Scratchbuilding 101

Sharing my (limited) experience, mistakes, and lessons learned

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Agenda

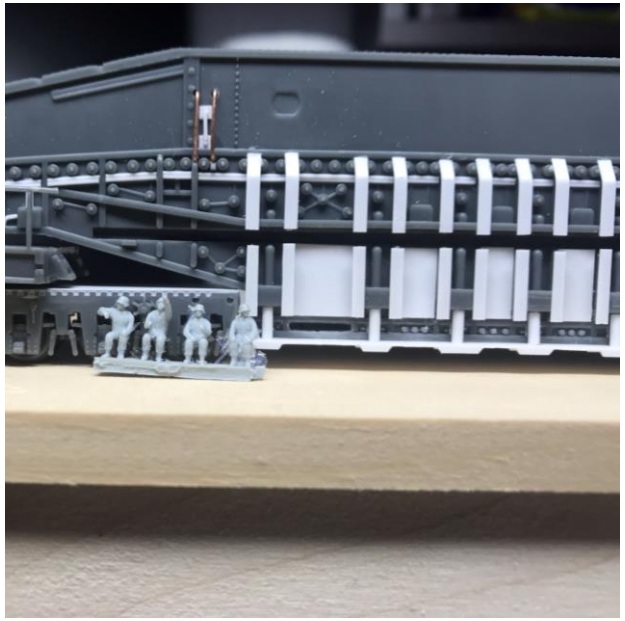
WHAT IS SCRATCHBUILDING

CHOOSING AND PLANNING YOUR SUBJECT

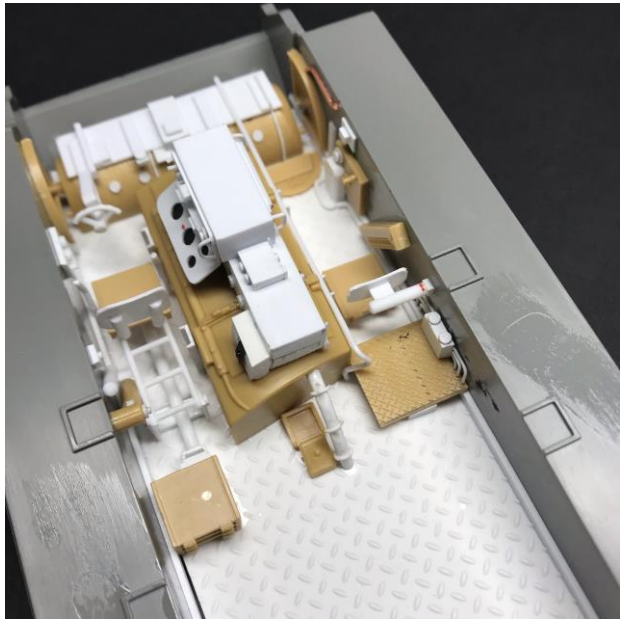
MATERIALS, TOOLS, AND BASIC TECHNIQUES

CONCLUSIONS

Have you ever scratchbuilt? *(hint: you probably have)*



Small corrections to a kit
(in white)



New driver & radio
compartment added
(in white and beige)

Entire model
(in black primer and white)

