Tim Celeski
May 17, 2020

# Tips & Tricks

## May 17th, 2020

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# Overall Tips

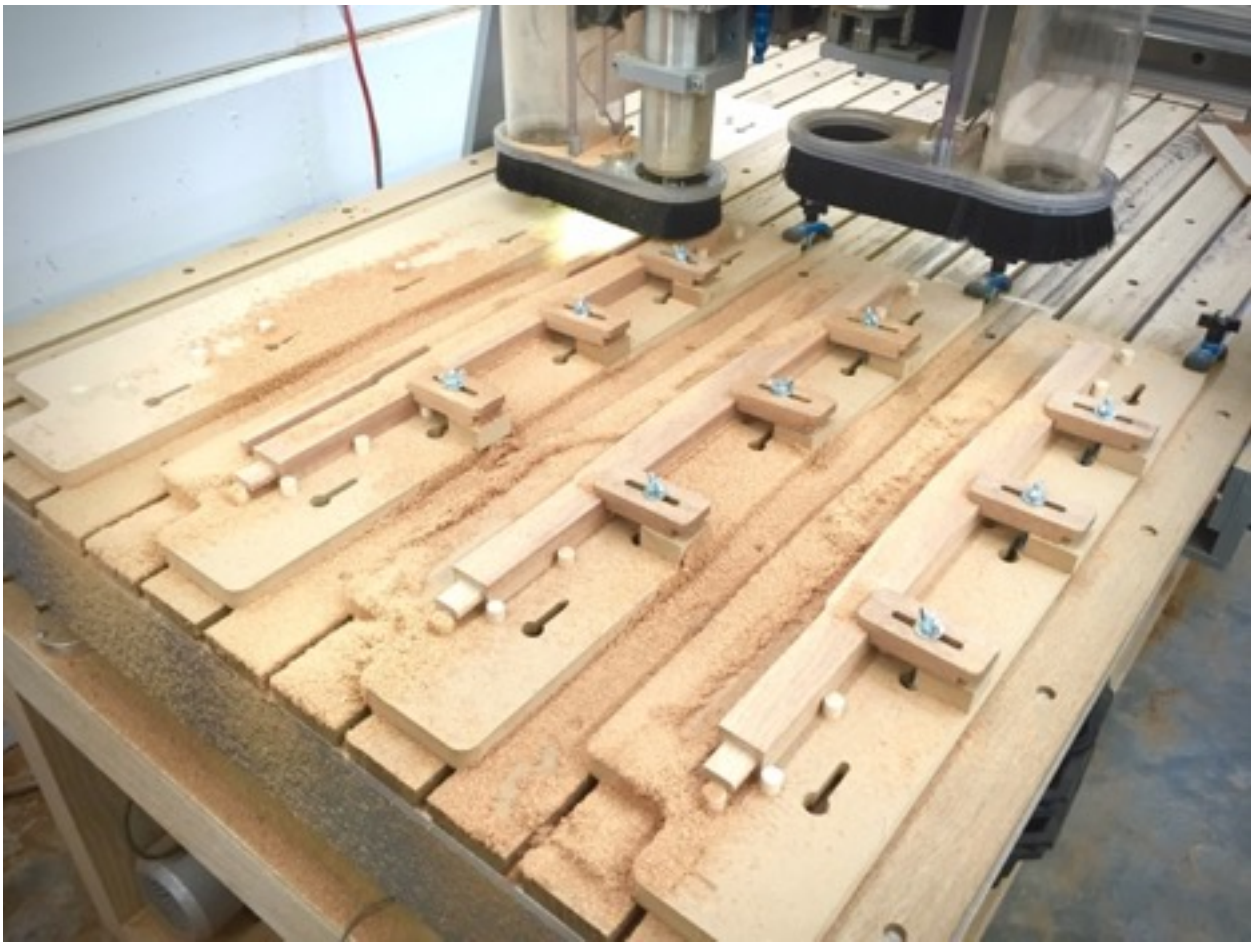
## Use your CNC to the max

1. **Understand and Use CNCs benefits to the max**

- Accuracy
- Repeatability
- More…

2. **Make sure your CNC is Square and True**
3. **Make sure your bed is flat**
4. **Make sure your CNC is STABLE**
5. **Set up your CNC for position and repeatability**

- Relative position bed like a t-track bed is inaccurate.
- A MDF spoil board bed is only good for one job
- Positions must be absolute
- Accuracy can only be determined by the machine.



