

Getting started, some hints and tips

1.0 Introduction

There continues to be a significant number of people interested in model making in one form or another, in particular live model steam locomotives. But these days very few have acquired the skills required to build a model for their own use. So how do you get started?

This article is aimed at those wishing to get started on model making plus a few do's and don'ts from experienced modellers. It will concentrate on live steam locomotives but the concepts are applicable to all types of models including boats, some with a marine boiler, traction engines, clocks and road vehicles.

2.0 Making choices

The first step is to make some decisions. These will depend on your interests, how soon you want a completed model, your own experience and your skill level.

The first choice is to decide on the type of model you require e.g. locomotive, boat, road vehicle etc., that you wish to build then decide on the motive power e.g. steam, electric, internal combustion etc.

Then you need to choose the specific model. This will be a compromise between one you like, your skill level, how much you are going to do yourself and how much you can afford to spend. For example if you are going to purchase a ready or partly built model then you might go for a more complex item but if you are going to start from scratch then something a bit simpler would be a better idea.

You will also need to consider what facilities you have available or are willing to purchase e.g. workshop, equipment, tools etc.

2.1. Ready to run

This is the most expensive option but it only requires knowledge of the models operation and the ability to maintain it. If it's a live steam model then you must ensure that it has a boiler test certificate and a valid steam test certificate. If not this should be reflected in a lower than average price and it would be wise to get an expert to check it over before purchase so you can understand the risks involved.

2.2. Complete model in need to re-conditioning

The price will depend on the condition, so it is advisable to get an experienced club member to help in the assessment. Never buy a live steam model without a valid boiler test certificate. Always be prepared for more work than first expected.

2.3. Kit

This is a good way to acquire a new model as it usually only requires a set of basic assembly tools. But beware, in the past, members have experienced problems with kits. Poly models offer live steam locomotive kits (See suppliers list on Club website).

2.4. New model from scratch

For your first project it is best to choose a simpler model e.g. a tank engine. Many parts can be purchased ready made but you will still need to do a lot of work yourself as well as having access to a well-equipped workshop. Larger models may well require lifting equipment.

You should also consider the level of complexity. Outside motion is easier to service than inside motion, three and four cylinder locomotives are much more complex than two cylinder locomotives and piston valves require more work than slide valves.

3.0 Resources

3.1 Information

The Club library has an extensive collection of books including the 'Manual of Model Steam Locomotive Construction' by Martin Evans and 'Simplex 5" Gauge 0-6-0 Tank' plus all back copies of Model engineer and books by Don Young.

A suppliers list has been compiled and can be accessed on the Club website.

The club has a complete workshop with club members on hand to show you how to operate the equipment.

Traditionally, model engineers used BA nuts and bolts which are still available from specialist suppliers. But metric nuts and bolts are much cheaper and readily available.

3.2 Equipment

You will probably need to purchase taps and dies so consider HSS rather than carbon steel for those you are going to use a lot as they will last much longer.

If you decide to purchase a metalworking lathe then consider the size. A small lathe will do most of the jobs up to say a 5" locomotive but you will then need to use the club facilities for the larger tasks such as wheels.

A vertical milling machine is not essential as most jobs can be done with a lathe and suitable tools and jigs. Some lathes can be fitted with a vertical milling attachment.

4.0 Before you start cutting metal

If you have no prior knowledge of the operation of your chosen model then you would be best to visit or join a local club and spend time looking at members models and finding out how they operate. You might also browse the internet, purchase a book or use the Clubs extensive club library. There are also lots of constructional videos on YouTube i.e. Mr Crispin, Blondihacks and Keith Appleton.

When seeking advice always bear in mind that there is often more than one way to do something. Different experts may well give good but conflicting advice which can be confusing.

5.0 One step at a time, building a model steam locomotive

5.1 Preparation

By now you will have a specific project in mind. It is worth noting that the smaller the scale of the engine the more fickle they are to drive and the less load they can pull, but the larger ones are more heavy to move around. So choose a scale that suits you.

You need to make sure that you can get all the parts e.g. castings for your chosen model.

Finally, purchase a set of drawings and study them carefully. Many of the drawings available were drawn up many years ago and contain errors and missing detail.

