

## **NDN Style Integral Knife**

By Ray Kirk, Master Smith

[ray@rakerknives.com](mailto:ray@rakerknives.com)

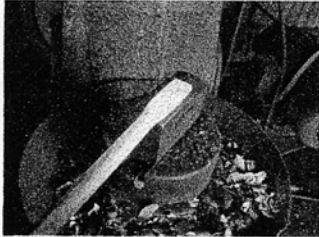
I saw a need for a low cost alternative to the labor intensive, hand rubbed finish, that most custom knives employ and still maintain a high performance cutting tool. This is the reason that I developed the NDN style knife. The integral style knife lends itself to easy maintenance and the stabilized wood is user friendly in all types of weather. After rough grinding and the handle is attached, the blade is finished on the grinding wheel down on an A-45 gaiter belt finish. The reason for a hollow grind is so that it will leave a little more on the spine for strength and will still produce a good cutting edge.

The items needed to make an NDN Integral are listed below. Some items can be substituted with what equipment you have that may be able to do the same thing.

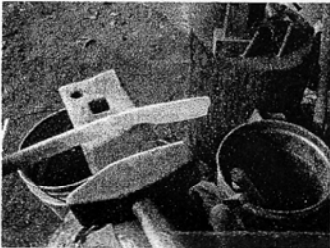
List of items:

- Round bar from ½" to 1" diameter with ¾" being my preferred size.
- Forge for heating the steel
- Hammers and anvil, with a power hammer a major help in the final stages of forming the blade.
- Fuller, cut off hardie, hot saw, drill press, epoxy, pin material, grinders, and various clamps.

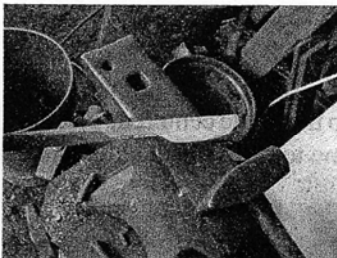
There are probably a few other items that would make it easier and you can utilize what equipment you have to make this style knife.



After heating the 3/4" round bar of 52100, it is flattened out on the anvil or power hammer. Alternate sides so that the flat part will be in the center. It should be flattened down to about 3/8" thick. I do not fuller the steel as I do not want the metal to go forward, just outward.



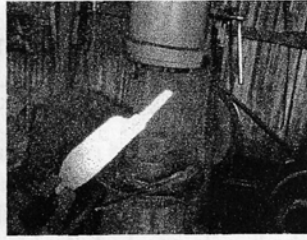
The pictured bar has had the spine moved down by hammering the flattened part of the blade over the edge of the anvil. You can also use a swage block to help keep the underside round. Once it has been moved down, it is ready to start forging kind of like forging a regular blade from flat bar. There is a little bit of difference as you want to make the steel move down toward the edge.



Always work from the edge toward the top. This will keep the spine in line with the top of the round bar. Keep it fairly straight and centered. Remember that the hammer moves it down when trying to keep the blade centered. After the blade is forged to the shape you desire, it is time to fuller the handle and draw out the tang.

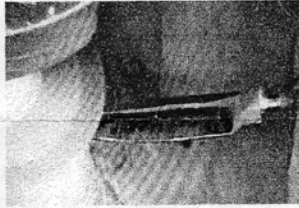
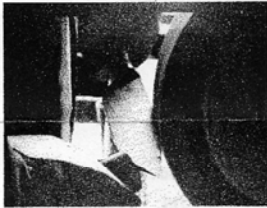
**This is the end product.**



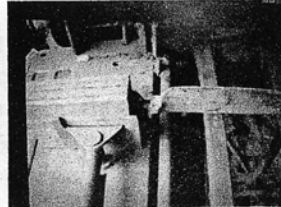


After the tang is fullered and drawn out, it is sized in a jig fixture to round up the tang to 3/8" dia. From the fixture, it is time to straighten and make sure it is ready to grind. When satisfied with the blade, it is time to normalize it a couple of times and to anneal it in vermiculite or lime. I use vermiculite. After a slow cool in the vermiculite, it will

be time to use the hot saw to square up the shoulders of the tang. This is done using a wooden block of wood with several shallow holes drilled in it. This is also the time to cut the tang to length.



After profiling the blade, I use a 7" side grinder to do most of the grinding on the blade. This is faster and saves sanding belts. You can also control the location of the grind by watching what your doing. The side grinder also does a slight hollow grind so that it makes it easier to complete the grinding on the belt sander.

