

WHICH AIRBRUSH IS THE BEST?

"What airbrush is the best?" or "What airbrush do I need?" or "Why can't I get fine lines from my airbrush?" or "I want a new airbrush to be able to ____." These are all variations of the same question and they are all virtually impossible to answer simply other than with this statement: An airbrush is a tool, no more, no less. While good-quality tools are critical to any project, the results achieved, as with any tool, are dependent on the abilities of the person holding the tool. Put an inexpensive airbrush in the hands of an experienced airbrush artist and you will get professional results. Put the best airbrush made in the hands of someone who has never held one and the results will be disappointing to say the least.

An airbrush will not make a normal person into an instant artist. It doesn't work that way. As stated above, an airbrush is just a tool and if your expectations are to instantly start producing professional-quality paint jobs you are most likely going to be disappointed. Did you pick up your first pencil and immediately start doing elegant pencil drawings? Not likely. Just like any other talent, using an airbrush properly and getting good results from it is something that must be achieved through practice. If you aren't willing to practice and learn to use your tools properly then don't be surprised when the results are less than you had expected.

For most of us it takes many long hours to become proficient with an airbrush. Learning how to mix your paint, how to adjust the pressure, how to hold your hand, how to adjust your lights, how to adjust your subject, these are all necessary learning experiences and they do not happen overnight. If this is not something you are willing to do then you would be better off staying with brushes or spray cans. You need to decide if this is for you or not.

Still here? Good! That means there is still hope for you.

Note that the focus of this document will be on airbrushes as they pertain to scale modeling. The use of the word "Paint" is somewhat incorrect because an airbrush can also spray ink or other media.

Let's get started by looking at the different types of airbrushes because there are several different types and combinations of those types. Each is suited to a particular type of use.

ACTION

Airbrushes are categorized as being either "Single-Action" or "Double-Action". Both have only one trigger, but the trigger operates differently.

In a single-action airbrush the trigger only controls the airflow. Push the trigger down and air passes through the airbrush to atomize the paint. Let go of the trigger and airflow stops. The volume of paint is controlled by adjusting the depth that the needle travels into the nozzle. This is normally accomplished by a screw adjustment on the airbrush, frequently at the rear.

In a double-action airbrush the trigger controls both the airflow and the paint volume. Push the trigger down and air passes through the airbrush, just like a single-action brush. Pull the trigger backwards and this allows paint to begin to flow. The farther back the trigger is pulled the more paint is delivered to the airflow. In this way the double-action airbrush is able to provide constantly varying amounts of paint. You do not have to stop, adjust the paint flow, then start spraying again.

In general, a double-action airbrush is much more flexible to use than a single-action airbrush. When building scale models, the ability to adjust the paint volume "On The Fly" is of great value. This is not to say that a double-action airbrush is critical for building models. There are many people who use single-action airbrushes extremely well and could put most of us to shame. It goes back to the concept that an airbrush is just a tool and what works best for one person is not automatically the best choice for everyone. Double-action brushes take a little more time to get used to because your hand has to do two

things at once. This is a minor inconvenience that most people overcome very quickly though.

FEED

Airbrushes require both air and paint to work. Air is simple; hook the airbrush to an air source, and the pressure does the rest. The feeding of the paint is different because it is not under any outside pressure. Two types of feeding are generally used for airbrushes; "Gravity" feed and "Siphon" feed.

Gravity fed airbrushes typically have a paint cup on either the top or side of the airbrush. Paint is poured into the cup and gravity pulls a minute amount down into the mixing chamber of the airbrush where it is atomized and sprayed.

Siphon fed airbrush, also called "Bottom Feed" airbrushes work on the principle of a siphon. A bottle, or other container, is connected to the bottom of the airbrush and a tube runs from the airbrush down into the bottle. As air is blown across the top of the tube paint is pulled up into the mixing chamber where it is atomized and sprayed.

There are also some "Hybrid" airbrushes that are a combination of the two. The Badger 360, for example, has a section that can be rotated so that it can use either a paint cup on top or a bottle on the bottom. There are also paint cups available for siphon feed airbrushes that raise the paint level up above the mixing chamber of the airbrush. If the paint level is higher than the mixing chamber, gravity will assist the feeding.

