

MULTI-AXIS SPINDLE TURNING

Presented by
Arnold Ward



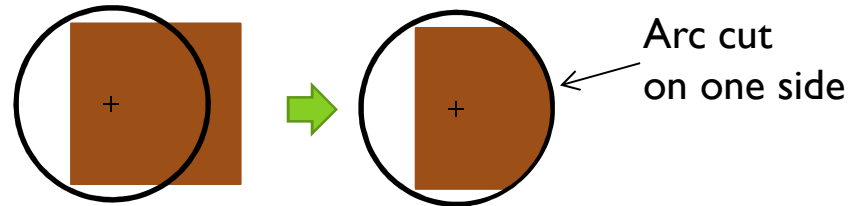
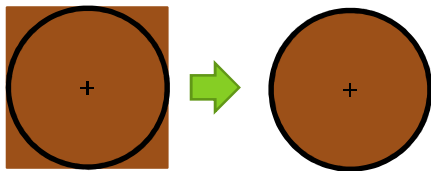
WHAT IS MULTI-AXIS TURNING?

- ▶ Turnings that are completed on more than one axis.
 - ▶ A piece is turned on one axis and then moved to a new axis and then turned again to form unique shapes.
- ▶ Multi-Axis is also known as 'Eccentric' and 'Off-Center' turning.
- ▶ Some “functional” applications of Multi-Axis turnings:
 - ▶ Tool Handles (turned on 2 or 3 axis to form a more elliptical shape.
 - ▶ Cabriole (Queen Ann) Table legs
 - ▶ Spoons & Ladles
- ▶ Some “artistic” applications of Multi-Axis turnings:
 - ▶ Finials
 - ▶ Stems for goblets, boxes or candlestick holders
 - ▶ Sculptural shapes

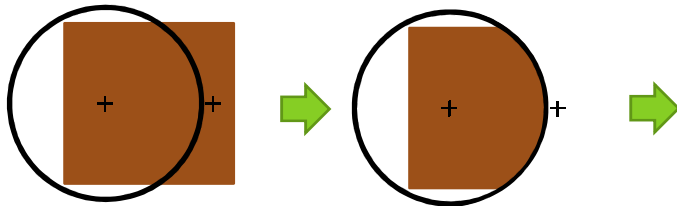


CIRCLES AND ARCS

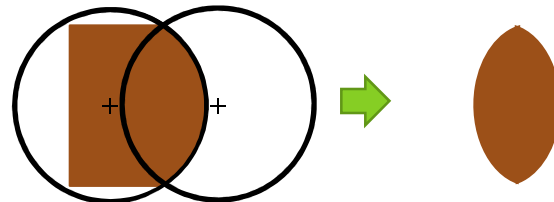
- ▶ In single-axis turning, we usually turn full circular items. The item is turned down until all the rough edges of the block of wood have been cut away.
- ▶ In multi-axis turning, we have the choice to either turn the wood down to a full circle, or we can choose to turn only part of the wood, which forms an arc on one side of the wood.



- ▶ After repositioning, more arcs can be cut on other sides to make shapes with curved sides.



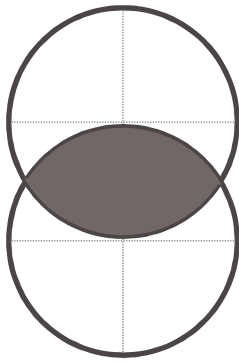
Arc cut on one side



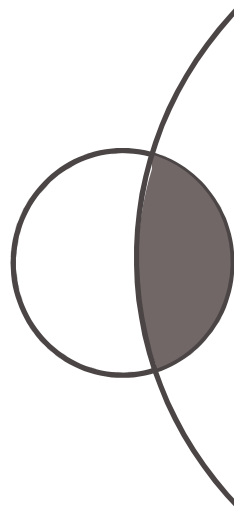
Arc cut on two sides

TWO ARCS

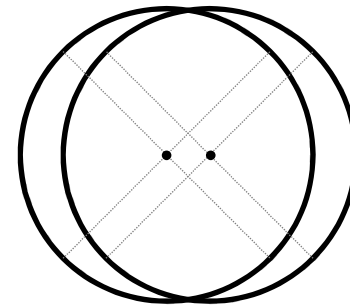
- An arc cut on two sides will form an eyelet shape. If one arc is much larger than the other, it will form more of a D Shape. The closer the axis are to each other for a specific size circle, the closer the piece will approximate a circle.



