Plans to Build a Ninja 250 Luggage Rack

Version 1.00

These plans detail the construction of a luggage rack suitable to carry a large pizza or small cargo trunk. The plans are designed for a Kawasaki Ninja 250 model 1988-2007 and will probably not work for other bikes. Including all parts and shipping, it can be built for around $30 over a weekend. In static testing, the rack could easily handle a 50 lb load. However, its recommended that you don't put more than a 10 lb load on it while riding.

This build is not for the squeamish. It has precisely positioned holes that need to be drilled, complex bends and requires careful welding. Most of the welding is done off the bike, but there is a small amount of welding that must be done in place. To do this, extra care is required in order to avoid damaging your Ninja.

It is suggested that you read through the plans completely and then decide if this project is right for you.

Legal Terms

Materials

The rack is made from 4130 Chromoly Steel tubing. This is sometimes referred to as aircraft steel. I chose this type of steel because it is much stronger than other steel alloys so it can be made out of thinner material and still be strong enough to do the job. The net result is that the finished product is lighter.

Quantity	Length	Description	Source
2	3 Feet	½" OD x 0.058" wall 4130 steel tubing	Aircraft Spruce 03-02600-3
1	1 Foot	3/8" OD x 0.058" wall 4130 steel tubing	Aircraft Spruce 03-01400-1
0.50	3 Feet	3/4" x 72" x 0.063" thick 4130 strip (Order half length to avoid high shipping fees)	Aircraft Spruce 03-18600
4	65 mm	Metric Bolt M6 x 1.00	Hardware Store
2	10 mm	Metric Bolt M6 x 1.00	Hardware Store
6		6mm Lock washers	Hardware Store

All of the 4130 steel can be purchased from Aircraft Spruce and Specialty (http://www.aircraftspruce.com/) . They are easy to deal with and don't complain about small orders. The 3/4" 4130 steel strip is sold in 6 foot lengths. They are kind enough to sell you half a strip, three feet long, in order to keep shipping costs reasonable.

The bolts and lock washers are common items that can be purchased in your local hardware store.

Tools Required

This is a partial list of some of the tools that are required for this build.

Tool	Where Used
Oxygen-Acetylene Torch - You can also use a TIG welder. The use of arc or stick welding is not recommended for 4130 steel. A high quality gas flux MIG welder can also be used. A propane torch will not work.	Used to weld all the parts together.
Welding rods for welding steel - use what is appropriate for the type of welder you use. Do not use brazing or silver solder rods. These will not hold.	Used to weld all the parts together.
Angle grinder with steel cutoff blade and grinding wheel.	Used to cut the steel tubing and grind welds smooth.
Bench grinder.	Used to deburr steel parts and to grind them to final size.
Speed square.	For drawing angles.
1/4" drill bit.	Drilling bolt holes.
1/8" drill bit.	Drilling pilot holes.
½" drill bit 12" long.	Drilling main bore.
Drill press.	Making jigs, holes in tubing.
Hacksaw.	Used for making multi-jig.
Vise.	Used to hold items steady.
2"-4" C clamps.	Used to hold items in place for welding.
Pliers, gloves, #3 Philips screwdriver, etc.	Various.
Vernier Caliper.	For making fine measurements.
3-4 foot ½" galvanized water pipe.	Used for bending side rails.

Build Instructions

This rack requires some rather complicated bending. To make the build simple, I have devised a “Multi-Jig” that makes everything go much smoother. The Multi-Jig is basically a specially crafted scrap of 2x4.

Making the “Multi-Jig”

1. Choose a short scrap of hard, knot free 2x4. I used dried, treated yellow pine, but you could also use a hardwood 2x4 if you have it. Don’t use whitewood. Its too soft.

2. Cut a length of your 2x4 to exactly 10". Make sure it has perfect square cut ends. A table saw is best for this, but a chop saw, miter box or even a steady skill saw will also work.

3. Circumscribe a centered line on the board lengthwise. Use a sharp pencil for this. This will act as a guide when drilling. On the ends, put a line across the first line to mark the center of the ends.

