

DEAFPOOL

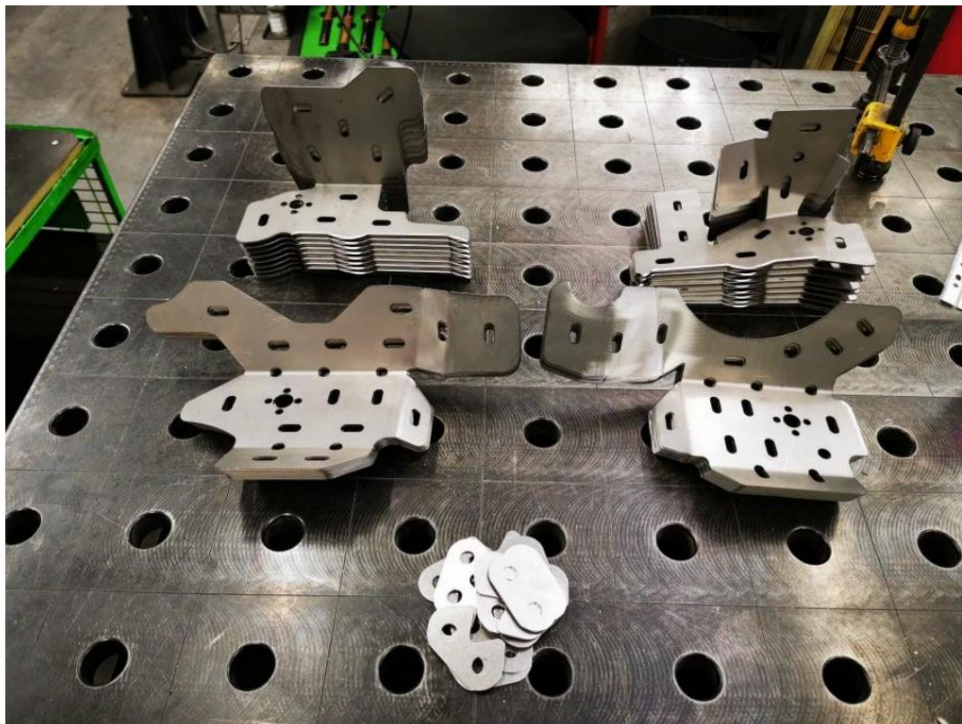
Straßensymphonie

Instructions for repairing an E46 rear axle

This guide refers to the repair panels from Deafpool Street Symphony (www.deafpool.de). The 6-piece set is available from me and was developed by me because the conventional and well-known sheets were not large enough to cover my damages and cracks.

As you can see, the sheets are naturally similar to standard products. However, they offer some technical features:

- More space is used, the sheets are larger
- Additional angles are stiffened
- Welding points on the sleeve holder, because this is exactly the critical point



Preparation

To prepare for the rear axle repair, the following work must be carried out:

- Removing the trunk linings, carpets
- Remove the rear seat, preferably also remove the rear carpet and the front seats so that you can get in and out cleanly
- Remove rear side panels ("door panels")
- Optional: Removal of doors, seals and windows
- Removing the Hi-Fi / Radio / Navi / etc rear left
- Remove battery
- Fixing the cable harnesses at a safe distance from the welding points
- Optional: Remove the complete parcel shelf and speakers, then run the wiring harnesses there
- Removing the rear axle
- Removing the tank
- Removal of rear apron
- Removal of all lines and cables from the underbody
- Remove the insulation mats in the rear seat recess and in the trunk (hot air gun and spatula, then wire brush (cordless screwdriver or better Flex)
- Remove the sealing compound between the domes of the rear axle, the longitudinal beams for the Impact absorber and trunk panel -> The cleaner, the better the weld
- > The more you dismantle, the better you can work, ideally you only have the pure Body there
- > Also in the interior: The more you dismantle, the more protection you need. Work with leather or cotton blankets to protect against flying sparks, watch your entryways, and stick fender protectors over them so welding hoses, etc., don't drag over your panels.

