

# CrazyMill Cool Ball - Type A - 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]

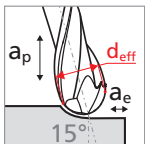
**f<sub>z</sub>** [mm] | [IPT]

**d<sub>eff</sub>** [mm] | [inch]

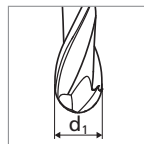
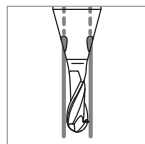
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Materials group	Material	AISI/ASTM/UNS	Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1																								
			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>																		
P	Unalloyed carbon steel Rm<800N/mm²	AISI 1010																																													
		AISI 1015																																													
		AISI 1045	45	0.24	0.006	59	0.31	0.008	74	0.39	0.012	89	0.47	0.014	100	0.63	0.017	140	0.79	0.018	140	0.94	0.020	200	1.18	0.029	200	1.42	0.031	220	1.57	0.041	220	1.97	0.043	240	2.36	0.058	260	3.15	0.060	260	4.72	0.060	260	6.29	0.060
		AISI 1020	148	.009	.00024	194	.012	.00033	243	.015	.00047	292	.019	.00057	328	.025	.00066	459	.031	.00071	459	.037	.00080	656	.046	.00113	656	.056	.00123	722	.062	.00161	722	.077	.00170	787	.093	.00227	853	.124	.00236	853	.186	.00236	853	.248	.00236
		AISI 1215																																													
		ASTM 3415																																													
	Low alloyed steel Rm>900 N/mm²	AISI 5115	45	0.24	0.005	59	0.31	0.007	74	0.39	0.011	89	0.47	0.013	100	0.63	0.014	140	0.79	0.017	140	0.94	0.019	200	1.18	0.026	200	1.42	0.029	220	1.57	0.038	220	1.97	0.041	240	2.36	0.055	260	3.15	0.058	260	4.72	0.058	260	6.29	0.058
		AISI 52100	148	.009	.00019	194	.012	.00028	243	.015	.00043	292	.019	.00052	328	.025	.00057	459	.031	.00066	459	.037	.00076	656	.046	.00104	656	.056	.00113	722	.062	.00151	722	.077	.00161	787	.093	.00217	853	.124	.00227	853	.186	.00227	853	.248	.00227
		AISI 4140																																													
		AISI O2																																													
	High alloyed tool steel Rm<1200N/mm²	AISI D2																																													
		AISI D4/D6	45	0.24	0.005	59	0.31	0.007	74	0.39	0.010	89	0.47	0.011	100	0.63	0.013	140	0.79	0.013	140	0.94	0.016	200	1.18	0.024	200	1.42	0.026	220	1.57	0.036	220	1.97	0.038	240	2.36	0.050	260	3.15	0.053	260	4.72	0.053	260	6.29	0.053
AISI M2		148	.009	.00019	194	.012	.00028	243	.015	.00038	292	.019	.00043	328	.025	.00052	459	.031	.00052	459	.037	.00061	656	.046	.00094	656	.056	.00104	722	.062	.00142	722	.077	.00151	787	.093	.00198	853	.124	.00208	853	.186	.00208	853	.248	.00208	
M	Stainless steel ferritic	AISI 430	45	0.24	0.006	59	0.31	0.008	74	0.39	0.012	89	0.47	0.014	100	0.63	0.014	140	0.79	0.019	140	0.94	0.022	200	1.18	0.029	200	1.42	0.031	220	1.57	0.041	220	1.97	0.043	240	2.36	0.055	260	3.15	0.058	260	4.72	0.058	260	6.29	0.058