Eyelet shape



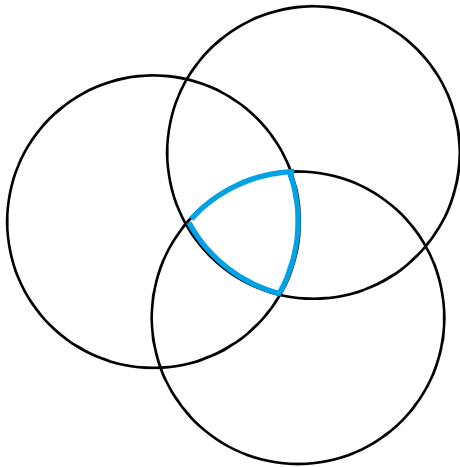
“D” shape



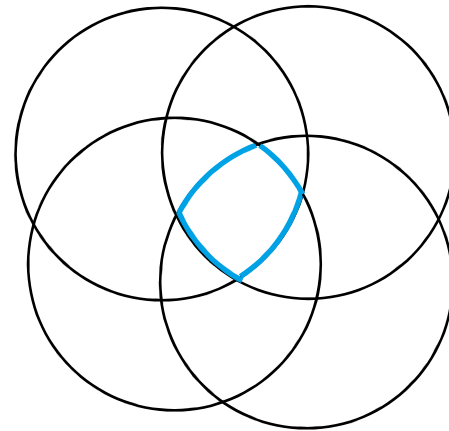
Axes close together
starts to approximate
round.

THREE AND MORE ARCS

- An arc cut on three sides will form an triangular shape. Four arcs will be rectangular, etc. More arcs will start to resemble a circle.



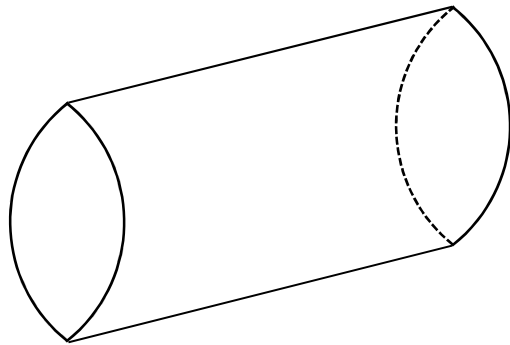
Triangular shape



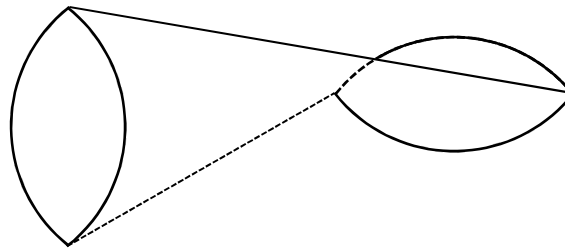
Rectangular shape

ARCS: STRAIGHT OR TWISTED

- ▶ If both axes are parallel to each other, the shape you cut will stay in the same orientation.
- ▶ If the axes are set so they pass next to each other, but do not cross, the resulting shape will have a twist. Two Axes can be twisted just short of 180° (at 180° , the axes will cross and there is no twist). Three axes can be twisted up to 60° . Twists can be made to the left or right.



Parallel Axes

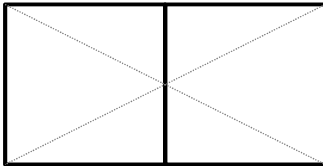


Axis are not parallel, and do not cross (90° twist shown)

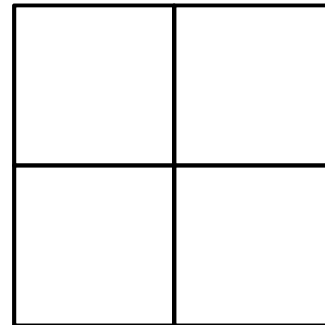


CUTTING ARCS ON MULTIPLE PIECES

- One convenient method of cutting arcs on parallel axes is to secure multiple pieces on the lathe at the same time. For example, securing two pieces or four by binding the wood together. This is also known as “split turning”.



