

# The Ken Dettmer Side-draft Forge, Part I

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On these pages, you will find construction notes for building a forge that Ken Dettmer built for himself. His forge is not only highly functional; it also has classic good looks. Figure 1 shows Ken's forge. In figure 2, you see a forge as shown in Joseph Moxon's book entitled "Mechanick Exercises", which was published in 1694!



Figure 1: Ken Dettmer's forge and forging area.

## Design

Before building your forge, you need to decide on the dimensions of it. While the width and depth of the forge are important considerations, the key decision is about the height of the forge table. Have a look at the set-up of Ken's smithy as shown in figure 1. The tops of his forge table, anvil, post vise and power hammer anvil are all approximately at the same height. This makes for a very convenient set-up, especially when handling heavy stock. For your reference, including the hood, Ken's forge is 76½" wide. It is 44" deep and 32" tall. This last dimension includes the table top, which is 3" thick.

It may be best to plan on a certain height. Then, before putting the table top in place, use a piece of plywood instead. Grab some tongs and a piece of iron and see whether the chosen height aids or detracts from the work flow. If you are not comfortable with the chosen height, add or remove a layer of bricks.

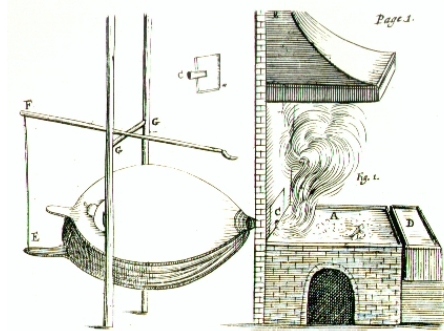


Figure 2: A forge in 1694

Standard bricks are 8" long by 4" wide. As such, it makes sense to consider multiples of 8 for the depth and width of your forge. Add about  $\frac{1}{2}$ " for each mortar joint, giving you the following formula for the width and depth:  $8\frac{1}{2} * n$ , where  $n$  is the number of bricks. Ken's forge is 9 bricks wide, giving  $8\frac{1}{2} * 9 = 76\frac{1}{2}$ ". (The additional  $\frac{1}{2}$ " is for the joint between the forge and the wall.) His forge is 5 bricks deep, giving  $8\frac{1}{2} * 5 - \frac{1}{2} = 42$ ". When it comes to the height, we found that bricks can be anywhere between 2" to 3" tall. The bricks Ken used are about  $2\frac{1}{2}$ " tall. His forge table is 10 bricks tall, giving  $10 * 2\frac{1}{2} - \frac{1}{2} = 29\frac{1}{2}$ ". Add in 3" for the apron and you get a height of about 32".

### Table Base

Figure 3 gives a nice view of the innards of Ken's forge. Notice that all walls are two bricks wide. A schematic layout of the footprint can be found in figure 4. Ken built the arch support from plywood, however, thick layers of insulating foam board glued together will work too. Lest you think that in Ken's shop, bricks float on air. The arch in figure 3 was too tall, and Ken removed it to start over again; see figure 5.

### Fire pot and Blower Assembly

Notice that the space between the arches is open towards the wall. This is where the blower assembly is housed as shown in figures 6, 7 and 9. In figure 7, you see a small table on which the blower is placed. Ken built it to suit his needs.

In the background of figure 6, you see the wiring for the blower. The wire for the electrical box is fed to the back of the forge between the wall and the forge proper. We will talk about wiring later on in the article. For now, you should know that he has a blower switch on both sides of the forge.



Figure 3: Innards of forge

Ken used a Roger Lorance firepot, which is by many considered to be the best firepot available today. The main firepot support structure consists of two T-bars, about 1" by 1 1/4" in size, as shown in figure 6. T-iron cross members are welded in place so that they support the front and back of the firepot. The firepot itself is not welded to the support, in case it needs to be replaced in the future, an unlikely event.

