ACCURACY AND ADAPTABILITY IN REAMING

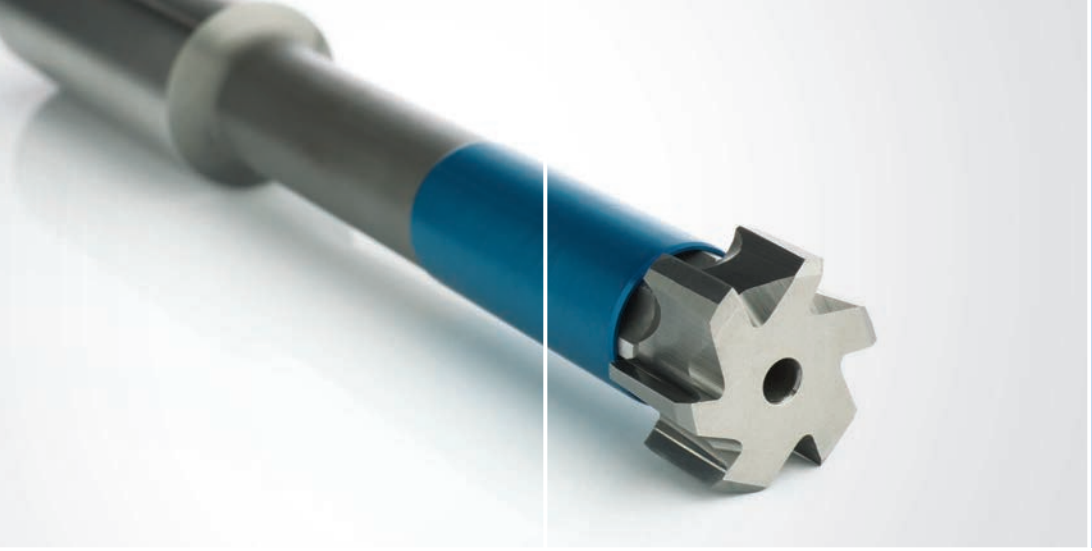
PRECIMASTER™ PLUS

Seco's new generation Precimaster Plus modular, indexable-head reaming system provides accuracy and part processing versatility. Through a selection of various reamer shanks and heads, users can accommodate a variety of hole sizes and workpiece materials with fewer required tools. Additionally, new system design enhancements boost reaming speed, precision and repeatability for overall better production. With the system, industries such as aerospace and automotive gain extreme process stability and dependability paired with the lowest cost per part.

For chip control and management, Precimaster Plus reamer shanks can apply different types of flushing for both blind and through holes. Tool body coolant outlets in the front force chips up along head flutes and out of blind holes, while standard through-tool coolant blasts chips forward and away from the tool for efficient through-hole reaming.

RANGE OVERVIEW

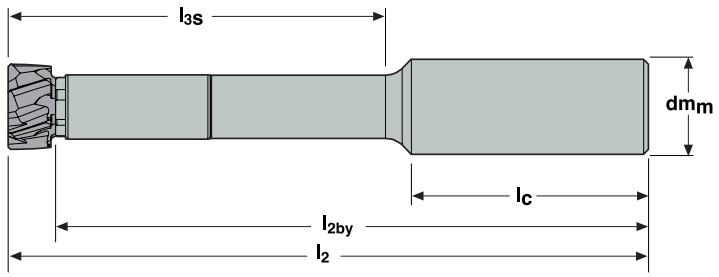
- Reaming head diameters from 0.394" to 2.362" (10 mm to 60 mm)
- 4 standard shank sizes to hold entire reaming head range
- Shank length options of short (restricted clearance situations), medium (common hole depths) and long (up to 10 x D)
- 3 lead geometries – EB45 45° x 0.020" (0.5 mm) (universal), EB25 25° x 0.027" (0.7 mm) (aggressive feed) and EB845 double lead angle 45°/8° x 0.030" (0.75 mm) (fine finish)
- 5 reamer head grades – 2 coated carbide, 1 coated cermet, 1 uncoated carbide and 1 uncoated cermet



REAMING

THE SECO ADVANTAGE

- Modular and cost-effective reaming
- Versatility and process stability
- Fast, easy tool set-ups
- Precise and repeatable head / shank connection
- Up to 30% longer tool life and higher feed rates
- Performance gains from advanced geometries and coatings
- Reduced tooling inventory



