

DORMER  **PRAMET**

**STN16 大黄蜂经济型方肩
铣刀**

ProLaunch 2021

SAFETY FIRST

Dormer Pramet's objective is **zero harm** to our people, the environment we work in, our customers and our suppliers.



ALARM



EMERGENCY
EXIT



ASSEMBLY
POINT



FIRST AID



PROTECTIVE
EQUIPMENT



EMERGENCY
NUMBER

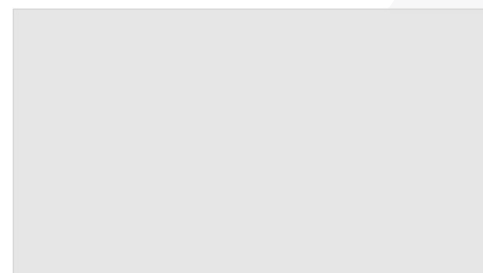


PSYCHOLOGICAL
SAFETY



产品预览

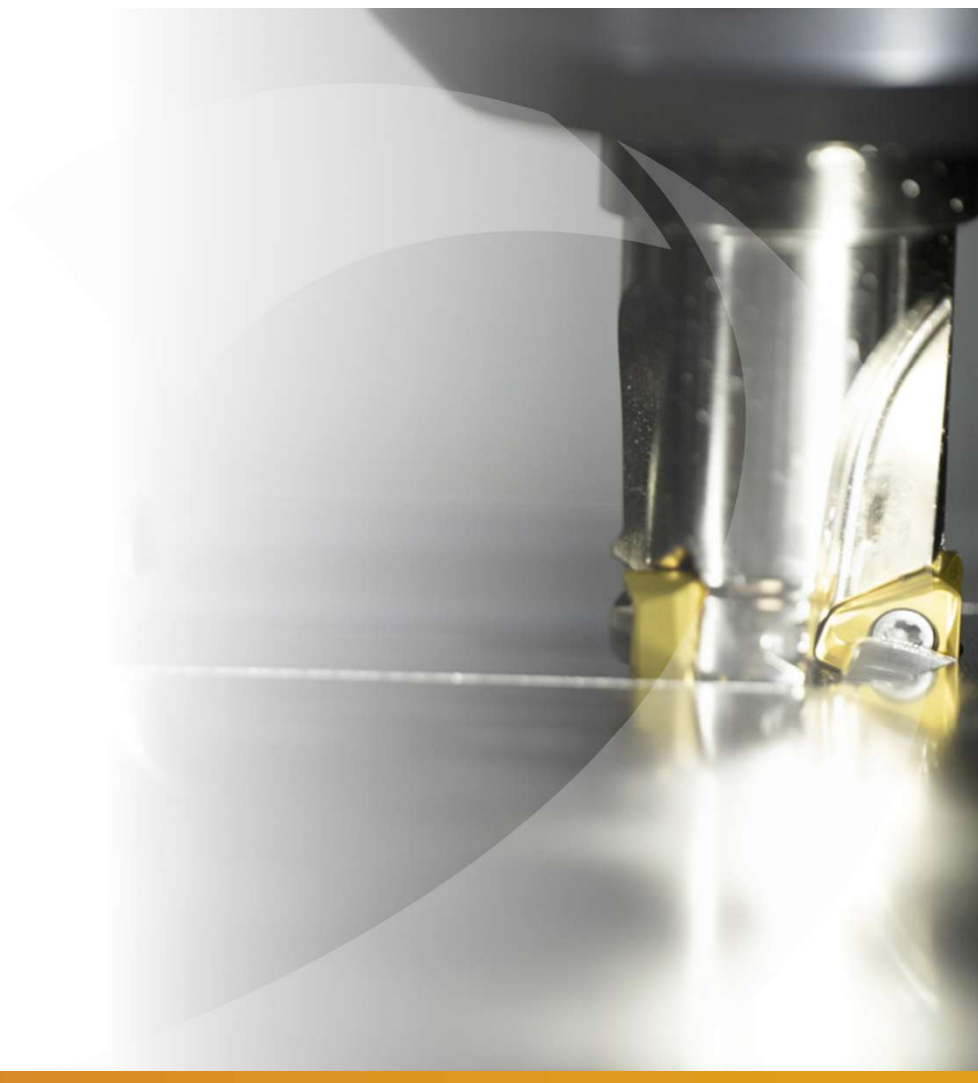
STN16 经济型方肩铣刀



DORMER PRAMET

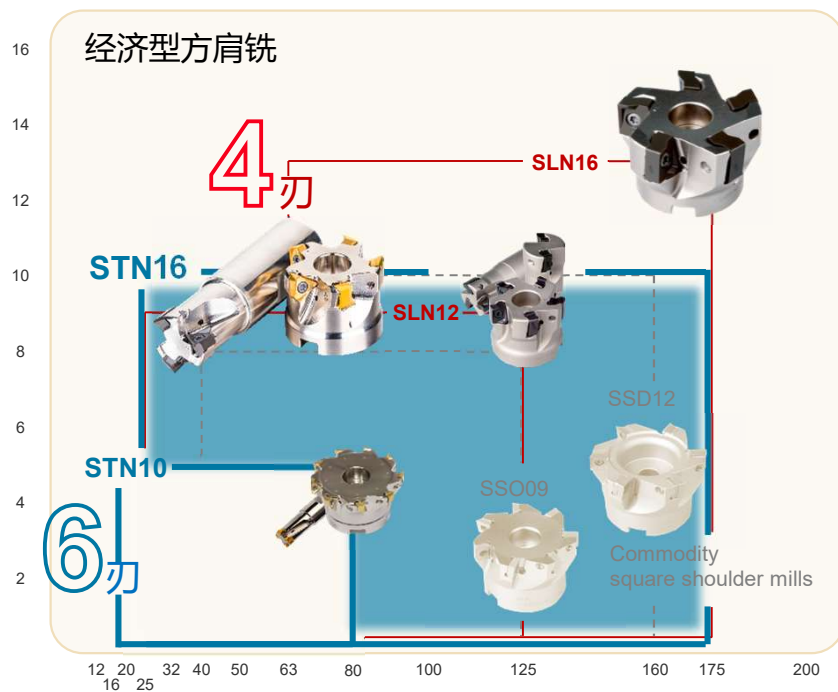
产品介绍

STN16 经济型方肩铣刀



STN16 方肩铣

产品介绍



为什么要开发STN16方肩

- 适用于更大切深的多刃口铣刀
- 更低切削力的铣刀
- 更大的直径范围

开发目的

- **经济性** – 6刃口降低刀具采购成本
- **安全性** – 选用大尺寸夹紧螺钉
- **高效率** – 更大切深和更高进给
- **竞争性** – 更低的切削力产生更好的寿命
- **有效性** – 真正的90°方肩铣刀和更高的表面精度
- **通用性** – 适用于更广的直径范围

产品预览

介绍

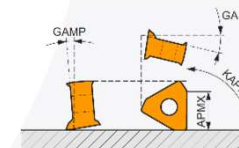
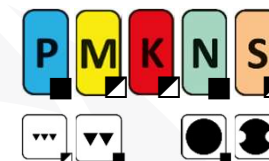
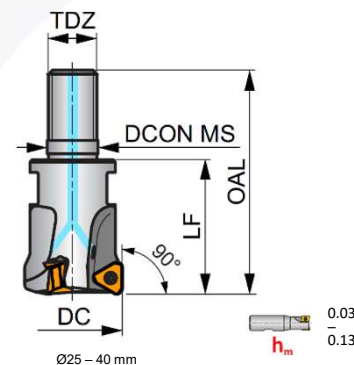
刀具	DC Range	APMX FFW	适用于以下工况											GAMP	GAMF	搭配刀片	P	M	K	N	S	H
立铣刀																						
STN16	25 – 40	10.0											-9.5°	-16 ÷ -18.5°	TNGX 16							
STN10	18 – 35	5.0											-11°	-16 ÷ -17°	TNGX 10							
SLN12	25 - 40	9.0											-6 ÷ -8°	-15 ÷ -23°	LNGX 12, LNGU 12							
SSO09	20 – 32	8.0											+6 ÷ +10°	-10 ÷ -12°	SOMT 09							
玉米铣刀																						
S90TN16	40 - 175	10.0											-9.5°	-16°	TNGX 16							
S90TN10	40 - 80	5.0											-11°	-15°	TNGX 10							
S90LN12	40 - 125	9.0											-6°	-14 ÷ -15°	LNGX 12, LNGU 12							
S90LN16	63 – 175	13.0											-6°	-10.5°	LNMU 16, LNGU 16							
S90SO09	40 - 125	8.0											+10°	-8 ÷ -9°	SOMT 09							
S90SD12	50 – 160	10.0											+8°	-5°	SDMT 12							

4刃或多刃口刀片的方肩铣刀种类
应用工况可在2017年以后的样本中查看
工件材料搭配不同的刀片类型

STN16 – 螺纹柄

槽型和材质介绍

 MODULAR	ISO	DC	OAL	LF	TDZ	DCON		
25A2R033M12-STN16-C		25	55	33	M12	12.5	2	-
32A2R043M16-STN16-C		32	66	43	M16	17.0	2	-
32A3R043M16-STN16-C		32	66	43	M16	17.0	3	-
40A3R043M16-STN16-C		40	66	43	M16	17.0	3	-
40A4R043M16-STN16-C		40	66	43	M16	17.0	4	-



GAMP	GAMF	KAPR	APMX
-9.5°	-16° ÷ -18.5°	90°	10.0

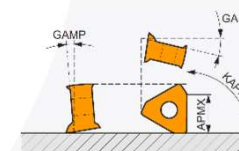
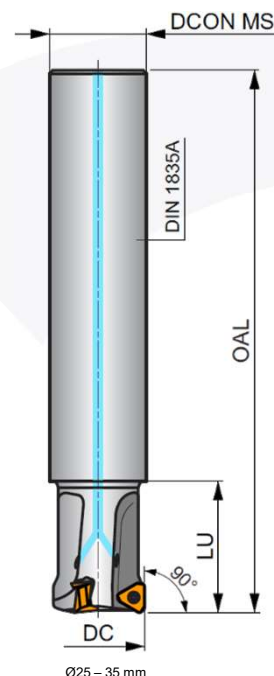


Designation	描述
APMX	最大切深
CPDF	不等齿距
DC	切削直径
DCON MS	柄部尺寸
GAMF	径向角
GAMP	轴向角
KAPR	主偏角
LF	有效长度
OAL	全长
TDZ	螺纹尺寸
ZEFP	有效刃口数量

STN16 – 圆柱直柄

槽型和材质介绍

 ISO	DC	OAL	LU	DCON		
25A2R034A25-STN16-C	25	170	34	25	2	-
32A2R034A32-STN16-C	32	195	34	32	2	-
25A2R080A25-STN16-C	25	170	80	25	2	-
32A2R080A32-STN16-C	32	195	80	32	2	-
32A3R034A32-STN16-C	32	195	34	32	3	-
35A3R034A32-STN16-C	35	195	34	32	3	-



GAMP	GAMF	KAPR	APMX
-9.5°	-16° ÷ -18.5°	90°	10.0



Designation
APMX
CPDF
DC
DCON MS
GAMP
GAMF
KAPR
LU
OAL
ZEFP

描述
最大切深
不等齿距
切削直径
柄部尺寸
径向角
轴向角
主偏角
最大推荐有效长度
全长
有效刃口数量



HC
液压刀柄



CC-HKS
强力刀柄



CC-ER
带精密筒夹的ER刀柄

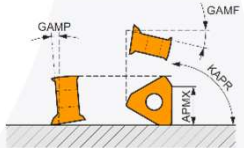
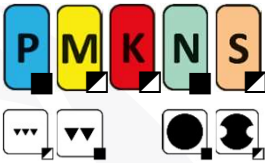
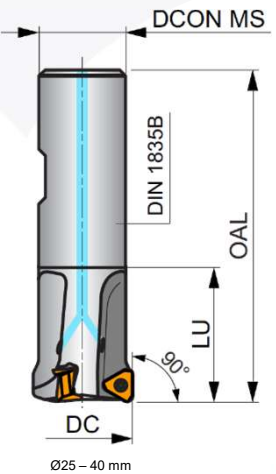
STN16 – 侧固式

槽型和材质介绍

 ISO	DC	OAL	LU	DCON		
25A2R042B25-STN16-C	25	100	42	25	2	-
32A3R042B32-STN16-C	32	110	42	32	3	-
40A4R050B32-STN16-C	40	120	50	32	4	-



W
侧固刀柄



GAMP	GAMF	KAPR	APMX
-9.5°	-16° ÷ -18.5°	90°	10.0



Designation	描述
APMX	最大切深
CPDF	不等齿距
DC	切削直径
DCON MS	柄部尺寸
GAMF	径向角
GAMP	轴向角
KAPR	主偏角
LU	最大推荐有效长度
OAL	全长
ZEFP	有效刃口数量