A little **A lot**

Scratchbuilding is…

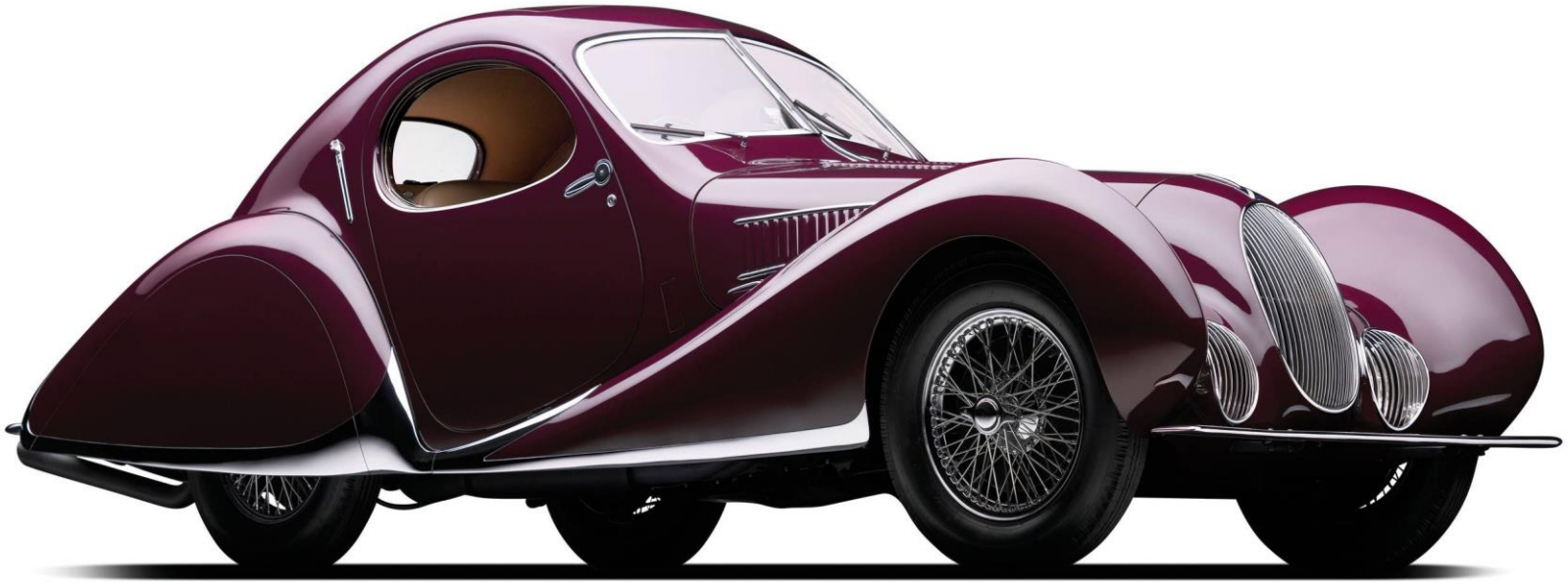
Kit	Accessories, spares	From scratch	Scratchbuilt?	Example
Y			No	Kit only
Y	Y		No	Kit tank + metal tracks
Y	Y or N	Y	Yes (a little)	Kit tank, metal tracks, S/B engine
	Y	Y	Yes (a lot)	S/B tank , spare wheels, metal tracks
		Y	Yes (all)	Complete tank from scratch

Torcan 2023 defines it as follows:

*A model is classed as scratch built if **no more 25%** of the model consists of unaltered kit parts. **75% of the model** must be made from raw materials (ie plastic, metal, resin, paper or wood)*

Not covered

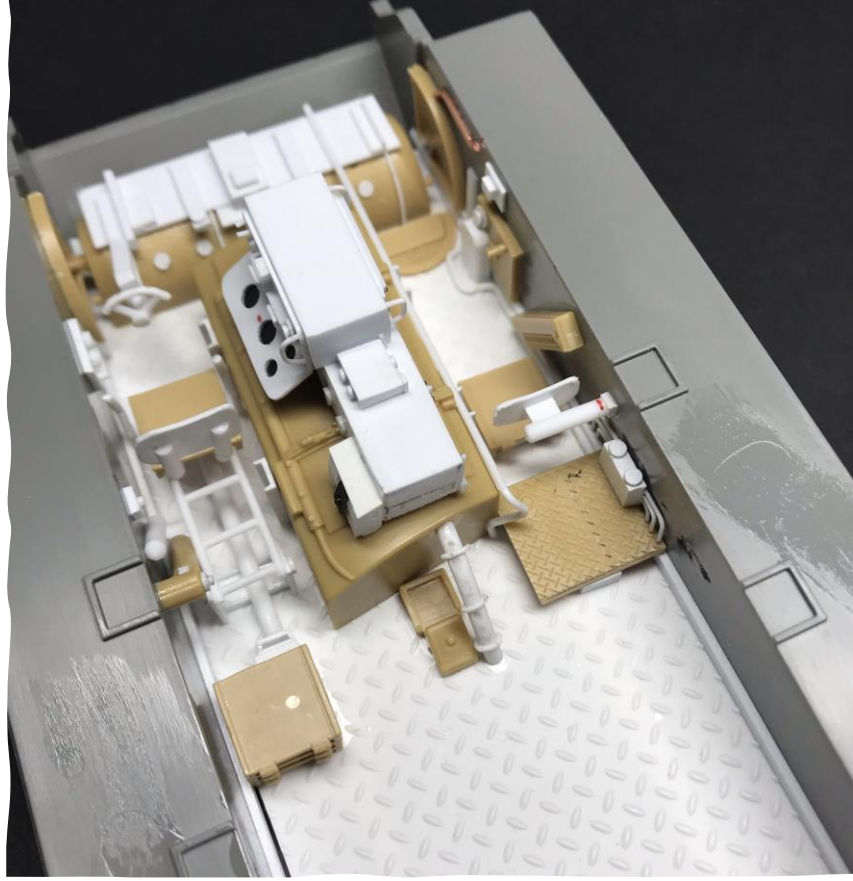
- 3D printing
- Vacuforming
- Molding
- Sculpting
- Metal etching
- Home-made decals



No way to model this by cutting and filing styrene sheet!