The advantage of a gravity feed airbrush is that it will feed at lower air pressure than a siphon feed brush. The air pressure does not have to pull the paint up from the bottle below, so they are capable of spraying at lower pressures. This is important when painting fine-line camouflage on model airplanes since lower pressure usually means less overspray to deal with.

The advantage of a siphon feed airbrush is usually quantity. The bottles used on them can hold a lot more paint than most paint cups. While this is usually not that critical on scale models, it is important when painting large objects. It is a nuisance to have to stop every couple of minutes, refill your paint cup, and then try to pick up where you left off.

It is often argued that a gravity feed airbrush is easier to clean than a siphon feed brush. I tend to disagree with this statement simply because the cleaning operation for either type is pretty much the same. Put some thinner in the cup or bottle, and blow it through the airbrush. In most cases that is all that is required. I have both types, and unless I completely disassemble them for cleaning (which I do from time to time) it takes about a minute to clean either one. When I do completely disassemble them for cleaning my siphon feed brush has one more part to clean than my gravity feed brush, that being the bottle cap assembly itself. OK, maybe a gravity feed brush *IS* slightly easier to clean, but we are only talking a few seconds.

Gravity feed airbrushes have a paint cup that holds the paint. This bears some consideration when you are choosing the one that you want. In most cases the cup is on the top of the airbrush, but in some cases it is on the side. The cups themselves are normally fixed to the airbrush and are not interchangeable in most cases, however they do come in varying sizes. If you build large models an airbrush with a tiny paint cup will cause you to have to stop frequently to refill the paint cup. Likewise, if you build small models a large paint cup is probably just going to be in your way. One of the things that bothered me when I first started using a gravity feed brush is that the paint cup always seemed to cast a shadow right where I was painting.

For some siphon feed airbrushes you can purchase a paint cup. They usually sit to the side of the airbrush but since they sit higher than a bottle, and the paint is usually up around the center of the airbrush, they do allow you to spray at a slightly lower pressure ("Slightly" being the keyword).

Another thing to consider is whether or not the paint cup has a cap on it. People who spray acrylics know how quickly they dry. If the paint cup is open to the air the paint can start to dry in the cup. Having a cap on the paint cup helps eliminate this problem to some extent.

MIX

Airbrushes are also categorized as being either "Internal" or "External" mix airbrushes.

Internal mix airbrushes atomize the paint inside the body of the airbrush. Paint from the cup or bottle flows directly into the body of the airbrush where it is introduced into the airflow. External mix airbrushes typically have the paint nozzle located below the airbrush body. The Paasche H model is an example of an external mix airbrush. Air flowing over the paint nozzle pulls paint into the airstream where it is atomized outside the airbrush. There is normally no paint inside the actual body of the airbrush itself.

Internal mix airbrushes typically produce a finer and smoother finish than external mix airbrushes. For this reason, especially when painting models, an internal mix airbrush is usually the tool of choice.

NOZZLES AND NEEDLES

Most airbrushes have nozzles and needles that can be changed for different purposes, and most people are under the impression that a smaller nozzle / needle combination automatically means a finer line. Not always true. Admittedly, a huge gaping hole at the end of your airbrush will never give a fine line, but what controls the line width is the geometrical relationship of the needle and the nozzle.

Think of your common garden hose nozzle. Most of them can be adjusted to give a wide mist spray or a narrow spray by simply turning them or squeezing a trigger. This is accomplished by changing the geometry between the hole in the end of the nozzle and the needle within the nozzle. Water, or paint in the case of an airbrush, flows over the needle and out of the nozzle. A long, tapered needle allows the paint to hit the end of the nozzle at a very shallow angle so that it will exit in a narrow cone. A sharply-shouldered needle will cause the paint to exit the nozzle at a much wider angle. The difference, obviously, is a trade off between a narrow line and being able to cover large areas.

