

Learn to Airbrush Model Airplanes



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Introduction

The airbrush is one of the best tools for painting a variety of craft and hobby items. When equipped with an air compressor as the air source, it becomes like a never-ending spray can, with the added benefits of control of the air pressure and of the paint amount. An airbrush can be used to paint plastic models, rc airplanes, t-shirts, nails, and many other items.

How does an airbrush work? Like anything that delivers a fine spray of paint or solvent, it uses Bernoulli's principle. Air moving at higher velocity has lower pressure. If this air stream happens to be near but above a solvent (e.g. paint), the solvent will be drawn upwards, towards the fast moving air. When it gets to that stream of air, the solvent gets broken up into fine particles, and is blown in the direction of the airstream.

The basic principle is very simple, and spraying itself is not hard. Choosing the right equipment and paints, as well as learning correct spraying technique, does require a bit of study. It does take some practice to turn out finely painted masterpieces.

Some basic tips:

- 1) A single action airbrush is simpler, easier to learn, and economical. So it makes a great beginner airbrush. However, the double action gives you much greater control over the paint process.
- 2) Your best air source is a good compressor.
- 3) Use the manufacturer's recommended thinner.
- 4) To keep the airbrush working smoothly, follow the instructions for cleaning.

Airbrush Types

There are various types of airbrushes on the market, each with advantages and disadvantages.

Internal versus External Mix

As the name implies, in external mix airbrushes, the air and paint are mixed outside the main body of the airbrush. An example would be the venerable Paasche Model H. This is a very simple design concept, and is relatively easy to clean. The internal mix airbrushes (combined with double action, see below) offer more control over the paint process.

Single versus Double Action

In the single action airbrush, pressing on the trigger controls only the airflow. The amount of paint released is adjusted by turning the nozzle *before* the trigger is pressed.

In the double action, the trigger can be moved down as well as back. The latter motion varies the amount of paint released, *during* the spray. This can be harder to learn to control, but allows the user enormous flexibility in the range of effects that can be achieved.

Most professionals and advanced amateurs will use a double action airbrush.

Bottom versus Gravity Feed

In bottom feed airbrushes, the cup holding the paint is below the nozzle. The paint is sucked upwards by air pressure. In the gravity feed models, the cup is above the nozzle, so that gravity assists the paint in flowing out of the tip. The advantage to gravity feed is that lower pressures can be used for a given paint volume, which is great for fine line work. The disadvantage is that gravity feed models generally have the cup and brush body as one unit, not a plug-in as with the bottom feed; some people find the one unit slower to change colors and clean. There are also variations such as side feed and movable feed.



Above: A single action, external mix, siphon (bottom) feed airbrush



Above: Business-end of the airbrush in previous picture



Above: Color cup and color bottle



Above: A double action, internal mix, gravity feed airbrush

Well, which should you get? We've found that a basic single action, external mix is sufficient for most model airplane jobs. It also tends to be more affordable than the double action internal mix models. I'm partial to the Paasche model H; Badger is also known for making solid, dependable airbrushes. Avoid super bargain or cheap "copy" models: the tolerances in an airbrush are small so you need a good quality manufacturer, otherwise you might have a poor airbrushing experience.

Also, make sure that you get a good airtsource, see next section.

Air Source

The airbrush itself is only one half of the painting solution. The other half is the air source.

Air Can - Many people start their airbrush experience with an air can. This may be fine for your first time. The can seems cheaper initially (maybe \$5 versus \$100 for a compressor), but in the long run it will get very expensive. A can contains only about 10 continuous minutes of air. It can be frustrating to have the air pressure peter out to zero when you're in the middle of a paint coat.

Besides the limited air volume, there is also no control over air pressure (although we have heard that regulators are available for these cans), again limiting your control over the process. We've also found that a lot of moisture condenses on the outside of the cans which get fairly cold during the process. Keep that moisture away from your paint job, it could ruin it.

IMO, once you get into airbrushing you will love it, and the cost and inconvenience of replacement cans, plus their lack of control, will have you looking for another solution.

Tank – Another option is a large air tank. There are gas cylinders and propane-style storage tanks. Some people use a car tire. You will need to figure out adapters and regulators. The advantage of these solutions is that the air will last longer than a can. However, they will also eventually run out and you will need a way to refill them. Even filling tires is not free anymore, it's usually 50 cents or so to run the compressor at a gas station.

Compressors – These are generally the best solution, despite higher initial cost. However, there are many types of compressors, so you will need to know what to look for. Compressors use an electric motor and a piston or diaphragm to compress the air. The better compressors are coupled with a storage tank. The advantage of the tank is that the compressor does not need to run all the time. This is great for two reasons: 1) less noise and (2) the piston or diaphragm causes the air supply to "pulse" which is effectively removed by buffer action of the tank. (The pulsing effect can actually be seen in the paint job if you are trying to spray fine lines).

You'll find quiet table-top compressors that are designed for nail work or cake decorating. However, these have a pulsing air supply. There are also compressors "designed for" airbrushing; these are generally small, have no regulators, and have no tank (again, pulsing air). My favorite solution is a smaller "workshop" compressor for air-powered tools, available at your home improvement store (see example below). These have a tank, built in pressure regulators, and a nice long coiled hose. Take your airbrush with you when you purchase this, so you can fit and buy hose adapters as well. This particular model holds 3 gallon, and is spec'd at 0.7 CFM (cubic feet per minute) and 120 psi. Once the tank is filled, we can spray for about 20-30 min at 15-20 psi before the compressor turns on again. It's not incredibly quiet but is really no louder than some household appliances (e.g. dishwasher; but would probably not use it indoors at night with the family sleeping). The price point is about \$100.



Above: A Workshop Compressor. Motor housed in black box sits on top of red metal air tank. Note the Pressure Gauge and Regulator (round dials on left side). Being

able to dial the pressure in with your regulator adds enormous flexibility to the airbrushing process.

