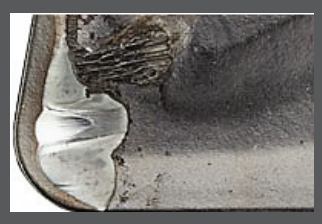
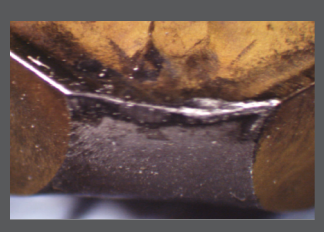
Insert wear

Cause & remedy

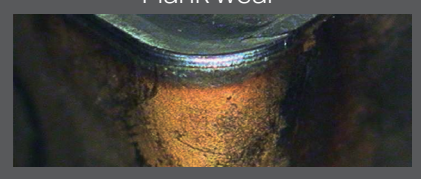
PRIME TOOLING

Insert wear

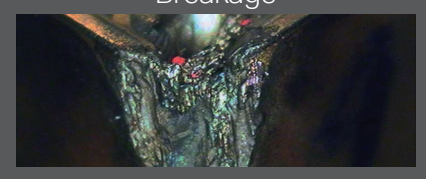
	Cause	Solution
Flank wear (abrasive) 	- Friction against the surface of workpiece material - Abrasive wear due to carbides, speed or hard skin	- Reduce cutting speed - Increase feed - Use grade with more wear resistance
Crater water (chemical) 	- Chip contact with the rake face of the insert - Diffusion between insert and workpiece material	- Reduce cutting speed - Choose insert (tool) with the right geometry & a more wear resistant coating
Plastic deformation (thermal) 	- High cutting forces - High temperature	- Use a grade with higher hot hardness - Use a grade with a more wear resistant coating - Reduce cutting speed or feed
Built up edge (adhesive) 	- Built up material can form on the cutting edge, that separates the cutting edge from material. This leads to failure by taking away parts of the coating and even substrate layers.	- Increase cutting speed - Choose a more positive geometry
Chipping (mechanical) 	- Thermomechanical and adhesive - Application too demanding for the selected insert	- Select an insert with a stronger cutting edge - Select a tougher grade - Select a grade with thinner coating - Choose PVD over CVD
Cracks (thermal) 	- Rapid fluctuation in temperature	- Stabilize temperature - Use a tougher insert grade - Apply coolant in large amounts or not at all
Notch wear 	- Work hardening and burr formation - Oxidation at the depth of cut	- Use smaller angle for work hardening materials - Vary the depth of cut - Select a tougher coating
Fracture 	- Cutting edge has been exposed to a greater load it can resist - Allow wear to progress too far leading to increased cutting forces - Incorrect cutting data - Unstable setup	- Identify and prevent the original wear type - Select correct cutting data - Check stability of setup

What we can learn from tool wear?

