

AFFORDABLE PERFORMANCE



**WCE**

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Versatile Solid Carbide End Mills

**WIDIA** 

# WCE END MILLS



## AFFORDABLE PERFORMANCE

The WCE solid end milling line features an advanced geometry wrapped into a versatile tool to enable material versatility for small-to-medium shops seeking a cost-effective solution to machine small batches.

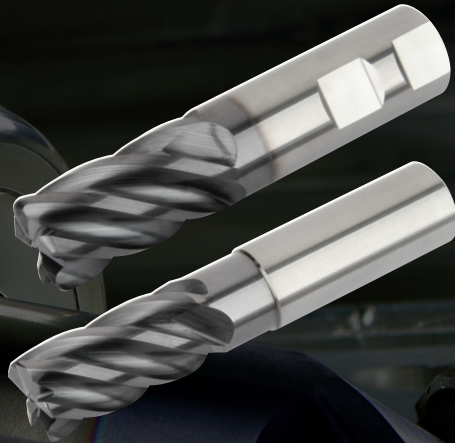


#### WCE4

Inch: 1/8"–1"

Metric: 3mm–20mm

- Sharp Edges
- Ball Nose
- Radiused
- Chamfered



#### WCE5

Inch: 3/16"–1"

Metric: 4mm–20mm

- Sharp Edges
- Chamfered
- Corner Radii

# WCE End Mill

Versatile Solid Carbide End Mills • WCE4 & WCE5

The WCE platform packs a combination of high-performance and general-purpose features into one end mill family offered at an affordable price point in both 4- and 5-flute geometries.



WCE4 4-flute geometry combines the asymmetrical index and variable helix features at an affordable price while ensuring material and application versatility, including demanding operations like full slots and heavy cuts.



WCE5 5-flute geometry combines the unequal index with an elevated 38-degree helix feature at an affordable price for use in primarily Carbon Steel and Stainless Steel shouldering and side milling applications.

## WCE End Mill Family Shared Features:

### **ECCENTRIC RELIEF**

to provide vibration dampening and increase tool life on stainless steels.

6mm+ = eccentric relief

6mm- = faceted relief

### **CORE TAPER**

for improved chip evacuation and tool stability.

# AFFORDABLE PERFORMANCE

## PRODUCT

### GRADE

WU20PD

### FLUTES

4, 5

### DIAMETER RANGE

#### WCE4

Inch: 1/8–1"  
Metric: 3–20mm

#### WCE5

Inch: 3/16–1"  
Metric: 4–20mm

## CORNER CONDITIONS

### WCE4

Sharp Edges  
Chamfered  
Radiused  
Ball Nose

### WCE5

Sharp Edges  
Chamfered  
Corner Radii

## INDUSTRY



## MATERIALS

### FIRST CHOICE



### SECOND CHOICE



## APPLICATIONS

### WCE4



SIDE/  
SHOULDER  
MILLING  
ROUGHING



SLOTTING  
SQUARE  
END



HELICAL  
MILLING



RAMPING  
BLANK



PLUNGE  
MILLING



3D  
PROFILING

### WCE5



SIDE/  
SHOULDER  
MILLING  
ROUGHING



HELICAL  
MILLING



RAMPING  
BLANK



TROCHOIDAL  
MILLING

### WCE4

## VARIABLE HELIX

and asymmetrical index to reduce vibrations and increase overall cutting stability.

### WCE5

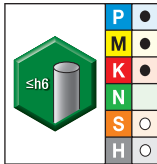
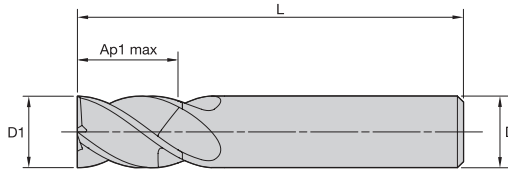
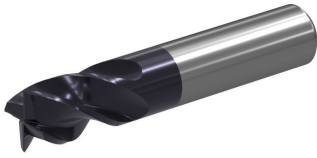
## UNEQUAL INDEX

to reduce vibration/chatter

## 38° HELIX

to increase performance in a variety of applications.

## WCE4 • Series W401 • Sharp Edge • 4 Flute • Cylindrical Shank • Inch

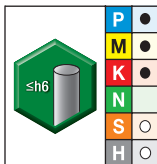
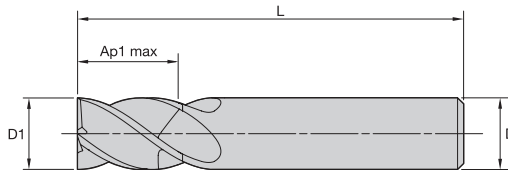
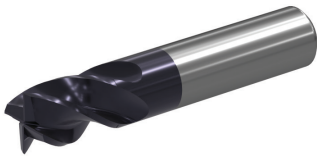


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945540	W401E03000SZT	1/8	1/8	1/4	1 1/2	4
6945591	W401E05001SZT	3/16	3/16	5/16	2	4
6945592	W401E07003SZT	1/4	1/4	3/8	2	4
6945583	W401E08004SZT	5/16	5/16	1/2	2	4
6945584	W401E10005SZT	3/8	3/8	1/2	2	4
6945696	W401E1100DSZT	7/16	7/16	5/8	2 1/2	4

## WCE4 • Series W411 • Sharp Edge • 4 Flute • Cylindrical Shank • Inch

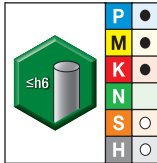
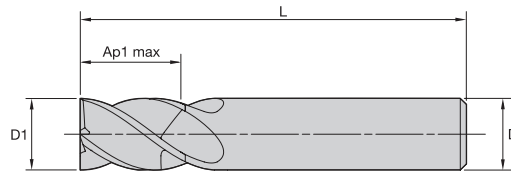
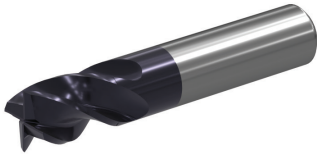


WU20PE

- first choice
- alternate choice

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6945917	W411E03010SZT	1/8	1/8	1/2	2	4
6945593	W411E05011SZT	3/16	3/16	5/8	2 1/4	4
6945595	W411E07013SZT	1/4	1/4	3/4	2 1/2	4
6945585	W411E08014SZT	5/16	5/16	3/4	2 1/2	4
6945586	W411E10015SZT	3/8	3/8	7/8	2 1/2	4
6945711	W411E1101DSZT	7/16	7/16	7/8	2 1/2	4

**WCE4 • Series W421 • Sharp Edge • 4 Flute • Cylindrical Shank • Inch**

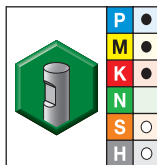
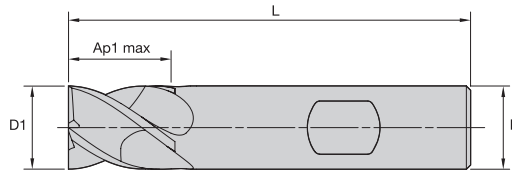
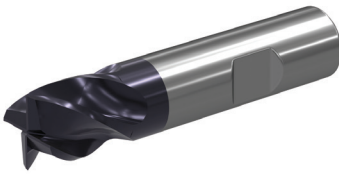


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945918	W421E07023SZT	1/4	1/4	1 1/4	3 1/4	4
6945945	W421E08024SZT	5/16	5/16	1 1/4	3 1/4	4
6945946	W421E10025SZT	3/8	3/8	1 1/2	4	4
6946188	W421E1102DSZT	7/16	7/16	2	4	4

**WCE4 • Series W401 • Sharp Edge • 4 Flute • Weldon® Shank • Inch**

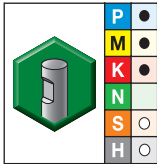
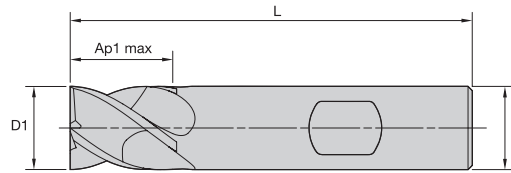
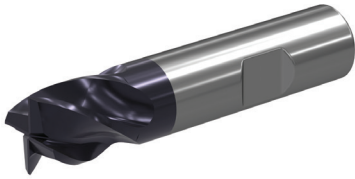


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945697	W401E13006SZW	1/2	1/2	5/8	2 1/2	4
6945698	W401E16008SZW	5/8	5/8	3/4	3	4
6945699	W401E19009SZW	3/4	3/4	7/8	3 1/2	4
6945700	W401E2500ASZW	1	1	1 1/2	4	4

## WCE4 • Series W411 • Sharp Edge • 4 Flute • Weldon® Shank • Inch

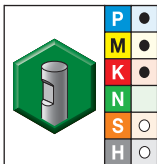
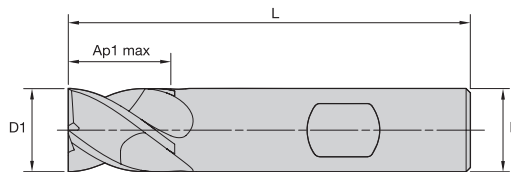
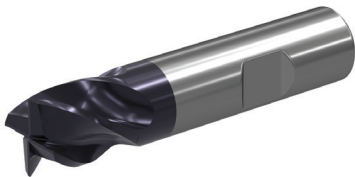


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945712	W411E13016SZW	1/2	1/2	1 1/4	3	4
6945713	W411E16018SZW	5/8	5/8	1 1/4	3 1/2	4
6945714	W411E19019SZW	3/4	3/4	1 1/2	4	4
6945715	W411E2501ASZW	1	1	2	5	4

## WCE4 • Series W421 • Sharp Edge • 4 Flute • Weldon Shank • Inch



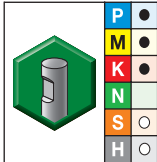
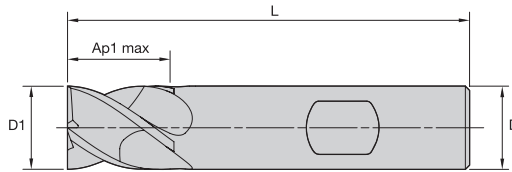
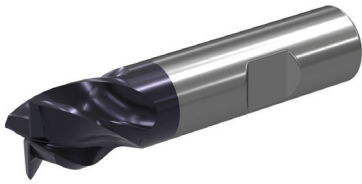
WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945716	W421E13026SZW	1/2	1/2	1 1/2	4	4
6945717	W421E16028SZW	5/8	5/8	1 5/8	4 1/8	4
6945718	W421E19029SZW	3/4	3/4	2 1/4	5	4



WCE4 • Series W431 • Sharp Edge • 4 Flute • Weldon® Shank • Inch

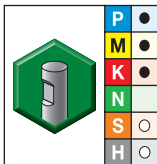
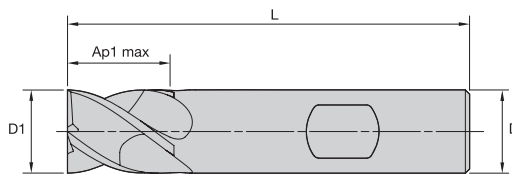
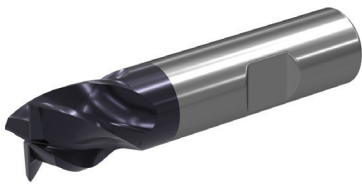


