

CUTTING DATA

PCB Drills & Router Bits

Reference starting spindle speed and feed for PCB drills, router bits and slot drills, with FR-4 focused routing data.

PCB Drills	FR-4 Routers	Slot Drills	High-speed spindles
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How to use this guide

Board stack height, copper thickness, entry/back-up material, pressure foot, vacuum, spindle condition and runout can materially change tool life and hole/edge quality.

PCB drill starting ranges

Drill D	Spindle speed	Chip load / rev	Approx. feed
0.10-0.15 mm	180k-200k rpm	0.005-0.008 mm	0.9-1.6 m/min
0.20-0.30 mm	150k-200k	0.010-0.018	1.5-3.6 m/min
0.35-0.50 mm	100k-150k	0.018-0.025	1.8-3.8 m/min
0.55-0.80 mm	60k-100k	0.025-0.035	1.5-3.5 m/min
0.85-1.20 mm	45k-70k	0.030-0.040	1.4-2.8 m/min
1.25-1.60 mm	30k-50k	0.035-0.045	1.1-2.3 m/min
1.65-3.175 mm	15k-30k	0.045-0.060	0.7-1.8 m/min

FR-4 ROUTING

Router reference - non-copper-layer FR-4

Router D	Spindle speed	Table feed
0.8 mm	60,000 rpm	0.4 m/min
1.0 mm	48,000	0.8
1.2 mm	35,000	1.0
1.4 mm	30,000	1.1
1.6 mm	27,000	1.2
2.0 mm	23,000	~1.2
2.5 mm	19,000	~1.3
3.175 mm	~16,000	~1.3

SLOT DRILLS & TROUBLESHOOTING

Slot drill starting envelope

Slot D	Spindle speed	Starting feed
0.3-0.6 mm	60k-100k rpm	0.4-0.9 m/min
0.7-1.0 mm	45k-70k	0.6-1.1
1.1-1.6 mm	30k-50k	0.8-1.3
>1.6 mm	20k-35k	0.9-1.4

Common corrections

Problem	First correction
Rough edge	Reduce excessive feed; reduce RPM if spindle vibration is present
Burrs / rapid wear	Avoid high RPM with very low feed
Router breakage	Reduce feed and/or board stack height
Dimensional error	Reduce radial load and improve board fixation

Disclaimer: Validate with trial panels and inspection before raising production speed. PCB tools are highly sensitive to spindle/runout, board stack and vacuum/pressure-foot performance.