During airbrushing, moisture from the air tends to condense in the system, and can find its way onto your paintjob masterpiece-in-progress. As cheap insurance, purchase one or more moisture traps from your airbrush supplier, and install between the compressor and the airbrush.

Airbrush Paints

There are several types of paint, each with its own benefits. Some examples are: dope, enamel, lacquer, acrylic and latex. Enamel gives a great finish but is tricky to cleanup and dries slowly. My favorite is water-based acrylic: dries quickly, easy to cleanup, and does not attack foam or wood. Acrylics tend to dry flat, so gloss finishes are best achieved with a separate clear coat.



Left to right: Acrylic Paint, Acrylic Thinner, Enamel Paint, Enamel Thinner

Most paints will need to be thinned before airbrushing. It's best to use the manufacturer's recommended thinner for this. The chemistry will match the paint exactly, and has been tested thoroughly. There are "homebrew" thinners that you can make to save a few dollars, but it's generally not worth it: it takes time to find the right concoction to make the paint flow right without drying too fast.

However, you can use the homebrews for cleaning the airbrush, either between color coats or after you're done airbrushing for the day. In this case, the paint consistency is not critical; you are just trying to dissolve it away. For acrylic paints, isopropyl alcohol (from the drugstore) mixed with water makes a great cleanup-thinner. I use this between colors. For final cleanup after acrylics, I like to soak the airbrush parts in a 50:50 Windex: water mixture. More on cleaning later.



Right: thinned alcohol for cleaning acrylic paints. *Left:* Future floor wax, for gloss coats over acrylic.

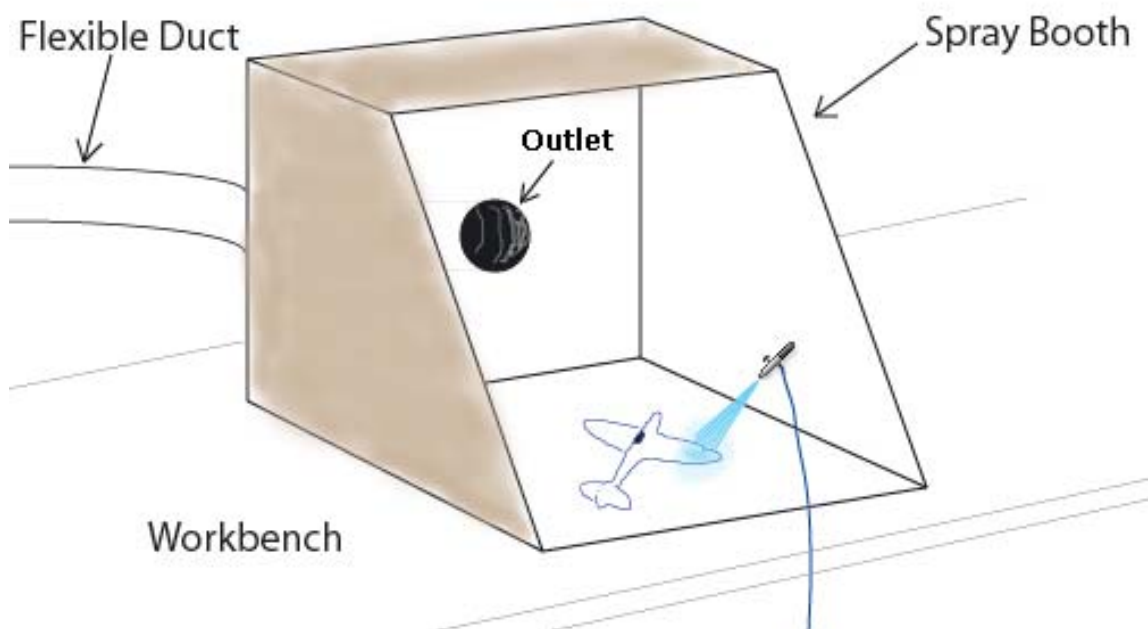
Another good solvent to know about is Future Floor Wax. Yes, Floor Wax. It's a liquid acrylic designed for floors. It works great as a gloss coat, and can be airbrushed straight from the bottle without thinning.

Workspace Setup

Having a convenient work area for airbrushing will make your life much simpler. Since the airbrush produces airborne paint, you will generally want to do this away from your main work area. If spraying in the garage you might want to back the car out.

It's best to use a sturdy workbench or table. Something that can be accidentally collapsed by a pet or child will not do. Make sure you have adequate ventilation in the room, especially if using enamel paints. Open a window and use a fan to help move air through the room.

One good option to reduce the paint fumes is to use a small spray booth. This is basically a box; an exhaust hose leads outside and a fan pulls the fumes out of the box. A nice option is a top-hinged door on the front to keep dust particles off the model as it dries.



Above: Typical spray booth. Can be made of wood, cardboard, plastic, etc. Cut outlet hole and use duct and fan to remove paint fumes if spraying in confined area.

You can also spray outside on a calm day (wind can blow dirt particles onto the wet paint). Some people design large paint booths with plastic sheet for walls, in a corner of their workshop.

Another option is a turntable for crafts, available from Target or other stores. It's basically a round stand that can rotate on its base. We glued this to a cheap stool, but you could put it on your worktable or in your spray booth. This is convenient for painting with one hand while rotating the table with the other, so that all sides of the part get painted. All the "bits" needed for airbrushing are in a plastic box "caddy" beneath the turntable. That way we can get all the necessary stuff to the paint area without making a large number of trips back and forth.



Above: Cheap stool and craft "turntable" make convenient airbrushing stand.



Above: Plastic caddy. Got paint, thinner, color cup, needles and nozzles, cups for mixing, toothpicks for mixing sticks, and plastic droppers to get paint or thinner.

