

# Airbrush

## Fundamental Information

### What is an airbrush?

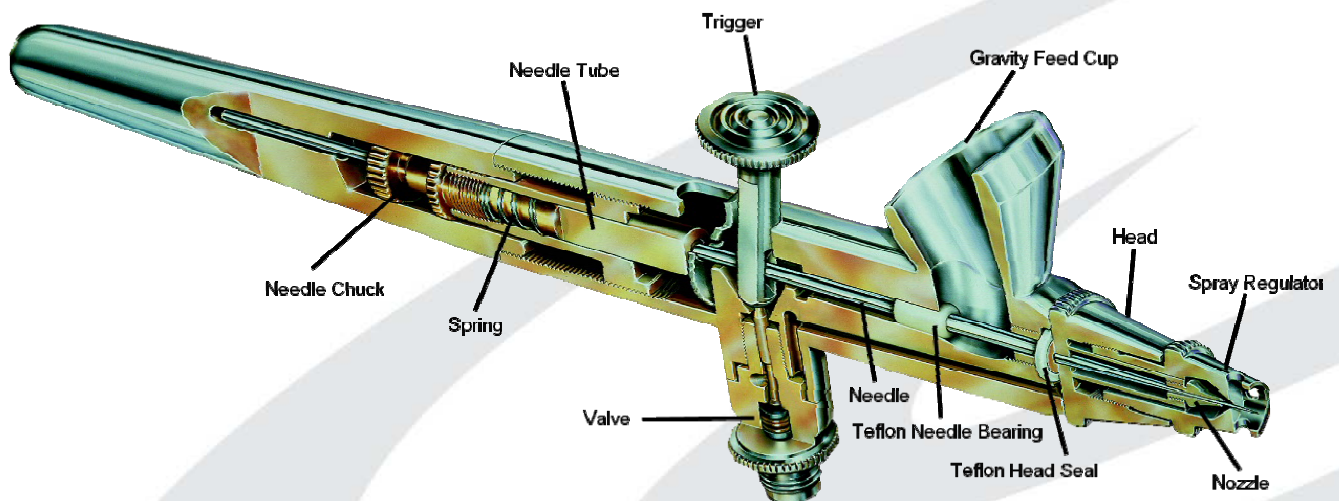
It is a miniaturized paint spray gun that sprays paint in a controllable manner using compressed air.



Various Airbrush Types

### What is the difference between an airbrush and a „normal“ paint spray gun?

Not all but most airbrushes contain a needle, which closes the nozzle completely when not in use. When the compressed air is turned on and the needle is slowly pulled back from the nozzle, a gap opens up (around the needle) and paint can get blown through the nozzle by the compressed air. Conventional spray guns (e.g. the large ones used by automotive body painters) usually do not contain a needle but only a paint nozzle instead. Pick-up and transport of the paint particles out of the airbrush or the spray gun uses the Venturi principle (Wikipedia: [http://en.wikipedia.org/wiki/Venturi\\_principle](http://en.wikipedia.org/wiki/Venturi_principle)). So why does an airbrush contain a needle? The needle provides for fine detail (fine lines), since the needle cone guides the paint particles to a tiny imaginary spot in front of the airbrush. The purpose of airbrushes is to provide for fine detail work with smooth and even coverage of smaller areas. The purpose of spray guns is to provide for fast and even coverage on larger surfaces (e.g. entire vehicles).



### **What can I do with an airbrush?**

An airbrush is suitable to apply thin liquids (e.g. paint) to all sorts of surfaces. That means one can decorate or modify all sorts of items with an airbrush.