Structure of the rear axle construction

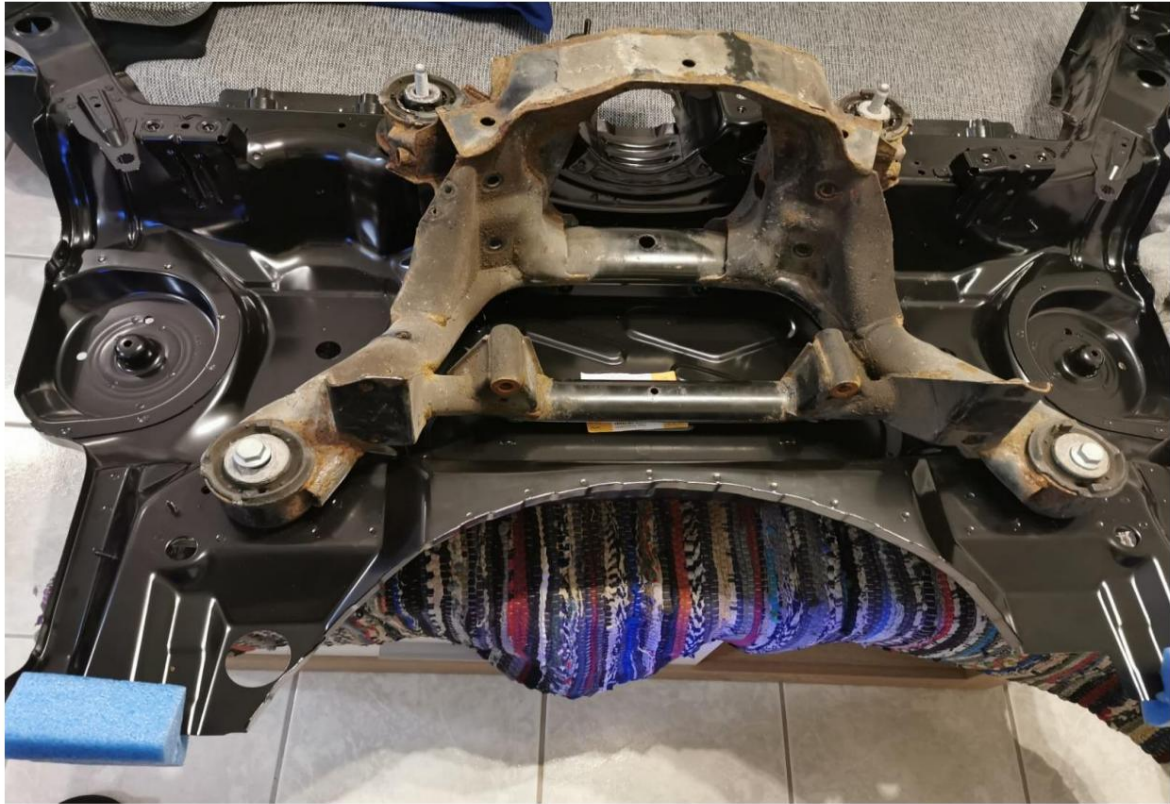
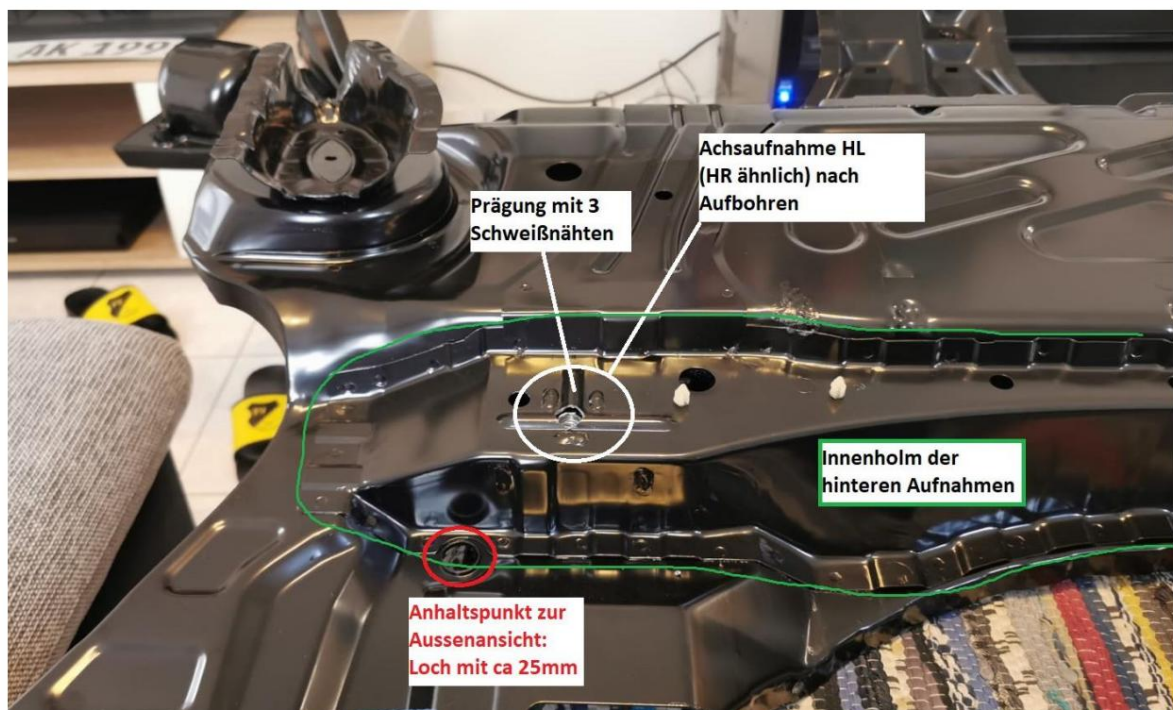
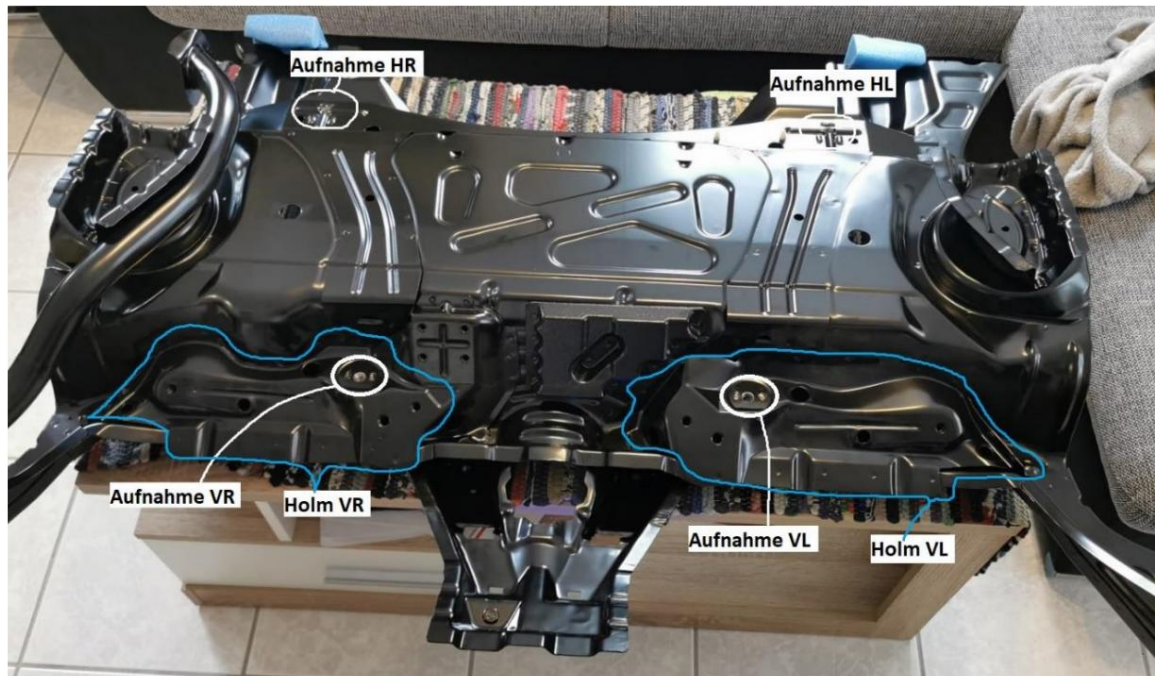


Image above: View from below / outside for orientation with bolted axle carrier

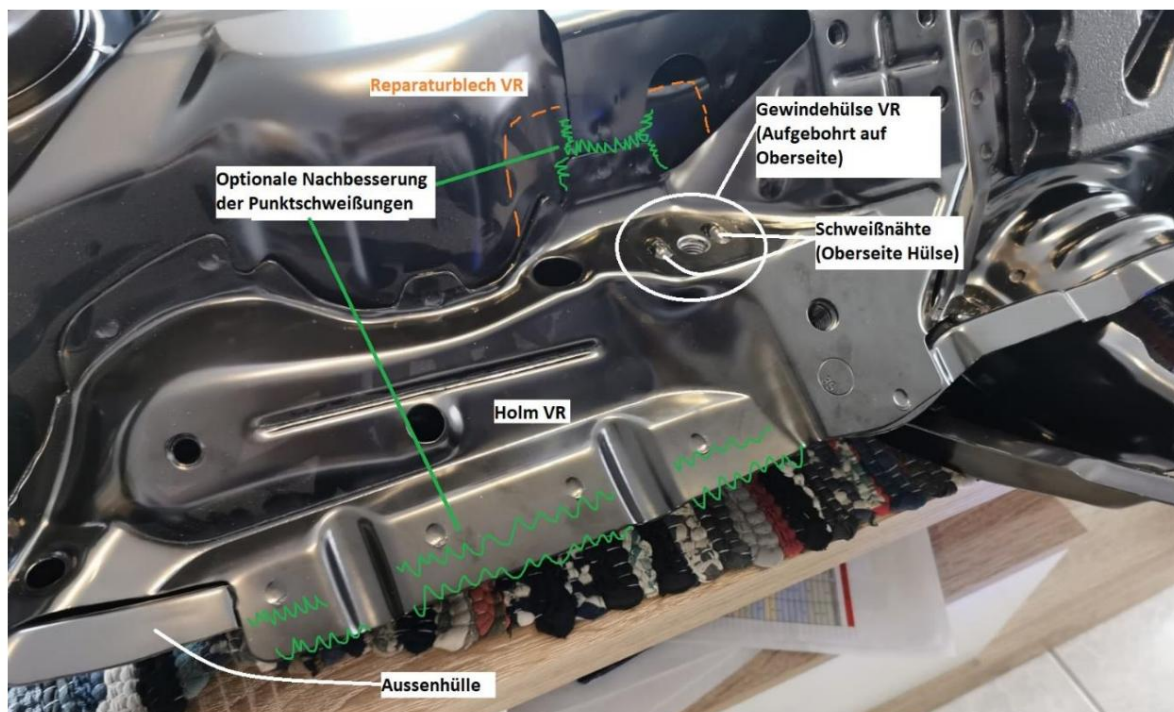
Picture below: View from inside, looking from the trunk lid without cover plate, curve at the bottom right is the connection to the spare wheel well

