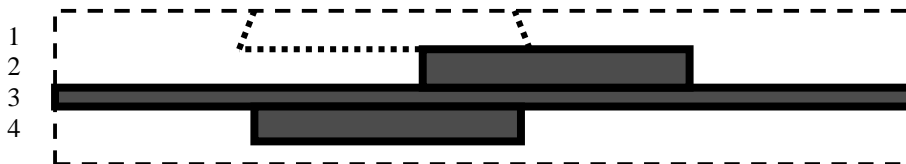


# Eccentric Circles

## Design, Layout and Turning Steps

**Turning Eccentric Ring Pieces** - This rotation will show the process to make eccentric ring pieces with straight or natural edges. I discuss wood selection, design and layout, turning, chucking and sanding. I will provide a handout showing the layout process and the design of the eccentric chuck.

- 1) My inspiration:
  - a) Stuart Batty's square and natural edge bowls.
  - b) Hans Weissflog's eccentric ring pieces.
  
- 2) Plan your design
  - a) Evaluate the wood for shape, depth, grain and color.
  - b) Design elements to consider:
    - i) Wood
      - (1) Shape of piece: rectangle, square, natural edge.
      - (2) Straight grain or burl.
      - (3) Outer diameter.
      - (4) Sap wood vs heart wood.
      - (5) Thickness of burl.
      - (6) Thickness of piece when complete.
    - ii) Rings
      - (1) Location: symmetry, balance.
      - (2) Diameter: same or alternate sizes.
      - (3) Thickness: fat or thin rings.
      - (4) Height: tall or short profiles.
  - c) Technical design considerations
    - i) Raw stock thickness must be the sum of:
      - (1) Depth of chuck recess/mortise.
      - (2) Height of top ring.
      - (3) Thickness of body.
      - (4) Height of bottom ring.



- 3) Layout the piece
  - a) Find your diagonals or perpendiculars; mark lines. Use a **ruler** for precision. Account for waste on sides and ends.
  - b) Determine ring diameter.
  - c) Mark centers of rings.

# Eccentric Circles

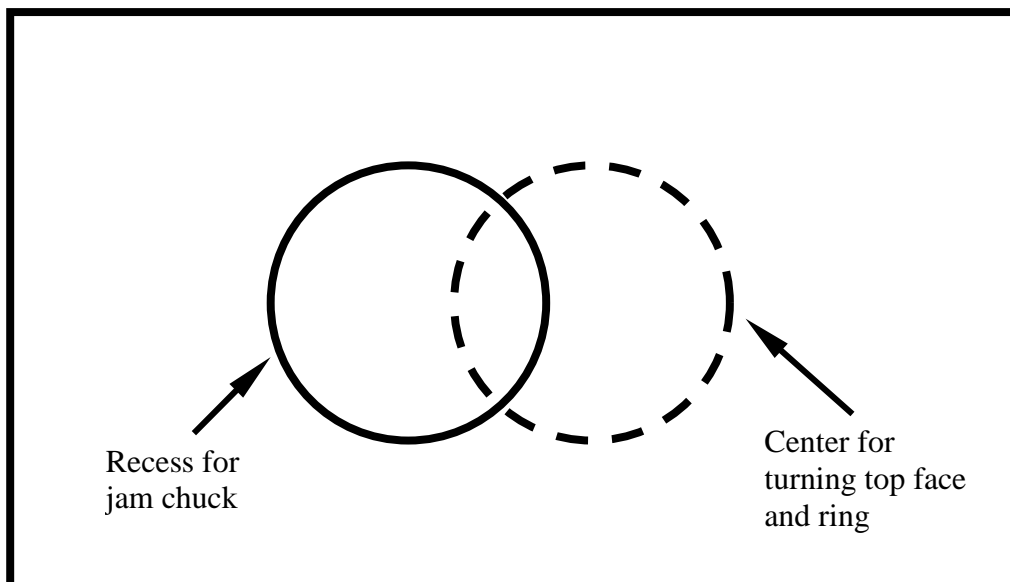
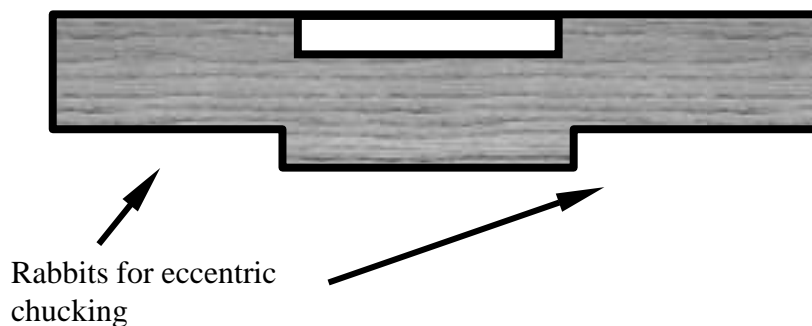
## Design, Layout and Turning Steps

- 4) Turn chucking mortise
  - a) Mount chuck.
  - b) Pierce center for live center with a **scratch awl**.
  - c) Press piece between chuck and tail center.
  - d) Measure chuck for mortise with **dividers**.
  - e) Mark block for mortise diameter.
  - f) Cut mortise using a scraper.
    - i) Asymmetrical **bedan** works well.
    - ii) Depth of about 1/8" or 3-4mm works well.
  