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6946189	W431E13036SZW	1/2	1/2	2	4	4
6946190	W431E19039SZW	3/4	3/4	3	6	4
6946291	W431E2503ASZW	1	1	4	7	4

WCE4 • Series W441 • Sharp Edge • 4 Flute • Weldon Shank • Inch

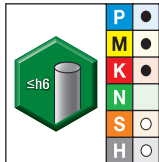
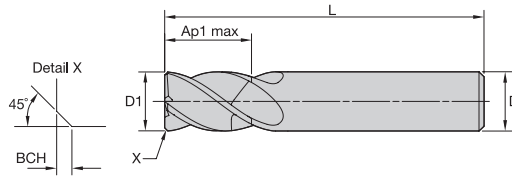
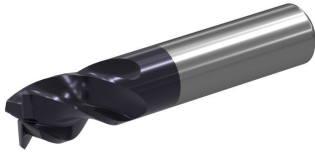


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6946292	W441E13046SZW	1/2	1/2	2 1/2	4 1/2	4

## WCE4 • Series W401 • Chamfered • 4 Flute • Cylindrical Shank • Inch

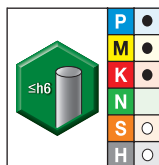
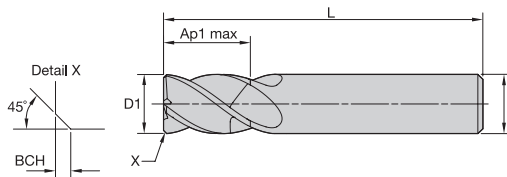
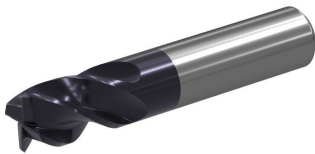


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945596	W401E03000CHT	1/8	1/8	1/4	1 1/2	.010	4
6945597	W401E05001CHT	3/16	3/16	5/16	2	.010	4
6945598	W401E07003CYT	1/4	1/4	3/8	2	.016	4
6945587	W401E08004CYT	5/16	5/16	1/2	2	.016	4
6945588	W401E10005CTT	3/8	3/8	1/2	2	.020	4
6945720	W401E1100DCTT	7/16	7/16	5/8	2 1/2	.020	4

## WCE4 • Series W411 • Chamfered • 4 Flute • Cylindrical Shank • Inch

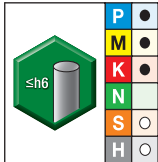
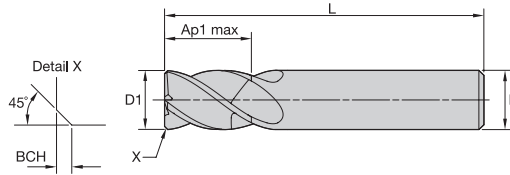
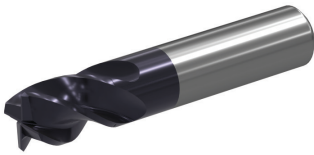


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945919	W411E03010CHT	1/8	1/8	1/2	2	.010	4
6945599	W411E05011CHT	3/16	3/16	5/8	2 1/4	.010	4
6945600	W411E07013CYT	1/4	1/4	3/4	2 1/2	.016	4
6945589	W411E08014CYT	5/16	5/16	3/4	2 1/2	.016	4
6945590	W411E10015CTT	3/8	3/8	7/8	2 1/2	.020	4
6945725	W411E1101DCTT	7/16	7/16	7/8	2 1/2	.020	4

**WCE4 • Series W421 • Chamfered • 4 Flute • Cylindrical Shank • Inch**

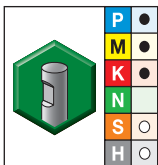
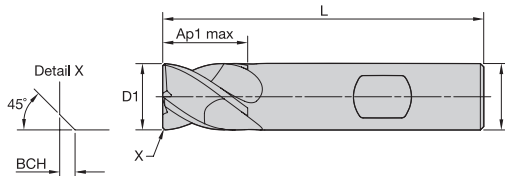
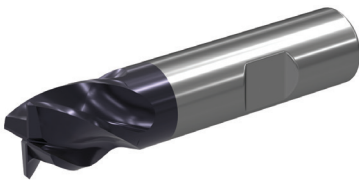


● first choice  
○ alternate choice

WU20PE

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945920	W421E07023CYT	1/4	1/4	1 1/4	3 1/4	.016	4
6945947	W421E08024CYT	5/16	5/16	1 1/4	3 1/4	.016	4
6945948	W421E10025CTT	3/8	3/8	1 1/2	4	.020	4
6946293	W421E1102DCTT	7/16	7/16	2	4	.020	4

**WCE4 • Series W401 • Chamfered • 4 Flute • Weldon® Shank • Inch**

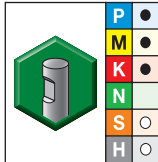
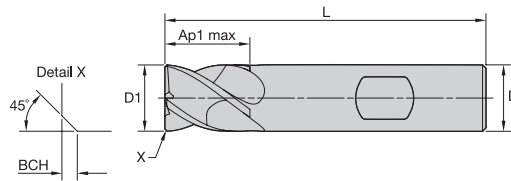
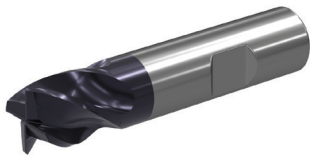


● first choice  
○ alternate choice

WU20PE

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945721	W401E13006CTW	1/2	1/2	5/8	2 1/2	.020	4
6945722	W401E16008CTW	5/8	5/8	3/4	3	.020	4
6945723	W401E19009CTW	3/4	3/4	7/8	3 1/2	.020	4
6945724	W401E2500ACTW	1	1	1 1/2	4	.020	4

## WCE4 • Series W411 • Chamfered • 4 Flute • Weldon® Shank • Inch

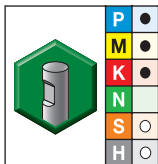
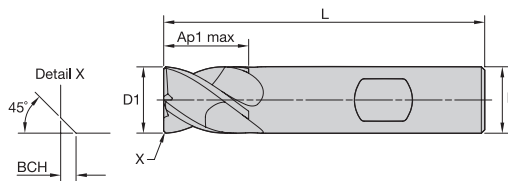
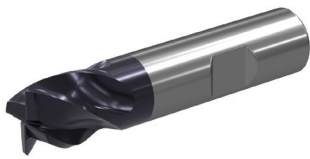


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945726	W411E13016CTW	1/2	1/2	1 1/4	3	.020	4
6945727	W411E16018CTW	5/8	5/8	1 1/4	3 1/2	.020	4
6945728	W411E19019CTW	3/4	3/4	1 1/2	4	.020	4
6945729	W411E2501ACTW	1	1	2	5	.020	4

## WCE4 • Series W421 • Chamfered • 4 Flute • Weldon Shank • Inch

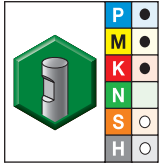
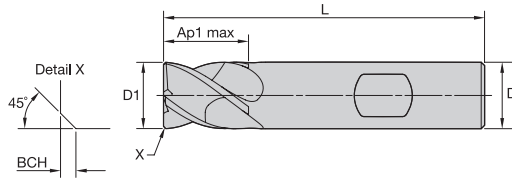
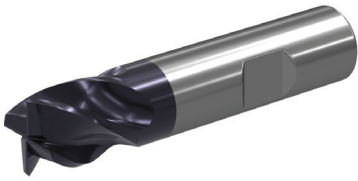


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945730	W421E13026CTW	1/2	1/2	1 1/2	4	.020	4
6945731	W421E16028CTW	5/8	5/8	1 5/8	4 1/8	.020	4
6945732	W421E19029CTW	3/4	3/4	2 1/4	5	.020	4
6945733	W421E2502ACTW	1	1	3	6	.020	4

WCE4 • Series W431 • Chamfered • 4 Flute • Weldon® Shank • Inch

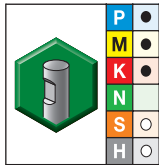
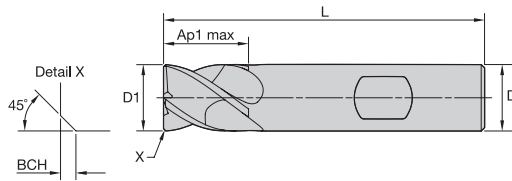
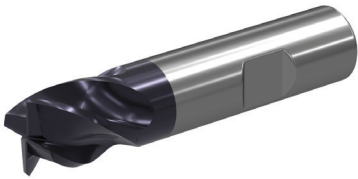


● first choice  
○ alternate choice

WU20PE

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6946294	W431E13036CTW	1/2	1/2	2	4	.020	4
6946295	W431E19039CTW	3/4	3/4	3	6	.020	4
6946296	W431E2503ACTW	1	1	4	7	.020	4

WCE4 • Series W441 • Chamfered • 4 Flute • Weldon Shank • Inch

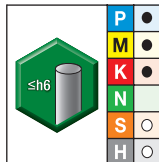
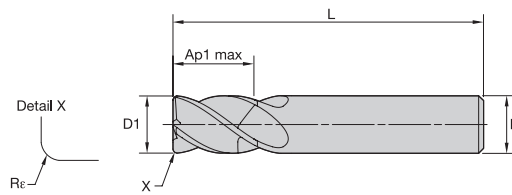
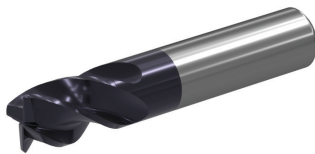


● first choice  
○ alternate choice

WU20PE

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6946297	W441E13046CTW	1/2	1/2	2 1/2	4 1/2	.020	4

## WCE4 • Series W401 • Radiused • 4 Flute • Cylindrical Shank • Inch

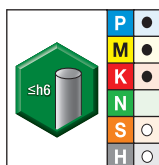
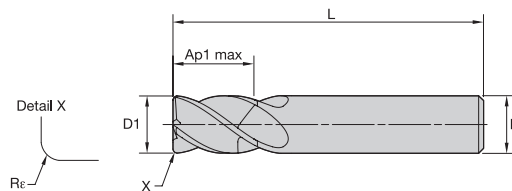
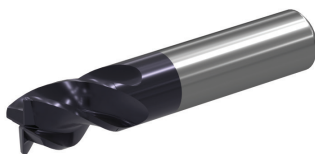


- first choice
- alternate choice

WU20PE

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
6945648	W401E03000RAT	1/8	1/8	1/4	1 1/2	.015	4
6945649	W401E05001RAT	3/16	3/16	3/16	2	.015	4
6945650	W401E05001RET	3/16	3/16	5/16	2	.030	4
6945651	W401E07003RAT	1/4	1/4	3/8	2	.015	4
6945652	W401E07003RET	1/4	1/4	3/8	2	.030	4
6945653	W401E07003RGT	1/4	1/4	3/8	2	.060	4
6945659	W401E08004RAT	5/16	5/16	1/2	2	.015	4
6945660	W401E08004RET	5/16	5/16	1/2	2	.030	4
6945671	W401E08004RGT	5/16	5/16	1/2	2	.060	4
6945672	W401E10005RAT	3/8	3/8	1/2	2	.015	4
6945673	W401E10005RET	3/8	3/8	1/2	2	.030	4
6945674	W401E10005RGT	3/8	3/8	1/2	2	.060	4
6945675	W401E10005RJT	3/8	3/8	1/2	2	.090	4