NEW PRECIMASTER PLUS - SHANKS FOR THROUGH AND BLIND HOLES

D_c	TOOL HOLDER MATERIAL	EDP	DESCRIPTION	DIMENSIONS MM				
				l_2	l_{2by}	l_{3s}	l_c	Dm_m
10.5 - 14.499			Metric					
	Steel	14352	PMX06-03700-12N1	84	77	37	45	12
	Steel	14353	PMX06-05700-12N1	104	97	57	45	12
	Steel	14354	PMX06-12000-12N1	167	160	120	45	12
	Carbide	14355	PMX06HM-12000-12N1	167	160	120	45	12
14.5 - 21.499	Steel	14356	PMX08-04600-20N1	99	89	46	50	20
	Steel	14357	PMX08-08200-20N1	135	125	82	50	20
	Steel	14358	PMX08-14500-20N1	198	188	145	50	20
	Carbide	14362	PMX08HM-14500-20N1	198	188	145	50	20
21.5 - 32.499	Steel	14363	PMX12-06800-25N1	127	115	68	56	25
	Steel	14364	PMX12-10400-25N1	163	151	104	56	25
	Steel	14365	PMX12-17000-25N1	229	217	170	56	25
	Carbide	14366	PMX12HM-17000-25N1	229	217	170	56	25
32.5 - 60	Steel	14367	PMX16-06300-32N1	124	110	63	61	32
	Steel	14368	PMX16-12700-32N1	188	174	127	61	32
	Steel	14370	PMX16-17000-32N1	231	217	170	61	32
	Carbide	14372	PMX16HM-17000-32N1	231	217	170	61	32

PRODUCT OVERVIEW

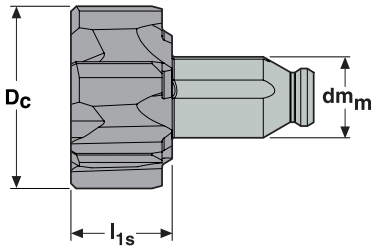
- New connection provides head exchange repeatability and run-out within 3 microns
- Solid carbide heads offer stability and 20% to 30% tool life increase
- More cutting teeth per head diameter enable 30% faster feed rates
- Surface finishes of Ra .4µm - Ra .8µm can be achieved at same feed per teeth per revolution as heads with fewer flutes
- Hole size tolerances held to between 15 microns and 25 microns (.0006” and .001”)
- Same tool shanks and heads used for both through and blind hole coolant requirements
- Various lead geometries and grades ensure optimized performance for all workpiece materials

NEW PRECIMASTER PLUS - HEADS FOR THROUGH HOLES

D_c	EDP	DESCRIPTION	GRADE	TEETH	DIMENSIONS MM		BODY SIZE
					l_{1s}	Dm_m	
		Metric					
11	14341	PMX6-11H7-EB45	RX2000	6	7	6	PMX06-xx
12	14342	PMX6-12H7-EB45	RX2000	6	7	6	PMX06-xx
13	14343	PMX6-13H7-EB45	RX2000	6	7	6	PMX06-xx
14	14344	PMX6-14H7-EB45	RX2000	6	7	6	PMX06-xx
15	14345	PMX6-15H7-EB45	RX2000	8	10	8	PMX08-xx
16	14346	PMX6-16H7-EB45	RX2000	8	10	8	PMX08-xx
17	14347	PMX6-17H7-EB45	RX2000	8	10	8	PMX08-xx
18	14348	PMX6-18H7-EB45	RX2000	8	10	8	PMX08-xx
19	14349	PMX6-19H7-EB45	RX2000	8	10	8	PMX08-xx
20	14350	PMX6-20H7-EB45	RX2000	8	10	8	PMX08-xx
21	14351	PMX6-21H7-EB45	RX2000	8	10	8	PMX08-xx
22	99793	PMX6-22H7-EB45	RX2000	12	12	12	PMX12-xx
23	99794	PMX6-23H7-EB45	RX2000	12	12	12	PMX12-xx
24	99795	PMX6-24H7-EB45	RX2000	12	12	12	PMX12-xx
25	99796	PMX6-25H7-EB45	RX2000	12	12	12	PMX12-xx
26	99797	PMX6-26H7-EB45	RX2000	12	12	12	PMX12-xx
27	99798	PMX6-27H7-EB45	RX2000	12	12	12	PMX12-xx
28	99799	PMX6-28H7-EB45	RX2000	12	12	12	PMX12-xx
29	99800	PMX6-29H7-EB45	RX2000	12	12	12	PMX12-xx
30	99813	PMX6-30H7-EB45	RX2000	12	12	12	PMX12-xx
31	99814	PMX6-31H7-EB45	RX2000	12	12	12	PMX12-xx
32	99815	PMX6-32H7-EB45	RX2000	12	12	12	PMX12-xx