For larger airplanes that won't fit in your booth or on your turntable, lay some plastic garbage bags or newspaper on the work surface. If spraying outside, use weights in the four corners of the bags /newspaper, as the wind tends to lift these up and onto your wet paint!

You will also need adequate lighting. A good desk lamp with a swing arm will do the trick. Two lamps illuminating the model from different directions will be even better. If using a spray-booth, you can integrate the lighting into the booth itself.

Keep any reference photos of the model close by, you will refer to these very often during the painting process. Taping a diagram of the paint scheme on the wall over the worktable will help your airbrush session go faster.

Surface Preparation

The paint job will be only as good as the surface that it goes on. You will not hide unevenness, cracks, wood grain or anything else with the paint.

The most critical ingredient in getting a good surface is sandpaper. Use various grades from coarse (400 grit or so) down to fine (as small as 2000 grit). Do not use the bare sandpaper with only your hand over large surfaces, as this will leave unevenness in the surface. Get small sanding blocks from the hardware store: we like the ones that allow you to remove and change the paper. The open grit dry sandpaper works well for most of our purposes, although I also like to wet sand after primer coats.

If necessary, apply fillers to close up bigger gaps or holes. Use 400 grit paper on the filled area to remove excess filler. Sand with 3 or more grades, each finer than the last, until the surface is smooth to the touch. Look at the surface by angling it upwards to a light. When you think you are done, sand some more. On some of the better quality kits, the fit is so good that no filler is necessary; in those cases, you can still roughen the surface slightly with 2000 grit paper to help the paint stick.

Be careful not to sand too aggressively, especially on kits with raised panel lines, as this detail is easily removed. In spite of your best efforts, some detail may be removed in areas where you had to correct the fit with filler. In those cases, use a hobby knife to re-scribe the surface detail. Use a flexible metal ruler, or thin card, or labeling tape, as a guide for your knife.

When the surface is smooth, it will need to be cleaned before painting. At this point, handle the model carefully, as dirt and oils from your hands can affect the paint quality. One good practice is to handle the model with disposable plastic gloves. Change your gloves from time to time; wash and dry your hands before pulling on new gloves.

Wash the model with soap and water, and air dry on paper towels. Use a hair dryer at medium setting to remove stubborn droplets and prevent watermarks.

Airbrush Lesson: Step by Step

1) Prep the area

Prepare your spray table, or lay down plastic sheets.

2) Prep model

Use gloved hands, position the model where you want it. I like to spray undersides first, any issues will be less noticeable and can be corrected before spraying the topside.

3) Prep equipment

Turn on the compressor and set the spray pressure. Assemble the needle and nozzle into the airbrush if necessary. Attach a color cup or bottle as appropriate.

4) Get comfy

No, seriously. If possible, sit while spraying. If not possible, have a chair handy to sit on between spray coats, to do cleaning and such. The job will go much easier if you are not standing or bent over the model for an extended period.

5) Mix paints

Following the maker's directions, mix the paint with thinner. Use disposable plastic droppers (from the hobby shop) or straws to draw up paint, then thinner, and place into a small mixing container. Use separate droppers for thinner, and for different colors, to avoid contamination. Mix the paint with a toothpick or similar. Note: do not pour paint from the bottle into the mixing container! This generally leaves dried paint on the bottle rim. The dried paint makes it hard to close the bottle properly, but worse, pieces will fall into the paint. This dried paint can clog the airbrush nozzle!

6) Test spray!

Always test spray! Make this a part of your routine. You never know how the initial spray will come out of the nozzle, it will sometimes make a big mess. Test spray and then make any adjustments to the airbrush, or to the paint mix. Then test again. Including when spraying a repeat coat, as paint may have dried on the nozzle between coats.

Spray on something similar if not identical to your actual subject; that way you can test for color and chemical compatibility, as well as spray pattern. Use scrap material and prepare it (sanding, and primer coat) as you prepare the rest of the airplane.

Be aware that some paints will eat certain materials. Lacquer and enamels tend to be aggressive. When in doubt, test before spraying on the airplane.

7) SPRAYING

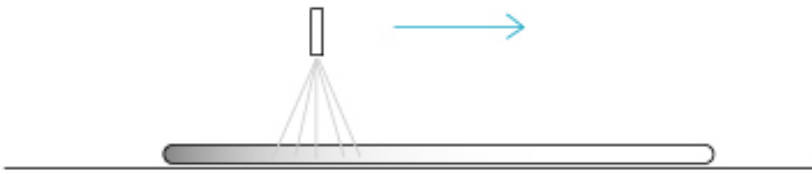
Now that you've test sprayed, time for the real thing. Always start and stop the spray off or away from the model. This will result in even coverage on the model. It will also give you time to abort if you see something strange (e.g. paint splatter) before you ruin the paint coat.

Hold the airbrush at an angle to the model (vertical is not practical), about 6 to 18 inches away. The distance will depend on the size of the part and the volume of the spray. Again, a test spray on some scrap will help you get a good starting point. Move smoothly and at an easy pace. (Be careful to not tip over the airbrush too far, or paint may spill from the color cup).

airbrush □



start spray *off* the part



stop spray *off* the part



8) Multiple Coats

Your first coat will be just a light dusting. Make several passes, but do not attempt to actually cover completely with color. Just go for a uniform light dust of paint. E.g. if the paint color is dark blue going over white foam, the first coat

will look like speckles of medium blue. Light is the keyword. The idea is to get just enough fairly uniform coverage so that subsequent coats will “bite” into the first coat. If you try to cover in only coat, you will usually get an uneven mess.

Follow the manufacturer’s recommendation on length of time between coats. We usually wait 20-30 min for acrylics and an hour for enamels. The follow-up coats can be much more “wet” than the first coat, but you should still expect to take at least 3-4 coats to get good even color coverage. Don’t rush it.

