Railway Line Anvil

by aerohydro on June 1, 2007

Table of Contents

intro: Railway Line Anvil

This Instructable describes how I made a small anvil for light forging work. It is made from a lump of railway line standing on end, welded to a plate of steel and firmly mounted to a hardwood stump.

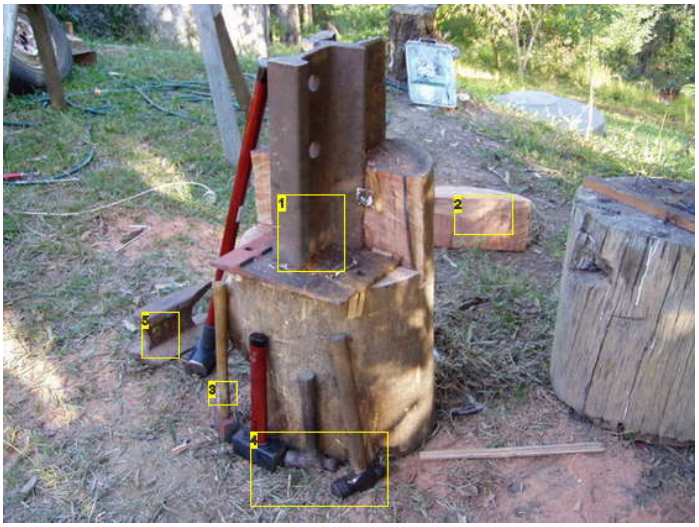


Image Notes
1. The finished anvil
2. The chunk of timber I cut out.
3. hatchet
4. forging hammers
5. light gauge rail

step 1: Technological Ingredients

Tools required:

Something to abrade steel with, I used a file and an angle grinder

A welder of some variety. I used a basic stick welder, though a MIG would have been easier to use.

Wood butchering equipment. I used a chainsaw and a hatchet but there are many other tools that could work

Drill - electric or otherwise

Heavy hammer

File card

Ring spanner

Chipping hammer

Personal Protective Equipment

Welding mask with correct filter glass - wear this when welding, obviously.

Protective clothing - Wear tough, close fitting, non flammable clothing when working with hot, heavy, sharp or fast moving things.

Protective footwear - This should be strong and non-flammable so they stop your feet being crushed and burned as badly.

Safety Glasses - May as well wear these the whole time, it's amazing how often stuff bounces off them.

Ear muffs - or other hearing protection. Wear when using loud tools.

Materials:

A lump of railway line or other heavy steel section. Finding this can be difficult if you don't want to spend too much cash but scrap metal dealers are a possibility. Looking around railway tracks may be dangerous and illegal depending on where you live.

A piece of heavy steel plate. This spreads the impact loads over a larger area of the wooden stand, increasing the effectiveness of the anvil somewhat. It also makes it easier to mount. I used a railway fish plate which is convenient because it already has mounting holes.

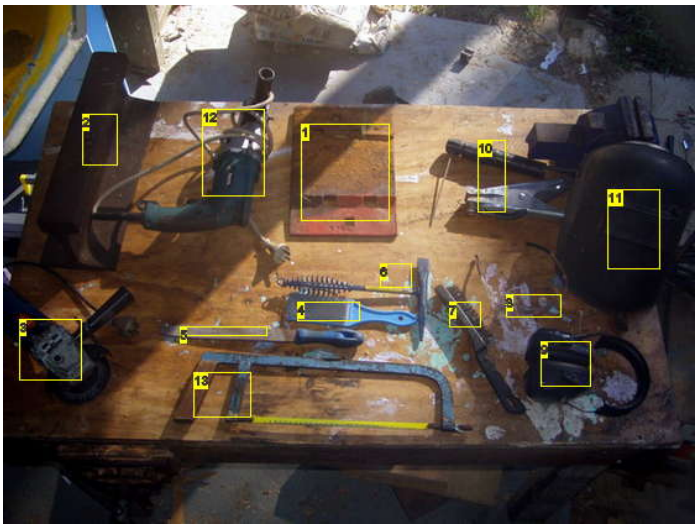


Image Notes
1. Railway fish plate
2. chunk of railway line
3. angle grinder
4. file card
5. mill bastard
6. chipping hammer
7. wire brush
8. safety glasses
9. Ear muffs
10. welder
11. welding mask
12. drill
13. Hacksaw - I don't think I used this

