

INTRODUCTION

PRESS :

- ❖ “It is a machine by which we can do cutting and non cutting process by applying force without removing chip on metallic or non metallic sheet.”
- ❖ “Metal forming is one of the manufacturing processes which are almost chip less. These operations are mainly carried out by the help of presses and press tools. These operations include deformation of metal work pieces to the desired size and size by applying pressure or force. Presses and press tools facilitate mass production work. These are considered fastest and most efficient way to form a sheet metal into finished products.”

CLASSIFICATION

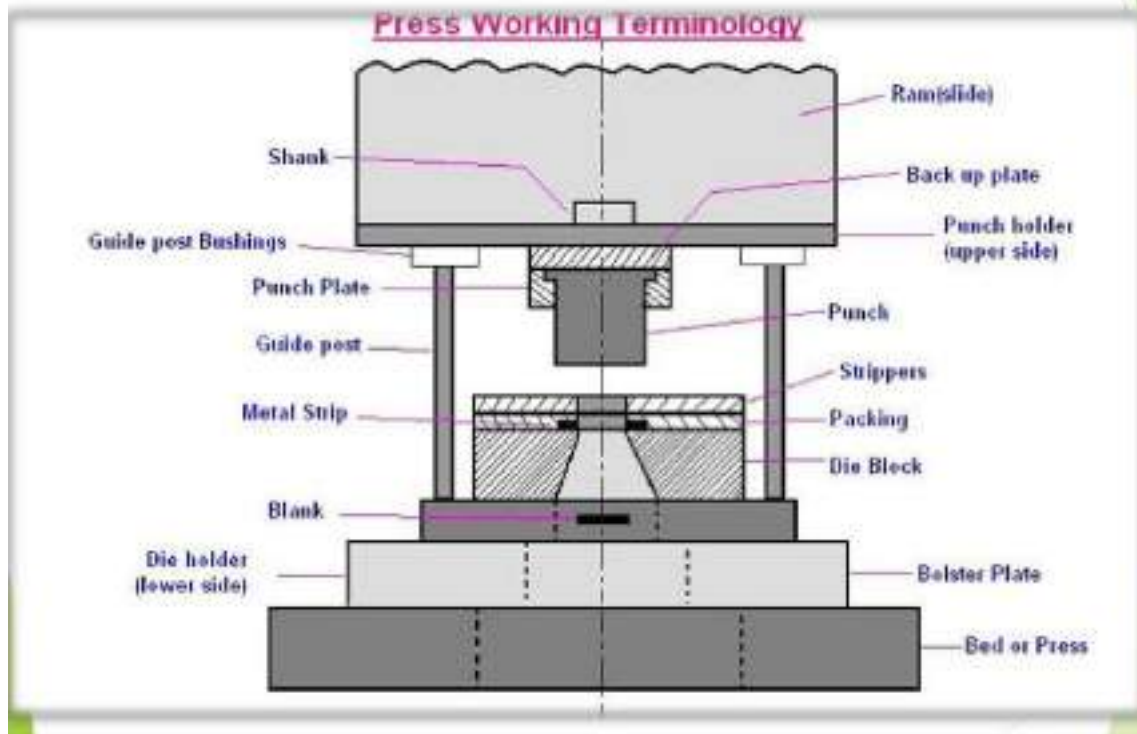
1. Manual Press:

- Foot press
- Arbor press
- Fly press
- Toggle press

2. Power Press:

- Crank press
- Eccentric press
- Cam press
- Screw press
- Rack & pinion press
- Hydraulic press
- Pneumatic press

Press Working Terminology



Press Working Terminology

1: Bed:

The bed is the lower part of the press frame that serves as a table to which a Bolster plate is mounted.

2: Bolster Plate:

This is a thick plate secured to the press bed, which is used for locating and supporting the die assembly. It is usually 5 to 12.5 cm thick.

3: Die Set:

It is unit assembly which incorporates a lower and upper shoe, two or more guide parts and guide part bushings.

4: Die Block:

It is a block or a plate which contains a die cavity

5: Lower Shoe:

The lower shoe of the a die set is generally mounted on the bolster plate of a press. The die block is mounted on the lower shoe, also the guide post are mounted on it.

Press Working Terminology

6: Punch :

This is male component of a die assembly, which is directly or indirectly moved by and fastened to the press ram or slide.

7: Upper Shoe:

This is the upper part of the die set which contains guide post bushings.

8: Punch Plate :

The punch plate or punch retainer fits closely over the body of the punch and holds it in proper relative position.