The following is not a complete guide but rather a few hints and tips

5.2 Step 1 - Making the frames

Consider purchasing ready, laser cut, frames as these save a lot of work. After fitting the horn blocks, assemble the frames and use a vertical milling machine to do the final horn block cut. This ensures that the wheels and axle blocks are parallel. Make sure that the oiling hole in the top of the horn block and axle box is off centre.

5.3 Step 2 - Adding the wheels

Use a four jaw chuck or faceplate to turn the wheels in a lathe. Using carbide tools on cast iron is better than HSS tools but always use a mask when machining cast iron.

Make sure you centre the wheel in the lathe so that you remove equal amounts from the rims otherwise you will end up with an uneven sided wheel.

Drill out and bore the centre hole of the wheel to allow press fitting the axle. Press fit and pin the crank pins. Loctite can be used but make sure the surfaces are clean.

Use a jig to quarter the wheels before final assembly in the frames. When satisfied, pin the wheels to the axel. Note that 3 cylinder locos need to be set at 120 degrees taking into account the angle of the inner cylinder compared to the outer cylinders.

5.4 Step 3 - Motion parts

A vertical milling machine, or lathe with vertical slide, is required to make the motion parts.

If you follow the drawings, then the setting of the return crank will be predefined but you will need to centre the valve spindle. This is easy if the cylinders have valve inspection holes. If not you will have to use measurements and/or drip water or feed compressed air into the inlet pipe and noteg when it comes out of the drain cock.

Setting the eccentrics of Stephenson's valve gear can be done by trial and error.

5.5 Step 4 - Cylinders

Either cast iron, phosphor bronze or gunmetal are suitable for the cylinders. Cast iron is cheaper but can rust. PTFE rings can be used with phosphor bronze. These have the advantage that they are self lubricating in case the lubricator fails. Using PTFE for piston valves does have a problem as PTFE expands and can lock the motion. An alternative is Fluoroscint but it is quite expensive. Vitron 'O' rings can also be used for the main cylinders.

5.6 Step 5 - Smoke box

This can be purchased ready rolled or you could make use of the clubs rolling machine.

Make sure that the blast pipe is centred on the chimney and that the smoke box is air tight. High temperature silicone sealant can be used between the boiler and smoke box.

5.7 Step 6 - Boiler

You can purchase all the copper and make you own formers, but it is much easier to purchase a kit of parts or even a ready-made boiler. If you have no experience of silver soldering, then seek help from an experienced club member. During construction you must get a boiler inspector to periodically check it as you progress.

It can be very difficult to spot microscopic leaks. One way is to immerse the boiler in water and pump up with air, or use soapy water on the out side area.

The boiler will need to be tested at 2 times working pressure. Subsequent yearly tests with fittings only require 1 1/2 times working pressure. Many regulators, in particular the sliding type, do not provide a perfect seal so you may need to block off the steam feed to pass the test.

5.8 Step 7 - Assembly and testing

You will be assembling parts as you proceed. Once you have a rolling chassis then use a rolling road and an air compressor to check the motion. Make sure you have drilled all the holes but assemble with just a few nuts and bolts as you may have to take it all apart several times to make adjustments.

5.9 Step 8 - Pipe work and fittings

Next you need to make up the pipe work. You will need to anneal copper pipes before bending and use silver solder to attach the pipe connections.

Where possible the injector needs a cold water feed and must have **NO** leaks in the pipe work. If an injector splutters when trying to inject water then this may well indicate an air leak.

You must have at least two working water feeds to the boiler to pass the steam test. These can be a hand pump and / or axel pump, and injector(s)

5.10 Step 9 - Plate work and tender

Finally make, paint and fit all the plate work and if required make the tender. Remember brass does not rust, can be easily soft soldered but steel plate work takes paint much better. Use the correct etch primer making sure all surfaces are clean before painting.

5.11 Step 10 - Testing

Finally arrange for a steam test, but check that everything works as intended beforehand. This is where you find your mistakes and have to take it all part to rectify. Even the most experienced builders have unforeseen problems!! Do not get despondent if it takes a while to get everything sorted.

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