How to Make a Draw Knife

by **notjustsomeone** on May 31, 2008

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Intro: How to Make a Draw Knife

This instructable demonstrates annealing steal in order to make, in this case, a draw knife from an old file. This process could be used to make just about any kind of cutting tool from any old peice of hardened steel.

In another instructable I recommended these instructions

http://www.woodworkersworkshop.com/cached_files/33092_files/

and then realized I'd never followed them completely. On doing so I have come to the conclusion that they're as usefull as I thought and would continue to recommend them as a simple way to heat treat hardened steel.

step 1: Know what you need before you need it.

Don't take on this project lightly, although this really is rather simple you will need quite a few things and it will take a couple days to finish. And don't get too discouraged if it doesn't work out just right the first time.

Stuff you need:
- about 12 *fire* bricks (they're usually kinda yellow)
DO NOT USE ANY OTHER TYPE OF BRICKS!
THEY EXPLODE!!
- charcoal, get a big bag use the extra for a barbeque
- lighter fluid, it just makes things easier
- an old file, don't use a new one they're usually just some
crappy soft metal covered by a harder one
- a coarse metal file, a grinder will help speed things along
- a cheap hair dryer, you need something to force air into
the "oven" (be careful if you borrow this, I've killed at
least one for sure) you'll need to find a way to secure this
in front of the oven
- a pipe long enough to reach front to back of the oven, 1/2"
steel is best but I used an old aluminum tent pole and it's
lasted through several heatings
- a pair of long pliers or tongs to handle the metal while
heating
- a small sledgehammer, just in case
- sandpaper, at least 80 and 100, the higher you go the better
- a breadpan, or other suitible metal container
- oil to put in the breadpan, I used 30 weight motor oil but
I've read that olive oil works rather well
- some peices of hardwood for the handles, I had some walnut
from an ice strom a few years ago. hickory, maple, oak, etc.
will work
- epoxy for the handles, preferably the slow set type. I've used
gorilla glue and it worked but epoxy's by far superior
- Acetone (a.k.a. fingernail polish remover) you don't need much
- a saw to shape the handles, wood rasps help if you've got them
- an oven, or whatever you can consistantly heat to 450degrees
F. for an hour
- a knife, chisle, or gouge to cut grooves in the handles
- a finish for the handles, I used linseed oil
- a shaprening stone -not completely necessairy

read through the steps carefully, I probablly left something out. Sorry this list is so random I wrote stuff as I remembered it.

