



Laser Cut Structure and Kit Development

From Concept to Finished Model

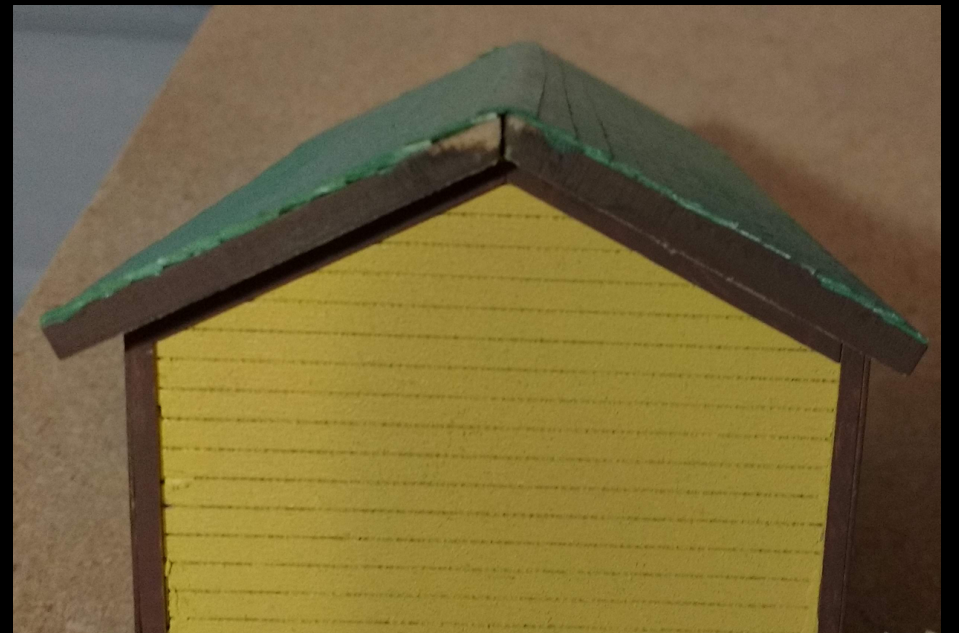
Michael Eldridge

The Project Flow

- Choosing a project the laser will do well
- Software choices: Why Fusion 360 instead of SketchUp
- Materials: some newer choices
- The laser cutter
- The business of producing a kit

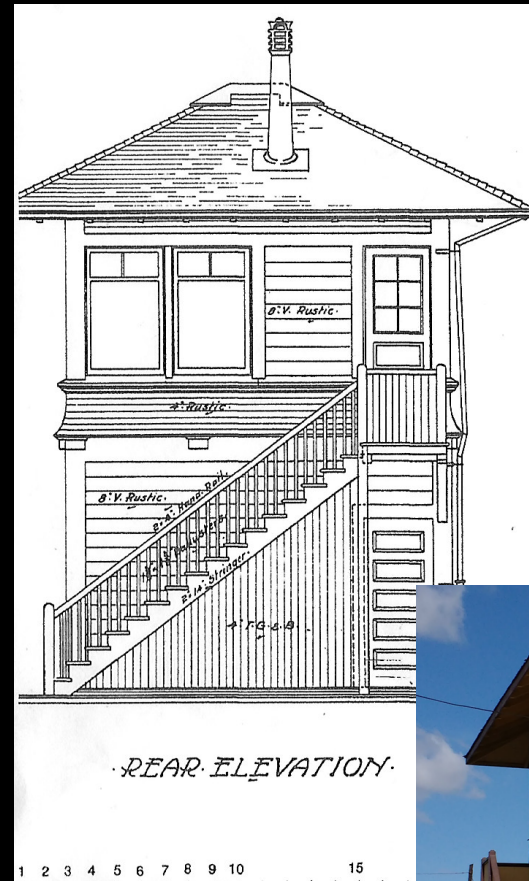
Choosing a project

- What the laser is good at
 - 2D precision cutting
 - Engraving lines
- What the laser does adequately
 - Surface texturing (relief cutting)
 - This can be expensive
- What the laser cannot do
 - Undercut, angled cut
 - Temptation to overuse a single technology



Research

- Not my favorite part
- Drawings available?
- Photos available?
- Structure still available (a dream come true)