9) Clean Up

Do not omit this step. Clean up when changing colors, and when you’re done for the day. See the Cleaning section for more details.

Below: Model prepared by following the steps outlined above. Bottom and top sides of model each airbrushed with 3 coats of acrylic paint.



Airbrush Cleanup

Many airbrush problems are caused by improper cleaning methods. The dried paint can result in clogs that make it impossible to achieve proper performance.

You can use the same thinner to clean the airbrush, or a solution of common chemicals. For acrylic paints, isopropyl alcohol (from the drugstore) mixed with water makes a great cleanup-thinner. I use this between colors. For final cleanup after acrylics, I like to soak the airbrush parts in a 50:50 Windex: water mixture.

If just resting the airbrush between coats, I'll close the nozzle to prevent dried paint on the tip. If changing colors, pour out the excess paint into a waste container, wipe out the cup or bottle, then spray the thinner mixture through the airbrush. Spray more thinner mixture until it comes out of the brush clear. Turning the brush upside down (siphon feed color cup) while spraying helps clear out the last of the thinner.

At the end of a spraying session, I like to disassemble the nozzle and needle and soak them in cleaning solution. Rub gently with cotton swabs, then wash in soap and water, leaving to air dry. Don't forget to clean the color cup or bottle. Note that siphon bottles (or cups with caps) will have a small hole on top to allow atmospheric pressure to work. This hole can get clogged by dried paint during spraying, so keep an eye on it.

Proper attention to cleaning will go a long ways to ensuring an enjoyable airbrush experience. Now find something and go paint!

Masking

Painting of scale models will often involve the use of **masks**. These masks simply block paint from areas where it doesn't belong. Models with military camouflage will often need masking. If the separation line between colors is **fuzzy** (depends on the real airplane), camouflage can sometimes be free-hand airbrushed with no masking. However, for **sharp** separation lines (e.g. Spitfire shown below), or for spray-can painting, masking will be necessary.

Using the right **masking materials** will help ensure success. The mask material needs to stick well to the surface, but must be removable without pulling up any of the underlying base paint. Masks can be made with **tape**, **film**, or **liquid**.

Not all tapes are created equal. Of all the brands we've tried (many!), Tamiya masking tape is the best. This is yellow tape, available at the hobby shop in various widths, see below. This might be a little more expensive than regular white masking tape, but it will go down and come off without damaging your paint job. You can burnish down the edges to prevent paint creeping under. The extra expense is worth it. We've also had good luck with blue house-painter's masking tape.

Frisket film is another great masking material (see photo below). It's generally available in art supply stores, sometimes in the local drug store. It's a low-tack, clear film with a backing. It can easily be cut with a hobby knife to the required shape. Since it comes in a large sheet, you can cover larger areas faster than with a roll of masking tape. The only disadvantage is that it doesn't go around compound curves really well, so at those points you can supplement it with masking tape.

Liquid masking films are very convenient. The bottle shown below is Micro Mask, available at your local hobby shop. Simply paint the liquid onto the surface needing a mask. When dry it forms a thin rubbery coating. Use a sharp knife to cut along the pattern, and remove the excess. This is obviously great for compound curves and surface detail. We use it all the time for masking off canopies (to paint the canopy frame).



Above: Frisket Film, Micro Mask liquid mask, and Tamiya masking tape.

To make the masks, use a photo of the **camouflage pattern** of the real airplane as a guide. A full-size painting guide is included in the better kits. In this case, a photocopy of the camouflage pattern that came with the kit was secured to the top of the Frisket film, which was then cut with an X-acto knife. Another option is to get a sheet of glass (e.g. cheap picture frame glass), and cover it with overlapping strips of wide masking tape. Lay the pattern on top and cut out the masks as before.

If the color separation lines are fuzzy, and airbrushing these free-hand is not an option (lack of skill or equipment), you can adapt the masks to achieve the same effect. Use flattened loops of tape, or "Blu-tack" to attach paper masks to the model. The slight distance offset from mask to model creates the softer color separation lines.

The Spitfire below has been masked mostly with transparent Frisket. You can see it easily on the wing (the lighter gray areas). Yellow Tamiya masking tape has been used in some of the more curvy spots, or where there is raised surface detail. There is also an area masked with Micro Mask (blue area on top of fuselage, just in back of

the cockpit). There is also masking tape applied to the edges of the wing, and the underside of tail and fuselage; this prevents top-side over spray from reaching the bottom.



Above: 1/48 scale Spitfire masked with frisket, liquid mask, and tape.

Next step will be to spray the second camouflage color.

A general rule of thumb when overlapping paint colors is: **paint the lighter color first**. If you did try to cover a dark color with a lighter one, it would require more paint than doing it the other way round. This would have the effect of obscuring surface detail. And if you're painting a flying model, you can do without the extra weight from excess paint.

After the 1st (lighter) color is dry, apply the masks. Then spray the darker color, as shown below.



Above: Second camouflage color sprayed over the masking material.

When the 2nd color is dry, carefully peel off the masks, and prepare to be impressed!



Above: Masking material removed.



Above: Corsair painted freehand with airbrush.

Note that for some planes, soft (fuzzy) separation lines between colors is more accurate than a sharp line. An example is the WW2 Corsair, in the three-color naval camouflage of that period. The colors on this one (photo above) were done free-hand with an airbrush. Before painting, the camo lines were gently drawn on the surface with a soft pencil. Another option would be masks offset slightly above the surface, in which case either airbrush or spray cans could be used.

Fine Lines

Getting fine lines with your airbrush can be challenging. This requires knowledge of many factors.

