BENDING OPERATIONS

Bending is the operation of forming the metal between a suitably shaped punch and a forming block.

The included angle on the tool is usually smaller than that to be produced to allow for the µ V S UE L DQ F J N ¶ the metal after forming. Spring back is a term which denotes the property of sheet metal to partially fall back from its bent position when the punch retards after completing the operation.

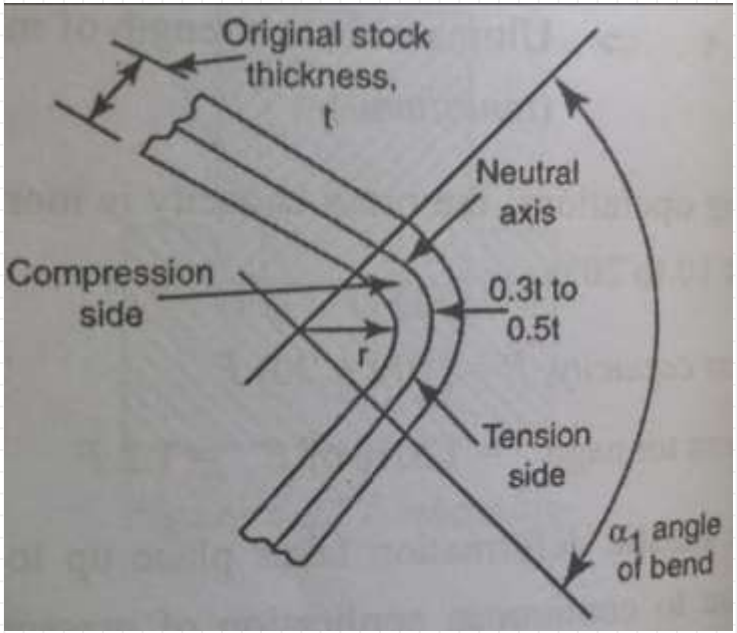
The metal is stressed beyond its elastic limit.
The line in which there is no change in length is called neutral line. The layers above the neutral line are stressed by tension.
But the layers below this neutral line are stressed by compression

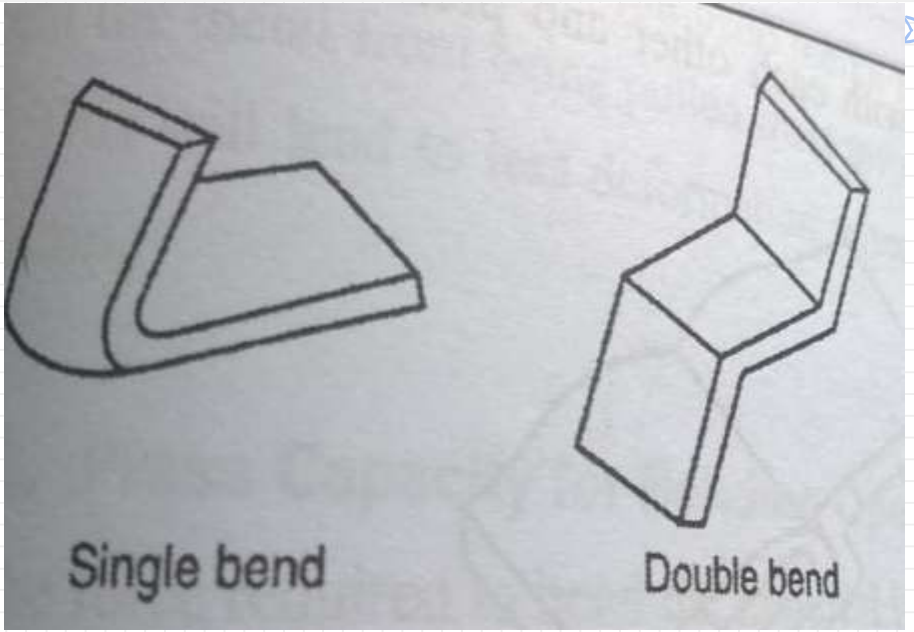
BENDING OPERATIONS

Types of Bending operations:

1. Angle Bending: In this case, the metal is bent at an angle to each edge. It is denoted by µ Ä ¶

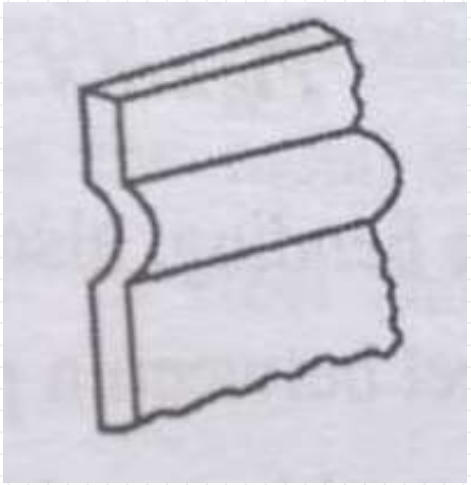
If $\theta < 90^{o}$ on side, it is called as single bending.
If $\theta = 90^{o}$, this is called as vertical or straight bending.
If $\theta > 90^{o}$ but in two places on the same work, it is called as double bending.

