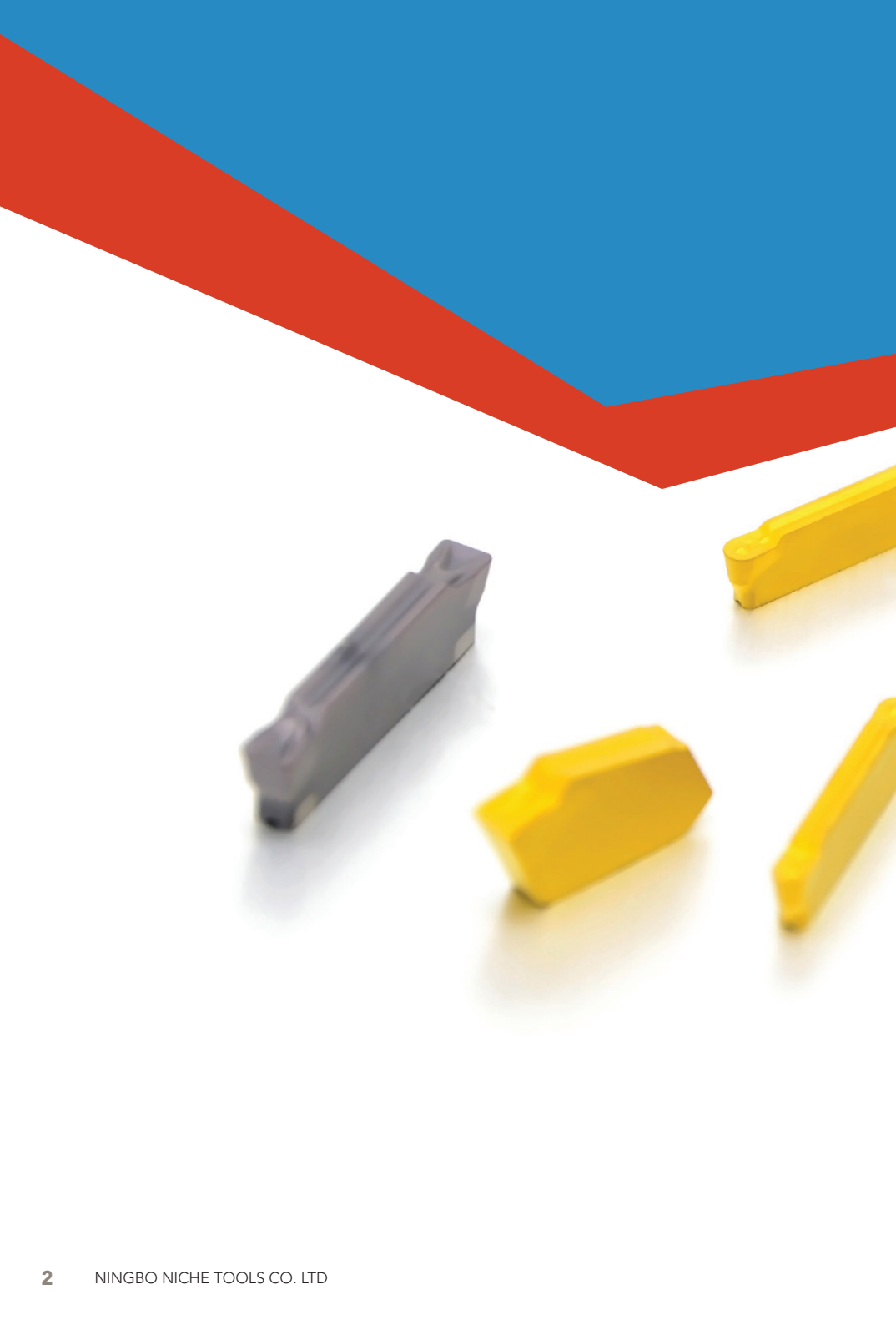
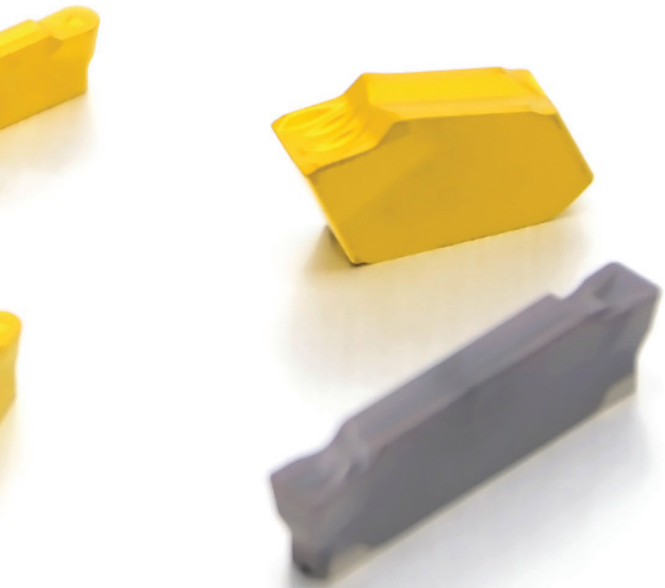
NICHE