6. **Use fixed setup CNC for position and offsets**

- Repeatable positions
- Fixed positions for accuracy reference.
- Palletize fixtures

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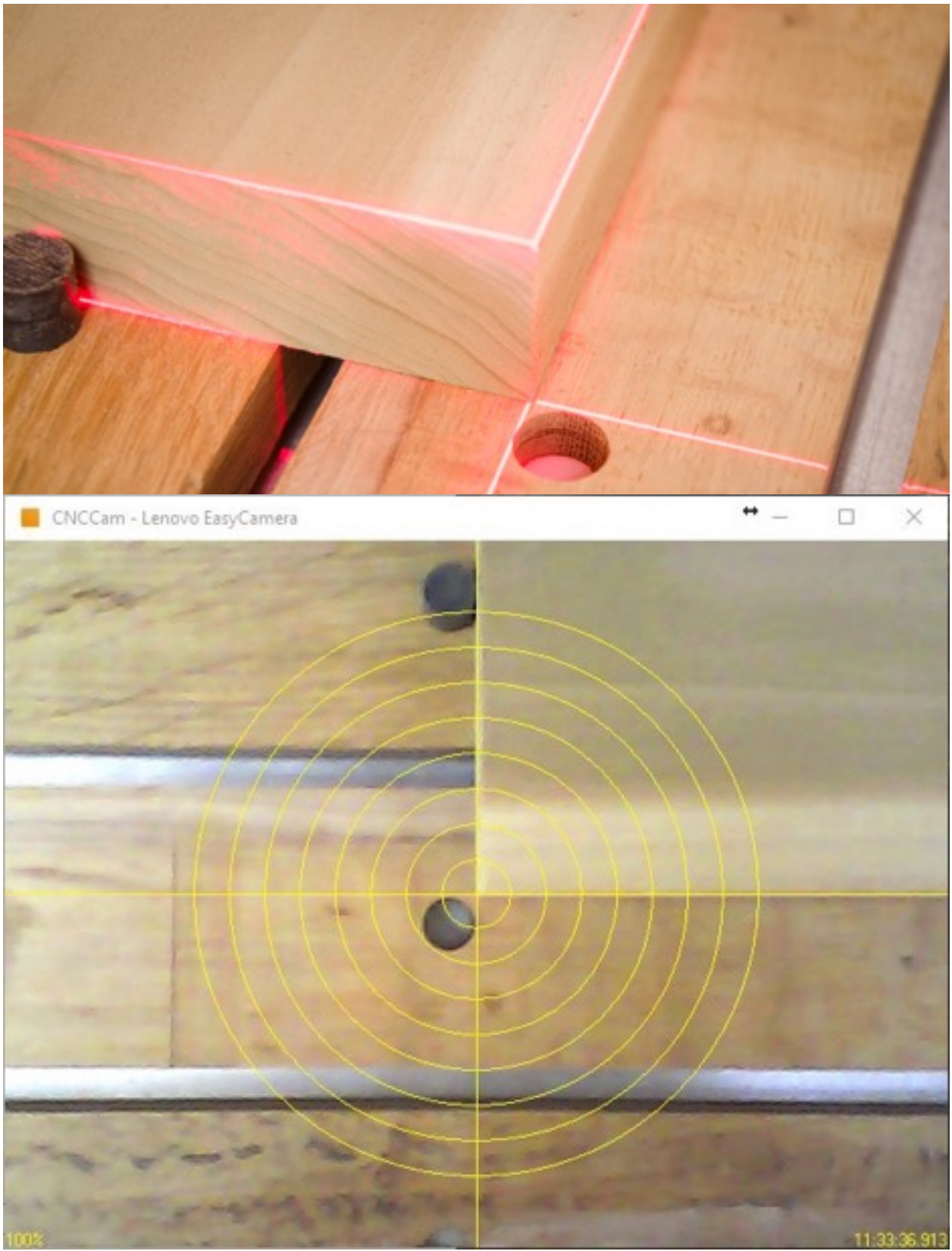
## 7. **Use Laser or Camera for XY**