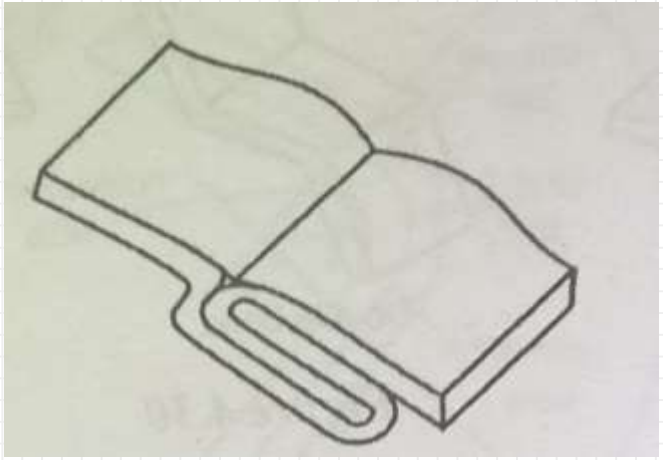

Original stock thickness, t
Neutral axis
Compression side
0.3t to 0.5t
r
Tension side
α_1 angle of bend


Single bend
Double bend

BENDING OPERATIONS

2. Roll bending: If the metal is bent in the form of rolled edge at the edges of the work, it is called as roll bending.
3. Roll forming: If the edges are formed to a desired shape or any impression in the form of bend is made on the sheet metal, it is called as roll forming operations.
4. Seaming The process of providing lock between the two edges of the different work metal is called as seaming. To perform this, the edges of sheet metal to be locked are bent in opposite direction to each other. Then they are inserted with each other and pressed or tightened to make complete lock.