Choosing a subject

- Have a passion for your subject (you'll need it)
- Start with a detailing project (e.g. engine compartment) or a small conversion
- Understand the overall shape: fewer curves = easier
- Availability of references w/ specs & dimensions
- Set aside enough time, takes a while but high ROI



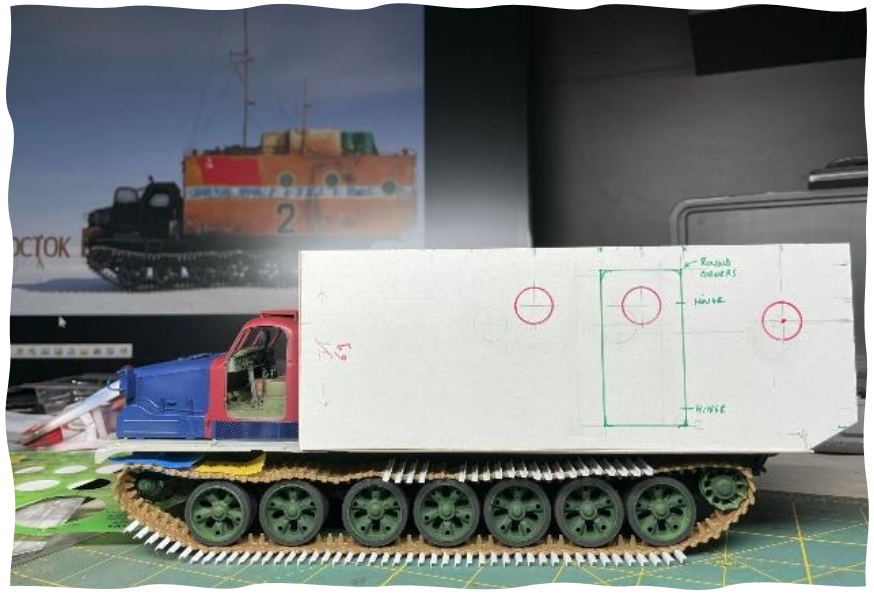
Planning and design

- Before cutting plastic, need measurements of subject
- Ideally you can get accurate measurements
- If you only have <u>some</u> measurements
  - Measure photos / drawings
  - If you know **Height** but not **Length**, derive Length based on ratio
  - H 2cm : L 8cm = **H 3m** : **L ?m** → **L 12m**

H 2cm = **3m**

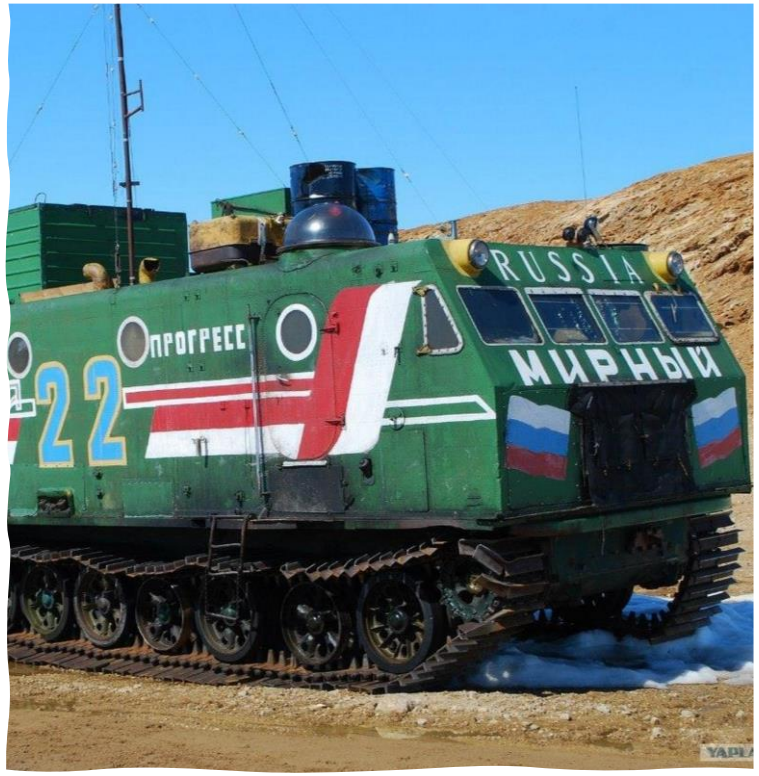
L 8cm = **?**

- If doing a conversion, you can size a side view in print or on screen to match your kit parts
- Use it to size cardboard cut-outs of your scratch-built parts



Planning and design

- When using ratios, measure on same plane to minimize perspective distortion
- If possible, use Photoshop or Snapseed to “flatten” perspective and reduce measurement distortions
- Use multiple ratios and measurements to “triangulate” dimensions
- Once L, W, H are calculated, divide by scale to draw the plan
- Forgo the quest for absolute accuracy – “looks right” Vs ±5 scale mm
- You can use MS Word to specify Length and Height (cm or in) of an object, which will then be printed on paper with those dimensions
- Question your references….



