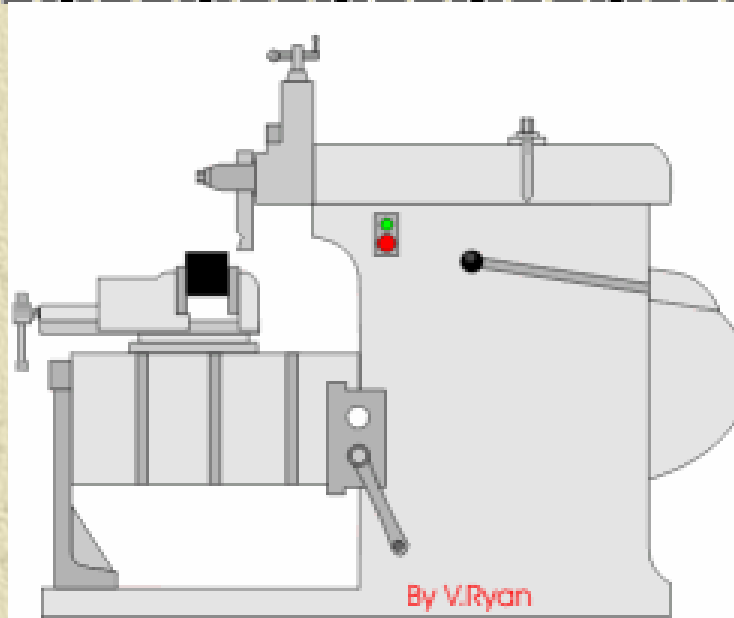


Shaping Machine & its Operations

1. Principle of Operation of the Shaping Machine
 2. Types of shaper
 3. Construction of the Shaper
 4. Mechanisms in a Shaper
 5. Shaper operations
 6. How to specify a Shaper?
 7. Introduction to Planer
-

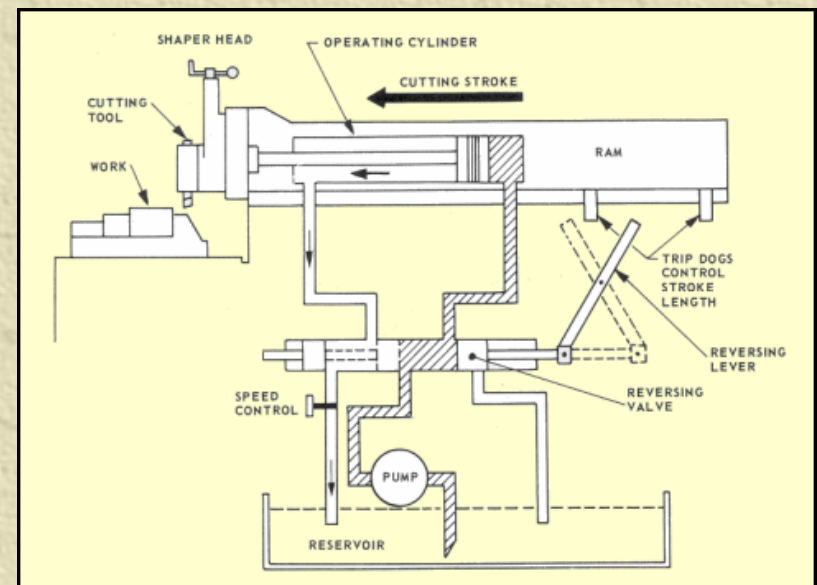
Principle of Operation of the Shaping Machine



1. Shaper machine is used for generating flat surfaces.
2. Single Point Tool reciprocates on the job.
3. Job is fed across the tool.
4. Tool is moved downward after completion of cross feed.
5. The length of stroke and position of stroke can be changed.

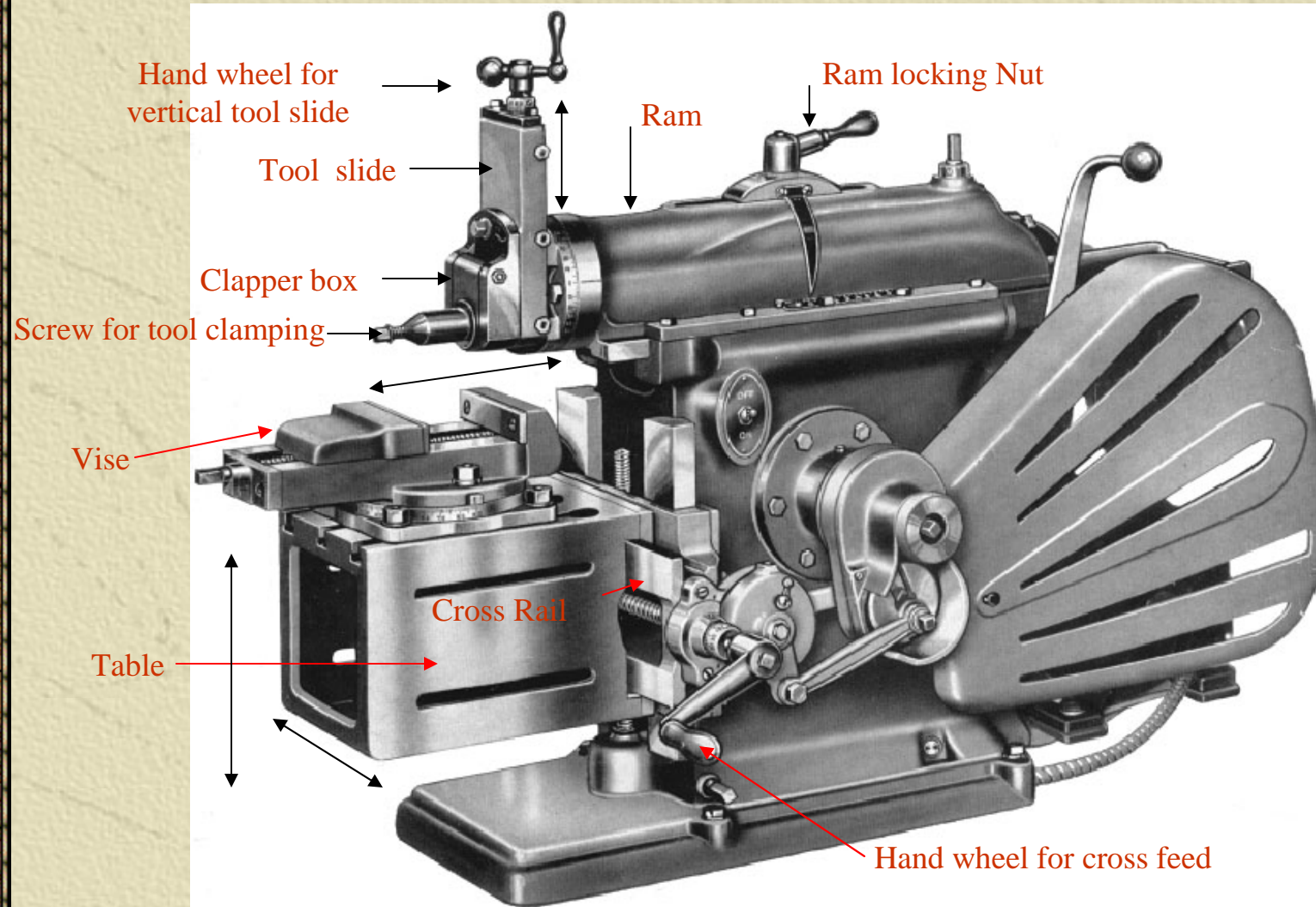
Types of Shapers

- 1) **Horizontal Shaper:** Ram is Horizontal
 - a) Push cut type: Cutting action in outward stroke
 - b) Pull cut type: Cutting action in inward stroke
- 2) **Vertical shaper:** Ram is vertical. Machine is similar to a Slotter.
- 3) **Mechanical Shaper:** Ram drive is Mechanical
- 4) **Hydraulic Shaper:** Ram drive is hydraulic