S90TN16 – 芯轴式

槽型和材质介绍

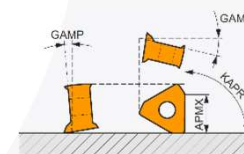
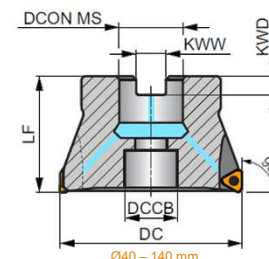
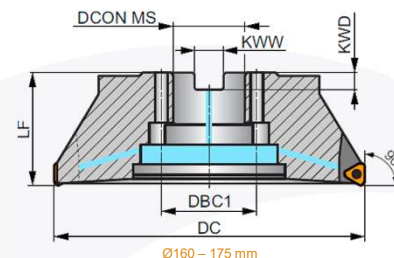


- FMH1
面铣刀柄



- FMH2
带键铣刀柄

ISO 6462 DIN 8030	ISO	DC	LF	DCON	KWW	KWD	齿数	槽型
	40A03R-S90TN16-C	40	40	16	8.4	5.6	3	-
	40A04R-S90TN16-C	40	40	16	8.4	5.6	4	-
	50A04R-S90TN16-C	50	40	22	10.4	6.3	4	√
	50A05R-S90TN16-C	50	40	22	10.4	6.3	5	√
	63A04R-S90TN16-C	63	40	22	10.4	6.3	4	√
	63A06R-S90TN16-C	63	40	22	10.4	6.3	6	√
	80A05R-S90TN16-C	80	50	27	12.4	7.0	5	√
	80A07R-S90TN16-C	80	50	27	12.4	7.0	7	√
	100A06R-S90TN16-C	100	50	32	14.4	8.0	6	√
	100A08R-S90TN16-C	100	50	32	14.4	8.0	8	√
	115A06R-S90TN16-C	115	50	32	14.4	8.0	6	√
	125A07R-S90TN16-C	125	63	40	16.4	9.0	7	√
	125A09R-S90TN16-C	125	63	40	16.4	9.0	9	√
	140A08R-S90TN16-C	140	63	40	16.4	9.0	8	√
	160C10R-S90TN16-C	160	63	40	16.4	9.0	10	√
	175C10R-S90TN16-C	175	63	40	16.4	9.0	10	√



GAMP	GAMF	KAPR	APMX
-9.5°	-16°	90°	10.0



Designation

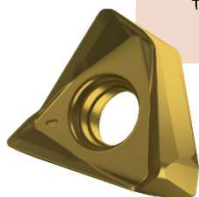
APMX
CPDF
DCN
DCX
DCCB
DCON MS
GAMF
GAMP
KAPR
KWD
KWW
LF
ZEFP

描述

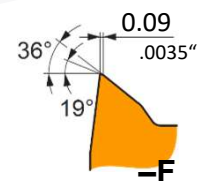
最大切深
不等齿距
最小切削直径
最大切削直径
沉孔直径
柄部尺寸
径向角
轴向角
主偏角
键槽深度
键槽宽度
有效长度
有效刃口数量

TNGX 16 – 槽型F

槽型和材质介绍



ISO		M6330	M8310	M8330	M8340	8215
TNGX 16	06 04 SR-F			•	•	
	06 08 SR-F	•	•	•	•	•



	IC	D1	L	S
[metric]	9.525	4.4	16.5	6.58
[inch]	.375	.173	.650	.259

-F:M6330			PVD
P	20-35	☑	
M	20-35	☑!	
K			
N			
S	10-30	☑	
H			



-F:M8310			PVD
P	01-10	☑	
M	01-10	☑	
K	01-10	☑	
N			
S	05-10	☑	
H			



-F:M8330			PVD
P	20-40	☑	
M	20-35	☑	
K	20-40	☑	
N			
S	15-25	☑	
H			



-F:M8340			PVD
P	25-50	☑	
M	20-40	☑!	
K	20-40	☑	
N			
S	20-30	☑	
H			



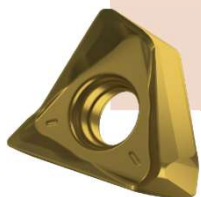
-F:8215			PVD
P	10-20	☑	
M	10-20	☑	
K	10-25	☑	
N			
S	10-15	☑	
H			



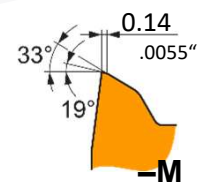
! 注意: F-槽型首选用于加工铁素体和马氏体不锈钢, 搭配使用M6330和M8340材质.

TNGX 16 – 槽型M

槽型和材质介绍



ISO		M6330	M8310	M8330	M8340	M8345	M9325	M9340	8215
TNGX 16	06 04 SR-M	•	•	•	•				•
	06 08 SR-M	•	•	•	•	•	•	•	•
	06 12 SR-M			•	•				
	06 16 SR-M		•	•	•				



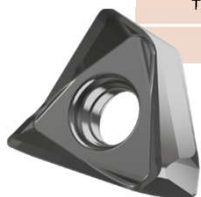
	IC	D1	L	S
[metric]	9.525	4.4	16.5	6.58
[inch]	.375	.173	.650	.259

-M:M6330 PVD			-M:M8310 PVD			-M:M8330 PVD			-M:M8340 PVD			-M:M8345 PVD			-M:M9325 CVD			-M:M9340 CVD			-M:8215 PVD		
P	20-35	☑	P	01-10	☑	P	20-40	☑	P	25-50	☑	P	30-50	☑	P	10-30	☑	P	35-50	☑	P	10-20	☑
M	20-35	☑!	M	01-10	☑	M	20-35	☑	M	20-40	☑!	M	30-40	☑!	M	10-25	☑	M	30-40	☑!	M	10-20	☑
K			K	01-10	☑	K	20-40	☑	K	20-40	☑	K			K			K			K	10-25	☑
N			N			N			N			N			N			N			N		
S	10-30	☑	S	05-10	☑	S	15-25	☑	S	20-30	☑	S	20-30	☑	S	05-15	☑	S	15-20	☑	S	10-15	☑
H			H			H			H			H			H			H			H		

! 注意: M-槽型首选用于加工铁素体和马氏体不锈钢, 搭配使用 M6330, M8340, M8345 和 M9340材质.

TNGX 16 – 槽型FA

槽型和材质介绍

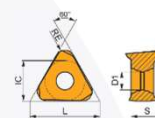
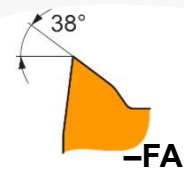
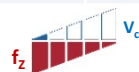


ISO		M0315	HF7
TNGX 16	06 04 FR-FA	●	●
	06 08 FR-FA	●	●

-FA:M0315 		
P		
M		
K		
N	05-25	■
S		
H		



-FA:HF7 		
P		
M		
K		
N	10-25	■
S		
H		

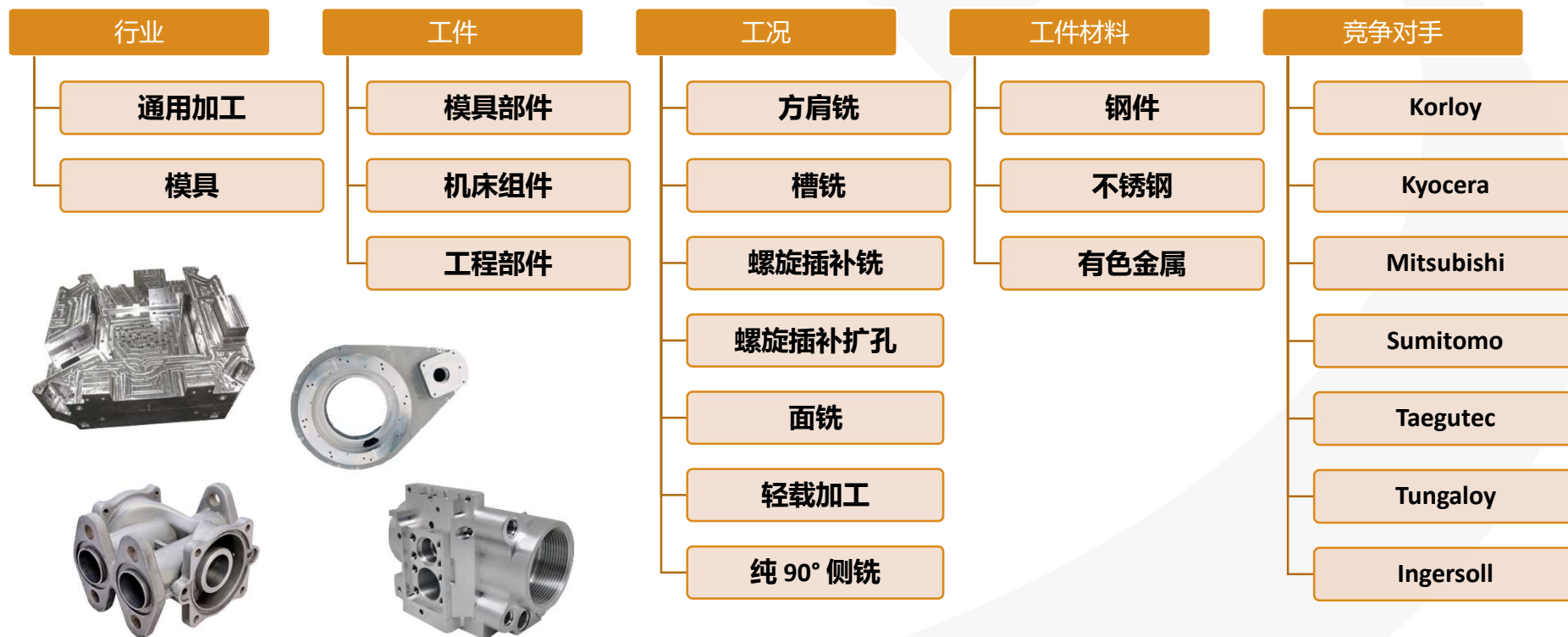


	IC	D1	L	S
[metric]	9.525	4.4	16.5	6.58
[inch]	.375	.173	.650	.259

! 注意: 使用FA槽型加工有色金属材料时, 推荐使用冷却液, 油雾, 高压空气, 以减少机械瘤的产生.

应用市场

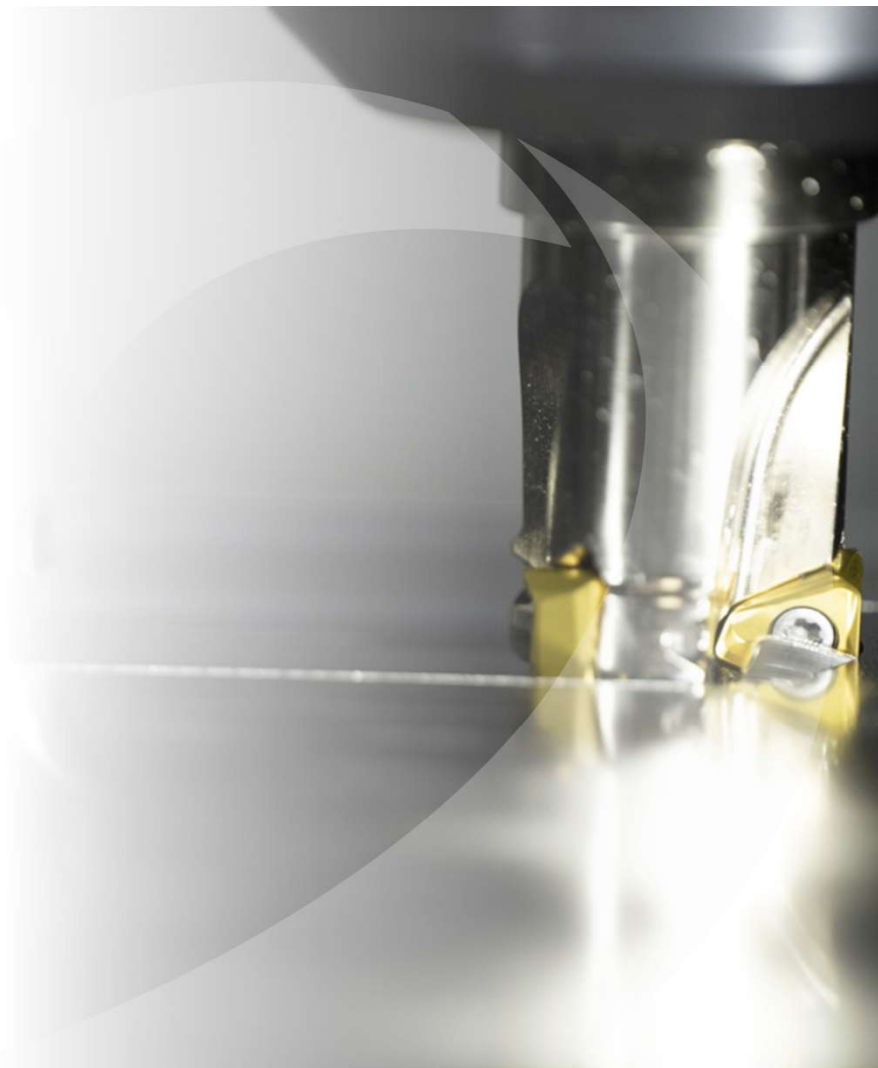
应用推荐



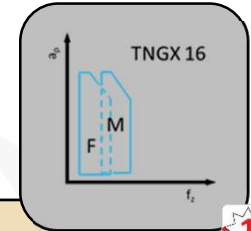
DORMER PRAMET

特点&优势

STN16 经济型方肩铣刀



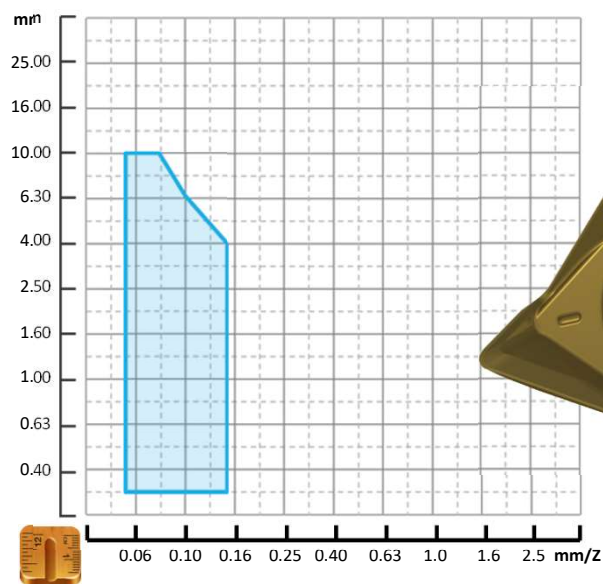
钢件(P- 材料组)