Equipment. The airbrush will need to have a fine needle or setting. Note that airbrushes meant for illustrations (paintings) may actually be too fine for other purposes. Illustration ink has very fine pigments, whereas the pigments in model airplane paints are relatively large and could clog the nozzle. Also note that it's easier to achieve fine controlled lines with a gravity feed airbrush than with a siphon feed. With a siphon feed, extra air pressure must be used to draw the paint upwards from the paint holder into the nozzle, and this extra pressure will make the paint line wider.

Paint to Thinner Ratio. At the lower pressures necessary to achieve fine lines, a thick paint mixture will not be delivered properly. For large area coverage with aqueous acrylics for models, we mix paint to thinner in a 2 to 1 or 3 to 1 ratio. For lines, we use a 1 to 1 ratio.

Pressure. Lower pressure in general will be better; we use as little as 10 psi with aqueous acrylics for plastic models. Of course, too little pressure and the paint won't atomize properly. If you notice excessive splatter while doing the fine lines, try turning up the pressure just a bit at a time.

Distance. Since a small amount of paint is coming out a low pressure, you will need to be closer to the workpiece. As little as ½ inch in the example pictured above. Of course, too close to the piece and you could start to have running paint (spiders, see Troubleshooting table).

You will need to balance all of the above factors to find the right settings for the fine lines that you are trying to make. Only trial and error and some test paint lines will show you exactly what is right for a particular case. With a bit of practice, it will become easier to dial in the right settings.

Below: Lines of varying widths achieved with a Paasche Model H (bottom feed) airbrush. Paint thinned 1:1, finest needle (#1), 15 psi, brush ½ to 1 inch above surface. Smallest repeatable line (at bottom) was 3mm wide on average, with about

1mm of fine splatter on each side. This would be perfectly fine for freehand painting a camouflage separation line on a 1/12 scale RC model, but not for a 1/48 plastic model.



Pre-Shading

Full-scale airplanes see lots of wear and tear in regular use. The surface skin panels often have uneven wear, with the center of the panels becoming lighter than the edges. To recreate this wear on models, we use the **pre-shading** method. The panel lines on the model are first darkened, then over-sprayed with the base color.

The model below has been pre-shaded. Highly thinned black acrylic paint was airbrushed at 15 psi. The panel lines molded into the plastic were sprayed with 1 or 2 passes. The lines can be a bit uneven, as real wear is not even. Both bottom and top of the airplane are done. This is easier than it looks; use the airbrush to practice making lines on scrap material.



In the next photo, the base color has been sprayed over the pre-shaded airplane. Note that the darkened lines are still slightly visible, don't cover them completely. The camouflage colors and top clear coats will lighten the panel lines some more, so don't overdo the base coat.



This technique can be used on any model with visible panel lines.

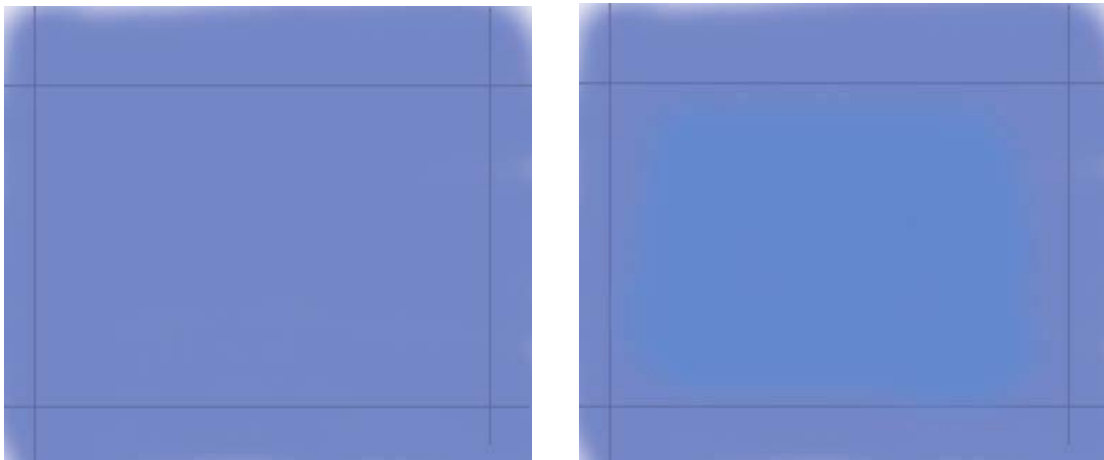
Panel Fade

Panel Fade refers to the uneven wear of an airplane's panels. The color is often lighter near the middle of the panel and darker near the edges. The pattern of fading depends on the particular airplane and its environment, so it's best to study your reference photos carefully before beginning.

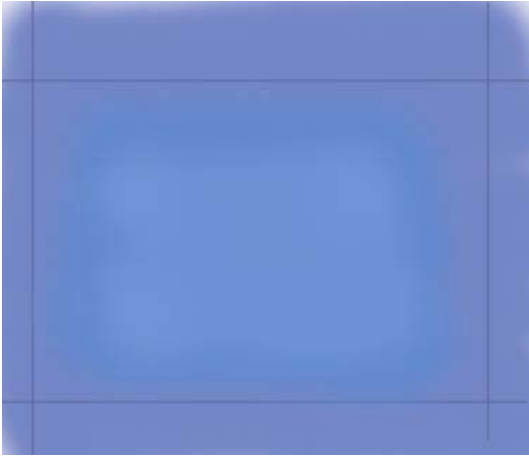
First, paint your airplane in the base color. Now choose a large panel to start with. Then **add a few drops of white** to the base color, and spray in the interior of the panel, avoiding the panel lines. Add a few more drops of white, then spray near the center of the panel only. Try to not make perfect circles (or rectangles).

Repeat this procedure for all the panels that you want to fade. When all the panels are done, go back to the base color, but make a *very thin* mixture. Spray a light coat of this mixture over the entire plane; this will tie the various shades together in a very subtle look.

