REQUIREMENTS
FOR THE ESTABLISHMENT
OF A FORGE

1. Introduction

Blacksmithing is an ancient and noble tradition; a useful trade; a respected artistic medium; and a hell of a fun way to spend an afternoon. In each of these capacities it is enjoying a wide popular resurgence.

The amount of interest that people have in blacksmithing is very high. The amount that people are willing to pay for blacksmithing lessons/workshops is just *comical*.

It is cheap to blacksmith. The raw materials used in blacksmithing are cheaper than for most artistic media: steel and fuel. Steel is cheap even when you buy it over-the-counter. A good-sized forge can run for twelve straight hours on thirty bucks worth of fuel.

It is cheap to build a forge. The equipment needed to blacksmith is simple and inexpensive. As with most hobbies it can get complicated and expensive – but only if you let it. Blacksmiths are also famous for making their own equipment as needed.

It is cheap to host a forge. You need liability insurance, but any shop has that. It's great to have access to other metalworking machines, but any shop has that too. You need some space, but not that much; it's very easy to set up a forge when you want it and then store it when you're done.

Anyone can be a blacksmith. All you need is training. Good hands and good eyes are important. But many physical limitations can be overcome. You don't need exceptional strength or fortitude. You just need to keep your wits about you, pay attention to your instructors, and strike while the iron is hot.

This is a proposal for introducing blacksmithing to Artisan's Asylum, and the various ways that could be done.

2. Safety Information

The easy answer to this is: until they've been trained and tested, NOBODY SHOULD BE BLACKSMITHING.

This is much the same as with other tools in the Asylum. Blacksmithing is just a series of tools.

Blacksmithing requires no special clothes, no hazardous chemicals, no fast-moving machines, and no more protection than a pair of safety goggles.

The main danger in blacksmithing is heat. To work steel requires temperatures in excess of two

thousand degrees. However, manipulating superheated metal is not complicated. If done correctly it is as safe as working with Legos.

When using a propane or acetylene forge, blacksmithing is a smoke-free and low-emission process. A properly used gas forge can be operated with no more ventilation than an open window.

Blacksmithing for long periods will generate some heat. In the summertime this can lead to a lot of sweaty hammerers. Running a forge with some air exchange – on a front porch, in a doorway, or near an open window – will cancel out most of the trouble here.

A forge requires fuel. Coal has its admirers, and it is certainly cheap, but it's hard to work with and it needs lots of ventilation. Natural gas works, but only if your shop is rigged for it – I don't think the Asylum is. That leaves propane.

Propane is the most common modern blacksmithing fuel. It's cheap, it's forgiving, it burns clean, and it comes in tanks from the hardware store. It should be stored in a safe space (a little wooden shed with a padlock out behind the shop). That's all.

Any competent blacksmithing instructor will be able to explain the basics of blacksmithing safety in a one-hour lesson. Over the course of four to six lessons of one to two hours each, anyone can be trained well enough that they can blacksmithing on their own.

3. Setting Up A Forge

There are four different set-ups for blacksmithing. They each have their strengths and weaknesses. As is to be expected the more you wish to invest in your forge – including money, space, and person-hours – the more people will be able to forge, and the more options they will have in forging.

A) THE FORGING STATION

This treats blacksmithing like any tool in the shop: it's aways there, and one person can use it at a time. If this station is permanently set up it will take up about as much space as a mill or lathe.

What you will need for this is:

- A small forge
- A small anvil
- A hammer

A small forge can be built fairly easily. All it requires is a metal frame (welded steel), insulation (fire bricks), and a gas/oxygen regulator. Small propane forges can be purchased for about $600 – www.chileforge.com make an excellent product and I have ordered forges through them before.

Even small anvils cost a few hundred bucks. But they are fairly easy to find for free, if you can wait. Hell, I'd be happy to let the Asylum use my anvil. It is older than the United States, but that

doesn't stop me from hitting on it!

As to hammers, I have several that are made especially for blacksmithing. I'd be happy to loan them to the asylum – at least until we can forge some for ourselves!

This equipment could all be stored on a $5 member storage rack, to be set up or put away as needed. When set up it would require about 25 square feet... roughly the same footprint as any machine tool in the shop.

B) THE SMALL FORGE

This is a setup which would allow between 4 and 10 people to blacksmith at the same time. This way the Asylum could teach blacksmithing classes and do so efficiently. The materials used here are very similar to those at a forging station, and can also be stowed when not in use.