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LASER t1= g1 x3.403 y-4.2366 F80
CAMERA t1= g1 x6.6421 y-3.7184 F80

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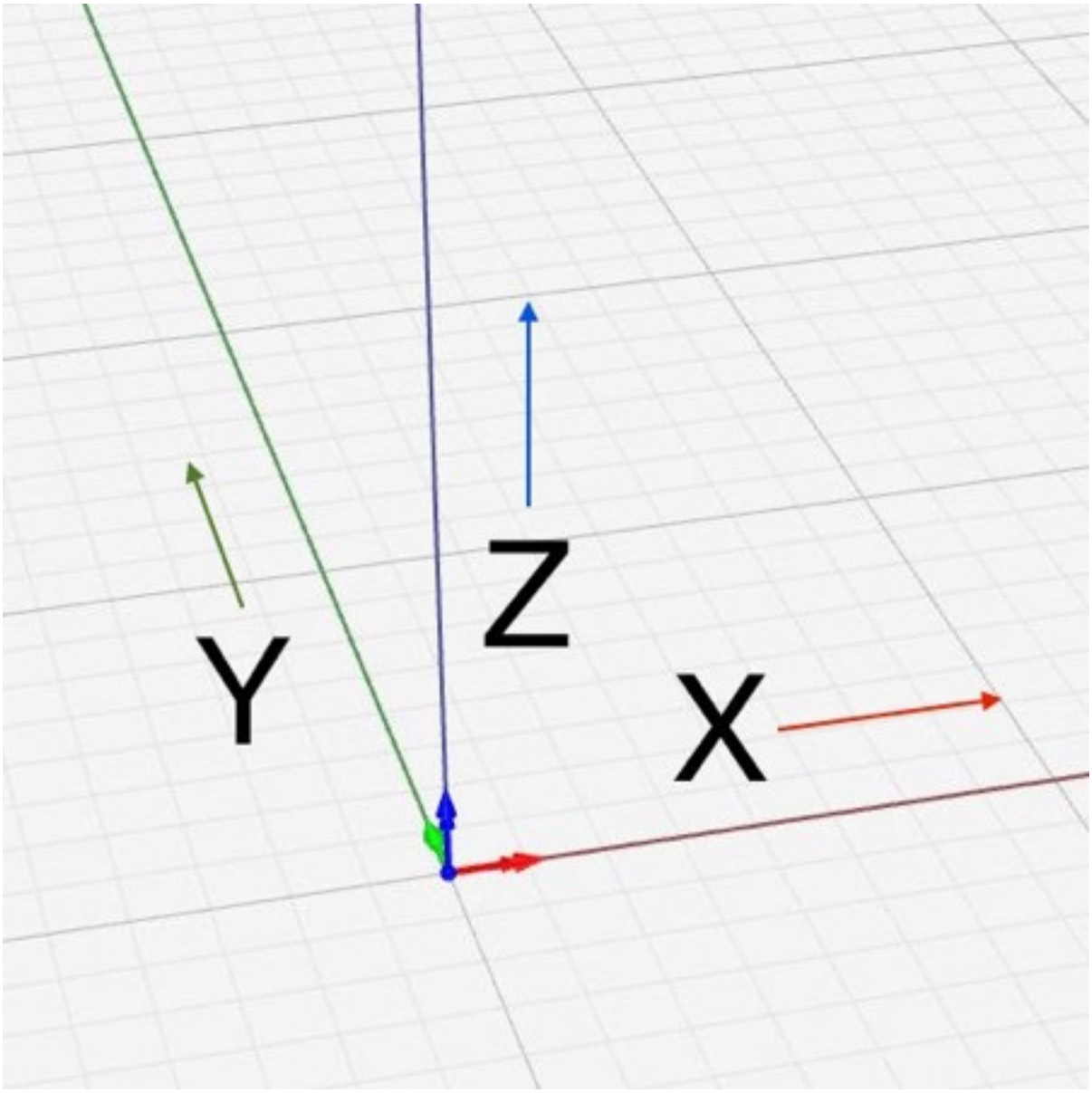
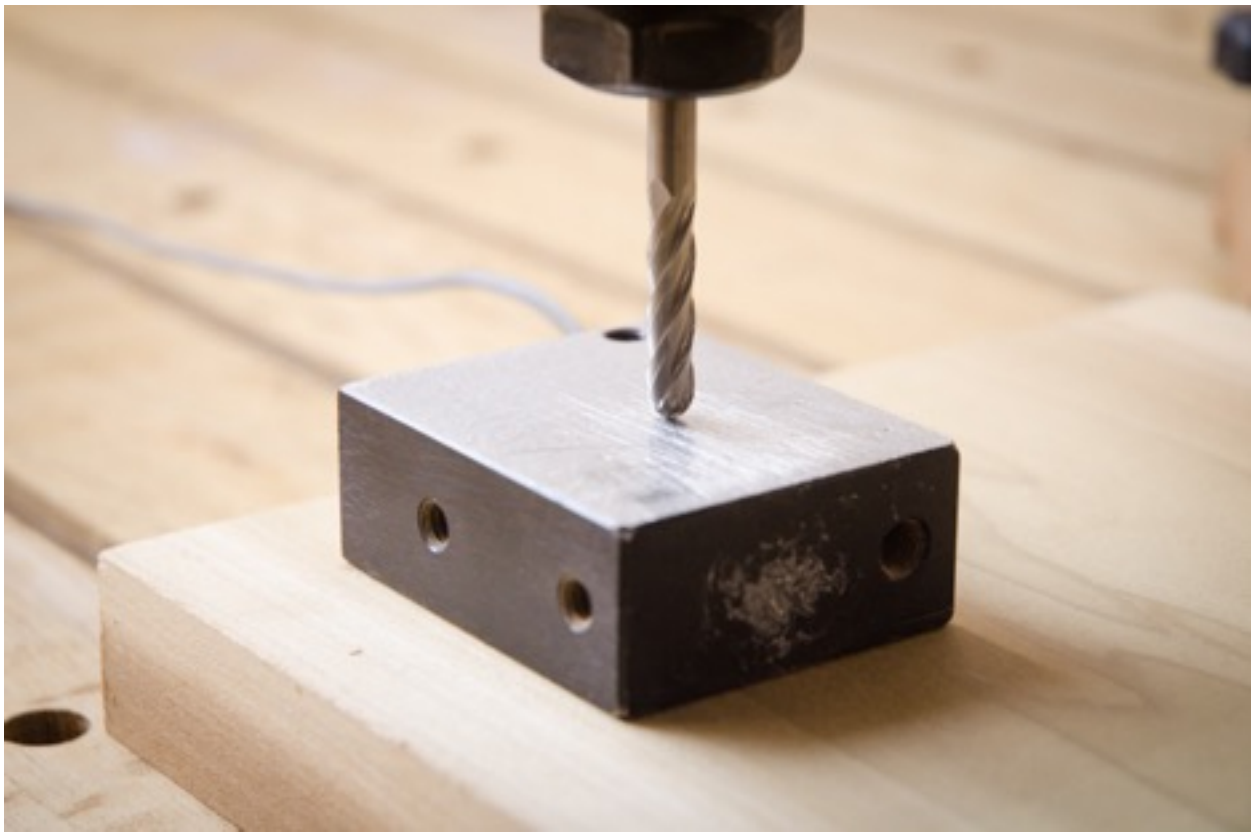



