

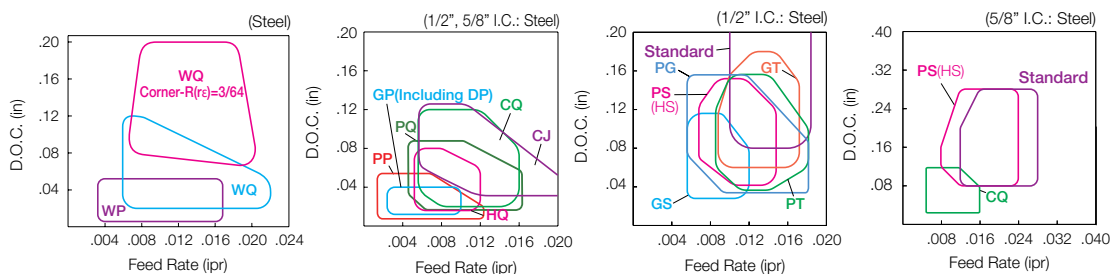
# CHIPBREAKER SELECTION (NEGATIVE INSERTS)

## Steel

### 1 Molded Chipbreaker

Finishing (With Wiper Edge)	WP		Wiper Insert. Double feed rate is available for finishing to light machining, while maintaining a smooth finish.	Finishing	GP		Finishing to light machining. Good chip control.	
	WQ		Wiper Insert. Double feed rate possible while maintaining a smooth finish. High efficiency and good chip control.		Finishing-Medium	HQ		Sharp cutting performance with 3-D rake angle and double projection design.
	PP		3-step dot structure realizes stable chip control at a wide range of feed rate. Less cutting force due to sharp cutting edge and smooth rake face.		Finishing-Medium (Up Facing)	CJ		Ensures chips will curl even in small depth, high feed rate machining. Improves chip evacuation when copying and up-facing.
	PQ		Stable chip control in a wide feed rate range by breaking chips effectively. The well-balanced edge sharpness and toughness.		Medium-Roughing	PG		Stable machining with a balance of edge sharpness and strength. Prevents chip clogging at high feed rates. Good chip control at low feed rates. Stable machining with wide chip control range.

### ● Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



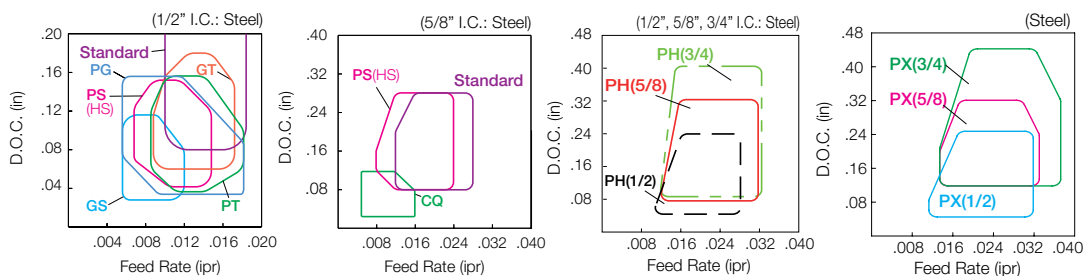
# CHIPBREAKER SELECTION (NEGATIVE INSERTS)

## Steel

### 1 Molded Chipbreaker

Medium-Roughing	GS		Strong edge chipbreaker. Stable for continuous machining and light interrupted machining.	Medium-Roughing (High Feed Rate)	GT		Strong edge chipbreaker. Wide land design and smooth chip control even at high feed rate machining.
Medium-Roughing	PS		General purpose chipbreaker. More stable due to large contact surface.	Roughing	Standard		Low cutting force and suitable for large D.O.C. roughing.
Medium-Roughing	HS		General purpose chipbreaker. Applicable for copying.	Roughing	PH		For roughing of steel. Suitable for heavy interrupted machining and for workpieces with scale due to strong cutting edge.
Medium-Roughing (High Feed Rate)	PT		Low cutting force during high feed machining. Land support structure.	Single Sided Roughing (High Feed Rate)	PX		Roughing and high feed rate operation. Low cutting force chipbreaker.

### ● Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



GRADES	A
INSERTS	B
CBN & POD	C
TOOLHOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
HSK TOOLING	N
SPARE PARTS	P
TECHNICAL	R
INDEX	T

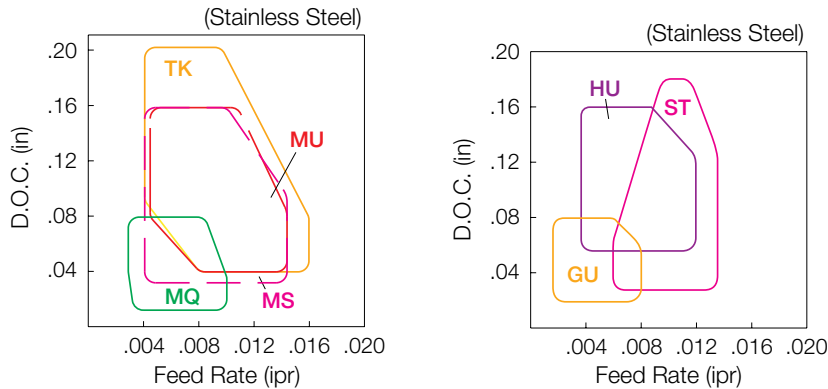
# CHIPBREAKER SELECTION (NEGATIVE INSERTS)

## Stainless Steel / Heat-Resistant Alloy / Titanium Alloy

Medium-Roughing	TK		Smooth chipbreaker geometry improves chip flow with less adhesion. Large curled chips.
	MU		Large rake angle reduces cutting force. Less burring achieved by diminishing damage from notching.
	MS		Superior cutting edge sharpness and strength achieved by a positive land. Extra strength of cutting edge inhibits damage from wall shouldering.
	MQ		Large rake angle and circular edge line. Low cutting force and good chip control.
Medium-Roughing	ST		Fewer cutting forces due to large rake angle. Less notching with special design.
	HU		Sharp cutting performance due to 3-D rake angle.
	GU		Sharp cutting performance and low cutting force due to 3-D rake angle.
	MQ		Large rake angle and circular edge line. Low cutting force and good chip control.

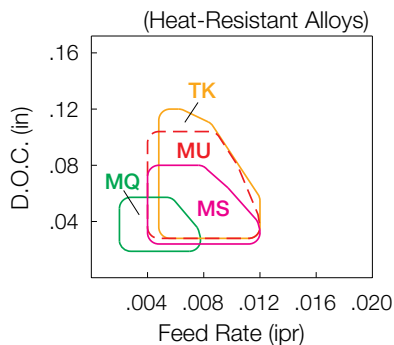
### Stainless Steel

Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



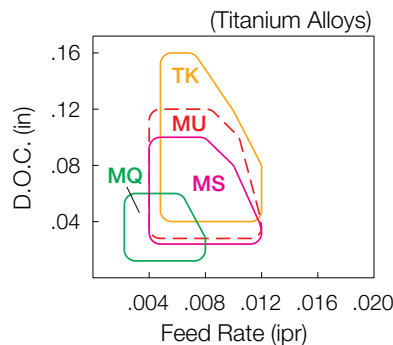
### Heat-Resistant Alloys (PR1535 / PR13-Series)

Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



### Titanium Alloys (SW Series)

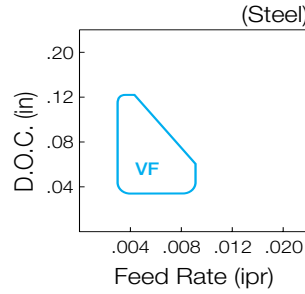
Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



## Steel (Copying / Undercutting , Varied D.O.C.)

Finishing-Medium	VF		Good chip control for varied ap such as copying and undercutting.

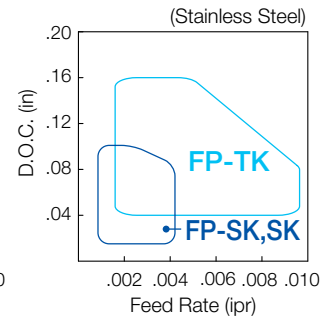
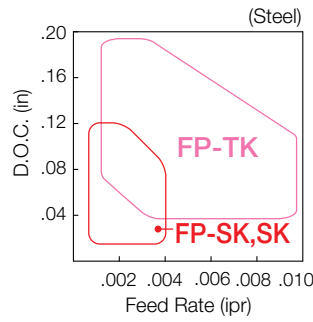
### Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



## Steel / Stainless Steel (for Small Parts Machining)

Finishing-Medium	SK		For finishing to medium machining in automatic lathes. Sharp cutting performance equivalent to positive inserts. 2-step dot design provides reliable chip control at various D.O.C..
Medium-Roughing	FP-TK		For medium to high feed rate in automatic lathes (When machining workpieces of medium to large dia.) Superior cutting performance achieved by sharp edge and polished surface. Smooth chipbreaker geometry improves chip flow with less adhesion. Large curled chips.

### Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)

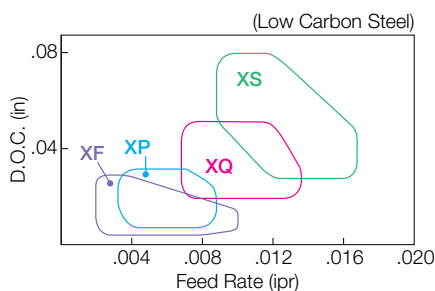


## Low Carbon Steel (Pipe / Rolled Plate / Rolled Steel)

Finishing	XF		Excellent chip control at high speed and small D.O.C. machining of low carbon steel.
Finishing	XP		Short chips when finishing due to sharp cutting and special design.

Medium	XQ		Consistent chip breaking at medium machining due to moderate rake face and special design.
Roughing	XS		Consistent chip breaking when roughing due to special rake angle design.

### Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



GRADES	A
INSERTS	B
CBN & PCD	C
TOOLHOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
HSK TOOLING	N
SPARE PARTS	P
TECHNICAL	R
INDEX	T

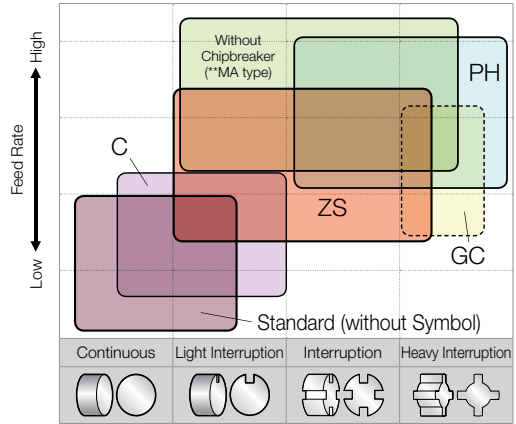
# CHIPBREAKER SELECTION (NEGATIVE INSERTS)

## Cast Iron

Sharp Cutting Oriented	Standard		Standard chipbreaker for continuous to light interrupted machining of cast iron. (Low cutting force)
	C		High feed rate chipbreaker for continuous to light interrupted machining of cast iron.
	ZS		Standard chipbreaker for light interrupted to interrupted machining of cast iron. (High stability)
	Without Chipbreaker		High feed rate chipbreaker for light interrupted machining of cast iron.

Stability Oriented	GC		Chipbreaker for heavy interrupted machining of cast iron. (Tough edge chipbreaker)
	PH		Chipbreaker for roughing of cast iron. Suitable for heavy interrupted machining and for workpieces with scale due to strong cutting edge.

### Chipbreaker Selection (Negative Inserts)

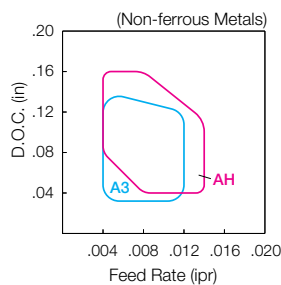


## Non-ferrous Metals

Finishing-Medium	A3		Large rake angle and smooth surface. Good chip control and less adhesion.
	AH		Polished chipbreaker. Smooth chip control and less adhesion.

Medium-Roughing	AH		Polished chipbreaker. Smooth chip control and less adhesion.
			G Class: Sharp Edge Prep. M Class: Horned Edge Prep.

### Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)


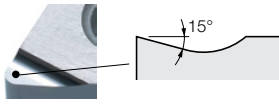

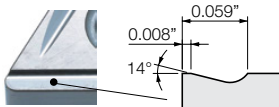

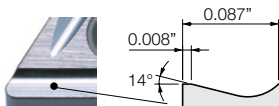



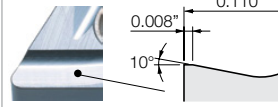

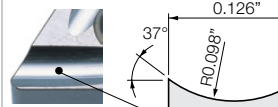
A3 Chipbreaker	
	D.O.C.= 0.08" f= 0.008 ipr
	D.O.C.= 0.08" f= 0.012 ipr

AH Chipbreaker	
	D.O.C.= 0.08" f= 0.008 ipr
	D.O.C.= 0.08" f= 0.012 ipr

## Steel

### 2 Ground Chipbreaker

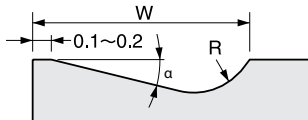
Finishing	S			Sharp edge and less cutting force. Good chip control and smooth chip evacuation.
	B			Suitable for general purpose machining at feed rate 0.006 to 0.010ipr.
	C			Suitable for general purpose machining at feed rate 0.008 to 0.014ipr.

Medium-Roughing / Low Cutting Force	D			Suitable for general purpose machining at feed rate 0.012 to 0.018ipr.
	25R			Applicable to sticky material such as low carbon steel. Large rake angle and suitable for stainless steel.

#### Effectiveness of ground chipbreaker

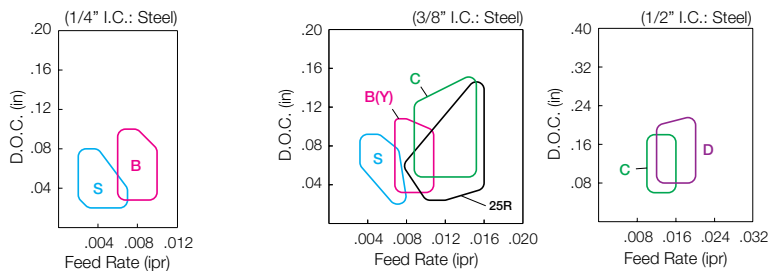
- (1) Lower cutting force and improve edge
- (2) Improved adhesion resistance
- (3) Improved dimension accuracy and finishing surface accuracy
- (4) Controlled chip evacuation direction

#### Specification of B, C, D and Parallel Ground Chipbreaker



Insert Type	I.C. Size	Chipbreaker Name	W (in)	$\alpha$	R (in)
CNGG	3/8, 1/2	Without Indication (Similar to C)	0.087	14°	0.040
WNGG	3/8	Without Indication (Similar to C)	0.087	14°	0.040
TNGG	1/4, 3/8	B	0.060	14°	0.020
	3/8, 1/2	C	0.087	14°	0.040
DNGG	3/8, 1/2	D	0.110	10°	0.060
	3/8, 1/2	Without Indication (Similar to C)	0.100	14°	0.080
VNGG	3/8	Without Indication (Similar to B)	0.060	14°	0.020
SNGG	3/8, 1/2	B	0.060	14°	0.020
	1/2	C	0.087	14°	0.040

#### Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



GRADES	A
INSERTS	B
CBN & POD	C
TOOLHOLDERS	D
SMALL TOOLS	E
BORING	F
GROOVING	G
CUT-OFF	H
THREADING	J
HSK TOOLING	N
SPARE PARTS	P
TECHNICAL	R
INDEX	T



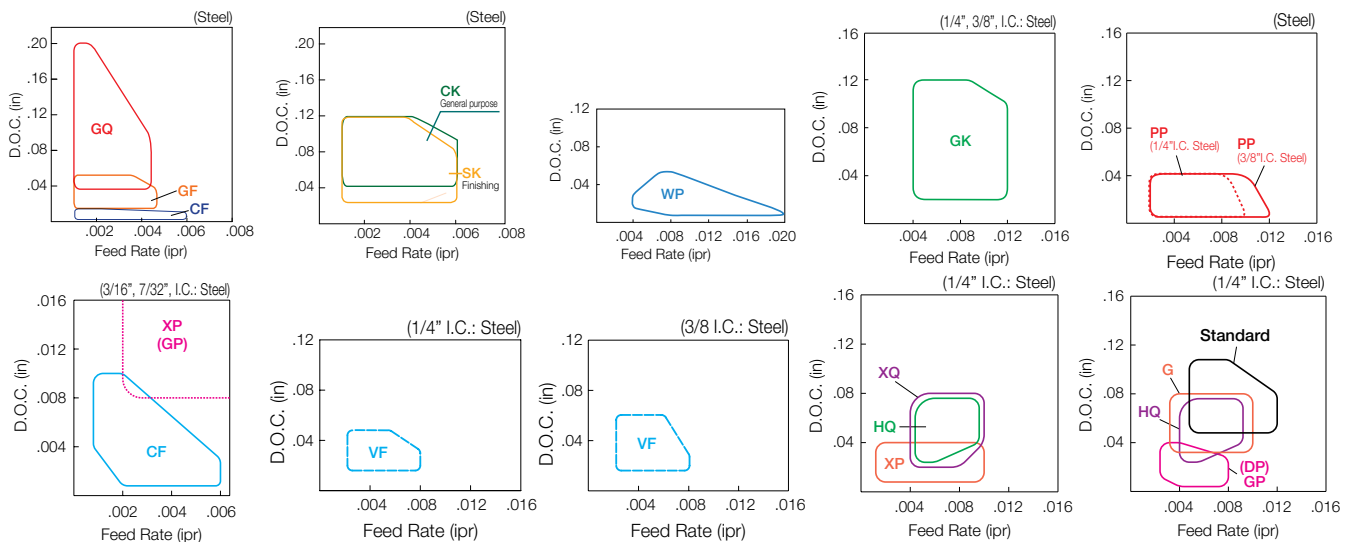
# CHIPBREAKER SELECTION (POSITIVE INSERTS)