		AISI 430F	148	.009	.00024	194	.012	.00033	243	.015	.00047	292	.019	.00057	328	.025	.00057	459	.031	.00076	459	.037	.00085	656	.046	.00113	656	.056	.00123	722	.062	.00161	722	.077	.00170	787	.093	.00217	853	.124	.00227	853	.186	.00227	853	.248	.00227
	Stainless steel martensitic	AISI 420C	45	0.24	0.005	59	0.31	0.007	74	0.39	0.011	89	0.47	0.012	100	0.63	0.014	140	0.79	0.018	140	0.94	0.020	200	1.18	0.026	200	1.42	0.029	220	1.57	0.038	220	1.97	0.041	240	2.36	0.053	260	3.15	0.055	260	4.72	0.055	260	6.29	0.055
		AISI 440B	148	.009	.00019	194	.012	.00028	243	.015	.00043	292	.019	.00047	328	.025	.00057	459	.031	.00071	459	.037	.00080	656	.046	.00104	656	.056	.00113	722	.062	.00151	722	.077	.00161	787	.093	.00208	853	.124	.00217	853	.186	.00217	853	.248	.00217
	Stainless steel martensitic-PH	AISI 630	45	0.24	0.005	59	0.31	0.007	74	0.39	0.011	89	0.47	0.012	100	0.63	0.013	140	0.79	0.018	140	0.94	0.020	200	1.18	0.026	200	1.42	0.029	220	1.57	0.038	220	1.97	0.041	240	2.36	0.053	260	3.15	0.055	260	4.72	0.055	260	6.29	0.055
		ASTM 15-5PH	148	.009	.00019	194	.012	.00028	243	.015	.00043	292	.019	.00047	328	.025	.00052	459	.031	.00071	459	.037	.00080	656	.046	.00104	656	.056	.00113	722	.062	.00151	722	.077	.00161	787	.093	.00208	853	.124	.00217	853	.186	.00217	853	.248	.00217
	Stainless steel austenitic	AISI 304																																													
		AISI 316L	45	0.24	0.005	59	0.31	0.007	74	0.39	0.010	89	0.47	0.012	100	0.63	0.011	140	0.79	0.014	140	0.94	0.017	200	1.18	0.019	200	1.42	0.022	220	1.57	0.036	220	1.97	0.038	240	2.36	0.050	260	3.15	0.053	260	4.72	0.053	260	6.29	0.053
		AISI 316LM	148	.009	.00019	194	.012	.00028	243	.015	.00038	292	.019	.00047	328	.025	.00043	459	.031	.00057	459	.037	.00066	656	.046	.00076	656	.056	.00085	722	.062	.00142	722	.077	.00151	787	.093	.00198	853	.124	.00208	853	.186	.00208	853	.248	.00208
	AISI 904L																																														
K	Cast iron	ASTM 30																																													
		ASTM 40B	45	0.24	0.004	59	0.31	0.006	74	0.39	0.007	89	0.47	0.009	100	0.63	0.011	120	0.79	0.013	120	0.94	0.026	140	1.18	0.029	140	1.42	0.031	160	1.57	0.034	160	1.97	0.043	180	2.36	0.053	200	3.15	0.066	200	4.72	0.066	200	6.29	0.066
		ASTM60-40-18	148	.009	.00014	194	.012	.00024	243	.015	.00028	292	.019	.00035	328	.025	.00048	394	.031	.00052	394	.037	.00104	459	.046	.00113	459	.056	.00123	525	.062	.00132	525	.077	.00170	591	.093	.00208	656	.124	.00260	656	.186	.00260	656	.248	.00260
		ASTM80-60-03																																													

