

Step 3 • Selecting the cutting speed *(continued)*
Low-Carbon (<0.3% C) and Free-Machining Steel

Material Group	grade	speed – m/min (SFM)									Starting Conditions	
		135 (450)	180 (600)	225 (800)	275 (900)	320 (1050)	360 (1200)	410 (1350)	455 (1500)	495 (1650)	m/min	SFM
P0/P1	TN10P	◊									316	1056
	TN20P	◊									248	833
	TN30P	◊									189	630

Medium- and High-Carbon Steels (>0.3% C)

Material Group	grade	speed – m/min (SFM)									Starting Conditions	
		135 (450)	180 (600)	225 (800)	275 (900)	320 (1050)	360 (1200)	410 (1350)	455 (1500)	495 (1650)	m/min	SFM
P2	TN10P	◊									212	704
	TN20P	◊									176	585
	TN30P	◊									135	450

Alloy Steels and Tool Steels (≤330 HB) (≤35 HRC)

Material Group	grade	speed – m/min (SFM)									Starting Conditions	
		135 (450)	180 (600)	225 (800)	275 (900)	320 (1050)	360 (1200)	410 (1350)	455 (1500)	495 (1650)	m/min	SFM
P3	TN10P	◊									152	504
	TN20P	◊									140	459
	TN30P	◊									108	360

Alloy Steels and Tool Steels (340–450 HB) (36–48 HRC)

Material Group	grade	speed – m/min (SFM)									Starting Conditions	
		60 (200)	90 (300)	120 (400)	150 (500)	180 (600)	210 (700)	240 (800)	270 (900)	300 (1000)	m/min	SFM
P4	TN10P	◊									116	384
	TN20P	◊									95	324
	TN30P	◊									86	293

Ferritic, Martensitic, and PH Stainless Steels (≤330 HB) (≤35 HRC)

Material Group	grade	speed – m/min (SFM)									Starting Conditions	
		120 (400)	150 (500)	180 (600)	210 (700)	240 (800)	270 (900)	300 (1000)	330 (1100)	360 (1200)	m/min	SFM
P5	TN10P	◊									172	576
	TN20P	◊									176	585
	TN30P	◊									122	405

Ferritic, Martensitic, and PH Stainless Steels (340–450 HB) (36–48 HRC)

Material Group	grade	speed – m/min (SFM)									Starting Conditions	
		105 (350)	135 (450)	165 (550)	195 (650)	225 (750)	255 (850)	285 (950)	315 (1050)	345 (1150)	m/min	SFM
P6	TN10P	◊									144	480
	TN20P	◊									135	450
	TN30P	◊									95	315

■ Step 1 • Select the insert geometry

Negative Inserts



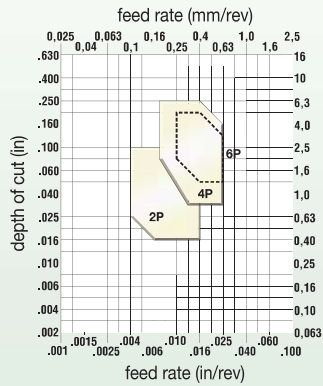
2P
Finishing



4P
Medium



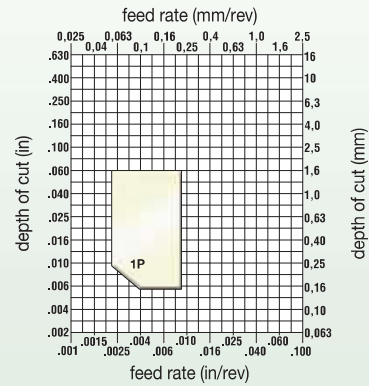
6P
Roughing



Positive Inserts



1P
Finishing



■ Step 2 • Select the grade

cutting condition	Negative Insert Geometry			Positive Insert Geometry
	2P	4P	6P	1P
heavily interrupted cut	TN15M/TN10	TN30M	TN30M	TN30M/TN10
lightly interrupted cut	TN15M/TN10	TN30M	TN30M	TN30M
varying depth of cut, casting, or forging skin	TN15M	TN15M/TN30M	TN15M/TN30M	TN15M/TN30M
smooth cut, pre-turned surface	TN15M	TN15M	TN15M	TN15M

■ Step 3 • Selecting the cutting speed

Austenitic Stainless Steel		speed – m/min (SFM)								Starting Conditions		
Material Group	grade	90 (300)	135 (450)	180 (600)	225 (800)	270 (900)	315 (1050)	360 (1200)	405 (1350)	450 (1500)	m/min	SFM
M1	TN15M		◊								162	540
	TN30M		◊								135	450
	TN10U			◊							194	630
	TN15U		◊								129	420

Austenitic Stainless Steel		speed – m/min (SFM)								Starting Conditions		
Material Group	grade	90 (300)	135 (450)	180 (600)	225 (800)	270 (900)	315 (1050)	360 (1200)	405 (1350)	450 (1500)	m/min	SFM
M2	TN15M		◊								149	495
	TN30M		◊								135	450
	TN10U			◊							180	585
	TN15U				◊						120	390

Austenitic Stainless Steel: Duplex (Ferritic and Austenitic Mixture)		speed – m/min (SFM)								Starting Conditions		
Material Group	grade	90 (300)	135 (450)	180 (600)	225 (800)	270 (900)	315 (1050)	360 (1200)	405 (1350)	450 (1500)	m/min	SFM
M3	TN15M		◊								135	450
	TN30M		◊								108	360
	TN10U			◊							167	540
	TN15U		◊								111	360