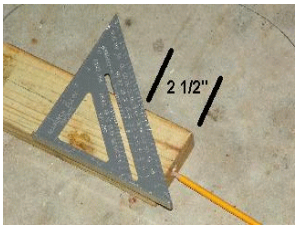
4. Lower the table in the drill press and mount the board on its end. On my drill press, I had to lower the table as low as it would go. You will not be able to do this with a shorter bench type drill press. Install the 12" x ½" bit. Use a small bullet level to check both the bit level and the 2x4 level. They should match. Lower the bit alongside the 2x4 and it should line up with your circumscribed line. Take time to set up this properly because if it drills crooked, you’ll have to start over.

5. Do not start with smaller bits. In other cases, its sometimes advisable to start with a smaller bit and then increase to larger bits. Because thinner bits are more flexible, doing that in this case could cause the drill path to wander. So start with the ½" bit.

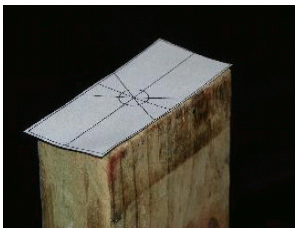
6. Start the drill press and drill into the center mark on the end of the 2x4. Go as far down as the drill press will go. You may have to stop and raise the table several times. Keep going until you have gone all the way through. It may be necessary to lower the table and raise it again in order to clear the bit. When done, swing your table out of the way and remove the 2x4 from the bit. The hole should be in the same spot on both ends. The holes don’t have to be exactly centered, but they do need to be in the same spot on both ends. The acceptable difference is 1/4" along the 3 ½" width and 1/8" on the shorter width. If more than that, you’ll need to find a new 2x4 and start over.

7. Test fit your ½" chromoly. It should be snug, but not binding. If its too tight, run the 2x4 up and down over the spinning bit once and check again. If the tubing is wobbly inside the hole, then you'll have to start over. In that case, either your bit or your tubing is the wrong size.

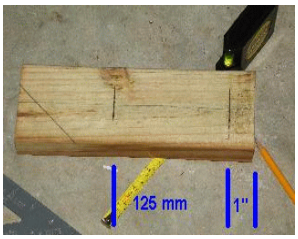
8. On one end of the 2x4, make a mark 2 ½" from the top right end. Use a speed square as shown to draw a 45 degree line. Note that the angle does not stop at the lower right corner.



9. Now clamp the 2x4 in a vise as shown with the angle you just drew at the bottom. Cut out the X Mark guide at the end of these plans and align it with the bore hole. A flashlight shined from the bottom helps with alignment. Transfer all of the lines that intersect the bore hole to the 2x4. We will call this the X mark.

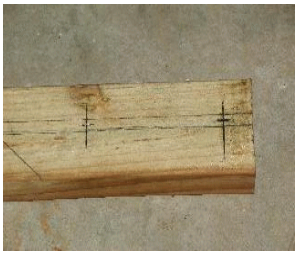


10. Lay the board flat again. From the end with X mark, measure 1" and draw a line across the 2x4 as shown. Measure from that mark, another 125 mm. Note that one measurement is in inches and the other is in millimeters. Sorry for the confusion, it just works out better that way.



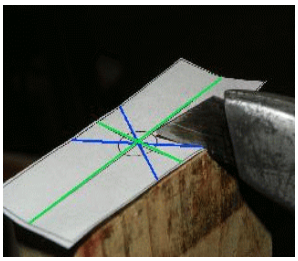
11. Now take one of your 3 foot ½" chromoly tubes and place it through the hole. Next take your 3 foot flat strip and place it on top of the 2x4 so that both its ends bend down and butt up against one side of the tube. Once this is in place, use the strip as a straight edge to draw a line the length of the 2x4. Then repeat for the other side of the tube. Its OK if the width of the pencil lead causes the distance between the resulting lines to be slightly less than ½". The important thing is that they are straight and aligned with the tube.

12. Now take a pencil and make a mark exactly in the middle between the two lines where they cross the lines you made in step 10. These are the points where you will drill holes into the center of the tube.



