Effect of finishes on the moisture buffering capabilities of wood

It’s Hygroscopic, Baby!

- Hygroscopic properties of wood are well known
- Recent interest in leveraging those properties for passive control of indoor comfort
- Just as thermal mass can regulate temperature, moisture buffering materials can regulate humidity

The Wrinkle

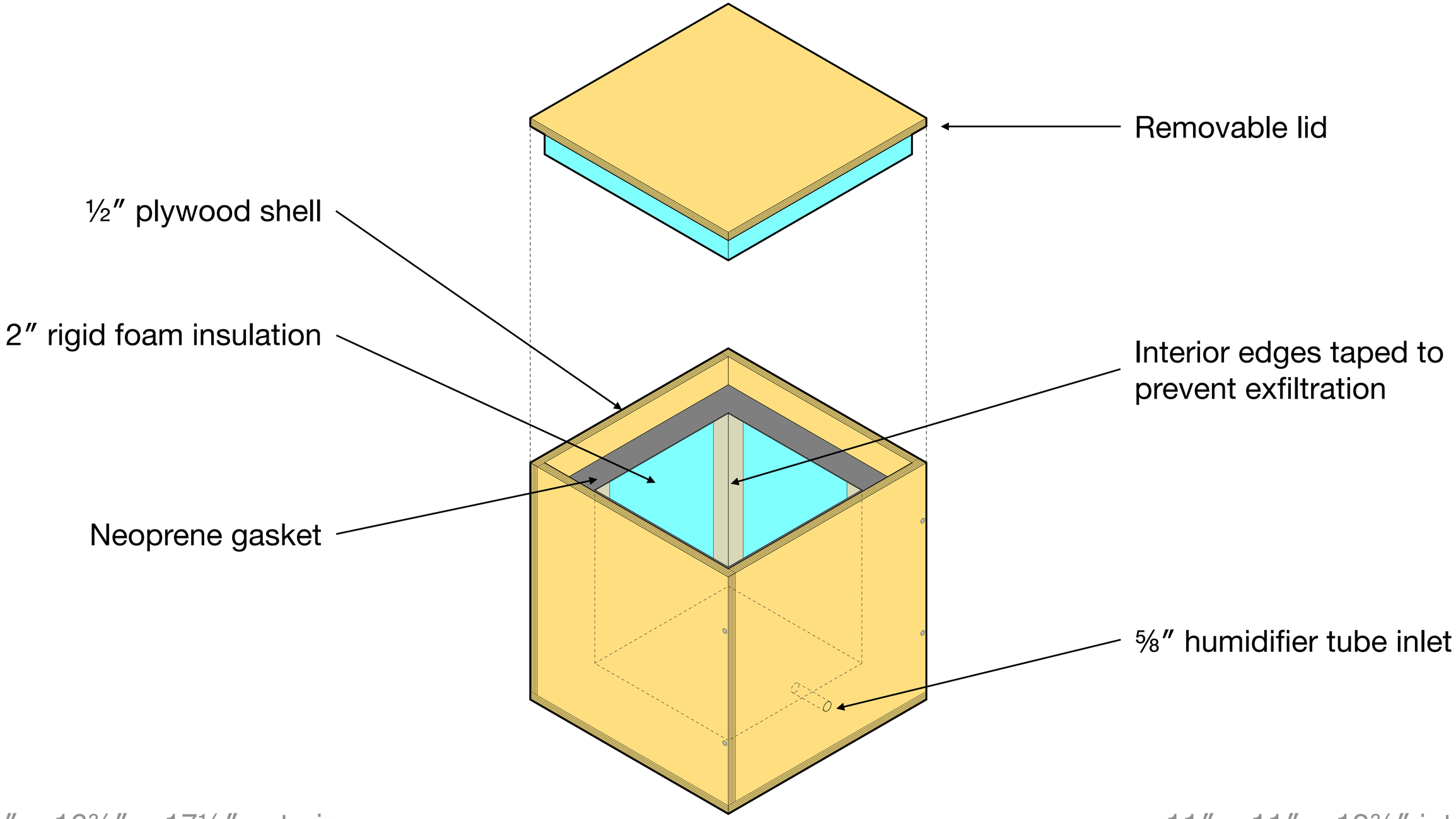
- Wood is seldom left exposed once construction is complete
- Finishes are applied for aesthetics and protection
- Finishes alter the physical properties of wood
- How do they affect the wood’s ability to absorb and release water vapor?

Protection From What?

- Mechanical damage — dents, scratches
- Chemical damage — food spills, skin oils
- Radiative damage — heat, light (especially ultraviolet)
- Biological damage — bacteria, fungi (i.e. rot)
- Moisture damage — vapor and direct liquid contact

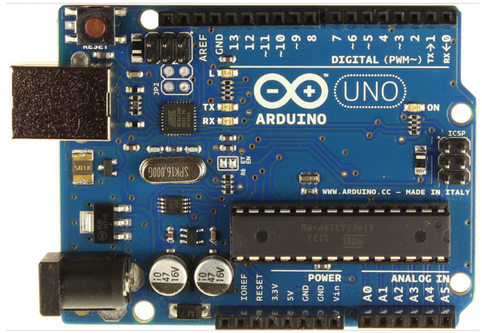
Hypothesis

- Different finishes provide different levels of protection against different types of damage
- Finishes designed to be most resistant to moisture will have the greatest impact on the moisture buffering capabilities of wood
- Shellac — Not known for its moisture resistance, probably won’t have a huge impact on moisture buffering
- Spar varnish — Used for finishing boats, expected to completely block moisture buffering


Removable lid
½″ plywood shell
2″ rigid foam insulation
Interior edges taped to prevent exfiltration
Neoprene gasket
⅝″ humidifier tube inlet
16⅜″ × 16⅜″ × 17½″ exterior
11″ × 11″ × 12⅜″ interior

Temperature and humidity readings

Weight readings

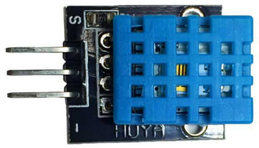


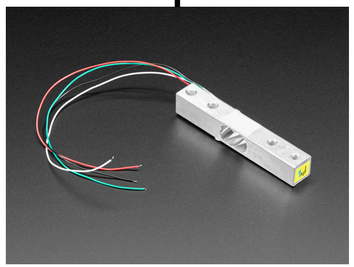
Data

On/off signal

Electricity

Humidity





What’s Next?

- Design and fabricate a part to hold the strain gauge and humidity sensor on the underside of the lid
- Calibrate the strain gauge
- Finish programming
- Prepare samples for testing
- Perform tests