## WCE4 • Series W411 • Radiused • 4 Flute • Cylindrical Shank • Inch

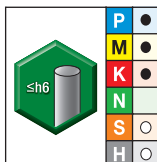
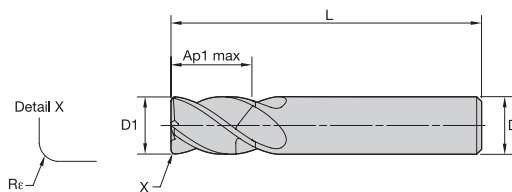
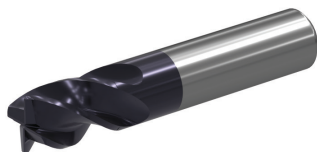


- first choice
- alternate choice

WU20PE

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
6945941	W411E03010RAT	1/8	1/8	1/2	2	.015	4
6945654	W411E05011RAT	3/16	3/16	5/8	2 1/4	.015	4
6945655	W411E05011RET	3/16	3/16	5/8	2 1/4	.030	4
6945656	W411E07013RAT	1/4	1/4	3/4	2 1/2	.015	4
6945657	W411E07013RET	1/4	1/4	3/4	2 1/2	.030	4
6945658	W411E07013RGT	1/4	1/4	3/4	2 1/2	.060	4
6945676	W411E08014RAT	5/16	5/16	3/4	2 1/2	.015	4
6945677	W411E08014RET	5/16	5/16	3/4	2 1/2	.030	4
6945678	W411E08014RGT	5/16	5/16	3/4	2 1/2	.060	4
6945679	W411E10015RAT	3/8	3/8	7/8	2 1/2	.015	4
6945680	W411E10015RET	3/8	3/8	7/8	2 1/2	.030	4
6945681	W411E10015RGT	3/8	3/8	7/8	2 1/2	.060	4
6945682	W411E10015RJT	3/8	3/8	7/8	2 1/2	.090	4

## WCE4 • Series W421 • Radiused • 4 Flute • Cylindrical Shank • Inch



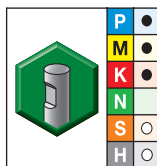
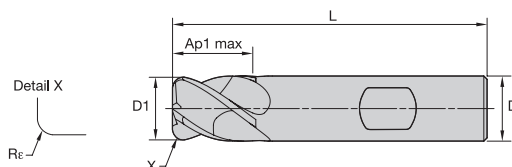
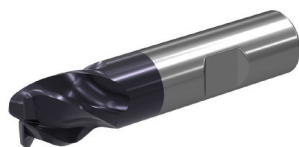
WU20PE

● first choice

○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
6945942	W421E07023RAT	1/4	1/4	1 1/4	3 1/4	.015	4
6945943	W421E07023RET	1/4	1/4	1 1/4	3 1/4	.030	4
6945944	W421E07023RGT	1/4	1/4	1 1/4	3 1/4	.060	4
6945949	W421E08024RAT	5/16	5/16	1 1/4	3 1/4	.015	4
6945950	W421E08024RET	5/16	5/16	1 1/4	3 1/4	.030	4
6945951	W421E08024RGT	5/16	5/16	1 1/4	3 1/4	.060	4
6945952	W421E10025RAT	3/8	3/8	1 1/2	4	.015	4
6945953	W421E10025RET	3/8	3/8	1 1/2	4	.030	4
6945954	W421E10025RGT	3/8	3/8	1 1/2	4	.060	4
6945955	W421E10025RJT	3/8	3/8	1 1/2	4	.090	4

## WCE4 • Series W401 • Radiused • 4 Flute • Weldon® Shank • Inch



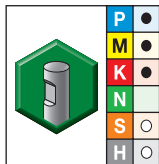
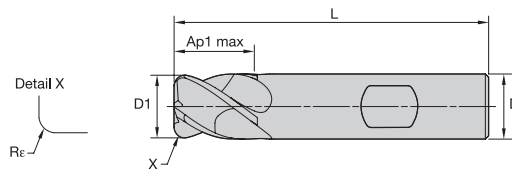
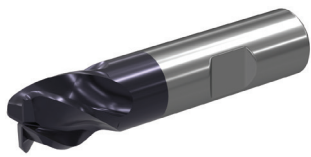
WU20PE

● first choice

○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
6945817	W401E13006REW	1/2	1/2	5/8	2 1/2	.030	4
6945818	W401E13006RGW	1/2	1/2	5/8	2 1/2	.060	4
6945819	W401E13006RJW	1/2	1/2	5/8	2 1/2	.090	4
6945820	W401E13006RKW	1/2	1/2	5/8	2 1/2	.120	4
6945841	W401E16008REW	5/8	5/8	3/4	3	.030	4
6945842	W401E16008RGW	5/8	5/8	3/4	3	.060	4
6945843	W401E16008RKW	5/8	5/8	3/4	3	.120	4
6945844	W401E19009REW	3/4	3/4	7/8	3 1/2	.030	4
6945845	W401E19009RGW	3/4	3/4	7/8	3 1/2	.060	4
6945846	W401E19009RJW	3/4	3/4	7/8	3 1/2	.090	4
6945847	W401E19009RKW	3/4	3/4	7/8	3 1/2	.120	4
6945848	W401E2500AREW	1	1	1 1/2	4	.030	4
6945849	W401E2500ARGW	1	1	1 1/2	4	.060	4
6945850	W401E2500ARJW	1	1	1 1/2	4	.090	4
6945851	W401E2500ARKW	1	1	1 1/2	4	.120	4

## WCE4 • Series W411 • Radiused • 4 Flute • Weldon® Shank • Inch

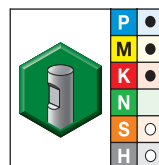
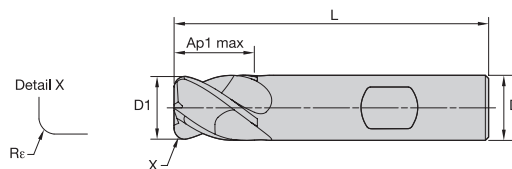
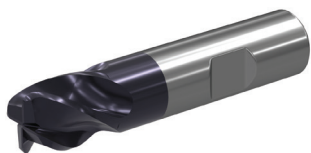


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6945852	W411E13016REW	1/2	1/2	1 1/4	3	.030	4
6945853	W411E13016RGW	1/2	1/2	1 1/4	3	.060	4
6945854	W411E13016RJW	1/2	1/2	1 1/4	3	.090	4
6945855	W411E13016RKW	1/2	1/2	1 1/4	3	.120	4
6945856	W411E16018REW	5/8	5/8	1 1/4	3 1/2	.030	4
6945857	W411E16018RGW	5/8	5/8	1 1/4	3 1/2	.060	4
6945858	W411E16018RKW	5/8	5/8	1 1/4	3 1/2	.120	4
6945859	W411E19019REW	3/4	3/4	1 1/2	4	.030	4
6945860	W411E19019RGW	3/4	3/4	1 1/2	4	.060	4
6945861	W411E19019RJW	3/4	3/4	1 1/2	4	.090	4
6945862	W411E19019RKW	3/4	3/4	1 1/2	4	.120	4
6945863	W411E2501AREW	1	1	2	5	.030	4
6945864	W411E2501ARGW	1	1	2	5	.060	4
6945865	W411E2501ARJW	1	1	2	5	.090	4
6945866	W411E2501ARKW	1	1	2	5	.120	4

## WCE4 • Series W421 • Radiused • 4 Flute • Weldon Shank • Inch



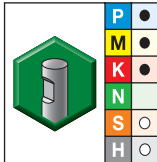
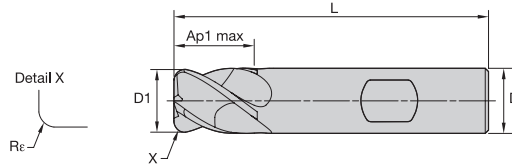
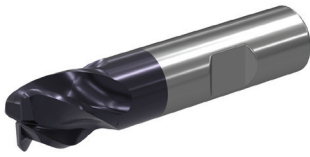
WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6945867	W421E13026REW	1/2	1/2	1 1/2	4	.030	4
6945868	W421E13026RGW	1/2	1/2	1 1/2	4	.060	4
6945869	W421E13026RJW	1/2	1/2	1 1/2	4	.090	4
6945870	W421E13026RKW	1/2	1/2	1 1/2	4	.120	4
6945871	W421E16028REW	5/8	5/8	1 5/8	4 1/8	.030	4
6945872	W421E16028RGW	5/8	5/8	1 5/8	4 1/8	.060	4
6945873	W421E16028RKW	5/8	5/8	1 5/8	4 1/8	.120	4
6945874	W421E19029REW	3/4	3/4	2 1/4	5	.030	4
6945875	W421E19029RGW	3/4	3/4	2 1/4	5	.060	4
6945876	W421E19029RJW	3/4	3/4	2 1/4	5	.090	4
6945877	W421E19029RKW	3/4	3/4	2 1/4	5	.120	4
6945878	W421E2502AREW	1	1	3	6	.030	4
6945879	W421E2502ARGW	1	1	3	6	.060	4
6945880	W421E2502ARJW	1	1	3	6	.090	4
6945881	W421E2502ARKW	1	1	3	6	.120	4



WCE4 • Series W431 • Radiused • 4 Flute • Weldon® Shank • Inch

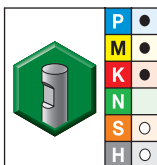
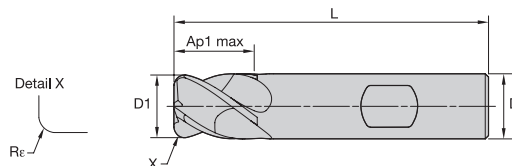
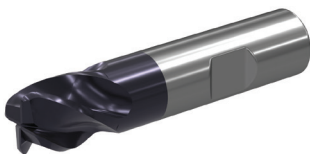


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
6946298	W431E13036REW	1/2	1/2	2	4	.030	4
6946299	W431E13036RGW	1/2	1/2	2	4	.060	4
6946300	W431E13036RJW	1/2	1/2	2	4	.090	4
6946301	W431E13036RKW	1/2	1/2	2	4	.120	4
6946302	W431E16038REW	5/8	5/8	2 1/4	5	.030	4
6946303	W431E16038RGW	5/8	5/8	2 1/4	5	.060	4
6946304	W431E16038RKW	5/8	5/8	2 1/4	5	.120	4
6946305	W431E19039REW	3/4	3/4	3	6	.030	4
6946306	W431E19039RGW	3/4	3/4	3	6	.060	4
6946307	W431E19039RJW	3/4	3/4	3	6	.090	4
6946308	W431E19039RKW	3/4	3/4	3	6	.120	4
6946309	W431E2503AREW	1	1	4	7	.030	4
6946310	W431E2503ARGW	1	1	4	7	.060	4
6946321	W431E2503ARJW	1	1	4	7	.090	4
6946322	W431E2503ARKW	1	1	4	7	.120	4