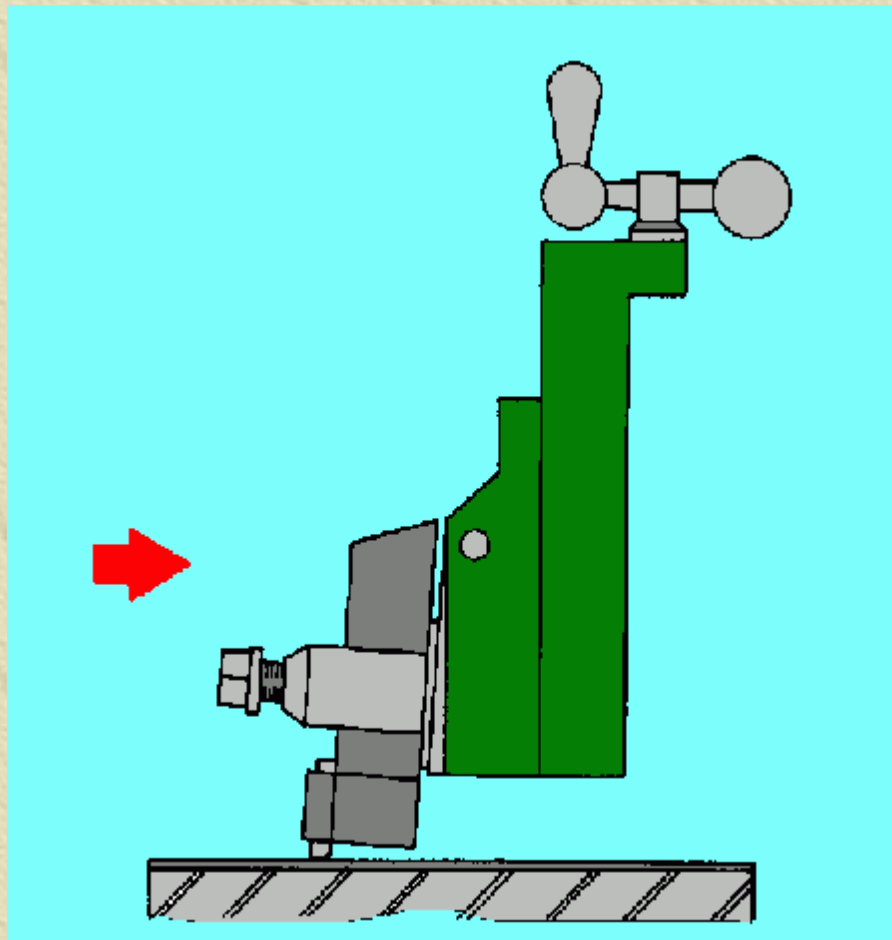
Hydraulic Shaper

Construction of the Shaper



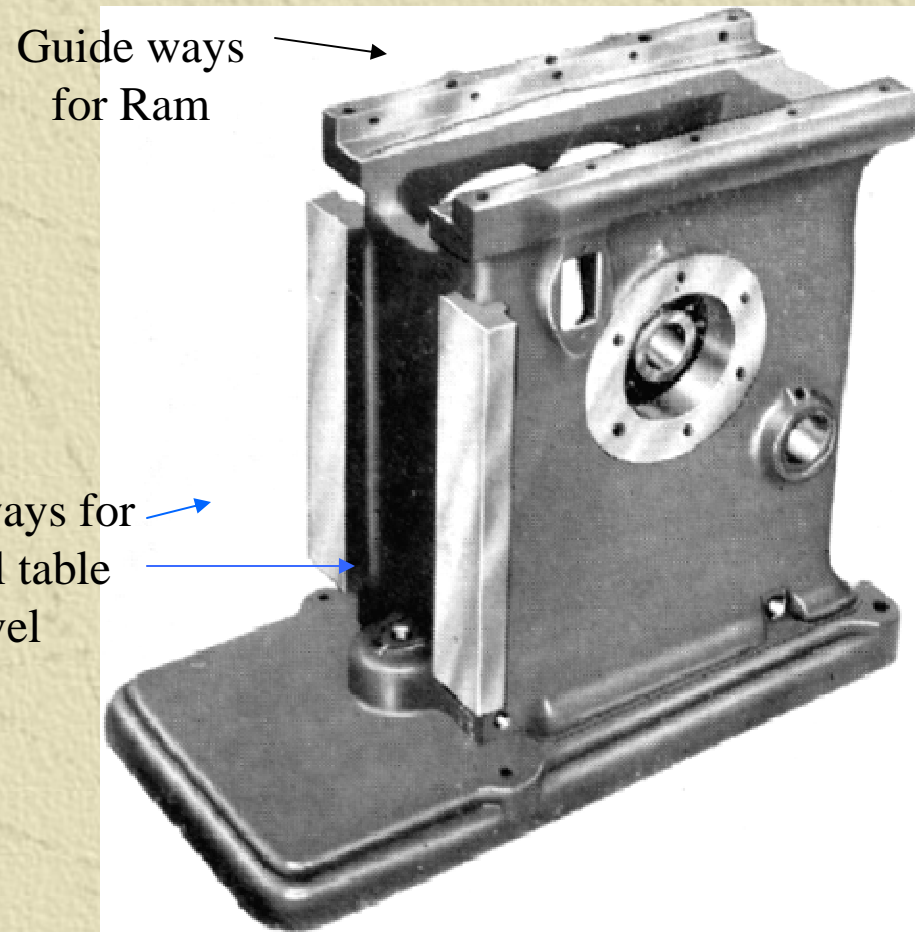
Clapper Box

Clapper box helps to avoid damage to machined surface during the return stroke of tool.

