

## ADVANCED SHAPER

**M. Anil Prakash<sup>1</sup>, Nalla Japhia Sudarsan<sup>2</sup>, K. Pavan Kumar<sup>3</sup> and K.Ch.Sekhar<sup>4</sup>**

<sup>1</sup>Associate Professor, M.V.G.R College of Engineering, Vizianagaram,  
Andhra Pradesh, India

Email: ap\_mandru@yahoo.co.in

<sup>2</sup>M.Tech Student, M.V.G.R College of Engineering, Vizianagaram, Andhra Pradesh, India  
Email: japhia333@gmail.com

<sup>3</sup>Assistant Professor, M.V.G.R College of Engineering, Vizianagaram,  
Andhra Pradesh, India

Email: pavan\_kmech@yahoo.com

<sup>4</sup>Associate Professor, Lendi Institute of Engineering and Technology, Vizianagaram,  
Andhra Pradesh, India

Email: sekhar.cadcam@gmail.com

### ABSTRACT

*A shaping machine (usually called shaper) is mainly used for producing flat surfaces, which may be horizontal, vertical or inclined. Sometimes irregular or curved surfaces are also produced by shapers. In existing shaping machines the stroke length can be varied depends upon the changing the distance between centre of the bull gear and pivot pin. It means the pivot pin will move away or towards the centre of the bull gear.*

*In advanced shaping machine the vertical slots are provide on one side of the shaping machine. The slots can be used to move vertically (either upwards or downwards) the bull gear position. It makes us easy to change the bull gear position, it means centre of the bull gear position can be moved away or towards the pivot pin. When the bull gear is move downwards or towards the pivot pin, stroke length can be increased or vice versa. In advanced shaping machine the stroke length can be varied in two types, one is to change the distance between centre of the bull gear and crank pin and another is to change the vertical distance between centre of the bull gear and pivot pin. So in an advanced shaping machine, without changing the diameter of the bull gear and height of shaping machine, we can increase the stroke length greatly.*

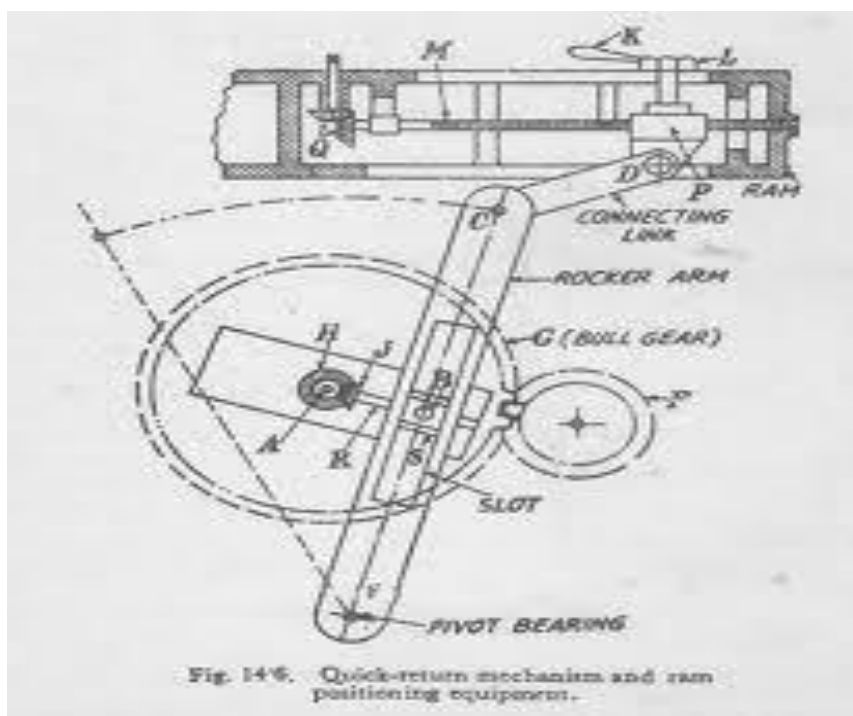
### INTRODUCTION

A shaping machine (usually called shaper) is mainly used for producing flat surfaces, which may be horizontal, vertical or inclined. Sometimes irregular or curved surfaces are also produced by shapers. In shaping, a tool is given a reciprocating motion with the help of mechanism produced on the machines that changes circular motion into reciprocating motion. The commonly used mechanism consists of ram, an eccentric rocker arm and crankpin. Since the length of a job varies, provision is made on shapers to change the stroke to the desired length. In shaper the crank pin can be moved towards or away from the centre of the bull gear, so the stroke length can be changed depending upon the crank pin position.