NEW PRECIMASTER PLUS - HEADS FOR THROUGH AND BLIND HOLES

D_c	EDP	DESCRIPTION	GRADE	TEETH	DIMENSIONS MM		BODY SIZE
					l_{1s}	Dm_m	
		Metric					
11	09693	PMX5-11H7-EB45	RX2000	6	7	6	PMX06-xx
12	99816	PMX5-12H7-EB45	CF	6	7	6	PMX06-xx
12	14306	PMX5-12H7-EB45	RX2000	6	7	6	PMX06-xx
13	99817	PMX5-13H7-EB45	CF	6	7	6	PMX06-xx
13	14313	PMX5-13H7-EB45	RX2000	6	7	6	PMX06-xx
14	99818	PMX5-14H7-EB45	CF	6	7	6	PMX06-xx
14	14315	PMX5-14H7-EB45	RX2000	6	7	6	PMX06-xx
15	99819	PMX5-15H7-EB45	CF	6	10	8	PMX08-xx
15	14316	PMX5-15H7-EB45	RX2000	6	10	8	PMX08-xx
16	99820	PMX5-16H7-EB45	CF	6	10	8	PMX08-xx
16	14317	PMX5-16H7-EB45	RX2000	6	10	8	PMX08-xx
17	99821	PMX5-17H7-EB45	CF	6	10	8	PMX08-xx
17	14318	PMX5-17H7-EB45	RX2000	6	10	8	PMX08-xx
18	99822	PMX5-18H7-EB45	CF	6	10	8	PMX08-xx
18	14319	PMX5-18H7-EB45	RX2000	6	10	8	PMX08-xx
19	14320	PMX5-19H7-EB45	RX2000	6	10	8	PMX08-xx
20	99823	PMX5-20H7-EB45	CF	6	10	8	PMX08-xx
20	14321	PMX5-20H7-EB45	RX2000	6	10	8	PMX08-xx
21	14328	PMX5-21H7-EB45	RX2000	6	10	8	PMX08-xx
22	99824	PMX5-22H7-EB45	CF	8	12	12	PMX12-xx
22	14329	PMX5-22H7-EB45	RX2000	8	12	12	PMX12-xx
23	14330	PMX5-23H7-EB45	RX2000	8	12	12	PMX12-xx
24	99825	PMX5-24H7-EB45	CF	8	12	12	PMX12-xx
24	14331	PMX5-24H7-EB45	RX2000	8	12	12	PMX12-xx
25	99826	PMX5-25H7-EB45	CF	8	12	12	PMX12-xx
25	14332	PMX5-25H7-EB45	RX2000	8	12	12	PMX12-xx
26	99827	PMX5-26H7-EB45	CF	8	12	12	PMX12-xx
26	14333	PMX5-26H7-EB45	RX2000	8	12	12	PMX12-xx
27	14334	PMX5-27H7-EB45	RX2000	8	12	12	PMX12-xx
28	99828	PMX5-28H7-EB45	CF	8	12	12	PMX12-xx
28	14336	PMX5-28H7-EB45	RX2000	8	12	12	PMX12-xx
29	14337	PMX5-29H7-EB45	RX2000	8	12	12	PMX12-xx
30	99829	PMX5-30H7-EB45	CF	8	12	12	PMX12-xx
30	14338	PMX5-30H7-EB45	RX2000	8	12	12	PMX12-xx
31	14339	PMX5-31H7-EB45	RX2000	8	12	12	PMX12-xx
32	99830	PMX5-32H7-EB45	CF	8	12	12	PMX12-xx
32	14340	PMX5-32H7-EB45	RX2000	8	12	12	PMX12-xx



Precimaster Plus now uses solid-carbide disposable heads up to diameter 32 mm, coated and uncoated, in various diameters that mount to a standard range of shanks. As opposed to traditional brazed-tip technology, solid-carbide heads allow for an increased number of cutting teeth on the same head diameters for faster feed rate capability. Solid carbide also extends tool life, delivers increased stability for tougher materials and makes for a more cost-effective system.

A new Precimaster Plus patented high-precision connection ensures reamer head exchanges are fast and easy with repositioning repeatability and runout of under 3 microns. The new connection handles much higher levels of transmissible driving torque due to its special three-vertical-drive-pin design. Internal axial clamping forces draw heads up and into system shanks, creating a strong and secure interface. Users gain the confidence and dependability to run any reamer head with any shank and for any material.

For Cutting Data please see pages 62-63

SECO MATERIAL GROUPS VERSION 2 (SMG v2) - INTRO

SMG v2 is the foundation for a new and accurate way of organizing work materials and choosing the correct speed, feed rate and depth of cut for any work material and any Seco tool. In addition to using a greater number of work material groups compared to our previous system, SMG v2 also incorporates a reference material - or standard - for each group. The machinability of all other materials within that group can be compared to the standard, allowing for adjustments to the cutting data and accounting for the unique characteristics of each material.

