KNIVES
YOU CAN MAKE

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About the Illustrations

As this book was coming together, a friend asked why I chose to make drawings rather than use photographs. It was a good question and when I explained the reason he said, "You should tell the readers that." So I will.

In fact, I did take pictures—hundreds of them, recording each step as a knife was being made. When it came time to match the text to the images, I discovered a conflict between what I wrote and what was shown. For me as a teacher, personal involvement in problem-solving is more important than accurately following directions. Let me use cooking as a metaphor. There is nothing wrong with using a cookbook, but good cooks see a recipe as a starting point. From there, a really great cook makes dozens of changes that range from the ingredients, to the slicing and dicing and on through to the presentation.

The pages that follow offer instructions on how to make about three dozen knives, always trying to make the point that the knives shown here are only examples of what can be made using the techniques presented. The problem with the photos was that they were too specific. My words might say, "Cut to a convenient length," but the photo says, "Use a hacksaw, ruler, marker and vise to cut to 6." That's just what photos do; they show exactly what is happening at that moment, which unintentionally dampens creativity.

So I turned to drawings. They allow me to focus on a particular point and, I hope, allow you to add your personal touches that will make the process more engaging, and make your knives unlike any others. Bon appetite!

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INTRODUCTION

I don't think there is a culture anywhere on the planet that does not use knives. They may be made from steel, bronze, bone, wood or some other material, but cultures as far back as we can reach have invented, altered and perfected knives and knifemaking. One thread of that development can be seen in industrialized cultures, where knives of remarkable strength and elegance can be found. Some are made in large quantities and others are handcrafted one-of-a-kind works of art, valued as much for their mastery as for their edge. Visits to museums, knife shows and online venues to search these out will reward the time spent.

This book pursues a different, simpler thread. For all the glamorous knives in the world there are dozens more everyday knives. Talk to any carpenter, carpetlayer, seamstress, cook or gardener and you'll soon learn about a favorite knife; one that is particularly suited to a task and fits well in the user's hand. These are the kind of knives presented in this book. They are a pleasure to make and offer years of rewarding use, for yourself or those lucky enough to acquire them.

Right from the start, let me make a bias clear. I favor hand methods over machinery and simplicity wherever possible. People who make knives for a living almost always use power equipment, and why not? Knifemaking is a precise and often time-consuming craft and electric saws, grinders, sanding and polishing machines help get the job done faster. I have no argument there.

This book, however, keeps things simple. One advantage of this approach is that it lowers the threshold for amateurs to make a knife. Most of the knives you'll find here can be made at a simple workbench with modest tools. For me another advantage is the pleasure of narrowing the gap between the maker and the object being made. Filing a blade by hand provides a more direct contact than holding the blade against a grinding wheel. Slower, but for me more enjoyable.

"Knives You Can Make" is divided into four sections. The first describes materials, tools and procedures that are applied throughout the book. The second deals with fixed blade knives, arranged from simplest to more challenging techniques. The third section turns attention to folders or "clasp knives" and again runs from simplest to more demanding folders with locking blades.

The fourth section, a little idiosyncratic perhaps, shows what I am calling Rustic Knives. These are only a few examples of artefacts that could fill a much larger book all by themselves. They embody vernacular design, ingenuity and an immediate response to a particular need. As before, the chapter moves from simple to more complicated knives, and while not everyone will be drawn to these knives, they provide a baseline that connects us to the blacksmiths, peddlers and artisans of bygone eras whose ingenuity has brought us to where we are today.

The best way to describe the techniques used in each of these knives is to show one being made. If you visited a knifemaker's workshop for a lesson, you wouldn't sit down over coffee and discuss the steps in making a particular knife—you'd watch him or her at work and learn each step by observation. That's what is going on here. This is not a project book, at least not unless you want it to be. You are free to copy these knives, but I encourage you to mix details between the knives shown here. For instance, choose a shape from one knife, a handle material from another and the size from a third. In other words, make it your own.

