



The Extruder Book

Second Edition



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Extruded vase with pulled handle by Tony Heslop, Colorado Springs, CO

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Getting Started

When you read this book you're in one of several extruder-related conditions: You've never used an extruder but you want to, or you've used an extruder but didn't get the results you wanted. Maybe you just acquired an extruder but you don't know what to do next, or you're an experienced, accomplished extruder user and you just want to see if the guy who wrote all of this really has anything new to impart. No matter which category you're in, the chapters that follow will help you get off to a good start with extruding or get back on track if you've been struggling. Let's start with some important pointers about safety, and then we'll get into the best way to set up your extruder work area. From there we'll get into the actual installation of your extruder, and touch on some considerations when setting up for people with disabilities. With the extruder mounted and the die installed, we'll want to cover the topic of clay. Then, we're actually ready to take the plunge! We'll go over the basic use of your extruder and hit on some special considerations when using the extruder in the school studio.

Proceeding Safely

Practicing safety in setting up and using an extruder and dies is important because, if nothing else, it can enhance the pleasure you derive from your extruder work. There are four main aspects of extruder use when you need to be thinking safety: during installation, while using your extruder, when storing the extruder between uses, and keeping the extruder in safe working order. A fifth critical safety area pertains to the precautions to take when making your own extruder and dies. Those are covered in Chapter 5, "Building Your Own Extruder," and Chapter 6, "Making Your Own Dies."

Installation

Mounting an extruder on a tabletop can be done with relative ease, but hanging an extruder on a wall can earn you some pinched fingers or a bump on the head if you don't carefully think through the process. You may also want to attach a length of foam pipe insulation to the handle of your extruder. It saves your hands or chest when pulling or pushing on it, and helps you avoid "ringing your bell" if you bang your head on the handle when standing up.

Moribana trays to 12 inches in width, by Fred Sweet,
Dallas, TX. Photo: John Pollack

Make sure you have all the tools needed close by before your start. The point at which you're straining to hold the extruder against the wall is not the time to grope around for the wrench and the right size socket. If you're installing a commercially manufactured extruder, read through the installation instructions carefully before hanging the extruder. If a drilling template hasn't been provided, you can make your own with a piece of heavy paper (or cardboard) or hold the extruder in position and mark through the holes in the extruder's back plate. Pre-drill the holes and thread a bolt a few turns in each hole. This will make the installation go much more smoothly with less frustration. You can get through all of this by yourself, especially if you have all of your tools within arm's reach. But, why not enlist the aid of a friend? It's much simpler and safer. Lastly, take a look at the area around your extruder. Don't set everything up in such tight quarters that you and a partner can't move around without bumping into each other. Allow a minimum of three feet on each side and in front of your extruder that you keep clutter free.

Safe Use of Your Extruder

Save your back and shoulders—use clay that has been prepared correctly. If you're trying to push hard, stiff clay through a small die, something has to give. If you don't break the extruder, or the die, or pull the extruder off the wall, you'll probably strain your back or arms. Avoid all of this by using good, well-wedged clay, and make sure the extruder is securely attached. Periodically check the pivot points on your extruder. Be sure that the plunger and handle assembly is tightened correctly and properly lubricated. A little turn of the wrench and some light machine oil in the joints are usually all that's needed to keep it in good working order. The middle of an extruding session is not the time to make repairs. Also, watch out for those areas where you can pinch your own, or your helper's, fingers or skin. We do, sometimes, become easily overconfident or distracted.

Storage

When you're not using the extruder, store it with the handle as close to the wall as possible. The handle on some models can be turned to one side. On others, the plunger can rest inside the barrel, allowing the handle to rest next to the front of the extruder. Find the safest way to store your machine so no one gets hurt by running into it.

Maintenance

Undoubtedly, there are those among us who are still using extruders older than the Dead Sea Scrolls. They've never put so much as a drop of oil on their extruder, but it's still pumping out extrusions like the day it was made. Believe me when I say that is the exception, not the norm. These things need lubrication now and then. WD-40 silicone spray, or its equivalent, is like preventive maintenance in a can.

CAUTION: For extruders using the sliding shackle arrangement like the Amaco/Brent and the Bailey, DO NOT lubricate the vertical post or the interior of the shackle. This can cause unexpected and dangerous slipping.