THE USE OF SMG v2 IS ILLUSTRATED BELOW

As shown in Table I, the reference material for work material group P4 is 1045, for P5 it is 4140 steel and for H5 it is 4140 hardened to 50 HRC. 4140 steel is available in a wide variety of hardness and tensile strengths. It will be expected that the machinability will vary with these properties.

SMG	DESCRIPTION	PROPERTIES (KSI)	REFERENCE
P4	Low alloy general structural steels, 0.25% < C < 0.67%wt Low alloy Quench & Temper steels	75 < UTS < 175	1045 UTS = 95 ksi
P5	Structural steels, 0.25% < C < 0.67%wt Quench & Temper steels	80 < UTS < 175	4140 UTS = 100 ksi

SMG	DESCRIPTION	PROPERTIES	REFERENCE
H5	Quenched & Tempered steels	38 < HRC < 56	4140 50 HRC

Table II gives some examples of 4140 in different conditions.

SMG	EN	W.-Nr	AFNOR	BS	UNI	JIS	AISI / ASTM	GOST	CONDITION	UTS (ksi)	HRC_{nom}
P5	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Annealed	100	
	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Quenched & Tempered	145	
H5	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Quenched & Tempered		45
	42 CrMo 4	1.1201	42 CD 4	708 M 40	42 CrMo 4	SCM 440 (H)	4142, 4140	38HM	Quenched & Tempered		50

The graphs indicate how the speed recommendation for a specific material can be adjusted to account for the different properties of the steel. As an example, consider 4140 with a tensile strength (UTS) of 145 ksi. The standard material for SMG P5 is 4140 steel with a tensile strength of 100 ksi. Since the material of interest is 45% stronger, the cutting speed will have to be reduced. Following the black arrows in Figure 1, it can be seen that a speed 75% of that recommended for 4140 at 100 ksi should be used. So if a cutting speed of 900 sf/min is suggested for a tool of interest when machining 4140 at 100 ksi, a speed of 675 sf/min (900 X 0.75) should be used if the 4140 has a tensile strength of 145 ksi.

Figure 1

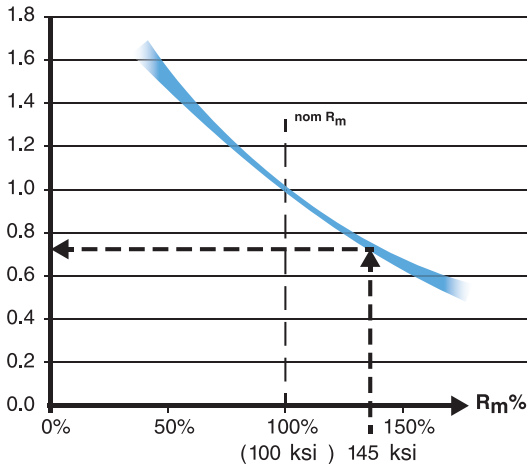
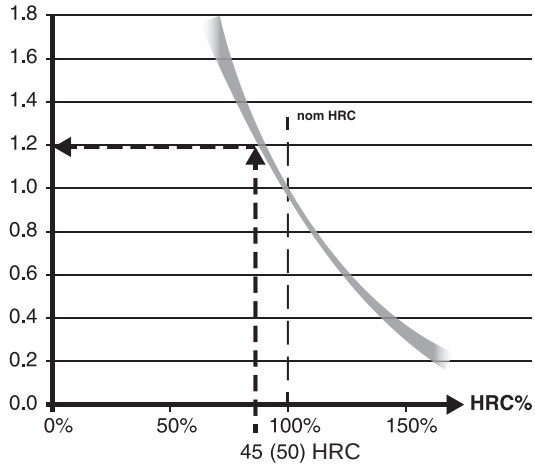


Figure 2



If the 4140 is quenched and tempered to a hardness of 45 HRC, an accurate cutting speed can be obtained by using Figure 2. The standard material for SMG H5 is 4140 heat treated to a hardness of 50 HRC. Logically, a softer material, in this case 45 HRC, can be machined at a higher speed. Since the hardness, 45 HRC, is 90% that of the standard material, Figure 2 shows a speed 120% that of the standard could be used. If a speed of 200 sfpm is recommended when machining 4140 at 50 HRC, a speed of 240 sf/min (200 X 1.2) could be used if the 4140 is 45 HRC.

