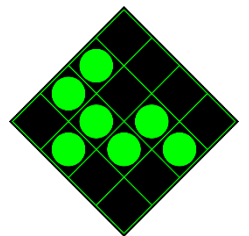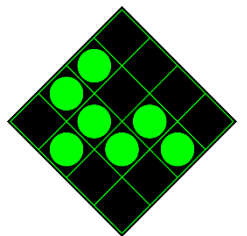# Laser Cutter

Max Bareiss

Hacksburg

August 29, 2021
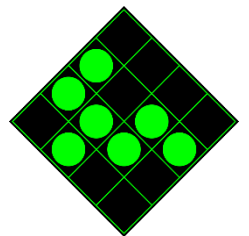
What is it?

- CNC (Computer Numerical Control) laser
- 600mm x 400mm working area (~24 x ~18)
- 80W Infrared Laser

How does it work?

- Laser turns on
- Laser melts/burns/vaporizes very small patch of material
- Compressed air blows away the melted/burnt/vaporized material
- Basically the same as a plasma cutter/waterjet

Laser Safety

- Really really bright!
  - Incandescing part may be very bright too
- Fumes are bad for you
  - Ensure ventilation is running properly
  - Check your materials (more on next slide)
- Fire may be involved
 - Do not walk away from cut job, part may catch on fire

Big Scary Laser
Do not look Into beam with remaining eye

www.electricstuff.co.uk
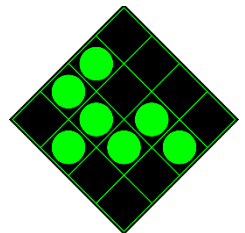
Materials

- Some materials cut really well on the laser
  - Hard wood, plywood, Acrylic (PMMA), Delrin (Acetal), Leather
- Many materials cut poorly on the laser
  - Plexiglass (PC), MDF, polyethelenes (HDPE, LDPE, UHMW), thin metals (<0.010")
- Some materials can only be marked
  - Thick metal, granite, glass, fiberglass
- Many materials are DANGEROUS to cut
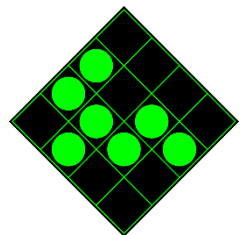
Dangerous Materials

- CHLORINATED PLASTICS
  - PVC, corrugated sign material
  - Releases CHLORINE GAS when laser cut
  - Cutting these plastics will DESTROY YOUR LUNGS and DESTROY THE LASER CUTTER
- Cyanide-containing glues
  - Some types of MDF and Plywood, you have to check
  - Releases CYANIDE when laser cut
  - Cutting these materials will POISON YOU
- Pressure treated woods
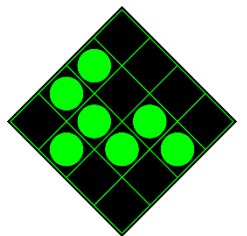 - It'll kill the bugs, and it's not good for you
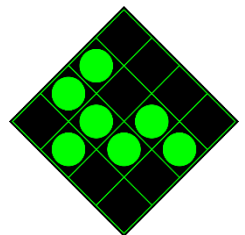
Materials

KNOW what you are cutting!

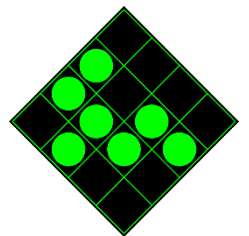Check online for unfamiliar materials
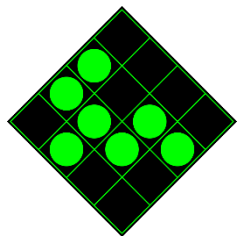
Process

1. Pick material
2. Find/make design
3. Open design in SmartCarve
4. Set process parameters
5. Prep machine
6. Perform test passes
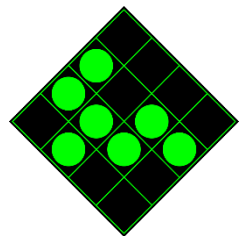7. Cut/engrave final design
8. Secure machine

