HOW TO GET A GREAT FINISH

BY MIKE HELLMUND

Finishing ... the one difficult aspect of model rocketry that everyone wants to do well. The time and patience an individual spends on sanding, sealing, priming, painting, and detailing is reflected in how the rocket looks on the pad. In fact, it is not unusual for finishing to take more time than the actual construction. The secret to having the best looking rocket on the launch field is to be patient - from the point you lay the first pencil line down on the body tube, until you apply the last coat of clear paint.

Every rocket should have some degree of finishing — whether it is as simple as doing a neat glue job and applying self adhesive decals on an E2X® model, or as complex as building and finishing a Mercury Atlas. There are pros and cons to finishing. The obvious pros are that a cleanly finished rocket gives a great appearance and reduces drag. The cons to finishing are a longer building time and a heavier rocket. Even the lightest competition rocket will have some degree of finishing — usually glass smooth fins and body tubes. There are several steps to a successful finish — construction, sanding, sealing, priming, painting, and in most cases, decal application. Let's first touch on construction.

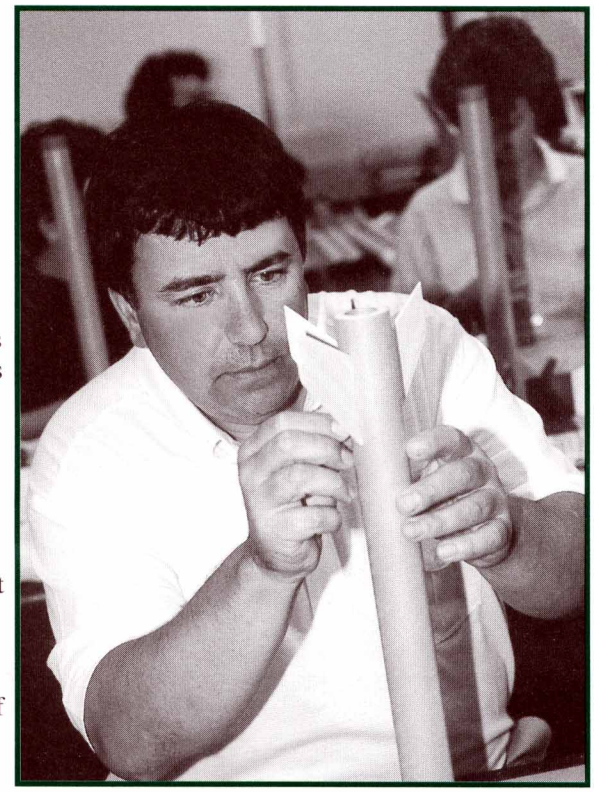
CONSTRUCTION

If you are not neat in your construction techniques, you will have a great deal of difficulty in getting a good finish. This applies especially to gluing. Wipe away any excess glue before it dries. If the glue has dried, sand or scrape it carefully away, making sure you do not do any damage to the underlying part. Make sure all glue fillets are neat, smooth and even. If you have air bubbles in the glue fillets, these can be filled with additional glue or filler. You should also lightly sand or buff with steel wool all the major plastic parts such as nose cones, transitions, plastic fins, etc. This will remove any mold release agents that may still be on the plastic surface, and can prevent paint from adhering.

SANDING

Every external part on a model rocket should be, in some way, touched with sandpaper even if is just a light dressing. This will ensure good glue and paint adhesion.

First, every modeler should have, at a minimum, the following grits of sandpaper available: #220, #320, #400 and #600. You should have a sanding block (or sanding bar), a sanding stick and a flat table top on which you can tape down a sheet of sand paper. The sanding block will allow you to sand a flat surface smooth (such as fins). A sanding stick (which looks like a square pencil with a sand surface at the tip) is great for smoothing out dried glue fillets especially those around fins. A piece of sand paper taped to a flat surface will allow you to sand straight, smooth edges like the root edge of fins.



