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A Simple, Effective Homemade Folding Spraybooth

In many situations, the best choice for glaze application is spraying, and while the little East Asian mouth-operated sprayers are fun to play with and good for applying blushes of glaze or oxide, they aren't any good if you want to cover a lot of surface. And when using spray equipment, too many people just put on a respirator and spray glazes inside the studio. That introduces serious hazards. Glaze overspray (the sprayed glaze which doesn't land on the work) becomes dust that settles on everything in the studio. Subsequent air movement stirs up the dust and you breathe it at times when you're not wearing your respirator. The only acceptable solution is a spraybooth. Commercial spraybooths are expensive and cumbersome, but you can build an equally-effective one that folds out of the way when not in use.

NOTE: Even with a spraybooth, protect your lungs and wear your respirator. Some small fraction of overspray might escape the spraybooth, and we should all do everything we can to safeguard our lungs. You're not working at the spraybooth for very long, so it's not much of an inconvenience to wear your respirator. Make sure that the respirator has P-100-rated dust filters (the 3-M half-facepiece respirator with the pink filters on amazon is a bargain and very effective).

Function of the Spraybooth

In the clay studio, the primary objective of a spraybooth is to acquire and retain all of the overspray or dust produced when you are spraying glazes or engaged in a dust-producing activity like sanding clay or mixing dry materials. This is accomplished by an exhaust fan drawing air through a filter at the back of the spraybooth, generally discharging outside the building. Some commercial spraybooths claim to filter the air so effectively that it can recycle into the room, thus avoiding the necessity of "make-up air" coming in from outside. That is a significant advantage in a very hot or very cold climate. But I am skeptical of the effectiveness of such systems. Unless the filtering mechanism is an industrial water-curtain system or a true HEPA (high efficiency particle arrestor) filter, the finest silica particles will pass through and end up in the air you breathe. For safety's sake, always vent a homemade spraybooth outside.

To avoid polluting the environment, an effective filter is mandatory. Household furnace filters work well for capturing most of the overspray and dust, and are inexpensively and can be changed frequently. Note: if you spray paint or other materials producing toxic fumes, those fumes will pass through these filters and into the environment. That's still better than having them confined to your studio. Fortunately, we rarely use such materials in the clay studio.

The two most common faults of a poorly designed spraybooth are an inadequate exhaust fan, and an excessively large opening in the front. The front opening should be just large enough for you stand there and do what you need to do - rotate the work on a banding wheel, spray the work, and see what you are doing. It works well if your body actually spans a significant portion

of the opening, because then air is drawn in around you, significantly reducing the chances of overspray or dust reaching you or escaping into the room.

Size of Spraybooth

A spraybooth is just a big wood, metal, or plastic box with a large opening on the front for access while spraying, and a smaller opening in the back for the exhaust fan connection. The size of the box depends on the size of work you need to spray. Don't build a spraybooth larger than you really need, but do try to take into account the possibility of making fairly large work. For average studio purposes, I recommend a tabletop spraybooth 40" tall, 36" wide, and 36" deep. Don't skimp on the depth, because you need room at the back for a shallow collection box to accommodate the filter and exhaust port.

What Type of Fan or Blower to Use?

As long as you have a furnace filter mounted on the collection box in front of the exhaust opening, the kind of fan does not matter as much as the amount of air it moves. One critical requirement is that the fan motor must be protected from abrasive and/or corrosive materials in the overspray, because small amounts will inevitably get through the filter. Household fans such as the ubiquitous "box fan" draw air through ports in the center-mounted motor housing to cool the motor, and thus the motor would become contaminated with glaze materials and would quickly fail. For any safe and efficient spraybooth design, you need an axial fan that has a central mounted sealed motor, or else a blower with an externally mounted motor.

The best exhaust fans or blowers are designed for commercial applications, and the examples below can be found at www.grainger.com. Just enter the item numbers in the search box on the Grainger webpage. Item #7C037 is a squirrel-cage blower with a direct-drive 1/4 HP motor that moves 600 CFM (cubic feet per minute), for $280. You will see that the motor is mounted externally, out of the air stream. Grainger item #1HLA3 is a shutter-mounted (the shutters close when the fan is turned off) 1/20 HP 16" axial fan which moves 1095 CFM, for $317, and is the ideal choice if you live in a place that gets very cold in the winter. Item #1HKL5 is the same but without the shutter assembly and moves 1280 CFM and costs $255. Note that the motors on both of these fans the motor are center-mounted within the airstream, but are totally enclosed, protected from dust contamination.

Axial fans move air much more easily than blowers, and thus the far lower horsepower rating (and greater energy savings). However, the efficiency of affordable axial fans drops off rapidly if there is any restriction on air flow, such as a partially clogged filter, whereas a blower will maintain much more power. Check Grainger's figures for these fans and you will see what I mean. The axial fan is good only for direct exhaust with no ducting, with the spraybooth located against an outside wall. Both of the axial fans would be mounted in a housing constructed outside on the wall so that they do not protrude into the interior space. The axial fan with the shutter assembly requires require a 17" square opening, so the sensible solution is to simply build a frame extending outwards from the outside wall, deep enough to accommodate the fan assembly, and of a height and width to accommodate the fan mounting flange. The one

without the shutter assembly is round, but since it is going to be mounted inside a similar frame extending outside the wall, it makes sense to still cut a 17” square opening.