WCE4 • Series W441 • Radiused • 4 Flute • Weldon® Shank • Inch

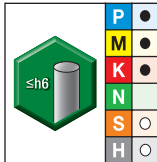
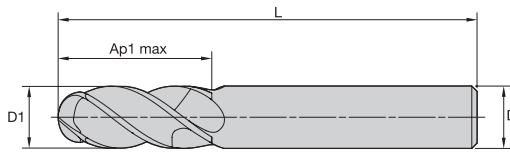


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
6946323	W441E13046REW	1/2	1/2	2 1/2	4 1/2	.030	4
6946324	W441E13046RGW	1/2	1/2	2 1/2	4 1/2	.060	4
6946325	W441E13046RJW	1/2	1/2	2 1/2	4 1/2	.090	4
6946326	W441E13046RKW	1/2	1/2	2 1/2	4 1/2	.120	4

## WCE4 • Series W40B • Ball Nose • 4 Flute • Cylindrical Shank • Inch

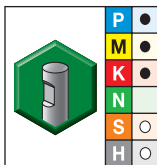
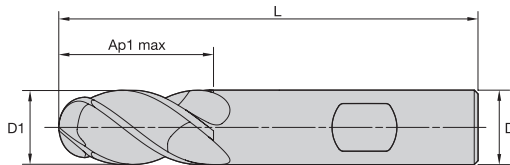
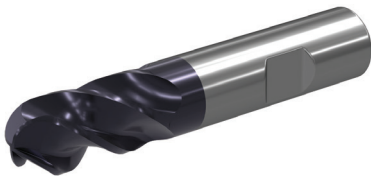


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945890	W40BE03000RBT	1/8	1/8	1/2	2	4
6945891	W40BE05001RBT	3/16	3/16	5/8	2 1/4	4
6945892	W40BE07003RBT	1/4	1/4	3/4	2 1/2	4
6945893	W40BE08004RBT	5/16	5/16	3/4	2 1/2	4
6945894	W40BE10005RBT	3/8	3/8	7/8	2 1/2	4

## WCE4 • Series W40B • Ball Nose • 4 Flute • Weldon® Shank • Inch

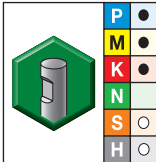
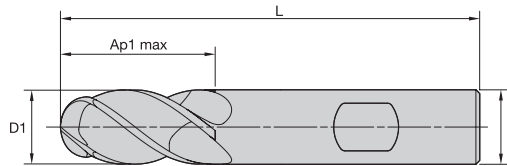
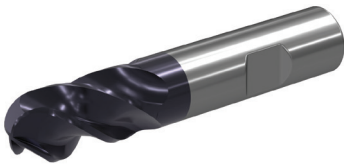


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945911	W40BE13006RBW	1/2	1/2	1	3	4
6945912	W40BE16008RBW	5/8	5/8	1 1/4	3 1/2	4
6945913	W40BE19009RBW	3/4	3/4	1 1/2	4	4
6945914	W40BE2500ARBW	1	1	1 1/2	4	4

WCE4 • Series W41B • Ball Nose • 4 Flute • Weldon® Shank • Inch

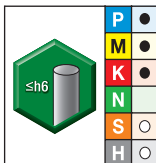
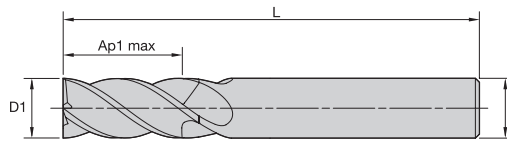
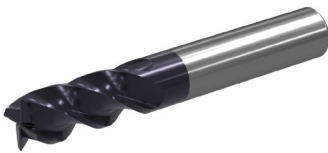


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945915	W41BE13006RBW	1/2	1/2	1 1/4	3	4

WCE4 • Series W401 • Sharp Edge • 4 Flute • Cylindrical Shank • Metric

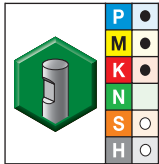
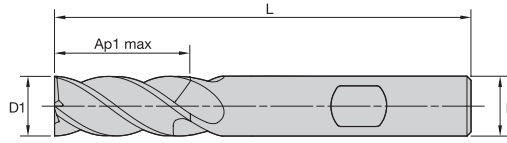
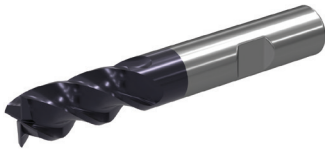


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945502	W401M03003SZT	3,0	6	8,00	57	4
6945503	W401M04003SZT	4,0	6	11,00	57	4
6945504	W401M05003SZT	5,0	6	13,00	57	4
6945505	W401M06003SZT	6,0	6	13,00	57	4
6945548	W401M08004SZT	8,0	8	19,00	63	4
6945549	W401M10005SZT	10,0	10	22,00	72	4
6945684	W401M12006SZT	12,0	12	26,00	83	4
6945685	W401M16008SZT	16,0	16	32,00	92	4
6945686	W401M20009SZT	20,0	20	38,00	104	4

## WCE4 • Series W401 • Sharp Edge • 4 Flute • Weldon® Shank • Metric

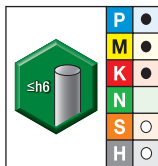
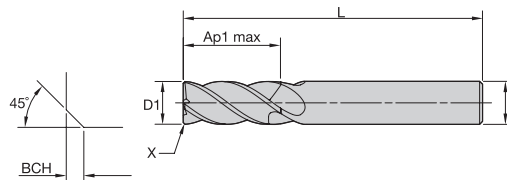
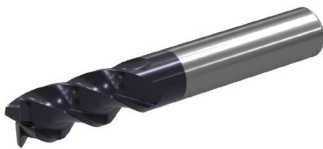


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6945510	W401M03003SZW	3,0	6	8,00	57	4
6945541	W401M04003SZW	4,0	6	11,00	57	4
6945542	W401M05003SZW	5,0	6	13,00	57	4
6945543	W401M06003SZW	6,0	6	13,00	57	4
6945562	W401M08004SZW	8,0	8	19,00	63	4
6945563	W401M10005SZW	10,0	10	22,00	72	4
6945690	W401M12006SZW	12,0	12	26,00	83	4
6945691	W401M16008SZW	16,0	16	32,00	92	4
6945692	W401M20009SZW	20,0	20	38,00	104	4

## WCE4 • Series W401 • Chamfered • 4 Flute • Cylindrical Shank • Metric

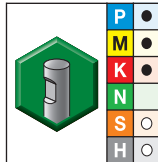
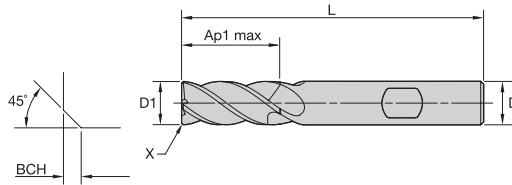
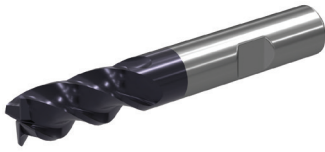


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945506	W401M03003CAT	3,0	6	8,00	57	0,40	4
6945507	W401M04003CAT	4,0	6	11,00	57	0,40	4
6945508	W401M05003CAT	5,0	6	13,00	57	0,40	4
6945509	W401M06003CAT	6,0	6	13,00	57	0,40	4
6945550	W401M08004CAT	8,0	8	19,00	63	0,40	4
6945561	W401M10005CET	10,0	10	22,00	72	0,50	4
6945687	W401M12006CET	12,0	12	26,00	83	0,50	4
6945688	W401M16008CET	16,0	16	32,00	92	0,50	4
6945689	W401M20009CET	20,0	20	38,00	104	0,50	4

## WCE4 • Series W401 • Chamfered • 4 Flute • Weldon® Shank • Metric

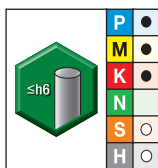
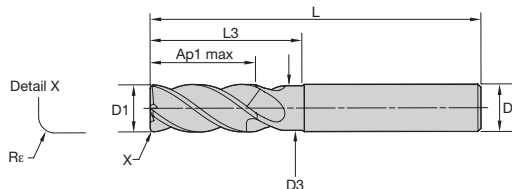
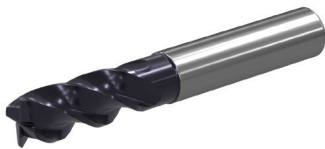


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6945544	W401M03003CAW	3,0	6	8,00	57	0,40	4
6945545	W401M04003CAW	4,0	6	11,00	57	0,40	4
6945546	W401M05003CAW	5,0	6	13,00	57	0,40	4
6945547	W401M06003CAW	6,0	6	13,00	57	0,40	4
6945564	W401M08004CAW	8,0	8	19,00	63	0,40	4
6945565	W401M10005CEW	10,0	10	22,00	72	0,50	4
6945693	W401M12006CEW	12,0	12	26,00	83	0,50	4
6945694	W401M16008CEW	16,0	16	32,00	92	0,50	4
6945695	W401M20009CEW	20,0	20	38,00	104	0,50	4

## WCE4 • Series W4N1 • Radiused • 4 Flute • Necked • Cylindrical Shank • Metric



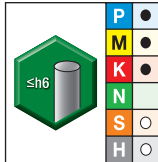
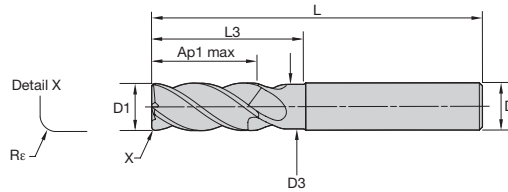
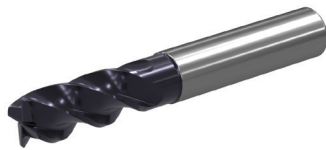
WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Re	Z U
6945620	W4N1M03003RAT	3,0	6	2,82	8,00	57	15,00	0,20	4
6945631	W4N1M04003RAT	4,0	6	3,76	11,00	57	16,00	0,20	4
6945632	W4N1M04003RET	4,0	6	3,76	11,00	57	16,00	0,50	4
6945633	W4N1M05003RAT	5,0	6	4,70	13,00	57	18,00	0,20	4
6945634	W4N1M05003RET	5,0	6	4,70	13,00	57	18,00	0,50	4
6945635	W4N1M05003RJT	5,0	6	4,70	13,00	57	18,00	1,00	4
6945636	W4N1M06003RET	6,0	6	5,64	13,00	57	21,00	0,50	4
6945638	W4N1M06003RHT	6,0	6	5,64	13,00	57	21,00	1,50	4
6945637	W4N1M06003RJT	6,0	6	5,64	13,00	57	21,00	1,00	4
6945640	W4N1M08004RET	8,0	8	7,52	19,00	63	27,00	0,50	4
6945642	W4N1M08004RHT	8,0	8	7,52	19,00	63	27,00	1,50	4
6945641	W4N1M08004RJT	8,0	8	7,52	19,00	63	27,00	1,00	4
6945643	W4N1M08004RKT	8,0	8	7,52	19,00	63	27,00	2,00	4
6945644	W4N1M10005RET	10,0	10	9,40	22,00	72	32,00	0,50	4
6945646	W4N1M10005RHT	10,0	10	9,40	22,00	72	32,00	1,50	4
6945645	W4N1M10005RJT	10,0	10	9,40	22,00	72	32,00	1,00	4