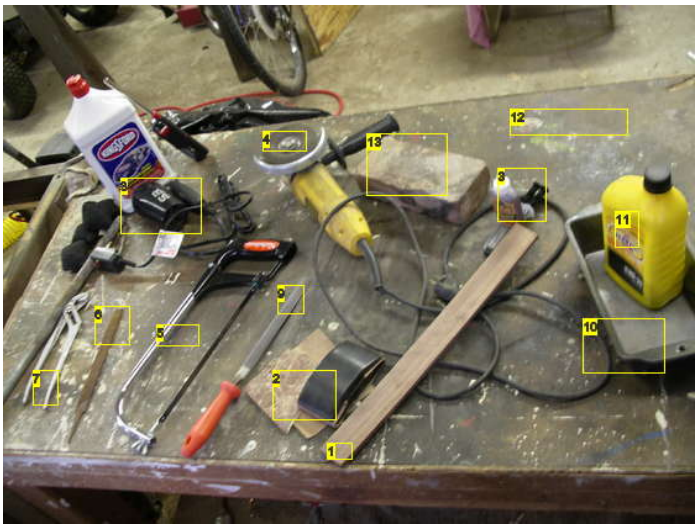

Image Notes
1. Walnut I harvested from a tree downed in a winter storm
2. Sandpaper; 80, 100, and 150. the sanding block really helps.
3. I strongly recommend using epoxy
4. a coarse wheel on a hand grinder makes things much faster
5. If you don't have a grinder a hacksaw can be used to shape the ends of the file
6. old file, ready for a new life
7. long pliers for handling the file while heating, vicegrips aslo work well and provide some extra security while handling the hot metal
8. cheap blowdrier provides the forced air
9. metal file for shaping the cutting edge
10. to quence the knife I used a breadpan. Be careful, there is a chance the oil will burst into flames during quenching.
11. clean motor oil, don't use leftover stuff from your car. olive oil is good substitute
12. all the stuff listed and not pictured can go here.
13. fire bricks are usually yellowish in color. I personally salvaged these from a 1920's fireplace that had to be destroyed, if you do this take only the ones directly exposed to heat. DO NOT USE ANY OTHER TYPE OF BRICKS.

step 2: Start a Fire

First make your oven with the fire bricks.

Again let me stress the importance of using bricks specifically made and tempored for use with fire. Other brick types are porous and often contain air pockets, which when heated cause the brick to explode, sending hot brick fragments, burning coals, and your red hot peice of metal flying in all directions.

Make the bottom with four bricks, use two for each side laid edge down on the bottom bricks. use one more for the back, same as the sides. The top will be put on after the fire is started, lay the remaining three bricks on the sides, make sure to leave a gap of about 1/2" at the back of the oven. The pipe goes in the bottom of the oven centered and about an inch from the back, this helps evenly distribute the airflow.
Once you have the charcoal burning, make sure the coals at the front are burning well or the fire won't heat evenly, go ahead and put the top bricks in place and turn on the blowdrier.
Once it gets hot, glowing brightly, put some more charcoal in.

Image Notes
1. it helps to leave just a bit a space between the bottom bricks for the pipe to sit in

Image Notes
1. about an inch from the back

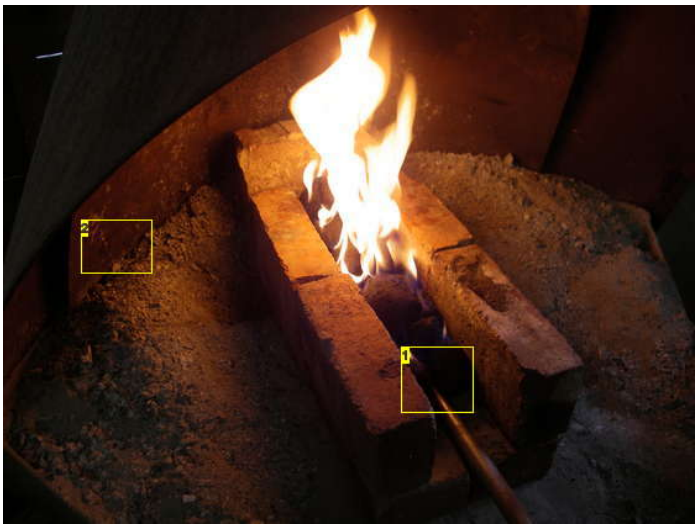

Image Notes
1. make sure this area is burning the same as the back before you force air into the oven
2. I did this in a fireplace. Don't use this unless you can contain the oven, burning embers will shoot out and can catch the surrounding area on fire.

Image Notes
1. This is BAD. also this was my first method of fixing the hairdrier in place. I should note the one pictured died after this use.
2. make sure the air is being blown into the oven and the pipe

Image Notes
1. A much more stable and reliable method of fixing the hairdrier in place, at least for me, was pipe clamps.

Image Notes
1. this is a good, hot fire

step 3: Annealing

In this step you're going to take the hardness out of the file to make it easier to work with.
Now that you've got the oven well heated, take off one or two top bricks (I suggest using thick gloves like those for welding) and put the file into the center of the coals, then add some more charcoal on top of the file.
Watch the file, when it turns bright red turn off the hairdrier and let the fire burn out. Leave the file in the oven until it is cool enough to pick up with your hand. This will take hours.
If the file comes out warped, the oven cooled unevenly but it's an easy fix. Start up another fire just as before. This time when the file turns an even red pluck it out and straighten it with that small sledgehammer I suggested you have. You don't have too much time to do this, if it cools and gets too hard before you get it straight throw it back into the fire and let it get red again. When you're done straightening it, turn off the hairdrier and put the file back into the oven to cool.