FOR A BETTER US

GROOVING INSERTS

www.niche-tool.com

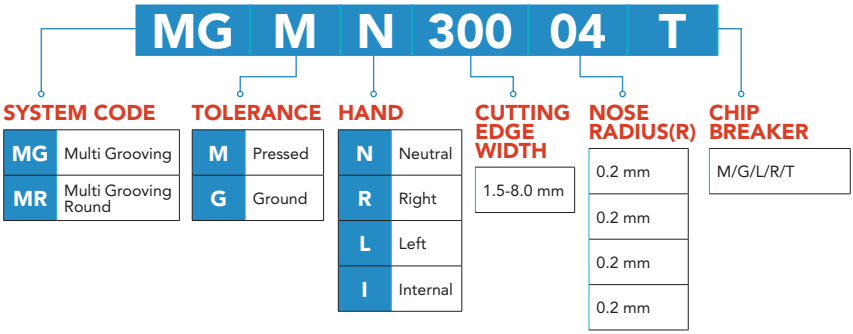




CONTENTS

CODE KEY 4
CHIPBREAKER GEOMETRY 5
COATINGS 6
GROOVING INSERTS 8
INSERT SELECTION 11
TECHNICAL INFORMATION 12

CODE KEY



HOW TO CHOOSE A GROOVING INSERT

THE GROOVE/SURFACE	THE COMPONENT	THE MACHINE
Consider the following quality demands of the groove or surface to be machined: • Type of application (e.g. parting off or internal grooving) • Cutting depth • Cutting width • Corner radius • Quality demand (tolerance, surface finish etc.). Do we need a Wiper design insert to reach acceptable surface finish? A Wiper insert will offer better surface finish at maintained cutting data	**After considering the quality demands, look at the component:** • Cutting depth • Cutting width • Corner radius • Quality demand (tolerance, surface finish etc.). Do we need a Wiper design insert to reach acceptable surface finish? A Wiper insert will offer better surface finish at maintained cutting data	**Machine considerations include:** • Stability, power and torque, especially for larger components • Cutting fluid and coolant supply • Is high pressure coolant for chip-breaking in long chipping materials necessary? • Tool changing times/ number of tools in turret • Limitations in rpm, especially for bar feed magazine and small diameters • Sub-spindle, or tail stock available?

CHIP BREAKER GEOMETRY

MGM(G)N-M

- Specially designed chip breaker allows a smoother chip flow versus conventional flat-top geometries through the use of 2 central chip breaker
- Specially placed convex dots assists with chip control in external machining, for a smoother chip flow
- Chip breaker designed for turning & grooving applications

MGMN-L

- Sharp cutting edge
- Low cutting resistance
- For auto CNC machine
- For small Dia. processing

MGMN-G

- Specially designed chip breaker allows narrower chips to promote better chip flow
- Specifically designed for grooving applications

MGMN-R

- Strong cutting edge
- For high Feed rate processing

MRMN-M

- Full radius geometry for applications that require profiling
- Available for relief machining

MGMN-T

- For turning & grooving
- Reduced chip width & smooth chip control by dot designed on the top comer

NICHE CVD NC (CVD COATING)

