

Butterley Gangroad Project

Outram plateway gauges

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The gauge of a railway is the basis of standardisation and also a statistic that every enthusiast first wants to know! However the published information about the gauge of the plateways that were built by Benjamin Outram in Derbyshire, Nottinghamshire and elsewhere is often confusing and sometimes inaccurate.

The gauge is the distance between the running face of the parallel rails and is thus common for both the track and whatever runs upon it, subject to clearance considerations. Using this modern definition we expect that the gauge of plateways to be measured between the outside faces of the upright flanges of the two parallel plates.

Baxter, the national expert on early railways, said that Outram at first used a gauge of 3 ft 6 in and went over to 4ft 2 in laterⁱ, but is this true? The Butterley Gangroad (Crich Railway) gauge is referred to as 3 ft 6 in in “The Crich Mineral Railways” where it is said to have been quoted by Outram in 1799ⁱⁱ. Ripley was confused about the gauge of the Little Eaton Gangway (Derby Canal Railway), he says that, “*the gauge between the insides of the upright flanges was 4’4” and between the outer sides 4’5”*. Bertram Baxter in “*Stone Blocks and Iron Rails*”, gives the gauge as 3’6”, whereas Cyril Hall in “*Modern Railway Working*”, published in 1912, gives the gauge as 4’6” between the ledges, and this is substantiated by Mark Fryer (sic) in his “*History of Denby*”ⁱⁱⁱ. In fact Mark Fryer gives lots of detailed dimensions in his “*History of Denby*”, including the 4 ft 4 in and 4 ft 5 in quoted by Ripley that relate to the gauge^{iv}. He was colliery agent to the Drury Lowe family at Denby Colliery when the line was still operating so was in a position to go out and measure the track himself. However some of his dimensions are suspect, for example he says the wagon wheel diameter was 2 ft 4 in, whereas the two examples that exist in Strutt’s North Mill at Belper measure 2 ft 1 in; and his generalisation of dimensions could not apply to every piece of equipment used over such a long time period. Riden, in his works about the Butterley Company and its products did not critically examine this issue. For example, he repeated Baxter and also said that the gauge “between the holes in the blocks was normally 4 ft 8 in.”, without giving a reference^v

There have been two ways to resolve these contradictions, one was to go back to the original source material and see what they actually say and the second was to measure some actual track. The latter is not as difficult as it might seem, stone blocks remain in situ in many places and accurate measurements have been made. Wagons and wagon parts of the Little Eaton Gangroad and Peak Forest Tramway have also

survived to be preserved at the NRM, in the NCB Museum and the Midland Railway Centre.

The key was carefully reading some passages quoted by Baxter from letters and notes written by Benjamin Outram himself. The first is a letter that he wrote to the Ashby de la Zouch Canal Committee 3/12/1799:

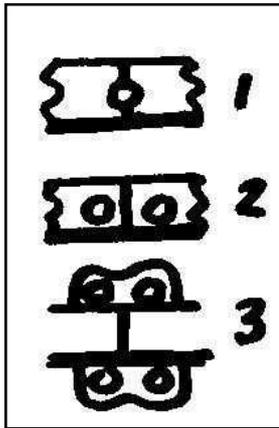
“The contractors Estimates and Specifications are founded on a design to make the Railways for the carriages of the same width as those of Derby and Crich which are very properly widths for Limestone Waggon. But as it is exceedingly probable that Railways will soon become general for the transport of Merchandize thro’ the commercial parts of this kingdom and as it appears that many Hogsheads and packages require Carriages eight Inches wider than those used on the Railways at Derby and Crich and that carriages fitted for Railways 4 feet 2 inches in width between the flanches would be desirable for all sorts of loading it seems therefore desirable that all extensive Railways should be of the same width and that width should be sufficient to suit all purposes of Trade.”