ISO group		WMG (Work Material Group)		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)	Examples of material (AISI, EN, DIN, SS, STN, BS, UNE, GB, AFNOR, GOST, UNI)	
P	P1	■ P1.1	Free machining steel <i>(carbon steels with increased machinability)</i>	sulfurized	< 240 HB	≤ 830	AISI 1108, EN 15S22, DIN 1.0723, SS 1922, ČSN 11120, BS 210A15, UNE F.210F, GB Y15, AFNOR 10F1, GOST A30, UNI CF10S20
		■ P1.2		sulfurized and phosphorized	< 180 HB	≤ 620	AISI 1211, EN 11SMn30, DIN 1.0715, SS 1912, ČSN 11109, BS 230M7, UNE F.2111, GB Y15, AFNOR S250, GOST A40G, UNI CF9SMn28
		■ P1.3		sulfurized/phosphorized and leaded	< 180 HB	≤ 620	AISI 12L13, EN 11SMnPb30, DIN 1.0718, SS 1914, ČSN 12110, BS 210M16, UNE F.2114, GB Y15Pb, AFNOR S250Pb, GOST AS35G2, UNI CF10SPb20
	P2	■ P2.1	Plain carbon steel <i>(steels comprised of mainly iron and carbon)</i>	containing <0.25%C	< 180 HB	≤ 620	AISI 1015, EN C15, DIN 1.0401, SS 1350, ČSN 11301 , BS 080A15, UNE F.111, GB 15, AFNOR C18RR, GOST St2ps, UNI Fe360
		■ P2.2		containing <0.55%C	< 240 HB	≤ 830	AISI 1030, EN C30, DIN 1.0528, SS 1550, ČSN 12031, BS 080M32, UNE F.1130, GB 30, AFNOR AF50C30, GOST 30G, UNI Fe590
		■ P2.3		containing >0.55%C	< 300 HB	≤ 1030	AISI 1060, EN C60, DIN 1.0601, SS 1655, ČSN 12061, BS 080A62, UNE F513, GB 60, AFNOR 1C60, GOST 60G, UNI C60
	P3	■ P3.1	Alloy steel <i>(carbon steels with an alloying content ≤ 10%)</i>	annealed	< 180 HB	≤ 620	AISI 3415, 4140, 4340, 6150, 8620, EN 15NiCr13, 42CrMo4, 41NiCrMo7-3-2, DIN 1.5732, 1.7223, 1.6563, 1.8159, 1.6523, SS 2244, 2541, 2230, 2506, ČSN 15020, BS 1501-240, UNE F.2601, GB 16Mo, AFNOR 15D3, GOST 15M, UNI 16Mo3KW
		■ P3.2		hardened and tempered	180 - 260 HB	> 620 ≤ 900	
		■ P3.3			260 - 360 HB	> 900 ≤ 1240	
	P4	■ P4.1	Tool steel <i>(special alloy steel for tools, dies and molds)</i>	annealed	< 26 HRC	≤ 900	AISI D2, EN X155CrVMo12-1, DIN 1.2370, SS 2736, ČSN 19573, BS BD2, UNE F.520A, GB Cr12Mo1V1, AFNOR Z160CDV12, GOST Ch12MF, UNI X155CrVMo121KU
		■ P4.2		hardened and tempered	26 - 39 HRC	> 900 ≤ 1240	
		■ P4.3			39 - 45 HRC	> 1240 ≤ 1450	

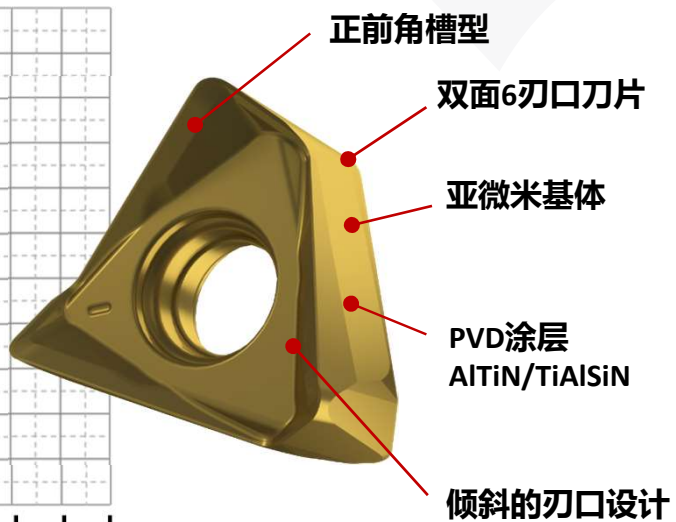
TNGX 160608SR-F

产品特点



钢件参数推荐

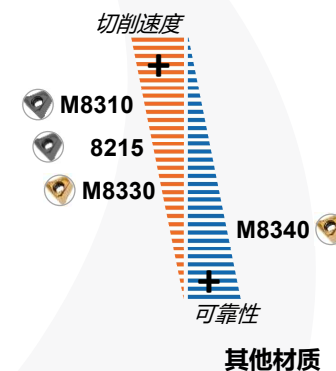
f_z 0.05 – 0.15 mm/Z
 a_p 0.2 – 10.0 mm
 V_c 185 – 295 m/min



ProLaunch 2017.2

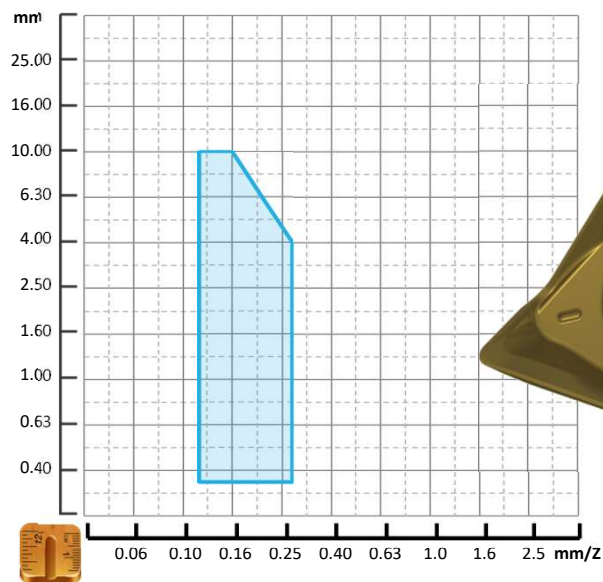
M8330

P	M	K	N	S	H
■	■	■	■	■	■



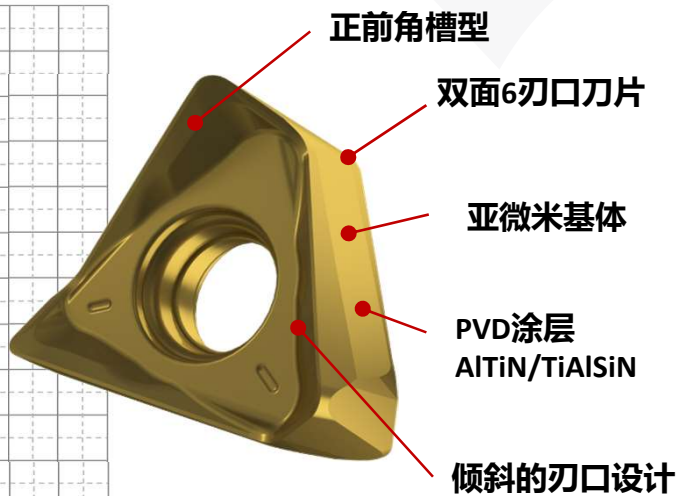
TNGX 160608SR-M

产品特点



钢件参数推荐

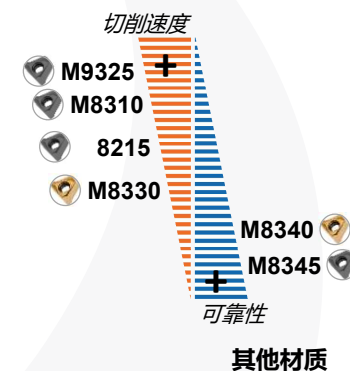
f_z 0.12 – 0.28 mm/Z
 a_p 0.3 – 10.0 mm
 V_c 160 – 240 m/min



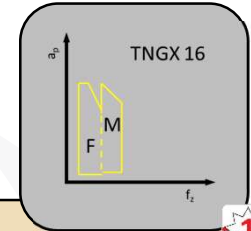
ProLaunch 2017.2

M8330

P	M	K	N	S	H
■	■	■		■	



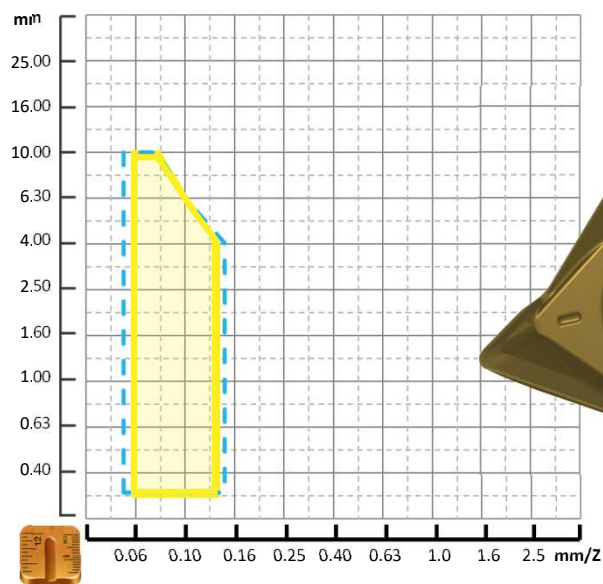
不锈钢(M- 材料组)



ISO group		WMG (Work Material Group)		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)	Examples of material (AISI, EN, DIN, SS, STN, B.S, UNE, CN, AFNOR, GOST, UNI)	
M	M1	■ M1.1	Ferritic stainless steel (straight chromium non-hardenable alloys)	< 160 HB	≤ 520	AISI S429, EN X7Cr14, DIN 1.4001, SS 2326, BS 434S17, UNE F.3401, AFNOR Z8C12, GOST 08Ch13, UNI X6CrTi12	
		■ M1.2		160 - 220 HB	> 520 ≤ 700	AISI 446, EN X10CrAl24, DIN 1.4762, SS 2322, ČSN 17113, BS 430S17, UNE F.3154, GB 10Cr17, AFNOR Z10CAS24, GOST 12Ch17, UNI X16Cr26	
	M2	■ M2.1	Martensitic stainless steel (straight chromium hardenable alloys)	annealed	< 200 HB	≤ 670	AISI 430F, EN X14CrMoS17, DIN 1.4104, SS 2383, ČSN 17140, BS 410S21, UNE F.3117, AFNOR Z10CF17, UNI X10CrS17
		■ M2.2		quenched and tempered	200 - 280 HB	> 670 ≤ 950	AISI 440C, EN X105CrMo17, DIN 1.4125, SS 2385, ČSN 17023, BS 425C11, UNE F.3402; GB 102Cr17Mo, AFNOR Z100CD17, GOST 95Ch18, UNI GX6CrNi 13 04
		■ M2.3		precipitation-hardened	280 - 380 HB	> 950 ≤ 1300	AISI 420, EN X45Cr13, DIN 1.4034, ČSN 17029, BS 425C11, UNE F.3405, AFNOR Z44C14, GOST 20X17H12, UNI X30Cr13
	M3	▣ M3.1	Austenitic stainless steel (chromium-nickel and chromium-nickel-manganese alloys)	< 200 HB	≤ 750	AISI 304, 309, 5848 EN X5CrNi18-12, X15CrNiSi20-12, X45CrNiW18-9, DIN 1.4303, 1.4828, 1.4873, SS 2352, ČSN 17249, BS 305S17, UNE F.3513, GB 10Cr18Ni12, AFNOR Z8CN18.12, UNI X7CrNi18 10	
		▣ M3.2		200 - 260 HB	> 750 ≤ 870		
		▣ M3.3		260 - 300 HB	> 870 ≤ 1040		
	M4	▣ M4.1	Austenitic-ferritic (DUPLEX) or super-austenitic stainless steel (alloys with austenitic-ferritic microstructure, austenitic alloys with > 20%Ni)	< 300 HB	≤ 990	AISI 329, EN X1-NiCrMoCU25-20-5, DIN 1.4539, SS 2562, ČSN 17265, BS 318S13, UNE F.3552, GB 022Cr25NiMo2N, AFNOR Z1NCDU25.20	
		▣ M4.2	Precipitation hardening austenitic stainless steel	300 - 380 HB	≤ 1320	AISI 631 (17-7PH), EN X7CrNiAl17-7, DIN 1.4568, SS 2388, ČSN 17465, BS 301S13, UNE F.3217, GB 07Cr17Ni7Al, AFNOR 29CNA17-07	