For more convenient cutting data recommendations use applicable tools in My Pages - www.secotools.com

PRECIMASTER PLUS

PM Plus…-EB45

SMG		a_p on (Ø) inch		f (in/rev)		V_c (sf/min)				
		z=6	z=8	z=6	z=8	H15	CP20	RX2000	CF	RX1500
P1	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	80 (50-100)	195 (100-330)	260 (100-490)	590 (295-655)	720 (395-985)
P2	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	80 (50-100)	195 (100-330)	260 (100-490)	590 (295-655)	720 (395-985)
P3	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	80 (50-100)	195 (100-330)	260 (100-490)	590 (295-655)	720 (395-985)
P4	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.008 –.028	.012 –.039	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P5	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.008 –.028	.012 –.039	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P6	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.008 –.028	.012 –.039	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P7	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.008 –.028	.012 –.039	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P8	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.008 –.028	.012 –.039	50 (35-65)	115 (65-195)	130 (65-260)	260 (195-395)	395 (260-590)
P11	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.008 –.028	.012 –.039	50 (35-65)	115 (65-195)	130 (65-260)	260 (195-395)	395 (260-590)
M1	PMX5/PMX6-EB45	.003 –.006	.004 –.008	.008 –.024	.012 –.031	40 (30-50)	80 (50-130)	115 (65-230)	–	–
M2	PMX5/PMX6-EB45	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	80 (50-130)	115 (65-230)	–	–
M3	PMX5/PMX6-EB45	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	80 (50-130)	115 (65-230)	–	–
M4	PMX5/PMX6-EB45	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	65 (35-100)	80 (50-165)	–	–
M5	PMX5/PMX6-EB45	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	65 (35-100)	80 (50-165)	–	–
K1	PMX5/PMX6-EB45	.004 –.008	.004 –.010	.012 –.035	.016 –.047	80 (50-100)	195 (130-330)	260 (100-490)	–	720 (395-985)
K2	PMX5/PMX6-EB45	.004 –.008	.004 –.010	.012 –.035	.016 –.047	–	80 (65-130)	130 (100-230)	–	260 (165-330)
K3	PMX5/PMX6-EB45	.004 –.008	.004 –.010	.012 –.035	.016 –.047	80 (50-100)	195 (130-330)	260 (100-490)	–	720 (395-985)
K4	PMX5/PMX6-EB45	.004 –.008	.004 –.010	.012 –.035	.016 –.047	80 (50-100)	150 (100-230)	230 (130-395)	330 (230-490)	490 (260-655)
K5	PMX5/PMX6-EB45	.004 –.008	.004 –.010	.012 –.035	.016 –.047	80 (50-100)	150 (100-230)	230 (130-395)	330 (230-490)	490 (260-655)
K6	PMX5/PMX6-EB45	.004 –.008	.004 –.010	.012 –.035	.016 –.047	–	195 (130-330)	260 (100-490)	–	720 (395-985)
K7	PMX5/PMX6-EB45	.004 –.008	.004 –.010	.012 –.035	.016 –.047	–	195 (130-330)	260 (100-490)	–	720 (395-985)
N1	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	165 (100-330)	–	260 (100-490)	–	–
N2	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	165 (100-330)	–	260 (100-490)	–	–
N3	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	165 (100-330)	–	260 (100-490)	–	–
N11	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	165 (100-330)	–	260 (100-490)	–	–
S1	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.024	.012 –.031	–	65 (35-80)	65 (35-80)	–	–
S2	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.024	.012 –.031	–	65 (35-80)	65 (35-80)	–	–
S3	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.024	.012 –.031	–	65 (35-80)	65 (35-80)	–	–
S11	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.024	.012 –.031	65 (50-100)	100 (50-130)	130 (65-165)	–	–
S12	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.024	.012 –.031	65 (50-100)	100 (50-130)	130 (65-165)	–	–
S13	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.024	.012 –.031	65 (50-100)	100 (50-130)	130 (65-165)	–	–
H3	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
H5	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
H7	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
H8	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
H11	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
H12	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
H21	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
H31	PMX5/PMX6-EB45	.003 –.006	.004 –.006	.008 –.016	.012 –.024	–	–	35 (25-50)	–	–
PM1	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	–	165 (100-260)	230 (130-330)	–	–
PM2	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	–	165 (100-260)	230 (130-330)	–	–
PM3	PMX5/PMX6-EB45	.004 –.008	.004 –.012	.012 –.035	.016 –.047	–	165 (100-260)	230 (130-330)	–	–
TS1	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
TS2	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
TS3	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
TS4	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
TP1	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
TP2	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
TP3	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
TP4	PMX5/PMX6-EB45	.004 –.006	.004 –.008	.012 –.035	.016 –.047	65 (50-80)	–	130 (65-195)	–	–
GR1	PMX5/PMX6-EB45	.004 –.012	.004 –.016	.012 –.035	.016 –.047	130 (260-65)	–	195 (100-395)	–	–

SMG = Seco material group a_p=inch f = in/rev v_c= sf/min All cutting data are start values.