Keep in mind that, just like your garden hose, paint exits an airbrush in the shape of a cone. An inch in front of your garden hose the spray pattern is probably only an inch wide. Ten feet from the end of the hose it is several feet in diameter. An airbrush is the same. Right at the nozzle, the spray pattern is only slightly wider than the nozzle itself (wider because of the different air pressures causing a slight vacuum right at the tip and causing the paint stream to spread out), but several inches away from the nozzle it will be much wider.

The closer you can get the nozzle of your airbrush to the surface, the finer the main body of a line will be. This is, of course, affected largely by the air pressure. Put the nozzle right against the surface and paint will splatter everywhere so you have to get back far enough to prevent splatters. But that means you start getting into overspray which also causes the line to widen out. Fine lines are always a balancing act between paint viscosity (thickness), air pressure, needle / nozzle, and the user's abilities.

You can also run into problems using ultra-fine needles and nozzles when using paints and other high-viscosity media. Ultra-fine nozzles are usually designed for ink which has a much smaller particle size

than paint. In many cases using a very fine nozzle will do nothing but cause feeding problems because the paint is just too thick for the nozzle. It's a lot like trying to pour molasses through a salt shaker, it just isn't going to happen.

THINGS TO WATCH OUT FOR

When deciding on what airbrush is right for you, here are a few things to consider:

- Match the airbrush to the intended use. If you plan to paint scale models then stay away from airbrushes designed for illustration. They are usually designed for spraying ink and other thin media and may not work properly with paints.
- Plastic Parts. Avoid plastic airbrushes like the plague. They break easily, they strip easily when tightening the tips, and in many cases aren't even impervious to the solvents in lacquer or enamel paints. An airbrush is a tool. You would never buy a plastic saw, why buy a plastic airbrush?
- Solvent Resistance. Solvents in paints, especially enamels and lacquers, can be nasty. Insure that every part in whatever airbrush you decide on is resistant to solvents.
- Parts availability. Eventually something on your airbrush is going to break. If you have to order every part and then wait a week to get it, you might consider something that is more readily available at local stores. If you have a store in your town that carries everything that Badger or Iwata makes then you might be better served by getting an airbrush that uses parts you can purchase locally.
- Cost. Cost is important but cost isn't everything. You can spend \$75 for a good airbrush that will last a lifetime or you can spend \$50 for a cheap airbrush that is going to have you buying new tips once a week.
- Practice Makes Perfect. I cannot emphasize enough that the key to good results with an airbrush is practice. This is the ONLY thing that will make you proficient with your airbrush; there are no shortcuts, there are no ways around it, there is no way to avoid it. You can practice on scrap, you can make mistakes on models, you can blame the problems on the airbrush. Any way you want to look at it the key is practice.

It is also important to keep in mind that airbrushing skills are easy to lose. If you don't paint for a month or year don't be surprised when you see that your skills have degraded. Like many other acquired skills, control of your airbrush degrades if it isn't used. Practice on some scrap and they will come back in short order though.

AIR SOURCES

You are going to need an air source to provide air for your airbrush. This can be in the form of a compressor or tank / can. For modeling purposes you will not need a lot of pressure nor a lot of volume, but the air does need to be dry and provided at a consistent pressure and volume. There are four generally accepted source of air:

- Compressor -- A compressor is the most commonly used source of air, but they come in various types.