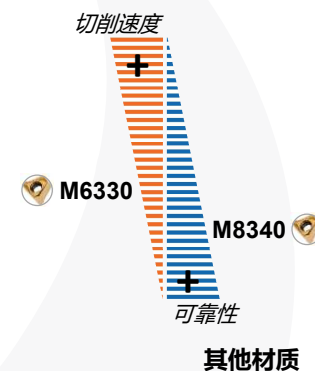
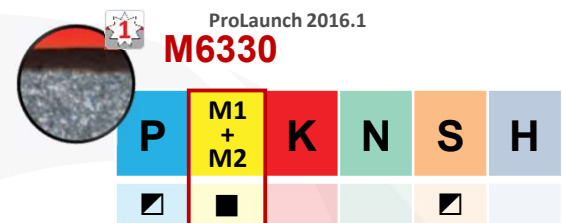
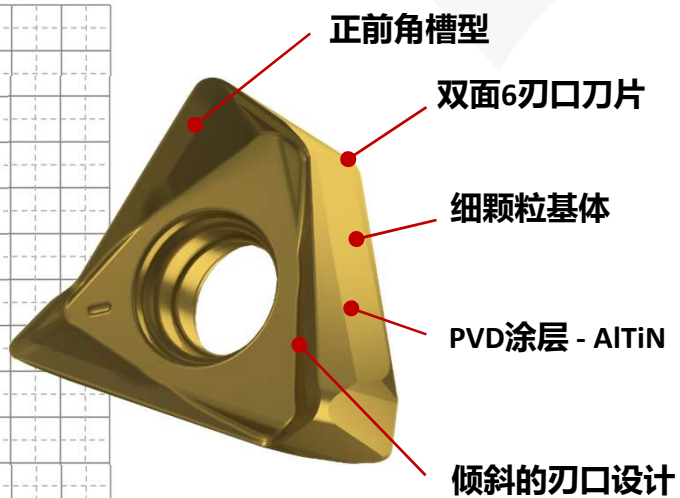
TNGX 160608SR-F

产品特点



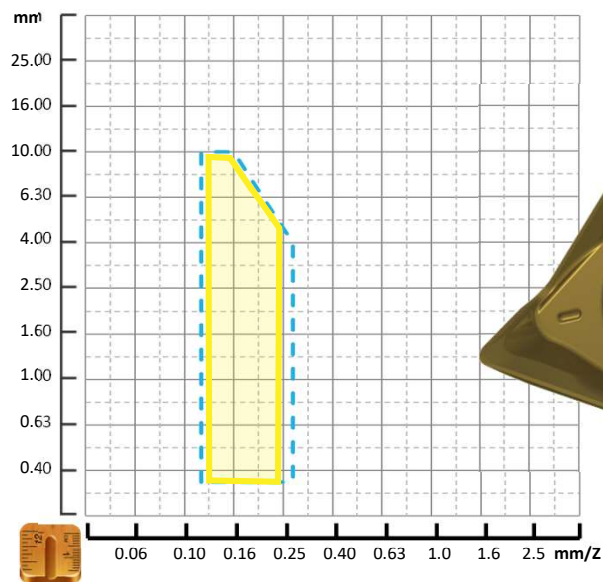
不锈钢材料参数推荐

f_z	0.06 – 0.14 mm/Z
a_p	0.2 – 10.0 mm
V_c	110 – 180 m/min



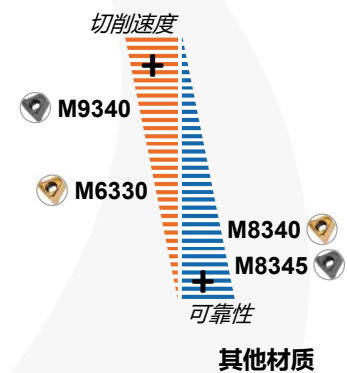
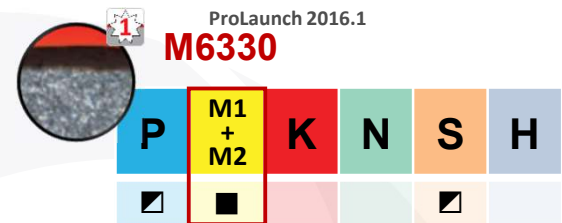
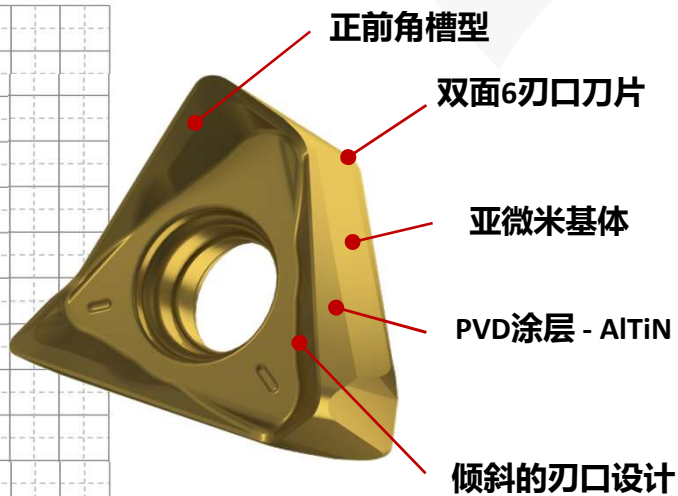
TNGX 160608SR-M

产品特点

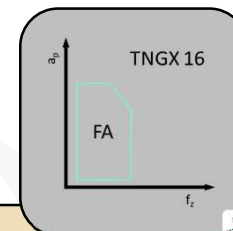


不锈钢材料参数推荐

f_z 0.13 – 0.25 mm/Z
 a_p 0.3 – 10.0 mm
 V_c 95 – 145 m/min



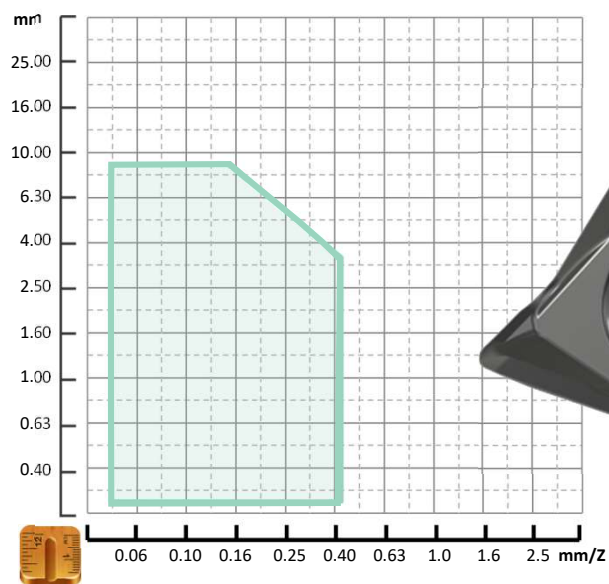
有色金属(N- 材料组)



ISO group		WMG (Work Material Group)		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)	Examples of material (UNS, EN, DIN, SS, STN, B.S, UNE, CN, AFNOR, GOST, UNI)	
N	N1	■ N1.1	Commercially pure wrought aluminum	< 60 HB	≤ 240	UNS A91200, EN AL99.6, DIN 3.0205, SS 4010, STN 424009, BS 1C, UNE L-3001, GB L5, AFNOR A4, GOST АДЧ, UNI 3567	
		■ N1.2	Wrought aluminum alloys	half hard tempered	60 - 100 HB	> 240 ≤ 400	UNS A93004, EN AlMn0.5Mg0.5, DIN 3.0505, SS 4054, STN 424432, BS N31, UNE L-3831, GB LF2, AFNOR A-M1, GOST АМu, UNI 3568
		■ N1.3		full hard tempered	100 - 150 HB	> 400 ≤ 590	UNS A95083, EN AlMg4.5Mn0.7, DIN 3.3547, SS 4140, STN 424415, BS N8, UNE L-3321, GB AlMg4.5Mn, AFNOR A-G4.5Mn, GOST Амг 4.5
	N2	■ N2.1	Cast aluminium alloys	< 75 HB	≤ 240	UNS A02080, EN AlCu4S, BS LM11, STN 424331, UNE Al Si1Cu, GOST AMg5K, UNI G-ALSi7Mg	
		■ N2.2		75 - 90 HB	> 240 ≤ 270	UNS A02420, EN AlCu4Ni2Mg2, SS AlSi7MgFe, BS LM6, STN 424519, UNE Al-7SiMg, AFNOR A-S7G, GOST AK7, UNI G-ALSi7Mg	
		■ N2.3		90 - 140 HB	> 270 ≤ 440	UNS A03360, EN G-ALCu4NiMg2, SS AlSi10Mg, STN 424336, BS LM 30, AFNOR A-S10G, UNI G-ALSi9Mg	
	N3	■ N3.1	Free-cutting copper-alloys materials with excellent machining properties			UNS C14700, EN CuPb1P, DIN 2.1498, STN 423214, BS C111, AFNOR CuZn35Pb2, GOST L63-3, UNI CuS(P0.01)	
		■ N3.2	Short-chip copper-alloys with good to moderate machining properties			UNS C81540, EN CuNi2SiCr, DIN 2.0857, STN 423220, BS NS113, UNE CuSn12, AFNOR CuZn40, GOST L60, UNI P-CuZn-40	
		■ N3.3	Electrolytic copper and long-chip copper-alloys with moderate to poor machining properties			UNS C10100, EN CuAg0.1, DIN 2.1203, SS 5010, UNE CUSi3Mn1, AFNOR Cu-C2, GOST M1f, UNI Cu-OF	
	N4	☑ N4.1	Thermoplastic polymers			ABS, Acryl, Duraplast, Elastomer, EP, Epoxid, FEP, Fluor, Gummi, Kautschuk, Latex, MF, MPF, PA, PAI, PC, PE, PEEK, PEI, PES, PET, PF,	
		☑ N4.2	Thermosetting polymers			Aramid, Epoxy, Fluoropolymer, Mehacrylate, Melamine, Phenolic, Polyester, Polyimide, Polymethacrylimide, Polyurethane	
		☑ N4.3	Reinforced polymers or composites			CFK, GFK, GMT, Honeycomb, Kevlar, LFT, Organo, SMC	
N5	N5.1	Graphite			CGM-1, CM-00, GM-10, GM-11, GR030, GR030PI, GR060, GR060PI, GR125, MC-01, MC-01RO, MC-03, MC-03M		

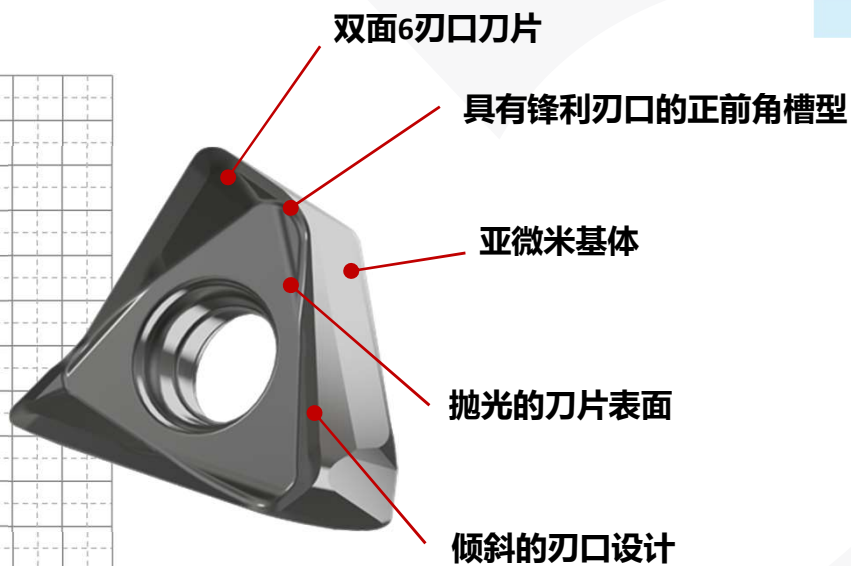
TNGX 16068FR-FA

产品特点



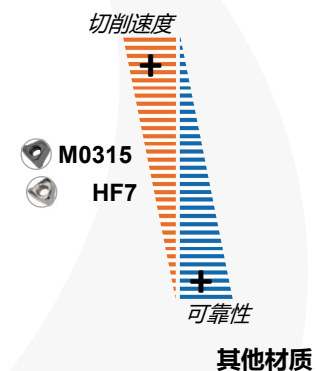
有色金属材料参数推荐

f_z 0.03 – 0.43 mm/Z
 a_p 0.2 – 9.0 mm
 V_c 95 – 470 m/min



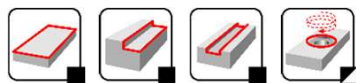
HF7

P	M	K	N	S	H

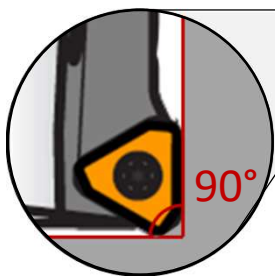


大黄蜂方肩铣

产品特点



高精度刀片定位面



强壮的夹紧螺钉

表面镀镍

不等齿距

内冷设计

双面负角刀片

米制 英制

螺纹柄立铣刀

M..-STN16-C

ø 25 – 40 mm

M..-ISTN16-C

ø 1 – 1 1/2"

