New Haden Colliery

Mark Forrest, Geoff Cook and Stafford Railway Circle

New Haden Colliery sat on the side of a sandstone ridge a mile south-west of the small market town of Cheadle, Staffordshire. The pit opened at the turn of the 19th and 20th century alongside and above the Cheadle Railway Company's three mile long branch off the North Staffordshire Railway's Stoke-on-Trent to Uttoxeter route.

In reality the collapse of the tunnel necessitated the construction of a diversion in the 1930s before the pit's closure during WW2, in model form the tunnel holds strong and the pit is still producing.
Some fifteen years ago the Stafford Railway Circle (SRC) was looking for greater accuracy and finer scale modelling. Some members turned to ‘O’ gauge, some to O-16.5 and some to a prototype EM project in the shape of New Haden Colliery.

The Real Thing

Coal mining near Cheadle (Staffordshire) dates from the middle of the 19th century. The specific history of the New Haden Colliery is incredibly complex and involves numerous companies, bankruptcies, legal battles, botched engineering and is the subject of a book by Allen C. Baker (The Cheadle Collieries and their Railways, 1986). Two of the more unusual aspects are worth mentioning as they will later be related to the way we have modelled the location and its operation.

First, it was the mining company that built the three and a bit mile Cresswell to Cheadle branchline serving the colliery. Their knowledge of railway construction can be summarised by looking at the 977-yard long tunnel to the south of the colliery. It contained gradients of up to 1 in 43 and its restricted diameter posed a real risk of asphyxiation for crews on hard working loaded trains. In November 1918 a 400ft section of tunnel roof collapsed, closing the line for a month. By 1933 the LMS had taken the costly measure of building a diversion around the troublesome tunnel and directly into Cheadle station. This effectively left the colliery served by a kickback siding from Cheadle. In return, the colliery was tied into an agreement with the LMS to export at least 250,000 tons of coal by train each year.

Second, the local geology and high water table resulted in New Haden being inefficient in comparison to other collieries in the Stoke area. Despite significant expenditure on modernisation in the 1930’s, annual coal production only exceeded the level agreed with the LMS for nine years. Perversely, efforts to increase productivity by reaching a more productive coal seam resulted in the workings being inundated by water to an unmanageable level. The end came swiftly in 1943, when the Fuel Ministry closed the colliery to help the war effort by transferring the thousand or so men and boys to more productive pits such as Florence and Hem Heath in the Stoke area.

A Bit of Reading

Is modelling a prototype a good thing to do? Analysing photos, counting bricks, scratch building windows and calculating hundreds of levels and measurements are all daunting tasks. However, the planning results in a more natural scene than can normally achieved using imagination alone. Luckily, during our research period, we came across the Allen C. Baker book, which includes much indispensable information about the real New Haden. Another windfall was that one of the businesses on the former colliery site was able to provide us with large plans of the colliery prior to its clearance and re-use as an industrial estate.

Armed with this little lot we realised that a true scale model would not fit in the room allocated by the club. Compression of the prototype was therefore called for but this was applied selectively, with some areas shortened (exchange sidings and screen roads) and others left true scale (fitting shops area and the complex buildings around the pit head near the rail tunnel). The other main item changed to keep the layout within the 3’6” wide boards was that the Cresswell to Cheadle line, which in reality continued on a steady right hand curve upon leaving the tunnel, was curved back onto the board. That was the X and Y dimensions sorted, so onto Z (the up and down).

An early visit to the site showed that the colliery was built into and onto a hillside. The loan of some surveying equipment enabled us to plot on a plan the relative heights of the few original buildings and features remaining. Additionally, Staffordshire’s Record Library held war time aerial photographs of the location. These were especially useful as they were taken in stereoscopic pairs which, with suitable equipment, enabled them to be viewed in full 3D. The effect of watching an item, such as a tall 100’ chimney, leap out of the photo towards you is outstanding. The final stage was meshing the X, Y and Z information together so that we got something that worked, i.e. the pit head buildings were at a level above the tunnel not in it! This was not easy, especially with the selective compression used, but the aim was to capture the overall feel of the location. This we feel has been achieved as the model has withstood the scrutiny of ex-employees.

