

# Woodworking

## *A Small-Scale Business*

**PRACTICAL ACTION**  
Technology challenging poverty



### Introduction

Woodworking is the art of forming and shaping wood to make both useful and decorative objects. It is a skilful process which takes time and determination to master. However, if you can perfect the making of a product - a bowl, for example - you can sell it to make money. Running a successful woodworking enterprise is dependant on many factors, some of which are covered in this Technical Brief.

### Workshop equipment and tools

To be able to work effectively you need to have at least some woodworking equipment. Many items of equipment and tools can be self-made, reducing the cost of setting up a workshop.

### Work Bench

A workbench is usually like a table. It has a large flat working surface supported on four legs. On the bench there be a rack for holding various tools (although these are sometime mounted on the wall) and hole for locking pins. As well as places for hand tools there may be vice fixed or incorporated into the bench design so work can be fixed into place while being worked on. The workbench should ideally be level and provide a solid working environment for a range of product sizes. See the Practical Action Technical Brief [How to Make a Woodworking Bench](#).

### Sawing Horse

A sawing horse consists of some 'A' frames. These can be joined together or freestanding, it doesn't really matter. The idea of the sawing horse is to lift your work off the ground and bring it to a suitable height to be able to cut it easily. Ensure you lift your work sensibly to avoid injury.



**Figure 1** : Tool-making training in Zimbabwe. Mr. Buekerwa tests a rebate plane. Photo: Aaron More / Practical Action 1991.



**Figure 2** : A display of tools and workbench made by Aaron Moore. Photo: Aaron More / Practical Action.

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technical brief

## Bench hook

Consisting of three pieces of wood the bench hook is designed to hook on to the top of your work bench to put work pieces on. The bench hook is fitted together squarely and allows you to cut small square pieces of wood raised off your work top, to avoid damage to your workbench.

## Clamp

Similar to a vice, the clamp clamps your work down on to a workbench so you can work on it freely.

Simple three peg plus wedge holding device – Three pegs, some dowel and some wedges, allow you to locate a piece of material in place squarely for cutting, without having to use clamps on your worktop. This is handy for log sections which are not easy to clamp.

## Wood Lathe

A lathe is a machine designed to spin your work piece round to create a cylindrical form. Using chisels to work your piece of material it is possible to create a range of poles, legs and pegs for use in the workshop or for specific products. The lathe can be electrically powered or manual powered depending on the availability. Practical Action has made available a design for a treadle operated wood lathe that uses low-cost components.

[Workshop Equipment 6 'How to make a treadle-operated wood-turning lathe'](#)

by Bob Ingham and Paul Smith.

## Hand tools

<b>Mallet</b>	Used as driving tool for chisels into wood and other pieces of wood into wood. The wood carvers mallet has a rounded head.
<b>Adze</b>	Similar to an axe in form, it is used for shaping and smoothing planks of wood. If used effectively by an artisan it is a versatile and accurate tool.
<b>Hammers</b>	various types for different jobs, such as banging in nails, squaring up and knocking in pieces of wood. The claw hammer is the most commonly used hammer due to its versatility.
<b>Pincers</b>	with reasonably long handles for a good gripping mechanical advantage, the pincers main task is to remove nails, either in the wrong place or from an old piece of wood.
<b>Pliers</b>	Pliers can be used in a similar way to the pincers, but with a fatter jaw they can grip and bend metal into various shapes as well as cut wire.
<b>Brace and bit</b>	(link to drill maybe) – The lesser form of a hand drill, the brace and bit is used for boring holes into pieces of wood. The diameter range is from 0.5cm to 5cm and a maximum of 15cm depth.
<b>Gimlet</b>	Similar in design to a corkscrew and working like a brace and bit, bores shallow holes into wood, for short screws.
<b>Hand drill</b>	Drilling small holes up to about 1cm the drill makes a pilot hole for screws, for fixing pieces of wood together.
<b>Auger</b>	Like the Gimlet but bigger. Creating holes up to 6.5cm in diameter with a shaft length of about 60cm.
<b>Saw - cross cut</b>	As the name suggests this saw is used for cross cutting. Large sections of trees which need to be reduced in size, the cross saw has a length of about 1.5m.
<b>Saw-rip</b>	The teeth are set to make it easy to cut along the grain (in the direction of the grain) making it easy to cutting down a plank of wood. About 50 – 70 cm in length.
<b>Pit saw</b>	Used for cutting/splitting pieces of wood along their entire length. The pit saw would be about 1.5 – 3 metres long.
<b>Bow saw</b>	The carpenters' bow saw is used for cutting wood into shapes. The foresters bow saw is used for felling trees and then cutting them across to make them into smaller lengths, ready to work on.

