

CHAPTER 1



INTRODUCTION

In many applications of metal cutting and forming, great importance is attached to the problem of the reduction of friction, as in almost all manufacturing and plastic forming processes undesirably high external and internal friction must be overcome. Both forms of friction can be considerably reduced under ideal conditions by the use of vibrations, where other methods of friction reduction cannot be used. Such methods are (1) hydrodynamic and (2) boundary lubrication. Magnetic fields are also used for friction reduction in high precision measuring instruments.

Some recent experiments show that if vibration is applied to cutting tool in a controlled manner, a reduction of cutting force will be obtained, together with a reduction of cutting temperature and an increase in tool life. The oscillation is made to act on the direction of feed or tangential to the workpiece surface at a frequency within the range 0-125 c/s. (Figs. 1-3., 1-4.)

When a die of a wire or tube drawer is excited to give longitudinal vibrations parallel to the direction of pulling, the traction force can be reduced. (Figs. 1-1., 1-2.)

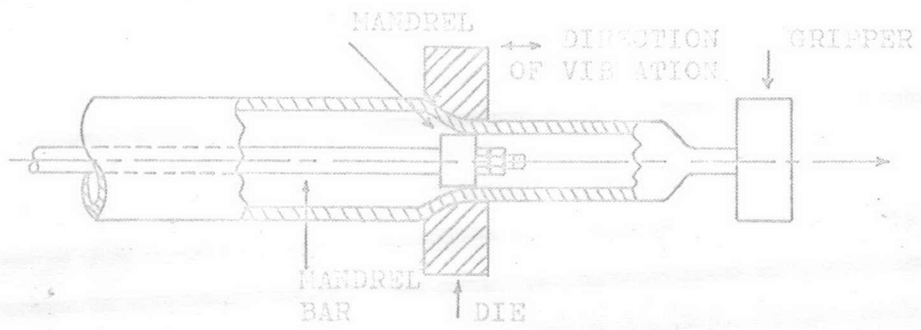


Fig. 1-1. TUBE - DRAWING.

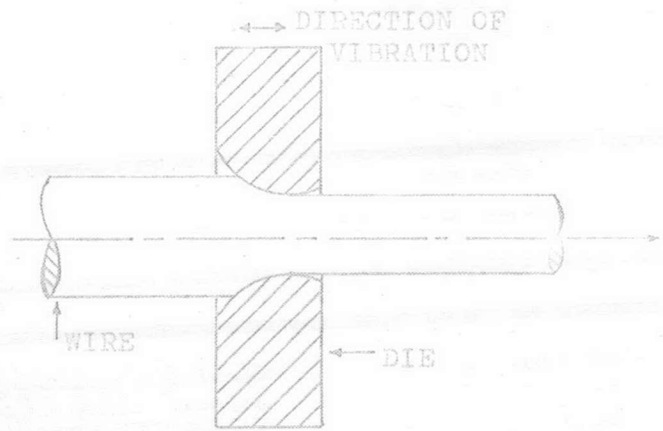


Fig. 1-2. WIRE - DRAWING.

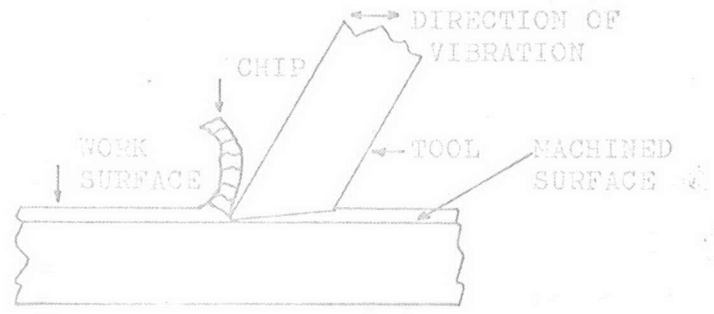


Fig. 1-3. SHAPING.

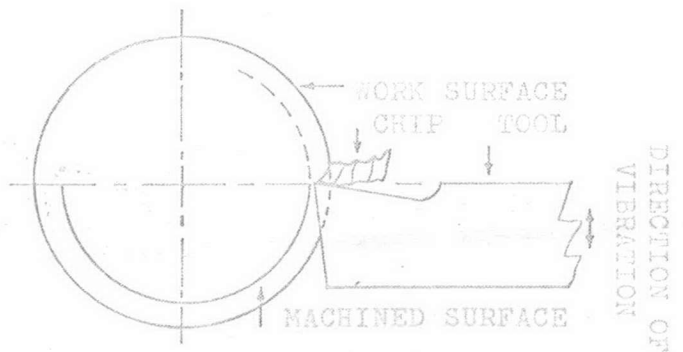


Fig. 1-4. LATHE MACHINING.