## WCE4 • Series W4N1 • Radiused • 4 Flute • Necked • Cylindrical Shank • Metric

(continued)

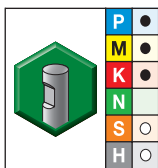
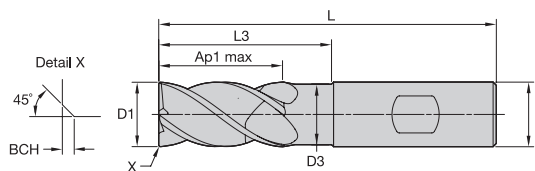


- first choice
- alternate choice

WU20PE

order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Re	Z U
6945647	W4N1M10005RKT	10,0	10	9,40	22,00	72	32,00	2,00	4
6945128	W4N1M12006RET	12,0	12	11,28	26,00	83	38,00	0,50	4
6945130	W4N1M12006RHT	12,0	12	11,28	26,00	83	38,00	1,50	4
6945129	W4N1M12006RJT	12,0	12	11,28	26,00	83	38,00	1,00	4
6945481	W4N1M12006RKT	12,0	12	11,28	26,00	83	38,00	2,00	4
6945482	W4N1M12006RQT	12,0	12	11,28	26,00	83	38,00	4,00	4
6945483	W4N1M16008RJT	16,0	16	15,04	32,00	92	44,00	1,00	4
6945484	W4N1M16008RKT	16,0	16	15,04	32,00	92	44,00	2,00	4
6945485	W4N1M16008RPT	16,0	16	15,04	32,00	92	44,00	3,00	4
6945486	W4N1M16008RQT	16,0	16	15,04	32,00	92	44,00	4,00	4
6945487	W4N1M20009RJT	20,0	20	18,80	38,00	104	53,00	1,00	4
6945488	W4N1M20009RKT	20,0	20	18,80	38,00	104	53,00	2,00	4
6945489	W4N1M20009RPT	20,0	20	18,80	38,00	104	53,00	3,00	4
6945490	W4N1M20009RQT	20,0	20	18,80	38,00	104	53,00	4,00	4

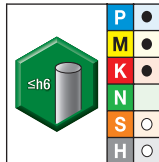
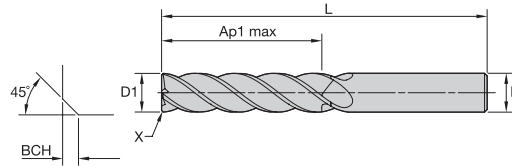
## WCE4 • Series W4N1 • Chamfered • 4 Flute • Necked • Weldon® Shank • Metric



WU20PE

order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	BCH	Z U
7006950	W4N1M03003CAW	3,0	6	2,82	8,00	57	15,00	0,15	4
7007001	W4N1M04003CAW	4,0	6	3,76	11,00	57	16,00	0,15	4
7007002	W4N1M05003CAW	5,0	6	4,70	13,00	57	18,00	0,15	4
7007003	W4N1M06003CAW	6,0	6	5,64	13,00	57	21,00	0,15	4
7007004	W4N1M08004CAW	8,0	8	7,52	19,00	63	27,00	0,20	4
7007005	W4N1M10005CAW	10,0	10	9,40	22,00	72	32,00	0,20	4
7006070	W4N1M12006CAW	12,0	12	11,28	26,00	83	38,00	0,20	4
7006091	W4N1M16008CYW	16,0	16	15,04	32,00	92	44,00	0,35	4
7006092	W4N1M20009CYW	20,0	20	18,80	38,00	104	53,00	0,35	4
7006093	W4N1M2500ACYW	25,0	25	23,50	45,00	121	75,00	0,35	4

## WCE4 • Series W411 • Chamfered • 4 Flute • Long Length • Cylindrical Shank • Metric

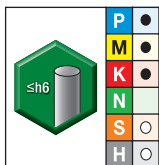
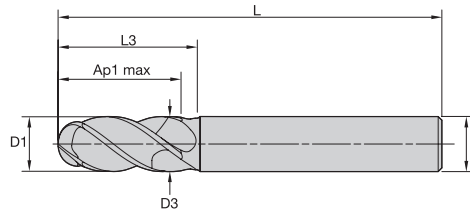
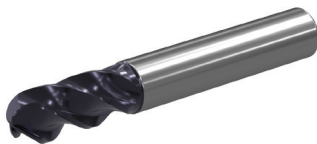


- first choice
- alternate choice

WU20PE

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
6946013	W411M06013CAT	6,0	6	32,00	76	0,40	4
6946014	W411M08014CAT	8,0	8	32,00	87	0,40	4
6946015	W411M10015CET	10,0	10	38,00	89	0,50	4
6946046	W411M12016CET	12,0	12	51,00	100	0,50	4
6946047	W411M16018CET	16,0	16	57,00	125	0,50	4
6946048	W411M20019CET	20,0	20	57,00	125	0,50	4

## WCE4 • Series W4NB • Ball Nose • 4 Flute • Cylindrical Shank • Metric

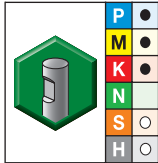
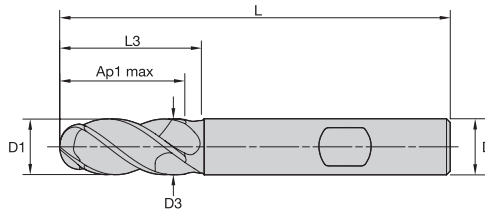


- first choice
- alternate choice

WU20PE

order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6945882	W4NBM05003RBT	5,0	6	4,70	13,00	57	18,00	4
6945883	W4NBM06003RBT	6,0	6	5,64	13,00	57	21,00	4
6945886	W4NBM08004RBT	8,0	8	7,52	19,00	63	27,00	4
6945887	W4NBM10005RBT	10,0	10	9,40	22,00	72	32,00	4
6945895	W4NBM12006RBT	12,0	12	11,28	26,00	83	30,00	4
6945896	W4NBM16008RBT	16,0	16	15,04	32,00	92	38,00	4
6945897	W4NBM20009RBT	20,0	20	18,80	38,00	104	50,00	4

## WCE4 • Series W4NB • Ball Nose • 4 Flute • Weldon® Shank • Metric






WU20PE

- first choice
- alternate choice




order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6945884	W4NBM05003RBW	5,0	6	4,70	13,00	57	18,00	4
6945885	W4NBM06003RBW	6,0	6	5,64	13,00	57	21,00	4
6945888	W4NBM08004RBW	8,0	8	7,52	19,00	63	27,00	4
6945889	W4NBM10005RBW	10,0	10	9,40	22,00	72	32,00	4
6945898	W4NBM12006RBW	12,0	12	11,28	26,00	83	30,00	4
6945899	W4NBM16008RBW	16,0	16	15,04	32,00	92	38,00	4
6945900	W4NBM20009RBW	20,0	20	18,80	38,00	104	50,00	4





Application Data • WCE4 Side Milling • Slotting • Inch

Material Group																		
	Side Milling		Slotting		WU20PE			Recommended feed per tooth (IPT = inch/th) for side milling (A). For slotting (B), reduce IPT by 20%.										
					Cutting Speed – Vc (SFM)				D1 – Diameter									
	ap	ae	ap	min	Start	max	fraction	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	
P	0	ap1max	0.4 x D1	1.0 x D1	490	580	660	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	1	ap1max	0.4 x D1	1.0 x D1	490	580	660	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	2	ap1max	0.4 x D1	1.0 x D1	460	540	620	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	3	ap1max	0.4 x D1	1.0 x D1	390	450	520	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
	4	ap1max	0.4 x D1	0.75 x D1	300	400	490	IPT	.0007	.0010	.0014	.0017	.0020	.0023	.0026	.0030	.0034	.0039
	5	ap1max	0.4 x D1	1.0 x D1	200	260	330	IPT	.0006	.0009	.0012	.0017	.0018	.0021	.0023	.0027	.0031	.0036
M	6	ap1max	0.4 x D1	0.75 x D1	160	200	250	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028
	1	ap1max	0.4 x D1	1.0 x D1	300	340	380	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
	2	ap1max	0.4 x D1	1.0 x D1	200	230	260	IPT	.0006	.0009	.0012	.0016	.0018	.0021	.0023	.0027	.0031	.0036
K	3	ap1max	0.4 x D1	1.0 x D1	200	210	230	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028
	1	ap1max	0.4 x D1	1.0 x D1	390	440	490	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	2	ap1max	0.4 x D1	1.0 x D1	360	410	460	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
S	3	ap1max	0.4 x D1	1.0 x D1	360	390	430	IPT	.0006	.0009	.0012	.0016	.0018	.0021	.0023	.0027	.0031	.0036
	1	ap1max	0.4 x D1	0.3 x D1	160	230	300	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
	2	ap1max	0.4 x D1	0.3 x D1	80	105	130	IPT	.0004	.0006	.0008	.0010	.0012	.0014	.0015	.0018	.0021	.0024
	3	ap1max	0.4 x D1	1.0 x D1	80	105	130	IPT	.0004	.0006	.0008	.0010	.0012	.0014	.0015	.0018	.0021	.0024
H	4	ap1max	0.4 x D1	1.0 x D1	160	180	200	IPT	.0005	.0008	.0011	.0014	.0017	.0019	.0021	.0025	.0028	.0033
	1	ap1max	0.4 x D1	0.75 x D1	260	360	460	IPT	.0007	.0010	.0014	.0017	.0020	.0023	.0026	.0030	.0034	.0039
	2	ap1max	0.4 x D1	0.5 x D1	230	310	390	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028



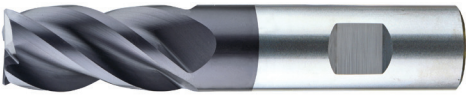
Application Data • WCE4 Side Milling • Slotting BN • Inch