Image Notes
1. it's better to have charcoal to within an inch of the opening of the oven.

Image Notes
1. place the file in the center of the fire

Image Notes
1. adding more charcoal over the file speeds up it's heating and also heats it more evenly

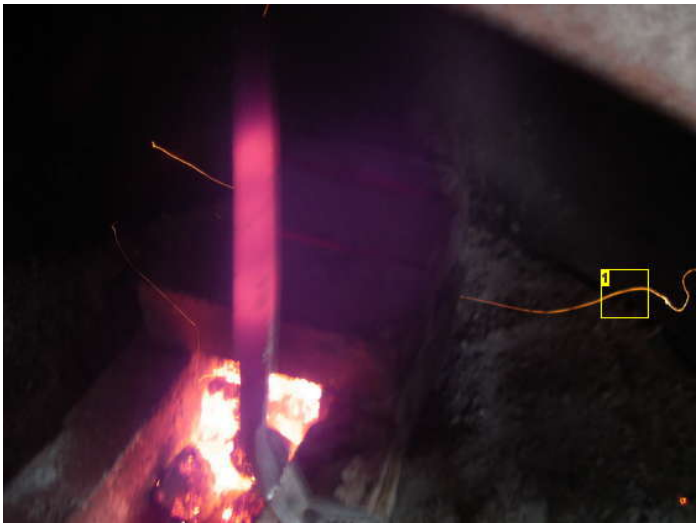

Image Notes
1. beware of flying embers

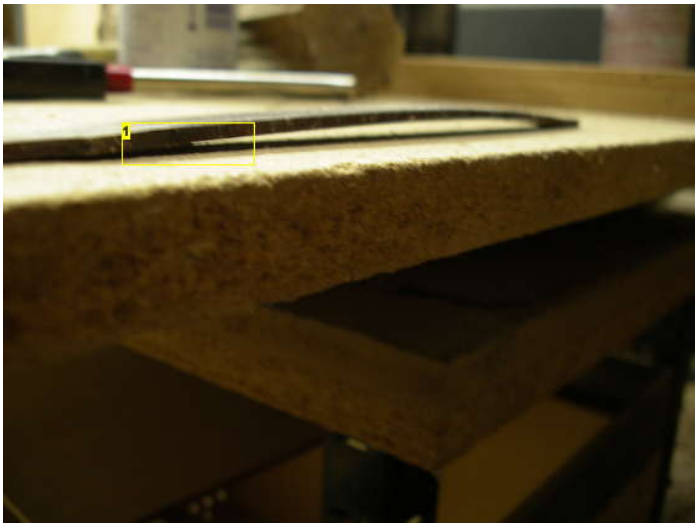

Image Notes
1. after the initial heating and cooling, my file came out warped.

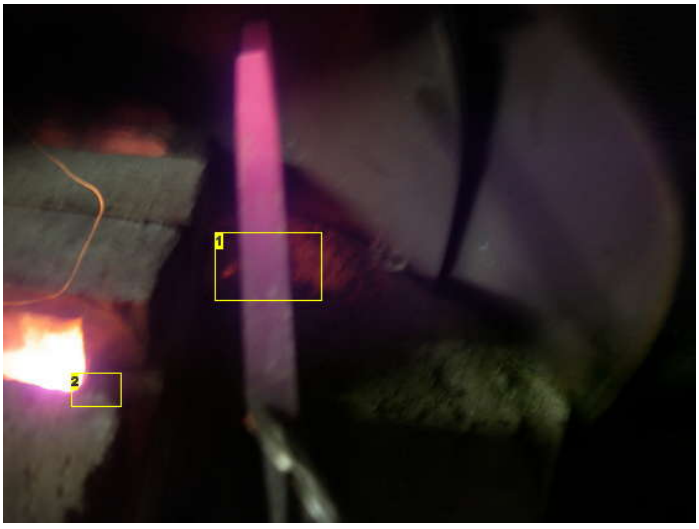

Image Notes
1. the bright color fades quickly, if you need more than two minutes to fix the warp put it back in the oven until bright red again.
2. I found the easiest way to place and remove the file was to remove a top brick