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Software choice

- We need to make a drawing that can be used by the software that runs the laser
- Typically two programs involved: CAD (3D) plus Vector Drawing
 - Need to know your laser cutter's requirement
 - The Chinese laser: CorelDraw and HP plotter software
 - The Glowforge laser: SVG and any vector drawing software
- I like free software
- I like open software

Software Choice: CAD

- Choose carefully
 - Very limited ability to move drawings from one package to another
 - Learning curve is steep in all CAD software
 - Should be 3D capable
- Three main contenders
 - SketchUp
 - Solidworks
 - Fusion 360

Software Choice: CAD

- SketchUp
 - Origin: architectural mockups
 - Advantages
 - Free
 - Quickly produce simple 3D models
 - My experience
 - Paint program vs Photoshop – parts are not related to each other
 - Netfabb / Mesh mixer always showed multiple errors
 - Could not enter small dimensions

Software Choice: CAD

- Solidworks
 - Premier professional 3D modeling
 - Advantages
 - Designed for manufacturing
 - Feature rich
 - Concerns
 - Very expensive – but available at Maker Shops
 - Learning curve and drop-off

Software Choice: CAD

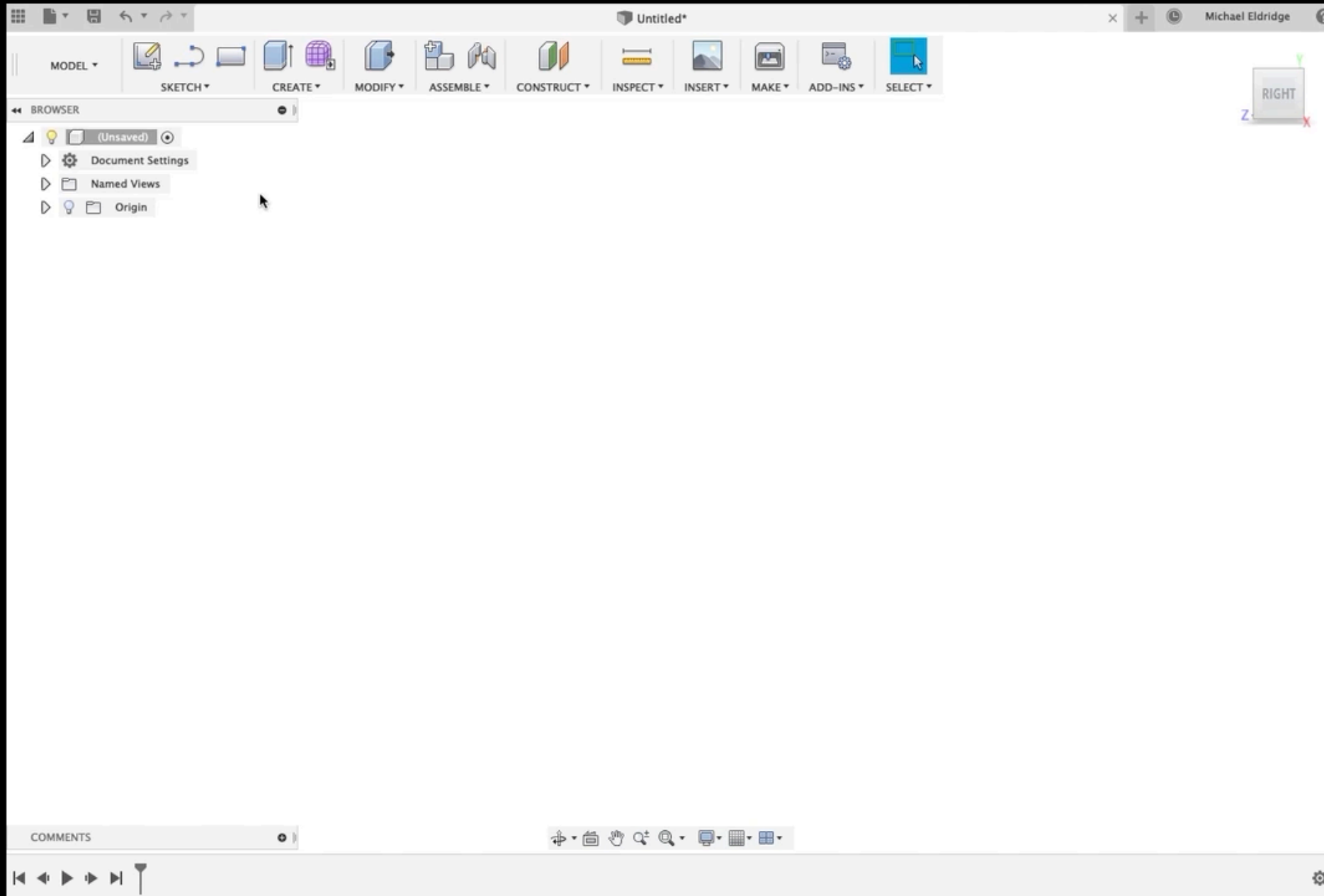
- Fusion 360
 - Autodesk response to Solidworks
 - Advantages
 - Designed for manufacturing
 - Feature rich
 - Free for “Start-ups”
 - Extensive online support – Autodesk and user community
 - Concerns
 - Learning curve and drop-off (excellent tutorials)
 - Cloud based