侧固柄立铣刀

B..-STN16-C

ø 25 – 40 mm

W..-ISTN16-C

ø 1 – 1 1/2"

圆柱柄立铣刀

A..-STN16-C

ø 25 – 35 mm

C..-ISTN16-C

ø 1 – 1 1/4"

芯轴铣刀

S90TN16-C

ø 40 – 175 mm

IS90TN16-C

ø 1 1/2 – 5"

大黄蜂方肩铣

DORMER PRAMET

www.dormerpramet.com

Full YouTube clip

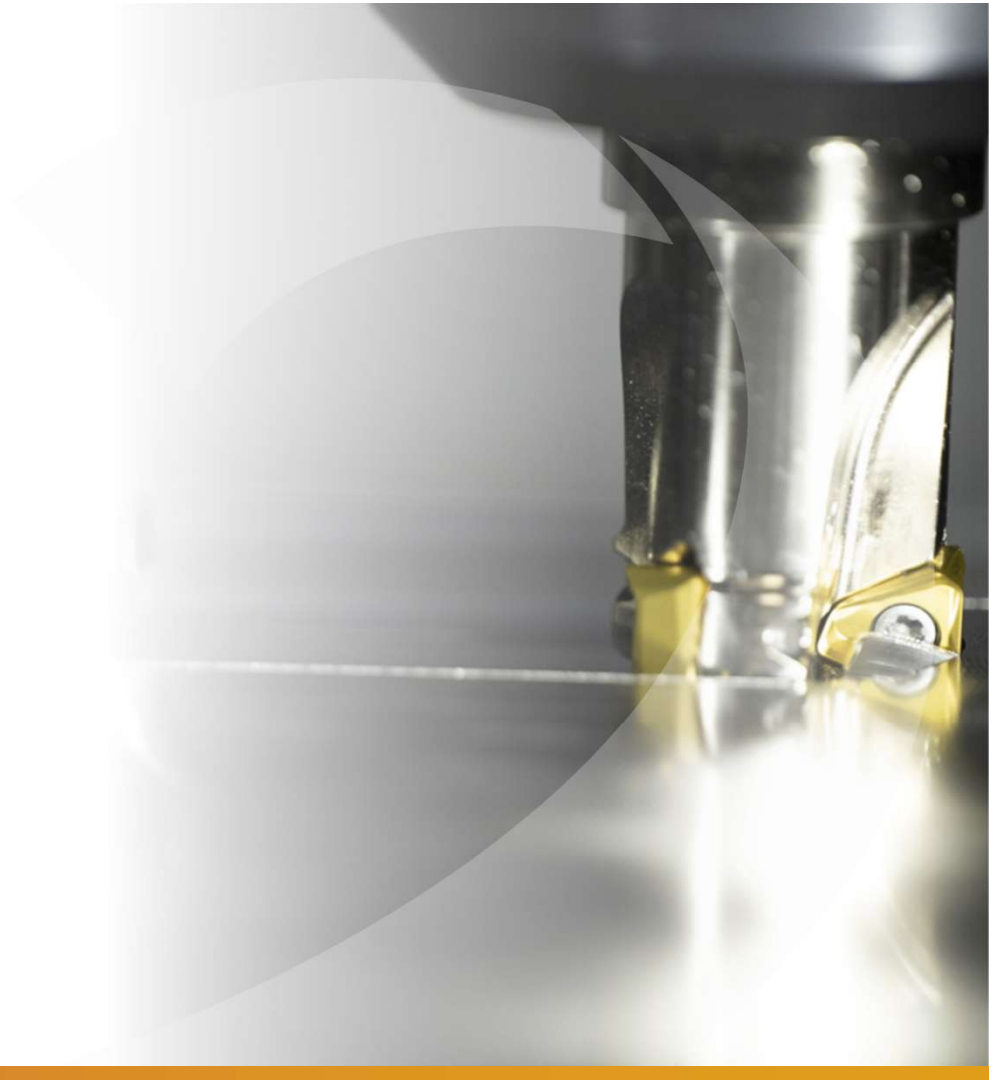


YouTube

DORMER PRAMET

测试情况

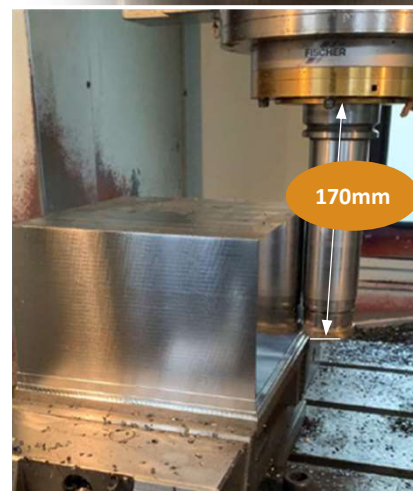
STN16 经济型方肩铣刀



模具钢铁削

Field test

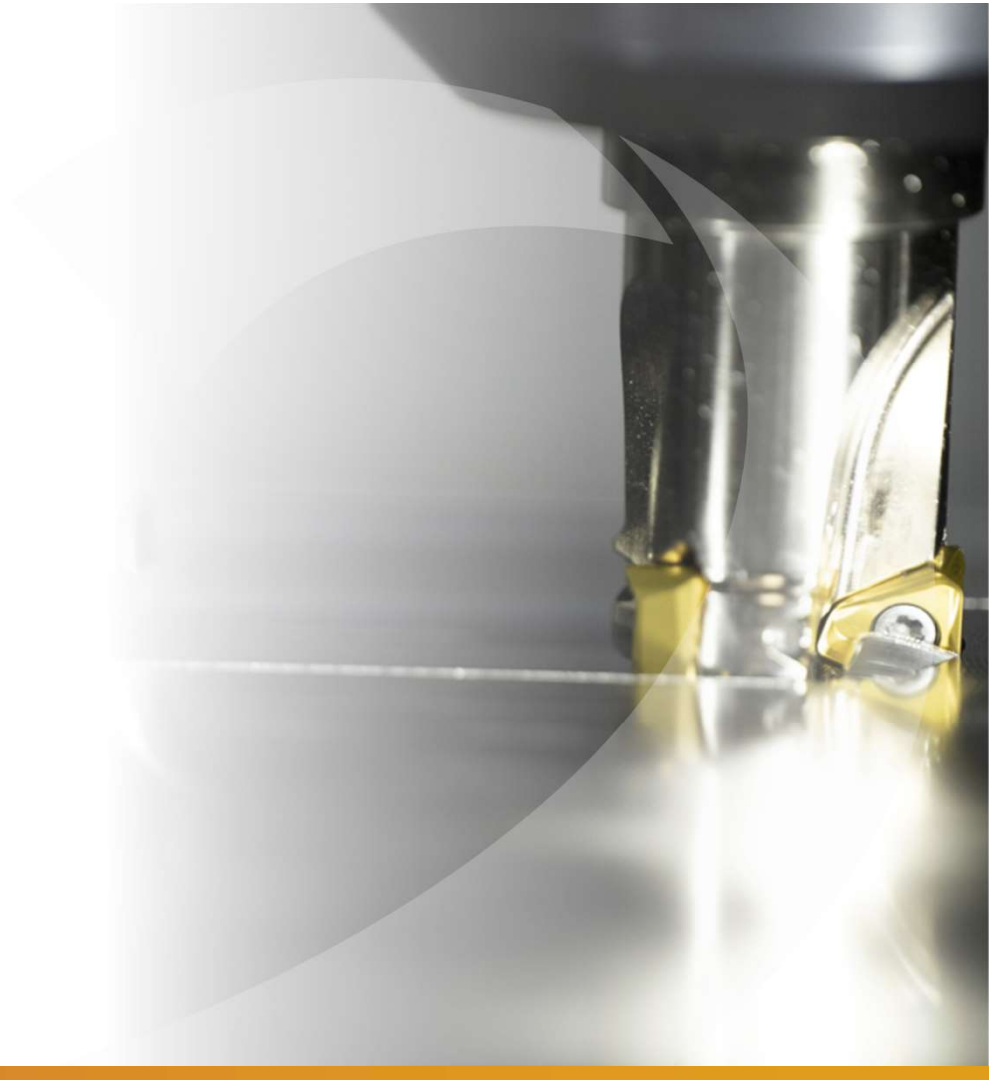
Company		Die & Mold Customer (Italy)
Work-material		AISI P20 (WMG P4.2)
Pre-hardness		28-34HRC
Brand		PRAMET
Cutter		50A05RS90TN16-C
Insert		TNGX 160608SR-M
Grade		M8340
ISO application range		P25-50
Coating method		PVD
Depth of cut	a_p [mm]	5.0
Width of cut	a_e [mm]	0.5
Coolant		Compressed air
Rotational 切削速度	RPM	1600
切削速度	V_c [m/min]	251
Feed	f_z [mm/z]	0.28
Maximum chip-thickness	h_{max} [mm]	0.06
Mean chip-thickness	h_m [mm]	0.03
Feed rate	V_f [mm/min]	2674
Metal removal rate	Q [cm ³ /min]	5.630



DORMER PRAMET

加工推荐

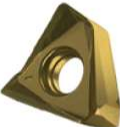
STN16 经济型方肩铣刀



刀片选择

样本的参数推荐

Vf,fn,ap 的初始值可使用参数计算器

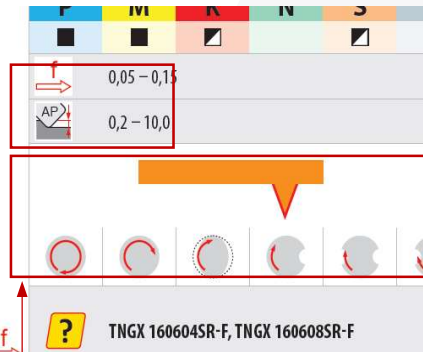
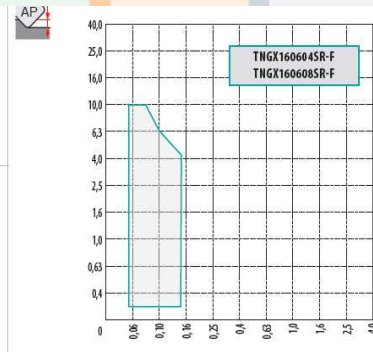
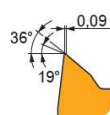
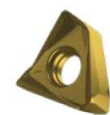
Product	RE [mm]	P			M			K			N			S			H		
		vc	f	ap	vc	f	ap	vc	f	ap	vc	f	ap	vc	f	ap	vc	f	ap
		[m/min]	[mm/tooth]	[mm]	[m/min]	[mm/tooth]	[mm]	[m/min]	[mm/tooth]	[mm]	[m/min]	[mm/tooth]	[mm]	[m/min]	[mm/tooth]	[mm]	[m/min]	[mm/tooth]	[mm]
	TNGX 160604SR-F	M8330	0.40	205	0.10	3.0	120	0.09	3.0	190	0.10	3.0	—	—	—	—	—	—	—
		M8340	0.40	225	0.10	3.0	135	0.09	3.0	210	0.10	3.0	—	—	—	—	—	—	—
		8215	0.80	250	0.10	3.0	150	0.09	3.0	—	—	—	—	—	—	—	—	—	—
		M6330	0.80	215	0.10	3.0	150	0.09	3.0	—	—	—	—	—	—	—	—	—	—
		M8310	0.80	280	0.10	3.0	140	0.09	3.0	—	—	—	—	—	—	—	—	—	—
	TNGX 160608SR-F	M8330	0.80	245	0.10	3.0	145	0.09	3.0	—	—	—	—	—	—	—	—	—	—
		M8340	0.80	225	0.10	3.0	135	0.09	3.0	—	—	—	—	—	—	—	—	—	—

设计用于精加工至半精加工的正前角槽型，用于钢件和铸铁材料的加工，也可用于耐热合金材料，连续或中等断续均可适用

ISO材料组对应的初始参数推荐

材质

刀片型号



工序窗
每齿进给，切深以及工况

刀片选择

标签上的参数推荐

TNGX 160604SR-F M8330 0.40 205 0.10 3.0 120 0.09 3.0 190 0.10 3.0

TNGX 160604SR-F:M8330

P20 - P40		[metric]		[inch]	
		V _c	f _z	a _p	
		250 - 155	0.05 - 0.15	0.2 - 10.0	820 - 510 .002 - .006 .008 - .394

M20 - M35		[metric]		[inch]	
		V _c	f _z	a _p	
		150 - 90	0.06 - 0.14	0.2 - 10.0	490 - 295 .002 - .006 .008 - .394

K20 - K40		[metric]		[inch]	
		V _c	f _z	a _p	
		235 - 145	0.05 - 0.15	0.2 - 10.0	770 - 475 .002 - .006 .008 - .394