13. Mount the 2x4 into the drill press. Use a regular 1/8" bit to carefully drill a hole exactly on the two cross marks you just made. Go all the way through the 2x4. Because the size of the final hole is 1/4", some minor errors can be tolerated with the 1/8" bit. Once the 1/8" holes are drilled correctly, go back and drill them again with a 1/4" bit. The 1/8" holes should act like a pilot hole and guide the 1/4" bit. The hole at the 1" mark will now be called hole #1 and the one in the middle will be called hole #2. Take your time and do this step correctly. If you get off the center mark, you'll have to toss the 2x4 and start over from the beginning. You can check your work by inserting a 1/4" bolt through your holes and then look down the ½" bore to make sure they go through exactly in the middle. These holes are critical and correspond to the distance between the luggage hooks on the Ninja. This should be the same with all of the 88-07 Ninja 250s, but you should measure this yourself to be certain.

14. Place the 2x4 back in the vice with the X mark from step 9 at the top. Use a hack saw or coping saw to saw into the angled lines (shown here in blue) to a depth of about 1/4". Repeat the cuts using a hand saw with a wider blade such as a pruning saw.



15. Now use a wood rasp to widen the cuts so that a 1/4" bolt will lay in them nicely. Be careful not to make them any deeper.

16. Use a hacksaw to cut a slit down through the center of the ½" bore hole as shown. Cut to a depth that is ½" deeper than the #1 hole. This slit forms a tubing clamp for many of the build operations.

17. Now place the 2x4 in the vice horizontally and saw off the 45 degree corner that you drew way back in step 8. Make sure this is the corner that is opposite the tubing clamp slit. This forms a guide for cutting and bending the tubing. This completes your "Multi-Jig" tool.

Making the Side Rails

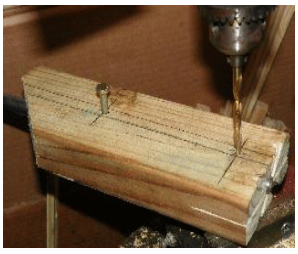
1. Use your angle grinder with the metal cutoff blade to split one of the 3 foot ½" chromoly tubes into two 18" tubes. They don't have to be exactly 18", but they should be close.

2. Now take one of your 18" tubes and insert it into the ½" bore of your Multi-Jig. Put the square end of the jig on the floor and push the tube down to the floor. The goal is to make the tube perfectly flush with the square end.

3. Use a C-clamp across the slit to clamp the tube so that it can't move. Its OK if the clamp covers hole #1 at this time.

4. Install a 1/4" drill bit in the drill press and carefully drill out hole #2. Be mindful that your multi jig is just pine and can easily be wallowed out. Go slow and use a sharp bit. Drill all the way through the tube.

5. Now drop a long 1/4" bolt through hole #2. This will prevent the tube from moving. Remove the clamp and drill hole #1. If your holes in the multi-jig are correct, then the holes in the tube will be correct. When the two holes are drilled, repeat for the other 18" tube.



6. Now you need to stop up the ends of the tubes that are opposite the #1 hole. I used caulk, but you could also use chewing gum or a cork or anything that can be easily removed that will stop it from leaking. You'll also need to wrap the #2 hole with electric tape to prevent it from leaking. It you used caulk, you'll need to let it dry before proceeding.

7. Fill the tubes up with water to the #1 hole and place in the freezer. They should be frozen solid in about 3 hours. Freezing the tubes is a critical step. If you don't, then bending them will cause the tubes to flatten out.

8. Meanwhile, locate a sturdy platform that will take a heavy prying force. I didn't think my workbench was sturdy enough so I used the frame of my trailer outdoors. Whatever location you choose, it should be at least 3-4 feet off the ground, heavy enough that you can't lift it and strong enough that you can't bend it. Clamp the multi-jig to the platform with two heavy duty C-clamps. The 45 degree angle cut should be facing up and toward you. A third C-clamp will be used for clamping the pipe in the slit.

9. After the tubes are completely frozen, remove one of them and cut off the tape so that the tube is smooth. Poke a 4" long 1/4" bolt through hole #1 in order to clear it of ice. Insert the tube into the multi-jig until the #1 hole can be seen. Quickly insert the 4" long 1/4" bolt through the #1 hole and pull the tube back so that the bolt seats in one of the X-grooves in the back of the multi-jig. You will make two side rails. One has the bolt in one groove and the other has the bolt in the other. Make a mental note as to which one you start with so you don't accidentally end up with two of the same. Now use the third clamp to clamp the tube in place. Remember to do all of this quickly as your ice is melting.