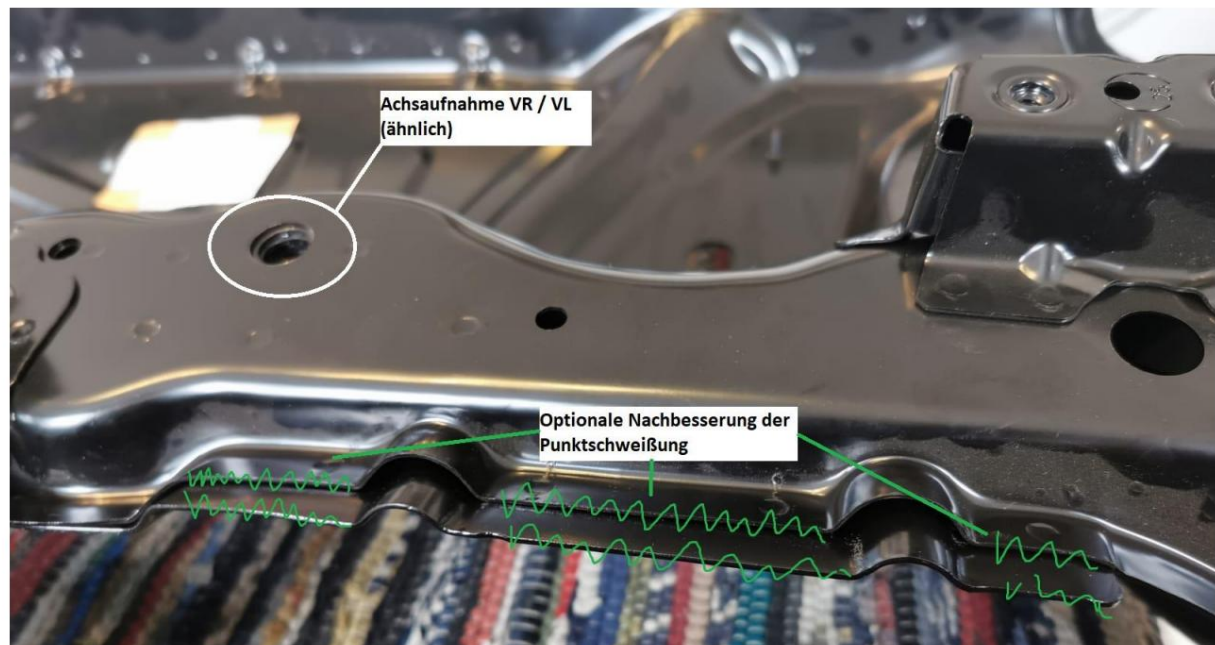




Picture above: Inside, view from the front (passenger compartment), the blue marked pillars are located under the rear seat bench (and the sheet metal layer below)

Picture below: Close-up, still inside with same view direction





Picture above: Outside of the front pillars, spot is easily recognizable on the vehicle underbody

Picture below: The same spot on the vehicle





Picture above: Split inner pillar (rear pillar, in front of spare wheel well) and top of the threaded sleeve

Picture below: inner spar, connection of the threaded sleeve (screwing point of the rear axle)





Picture above: Split outer pillar (front pillar, under rear seat bench) and top of the threaded sleeve

Picture below: inner spar, connection of the threaded sleeve (screwing point of the rear axle)



Once everything is dismantled, we begin:

- Get a 50cm round steel bar with a 10mm diameter, sharpen it on one side and build a punch out of it.

- Insert it from below (outside) through the four axle mounts (threaded sleeves) and center punch the

Sheet metal from the inside

- 8mm drill bit, shorten until only 1-2cm of side cutting edge remains below the tip, weld it to the round bar, grind off the weld seam, and use it to drill through the threaded sleeves. See image.

Page 9.

ÿ This ensures that you can drill perfectly positioned holes through the sheet metal with the can drill. Alternatively, you can buy a short drill bit and use it with

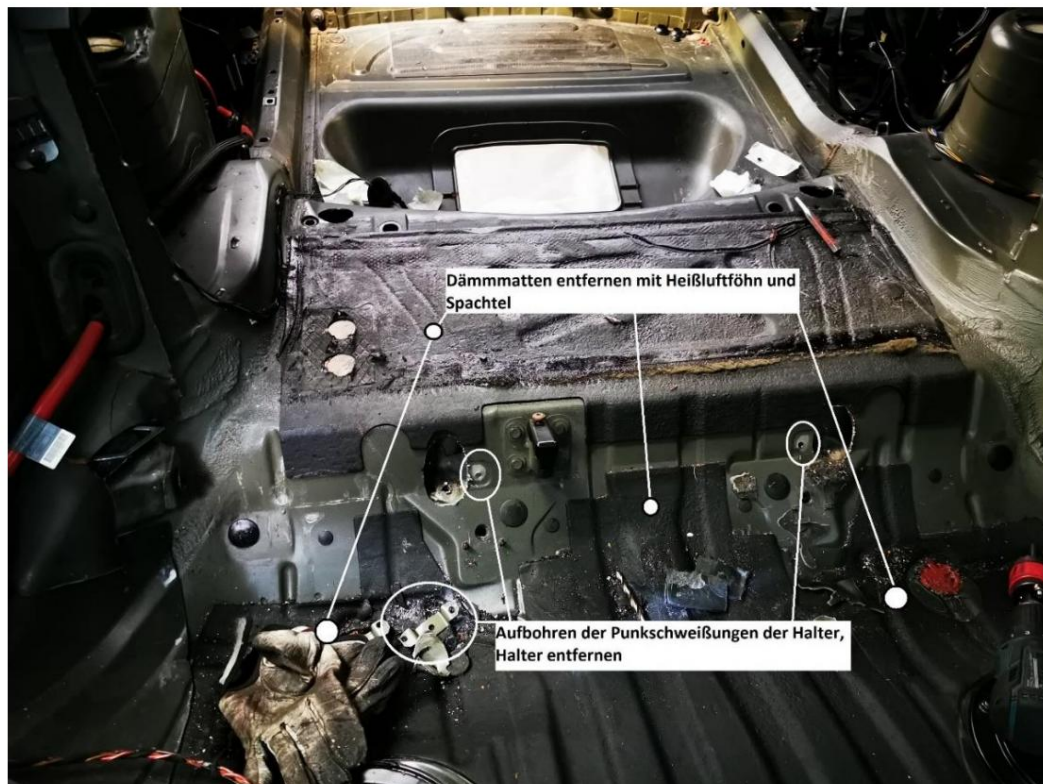
This will prevent damage to the threaded sleeve and will not weaken the

Screw connection between the axle and the chassis. Alternatively, you can also buy extremely long drill bits. The thinner they are, the lower the chance of damaging the thread.

- Now you have the four holes in the interior, and you can use a 44mm drill bit to drill through the first sheet metal layer from the interior to access the upper mount for the threaded sleeves. 44mm is sufficient for most rear axle cross members (which are usually 42mm) and provides enough space for welding.

- Pierces only the first sheet metal shell

- You should now see the upper welds of the sleeve



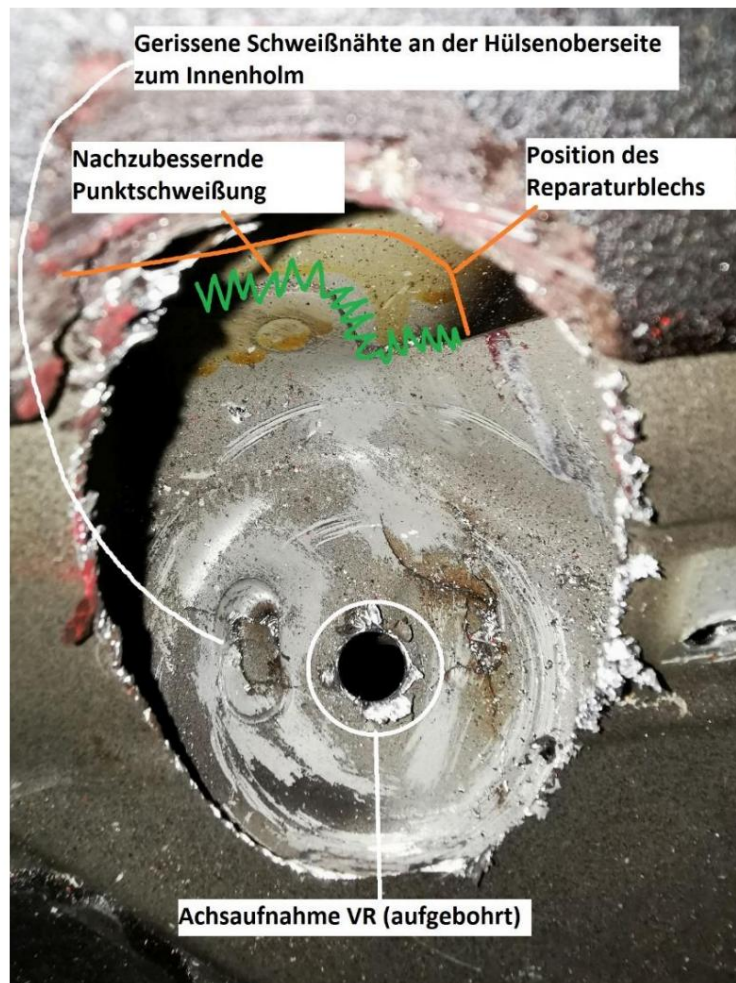
Picture above: Removing the small sheet metal holders, drilling out the pre-drilled holes of the Rear axle mounts with the can drill