Materials

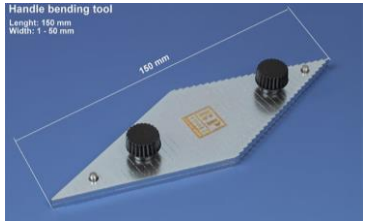
- Styrene sheet: 0.25, 0.38, 0.4, 0.5 mm, white or black
- Styrene rod: round, square, flat, I-Beam, L-profile
- Brass rod, tubing: K&S assorted micro-tubing
- Copper, aluminum, and led wire, metal meshes
- Molded styrene bolts and nuts (Meng)
- Micro solder balls
- XPS (pink or blue) foam
- Balsa
- Anything that resembles the shapes you need
- Finding a specific shape can take a lot of on-line research

Tools*



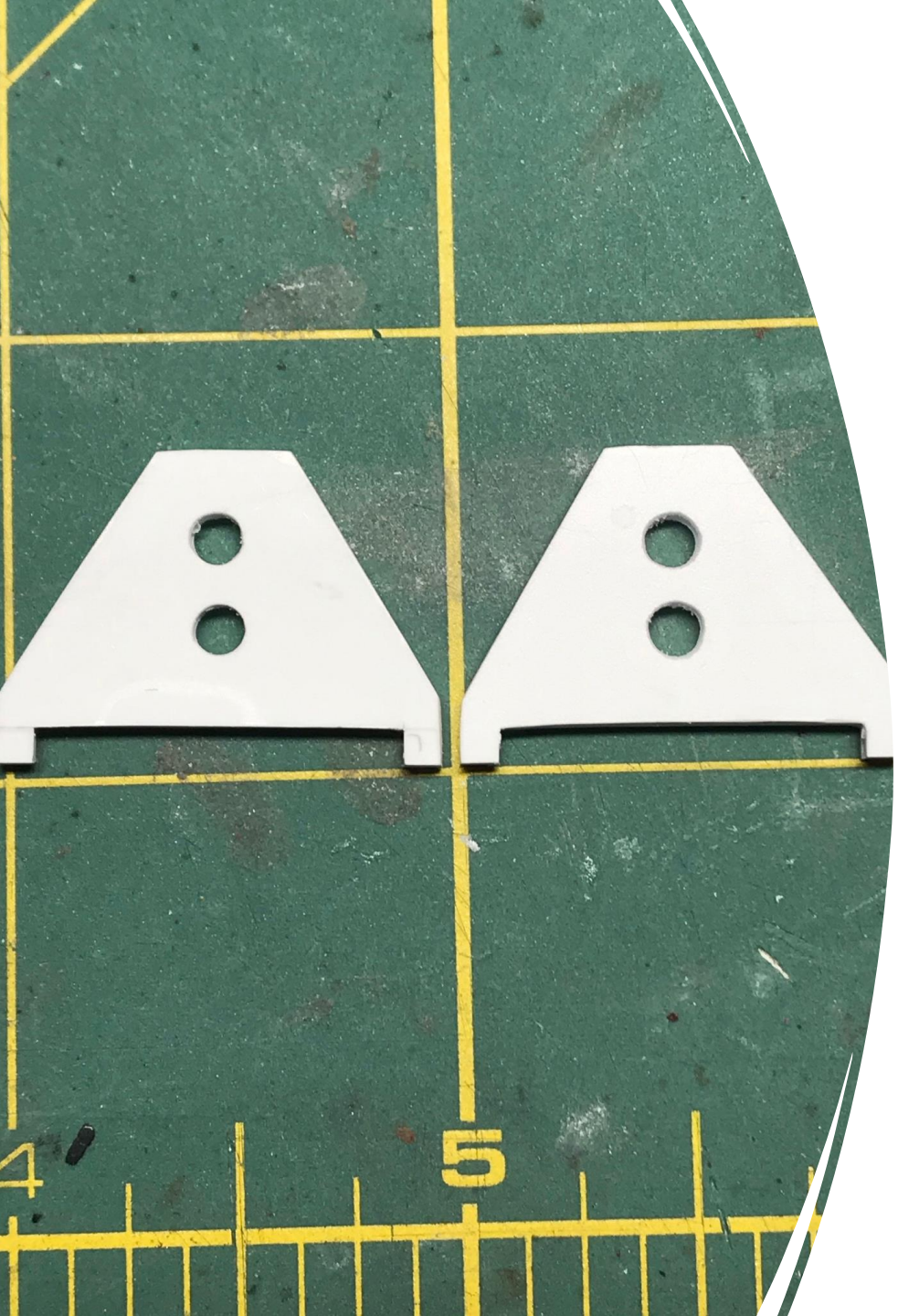




*In addition to the typical stuff

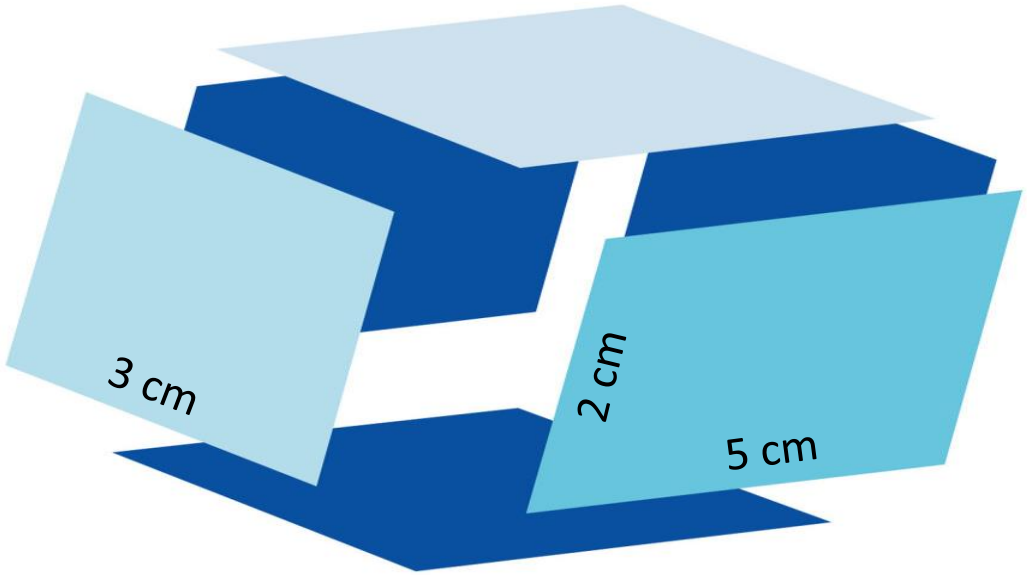
Fancy-schmancy stuff



Cutting plastic

- Use calipers instead of ruler and pencils to mark cuts