Fusion 360

- Parametric
 - Multi-scale
 - Change of material choice
 - Symbolic dimension names

Parameter	Name	Unit	Expression	Value	Comments
Favorites					
▼ User Parameters +					
☆ User Parameter	scale		48	48	Modeling scale ratio
☆ User Parameter	wall	in	0.126 in	0.126	Wall thickness
☆ User Parameter	trim	in	0.016 in	0.016	Trim thickness
☆ User Parameter	main_h	in	(252 / scale) * 1 in	5.25	Main wall height
☆ User Parameter	main_w	in	(194 / scale) * 1 in	4.042	Front width inside trim
☆ User Parameter	main_d	in	(170 / scale) * 1 in	3.542	Side depth inside trim
☆ User Parameter	win1top	in	(120 / scale) * 1 in	2.50	Top of 1st floor windows
☆ User Parameter	win2top	in	main_h - ((12 / scale) * 1 in)	5.00	Top of 2nd floor windows

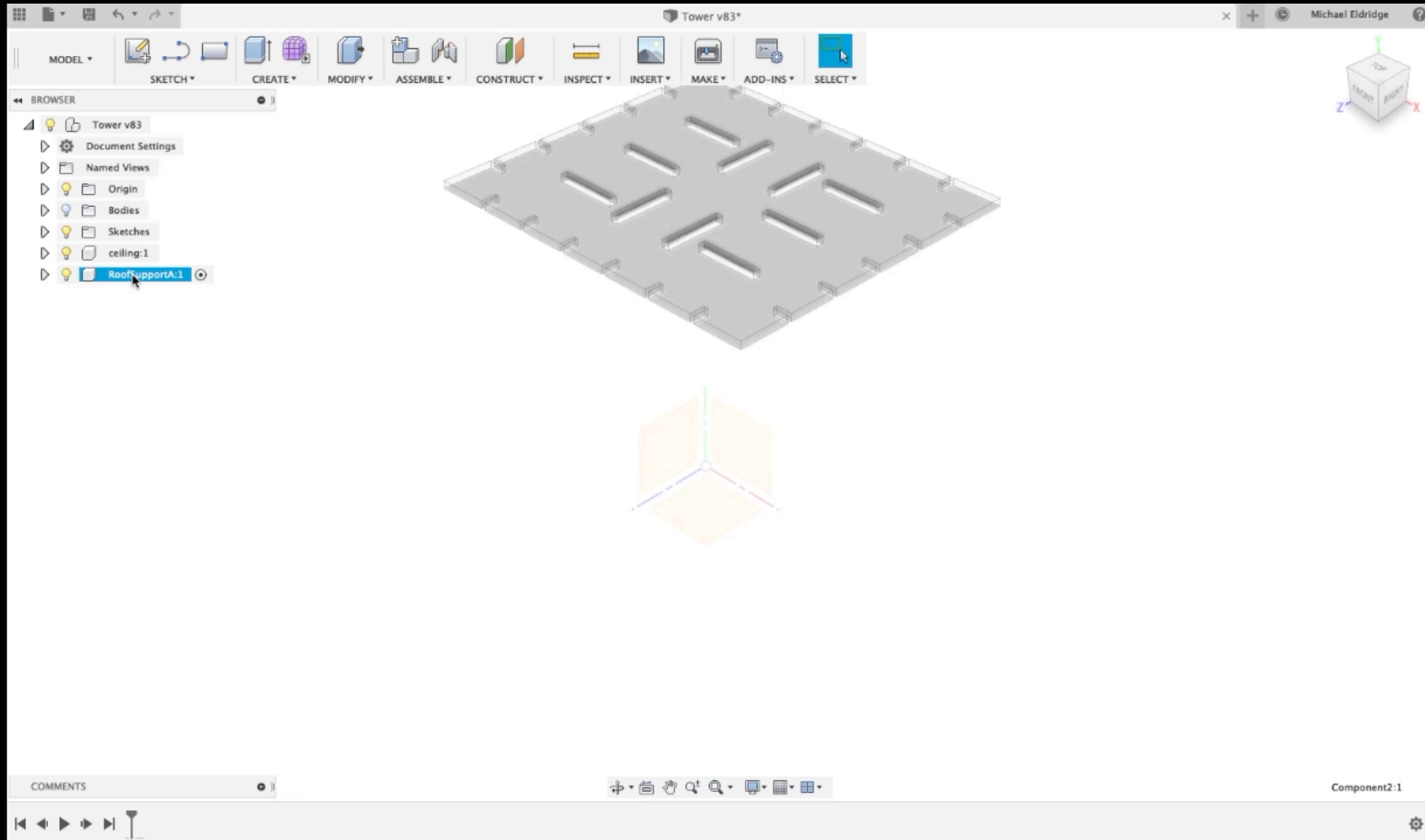
Fusion 360: Basic Drawing



Fusion 360

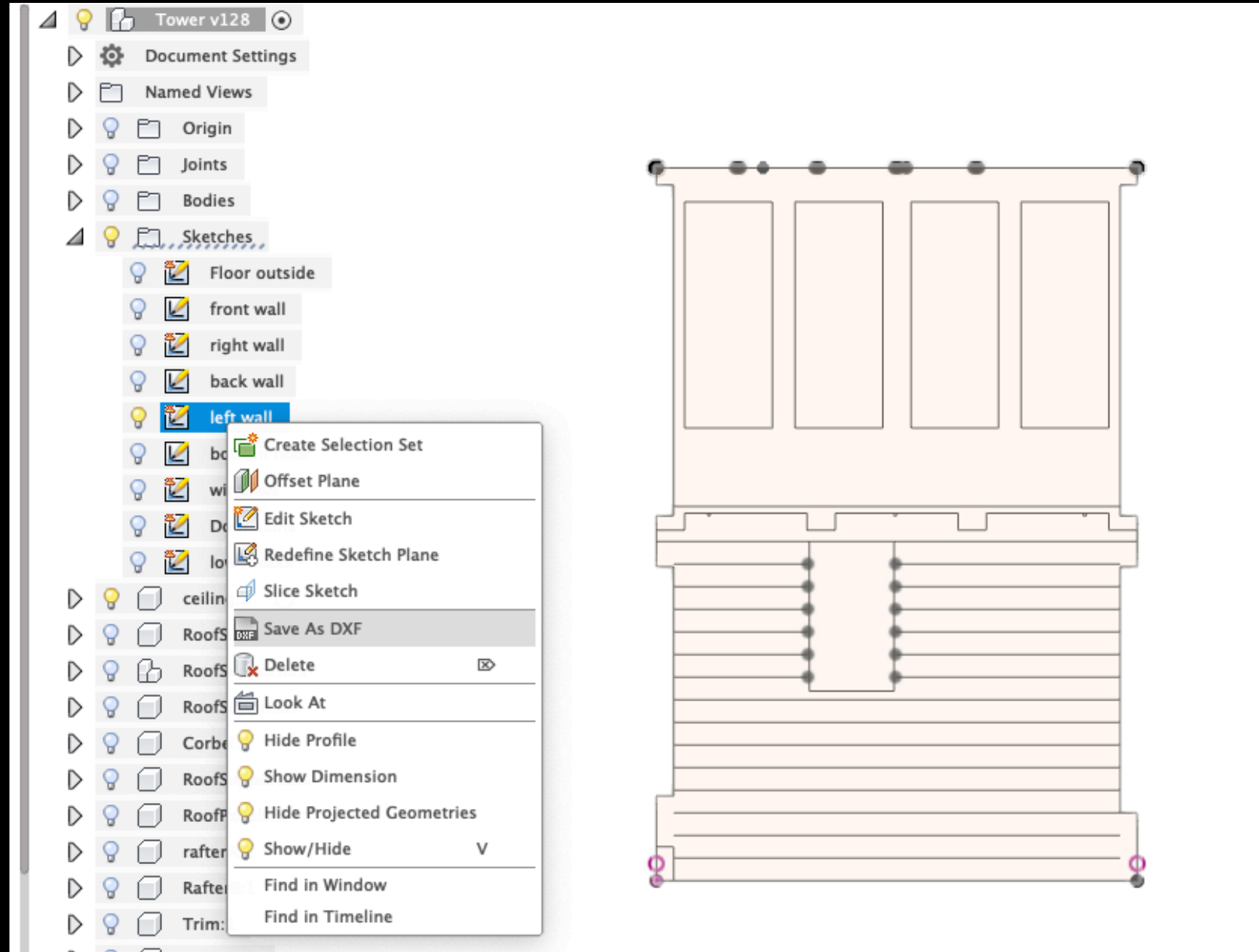
- The component model
 - Laser kit is an assembly of 2D cutout components
- Relationship between components is maintained
- Motion simulation, check for “assemblability”