step 2: Prepare the parts

Since I was using recycled steel I needed to remove the surface rust in order to achieve a reasonable weld. I used a chipping hammer and wire brush to remove the loose stuff, then the angle grinder to get back to bare metal. I marked an outline of the rail section onto the plate with a marker to show me what area to concentrate on.

On the end of the railway line to be welded I ground a heavy chamfer to aid weld penetration. When the parts were ground clean I test fitted them, removing more steel where necessary to get a close fit.

Image Notes
1. clamping system should be secure for safety

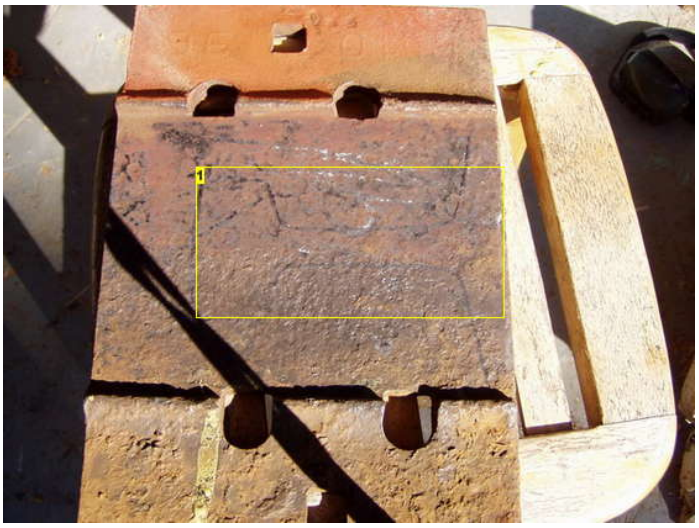


Image Notes
1. You can just see the rail section outline here.

step 3: Tack and weld

With the parts fitted together, I attached the earth clamp of my welder to a cleaned patch of the rail and tack welded the parts together. I then used the chipping hammer to remove the weld slag and checked that everything was still well fitted. When I was happy with it I proceeded to stitch weld the parts together fully.

Welding stuff this heavy properly would probably require more power than can be supplied by a basic 240v AC single phase stick welder. In this application however, the strength of the weld is not particularly crucial. I didn't have any electrodes other than these quite small ones on hand, so I invented the trick you see here in the second picture. It worked well enough for me, but I'm not a welder.

Image Notes
1. tack

Image Notes
1. clothes peg
2. two electrodes

step 4: Stumping

To work properly, the anvil needs to be mounted on something heavy and resilient. Other criteria might include availability and theoretical portability as was the case for me. I used a section of a Flooded Gum (*Eucalyptus grandis*) log into which I cut a step. To do this I mostly used a chainsaw, and fine tuned the fit to the anvil with a hatchet.

WARNING: Chainsaws are really really dangerous and like to bite. Don't chop any limbs off or anything please.

Other combinations of concrete, steel and timber would also work well as an anvil stand. A good mounting will increase the effectiveness of the anvil and reduce noise.

I used some small pieces of steel plate and coach screws to attach the rail to the upright section of the stump. I also hammered steel spikes through the holes in the fish plate and bent them over.

Behind the new anvil on the top of the stump, I cut a notch and hammered in a small piece of light gauge rail. This provides more useful edges and surfaces on which to hit things.

I have not used this anvil extensively yet and I'm sure it will be modified later on. It does however seem to be pretty useful, and is good value for the effort required to make it.

