

# Milwaukee Area Woodturners: Laser Marking Demo

Curt Van Weelden

September 14, 2020

## Why buy a laser?

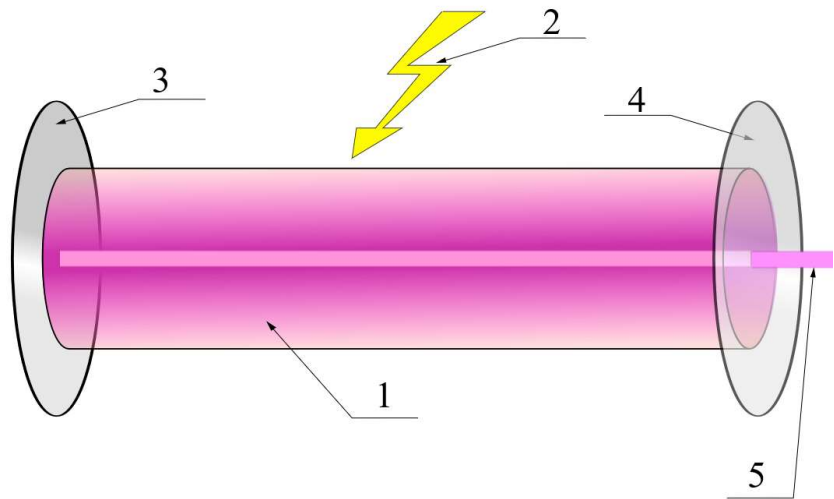
- Looks more professional
- You hate to sign things but want your work identified
- Creativity
- Personalization
- You can mark tiny stuff
- Dark wood with filler
- Pens
- Bowls

## Why not to buy a laser?

- Requires some computer skills like installing drivers
- Creates fumes, plastic fumes could be toxic
- It requires some careful experimentation
- Cost
- It could blind you
- Could expose your PC to some outside threats
- What faster way can you ruin a project than with a computer!

# Laser Technology

- "light amplification by stimulated emission of radiation"
- Produces light of a fixed wavelength that can be focused to a narrow beam
- Two important ratings: power in mW and wavelength in nm



# What is happening?

- On wood:
  - Raise the temperature of the surface to ~500 F to create charring
  - This requires absorbed, concentrated power and time
  - If the surface is too shiny the light bounces off, no absorption
  - If the laser is not focused, beam is not concentrated
  - If the wavelength is wrong for the material, it may look transparent to the laser: no absorption
- On plastic:
  - All the above apply except the surface melts/ vaporizes and a rougher surface is produced

# Materials to be Marked

Wood, leather, paper, and plastic don't require much power because the temperatures are low, and the material does not conduct heat away

The wavelength of the laser must be compatible to the material

Steel and stainless steel can be marked with the 20 W Neje

Brass and bare aluminum are difficult because they conduct heat away too fast

# Selecting a Laser Marker

- There are two basic types for the hobbyist:
  - Enclosed cabinet style
  - Gantry arm style
    - I got this type because I thought it was more versatile



- 3500 mW, 7 W, and 20 W versions are available
- 405 nm wavelength
- Master 2 series adds wireless control and updated firmware GRBL1.1F
- Master series area is 150x150 mm (5.9" square)
- Master 2 series area is 170x170 mm (6 ¾" for you imperialists)

## The NEJE Master series

- You can copy a picture from the internet
- Make your own using a drawing program
  - INKSCAPE is free and very powerful (and therefore harder to learn)
- Use one of the many supplied images and NC files
- You can add text with different fonts, size and angle to any picture directly in the software

A blue rectangular graphic with a white text overlay. The text reads "Creating the image". The graphic has a slight 3D effect with a darker blue shadow on the right side.

