OPTIMUM GRADES AND CHIP BREAKERS FOR EXTERNAL TURNING

●Selection of optimum inserts for turning

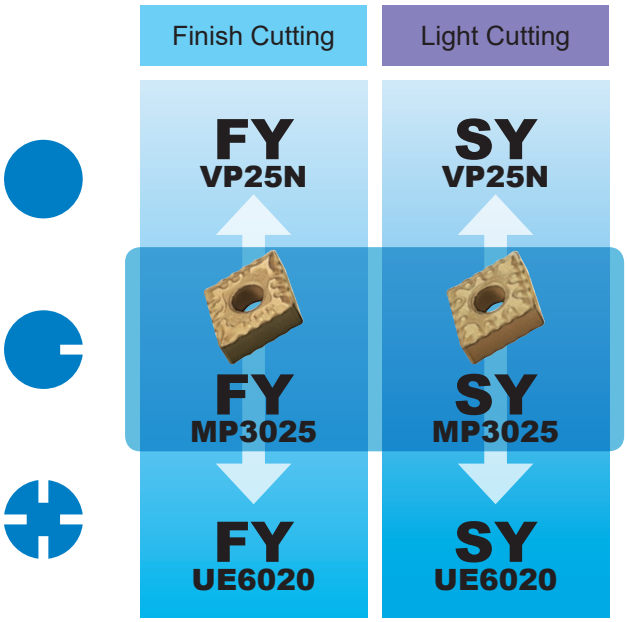
The following diagrams show the optimal combination of suitable grades and chip breakers for each application area in turning for each type of workpiece material.

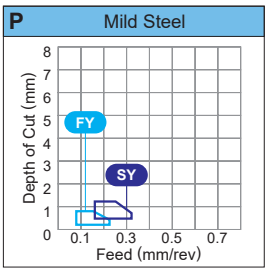
■CUTTING CONDITIONS

Stable Cutting	Continuous Cutting Constant Depth of Cut Pre-Machined Securely Clamped Component Cutting
General Cutting	
Unstable Cutting	Heavy Interrupted Cutting Irregular Depth of Cut Low Clamping Rigidity Cutting

■CUTTING AREA

- **F** Finish Cutting
- **L** Light Cutting
- **M** Medium Cutting
- **R** Rough Cutting
- **H** Heavy Cutting



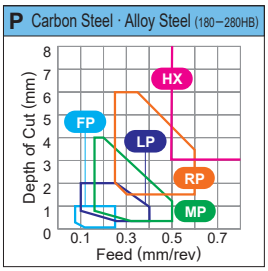


P Mild Steel (Ex : SS400, S10C)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	**FY**	**VP25N**	285—450	0.09—0.23	0.20—0.80
	L	**SY**	**VP25N**	260—410	0.16—0.33	0.50—1.20
General Cutting	F	**FY**	**MP3025**	275—425	0.09—0.23	0.20—0.80
	L	**SY**	**MP3025**	255—385	0.16—0.33	0.50—1.20
Unstable Cutting	F	**FY**	**UE6020**	285—465	0.09—0.23	0.20—0.80
	L	**SY**	**UE6020**	260—425	0.16—0.33	0.50—1.20



- Stable Cutting
- General Cutting
- Unstable Cutting

- F Finish Cutting
- L Light Cutting
- M Medium Cutting
- R Rough Cutting
- H Heavy Cutting

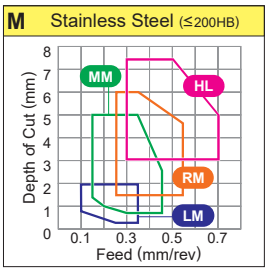
	Finish Cutting	Light Cutting	Medium Cutting	Rough Cutting	Heavy Cutting
Stable Cutting	FP NX2525	LP MC6115	MP MC6115	RP MC6115	HX MC6025
General Cutting	FP MP3025	LP MC6115	MP MC6125	RP MC6125	HX MC6025
Unstable Cutting	FP MC6025	LP MC6125	MP MC6125	RP MC6035	HX MC6035

P Carbon Steel • Alloy Steel (Ex : S45C, SCM440)