- Use metal straightedge, a sharp x-acto blade, and score the sheet 2-3 times – ***don't try to cut through it***
- Once scored, you can easily snap the sheet for a clean cut
- Use a metal T-square to get true 90 deg. Cuts
- To cut multiple identical strips
  - use the first strip & jam it between 1-2-3 blocks and straight edge
  - remove first strip and score along straight edge
- Draw and free-hand round cuts, sand to shape
- Use thinner styrene (0.38 or 0.5mm) and reinforce with rod

Making boxes is good practice *(think it's easy?)*

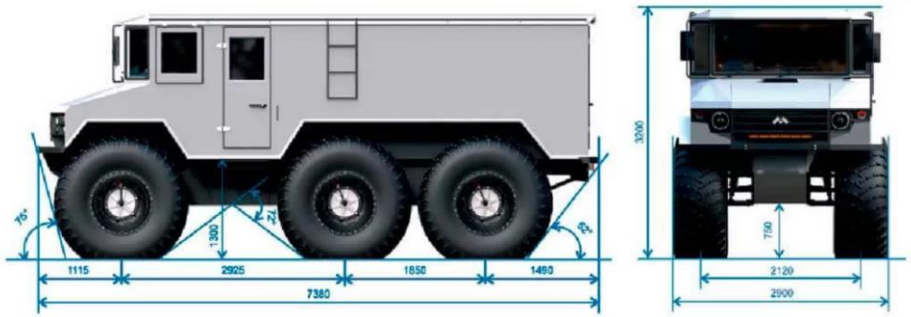


- Cut straight and 90 deg. angles
- Each wall pair needs to be identical
- Top and bottom need to account for thickness of side walls
- Cement at right angles for the box to be straight