Don't rush; don't hurt yourself. I hope knifemaking gives you as much pleasure as it gives me.

Tim McCreight,
Harpswell, Maine

Carving Knife

There are several names and many variations on this knife. For our purposes we'll define it as a tool in which the blade is considerably smaller than handle. A familiar modern version is the popular X-Acto knife. Many trades have similar knives adapted to their particular needs—knives like these are used by woodcarvers, furniture makers, graphic artists, seamstresses, carpetlayers and many others.

Materials for this style are simple: hardenable steel, wood and a nail or rod of brass, nickel silver or any other metal.

Besides the thousands of possible shapes of the handles and blades, there are also options in the way these simple knives can be constructed. I'll show three styles here, and encourage readers to use these only as starting points for their own designs.

Full Tang

This variation builds on the self-handled knife in the first project. The idea is to saw a piece of carbon steel into the shape of the entire knife, then attach a handle over a portion, leaving the blade element exposed. The handle could be made of wood, plastic or metal and could be attached with rivets or pins.

Friction Tang

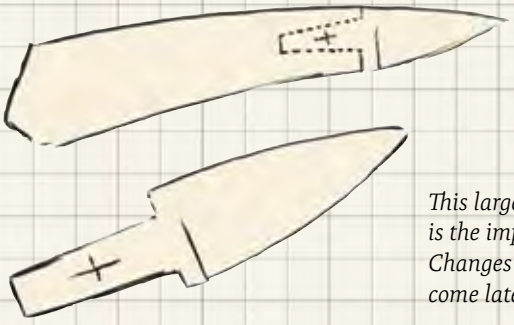
In this version the blade has a tapered tang like a file. One or two holes are drilled into the end of a handle and the blade is forced into the hole, perhaps with the addition of epoxy. This style is particularly suited to a handle design in which you don't want the edge of the steel or any pins to show.

Tang with Rivet

This style has the benefit of using less steel than the full tang and being stronger than the friction tang. It is the one I will demonstrate in detail.

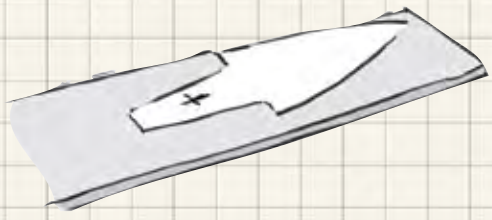
The first step, as always, is to sketch some shapes to come up with a design that looks and feels right for your hand and the tasks you intend it to do. Cutting the shape out of stiff paper is a good idea and making a full size pattern in something more tangible is even better. A strip of soft pine sold in home supply stores as lattice is perfect for this because it is easy to cut and file. It is much easier to refine ideas on wood than in steel. Making a mock-up, something that might seem like an extra step, could end up saving time in the long run.

1. When you have decided on your design and materials, draw the shape of the entire knife and figure out the size and shape of the tang. It should taper slightly as it goes into the handle but remain wide enough to have a rivet hole that is not too close to the edge.

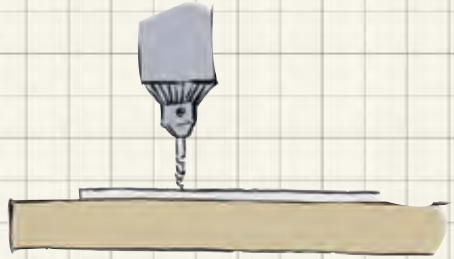


This larger view of the steel blade is the important part at this stage. Changes to the handle shape can come later on.