Fusion 360: Component relationships



Fusion 360

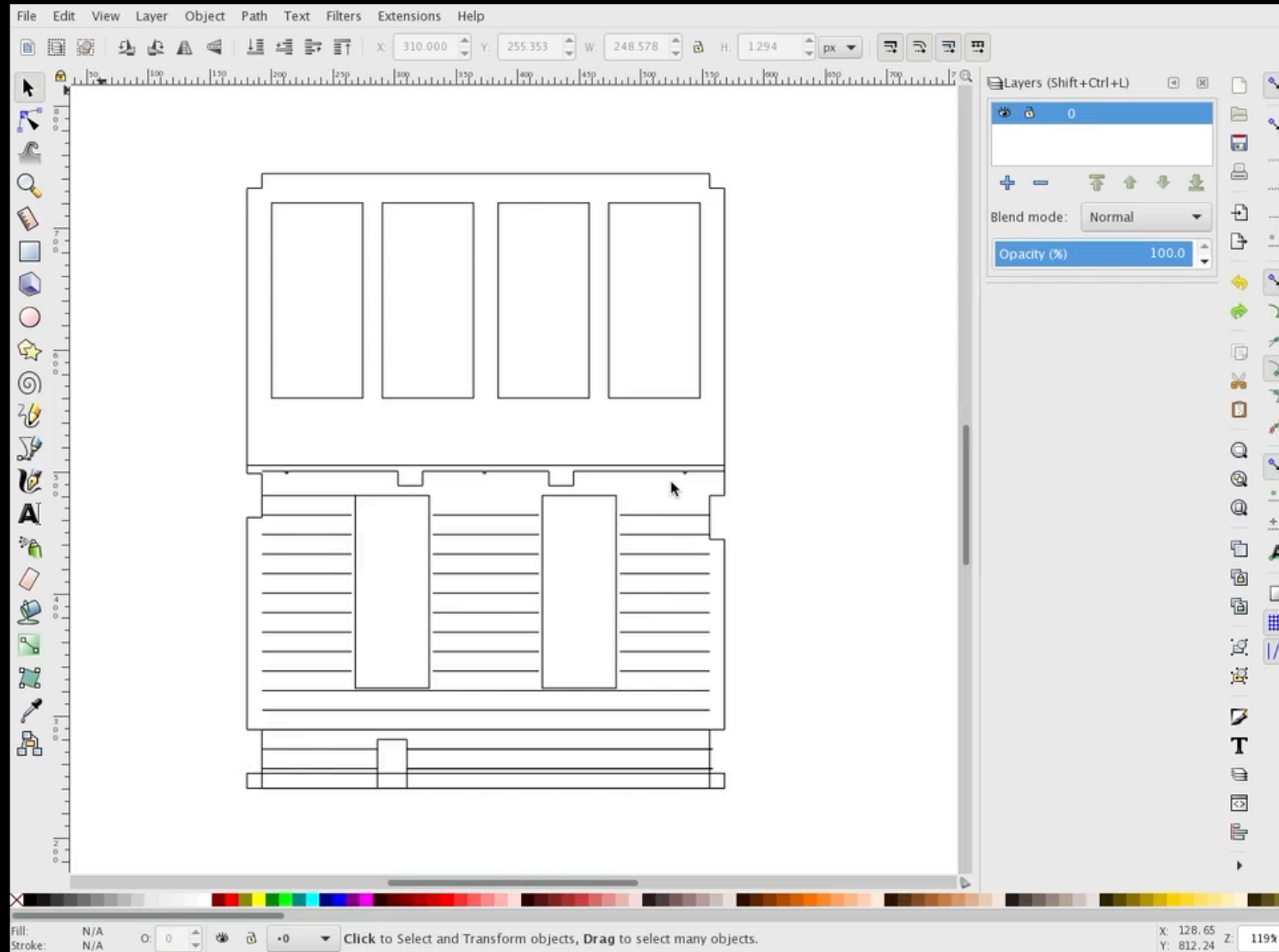
- Exporting the dxf



Inkscape

- Free, cross platform
- Vectors
 - Move drawing segments without loss of data
- Colors to control order and type (Glowforge specific)
- Fixups
 - Construction lines, Reference lines picked up from other components
- Save as SVG

Inkscape: Prepare for laser



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Materials

- Basswood: the old standard
- MDF
 - Don't have to align grain
 - Smoother cut
 - Does not show grain in finished model
- Laserboard
 - Clean cutting
 - Stronger than wood in thin sections

Materials

- Plastics
 - Acrylic cuts smoothly
 - Any vinyl is poison, literally
 - Styrene: score and snap
- Adhesive transfer

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The Laser Cutter

The Chinese Laser	Glowforge Basic
\$3000	\$2500
Requires CorelDraw	Any SVG, JPG, PNG...
Cable attachment	WiFi / Browser based
Repairs and laser replacement overseas	USA based
Requires water cooling system	Internal cooling system
Floor standing	Tabletop (requires vent)

The Laser Cutter



The Laser Cutter: Sending the file

The screenshot shows the Glowforge Design Library website. The top navigation bar includes links for Home, Catalog, Shop, Community, and Support, along with a user profile for Michael E. The main content area is divided into two sections: Design Library and Discover.

Design Library

NEW DESIGN: [Upload](#) [Trace](#)

The Design Library displays a grid of 25 design files, each with a thumbnail and a label:

- temp
- tool
- sashes
- Sheet D
- lath
- walls
- backwall 64
- Shingles 64
- RafterA 64
- RoofPanels 64
- ceiling64
- windows64
- windowframes64
- doorskins64
- trim64

Discover

EXPLORE
See what others are making and add yours [here](#).

The Discover section features a grid of six images showing various laser-cut projects, including a wooden basket, earrings, glasses, a wooden bowl, a sign, and a necklace.

INSPIRE
Looking for a little spark? Start with [this free design](#).

Sometimes all it takes is one small idea to inspire many more. The free design is our gift to you and we hope it will get your creative juice flowing. Personalize it, print it, and then share it to inspire others.

LATEST IMPROVEMENTS
Warmer weather operation - just in time for Spring

This week, we'll be releasing software that improves the temperature sensing of your Glowforge. You'll be able to operate your Basic, Plus, or Pro in temperatures that are 2-4° F (1-2° C) warmer without pauses.

[Read More](#)

The Laser Cutter: In Action

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The Business of Producing a Kit

- Develop instructions
- Packaging
- Pricing
 - Materials are a minor player
 - How much is your time worth?
 - Shipping – usually subsidized
- Legal requirements
 - Fictitious business registration
 - Sales Tax – now several states
- Advertising

First Project

- Make a friend of someone with a laser
- Download Fusion 360 and Inkscape
- Draw a rectangular building



www.sandypointmodels.com/resources