



# CrazyMill Cool Ball - Type A - Semi-finishing

RECOMMENDATION FOR USE

● Excellent | ● Good | ○ Acceptable | ☒ Not recommended

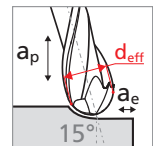
|   |                |                |
|---|----------------|----------------|
| P | N              | S <sub>3</sub> |
| M | S <sub>1</sub> | H <sub>1</sub> |
| K | S <sub>2</sub> | H <sub>2</sub> |

**V<sub>c</sub>** [m/min] | [SFM]  
**f<sub>z</sub>** [mm] | [IPT]  
**d<sub>eff</sub>** [mm] | [inch]

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

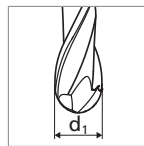
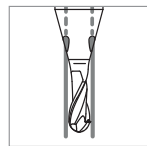
| Materials group           | Material                | AISI/ASTM/UNS | Ød1  .012"     |                  | Ød1  .016"     |                | Ød1  .020"       |                | Ød1  .024"     |                  | Ød1  .032"     |                | Ød1  .039"       |                | Ød1  .047"     |                  | Ød1  .059"     |                | Ød1  .071"       |                | Ød1  .079"     |                  | Ød1  .098"     |                | Ød1  .118"       |                | Ød1  .158"     |                  | Ød1  .236"     |                | Ød1  .315"       |                |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
|---------------------------|-------------------------|---------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|----------------|------------------|----------------|------|--------|--------|------|--------|--------|------|--------|--------|------|--------|--------|------|--------|--------|--|
|                           |                         |               | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> | v <sub>c</sub> | d <sub>eff</sub> | f <sub>z</sub> |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| N                         | Aluminium alloy wrought | ASTM 6351     | 55             | 0.29             | 0.006          | 73             | 0.39             | 0.008          | 92             | 0.48             | 0.012          | 100            | 0.60             | 0.014          | 100            | 0.80             | 0.016          | 140            | 1.00             | 0.018          | 140            | 1.20             | 0.020          | 200            | 1.50             | 0.026          | 200            | 1.80             | 0.028          | 220            | 2.00             | 0.036          | 220  | 2.50   | 0.040  | 240  | 3.00   | 0.058  | 260  | 4.00   | 0.060  | 260  | 6.00   | 0.060  | 260  | 8.00   | 0.060  |  |
|                           |                         | ASTM 7075     | 180            | .011             | .00024         | 240            | .015             | .00031         | 302            | .019             | .00047         | 328            | .024             | .00055         | 328            | .032             | .00063         | 459            | .039             | .00071         | 459            | .047             | .00079         | 656            | .059             | .00102         | 656            | .071             | .00110         | 722            | .079             | .00142         | 722  | .098   | .00157 | 787  | .118   | .00228 | 853  | .158   | .00236 | 853  | .236   | .00236 | 853  | .315   | .00236 |  |
|                           | Aluminium alloy cast    | ASTM A380     | 55             | 0.29             | 0.006          | 73             | 0.39             | 0.008          | 92             | 0.48             | 0.012          | 100            | 0.60             | 0.014          | 100            | 0.80             | 0.016          | 140            | 1.00             | 0.018          | 140            | 1.20             | 0.020          | 200            | 1.50             | 0.026          | 200            | 1.80             | 0.028          | 220            | 2.00             | 0.036          | 220  | 2.50   | 0.040  | 240  | 3.00   | 0.058  | 260  | 4.00   | 0.060  | 260  | 6.00   | 0.060  | 260  | 8.00   | 0.060  |  |
|                           |                         | UNS A03590    | 180            | .011             | .00024         | 240            | .015             | .00031         | 302            | .019             | .00047         | 328            | .024             | .00055         | 328            | .032             | .00063         | 459            | .039             | .00071         | 459            | .047             | .00079         | 656            | .059             | .00102         | 656            | .071             | .00110         | 722            | .079             | .00142         | 722  | .098   | .00157 | 787  | .118   | .00228 | 853  | .158   | .00236 | 853  | .236   | .00236 | 853  | .315   | .00236 |  |
|                           | Copper                  | UNS C10100    | 55             | 0.29             | 0.006          | 73             | 0.39             | 0.008          | 92             | 0.48             | 0.012          | 100            | 0.60             | 0.014          | 100            | 0.80             | 0.016          | 140            | 1.00             | 0.018          | 140            | 1.20             | 0.020          | 200            | 1.50             | 0.026          | 200            | 1.80             | 0.028          | 220            | 2.00             | 0.036          | 220  | 2.50   | 0.040  | 240  | 3.00   | 0.058  | 260  | 4.00   | 0.060  | 260  | 6.00   | 0.060  | 260  | 8.00   | 0.060  |  |