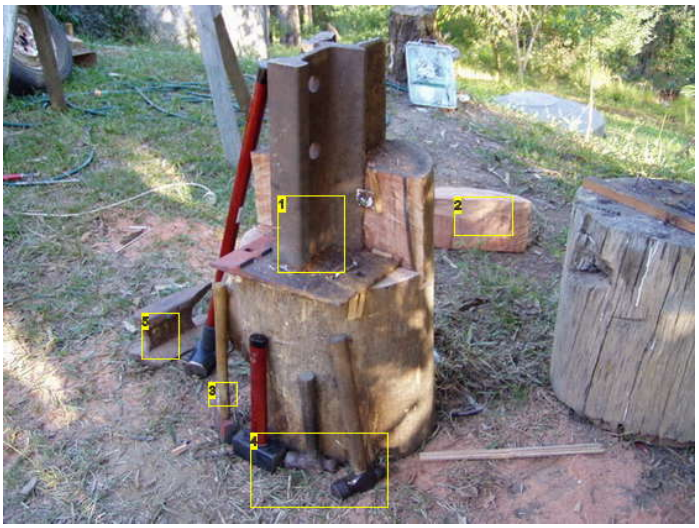


Image Notes
1. The finished anvil
2. The chunk of timber I cut out.
3. hatchet

4. forging hammers
5. light gauge rail

Image Notes
1. Edges here are ground to various radii and other shapes to use as fullers etc.

Image Notes
1. this works like a bottom fuller

step 5: New ideas

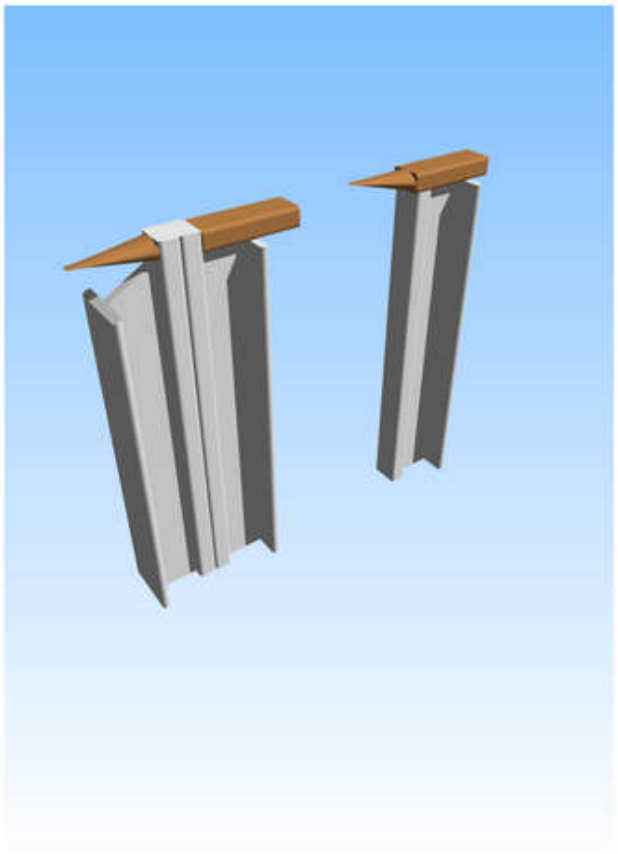
Well I've used this anvil a bit now and its limitations have caught up with me. The pictures below show a possible design, again using railway line. Ignore the shape of the horn, I'm still getting used to this CAD software. If you can't make sense of it, it's two sections of rail, on end, with the upper flanges together. This gives me a very well supported forging face of aout 70x80mm, just from the ends of the upper flanges. The brown parts would be welded on to give addtional area for straightening and bending. These would not stand up to heavy blows but would not really need to.