**Types of Mechanisms****Crank Mechanism:**

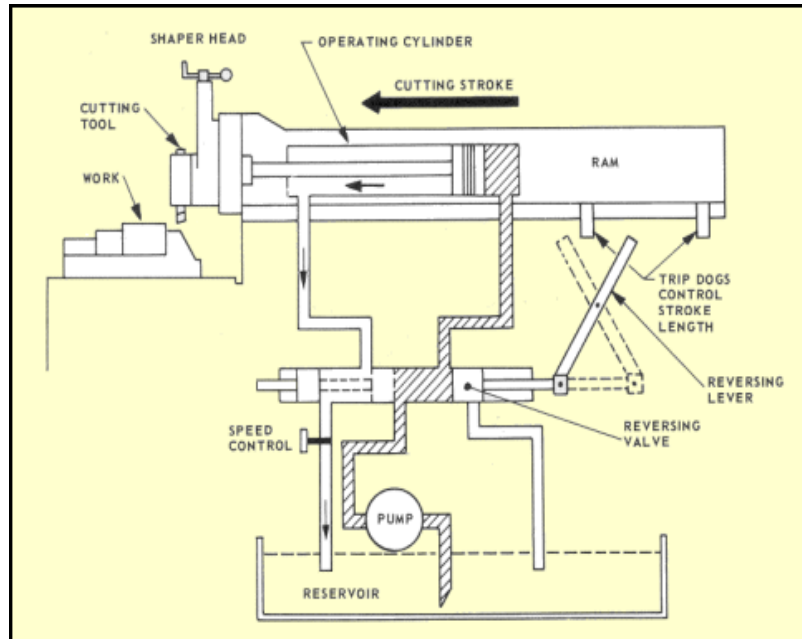
Figure shows the crank and slotted link driving mechanism of a shaper. It consists of a rocker arm called the fulcrum, fitted at the bottom. At top it carries another short link which is attached to the block that slides up and down when the bull gear revolves. In the slide block revolves the crank pin. The bull gear and slide block are fitted together with a crank pin.

The crank pin is fitted to the slotted disc carrying a T-slot and can be moved to any desired position by means of bull gear. The bull gear is driven by a bull gear pinion that is mounted on a power shaft. The bull gear while rotating makes the rocker arm swing about the fulcrum. The rocker arm in turn moves the ram to-and-fro. The angle traversed by the bull gear (and thus the rocker arm) during the cutting stroke is more than the return stroke. Thus the time taken by the cutting stroke is more than that taken by the return stroke. In other words, the cutting stroke is slower and the idle stroke faster. This is indicated by the velocity diagram at the top of the crank mechanism.

**Hydraulic Shaper:**

Hydraulic mechanisms are becoming increasingly popular these days because of their greater flexibility, smooth operation, ability to slip in case of over load, ability to withstand obstructions without damaging the tool or machine and the possibility of changing the speed and the feed during operation. Hydraulic system can be effectively used as quick return mechanisms. In the shaper ram is on its forward cutting stroke is passed through a filter and pump. The pump, driven by electric motor, pushes the oil in a constant quantity and at moderate pressure to the central valve. The control valve is fitted with an indicator that

indicates the direction in which the oil is moving. From the control valve the oil can be delivered to either side of the piston.