- * General Purpose Compressors -- These are the compressors that you see for sale at hardware stores or department stores. They can be used for any task, from powering your airbrush to powering a nail gun. They will frequently have a tank to accumulate air, and a compressor motor to generate compressed air. The motor normally only runs when the pressure in the tank gets low. A pressure switch will turn the compressor motor on when the pressure is low and automatically turn it off when the pressure reaches a certain level.
 - * One important thing to remember is that it does not matter how physically big the compressor is or how much pressure it produces. You can purchase a compressor with a 2 gallon tank or a 20 gallon tank. You can purchase one that provides 90 psi (pounds per square inch) of pressure or one that provides 200 psi. For use with your airbrush it does not matter. The compressor will have a regulator to allow you to adjust the pressure down to what you need for your airbrush. A larger tank with higher pressure just means that the compressor motor will come on less often than a compressor with a smaller tank.
 - * The down side to this type of compressor is that they are frequently loud. If you live in an apartment or do not have a place to put a compressor that will not bother other family members this may not be the choice for you. That is a choice that you will have to make.
 - * Hobby Compressors -- These compressors are specially designed for airbrush use. They are usually very quiet and frequently can barely be heard when they are running. They are also frequently expensive when compared to a "General Purpose" compressor. Their pressure and volume is usually much lower than a general purpose compressor, but for an airbrush you do not need a lot of either.
 - * One thing to watch out for with some of the less expensive hobby compressors is that they frequently have a pulsation to the air flow. This is common in diaphragm-type compressors that do not have a tank to accumulate air and smooth out the pulses.
- O Compressed Air Tank -- Actually these tanks are seldom "Air", they are usually carbon dioxide or nitrogen. The advantage to these is that they are completely silent. The only noise you hear is a hiss as the gas escapes. A 20 pound tank will usually last a modeler for several months (some people have mentioned having to have their tanks refilled only once a year!). You can usually lease or purchase them from companies that provide soft-drink vending services or from welding supply companies.
 - O Compressed Air Tank (Take 2) -- Another option is to get a tank that is used for inflating a flat tire. These are available from many hardware or department stores, and come in sizes varying from about 5 gallons to around 10 gallons. You can take it to your local service station occasionally and fill it up, and use it until the pressure drops to the point that you can't paint reliably.
 - O "Canned Air" -- I saved this for last because this is the least useful of the options. These cans of propellant are sold under various names, and for airbrushing they are virtually useless. As the gas escapes from the can it causes it to be chilled. They will get so cold that ice will form on the outside. As the can chills it causes the pressure inside to be reduced, which in turn causes the pressure that you are spraying at to drop. As the can warms back up, the pressure increases,

and your spraying pressure increases. The bottom line is that the whole time you are trying to paint your pressure is going up and down. This makes it very difficult to get any kind of consistent results from your airbrush. You can alleviate the problem somewhat by sitting the can in a pan of warm (not hot!!) water, but it still doesn't work that well. In general I consider this option to be a last resort, and do not recommend it.

In most cases you will need a regulator. A regulator is used to adjust the pressure of the air, and most good compressors will come with one installed. Smaller compressors may not need one because their output air pressure is so low. For modeling use you will normally want to paint at 30 psi or lower. I seldom paint above 20 psi, and most of my painting is done at pressure much lower than that. If your compressor did not come with a regulator you may need to add one.

In most cases you will also need to add a moisture trap. Tanks of carbon dioxide or nitrogen do not need a moisture trap because those gases are completely dry. Compressors nearly always do need a moisture trap. When air is compressed the moisture in it is squeezed out. This moisture is picked up and blown down the hose when the air escapes. It will frequently blow out of the airbrush and can ruin a paint job before you know what happened. A moisture trap will capture the moisture before it can be blown out of the airbrush, and is cheap insurance against ruining a paint job that you put a lot of time and effort into. The trap should be located as close to your airbrush as is conveniently possible. This gives it a better chance of picking up moisture that manages to condense and travel down the hose.

PROTECT YOURSELF

In my opinion no discussion on airbrushing would be complete without a warning to protect yourself. The thinners and solvents used in paints are not meant to be breathed into your body. In many cases they are toxic and even the materials that are not explicitly toxic were never meant to be breathed. We use Future Floor Polish a lot in our models, but it is a FLOOR POLISH and was never meant to coat the inside of our lungs. Acrylic paints may not contain toxic solvents but a coat of acrylic plastic on the inside of our lungs is not going to do a thing for our ability to breathe! Protect yourself! Use a respirator or spray booth when painting. A good respirator with organic vapor canisters will remove the vapors and particles before they get into your lungs (note that a paper filter mask is ****NOT**** sufficient protection from paint vapor) and a spray booth will evacuate the vapors from the area. Nobody can force you to do this but if you don't, who will? At the risk of sounding trite, you only have one pair of lungs and living without them is difficult to do.

