Teaching Engineering Through Guitar Building

Academies of the Antelope Valley

Knight Prep Academy

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A smaller middle school of ~250 students with an engineering emphasis designed to feed into the adjoining high school CPA Public school with average class sizes around 32 students.

Why This Project?

- Kids LOVE it!
- Provides an engaging way to teach virtually every tool in your space
- Gives kids a real world connection to their learning
- Parents are excited about the project
- Great recruiting tool for the school, shows well
- Aligns with many state CTE standards

CTE Standards Taught

Career Ready Practice 1

Apply appropriate technical skills and academic knowledge

Career Ready Practice 4

Apply technology to enhance productivity

Career Ready Practice 10

Demonstrate creativity and innovation

Engineering Design Pathway C 2.0

Understand the effective use of engineering design equipment

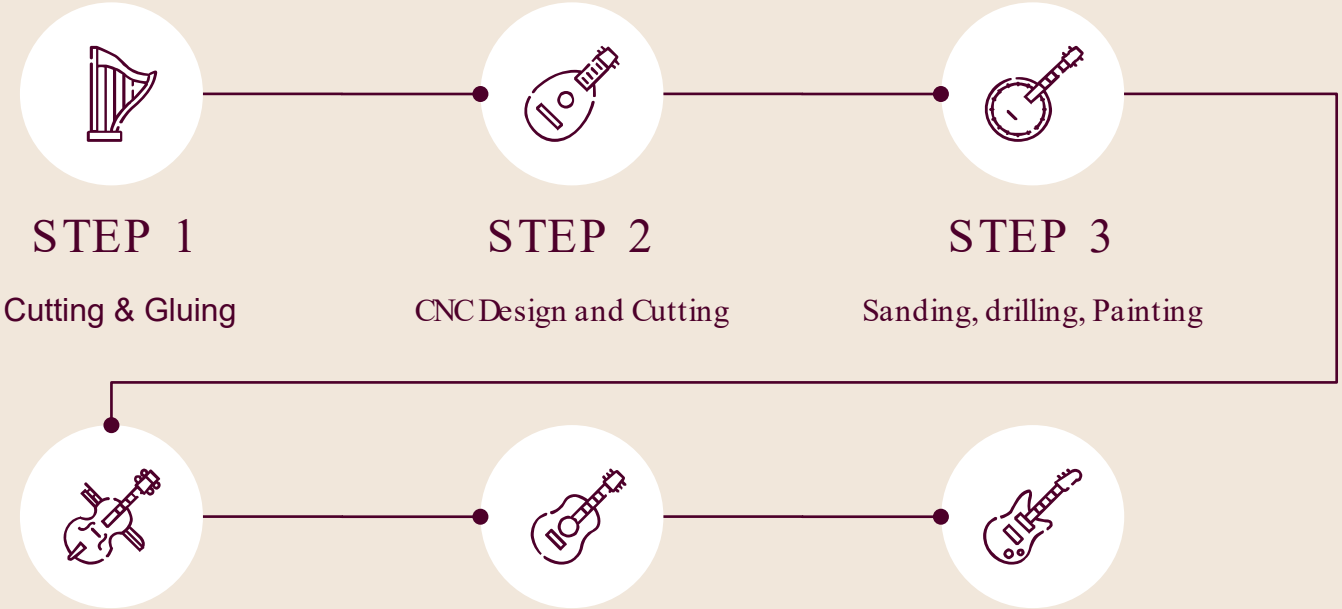
Engineering Design Pathway C 2.0

Understand the sketching process used in concept design development

Engineering Design Pathway C 2.0

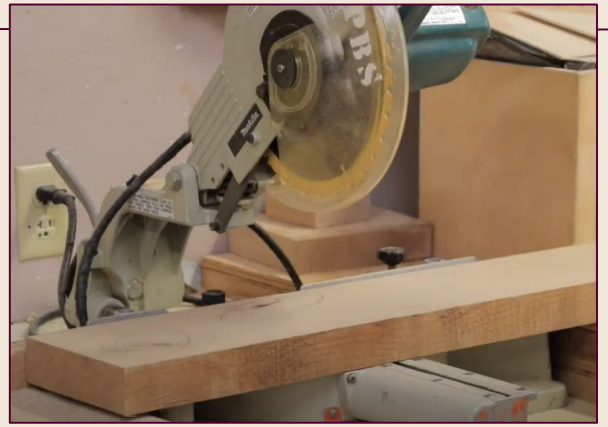
Understand measurement systems as they apply to engineering design