Material Group																		
	Side Milling		Slotting		WU20PE			Recommended feed per tooth (Fz = IPT) for side milling (A). For slotting (B), reduce Fz by 20%.										
					Cutting Speed – Vc (SFM)				D1 – Diameter									
	ap	ae	ap	min	Start	max	fraction	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	
P	0	ap1max	0.4 x D1	1.0 x D1	490	580	660	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	1	ap1max	0.4 x D1	1.0 x D1	490	580	660	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	2	ap1max	0.4 x D1	1.0 x D1	460	540	620	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	3	ap1max	0.4 x D1	1.0 x D1	390	450	520	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
	4	ap1max	0.4 x D1	0.75 x D1	300	400	490	IPT	.0007	.0010	.0014	.0017	.0020	.0023	.0026	.0030	.0034	.0039
	5	ap1max	0.4 x D1	1.0 x D1	200	260	330	IPT	.0006	.0009	.0012	.0017	.0018	.0021	.0023	.0027	.0031	.0036
M	6	ap1max	0.4 x D1	0.75 x D1	160	200	250	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028
	1	ap1max	0.4 x D1	1.0 x D1	300	340	380	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
	2	ap1max	0.4 x D1	1.0 x D1	200	230	260	IPT	.0006	.0009	.0012	.0016	.0018	.0021	.0023	.0027	.0031	.0036
K	3	ap1max	0.4 x D1	1.0 x D1	200	210	230	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028
	1	ap1max	0.4 x D1	1.0 x D1	390	440	490	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049
	2	ap1max	0.4 x D1	1.0 x D1	360	410	460	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
S	3	ap1max	0.4 x D1	1.0 x D1	360	390	430	IPT	.0006	.0009	.0012	.0016	.0018	.0021	.0023	.0027	.0031	.0036
	1	ap1max	0.4 x D1	0.3 x D1	160	230	300	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045
	2	ap1max	0.4 x D1	0.3 x D1	80	105	130	IPT	.0004	.0006	.0008	.0010	.0012	.0014	.0015	.0018	.0021	.0024
	3	ap1max	0.4 x D1	1.0 x D1	80	105	130	IPT	.0004	.0006	.0008	.0010	.0012	.0014	.0015	.0018	.0021	.0024
H	4	ap1max	0.4 x D1	1.0 x D1	160	180	200	IPT	.0005	.0008	.0011	.0014	.0017	.0019	.0021	.0025	.0028	.0033
	1	ap1max	0.4 x D1	0.75 x D1	260	360	460	IPT	.0007	.0010	.0014	.0017	.0020	.0023	.0026	.0030	.0034	.0039
	2	ap1max	0.4 x D1	0.5 x D1	230	310	390	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028




Application Data • WCE4 Side Milling • Long • Inch

Material Group																		
			Side Milling		WU20PE		Recommended feed per tooth (fz = IPT) for side milling. No slotting operations recommended.											
					Cutting Speed – Vc (SFM)		D1 – Diameter											
			ap	ae	min	Start	max	frac-tion	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1
P	0	ap1max	0.2 x D1	490	580	660	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049	
	1	ap1max	0.2 x D1	490	580	660	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049	
	2	ap1max	0.2 x D1	460	540	620	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049	
	3	ap1max	0.2 x D1	390	450	520	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045	
	4	ap1max	0.2 x D1	300	400	490	IPT	.0007	.0010	.0014	.0017	.0020	.0023	.0026	.0030	.0034	.0039	
	5	ap1max	0.2 x D1	200	260	330	IPT	.0006	.0009	.0012	.0017	.0018	.0021	.0023	.0027	.0031	.0036	
M	6	ap1max	0.15 x D1	160	200	250	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028	
	1	ap1max	0.2 x D1	300	340	380	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045	
	2	ap1max	0.2 x D1	200	230	260	IPT	.0006	.0009	.0012	.0016	.0018	.0021	.0023	.0027	.0031	.0036	
K	3	ap1max	0.2 x D1	200	210	230	IPT	.0005	.00008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028	
	1	ap1max	0.2 x D1	390	440	490	IPT	.0009	.0013	.0018	.0023	.0027	.0031	.0034	.0039	.0044	.0049	
	2	ap1max	0.2 x D1	360	410	460	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045	
S	3	ap1max	0.2 x D1	360	390	430	IPT	.0006	.0009	.0012	.0016	.0018	.0021	.0023	.0027	.0031	.0036	
	1	ap1max	0.1 x D1	160	230	300	IPT	.0007	.0011	.0015	.0020	.0023	.0026	.0029	.0034	.0039	.0045	
	2	ap1max	0.1 x D1	80	105	130	IPT	.0004	.0006	.0008	.0010	.0012	.0014	.0015	.0018	.0021	.0024	
	3	ap1max	0.15 x D1	80	105	130	IPT	.0004	.0006	.0008	.0010	.0012	.0014	.0015	.0018	.0021	.0024	
H	4	ap1max	0.15 x D1	160	180	200	IPT	.0005	.0008	.0011	.0014	.0017	.0019	.0021	.0025	.0028	.0033	
	1	ap1max	0.15 x D1	260	360	460	IPT	.0007	.0010	.0014	.0017	.0020	.0023	.0026	.0030	.0034	.0039	
	2	ap1max	0.15 x D1	230	310	390	IPT	.0005	.0008	.0010	.0013	.0015	.0017	.0019	.0022	.0025	.0028	


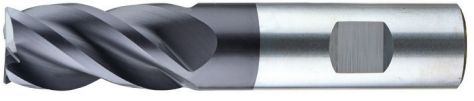
Application Data • WCE4 Side Milling • Slotting • Metric

Material Group	 																			
			Side Milling		Slotting		WU20PE		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
					Cutting Speed – Vc m/min		D1 – Diameter													
			ap	ae	ap	min	Start	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	ap1max	0,4 x D1	1,0 x D1	150	175	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	1	ap1max	0,4 x D1	1,0 x D1	150	175	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	ap1max	0,4 x D1	1,0 x D1	140	165	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	3	ap1max	0,4 x D1	1,0 x D1	120	140	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	4	ap1max	0,4 x D1	0,75 x D1	90	120	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	5	ap1max	0,4 x D1	1,0 x D1	60	80	100	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	6	ap1max	0,4 x D1	0,75 x D1	50	65	75	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
	1	ap1max	0,4 x D1	1,0 x D1	90	100	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	ap1max	0,4 x D1	1,0 x D1	60	70	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
K	3	ap1max	0,4 x D1	1,0 x D1	60	65	70	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
	1	ap1max	0,4 x D1	1,0 x D1	120	135	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	ap1max	0,4 x D1	1,0 x D1	110	125	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
S	3	ap1max	0,4 x D1	1,0 x D1	110	120	130	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	1	ap1max	0,4 x D1	0,3 x D1	50	70	90	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	ap1max	0,4 x D1	0,3 x D1	25	30	40	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	ap1max	0,4 x D1	1,0 x D1	25	30	40	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
H	4	ap1max	0,4 x D1	1,0 x D1	50	55	60	fz	0,011	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
	1	ap1max	0,4 x D1	0,75 x D1	80	110	140	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	2	ap1max	0,4 x D1	0,5 x D1	70	90	120	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071

Application Data • WCE4 Side Milling • Slotting BN • Metric

Material Group																							
	Side Milling		Slotting		WU20PE		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.																
					Cutting Speed – Vc m/min			D1 – Diameter															
	ap	ae	ap	min	Start	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0				
P	0	ap1max	0,4 x D1	1,0 x D1	150	175	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124			
	1	ap1max	0,4 x D1	1,0 x D1	150	175	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124			
	2	ap1max	0,4 x D1	1,0 x D1	140	165	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124			
	3	ap1max	0,4 x D1	1,0 x D1	120	140	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114			
	4	ap1max	0,4 x D1	0,75 x D1	90	120	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098			
	5	ap1max	0,4 x D1	1,0 x D1	60	80	100	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091			
M	6	ap1max	0,4 x D1	0,75 x D1	50	65	75	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071			
	1	ap1max	0,4 x D1	1,0 x D1	90	100	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114			
	2	ap1max	0,4 x D1	1,0 x D1	60	70	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091			
K	3	ap1max	0,4 x D1	1,0 x D1	60	65	70	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071			
	1	ap1max	0,4 x D1	1,0 x D1	120	135	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124			
	2	ap1max	0,4 x D1	1,0 x D1	110	125	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114			
S	3	ap1max	0,4 x D1	1,0 x D1	110	120	130	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091			
	1	ap1max	0,4 x D1	0,3 x D1	50	70	90	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114			
	2	ap1max	0,4 x D1	0,3 x D1	25	30	40	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061			
	3	ap1max	0,4 x D1	1,0 x D1	25	30	40	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061			
H	4	ap1max	0,4 x D1	1,0 x D1	50	55	60	fz	0,011	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084			
	1	ap1max	0,4 x D1	0,75 x D1	80	110	140	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098			
	2	ap1max	0,4 x D1	0,5 x D1	70	90	120	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071			

Application Data • WCE4 Side Milling • Long • Metric

Material Group																					
	Side Milling		WU20PE		Recommended feed per tooth (fz = mm/z) for side milling. No slotting operations recommended.																
			Cutting Speed – Vc m/min			D1 – Diameter															
	ap	ae	min	Start	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0			
P	0	ap1max	0,2 x D1	150	175	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124		
	1	ap1max	0,2 x D1	150	175	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124		
	2	ap1max	0,2 x D1	140	165	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124		
	3	ap1max	0,2 x D1	120	140	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114		
	4	ap1max	0,2 x D1	90	120	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098		
	5	ap1max	0,2 x D1	60	80	100	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091		
M	6	ap1max	0,15 x D1	50	65	75	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071		
	1	ap1max	0,2 x D1	90	100	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114		
	2	ap1max	0,2 x D1	60	70	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091		
K	3	ap1max	0,2 x D1	60	65	70	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071		
	1	ap1max	0,2 x D1	120	135	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124		
	2	ap1max	0,2 x D1	110	125	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114		
S	3	ap1max	0,2 x D1	110	120	130	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091		
	1	ap1max	0,1 x D1	50	70	90	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114		
	2	ap1max	0,1 x D1	25	30	40	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061		
	3	ap1max	0,15 x D1	25	30	40	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061		
H	4	ap1max	0,15 x D1	50	55	60	fz	0,011	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084		
	1	ap1max	0,15 x D1	80	110	140	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098		
	2	ap1max	0,15 x D1	70	90	120	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071		

## WCE • Adjustment Factor Table for Feed Calculation

To calculate application-specific cutting data, please use Kv coefficient table to the right for adaptation of cutting speed and KFz for feed, respectively.

$$Vc_{new} = Vc \cdot Kv$$

$$Fz_{new} = IPT \cdot KFz$$

Calculation example:

Application: D = 20mm; M2 material group;

Ae = 2mm

Cutting data recommendation: Vc = 80 m/min;

Fz = 0,089 mm/th

Adjustment coefficients: Ae = 2mm equals 10,0%;

Kv = 1,3; KFz = 1,64

Final cutting data recommendation:

Vc<sub>new</sub> = 80 \* 1,3 = 104 m/min

Fz<sub>new</sub> = 0,089 \* 1,64 = 0,146 mm/m

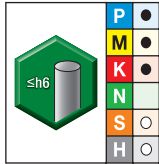
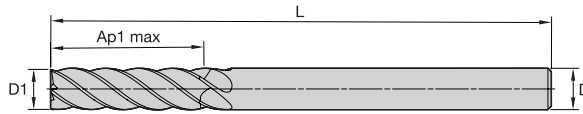
### Metric

	Ae/D	2%	4%	5%	8%	10%	12%	20%	30%	40%	50%	100%
Speed Factor	Kv	1,9–3,3	1,45–2,7	1,45–2,3	1,45	1,3	1,3	1,2	1,1	1,0	0,9	0,8
Feed Factor	KFz	3,51	2,51	2,25	1,80	1,64	1,51	1,23	1,07	1,00	0,98	0,98