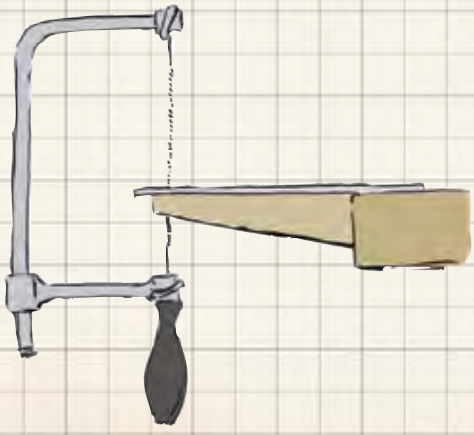
2. Trace the blade onto a piece of steel, for instance by pasting the paper directly on the blank. Remember to clean the steel to remove oil that will prevent the paper from sticking.



3. Centerpunch and drill the hole that will take a rivet. This will secure the blade into the handle. As mentioned earlier, it's always a good idea to drill holes when the piece of steel is large and unsharpened. At this point there is more to hold onto and less danger of cutting your hand if the steel spins during the drilling.



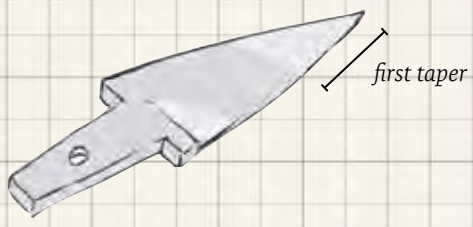
4. Saw out the blade, then refine the outer edge by filing.



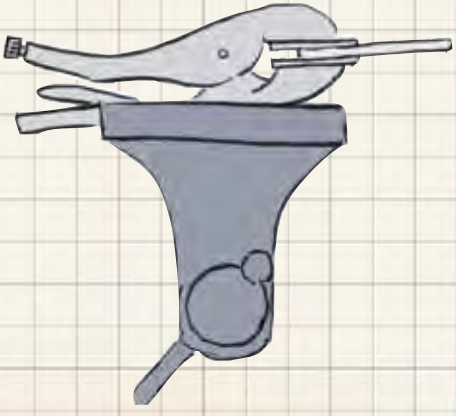
5. Blacken the outer edges with permanent marker and use dividers to scratch a centerline around the blade. This point of reference will help you file a symmetrical blade. Clutch the blade in vise-grip pliers, using a bit of copper or brass to avoid making unwanted marks in the tang.

6. If there is to be a ricasso, file it now. This is an optional step.

7. File the "first taper"—a flat plane that covers about a third of the blade at the pointed end. Remove the same amount of metal from each side until you come close to the centerline.



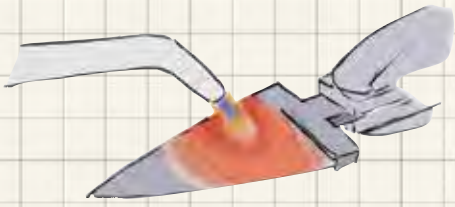
8. File the "blade taper"—the slope that covers the entire blade leaving the steel at original thickness along the back or spine and ending at or very near the centerline. There is a tendency to focus on the cutting edge and neglecting the midsection of the blade. This will make it difficult to get a really sharp edge so don't quit too soon.



The cross-section on the left is the goal. Be careful to file away the darker areas on the image on the right.

9. Sand the blade to remove file marks, working evenly on both sides. Move progressively from coarse to finer paper, for instance #150, #220, #320.

10. With the blade held in vise-grip pliers, heat the entire blade to a glowing luminous red-orange color and plunge it quickly into oil (or water depending on the steel being used). Swirl the blade as you immerse it so the metal is constantly bathed in fresh coolant. Keep the steel in the liquid for about a minute or until the steel is cool enough to be held in your fingers.