Building Bookcases

The graded nature of the prototype plus the significant variation in scenery heights meant that an open baseboard construction was adopted. We were eager to get our project started and therefore the main boards were completed before we’d worked out the various level differences. This wouldn’t cause any problems would it? After all we knew the available space, and that the boards would be higher at the tunnel end than the embankment towards Cheadle. The reality was that we had 4 boards, each 5’ x 3’6”, on which various bits of wood had either to be added or removed to give the final track and fascia heights. The moral of the story is to think and plan before you cut and build.

1/2” plywood was used for the main framework which, when assembled, resembled a bookshelf. This similarity was not lost on some club members and, in the early days, it was common to find a selection of books placed on the ‘shelves’ if ever the boards were stored vertically. Horizontal surfaces were only added where required, i.e. under the trackwork and buildings, and these were arranged at the various levels and gradients calculated during planning. The New Haden group’s growing reputation for robust construction was cemented for good by the use of some very large bolts (>M20) and steel backing plates to join the boards together. The two fiddle yard boards are of similar construction but with a MDF top. This gives a better surface to allow smooth sliding of the fiddle yard stock carriages.

The carriages in the fiddle yard are made out of aluminium angle. These were mounted (using araldite) on 6mm MDF and gauged to track width. There are two lengths, one for the longest loco and one for 4 coaches. Electrical contact is made through brass pins soldered to a brass plate, which was bolted horizontally into the corner of the aluminium angle. All ends are treated, some being male, and some being female. The units then just push together like a plug into a socket. This means there are no loose leads or clips, everything is self-contained. A strip of thick plastic down the middle acts as a check rail, to aid re-railing and prevent de-railing.
Stafford Railway Circle’s 22’ 4" x 3’ 6" (scenic size) EM layout is set in the 1950s depicting the interchange sidings for the colliery alongside the single-line branch as it heads down from the tunnel on its run to Cheadle’s terminus station.

Arriving empty trains come down the bank, passing the colliery and run around at Cheadle station before returning up the branch to reverse into the interchange sidings. Thereafter the wagons are fed to and from the coal screens for loading by the colliery’s own locos. Loaded trains are collected from the interchange sidings and immediately face an uphill departure into the tunnel.

The branch sees a twice-daily passenger service extended from a Potteries loop service. In addition to the colliery the foremost chimney in the image (left) is that of the brickworks which can be seen behind the base of the chimney. This has its own traffic flows along with sand trains from the nearby quarries.

The layout is operated with a fiddle yard at each end representing the Cresswell and Cheadle ends of the line. It is unusual to find a layout depicting the waste areas of mining with its bleak landscape around the settling ponds.

New Haden Colliery has similarities of building style to that of Foxfield Colliery a few miles away and a number of the structures still exist amongst the industrial units although it is difficult to now imagine the railway in that environment.

This overall view is taken from the area usually occupied by the Cheadle fiddle yard, looking towards the colliery and on towards Creswell where the branch joined the North Staffordshire Railway’s Stoke on Trent to Uttoxeter line.
The proximity of New Haden Colliery to the tunnel is apparent here.

When the tunnel was built the Cheadle Railway Company did not acquire the mining rights for the land beneath the tunnel. Subsequent mining activity soon led to subsidence and numerous tunnel collapses throughout the life of the tunnel. Several sections had to be patched up over the years but in November 1918, a partial collapse caused the line to be closed for almost a month. While repairs were underway, the coal traffic was important enough to justify wagons being exchanged between locomotives while inside the tunnel, repairs being carried out by men working on a timber platform with just enough room for the wagons to pass underneath.

As disruption and maintenance continued the LMS opened a diversionary route to Cheadle in 1930, closing the line through the tunnel. This necessitated the reversal of trains at Cheadle to reach the colliery.

Modeller’s licence allows us to ignore these facts and run the layout as though the line had remained open, with through passenger, goods and sand trains passing the colliery en route to and from Cheadle. Which all helps to keep operators and exhibition punters entertained.

Traffic included NSR passenger services, pick up goods from the station at Cheadle and the brick works at New Haden, coal trains and in later decades, trains of sand tipplers up to its closure in 1986. The branch was operated as one engine in steam, which means that at Cresswell the driver, would collect the staff from the signal box unlocking the points to the branch and no further trains would be allowed onto the branch until that train and the staff returned to Cresswell. This means that the branch had no signals or signal boxes and all points were operated by hand or ground frame.
Endless Sleepers

The majority of locos and rolling stock were not available RTR and therefore would have to be kit built. Using proprietary trackwork just didn’t seem to give the right flow and feel of an industrial complex and so we’d decided to build the track ourselves. With everything being built from scratch, the opportunity was there to try one of the more accurate gauges. The EM Gauge Society offered us novices the most complete assistance possible in the form of their extensive manual. So EM it was.