## Steel

### 1 Molded Chipbreaker

Minute D.O.C.	CF		Available for minute D.O.C. (0.0008" - 0.008") finishing.	Finishing	PP		3-step Smart Dot structure is applicable to a wide range of feed rates in steel finishing. Smooth taper cutting edge reduces cutting forces.
Finishing	GF		Dot located close to ridge line of cutting edge on corner. Chips fragmented in small pieces in cutting of small D.O.C..	Finishing	DP		Consistent chip breaking performance for finishing.
Finishing-Medium	GQ		Enables cutting over a wide range of conditions by using the optimum chipbreaker width according to the cutting depth.	Finishing	GP		Good chip control at finishing. Applicable to sticky material like low carbon steel, pipe material.
Finishing	SK		Sharp cutting performance due to Large rake angle. Large dot to the corner edge improved chip control in a wide feed rate range.	Finishing	VF		Good chip control for varied ap such as copying and undercutting.
Finishing	CK		Good cutting performance. Applicable without hand for two direction cutting on automatic lathe.	Finishing-Medium	HQ		General purpose chipbreaker for medium machining.
Finishing	WP		Dual-dot structure with one dot offering stabilized chip control at low feed rates, while a second dot controls chips at higher feed rates.	Medium	G		Chipbreaker for short chips at medium machining.
Finishing-Medium	GK		Good chip evacuation at wide range by breaker dot and wide chip pocket.	Medium	Standard		Strong edge chipbreaker for medium machining range.

### ● Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



# CHIPBREAKER SELECTION (POSITIVE INSERTS)

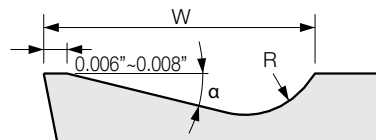
## Steel

### 2 Ground Chipbreaker

Finishing Low Feed	(Without Indication)		Good chip control during finishing to light machining with low cutting forces.
	F		Good chip control during finishing to light machining with low cutting forces.
	Y		Sharp cutting performance and good surface finish.
	J		Slant chipbreaker width and chip control at various D.O.C..
	U		Good chip control at low feed rate and varied D.O.C. with low cutting force. Suitable for automatic lathes.

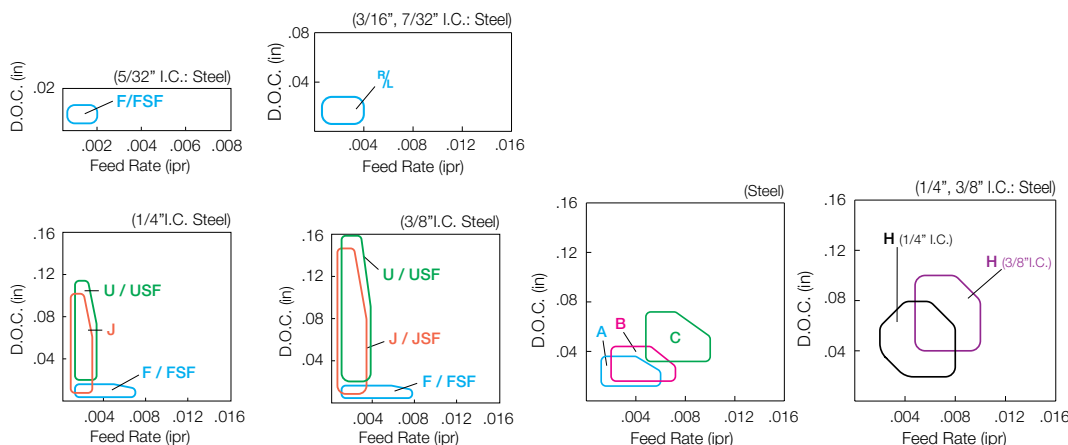
Finishing Medium Finishing-Medium	A		Large rake angle and low cutting force. Narrow chipbreaker width and consistent chip control.
	B		General purpose chipbreaker for medium machining. Good balance between chip control and sharp cutting.
	C		Applicable to high load machining. Good chip flow and less resistance.
	H		Sharp cutting performance and small curled chips.