PRECIMASTER PLUS

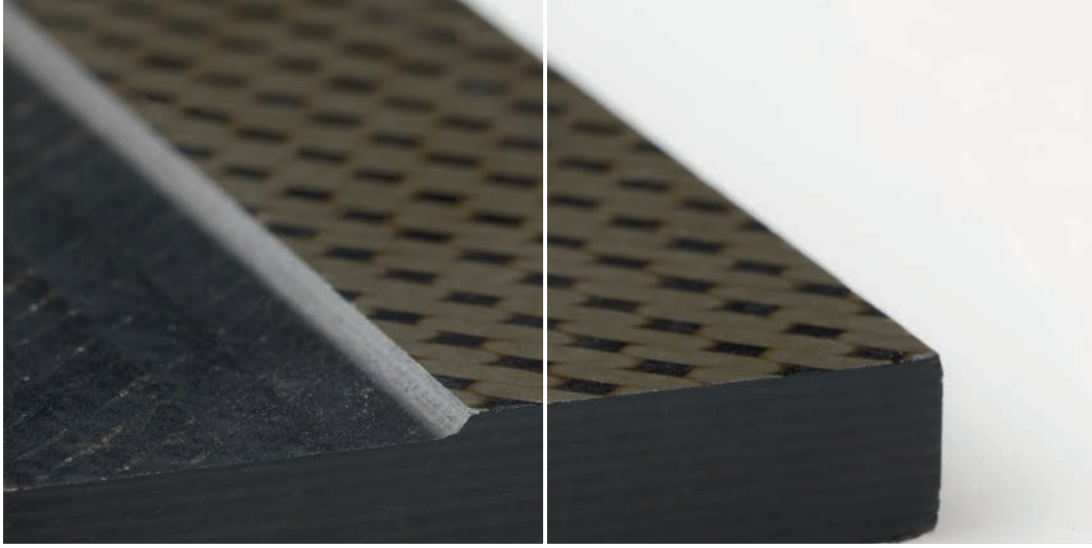
PM Plus...-EB845

SMG		a_p on (Ø) inch		f (in/rev)		V_c (sf/min)				
		z=6	z=8	z=6	z=8	H15	CP20	RX2000	CF	RX1500
P3	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.035	.012 –.047	–	195 (100-330)	260 (100-490)	590 (295-655)	720 (395-985)
P4	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.028	.012 –.035	–	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P5	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.028	.012 –.035	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P6	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.028	.012 –.035	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P7	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.028	.012 –.035	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P8	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.028	.012 –.035	50 (35-65)	115 (65-195)	130 (65-260)	260 (195-395)	395 (260-590)
P11	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.028	.012 –.035	50 (35-65)	115 (65-195)	130 (65-260)	260 (195-395)	395 (260-590)
M1	PMX5/PMX6-EB845	.003 –.006	.004 –.008	.008 –.024	.012 –.031	40 (30-50)	80 (50-130)	115 (65-230)	–	–
M2	PMX5/PMX6-EB845	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	80 (50-130)	115 (65-230)	–	–
M3	PMX5/PMX6-EB845	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	80 (50-130)	115 (65-230)	–	–
M4	PMX5/PMX6-EB845	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	65 (35-100)	80 (50-165)	–	–
M5	PMX5/PMX6-EB845	.003 –.006	.004 –.008	.008 –.024	.012 –.031	–	65 (35-100)	80 (50-165)	–	–
K1	PMX5/PMX6-EB845	.004 –.008	.004 –.010	.012 –.035	.012 –.047	80 (50-100)	195 (130-330)	260 (100-490)	–	720 (395-985)
K2	PMX5/PMX6-EB845	.004 –.008	.004 –.010	.012 –.035	.012 –.047	–	80 (65-130)	130 (100-230)	–	260 (165-330)
K3	PMX5/PMX6-EB845	.004 –.008	.004 –.010	.012 –.035	.012 –.047	80 (50-100)	195 (130-330)	260 (100-490)	–	720 (395-985)
K4	PMX5/PMX6-EB845	.004 –.008	.004 –.010	.012 –.035	.012 –.047	80 (50-100)	150 (100-230)	230 (130-395)	330 (230-490)	490 (260-655)
K5	PMX5/PMX6-EB845	.004 –.008	.004 –.010	.012 –.035	.012 –.047	80 (50-100)	150 (100-230)	230 (130-395)	330 (230-490)	490 (260-655)
K6	PMX5/PMX6-EB845	.004 –.008	.004 –.010	.012 –.035	.012 –.047	–	195 (130-330)	260 (100-490)		720 (395-985)
K7	PMX5/PMX6-EB845	.004 –.008	.004 –.010	.012 –.035	.012 –.047	–	195 (130-330)	260 (100-490)	–	720 (395-985)
S1	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.024	.012 –.031	–	65 (35-80)	65 (35-80)	–	–
S2	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.024	.012 –.031	–	65 (35-80)	65 (35-80)	–	–
S3	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.024	.012 –.031	–	65 (35-80)	65 (35-80)	–	–
S11	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.024	.012 –.031	65 (50-100)	100 (50-130)	130 (65-165)	–	–
S12	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.024	.012 –.031	65 (50-100)	100 (50-130)	130 (65-165)	–	–
S13	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.024	.012 –.031	65 (50-100)	100 (50-130)	130 (65-165)	–	–
H3	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
H5	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
H7	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
H8	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
H11	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
H12	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
H21	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
H31	PMX5/PMX6-EB845	.003 –.006	.004 –.006	.008 –.016	.012 –.022	–	–	35 (25-50)	–	–
PM1	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.024	.012 –.031	–	165 (100-260)	230 (130-330)	–	–
PM2	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.024	.012 –.031	–	165 (100-260)	230 (130-330)	–	–
PM3	PMX5/PMX6-EB845	.004 –.008	.004 –.012	.008 –.024	.012 –.031	–	165 (100-260)	230 (130-330)	–	–