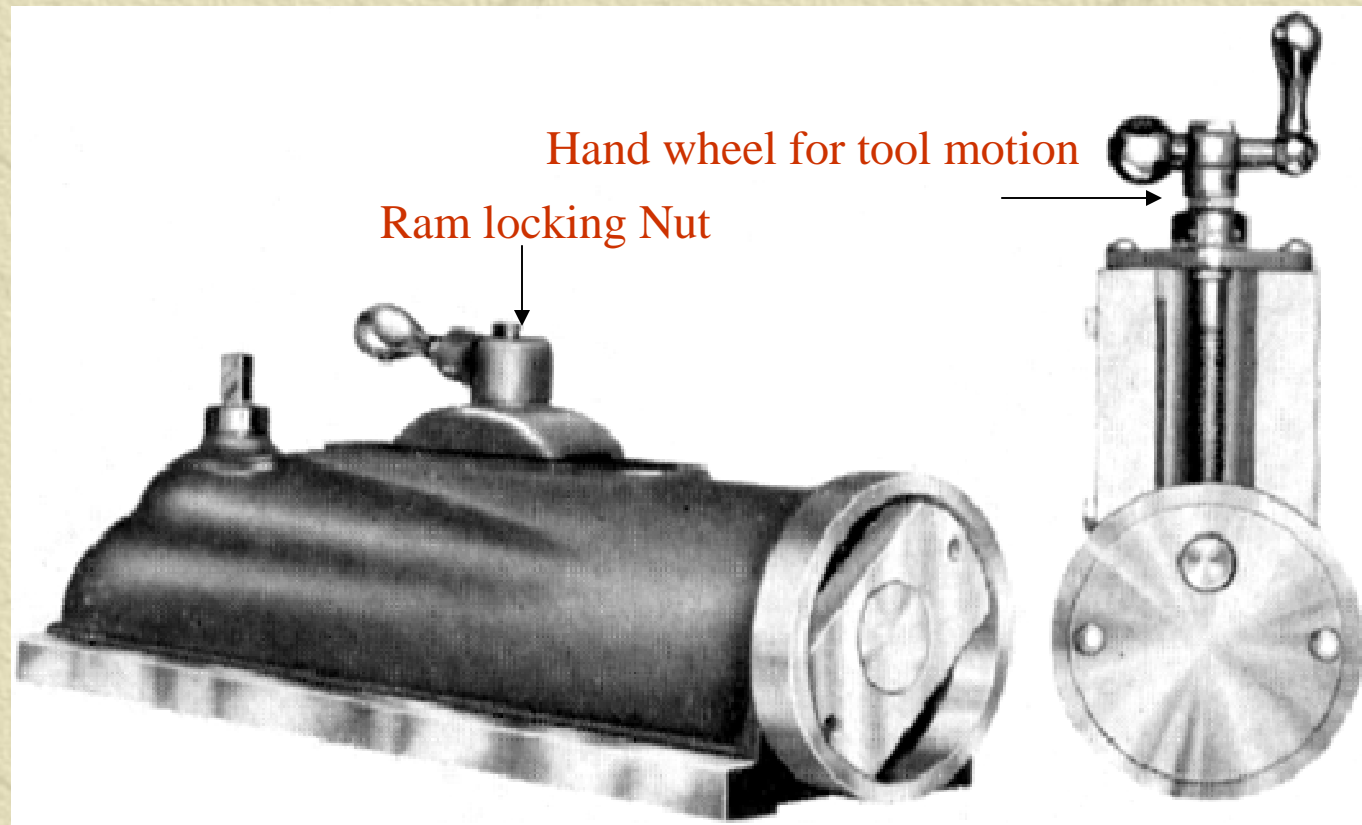


Details of column

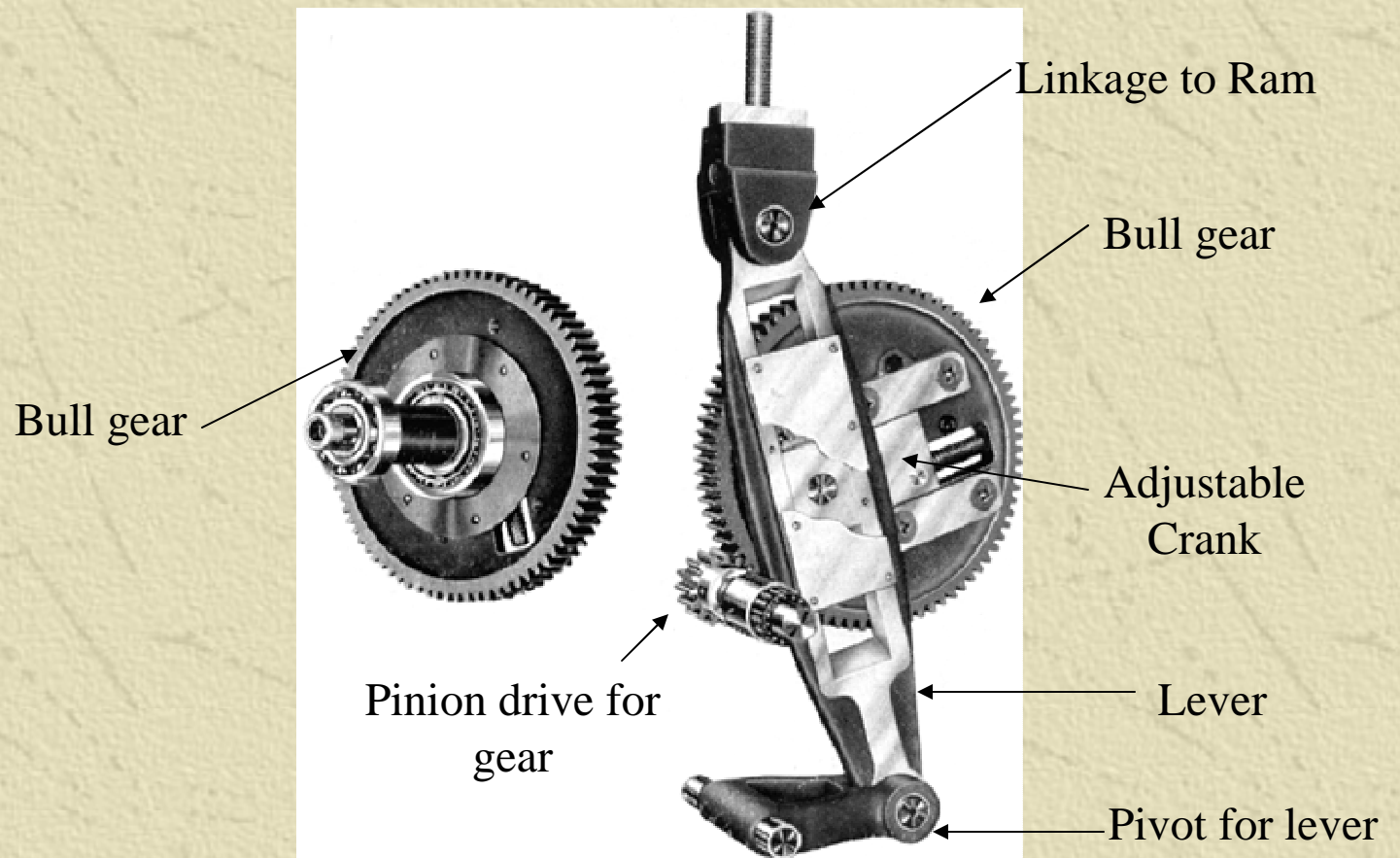
1. Column is of Cast Iron
2. It has guide ways for Ram and table
3. All other parts are mounted on the column



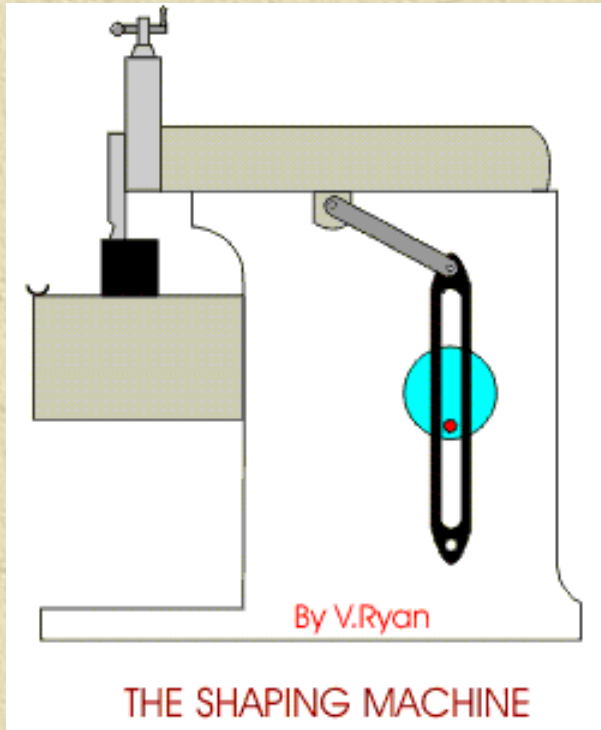
Details of Ram



Details of Ram Drive



Quick Return Mechanism



$$\begin{aligned}\text{Stroke ratio} &= \text{Cutting stroke angle}/360 \\ &= 220/360\end{aligned}$$

1. Shaper cuts only in one stroke (forward stroke). Other stroke is idle.
2. Cutting stroke is slower than the idle (return) stroke.
3. Angle covered by the crank is more in cutting stroke. Hence more time for cutting. Typical values are: Cutting stroke – 220° & Return stroke – 140°
4. Bull gear rotates at uniform speed but ram speed is varying.
5. By changing the length of crank, ram stroke can be changed.