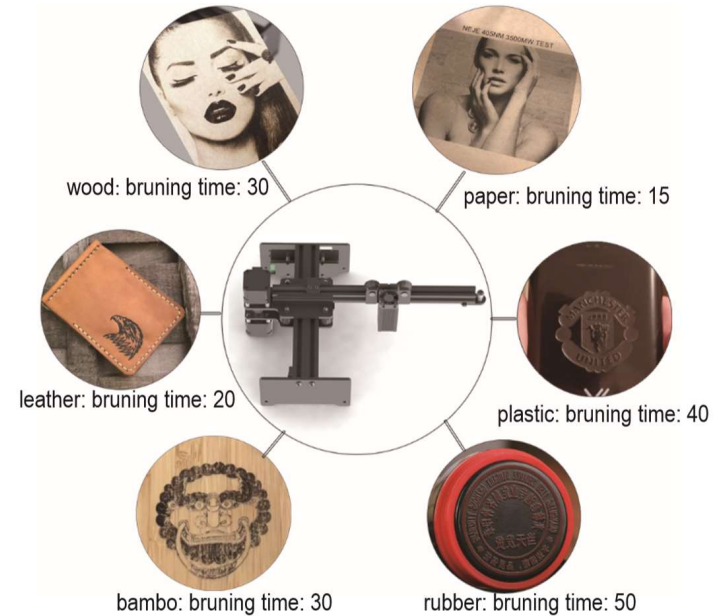
Creating the  
image

## NEJE modes

- The NEJE master machines can operate in two modes
  - Standard mode – breaks the picture into pixels and scans back and forth to create a picture, like the old dot matrix printers
  - NC mode – operates like a CNC machine and draws lines, circles, and radii to create the picture