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

参数初始值打印在标签上

TNGX 160608FR-FA:HF7

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

N10 - N25		[metric]		[inch]	
		V _c	f _z	a _p	
		470 - 95	0.03 - 0.43	0.2 - 9	1540 - 310 .001 - .017 .008 - .354

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

TNGX 160608SR-F:M6330

P20 - P35		[metric]		[inch]	
		V _c	f _z	a _p	
		255 - 160	0.05 - 0.15	0.2 - 10.0	835 - 525 0.002 - 0.006

M20 - M35		[metric]		[inch]	
		V _c	f _z	a _p	
		180 - 110	0.06 - 0.14	0.2 - 10.0	590 - 360 0.002 - 0.006

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

		[metric]		[inch]	
		V _c	f _z	a _p	
		-	-	-	-

刀片型号

工序窗

切削速度
每齿进给
切深

Edit

WMG材料组的校正因子

加工推荐

ISO P	WMG (Work Material Group)	C _{vcWMG}
P1.1	Free machining sulfurized carbon steel with a hardness of < 220HB	1,17
P1.2	Free machining sulfurized and phosphorized carbon steel with a hardness of < 180HB	1,31
P1.3	Free machining sulfurized/phosphorized and leaded carbon steel with a hardness of < 160HB	1,35
P2.1	Plain low carbon steel containing < 0.25%C with a hardness of < 180HB	1,00
P2.2	Plain medium carbon steel containing < 0.55%C with a hardness of < 240HB	0,88
P2.3	Plain high carbon steel containing > 0.55%C, with a hardness of < 300HB	0,78
P3.1	Alloy steel with a hardness of < 180HB	0,81
P3.2	Alloy steel with a hardness of 180 - 260HB	0,65
P3.3	Alloy steel with a hardness of 260 - 360HB	0,55
P4.1	Tool steel with a hardness of < 26HRC	0,48
P4.2	Tool steel with a hardness of 26 - 39HRC	0,41
P4.3	Tool steel with a hardness of 39 - 45HRC	0,33

ISO N	WMG (Work Material Group)	C _{vcWMG}
N1.1	Pure aluminium and wrought aluminium alloys with a hardness of < 80HB	1,33
N1.2	Wrought aluminium alloys with a hardness of 60 - 100HB	1,00
N1.3	Wrought aluminium alloys with a hardness of 100 - 150HB	0,67
N2.1	Cast aluminium alloys with ≤ 7% Si and a hardness of < 75HB	0,67
N2.2	Cast aluminium alloys with 7 ≤ 12% Si and a hardness of 75 - 90HB	0,60
N2.3	Cast aluminium alloys with > 12% Si and a hardness of 90 - 140HB	0,43
N3.1	Free-cutting copper-alloys materials with excellent machining properties	0,70
N3.2	Short-chip copper-alloys with good to moderate machining properties	0,41
N3.3	Electrolytic copper and long-chip copper-alloys with moderate to poor machining properties	0,21
N4.1	Thermoplastic polymers	0,70
N4.2	Thermosetting polymers	0,27
N4.3	Reinforced polymers or composites	0,29
N5.1	Graphite	(1,00)

ISO M	WMG (Work Material Group)	C _{vcWMG}
M1.1	Stainless steel, ferritic with a hardness of < 160HB	1,22
M1.2	Stainless steel, ferritic with a hardness of 160 - 220HB	1,03
M2.1	Stainless steel, martensitic with a hardness of < 200HB	1,08
M2.2	Stainless steel, martensitic with a hardness of 200 - 280HB	0,89
M2.3	Stainless steel, martensitic with a hardness of 280 - 380HB	0,75
M3.1	Stainless steel, austenitic with a hardness of < 200HB	1,00
M3.2	Stainless steel, austenitic with a hardness of 200 - 260HB	0,86
M3.3	Stainless steel, austenitic with a hardness of 260 - 300HB	0,77
M4.1	Stainless steel, austenitic-ferritic or super-austenitic with a hardness of < 300HB	0,75
M4.2	Stainless steel, precipitation hardening austenitic with a hardness of 300 - 380HB	0,64

ISO S	WMG (Work Material Group)	C _{vcWMG}
S1.1	Titanium or titanium alloys, with a hardness of < 200HB	1,94
S1.2	Titanium alloys, with a hardness of 200 - 280HB	1,72
S1.3	Titanium alloys, a hardness of 280 - 360HB	1,44
S2.1	High-temperature Fe-based alloys with a hardness of < 200HB	1,33
S2.2	High-temperature Fe-based alloys with a hardness of 200-280HB	1,17
S3.1	High-temperature Ni-based alloys with a hardness of < 280HB	1,00
S3.2	High-temperature Ni-based alloys with a hardness of 280 - 360HB	0,83
S4.1	High-temperature Co-based alloys with a hardness of < 240HB	0,78
S4.2	High-temperature Co-based alloys with a hardness of 240 - 320HB	0,67

ISO K	WMG (Work Material Group)	C _{vcWMG}
K1.1	Gray iron, ferritic or ferritic-pearlitic with a hardness of < 180HB	1,35
K1.2	Gray iron, ferritic-pearlitic or pearlitic with a hardness of 180 - 240HB	1,00
K1.3	Gray iron, pearlitic with a hardness of 240 - 280HB	0,75
K2.1	Malleable iron, ferritic with a hardness of < 160HB	1,39
K2.2	Malleable iron, ferritic or pearlitic with a hardness of 160 - 200HB	1,13
K2.3	Malleable iron, pearlitic with a hardness of 200 - 240HB	0,90
K3.1	Ductile (nodular/spheroidal) iron, ferritic with a hardness of < 180HB	1,23
K3.2	Ductile (nodular/spheroidal) iron, ferritic or pearlitic with a hardness of 180 - 220HB	0,94
K3.3	Ductile (nodular/spheroidal) iron, pearlitic with a hardness of 220 - 260HB	0,76
K4.1	Austenitic cast iron with a hardness of < 180HB	1,14
K4.2	Austenitic cast iron with a hardness of 180 - 240HB	0,86
K4.3	Austempered ductile iron with a hardness of 240 - 280HB	0,63
K4.4	Austempered ductile iron with a hardness of 280 - 320HB	0,54
K4.5	Austempered ductile iron with a hardness of 320 - 360HB	0,45
K5.1	Vermicular, compacted graphite iron with a hardness of < 180HB	1,29
K5.2	Vermicular, compacted graphite iron with a hardness of 180 - 220HB	0,97
K5.3	Vermicular, compacted graphite iron with a hardness of 220 - 260HB	0,75

ISO H	WMG (Work Material Group)	C _{vcWMG}
H1.1	Chilled cast iron with a hardness of < 440HB	1,52
H2.1	Hardened cast iron with a hardness < 55HRC	0,90
H2.2	Hardened cast iron with a hardness > 55HRC	0,77
H3.1	Hardened steel with a hardness of < 51HRC	1,00
H3.2	Hardened steel with a hardness of 51 - 55HRC	0,82
H4.1	Hardened steel with a hardness of 55 - 59HRC	0,64
H4.2	Hardened steel with a hardness of > 59HRC	0,54

Important 注意:

Look into the technical section of the catalogue for the correction factors for the different WMG!

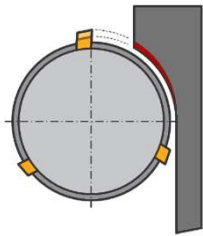
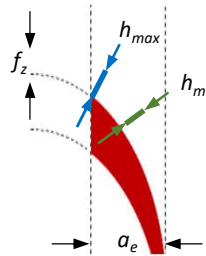
STN16选择时考虑的因素

加工推荐

方肩铣

Apply the compensation factors to compensate for chip thinning when the **radial immersion** (a_e/D_c) is less than 50%

Radial
chip-thinning



a_e/D_c	0.05 (5%)	0.10 (10%)	0.15 (15%)	0.20 (20%)	0.25 (25%)	0.30 (30%)	0.40 (40%)	0.50 (50%)	0.60 (60%)	0.70 (70%)	0.75 (75%)	0.80 (80%)	0.90 (90%)	1.00 (100%)
 X.V	1.48	1.35	1.27	1.22	1.19	1.16	1.11	1.08	1.05	1.03	1.00	1.00	1.00	1.00
 X.f	2.27	1.67	1.41	1.25	1.15	1.09	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00
 X.f	0.64	0.64	0.64	0.64	0.64	0.65	0.65	0.67	0.68	0.71	0.72	0.74	0.79	1.00

注意: compensation factors in red (for single sided cutting) are based on the maximum chip thickness.
Contrary to what is published in the brochure where they are based on the mean chip thickness.

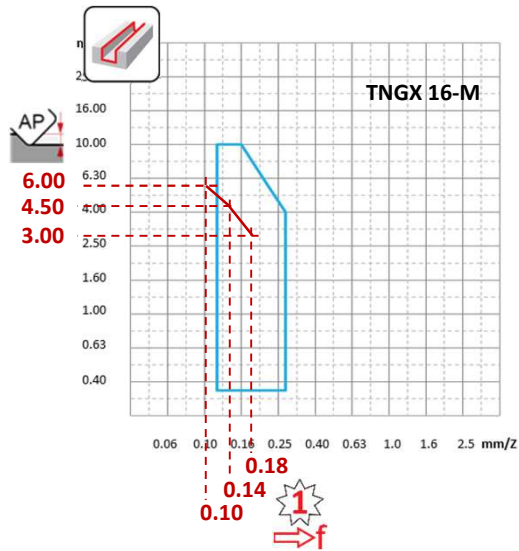
$$h_{max} = f_z \times \sqrt{1 - \left(1 - \frac{2 \times a_e}{D_c}\right)^2}$$

STN16选择时考虑的因素

加工推荐

槽铣

Apply the recommended starting values for slot milling



面铣

ensure that the feed per revolution is kept below that of the smoothing segment (a) of a single insert to prevent scallops will be formed which cause a rough surface finish.



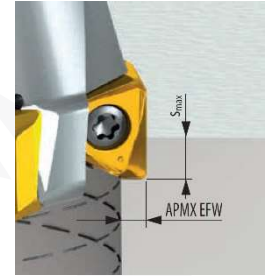
		TNGX 16-F		TNGX 16-M				TNGX 16-FA	
	[metric]	0.4	0.8	0.4	0.8	1.2	1.6	0.4	0.8
	[inch]	.0157	.0315	.0157	.0315	.0472	.0630	.0157	.0315
	[metric]	2.10	1.90	2.10	1.90	1.73	1.14	2.10	1.90
	[inch]	.083	.075	.083	.075	.068	.045	.083	.075

STN16选择时考虑的因素

加工推荐

预钻孔的螺旋插补铣(PHD=预钻孔直径)

确保PHD至少等于刀具直径, 考虑每转的轴向进给深度(s_{max})和切削宽度(APMX EFW). 当 $PHD \leq 1.5 \times DC$ 时降低进给.



DC	PHD = 1 x DC			PHD = 1.25 x DC			PHD = 1.5 x DC			PHD = 1.75 x DC			d ≥ 2 x DC		
	PHD		APMX EFW	PHD		APMX EFW	PHD		APMX EFW	PHD		APMX EFW	PHD		APMX EFW
25	25	0.14	1.3	31	0.22	2.2	38	0.33	3.0	44	0.60	4.0	50	0.70	5.0
32	32	0.16	1.5	40	0.33	2.8	48	0.44	4.0	56	0.70	5.0	64	0.90	6.5
40	40	0.22	2.0	50	0.38	3.5	60	0.55	5.0	70	0.90	6.5	80	1.15	8.0
50	50	0.27	2.5	63	0.50	4.5	75	0.70	6.5	88	1.00	8.0	100	1.40	10.0
63	63	0.33	3.2	80	0.60	5.5	95	0.90	8.0	110	1.45	10.0	125	1.80	12.5
80	80	0.55	4.0	100	1.00	7.0	120	1.45	10.0	140	2.15	13.0	160	2.60	16.0
100	100	0.70	5.0	125	1.20	9.0	150	1.80	12.5	175	2.70	16.5	200	3.30	20.0
115	115	0.85	6.0	145	1.50	10.0	175	1.90	14.5	200	2.80	19.0	230	3.80	23.0
125	125	0.90	6.5	155	1.60	11.0	190	2.30	15.5	220	3.10	20.0	250	4.10	25.0
140	140	1.00	7.0	175	1.80	12.5	210	2.60	17.5	245	3.70	23.0	280	4.60	28.0
160	160	1.20	8.0	200	2.00	14.0	240	2.90	20.0	280	4.30	26.0	320	5.30	32.0
175	175	1.30	8.8	220	2.20	15.5	265	3.20	22.0	305	4.70	29.0	350	5.80	35.0

STN16 只能用于带有预钻孔工件的扩孔加工!

