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Factor affecting tool life

(1) Cutting conditions

(2) Tool geometry

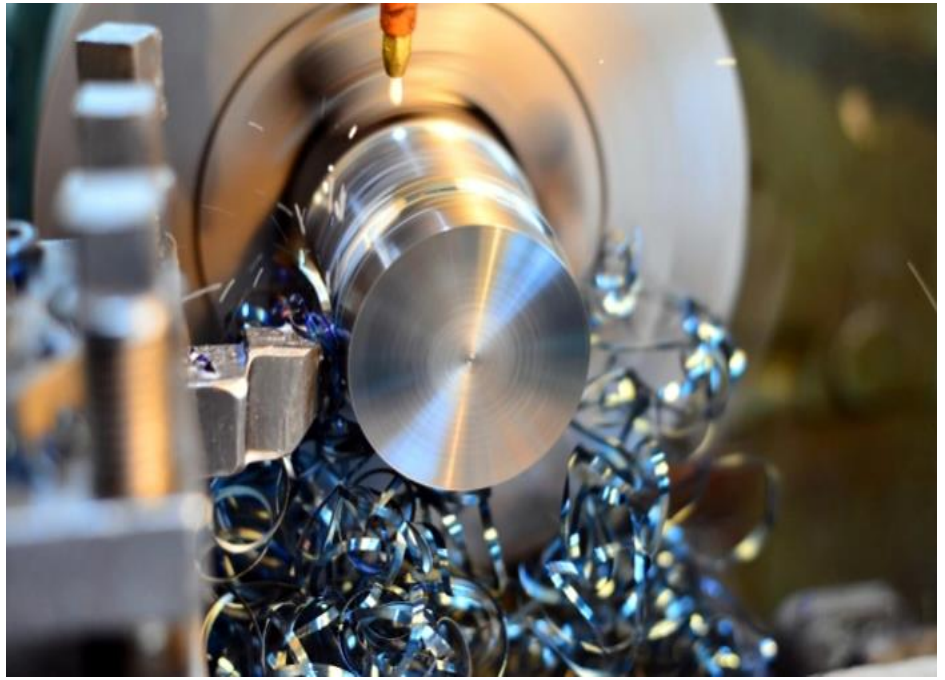
(3) Tool material

(4) Work material

(5) Cutting fluid

(6) Rigidity of machine tool and work

(7) Nature of Cutting



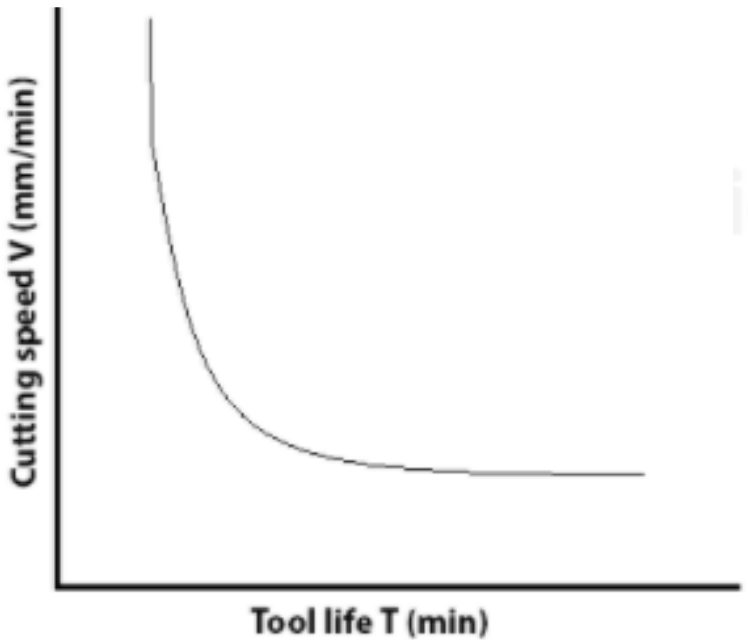
(1) Cutting conditions

The effect of various cutting condition that is cutting speed (v),feed (f) and depth of cut (d) is given by tool life equation when any of these condition increases ,the tool life will be decrease.