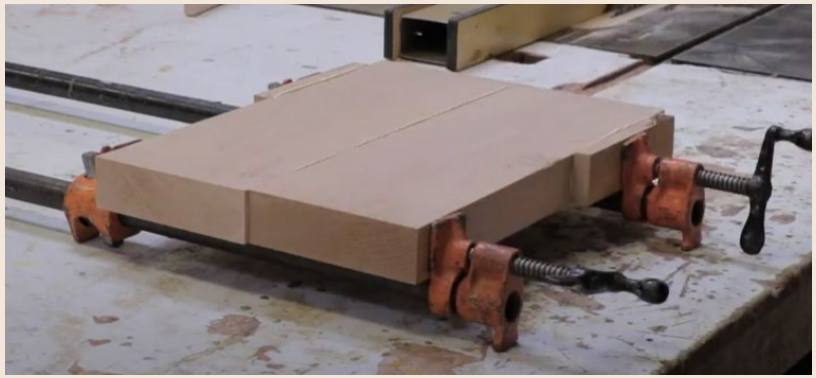
Basic Overview of building process



Step 1- Cutting & Gluing

- Teach chop saw as cut lumber
- Teach proper wood glue up
- Teach clamping
- Teach proper use of planer
- Importance of PPE
- Proper measuring, units, fractions



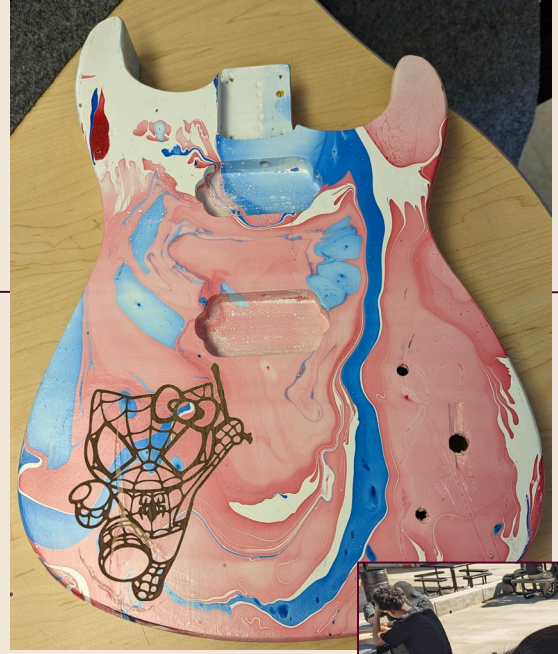


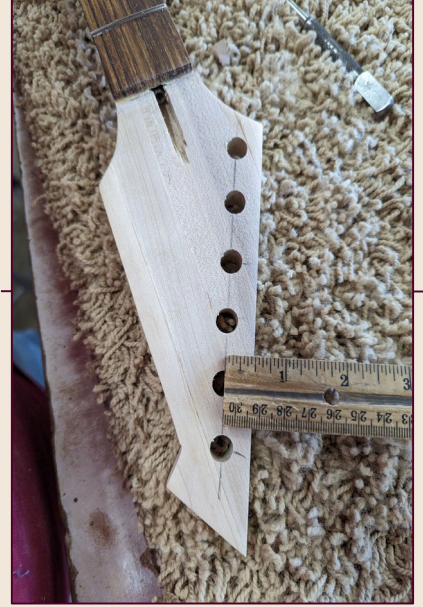
Step 2- CNC Design & Cutting

- Design body in CorelDraw
- Prepare toolpath file in Vcarve
- Teach use of CNC Router
- Post processing after router
- 2D vs 3D design
- Individual creativity

Step 3- Sanding, Drilling, Painting

- Fill holes, imperfections
- More measuring for drilling
- Use of drill press, hand drills
- How to correctly sand for painting
- HVLP, rattle cans, hydrodip painting
- CNC laser to personalize