Picture above: Rear mounts after drilling with the visible embossing



Image above: Extended drill bit with a long side cutting edge. Should be shortened to prevent the side cutting edges from damaging the threaded sleeve/thread of the chuck. Alternatively, use a drill bit with a smaller diameter.

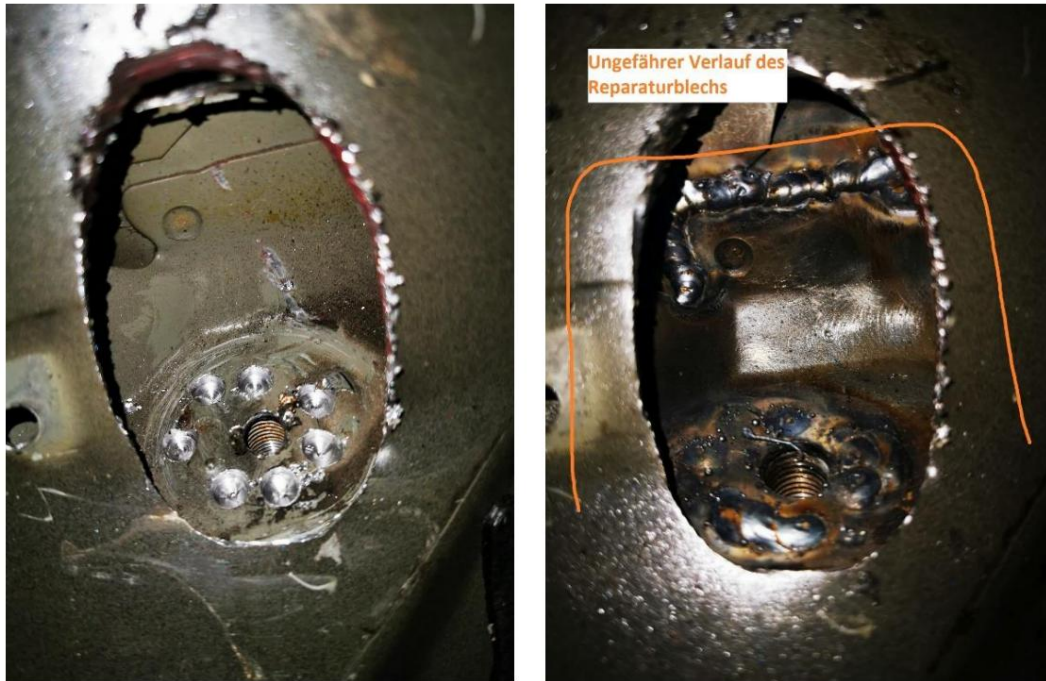


Picture above: Front shots in the rear seat recess with visible cracks

- Depending on how damaged/torn they are: mill out and rebuild or simply bolt circle Punch, drill through (later: re-weld with real current (longer spotting))

-> Insert a small screw into the hole of the sleeve to protect the thread from splashes

Before welding, however, assess the remaining condition first! (This list is not in chronological order; prepare everything before you start welding!)



Picture left top: Drilling the hole circle through the spar plate onto the sleeve

Top right image: Weld the holes shut with the right amount of electricity; optionally, weld the inner spar to the outside, where the repair sheet runs and provides additional support!

Picture below: Exterior view of the front spars (here: VR)



- Now, using a wire brush on an angle grinder (a drill takes too long), expose the entire axle mount and floor panels. Protip: Wear a jacket, long leather welding gloves, and a protective shield.

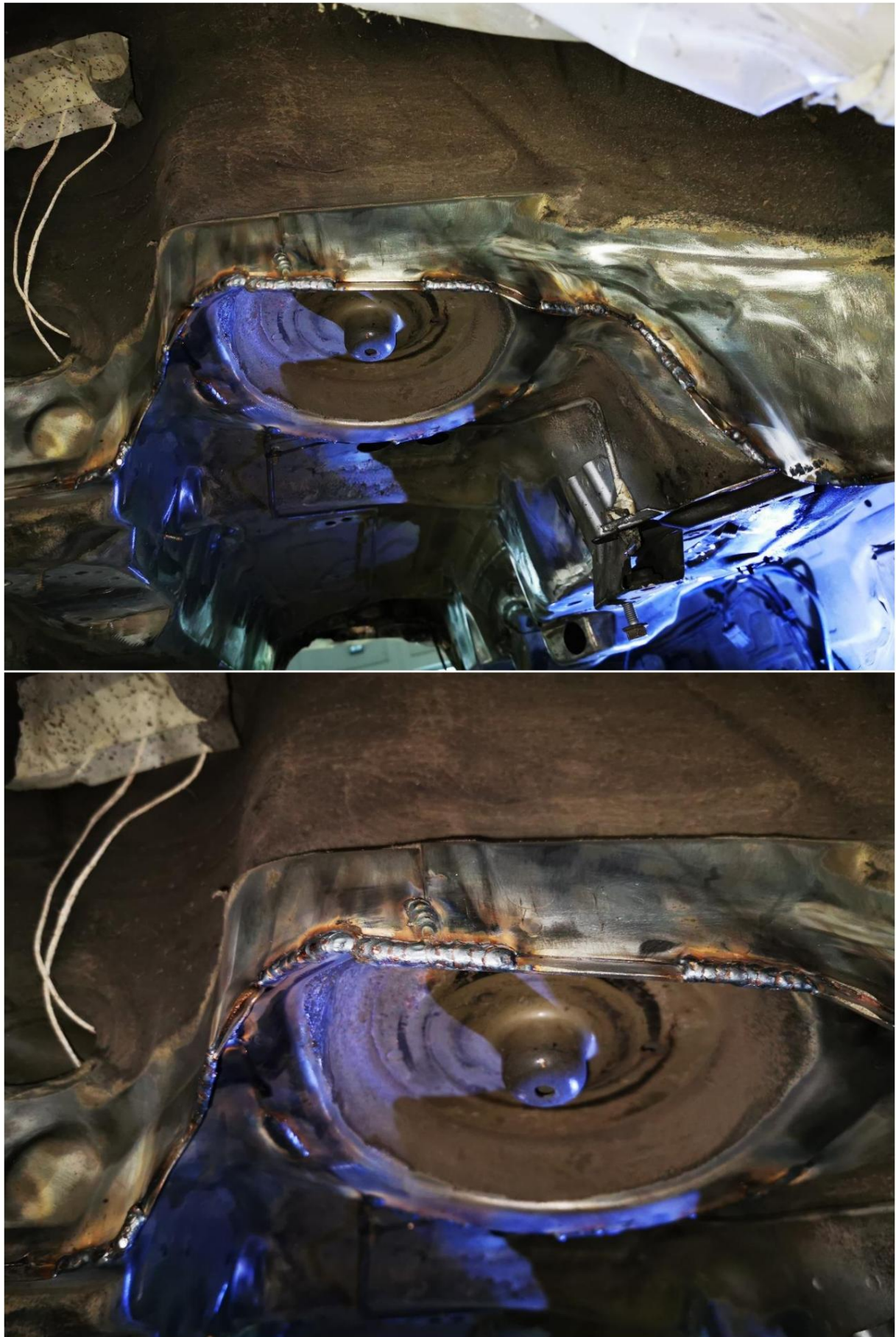
-> Loose rear axle mounts/sleeves usually tear several spot welds in the surrounding area. Few people know which comes first, but a good repair involves more than just the sheet metal. At a minimum, you'll need to reweld all the torn spot welds, but it's better to weld the entire sheet metal layers together.

