

Surface Footage Chart and Formula

Surface Footage

Theory behind Surface Feet per Minute:

1. Every cutter has a Diameter
2. Diameter x 3.14159 (PI) = Distance cutter travels every revolution
3. Distance cutter travels every Revolution x 12 = Distance traveled in Feet.(SF)
4. Chart is Recommending how far your cutter should travel per minute in feet. (SFM)

Theory behind Feed Rate formula (inches):

1. It is Always calculated in “Inches per Tooth” (in/tooth)
2. For every time a cutter goes around how far should the cutter advance into the material Per Tooth.
3. The chart is Recommending a Chip Load per Tooth depending on cutter diameter and depth of cut.
4. Chip Load per Tooth x Number of teeth = (Inches per Revolution)

The following chart is Recommended Surface Footage for standard 4-Flute styled endmills. For aluminums, start somewhere in the middle. For steels start on the bottom side and work your way up.

Always use manufacturers recommended Surface Footage for tooling where applicable.

RPM

$$\text{SFM} \times 3.82 / \text{Cutter Diameter} = \text{RPM}$$

Feed Rate

$$\text{RPM} \times \text{Chip Load}_{(\text{FPT})} \times \text{Number of Teeth} = \text{Feed Rate}$$

Material	SFM		FPT for Endmills		FPT for HSS Drill
	HSS	Carbide	HSS	Carbide	1/16-3/4 Ø
1018 CRS	125	350	.001-.005	.0015-.006	.001-.015
6061-T6 ALUM	250-800	800-1300	.002-.006	.002-.010	.001-.016
11L17	170	415	.001-.005	.001-.007	.001-.018
4140	70	300	.001-.004	.0015-.006	.001-.014
A2 TOOL STEEL	50	250	.0005-.003	.001-.004	.001-.007
P20 MOLD STEEL	70	320	.0005-.004	.001-.005	.001-.009
303 SS	100	300	.001-.005	.001-.005	.001-.014
304/316 SS	60	230	.001-.005	.0005-.003	.001-.010
416 SS	110	335	.001-.005	.0005-.005	.001-.014
440C SS	50	205	.001-.004	.0005-.004	.0005-.009
17-4 SS	55	220	.0005-.003	.0005-.004	.001-.008
Delrin	450	800-1300	.003-.010	.003-.010	.001-.006

Example: 1/2" 4-Flute Endmill cutting 1018 CRS
 $350 \times 3.82 / .500 = \mathbf{2674 \text{ RPM}}$
 $2674 \times .002 \times 4 = \mathbf{21.4 \text{ in/min}}$

FPT = Feed Per Tooth