加工前的准备工作

加工推荐

加工路径

刀具

刀片夹紧

$M_{Amax} = 3.5Nm$

机床

刀柄

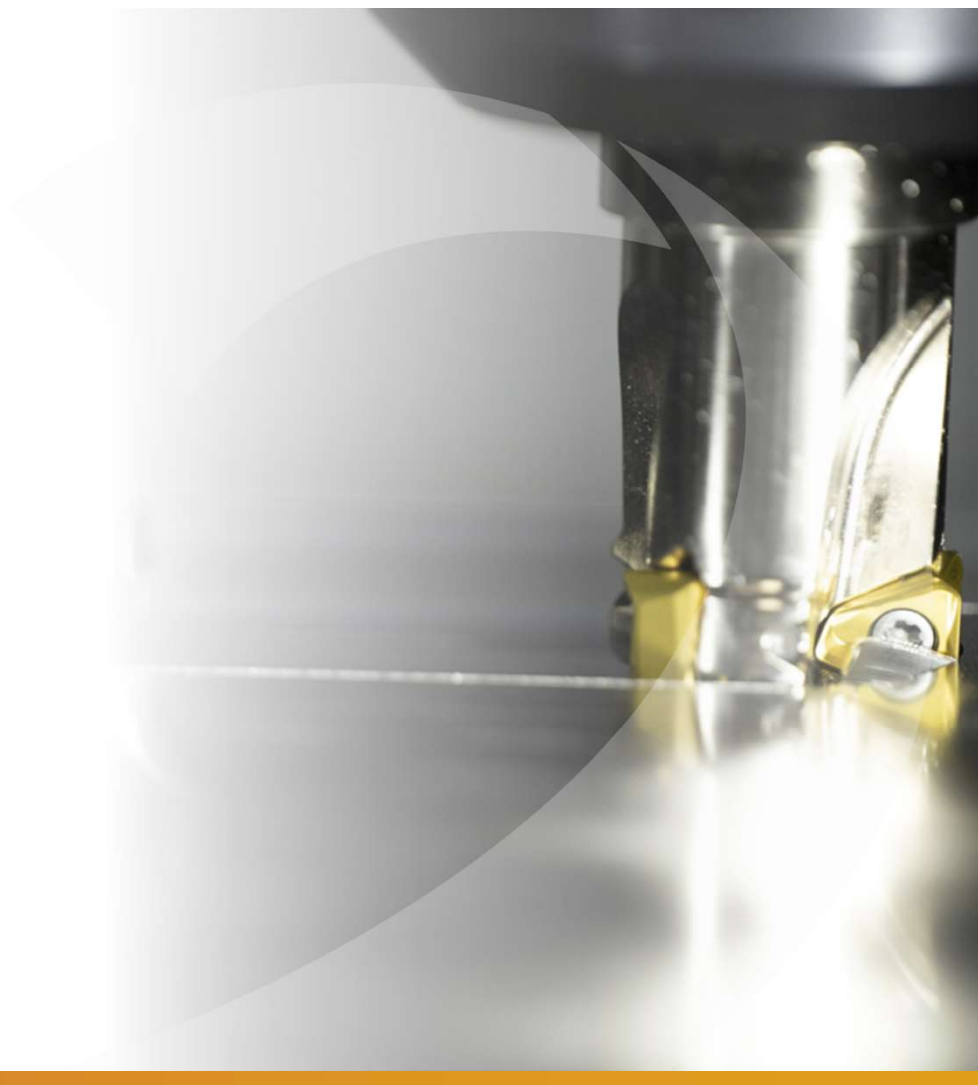
夹具





销售信息

STN16 经济型方肩铣刀



TNGX16 – 大黄蜂铣刀

Dia:25~175

Max Ap:10mm

F / M /FA

Radius: 0.4 / 0.8 / 1.2 / 1.6mm



TNGX16-F		F	小黄蜂产品的扩充，具有更大切深(达到10mm)和更高的进给	TNGX16 是双面刀片，具有6个切削刃可提升方肩铣的经济性，F槽型是加工低碳钢和中碳钢的首选。
TNGX16-M		M	小黄蜂产品的扩充，具有更大切深(达到10mm)和更高的进给	TNGX16 是双面刀片，具有6个切削刃可提升方肩铣的经济性，M槽型可以加工合金钢，不锈钢以及铸铁材料，适用于轻至中等工况。
TNGX16-FA		FA	小黄蜂产品的扩充，具有更大切深(达到10mm)和更高的进给	TNGX16 是双面刀片，具有6个切削刃可提升方肩铣的经济性，FA槽型适用于加工铝合金，抛光的前刀面设计可降低粘屑的风险。

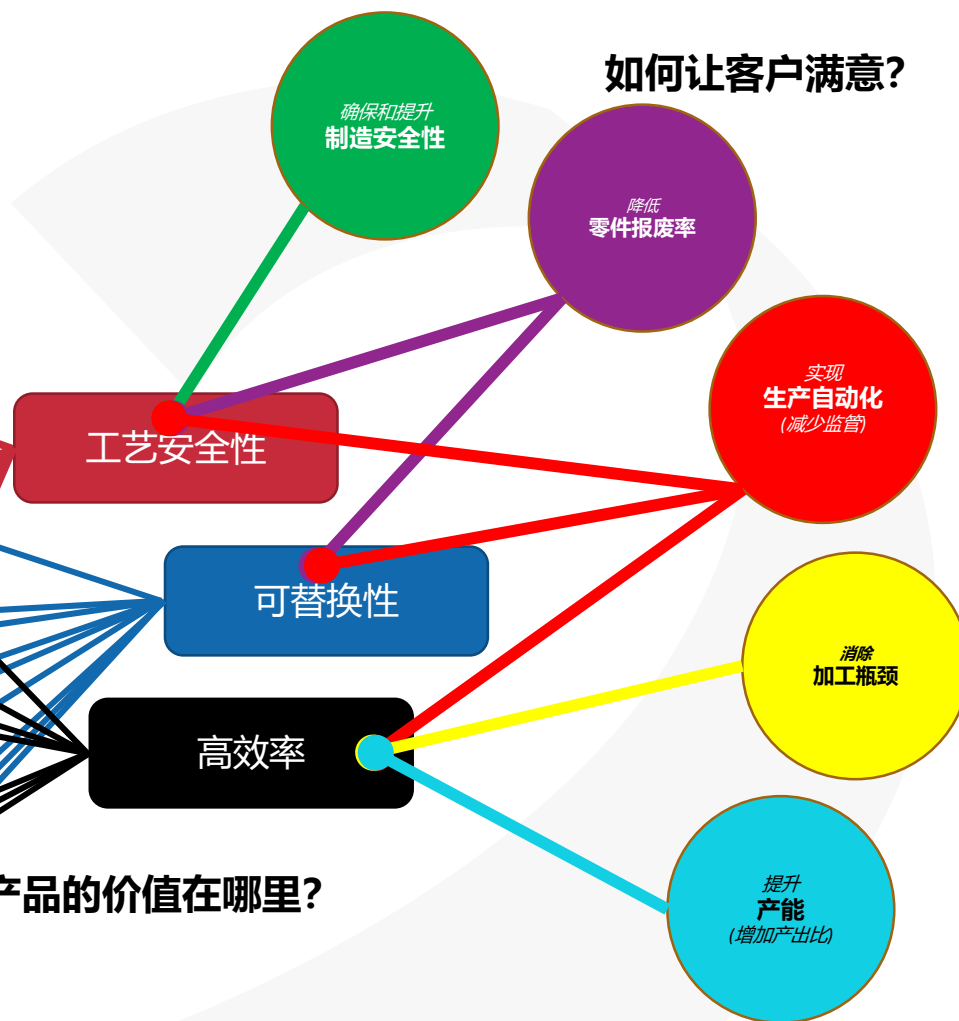


销售信息

产品的卖点在哪里？

产品特点	产品优势寿命
双面负角刀片	提升刃口强度
	应力朝向工件一侧
	可使用6个刃口
高精度定位刀座	提升方肩铣的精度
大而强壮的夹紧螺钉	夹紧更方便
不等齿距	提升锁紧强度
	降低噪音风险
内冷设计	实现光顺加工
	更优的刃口冷却
窄的T-倒棱 (F-槽型)	提升安全性和更好的排屑性能
	降低切削力
中等 T-倒棱 (M-槽型)	提供出色的表面精度
	增加刃口稳定性
锋利刃口 (FA-槽型)	提供光顺切削
3 rd 代 PVD/CVD 材质	增加切削速度
	增强耐磨性和材质附着性
材质具有抛光的刀片表面	降低机械瘤风险
4 种不同刀尖圆角 (0.4, 0.8, 1.2 和 1.6mm)	提升通用性
	避免过切风险

产品的价值在哪里？



如何让客户满意？

DORMER PRAMET



SIMPLY
RELIABLE



/DormerPrametSocial



Dormer Pramet



@DormerPramet



Dormer Pramet



dormerpramet.com

COVID-19 PRECAUTIONS



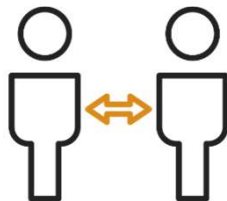
**FOLLOW LOCAL
GUIDELINES**



**STAY HOME WHEN
FEELING SICK**



**WASH YOUR HANDS
CAREFULLY**



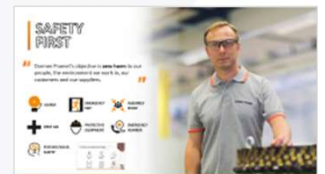
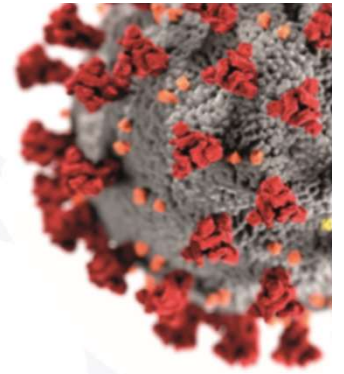
**OBSERVE PHYSICAL
DISTANCING GUIDELINES**



**COUGH AND SNEEZE
CORRECTLY**



**AVOID TOUCHING
YOUR FACE**



IHA 螺纹接口铣刀柄

Product data

描述	Thread connections	DIN 69871				JIS B 6339			DIN 2080		DIN 69893-A	
		SK30	SK40	SK50	SK60	BT30	BT40	BT50	SK40	SK50	HSK63	HSK100
Screw-in tool holders	M6 – M12		•	•			•	•			•	•

IHA



DIN 69871



Form AD

$\nabla \leq 0,003$

G6,3
15.000 min⁻¹

- Extra reach and flexibility
- For ISO-Metric threaded shanks



HC 液压刀柄

Tooling systems

描述	Diameter range	DIN 69871				JIS B 6339			DIN 2080		DIN 69893-A	
		SK30	SK40	SK50	SK60	BT30	BT40	BT50	SK40	SK50	HSK63	HSK100
液压刀柄	3 – 20	•	•	•		•	•	•			•	•
	25 – 32		•	•			•	•			•	•

HC



Form AD/B
 $\nabla \leq 0,003$
 G6.3
 15.000 min⁻¹



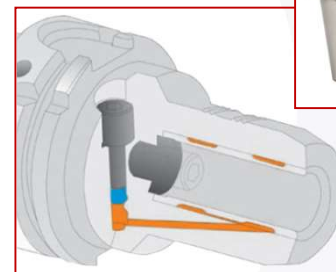
HC-C-S

Sealed for tough coolant

Torque

Clamping- $\varnothing$ mm	Moment (Nm)
6	10
8	20
10	40
12	50
14	80
16	100
18	150
20	200
25	250
32	400
40	550

- Easy handling
- For h6 shanks
- **For finishing and super finishing**
- Medium-high torque transmission
- High run-out accuracy
- Dampen vibrations in low speed range



HKS 强力刀柄

Tooling systems

描述	Diameter range	DIN 69871				JIS B 6339			DIN 2080		DIN 69893-A	
		SK30	SK40	SK50	SK60	BT30	BT40	BT50	SK40	SK50	HSK63	HSK100
High-performance Chuck	3 – 20		•	•			•	•			•	•
	25 – 32		•	•			•	•			•	•

HKS



Form AD/B
 $\nabla \leq 0,003$
 G6.3
 15.000 min⁻¹



HKS-C

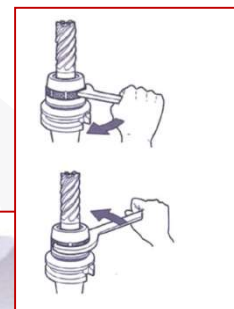
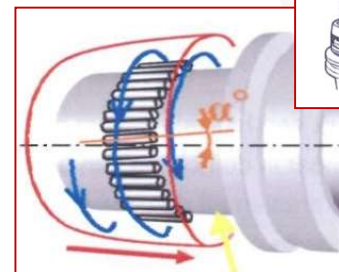


HKS-C-S

Sealed for through coolant

Size	20mm	25mm
Clamping torque	50-70 Nm	80-100 Nm
Clamping force	780 Nm	2000 Nm

- Easy handling
- For h6 shanks
- **For operations involving high MRR**
- High retention force
- High torque transmission
- Highest stability
- Accurate
- Flexible



ER COLLET CHUCK

Tooling systems

ER Collet chuck are not the first choice to recommend for holding indexable milling cutters. However, if a customer wants to, we should recommend to use at least high precision collets (ER-C-P or ER-C-SC4)!