■ **Step 1 • Select the insert geometry**

Negative Inserts



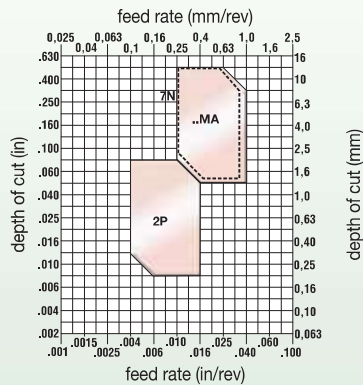
2P
Finishing



..MA
Heavy Roughing



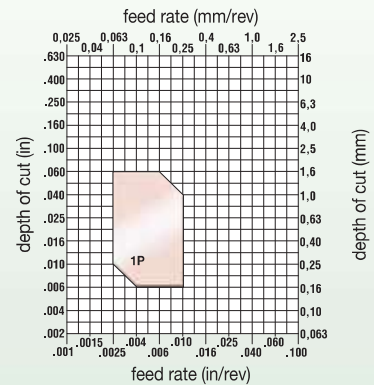
7N
Heavy Roughing







Positive Inserts




1P
Finishing





■ **Step 2 • Select the grade**


cutting condition	Negative Insert Geometry			Positive Insert Geometry
	2P	..MA	7N	1P
heavily interrupted cut 	TN20K	TN20K	TN20K	TN20K
lightly interrupted cut 	TN20K	TN20K	TN20K	TN20K
varying depth of cut, casting, or forging skin 	TN20K	TN20K	TN20K	TN20K
smooth cut, pre-turned surface 	TN20K	TN20K	TN20K	TN20K


■ **Step 3 • Selecting the cutting speed**


Gray Cast Iron speed – m/min (SFM) Starting Conditions 

Material Group	grade	60 (200)	150 (500)	240 (800)	330 (1100)	420 (1400)	510 (1700)	600 (2000)	690 (2300)	780 (2600)	m/min	SFM
K1	TN20K										270	900

Ductile, Compacted Graphite, and Malleable Cast Irons (<80 KSI tensile strength) speed – m/min (SFM) Starting Conditions 

Material Group	grade	60 (200)	150 (500)	240 (800)	330 (1100)	420 (1400)	510 (1700)	600 (2000)	690 (2300)	780 (2600)	m/min	SFM
K2	TN20K										216	720

Ductile, Compacted Graphite, and Malleable Cast Irons (>80 KSI tensile strength) speed – m/min (SFM) Starting Conditions 

Material Group	grade	60 (200)	150 (500)	240 (800)	330 (1100)	420 (1400)	510 (1700)	600 (2000)	690 (2300)	780 (2600)	m/min	SFM
K3	TN20K										189	630

■ Step 1 • Select the insert geometry

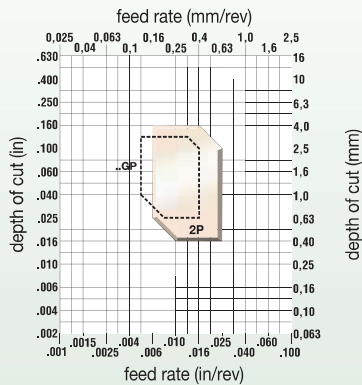
Negative Inserts



2P Finishing



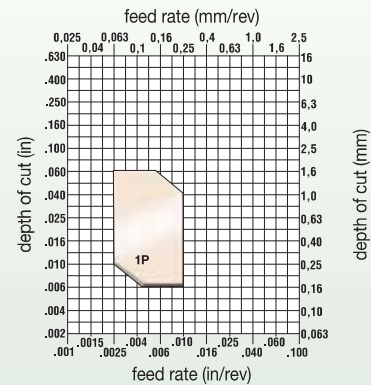
..GP Medium



Positive Inserts



1P Finishing



■ Step 2 • Select the grade

cutting condition	Negative Insert Geometry		Positive Insert Geometry
	2P	..GP	1P
heavily interrupted cut	TN15U	-	TN15U
lightly interrupted cut	TN10U	TN10U	TN15U
varying depth of cut, casting, or forging skin	TN10U	TN10U	TN10U
smooth cut, pre-turned surface	TN10U	TN10U	TN10U

■ Step 3 • Select the cutting speed

Iron-Based, Heat-Resistant Alloys (135–320 HB) (≤34 HRC)

Material Group	grade	speed – m/min (SFM)								Starting Conditions	
		15 (50)	45 (150)	75 (250)	105 (350)	140 (450)	170 (550)	200 (650)	230 (750)	260 (850)	m/min
S1	TN10U	◊								50	162
	TN15U	◊								33	108

Cobalt-Based, Heat-Resistant Alloys (150–425 HB) (≤48 HRC)

Material Group	grade	speed – m/min (SFM)								Starting Conditions	
		15 (50)	45 (150)	75 (250)	105 (350)	140 (450)	170 (550)	200 (650)	230 (750)	260 (850)	m/min
S2	TN10U	◊								54	176
	TN15U	◊								36	117

Nickel-Based, Heat-Resistant Alloys (140–475 HB) (≤48 HRC)

Material Group	grade	speed – m/min (SFM)								Starting Conditions	
		15 (50)	45 (150)	75 (250)	105 (350)	140 (450)	170 (550)	200 (650)	230 (750)	260 (850)	m/min
S3	TN10U	◊								63	203
	TN15U	◊								42	135

Titanium and Titanium Alloys (110–450 HB) (≤48 HRC)

Material Group	grade	speed – m/min (SFM)								Starting Conditions	
		15 (50)	45 (150)	75 (250)	105 (350)	140 (450)	170 (550)	200 (650)	230 (750)	260 (850)	m/min
S4	TN10U	◊								63	203
	TN15U	◊								42	135