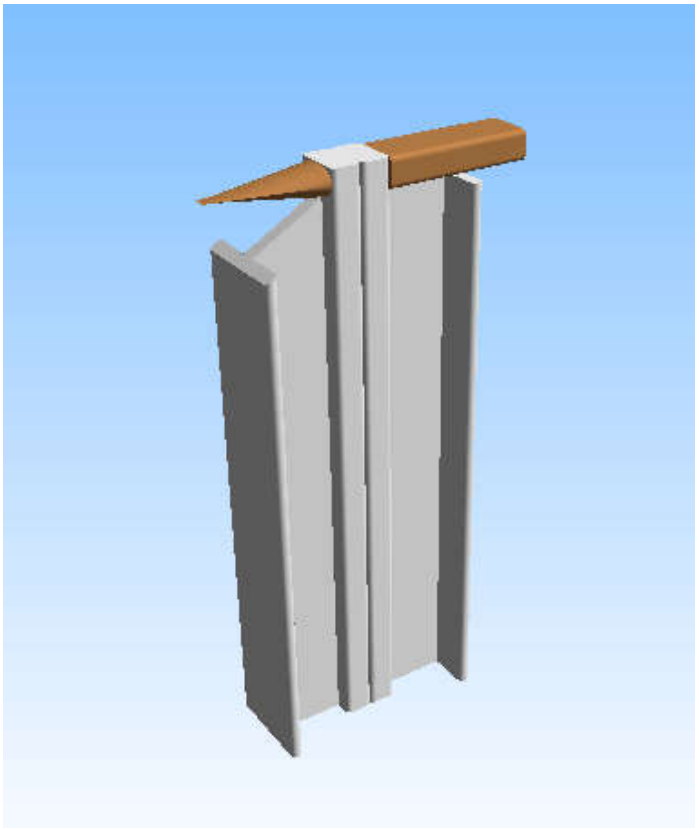
This design was derived from discussions on the Anvilfire discussion forum, with input from a number of members including the Anvilfire Guru. See the archived messages here, click on June 1 - 7, 2007 log.

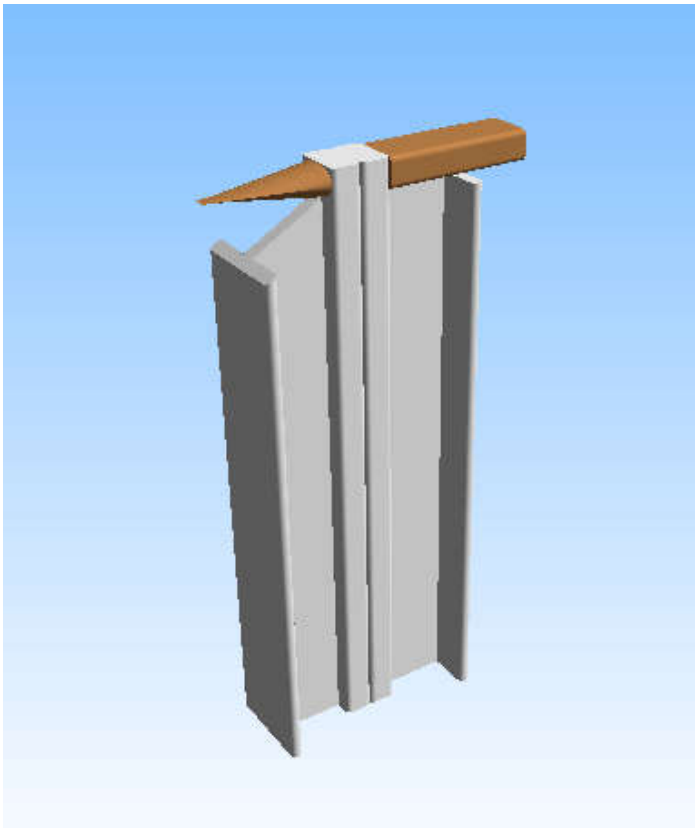
Would halving the length of the upright sections reduce performance considerably? the second picture has tentative dimensions.
Any other comments?