Obviously, balsa fins are the one part of a rocket that require a lot of sanding. Stack the fins together, holding them even, and then run the edges back and forth over a taped-down sheet of 320 grit. Sand ALL edges smooth even if you eventually want to airfoil the leading and trailing edges. Once all fins are equal and even, sand your airfoils as desired. Airfoils are best sanded by laying the fin down flat on a small block of wood (larger than the fin itself), with the leading or trailing edge lined up with the edge of the block. By moving the fin edge back a small distance from the block edge, you can control the curve and shape of the airfoil.

The surfaces of the fins need to be smooth, eliminating as much of the grain pattern as possible. Use progressively finer grits of sandpaper (the higher numbers are finer grits) and a sanding block to get great results. Sand with a moderate touch. If you are sanding grooves into the surface you are applying too much pressure.

The next surface that requires light sanding is the body tube. Do this before you mark the fin location on the body tubes. Use 400 grit to start and then 600 grit to finish. All you want to do is to take the sheen off the body tube. This will make stronger glue joints between the tube and the fins. It also allows the paint and primer to go on easier. Don't forget to do the same thing for the launch lug. Remember, the key to successful sanding is to use moderate to light pressure —it's easier to remove material than to replace it because you sanded too much away.

SEALING

This can be the most frustrating step in finishing a model rocket, but there are easy ways to create a smooth surface. First, the traditional method is to use a commercial sanding sealer. You can also make a home brew made out of clear airplane dope and balsa dust or talcum powder, mixed to the consistency of wood glue. Whatever you cook up, do not use a white or yellow glue to mix with your dust or powder. Water-based glue can warp balsa.

To use a sanding sealer, generally you apply a base coat, let it dry thoroughly, then sand the filler down to the balsa surface (so that all that is filled is the grain), and repeat the process until the grain is filled. A sanding block is ideal for this type of work. If you decide to seal your fins before you attach them to the body tube, make sure that there is no sealer on the root edge. Sealer will make fin/body tube joints weak. Another way to seal is not to seal them at all— at least not with sealer. Let the primer do all the work, as described in the following section.

At this point, you want to make sure all gaps, holes and gouge marks are filled. You can use a mixture of glue (white or yellow) mixed with balsa dust or a plastic filler or putty. Make sure you fill the holes in the edges of fins and any air pockets in your glue fillets. It is usually at this stage that the finishing of competition rockets stops. The smooth finish gives the necessary drag reduction, whereas the lack of paint gives the competitor significant weight savings.

PRIMING

First a word of warning: You will be spraying a lot and creating quite a bit of dust. Anytime you spray, make sure there is plenty of ventilation and wear a dust mask. The single most important step in getting a great finish is the use of a sandable primer. Primer not only gives you a nice surface to apply your paint but it also seals and smoothes your rocket (including fins and body tube spirals). An additional benefit is that it will give your rocket a uniform color. This allows you see any potential flaws (such as rough spots that require a little more sanding, or holes that need to be filled). If weight is not a consideration, you will need several coats to get a smooth finish. Spray-on primer is relatively inexpensive and most brands work well. What's nice about primer is that if it runs, the runs can be sanded off quite easily. If you are going to use primer to give your fins a smooth surface, use a thick primer sometimes called "spot filler and primer". This will fill grain and spirals quicker, with less coats than ordinary sandable primer.

Sealing your fins with primer is best done after the fins have been attached. Spray the primer on just the balsa surfaces (the rest of the rocket can be done later). Let the primer dry (usually 15 to 30 minutes). The surface may appear a bit fuzzy. Sand the primer off (with 320 grit) until all that remains is the primer in the grain. Wipe or blow the surface clean. Spray the surfaces again, sand and clean. Leave a little more primer on the surface than in the previous step. If you did a good job of sanding (the sanding done before you primed), you should only need to do this about three times. After the second application, start to prime the entire rocket, sanding it between each application. This will fill in little mistakes and the dreaded spiral on the body tube. Once the rocket is absolutely smooth, spray a final coat of primer, and sand with 400 to 600 grit sandpaper- you do not want to remove the primer coat in this step. The surface should be uniform in color. Once your're satisfied, you are ready to apply color.

