S1.3 Basic Machine Tool List.

This document was written by 'The Wagon Man' and was written for the FMES on line readership. 'The Wagon Man' is a Committee Member of FMES and has as his speciality producing scratch-built models of Railway Wagons in 5-inch gauge. This series of Articles includes his personal perspective on this fascinating branch of the hobby.

Supplement 1.3

Introduction

This is the final Part of Supplement 1, and will deal with the Basic Machine Tools required for a serious attack on scratch building.

As ever, I can only discuss my selection and the reasons for the choices, but I hope they will give you a sound basis for your own decisions.

As we are now starting to talk about potentially significant costs, it makes even more important that I repeat my frequent cry "Join a Club". You will get plenty of advice, most of it good, but beware the "Expert". Every Club has one, but they can be recognised easily – they will tell you, sooner rather than later. (I have a golden rule that I will only give advice on something if I have tried it. Otherwise, I might reply "I have heard/read that…but I digress). You must have an individual with you whom you can trust – a quiet word in confidence with a Senior Committee Member is well worth it, and they may perhaps suggest an appropriate person.

Basic Machine Tools

Bench Drill (aka Drill Press). I bought mine 50+ years back. It is a solid (ie heavy) example, and has only needed a replacement bearing in all that time. The chuck capacity is nominally 1/4" (6 mm), and with it, and a conventional DIY pistol drill, I built my first locomotive, a Class 33 Diesel/Electric in 5" gauge. The only external help I needed was in the turning of the wheel sets.

I was fortunate later in picking up a Pillar (ie floor standing) Drill later from a second-hand tool merchant. The table on this will go to the floor, and most unusually the Drill Head also ran on its own vertical bed. This enables precision drilling to start an operation and to proceed dropping the table as the drills got longer whilst accurately maintaining the centre. It had a chuck capacity of ½". The dealer had four of these in stock, and I chose the best example. When I got it home it was full of sawdust, so I assume it came from a school workshop.

The Lathe. Throughout this series I have deliberately not identified any specific company by name, as I am giving guidance to assist you to make your own choices. However, the lathe is an exception in view of it probably being the most expensive item and one which you will need early on. To modellers of an earlier generation several machines with various different pros and cons for each were the popular item of choice. These are now reappearing in the second-hand tool suppliers and some societies as the inevitable overtakes us all.

As a consequence, some very nice machinery can be obtained at considerable saving. Worry not that it is old – I bought my lathe at one of the engineering shows 35 years ago, and it was 25 years old then. It has since built three 5" gauge steam locomotives and one electric, in addition to the wagons and countless other mini projects. The only thing I have done in all that time was to replace the main spindle in the headstock when I first bought it – a testimony to its quality.

The Mill. The Mill is a close relative of the lathe, and can come in two types – vertical and horizontal. My preference is for the vertical type, but that is only because I have never used the alternative. More recent models have a swivel head. Though nice to have, it is possible to improvise with various packings if angular cuts are required. I do not advocate this sort of compromise for the lathe or the mill, as everything from tool tip to workpiece must be as solid as possible if good results are to be obtained.

I would suggest that a mill is not a high priority acquisition, useful as it is, as with a bit of ingenuity the Lathe can be adapted to satisfy our needs. Talk to other Club Members.

Lathe and Mill Cutting Tools. Originally tools were ground from High-Speed Steel blanks. To do this and produce a good tool with the appropriate tip shape and size together with the necessary clearance angles is a highly skilled process, particular for the newcomer, and is not to be recommended. Modern practice favours a special holder which can take interchangeable tips, typically of carbide or similar hard material, and is undoubtedly the way to go. They do have one major drawback however in that they do not like intermittent cuts which may be encountered castings are the starting point. Intermittent cuts will crack or chip carbide in no time flat. It is therefore worth having a few HSS tools in the box, and use these for initial roughing out. Once again, the specialist suppliers should be consulted – they have a vast range of knowledge and experience to draw on.