### Finishing



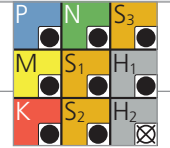
- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$
- Machining angle = 15°
- $n_{max} = 60'000$  rpm



# CrazyMill Cool Ball - Type A - Finishing

RECOMMENDATION FOR USE

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

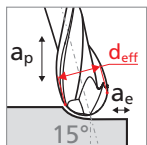


**V<sub>c</sub>** [m/min] | [SFM]  
**f<sub>z</sub>** [mm] | [IPT]  
**d<sub>eff</sub>** [mm] | [inch]

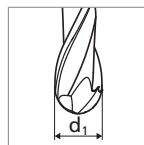
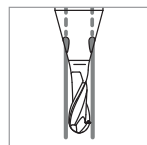
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Materials group	Material	AISI/ASTM/UNS	Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1		Ød1																						
			0.3 mm .012"	0.4 mm .016"	0.5 mm .020"	0.6 mm .024"	0.8 mm .032"	1.0 mm .039"	1.2 mm .047"	1.5 .059"	1.8 mm .071"	2.0 mm .079"	2.5 mm .098"	3.0 mm .118"	4.0 mm .158"	6.0 mm .236"	8.0 mm .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>																		
N	Aluminium alloy wrought	ASTM 6351	45	0.24	0.007	59	0.31	0.010	74	0.39	0.014	89	0.47	0.017	100	0.63	0.019	140	0.79	0.022	140	0.94	0.024	200	1.18	0.031	200	1.42	0.034	220	1.57	0.043	220	1.97	0.048	240	2.36	0.070	260	3.15	0.072	260	4.72	0.072	260	6.29	0.072
		ASTM 7075	148	.009	.00028	194	.012	.00038	243	.015	.00057	292	.019	.00066	328	.025	.00076	459	.031	.00085	459	.037	.00094	656	.046	.00123	656	.056	.00132	722	.062	.00170	722	.077	.00189	787	.093	.00274	853	.124	.00283	853	.186	.00283	853	.248	.00283
	Aluminium alloy cast	ASTM A380	45	0.24	0.007	59	0.31	0.010	74	0.39	0.014	89	0.47	0.017	100	0.63	0.019	140	0.79	0.022	140	0.94	0.024	200	1.18	0.031	200	1.42	0.034	220	1.57	0.043	220	1.97	0.048	240	2.36	0.070	260	3.15	0.072	260	4.72	0.072	260	6.29	0.072
		UNS A03590	148	.009	.00028	194	.012	.00038	243	.015	.00057	292	.019	.00066	328	.025	.00076	459	.031	.00085	459	.037	.00094	656	.046	.00123	656	.056	.00132	722	.062	.00170	722	.077	.00189	787	.093	.00274	853	.124	.00283	853	.186	.00283	853	.248	.00283
	Copper	UNS C10100	45	0.24	0.007	59	0.31	0.010	74	0.39	0.017	89	0.47	0.019	100	0.63	0.022	140	0.79	0.024	140	0.94	0.026	200	1.18	0.031	200	1.42	0.034	220	1.57	0.043	220	1.97	0.048	240	2.36	0.070	260	3.15	0.072	260	4.72	0.072	260	6.29	0.072
		UNS C11000	148	.009	.00028	194	.012	.00038	243	.015	.00066	292	.019	.00076	328	.025	.00085	459	.031	.00094	459	.037	.00104	656	.046	.00123	656	.056	.00132	722	.062	.00170	722	.077	.00189	787	.093	.00274	853	.124	.00283	853	.186	.00283	853	.248	.00283
	Brass lead free	UNS C27400	45	0.24	0.007	59	0.31	0.010	74	0.39	0.017	89	0.47	0.019	100	0.63	0.022	140	0.79	0.024	140	0.94	0.026	200	1.18	0.031	200	1.42	0.034	220	1.57	0.043	220	1.97	0.048	240	2.36	0.070	260	3.15	0.072	260	4.72	0.072	260	6.29	0.072
		UNS C28000	148	.009	.00028	194	.012	.00038	243	.015	.00066	292	.019	.00076	328	.025	.00085	459	.031	.00094	459	.037	.00104	656	.046	.00123	656	.056	.00132	722	.062	.00170	722	.077	.00189	787	.093	.00274	853	.124	.00283	853	.186	.00283	853	.248	.00283
	Brass, Bronze Rm<400N/mm²	UNS C38500	45	0.24	0.007	59	0.31	0.010	74	0.39	0.017	89	0.47	0.019	100	0.63	0.022	140	0.79	0.024	140	0.94	0.026	200	1.18	0.031	200	1.42	0.034	220	1.57	0.043	220	1.97	0.048	240	2.36	0.070	260	3.15	0.072	260	4.72	0.072	260	6.29	0.072