Below Left: Panel with base color only. Below right: Lightened base color sprayed inside panel.



Below Left: Lighter base color applied in center only. Below right: Base color with high ratio of thinner sprayed over all panels.

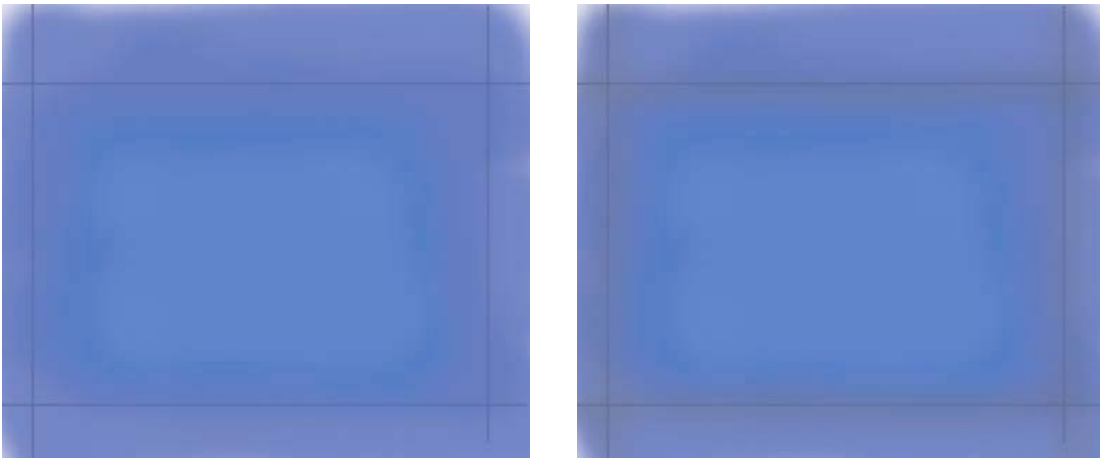


Post-Shading

Post-Shading is used to enhance the panel lines on a model airplane. It involves using the airbrush and painting a fine shadow along each panel line. This is generally done with a very thin, dark color. Post-shading can be used instead of a panel-line wash. The wash can be messier, a bit more labor-intensive, and generally works better with recessed panel lines. However, post-shading does require an airbrush capable of fairly fine lines, as well as a steady hand.

Thinned black can be used, or a mixture of the base color with black added to it. Tamiya "Smoke" color can also be used for this. The key is that the color must be *very thin*, and applied as a narrow line, so low pressure will be needed. Go for a subtle look, you can always add more if necessary.

Below Left: Panel with fading, but no post-shading. Below Right: Panel after lines have been post-shaded with very thin dark gray. The effect is intentionally subtle.



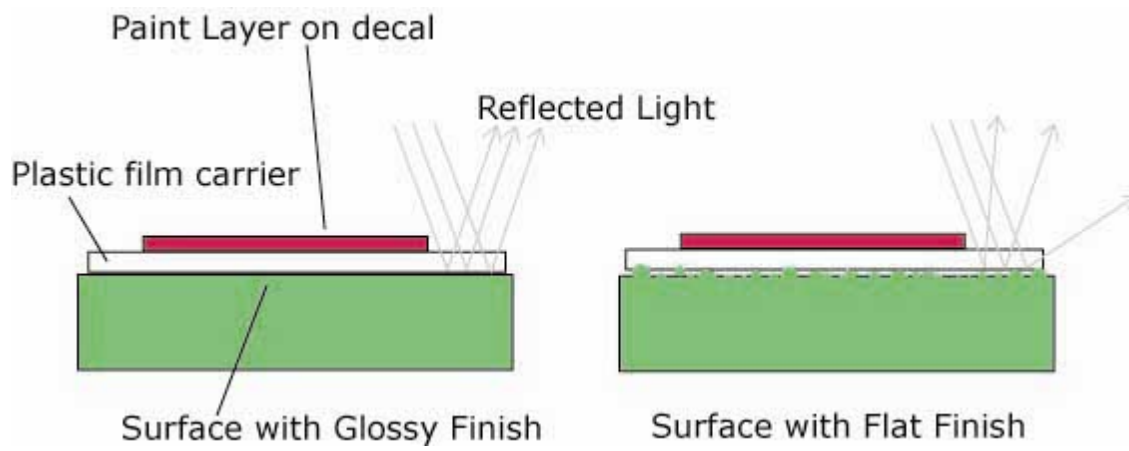
Clear Coats

A clear coat is a transparent coat of paint, generally applied as one of the later steps in the paint job. The clear coat could be glossy or flat. Seen through a magnifying glass, the surface of a flat coat looks rough compared to a gloss coat. This is generally accomplished by adding fine particles to a basic clear coat.

Now you may be asking yourself, why put on a coat of paint if you can see right through it? Actually, there are several good reasons for doing this.

The clear coat acts a final protective layer for the paint underneath it. In many cases, there may be several different colors applied to the piece, and each color can have a different level of gloss or shine. A uniform clear coat on top of all that gives a uniform shine to the finish. A gloss clear coat can make add "depth" and brilliance to the paint job, as commonly seen on real automobile finishes. With a model warplane or other service vehicle, the actual paint finish of the real thing might be flat, i.e. non-reflective (glossy airplanes are too easily found by the opposing forces). In that case, a flat clear coat gives a uniform (and controllable) level of dullness. Gloss and flat paints can be mixed to give semi-gloss finishes.

There is a specific application for gloss clear coats in model building, and that is for the decals used for the painted markings (e.g. national insignia). These decals are layers of paint on a plastic backing film. If applied over a flat-finished surface, reflected light gets randomly scattered through the clear plastic film, making it highly visible. The effect is called "silvering". However, a clear gloss coat sprayed on the model before the decals are applied reduces the scattering of light, making the plastic backing film less visible. Another coat of clear gloss after decal application helps seal them. If the real article has a flat finish, a flat clear coat is applied as the last step.