Holding the Workpiece – The Machine Vice, Clamping Kits and Chucking Pieces. No matter if it be a lathe or a mill, it is essential that the workpiece should be rigidly held. Even in our size considerable cutting forces are involved. The consequences of the workpiece coming loose range from ruining the work which may have taken a long time to get to the stage it's at, damage to the machine and anything in its surrounding area and, worst of all, injury to you or any bystanders. If you have ever witnessed such an event, you will not forget it in a hurry.

There are three favourite methods of holding a workpiece.

The first is a proper **machine vice**. This is a solid, heavy piece of kit which is clamped to the bed of a mill (or drill press). Get the biggest that you can which is compatible with your chosen machine.

The second is to bolt or clamp the workpiece directly to the machine bed. There are a number of versatile **clamping kits** on the market which consist of a variety of long screws, adjustable height blocks, clamps and the correct size T nuts for the bed, as these vary in size between machines. A blinding glimpse of the obvious, but make sure you get the kit with the correct size T nuts for your machine.

The third is the incorporation of a **chucking piece** whose position requires careful pre-planning, It is common in lathe work with castings. It is a superfluous round protrusion which will eventually be no part of the finished article. This is turned to be round first, and then held in the lathe chuck (or rotary table – see later) to hold the workpiece firmly. When I were a lad, I was told that it was called a chucking piece because you chucked it away when you had finished with it - ah, the sweet innocence of youth.

Comment. A lathe or mill can be expensive, and that is why I have concentrated on pre-owned (and loved) machinery. Because of its age, it is likely to be Imperial based, rather than Metric, but with relatively inexpensive Digital Read Outs (DROs) which are now available and can be fitted retrospectively, that is no longer a problem. Whatever your machine, you can have whatever you

like. I would repeat my opinion that a mill is a low priority acquisition, as most of our needs can be met by a lathe, and that is the only machine tool requiring the highest financial outlay

It's a bit like buying your first car. Take an expert with you, but remember if you have any doubts there will be another one round the corner. Take your time – there is plenty more to do on any project which does not need a lathe! I might even suggest that you put off your decision until you build your second model – after all, you may decide (I hope not) that scratch building is not for you.

Other Machine Tools.

It is my belief that a lathe and its accessories is the only machine tool that you need to buy. However, there are a number of “nice to haves” if you spot a good one, and the following notes relate to my choices and preferences.

The **Rotary Table.** As its name suggests this is a circular table which runs on a built-in base. The latter is fitted with a screw/worm mechanism and by this means the table can be accurately moved a given angle, the table and the screw handle both being calibrated in degrees, Clamped to the machine bed, and accurately catered it is ideal for angular indexing work.

A **Power Hacksaw.** A common tool, with many still on the market, is a bench hacksaw. Apart from its obvious use, when fitted with stops it is a great time saver. After setting it will then cut as many pieces of identical length whilst you get on with something else.

A **Bandsaw.** There are a number of Bench fretsaws around, originally intended for woodworking.

The cutting speed is really too high for metals, but it is possible to fit a smaller pulley onto the motor drive shaft and extra support for the blade itself (ask a friend to help) and produce an inexpensive machine. Mine has been in use for 25 years.

A **Linisher.** Again, primarily sold for wood working, when fitted with fine grit belts can be a most useful adjunct in the work shop. You have only to use it once to appreciate the superb finish this can give to metal items.

Conclusion

Well, that’s it. I hope that I have helped with my own views and suggestions, but please ask others.

I have no wish to discourage you from buying new from manufacturers. Talk with them. Many fine and versatile products are available if you choose to take this route.

However, I hope that I have shown that that you do not need to obtain everything at once – my collection was built up over a lifetime, and many of the items in this and Supplements S1.1 and S1.2 are nice to haves. Think about what you <u>really need at the outset</u> and financial savings can be the result. Keep your eyes open, talk to fellow club members and take your trusted colleague with you for machines.

Above all, ENJOY!!.

As ever the choice is yours.

The Wagon Man

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