PAINTING

Painting is skill acquired through practice and practice, and practice- plain and simple. This holds true whether you brush or spray. In this article we will discuss aerosol or spray paint. If you have access to an air brush and know how to use one, then that is the way to get the finest of finishes. First, pick a place that has plenty of ventilation like a paint booth or the great outdoors. If you paint outdoors, make sure the temperature is between 65 and 80 degrees and there is as little wind as possible. Make sure bugs (the crawly kind) stay away from the wet painted rocket. If the temperature is not right then carefully move your rocket to an indoor area like a garage to dry after you have painted it. If it is too windy, do not paint. It's not worth the dust and particles that will imbed and mar your paint job.

The next step to successful painting, is distance. If you hold the can too close to the model, the paint runs and drips. If you are too far away, you get orange peel (as the name infers, the surface starts to looks like the skin of an orange). If there is low humidity, some paints tend to dry before hitting the surface, also creating an orange peel like surface. The distance stated in the instructions of most paint cans is about 12 to 18 inches. The right distance (which will vary from can to can of the same paint) is where the paint goes on in a nice glossy coat.

First apply a light dust coat of paint. Make sure the entire rocket is painted, but don't worry about covering it all in one pass. Also, don't forget the leading and trailing edges of the fins. Spray the rocket with light, even passes. Start to spray before you reach the rocket and stop after you have passed the rocket's surfaces. Move the can parallel to the rocket. The dust coat lays down a base color on the rocket. Let the dust dry a few minutes and then apply a second, heavier, glossy coat. Don't paint too close- you'll get runs and sags. This is where most of the problems occur and it is only with practice that you acquire the correct touch for applying paint. Paint a third coat if necessary. Follow the same paint procedure as you did with the dust coat. After each coat, let the paint dry thoroughly.

On large rockets, you should paint in sections that are easy to handle. Paint each section right after each other. If your rocket can be physically broken down into sections such as nose cone and or payload, stages, etc., paint each section as a separate entity.

The two problems encountered with most good paint jobs are paint runs and orange peel. There are two schools of thought on how to "fix" paint runs. One way is to take a cotton swab when the paint is still wet and dab away the excess paint. Try not to dab too much paint. You do not want to see the primer coat. Let the paint dry and then sand the surface. With some light runs and sags, you can turn the rocket opposite the flow of the run and allow the paint to flow in the opposite direction. Sometimes this will let the run or sag spread itself out. The second method is to sand runs out when the paint is completely dry and hard (wait at least 48 hours). Use 400 grit to sand away the run, and then do a final sanding of the area with 600 grit. Make sure you confine your sanding to the area of the run.

Orange peel can sometimes be resolved by painting the area again, this time a little closer. In most cases, you will find that you have to sand the surface with 400 or 600 grit. In this situation, you may want to wet sand the area. Use sandpaper specifically made for this type of work (it is usually black in color and stamped "Wet/Dry"). Wet the sandpaper with a small amount of water and sand the affected area. Every so often, rinse the residue off the sandpaper. Regardless if you use wet or dry, you do not want to remove all the paint. You simply want to sand the paint smooth. Repaint the rocket as needed.

If the orange peel is tolerable, then you may use, instead of sandpaper, a polishing compound or even a harsher rubbing compound (both available at automotive stores). Apply the compounds only to rockets that have dried for 24 to 48 hours. Use a soft cloth to rub the compound off. Your finish will become smooth, however the surface may be a little duller then you want. You can restore the shine (necessary if you are going to apply decals) by spraying a clear gloss coat or wax (available at hobby stores) on the surface.

TWO COLOR PAINT JOBS

If you are going for a two color paint job, let your base coat dry completely before you try to mask it. Let it dry for 2-3 days in a warm area. The base coat should always be the lighter color. You will need to mask off the area that will not be painted to ensure any overspray does not ruin your first color. Masking may be required to be done in three zones — close (where the two colors actually meet), medium (1/16" to 1/4" away from the close zones) and large zones (any large areas that will receive no paint).