NEGATIVE INSERTS

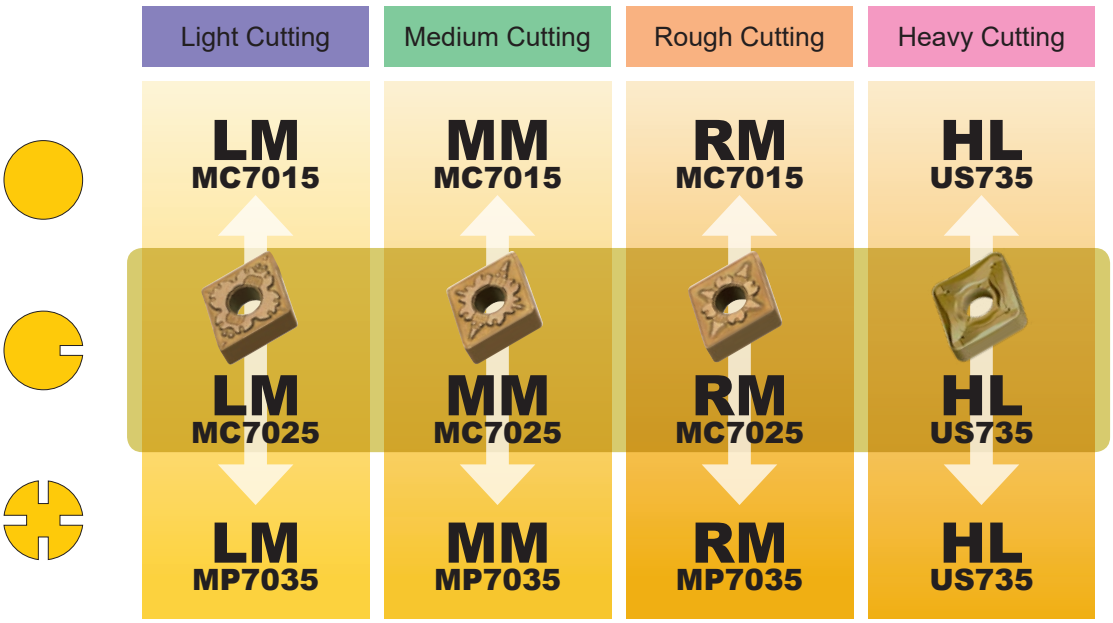
vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	1st Recommendation Grade	vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	FP	NX2525	210–300	0.08–0.25	0.10–1.00
	L	LP	MC6115	250–480	0.10–0.40	0.30–2.00
	M	MP	MC6115	230–440	0.16–0.50	0.30–4.00
	R	RP	MC6115	215–415	0.25–0.60	1.50–6.00
	H	HX	MC6025	165–265	0.50–1.26	3.00–11.00
General Cutting	F	FP	MP3025	215–330	0.08–0.25	0.10–1.00
	L	LP	MC6115	250–480	0.10–0.40	0.30–2.00
	M	MP	MC6125	250–390	0.16–0.50	0.30–4.00
	R	RP	MC6125	235–370	0.25–0.60	1.50–6.00
	H	HX	MC6025	165–265	0.50–1.26	3.00–11.00
Unstable Cutting	F	FP	MC6025	230–375	0.08–0.25	0.10–1.00
	L	LP	MC6125	275–425	0.10–0.40	0.30–2.00
	M	MP	MC6125	250–390	0.16–0.50	0.30–4.00
	R	RP	MC6035	160–225	0.25–0.60	1.50–6.00
	H	HX	MC6035	140–200	0.50–1.26	3.00–11.00



- Stable Cutting
- General Cutting
- Unstable Cutting

- L Light Cutting
- M Medium Cutting
- R Rough Cutting
- H Heavy Cutting

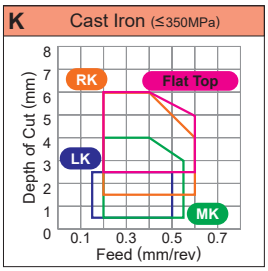


M Stainless Steel (Ex : SUS304, SUS316)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	L	LM	MC7015	180—285	0.10—0.35	0.30—2.00
	M	MM	MC7015	165—260	0.15—0.45	0.70—5.00
	R	RM	MC7015	155—245	0.25—0.55	1.50—6.00
	H	HL	US735	75—140	0.30—0.70	3.00—7.50
General Cutting	L	LM	MC7025	165—220	0.10—0.35	0.30—2.00
	M	MM	MC7025	150—200	0.15—0.45	0.70—5.00
	R	RM	MC7025	140—190	0.25—0.55	1.50—6.00
	H	HL	US735	75—140	0.30—0.70	3.00—7.50
Unstable Cutting	L	LM	MP7035	95—155	0.10—0.35	0.30—2.00
	M	MM	MP7035	90—145	0.15—0.45	0.70—5.00
	R	RM	MP7035	85—135	0.25—0.55	1.50—6.00
	H	HL	US735	75—140	0.30—0.70	3.00—7.50



