

Jigs & Fixtures:

These are ^{auxiliary} ~~complex~~ devices used in mass production.
Fixtures ensure that every time machining is taking place in a single plane preference only.

Jig is having one additional function to perform i.e. guiding the tool.

Jigs are used in Drilling, Boring, Reaming, Broaching

Elements of Jigs and Fixtures:-

- ① Locating element
- ② Clamping element
 - Pneumatic
 - Toggle & wedges
- ③ Tool guiding element → Jigs
- ④ Jig body

① Locating element

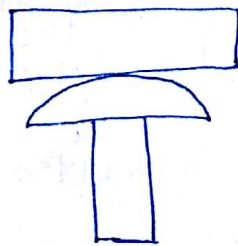
(a) 3-2-1 principle:-

These pins are provided in the body of Jig. There are 12 DOF during machining i.e. movement along positive and negative axis and also clockwise and anticlockwise rotation about the axis (~~2x3~~). Three hemispherical pins are provided in the base of Jig so when the workpiece is thrown in jig body it resting on three points.

Three points can define a plane so these 3 pins ensure that every time machining is taking place in a single plane of principle only. These three pins arrest 5 DOF of work piece i.e. movement along $(-z)$ direction and cw & Acw rotation along ~~em~~ x and y axis.

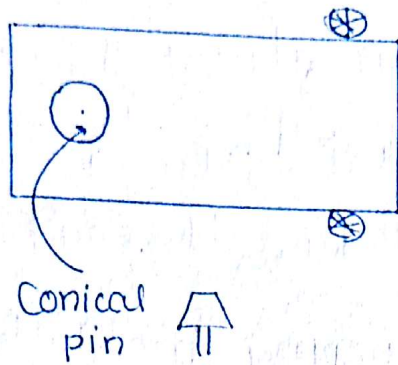
Two pins are provided on a plane $\perp$ to the base in the length direction. These 2 pins arrest 3 more DOF i.e. movement along $(-x)$ direction and Acw & cw ~~dir~~ rotation along z axis.

A sixth pin is provided on a plane $\perp$ to the previous two planes and this pin arrest one more DOF i.e. movement along $(-y)$ direction. So by providing 6 pins 9 DOF can be arrested. Remaining two DOF will be arrested by clamping element. Before machining start 11 DOF of any workpiece must be arrest.

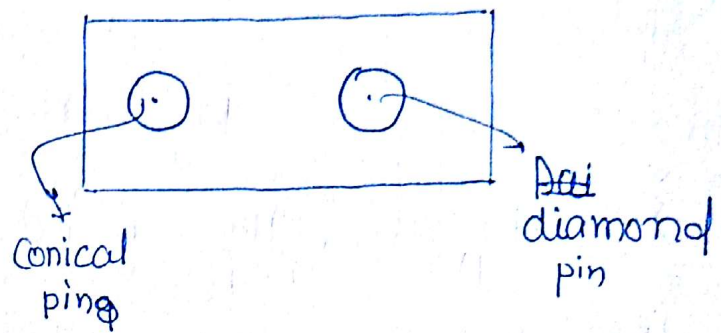


(b) Radial location:-

one hole



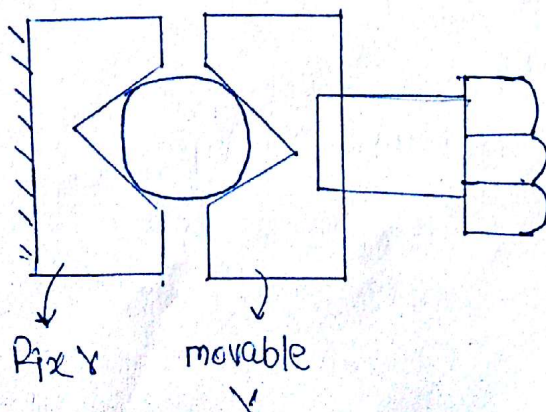
Two hole



This type of location is used when there is already one drilled hole in the workpiece. A conical pin is inserted in the hole to arrest 9 Dof.

Conical pins are used to accomodate the variation in size of hole. If there are two holes in the work, in one hole we insert conical pin, and in larger hole we insert diamond pin. Two surface of diamond pin are ~~leave~~ relieved and it can accomodate any variation in centre to centre distance.

(c) V-locators:- This is used in cylindrical & spherical wp.



Steps in Designing a Jig:-

- ① The workpiece for which jig and fixture has to be design its plan and elevation and end view are drawn with red pencil.
- ② Identify the type of locating element.
- ③ Identify the places where clamping has to be done
- ④ Identify the places where the machining has to performed. (because that places we don't have jig)
- ⑤ Draw the jig body.