10. Now you are ready to bend the tube. Place a 3 to 4 foot ½" galvanized water pipe over the end of the tube. Since water pipe is ½" inside diameter and our tube is ½" outside diameter, this should work fine. Test your pipe ahead of time since sometime they get rust and crud inside that may prevent it from sliding over the tube. Slide it to about 1" away from the multi-jig. Now pull downward on the water pipe until you have a nice 30 degree bend in your tube. Use the drawing of the side rail at the end of these plans as a guide. Because chromoly is a little springy, you will need to pull it past 30 degrees a little bit. Bend a few degrees at a time and then check your angle. If your water pipe is too long, you'll have trouble swinging the pipe far enough down to make the bend. You have completed the first side rail.

11. Now repeat steps 9 and 10 with the second 18" tube, only this time put the 4" long bolt in the other X-groove. You have now completed both side rails.

Cutting the Deck Tubes

1. The deck tubes are cut at 45 degree angles using the multi-jig. Clamp the multi-jig flat in a vice.

2. Insert your remaining 3 foot ½" chromoly tube into the multi-jig so that it just pokes out of the 45 degree angle end. Clamp the slit end and then use the 45 degree cut on the multi-jig as a guide. Use an angle grinder with a metal cutoff saw blade to make the cut.

3. Now measure from the tip end of the tube to 13" and mark the tube with a sharpie marker. Circumscribe the mark so it goes all the way around the tube. Align the mark with the farthest part of the multi-jig angle (the point closest to the #2 hole). Turn the tube so that the previous cut is bevel side **up**. Clamp and then cut. This will produce a tube with the bevels 90 degrees to each other.

4. Repeat step 3, only this time turn the tube so the previous cut is bevel side **down**. This produces a tube with the bevels 90 degrees to each other, but opposite the one you made in step 3.

5. To make the last cut, you will need to remove the remaining tube and make a circumscribed mark at 9 1/8". Reinsert it into the multi-jig so that the previous cut is on the clamp end. Turn the tube so that the bevel from the previous cut is facing away from you. Note that this time you need to position your mark on the 45 degree angle at the point that is farthest from hole #2. Now clamp and cut. This will produce a 9 1/8" long tube with bevels on the same side. You have now finished cutting the tubes for the deck.

6. For the deck, we also need to cut the 3/4" flat strip. Start by cutting two strips two inches long. Use the grinder to make them even. These will become the grab bar brackets and are used to attach the deck to the bottom of the grab bar.

7. Use a center punch to punch a divot at the end of one of the strips. It should be approximately half an inch from the end and centered.

8. Use a 1/4" drill bit and the drill press to drill out the divot. It should be close to the center and half an inch form the end. If its off a little, its not the end of the world, but it should be fairly close.

9. Now use the first 2" strip as a template to drill a hole in the second strip. You should now have two identical brackets. To complete them, use the bench grinder to get rid of any burrs.

10. There are also two flat strips that connect the two sides of the deck. Cut two 9 1/4" strips from the remaining flat strip.

Cutting the Side Rail Spacers

1. The side rail spacers are used to keep the side rails from rubbing the Ninja's plastics. They are made from the 3/8" tubing that you bought. Making them is not horribly difficult, but if you use the following technique, things will go a lot easier.

2. Using the bench grinder, grind a 45 degree bevel on the end of your 3/8" stock tube. This is done on an uncut tube because the extra length makes handling the piece much easier. The purpose of the bevel is so that it fits the luggage hook screw holes which were designed to accept a tapered head screw.

3. Set your vernier caliper to 1.10 inches. Use it to lightly score a mark on the tubing from the end with the bevel.

4. Place the tubing in a vice. Use the angle grinder with a metal cutoff blade to cut the piece off. Take into consideration the width of the blade. Cut it about 1mm longer than the mark.

5. Use the bench grinder to grind the spacer down to the exact size of 1.10". This frequently takes multiple steps to sneak up on the exact size. Bear in mind that steel expands when hot so you'll want to dip the piece in water before checking the length. When you have it at the right length, use the grinder to remove the burrs. You now have completed one spacer.