- Stable Cutting
- General Cutting
- Unstable Cutting

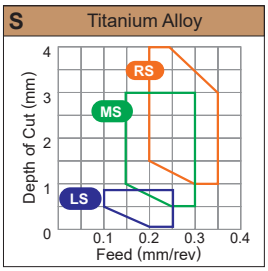
- L Light Cutting
- M Medium Cutting
- R Rough Cutting
- H Heavy Cutting

K Cast Iron • Ductile Cast Iron (Ex : FC300)

NEGATIVE INSERTS

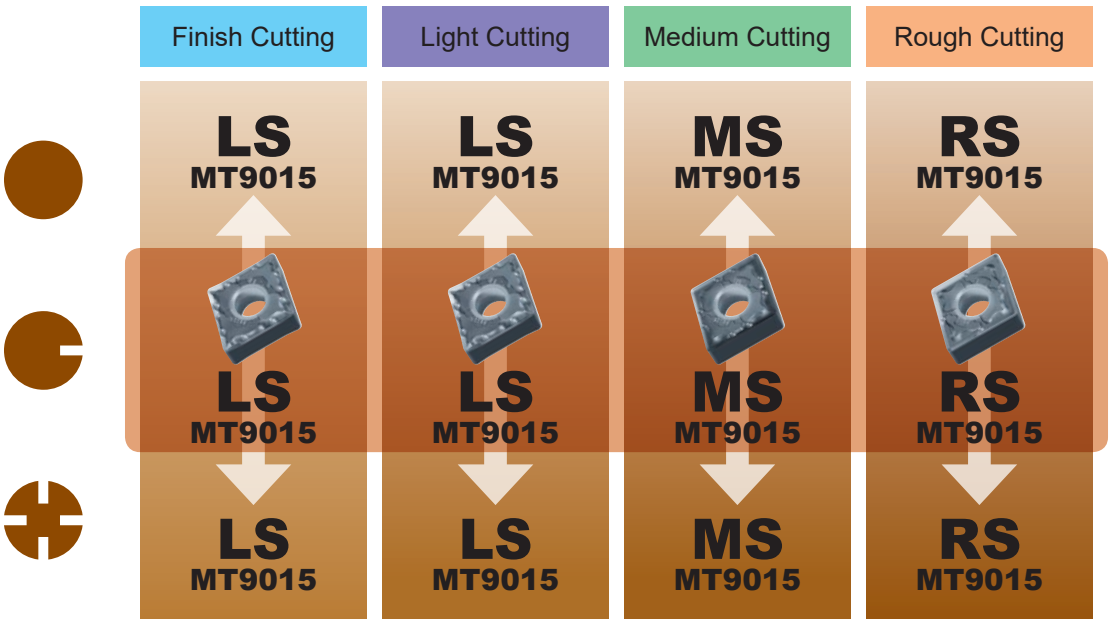
vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	L	LK	MC5005	230—365	0.10—0.50	0.50—2.50
	M	MK	MC5005	210—335	0.20—0.55	0.50—4.00
	R	RK	MC5005	195—315	0.20—0.60	1.50—6.00
	H	Flat Top	MC5005	195—315	0.20—0.60	2.50—6.00
General Cutting	L	LK	MC5015	205—335	0.10—0.50	0.50—2.50
	M	MK	MC5015	190—305	0.20—0.55	0.50—4.00
	R	RK	MC5015	180—285	0.20—0.60	1.50—6.00
	H	Flat Top	MC5015	180—285	0.20—0.60	2.50—6.00
Unstable Cutting	L	LK	MC5015	205—335	0.10—0.50	0.50—2.50
	M	MK	MC5015	190—305	0.20—0.55	0.50—4.00
	R	RK	MC5015	180—285	0.20—0.60	1.50—6.00
	H	Flat Top	MC5015	180—285	0.20—0.60	2.50—6.00



Stable Cutting
General Cutting
Unstable Cutting

F Finish Cutting
L Light Cutting
M Medium Cutting
R Rough Cutting

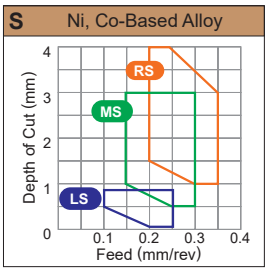


S Titanium Alloy (Ex : Ti-6Al-4V)

