

EQUIPMENT BUILD PLAN

LIGHT & OPTICS

Face vs. Face Profile Vase

Rubin's vase is a classic figure-ground illusion. Bruce turned one on a wood lathe, using his own side profile as the guide, so the solid vase's outline forms two life-size faces. A no-lathe version lets students make the same illusion from a digital photo.

Written from Bruce's original workshop handout. Bruce's final review of this plan is in progress.



<div>DIFFICULTY</div> <div>Advanced</div>	<div>BUILD TIME</div> <div>4-6 hours</div>
<div>COST</div> <div>About \$15-30 for wood (lathe required)</div>	<div>SAFETY</div> <div>Adult build / supervision</div>
<div>GOOD FOR</div> <div>Makers, Teachers</div>	

What it shows

Look at it one way and it's a vase; look again and it's two faces nose to nose, and the faces are yours.

Key ideas: optical illusions, figure and ground, perception, symmetry

Safety (Adult build / supervision).

Woodturning is for adults trained on a lathe: wear a face shield, tie back hair and loose clothing, keep the tool rest close and check that the blank is solidly glued and mounted before starting.

CONSTRUCTION

Build it

Materials

- ☐ **Turning blank (solid or glued-up hardwood)** · About 4 in x 4 in x 12 in
Size depends on your profile; check before buying
- ☐ **Wood finish or stain** · Small can
- ☐ **A clear side-view photo of a face** · 1
Plain background, looking straight ahead

Tools

Wood lathe and turning tools
Calipers
Camera and printer
Scissors and thin cardboard or hardboard (template)
Sandpaper
Face shield

1

Take the profile photo

Photograph the person exactly side-on against a plain background, with the head level.



2

Print it life-size

Print the profile at actual size (measure from chin to forehead and scale the print to match).

3

Draw the center line

Draw a vertical line just in front of the tip of the nose. This will be the centerline of the vase. The vase is the space between the face and this line, so the nose makes the narrowest part of the stem; leave enough wood there for strength.

4

Make a template

Cut along the profile and transfer the shape to thin cardboard or hardboard, so you have a template whose edge is the face and whose straight side is the centerline. At every height, the distance from the line to the profile is the radius the vase must have there.

5

Rough-turn the blank

Mount the blank between centers and turn it to a cylinder slightly larger than the widest radius on your template.

6

Turn the profile

Mark the key heights (forehead, nose, lips, chin) on the spinning blank, set calipers to the radius at each mark, and turn down to them. Then blend between the marks, checking often against the template. Work slowly: as Bruce learned, once wood is removed, it cannot be added back.

7

Sand and finish

Sand smooth on the lathe, apply finish, and part it off.

8

Display it

Set the vase in front of a light, plain background or photograph it as a dark silhouette on a white background, so viewers can flip between seeing the vase and the two faces.



THE PHYSICS

How it works

Your brain sorts what you see into a 'figure' (the object) and a 'ground' (the background). In Rubin's vase the same outline is shared by both, so the brain can't settle on one answer and flips between a vase and two faces.

Using it

- Show the vase and ask students to describe what they see before revealing the faces.

A turned vase is the same in every direction around its center, so its outline on the left is a mirror image of the outline on the right. If that outline is shaped like a face, you see two faces looking at each other.

The illusion works best with strong contrast, such as a dark vase against a light wall, because the eye has only the edge to go on.

- No-lathe activity: students photograph their own profile, mirror it on a computer, and place the two halves nose to nose to create their own Rubin's vase picture.
- Discuss other figure-ground images and why the brain can't see both interpretations at once.
- Cut a flat version from plywood on a scroll saw for a simpler project with the same effect.

GO FURTHER

Variations

- Flat silhouette version: cut the vase shape (face profile mirrored) from 1/2 in plywood and paint it black.
- Use two different profiles, one on each side, for a 'face vs. face' portrait of two people (the turned vase can only have one, since it's symmetrical).

IF IT DOESN'T WORK

Troubleshooting

IF THIS HAPPENS

The faces don't read.

TRY THIS

Increase contrast; display the vase as a silhouette against a bright background.

IF THIS HAPPENS

The stem is too thin and fragile.

TRY THIS

Move the centerline farther in front of the nose before you start.

IF THIS HAPPENS

The finished vase doesn't look like the person.

TRY THIS

Small errors add up; take caliper readings at more heights. Even Bruce's came out as 'a life-size face, if not a self-portrait'.

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