Pick Material

- Lowe's
  - Plywood, MDF
- Woodcraft
  - Nicer plywood
- Online Metals
  - Acrylic, Delrin
- McMaster-Carr
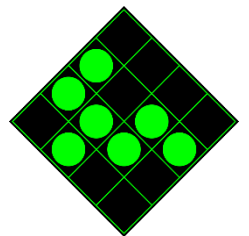 - Acrylic, Delrin
- Others available

Find/make design

- Account for material properties

- Account for laser cutter:
  - ~0.010-0.020" kerf
  - Sides won't be flat

- Desirable formats:
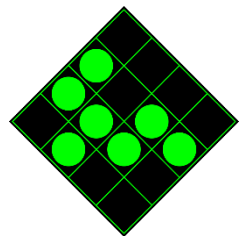 - DXF
  - BMP/PNG
  - SVG

Formats - DXF

- Autodesk file format
- Good compatibility with LightBurn from Autodesk software (Inventor, Fusion 360)
- Okay compatibility from other software
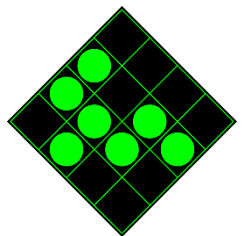- May have scaling issues

Formats – BMP/PNG

- Raster Image – Undesirable for some uses
- May have scaling issues
- BMP/PNG vs. JPG
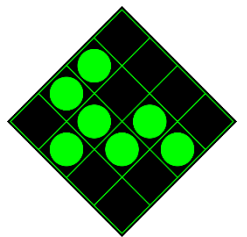 - JPG may have undesirable artifacts

Formats - SVG

- Used by websites and Inkscape native format
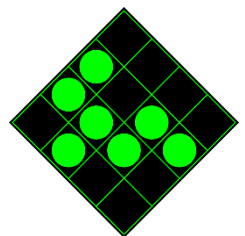- Sometimes issues with text

Open design in LightBurn

Set process parameters

- Check LightBurn built-in library

- Check wiki for laser cutter parameters for your material/process combo

- For new-to-Hacksburg materials, check online for cutting parameters and document successes on our wiki!
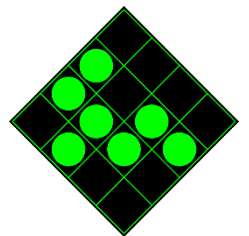
Prep Machine

- Follow instructions on wiki
  - Turn on…
    - Computer
    - Wall switch
    - Power conditioner
    - Tube chiller/pump
    - Laser cutter (!!)
  - Load material
  - Set focus
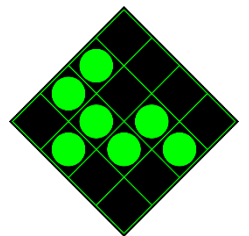 - Move to origin
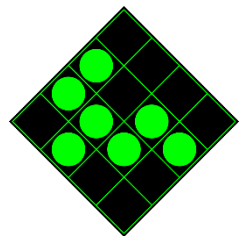
Perform Test Passes

- If you're not using a material/thickness/process combination you're familiar with, do a test cut to check you're getting what you want.

Cut/Engrave Design

- Follow instructions on the wiki
  - Open window
  - Turn on…
    - Blower Fan
    - Air compressor
    - Laser tube
  - Set laser power dial to 100%
  - Ensure start location is correct
  - Start job on computer
  - Repeat as necessary

Secure Machine

- Follow instructions on wiki:
  - Turn off…
    - Laser tube
    - Blower fan
    - Air compressor
    - Laser cutter
    - Chiller/pump
    - Power conditioner
    - Wall switch
    - Computer
  - Set laser power dial to 0%
  - Remove Material
  - Cleanup
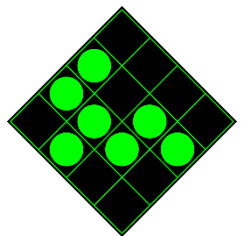
Tell Someone If…

- A familiar power setting isn't cutting the same.
- Multiple cutting paths are visible.
- Something doesn't work.
- You cut something you shouldn't have.