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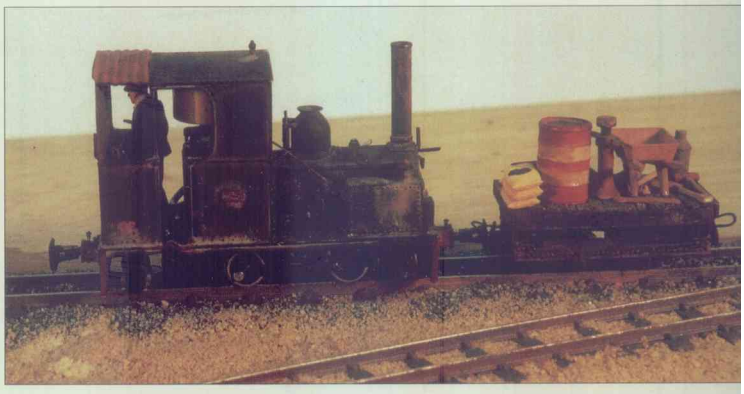
Francis Samish

LOCOMOTIVE MODELLING IN 0

Some narrow gauge motive power examined

Francis guides the modeller through the various techniques for reproducing typical nar gauge locomotives- both inside and outside framed - in miniature.

The traditional English narrow gauge locomotive as built by Hunslet, Manning-Wardle and Kerr-Stuart amongst others, was invariably outside framed. For the modeller, this type of construction poses certain problems - especially in the scale of 4mm to the foot.



Excelsior

However, inside framed prototypes were far more common than might first appear. One needs only to leaf through the catalogues of such firms as Andrew Barclay, and Bagnalls of Stafford. The little well tank *Excelsior* is a case in point. Built for the Kerry Tramway in mid-Wales, thence to the embryo L&B for construction work, she ended her days on Portland - and is rumoured to be buried in one of the abandoned stone quarries there still.

The model was built from drawings produced by Roy Link for a projected kit to be based on a Joe Works 0-4-0 RTR chassis. As is the way of the world, on completion no end of kind souls came forward with "proper" dimensioned scale drawings, all of which painfully highlighted the liberties which had had to be taken with the design so as to fit this running gear. Therefore as the model stands, she is some-what too short in the boiler department, and mite long in the wheelbase.

As a first scratchbuilt project in 009 - or indeed O-16.5 - little *Excelsior* must rate highly as a first choice. The body is basically a series of boxes and cylinders, the only tricky formation being the curved cab roof, which can be heat formed under boiling water over a tube of the right size.

Any English engine's foundation is its footplate. In this case a section of 60thou plastic sheet does duty, pierced with cut-outs to clear the motor and gear tower of the Joe Works chassis. However a built-up construction featuring plastic strips assembled on a piece of glass would work just as well - after all, it is only the edges of the footplate that are visible. At this stage, it is always prudent to work out how the superstructure is to be attached to the chassis - plastic can be tapped to take a thread, but a sounder approach is to epoxy or Superglue in a threaded plate.

Moving on to the boiler, *Excelsior's* is a section of Plastruct tubing, cut to butt up against the water tank front cum smokebox. The cab is merely a three-sided box with an open top. The trick here is to get the boiler at the right height and level between the two, and then build the rest of the loco around these key assemblies.

The rest of the work is detailing. Rivets are made using the plastic cube method. Take a section of 10thou plastic strip and cut the end lengthways into a number of tiny slivers, and then chop crosswise to produce a series of tiny "cubes". Spread these about a bit on the cutting surface, and - dipping a brush into solvent - pick one cube up at a time transfer this to the exact spot where you a rivet to appear on the model. When a r done, flood with solvent to "round off cubes into as convincing a set of rivet hea you are likely to find outside of a rivet pr

Chimney can be a length of tu *Excelsior's* is turned on the trusty U lathe, but there's no reason yours won't good if it is made up from a bit of sprue plastic strip; don't forget to drill out the t make it look as though it really is a sm stack! The dome is a little more tricky model's is turned but, for all the heart involved, a bit of Plastruct tubing with a lop of Milliput set hard would have don as well.