After a great deal of use, the vertical post of shackle-type extruders often collapses into an egg shape. To remedy this, have a welded bead drawn down the sides of the post and regrind to a more circular shape. This will extend the life of the extruder. If you notice clay accumulating above the plunger plate, the plate may be wearing out, and you should cut a new one or order one from your supplier.

Setting Up Your Work Area

Think about where you will be working with your extruder. A little planning and preparation will help you avoid having to take the extruder down and relocate it to a better spot where it could have gone in the first place. When I got my first extruder, I was mostly concerned about the sturdiness of what it was attached to and didn't give much thought to where it was located. It was sticking out into one of the main pathways in our studio and, after banging into it enough, we cleared another space and created "The Extruding Zone."

Installing Your Extruder

Now that you've determined the best location for an extruder in your work area, you have to install it correctly. To rush the installation job, or to use undersized mounting hardware, is to invite disaster.

The three most important success factors in retailing are location, location, and location. The same holds true for your extruder. Where you attach the extruder, relative to your own height and traffic/work flow patterns, is critical to ease of use. You'll need to give equal consideration to the hardware (that is, the bolts or screws) you'll use to attach it, and the strength of the surface to which the extruder will be mounted. Bear in mind that this thing is



Charan Sachar maintains a very orderly studio with a dedicated area for his extruder work.

The Extruding Zone

1. Allow approximately three feet of clear space on the sides and in front of the extruder for you and a helper to work comfortably without feeling cramped together. Avoid locating the extruder along a heavy traffic path to lessen the risk of running into it.
2. If you mount your extruder on a wall or post, locate a table or bench within three to five feet of it where you can lay down the freshly extruded clay. *Before you start extruding*, make sure you have a clear path to that “landing zone.” When you’re working with a heavy, large-diameter hollow form, you’ll be glad to have a place where you can set it down quickly.
3. Set up a place near the extruder to store your dies. If you have the wall space, you might hang the dies to make selection easy. Lacking the wall space, find a cupboard shelf, a roomy drawer, or a sturdy box that can be designated for storing dies, blanks, and die hardware.

heavy when it’s empty and even heavier when loaded with clay. It will be subjected to lots of pulling and tugging, so installing it correctly the first time will save time wasted reinstalling it later, and doing so may also spare you a broken foot or a wrenched back.

Wall Mounting

If you’re mounting your extruder on the wall, it should be at a height where you can operate the handle easily, in a pulling or pushing fashion. North Star recommends mounting its extruder with the top of the barrel about waist high. This position is good because the user has plenty of leverage and can use the arms and upper body safely. The only trouble I’ve encountered by having the extruder at this height is that the extrusions come out fairly low to the floor, and it’s a little awkward for someone helping you to guide the extrusion. If the extruder is mounted a little higher, with the top of the barrel at the middle of your chest, you can still apply plenty of leverage, and you can manage the extrusions in a standing position, which saves the knees.

With the large Bailey System 9 extruder, there is some advantage in mounting it with the top of the barrel a little lower than chest high. You can easily look in the barrel before loading it to see that the die frame is in the position you want. You can also apply plenty of leverage with a pushing motion. The trade-off, however, is that the extrusions come out pretty low, and you or your helper will have to squat or kneel to guide and remove

them. This can be rough on the back, especially with a large, heavy extrusion. We've mounted our Bailey a little higher but it can still be loaded easily. I use a pulling motion to start with and change to a pushing motion as the plunger moves deeper in the barrel. The extrusions are higher off the floor and easier to manage. When they are cut away from the extruder, they can be moved to the table without any bending. Again, save that back and those knees!

Bench-top Mounting

The proper positioning of bench-top extruder models doesn't pose much of a problem. You can readily tell before anchoring it to the table if you're going to be able to operate the extruder comfortably and safely.

Post Mounting

If you can work it out in your workspace, attaching your extruder to a sturdy four-by-four or six-by-six-inch post can be a very convenient arrangement. If the post is against a wall, it brings your extruder out a little and affords more side access for a helper cutting and removing the extrusions. The same holds true if the post is freestanding in the room, which provides even more working space. If you don't have a suitable wall space for your extruder, you may wish to install a post between the surface of your bench and the ceiling. The post should be lag-bolted to the bench and to a ceiling rafter.