描述	Diameter range	DIN 69871				JIS B 6339			DIN 2080		DIN 69893-A		DIN 228-1					
		SK30	SK40	SK50	SK60	BT30	BT40	BT50	SK40	SK50	HSK63	HSK100	MT2	MT3	MT4	MT5	MT6	
ER Collet Chuck	1 – 10 (ER16)	●	●	●		●	●	●			●		●					
	2 – 16 (ER25)	●	●	●		●	●	●	●		●	●	●	●	●			
	2 – 20 (ER32)	●	●	●		●	●	●	●	●	●	●		●	●			
	3 – 26 (ER40)	●	●	●		●	●	●	●	●	●	●				●		

CC-ER



Form AD/B
 $\epsilon \leq 0,003$
 G6,3
 15.000 min⁻¹



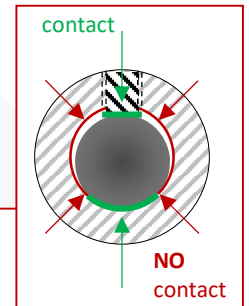
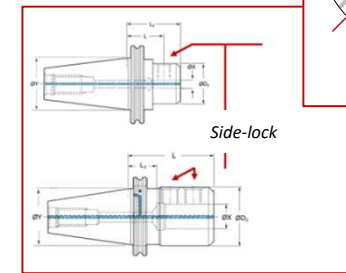
- Medium torque transmission
- Low to medium run-out accuracy
- Assembly requires some instruction (read instructions) 
- Moderate repeatability
- Dampen vibration
- Not suited for high speeds
- Flexible (broader range of collets than OZ system)
- Clean carefully
- Rotate the tool to achieve best run-out



侧固刀柄

Tooling systems

描述	Diameter range	DIN 69871				JIS B 6339			DIN 2080		DIN 69893-A	
		SK30	SK40	SK50	SK60	BT30	BT40	BT50	SK40	SK50	HSK63	HSK100
侧固刀柄	6 - 20	•	•	•		•	•	•	•	•	•	•
	25 - 40		•	•			•	•	•	•	•	•
侧固刀柄 with peripheral coolant	6 - 20		•	•			•	•			•	•
	25 - 40		•	•			•	•			•	•



W



$\nabla \leq 0,003$
 G6,3
 15.000 min⁻¹

Torques for DIN 1835

Bore	Screw	Torque
Ø 6 mm	M 6 SW 3	10 Nm
Ø 8 mm	M 8 SW 4	10 Nm
Ø 10 mm	M 10 SW 5	16 Nm
Ø 12 mm	M 12 SW 6	28 Nm
Ø 14 mm	M 12 SW 6	28 Nm
Ø 16 mm	M 14 SW 6	42 Nm
Ø 18 mm	M 14 SW 6	42 Nm
Ø 20 mm	M 16 SW 8	50 Nm
Ø 25 mm	M 18 × 2 SW 10	60 Nm
Ø 32 mm	M 20 × 2 SW 10	72 Nm
Ø 40 mm	M 20 × 2 SW 10	72 Nm
Ø 50 mm	M 24 × 2 SW 12	90 Nm



W-C

With peripheral coolant channels
(for tools without 内冷设计)

- High torque transmission
- Easy handling
- Low cost
- Poor balance and radial run-out
- Every shank size needs one chuck
- Not suited for high speeds
- Heavy roughing- semi finishing



SHELL MILL ARBO

Tooling systems

描述	Diameter range	DIN 69871			JIS B 6339			DIN 2080		DIN 69893-A	
		SK30	SK40	SK50	BT30	BT40	BT50	SK40	SK50	HSK63	HSK100
Shell mill arbor with transverse groove	16 - 32	•	•	•	•	•	•	•	•	•	•
	40		•	•		•	•	•	•	•	•
Combi shell mill arbor with transverse or longitudinal groove	16 - 32	•	•	•	•	•	•	•	•	•	•
	40		•	•		•	•	•	•	•	•

FMH1



Form AD/B
 $\lambda \leq 0,005$
 G6,3
 15.000 min⁻¹

FMH2



SC SHRINK FIT HOLDERS

Tooling systems

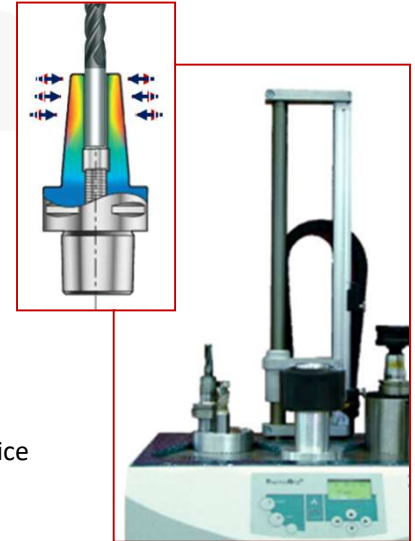
描述	Diameter range	DIN 69871				JIS B 6339			DIN 2080		DIN 69893-A	
		SK30	SK40	SK50	SK60	BT30	BT40	BT50	SK40	SK50	HSK63	HSK100
液压刀柄	3 - 20	•	•	•		•	•	•			•	•
	25 - 32		•	•			•	•			•	•

SC



Form AD/B
 $\nabla \leq 0,003$
 G6,3 15.000 min⁻¹

- Requires a shrink-fit device
- For h6 shanks
- For finishing
- High torque transmission
- High levels of accuracy
- Extremely rigid



CAST IRON (K- 材料组)

ISO group		WMG (Work Material Group)		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)	Examples of material (ASTM, EN, DIN, SS, STN, B.S, UNE, CN, AFNOR, GOST, UNI)	
K	K1	■ K1.1	Gray iron or Automotive Gray iron (iron-carbon castings with a lamellar graphite microstructure)	ferritic or ferritic-pearlitic	< 180 HB	≤ 190	ASTM A48 Grade 20, EN-JL-100, DIN GG-10 (0.6010), STN 422410
		▣ K1.2		ferritic-pearlitic or pearlitic	180 - 240 HB	> 190 ≤ 310	ASTM A48 Grade 30, EN-JL-1030, DIN GG-20 (0.6020), SS 0120, STN 422420
		K1.3		pearlitic	240 - 280 HB	> 310 ≤ 390	ASTM A48 Grade 50, EN-JL-1060, DIN GG-35 (0.6035), SS 0135, STN 422435
	K2	K2.1	Malleable iron (iron-carbon castings with a graphite-free microstructure)	ferritic	< 160 HB	≤ 400	ASTM A602 Grade M3210, EN-JM-1130, DIN GTS-35 (0.8135), SS 0815
		K2.2		ferritic or pearlitic	160 - 200 HB	> 400 ≤ 550	ASTM A602 Grade M4504 (F20001), EN-JM-1040, DIN GTS-50-05 (0.8045)
		K2.3		pearlitic	200 - 240 HB	> 550 ≤ 660	ASTM A602 Grade M7002, EN-JM-1140, DIN GTS-45 (0.8145), STN 422540
	K3	K3.1	Ductile iron (iron-carbon castings with a nodular graphite microstructure)	ferritic	< 180 HB	≤ 560	ASTM A536 Grade 60-40-18, EN-JS-1030, DIN GGG-40 (0.7040), STN 422304
		K3.2		ferritic or pearlitic	180 - 220 HB	> 560 ≤ 680	ASTM A536 Grade 80-55-06, EN-JS-1050, DIN GGG-50 (0.7050), STN 422305
		K3.3		pearlitic	220 - 260 HB	> 680 ≤ 800	ASTM A536 Grade 100-70-03, EN-JS-1060, DIN GGG-60 (0.7060), STN 422306
	K4	K4.1	Austenitic gray iron (iron-carbon alloy castings with an austenitic lamellar graphite microstructure)		< 180 HB	≤ 190	ASTM A436 Type 1 (L-NiCuCr 15 6 2), DIN GGL-NiMn 13 7 (0.6652)
		K4.2	Austenitic ductile iron (iron-carbon alloy castings with an austenitic nodular graphite microstructure)		< 240 HB	≤ 740	ASTM A439 Type D-2B (S-NiCr 20 3), DIN GGG-NiMn 23 4, GOST ЧН19Х3Ш
		K4.3	Austempered ductile iron (iron-carbon alloy castings with an ausferrite microstructure)		< 280 HB	> 840 ≤ 980	ASTM A897 Grade 110-70-11
		K4.4			280 - 320 HB	> 980 ≤ 1130	ASTM A897 Grade 125-80-10, EN-JS-1100, DIN GGG-90 (5.3400)
		K4.5			320 - 360 HB	> 1130 ≤ 1280	ASTM A897 Grade 2 (150-110-07), EN-JS-1110, DIN GGG-100 (5.3403)
	K5	K5.1	Compacted graphite iron (iron-carbon castings with a vermicular graphite structure)	ferritic	< 180 HB	≤ 400	ASTM A842 Grade 300, EN-GJV-300, DIN GGV 30, GOST ЧВГ30,
		K5.2		ferritic-pearlitic	180 - 220 HB	> 400 ≤ 450	ASTM A842 Grade 350, EN-GJV-350, DIN GGV 35 (5.2200), GOST ЧВГ30,
		K5.3		pearlitic	220 - 260 HB	> 450 ≤ 500	ASTM A842 Grade 450, EN-GJV-450, DIN GGV 45, GOST ЧВГ45,

SUPER ALLOYS (S- 材料组)

ISO group		WMG (Work Material Group)		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)	Examples of material (UNS, EN, DIN, SS, STN, B.S, UNE, CN, AFNOR, GOST, UNI)
S	S1	■ S1.1	Titanium or titanium alloys	< 200 HB	≤ 660	UNS R50250 (Grade 1), EN Ti 99.6, DIN 3.7035, BS TA.2, UNE Ti-Po2, AFNOR T-40, GOST BT1-00
		▣ S1.2		200 - 280 HB	> 660 ≤ 950	UNS R56404 (Grade 29), EN Ti2Cu, DIN 3.7124, BS TA.21, UNE Ti-P11, AFNOR T-U2
		S1.3		280 - 360 HB	> 950 ≤ 1200	UNS R54250 (Grade 38), EN TiAl6V4, DIN 3.7165, ČSN TiAl6VELI, BS TA. 13, UNE Ti-P63, AFNOR T-A6V, GOST BT6
	S2	S2.1	Fe-based high-temperature alloys	< 200 HB	≤ 690	UNS N08801 (Incoloy 801), EN X8 NiCrAlTi31-21, DIN 1.4959, BS NA 15, AFNOR Z8NC33-21
		S2.2		200 - 280 HB	> 690 ≤ 970	UNS N19907, EN X6NiCrTiMoVB25-15-2, DIN 1.4980, SS 2570, BS HR52, AFNOR Z6NCTDV25.15B, GOST 36HXTIO
	S3	S3.1	Ni-based high-temperature alloys	< 280 HB	≤ 940	UNS A09706 (Inconel 706), EN NiCr25FeAl, DIN 2.4856, ČSN Inconel 625, BS HR 6, UNE F.3313, GB 1Cr16Ni35, AFNOR NC22FeDNB, GOST XH38BT
		S3.2		280 - 360 HB	> 940 ≤ 1200	UNS N07001, EN NiCr20Co13Mo4Ti3Al, DIN 2.4654, BS HR 2, ČSN Waspaloy, AFNOR NCKD 20ATV, GOST XH80T6Ю
	S4	S4.1	Co-based high-temperature alloys	< 240 HB	≤ 800	UNS R30016 (Stellite 6b), EN CoCr20W15Ni, DIN 2.4964, AFNOR KC 20 WN, GOST ЛK52
		S4.2		240 - 320 HB	> 800 ≤ 1070	UNS R30016 (Stellite 6b), EN CoCr20W15Ni, DIN 2.4964, AFNOR KC 20 WN, GOST ЛK52

HARDENED MATERIALS (H- 材料组)

ISO group	WMG (Work Material Group)		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)	Examples of material (UNS, EN, DIN, SS, STN, B.S, UNE, CN, AFNOR, GOST, UNI)
H	H1	■ H1.1	Chilled cast iron	< 440 HB	UNS F45001, EN-GJS-1050-6, DIN 5.3406, SS 0512, BS Grade 2A
	H2	▣ H2.1	Hardended cast iron	< 55 HRC	UNS F45003, EN-GJS-1400-1, DIN 5.3405, SS 0457, BS Grade 3D
		H2.2		> 55 HRC	UNS F45003, EN G-X260NiCr4-2, DIN 0.9620, SS 0466, BS Grade S
	H3	H3.1	Hardened steel <55HRC	< 51 HRC	AISI 4135, EN 34CrMo4, DIN 1.7220, SS 2234, STN 415131, BS 198, UNE F.1250, GB 35CrMo, AFNOR 35CD4, GOST AC38XFM, UNI 35CrMo4KB
		H3.2		51 - 55 HRC	AISI 4135, EN 34CrMo4, DIN 1.7220, SS 2234, STN 415131, BS 198, UNE F.1250, GB 35CrMo, AFNOR 35CD4, GOST AC38XFM, UNI 35CrMo4KB
	H4	H4.1	Hardened steel >55HRC	55 - 59 HRC	UNS T31501, EN 100MnCrW4, DIN 1.2510, SS 2140, STN 419413, BS B01, UNE F.5220, GB 9CrWMn, AFNOR 90MWCrv5, GOST 9XBГ, UNI 95MNWCrv5KU
		H4.2		> 59 HRC	UNS T31501, EN 100MnCrW4, DIN 1.2510, SS 2140, STN 419413, BS B01, UNE F.5220, GB 9CrWMn, AFNOR 90MWCrv5, GOST 9XBГ, UNI 95MNWCrv5KU