|                           |                         | UNS C11000    | 180            | .011             | .00024         | 240            | .015             | .00031         | 302            | .019             | .00047         | 328            | .024             | .00055         | 328            | .032             | .00071         | 459            | .039             | .00079         | 459            | .047             | .00087         | 656            | .059             | .00102         | 656            | .071             | .00110         | 722            | .079             | .00142         | 722  | .098   | .00157 | 787  | .118   | .00228 | 853  | .158   | .00236 | 853  | .236   | .00236 | 853  | .315   | .00236 |  |
|                           | Brass lead free         | UNS C27400    | 55             | 0.29             | 0.006          | 73             | 0.39             | 0.008          | 92             | 0.48             | 0.012          | 100            | 0.60             | 0.014          | 100            | 0.80             | 0.016          | 140            | 1.00             | 0.020          | 140            | 1.20             | 0.022          | 200            | 1.50             | 0.026          | 200            | 1.80             | 0.028          | 220            | 2.00             | 0.036          | 220  | 2.50   | 0.040  | 240  | 3.00   | 0.058  | 260  | 4.00   | 0.060  | 260  | 6.00   | 0.060  | 260  | 8.00   | 0.060  |  |
|                           |                         | UNS C28000    | 180            | .011             | .00024         | 240            | .015             | .00031         | 302            | .019             | .00055         | 328            | .024             | .00063         | 328            | .032             | .00071         | 459            | .039             | .00079         | 459            | .047             | .00087         | 656            | .059             | .00102         | 656            | .071             | .00110         | 722            | .079             | .00142         | 722  | .098   | .00157 | 787  | .118   | .00228 | 853  | .158   | .00236 | 853  | .236   | .00236 | 853  | .315   | .00236 |  |
| Brass, Bronze Rm<400N/mm² | UNS C38500              | 55            | 0.29           | 0.006            | 73             | 0.39           | 0.008            | 92             | 0.48           | 0.012            | 100            | 0.60           | 0.014            | 100            | 0.80           | 0.016            | 140            | 1.00           | 0.020            | 140            | 1.20           | 0.022            | 200            | 1.50           | 0.026            | 200            | 1.80           | 0.028            | 220            | 2.00           | 0.036            | 220            | 2.50 | 0.040  | 240    | 3.00 | 0.058  | 260    | 4.00 | 0.060  | 260    | 6.00 | 0.060  | 260    | 8.00 | 0.060  |        |  |
|                           | UNS C51900              | 180           | .011           | .00024           | 240            | .015           | .00031           | 302            | .019           | .00055           | 328            | .024           | .00063           | 328            | .032           | .00071           | 459            | .039           | .00079           | 459            | .047           | .00087           | 656            | .059           | .00102           | 656            | .071           | .00110           | 722            | .079           | .00142           | 722            | .098 | .00157 | 787    | .118 | .00228 | 853    | .158 | .00236 | 853    | .236 | .00236 | 853    | .315 | .00236 |        |  |
| Bronze Rm<600N/mm²        | UNS C63000              | 55            | 0.29           | 0.006            | 73             | 0.39           | 0.008            | 92             | 0.48           | 0.012            | 100            | 0.60           | 0.014            | 100            | 0.80           | 0.016            | 140            | 1.00           | 0.018            | 140            | 1.20           | 0.020            | 200            | 1.50           | 0.026            | 200            | 1.80           | 0.028            | 220            | 2.00           | 0.036            | 220            | 2.50 | 0.040  | 240    | 3.00 | 0.058  | 260    | 4.00 | 0.060  | 260    | 6.00 | 0.060  | 260    | 8.00 | 0.060  |        |  |
|                           | UNS C63200              | 180           | .011           | .00024           | 240            | .015           | .00031           | 302            | .019           | .00047           | 328            | .024           | .00055           | 328            | .032           | .00063           | 459            | .039           | .00071           | 459            | .047           | .00079           | 656            | .059           | .00102           | 656            | .071           | .00110           | 722            | .079           | .00142           | 722            | .098 | .00157 | 787    | .118 | .00228 | 853    | .158 | .00236 | 853    | .236 | .00236 | 853    | .315 | .00236 |        |  |
| S <sub>1</sub>            | Super alloys            | Inconel 625   |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
|                           |                         | Inconel 718   | 55             | 0.29             | 0.003          | 73             | 0.39             | 0.004          | 92             | 0.48             | 0.004          | 100            | 0.60             | 0.005          | 100            | 0.80             | 0.006          | 120            | 1.00             | 0.007          | 120            | 1.20             | 0.008          | 130            | 1.50             | 0.009          | 130            | 1.80             | 0.010          | 140            | 2.00             | 0.010          | 140  | 2.50   | 0.012  | 150  | 3.00   | 0.015  | 170  | 4.00   | 0.020  | 170  | 6.00   | 0.020  | 170  | 8.00   | 0.020  |  |