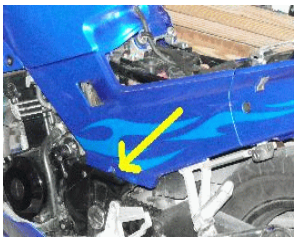
6. Repeat steps 2-5 until all four spacers are complete.

Preparing The Ninja For Welding

1. Regrettably, some of the angles must be cut and welded while your luggage rack is attached to your Ninja. This is undeniably a very bad construction technique as damaging your Ninja is quite easy. However, in order to minimize the risk for damage, the gas tank and rear plastics must be removed.

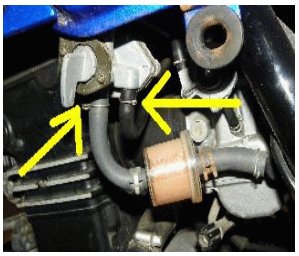
2. Start by moving your Ninja to where it is in reach of the welder. Put it on its center stand. Remove the seat and any objects stored under it (rags, toolkits, etc.).

3. Using a #2 phillips screwdriver, remove the bolt that holds the side panel on. The arrow in the picture shows the location of the bolt. Repeat for the side panel on the other side.



4. Using a 10mm socket, remove the two bolts at the rear of the tank. There is a small rubber tube that must be disconnected. On California models, there may be other vent tubes that must be disconnected as well. Use a 4mm hex bit allen wrench to remove the 4 bolts on the side of the tank that attach the plastic fairing. The 4mm allen wrench in the bike's toolkit works very nice for this. Note that on reassembly, the upper side bolt has a tendency to puncture the gas tank, so be very careful during reassembly as repairing and replacing gas tanks is very expensive.

5. Detach the fuel line and the vacuum line from the petcock on the lower left side of the tank. The fuel line is the larger of the two rubber hoses. There should be no gas dripping from the tank when the valve selector is in the ON position. If it does, your petcock needs rebuilding. Plug the end of the fuel line on the bike with a bolt or pencil. Be careful not to get any debris in the hose.

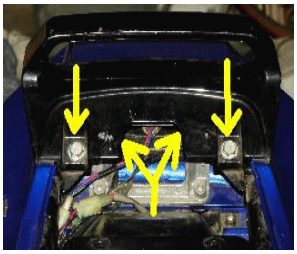


6. Since the tank has a petcock that protrudes from the bottom of the tank, it cannot be laid directly on the ground. Find a suitable object, such as an old tire or a drawer, that you can set it on. You should be able to gently lift the tank off the bike and set it on the tire. Make sure that it is at least 30 feet away from where you will be welding.

7. If you look under the rear fender, you will see 2 bolts on each side and two in the rear. Use a 10mm socket and extension to remove the 4 side bolts. The remaining two in the rear should be left alone. The bolts are all the same size. If not, then you got one of the rear ones by mistake. The fender will now drop down.

8. Disconnect the 3-pin tail light connector, the 2-pin tag light and both turn signals. Make a note as to which turn signal is which as they both use individual bullet style connectors.

9. Using a 12mm socket, remove the two upper grab bar bolts. On the underside of the grab bar, there are two 10mm bolts that must also be removed.

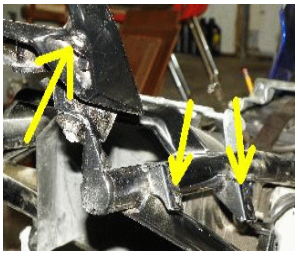


10. Use a 10mm socket to remove the 2 side tailpiece bolts. Then using a #2 phillips screwdriver, remove the 4 bolts that attach the luggage hooks to the frame. Then pull out the luggage hooks themselves.

11. The plastic tailpiece should now be loose and can be removed. It has to be wrestled a little bit in order to clear the key mechanism on the left side.

12. Inspect the grab bar. There are two unused 6mm bolt holes in the bottom. These will be used to hold your luggage rack on. Check the holes for debris as they are a favorite nesting spot for dirt and certain insects. Clear the holes so that you can drive a 12mm long bolt all the way in. If you can't, then as a last resort, re-thread the holes with a 6mmx1.00 tap.