PM Plus…-EB25

SMG		a_p on (Ø) inch		f (in/rev)		V_c (sf/min)				
		z=6	z=8	z=6	z=8	H15	CP20	RX2000	CF	RX1500
P1	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.071	.039 –.094	80 (50-100)	195 (100-330)	260 (100-490)	590 (295-655)	720 (395-985)
P2	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.071	.039 –.094	80 (50-100)	195 (100-330)	260 (100-490)	590 (295-655)	720 (395-985)
P3	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.071	.039 –.094	80 (50-100)	195 (100-330)	260 (100-490)	590 (295-655)	720 (395-985)
P4	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.071	.039 –.094	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P5	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.071	.039 –.094	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P6	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.071	.039 –.094	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
P7	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.071	.039 –.094	65 (35-80)	165 (100-260)	195 (100-395)	395 (260-490)	590 (295-655)
M1	PMX5/PMX6-EB25	.003 –.006	.004 –.008	.031 –.047	.039 –.079	–	80 (50-130)	115 (65-230)	–	–
K1	PMX5/PMX6-EB25	.004 –.008	.004 –.010	.031 –.087	.039 –.110	80 (50-100)	195 (130-330)	260 (100-490)	–	720 (395-985)
K2	PMX5/PMX6-EB25	.004 –.008	.004 –.010	.031 –.071	.039 –.094	–	80 (65-130)	130 (100-230)	–	260 (165-330)
K3	PMX5/PMX6-EB25	.004 –.008	.004 –.010	.031 –.087	.039 –.110	80 (50-100)	195 (130-330)	260 (100-490)	–	720 (395-985)
K4	PMX5/PMX6-EB25	.004 –.008	.004 –.010	.031 –.087	.039 –.110	80 (50-100)	150 (100-230)	230 (130-395)	330 (230-490)	490 (260-655)
K5	PMX5/PMX6-EB25	.004 –.008	.004 –.010	.031 –.087	.039 –.110	80 (50-100)	150 (100-230)	230 (130-395)	330 (230-490)	490 (260-655)
K6	PMX5/PMX6-EB25	.004 –.008	.004 –.010	.031 –.071	.039 –.094	–	195 (130-330)	260 (100-490)	–	720 (395-985)
K7	PMX5/PMX6-EB25	.004 –.008	.004 –.010	.031 –.071	.039 –.094	–	195 (130-330)	260 (100-490)	–	720 (395-985)
N1	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.087	.039 –.110	165 (100-330)	–	–	–	–
N2	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.087	.039 –.110	165 (100-330)	–	–	–	–
N3	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.087	.039 –.110	165 (100-330)	–	–	–	–
N11	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.031 –.087	.039 –.110	165 (100-330)	–	–	–	–
PM1	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.020 –.071	.031 –.079	–	165 (100-260)	230 (130-330)	–	–
PM2	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.020 –.071	.031 –.079	–	165 (100-260)	230 (130-330)	–	–
PM3	PMX5/PMX6-EB25	.004 –.008	.004 –.012	.020 –.071	.031 –.079	–	165 (100-260)	230 (130-330)	–	–