Image Notes
1. To fix any warping a small sledgehammer is useful. Of course you could just use he biggest hammer you have
2. You'll need something flat to hammer on. I don't have an anvil but for some reason I do have a peice of railroad.

Image Notes
1. much straighter than it was
2. remember that this is extremely hot. be careful and don't drop it on anything important

step 4: Transform that peice of metal

First mark out and cut the file so both ends are the same.
I used a hand grinder but a bench grinder or hacksaw or even a metal file will work.

Second, if you had to straighten out the file you'll probablly want to get rid of the dimples that were made by the hammer. Use the grinder or file to grind down the surface until you can't tell where the dimples are. Don't worry about removing the grooves from the old file, they are deeper than you'd think and give your knife some character.

After that is done, if it was needed, you'll rough out the cutting area. Twenty to twenty-five degrees is a good angle for the knife edge. You can use the grinder to remove material initally but you should use a coarse metal file to make sure the edge is uniform in angle and flat.

Once the knife edge is roughed out, though it may be quite sharp now, sand the whole thing. Start with a coarse grit like 60 or 80 and work up to at least 150 for a smooth looking tool. You could go all the way up to 600grit if you wanted to use it as a mirror, but that's up to you.

Image Notes
1. dimples made from straightening with the hammer.

Image Notes
1. fix it firmly in a vise before shaping the end. Clamping it onto the table may be easier for filing the cutting edge

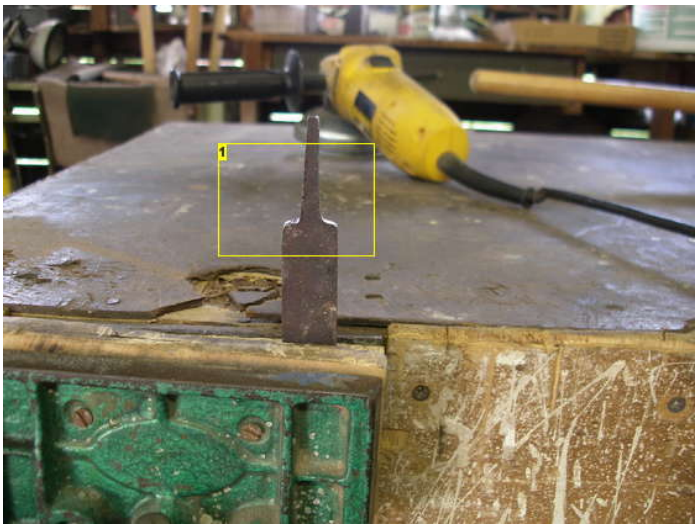

Image Notes
1. it doesn't need to be pretty, nobody's going to see it. don't bother to sand it down either the rough edges will help the epoxy grip it.