- A forge
- Four anvils
- Five hammers
- Five tongs
- Five chisels
- A quench bucket

The forge should be large enough that four small pieces of metal can be in it at the same time, two per side. This is equivalent to the Habanero or Cayenne forges from Chile Forge – between $750 and $1000.

A class of ten people can comfortably blacksmith on four anvils. I've done it many times before. To purchase four new anvils would cost between $400 and $800. But really, getting anvils donated or loaned to the shop should not be that hard.

Each anvil will have to have a stand. A tree-stump works perfectly well. Otherwise stands can be welded up out of stock steel. In either event the anvils can be lined up against a wall when not in use.

For a class of ten people there should be at least five hammers. I recommend one each of the most common designs: Swedish, French, British (English), German (Saxon), Czech (Bohemian). These can be purchased in varying weights, from the 100g “jeweler's” to the 2000g “you are just showing off”. I recommend various weights to suit different projects / arm strengths. Each hammer will cost about $25.

A formal class should have some tongs going around. I'd recommend French Wolf Jaws, also called Universal tongs. 400mm tongs will hold pieces from 1/2” to 2” in diameter. That covers the majority of blacksmithing. Each pair of tongs will cost about $40.

Five chisels of various shapes – round punch, square punch, straight cut, curved cut, cold cut – will provide a variety of options for blacksmiths. Each can be purchased for about $10.

A quench bucket is... a bucket containing water. The bucket should be made of metal. Old kegs work really well. Otherwise a new metal bucket will cost about $20.

Assuming that all these tools were bought new – not bought used, not donated, and not made ourselves – this entire setup would cost about $2000.

It should be noted that, with a simple “forging station,” most of the tools in a “small forge” could be handmade. Likewise it is very common for the making of these tools to be the projects assigned to beginner blacksmiths.

This setup would allow ten people to take classes at a time. Even assuming only one class per month, this entire expense should pay for itself within a year – at the very outside.

C) THE PROFESSIONAL FORGE

This would allow beginners to take classes, intermediates to do their own work, and professionals to do *anything*. This is basically a laundry list of everything a forge *can* contain.

- A two- or three-hose forge
- A small single-hose forge
- Four anvils of various shapes and sizes
- An assortment of stake anvils
- An assortment of smithing hammers, various styles and weights
- Two sledgehammers
- An assortment of tongs
- An assortment of tools, including pliars and blade-flatters
- An assortment of hardie and pritchard tools
- An assortment of hand tools, including chisels and punches
- One or more sets of letter-punches
- A basic assortment of texturing tools
- A large freestanding vise
- A Smithin' Magician
- A large swage block
- A quench bucket with retrieval basket
- An annealing bucket full of vermiculite
- An oil bucket for oil-quenching
- A trough for oil-quenching
- A series of crucibles for casting

A one-hose forge and a two-hose forge will allow for multiple temperature settings. This is useful for larger classes, and especially useful for bladework. The small forge from setup A and the medium forge from setup B would suffice; the largest Chile Forge is a three-hose and costs about $1600. A competent machinist could probably make even the largest of these for about $100 in materials. If that.

Anvils come in many shapes and sizes. Brand-new high-quality anvils cost upwards of a thousand dollars. There is no reason that, with a little patience, we couldn't find a wide assortment of anvil styles either for free or very inexpensively. It'll just take a while.

Stake anvils are small anvils in unusual shapes, mounted at the end of long metal stakes. They are particularly useful for armor-making, which can either be worked hot or cold. These can be hand-forged.

A fully-stocked teaching shop would contain two or three sizes (250g, 500g, 1000g) for each of seven styles of hammer: English, French, German, Czech, Spanish, Swedish, Nordic, Ball-Peen. Call it 20 hammers. Any of which could be handmade from a $5 piece of tool steel and a $3 hammer handle.

A full shop would also contain several sledgehammers, including a 4lb engineer's hammer, a 7lb sledge, a 14lb sledge, and perhaps a 21lb sledge. These are somewhat harder to make, but not terrible complicated – just labor-intensive.

There are a dozen major styles of tongs. It would be nice to have each style in 1/2" and 1", as well as a few smaller and larger. Call it 25 pairs of tongs. In reality this is more than *any blacksmith shop in the world ever*, but hey – while we're dreaming! Every one of these pairs of tongs could be made by students.