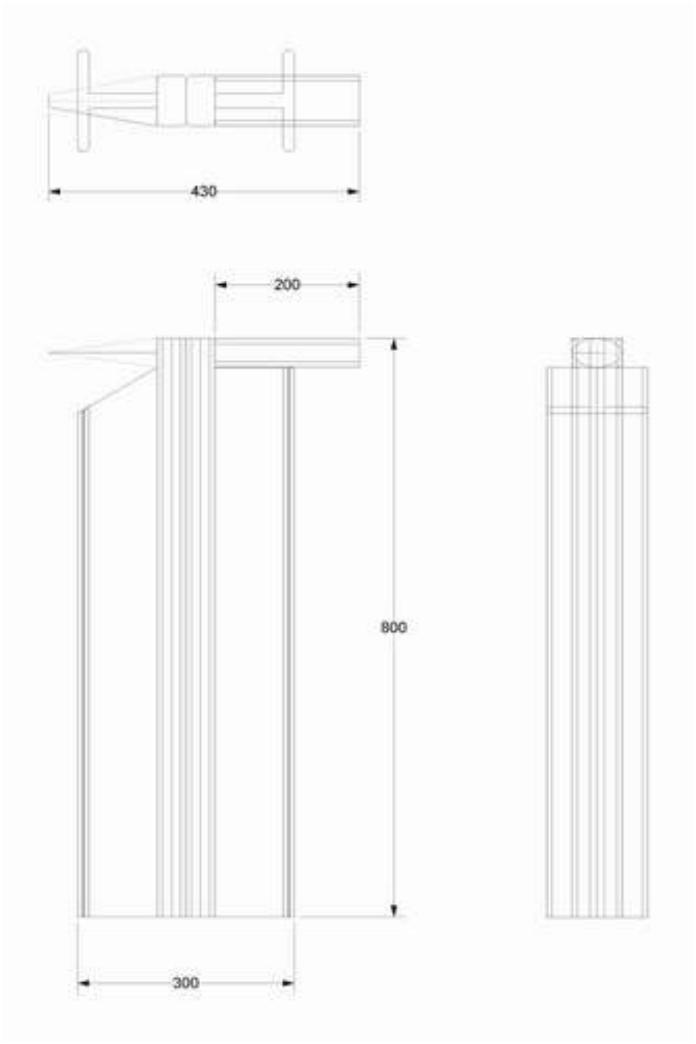
ANOTHER EDIT
I added another drawing showing a second possibilty, involving a single upright section with a continuous face/horn piece welded on. Which is better?

AND ANOTHER EDIT
I decidd to go with the heavier option. No photos of construction unfortunately. The parts were cut using an oxygen/acetylene cutting torch and partially finished with an angle grinder. Welding was done with a MIG welder. My future holds quite a few more hours with an angle grinder.








430
200
800
300

Related Instructables

Make a Small Blacksmith's Forge by Vendigroth

Making a Simple and Easy Charcoal/ Coal Forge by acer73

Forge a Knife by jtobako

2-day $20-$50 Blacksmithing Forge by katanakreater

Waste-Oil Forge and Foundry by notjustsomeone

Metal Petals! by abbabibble2

Coke forge and sword! by [Tom]

5 Things to Do with Hot Steel, and Ideas for More. by Vendigroth

Comments

26 comments **Add Comment**

scafool says: Oct 27, 2008. 2:55 PM **REPLY**

We used to be able to get rail cut offs like that. We used to just burn some holes in the lower flanges or gring notches into them so we could spike them down to a stump. The top were the train wheels rode is really hard.

thedog458 says: Apr 23, 2008. 2:03 AM **REPLY**

hey how did you make the little anvil because I'm 13 and do I a lot of smiting but I only need a small anvil and in not to wiling to use my money to by a anvil when I have railway line to use so how did you make it?