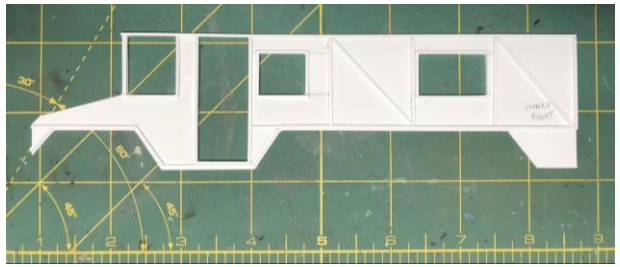
If your cuts are sloppy, sanding the joints will improve the fit, but not the "square"

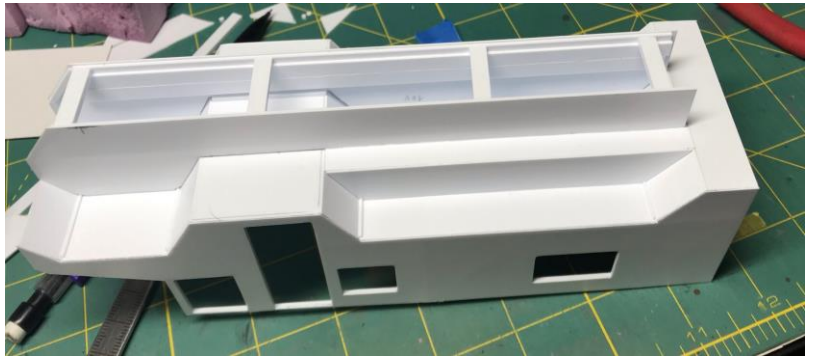
- Reinforce interior joints with square or L-profile rod to improve square joints & rigidity
- Use 1-2-3 blocks to cement and hold sides at square angles

To build a structure, decompose it into basic “boxes”