Operating Parameters

✱ Cutting Velocity = $2 * \text{Average forward velocity}$

✱ Cutting speed = $2 * l * N / R_s$

Where, l = length of stroke (Should be more than length of cut L)

N = Rotational speed of bull gear (rpm)

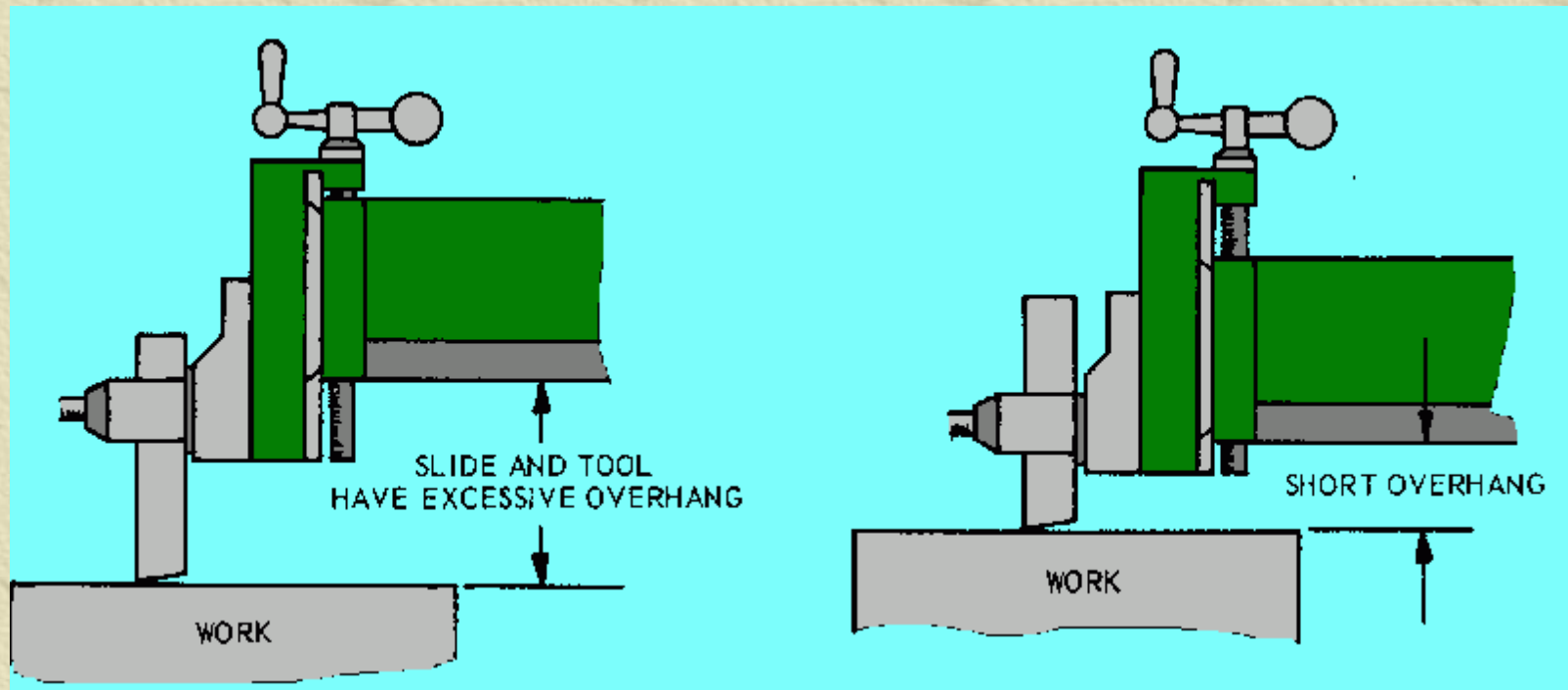
R_s = Stroke ratio

Cutting time = $\text{width} / [N * \text{feed}]$

Setting the Tool

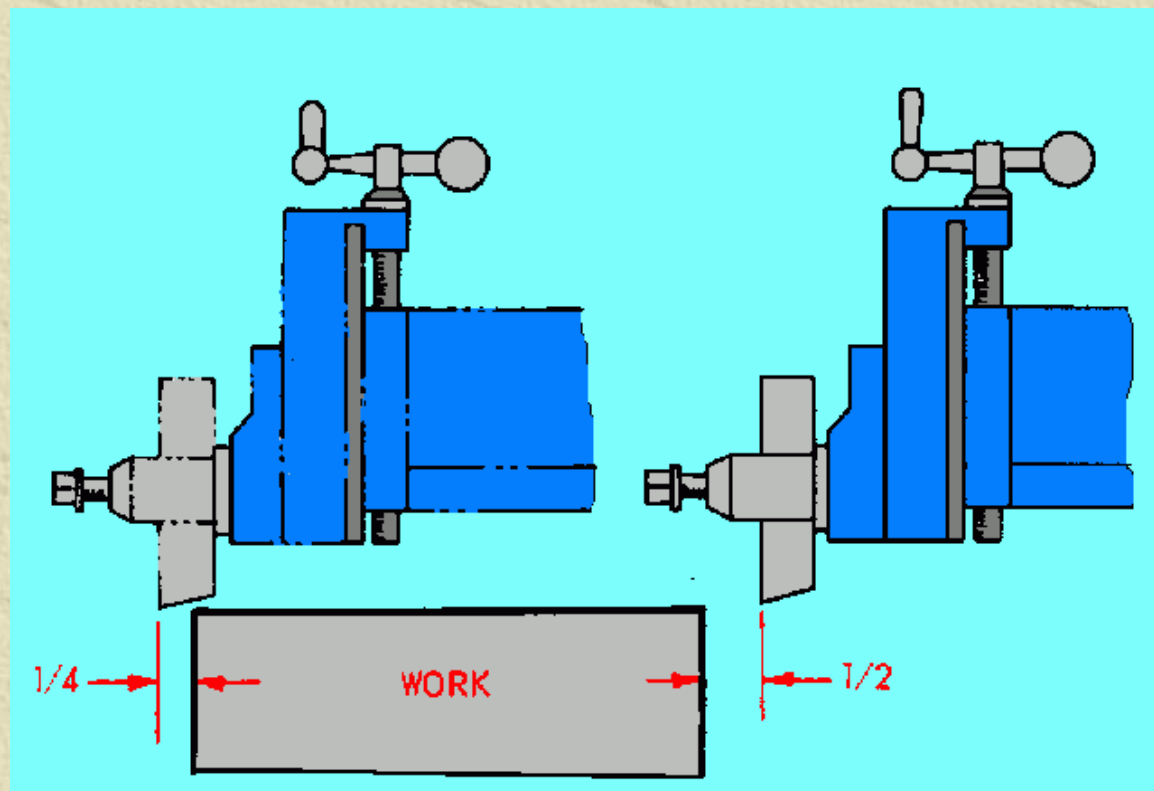
Tool overhang should be minimum.

Tool should be clamped properly with adequate support.