Flank wear



Breakage

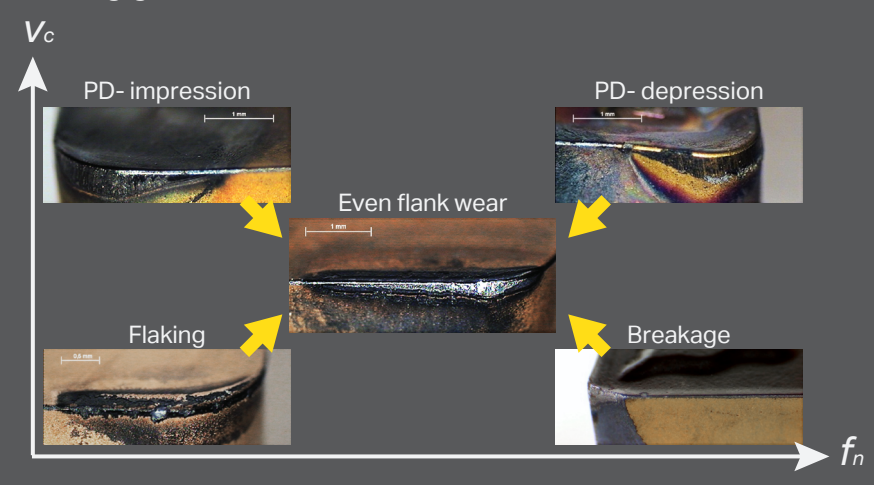


- Tool wear tells us if we have chosen the right grade.
- We can change the behaviour to some extent by changing cutting data.
- There is a connection between specific workpiece materials and their wear mechanisms.
- Our target is to reach predictable flank wear.
- Continuous wear - even wear along the edge (predictable).
- Discontinuous wear - uneven wear along the edge (unpredictable).

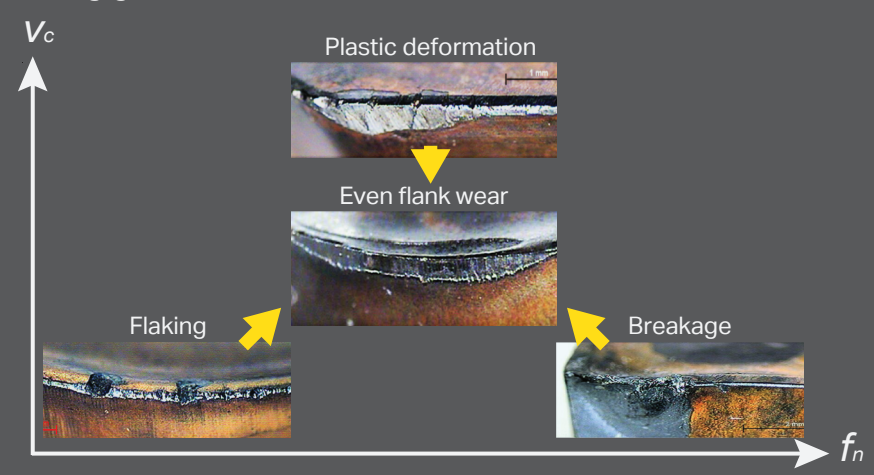
Wear vs. Cutting data

Below shows the initial wear patterns plotted on ***cutting speed (v_c) vs feed rate (f_n)*** graphs. To achieve the ***predictable even flank wear***, adjust the cutting data by following the arrows on the graphs.

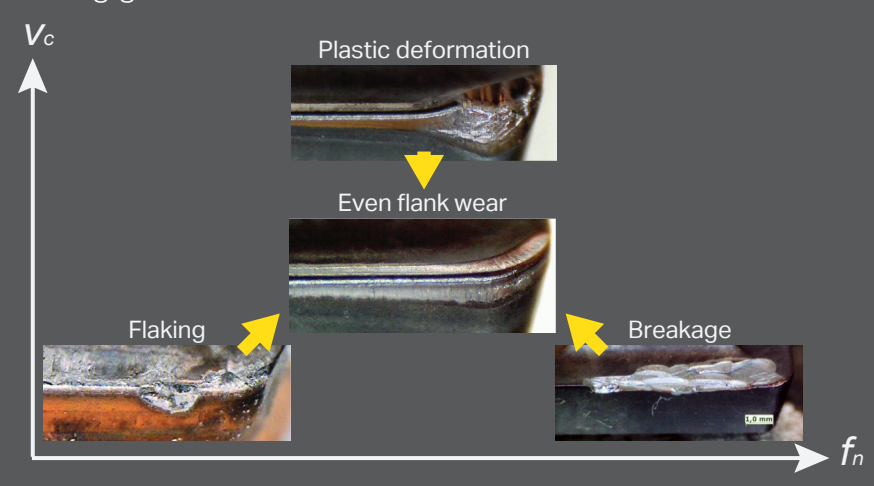
Turning grades



Milling grades



Drilling grades



For technical support, please contact Sandvik Coromant's Authorized Techincal Distributor - Prime Tooling.

Phone: +64 9 257 4007
Email: sales@primetooling.co.nz
Website: www.primetooling.co.nz

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