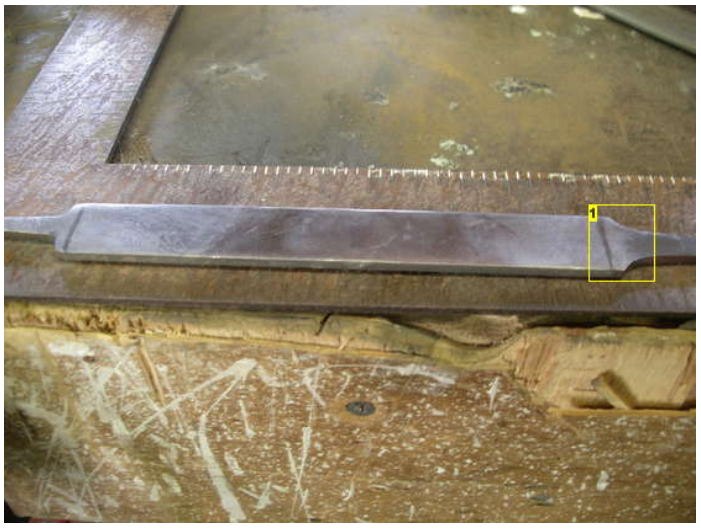

Image Notes
1. measure where you want the handles and where the cutting edge is going to be

Image Notes
1. be careful when shaping the cutting edge or you'll end up with mistakes

step 5: Hardening

To reharden your knife you're going to fire it again and then quench it in oil.

Heat the oven as before and watch the knife. It will go through stages of dark red colors and then become a bright cherry red. When it reaches this take it quickly and dip it in back first, so the last part to go in is the knife edge. Dip it in and out of the oil about ten times and then leave it in the oil until cool enough to handle.
Make sure the oil is close to the oven so you don't loose any heat in the transfer.

After it cools clean it and sand it back to a bright finish. Once sanded wipe it down and clean it with acetone.

Image Notes
1. make sure the knife will fit in your pan before you need to quench it

Image Notes
1. Danger! Extremely Flammable!

step 6: Tempering

This step will take the brittleness out of the knife, keeping the edge sharp.
The easiest way to do this is with a conventional oven.

Set the oven at 425degrees F.
Once up to 425 place the knife in the center of the oven, cutting edge up. This can be easily done by using some wire (a wire coat hanger works well) wrapped around the ends and formed into hooks at the other to hang from the oven rack.
Leave the knife in the oven at 425 for an hour and fifteen minutes. Then turn the oven off but leave the knife in for another thrity minutes. After that take it out and let it air cool somewhere.
The cutting area after this heating should be a yellowish straw color.

Once tempered finish the knife by sharpening it on a stone. I got mine for about $15 from a hardware store.

Image Notes
1. this temperature is important. If you're not sure about your oven's temp get a cheap oven thermometer and hang it where the knife will go. be careful when removing it, it should be 425 degrees.

Image Notes
1. center of the oven, blade facing up

Image Notes
1. one side is coarse and one fine. Read any instructions if you buy one some need oil when sharpeng others recommend water and clean it after you use it.

step 7: Handles

To finish off the project add your handles.

Cut four small slabs the length you want your handles and half the thickness. Use a knife, chisel, or gouge to make a groove in each peice. A trick I found usefull is to cut the groove in one slap half the thickness of the file and so it is a good fit. Then hold the two peices together and pour sawdust down into the groove. place this on your workbench and carefully lift off the peice with the groove. outline the sawdust with a pencil and check to make sure both peices are the same, then just cut out where you marked.

Once the grooves are finished, epoxy the handles to the knife. Clean the ends with acetone again before you glue them. As you can see in the pictures I used gorilla glue for this project. It really doesn't work well for this, but it does work. Actually one handle didn't set well and I ended up using epoxy to reattach it. So do yourself a favor and go to the hardware store and get epoxy specifically for tool handles.

Once the handles are on and the epoxy is completely set shape the handles with a knife, a wood rasp is also good for this process. Watch out for the knife, it's sharp. Once you get the handles shaped sand them and then finish them. I would suggest using tung oil or linseed oil instead of polyethylene, but that's just a personal preferance.
Remember to oil you knife occasoinally to prevent rust.