### ● Specification of A, B, C and parallel ground chipbreaker



Insert Type	Size	Chipbreaker Name	W (in)	$\alpha$	R (in)
TPGR	1/4	A	0.040	17°	0.020
	1/4, 3/8	B	0.060	14°	0.020
	3/8	C	0.087	14°	0.040
SPGR	3/8	Without Indication (Similar to B)	0.060	14°	0.020
	1/2	Without Indication (Similar to C)	0.087	14°	0.040

### ● Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)





# CHIPBREAKER SELECTION (POSITIVE INSERTS)

## Low Carbon Steel (Pipe / Rolled Plate / Rolled Steel)

**Finishing**

**XP**

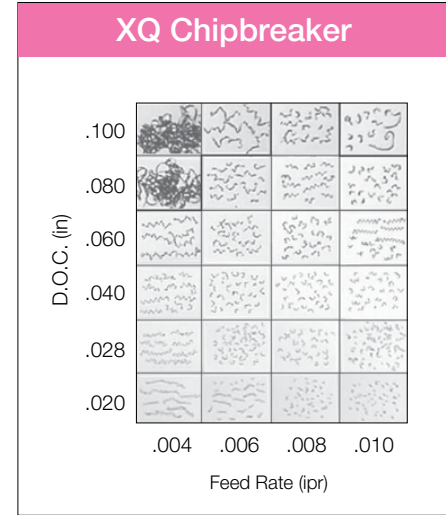
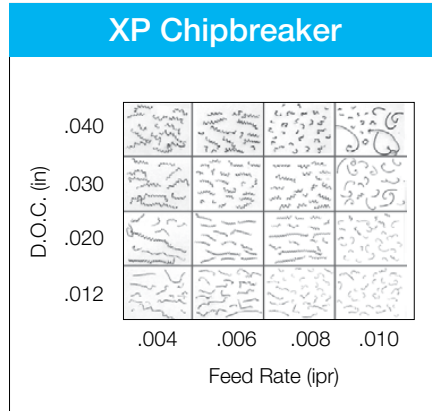
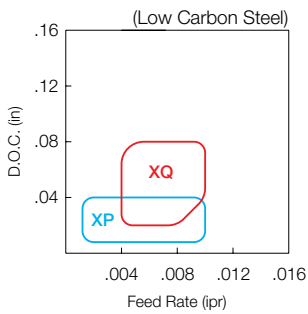
Wide chip control range and sharp cutting performance. Suitable for low carbon steel and sticky material.

**Finishing-Medium**

**XQ**

Wide chip control range and sharp cutting performance. Suitable for low carbon steel and sticky material.

### Applicable Chipbreaker Range (D.O.C. Indicates Radius)



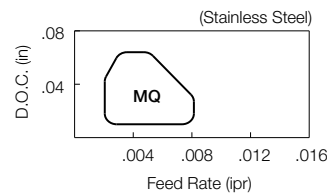
## Stainless Steel

**Finishing**

**MQ**

Good chip evacuation at internal turning. Small curled chips. Prevents chip entanglement with toolholder and stabilizes surface roughness.

### Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)



**Finishing-Medium**

**AH**

Positive chip groove and good chip control with low cutting forces. Polished surface reduces adhesion.

**A3**

Large rake angle, smooth chip flow and less adhesion. Sharp edge and good surface finish.

### Applicable Chipbreaker Range (D.O.C. Refers to Radial Depth of Cut)

