Machining Hardened Materials with Ceramics

Dramatically Reduce Costs

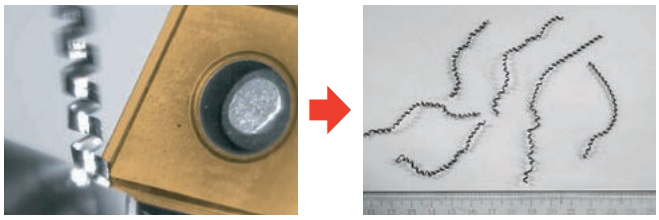
Features

- *ZC7 and ZC4 have excellent wear resistance needed to machine hardened materials*
- *ZC7 covers a wide range of applications such as carburized or induction hardened steels*
- *ZC4 performs the best in hardened material applications from HRc 55-70*
- *Wiper inserts and AG-chipbreaker improve machining efficiency*

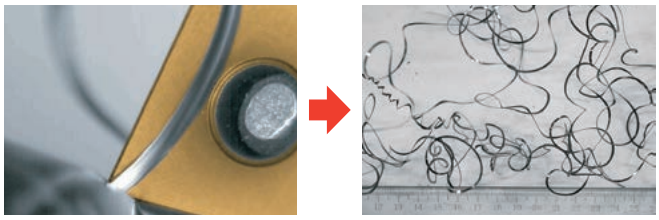
AG-Chipbreaker

● Good chip control ● Improve surface finish ● Reduce machine downtime

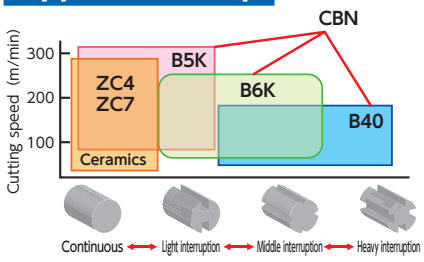
■ With AG-chipbreaker



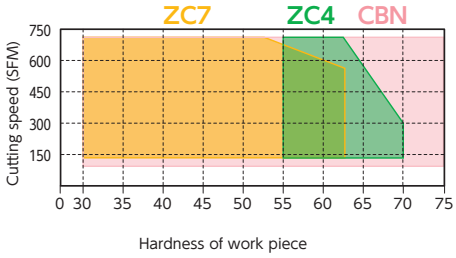
■ Without AG-chipbreaker



Application Map

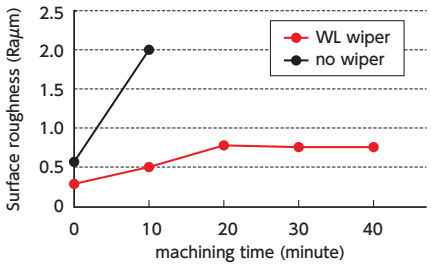


Recommended Speed Range



Effect of Wiper Flat on Cutting Edge

CNGA433WL 320SFM 004IPR 020doc



Recommended Cutting Conditions

Work material	Hardness (HRc)	Grade	Purpose	Cutting speed (SFM)	Feed (IPR)	DRY	WET
Hardened material	30–62	ZC7	Finish (Continuous)	130–700	.003–.008	●	●
	55–70	ZC4				●	●

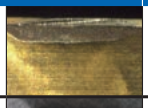
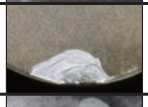
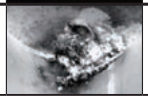
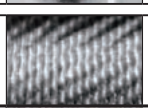
Recommended Depth of Cut and Feed Rate

Recommended depth of cut and feed rate by corner R dimension

corner R	feed rate (IPR)	depth of cut (inch)
R .016	.001–.003	~ .007
R .032	.003–.004	~ .015
R .047	.004–.005	~ .020
R .063	.005–.006	~ .030
R 1/4 (Round Insert)	.006–.010	~ .080

※for 30RMS finish

Troubleshooting for Hard Turning with Ceramic Inserts

	Case		Possible cause	Action required
Insert	VB wear		●Cutting speed is too high ●Feed rate is too low ●Improper nose radius	●Decrease cutting speed ●Increase feed rate ●Enlarge nose radius
	Wear on face		●Improper cutting condition ●Improper honed edge	●Decrease cutting speed ●Reduce angle of honed edge
	Flaking		●Improper cutting condition ●Improper honed edge	●Reduce honed edge ●Use insert without round honing ●Decrease feed rate ●Increase cutting speed
	Fructure		●Improper cutting condition ●Improper honed edge ●Use of coolant	●Decrease feed rate ●Enlarge honed edge ●Put round honing on edge ●Stop coolant
Workpiece	Chattering		●Too high tool pressure ●Shortage of workpiece and/or tool rigidity ●Cutting speed is too low	●Decrease feed rate ●Reduce honed edge ●Enlarge relief angle ●Shorten the length of tool overhang ●Increase cutting speed
	Surfacefinish		●Feed rate is too high ●Nose radius is too small ●Wear of insert	●Decrease feed rate ●Enlarge nose radius ●Use insert with wiper flat ●Decrease cutting speed