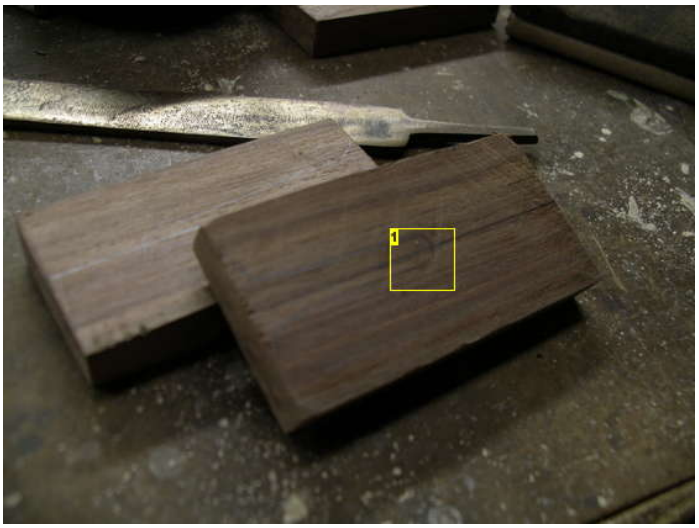

Image Notes
1. find the center and mark out where the groove will be

Image Notes
1. the grooves don't have to be a tight fit, the epoxy will ensure they stay in place

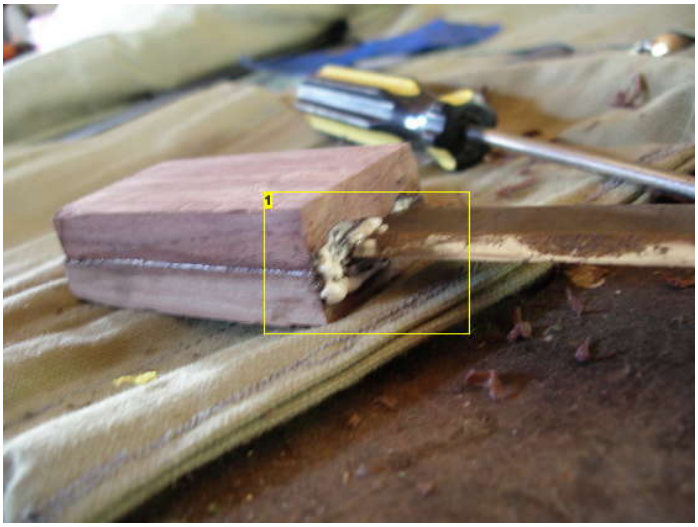

Image Notes
1. this is why gorilla glue is bad, it expands. while this helps get uniform adhesion it aslo gets all over your knife and takes a while to clean it off.

Image Notes
1. rough formed, still needs to be sanded.

Image Notes
1. this is the first coat. several additional applications followed.
2. With linseed oil don't worry about getting it on the knife, it's actually very good for preventing rust.

3. you can also use the raw stuff but it takes a lot longer to dry

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Comments

34 comments **Add Comment**

Ron-Ray says: Sep 29, 2009. 10:42 AM **REPLY**

I see you used a single bevel (\ ). Is this common for a draw knife?
(As opposed to the double-bevel of a standard knife ?)
Also, what if the angle of the bevel was decreased? - To about 15-18º or so... ?
I just don't know anything about draw knives and needed to ask.

notjustsomeone says: Oct 1, 2009. 8:26 PM **REPLY**

A single bevel is standard, and essential, for a good draw knife. It would be extremely difficult to achieve the controlled, shallow, planing cut of a typical drawknife with a double-beveled edge. The angle of chisel edged (single-bevel) blades is generally between 20 and 30 degrees. I've never made or used one with a finer angle than that, so can't speak from experience. However, a shallow angled blade should be weaker -has less material- at the cutting edge, making it more prone to chipping and also may develop wear patterns that receded further into the blade's edge, which would require reshaping the entire blade rather than simply resharpening it.

-a typical knife edge > cuts through things, a chisel edged blade _\ shaves material off of things.