necropolian says: Oct 1, 2008. 10:09 PM **REPLY**

aha...another teenager who likes smithing... this makes me happy...what do you make, specifically?
i only transform iron nails into little swords yet, and i just use the head of a big broken hammer.
a big piece of solid iron will always work.

thedog458 says: Oct 2, 2008. 2:29 AM **REPLY**

i make daggers and sword but i cant any more because its summer and it will be way to hot where i live to make any thing with fire.

necropolian says: Oct 2, 2008. 7:17 AM **REPLY**

ahh oke. it's just, i don't know anyone around here that likes smithing and wants to practice it so i was interested. i'm now have to ask my parents permission to make a forge...

thedog458 says: Oct 24, 2008. 10:13 PM **REPLY**

well i would show you mine but i pulled it down im curntly makeing a new 1

aerohydro says: Apr 24, 2008. 8:20 PM **REPLY**

I didn't make it, I got it cut by someone using an oxy-acetylene torch. It's pretty hopeless for forging on, far too light. It might be ok for very fine work though. What sort of work are you doing?

thedog458 says: Apr 26, 2008. 6:02 AM **REPLY**

not to heavy stuff just light stuff and sum medium.thanks anyway

aerohydro says: Apr 27, 2008. 12:17 AM **REPLY**

How big is the piece of railway line you're using? If it's at least 30cm or so long you would probably be best off mounting it as is shown in the Instructable. The end of the line is not a very big striking area, but it gives you a reasonably solid striking surface. An anvil horn is useful, but you can do plenty of interesting work with just a simple flat striking surface and a hammer.

panstar1 says: Oct 9, 2008. 8:52 PM **REPLY**

I made something like this but for mounting a vice ,I just bolted everything together by drilling and tapping thought. but I used a large flywheel from a large diesal engine as a foot & just drilled and tapped bolt holes to bolt the vice down. I never welded anything b/c I never had a wielder large enough at the time. But I have a older 250 amp stick wielder now but I never really needed to weld it anyway b/c I actually broke the vice & it still held together the only other thing I did was mount a grinder on it for general sharping and grinding .

pappyld04 says: Dec 1, 2007. 10:15 PM **REPLY**

The small pieces of iron you seek are always available if you are willing to ask a worker. With all the theft that happens here I just wait until they are work on something nearby then go and ask. At times I've spotted what I needed and other times I asked if they knew of it or have even walked the tracks until I found one. I'm sure this is the best way to abtain this iron since they throw it away into the ditches. As long as you don't get greedy or steal it they are just like you and I. They tinker at home also!!!

CanDo says: Jun 4, 2007. 7:35 PM **REPLY**

Cool, but where do you get the railway line to begin with?

bryanr01 says: Sep 7, 2007. 11:10 AM **REPLY**

There was an old Sante Fe rail line not far from my house that was unused for decades. A few years ago, the RR gave the land to the city, for use as a bike trial and to connect several parks. You might check your local Parks & Recreation department to see if there are plans like this in the works. Eeven though they tore out all the rail lines a few years ago, I have found dozens of spikes along the trail, which I use as practice blacksmithing projects.

aerohydro says: Jun 4, 2007. 7:17 PM **REPLY**

I'll quote step 2:

A lump of railway line or other heavy steel section. Finding this can be difficult if you don't want to spend too much cash but scrap metal dealers are a possibility. Looking around railway tracks may be dangerous and illegal depending on where you live.

I was given this piece, and I know of a fair few people with bits and pieces lying around. Ask around and you'll come up with something.