13. With the tailpiece removed, reinstall the grab bar. Only the two 12mm bolts need to be used for now. Note the locations of the two brackets that hold the luggage hooks and also the rack mount holes you cleared in the previous step.



14. Cover the rest of the bike with a non-flammable welder's blanket. Put the bike in gear and cover the rear tire and dangling electric wires as well. You are now ready for welding.

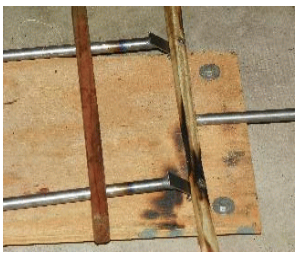
Welding

1. Now that you have your Ninja disassembled, you will be able to start the welding process knowing that your plastics and gas tank are a safe distance away. However, one small caveat to that is the grab bar. The grab bar is aluminum. While it isn't as sensitive to the heat as plastic, if it gets too hot, it will suddenly turn into a puddle on the floor with no warning. A technique will be presented here that will enable you to weld close to the grab bar and keep it safe.

2. Before you start welding, there are two more simple wooden jigs that must be made. Cut two strips of 1x2 or plywood one foot long. On both of them, make two center marks exactly 22cm from each other. Drill holes through the boards at the marks with a 1/4" drill bit. Place two 1/4" bolts through the holes and check the distance to make sure it is still exactly 22cm. The 22 cm corresponds to the distance between the two unused bolt holes in the bottom of the grab bar. This should be the same for all Ninjas in this date range, but check just to make sure. Now take <u>one</u> of the boards and use a ½" drill bit and enlarge the holes to ½".

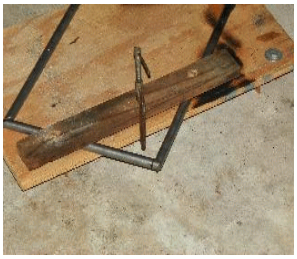
3. Using the jig with the 1/4" holes, attach the 2" steel strips to the holes using 1/4" nuts and bolts of suitable length. Slide the two 13" deck rails through the ½" holes of the second jig. Make sure they are even and bevel side up. Make sure the bevels at the rear of the deck rails are facing each other.

4. Use clamps or wood screws to temporarily fix the strips and the deck rails for tack welding. The deck rail bevels attach to the end of the 2" brackets opposite the 1/4" hole. The brackets should be straight with the deck rails.



5. Tack weld the brackets to the ends of the deck rail tubes. Let cool and remove the deck rails from the jigs. Finish the welds in a vice. Then let cool.

6. Bolt the two deck rails back to the 1/4" jig. Do not use the ½" jig at this time. Fit the rear deck tube to the ends of the deck rails. The 45 degree bevels should line up with each other. Clamp them in place using the ½" jig across the corner as shown. Make sure that the mounting brackets stay perpendicular to the deck rail.

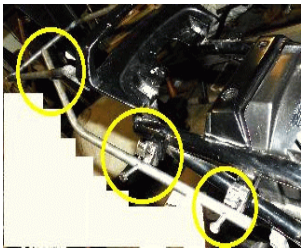


7. Tack weld the corner in place. Let cool then repeat for the other corner. Let cool then remove the clamps. Leave the 1/4" jig in place. Finish the welds in a vice. Let cool. Remove the 1/4" jig. Use the angle grinder to clean up the welds.

8. The welding process causes the tubes to warp a little bit. Place the deck assembly on the floor and check to see that its level. If not, you can reattach the 1/4" jig and then bend the assembly a little bit at a time until it lays evenly.

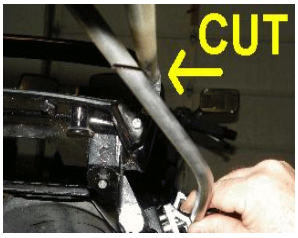
9. Use the 12mm M6 bolts to attach the deck assembly to the bottom of the grab bar. The bolts should only be lightly tightened. The deck assembly should be level with the ground when the rear wheel is touching the floor. Check for level in both directions. If the rear needs to go up or down, the grab bar brackets can be bent in place. If the sides are not level with each other, then you'll need to adjust one of the 1/4" holes in grab bar brackets.