GRADE	ISO	FEATURES
NC3215	**P10~P15**	• Continuous machining of general steel and forged steel at high speed • Substrate with excellent thermal crack/plastic deformation resistance, coating with improved chipping resistance for continuous machining • MT-TiCN + Al2O3 + TiN
NC3225	**P15~P25**	• Universal grade for general steel and forged steel • 1st Recommended grade for general machining with the use of high toughness substrate and coating layer with improved welding/chipping resistance • MT-TiCN + Al2O3 + TiN
NC3120	**P20~P25**	• Medium to roughing for steel • Combining excellent fracture resistance substrate with chipping resistance and heat resistance Al2O3 increased stability • MT-TiCN + TiC + Al2O3
NC3030	**P25~P35**	• Medium to low speed machining of steel and interrupted roughing • Harmony between substrate with excellent wear/fracture resistance and Al2O3 film with excellent thermal/chipping resistance • Increased stability in wide ranges of cutting conditions • MT-TiCN + TiC + Al2O3 + TiN
NC5330	**P30~P35** **M25~M35** **K15~K25** **S15~S25**	• Stainless Steel – General cutting for mild steel & forging steel • Excellent cutting performance in hard to cut materials which are vulnerable to built up edge, due to the high tough substrate with improved fracture resistance and the coated layers • MT-TiCN + Al2O3 + TiN
NC9125	**M20~M30**	• General cutting of stainless steel and heat resistant alloys • MT-TiCN + Al2O3 + TiN
NC6315	**K10~K15**	• Universal grade for ductile and gray cast Iron • Excellent performance thanks to the alumina (Al2O3) coating's improved grip on the tough substrat • MT-TiCN + Al2O3

WORKPIECE MATERIAL

P M K N S H

NICHE PVD NP (PVD COATING)

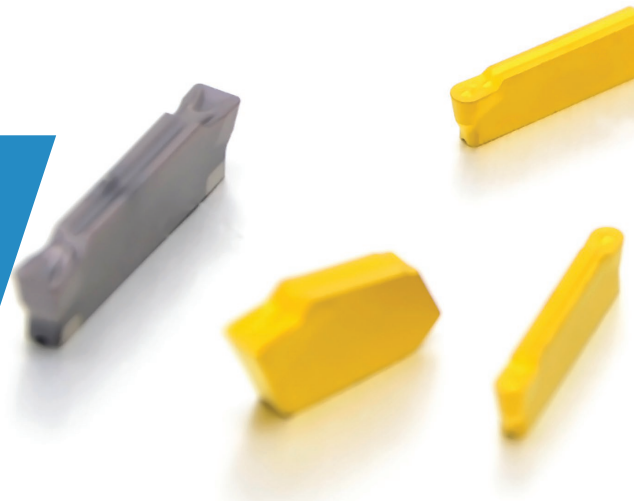
GRADE	ISO	FEATURES
NP8105	M05~M15 S01~S10 H01~H05	• For high speed and continuous finising of hard-to-cut materials • Excellent cutting performance with high wear resistance and oxidation resistance • Ultra fine substrate and the new TiAlN coating layer
NP8110	M10~M20 S05~S15 H01~H10	• For high speed and continuous medium cutting of hard-to-cut materials and STS • Excellent tool life with high wear/plastic deformation resistance at high temperature • New TiAlN coating layer and substrate with excellent thermal resistance
NP8115	M15~M25 S10~S20 H05~H15	• For medium to low speed and medium to rough cutting of hard-to-cut materials and STS • Excellent tool life with high wear resistance and chipping resistance • Ultra fine substrate and the new TiAlN coating layer
NP5300	P30~P40 M20~M30 K20~K25 S15~S25	• Universal grade for stainless,HRSA,steel and interrupted cast iron machining • High chipping and welding resistance for longer tool life • New TiAlN coating and ultra fine grain substrate adopted
NP9030	M25~M35	• Medium,roughing and heavy interrupted cutting for stainless steel • TiAlN coating and ultra fine grain substrate adopted • High chipping and welding resistance for stable machining
NP5400	P35~P45 M30~M40 K30~K35 S25~S35	• For medium cutting for hard-to-cut materials, stainless steel, steel, and cast iron at medium or low speed • Stable machinability with chipping resistance, fracture resistance and welding resistance • Ultra fine substrate with high toughness and new AlCiN layer

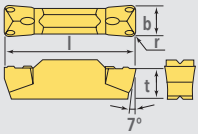
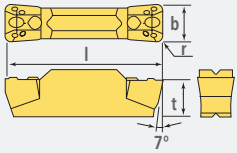
NICHE UNCOATED NU (NO COATING)

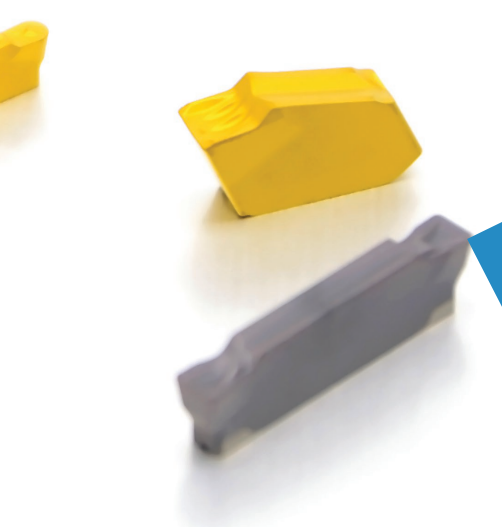
GRADE	ISO	FEATURES
NU810	N	For aluminium alloy