Blade-flatters are very useful for swordmaking. Pliars, particularly long-nosed scrolling pliars, are essential for most decorative work. A half-dozen such tools would all be well-used in a professional smithy. All of them could be made by hand.

Hardie and pritchard tools – depending on what kind of anvils we have – will be a great boon to the blacksmith. These include cones, jigs, cutoffs, etc. These are pretty trivial to make; most of them wouldn't even require forging.

Chisels and punches are easy to shape, somewhat harder to properly harden. A rack of 20 or 30 of them, in various shapes, would be easy enough to assemble – and would be *very* well-used.

A set of letter-punches is excellent for signing work and working signs. A 1/2" letter set would be nice. Sizes as small as 1/8" and as large as 4" would most certainly be used. (Let's for the moment ignore the issue of typeface).

Texturing tools are the provenance of the artist and the dedicated (or fraudulent) restorer. While they can be purchased in an amazing variety, there is no real reason why they couldn't be shaped by hand. All that would be required is some TLC. Or a CNC mill :-)

A large freestanding vice is essential for larger bending and clamping, particularly of jigs. I believe the shop already has one. A dedicated forging vice would be appropriate in a bustling smithy.

The Smithin' Magician is a hardie tool designed to allow a blacksmith to perform tasks that usually require either two hands or two people. It is a wonderful tool, not terribly expensive, and comes with many different attachments. It would be trivial to make one, especially using precision machine tools (mill and lathe).

A swage block is a blacksmith's bosom buddy. Two or three blocks of different shapes would be well used. These are usually cast, and so ought to be purchased... but they are often available inexpensively, as they are, to most people, just weird hunks of metal. I recommend one with straight lines, one curviliniear, and one, if possible, "other."

A quench bucket capable of holding at least 15 gallons is necessary for the cooling of thick, architectural pieces (2”x2” or more). A retrieval bucket is a metal grille which sits in the bottom of the bucket and can be pulled up by handle or chain. This prevents dropped pieces from rusting in the bucket until the end of time.

An annealing bucket is just a small metal bucket full of sand, in which metal can cool slowly. Even the current welding shop would benefit from such being available.

A bucket full of oil is necessary for quenching certain tool steels, particularly O1 and laminates. Used motor oil is the quench of choice.

A series of small troughs. This is particularly useful for quenching blades. These can be made by welding together scrap steel. Trivial – but important.

Though it is not technically the purview of the blacksmith, forges are very useful for heating the, ah, *lesser* metals. The shop would certainly benefit from having a casting setup that could bring brass, copper, bronze, aluminum, silver or gold up to pouring temperatures in a matter of minutes. (Iron casting would also be feasible, using the right sort of crucible).

All set up and being used by a half-dozen blacksmiths at a time, this forge would take up an area approximately half the size of the current Asylum welding shop. All put away it could be stored in an area approximately the size of one of the welding booths, including wall-space for hanging.

To purchase all the items on this list *new* would require upwards of five thousand dollars. To make them all – not including the forge or anvils – would require less than five hundred dollars, and several months of concentrated effort / a year of sporadic effort.

The amount of money which could be brought into the Asylum by a dozen dedicated blacksmiths could be significant, even if only membership fees are considered.

The amount of money which could be brought into the Asylum by means of professional blacksmithing lessons is... well... not small!

4) Sample Lessons

Basic Training – four weeks, one two-hour class per week

Basic Toolmaking – everyone will make themselves a pair of tongs, a punch, a chisel, and a hammer – 4 weeks, 2-hour class/wk

Introduction to Knifemaking – students will make a 4-8” blade, suitable for use as a chef's knife, letter-opener, or utility knife. 4-6 weeks.

Intermediate Toolmaking – students can engage in projects including advanced

tong design, small anvil- or swage-forging,

Architectural Blacksmithing – students can make a chair, bench, or table. Length of class depends on whether projects are collaborative or individual

Swordmaking – 'nuff said.

Kinksmithing – a class dedicated to making things for their, um, dungeon. Don't underestimate the overlap between the smiths and the kinksters.

Damascus Steel making – the art of forging different metals – usually tool steels – into beautiful patterns. Could be followed by a decorative or a functional (knife-making) class.

Jewelrysmithing – the art of making small, beautiful pieces of ironwork. Could be traditional (Celtic toques) or modern.

Armor-making – who doesn't need a suit of armor?

Make A Chess Set – this was the most rewarding blacksmithing project I ever undertook. And the most difficult.

...and God but the list goes on!