One interesting point as regards such gear coupled 0-4-0 mechanisms is that tend to run far better when converted to 2-0s, since there's then no chance o idlers jamming when moving in reverse.

Triumph

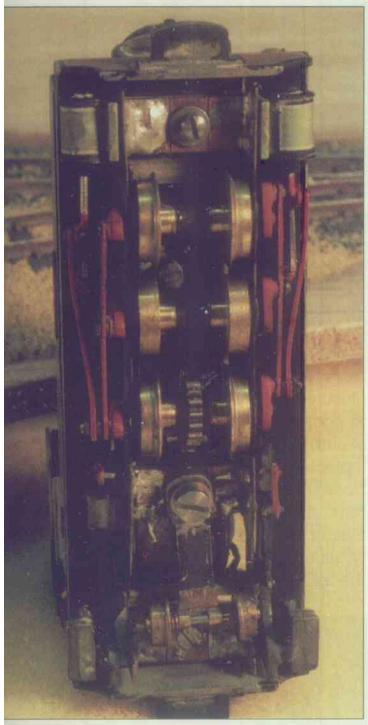
With the bigger prototypes of course th no avoiding outside frames if a truly con ing model is to result. There are, of co several ways of going about this, and it comes down to choosing the system w works best for you.

Triumph from the Bowaters paper mil way at Sittingbourne, and based arou Chivers body kit, makes a very good cas the use of split frame pick-up. This loco Saltford Models' brass wheels turned grally with axle-stubs, and designed t used with cast brass flycranks from the supplier. Electrical insulation is achieve Tufnol-like sleeves into which each half assembly is glued.

Construction commences by markin and drilling the coupling rod blanks - n as a pair from identical slivers of brass

oldered together. The frame sides are pre-pared in like manner, and the rods then clamped or tack-soldered approximately in the correct position where the axle holes should be. A quick run through with a drill the same size as that used to pierce the rods earlier, and presto! - perfect alignment every time. Only then were the rods filed to shape around the crankpin holes. The frames are a little more complicated, since you have to use the axle holes as datum marks for all the other dimensions. Once the frame profile is filed out to your satisfaction, drill through to match the diameter of the axle.

When drilling in such small sizes and in relatively thin or otherwise difficult to hold material try not to use too much pressure. A small 12 volt mini-drill scores over the pin vice here, because you do not have to worry about simultaneously having to twirl the bit at the same time. Yet for opening-up pilot holes as for axles - the pin vice should be the preferred choice, because you can "feel" when the drill is begging to bite before breaking through.



For *Triumph* copper-clad paxolin frame spacers are fixed to each sideframe with the wheels trapped within, the whole assembly being held level on a flat surface whilst soldering. Light cuts were then made with a razor saw blade to achieve electrical insulation for each side. Cylinders are sections of plastic tubing, sleeved with bits of brass tube for the piston rods, and mounted on a plastic stretcher that locates in a notched portion of the chassis.

Worth noting too is that to gain a bit of space for the front flycrank to rotate, *Triumph* has its connecting rod pinned to the outside of the crosshead rather than the prototypically-correct inside position. It is also an idea to omit any retaining collar from the front crankpin for the same reason on a six-coupled loco, filing down the pin to the bare minimum to that capable of keeping the connecting rod in place.

Mounting the motor in a split-framed chassis can be a bit of a poser. Here, the Mashima flat can is secured using silicone bath sealant onto a mounting plate - gear mesh being adjusted whilst the sealant sets - which in turn is secured to a convenient frame spacer with a single screw passing through from underneath. The mounting plate also has a Saltford idler gear bracket (originally introduced to their range to make a 4mm De Winton vertical-boiler quarry loco a working proposition!) affixed to it at one end.

Melior

The main reason for the presence of the idler gear is to allow the motor to lie flatter inside the superstructure. A refinement of this system is best illustrated by the embryo chassis for another Bowaters loco, this time the Kerr-Stuart 0-4-2 *Melior* as produced by Golden Arrow (yes, *that* one - with the Hackworth gear on the outside!). Here, a Branchlines double-reduction gearbox has been slimmed down to 7mm in width, and mounted on the front of the smallest-but-one size of Mashima open-frame 5-pole.