I recommend: Complete wheel arches on both sides, spring plate mounts, the entire connecting plate between the front and rear axle mounts in the interior, all spot welds between the dome and the connecting plate, all spot welds behind the rear axle mounts, reinforcement of the spot welds on the spar that fixes the top of the threaded sleeves.

Often you only see the torn spot welds and separated sheets once the underbody protection has been removed.



Picture above: Cracked spot welds between floor assembly and wheel arch, here
Exceptionally visible despite underbody protection







Afterwards, it's best to convert the rear axle to PU barrel bearings to reduce rear axle wobble/rocking and thus absorb the shocks to the chassis. It's best to install a brace between the rear mounts and the domes. More on this later.

Repair sheets

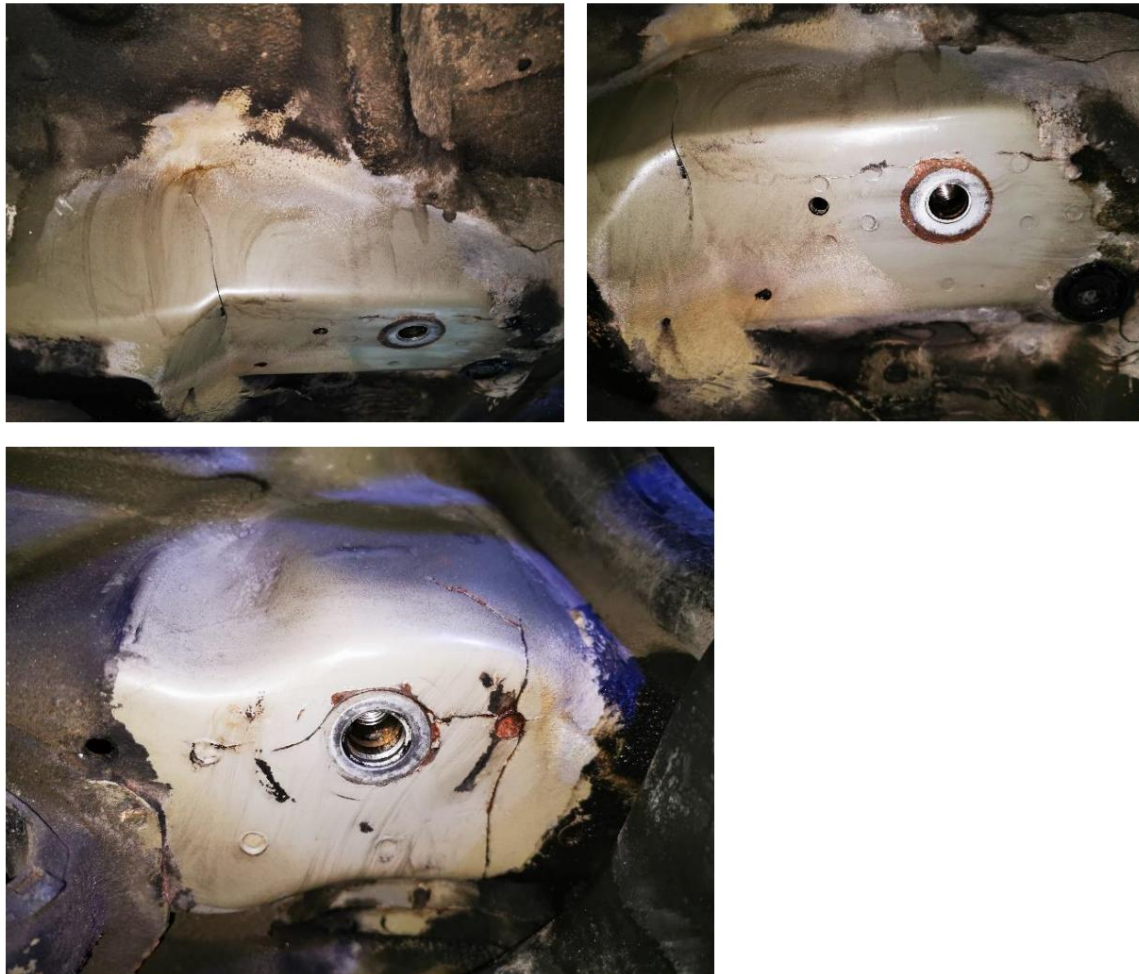
For the actual mounts (outside) on which the repair sheets are placed: Place the sheets on top, mark the size, and use the angle grinder to expose everything down to the bare metal.

Check the cracks. Cracks need to be drilled out at the ends. So: Center punch: Drill out with a 2-3mm drill bit. Now the cracks should be sanded/milled/ground. Ideally, use a pneumatic cutter or a 1mm cutting disc with a small diameter (i.e., worn out).

Trace the crack, separate the damaged/torn material.

Next, first tack the cracks at 2-3 cm intervals, then weld them shut. Don't weld too hot, so you don't cause structural changes that would further weaken the material.

Once everything is welded, the material is ground flat again so that the sheets can be put on.



This is what advanced damage looks like and it can be repaired without any problems.

You will not notice this damage in your driving behavior. Some completely destroyed Rear axles not noticed by drivers with years of track experience.





Repaired cracks after stripping the body sheet metal, additionally nail-welded differential mount (because why the fuck not?)

Now check all spot welds on the inner spars to the outside for damage. You can also always drill into the lower sheet metal layer and reinforce the welds. This is how I would do it in the future. Use the pictures on the first few pages for this.

Front shots

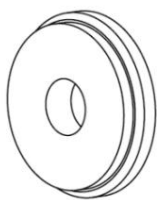
You can stiffen the front inner spars on the outside through the can-drilled hole (see pictures on page 12). The repair panels rest on the outside here, ensuring a stable connection. You'll need to remove the paint here with a cordless screwdriver and wire brush head to create a somewhat weldable surface.

The optional green improvements marked above in the repair section are recommended. They significantly strengthen the connection of the inner spars.

You can now either hammer a piece of sheet metal over the drilled-out 44mm hole or install a preparation for a cage/rear axle cross. I solved it like this:



This means the upper sheet metal layer also serves as reinforcement. Now you'll need M12x1.5 threaded rods to connect the axle to the tube. The tube has a welded-in turned part at the bottom, but a 3-5mm thick sheet metal disc, sanded to size with a grinder and sanding disc, will also suffice. The rear seat can now be reinstalled.



Isometrische Ansicht

Drawing above: Turned part under the pipe

Here, you can also rivet/screw/glue a piece of metal that you can remove later. Two-component body adhesive is also used on the wheel arches and works well.

Rear shots:

Weld the top of the threaded sleeve here too if it's cracked or you're unsure. Drill the hole pattern, mill off the weld seams if necessary, and rebuild.

Here, you can also use a grinder instead of a can drill and remove the entire (or partial) upper sheet metal cover, reweld the inner spar to the outside, and then reattach it later or build a new one. My recommendation would be to reweld and reinforce it: This is the rear axle's major weakness. The more ribs you install in these cavities or the more you stiffen them, the more stable the axle will be. More on this later.

If you separate the sheet metal layer, you expose the two areas around the mounts and can then re-weld them. This saves you a lot of time later on from the tiresome searching for the spot welds.

under the underbody protection, the condition of which is difficult to assess from the outside anyway.

You can find explanations on page 24.