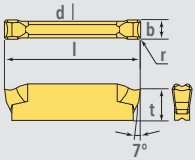
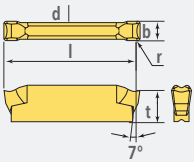
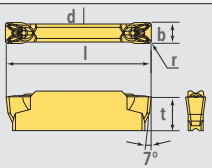
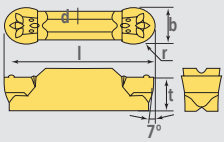
WORKPIECE MATERIAL

P M K N S H

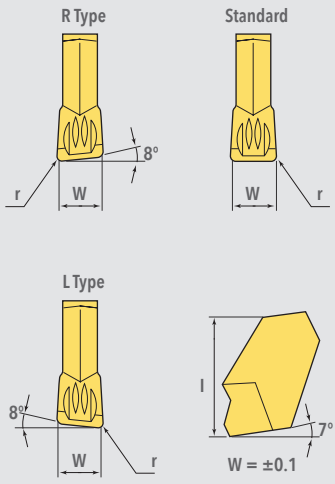


SPECIFICATION	DIMENSION					CONFIGURATION	APPLICATION
	b	r	l	d	t		
MGMN150-G	1,5	0,15	16,0	1,2	3,5		GROOVING
MGMN200-G	2,0	0,2	16,0	1,6	3,5		
MGMN250-G	2,5	0,2	18,5	2,0	3,85		
MGMN300-G	3,0	0,3	21,0	2,35	4,8		
MGMN400-G	4,0	0,3	21,0	3,3	4,8		
MGMN500-G	5,0	0,5	26,0	4,1	5,8		
MGMN600-G	6,0	0,8	26,0	5,0	5,8		
MGMN200-M	2,0	0,2	16,0	1,6	3,5		GROOVING TURNING
MGMN250-M	2,5	0,2	18,5	2,0	3,85		
MGMN300-02-M	3,0	0,2	21,0	2,35	4,8		
MGMN300-M	3,0	0,4	21,0	2,35	4,8		
MGMN350-03-M	3,5	0,3	21,0	2,9	4,8		
MGMN400-02-M	4,0	0,2	21,0	3,3	4,8		
MGMN400-M	4,0	0,4	21,0	3,3	4,8		
MGNMN500-04-M	5,0	0,4	26,0	4,1	5,8		
MGMN500-M	5,0	0,8	26,0	4,1	5,8		
MGMN600-M	6,0	0,8	26,0	5,0	5,8		
MGMN800-M	8,0	0,8	31,0	6,0	6,5		

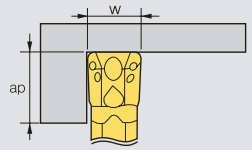
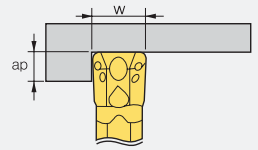


SPECIFICATION	DIMENSION					CONFIGURATION	APPLICATION
	b	r	l	d	t		
MGMN200-02-L	2,0	0,2	16,0	1,6	3,5		GROOVING
MGMN300-02-L	3,0	0,2	21,0	2,35	4,8		
MGMN400-02-L	4,0	0,2	21,0	3,3	4,8		
MGMN200-04-L	2,0	0,4	20,0	1,7	3,5		
MGMN300-04-L	3,0	0,4	20,0	2,3	4,0		
MGMN400-04-L	4,0	0,4	20,0	3,3	4,0		
MGMN500-04-L	5,0	0,4	26,0	4,1	5,8		
MGMN200-02-R	2,0	0,2	16,0	1,6	3,5		GROOVING PARTING OFF
MGMN300-02-R	3,0	0,2	21,0	2,35	4,8		
MGMN400-02-R	4,0	0,2	21,0	3,3	4,8		
MGMN200-04-R	2,0	0,4	20,0	1,7	3,5		
MGMN300-04-R	3,0	0,4	20,0	2,3	4,0		
MGMN400-04-R	4,0	0,4	20,0	3,3	4,0		
MGMN500-04-R	5,0	0,4	26,0	4,1	5,8		
MGMN200-T	2,0	0,2	16,0	1,6	3,5		GROOVING TURNING
MGMN300-T	3,0	0,4	21,0	2,35	4,8		
MGMN400-T	4,0	0,4	21,0	3,3	4,8		
MGMN500-T	5,0	0,8	26,0	4,1	5,8		
MRMN200-M	2,0	1,0	16,0	1,5	3,5		RELIEFING PROFILING
MRMN300-M	3,0	1,5	21,0	2,35	4,8		
MRMN400-M	4,0	2,0	21,0	3,3	4,8		
MRMN500-M	5,0	2,5	26,0	4,1	5,8		
MRMN600-M	6,0	3,0	26,0	5,0	5,8		
MRMN800-M	8,0	4,0	31,0	6,0	6,5		