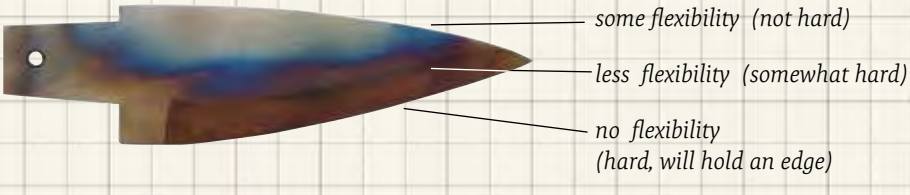


11. Wipe off the coolant and lightly rub a file along the blade to test hardness. If the hardening process was successful, the file will skate across the steel without biting into it. You will also hear a high-pitched sound that is clearly different from the noise made earlier when you were shaping the blade. If your hands are clean, pat yourself on the back.

    If the blade does not pass the hardness test, it means the steel was not hot enough, or, possibly that you paused before the quench. Hesitation of only a few seconds is enough to allow the steel to cool down from what is called the "critical temperature," the temperature needed to transform the steel into a harder structure. If that is what happened, repeat the hardening step and test again.

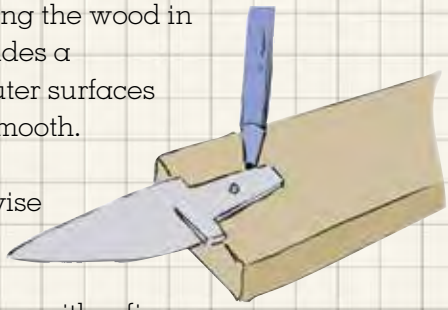
12. The next step requires that you see color changes when you reheat the steel. In order to see the colors, sand off the black and gray oxides just created. Return to the last sandpaper used on the blade and sand the steel to reveal its silver color.

13. The next step is called tempering or "drawing the temper" and it involves heating the blade to a specific range of temperatures. Gently heat the spine of the blade near the tang until you see a bloom of colors. Using a small torch flame, nudge that heat along the blade so the spine becomes blue, the cutting edge is straw yellow and the area between them is purple. The moment you see this pattern, dip the blade into water to stop the heat from going further. The heat used for tempering is much lower than for the hardening process. Use the smallest torch tip available, and keep the flame small.



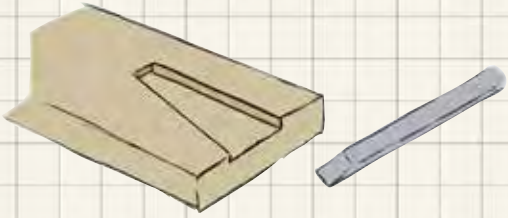
14. Sand the blade to its desired finish. This could end with #320 paper or go through progressively finer grits to #600 or even to polishing on a buffing motor.

15. The handle for this design calls for two matching slabs of wood, both with a perfectly flat surface where they will be glued together. Rub the wood on sandpaper if needed to achieve this perfect fit. Leaving the wood in block form at this stage provides a better grip in the vise. The outer surfaces do not need to be perfectly smooth.

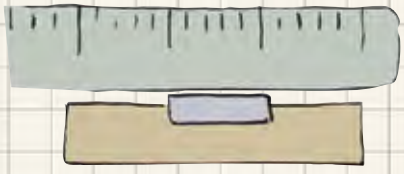


16. Grip one block of wood in a vise with the flat side up, and lay the blade on it, tight up against the end. Trace the tang with a fine-tipped pen and be precise. The goal of the next step is to carve a recess that makes a hand-in-glove fit with the tang.

17. Carve a recess that is a perfect fit with the tang, using whatever blades and chisels are available. Of course now that you know how to harden and temper steel, you can make a small chisel if you need to.

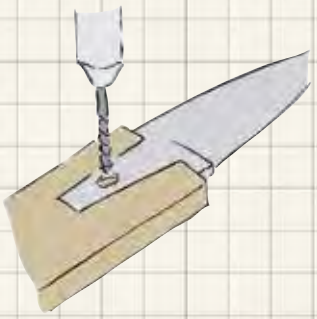


As the carving proceeds, put the tang into place and lay a straight-edge like a ruler across the opening to check the depth. The tang must be flush with the surface—neither too high nor too low.