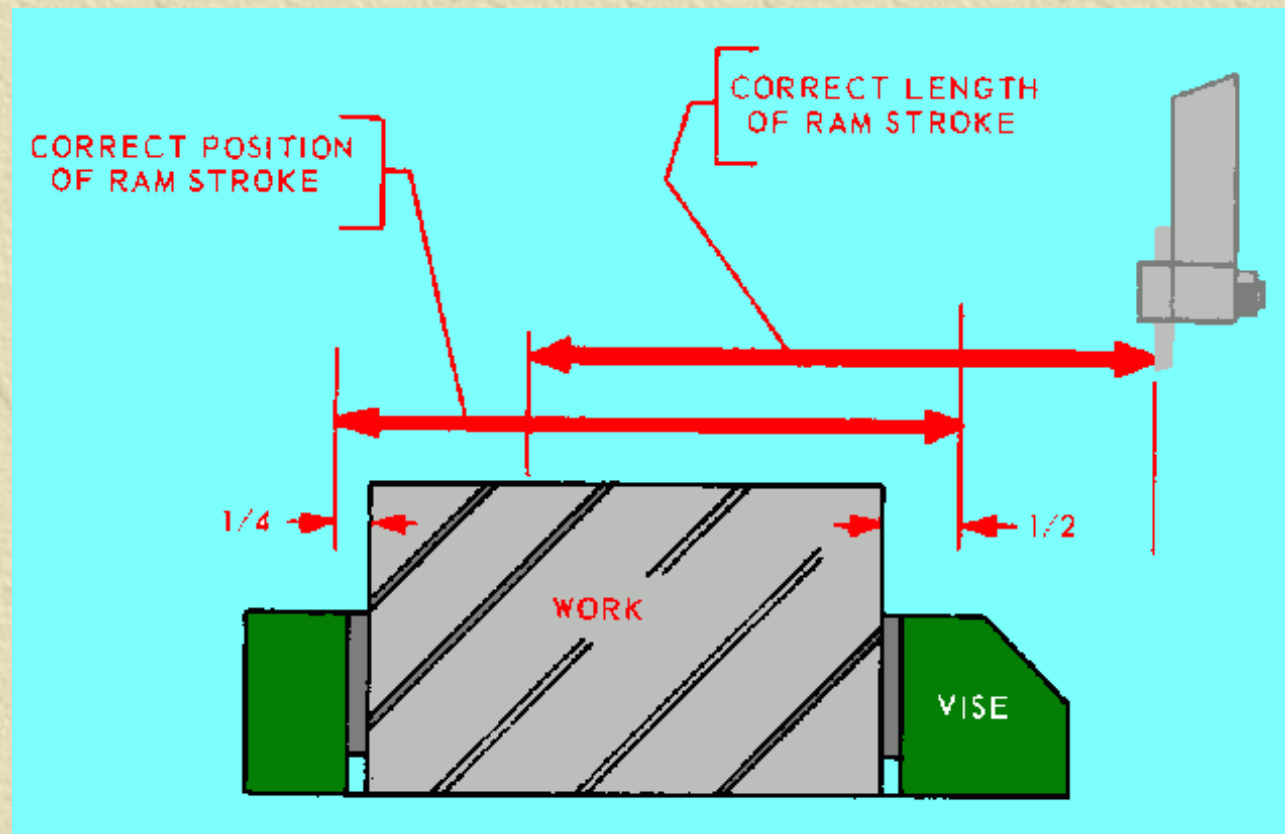
Setting the Stroke Length

- Max. Stroke length depends on the machine (18", 24", 36" etc.)
- Stroke length can be adjusted to a value less than maximum.
- Stroke length depends on the length of job.



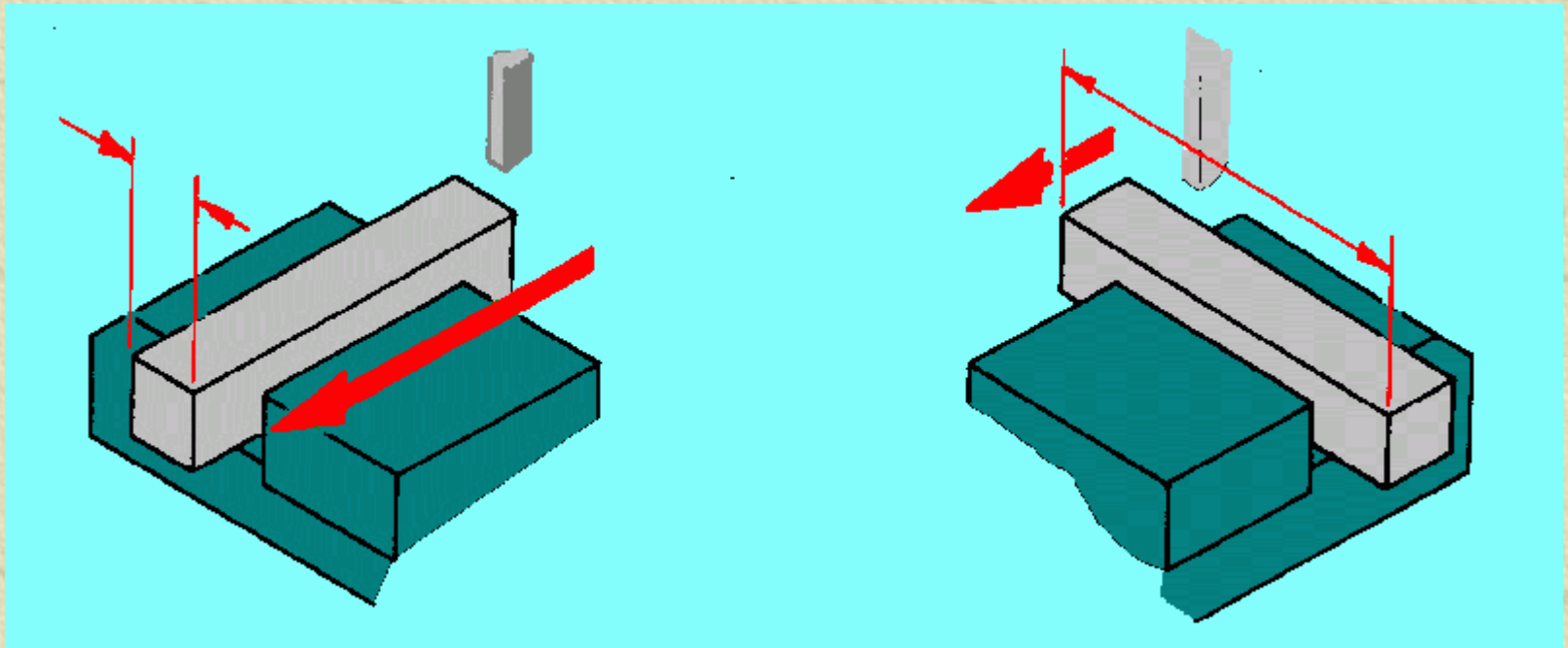
Setting the Position of Stroke

Position of stroke is the starting point & end point of stroke.



Position of workpiece

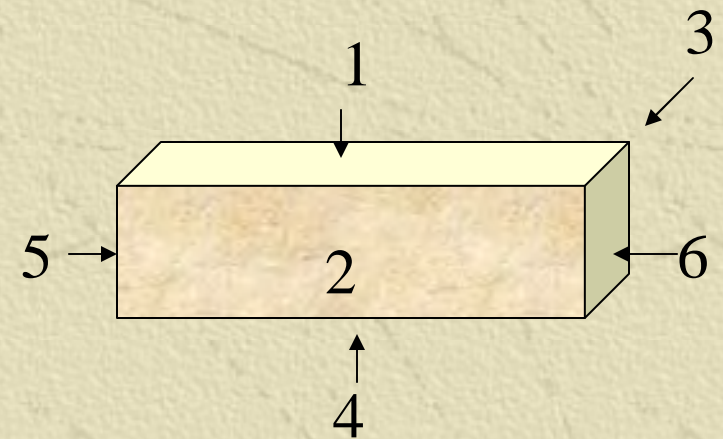
Workpiece should be mounted to machine maximum length in one stroke.