### Inch

	Ae/D	2%	4%	5%	8%	10%	12%	20%	30%	40%	50%	100%
Speed Factor	Kv	1,9–3,3	1,45–2,7	1,45–2,3	1,45	1,3	1,3	1,2	1,1	1,0	0,9	0,8
Feed Factor	KFz	3,51	2,51	2,25	1,80	1,64	1,51	1,23	1,07	1,00	0,98	0,98

**WCE5 • Series W501 • Sharp Edge • 5 Flute • Straight Shank • Stub • Inch**

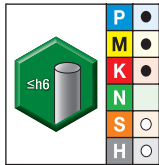
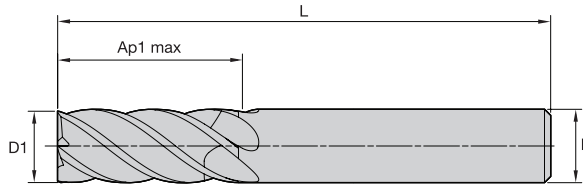


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
7008480	W501E05001SZT	3/16	3/16	5/8	2 1/4	5
7008481	W501E07003SZT	1/4	1/4	3/8	2	5
7008485	W501E08004SZT	5/16	5/16	3/4	2 1/2	5
7008486	W501E10005SZT	3/8	3/8	1/2	2 1/2	5

**WCE5 • Series W511 • Sharp Edge • 5 Flute • Straight Shank • Regular • Inch**

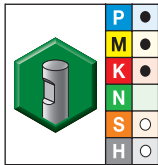
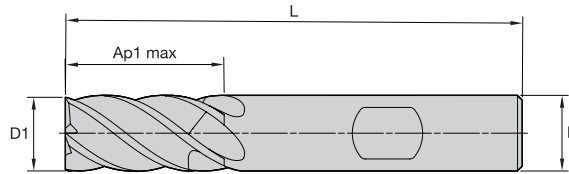


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
7008482	W511E07013SZT	1/4	1/4	3/4	2 1/2	5
7008487	W511E10015SZT	3/8	3/8	7/8	2 1/2	5

## WCE5 • Series W501 • Sharp Edge • 5 Flute • Weldon® Shank • Stub • Inch

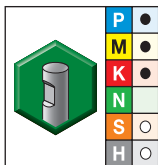
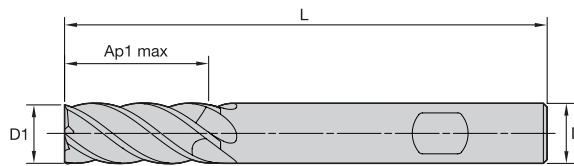


WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
7008709	W501E13006SZW	1/2	1/2	1	3	5
7008710	W501E16008SZW	5/8	5/8	1 1/4	3 1/2	5
7008711	W501E19009SZW	3/4	3/4	1 1/2	4	5
7008712	W501E2500ASZW	1	1	1 3/4	4 1/2	5

## WCE5 • Series W511 • Sharp Edge • 5 Flute • Weldon Shank • Regular • Inch

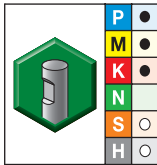
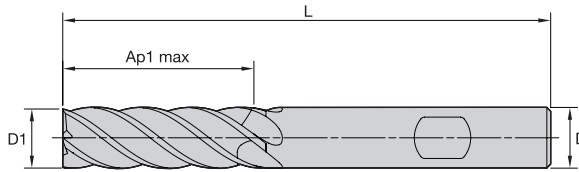


WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
7008713	W511E13016SZW	1/2	1/2	1 1/4	4	5

WCE5 • Series W521 • Sharp Edge • 5 Flute • Weldon® Shank • Long • Inch

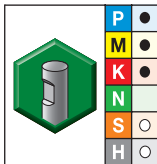
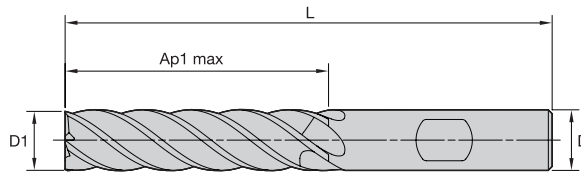


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
7008714	W521E13026SZW	1/2	1/2	1 5/8	4	5

WCE5 • Series W531 • Sharp Edge • 5 Flute • Weldon Shank • Extra Long • Inch

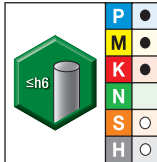
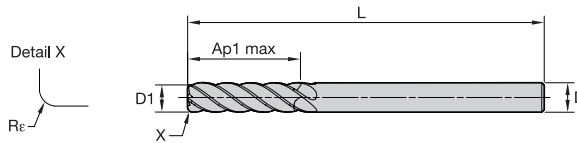


WU20PE

- first choice
- alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
7008715	W531E13026SZW	1/2	1/2	2 1/8	4	5

## WCE5 • Series W501 • Radiused • 5 Flute • Straight Shank • Stub • Inch

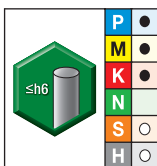
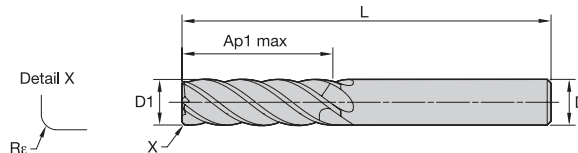


WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
7008488	W501E05001RAT	3/16	3/16	5/8	2 1/4	.015	5
7008489	W501E05001RET	3/16	3/16	5/8	2 1/4	.030	5
7008490	W501E07003RAT	1/4	1/4	3/4	2 1/2	.015	5
7008491	W501E07003RET	1/4	1/4	3/4	2 1/2	.030	5
7008492	W501E07003RGT	1/4	1/4	3/4	2 1/2	.060	5
7008502	W501E08004RAT	5/16	5/16	3/4	2 1/2	.015	5
7008503	W501E08004RET	5/16	5/16	3/4	2 1/2	.030	5
7008504	W501E08004RGT	5/16	5/16	3/4	2 1/2	.060	5
7008505	W501E10005RAT	3/8	3/8	7/8	2 1/2	.015	5
7008506	W501E10005RET	3/8	3/8	7/8	2 1/2	.030	5
7008507	W501E10005RGT	3/8	3/8	7/8	2 1/2	.060	5

## WCE5 • Series W511 • Radiused • 5 Flute • Straight Shank • Regular • Inch



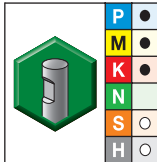
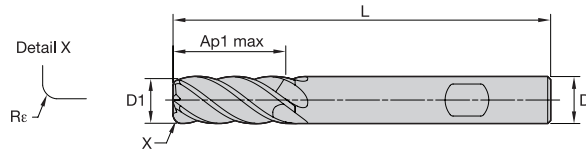
WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Re	Z U
7008508	W511E10015RAT	3/8	3/8	1 1/4	3	.015	5
7008509	W511E10015RET	3/8	3/8	1 1/4	3	.030	5
7008510	W511E10015RGT	3/8	3/8	1 1/4	3	.060	5



**WCE5 • Series W501 • Radiused • 5 Flute • Weldon® Shank • Stub • Inch**

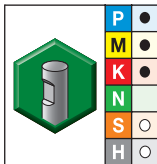
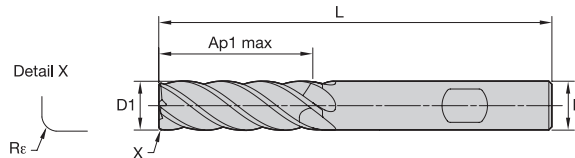


WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
7008309	W501E13006RAW	1/2	1/2	1 1/4	4	.015	5
7008310	W501E13006REW	1/2	1/2	1 1/4	4	.030	5
7008691	W501E13006RGW	1/2	1/2	1 1/4	4	.060	5
7008692	W501E13006RJW	1/2	1/2	1 1/4	4	.090	5
7008693	W501E16008REW	5/8	5/8	1 1/4	3 1/2	.030	5
7008694	W501E16008RGW	5/8	5/8	1 1/4	3 1/2	.060	5
7008695	W501E16008RJW	5/8	5/8	1 1/4	3 1/2	.090	5
7008696	W501E16008RKW	5/8	5/8	1 1/4	3 1/2	.120	5
7008697	W501E19009REW	3/4	3/4	1 1/2	4	.030	5
7008698	W501E19009RGW	3/4	3/4	1 1/2	4	.060	5
7008699	W501E19009RJW	3/4	3/4	1 1/2	4	.090	5
7008700	W501E19009RKW	3/4	3/4	1 1/2	4	.120	5
7008701	W501E2500AREW	1	1	1 3/4	4 1/2	.030	5
7008702	W501E2500ARGW	1	1	1 3/4	4 1/2	.060	5
7008703	W501E2500ARJW	1	1	1 3/4	4 1/2	.090	5
7008704	W501E2500ARKW	1	1	1 3/4	4 1/2	.120	5

**WCE5 • Series W511 • Radiused • 5 Flute • Weldon Shank • Regular • Inch**

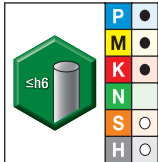
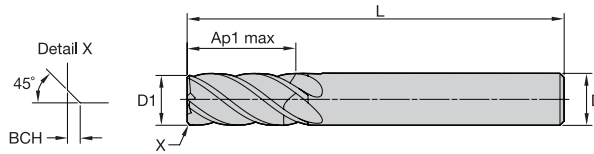


WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
7008705	W511E13016RAW	1/2	1/2	1 5/8	4	.015	5
7008706	W511E13016REW	1/2	1/2	1 5/8	4	.030	5
7008707	W511E13016RGW	1/2	1/2	1 5/8	4	.060	5
7008708	W511E13016RJW	1/2	1/2	1 5/8	4	.090	5

## WCE5 • Series W501 • Chamfered • 5 Flute • Straight Shank • Metric

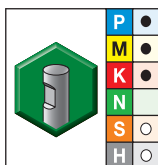
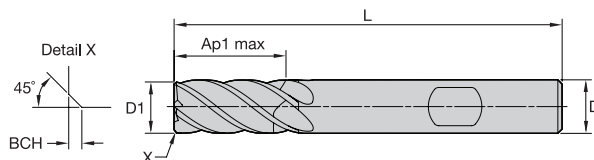


WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
7006956	W501M04003CAT	4,0	6	11,00	57	0,20	5
7006957	W501M05003CAT	5,0	6	13,00	57	0,30	5
7006958	W501M06003CAT	6,0	6	13,00	57	0,40	5
7007602	W501M08004CAT	8,0	8	19,00	63	0,40	5
7007603	W501M10005CET	10,0	10	22,00	72	0,50	5
7008716	W501M12006CET	12,0	12	26,00	83	0,50	5
7008717	W501M16008CET	16,0	16	32,00	92	0,50	5
7008718	W501M20009CET	20,0	20	38,00	104	0,50	5