- 5) Set up for turning bottom side (side 1).
  - a) Reverse the piece on the chuck using the mortise.
  - b) Set the toolrest perpendicular to the lathe bed. Use a **triangle** or **square** to insure this. This is important because the toolrest is your guide to keeping the piece flat instead of tapered.
  - c) Rotate the block so that the furthest extended position toward you.
  - d) Mark this position on the toolrest with **tape**. This demarks the danger zone.
  - e) Bring up tailstock for support until it is time to hollow the ring.
  
- 6) Turn the bottom face and bottom ring.
  - a) Mark bottom ring outside diameter with **dividers** or **pencil**.
  - b) Turn the bottom face.
    - i) Start turning from the outer diameter in. Once outer edges are thin, then you can't go back.
    - ii) Cut shallow and then progress deeper into face. Cut depth a little more than the height of the bottom ring. 1/4" to 3/8" (6mm to 9mm) finished height is good.
    - iii) **Bowl gouge** or negative rake **scraper** for face. Consider using **beading and parting tools** or **skews**. Dense exotics like to be scraped. If scraping with a negative rake scraper, sharpen often.
    - iv) Make sure the face is flat as you go. Check often with a **straight edge**.
    - v) Work inward to ring keeping face flat.
  - c) Cut the ring
    - i) Make ring cut with a **spindle gouge**. Bowl gouge wings will get in the way.
    - ii) Remove tailstock.
    - iii) Mark ring thickness.
    - iv) Use bowl gouge to start hollowing ring.
    - v) Scrape balance of ring.
    - vi) Sneak up on thickness. Avoid leaving cut lines – they are difficult to sand out.
    - vii) Scrape or cut top of ring to make desired ring height.
    - viii) Depth is the sum of:
      - (1) Ring height.
      - (2) Body thickness.
      - (3) A fraction more for cut-through clearance.
    - ix) Make clean cuts on the bottom of the recess because lines will show.

# Eccentric Circles

## Design, Layout and Turning Steps

- 7) Sand bottom face.
  - a) Use a stiff **sanding block** to maintain flatness. Sand by hand, if needed.
  - b) Avoid rounding over the edges.
  - c) Avoid hitting the ring with the sandpaper when sanding the face and vice versa.
  - d) Sand all faces of the ring.
  - e) Check for scratch marks often.
  - f) Sand with the grain to eliminate sanding marks.
  - g) Remove piece from lathe.
- 8) Create an eccentric chuck.
  - a) Remove opposing jaws of the mechanical chuck.
  - b) Cut a 2" x 6" or 2" x 8" **block of wood** for the eccentric chuck.
    - i) Cut a wide rabbit on each side to mate with the jaws.
    - ii) Cut the rabbit depth so that the block bottoms out on the face of the jaws.



# Eccentric Circles

## Design, Layout and Turning Steps

- c) Mount block on chuck.
  - d) Face off the surface of the block to insure that it is flat. Use a **bowl gouge**.
  - e) Turn recess for bottom ring. This is a jam chuck for the piece.
    - i) Make the fit rather tight.
    - ii) The jam is an internal jam.
    - iii) Cut depth to accept entire ring and so that the bottom face sits flat on block of wood.
  - f) Remove the piece after fitting.
  - g) Re-center the eccentric chuck on the mechanical chuck. The offset should be the distance between centers of the two rings. Grip the block tightly.
  - h) Re-check the face to insure that it is absolutely perpendicular to the lathe bed. This is critical to make the body of the piece consistently thick.
  - i) Place **double face tape** on exposed surfaces of the eccentric chuck to hold the piece.
  - j) Fit the piece to align second center on the centerline of eccentric chuck. Press firmly on the tape to insure that the piece doesn't rotate in the chuck.
  - k) Mark the edge locations on the eccentric chuck for registration marks in case the piece moves.
- 9) Turn the top face and ring.
- a) Turn the top face.
    - i) Repeat steps for turning the bottom face.
    - ii) Check thickness often to insure consistent thickness of the body. If thickness seems to vary from one side to the other, either reface the eccentric chuck or shim the piece with paper.
    - iii) Sneak up on the thickness.
    - iv) Turn from largest diameter inward.
  - b) Turn the top ring.
    - i) Repeat the steps for turning the bottom ring.
    - ii) When cutting the inside of the ring, sneak up on the depth until the two inner circles are joined.
  - c) Sand the top face and ring.
    - i) Repeat the steps for sanding the bottom face and ring.
- 10) If turning a straight edged piece, consider using a **block plane** to clean up the edges.
- 11) Finish as appropriate for wood species. If buffing, do so carefully because there are lots of edges that can be grabbed by the wheels.