|                           |                         | Hastelloy B-2 | 180            | .011             | .00012         | 240            | .015             | .00016         | 302            | .019             | .00016         | 328            | .024             | .00020         | 328            | .032             | .00024         | 394            | .039             | .00028         | 394            | .047             | .00031         | 427            | .059             | .00035         | 427            | .071             | .00039         | 459            | .079             | .00039         | 459  | .098   | .00047 | 492  | .118   | .00059 | 558  | .158   | .00079 | 558  | .236   | .00079 | 558  | .315   | .00079 |  |
|                           |                         | Hastelloy X   |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
|                           |                         |               |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |
| S <sub>2</sub>            | Titanium pure           | ASTM B348     | 55             | 0.29             | 0.004          | 73             | 0.39             | 0.004          | 92             | 0.48             | 0.008          | 100            | 0.60             | 0.009          | 100            | 0.80             | 0.011          | 120            | 1.00             | 0.016          | 120            | 1.20             | 0.018          | 130            | 1.50             | 0.020          | 130            | 1.80             | 0.022          | 140            | 2.00             | 0.028          | 140  | 2.50   | 0.030  | 150  | 3.00   | 0.042  | 170  | 4.00   | 0.044  | 170  | 6.00   | 0.044  | 170  | 8.00   | 0.044  |  |
|                           |                         | ASTM B348     | 180            | .011             | .00016         | 240            | .015             | .00016         | 302            | .019             | .00031         | 328            | .024             | .00035         | 328            | .032             | .00043         | 394            | .039             | .00063         | 394            | .047             | .00071         | 427            | .059             | .00079         | 427            | .071             | .00087         | 459            | .079             | .00110         | 459  | .098   | .00118 | 492  | .118   | .00165 | 558  | .158   | .00173 | 558  | .236   | .00173 | 558  | .315   | .00173 |  |
| S <sub>3</sub>            | Titanium alloys         | ASTM B348     | 55             | 0.29             | 0.004          | 73             | 0.39             | 0.004          | 92             | 0.48             | 0.008          | 100            | 0.60             | 0.009          | 100            | 0.80             | 0.011          | 120            | 1.00             | 0.016          | 120            | 1.20             | 0.018          | 130            | 1.50             | 0.020          | 130            | 1.80             | 0.022          | 140            | 2.00             | 0.028          | 140  | 2.50   | 0.030  | 150  | 3.00   | 0.042  | 170  | 4.00   | 0.044  | 170  | 6.00   | 0.044  | 170  | 8.00   | 0.044  |  |
|                           |                         | ASTM F1295    | 180            | .011             | .00016         | 240            | .015             | .00016         | 302            | .019             | .00031         | 328            | .024             | .00035         | 328            | .032             | .00043         | 394            | .039             | .00063         | 394            | .047             | .00071         | 427            | .059             | .00079         | 427            | .071             | .00087         | 459            | .079             | .00110         | 459  | .098   | .00118 | 492  | .118   | .00165 | 558  | .158   | .00173 | 558  | .236   | .00173 | 558  | .315   | .00173 |  |
| H <sub>1</sub>            | Hardened steel < 55 HRC | AISI O1       | 55             | 0.29             | 0.004          | 73             | 0.39             | 0.006          | 92             | 0.48             | 0.007          | 80             | 0.60             | 0.008          | 80             | 0.80             | 0.009          | 100            | 1.00             | 0.010          | 100            | 1.20             | 0.012          | 140            | 1.50             | 0.014          | 140            | 1.80             | 0.018          | 180            | 2.00             | 0.020          | 180  | 2.50   | 0.026  | 200  | 3.00   | 0.035  | 240  | 4.00   | 0.040  | 240  | 6.00   | 0.040  | 240  | 8.00   | 0.040  |  |
|                           |                         |               | 180            | .011             | .00016         | 240            | .015             | .00024         | 302            | .019             | .00028         | 328            | .024             | .00031         | 328            | .032             | .00035         | 328            | .039             | .00039         | 328            | .047             | .00047         | 459            | .059             | .00055         | 459            | .071             | .00071         | 591            | .079             | .00079         | 591  | .098   | .00102 | 656  | .118   | .00138 | 787  | .158   | .00157 | 787  | .236   | .00157 | 787  | .315   | .00157 |  |
| H <sub>2</sub>            | Hardened steel ≥ 55 HRC | AISI D2       |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |                |                  |                |      |        |        |      |        |        |      |        |        |      |        |        |      |        |        |  |

### Semi-finishing



- $a_p = 0.25 \times d_1$   
( $\varnothing d_1 \leq 0.5 \text{ mm} | .020''$ )
- $a_p = 0.5 \times d_1$   
( $\varnothing d_1 > 0.5 \text{ mm} | .020''$ )
- $a_e = 0.1 \times d_1$

Machining angle = 15°



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