<b>Hack saw</b>	traditionally a metal working saw, but it can be used for cutting wood. As the teeth on the blade are so small the process is usually slower than with a normal saw. Various size blades can be fitted and usually range in length from 15 – 20 cm.
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**Clamps** : As their name suggests they clamp materials in place. This could either be clamping one piece on to a workbench whilst cutting it or clamping to pieces of material together whilst joining them.

**Saw-keyhole** : Again as the name suggests this saw is used to cut keyhole size shapes in wood. They are good for cutting small holes in wood in general. Usually about 30cm in length.

**Saw-Tennon** : A fine toothed blade for cutting small accurate pieces of wood accurately.

**Screwdrivers** : There are two main types of screwdriver the slot head and cross head or the ordinary blade and the cruciform blade. Lengths vary from 15 to 50cm, as do the head sizes according to screw type.

**Files** : The main use for files is to shape your wood. There are a few types, from flat to triangular, round and half round, and they all come in different sizes. The other use for files (mainly the flat and the triangular) is to sharpen the teeth on saws' blades.

**Chisels** : Basic tool for shaping and cutting you piece of wood in to various shapes. They can be used effectively with a mallet to carve out rough shapes, which then can be smoothed down. The most common use is probably in joint making such as mortises and tenons. They come in various shapes and sizes and are also used in woodturning.

**Rules** (various) : Various tape measures and rulers can be used in the workshop depending on the accuracy or the measurement and the size of your material. Most common is wooden or steel rule.

**Spoke shave** : A small wooden device with a small blade attached. Like a small plane the spoke shave is used to shape your wood in smaller detailed areas.

**Block Plane** : Use to smooth off the end of your piece of work material, cutting the end grain. Usually about 2.5 – 4cm in width.

**Jackplane** : Used to shave pieces of wood off in the direction of the grain, i.e. along your work piece. Shaving material off until an exact thickness is achieved. [How to Make a Jack Plane](#)

**Rasp** : Similar to a file, but with larger teeth. Used for removing larger sections of wood to shape and smooth your wood. May be made of solid metal, with the possibility or renewable blades.

**Oilstone** : Used for sharpening most tools, blades –such as chisels, knives and other sharp edges.

**Smoothing plane** : Used to plane timber smooth after it has been worked. About 4-6cm cutting iron, leaving a smooth finish.

**Callipers** : used for measuring diameters of various sections, both internal and external.

**Set Square** : Again as the name suggests, this tool is used to set things square. Can be used for setting or marking out right-angled sections.

**Marking gauge** : Used to mark out where wood is going to be cut. They come in various forms with tightening screw or home made with a wedge tightening set up.

**Vices** : similar to clamps in that they hold your work piece in place, but they can hold larger pieces of material both in width and lengths. They are usually mounted on your workbench so you can work on the material with all your tools at hand.

### Running a business

Whatever the business, there are certain practices that make the business work and ensure that you are making a profit such as looking after your customers, ensuring you are asking the right price for what you sell.

### Product design

It is important to produce items that are going to be popular with customers. Some of the options are considered below.

### Furniture



**Figure 3:** Furniture made in Malawi.

Photo: Paul Harris

### *Manual on Jigs for the Furniture Industry*

[United Nations Industrial Development Organization](#) (UNIDO) 1981

This manual details the basic requirements in the design of jigs and gives some examples of jigs for use on basic woodworking machines.

### Wooden toys

[Case Study 1: Educational Wooden Toys in Sri Lanka](#) by Tim Godwin & Marjorie Wright, Practical Action Publishing 1984 ISBN: 9781853390531

### Equipment suppliers

#### **Acres Willington Ltd**

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## References and further reading

- [How to Make a Jack Plane](#) Practical Action Technical Brief
- [A Woodworking Bench](#) Practical Action Technical Brief
- [Oil Soaked Wood Bearings](#) Practical Action Technical Brief
- [How to make Planes, Camps and Vices](#), Moore A, Practical Action Publishing 1987 ISBN: 9780946688982
- [Carpentry Toolmaking](#), Moore A, Practical Action Publishing, 1993 ISBN: 9781853391965
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- [Educational Wooden toys in Sri Lanka](#), Godwin T, et al, Practical Action Publishing 1984 ISBN 9781853390531
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- [A Guide to Wood Joinery: Part II \(Techniques of Manufacture\)](#), National Investment Commission, Monrovia, Liberia, 1984
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This Technical Brief was compiled by Neil Noble for Practical Action, 2008.

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