Scratchbuilding Thoughts

By Pete Birdsong, MMR

MOTIVATION & OPTIONS

There are several reasons to want to scratchbuild: to get an AP certificate for it, to build something not offered on the market, to increase modeling skills, or even just to see if you can. You can have multiple motives, of course; this article assumes that at least part of your motivation is to get an Achievement Program certificate. So if any of these ideas presses any of your buttons, read on.

A few things make it easier than you might think:

- Experience from kit building will help.

Just as in all major projects, breaking it down into components means each piece of the project is relatively easy - eating an elephant one bite at a time.
The prototype you choose may have plans available which you can use or modify. (But it's not hard to draw your own plans.)
Pictures abound on the internet.
You probably have most, if not all, the tools you need already. And if you don't have them all, it's a good excuse to get them.

So figure out what turns you on, and if you have the desire to do this, let's get started. First off, decide what you want to model - a specific prototype, a generic example of some kind, or just something that looks vaguely like the model you have in mind.

Modeling a specific prototype will get the most points for conformity in Achievement Program judging, requires the most attention to detail, and makes it clear what you are trying to achieve, but it narrows your choices on what to include, exclude or emphasize.

Going for a generic source gets fewer conformity points, may make more pictures available, means you pretty much have to draw your own plans (for which you get more points), and allows more flexibility, but it also makes your objective a little less clear.

The third path may seem like the easiest, but it tends to dilute the focus needed to produce a quality result.

You have to make the choices you're comfortable with, but try to balance your choices in such a way as to maintain your motivation.

This will not be a step-by-step article, but more of a general guide to the process. After all, you may not want to build the same things, or in the same scale, as I have done. So let's get going.

TOOLS & MATERIALS

If you've done a lot of modeling, especially any kit building, you probably already have all or most of them. Even if you're missing a few, they're not expensive.

The few things you're most likely *not* to have are:

- The Handy Converter software. Download it for $12.95 at: http://www.stanstrains.com/SoftwareHandyConverter.htm

Calipers. Micro Mark has them for about $25.00. I recommend one that measures in both inches and millimeters.
A jeweler's saw.
A soldering pad.
Some heavy cast right angles.
The software is great for converting measurements from/to prototype/scale, fractions to decimal, and many more uses. It's a modeler's tool that makes many tasks easy. You can do everything manually that it does on the computer, but you can tell time by the sun instead of using a watch, also. I keep an old computer at my workbench, with this application up and running all the time. The caliper is also great for measuring the diameter of small drills or screws, and almost essential for taking and transferring measurements. The rest of the tools are available at Micro Mark and other sources; none are expensive, and all are useful in other projects.

PLANNING

Assuming you know what you want to model, and that you're going to draw

your own plans, there is one essential: the prototype measurements. If you have a drawing which provides these, that's great, but don't trust them completely. Cross-check one dimension against another, and compare them to those in other sources. It's easier to change the plans than to change the brass after it's cut.

If all you have is a picture or two with a few dimensions, you can scale the dimensions you have to extrapolate the others you need, assuming you have fairly straight-on side, end and top views.

Using whatever you have, develop the essential dimensions of length, width and height of the main components and visualize Them as THE TWO-DIMENSIONAL PARTS THAT MAKE THEM UP: a HOOD CAN BE A SINGLE FLAT PIECE, BENT AROUND AN arch AT THE TOP; a building or a boxcar CAN BE FOUR FLAT SIDES, WITH AN ARCHED or peaked ROOF; IF NEEDED, plan BULKHEADS TO FORM CURVED pieces.

Draw EACH PART, WITH scale PROTOTYPE DIMENSIONS, Using THE SOFTWARE AND THE SCALE RULE TO MAKE LAYOUT EASY. Transfer THE parts drawings TO THE wood, plastic or BRASS building material, USING THE calipers TO SET THE DIMENSION ON THE PLAN AND SCRIBE IT ON THE material. Double-CHECK EVERY DIMENSION.