		UNS C51900	148	.009	.00028	194	.012	.00038	243	.015	.00066	292	.019	.00076	328	.025	.00085	459	.031	.00094	459	.037	.00104	656	.046	.00123	656	.056	.00132	722	.062	.00170	722	.077	.00189	787	.093	.00274	853	.124	.00283	853	.186	.00283	853	.248	.00283
Bronze Rm<600N/mm²	UNS C63000	45	0.24	0.007	59	0.31	0.010	74	0.39	0.014	89	0.47	0.017	100	0.63	0.019	140	0.79	0.022	140	0.94	0.024	200	1.18	0.031	200	1.42	0.034	220	1.57	0.043	220	1.97	0.048	240	2.36	0.070	260	3.15	0.072	260	4.72	0.072	260	6.29	0.072	
	UNS C63200	148	.009	.00028	194	.012	.00038	243	.015	.00057	292	.019	.00066	328	.025	.00076	459	.031	.00085	459	.037	.00094	656	.046	.00123	656	.056	.00132	722	.062	.00170	722	.077	.00189	787	.093	.00274	853	.124	.00283	853	.186	.00283	853	.248	.00283	
S <sub>1</sub>	Super alloys	Inconel 625																																													
		Inconel 718	45	0.24	0.004	59	0.31	0.005	74	0.39	0.005	89	0.47	0.006	100	0.63	0.007	120	0.79	0.008	120	0.94	0.010	130	1.18	0.011	130	1.42	0.012	140	1.57	0.012	140	1.97	0.014	150	2.36	0.018	170	3.15	0.024	170	4.72	0.024	170	6.29	0.024
		Hastelloy B-2	148	.009	.00014	194	.012	.00020	243	.015	.00020	292	.019	.00024	328	.025	.00028	394	.031	.00033	394	.037	.00038	427	.046	.00043	427	.056	.00047	459	.062	.00047	459	.077	.00057	492	.093	.00071	558	.124	.00094	558	.186	.00094	558	.248	.00094
		Hastelloy X																																													
S <sub>2</sub>	Titanium pure	ASTM B348	45	0.24	0.005	59	0.31	0.005	74	0.39	0.010	100	0.47	0.011	100	0.63	0.013	120	0.79	0.019	120	0.94	0.022	130	1.18	0.024	130	1.42	0.026	140	1.57	0.034	140	1.97	0.036	150	2.36	0.050	170	3.15	0.053	170	4.72	0.053	170	6.29	0.053
		ASTM B348	148	.009	.00019	194	.012	.00020	243	.015	.00038	328	.019	.00043	328	.025	.00052	394	.031	.00076	394	.037	.00085	427	.046	.00094	427	.056	.00104	459	.062	.00132	459	.077	.00142	492	.093	.00198	558	.124	.00208	558	.186	.00208	558	.248	.00208
S <sub>3</sub>	Titanium alloys	ASTM B348	45	0.24	0.005	59	0.31	0.005	74	0.39	0.010	89	0.47	0.011	100	0.63	0.013	120	0.79	0.019	120	0.94	0.022	130	1.18	0.024	130	1.42	0.026	140	1.57	0.034	140	1.97	0.036	150	2.36	0.050	170	3.15	0.053	170	4.72	0.053	170	6.29	0.053
		ASTM F1295	148	.009	.00019	194	.012	.00020	243	.015	.00038	292	.019	.00043	328	.025	.00052	394	.031	.00076	394	.037	.00085	427	.046	.00094	427	.056	.00104	459	.062	.00132	459	.077	.00142	492	.093	.00198	558	.124	.00208	558	.186	.00208	558	.248	.00208
H <sub>1</sub>	Hardened steel < 55 HRC	AISI O1	45	0.24	0.005	59	0.31	0.007	74	0.39	0.008	80	0.47	0.010	80	0.63	0.011	100	0.79	0.012	100	0.94	0.014	140	1.18	0.017	140	1.42	0.022	180	1.57	0.024	180	1.97	0.031	200	2.36	0.042	240	3.15	0.048	240	4.72	0.048	240	6.29	0.048
			148	.009	.00019	194	.012	.00028	243	.015	.00033	262	.019	.00038	262	.025	.00043	328	.031	.00047	328	.037	.00057	459	.046	.00066	459	.056	.00085	591	.062	.00094	591	.077	.00123	656	.093	.00165	787	.124	.00189	787	.186	.00189	787	.248	.00189
H <sub>2</sub>	Hardened steel ≥ 55 HRC	AISI D2																																													

### Finishing



- $a_p = 0.1 \times d_1$
- $a_e = 0.05 \times d_1$
- Machining angle = 15°
- $n_{max} = 60'000$  rpm



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