A few examples are:

- Custom color decoration of appliances or other devices/items (coffee makers, vacuum cleaners, toilet lids, computer cases, skis, surf boards, cellular phones, etc.)
- Painting of ship/aviation/car/motorcycle models
- Custom painting of real cars, motorcycles, trucks, etc.
- Touch-up/repair of minor damage of the paint (spot repair) on real cars, motorcycles, boats, airplanes, etc.
- Applying food coloring to cookies, cakes, pastries, etc.
- Weathering of models (e.g. rust and mud on model railway cars).
- Weathering of model buildings (e.g. soot on a chimney)
- Applying body paint on people (Body-Painting, temporary Tattoos)
- Applying liquid make-up on actors
- Applying liquid make-up for carnivals, Halloween, weddings, etc.
- Finger nail design
- Applying tanning solution
- Taxidermy – applying paint to obtain a natural „live“ look
- Applying paint to ceramics/pottery and applying glazes
- Painting/designing T-Shirts and other fabrics
- Painting/designing walls
- Illustrations
- Touch-up on pictures or photographs

### **I have always used a regular paint brush - why should I use an airbrush?**

The short answer: appearance, detail & precision

A regular paint brush serves its purpose and many airbrushers often use both (airbrush & paint brush). For some applications a paint brush is better suited for other applications it is the airbrush. Nobody would ever really want to paint a real car with a paint brush or a roller. The coating would not be even and streaks would be visible. A paint brush also often causes too thick of a coating. On small detailed items the detail is often lost/covered up by a thick coat of paint. If one looks at a typical model railway car or a model airplane, many rivets, screws, seams, grooves, etc. are visible. If that railway car or airplane is painted using a paint brush most details will be covered up by the thicker coat of paint. In addition one will be able to see brush strokes in the paint coating.

An airbrush provides for a very thin and even coating of paint, without drowning details in the paint. The paint coating looks like it does in real life. There are no brush strokes visible on a real vehicle because they are painted using spray guns. Why shouldn't the same technique be used on models? The goal of modeling is to recreate reality as accurate as possible.

### **What do I need for airbrushing?**

- Airbrush
- Source of compressed air (small compressor or can of compressed air)
- Air hose
- Paint
- An object to paint
- Airbrush cleaner

### **Where are airbrushes being used?**

- Commercial/industrial and hobby model building (vehicles, dioramas, etc.)
- Dental laboratories (color matching of white porcelain teeth to the natural tooth color of patient)
- Vehicle repair (paint touch-up/spot repair)
- Bakeries to apply food coloring
- Festivals/concerts/children activities to apply removable/temporary tattoos using body paint

- Art – Illustrations, pictures, body painting, etc.
- Film, television, theater – applying liquid make-up and special effects (e.g. burns, bruises, etc.)
- Cosmetics – finger nail design, applying tanning solution
- Taxidermy
- Ceramics/pottery (painting/glazing)
- Prototyping – often time prototypes are designed or painted using airbrushes
- Manufacturing of dolls, figures, etc.
- Manufacturing & industry in general to apply liquid glues or paint
- Restoring/repairing furniture, antiques, and other items
- Custom color decoration of appliances or other devices/items (coffee makers, vacuum cleaners, toilet lids, computer cases, skis, surf boards, cellular phones, etc.)
- Retouching
- Interior architecture/design (painting on or design of walls, columns, door panels, etc.)

### **A few rumors (and the truth) surrounding airbrushing:**

#### Airbrushing is very difficult to learn...

That depends – the functionality of the airbrush is easy to learn. What requires time is learning the creative/artistic aspect. Painting of a cellular phone cover in one single color can be learned within 10 to 30 Minutes. A little more difficult but still easy to learn is the use of stencils. One could for example paint a computer case in one color and then use circular stencils to paint spheres in a different color on top of the base coat. It is also fairly easy to mask off certain areas on a vehicle and then paint the remaining visible area with a color. Those types of things are quickly learned. The most difficult part here is cutting the stencils and properly masking areas not to be covered. As soon as three-dimensional effects are desired or lifelike items are to be recreated/painted a lot of patience and practice is required.