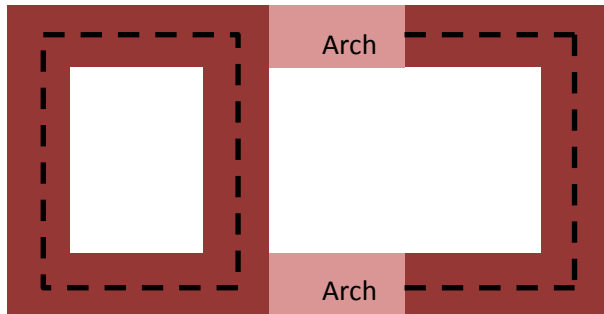


Figure 4: Double wall construction



Figure 5: Starting over again

The firepot support structure is welded to a table top frame which is made from 3" angle iron. The angle iron frame lines the outside of the forge and will eventually become the table top. Notice that Ken's table top butts up to the draft hood base and does not cover the entire width of the forge. To be exact, the angle iron stops short at the length of three bricks, see figure 11 for details. Some people like the top of the firepot to be a flush with the top of the table, some like to have it a little bit below the top. Now is a good time to make this decision.

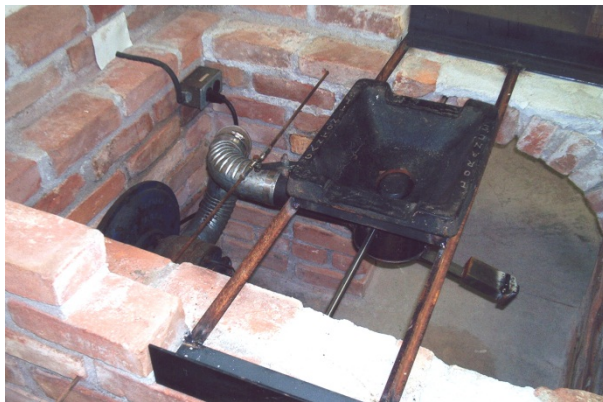


Figure 6: Placement of firepot



Figure 7: Blower placement

On the right side of figure 8, you will notice a lever which is used to operate the clinker breaker. The push/pull knob on the left side of figure 8 is used to operate a butterfly valve which regulates the airflow to the firepot. There are two equivalent levers on the other side of the forge so as to operate it from either side. Now is a good time to drill the holes for the rods that are operated by the levers. The clinker breaker actuating rod will likely need to be welded to extend it on both sides. See figure 7 for an under-the-hood view of the clinker breaker rods.



In figure 9, you see some of the details of the butterfly valve actuating mechanism. Ken built it himself. In the center of figure 9 you see a lever which is attached to the butterfly valve. On the left side of the lever, you see tie rod ends with which the push/pull rods are attached to the lever. On the right side, you will notice a horizontal and vertical bar. The vertical bar acts as a stop, when the butterfly valve is in the closed position. The vertical bar could be used as a friction plate, in case the rods that stick through the walls do not provide enough friction.



Figure 8: Levers for clinker breaker and air-valve



Figure 9: Air-valve assembly

### Table Top

As mentioned earlier, the table top has a frame made partially from 3" angle iron and partially from a single row of bricks. See figure 10 for details. In figure 10, you also see that Ken plugged the hole on the near-side of the forge with lumber. The top of this plug is about 1" shy of the surrounding brick, so as to key the top in. This prevents it from shifting. The archway is plugged with sheet metal. Anything sturdy will work, including corrugated steel. In the back of figure 10, you will notice the routing of the wires through the back brick wall. The hole is covered with sturdy cardboard.

Next, you want to weld up a reinforcing mesh that prevents the concrete from cracking. See figure 11 for details.



Figure 10: Plugged top

Ken decided to build a steel mouth to the opening of the smoke chamber. In figure 11, you see that it butts up right to the firepot. By inference, you can tell that the firepot butts up right to the smoke chamber. The opening of the smoke chamber is 13" wide by 17" tall and is welded from 3" angle iron. It is tack-welded to one of the angle irons that hold the sheet metal in place.

Notice that the opening of the smoke chamber is as about as wide as the firepot is long. The firepot is 14" wide while the opening is just 13" wide.

If you prefer to go with an arched opening, then weld in place a properly bent piece of flat steel. See figure 12 for such an alternative.



Figure 11: Rebar mesh in place



Figure 12: Alternative, arched opening

Since the concrete has a good amount of weight to it, you want to add some temporary supports, especially around the firepot. 2 by 4s cut to length work well. Once everything looks good, it is time to mix up the concrete. SAKRETE concrete mix is a good choice; all you need to do is add water. See figure 13 for the current state of affairs. Notice the wires for the forge blower switches tucked behind the far wall.



Figure 13: Base of forge finished