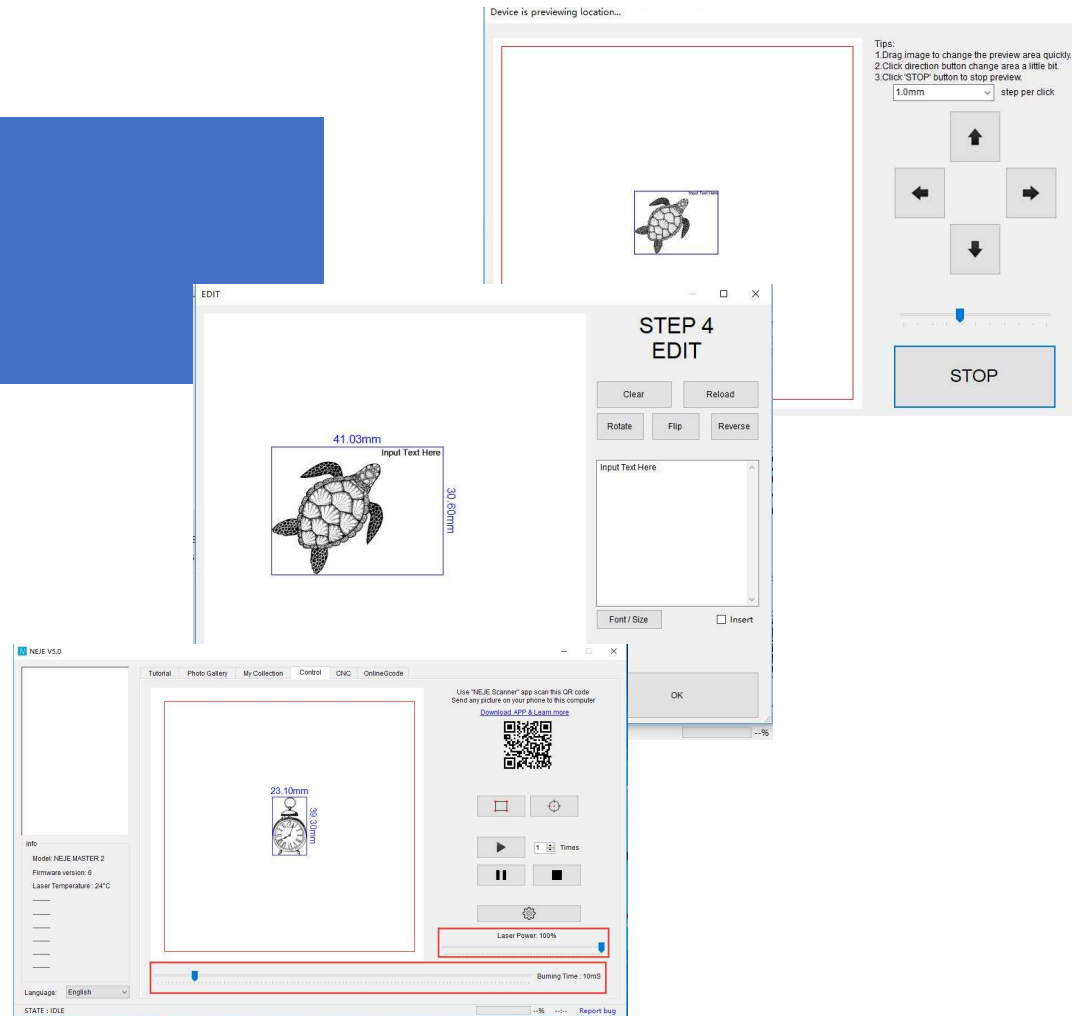
# General Tips and Tricks

- Clamp the machine down to make sure it doesn't walk
- Position the machine so that it marks in the same direction as your computer screen to avoid confusion
- Get a stand to set the height of your piece, the focus ring is a pain and moves your center
- Experiment with settings and keep a log



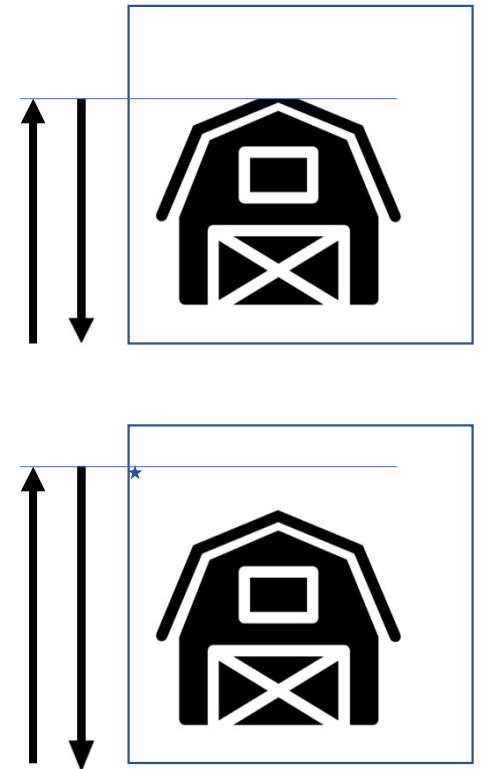
# The process

- Connect and power machine
- Load and size image
- Rotate Image as needed
- Focus laser on surface
- Center image on object
- Check outline of object
- Set %power and burn time (ms)
- Think twice
- Hit Play