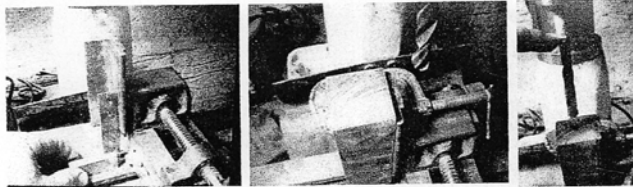


The tang of the blade is inserted into the shallow hole in the block of wood. It is then placed in the vice on the hot saw and adjusted to cut a ring where needed. I prefer short bolsters on the integral as this will reduce weight. The blade of the hot saw needs to be almost wore out. The smaller the wheel, the less vibration it will make when making the cut. Bring the saw blade down

so that it will cut a groove about 1/8" deep, rotate counter clock wise while holding the saw at the same depth. This will put a 1/8" groove all the way around the bolster. Check blade and if ground too deep, you might as well cut it off, it is ruined. Always check the groove to prevent this from happening.

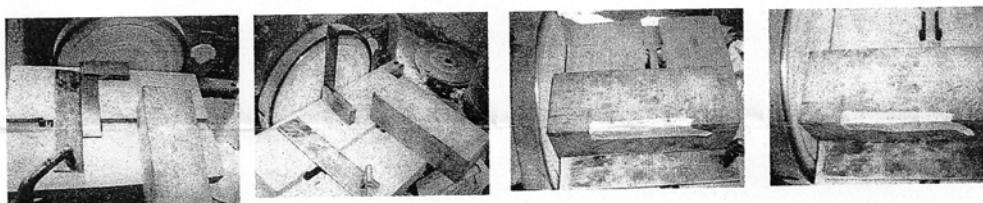
After the ring has been cut, there will be an area that needs to be ground on the belt sander or bench grinder to make the tang uniform. After completing this step, cut tang to length and grind a flat spot on the end to drill a 3/16" hole. It is time to heat treat. Use the heat treat necessary for the particular steel you using. I use the 52100 and after hardening, I temper to 475 deg for one hour twice. To harden, I use a torch and bring the whole knife up above critical and let cool to black before heating the part of the edge that I want to harden. The oil I use is transmission fluid that is heated to about 200 degrees. Your particular method is what you should use as that is what you have gotten good results from. This just happens to be the way I do it and it has produced good results.

The next step is attaching the handle. I have some jigs made to put in my end mill to drill a 3/8" hole the depth of which is the length of the tang. To locate the hole to drill, hold the knife up to the block and see how far down from the top to drill it. It should be drilled in the center and probably from a block of wood at a minimum of 3/4" thick. I prefer a 1" as sometimes the tang is not perfectly aligned with the blade and is not noticeable till you have it all glued up. That sucks so I need a little extra for a margin of error. Before drilling, make sure that the end of the block is perfectly square with the sides. This is what will make the bolster fit tight without gaps. I use a small disc sander with table and square everything up before putting the block on it. This can be done after the block of wood is drilled so if you forget, no problem. After drilling the hole, check the fit and if there is a gap around the bolster, now is the time to fix it. You are now ready to locate the hole for the pin material. I use a 1/16" pin in addition to the epoxy to hold the handle on.



The jig for drilling the hole square with the end. Notice the circular grind marks that show it didn't miss any spots. The last pic shows the depth indicator (tape) and the location of the drilled hole.

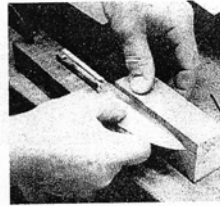
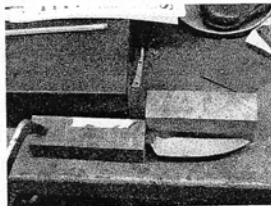
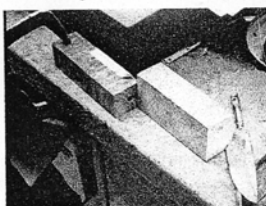
To get the end perfectly square with the sides, you need to set up a disc sander with stops and guides to follow. Below is a series of pics that show how I do that.



Checking bar for square and table for square.

Block before sanding end and after sanding end.

Locating the handle pin is easy to do, just follow the photos and drill.



Clamp your handle material down to hold it in place. Insert the tang and hold block to blade. Take out blade and hold over handle

material to mark hole for drilling. I drill a 1/16" hole for the pin. After drilling hole, insert tang into handle and look to see if hole aligns with hole in tang. IF, you only see part of the hole, no worry, take a 1/8" round file and file out the obstruction. If real bad, slot the hole as the glue will fill the void and the pin will still keep the tang from coming out in the event the glue would ever fail.

AT THIS POINT, THE BLADE HAS BEEN HEAT TREATED AND IS READY TO GLUE AND PIN.



Mark profile on handle.

Saw and grind to lines.

Grind sides to shape.

Clamped up, check alignment of blade with block.



The sides have been rounded off to shape and rough sanded. Clamp to board and hand sand to final finish. The knife is then ready to finish grinding, sand blasted, tool black applied and final belt sanding. The knife is belt sharpened and finished on hard Arkansas stone.

*Ray Kirk*



Ray Kirk, Master Smith  
[ray@rakerknives.com](mailto:ray@rakerknives.com)