Reducing the width of the paired set of gears can be done in-situ by chucking the entire assembly in a lathe should you be so fortunate to possess such an animal, and taking a series of light cuts with a knife-edge tool until the desired "thinness" is achieved. Alternatively, the gears will need to be removed from the shaft. If these have been Loctited on, heat from a small blowtorch should be adequate to free them. Reducing the width is then a laborious matter of rubbing the gear face down on a flat file until enough metal has been removed - and of course, you will have to do the other one of the pair too.

Melior has the bottom part of the Branchlines gearbox removed, to avoid a short circuit between the wheel/axle stubs. Correct mesh is achieved by sliding the motor/gearbox backwards or forwards along a mounting plate cantilevered out from one frame whilst the puddle of bath sealant is still tacky.

Commercial chassis modified

If you can master the techniques involved, there is no doubt that split-frames point the way forward to unproved running and current pick-up. Yet the commercially-available N gauge mechanisms still have much to offer - providing you are prepared to put in a little extra work.

All these mechanisms are inside framed, but most can be fitted with false outside frames with "U"-shaped cut-outs to drop over extended axles. Bachmann for instance use a 2mm diameter axle on many of their locos - the same size as that found on most OO standard gauge coach and wagon wheelsets. Minitrix locomotives can be fitted with the same size axles as well; though 2mm is a tad undersize, in practice this diameter seems to work OK.

Driving wheels will generally come off proprietary axles with a more or less gentle tug. Resist the temptation to twist and turn, as some manufacturers use splines for a better fit. Alternatively, punch the wheels and gears off the shaft individually, using a piece of 1/16" steel plate with a slot the same size as your axle cut into it, and laid across the open jaws of a vice for support.

With luck, the old wheels may work out to be a nice tight fit on the new extended axles.

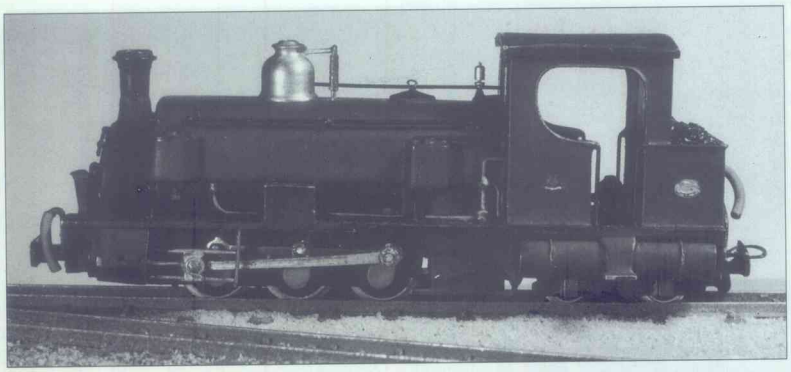
Opposite page, top:* Excelsior, *an 0-4-2 ex-Kerry Tramway, ex-Lynton & Barnstaple, modelled in final years as running on Portland, Dorset. Loco uses Joe Works 0-4-0 chassis with vertically-mounted Sagami can motor and flywheel in cab.

Opposite page, bottom: Bowaters 0-6-2 Bagnall* Triumph, *based on Chivers body and scratchbuilt split-frame chassis employing Saltford Models components.

Top: components for another Bowaters loco - this time Kerr-Stuart 0-4-2* Melior. *Chassis is split-frame pick-up, with drop-in motor and double-reduction gearbox package assembled from cut-down Branchlines drive train kit. Turned Perspex spacers are used to keep the frames electrically isolated.

Left:* Triumph *from underneath showing pony and Saltford Models "sleeves" that provide the insulation between the wheel and axle stubs on each side. Incidentally, cylinders are plastic tube assembled on a plasticard stretcher and fitted with brass tube inserts for piston rods.

Photographs by the author.



Whilst there is not a lot that can be done about wheels that are too loose, those that are tight can be carefully be opened out using the nearest sized drill - assuming that is, you cannot get hold of that most useful of modelling aids, a broach. Though this tool will strictly speaking create a tapered hole, for our purposes there will normally be sufficient "deformability" in the plastic wheel centre to ensure a tight enough fit.

Brass gears can be treated in the same way - and if they are too loose, bores can be "closed up" by centre-punching a series of pips around the centre hole.