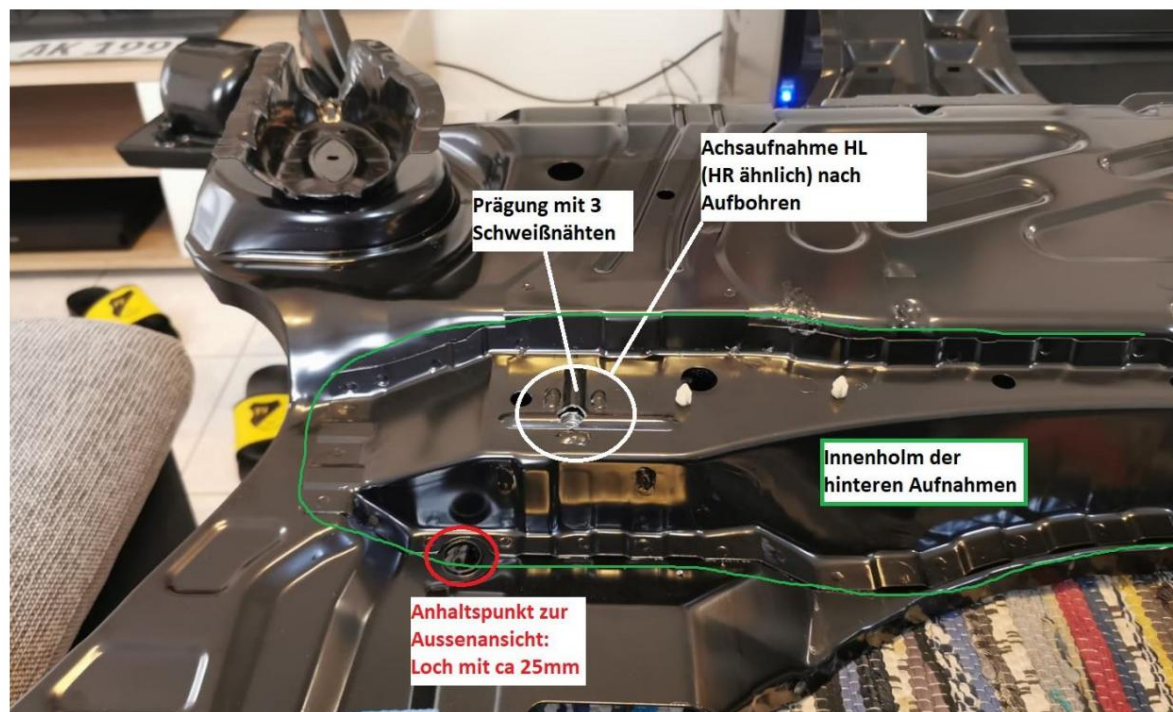


Image above: Rear axle mounts viewed from the trunk looking forward into the passenger compartment. See also image on page 24.

Inserting the sheets

I recommend painting the weldable areas and the interior panels with weldable primer. Galvanized bodies are already awful to weld, and these primers are barely noticeable during welding. However, they at least provide some basic protection. The theory is that the paint liquefies during welding, coats the weld points, and hardens. I used Technolit Inox spray. But be careful: Not every stainless steel spray is weldable! Be careful!

Now finally to the installation of the sheets:

Press it on, use the short axle screws and tighten.



If the sheets are too tight, take a hammer and tap the radius. This will bend the edge. Staple the sheets at the bottom so that the mounting surfaces fit perfectly. Do not staple the hole circle around the sleeve yet.

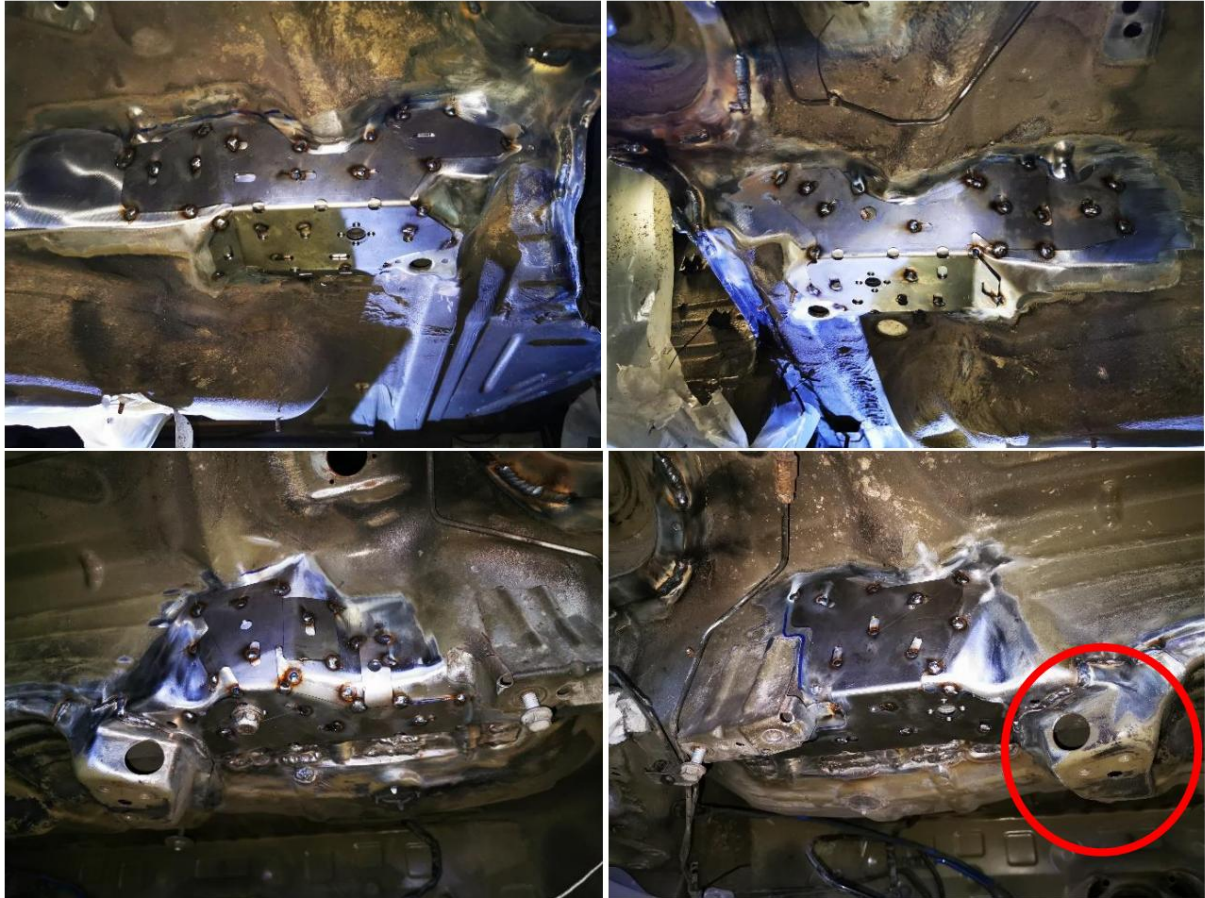
You can now either use a hammer to bend it back around, press it down, and staple it, or you can make 2-3 seams near the edges to heat up the sheet metal so that it is easier to bend.

If they're too wide, proceed similarly: Staple at the bottom, ensuring a perfect fit, and use the hammer near the edge to tap the radius tighter. Staple one or two spots along the radius, then you can hammer the rest into place.

On the front mount (passenger side, front), there are two tabs that are also unbent, as the chassis shape is too complex to prefabricate. Also, some of the edges are only pre-bent (both wings of the rear mounts have two 10° bends, and the front mount has the wings of the vertical tab). Here, you'll have to do the fine work with a hammer and a squaring tool.

Once everything is in place, drill the hole circle around the threaded sleeve, then weld it. Then weld the sheets.

Change the sheet metal you're working on frequently to reduce heat buildup and warping. Be careful not to let the box catch fire. The wax/paint in the sheet metal layers will likely burn, so be sure to have compressed air/water/CO2 extinguishers handy to put out the fire when you go inside.



Please note: Images show older versions of the development stage. The panels have been reworked in some places. Don't be surprised.