For close areas use 1/8" to 1/4" wide masking tape to mask off areas. Then use a wider tape (1/2") for the medium zones, with half the tape taped to the straight side of a sheet of plain white paper or any piece of unprinted paper. Do not use newspaper, which can smudge black ink on your paint job. If you are painting rockets that require large areas to be masked off, mask for the close and medium areas as outlined. Then place half the width of 1/2" wide masking tape around the opening of a large plastic bag. Tape the bag to the areas needing protection from the overspray.

A word about tape: Do not use a tape that is too tacky or sticky. Masking tape or magic clear tape generally works well. You can remove some of the tackiness by applying the tape to a glass surface and then applying the tape to the rocket. To ensure that paint does not "bleed through" the masking tape, use this simple trick: Apply a light coat of your first color over the masked area. Let it dry before applying your second color. This will help "seal" the tape and prevent the paint of the wrong color from seeping through the tape into areas where you don't want it. As soon as the last coat of paint is dry to the touch, remove the masking. Be careful in applying too much pressure when removing the masking tape because, although the paint may be dry to the touch, it may still be soft underneath and very susceptible to leaving permanent fingerprints.

PAINTING WITH METALLIC OR FLUORESCENT PAINTS

Before painting with metallic flake or fluorescent paints, it is best to lay down a base coat of white (flat or gloss) paint. Metallics and fluorescent paints are not known for their thick coverage. A base coat of white will allow these types of paints to show better. This method works well for silver paint, too. A note on fluorescent paints: They do not go on glossy and they tend to look flat. You can make them look a little shiny by coating them with a clear gloss coat.

DECALING

There are two types of decals in the rocket modeling world, self adhesive, and water transferable decals. Self adhesive decals will adhere to almost any surface- flat or glossy. On a flat surface, a glossy decal will be very noticeable. To eliminate this, first spray the model with a clear dull coat before applying the decals. On the other hand, water transferable decals should never be applied on to a flat surface, as they will not adhere well. If your model has a flat finish (and, in the case of scale models, you want it to remain flat), then spray the rocket with gloss clear coat first, apply the decals and after the decals have completely dried, spray model with a clear dull coat.

SELF ADHESIVE DECALS

As a rule, self adhesive decals will stay stuck once you press them against the surface. At times, this makes them problematic to work with. There is a solution (pardon the pun)! Add two or three drops of dish detergent to a bowl of water. Apply this solution over the area on which you want to place the decal. Do not soak the decal in this solution! Position the decal and blot the water away with a paper towel. The water/soap solution will allow you to "glide" the decal into position and helps get rid of any air bubbles. If you do have air bubbles, use a pin to prick a tiny hole into the bubble, then rub down the decal. Large roll patterns and wrap-arounds have always been difficult to apply and match up. The water/soap method will help but you may need to resort to cutting the wrap into sections and applying each section individually. Cut the sections along lines that may be present in the decal. This method works equally well with water transferable decals.

WATER TRANSFERABLE DECALS

Because of their fragile nature, water transferable decals need to be treated carefully. Do not soak them longer than 10 to 20 seconds in warm water. Any longer, and the water will dissolve the adhesive on the decals. If the decals do not slide easily from the paper backing, let them soak a little longer. A decal soaking in warm water will curl, and then begin to relax (uncurl). At this point the decal is ready to be applied. Before applying a decal, brush a layer of water over the application area. This will allow you to glide the decal into position. After the decal is positioned and blotted with a paper towel, you may want to try using a decal solution. Decal solutions soften the decal, get rid of air bubbles, and help the decal tighten down against the surface. This is particularly helpful on surfaces that have a lot of detail (such as a Mercury capsule), allowing the decal to "snuggle" against the details. Decal solutions are usually available at all fine hobby stores.
If the decals you are using lack sufficient adhesive, add a drop or two of white glue to a small bowl of water. Mix it thoroughly and then brush this liquid over the area where the decal is to be applied. Reapply the decal, gently blot away excess water/glue solution. Let the decal dry. When dry, remove any glue residue with a clean damp cloth.