#### Not all paints can be used with airbrushes...

This statement is too general and not really true. All liquids that can be thinned to a consistency approximating buttermilk can be sprayed with an airbrush. Some examples are acrylic, water, oil, enamel paints, lacquers (also solvent based), stains, inks, etc. With some makes of airbrushes the compatibility to liquids containing solvents can be a problem. Since most airbrushes use needles they also contain seals around the needles. Without seals the paint could leak into the back of the airbrush. Sometimes airbrushes also have a second seal inside the head, which also come in contact with the paint. Different manufacturers use different materials for the seals; some are not affected by solvents, others are. Badger airbrushes exclusively contain needle and head seals made from Teflon™ (some other manufacturers use for example leather or rubber). Seals made from Teflon™ are resistant against just about everything which might be sprayed with an airbrush. That means one can also spray solvent based lacquers or other aggressive materials without a problem (reference is made to the airbrush, no health!).

#### The smallest nozzle possible is the best...

In certain respects it is a fallacy to think the smallest nozzle will create the finest lines or detail. Other factors are more important when it comes to fine lines.

Many users demand nozzle sizes between 0.13 and 2.00mm and will not even look at anything larger. It always depends on the type of work to be done and which material (pigment size) in which consistency is to be sprayed.

Most paints are made with ground pigments (longer grinding time = finer pigments = higher price). Pigments are small particles of different materials which are then mixed with a carrier liquid. This can be observed when paint sits for a few days. The pigments will settle similar to mud on the bottom of the paint bottle. If the nozzle does not have the appropriate/sufficient size clogging will occur. Pigments are of course much smaller than the nozzle opening and should always be able to pass through but...! In order to illustrate this one only has to imagine a funnel with an opening just large

enough for a marble to fit through. If the funnel is filled to the top with marbles of all the same size, only a few will fall through and the rest will create a blockage.

With paint there is also the effect of drying. When the nozzle is not large enough for new liquid to follow the passing air will dry up the paint. The result is frustration because one cleans more often than one is able to spray.

A nozzle diameter between 0.2 and 0.27 is “small” enough for over 90% of the work with normal paints. One should keep in mind that masking is used in most cases anyways. If masking is used to spray a 1.2mm strip, it does not matter whether my nozzle achieves a line of 1.0mm or “only” 1.6mm. When doing freehand work a 0.25mm nozzle will be able to spray a line approximating the same as a line of a sharpened pencil. Do most airbrushers really need finer lines for freehand work?

The more important factors for fine lines are thinning, paint type, air pressure, needle positioning, and the shape of the needle (the cone). Tip size also plays a role but is secondary.

Thinning: If the paint is not properly thinned the small paint droplets being blown out of the airbrush will be too large.

Paint Type: If the pigments are too large (or the tip is too small) the airbrush will continuously clog up.

Air Pressure: If the pressure is increased the spray pattern will become wider; if the pressure is decreased the spray pattern will become narrower. Pressure between 1 and 2 bar is sufficient for fine detail work (depending on paint type and consistency/thinning). Airbrushing on textiles is usually done at a higher pressure. Cotton for example will absorb the paint and for that reason more paint must be applied. Many times a larger nozzle is also used so more paint will fit through.

Needle Positioning: Positioning requires good finger coordination, especially with double-action airbrushes. The position of the needle determines the opening size of the nozzle. If the needle is only retracted a small amount only a small amount of paint will fit through the opening. If the needle is fully retracted, the nozzle is fully open and the widest lines can be sprayed. On single-action airbrushes the needle is positioned using a screw mechanism (usually on the back of the airbrush). On double-action airbrushes the needle position is controlled by the trigger position and continuously adjustable while spraying. That is why double-action airbrushes require more practice; the position can be changed by 0.1 or 0.01cm with the trigger/index finger.

Needle Shape (cone): The cone of the needle must be optimally designed and manufactured in order to guide the paint particles to a tiny imaginary point right in front of the airbrush. The spray pattern will be negatively affected, if the tip of the needle has even the slightest deformations (bent or waves) or if its surface finish quality is too rough. Smallest changes, which are sometimes only visible through a microscope can/will affect the spray pattern significantly.

Please also take a look at the document explaining the various types of airbrushes and their advantages/disadvantages, as well as the Q&A section.