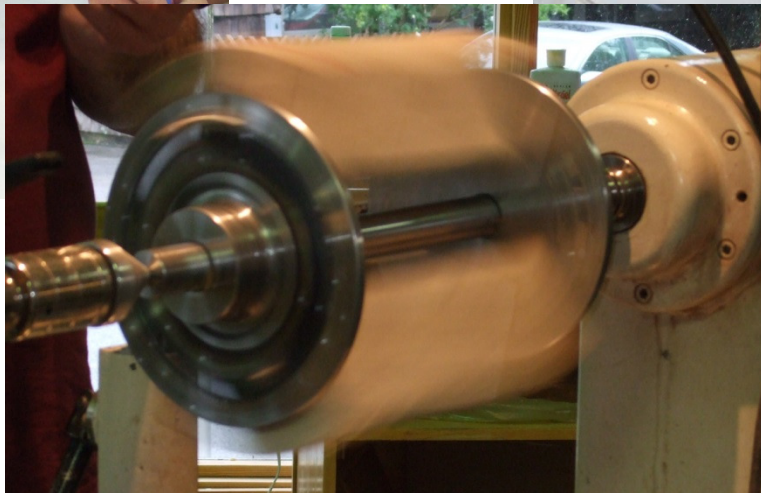
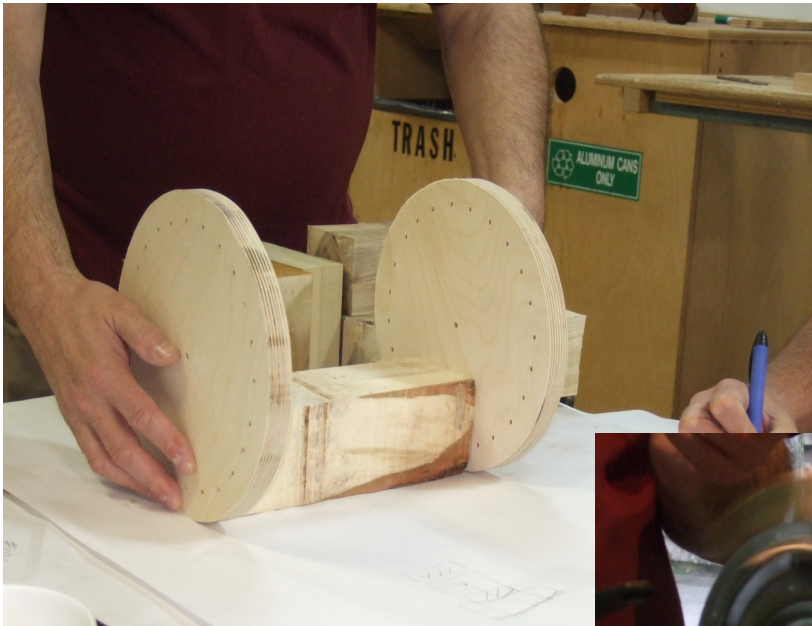
Two blocks
secured together
and turned from
the center of the
joined edge.



Four blocks
secured together
and turned from
the spot where
the four corners
meet.

CUTTING ARCS ON MULTIPLE PIECES

- Therming is a method by which multiple pieces are cut at the same time. This is good for cutting identical profiles on multiple pieces.