MANUFACTURERS

These are the most common airbrushes available in the USA. This list is by no means a complete list of airbrush manufacturers, but they are the most common airbrushes available here. In my opinion, and I emphasize that this is my own personal opinion, if you buy a double-action, internal mix airbrush made by Badger / T&C, Iwata, or Paasche that is suited to what you are going to paint you will never be sorry. The last phrase is important because all of these manufacturers have models that are not well suited for painting models. An airbrush is designed for a specific medium such as paint or ink. Airbrushes designed for ink may not spray paint well and airbrushes designed for paint may not spray ink well.

- o BADGER -- My personal favorite. I've been using Badger brushes for about 13 years now and they have never let me down. Badger makes brushes for every type of use and their customer service is, in my opinion, second to none. Parts are also easy to find when you need them.

- o Badger also manufactures Thayer and Chandler airbrushes now. In addition to my Badger 200 (single action, siphon feed) I have a T&C Omni 3000 (double action, siphon feed) and a T&C Omni 4000 (double action, gravity feed). For modeling purposes, the Omni 4000 is an excellent airbrush and does everything I need.
- o IWATA -- People who own Iwata airbrushes swear by them. Their machining is reportedly excellent and they reportedly have one of the smoothest actions around. Having never owned one, I can only state what I've been told. One of the drawbacks to Iwata is that they are usually somewhat more expensive than a comparable Badger or Paasche and parts for them tend to be more expensive.
- o PAASCHE -- Paasche has been making airbrushes for a very long time, and their brushes have withstood the test of time. They are easy to find, and availability of parts is very good. Virtually any art supply store that carries airbrushes is going to carry Paasche.
- o One thing about some Paasche models is that the handle is somewhat thicker than either Badger or Iwata. Depending on your personal preference this can be either a good thing or a bad thing, and that is something that you will have to decide for yourself. I was told that this is the case on the Paasche VL and H models but not on the V, VJR and VSR models.
- o AZTEK -- I'm not going to get drawn into a discussion on Aztek airbrushes because I've never owned or used one. I will not pass judgement on them, nor will I recommend or dissuade anyone in their decision to purchase one. They are probably one of the most commonly used airbrushes for model building, whether that is because of the Testors name on them or because of the availability of them I do not know.

Their style is completely different from most other airbrushes, and instead of holding the airbrush like a pencil the Azteks are held more like a gun. Some people prefer this style, others do not. It is a personal preference that you will have to decide for yourself.

I will, however, repeat what I have been told many times over: that they are unreliable. One day they will be working properly, the next they will be spitting and sputtering. I think (emphasis on "Think") that this is because of improper cleaning of the removable tips. Reportedly they are supposed to require very little cleaning, but in reality everyone who uses them tells me that the tips absolutely MUST be soaked in thinner overnight to prevent clogging.

I would also like to add that there are a number of people whose abilities I respect very much that have had excellent results with Aztek airbrushes. I think it all goes back to knowing and understanding your tools and being able to maintain them in the manner that they require.

PHOTOGRAPHS



This is a Badger 200 airbrush. It is a single action, siphon feed brush. Air is triggered with the trigger on top of the airbrush and the amount of paint flow is adjusted using the screw at the very back of the airbrush. Also notice that the cap for the bottle will fit both Tamiya and Testors Model Master paint bottles (although the siphon tube may need trimming). The bottle in the photograph is a Tamiya bottle. Also notice how I bent the siphon tube. Normally they come straight down but I warmed this one with a heat gun and bent it toward the front of the bottle. I then trimmed it so that it just clears the bottom of the bottle (it is a little closer when the bottle is screwed on tightly). This allows me to virtually empty the paint bottle with very little waste.



This is a Badger 100LG airbrush. It is a double action, gravity feed brush. Notice the differences between it and the Badger 200 above. Whereas the 200 has a bottle on the bottom the 100LG has a paint cup on top. Also note that the cup is angled so that when you are spraying with the airbrush pointed downward paint will still flow into the paint cavity in the brush. Also take note that there is no needle adjustment screw at the rear of the airbrush. Since this is a double action brush, air is triggered by pushing DOWN on the trigger and paint flow is controlled by pulling back on the trigger.