If you intend to locate the spraybooth elsewhere in the studio, you must use a blower that can accommodate ducting. The one recommended above accommodates a 6" duct, and can exhaust through the wall or ceiling. In such an installation the blower is usually mounted on the roof or on a bracket attached to the outside wall. Keep in mind that a longer run of ducting will lower the CFM rating, and might require a larger blower and duct.

In order to operate efficiently, any spraybooth that exhausts outside will require “make up air” coming in from outside. In other words, if your studio is tightly constructed, you may have to open a door or window a bit when the exhaust fan is running.

The Spraybooth Filter

Whether you use an axial fan or a blower, you must mount a furnace filter in front of the exhaust opening to catch the overspray. This is not just a matter of protecting the environment. The overspray will collect on the fan blades, screening, and shutter assembly, eventually causing problems. The cheapest furnace filters you can find are perfectly adequate, so there’s no reason not to change them frequently, based on how often you use the spraybooth. Furnace filters come in a variety of sizes and are available at any hardware store or home improvement superstore. I recommend a 20" square filter. There’s plenty of room on the back wall of this spraybooth for a 20” filter, and it will clog less often than a smaller one.

Installation Location

This folding spraybooth needs to be installed above a stationary table or workbench at least 36” deep (from the front edge to the wall) that will provide the horizontal surface of the booth. Cut the appropriate hole in the wall centered 15" above the table or workbench surface. If you are using a blower, built the mount for the blower outside or on the roof and install the necessary ducting to the opening in the wall. If you are using an axial fan, build the appropriate box outside the wall and mount the fan. If you are not a qualified electrician, hire one to do the electrical wiring. The wiring should be in conduit, with a wall switch next to the stationary frame mentioned in the next paragraph.

Building the Collection Box and Mounting the Filter

On the inside back wall of your spraybooth, build a 20" by 20" outside-dimensions square frame around the exhaust opening as a collection box on which to mount the filter. Regardless of whether your opening is a 6"-diameter hole to accommodate blower ducting, or a 17" square opening for the axial fan, the collection box must be built to the filter’s dimensions. Build the box from 1x4 lumber, which is actually ¾” by 3½”, so that it sticks out 3½” from the inside back wall. Around the outside front edge of the collection box, fasten narrow strips of lumber or metal, creating an outer frame or “socket” to accommodate the furnace filter flush against the front of the collection box, held in place by these strips. Improvise any sort of clips, or even several lengths of wire or cord spanning the front of the box to hold the filter in place.

Building the Spraybooth Wall Frame

The collection box with filter installed will extend out about 5" from the inside wall. This is a folding spraybooth, so the next step is to build a stationary frame attached to the wall to accommodate the hinged sides and top, so that they can fold shut over the collection box and filter when not in use. The frame extends out 6" from the wall, with the left, right, and top members staggered in width, so that each panel can fold shut over the previous one. For our spraybooth this frame is 36" wide and 40" tall, built from 2 by 8 lumber, with the left vertical board ripped (cut lengthwise) to 5" wide, the right vertical board to 5 5/8", and the top horizontal board to 6 1/4".

Cutting the Side and Top Panels and Assembling the Spraybooth

Cut the two side panels from 1/2" plywood, each one 36" by 40" tall, and a top panel 36" by 38" wide. Rip ¾" strips off the edges of a piece of ¾" lumber, and tack/glue those on the underside of the 36" edges of the top panel. Using two common rectangular cabinet hinges per panel, attach the sides and top to the stationary frame. The hinges should be mounted to the 1 1/2" face of the stationary frame, and to the inside surface of the side and top panel, so that the panels fold inwards.

With the staggered width of the stationary frame members, the left side folds in first, the right side folds over the left, and the top swings down over both, holding everything in place, eliminating the need for any sort of latch. When you want to use the spraybooth, swing the top upwards (push it up and prop it with a stick if it makes it easier), swing the two sides out, and rest the top upon the sides. The ¾" strips under the outer edges of the top panel are to prevent you from accidentally swinging the side panels outward, allowing the top panel to suddenly fall. Having the top panel rest on the side panels is an especially useful feature, because you can swing the sides out only as far as you need, restricting the front opening and increasing the efficiency of the spraybooth.

When folded shut, the spraybooth will take up a space 36" wide, 40" high, and 6½" deep at the back of your bench or table, but otherwise the surface will be available for other applications.

Lighting for the Spraybooth

Good lighting in a spraybooth is pretty essential, and an easy solution with this design is to have two clip lights plugged into a nearby outlet, hanging on hooks on either side of the spraybooth, with cords long enough so that they can be clipped on the upper front edges of the side panels with the reflectors aimed into the spraybooth.