Ron-Ray says: Oct 2, 2009. 3:13 PM **REPLY**

It's so obvious, I should have thought of it before asking.
But I guess you never realize the true perspective of your foot until it's in your mouth.....
Thank you for your excellent demonstration (instructable) and your time answering a dumb question. ;-)
Ron

Ron-Ray says: Sep 29, 2009. 10:43 AM **REPLY**

Very helpful instructions!
Thanks!

pumpkinman says: Dec 9, 2008. 12:17 PM **REPLY**

what if you make a small forge of clay, will it too explode? perhaps a clay pot, I've heard you can burn thermite in them.

oldanvilyoungsmith says: Sep 29, 2009. 7:43 AM **REPLY**

if you used good quality clay and got out all air bubbles it would be unlikely to explode. if you built it you would need to let it dry completly before building a fire in it, and heat it slowly, letting it cook (walk away while it's cooking, if it does explode you don;t want to be near)

Dorkfish92 says: Jun 2, 2008. 6:54 PM **REPLY**

Great instructable! I made one knife for my grandpa as a practice knife a few months aga. (more for show, it's aluminum). I will definately try this when I get a chance!

z-man6233 says: Aug 23, 2009. 12:06 PM **REPLY**

uhh aluminum is extremely soft and unheat treTABLE

Dorkfish92 says: Aug 23, 2009. 5:41 PM **REPLY**

Right, that's why I said it's more for show. It's the only metal scrap I had sitting around anyways.

z-man6233 says: Aug 23, 2009. 6:31 PM **REPLY**

Oh ok

iloveairsoftstuff says: May 6, 2009. 6:54 AM **REPLY**

ive also heard this called a fleshing knife, used to take the fat off of animal hides

The Red Button says: Dec 27, 2008. 4:28 PM **REPLY**

want to draw a knife with only 2 items?:

pencil, paper :P

lucazoid says: Feb 11, 2009. 8:14 PM **REPLY**

lolers

Cai says: Jun 4, 2008. 7:12 PM **REPLY**

This is perhaps the easiest and simplest description of how to make knives in general; excellent work. I know very little about making them, but do know a lot about them in general. My only question would be, will a file keep a good edge and be sharpened easily? The reason some of the best knives are made out of high carbon steel is because it is hard enough to keep an edge but easy enough to sharpen...then again that is cooking knives. How has your blade kept its edge and have you had to sharpen it? If so, how well did that go. Any other ideas on types of metals that would keep a good edge but would easily be sharpened? I mean in the form of scraps of metal...old files are great, but who knows what the heck they're made out of! Excuse my ignorance, knowlege would be great!

aerohydro says: Jun 12, 2008. 3:58 AM **REPLY**

Files are excellent steel for simple cutting tools. They are generally a plain, high-carbon steel without other alloying elements. Another source of steel for tools is old springs from vehicles or other machinery.

notjustsomeone says: Jun 6, 2008. 11:44 AM **REPLY**

So far my drawknife has kept very sharp, even after using it to shape hardwoods like walnut. I've only had to sharpen it once, so far, and that is shown in the instructable. Because of the chisel-edge it was actually easier than most knives to sharpen to a fine edge. As for other scraps, the only things I can suggest from experience are old lawnmower blades and leafsprings off anything 50's or 60's.

aerohydro says: Jun 12, 2008. 3:55 AM **REPLY**

This is a great tutorial. It teaches basic, functional heat treating of simple steels, without being more technical than needed for the hobbyist. Once you've got this far, it's not much more work to forge some tangs for proper drawknife handles.

awkrin says: Jun 3, 2008. 10:02 AM **REPLY**

looks cool. I don't know too much about metal, blades and all of that..

anyway, my woodwork teacher was right: most people misspell the chisel, or maybe it was just a typo

Basta says: Jun 3, 2008. 7:44 AM **REPLY**

Great instructable! You definitely show a wide knowledge of the subject, and everything is detailed enough to actually follow the instructions without extra guesswork. You're also entirely coherent, which is a rarity. We need more instructables like this, especially those on knife making. At the time of this posting my own knife making guide is in the sidebar, check it out if you like.