What followed were many months of ‘slave labour’, dying batches of wooden sleepers, inserting brass rivets into every fifth sleeper, laying each one out at the correct spacing along the desired line, sliding plastic chairs onto the rail and then soldering rails onto the rivets. But oh no, it didn’t end there! Next came the laborious task of grinding down the soldered joints on every fifth sleeper and then gluing cosmetic chairs over the joint. We’ve not even mentioned the tasks of painting the rails and ballasting the branchline. Was it all a joy to do? Well no; but looking at the end result (and after some psychiatric help) we feel it was worth it.

Those Wires

All power for New Haden comes from a self contained power pack, which sits on the floor and ensures that the mains voltages are kept away from the layout. Four identical transformers provide the layout with three 15v AC supplies for the controllers and three separate DC supplies, 10v for point motors, 24v for electro-magnets and 12v for electronics and LED display on the control panel. The wiring on each board is self-contained and is linked directly to the control panel by plug-in multicore cable. There’s no daisy chain wiring between the boards; this system allows you to power up the boards individually to help with fault finding and testing.

The track on the layout is divided into individual sections which, using three-way toggle switches, can be driven by two different controllers or turned off; the status of the section is indicated by coloured LEDs on the control panel track plan. The control panel also contains push-buttons to operate the electro-magnetic coils for the uncouplers and point motor switches for the six points that are not operated by the two lever frames. Three Modelex hand-held controllers are used, two control the locos in the colliery yard and one controlling the locomotives on the branch line with some overlap at the colliery entrance.

Large Erections

All the numerous buildings are scratchbuilt to suit the dimensions found on the plans, remaining buildings and photographs. Where no photographs of buildings existed and only ground-level dimensions were known, we based the design on similar mining buildings in North Staffordshire. Making windows from plastic strip is a thankless task, and the finished job is never worthy of your efforts. After a while we learnt to plan ahead and use proprietary plastic and brass windows and adjust the window aperture to suit. Of all the many structures, two pairs stand out. First, the two headstocks, both of which have been skilfully soldered up from brass section by two club members. Second, the two massive chimneys located at the brickworks and Lancashire boilers. These dwarf the other buildings on the layout and have a turned wooden core with brick detailing.

Moving Coal

A mainline loco delivers empty wagons to the exchange yard. The colliery locos then sort the rake, take small numbers for filling under the screens, return them full to the exchange yard and make up outgoing trains. These are collected by a mainline loco. An important feature was therefore the filling of the wagons without the use of the ‘great hand in the sky’. Some sort of storage hopper was required that included a mechanism that could deliver the correct amounts for 12, 16 and 21 Tonne wagons. A recurring theme for some of the dubious efforts to achieve this was the use of a vacuum cleaner either sucking or blowing the coal. But our hours of fun were spoilt by coming up with a relatively simple mechanism.

A hopper with a hole in the bottom has a circular plate suspended a small distance below it by a shaft. When the hopper is charged with coal it then falls through the hole and on to the circular plate and piles up, blocking said hole. The clever bit is that a motor is used to spin the shaft, which then turns the plate. Hey, presto coal flies off the quickly spinning plate and is replaced by more from the hopper above until the motor is stopped. Those paying attention will probably wonder where all the flying coal goes. The spinning plate is surrounded by vertical sheeting, which the coal hits and then falls, via a funnel, into the wagon below. The time the plate spends spinning is proportional to the amount of coal discharged.

In operational terms, two aspects of the real colliery have been altered. First, it has been assumed that the tunnel was stabilised and continued to be used after the real closure and diversion on 26 November 1933. This enables us to run passenger stock and freights along the front of the layout to and from Cheadle, adding interest when the colliery is shunted. Second, the colliery managed to overcome the underground flooding problems and remained operational after 6 June 1943 and well into BR steam days. The simple reason for this was that the period matched the mainline locos we had available and that we all liked BR 16T wagons!