## WCE5 • Series W501 • Chamfered • 5 Flute • Weldon® Shank • Metric

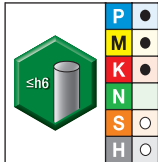
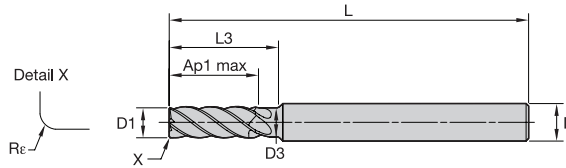


WU20PE

● first choice  
○ alternate choice

order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH	Z U
7006959	W501M04003CAW	4,0	6	11,00	57	0,20	5
7006960	W501M05003CAW	5,0	6	13,00	57	0,30	5
7007081	W501M06003CAW	6,0	6	13,00	57	0,40	5
7007604	W501M08004CAW	8,0	8	19,00	63	0,40	5
7007605	W501M10005CEW	10,0	10	22,00	72	0,50	5
7008719	W501M12006CEW	12,0	12	26,00	83	0,50	5
7008720	W501M16008CEW	16,0	16	32,00	92	0,50	5
7008731	W501M20009CEW	20,0	20	38,00	104	0,50	5

WCE5 • Series W5N1 • Radiused • 5 Flute • Necked • Straight Shank • Metric



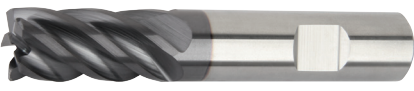


WU20PE

● first choice  
○ alternate choice



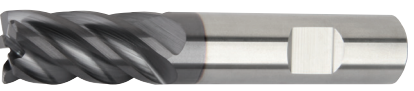
order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Re	Z U
7007606	W5N1M04003RAT	4,0	6	3,76	11,00	57	15,00	0,20	5
7007607	W5N1M04003RET	4,0	6	3,76	11,00	57	15,00	0,50	5
7007608	W5N1M05003RAT	5,0	6	4,70	13,00	57	17,00	0,20	5
7007609	W5N1M05003RET	5,0	6	4,70	13,00	57	17,00	0,50	5
7007610	W5N1M05003RJT	5,0	6	4,70	13,00	57	17,00	1,00	5
7007611	W5N1M06003RET	6,0	6	5,64	13,00	57	21,00	0,50	5
7007613	W5N1M06003RHT	6,0	6	5,64	13,00	57	21,00	1,50	5
7007612	W5N1M06003RJT	6,0	6	5,64	13,00	57	21,00	1,00	5
7007614	W5N1M08004RET	8,0	8	7,52	19,00	63	27,00	0,50	5
7007616	W5N1M08004RHT	8,0	8	7,52	19,00	63	27,00	1,50	5
7007615	W5N1M08004RJT	8,0	8	7,52	19,00	63	27,00	1,00	5
7007617	W5N1M08004RKT	8,0	8	7,52	19,00	63	27,00	2,00	5
7007618	W5N1M10005RET	10,0	10	9,40	22,00	72	32,00	0,50	5
7007620	W5N1M10005RHT	10,0	10	9,40	22,00	72	32,00	1,50	5
7007619	W5N1M10005RJT	10,0	10	9,40	22,00	72	32,00	1,00	5
7007621	W5N1M10005RKT	10,0	10	9,40	22,00	72	32,00	2,00	5
7008732	W5N1M12006RET	12,0	12	11,28	26,00	83	38,00	0,50	5
7008734	W5N1M12006RHT	12,0	12	11,28	26,00	83	38,00	1,50	5
7008733	W5N1M12006RJT	12,0	12	11,28	26,00	83	38,00	1,00	5
7008735	W5N1M12006RKT	12,0	12	11,28	26,00	83	38,00	2,00	5
7008736	W5N1M12006RQT	12,0	12	11,28	26,00	83	38,00	4,00	5
7008737	W5N1M16008RJT	16,0	16	15,04	32,00	92	44,00	1,00	5
7008738	W5N1M16008RKT	16,0	16	15,04	32,00	92	44,00	2,00	5
7008739	W5N1M16008RPT	16,0	16	15,04	32,00	92	44,00	3,00	5
7008740	W5N1M16008RQT	16,0	16	15,04	32,00	92	44,00	4,00	5
7008741	W5N1M20009RJT	20,0	20	18,80	38,00	104	55,00	1,00	5
7008742	W5N1M20009RKT	20,0	20	18,80	38,00	104	55,00	2,00	5
7008743	W5N1M20009RPT	20,0	20	18,80	38,00	104	55,00	3,00	5
7008744	W5N1M20009RQT	20,0	20	18,80	38,00	104	55,00	4,00	5

## Application Data • WCE5 Side Milling • Slotting • Inch

Material Group																				
	Side Milling		Slotting		WU20PE			Recommended feed per tooth (IPT = inch/th) for side milling (A). For slotting (B), reduce IPT by 20%.												
					Cutting Speed – Vc m/min			D1 – Diameter												
	ap	ae	ap	min	Start	max	frac. dec.	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	1 1/4			
P	0	ap1max	0.4 x D	0.3 x D	490	–	660	IPT	0.0013	0.0018	0.0023	0.0027	0.0031	0.0034	0.0039	0.0044	0.0049	0.0049		
	1	ap1max	0.4 x D	0.3 x D	490	–	660	IPT	0.0013	0.0018	0.0023	0.0027	0.0031	0.0034	0.0039	0.0044	0.0049	0.0049		
	2	ap1max	0.4 x D	0.3 x D	460	–	620	IPT	0.0013	0.0018	0.0023	0.0027	0.0031	0.0034	0.0039	0.0044	0.0049	0.0049		
	3	ap1max	0.4 x D	0.3 x D	390	–	520	IPT	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0039	0.0045	0.0048		
	4	ap1max	0.4 x D	0.3 x D	300	–	490	IPT	0.0010	0.0014	0.0017	0.0020	0.0023	0.0026	0.0030	0.0034	0.0039	0.0040		
	5	ap1max	0.4 x D	0.3 x D	200	–	330	IPT	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0031	0.0036	0.0039		
M	1	ap1max	0.4 x D	0.3 x D	300	–	380	IPT	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0039	0.0045	0.0048		
	2	ap1max	0.4 x D	0.3 x D	200	–	260	IPT	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0031	0.0036	0.0039		
	3	ap1max	0.4 x D	0.3 x D	200	–	230	IPT	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0025	0.0028	0.0029		
K	1	ap1max	0.4 x D	0.3 x D	390	–	490	IPT	0.0013	0.0018	0.0023	0.0027	0.0031	0.0034	0.0039	0.0044	0.0049	0.0049		
	2	ap1max	0.4 x D	0.3 x D	360	–	460	IPT	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0039	0.0045	0.0048		
S	1	ap1max	0.3 x D	0.2 x D	160	–	300	IPT	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0039	0.0045	0.0048		
	2	ap1max	0.3 x D	0.2 x D	80	–	130	IPT	0.0006	0.0008	0.0010	0.0012	0.0014	0.0015	0.0018	0.0021	0.0024	0.0026		
	3	ap1max	0.4 x D	0.3 x D	200	–	260	IPT	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0031	0.0036	0.0039		
	4	ap1max	0.4 x D	0.3 x D	160	–	200	IPT	0.0008	0.0011	0.0014	0.0017	0.0019	0.0021	0.0025	0.0028	0.0033	0.0036		
H	1	ap1max	0.4 x D	0.3 x D	260	–	460	IPT	0.0010	0.0014	0.0017	0.0020	0.0023	0.0026	0.0030	0.0034	0.0039	0.0040		
	2	ap1max	0.2 x D	0.3 x D	230	–	390	IPT	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0025	0.0028	0.0029		

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.  
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.  
Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on diameters greater than 1/2".  
For better surface finish reduce feed per tooth.  
Side milling applications - for longest reach (L3) tools, reduce Ae by 30%.  
Slot milling applications - for longest reach (L3) tools, reduce Ae by 30%.

## Application Data • WCE5 Side Milling • Slotting • Metric

Material Group																				
	Side Milling		Slotting		WU20PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
					Cutting Speed – Vc m/min			D1 – Diameter												
	ap	ae	ap	min	Start	max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0		
P	0	ap1max	0,4 x D	0,3 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124	
	1	ap1max	0,4 x D	0,3 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124	
	2	ap1max	0,4 x D	0,3 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124	
	3	ap1max	0,4 x D	0,3 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114	
	4	ap1max	0,4 x D	0,3 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098	
	5	ap1max	0,4 x D	0,3 x D	60	–	100	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091	
M	1	ap1max	0,4 x D	0,3 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114	
	2	ap1max	0,4 x D	0,3 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091	
	3	ap1max	0,4 x D	0,3 x D	60	–	70	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071	
K	1	ap1max	0,4 x D	0,3 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124	
	2	ap1max	0,4 x D	0,3 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114	
S	1	ap1max	0,4 x D	0,3 x D	110	–	130	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091	
	2	ap1max	0,3 x D	0,2 x D	50	–	90	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114	
	3	ap1max	0,3 x D	0,2 x D	25	–	40	fz	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061	
	4	ap1max	0,4 x D	0,3 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091	
H	1	ap1max	0,4 x D	0,3 x D	80	–	140	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098	
	2	ap1max	0,2 x D	0,3 x D	70	–	120	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.  
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.  
Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on diameters greater than 12mm.  
For better surface finish reduce feed per tooth.  
Side milling applications - for longest reach (L3) tools, reduce Ae by 30%.  
Slot milling applications - for longest reach (L3) tools, reduce Ae by 30%.

**WCE • Adjustment Factor Table for Feed Calculation**

To calculate application-specific cutting data, please use Kv coefficient table to the right for adaptation of cutting speed and KFz for feed, respectively.

$Vc_{new} = Vc \cdot Kv$   
 $Fz_{new} = IPT \cdot KFz$

Calculation example:  
 Application: D = 20mm; M2 material group;  
 Ae = 2mm  
 Cutting data recommendation: Vc = 80 m/min;  
 Fz = 0,089 mm/turn  
 Adjustment coefficients: Ae = 2mm equals 10,0%;  
 Kv = 1,3; KFz = 1,64

Final cutting data recommendation:  
 $Vc_{new} = 80 \cdot 1,3 = 104 \text{ m/min}$   
 $Fz_{new} = 0,089 \cdot 1,64 = 0,146 \text{ mm/m}$

**Metric**

	Ae/D	2%	4%	5%	8%	10%	12%	20%	30%	40%	50%	100%
Speed Factor	Kv	1,9–3,3	1,45–2,7	1,45–2,3	1,45	1,3	1,3	1,2	1,1	1,0	0,9	0,8
Feed Factor	KFz	3,51	2,51	2,25	1,80	1,64	1,51	1,23	1,07	1,00	0,98	0,98

**Inch**

	Ae/D	2%	4%	5%	8%	10%	12%	20%	30%	40%	50%	100%
Speed Factor	Kv	1.9–3.3	1.45–2.7	1.45–2.3	1.45	1.3	1.3	1.2	1.1	1.0	0.9	0.8
Feed Factor	KFz	3.51	2.51	2.25	1.80	1.64	1.51	1.23	1.07	1.00	0.98	0.98







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