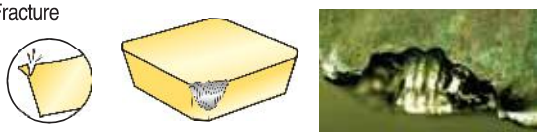
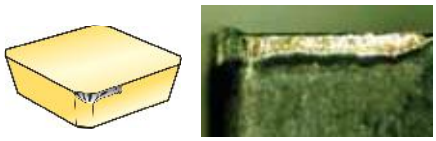
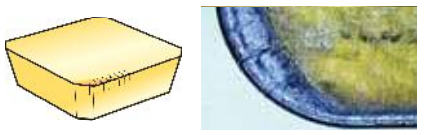
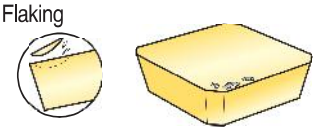
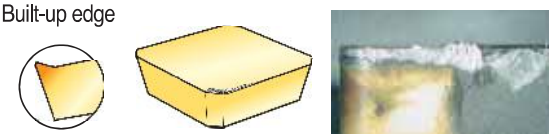
Trouble shooting

Tool Failure	Cause	Solution
Crater wear 	• Improper grade • Excessive cutting condition	• Choose harder grade • Decrease cutting condition
Fracture 	• Improper grade • Excessive feed • Shorten cutting edge strength • Insufficient rigidity of holder	• Choose tougher grade • Decrease feed • Apply to large honed or chamfered edge • Choose bigger size holder
Plastic deformation 	• Improper grade • Excessive cutting condition • High cutting temperature	• Choose harder grade • Decrease cutting condition • Choose grade wich heat conductivity are big
Wear on nose radius (Flank wear) 	• When the hardness of workpiece is too high compare with tool • When machinig surface hardened workpiece • Improper grade • Excessive cutting speed • Too small relief angle • Too low feed	• Choose harder grade • Decrease cutting speed • Choose lager relief angle • Increase feed
Thermal crack 	• Expansion and shrinking by cutting temperature • Improper grade (*Specially milling operation)	• Apply to dry cutting (In case of wet cutting, use enough coolant) • Choose tougher grade
Chipping 	• Improper grade • Excessive feed • Shorten cutting edge strength • Insufficient rigidity of holder	• Choose tougher grade • Decrease feed • Apply to large honing or chamfer edge • Choose bigger size holder
Notch wear 	• Surface hardened workpiece • Friction due to bad chip geometry (Generate vibration)	• Choose harder grade • Improve chip control form large rake angle
Flaking 	• Deposition on cutting edge • Bad chip control	• Improve cutting performance fromd large rake angle • Apply to chip pocket with big size
Complete breakage 	• Unusable condition due to wear off the most parts of cutting edge by progress of wear	• Reduce the feed rate. • Reduce the depth of cut. • Select a tougher grade. • Select a stronger chipbreaker. • Select a thicker insert.
Built-up edge 	• Slow cutting speed • Sticky materials	• Increase cutting speed. • Use more positive rake geometry. • Use tougher grade

Types of tool failure and trouble shooting

Troubles	Causes	Solution																		
		Cutting conditions				Selecting insert grade				Tool shape							Machine clamping			
		Cutting speed	Feed	Depth of cut	Coolant	Select harder grade	Select tougher grade	Select better heat-impact resistance grade	Select better adhesion resistance grade	Chip breaker valuation	Rake angle	Nose radius	Side cutting edge angle	Cutting edge strength Honing	Improving insert precision M class G class	Improving holder rigidity	Clamping workpiece	Holder overhang	Machine vibration
Poor precision Unstable machining size	Insert precision is variable														●				
	Workpiece, Separation of tool									●	⬆	⬇				●	●	●	●
Cutting edge back thrust is big It's necessary to adjust because machining precision changes during operation.	Flank wear increase					●						⬆							
	Cutting condition is improper	⬇	⬆																
Poor surface roughness for finishing Criterion of tool life.	Weakened cutting force by increasing wear of tool	⬇			Wet cutting	●			●	●	⬆	⬆		⬇	●				
	Cutting edge chipping		⬇	⬇			●			●		⬆		⬆			●	●	●
	Adhesion, built-up edge	⬆	⬆		Wet cutting				●	●	⬆			⬇	●				
	Improper cutting conditions	⬆	⬇	⬇	Wet cutting														
	Improper tool and shape of cutting edge									●		⬆		⬇	●				
	Vibration, chattering	⬇	⬇	⬇	Wet cutting		●			●	⬆	⬇		⬇		●	●	●	●
Cutting heat generation Poor machining precision and short tool life by cutting heat	Improper cutting conditions	⬇	⬇	⬇															
	Improper tool and shape of cutting edge					●				●	⬆			⬇					
burr, chipping, nap steel, aluminum (burr)	Improper cutting conditions	⬇	⬆		Wet cutting														
	Wear on the tool, improper shape of cutting edge					●			◉	●	⬆	⬇		⬇					
Cast iron (Weak chipping)	Improper cutting conditions		⬇	⬇															
	Wear on the tool, improper shape of cutting edge					●				●	⬆	⬆		⬇		●	●	●	●
Soft steel (nap)	Improper cutting conditions	⬆	⬍		Wet cutting														
	Wear on the tool, improper shape of cutting edge					●			◉	●	⬆			⬇					

⬆ : Increase ⬇ : Decrease ● : use ◉ : Correct use

Tool life criterion

● KS B0813

Flank wear width	0.2mm	Precision light cutting , Finishing in nonferrous alloy
	0.4mm	Machining special steel
	0.7mm	General cutting in cast iron, steel etc
	1~1.25mm	General cutting in cast iron, steel etc
Depth of crater wear	In general 0.05~0.1 mm	

● ISO(B8688)

Tool life criterion	Application
Complete breakage	Machining special steel
Flank wear width VB = 0.3mm	Even flank wear of cemented carbides, Ceramic tool
VBmax = 0.5mm	Uneven flank wear
Crater wear width KT = 0.06+0.3fmm (f:mm/rev)	Cemented carbides tool
Criterion by surface roughness 1, 1.6, 2.5, 4, 6.3, 10㎛Ra	When surface roughness is important