FINAL TOUCHES

After your decals have dried completely (about 24 to 48 hours), spray the model with clear coat (either gloss or dull).
A dull (or flat) clear coat gives scale and futuristic models a realistic appearance. If you have clear-coated your model with gloss, you can further enhance the appearance by waxing your model with a carnuba based wax (available at automotive stores).

The art of finishing a model rocket is not impossible. It takes patience. It takes time. In the end you will be rewarded with a superb looking rocket.

DESIGN OF THE QUARTER CONTEST!

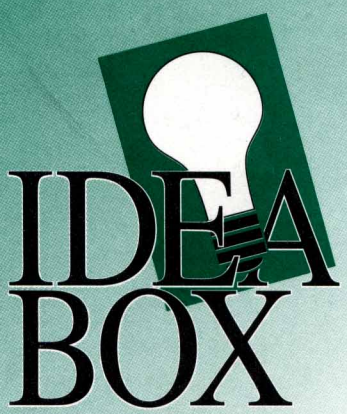
It's easy to win valuable Estes products by submitting your model rocket design to Estes! Here are the rules:

1. All entries become the property of Estes Industries and will not be returned.
2. Employees of Estes Industries and members of their immediate families are not eligible.
3. Any type of model rocketry design can be entered (rockets, boost gliders, launch or recovery designs, etc.)
4. Designs should be new, original, and different. They also need to be workable. The goal is to develop something new that other rocketeers can build and use successfully.
5. Entries will be judged on practicality, originality, neatness, completeness, and clarity. All plans must be flight-tested and proven safe and successful.
6. Winning entries may be published in the *Model Rocket News* and/or other Estes publications.
7. Your design entry should include a parts list and any instructions or diagrams that you feel would be helpful. Include a list of the engines with which the entry has been successfully flown (if applicable). Be sure your name and address are on each page of your entry.
8. Please do not send the actual model unless requested, as it will not be returned.
9. Photos of the model are greatly appreciated, but not required. However, photo documentation of your entry may help it win.
10. You may enter as many times as you like.
11. There is a new contest every quarter (January to March, April to June, July to September, and October to December).
12. All designs reaching Estes Industries during that quarter will be entered in that quarter's competition. Date of receipt, not postmark, will determine the quarter that the design is entered.
13. If two or more exceptional entries are received during any quarter, the judges may, at their discretion, make identical awards.
14. Designs should be sent to:
    Design of the Quarter Contest
    Estes Industries
    1295 H Street
    Penrose, CO 81240
    All plans sent to us will be placed in the Estes Design contest.
15. Each quarter's winner will receive a $100 merchandise gift certificate and a certificate suitable for framing. Award winners will be notified by mail.

Here's a few tips to help make your entry a winner:

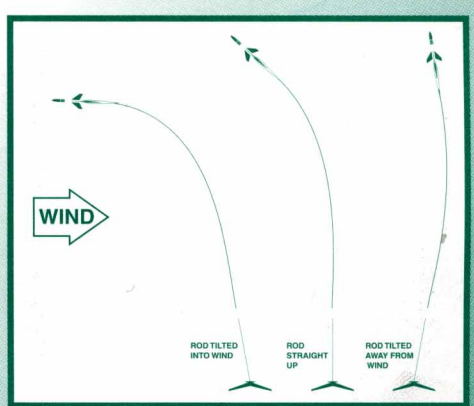
A. Make sure your designs are built and test flown.
B. Include a parts list.
C. Make a drawing of the design that is complete and includes all necessary patterns.
D. Be neat! Neatness does count!

We are looking for innovation and proven performance. Good luck, and send those entries in today!



FLYING TIP:

Remember that rockets always fly into the wind, or "weathercock". As a result, to get maximum altitude, you want to actually point the rod "out of the wind" rather than into the wind. When you point your rocket into the wind, you reduce the rocket's altitude, and may reduce the required delay time as well. The illustrations above indicate a rockets flight path in a moderate breeze. The best bet is to fly straight up whenever possible. If it's too windy to fly in your field, just wait for another day..it also saves on a long chase down wind.



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