

MATERIAL HOOK OR RAKE ANGLES, SUGGESTED SURFACE TREATMENTS, CUTTING FLUIDS & CUTTING SPEEDS (Starting Recommendations Only)

Material To Be Tapped	Hook or Rake Angle	Suggested Surface Treatment**	Lubricant / Coolant	Speed / SFM
ALUMINUM (WROUGHT)	12° - 15° HOOK	TiN, TiCN	Soluble, Light Base, or Lard Oil	90 - 150
ALUMINUM DIE CASTING	8° - 10° HOOK	TiN, TiCN, CrN, TiAlN+WC/C	Soluble or Lard Oil	65 - 75
ALUMINUM BRONZE	0° - 3° RAKE	N, TiN	Mineral Oil w/Lard, or Light Oil	20 - 60
BAKELITE (HARD PLASTIC)	0° - 3° RAKE	TiCN	Dry or Air Jet	25 - 40
BERYLLIUM COPPER	12° - 14° HOOK	TiAlN+WC/C, CrN, N	Soluble Light Base Oil	50 - 90
BRASS	0° - 3° RAKE	None, TiCN	Soluble Light Base Oil	100 - 200
BRONZE (FREE-MACHINING)	2° - 6° HOOK	None, TiCN, N	Soluble Light Base Oil	80 - 150
CAST BRASS	2° - 5° RAKE	N, TiCN	Soluble Light Base Oil	100 - 200
CAST IRON (GRAY)	0° - 3° RAKE	N, TiCN	Dry or Soluble Oil	20 - 80
COPPER	18° HOOK	TiAlN+WC/C, CrN	Soluble Light Base Oil	80 - 150
COPPER - NICKEL	12° HOOK	N, TiCN	Soluble Light Base Oil	10 - 20
DELTRIN	5° - 8° HOOK	TiAlN+WC/C, TiN, N	Dry, Air Jet, or Water Soluble	65 - 100
DUCTILE IRON	3° - 6° HOOK	N+O, TiN, TiCN	Soluble or Sulphur Based Oils	30 - 50
DURALUMIN	12° - 14° HOOK	TiAlN+WC/C, CrN	Soluble or Lard Oil	50 - 90
FERRO-TIC	0° - 3° NEG RAKE	None	Anti-Seize Compound	8 - 20
FIBERGLASS	0° - 3° RAKE	TiCN	Dry or Air Jet	25 - 40
HASTELLOY	12° - 15° HOOK	CrN	Sulphur Based Oils	8 - 20
INCONEL	12° - 15° HOOK	N, CrN	Sulphur Based Oils	8 - 20
MAGNESIUM	18° - 20° HOOK (MUST)	CrN	Soluble Light Base Oil	100 - 150
MALLEABLE IRON	3° RAKE	N+O, TiN, TiCN	Soluble or Sulphur Based Oils	30 - 50
MANGANESE	0° - 3° RAKE	TiCN	Sulphur Based Oils	8 - 20
MANGANESE BRONZE	0° - 3° RAKE	N, TiCN	Soluble Light Base Oil	20 - 60
MOLYBDENUM	12° - 14° HOOK	N, TiN, TiCN	Sulphur Based Oils	20 - 45
MONEL	12° - 15° HOOK	N, TiCN	Sulphur Based Oils	8 - 20
NAVAL BRASS	0° - 3° RAKE	N	Soluble Light Base Oil	100 - 200
NAVAL BRONZE	2° - 6° HOOK	None, TiCN	Soluble Light Base Oil	80 - 150
NICKEL SILVER	0° - 3° RAKE	N, TiCN	Sulphur Based Oils	20 - 60
NICKEL (PURE)	12° - 15° HOOK	N, TiCN	Soluble Light Base Oil	5 - 25
NITRALLOY	0° RAKE	N, TiCN	Sulphur Based Oils	8 - 20
NITRONIC (*NO GUARANTEE)	12° - 14° POS RAKE	N, TiN, TiCN	Sulphur Based Oils	8 - 20
NYLON	5° - 8° HOOK	N, TiN	Dry, Air Jet or Water Soluble	65 - 100
PLASTICS:				
THERMOPLASTIC (SOFT)	5° - 8° HOOK	N, TiN	Dry, Air Jet or Water Soluble	65 - 100
ABS, DELTRIN, NYLON, PVC, etc.				
THERMOSETTING (HARD)	0° - 3° RAKE	TiCN	Dry or Air Jet	25 - 40
BAKELITE, L AMINATES,				
PHENOLIC, POLYESTERS, etc.				
POWDERED METAL (Sintered)	0° RAKE	TiCN	Soluble Light Base Oil	25 - 80
RUBBER, HARD	0° - 3° RAKE	None	Dry	50 - 200
SILICON BRONZE	0° - 3° RAKE	N, TiCN	Soluble Light Base Oil	20 - 60
STEEL:				
CARBON STEEL	10° - 12° HOOK	O, N, TiN	Sulphur Based Oils	40 - 90
COLD-ROLLED STEEL (1018, etc.)	10° - 12° HOOK	O, N, TiN	Sulphur Based Oils	40 - 90
FORGED	10° - 12° HOOK	O, N, TiN	Sulphur Based Oils	20 - 50
LEADED (12L14, etc.)	12° HOOK	O, N, TiN	Sulphur Based Oils	40 - 90
STAINLESS:				
FREE MACHINING	12° - 14° HOOK	N, TiN, TiCN	Sulphur Based Oils	20 - 40
PRECIP. HARDENING	12° - 14° HOOK	N, TiN, TiCN	Sulphur Based Oils	8 - 20
TOOL STEEL	12° - 14° HOOK	N, TiN, TiCN	Sulphur Based Oils	20 - 50
TITANIUM	15° - 20° HOOK	O, N, CrN	Sulphur Based Oils	20 - 50
TUNGSTEN	5° RAKE	TiN	Sulphur Based Oils	8 - 20
TURCITE (SOFT PLASTIC)	5° - 8° HOOK	N, TiN	Dry, Air Jet or Water Soluble	65 - 100
ZAMAK (ZINC DIE CAST)	10° - 12° RAKE	TiCN, TiN, CrN, TiAlN+WC/C	Soluble Light Base Oil	50 - 200
ZINC	10° - 12° RAKE	TiCN, TiN, CrN, TiAlN+WC/C	Soluble Light Base Oil	50 - 200

* If problems are encountered when tapping nitronic (or any other material), please consult Tool Designers.

** See page 206 for definitions of tool coating abbreviations.