CanDo says: Jun 4, 2007. 8:54 PM **REPLY**

Haha, I just look at pictures :)

I see.... Well, I'll be on the lookout then.

aerohydro says: Jun 4, 2007. 7:18 PM **REPLY**

Oops I meant to say step 1

paparush says: Jul 8, 2007. 12:07 AM **REPLY**

Nice job! How did you cut the 'horn' on the smaller anvil? My 12 year old does blacksmithing and we use a 1' section of rail as his 'anvil', but he's been wanting a horn, but I'm not ready to shell out $$. But maybe we can mod the rail that he currrently has.

aerohydro says: Jul 9, 2007. 3:55 AM **REPLY**

I didn't make that little thing but it was cut using an oxygen/acetylene torch. It really needs a lot more shaping to be useful as an actual horn. I have found anvils of this type to be next to worthless for forging, unless you are working with wire or other small stock. With some shaping and polishing it would probably be excellent for jewellery making. There are lots of possible alternatives to a proper anvil, some are better than others. I've improved mine since I made this Instructable, check out the final step.

ironsmiter says: Jun 6, 2007. 8:35 AM **REPLY**

Nice looking project.

From the title, i thought you were gonna show the "construction" of the "light gauge rail" anvil.

Are the holes in the baseplate spaced so you can rotate the anvil 90degree, and us the rail face for normal forging?

One suggestion... Do a full weld on the anvil-to-plate connection.
That's gonna take a TON of pounding, and those couple of tack welds aren't gonna hold up for long, once you start swinging heavier hammers.
Your 240 stick welder should do fine for a full weld, and no need for a bigger electrode, or even your <shudder> double rod. All that is needed is patience. It's already tacked, so no worries there. Just go in and lay down 2-3 inches of bead at a time, right in the crack. Use the smaller electrode, and adjust the machine properly. That's probably all you'll need, as the two parts are now one piece of metal. The only basic difference between using skinny electrodes, and big fat electrodes is how much metal you can lay down before having to start a new electrode.

aerohydro says: Jun 6, 2007. 5:02 PM **REPLY**

You mean the little thing on the ground in the above photo? That was just roughly torch cut a few years ago, not by me. It's not very useful for anything much.

I didn't actually show any photos of the final welds, but I assure you there is a good bit more than just those tacks you see. Still probably not up to a particularly high standard though. I know it can't be correct, but what is the actual reason using two electrodes together would cause a problem? Slag inclusions or something? Also would it have been better to pre-heat the parts before welding?

I won't be using the face for forging. Using the end like this gives a small working space but is more efficient. Less of the hammering effort is wasted flexing and distoring the anvil since there is more solid mass directly under the hammer blows this way.

Thanks for the comments.

hanelyp says: Jun 12, 2007. 9:14 PM **REPLY**

What rod did you use? From the photo and slag comment I'm guessing 7018. I'd probably do that job using an 1/8in 6010 or 6011 rod at around 100A. Very little slag problem. And very penetrating, so no need for the chamfer for that job.
About MIG, it's fast, clean, and very easy to produce beautiful welds with little strength.
Not a professional welder, just took a class in the subject.

Vendigroth says: Jun 7, 2007. 6:03 AM **REPLY**

plenty of disused rails 'round here, tho i don't want to go out as midnight and dig one up.....
i've been meaning to get a bigger anvil for ages, and might make one like this, but i've got one even simpler in mind....
Coincidentally, i was browsing anvilfire.com and came across this

aerohydro says: Jun 7, 2007. 6:06 AM **REPLY**

What is your current anvil? I'm happy with this for the time being but a bigger piece of steel is always better.

Vendigroth says: Jun 7, 2007. 7:12 AM **REPLY**

my current anvil is a large hammer (4 or 5 pounds), laid on its side
shudder
but i've got plns for a slightly different one, again using a hammer
I'll put up an instructable when it's done, but i can see that i'm going to have to get myself a piece of railway track at some point in the near future...

aerohydro says: Jun 7, 2007. 7:01 AM **REPLY**

I share your shudder. I hope that hammer's mounted to something nice and solid and that you work with small section steel. My main forging hammer is 1.8kg, about 4 lb. I'm thinking you might get better performance using the face of the hammer rather than the side, but maybe that's just too small of a target.

Sgt.Waffles says: Jun 4, 2007. 9:03 PM **REPLY**

I just use a section of I-beam on a steel table. Good instructable though.