Hardware and Structural Considerations

Let's move on to the actual installation of your extruder and the bolts or screws you'll use to attach it. If you've purchased your equipment new, the manufacturer may have provided installation instructions and hardware. Read through the instructions carefully. If you've purchased a commercially manufactured extruder secondhand, you may wish to contact the manufacturer and request a copy of the instructions for your model. Your choice of mounting hardware is determined by two factors: the diameter of the holes in the extruder's back plate and the method you'll use to attach the extruder to the wall, post, or bench. Select bolts or screws that are slightly smaller in diameter than the holes in the back plate. Ideally, you'll use all of the back plate's mounting holes to attach your extruder to the wall.

If you're mounting to a wall covered with drywall, your extruder will have to be attached to the studs behind the drywall. Attaching the equipment to the drywall covering alone, no matter how secure it might seem, is never safe. Most extruders are designed with the holes vertically aligned in the back plate. This allows you to anchor the extruder to the wall studs at two points. Use a magnetic stud finder, available at any hardware store, to find the exact vertical position of the stud to which you will attach

your extruder. The stud is 1½ inches half wide, and you want to drill your mounting holes as close to the center of the stud as possible. Make a mark where your stud finder indicates the presence of a stud in the wall. With a yardstick, draw a perfectly vertical line. Hold your extruder against the wall at the preferred height and aligned with the back plate holes over the line you've drawn. Make a mark on the wall through each of the back plate holes. Lay down the extruder and drill small pilot holes through the marks on the wall. Be sure your drill is finding the stud. If you've missed the stud, probe for it by drilling pilot holes on either side of your vertical line until the drill soundly penetrates wood. Off-center attachments can be as, or more, dangerous than not hitting the stud at all! When you're certain you have found the stud, the extruder can be bolted in place. Rather than mounting your extruder directly to the wall stud, you may wish to bolt it to a mounting board, then attach the mounting board to two or more of the studs. Mounting boards afford an extra measure of attachment strength. This approach is suitable for wall-mounting any extruder, but it's recommended for extruders that have a four-bolt mounting pattern. After your extruder is on the wall, bench, or post, snug down each of the bolts and check to be sure that the extruder is firmly anchored. Check the bolts periodically to be sure they are staying tight.



Extruders mounted on 4×4 posts and 2×4s. Follow the manufacturers instructions carefully when mounting an extruder in your studio.

Setting Up the Extruder for People with Disabilities

Clay is a wonderful medium for self-expression—and for just playing around. But the layout of the ceramics studio and the tools in it can interfere with the enjoyment of clay by those artists who are visually impaired or who use wheelchairs, crutches, or other mobility aids. People with disabilities can use the extruder very effectively and enjoy a great deal of gratification in the process. They can operate the equipment independently, but the truly special benefit of the extruder is that it also affords the person with a disability the opportunity to team up with any other artist, working on an equal plane making extrusions for each other. For instance, a person using a wheelchair can pull down on the extruder handle while another person guides the extrusion. Or the roles can be reversed. The important thing is to mount the extruder and store the dies where everyone can “do their thing” with ease. The extruder may have to be mounted a little lower on the wall, and you may have to allocate more working space around it, but those arrangements shouldn’t pose any special problems in most studios. It’s also important to store the handle of the extruder where there’s no risk of someone backing into it or stumbling over it.

What About the Clay?

Just about any clay can be pushed through an extruder, but the results will vary enormously, depending on the characteristics of each. Clearly some clay bodies are better suited to extruder work than others. As a general rule, any clay in a condition that’s well suited for use on a potter’s wheel will work well in your extruder. A Bailey Standard 9 comes with “Extruding Instructions” that make good points about the clay you put in your extruder: “First and foremost, the clay must be plastic. Clay bodies that lack plasticity will not yield satisfactory results. Water content is also an important consideration. An adequate amount of water must be present in the clay if it’s to pass through the barrel successfully. When determining water content, remember that a tremendous amount of compression takes place within the extruder. Clay that seems too soft and sticky prior to extruding can end up being ideal for extruding because of the compression factor. If the extruded form falls away, it’s likely to be too moist. The clay remaining in the barrel should be removed and wedged over a dry, porous surface to firm it up and wick away excess water.