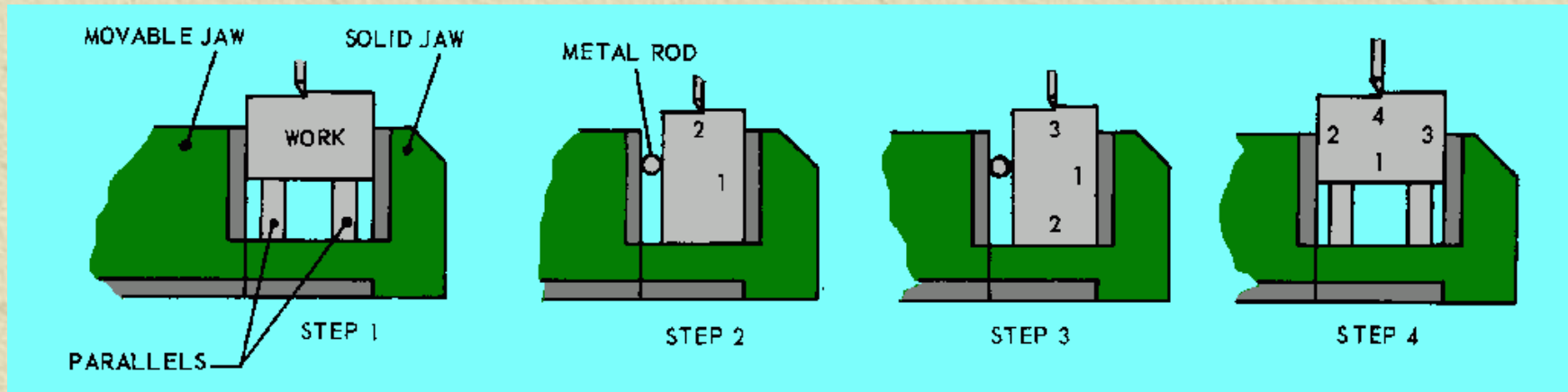
Shaper Operations

Steps in making a block square & parallel

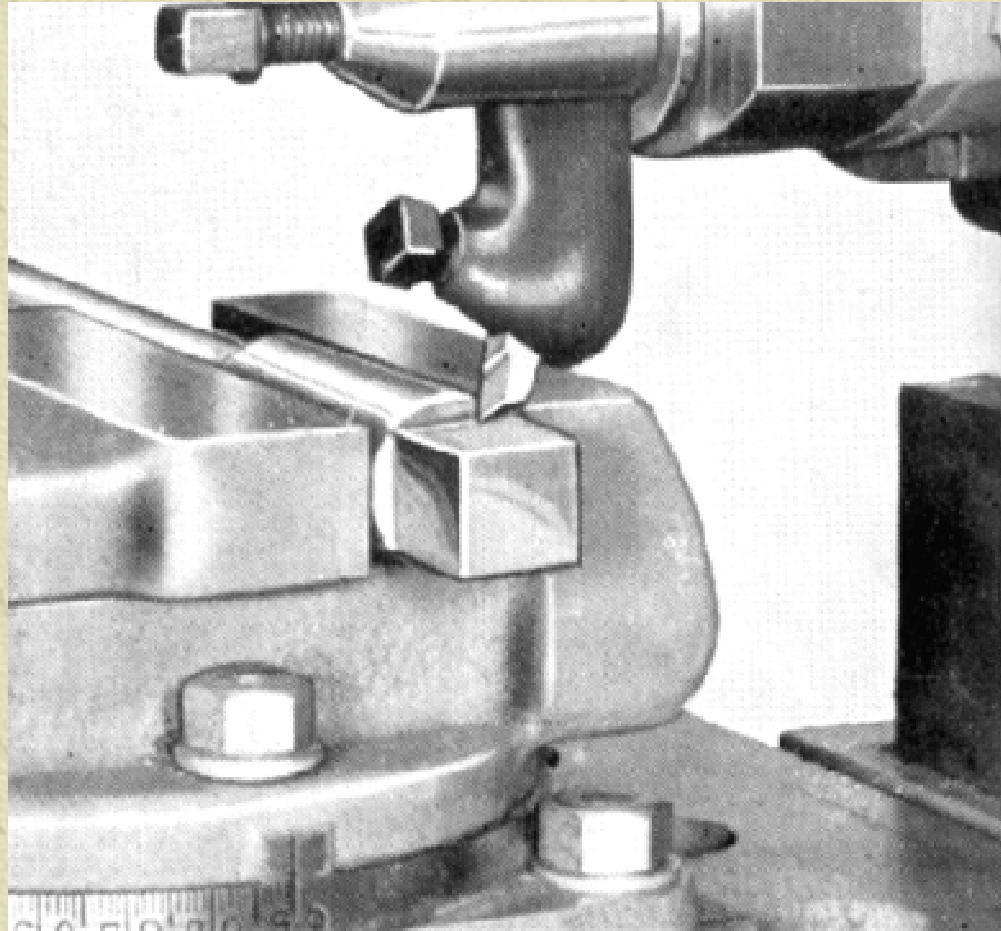
1. Remove all dirt and burrs from the work piece and the vise.
2. Vise jaws should be perpendicular to the line of motion of ram.
3. Tool should be vertical.
4. Set the work piece in the vise with parallel blocks at the bottom.
5. All cutting force should be against the fixed jaw of the vise.
6. Machine the side 1. (It is the surface having the largest area)
7. Machine side 2, with side 1 resting against the fixed jaw.
8. Machine side 3, opposite to side 2 with side 1 resting against the fixed jaw.
9. Machine side 4, opposite to side 1.
10. Then machine the two edges side 5 & 6.