This document was revealing from a number of viewpoints, not least in that it showed him envisaging a national railway network when George Stephenson was a young lad of 18! It did show that he was measuring “between the flanches (flanges)”, not what we now would consider as the gauge. It also confirmed, and he must be right, that the Crich and Derby Canal lines were built at 3 ft 6 in between the flanges, and that he was recommending a new standard of 4 ft 2 in, for the Ashby line (that later became the Ticknall Tramway). The relationship with wagon dimensions is important. The bodies of these early vehicles did not overhang the wheels as on modern ones. The wheel diameter was large and the underframe and body, or at least the lower part of it, had to fit between them.

The second document is his “Minutes to be observed in the Construction of Railways”, where he stated, “*the best width of road for general purposes is 4 feet 2 inches between the Flanches of the rails, the wheels of the Carriages running in tracks about 4 feet 6 inches or under.*”^{vi} This is, in effect, stating a relationship between the distance between the rails and the centre line of the wheels.

Measurements were made on the well preserved incline of the Belper and Morley Park Railway east of Hill Top Farm, Openwoodgate in 2009^{vii}. These were augmented by others made myself recently on the same section. This was a single track formed of “Outram standard” 3ft long iron rails spiked to stone blocks. It is believed to have been built about 1830^{viii}, and was still in existence when the 1880 25 inch to 1 mile Ordnance Survey map was surveyed.

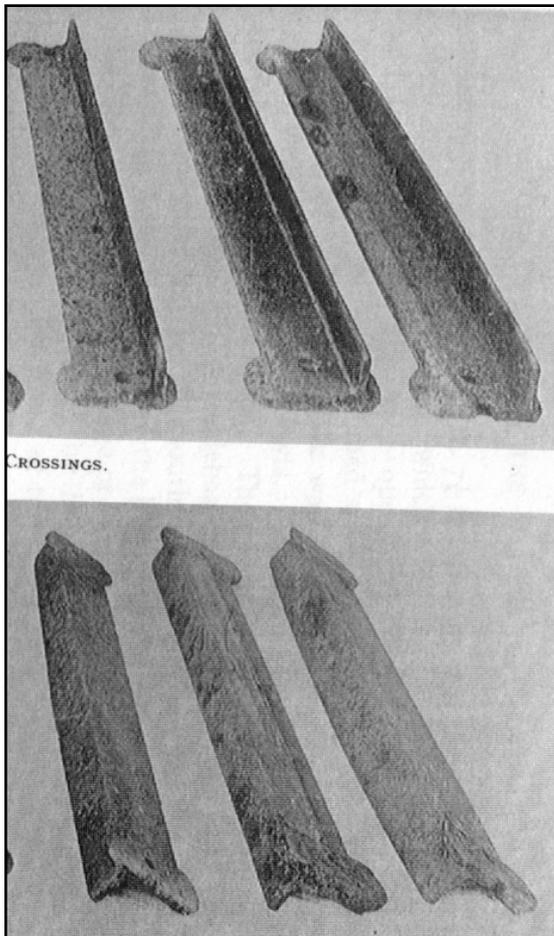
Outram's plateways used three basic methods of fixing the rails:



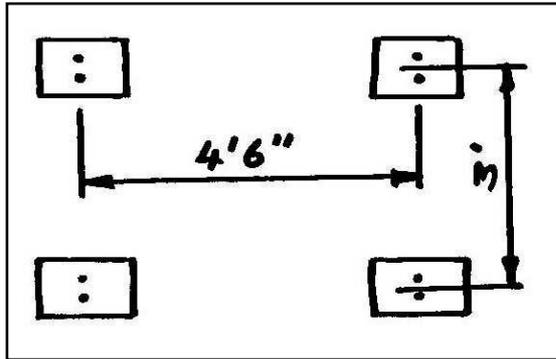
1. Each end of the plate had a semi-circular notch and a single spike was driven into the block between the plates in the hole so formed. This method was found to be insecure.
2. Holes were drilled at each end of the plate so they were spiked individually to the blocks, this would have been more secure but perhaps made them more breakage prone.
3. The rails were butted together into chairs that were spiked to the blocks using four spikes.