9: Back up Plate:

Back up plate or pressure plate is placed so that intensity of pressure does not become excessive on punch holder. The plate distributes the pressure over a wide area and the intensity of pressure on the punch holder is reduced to avoid crushing.

10: Stripper:

It is a plate which is used to strip the metal strip from cutting a non-cutting Punch or die. It may also guide the sheet.

Accessories of common press

- 1. Base*
- 2. C- frame*
- 3. Ram*
- 4. Crank shaft*
- 5. Clutch*
- 6. Brake*

Press selection

- ❖ Size of work piece*
- ❖ Stock Width and material*
- ❖ Type of operation*
- ❖ Power of press and speed of operation*

Press Size

The size of press is designated by its maximum capacity of applying load on a piece of blank, and its expressed in tones

The bed area is also considered in the press size

Mechanical

- ❖ Capacities to 6000 tons
- ❖ Force varies throughout the stroke
- ❖ Limited/difficult overload

Hydraulic

- ❖ 50,000 +ton capacities
- ❖ Large force available at the top of the stroke
- ❖ Overload protection

Press Working

- Use of mechanical and hydraulic presses for forging and extrusion.
- Knuckle type mechanical presses are used widely for sheet metal work.
- These presses are usually of vertical configuration.
- These presses are provided with a heavy flywheel driven by an electric motor.
- A ram moves up and down the guide ways provided in the frame of the press, when the ram is connected to the flywheel through a connecting rod and a crank mechanism.
- The clutch for transferring the motion from the flywheel to the ram is operated by a foot operated treadle.
- The arrangement is some what similar to the mechanism of a reciprocating engine.
- Such presses are very useful for providing short powerful strokes.

Types of press

- 1. Fly press*
- 2. Gap frame press*
- 3. Hydraulic press*
- 4. Screw press*

There are different criteria of classification of presses into different categories. These criteria, related classifications and their descriptions are discussed below.

According to the Power Source

These power source are categorized as :

Manually Operated or Power Driven

These presses are used to process thin sheet metal working operations where less pressure or force is required. These are operated by manual power. Most of manually operated presses are hand press, ball press or fly press.

Power Presses

Power presses are normally driven by mechanical mechanism or hydraulic system. Power source of these presses may be electric motor or engine.

According to the Type and Design of Frame

The type and design of frame depending on the design of frame these are classified as:

- ❖ **Inclinable.**
- ❖ **Straight side.**
- ❖ **Adjustable bed.**
- ❖ **Gap frame.**
- ❖ **Horning and open end.**

According to the Type and Design of Frame

❑ *Inclinable Frame Press*

Its frame is called inclinable due to its capability to tilt back up to some angle. It can be locked into any of its inclined position. Its back is open to exit the scrap so it is also called open back incli



According to the Type and Design of Frame

❑ *Gap Frame Press*

These presses have larger frame openings, that means a wide gap between its base and ram to accommodate larger work pieces. It also has longer beds.

Gap-Frame Presses

- Also called "C-frame" presses
- OBI – Open-back inclinable
- OBS – Open-back stationary



❑ *Straight Side Press*

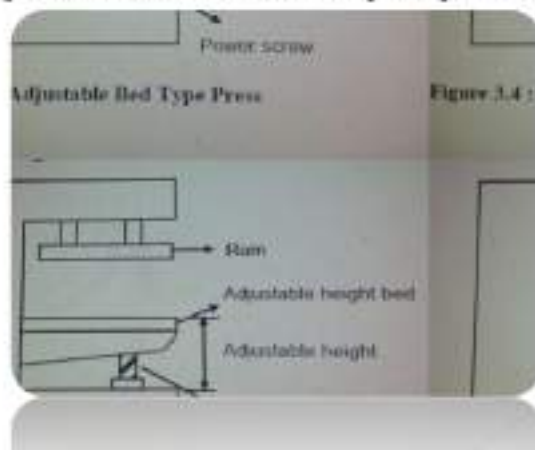
These presses have straight side type frame which is preferred for presses having larger bed area and high tonnage. This offers greater rigidity and capable of longer strokes. The frame consists of vertical and straight sides so it is called straight side press.



According to the Type and Design of Frame

❑ Adjustable Bed Type Press

It is also called column and knee type press because it has a knee type bed supported on its column shaped frame. Its bed (knee) can be adjusted at any desirable height by moving it vertically up or down with the help of power screws.