A Few Wagons More

The locomotives operating on the branch line to Cheadle and servicing New Haden Colliery were all stabled at Stoke shed, 5D. In the 1950s the shed allocation was dominated by 2-6-4 tanks and 4F 0-6-0s. This allocation is reflected in our stock which includes a Fairburn tank (42234), a Stanier tank (42440) and a Fowler 4F (43915). These are built from a mixture of Parkside, Slaters and Cambrian kits. Initially the first batches were built compensated but for the shorter wheelbase wagons this has proven unnecessary. Not fitting compensation saves much time and money. All stock is in the process of being weathered to reflect the grubby nature of coal traffic.
The exchange sidings with big Barclay 0-6-0 collecting empties and the Barclay 0-4-0 hiding behind a BR brake van while a Peckett 0-6-0 collects an empty LMS double bolster in the background. The building at the rear is the weighbridge office, in the foreground is the ‘mainline’ to Cheadle.

The Barclay 0-6-0 is a High Level kit, built as designed with beam compensation to all wheels, power comes from an open frame motor and scratch built 80:1 gearbox, wheels are 8-spoke from Alan Gibson, pick ups are of a sprung plunger type to each wheel rim, body is fitted with 8mm dia large sprung buffers.
Hilly Bits

‘Polystyrene glued within the open top boards, cut to shape, plastered and then covered with scenic materials’ - that’s the scenic bit done isn’t it? Well no, but as this method has been described numerous times before, we’ll concentrate on the thoughts behind the scenery. We’d recommend spending time considering the scenery, in the same manner that you would when building or detailing a structure or item of rolling stock. This doesn’t mean going out to count and measure blades of grass. What it does mean is deciding where in the country your layout is to be set and some good old research in books and magazines looking at the detail in the space beyond the railway. Better still visit, make notes, take photographs and generally get the feel of the location. This can include the type of materials used, the style / relationship of buildings, the form of the landscape and the typical vegetation.

For the New Haden project we visited the Cheadle area and what little remains of its coalfields and it appeared that we would have to model three main types of landscape:

- The land used by the colliery with its mass of sidings, buildings and general spread of industrial muck and pollution. The bias here was to be towards the grey, brown and black of the spectrum but with Mother Nature reclaiming the odd corner with scrappy vegetation. The colliery was actually built into and on the side of a hill, the shape of which altered well beyond its natural state as the colliery expanded and looked for places to tip waste.

- The land within the fencing of the branchline railway, which emerged from the doomed tunnel into a deep cutting and then descending into Cheadle on an embankment. Remains on site showed that both the cutting and embankment slopes were fairly steep and photos showed that there was a good covering of fairly scrubby vegetation covering both.

- Adjacent landowners/farmers. These areas along the ends and front of the layout serve to show the levels of the landscape before the railway and colliery arrived and rearranged things. Although very much in the minority on the layout, the farmlands’ more cared for and managed appearance helps serve as a counterpoint to the unkemptness of the colliery and brings in a bit of colour.

Scenic Cack

A solution had to be found to replicate the mass of drab colliery waste that covered such large areas of the layout. Following experimentation the final recipe for the solution is as follows. Put a couple of cups of sharp sand in an old mixing pot, add a spoon full of brown or black Cementone cement powder and add enough water to dampen the mix. Stir thoroughly until the sand takes the colour but be patient. What you’ll be left with is a pot of damp, ‘dirty’ sand - it’s not much use like this - so spread it thinly over some cardboard and leave to dry. Once dry, chop and cut the mix thoroughly with something like an old credit card to separate the lumps.

The best way of using this material is to mix and store batches of various shades of black and brown. Use this colour pallet to mix up a range of composite colours - for instance a black with hints of different browns, with perhaps a pinch of green scenic scatter to add some life. These mixes can then be applied in the same way as normal scatters using a dilute PVA mix (with a drop of washing up liquid). A few notes to remember - the effects can be altered by using different types/grades of sand; the cement colouring although expensive will last a life time, so buy only a small tub of black and brown and don’t forget it can also be used to colour stuff such as the base plaster coat and finally it should be noted that the sand-based mix is heavier than scenic powders and will add to the weight of your layout.

When it all goes wrong!

A common misconception appears to be that large exhibition layouts are just created by experts without trial or tribulation. Well; I can assure you this is not true. In the case of this layout, a mother of all times was had with the large scenic area containing the settling lagoons. Imagine the scene, polystyrene carved, plaster set, scenic sand scattered, detailing items finished. Only the water remained to do and, with 6 months to the exhibition, no problem with time.