Important: The small plates (pictured below) serve as shims for leveling. Since you've welded 2mm plates everywhere, the cross member on the differential now also needs to be shimmed.

These are intentionally made of stainless steel to prevent rust. These are not welded in. Since the support (top right, red circle) to which these are bolted is open to the outside and you can't sand or repaint it from the inside, I intentionally designed it this way.

Otherwise, it would be a complete rust pit, as the welding would burn off the entire coating in the support, exposing bare metal. You could, of course, paint it.

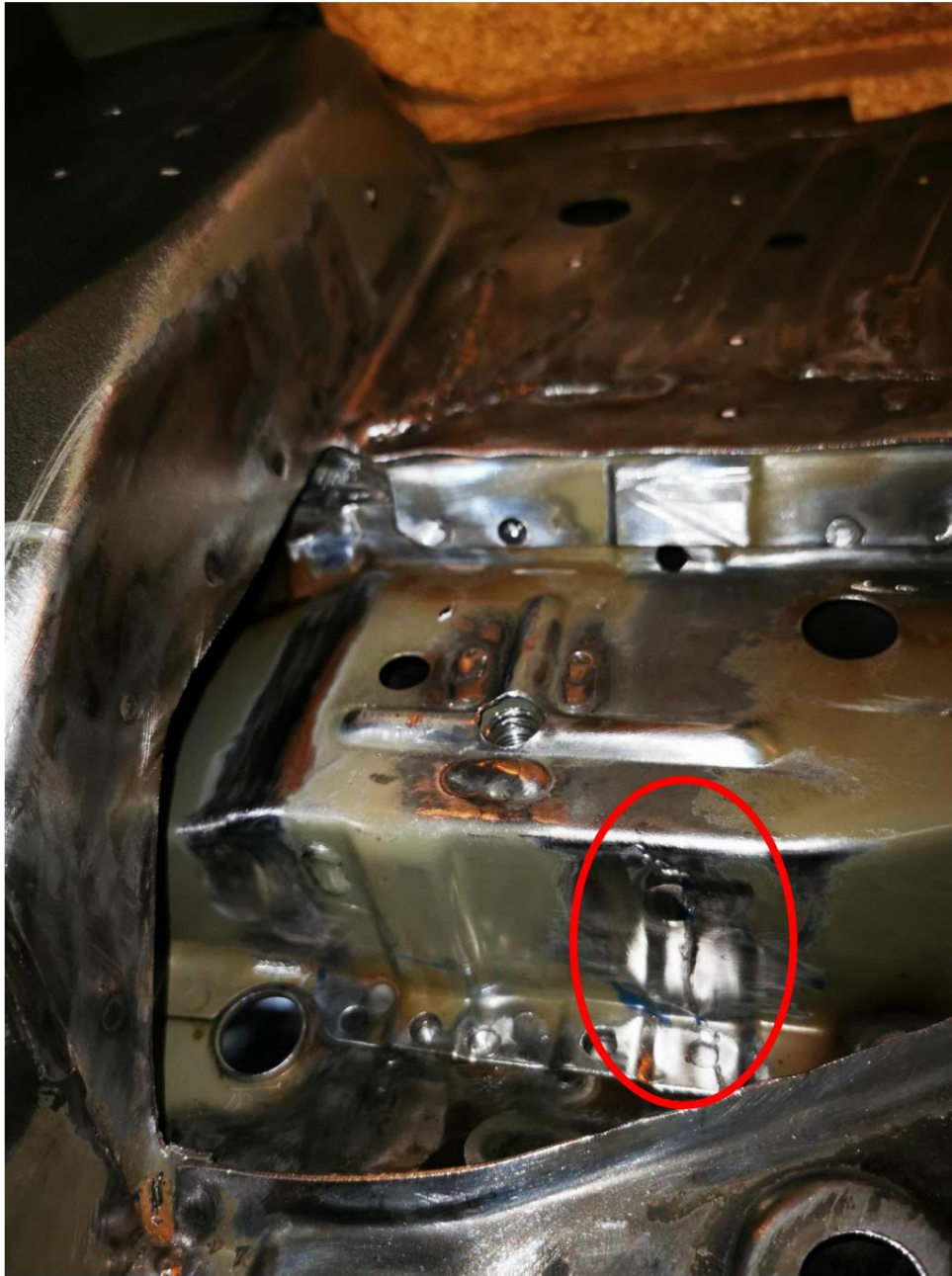




A common side effect of a rear axle being torn out in its advanced stages is the tearing of the spot welds around the struts between the mounts (see white markings above). Check the spot welds here and repair or reinforce them if you're already doing it. Drill out, then place the spot weld for 2-3 seconds.

I kept playing around with spot welding forever. You can see how far you can go by looking at the original repair sheet (page 2ff).

Optional: Holmversteifung



Picture above: Exposed inner spar at the rear mounts with crack caused by welding of the threaded sleeve

Please note the following images: This spar only cracks near the threaded sleeves, never in the middle. For the repair/to reinforce the spar, it's sufficient to remove only the outer sections. This saves you some work and makes it look nicer, as the center section retains its original appearance. I left the outer sections open on my vehicle.



Image above: Rear inner spar, sheet metal layer drilled to support the original spot welds of the spar. Additional spot welds are placed here.

Picture below: The spar after additional welding. These seams partially meet the outside of the Repair sheet and therefore have very good strength, as all sheet layers are connected to each other.



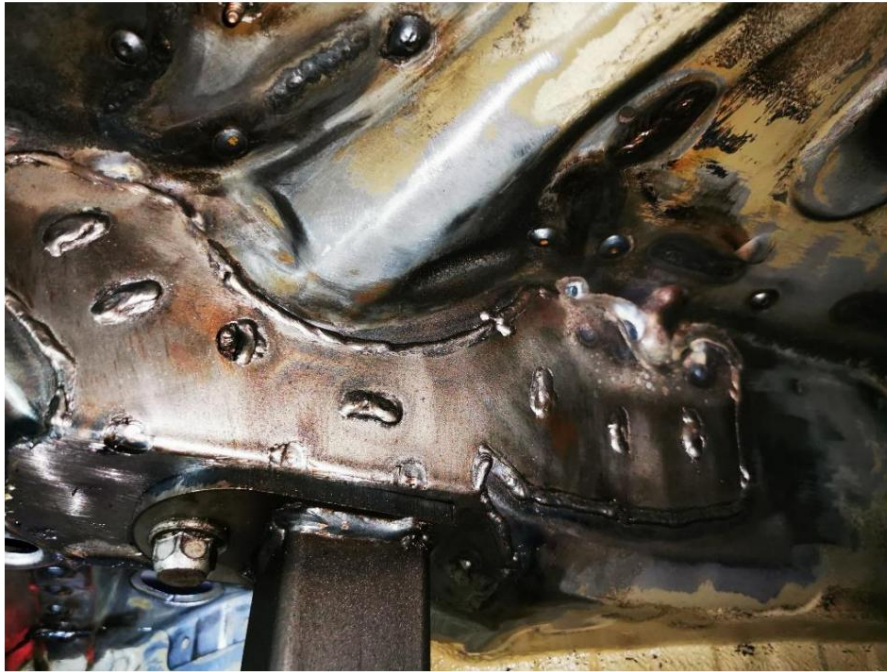


Image above: Repair sheet outside, the new welding work can be partially seen here due to the temperature discoloration.

Image below: The spar stiffener is intended to improve the connection between the spar and the chassis. The area was sanded, cleaned, and painted with weldable primer. The round holes provide additional welding points, and the large holes provide access to the cavity for cavity sealing.