Above: Decal on glossy versus flat surface finish.

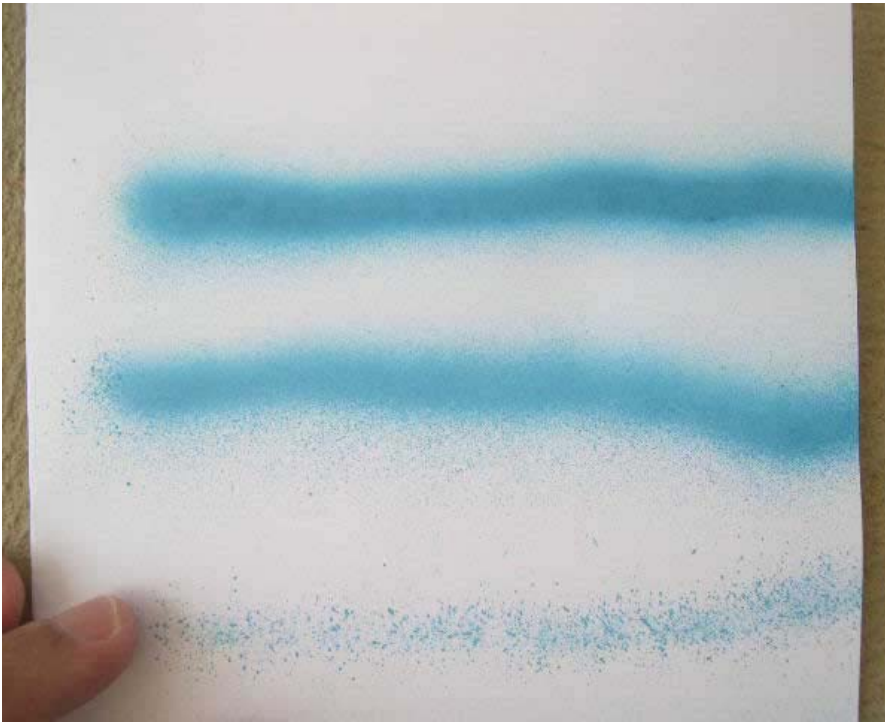
Troubleshooting

This section contains a detailed troubleshooting table designed to help you cope with just about any airbrushing issue. However, first a few general words. Airbrushing problems are best solved by prevention, not cure. Two basic habits will help you prevent a poor layer of paint from getting onto your pride-and-joy. These are: (1) Cleaning and (2) Test Spraying.

Keeping the airbrush clean will help keep it in proper working order. An airbrush that is cleaned poorly or never will be a source of great frustration. If you haven't already read the section on Cleaning, go back and read it now.

Now if your airbrush is clogged or not adjusted properly, you want to know this before paint hits the workpiece. Always do a test spray on a piece of scrap material. Adjust the paint, pressure or distance until you have it just right, then spray the model. You will put the airbrush down between coats, test spray again before the next coat.

The sheet of paper in the figure below shows the result of some test spraying. Going from top to bottom, the paint volume was reduced from one test pass to the next, by closing the nozzle half to one full turn each time. Setup was a single action Paasche airbrush (highly thinned paint, smallest needle, 15 psi). You can see there is major difference in the results: always test spray!



Above: Test spray experimenting with paint volume.

Now if you've taken all the precautions and still ended up with a horrible paint job, should you throw your model into the garbage can? No, with some effort you can actually remove the paint and start over.

For a wood or foam radio control model, you can sand the model with 600 grit or finer wet-dry sandpaper. Clean and dry then start painting again.

For a plastic model, sanding may remove some of the surface detail, but there are chemical solvents that will remove the paint. Bear in mind that these are somewhat aggressive chemicals, so follow the manufacturer's safety precautions. At the very least, use safety goggles and rubber gloves.

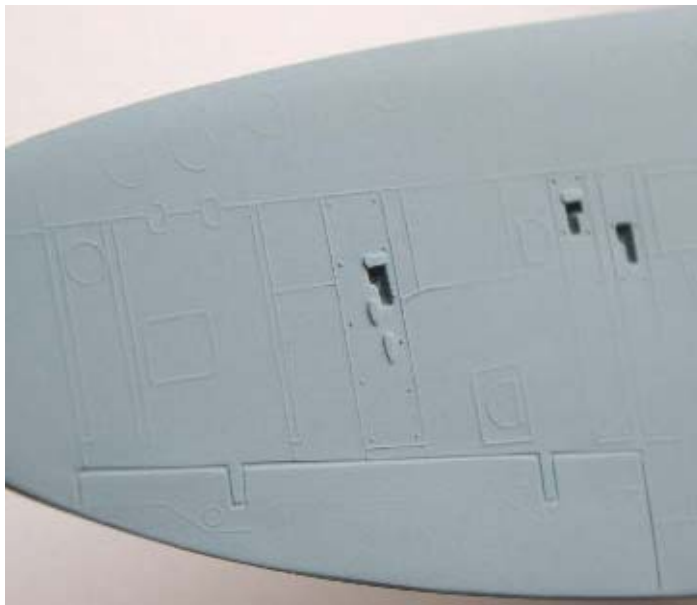
Easy Off oven cleaner works well for paint removal from plastic, as does Castrol Super Clean. For Easy Off, spray a foam coating on the model and seal it in a plastic container overnight. For the Castrol, soak it in a tray for an hour or so. In either case, use a toothbrush and running water to scrub the surface. Be sure to wash off the chemicals completely, or your next paint layer might not stick so well.

OK, now on to the Troubleshooting table. For comparison purposes, here are some pictures of model airplane parts with nice smooth airbrushed paint jobs.






Above: Two thin layers of Tamiya Acrylic blue paint (gloss), airbrushed at 15 psi. As good as it gets.