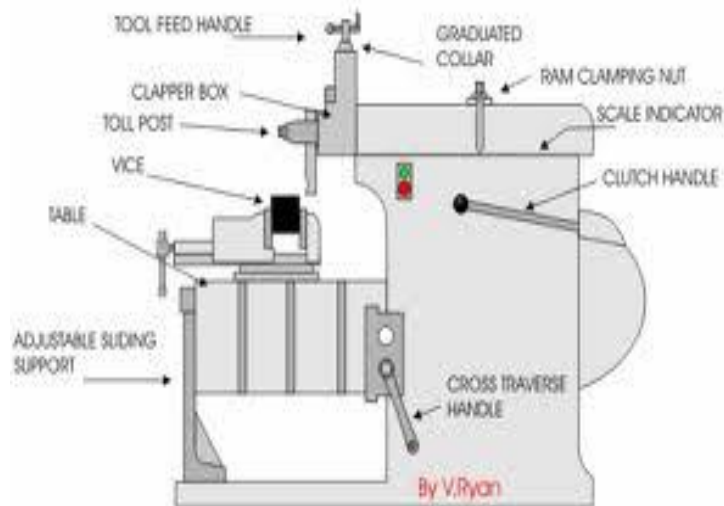


The two types of mechanisms commonly used are constant volume hydraulic mechanism constant pressure hydraulic mechanism. Figure shows a constant volume hydraulic mechanism. In this system, the same volume of oil is delivered on both sides of the piston alternatively by the actuating valve. Due to difference in the effective area of the piston (one side of the piston contains the piston rod), the ram travels at a lower velocity during the cutting or working stroke and higher velocity during the return stroke.

### **Existing shaping machine**

#### **Working Principle**

In a shaping machine the job is held in a suitable device (generally vice) clamped rigidly on the machine table. The cutting tool is held in the tool post mounted on the ram of the shaper. The ram reciprocates to-and-fro in doing so cuts the materials held in vice during the cutting stroke. Generally, the cutting action takes place in the forward stroke, which is also known as cutting stroke. No cutting of material takes place during the return stroke of the ram which is termed as idle stroke. The job is given an index feed with the help of a cross rail mechanism fitted inside the table.

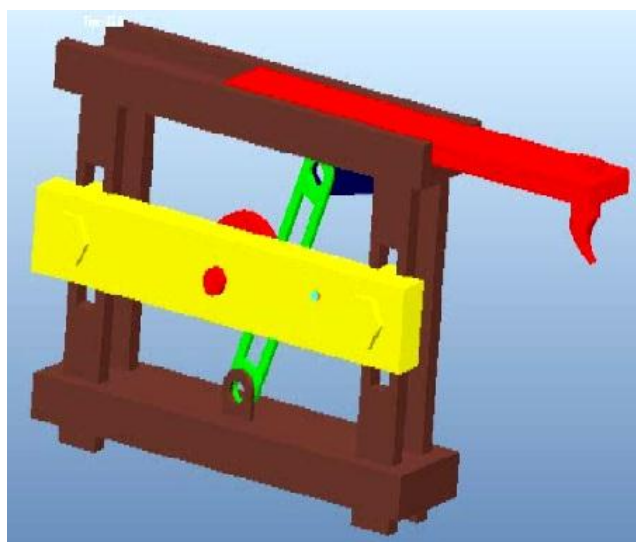


## Shaping Machine

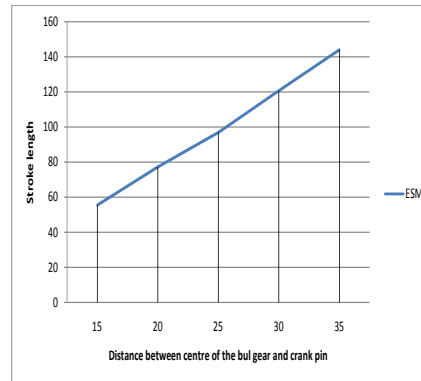
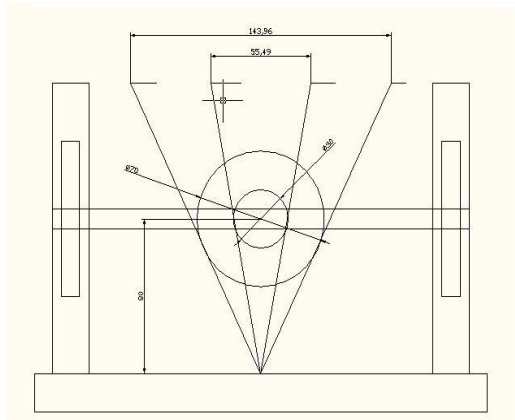
### Advanced shaping machine