Get dimensions, draw plan, cut

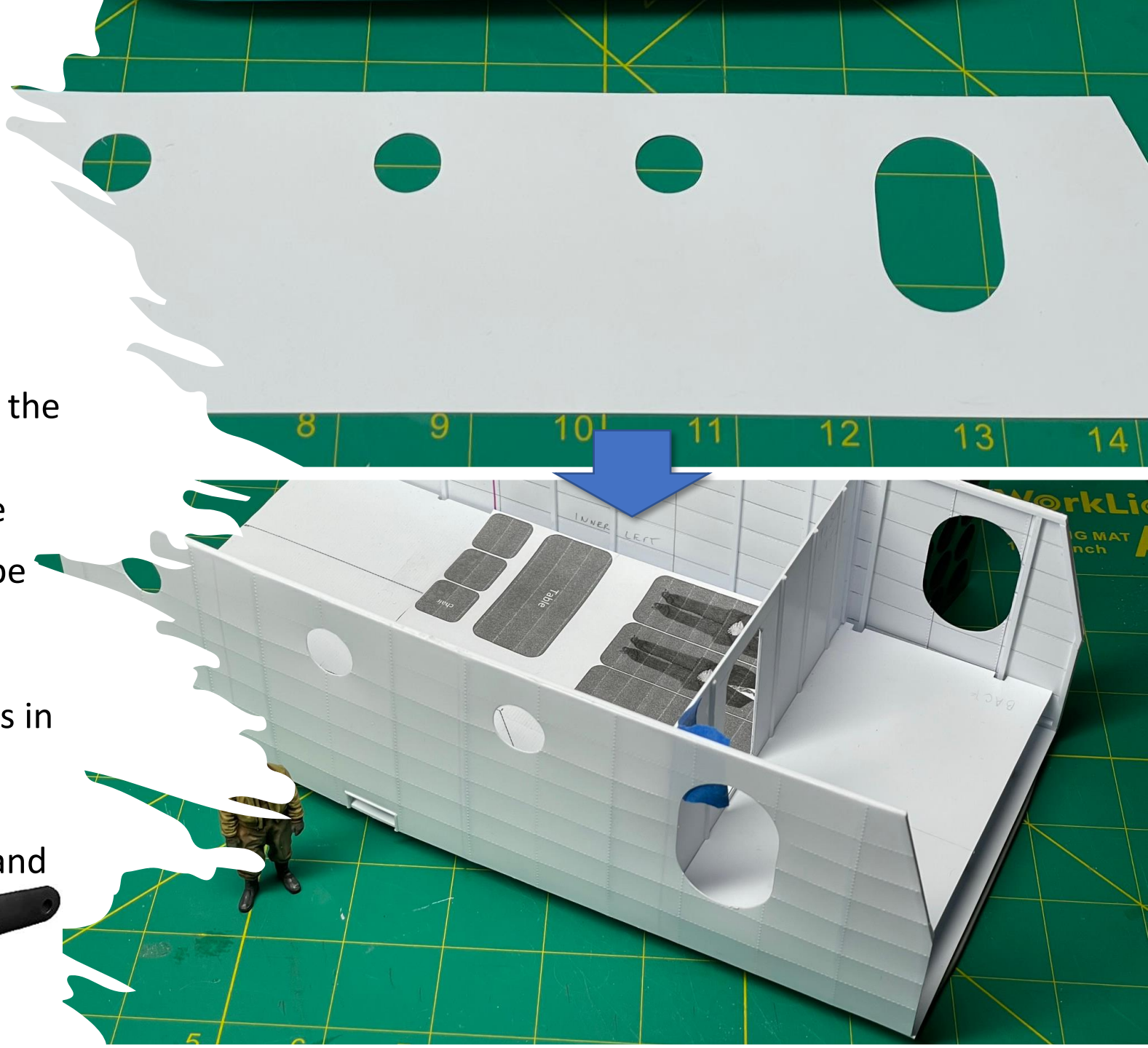




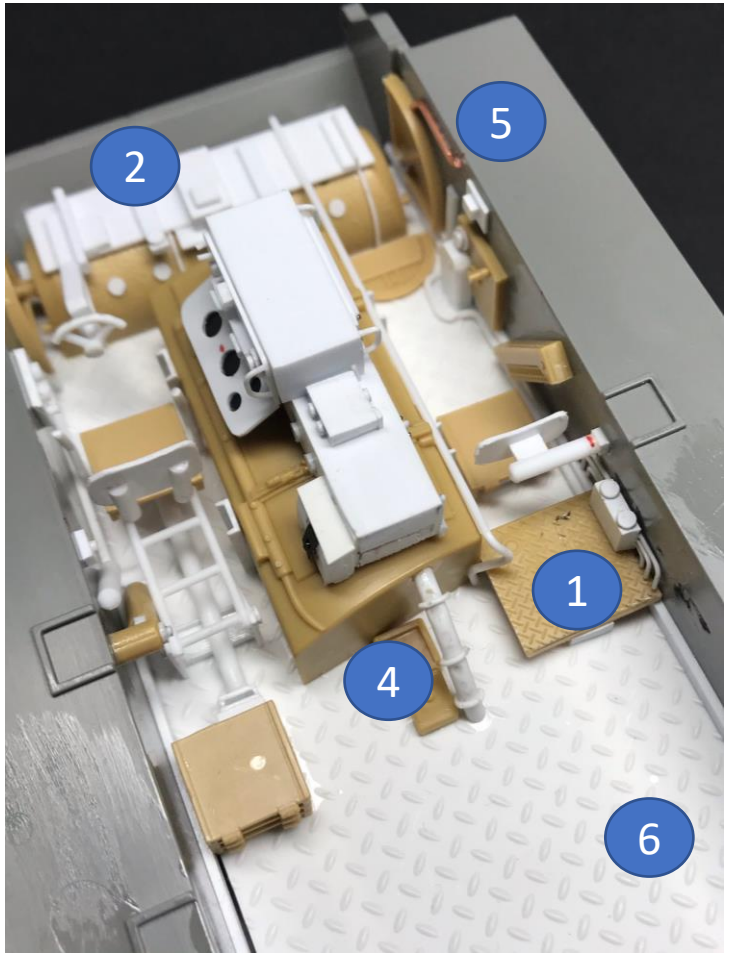
- Getting the two side walls right (straight and true) is probably more critical than being dimensionally perfect
- Failing that, the model will be crooked and ill fitting
- You’re just making boxes!

Texturing and detailing surfaces

- Add raised riveting with riveter on the *back side* of the surface
- Add sunk riveting on the front side
- Scribe paneling as needed, use tape to avoid scribing past intersecting panel joints
- Bonus: pressing with riveter results in realistic buckled metal effect
- Once surfaces are textured, add beams / rods / strips to reinforce and straighten panels