The ruler doesn't touch the wood, which indicates that more carving is needed.

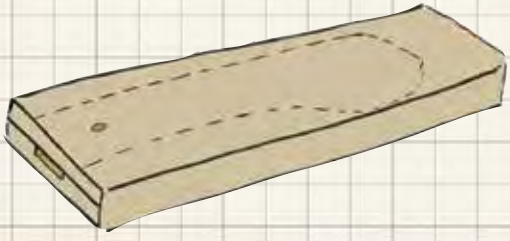
18. With the tang in place, drill a hole through the wood that aligns perfectly with the hole in the tang. Use the same drill bit that was used for the tang.



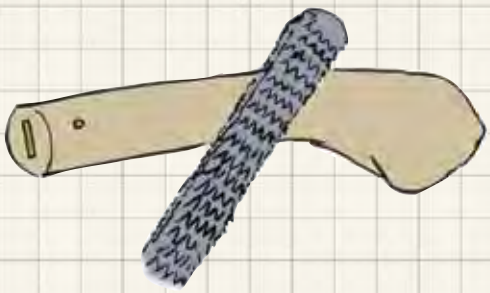
The recess can be carved in only one of the handle pieces to full depth, or carved half-depth in each piece. If that is the approach, take care that the recesses line up when the handle slabs are glued together.

19. Spread a thin layer of wood glue onto the slab, being careful that it doesn't spill into the recess. Fit the pieces together, secure with clamps or in a vise, and allow the glue to cure.

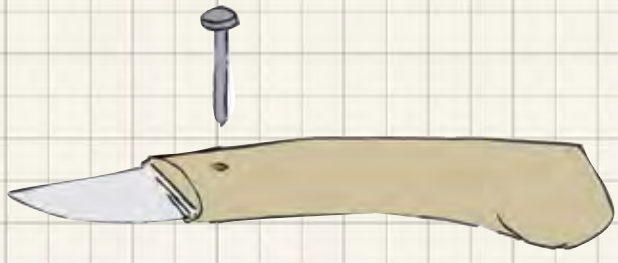
20. Using the hole in the first side of the wood as a guide, drill a hole through the other side. Keep the drill bit perpendicular to the handle.



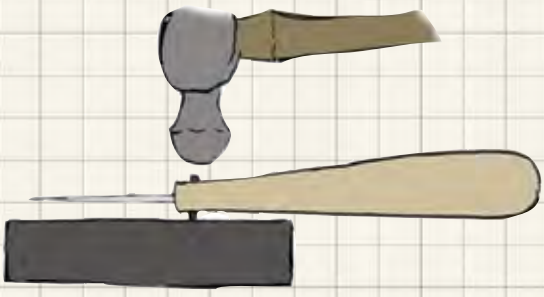
21. Check the fit of the blade into the handle, and when you know it is a good fit, turn your attention to shaping the handle. This is typically a matter of tracing your original paper pattern, cutting the wood with a saw, then refining the shape with rasps, files and sandpaper. Check the feel of the handle frequently as you seek the perfect shape.



21. In this example I used a short steel rod to secure the blade into the handle. These rods are commonly available in hardware stores where they are called "nails." Find one close to the right size and file as needed until it makes a snug fit into the holes in the blade and handle. Insert the pin and cut it off so only a small bit sticks out from each side. The rule of thumb for a rivet is one-half of the diameter of the rod. If the nail is two millimeters in diameter, the amount projecting should be no more than one millimeter.



22. To form a gently flared lump on each end of the rod, hold the knife above a steel surface (such as the table of a vise) and tap lightly on the end of the rod. Turn the knife over and repeat, alternating from side to side until a rivet head is formed on each end. Use a fine file and then sandpaper to smooth the rivet heads.



23. The wood can be left as is or finished with oil, paint or varnish. Apply and allow to dry as instructed by the manufacturer.

24. Sharpen and hone the cutting edge as described in the first chapter.

The finished knife