



## BENT AND STRAIGHT KNIVES

This workshop is an introduction to making traditional bent and straight knives of the Northwest Coast. They are essential tools for carving Northwest Coast Art, it is difficult to carve these shapes without them.

The student will learn the necessary skills and appreciate the fundamentals of making the traditional knives. Along with, proper use of power tools, files and torches and the importance of caring for and sharpening their tools.

### Materials

- Tool Steel ½" to ¾" in width, various lengths

### Supplies

- Sharpie
- Paper towel
- Motor oil
- Dowels

- Emery paper 1000-, 2000-grit

### Tools

- Bench Grinder
- Flat File
- Clamps
- Diamond Stones: 200-, 600-, 1200-grit

- Torch
- Vice grips

### Safety

- Eye protection
- Ear protection
- Dust mask
- Safety boots

### Procedure: Bent Knife

**SAFETY: Wear CSA approved goggles, dust mask and steel toed boots while making these tools.**

1. Using a sharpie felt, draw the center line on your piece of tool steel. Then, draw on the profile of knife you want to make.
2. Using the bench grinder, shape the steel to your specifications. When doing a double-sided knife, ensure you use the center line as a guide. Quench the hot steel in cold water after a couple passes on the grinder. This will prevent the steel from overheating and warping.

- Once the shape is ground down to the desired thickness, start on the bevels. Start at the center of the blade and work towards the end. This is where the bulk of the grinding will take place.

**TIP:** Grind the bevels as flat as you can, using the light reflecting off the blade as a guide.

- Once you have created a bevel from the center to the edge on both sides, you can attach your knife to a table with a clamp and use a flat file to start to flatten in the bevel. This will level out any bumps, creating a flatter surface.

- Once flat on both sides, you can now turn to the diamond stones. Starting with a 200-grit diamond stone and work your way up to a 1200-grit stone. At this point we are looking to make your bevels mirror sharp with no blemishes on the steel.

**TIP:** Use the light, as an aid, to look for blemishes or dips in the blade.

- Once you have finished with the 1200 diamond stone, switch to emery paper, working from 1200- to 2000-grit. It is important to continue keeping the bevel flat. Once you have completed with 2000-grit emery paper, your knife will be sharp with a mirror like surface.

- Now is the time to bend the blade using a torch, vice grips and the anvil surface of a vice. Gripping the end of the knife with the vise grips, heat the steel to a cherry red. Gently and without much force, start bending the blade on a hard surface.

**A.** The blade will cool while bending and will have to be reheated to cherry red to continue the bend. Repeat this procedure until the desired bend is completed.

- When we have reached the desired bend, heat the entire blade to the cherry red and quickly dunk it in oil.

**NOTE:** It will result in a quick cool down and will make the blades brittle. Be careful handling the blades from here as they are susceptible to breaking. They will look burnt and covered with black scale. Wipe the oil from the blade and take a dowel wrapped with 1000-grit emery paper to clean them up. It is important to take off all the carbon and soot so you can see the steel underneath it. Once all the carbon has been removed you can go on to the next step – tempering.

## Tempering

Tempering is using heat to a desired temperature to change the hardness of the metal. A good indication of proper temperature is to use the metals colour when heated.

The following table shows the various colours, temperatures, and common uses of tempered steel.

Colour	Temperature	Use
Pale straw	176° C / 349° F	Engraver, razors, scrapers
Light Straw	250° C / 401° F	Bent knives, metal drills, reamers, metal-cutting
Dark straw	226° C / 439° F	Bent knives, adzes, scribes, planer blades
Brown	260° C / 500° F	Dies, drill bit, cold chisels, hammer
Purple	282° C / 540° F	Punches, stone carving tools
Bright Blue	310° C / 590° F	Screwdrivers, wrenches
Deep Blue	310° C / 590° F	Springs, wood cutting saw
Grey blue	371° / 640° F	Structural steel

- To temper the blade, use a torch heating the steel to the selected temper. Pass the knife over a low flame, heating the heavy or thicker part of the blade first. From there, move the blade back and forth through the flame until the desired temper has been reached. When the temper has been reached, dunk the blade in the oil immediately and then lay it out to cool to touch.

- You are now finished and can attach to a handle.

## Procedure: Straight Knife

**SAFETY:** Wear CSA approved goggles, dust mask and steel toed boots while making these tools.

- Using a sharpie felt, draw the profile on both sides of your piece of tool steel and draw on the profile of knife that you want to make.
- Using the bench grinder, shape the steel to your specifications. When doing a double-sided knife, ensure you check both sides of the knife. Quench the hot steel in cold water after a couple passes on the grinder to prevent from overheating and warpage.
- Once the profile is complete you can start on the bevels. This is where the bulk of the grinding will take place. Remark the bevel profiles on both sides of the metal with a sharpie.

**TIP:** Grind the bevels as flat as you can, using the light reflecting off the blade as a guide.

4. Once you have created a bevel from the center to the edge on both sides, you can attach your knife to a table with a clamp and use a flat file to start to flatten in the bevel. This will level out any bumps, creating a flatter surface.
5. Once flat on both sides, you can now turn to the diamond stones. Starting with a 200-grit diamond stone and work your way up to a 1200-grit stone. At this point we are looking to make your bevels mirror sharp with no blemishes on the steel.  
**TIP:** Use the light, as an aid, to look for blemishes or dips in the blade.
6. Once you have finished using the 1200 diamond stone, switch to emery paper, working from 1200- to 2000-grit. It is important to continue keeping the bevel flat. Once you have completed with 2000-grit emery paper, your knife will be sharp with a mirror like surface.
7. For this step we will use a torch and vice grips, and car oil. Gripping the knife with a pair of vice grips, heat the steel to cherry red. Quickly dunk your knife into car oil.

**Note:** It will result in a quick cool down and will make the blades brittle. Be careful handling the blades from here as they are susceptible to breaking. They will look burnt and covered with black scale. Wipe the oil from the blade and take a dowel wrapped with 1000-grit emery paper and clean them up. It is important to take off all the carbon and soot off so that you can see the steel underneath it. Once all the carbon has been removed you can go on to the next step – tempering.

8. To temper the blade, use a torch and heat the steel to the selected temper. Pass the knife over a low flame, heating the heavy or thicker part of the blade first. From there, move the blade back and forth through the flame until the desired temper has been reached. When the temper has been reached, dunk the blade in the oil immediately, and then lay it out to cool to touch.
9. You are now finished and can attach to a handle.