That was the case until we got bored of applying the varnish layer by layer and decided to apply a single centimetre thick ‘layer’. After a number of months this still remained a bit on the fluid side under the ‘crust’. OK; so scrape it all out and on to the next great idea of using clear casting resin, which is ideal for thicker applications, if you remember to seal the void first with a non-porous paint that is. In our case the resin soaked through the plaster layer and dissolved vast areas of polystyrene underneath. So; let’s scrape out all the dissolved polystyrene goo and use expanding gap-filling spray foam to fill the void found under the scenery. Fine; but this stuff does exactly what it says on the tin and after application continued to grow into all sorts of places for hours afterwards. With only a few weeks now remaining to the show, and having tamed the spray foam, it was back to buying a tin of quick drying varnish and applying a coat a day until the eve of the show.

And finally

It’s fair to say that the group under-estimated the amount of time needed to build this layout. In particular undertaking the research, constructing the track and the numerous buildings took substantially longer than thought. Indeed the construction of the layout has seen many of the group leave education, get married and have kids! The membership of the group has been fluid over the years and we’d particularly like to thank those members that have kept the layout progressing whilst others have taken breaks and worked on different projects.

Well that’s all folks. If you’d like to see more of this and other club projects then come and join us at the SRC’s annual exhibition at the Stafford County Showground on 4/5 February.

End credits

Many SRC members who are also RMweb members have been involved with this project over the years.

Geoff Cook
Mark Forrest
Andy Banks (wagonbasher)
John Wardle (oldgringo)
Nigel Brazier (Avonside1663)
Chris Tooth (2manyspams) - former SRC member
Damian Ross (indomitable026) - former SRC member

Specific credit is also due to Fred Shilton for his work on the headsticks.
The drivers of the Peckett and Hunslet saddle tanks prepare to extract some loaded wagons from beneath the screens. The loading mechanisms in these drop a measured amount of coal into the waiting wagons at the press of a button.

The Peckett 0-6-0 (left) is a Wychbury Loco Works kit, built with a rigid rear axle with the front and middle axles having beam compensation, fitted with Romford 10-spoke wheels, power is from open frame motor and a Mainly Trains 80:1 gearbox, pickups are phosphur-bronze wipers to each wheel rim.
The 3F 'Jinty' is running back from Cheadle with a brake van to collect the first loaded coal train of the day. In the lane below the bridge a NBC low loader makes its way back to base having delivered an excavator to the pit.
With a couple of internal user wagons in tow, the Barclay 0-4-0 prepares to move over to the weighbridge seen in the background. In the foreground runs a channel and a pipeline (underground) carrying water used to wash the coal down to a series of settling pools.

The Barclay 0-4-0 is a DJH kit, with the cast in name plates removed from the sides of the tank and fitted with large head sprung buffers, the chassis was widened out to 15mm external, with the rear axle running in fixed bearings driven by a scratch built 80:1 gearbox with open frame motor, the motor sits vertically in the firebox area of the cab, the front axle bearings are fitted in square tube so that the axle can pivot on a centre pivot giving some compensation to improve running, pickups to all wheels are by sprung plunger running on the back off the wheel rims. The wheels are the original Romfords as supplied with the kit, at the time of construction there were no wheels to suit the prototype available, now 8-spoke wheels to suit are produced by Alan Gibson Workshop and a wheel change is due to be done in the future.
Having left the problematic tunnel behind, a Fairburn tank works the branch passenger service towards Cheadle passing the loading screens of the colliery.

New Haden Colliery can be seen at the forthcoming events:

Spalding 12/13 November 2011
Stafford 04/05 February 2012

The days of the ex-PO mineral wagons are numbered, being superseded by the steel 16t and 21t minerals.
The big Barclay prepares to push a brace of 21t mineral wagons under the screens. The screens building is based on those at Dilhorne Colliery as we have been unable to locate photos of the actual buildings. However as aerial photos of the colliery in the 1940s show the buildings had been demolished, this led the group to the conclusion that these were of steel girder construction and had been dismantled as part of the war effort. In our alternative reality the pit has remained open and survived the war years.
D5030, the first mainline diesel-electric loco to be built at Crewe, finds herself bound for Cheadle hauling sand empties, maybe it’s a running in turn before being despatched to her first home depot at March.

The sand wagons are Red Panda bodies on Parkside underframes, with cast whitemetal brakes and buffers from ABS (construction was detailed in Mark Forrest’s blog entry here), the Type 2 is re-gauged Bachmann.