GROOVING INSERTS

SPECIFICATION	DIMENSION			CONFIGURATION	APPLICATION
	W	l	r		
SP160	1,6	7,8	0,16		PARTING OFF
SP180	1,8	9,3	0,16		
SP200	2,2	9,3	0,20		
SP200R	2,2	9,3	0,20		
SP200L	2,2	11,3	0,20		
SP300	3,1	11,3	0,20		
SP300R	3,1	11,3	0,20		
SP300L	3,1	11,3	0,20		
SP400	4,1	11,3	0,25		
SP400R	4,1	11,3	0,25		
SP400L	4,1	11,3	0,25		
SP500	5,1	11,4	0,30		
SP500R	5,1	11,4	0,30		
SP500L	5,1	11,4	0,30		
SP600	6,4	11,4	0,35		
SP600R	6,4	11,4	0,35		
SP600L	6,4	11,4	0,35		

SELECTION OF INSERT

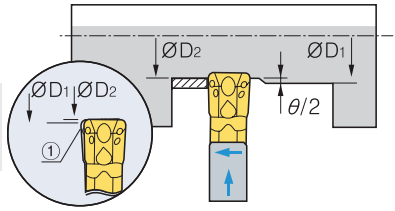
Feed Rate	• Decide maximum feed rate after concidering t he insert's characteristics and machine capabilities (Fmax = W x 0.075) • Max feed rate should not be larger than the corner radius of the insert • In grooving applications, chip evacuation problems can be remedied by using step feed methods at small intervals	
Depth of Cut	• The minimum depth of cut should be bigger than corner radius of insert • When deciding on the max depth of cut, concider the machine's cutting load • Depending on the shape of the insert, deflection of work piece and clearance angle can be changed	

NOTICE FOR FINISHING (OFFSET NEED FINAL QUALITY)

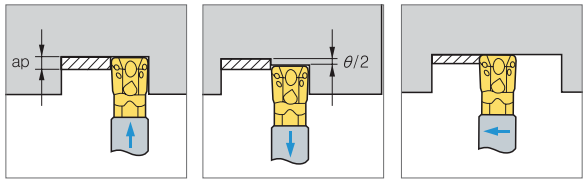
- After desired diameter is grooved, continuous turning operation might cause some deflection of the workpiece. In these cases follow the given formula, offsetting these factors enables the desired diameter that you want
- To eliminate the difference in the machined diameter by utilizing the clearance angle (which is commonly generated during the final turning operation) follow the directions above when machining

- Follow these steps:
  1) Groove to the desired diameter
  2) Pull the tool backs a total distance of /2
  3) Continue the external turning operation to desired diameter

$$\frac{\theta}{2} = \frac{ØD_1 - ØD_2}{2}$$



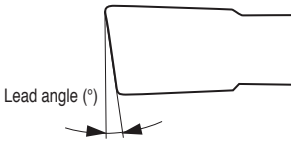
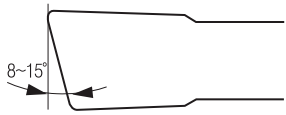
INCORRECT USAGE



INSERT SELECTION CONSIDERATIONS

To properly match the insert and cutting condition, the following factors should be considered • Width of insert • Chip breaker • Grade and nose	The relationship between the cutting width and cutting depth • Neutral type, inserts with a 0-degree lead angle are best when used an applications maximum depth of cut • In general alloy steel, the maximum depth of cut = W x 0.8	Insert with lead angle • To reduce burrs, we recommend using an insert with a lead angle. Inserts that have larger lead angles reduce burrs but will also decreases tool life • In the case where burrs are acceptable, we recommend using a neutral type insert