Machining a block : sequence of operations

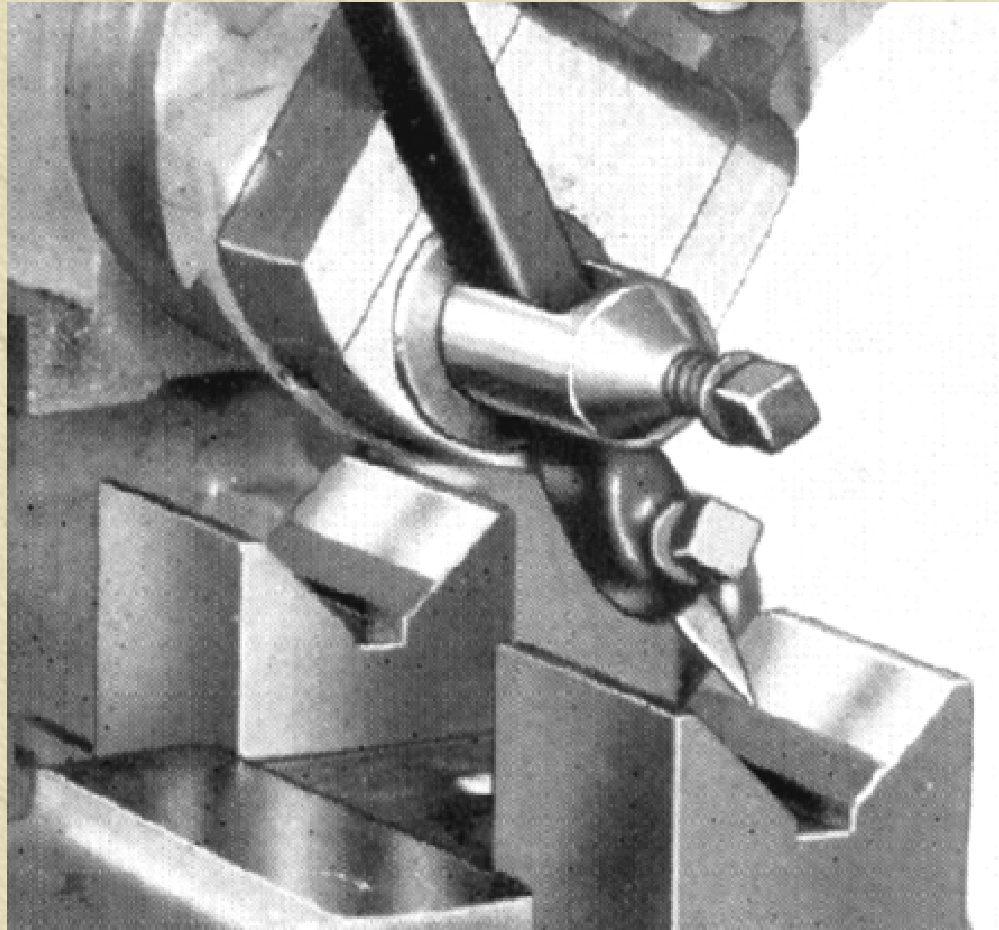


Making a Chuck Key



ME 113, By A. B. Andhare

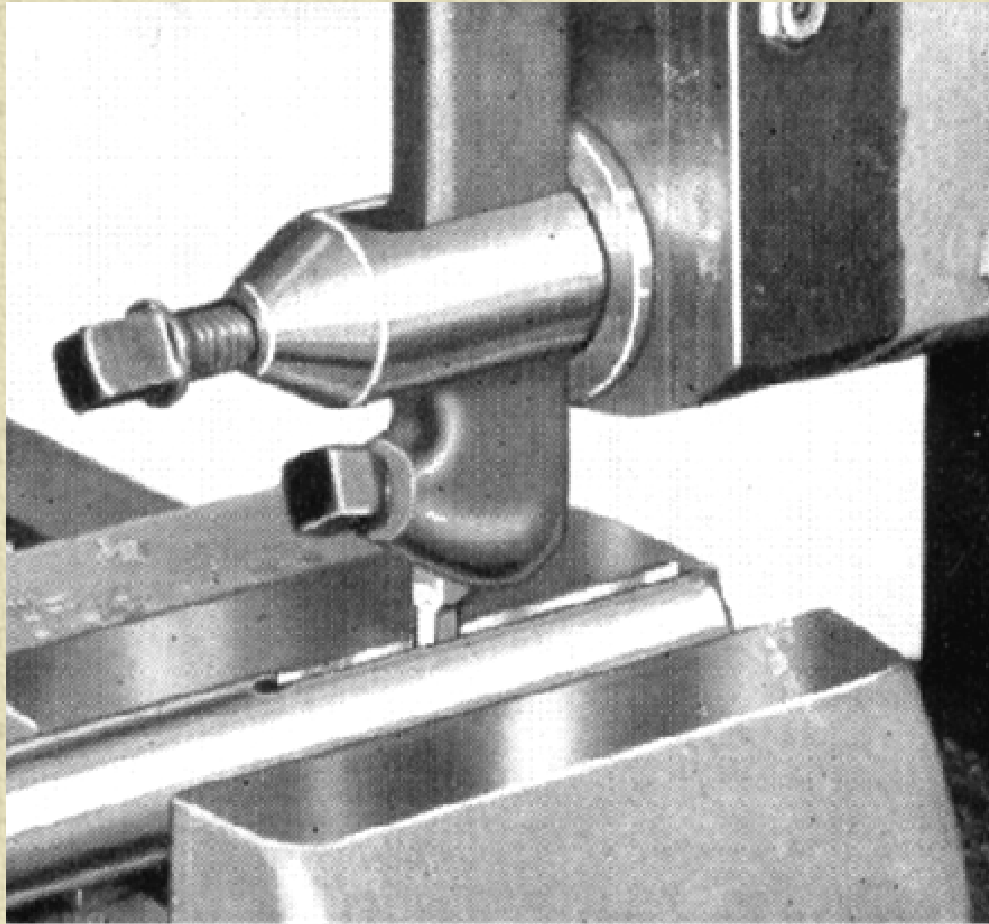
Making a V Block



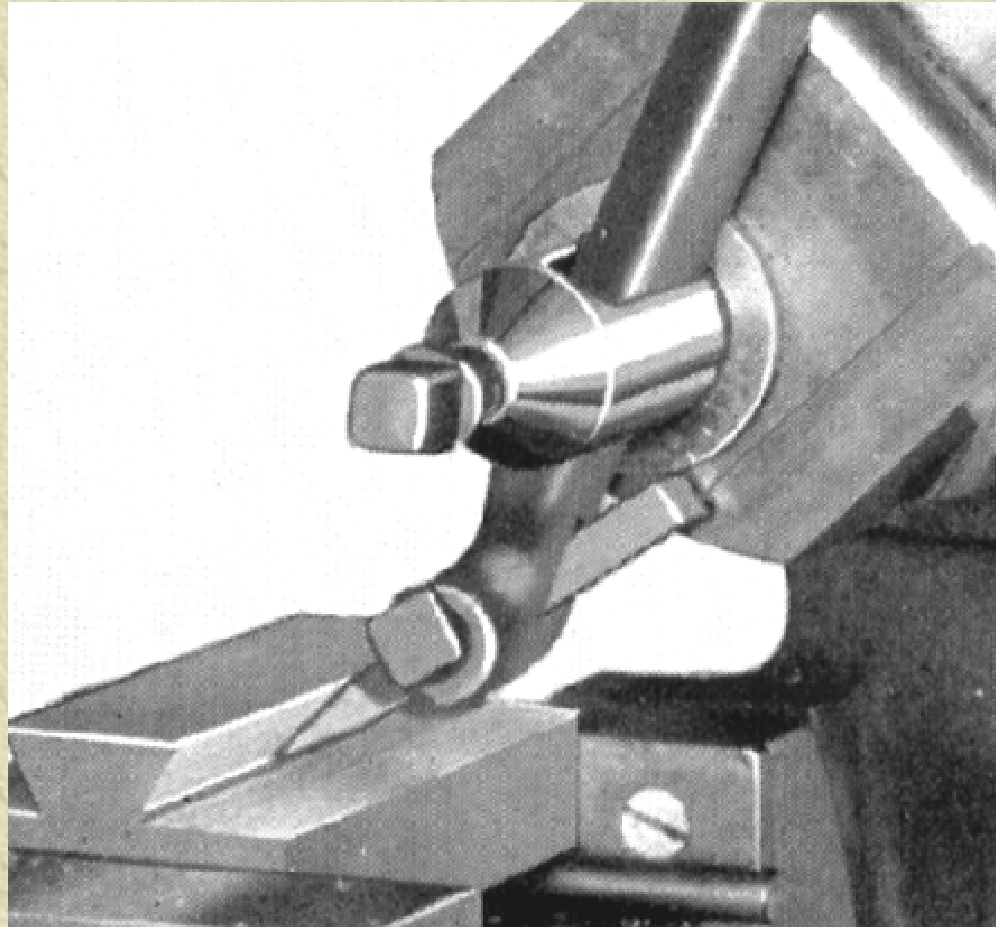
Tool slide is tilted at an angle for V Block

Taking the finishing cuts on a home-made pair of V blocks.