SMG V2



Steels, ferritic and martensitic stainless steels

SMG	DESCRIPTION	PROPERTIES UTS = Ultimate tensile strength (ksi)	REFERENCE MATERIAL (ANSI)
P1	Free-cutting steels	50 < UTS < 75	1213 UTS = 55 ksi
P2	Low alloy ferritic steels, C < 0.25%wt Low alloy weldable general structural steels	45 < UTS < 85	A 573 Gr. 58 UTS = 60 ksi
P3	Ferritic & ferritic/pearlitic steels, C < 0.25%wt Weldable general structural steels Case hardening steels	60 < UTS < 90	5115 UTS = 80 ksi
P4	Low alloy general structural steels, 0.25% < C < 0.67%wt Low alloy Quench & Temper steels	75 < UTS < 175	1045 UTS = 95 ksi
P5	Structural steels, 0.25% < C < 0.67%wt Quench & Temper steels	80 < UTS < 175	4140 UTS = 100 ksi
P6	Low alloy through hardening steels, C > 0.67%wt Low alloy spring and bearing steels	75 < UTS < 170	1095 UTS = 85 ksi
P7	Through hardening steels, C > 0.67%wt Spring and bearing steels	85 < UTS < 170	52100 UTS = 95 ksi
P8	Tool steels High Speed Steels (HSS)	85 < UTS < 170	H13 UTS = 100 ksi
P11	Ferritic & martensitic stainless steels	60 < UTS < 170	420 UTS = 95 ksi

WORKPIECE MATERIALS CLASSIFICATION, SMG v2

Free-cutting, austenitic and duplex stainless steels

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
M1	Free-cutting austenitic stainless steels		303
M2	Low alloy austenitic stainless steels		304
M3	Medium alloy austenitic stainless steels		316 L
M4	High alloy austenitic and duplex stainless steels		2205 Duplex
M5	Difficult high alloy austenitic and duplex stainless steels		2507 Super duplex

Cast irons

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
K1	Grey cast irons (GCI)		A48 35 B
K2	Compacted graphite irons (CGI)		Grade 400-15
K3	Malleable cast irons (MCI)		A220 60004
K4	Nodular cast irons (SGI)		80-55-06
K5	Austempered ductile irons (ADI)		1050/700/7
K6	Austenitic lamellar cast irons		A436 Type 1 (Ni-Resist 1)
K7	Austenitic nodular cast irons		A439 Type D-2M (Ni-Resist D-2M)

WORKPIECE MATERIALS CLASSIFICATION, SMG v2

Non-ferrous metals

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
N1	Aluminum alloys, Si < 9%		7075-T6
N2	Aluminum alloys, 9% < Si < 16%		413.2 Si = 12%
N3	Aluminum alloys, Si >16%		AlSi17Cu5
N11	Copper alloys		UNS C38500

Superalloys and titanium

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
S1	Iron based superalloys		Discalloy
S2	Cobalt based superalloys		Stellite 21
S3	Nickel based superalloys		Inconel 718
S11	Titanium, low alloyed, (α)		Ti
S12	Titanium, medium alloyed, (α+β)		TiAl6V4
S13	Titanium, high alloyed, (near β and β)		Ti10V2Fe3Al

Hard materials

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
H3	Case hardened steels	58 < HRC < 62	5115 60 HRC
H5	Quenched & Tempered steels	38 < HRC < 56	4140 50 HRC
H7	Quenched & Tempered steels Bearing steels	56 < HRC < 64	52100 60 HRC
H8	Tool steels High Speed Steels	38 < HRC < 64	H13 50 HRC
H11	Martensitic stainless steels	38 < HRC < 50	420 45 HRC
H12	Precipitation hardened stainless steels	33 < HRC < 50	17-4PH 35 HRC
H21	Manganese steels	23 < HRC < 64	Hadfield, High manganese steel 50 HRC
H31	White cast irons	50 < HRC < 64	A532 ID, White cast iron 55 HRC

WORKPIECE MATERIALS CLASSIFICATION, SMG v2

Other difficult materials

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
PM1	Low alloy PM materials		F-0008 Fe-0.7C
PM2	Medium alloy PM materials		FLC-4608 Fe2Cu1.8Ni0.5Mo0.2Mn0.8C
PM3	High alloy PM materials Exhaust valve seat materials		
HF1	Hard facing alloys Welded or plasma deposited iron based alloys		
HF2	Hard facing alloys Welded or plasma deposited cobalt and nickel based alloys		
CC1	Sintered tungsten carbide		G50

Plastics and Composites

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
TS1	Thermosetting polymers		Urea formaldehyde (UF)
TS2	Thermosetting Carbon fibre composites		T300 T700 T800 HTA-S IMA - Epoxy (M21)...
TS3	Thermosetting Glass fibre composites		Epoxy - HX..(42..)/E glass (7781...)...
TS4	Thermosetting Aramide fibre composites		Kevlar 49
TP1	Thermoplastic polymers		Polycarbonate (PC)
TP2	Thermoplastic Carbon fibre composites		PPS/PEEK - T300..
TP3	Thermoplastic Glass fibre composites		PPS/PEEK - E glass or A glass...
TP4	Thermoplastic Aramide fibre composites		

Graphite

SMG	DESCRIPTION	PROPERTIES	REFERENCE MATERIAL (ANSI)
GR1	Graphite		R 8500