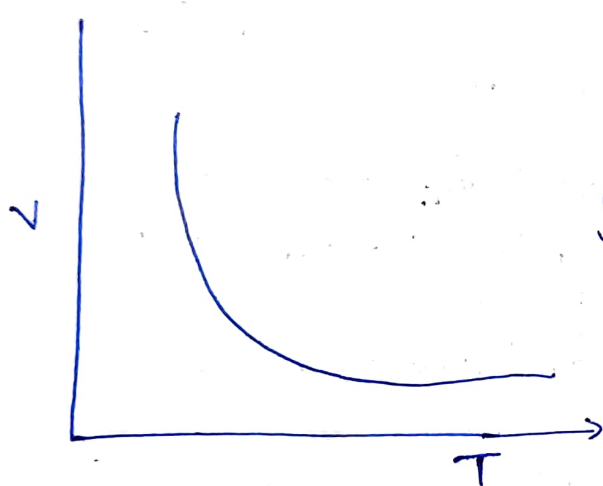


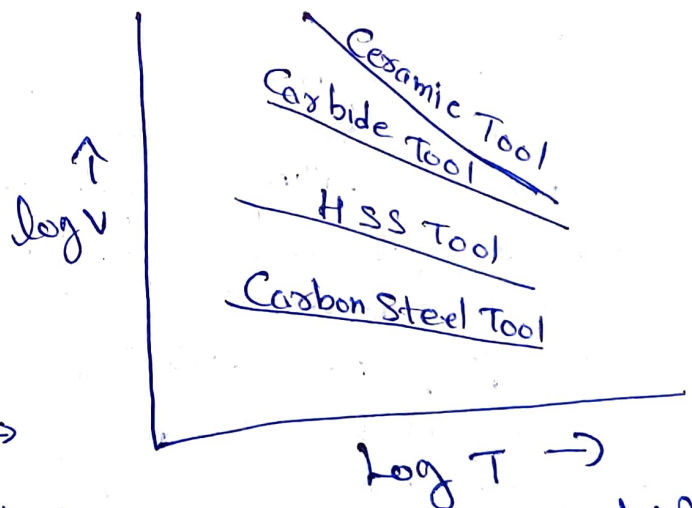
Effect of Various Factors on Tool Life.

- i) Cutting Speed
- ii) Feed & depth of cut
- iii) Tool Geometry
- iv) Tool material
- v) Work material
- vi) Nature of cutting
- vii) Rigidity of m/c tool & work.
- viii) Cutting fluids.

i) Cutting Speed Max. effect on tool life. The tool life varies inversely as the cutting speed i.e. higher cutting speed the smaller the tool life.



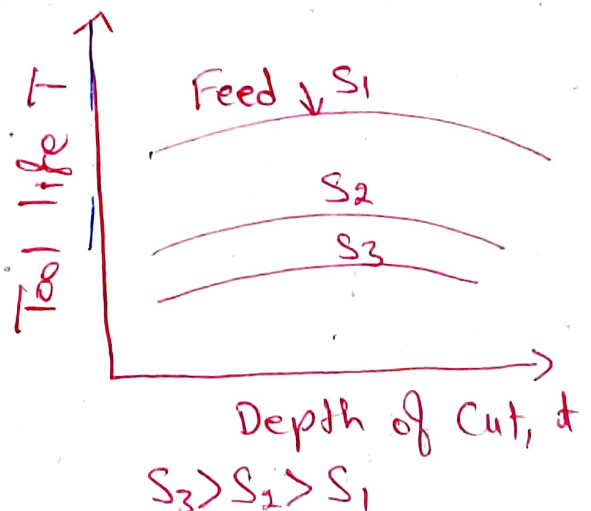
Curve showing parabolic reduction in tool life with the increase in cutting speed.



Cutting speed - tool life curves for different tool materials.

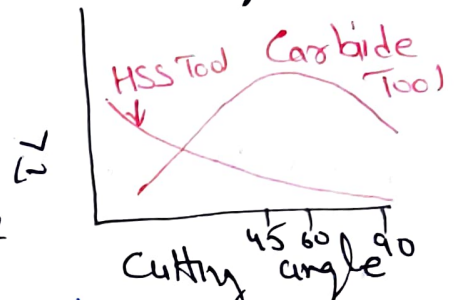
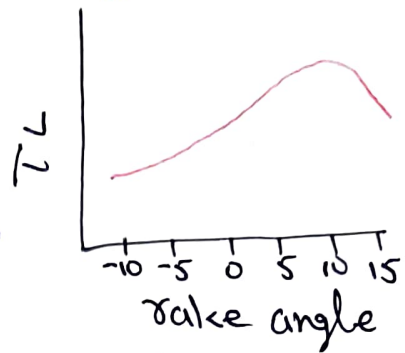
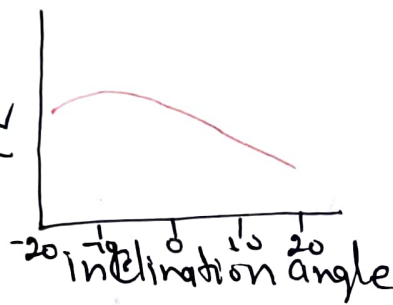
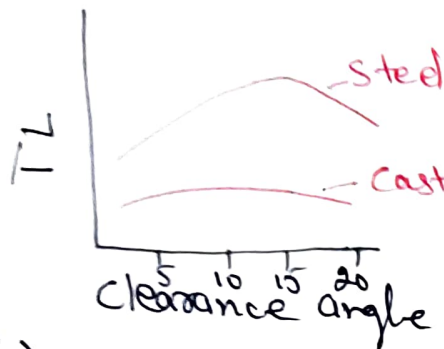
ii) Feed & Depth of cut.

Increase in feed also reduce the tool life as it results in increased cutting force and cutting temp.



iii) Tool Geometry Tool life of tool depends on both material and geometry. Proper selection of primary geometrical features enables to obtain such higher tool life through.

- Reduction in Cutting forces and heat generation
- Better heat dissipation.
- Favourable Stresses distribution
- Prevention of BUE
- More effective cutting fluid action



iv) Work Material The metallurgical, mechanical and thermal properties of work material affect the tool life.

- The significant metallurgical factor that affect TL is - composition of work material, its microstructure, chemical affinity and chemical aggressiveness towards the tool material.
- mechanical properties - high strength, hardness and work hardening as well as too much softness cause reduction in tool life.
- TL decreases with more heat resistivity of the work material.

v) Tool Material Same as work material.

- Tools that are chemically inert or stable against the work material, atmospheric gases and cutting fluid, undergo lesser and slower damage and provide longer TL.
- Finer and refined microstructure of material renders improvement in TL.
- Mechanical properties - its strength and hot strength, high hardness and hot hardness as well as high fracture toughness enhance the TL.
- Thermal properties - low thermal conductivity at the surface but high at its core, if feasible, is ideal for TL.

vi) Cutting Fluid Proper Selection & method of application can raise tool life drastically through cooling, lubrication & cleaning of cutting zone from chip and debris.

$T = 2.30 \text{ min.}$

Effect of Cutting Fluid on
Tool Life. $\rightarrow$

Cutting Speed $\Rightarrow$
m/min

Tool Life (min)