Experimenting with Different Clays

Experimentation is the only way to determine if your clay body is suited for extruding. Start with your favorite clay, if you have one, and go from there. If you’re a methodical type, you may wish to experiment with different clays and see what happens. With

each of the clays you try, see how coil or handle shapes come out, then set up a hollow die and see what you get. You'll notice that you have more freedom of choice in clay when making coils than you do with the hollow forms.

Generally speaking, more clay types will move through the solid-form die successfully. The hollow-form die, with one or more center pieces and braces obstructing the flow, places more demands on the clay. If the clay is too coarse or "short," it won't heal back together after passing across the hollow-form die hardware. Determining which clay is best for use in your extruder may be approached in much the same way Goldilocks sampled the three bears' porridge. The best clay to use for each of your applications is determined either through careful experimentation or serendipitous discovery.

Using Fresh, Ready-Mixed Clay

When loading your extruder, you might be tempted to avoid wedging, opting to cut a piece from a freshly opened 25-lb. (11-kg) block of clay that just fits in the barrel. With the larger extruders you might want to shove the whole block of clay in the barrel at once. Resist this temptation! Because you just bought it and it's fresh from the bag doesn't mean the moisture and the density of the clay are evenly distributed throughout the entire block. You wouldn't throw a piece of clay on the wheel that wasn't well wedged, and you shouldn't extrude it, either. Always wedge your clay well before loading it into the barrel of your extruder. "Wedge it or warp it"—that's my motto! You might be one of those among us who saves your "good clay" for the wheel, and you mess around with the extruder using your reconstituted, hastily-wedged trimmings. I admit that I did it a lot. I held onto the notion that, while this scrap clay of mine wasn't very good for wheelwork, it must be OK for extruding. But the extruded boxes I made with that stuff usually looked awful compared to those I made with clean, freshly wedged clay. I realized that, of the boxes I made, more of those that warped or cracked were made from the clay that I had not taken the time to wedge properly. In short, use your scrap clay in your extruder, but prepare it as if you were going to use it on a kick wheel.

Using Your Extruder

You have hung your extruder on the wall, a post, or the bench. You have figured out how to attach the dies. You have a big wad of clay to pack in it. You have a cutting wire handy, and you have a nearby place to lay the extrusion after you cut it. Have you given any thought to what you're going to make? In the early going it's best just to make some extrusions, even if you don't know what you're going to make. Try all of your accessory dies or, if you're making your own, cut out a variety of shapes, and see what they make. This should spawn lots of wonderful ideas. Later, knowing what you and your extruder

can make, you'll see the benefits that come from planning out your extruder project with drawings and small-scale models. For now, put the extrusions first. If you're scratching for ideas, you have only to look at the next chapters.

Loading the Clay

All that's left to do is wedge up some moist clay really, really well and load that barrel. Take your time and pack the clay into the barrel as evenly as possible. This is easier if you shape the clay mass to be just slightly smaller than the inside diameter of the barrel.

Making That First Extrusion

The first length of extruded clay will likely come out bent, with an uneven edge. Push it through until it looks like the form is straightening a bit then cut it off cleanly with a cutting wire. If you're operating the extruder by yourself, you might find it awkward to push the handle and guide the extrusion at the same time. This is especially problematic when you're making hollow forms. Generally speaking, unless you're making very small coils with a large extruder, you should be able to move the handle one-handed. If you have to hang on the handle with both hands and all of your body weight, something's wrong. The clay's too stiff or the diameter of the opening in the die isn't suited to the size of the barrel.

Handling the Fresh Extrusion

Now you have to get your extrusion over to the table without too much distortion. If you're working by yourself, and it's a coil you're dealing with, no problem. Just grasp it with both hands and pinch the coil free with the fingers of the higher hand. But hollow forms are a little trickier. Take your cutting wire and make a loop in it that's larger than the diameter of your extrusion. Now slide the loop up from the bottom of the extrusion to the point where you want to cut the extrusion away. Smoothly pull the wire through the clay while holding the bottom of the extrusion with your other hand. As the clay comes free from the extruder, drop the cutting wire and take hold of the clay with both hands, one at the top and one at the bottom. On to the table! If you have a helper, you can approach this differently. As your helper pushes the handle, you can guide the extrusion. Then, while you hold the extrusion lightly in both hands, your helper draws the cutting wire through the clay.