As an aside, don't be restricted in your choice of outside framed prototype by the available wheel configuration of a readily-available chassis. A Minitrix 2-6-2 can be reworked to an 0-4-0 by omitting the centre set of drivers, and converting the centre axle to an idler. You can now fit the correct size of driving wheels, spoked or disc to taste - a 10.5mm diameter Lowmac wheel scales out near enough to 2'6", a 12mm spoked wagon wheel to 3',and Romford even do a 9mm brass one that comes out to a very useful 2'3". In a similar vein, Fleischmann or Minitrix ten-coupled units can be made into 0-6-0s. Expensive and extravagant perhaps, but the option is at least there for those with the courage to take it.

Since such conversions do not rely on the coupling rods to transmit the drive, these and the flycranks themselves become far less critical items. New rods can be made by transferring the axle centre distance to a piece of brass sheet, and making the holes oversize or even oval.

As for the outside cranks themselves, it is possible to bore out the cast Saltford Models items to 2mm, but due to the small size of the things, it is all to easy to find them trying to climb out of your drilling fixture in the middle of the job. A model of the North Wales Narrow Gauge Railway *Beddgelert* (above) uses these cranks thus modified - and it was a vexing task and then some. Whitemetal cranks are available from the same source, but your scribe has to admit to not having experience of using these.

Which leaves making your own as the third option. Basically, what needs to be done is to mark out a paired set of holes - one big, for the axle, the other little, for the pin - and then saw these out individually, doing the final shaping by hand in the bench vice. Use thickish material - about 1/16", to ensure that there is enough "meat" there to grip onto the axle.

Small stubs of brass wire can then be soldered in place to serve as crankpins, using slivers of insulation - another Saltford Models kick this - to secure the coupling and connecting rods.

Loctite bearing retaining compound - or Superglue at a pinch - is ideal for fixing the flycranks to the axles. Don't use this with plastic centred wheels or gears as Loctite can soften them, though for what it is worth the bushes used by Romford on their wheelsets seem to be immune.

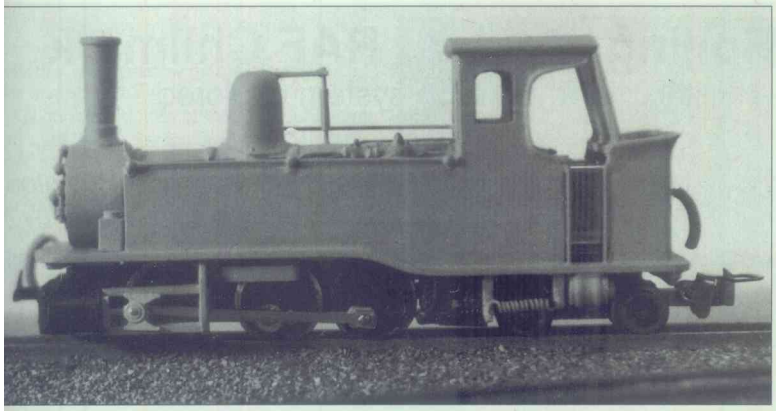
Sunbury

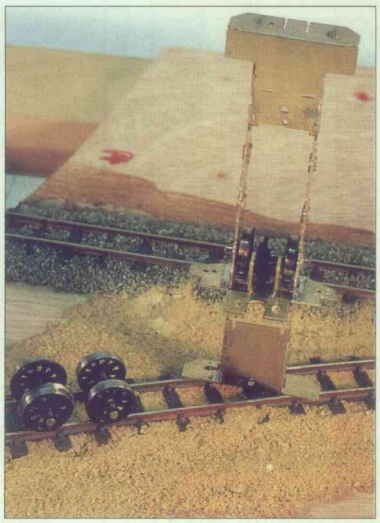
Luckily, the majority of medium sized light railway and industrial narrow gauge engines supplied to the home market had Stephenson's gear tucked discretely between the frames. Unfortunately, the more modern (and usually the most desirable!) prototypes were sometimes fitted with Walschaerts valve gear. Amongst other things, this involves a return crank somewhere along the line.

