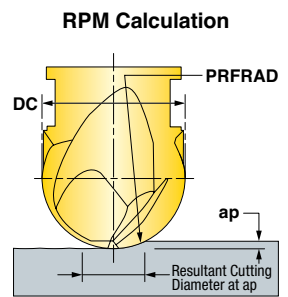
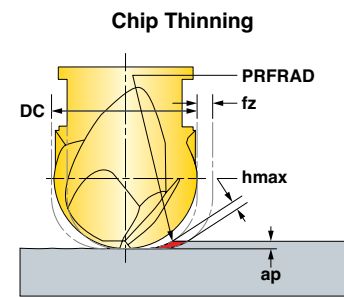




CHIPSURFER™ OPERATING GUIDELINES: BALL NOSE TIPS



RPM calculation is to be made using the resultant diameter at ap.



Chip Thinning Calculator is recommended to ensure hmax is in fz range.

ISO	Materials			Cutting Speed SFM	DC Cutting Dia. (inch)	fz Feed per Tooth (inch)	Harder <-----> Tougher				Coolant			
	Material Group	Type	Examples				IN2006	IN055	IN2505	IN2005				
P	1-5	Non-alloy Steel	1018, A36, 1045, A572, 1070	400-1000	.187-.250	.0007-.0035	2	-	1	No				
					.312-.500	.0010-.0040								
					.625-.750	.0010-.0045								
	6-9	Low-alloy Steel	4140, 4340, P20, 8620, 300M	350-700	1.000	.0010-.0050								
					.187-.250	.0007-.0030								
					.312-.500	.0010-.0035								
	10-11	High-alloy Steel	H13, A2, D2, M2, T1	300-600	.625-.750	.0010-.0040								
					1.000	.0010-.0045								
					.187-.250	.0007-.0025								
M	12-13	Stainless Steel (Ferritic & Martensitic)	410, 416, 440	350-600	.312-.500	.0010-.0030	-	-	1	Yes				
					.625-.750	.0010-.0035								
					1.000	.0010-.0040								
	14	Stainless Steel (Austenitic)	303, 304, 316, 15-5, 17-4	300-550	.187-.250	.0007-.0025								
					.312-.500	.0010-.0030								
					.625-.750	.0010-.0035								
K	15-16	Gray Cast Iron	CLS. 20, 30, 45	500-1000	.187-.250	.0007-.0030	-	-	1	No				
					.312-.500	.0010-.0035								
					.625-.750	.0010-.0040								
	17-20	Nodular Cast Iron	60-40-18, 100-70-03	400-800	1.000	.0010-.0045								
					.187-.250	.0007-.0025								
					.312-.500	.0010-.0030								
	N	21-30	Aluminum	7075, 6061	1000-3000	.625-.750				.0010-.0035	-	1	-	Yes
						1.000				.0010-.0050				
						1.000				.0010-.0060				
S		31-35	High-Temp Alloys	Inconel, Hastelloy, Nimonic, Monel	65-200	.187-.250	.0007-.0025	-	-	1				Yes
						.312-.500	.0010-.0030							
						.625-.750	.0010-.0035							
	36-37	Titanium Alloys	6Al-4V, 5Al-5Mo-5V-3Cr	85-200	1.000	.0010-.0040								
					.187-.250	.0007-.0025								
					.312-.500	.0010-.0030								
H	38-39	Hardened Steel >48	A2, O1, D2	130-250	.625-.750	.0010-.0035	1	-	2	No				
					1.000	.0010-.0040								
					.187-.250	.0007-.0015								
					.312-.500	.0010-.0020								

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.