If you look closely you may also note that the head assembly of the 200 and 100LG are exactly the same. Both the 100 and 200 have three heads / needles available; Fine, Medium, and Large. The Fine head, while able to spray slightly finer lines, was designed for fine-pigment mediums such as ink. Many people have problems getting model-type paints to flow through the fine head because of the pigment size, however I have not had any problems in that regard. The 100LG is new and has not been used yet, however I have had a fine head installed on my 200 for a long time now and have not had any problems with it clogging. I do generally just use that airbrush for general coverage type jobs at relatively high pressure (around 20 psi) though, and if I tried to paint something at low pressure I might experience problems with the fine tip.



This is a Thayer and Chandler Omni 3000 airbrush. It is a siphon feed, double action airbrush. Thayer and Chandler are now manufactured by Badger, so this is effectively another Badger product. Similar to the Badger 200 above it uses a paint bottle on the bottom of the brush (in fact this is the same bottle assembly as is shown in the Badger 200 photograph), however unlike the 200 it is a double action brush.

This was my first double action airbrush, and after I started using one I have found it difficult to go back to a single action brush for delicate work.

The Omni series uses a single nozzle and needle combination. There are no Fine, Medium or Large nozzles available, only the one that comes on the brush.



This is a Thayer and Chandler Omni 4000 airbrush. It is a gravity feed, double action airbrush. This is my main "Workhorse" airbrush and it is used for everything from general coverage to camouflage. As an all around airbrush it is hard to beat in my opinion.

AIRBRUSH HISTORY

Just a little touch of the history of airbrushes to give you an idea of how long they have actually been around

The first airbrush, named a "Paint Distributor", was invented by Mr. Abner Peeler of Webster City, Iowa in 1879. In 1881 Liberty & Charles Walkup of Rockford, Illinois buy the rights to Peeler's airbrush patent, and in 1883 the Walkups form "The Rockford Manufacturing Co." to produce the new "Air Brush." The name is subsequently changed to "The Airbrush Manufacturing Company". The web site at http://www.airbrushmuseum.com/airbrush_museum_01.htm has photographs of early airbrushes, starting out with the 1885 Wwalkup airbrush at the top.

The web site at http://www.airbrushmuseum.com/airbrush_history_timeline.htm has a complete timeline from 1879 to 2004 that shows the development of the airbrush as we know it today. This information was gathered from The Airbrush Museum at <http://www.airbrushmuseum.com> web site and anyone who is interested in airbrushes should take some time to visit this web site. This site is full of interesting information about the development of the airbrush, as well as lots of photographs of many early airbrushes.

SUMMARY

"But this still didn't answer the question of what is the best airbrush for me!" You are absolutely right, it didn't. And that is because, as stated at the very top of this document, there is no simple answer to that question. An airbrush is a tool, no more, no less, and the best airbrush for you is the one that you prefer. Some people prefer Iwata over Badger, others prefer Badger over Iwata. This does not necessarily mean that one is better than the other, only that a particular person prefers a particular airbrush. The one that is right for you is the one that you are comfortable with.

Results from an airbrush are all that matter. If you have an airbrush that is doing exactly what you want, that is giving you the results that you are after, and is behaving the way you want, then you already have the right airbrush for you. Buying another airbrush is not going to improve things because you already have the results you are trying to attain. Take the money you were planning to spend on a new airbrush, get some paint and sheet styrene, and practice.

If you are not getting the results that you want then you need to decide what area is not working. Does your airbrush constantly clog up at the tip? Are your spray jobs grainy and rough? Are you unable to get the fine lines that you desire? Decide what the deficient areas are and then insure that it actually is the airbrush causing the problem. It may be something as simple as Improperly Thinned Paint. All of those things mentioned can be caused by factors other than the airbrush itself. You might go out and buy a new airbrush only to have exactly the same problems with it. Before you blame your tools, be sure that the tool is at fault.

This is an open document. While the opinions are mine alone, I am always open for input from others. I do not pretend to be an expert with an airbrush, nor do I pretend to have all the answers. If you disagree with something that is written here, or if you just have something to add, feel free to drop me an email.

A link to this information was placed on Fine Scale Modeler's Forum along with a request for input, so the members of that forum deserve a lot of credit for their input and assistance. As far as that goes, they deserve credit for virtually everything I know about airbrushing since so many of them were willing to answer my own questions.

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