At the Work Table

Most of the technical part is out of the way. Now, you have a choice to make. Are you going to modify the basic shape of the extrusion, or are you going to preserve it pretty much as it came out of the extruder? If you're going to do much in the way of bending or

smashing, do it while the clay is fresh and plastic to avoid cracking and splitting. If you're going to keep the shape, roll it a bit if it's a cylinder or use small boards to true the sides if it's square, hexagonal, or triangular. As the clay firms up, you can handle it more easily and modify the shape at will.

Don't Neglect Your Extruder

With the extrusions on the table and safely under some plastic, you can turn your attention back to the extruder. Experiment to see which is easier: lifting the plunger/handle assembly up and out of the way first, or removing the die holder first. I've tried it both ways. It seems like the plunger comes up easier after the die has been removed. Whichever way you approach it, get the plunger out of the barrel and remove the die. Over the years I've found it easier to get most of the clay out of the barrel and let the rest dry before cleaning. This is true for the die, too. It seems that the dry clay is much easier to remove than the sticky clay. The clay in the barrel should be saved for later use and added to the clay you've cleaned off the die.

The Extruder in the School Studio

How many neglected extruders are hanging on the walls of school ceramics studios around the world just collecting dust, and why? It's doubtful that it's because they just got worn out from overuse. Maybe these extruders were abandoned. At one time, each school had an instructor who championed the cause of extruding, managed to get an extruder into the budget, and actually got some students using it. But he or she left, and now no one has a clue about how to use the darned thing or where those thingamajigs that go on the bottom of it are hiding. Ceramics teachers, does this sound familiar?

The point is that if an extruder is getting regular use in a school studio, it's probably because there's an extruder advocate behind—or next to—it, encouraging students and other instructors to give it a try. As a teacher of students of any age or artistic ability, if you can facilitate a good brainstorming session you can come up with dozens of ideas for extrusions. To stimulate ideas, make a few square, circular, and hexagonal extrusions and pass them out to the students, saying, "What do you think you can make from a shape like that?" Listen carefully and write all of it down for all to see. In just a few minutes you'll have a list like this:

Animals	Boxes	Flutes	Pet houses
Banks	Cars	Dolls	Monsters
Bird feeders	Lantern	Bottles	Candle holders
Planters	Cups	Boats	Bells

The point is that, accepted as they are as the time-honored foundation of the ceramic arts, those little pinch pots or wobbly, wheel-thrown “dog dishes” don’t *have* to be the first things your students make. They can make solid or hollow extrusions and turn them into just about anything they can imagine.

In many school studios, the students work at either the table or the wheels. Where wheel work is given the most emphasis, there may be more students than there are wheels; especially when one or more of the wheels have fallen into disrepair. Students are forced to wait for wheels; usually at the tables, where they halfheartedly occupy themselves with some slab or coil work. Here again, the extruder can give some balance to the studio and to where the students do their work. A couple of extruders can occupy four students and quickly provide them with raw shapes ready to be sculpted. Introduce them to die making and they may leave the ranks of the wheel-minded altogether.

What other studio tool encourages students to pair up and work together? Taking turns at the handle and guiding the extrusion as it comes out, you have the perfect partnership. And the partnership isn’t dissolved until the barrel is cleaned and the dies have been washed!



The extruder is an efficient time-saver that frees up time for you to do more with your creativity. There's no other way to make the shapes the extruder makes as efficiently. A fresh extrusion can be likened to a blank canvas or a sheet of drawing paper—it challenges you to apply your creativity and make something special from it.

In this extensive how-to book, Daryl Baird emphasizes the creative potential that the clay extruder has to offer potters and ceramic artists. Baird updates his authoritative first edition with fresh projects, the latest tips and techniques and a collection of stunning work by artists from around the world. Through hundreds of how-to photos and drawings as well as scores of images of finished work, you'll discover just how versatile and indispensable the extruder can be in your studio.

"Having another gadget doesn't impress me. Having another way to approach the way I make my work, that really moves me! The extruder is a tool, a valuable and challenging one. As it has always been with any tool, the discovery of possibilities for creative design rests in the fertile minds and the hands of each one of us." — John Glick

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