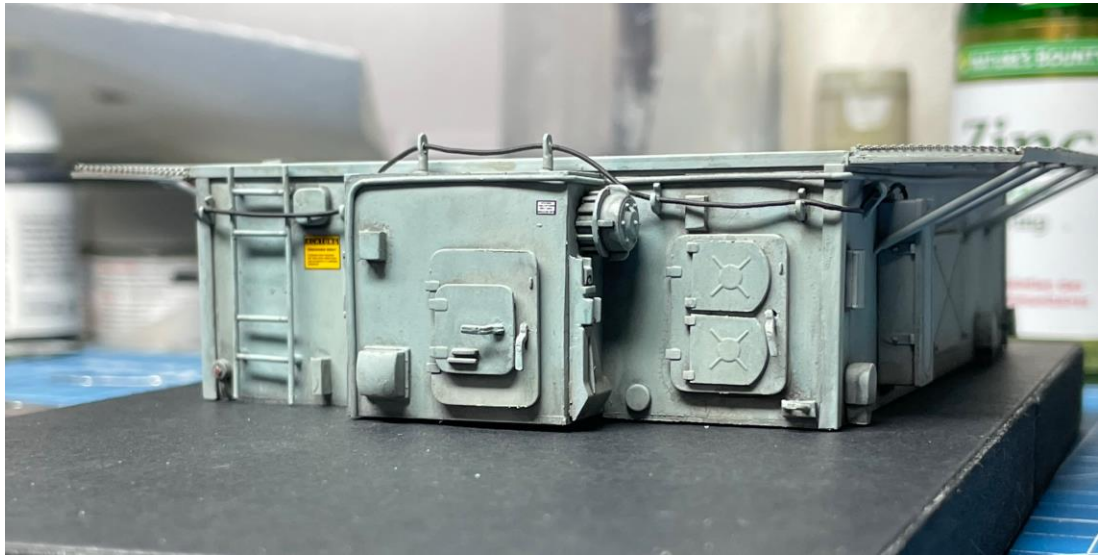


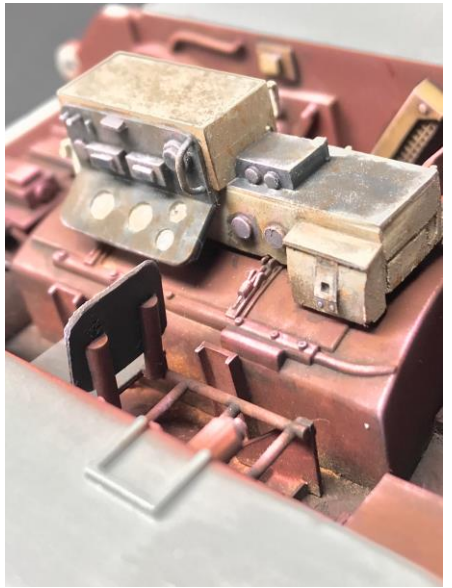
The illusion of complexity

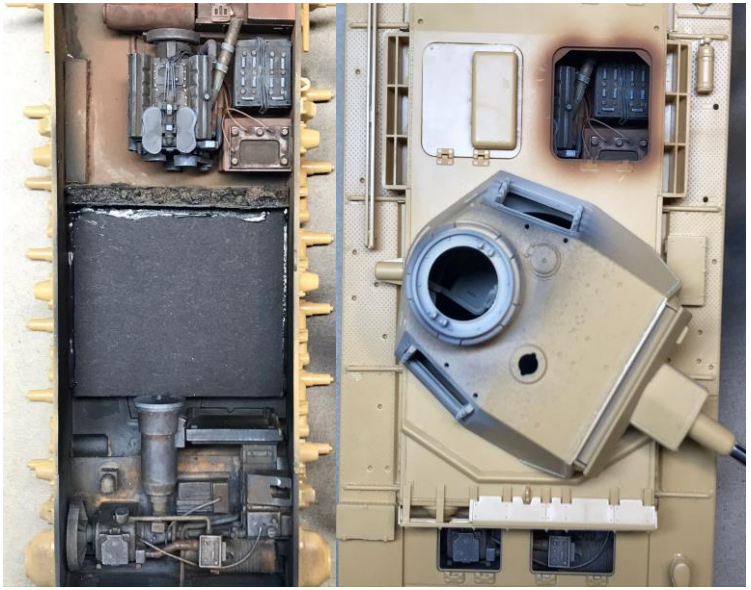


1. Raid your spares box
2. Make features from styrene
3. You can laminate thicker styrene sheet to build up a styrene block, then shape it with a knife and files to give it form
4. Cold-bend plastic rod to simulate tubing (easier to cement but easier to break or crimp)
5. Use copper or led wire to simulate wiring – anneal metal wire to make it softer and more pliable
6. Use texture styrene sheets for antiskid and metal flooring

Examples





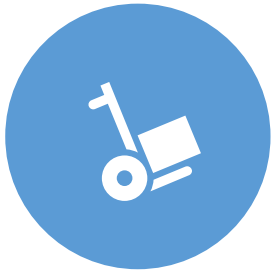


Conclusions

START SMALL AND GROW INTO IT

DOING IT CHALLENGES AND IMPROVES ALL YOUR SKILLS AS A MODELER

DARE TO BE ORIGINAL (NOT ANOTHER TIGER OR SPITFIRE)



BUILD A SIMPLE BOX (I DARE YOU…!)