Below: Two layers of Model Master Acryl U.S. Navy Blue Gray (flat), airbrushed at 15 psi. So perfect it's almost boring! Model will be weathered to highlight surface detail.


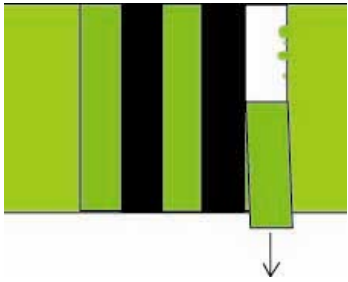


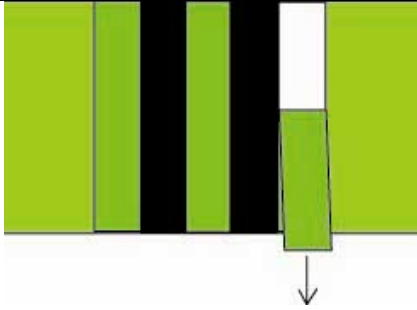
Troubleshooting Table

Issue	Description	Prevention
Over-spray	Paint goes beyond area that you intended.	<ol style="list-style-type: none"> 1) Mask off areas where you don't want excess paint to go. 2) Reduce Paint volume and air pressure, and get closer to the model. 3) Use a finer needle/tip if applicable.
Orange Peel	<p>Paint has a coarse, large grained appearance, reminding you of an orange's skin. Caused by paint not being atomized properly.</p> 	<ol style="list-style-type: none"> 1) Reduce paint volume 2) Increase air pressure.

<p>Gritty Finish</p>	<p>Paint surface seems to have fine particles covering it. Caused by paint drying on the way to the model.</p> 	<ol style="list-style-type: none"> 1) Move the airbrush closer to the model's surface. 2) Do not move the airbrush very rapidly over the surface ("fanning"). This also causes the paint to dry faster. 3) Reduce the air pressure. 4) Thin the paint some more.
<p>Runs</p>	<p>Paint builds up in certain areas and then drips or runs along the surface.</p>	<ol style="list-style-type: none"> 1) Reduce the paint volume. 2) Keep the airbrush moving.
<p>Spiders</p>	<p>Paint spreads out in tiny runs from one spot, looking like a sun or spider pattern.</p> 	<ol style="list-style-type: none"> 1) Move the airbrush back from the model. 2) Reduce the paint volume. 3) Add more paint to increase the paint to thinner ratio.
<p>Fine Splatters</p>	<p>Droplets around your fine lines.</p>	<p>Check your needle and</p>

		nozzle for damage, replace if necessary.
Splotches	The airbrush coughs up paint unevenly. Big splotches may come out.	<p>a) The system is clogged somewhere. Check for:</p> <ol style="list-style-type: none"> 1) Dried paint on the needle. 2) Paint bottle breather hole (on top) clogged with dried paint. 3) Dried paint clumps falling from paint container into airbrush container during mixing of paint. Use paint droppers. 4) Paint itself drying too quickly. Acrylics benefit from the manufacturer's thinner or from added paint retarder. <p>b) Moisture in the system</p> <ol style="list-style-type: none"> 1) Spray in drier conditions. 2) Install moisture filter in the air line.
No Paint	Paint does not come out of airbrush.	<ol style="list-style-type: none"> 1) Check that needle / nozzle is opened. 2) Check for clogs (see also

		<p>“Splashes”).</p> <ol style="list-style-type: none"> 3) Check pressure reading on air regulator of compressor. If using air can, replace or allow to warm up. 4) If using bottle attachment, check that hole on bottle top is clear. 5) Add more thinner to the paint.
Cracks	<p>Fine Cracks appear in the paint after drying.</p>	<p>Most often caused by using different paint types in different layers. Try to avoid mixing lacquers, enamels and acrylics on the same model. If you must mix paint types, use a test piece to check for compatibility. Allow full drying between layers as recommended by each manufacturer.</p>
Bleed Under	<p>Paint gets under the masking tape.</p> 	<ol style="list-style-type: none"> 1) Burnish down the edge of the tape with a toothpick, before spraying. 2) Spray in multiple light coats instead of a heavy wet coat. 3) After masking,

		<p>spray a coat of clear along the masking line. After this dries, spray the color coat.</p>
<p>Masking Tape pulls adjacent paint up</p>	 <p>Above: The correct way to remove masking tape.</p>	<ol style="list-style-type: none"> 1) Make sure surface is clean before spraying. 2) Peel the tape back on itself when removing, not over the new paint coat. 3) Use good quality masking tape e.g. Tamiya.
<p>Tip Dry</p>	<p>Paint dries on tip of airbrush needle, causing clogs or reduced paint flow.</p>	<ol style="list-style-type: none"> 1) Keep a Q-tip moistened with thinner nearby. Close the nozzle and wipe the needle tip when resting between coats. 2) Use needle lube such as Medea Super Lube. 3) Add retarders to the paint to slow drying (especially for acrylics).
<p>Yellow or White Paint doesn't cover well</p>	<p>These colors are usually very thin and don't cover the underlying coat well.</p>	<ol style="list-style-type: none"> 1) Use a primer specific to the type of paint being used.

		<ol style="list-style-type: none"> 2) Build up several thin layers of paint. You may need to burnish or sand lightly at edges of the masked region.
Fine lines have an intermittent appearance	Some airbrush compressors pulse the air supply, which can be seen in fine lines.	<ol style="list-style-type: none"> 1) Use a compressor with a reservoir tank. 2) Make sure the tank is full (motor shuts off) before painting fine lines.
Cannot make fine lines		<ol style="list-style-type: none"> 1) Thin paint more. 2) Reduce air pressure. 3) Get close to surface. 4) Use gravity feed brush.

End