According to the Type and Design of Frame

❑ Open End Press

It has a solid type of vertical frame with all sides open. Driving mechanism is housed at the back and ram controlling mechanism at the front. It is easily to accommodate work piece and dies in this type of structure. Its is identified as light duty machine.

❑ Horning Press

It consist of a vertical frame, top of which over hangs towards the front. The over hanging portion serves for housing for driving mechanism and ram control. The frame consists of a front face as a work table called horn.

According to the Position of Frame

Presses can also be categorized by the position of frame as described below.

Inclinable Frame

Already described.

Vertical Frame

Vertical frame type of press is already been discussed, it cannot be adjusted like inclinable frame. Gap, adjustable bed, straight side, open end and honing presses are the example of vertical frames.

Horizontal Frame

It has a fixed frame in horizontal position. It provides the facility of auto ejection of produced part and scrap due to gravity.

Inclined Frame

Like inclinable frame, inclined frame press has an inclined frame but fixed, it cannot be adjusted to any other angle.

According to the Actions

According to the number of actions it can be categorized as **single action**, **double action** or **triple action press**. Here number of actions is same as the number of rams on the press.

According to Mechanism Used to Transmit Power to Ram

Crank Press

It consists of crankshaft driven by a flywheel, rotary motion of the crankshaft is converted into reciprocating motion with the help of a connecting rod connected to ram.

Cam Driven Press

In this press, a cam is used to press the ram down words and suitably located springs restore the original position of ram when pressure applied is removed.

Eccentric Press

In this press, the driving shaft carries an eccentric integral with it. One end of the connecting rod carried an attachment of revolving eccentric and its other end is connected to ram. As the eccentric shaft revolves, the offset between the eccentric centre and the centre of rotation of the shaft provides the required movement.

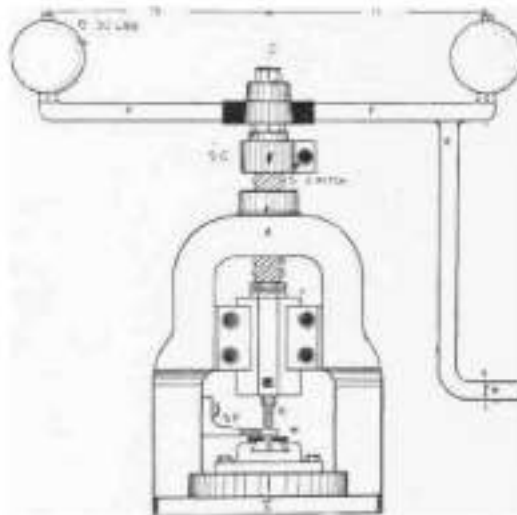
According to the Purpose of Use

Some of the operations require low stroke strength and some larger stroke strength. In the same way requirements of stroke length is different for different operations. So depending on power and stroke length presses are classified as given below depending on their suitability of performing different operations.

- ❖ Shearing press
- ❖ Seaming press
- ❖ Punching press
- ❖ Extruding press
- ❖ Coining press
- ❖ Forging press
- ❖ Rolling press
- ❖ Bending press.

FLY PRESS

A fly Press is a machine tool used to shape sheet metal by deforming it or cutting it with punches and dies



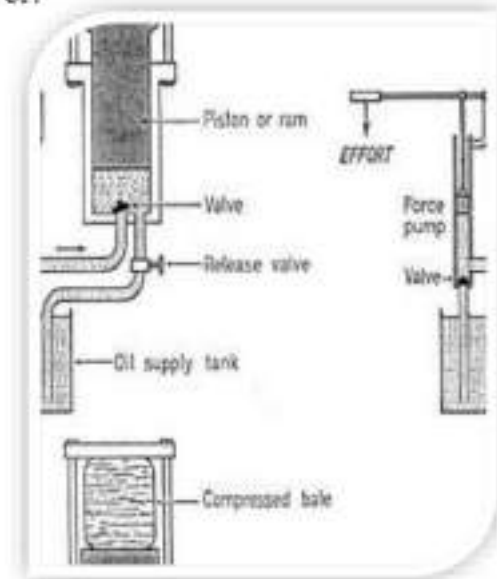
GAP FRAME PRESS

A type of press with a C-shaped frame suspending the crown over the bed and an open portion in the front. The open front of the gap-frame press offers easy access to the die set.



HYDRAULIC PRESS

A hydraulic press is a machine using a hydraulic cylinder to generate a compressive force. It uses the hydraulic equivalent of a mechanical lever.



SCREW PRESS

A screw press is a type of machine press in which the ram is driven up and down by a screw.