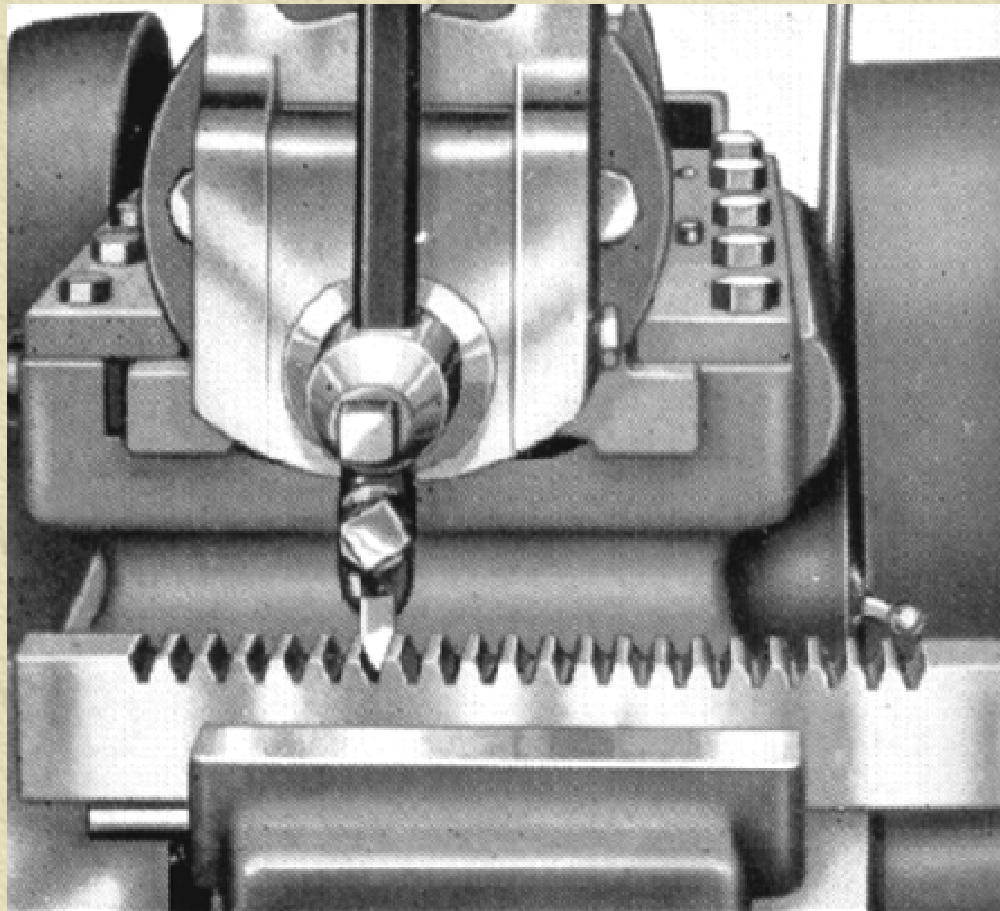
Making an external Key way



Making of Dovetail

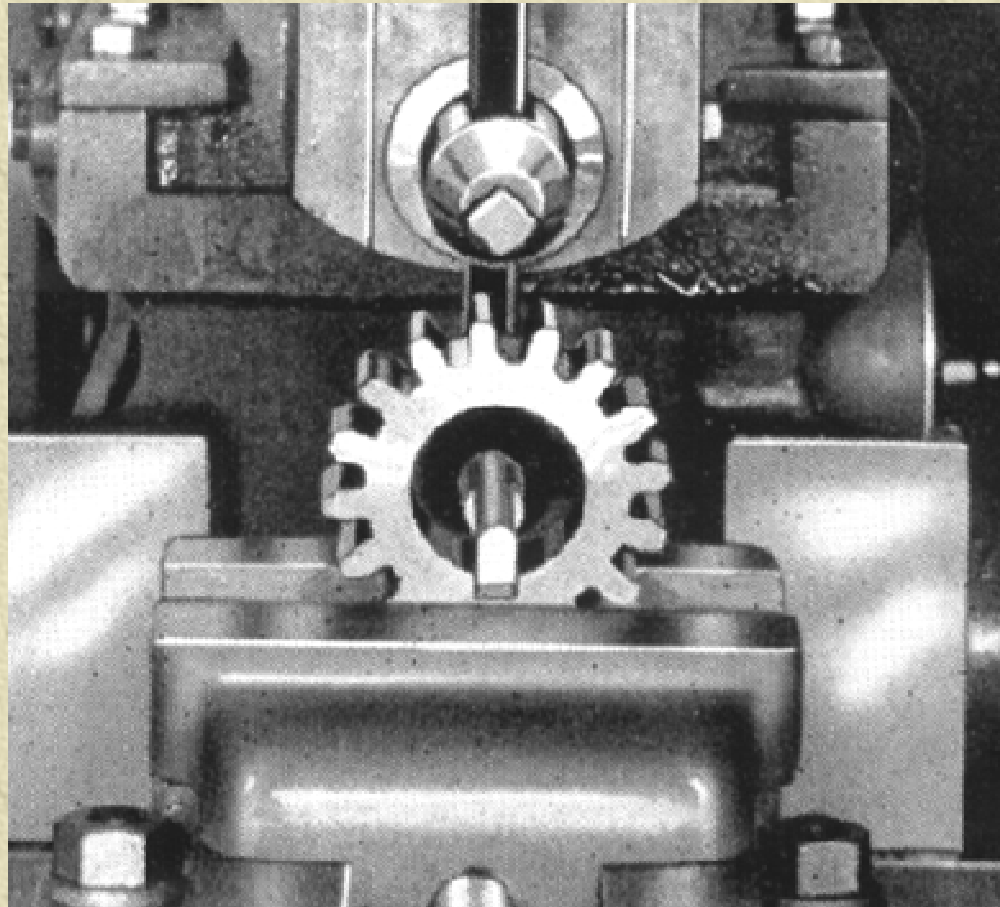


Making of a Rack



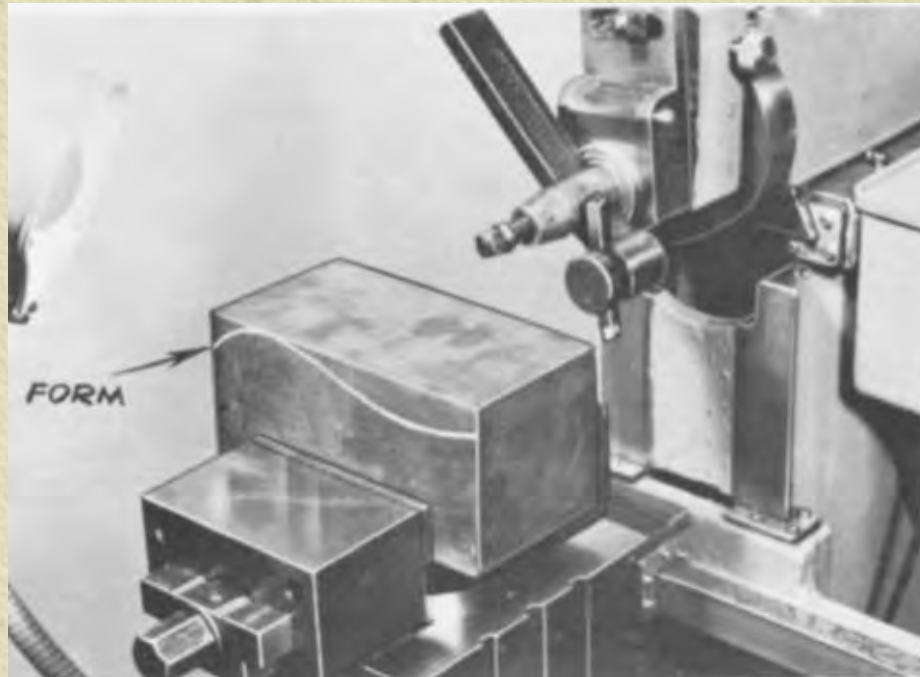
ME 113, By A. B. Andhare

Making of an Internal Key way

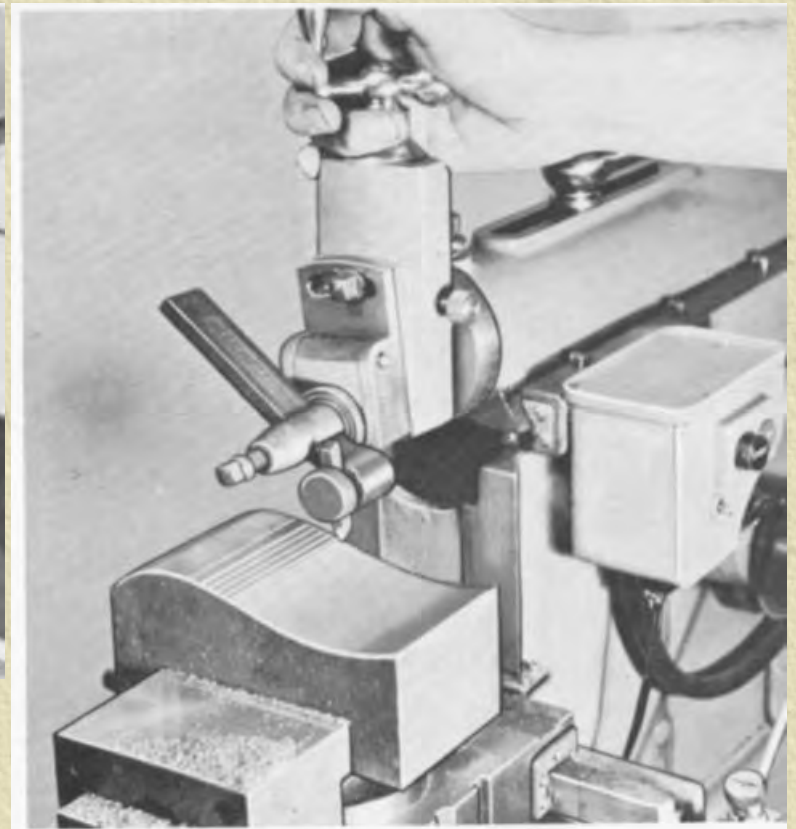


Machining a contour

Workpiece with marking



Workpiece after machining



Shaper Machine - Specifications

Length of Ram stroke: 457 mm (18")

Range of Ram speeds: 12, 24, 40 & 72 strokes per minute

Working surface of table: 483 mm * 330 mm

Max Table Travel – Horizontal: 610 mm

Max Table Travel – Vertical: 457 mm

Angular movement of table on either side: 60°

Maximum size of Tool Shank in Tool Head: 51mm * 21mm

Maximum vertical travel of Tool Slide: 152 mm

Maximum swivel of Tool Head: 60°

Main Drive Motor: 3 H.P./ 950 rpm

Planing Machine

- Tools is/are stationary at a point while cutting.
- Tool feed is given after completing one stroke.
- Table reciprocates
- Used for larger sizes of jobs
- Less accurate than shaper.

