes

- Extreme Production
- Unique Polishing Process
- Unique Honing Process
- Plunging, Pocketing
- Slotting, Ramping, Profiling
- Ultra Premium Micrograin Carbide



## Ball Nose - Fractional

| Cutter<br>D | Shank<br>d | LOC<br>l1 | Overall<br>L | End<br>Face | Uncoated  |           | ZrN       |           |
|-------------|------------|-----------|--------------|-------------|-----------|-----------|-----------|-----------|
|             |            |           |              |             | 2 Flute   | 3 Flute   | 2 Flute   | 3 Flute   |
| 3/16        | 3/16       | 5/8       | 2            | BN          | BST-47122 | BST-47123 | BST-47006 | BST-47007 |
|             |            | 3/4       | 2-1/2        | BN          | BST-47138 | BST-47139 | BST-47022 | BST-47023 |
|             |            | 1-1/8     | 3            | BN          | BST-47170 | BST-47171 | BST-47054 | BST-47055 |
| 1/4         | 1/4        | 3/4       | 2-1/2        | BN          | BST-47124 | BST-47125 | BST-47008 | BST-47009 |
|             |            | 1-1/8     | 3            | BN          | BST-47140 | BST-47141 | BST-47024 | BST-47025 |
|             |            | 1-1/2     | 4            | BN          | BST-47172 | BST-47173 | BST-47056 | BST-47057 |
| 5/16        | 5/16       | 13/16     | 2-1/2        | BN          | BST-47126 | BST-47127 | BST-47010 | BST-47011 |
|             |            | 1-1/8     | 3            | BN          | BST-47142 | BST-47143 | BST-47026 | BST-47027 |
|             |            | 1-5/8     | 4            | BN          | BST-47174 | BST-47175 | BST-47058 | BST-47059 |
| 3/8         | 3/8        | 1         | 2-1/2        | BN          | BST-47128 | BST-47129 | BST-47012 | BST-47013 |
|             |            | 1-1/8     | 3            | BN          | BST-47144 | BST-47145 | BST-47028 | BST-47029 |
|             |            | 1-3/4     | 4            | BN          | BST-47176 | BST-47177 | BST-47060 | BST-47061 |
| 1/2         | 1/2        | 1-1/4     | 3            | BN          | BST-47130 | BST-47131 | BST-47014 | BST-47015 |
|             |            | 2         | 4            | BN          | BST-47146 | BST-47147 | BST-47030 | BST-47031 |
|             |            | 3         | 6            | BN          | BST-47178 | BST-47179 | BST-47062 | BST-47063 |
| 5/8         | 5/8        | 1-1/4     | 3-1/2        | BN          | BST-47132 | BST-47133 | BST-47016 | BST-47017 |
|             |            | 2-1/4     | 5            | BN          | BST-47148 | BST-47149 | BST-47032 | BST-47033 |
|             |            | 3         | 6            | BN          | BST-47180 | BST-47181 | BST-47064 | BST-47065 |
| 3/4         | 3/4        | 1-1/2     | 4            | BN          | BST-47134 | BST-47135 | BST-47018 | BST-47019 |
|             |            | 2-1/4     | 5            | BN          | BST-47150 | BST-47151 | BST-47034 | BST-47035 |
|             |            | 3         | 6            | BN          | BST-47182 | BST-47183 | BST-47066 | BST-47067 |
| 1           | 1          | 1-1/2     | 4            | BN          | BST-47120 | BST-47121 | BST-47004 | BST-47005 |
|             |            | 2-1/4     | 5            | BN          | BST-47136 | BST-47137 | BST-47020 | BST-47021 |
|             |            | 3         | 6            | BN          | BST-47168 | BST-47169 | BST-47052 | BST-47053 |



## Ultra HP Aluminum Speeds & Feeds

| Material Classification          | Speed | Feed Per Tooth By End Mill Diameter (IPT) |       |       |       |       |       |       |       |       |
|----------------------------------|-------|---|-------|-------|-------|-------|-------|-------|-------|-------|
|                                  |       | SFM                                       | 1/4"  | 5/16" | 3/8"  | 7/16" | 1/2"  | 5/8"  | 3/4"  | 1"    |
| Aluminum Alloys & Aluminum       | N     | 900-1800                                  | .0030 | .0035 | .0040 | .0045 | .0050 | .0060 | .0070 | .0090 |
| Copper Alloys & Copper           |       | 525-1275                                  | .0030 | .0035 | .0035 | .0040 | .0040 | .0045 | .0050 | .0070 |
| Bronze & Brass                   |       | 375-600                                   | .0030 | .0035 | .0035 | .0040 | .0040 | .0045 | .0050 | .0060 |
| Graphite                         |       | 500-1200                                  | .0040 | .0045 | .0045 | .0045 | .0045 | .0050 | .0060 | .0080 |
| Plastics                         |       | 600-1650                                  | .0040 | .0045 | .0050 | .0060 | .0070 | .0090 | .0110 | .0160 |
| Softer Cast Iron                 | K     | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Harder Cast Iron                 |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Ductile Iron                     |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Malleable Iron                   |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Low Carbon Steels (1020 & Under) | P     | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Medium Carbon Steels (1030-1060) |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Alloy Steels Hardened to 35 Rc   |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Alloy Steels Hardened to 50 Rc   |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Die Steels Hardened to 60 Rc     |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Tool Steels                      | P     | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Mold Steels                      |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Softer Stainless Steels          | M     | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Harder Stainless Steels          |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Monel & High Nickel Steel        | S     | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Softer Titanium                  |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Harder Titanium                  |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |
| Nickel Based High Temp Alloys    |       | --  | --    | --    | --    | --    | --    | --    | --    | --    |

**Note: These are guidelines only & the following points are important to consider:**

- Higher Feed Per Tooth should be used to start for radial depths of cut less than 25% of the tool diameter.
- The above recommendations are for axial lengths of cut not to exceed 1.5 times the tool diameter for profiling and 1 times the diameter for full slotting.
- The above parameters are recommended starting points only. If the tool is working well, without vibrations or significant noise, increase the SFM and/or Feed Per Tooth in 5-10% increments.
- Optimum speeds & feeds will depend upon material, setup, machine conditions & tool deflection. Higher or lower parameters may be required to achieve optimum machining conditions.
- For Light Radial Depths of cut, make certain to increase the feed rate to compensate for Radial Chip Thinning Factor (RCTF). Consult a formula or app to calculate.
- For Plunging or Ramping the feed rate should be reduced by about 50%.
- Climb Milling is preferred to Conventional Milling.



# ***Precision Carbide***

**Buckeye Saws & Tools**  
792 Jim Lachey Drive  
St. Henry, OH. 45883  
P: 419.763.4300

[www.buckeyesaws.com](http://www.buckeyesaws.com)  
[info@buckeyesaws.com](mailto:info@buckeyesaws.com)