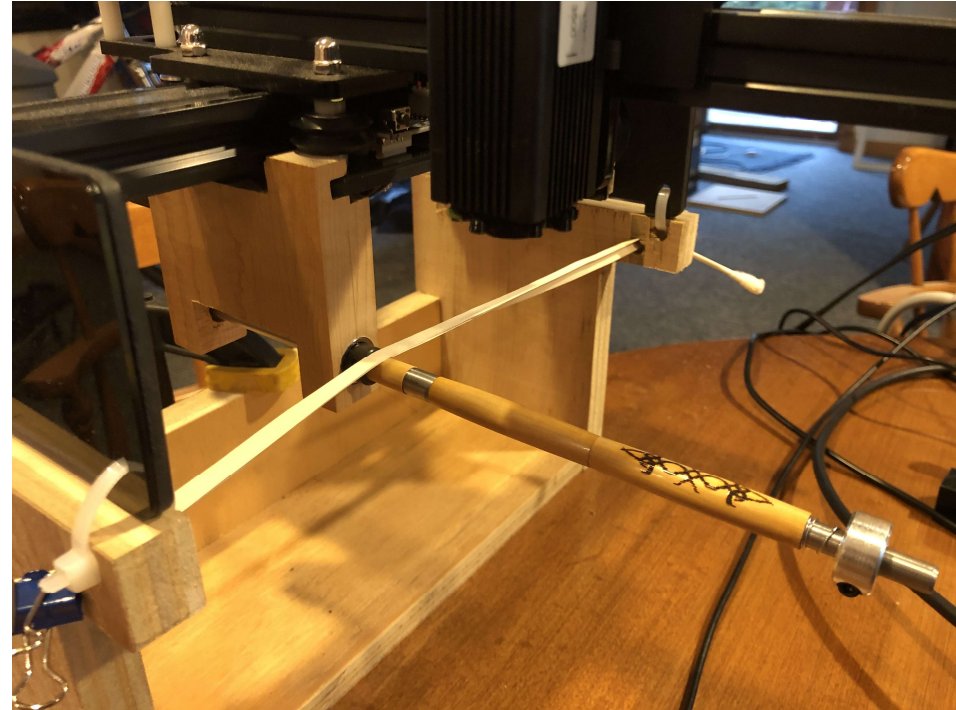
# Pen Marking

- You can mark text along the length without a jig as long as the text is not too tall compared to the diameter ( $\sim 1/4 D$ )
- A thin coat of sealer helps keep char out of the wood pores
- To mark around a significant part of the circumference, you need a jig
  - A jig converts movement in one direction to rotation
  - You need very low friction, or your image will get distorted
  - A small dot outside the image can help because the biggest problems happen when the direction is reversed



# Pen Marking Jig

- You can buy them or make your own
- The one I made for the NEJE Master:
  - I made the carriage from hard maple. Purchased ones are 3D printed
  - I bought letter D drill rod for the shaft (0.246")
  - I put ball bearings on the rod (iteration 2)
  - I used a spring and shaft collar to hold the blanks on
  - Use a pen bushing or a custom one to act as a "pulley"
  - Use a rubber band strap. Mine came from an old face mask. Remember when those were plentiful and cheap!
  - The hardest part is making sure the rod is centered under the laser



# Bowl Marking

- Build a stand to raise the laser off the tabletop ~ 6"
- Get a lab jack to set the bowl over. This is necessary for natural edge bowls
- Make a centering template out of plexiglass with circles and a center

## Steps:

1. set level, height and focus. The focus moves the center, so do this first
2. outline edges of the bowl bottom with blue tape to make them more visible
3. place the centering template over the bowl and align concentric circle over edges
4. center laser on bullseye by moving laser or bowl, use bullseye command
5. remove template
6. check outline of image with box command
7. burn





# Marking Reflective Surfaces

---

- Use chalk paint to coat surface. Dry erase marker works too, but has solvents that may react with the plastic and is harder to put on and take off
- You can reapply the chalk paint after marking to color the marking

# Marking Dark Surfaces

- You need a smooth surface so the pores don't take the filler
- Or apply blue painters' tape and burn through
- Rub contrasting filler into figure
  - Rub and buff
  - Lacquer stick
- Rub off excess and let dry
- Peel off tape and gently remove cut regions



## Gallery

Courtesy of Dave Drickhamer



My 1<sup>st</sup> laser marked pen courtesy of Dave Drickhamer,  
my son's 21<sup>st</sup> BD present

---

# My daughter's nightstands

I marked the bottom of each  
drawer bottom



Handcrafted with love  
for  
Emily Louise Van Weelden  
by  
Curtis Lee Van Weelden  
August 2019

# Demo items

- Pen
- Dark wood with filler
- Bowl
- Pen tube
- NC file on plywood

# Completed Items

- Pens
  - Cartridge Brass
  - Pictures
  - Writing
- Bottle stoppers
- Bowls
- Boxes