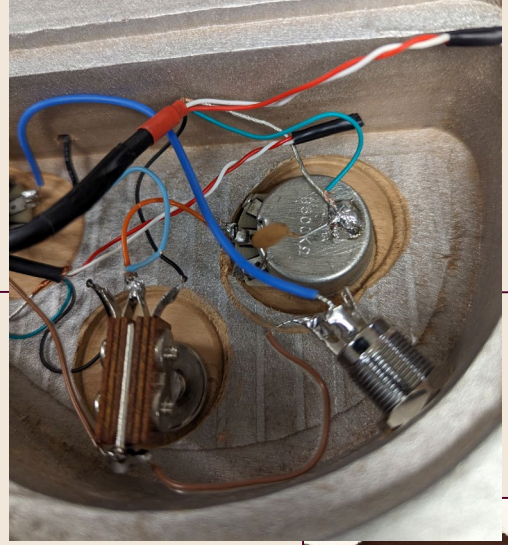


Step 4- Build Neck & Headstock

- Reinforce chop saw, gluing, clamping
- Teach band saw
- Cross-curricular with headstock
- Teach radial arm saw
- Importance of measurement
- Teach grinder
- Reinforce drill press

Step 5- Install & Solder Components

- Cost analysis, project sustainability
- Install hardware
- Reinforce drilling
- Teach soldering techniques
- CNC laser electrical cover



Step 6- Stringing & Testing

- Cut bone nut
- File bone nut
- Install strings
- 3Dprint string tightening tool
- Play it!
- Extension- Amp project

Tools Used

Power Tools

- Chop Saw
- Table Saw
- Band Saw
- Radial Arm Saw
- Drill Press, Hand drills, Dremel
- Routers with table
- Thickness Planer
- Long arm sander, spindle sander, Orbital sanders, grinder

Traditional Tools

- Pipe clamps, C clamps
- Rubber mallet, stamps
- Soldering iron
- Screwdrivers

Lab Specific

- CNC Router
- CNC Laser
- HVLP sprayer or Hydrodip

How to get started?

Woodshop Rocks

Local teacher who has been teaching guitar building in the classroom for over 30 years, offers amazing support!

In Person Training

Build your own guitar from scratch, experience the process yourself, learn to use all of the tools involved.

Collaborate

Talk to us, talk to other teachers who are doing this project in their classrooms, compare notes, be a part of a supportive community of educators.

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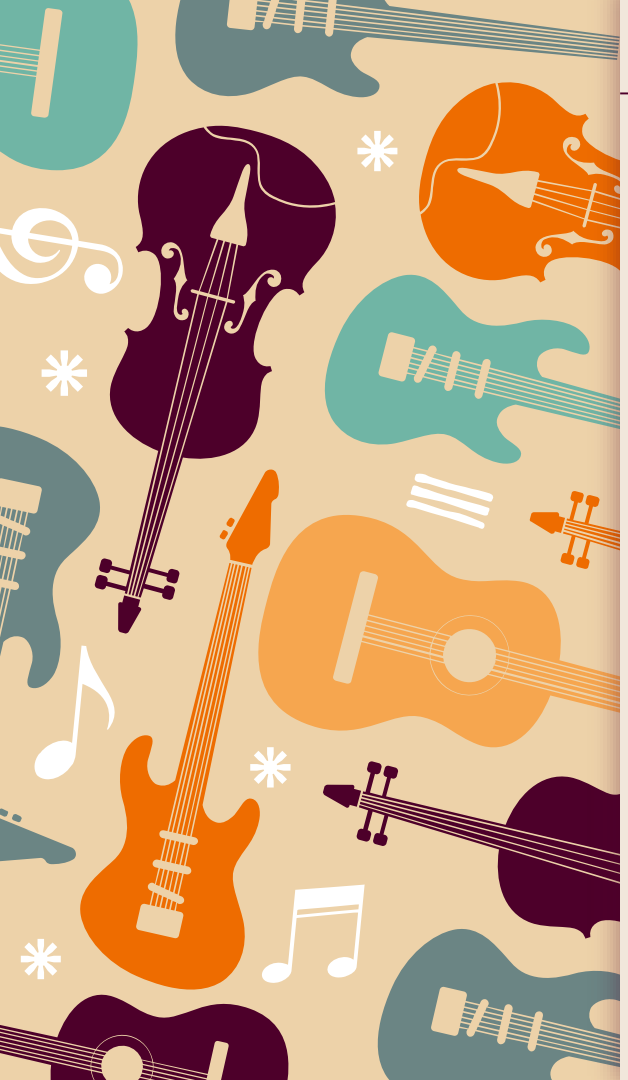

THANKS!

ANY QUESTIONS?

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