NEGATIVE INSERTS

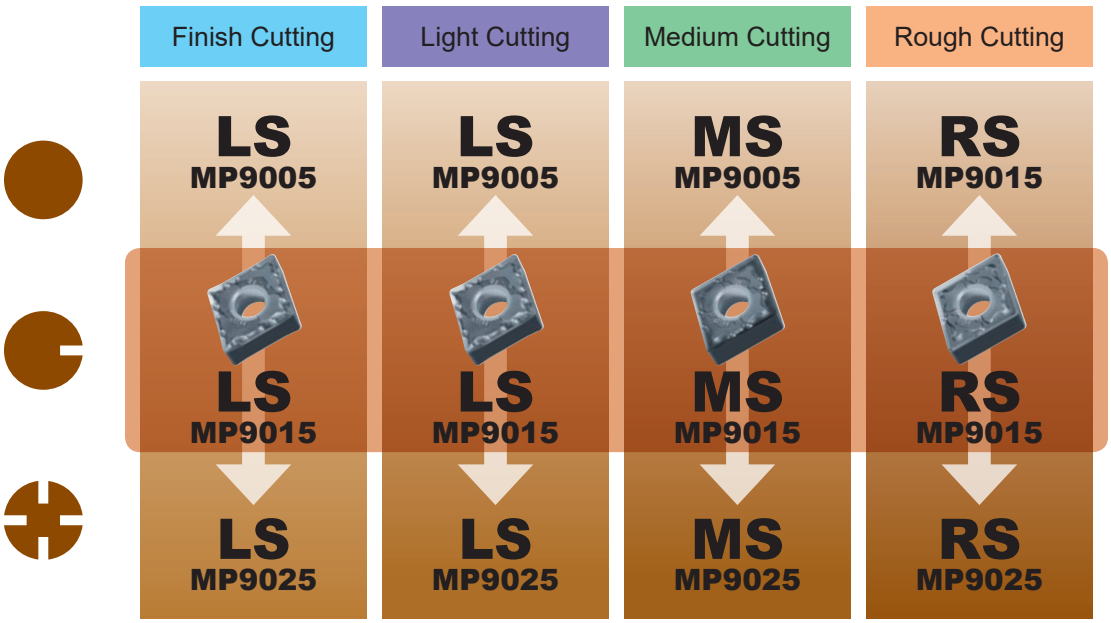
vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	L	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MT9015	40—80	0.15—0.30	0.50—3.00
	R	RS	MT9015	35—75	0.20—0.35	1.00—4.00
General Cutting	F	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	L	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MT9015	40—80	0.15—0.30	0.50—3.00
	R	RS	MT9015	35—75	0.20—0.35	1.00—4.00
Unstable Cutting	F	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	L	LS	MT9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MT9015	40—80	0.15—0.30	0.50—3.00
	R	RS	MT9015	35—75	0.20—0.35	1.00—4.00



- Stable Cutting
- General Cutting
- Unstable Cutting

- F Finish Cutting
- L Light Cutting
- M Medium Cutting
- R Rough Cutting



S Ni, Co-Based Alloy (Ex : Inconel718)

NEGATIVE INSERTS

vc : Cutting Speed
f : Feed
ap : Depth of Cut

	Cutting Area	Chip Breaker	Grade	1st Recommendation vc (m/min)	f (mm/rev)	ap (mm)
Stable Cutting	F	LS	MP9005	55—110	0.10—0.25	0.20—0.80
	L	LS	MP9005	30—110	0.10—0.25	0.20—0.80
	M	MS	MP9005	50—100	0.10—0.25	0.50—4.00
	R	RS	MP9015	35—75	0.20—0.35	1.00—4.00
General Cutting	F	LS	MP9015	40—85	0.10—0.25	0.20—0.80
	L	LS	MP9015	40—85	0.10—0.25	0.20—0.80
	M	MS	MP9015	40—80	0.15—0.30	0.50—3.00
	R	RS	MP9015	35—75	0.20—0.35	1.00—4.00
Unstable Cutting	F	LS	MP9025	30—45	0.10—0.25	0.20—0.80
	L	LS	MP9025	30—45	0.10—0.25	0.20—0.80
	M	MS	MP9025	30—45	0.15—0.30	0.50—3.00
	R	RS	MP9025	25—40	0.20—0.35	1.00—4.00