Before doing any cutting, try to imagine how the various parts will fit together, especially any interior bulkheads or other parts that have been extrapolated. Pay attention to overlaps. Do sides overlap ends or vice versa? What dimensions need to be adjusted for that? How will the body attach to the frame, the walls to the foundation? What kind of access to the joints will be needed to fix them together, and what assembly sequence best accommodates that? Will I use solder instead of glue? What kind of glue? Will I want to take some things apart later, so screws or nuts and bolts would be better than solder? How far do I want to go with scratchbuilt versus commercial parts? Do I want to build the windows and doors, or use a commercial part, and how will it mate with the others, either way?

Do I need thin stock to make bending a curve easier, or thick stock to provide rigidity for this part, say a frame component? Am I going to be machining (filing, drilling & tapping) the part after I assemble it from components? How

does that affect the materials I choose and the joining process?

What materials will I need, and how much of each? Wood, plastic and brass is carried in lots of hobby shops and other places, but do I have the right details and castings? How will they be installed? Will I be using lighting or other electrical components? What are their dimensions, where will they go, and where will I get them? Order or buy what you need ahead of time, including tools as well as materials and supplies.

After you've determined the answers to these questions, I recommend making a list of assembly and painting steps so you get the sequence in mind. You don't want to have to unsolder or unglue something already assembled to get to something inside. Also, some parts are best painted before assembly, some after.

If all this sounds overwhelming, take two Valium and call me in the morning. It's best practice to plan all these things out, but most advice we get along these lines comes from experience doing it the other way: trial and error. I made lots of errors, did not plan nearly as thoroughly as I'm advocating, and, as I like to say, "I may be slow, but I make a lot of mistakes." As a result, I had to make some parts over again, because I didn't plan adequately. It takes longer that way, but it's not a show-stopper if you make a mistake. Consider it part of the fun.

BUILDING, PAINTING, & DETAILING

You can start with something simple, or something more complicated. Starting simple and advancing has it's benefits: developing skills in steps, building confidence, minimizing mistakes and their impacts. I started with the frame parts and their assembly, to give me a mostly finished component, without too much complexity. Use a saw or Dremel tool to cut out the frame shapes. Cut outside the lines, leaving room to file them down to the final dimensions, using full-size, sharp files, not your tiny modeling files.

Using a center punch, the scribe tool from a square, or any hard, pointed object, mark the drill centers for holes or openings (windows, doors, etc.) to be drilled. Then cut away the center space with the jeweler's saw, and file the openings smooth. This *is* a good place to use your small modeler's files.

Holding the components to glue or solder them can be done with the heavy right angles and pins in a soldering pad overlaid with your plans and then covered with wax paper, or by using one of the new Combo Right Clamps form Coffman Graphic Solutions: http://www.coffmaneng.com/. Squareness being ever important, a jig or clamp is important for assembling many components.

'Preparing the parts for painting involves a search-and-destroy mission for solder blobs, glue blobs, or whatever, using files, sandpaper or emery cloth to get rid of it. For brass or other metal parts, a bath in white vinegar with a water rinse is a good idea, to put a little 'tooth' on the finish, and generally clean it for painting. When dry, use a spray can of automobile etching primer on everything. For plastic or wood, or for metal after the above treatments are dry, spray with gray primer, using a spray can or air brush. Mask off parts not to be painted. After that, several very light spray coats of the final colors are in order, as well as some hand painting with brushes for most of the details. Some of the detail parts will need to be added before spraying, and then hand painted afterward.

SUMMARY

Scratchbuilding isn't rocket science; you can do it. A little patience and care, and a sense of adventure, are all you need (Oh, I forgot about all those tools, materials, etc., but you <u>can</u> do it.) Good luck!

For a great article on scratchbuilding a flat car, try "Scratch Building Wooden Freight Cars - A generic truss rod flat car" by Martin Brechbiel from NMRA Bulletin November 2004 p. 30.