10. Take one of the side rails and bolt it to the luggage hook frame brackets on the appropriate side of the Ninja frame as shown. Use the luggage hooks and the 65mm bolts, but not the spacers. If you made the multi-jig and drilled the holes in the side rails correctly, then the bolts will line up with the luggage hook brackets on the Ninja frame without binding. If not, then you will need to adjust the holes in your side rails by carefully enlarging them with a 1/4" drill or milling bit.



11. Make sure the luggage hooks are properly oriented. Use some duct tape to keep the side rail touching the luggage hooks as the 65mm bolts will not hold it tight without the spacers. The bent portion of the side rail fits inside the deck assembly and should rest snugly against the deck rail. If not, then remove the side rail and bend it to the proper position with the multi-jig.

12. Once you have everything fitting properly, use the angle grinder with a metal cutoff blade to make a horizontal cut, just under the deck rail tube, through the bent side rail tube.



13. Remove the side rail reinstall with the spacers between the luggage hooks and the side rail. Tighten the bolts snugly. The cut end of the side rail will now be directly under the deck rail tube.

14. **Remember that the grab bar is aluminum and will suddenly turn into a puddle if it gets too hot.** Wrap a wet paper towel around the deck tube just underneath the grab bar. Drape another wet paper towel over the entire grab bar. Keep a bottle of water handy to be able to keep them from drying out.

15. Weld the side rail to the deck assembly. Be mindful of your torch flame so that it doesn't go near your grab bar. Weld as quickly as possible. Dribble water on the paper towels every 30 seconds. Keep doing this until the assembly is cool. If you are careful, the grab bar will not be damaged. If not, then you can probably find a new one on Ebay.

16. Use the angle grinder to clean up the welds.

17. Repeat steps 10-16 for the other side rail on the other side. Your luggage rack is almost done.

18. Measure from the front side of the rear deck tube to 2" on each deck rail. Mark with a sharpie. Place one of the 9 1/4" strips across the deck rails at that mark so that the inside dimension between the rear deck tube and the strip is 2". Clamp one end in place with a C-clamp.

19. Measure from the front side of the flat strip to 3 ½" on each deck rail and mark with a sharpie. Place the other 9 1/4" strip across the deck rails at that mark so that the inside dimension between the two strips is 3 ½". Clamp one end in place with a C-clamp.

20. Wrap wet paper towels around both deck rails where they connect to the deck brackets and aluminum grab bar. Again, drape a third wet paper towel over the grab bar.

21. Weld the free ends of the strips to the deck rails. Keep dribbling water on the paper towels while welding and until cool.

22. Remove the clamps holding the strips. Repeat steps 20-21 for the previously clamped ends.

23. You luggage rack is complete. The only thing left is painting.

Finishing Up

1. Remove your luggage rack from your Ninja. Remove the grab bar by removing the two 12mm bolts. The Ninja is reassembled in reverse order of disassembling it.

2. Replace the plastic tailpiece, being careful to align the key mechanism properly. Tighten the front side bolts. Insert the luggage hooks and tighten their bolts.

3. Reinstall the grab bar. Finger tighten the upper two 12mm bolts. Reinstall the lower two 10mm bolts and tighten. Then tighten the top bolts snugly.

4. Reconnect the electrical connections to the fender and tail light.

5. Install the rear fender with the four bolts from underneath. Before tightening, make sure that none of the electrical wires are crimped. When clear, tighten all four bolts.

6. Set the gas tank back in place. Make sure it properly aligns with the rubber bushings on the frame. If its doesn't, the fairing bolt holes will not line up. Install and tighten the two rear 10mm tank bolts. Reattach the vent rear vent tube. Install the four fairing tank bolts, but don't tighten. Use the allen wrench in the Ninja's toolkit. Don't use a power driver or you could drive a bolt right through your gas tank. The lower tank bolts can be tightened snugly, but the upper bolts should only be tightened lightly. With the tank fully bolted in place, reattach the vacuum and fuel lines.

7. Reinstall the side panels with the phillips head bolts. Reinstall the seat.

8. Go outside or an area safe for painting and hang the luggage rack from one of its 1/4" mounting holes. Cover the rack completely with a spray primer coating such as Rust Oleum Rusty Metal Primer. Don't forget to paint the bolt heads and spacers. Be sure to spray inside the ends of the tubes. Allow to dry for one hour.