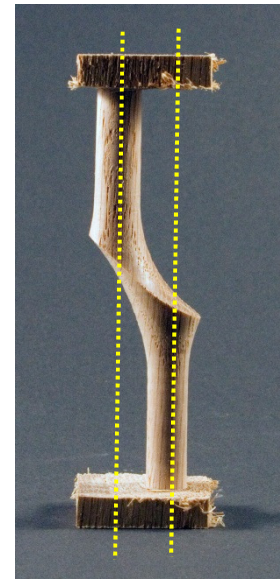
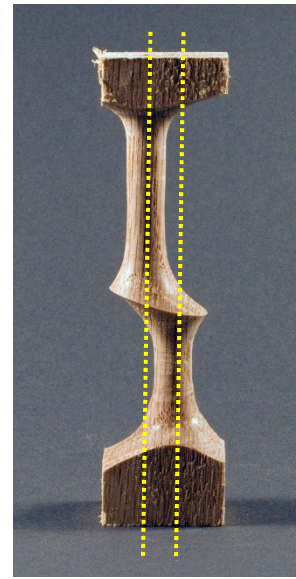
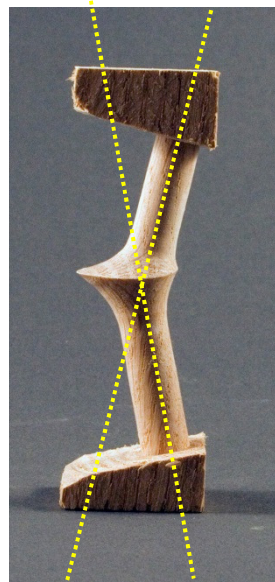
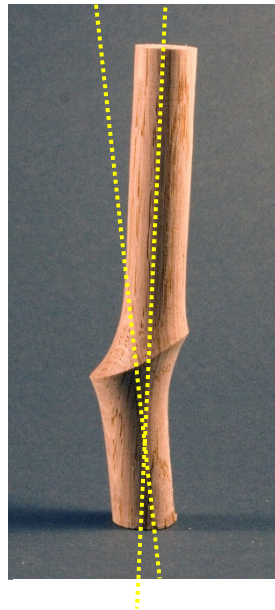
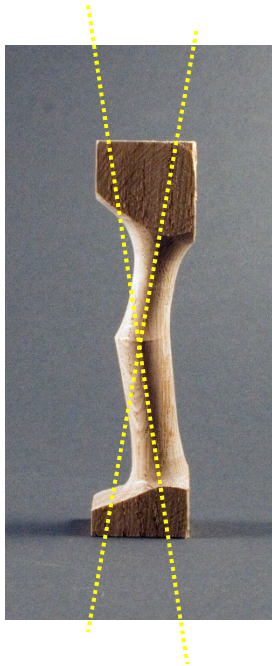
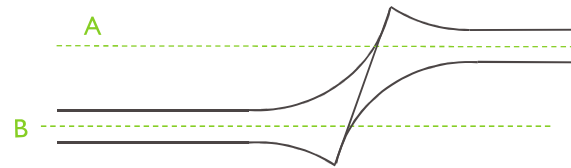
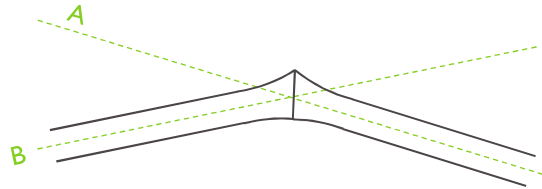
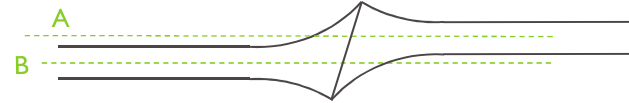
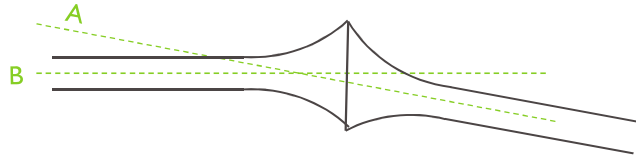


CIRCULAR JOINTS OF DIFFERENT AXES

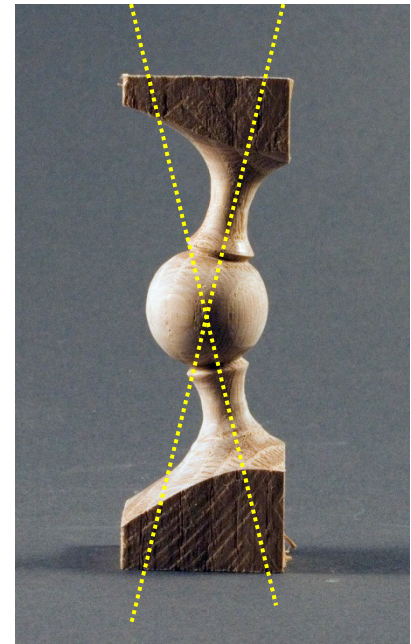
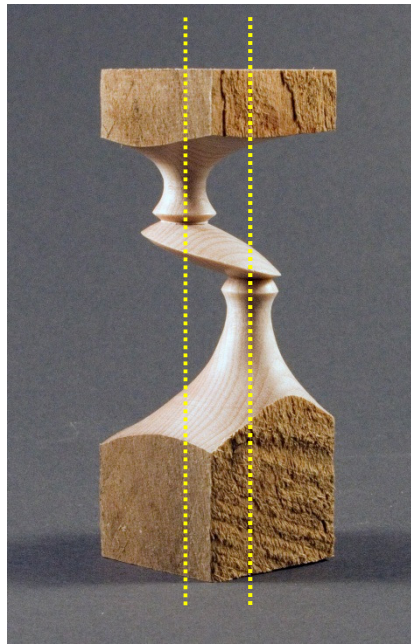
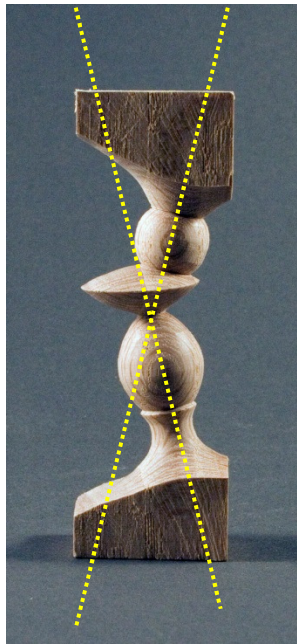
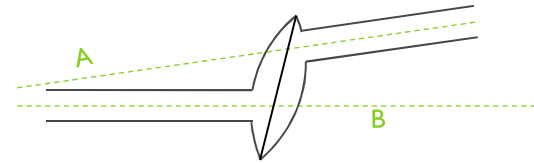
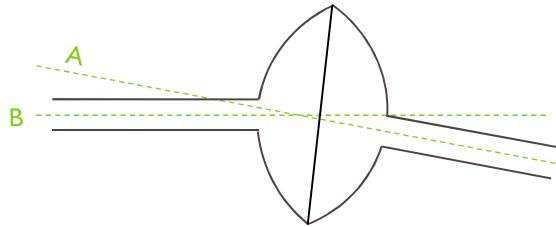
- ▶ A joint is created when two different axes with circular cuts intersect. The shape of the joint depends on the amount of angle, the distance between the axes, and whether the cuts at the joint are concave or convex or a combination.