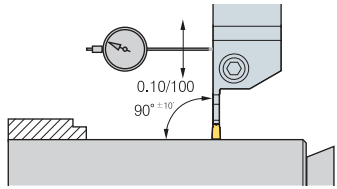
INSERT

LEAD ANGLE APPLICATIONS	LEAD ANGLE 0° (NEUTRAL)
	
• 4°- Pipe (Tubing and hollow bar) • 6°- Pipe and solid bar • 8°- Solid bar • 15°- Small diameter Solid bar	• Parting off on solid bar type • Occurring the center stub when parting off • Prevent to be deflected workpiece by cutting direction during parting off • Available for use deep parting depth
LEAD ANGLE 4°~ 8°	**LEAD ANGLE 8°~15°**
	
• Reduce the center stub when parting off on solid bar type • Reduce the burr when parting off on tubing or hollow bar type	• Parting off on small diameter and hollow bar type • Reduce the burr and center stub when parting off on small diameter solid bar type

GROOVING INSERTS

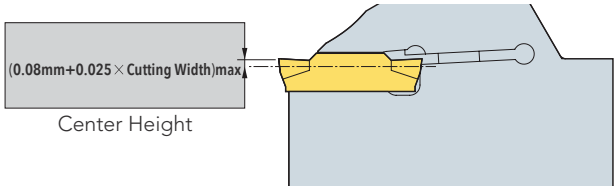
SETTING OF HOLDERS

- The cutting position should be exactly mounted on machined axis in order to create a perpendicular direction or 90 to minimize vibration



SETTING OF PARTING OFF

- The edge height of an insert should be set within ±0.1mm based on the center line
- Parting off should be done as close to the chuck as possible to minimize vibration



Center Height

NOTICE

- Keep a consistent cutting speed and feed
- Use proper amounts of coolant for better performance
- Properly clean the insert pocket before mounting insert

USAGE

- If insert is worn, immediately replace with a new insert. This is to prevent the damage on the workpiece
- If the holder seat is worn or damaged replace with a new one immediately for stable clamping
- Do not grind or regrind the holder seat

TROUBLESHOOTING

Problem/Issue	Solution
Rough surface	• Use a short and stable tool • Use geometry with good chip control • Check speed / feed guidelines • Use wiper geometry • Check tool set-up
Roug surface on aluminium	• Select the sharpest geometry • Use geometry with good chip control • Select a special soluble oil for the material
Poor chip breakage	• Change geometry • Select a higher feed • Use dwelling (pecking) • Increase coolant
Vibration	• Use a stable set-up • Check speed/feed guidelines • Use shorter overhang • Change geometry • Check tool condition • Check tool set-up
Poor tool life	• Check centre height • Check angle between tool and component • Check condition of the blade. If the blade is old, the insert could be unstable in the tip-seat

INSERT WEAR (EDGE)

Problem/Issue	Cause	Solution
Built-up edge (B.U.E) When parting to centre and on stainless material, it is almost impossible to avoid BUE. It is important to minimize this by following the solutions.	• Cutting edge temperature too low	• Increase cutting speed and/or feed
	• Unsuitable geometry or grade	• Choose a geometry with a sharper edge preferably a PVD-coated grade
Chipping/breakage	• Too hard grade	• Choose a softer grade
	• Too weak geometry	• Choose a geometry for higher feed area
	• Unstable conditions	• Reduce overhang. Check centre height
	• Too high cutting data	• Reduce cutting data
Plastic deformation (PD)	• Excessive temperature in cutting zone	• Reduce cutting speed and/or feed
	• Unsuitable grade	• Choose more wear resistant grade
	• Lack of coolant supply	• Increase coolant supply
Flank wear	• Cutting speed too high	• Decrease cutting speed
	• Too soft grade	• Choose a more wear resistant grade
	• Lack of coolant supply	• Increase coolant supply
Crater wear	• Cutting speed too high	• Decrease cutting speed
	• Too soft grade	• Choose more wear resistant grade
	• Feed too high	• Decrease feed
	• Lack of coolant supply	• Increase coolant supply
Notch wear	• Oxidation at the cutting depth • Cutting edge temperature too high	• Use varying cutting depths (ramping) • Reduce cutting speed

NICHE

FOR A BETTER US

ADDRESS

ROOM 1601, NO. 399 MINHE ROAD, ZHENHAI,
NINGBO CHINA, 315202

GET IN TOUCH

PHONE: **+86 574 8659 2189** FAX: **+86 574 8659 3892**

NTOOLS2017@GMAIL.COM **WWW.NICHE-TOOL.COM**