9. Spray completely with a top color of your choice. I used gloss black. Depending on the paint used, it may take up to 48 hours to completely dry.

10. When dry, you can install it back on the Ninja by removing the phillips luggage bolts and bolting everything back up with the spacers. This time, include the lock washers just under the bolt heads. Leave the luggage hooks in place. On some bikes, it may be necessary to use a 60mm bolt in place of the 65mm bolts.

11. Congratulations! You have finished building your luggage rack. You can use it as is, or you can bolt a trunk to it. Have fun!

Alternative Construction Ideas

Here are a few ideas for alternative construction techniques that might work for those having trouble with some of the regular construction techniques. Admittedly, I have not actually used any of them, but they might work in cases where the regular way is not feasible.

Drilling the 10" Bore

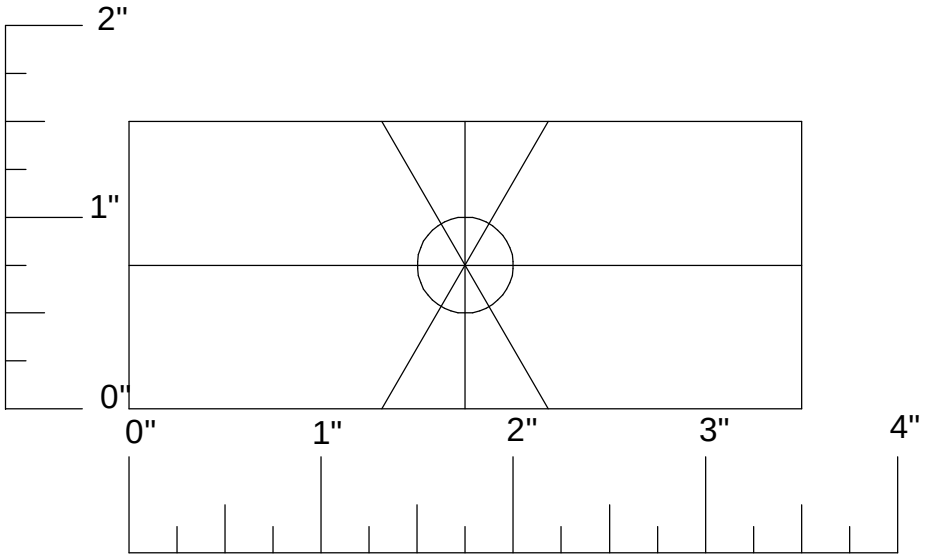
1. Instead of using a single 2x4, start with two hardwood 1x4's. Use a ½" Round Nose router bit and a router to route a channel slightly less than ½" deep in each board. Glue the two boards together with carpenter's glue. Then use a hand drill and a 12" long ½" drill bit to bring it to the correct size and remove any dried glue. I would also throw in some wood screws just for good measure.

2. Instead of using a 10" 2x4, use five 2" long ones. Drill 3/8" bore holes in each. Glue the ends and use the 3/8" tube as a guide to fit them all together. Clamp and remove the tube before it dries. Use a table saw to make the sides and edges even. Then use a hand drill and a 12" long ½" bit to enlarge the bore to ½". The ½" bit should follow the 3/8" hole. Then for strength, use two nail plates on both sides with 4d nails to hold things together.

Side Rail Hole Drill Guides

Instead of using the wood alone as a template for drilling the #1 and #2 holes in the side rail, cut two 2" strips from the 3/4" flat strip. Drill three 1/4" holes in each strip. One in the middle and one at each end. The exact placement is not critical. Place the center hole over the mark for the #1 hole. Hold in place with a C-clamp. Use the 1/4" holes in the ends of the strips to drill two 1/4" holes completely through the 2x4. Use 1/4" bolts and nuts to hold these in place. Remove the clamp. Then drill the #1 hole through the mark all the way through the 2x4. Repeat for hole #2. This has the advantage of making the hole placement easier and also steel wont wallow out like wood.

Multi-Jig X-Mark



Bending Angle Guide for Side Rails