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TOOLING SOLUTIONS EXPERTS
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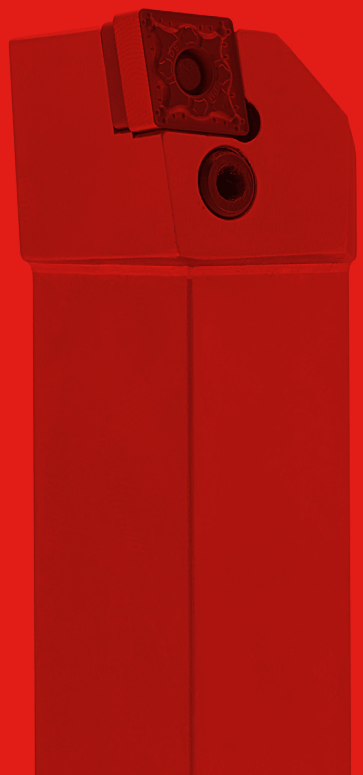
Tooling the future, Today



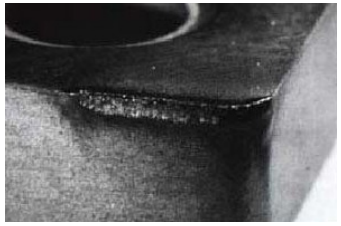
Troubleshooting

Troubleshooting

Problem / Concern		Possible causes and areas of investigation	Cutting speed	Feed	Depth of cut	Grade	Coolant	Rake angle	Edge preparation	Material (type / condition)	Center height	Geometry (insert)	Insert finish	Insert thickness	Nose radius	Lead angle	Holder (type / condition)	Machine condition	Chip flow direction	Horsepower	Excessive overhang	Spindle bearings	Turret	Machine anchored	Workholding	Rigidity	Chatter
Problem / Concern	Unacceptable chips	Stringer / Ribbons (Ligth silver color)	P↑	P↑	•		•	•	•	•		P			•	•			•								
		Corrugated / Tight (Dark blue or black color)	•	P↓	•	▪	•	•	•	•		P			•	•											
	Workpiece concerns	Finish / RMS tolerance	P	P	▪	•	•	•	•	•	•		•		P			•	•								
		Interrupted cuts	P↑	P↓	P↓	•		•	•	•		•		•	•	↑		•		•	•	•			•	•	•
	Machine concerns	Areas of investigation	•	•	▪	▪	•				•							•		•	•	•	•	▪	•	P	
	Insert failure modes	Edge wear	P	P	•	P	•				•																
		Heat deformation (upset)	P↓	P↓	P↓	•	•	•						•	•												
		Thermal cracking	•	•	•	P	P	•						•													
		Crater	P↓	P↓		•	•	•				•							•								
		Chipping	•	•		P	•	•	P	•	•	•		•	•	•	•	•							•	•	•
		Depth-of-cut notching	•	•		•		•	•	P				•		P											
		Buit-up edge	P↑	P↑		PVD	•	•	P	P	•	•	•														
		Catastrophic breakage	•	•	•	•	•	•	•	•		•		•	•	•	•	•			•				•	P	P

↑↓ Arrows indicate direction of adjustment
"P" Indicate areas of primary investigation

Edge wear

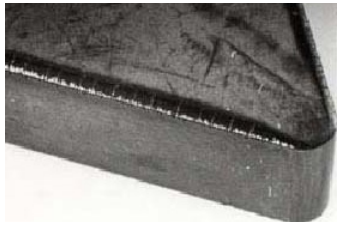


Reduce feed rate;
Reduce cutting speed;
Use more wear resistant grade;
Apply coated grade;

Heat deformation

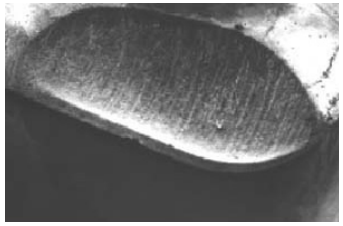
Reduce cutting speed;
Reduce feed;
Reduce depth of cut;
Use grade with higher hot hardness;

Thermal cracking



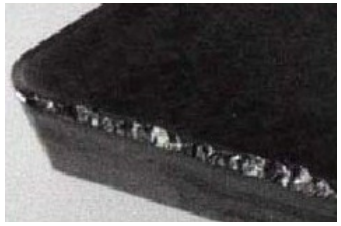
Properly apply coolant;
Reduce cutting speed;
Reduce feed;
Apply coated grade;

Crater



Reduce feed rate;
Reduce speed;
Apply coated grades;
Use coolant;

Chipping

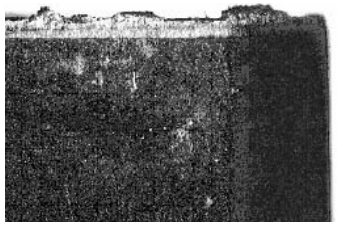


Use stronger grade;
Consider edge preparation;
Check rigidity of system;
Increase lead angle;

Depth-of-cut notching

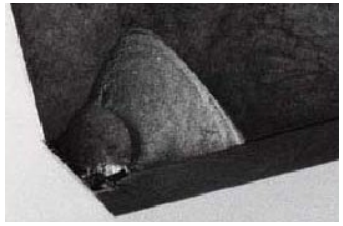
Change lead angle;
Consider edge preparation;
Apply different grade;
Adjust feed;

Built-up edge



Increase cutting speed;
Increase feed rate;
Apply PVD coated grades;
Use coolant;
Edge preparation (smaller hone);

Catastrophic breakage



Use stronger grade/geometry;
Reduce feed rate;
Reduce depth of cut;
Check rigidity of system;
Examine edge prep/nose radius;

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