Making said items is not for the squeamish - though at the risk of some burnt fingertips and lots of patience it can be done. Starting with a strip of 1/2" long thin brass - around 30thou is about right - drill two holes 1mm diameter about 3mm apart. Take a 14BA brass nut, run this part-way along a steel 14BA screw, poke the thread through the hole nearest the end of the strip into somethi yielding such as a balsa block, and then sti a short section of 1mm diameter brass r into the other. Flood everything with sold and when cool to the touch carefully loos the steel screw, and file to shape - only cutti away the excess strip in the final stages. T idea is to use a 14 BA screw instead of t brass wire in the flycrank, and once all t rods are on, spinning the return crank do the thread and using Superglue instead solder to hold this in position.

To see how this all works in practice, tak look at the model of Kerr-Stuart *Sunbury*, supplied to the Metropolitan Water Boa around the turn of the century. Though t model is a bit of a cheat in that there are front flycranks and thus a complete absen of coupling rods, the return cranks are as j described. Incidentally, when making va gear and other twiddly bits for such t models, don't make the mistake of using t thin material. 1/16" brass is ideal, and the va ous rods and links are sawn out of this a drilling any holes, and carefully filed to sha in the jaws of an accurate bench vice. Wh possible, leave yourself enough extra m to maintain a satisfactorily grip. Criti dimensions are transferred using a pair dividers from those parts already on model to the next link to be added. In t way, you can compensate for any slop untoward deviations from the scale draw (assuming one is available, that is).

To fix all the "waggly bits" to each oth you could use proprietary rivets as sold 4mm valve gear - though these are a bit the large size. Alternatively, make your o by gently teasing a mushroom head ou soft brass wire held in the end of a pin v pass this "rivet" through the rods to joined, cut to length with old nail scissors use the ball peine hammer to form a sim closure on the other end. If the brass rod t to cooperate, try thick fuse wire instead secure the valve gear, motion brackets ca a pinch be fixed to the undersides of runn boards, though slidebars are best treated part of the cylinder assembly. This is h *Sunbury* is put together, with the body act ly acting as part of the retaining system the expansion link and valve rod.





In conclusion, whilst many of the techniques have been described in the context of 009, there is no reason for them not to be applied to other sub-standard gauge prototypes. Or for that matter, to some of the juicier examples of industrial 4'8½" motive power quipped with outside valve gear.

Top left: NWNGR Vulcan Fairlie 0-6-4 in "works grey". Chassis is a Liliput 0-6-2 which just fits within the confines of a Chivers body kit. New cylinders and front-end framing were made up from plasticard and tube, though the Liliput slidebars were retained albeit with new coupling rods to change the drive from the middle to the rearmost axle.

Top right: Rheidol 2-6-2 chassis as converted to keeper-plate wheel retention system. Just visible is the "drop-box" system to allow fine adjustment of idler gear mesh. Note also the flangeless centre drivers.

Left: Vale of Rheidol No.7* Llywelyn, *from a Backwoods Miniatures etched kit with added detail.

Below left: Fletcher Jennings* Talyllyn *using Ibertren 0-4-0 chassis with Sharman wheels. Model runs without coupling rods to allow room for overscale crossheads. Mashima open-fine motor with ½" flywheel provides the power.

Below right: another VoR tank, this time No.9 as running in 1956.

Other challenges

Having broached the subject of the truly awkward prototype, it remains to offer some thoughts on such mechanical marvels as Fairlies and articulateds such as the Garratt and the Kitson-Meyer, of which only the Lowaters *Monarch* ever ran in the UK. All are essentially two locomotives in one, and for the purposes of modelling, their running gear can be treated in the same way - there's just more of it. The single Fairlie for simplicity of construction in 009 is best treated as a rigid-frame trailing bogie engine.

Not only do you eliminate any problems of motor overhang inside the body whilst traversing curves, but the loco can as a result be far more easily balanced to put all the weight over the driving wheels for good pick-up. The NWNG *Snowdon Ranger* can employ the Liliput 0-6-2 Austrian U class RTR chassis in this manner. The wheel spacing on this mechanism is virtually spot on for these Fairlies, and by doing away with the requirement to pivot, the rear motor extension fits comfortably within the confines of the Chivers body.