I'd make one recommendation: in the hardening process, you determined the critical temperature by looking at the color of the metal--while this is fine, I'd suggest using a magnet. At its hardening temperature steel becomes nonmagnetic, so if you hold the magnet to the blade and it doesn't stick, you're ready for quenching. It's just a reasonably foolproof method that has worked well for me in the past.

Good work!

--Basta

Mr. Rig It says: Jun 1, 2008. 4:31 PM **REPLY**

Cool idea and great use of material. I am pretty sure I know what a draw knife is. Isn't it used sort of like a planer? You draw it to you with both hands taking on thin layers of wood?

notjustsomeone says: Jun 2, 2008. 10:22 PM **REPLY**

Exactly. With this kind of straight-handled type you can pull (or draw) it towards you or if you're working on an end or somthing you can push it as well. But ya, it works very much like a plane, without being quite so boring.

Mr. Rig It says: Jun 2, 2008. 11:17 PM **REPLY**

It is a really good instructable.

Mikey D says: Jun 1, 2008. 7:11 PM **REPLY**

Excellent idea!

It is too bad that gone are the times where we could let students make knives in shop class. What a great motivational tool!

I especially liked the tempering section. Way back in the late 70's we did it with a torch and watched for the "straw" color to come up. (The 70's? Oh my gosh I'm OLD!!!)

Great job!

notjustsomeone says: Jun 2, 2008. 10:16 PM **REPLY**

I'll have to try the torch method sometime, that sounds useful since an oven isn't always available. You should try get around the whole "knives are dangerous and my kid's not allowed to do that" mantra by making a chisle or gouge and stressing the confidence and self worth that comes from making and using your own tools. I know, wishful thinking.. good luck with that.

abbabibble2 says: Jun 2, 2008. 10:16 AM **REPLY**

Great idea, good build, but there's one thing i must stress.
DO NOT USE BRIQUETTES for metalworking. The chemicals and sulphur and other additives in the briquettes can impart impurities to the steel. Go for the lump charcoals or make your own.

notjustsomeone says: Jun 2, 2008. 10:08 PM **REPLY**

Ya, since I did this I've been reading a lot about metalworking on the internet, the next time I need to make something I'm deffinately going to make my own charcoal. Thanks for the tip.

Weissensteinburg says: Jun 2, 2008. 7:16 PM **REPLY**

Very cool..nice, simple instructions.

gmoon says: Jun 2, 2008. 6:37 AM **REPLY**

I'm not sure I'd want to do this...when you can buy one fairly inexpensively. plus I already have my grandfathers drawknife.

But the metalworking (the bulk of this 'ible) is superb! Love it!

chuckr44 says: Jun 2, 2008. 10:32 AM **REPLY**

Yes, but it's fun to learn how to do things yourself, instead of depending on someone else, whose quality may be dubious.

As for the cost of new draw knives, I priced them out last year. New ones start at $30 and go up from there.

gmoon says: Jun 2, 2008. 1:04 PM **REPLY**

No doubt, I completely agree--just the drawknife wouldn't be *my* personal choice. I've got some nice toolmaking books, and I'd pick something else.

Then again, a drawknife isn't a complex tool, so it's probably a great first project for many...

explosivemaker says: Jun 1, 2008. 11:50 PM **REPLY**

thats a neat idea.....

thewoodcarver says: Jun 1, 2008. 9:28 PM **REPLY**

I have made smaller ones and carving knives out of old straight razors and planer / joiner blades (reshape them on lapadary wheels) ..this is very well done wish I had a shop still but it is used for storage .. I use auto body bondo for the handles it works well and if it comes apart super glue will stick to it and hold forever

bumpus says: Jun 1, 2008. 6:04 PM **REPLY**

excellent instructable, this shoulda been featured

Tool Using Animal says:
Jun 1, 2008. 4:56 PM **REPLY**

Very, very good, there are a few spelling errors I'd suggest you fix up, but an outstanding instructable.