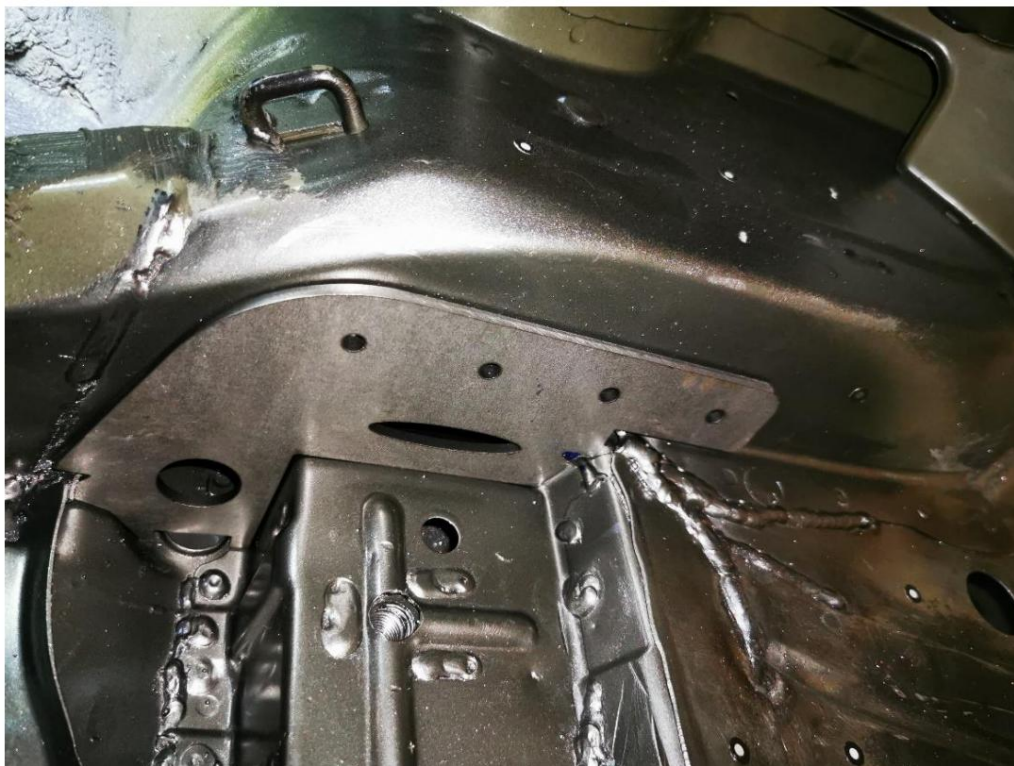




Image above: almost completely welded ribs. The small rib sits directly above the cracked weld seam from the first image. This should provide sufficient rigidity.

As you can see, the weldable primer still burns – but what wouldn't you do for Conscience?



Image Top Left / Top Right: Close-ups before / after cleaning with the wire brush

Picture below: Reinserted sheet metal layer, which I recommend not to remove from the beginning. There's simply nothing to do down here, so you can save yourself the work.

Aftercare

Once you have welded everything, let's continue:

- 2K Kack, black
- 2K paint, e.g. color BMW 001 Nevada Grey (original beige BMW color of the underbody)
- Sharpenable seam sealant (original underbody protection from BMW)
- Silicone remover
- Cavity preservation

Why 2K paint?

This contains acid components. It chemically bonds with the paint/underbody protection that hasn't been fully or partially sanded (e.g., at the transition to the original underbody protection) and is mandatory, as regular spray cans don't adhere.

Product recommendation from several painters:



What is sprayable seam coverage?

This is the original underbody protection. It can be applied by brush or spray. The spray gun costs €150—worth a treat. It can be used to restore the original structure relatively easily. Product recommendations from several painters:



Why silicone remover?

Product recommendation from the painter, don't ask such a stupid question!

Now you have to decide what you want to cover. You can see an example on the following pages.

Which cavity preservation? Why?

You've welded everywhere and burned through corrosion protection like wax, grease, paint, and underbody protection.

If you don't want your car to rot away like a Fiat 500 in a showroom, then you should thoroughly preserve all areas. I rely on the popular Mike Sanders grease with a caulking gun. It's been successfully tested in classic car magazines for years and will never crack like wax. Cover everything with slurry; don't skimp.

Final Pictures

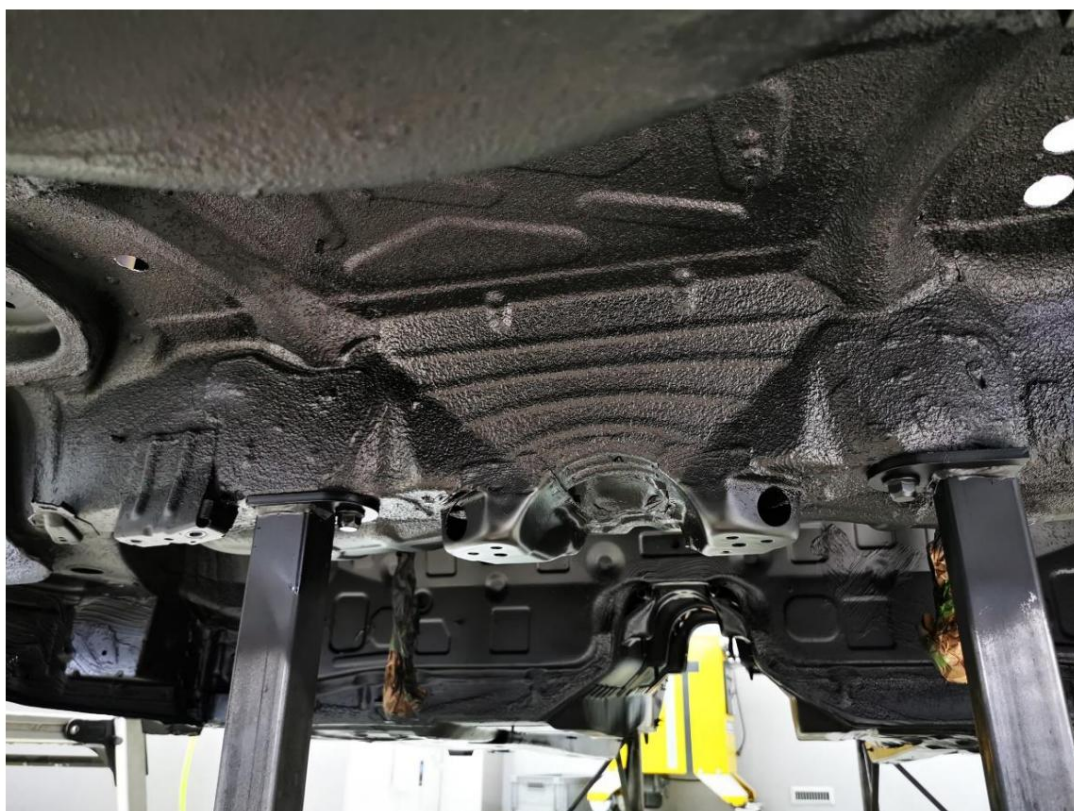






Image above: I completely sealed the overlapping sheet metal layers of the front mounts. Why? There's no water entry point, so there doesn't need to be an open drain. I spray the entire chassis from the inside with cavity sealant, and that's it. It's best to re-glue all the rubber plugs with wax as well. This prevents water from getting through and keeps them sealed.

Summary

After months of research, I wouldn't drive without rear axle stiffeners anymore. BMW's rear end on the M3 is simply poorly designed and wouldn't even withstand a warm summer breeze.

Therefore, I have installed the following versions so far:

- Only rear mounts and dome, unscrewable
- Front and rear mounts and dome, unscrewable, rear seat not usable

The version that uses all the recordings and uses the rear seat will follow soon.
can be.







Liability



Image above: Copyright by Peter Parker and so

Just don't call me if your car catches on fire, the shit still rips, or everything rots away. This is a guide based on hours of research, my work on my own vehicle, and a bit of logic. Any criticisms or suggestions for improvement? Feel free to email them to me:

Markus.petschl@deafpool.de

Is the instruction perfect? No.

Is there anything better? Idc.

Is this all just made up because no one else is listening to me? Quite possible.

Thanks also go to Andreas Kühn for providing many pictures and for filleting his defective floor assembly.