In this shaping machine one horizontal frame is to move perpendicular to the side of the shaping machine along the grooves. Above the frame motor with pulley arrangement and bull gear can be fixed. With the help of screw jacks the horizontal frame can be move vertically (above or below). So the bull gear can be moved away or towards the pivot pin. When changes the bull gear position, the stroke length can be varied. So in advanced shaping machine the stroke length can be varied in two types

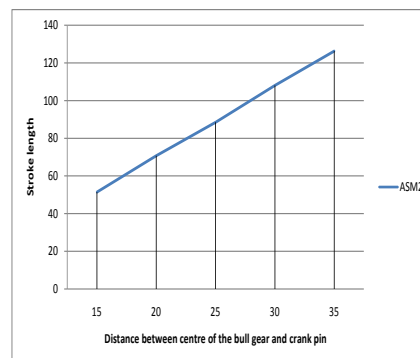
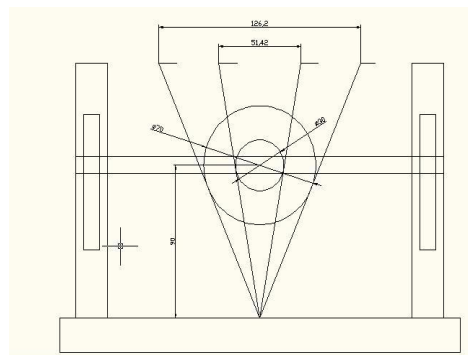
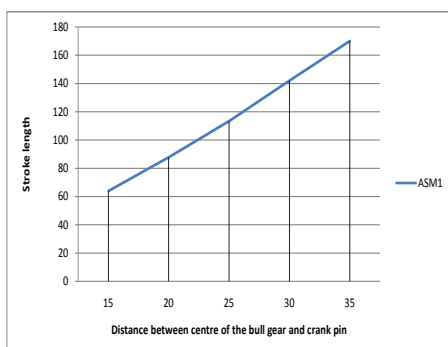
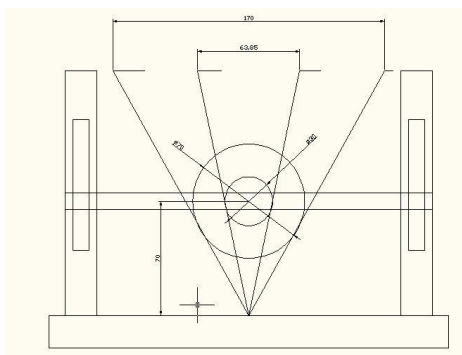
1. Change the distance between centre of the bull gear and crank pin, i.e. crank pin can be moved away or towards the centre of the bull gear with the help of screw arrangement.
2. Change the distance between centre of the bull gear and pivot pin, i.e. bull gear can be moved vertically (either upwards or downwards) to the pivot pin.



**Advanced Shaping Machine**



Above figure shows the “Existing shaping machine”. In this shaping machine minimum stroke length is 55.49mm and maximum stroke length is 143.96mm.



Above figures shows the “Advanced shaping machine”. In this shaping machine minimum stroke length is 51.42mm and maximum stroke length is 170mm

As mentioned above about the Advanced shaping machine, the figures which have been shown gives us a conclusion that if the principle of the “Advanced Shaping machine” is used in the “Existing shaping machine” then there is a increasing stroke length and decreasing stroke length

**CONCLUSION**

We can consider the figure “B” shows the existing shaping machine values and figures “A” and “C” shows the advanced shaping machine values.

In existing shaping machine: Minimum stroke length is 55.49 mm

Maximum stroke length is 143.96 mm

In advanced shaping machine: Minimum stroke length is 51.42 mm

Maximum stroke length is 170 mm

In “Advanced shaping machine”, if the bull gear can be moved vertically (up and down) with the help of screw jacks. So in this shaping machine the bull gear can be moved upwards or away from the pivot pin, we can cut the smaller materials as compared to existing shaping machine and if the bull gear can moved downwards or towards the pivot pin, we can cut the longer materials as compared to existing shaping machine.

So in advanced shaping machine we can able to cut minimum and maximum length of work pieces as compared to existing shaping machine.

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