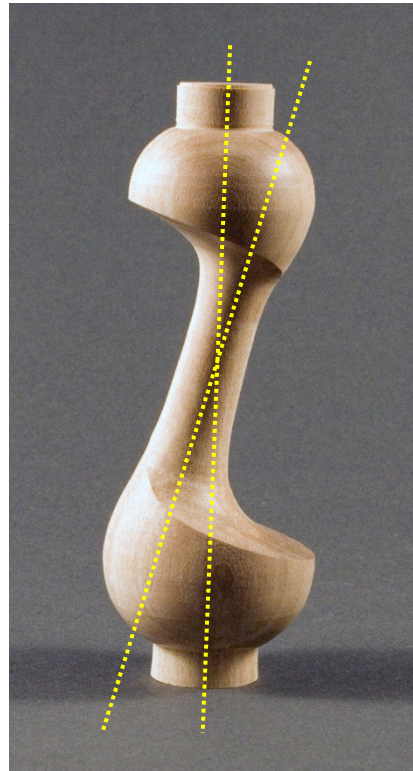
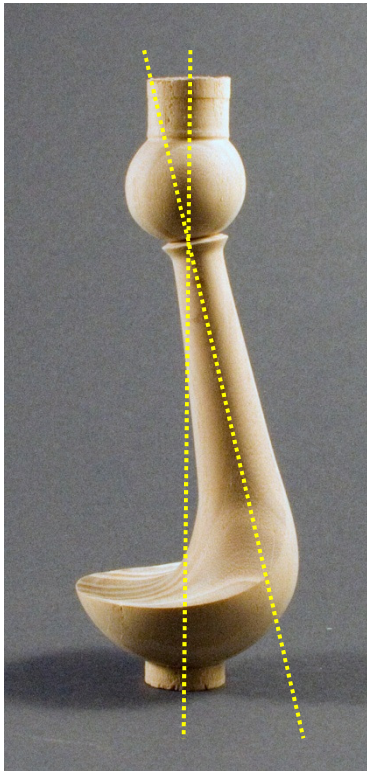
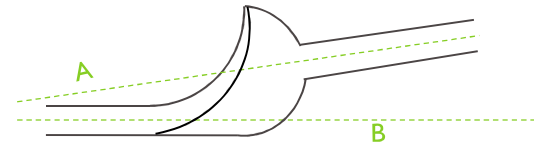
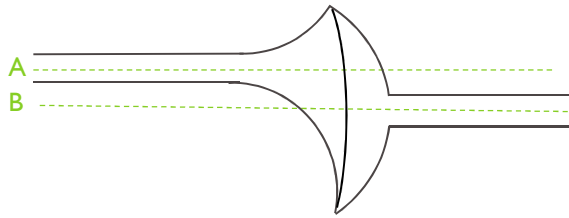
CONCAVE CURVE TO CONCAVE CURVE



CONVEX CURVE TO CONVEX CURVE



CONCAVE CURVE TO CONVEX CURVE



MULTI-AXIS CHUCKS



“Pendant” Chuck

Sorby Wobble Chuck



MULTI-AXIS CHUCKS



Robert Sorby Eccentric Chuck

Vicmarc Escoulen Chuck