# All About Z

1. **Use a Z block**



- XYZ block

2. **Z tip one Top or Bottom**

3. **Z tip two** Disposable spoil boards
    - Paper
    - **Transfer Tape**

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# Tooling

1. **Two flutes** and standard 27 degree helix until you understand when not to
    - Up to 600 for 2
    - 600 to 1200 for 3
    - Over 1800 for 4
2. Understand and observe **waste ejection**
3. **Upcut and Downcut** bits, compression bits. Why?
4. **Shortest bits** whenever possible

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# Speeds

1. **Feed rate tables** are not designed for smaller spindles and tooling
2. Feed rate **tables for wood are relative**
3. Feed rates depend on the **size of the tool**
4. **Work within the power** of your steppers and spindle
5. **RPM** 16,000 -20,000
6. **Listen, listen, listen**
7. **Watch**

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# Spoilboards

1. **Spoil boards should not be the default**
   - When spoil boards make sense
   - Dedicated spoil boards for Plywood
   - Dedicated spoil boards for small parts
   - Dedicated spoil boards for special ops
   - Spoil boards with their own clamp system
2. No Spoil boards: **Working without a net**
3. Learn the **Paper Trick**

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# Rules to live by

1. Always **Play inside the field of play**
2. Make and Use **Wood clamps**
3. **Measure all cutters** and use that info in CAM
4. **Know when** to break rules

- **When to lie** to your CNC
- **Only cheat** at the last step

# Workflow

1. **Understand Modern Woodworking workflow**

- Use the CNC for **some things** not others. Why?
- Some **traditional methods are better** and faster

2. **Small, slow CNC**? Make accurate patterns, not parts
3. **No CNC**? Make patterns

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# Parts and Part Holding

1. Understand the unique **challenge of holding wood**
2. 90% of holding is preventing **lateral movement**
3. **Block movement**
4. **Make and Use Wood clamps**

- Clamps for different tasks

5. **Wedges**
6. **XY Tricks**
7. **Register and Hold to Bed**

## Options for part holding during machining

1. **Bridges and Tabs**
2. **Thickness** and size matter – physics

3. **Tabs** Not always at the bottom
4. .1" or .2 final layer, **trim or RO**
5. **Onion Skin** trick
6. Know when and how to use **dedicated fixtures**
7. **Palletize** complete setups

# Alternative Holding

1. Double-sided **tape**
2. Wax
3. **Blue Tape** Trick
4. Add strategically placed **Vertical Supports**
5. **Shim Stock** with wedges
6. Use **oscillating tool** to cut tabs

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# CAD CAM

1. Work to **3 digits ALWAYS**

- Know when to lie

2. The key is **accurate drawings**

3. **Work from geometry** not scans

- Fake 3D is fake 3D

4. **Master CAD** and CAM

- Use the automatic features of modern CAD for built in accuracy.

5. **Invest your time** and $ in the best software

6. **Free is not free**

7. **CAD IS THE SECRET SAUCE**

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# Top Tips

1. CNC's top benefits are **Accuracy and Repeatability**
2. Use woodworking **common sense**
3. **Think workflow**
4. **Build a better CNC bed** designed for position, registration, accuracy and holding
5. **CAD is the secret sauce**

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# Tips for Forward Thinking Digital Woodworkers

1. Think **beyond demos** that came with your machine
   - Think **accuracy and repeatability** first
2. Think **beyond one step or one part**
   - **Palletize and Use Fixtures**
3. Dedicated **spoil boards with purpose**
4. Think **assembled parts**
   - Assemblies
5. **Think beyond** two dimensions
   - **Design for three** dimensions
   - **Flip milling** should be routine
6. Buy a **3D printer**