TIPS FOR SELECTION OF A JIG
1)- To drill holes on the rectangular surface.

Plate jig with side and top views
*To drill holes on large work pieces we generally go for table jig
*Table jigs are plate jigs with legs to raise the jig of the table

TABLE JIG
2) To drill a hole exactly on the diameter of the cylinder or spherical piece.
Box jig to drill hole at the centre of the spherical workpiece
3) For drilling holes in large rectangular piece with less accurate operation

For this operation we have to use channel jig
*Channel jigs are used for large rectangular pieces where there is little tolerance in accuracy.
*The work is held between the two sides and machined from the third side.
4) To drill holes in cylindrical piece, template circular jigs are used. Template jigs are normally used for accuracy rather than speed. This type of jigs can be fit over, on or into the workpiece.
RECTANGULAR TEMPLATE JIGS
Diagram showing use of template jig
8) To drill holes at different angles:
   a) Box jig

Box jig used for drilling holes at different points at different angles
Diagram showing box jig to drill hole at inclined angle, with unequal legs to give desired angle
Plate jig for drilling at an angle-

Angle plate jig for drilling at 90 degree

Modified angle plate jig for drilling at angle < 90 degree
6) For angular drill entry, an angular plate jig with angular bush is used.
7) To drill holes on the irregular surfaces at different positions can be done by making end of bushing to the workpiece contour.
To make hole at one side of the flank, pot jig is used.

View showing clamping screw released, C washer withdrawn, so that bush plate may be lifted off and component removed.
*leaf jig is used for drilling two connecting holes in small plate.
*It is a type of box jig with small size which surrounds the work and have a handle.
Indexing jigs are used for accurately space holes around a circular part.
PROBLEM 1

• Design and draw a channel jig for mild steel component as shown in the figure to drill a hole of 18 mm diameter.
Different steps involved in design

• Selection of Bush
• Selection of locator
• Design of jig body
• Selection of Clamps
• Bill of Materials
Selection of Bush

- Outside diameter – Push fit or Press fit
- Inner hole – Run Fit

- Bush Selection, : headed fixed type DDB 5.100
• Given hole diameter is 18mm.
• Tolerance for inner diameter of bush: $d_1 F7 \phi$ – running fit
• From DDB 3.9 $d_1 = 18^{+0.041}_{-0.020}$
• $d_2 = 30$ mm
• Tolerance push fit- $d_2 h6 \phi$
• From ddb-3.7 $d_2 = 30^{+0.000}_{-0.016}$
Other dimensions

- $l_1 = 20\text{mm}$
- $l_2 = 15\text{mm}$
- $d_3 = 35\text{mm}$
Selection of locator

- Thickness of jig plate must be equal to distance, $l_2$ of brush= 15mm
- For better rigidity- 2 locators and clamps on both sides are used
- Select locating pin corresponding to jib plate thickness
• Width of workpiece = width of jig = 45 mm

• Use 2 locators for perfect alignment at a width of 45 mm
DDB 5.92

- Locator head diameter, $D=16\text{mm}$
- $h_1=14\text{mm}$

**Other Dimensions**
- $d=15\text{mm}$,
- $h_1=14\text{mm}$,
- $h_2=22\text{mm}$,
- $d_1=12\text{mm}$,
- $d_2=11.5$
Design of Jig Body

• W=45mm

• Length of jig plate =
  2tp+lw+h2+allowance =
  (2*15) + 75 + 22 + 13 =
  140mm

• tp – thickness of jig plate

• Lw – length of workpiece
Continued

• Height of jig plate =
  Hw + tp + clearance for chip removal = 52+15+
clearance

  Clearance
  = 0.5 drill dia – for ductile
  = 1 drill dia – for brittle

So, height of jig plate=52+15+9 =76 mm
Selection of Clamp (DDB 5.104)

- Pressure pad assembling is used to clamp right hand side of workpiece and fixed at the end of clamp.

- 2 clamps are selected for better rigidity
• Outer dia of pressure pad = d1 = 16mm
• Other dimensions
  • d4 = 64mm
  • f = 3.5mm
  • h = 9.5mm
  • d5 = 12mm
  • d6 = 7mm
  • d7 = 2mm
• Size of screw M8
# Bill of Materials

<table>
<thead>
<tr>
<th>SL. NO</th>
<th>Part Name</th>
<th>Material</th>
<th>No. o</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bush</td>
<td>Gun Metal</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Jig Plate</td>
<td>Steel</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Screw clamp with pressure pad</td>
<td>Steel</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Locator</td>
<td>Steel</td>
<td>2</td>
</tr>
</tbody>
</table>
Problem 2

Design a jig for drilling two holes of 10mm diameter on the given workpiece.
Step 1: Selection of bush

- Fixed type bushes is selected (one for each hole to be drilled)

- Inner hole - loose running fit \( (d_1=10\text{mm } f7) \)
- Length of the bush \( (l_1=20\text{mm}) \) \( l_1=2xd_1 \) (general rule)
- Outer diameter - press fit \( (d_2=18\text{mm } h6) \)
- Flange diameter - 22mm

- \( d_1 = 10^{+0.034} \) \( -0.004 \)
- \( d_2 = 18^{+0.000} \) \( -0.003 \)
Step 2 : Design of locator and supporting block

For cylindrical workpiece, form locator is fabricated.

V-block locator may be used.

Drawback – height of jig will be increased
Supporting Block

- Used to support the workpiece from bending during drilling operation
- Similar to hollow pipe
Step 3: Design of Clamp

- Used to clamp the workpiece
- Avoids the action of disturbance forces