$$VT^n d^x f^y = C$$

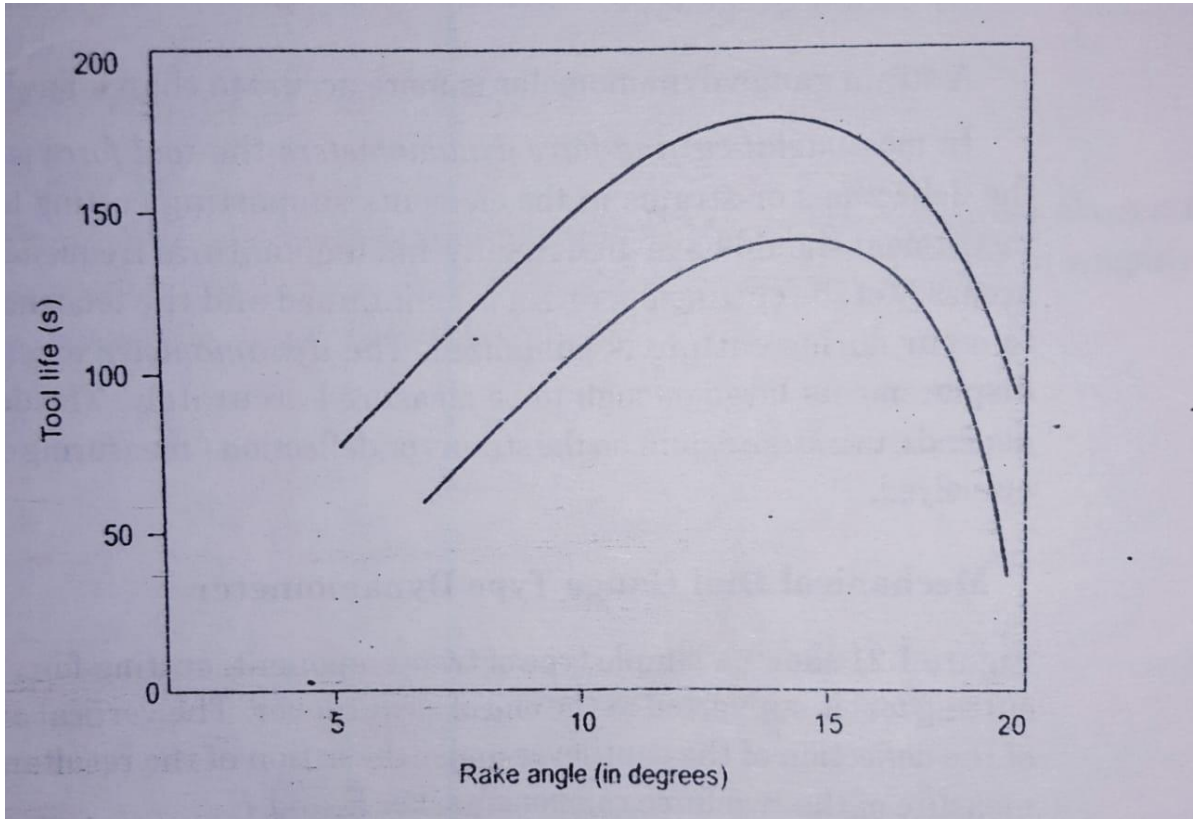
$$T^n = \frac{C}{Vd^x f^y}$$

$$T \propto \frac{1}{V}, \frac{1}{d}, \frac{1}{f}$$



(2) Tool geometry

- Increasing the rake angle decreases the cutting force and the heat produced at the tool tip,therefore increasing tool life.
- However increasing the rake angle to a large value reduces the tool material available at the tool tip for conducting heat generated , thus increasing the tool temperature. This would decrease the tool life.
- Optimum value



(3) Tool material

- using ideal tool material to remove the maximum volume of material at all cutting speed.
- The physical and chemical property of cutting tool material will be influence the life of tool.
- High speed steel cutting tool is more durable of machining than carbon steel tool.
- But it carbide tools has more life than high speed tool.

(4) Work material

- The tool life also depends upon microstructure of work material. The physical microstructure, Constituent phases and the hardness of the material make a large difference in the actual tool life value.
- Presence of cementite (Fe_3C) reduce tool life.
- In cast iron ,the free graphite improves tool life.

(5) Cutting fluid

- The heat produced during the metal cutting process, it heat carried out from the tool and workpiece by means of cutting fluid.
- The fluid reduce friction at chip tool interface and increased life of tool

(6) Rigidity of machine tool and work

- When that tool have supported in strongly, which is rigid the machine will have more life than tool under vibration of machine.
- Loose work piece will have decrease the life of tool.

(7) Nature of Cutting

It has also great influence on tool life; e.g. in the case of continuous cutting the tool life is much better than in intermittent cutting. The intermittent cutting gives regular impacts on the tool leading to its failure much earlier.

THANKYOU