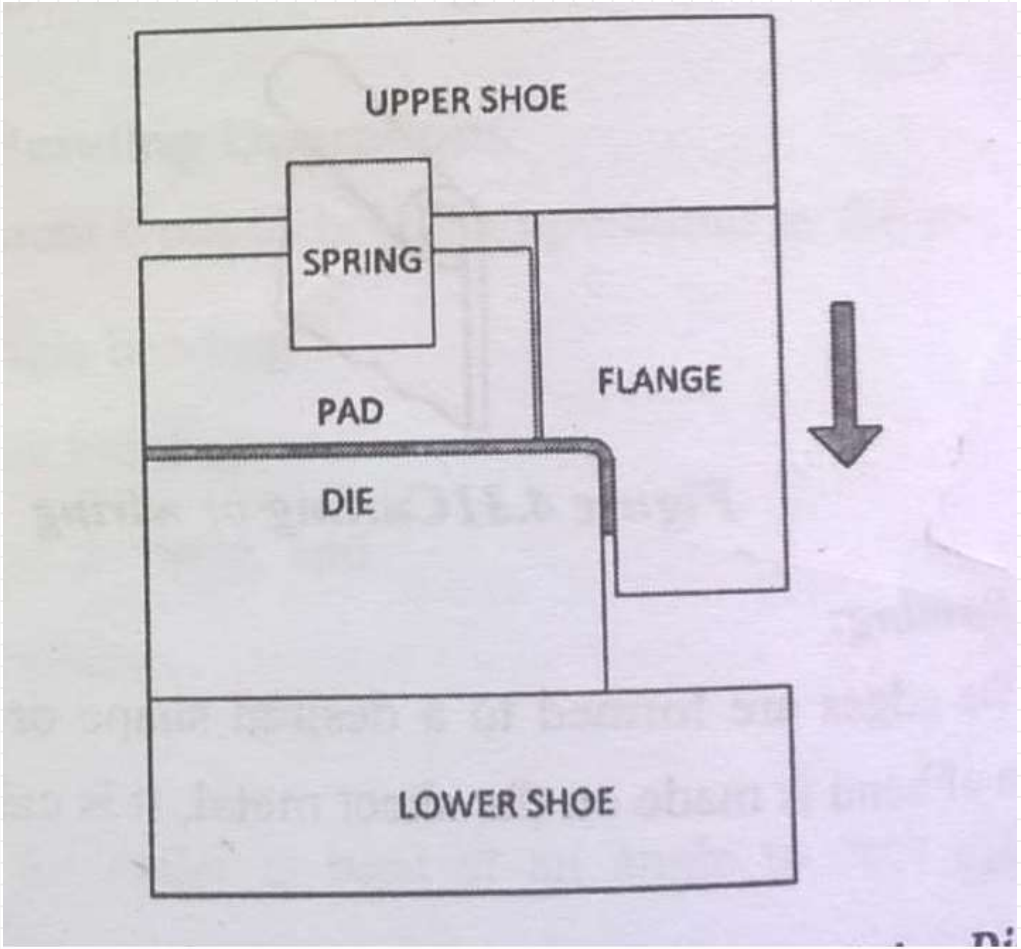


BENDING OPERATIONS

5. Bending edge of a sheet using wiping-die: Wiping die bending, also known as edge bending, is performed by holding the sheet between a pad and die then sliding the wiping flange across the face pushing and bending the sheet metal which protrudes from the pad and die.

The flange is driven by an upper shoe and the die is supported by a lower shoe

A spring between the pad and upper shoe grabs the metal before the flange hits it and holds the workpiece down during the bending process.


UPPER SHOE
SPRING
FLANGE
PAD
DIE
LOWER SHOE

DRAWING OPERATIONS

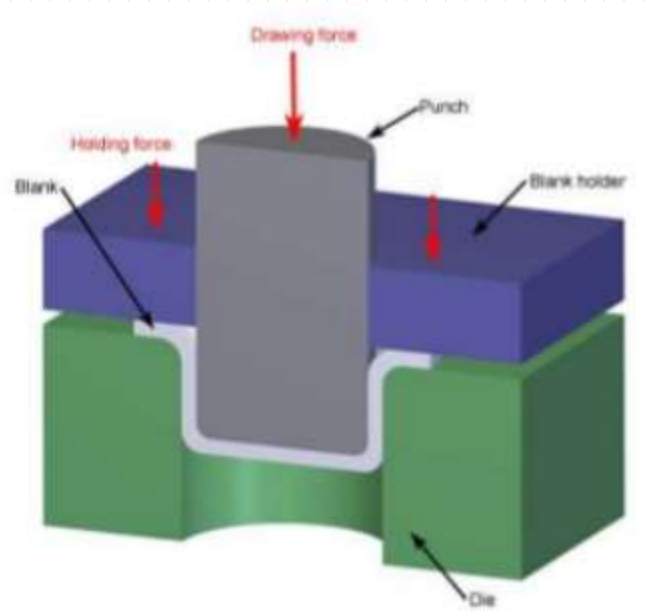
Drawing operation consists of a punch forcing a sheet metal blank to flow plastically into the clearance available between the punch and die surfaces and die surfaces so as to acquire an up shape, a cylindrical shape or a box shape.

Types of Drawing operations:

1. Deep drawing
2. 2. Shallow or box drawing

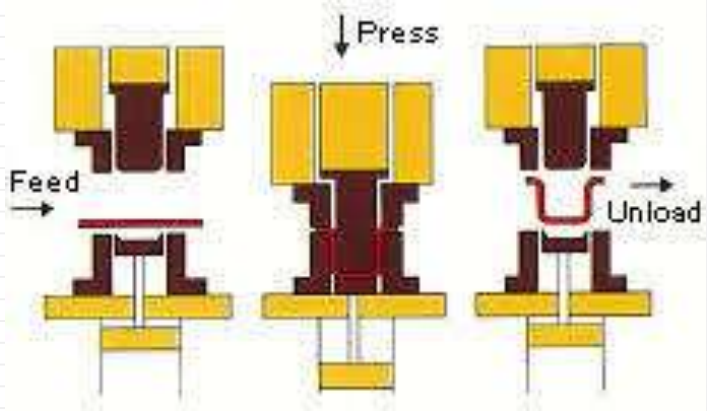
DRAWING OPERATIONS

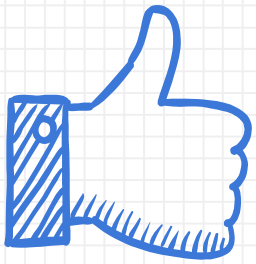
1.Deep drawing: In this case,the length of the part to be drawnis deeperthanits width.



2. Shallow or box drawing: In this case, the length of the part to be drawn is lesser than its width. Example: Seamless pots,tubs,cans

- When **depth** of the product is **greater** than its **diameter**, it is known **"Deep drawing".**
- When **depth** of the product is **less** than its **diameter**, it is known **"shallow drawing".**





THANKS!

Any questions?

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- Image credit: Conditiohumania.io