The Belper and Morley Park Railway connected with the Derby Canal Railway; in fact when the latter closed in 1908 it was using a surviving section of the former to access Denby Colliery: so one would expect that the gauges would be the same. That all types of fixing were used on the Derby Canal line is evidenced by the survival of a large number of blocks in the gardens of houses at Ticknall Lane at Smithy Houses. These houses were built by the Drury Lowe family when the Gangway was being closed so the blocks came in handy to provide garden walls etc. All three types of block can be seen, including a great many with just a single hole.



The blocks on the incline have two holes, so they were of "Type 2", despite the relatively late period of construction. The imprint of the pedestal shaped castings (see the old photo of typical rails used in the Denby area) on the rail ends can be seen clearly, this all suggests that the line remained as built throughout its period of use. The ruler in the photo is 12 inches long, and the line of rails ran left to right.



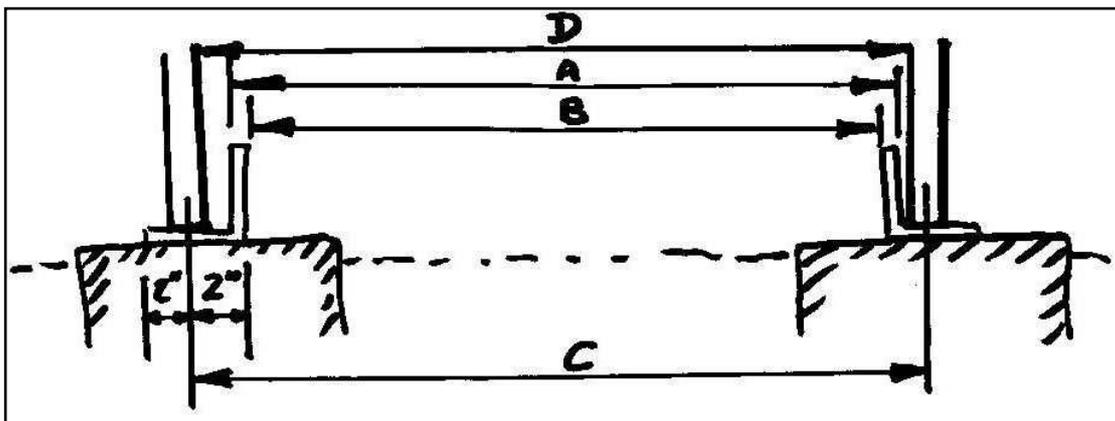
The distances between the imprints of the rails are exactly 3ft over a length of eight blocks. The distance between the holes under each set of rail ends was measured in 2009 at 4ft 6 in, the investigators dug down to find a block on the hedge side but this is covered up now.

This confirmed that the Little Eaton Gangway ended up at a wider gauge than when it was first built and this can be clearly seen by studying the amazing series of photos taken of the line just before it closed and by studying the surviving wagons.

Ripley referred to the fact that the Derby Canal Company minutes mention early “upgrades” to their railway. He says that originally the line was laid out for twin tracks with the single line offset to one side. The stone blocks were slipping down the side of embankments. In 1808 this was rectified and extra passing places were introduced^x. It seems possible that what actually occurred was that the track was taken up and re-laid at the “new gauge” at the centre of the formation, the extra loops being evidence of the intention to stay with a single track solution.

All sources agree that the plateway rails were about 4 inches wide, had flanges about ½ inch thick and that the fixing holes were central to the base of the rail. These dimensions are those of the replica rails cast at Ironbridge and now on display at Strutt’s North Mill.

Taking all this evidence together it was possible to resolve exactly what the gauge actually was.



$$A = C - 3 \text{ inches}$$

$$B = C - 4 \text{ inches}$$

$$D = C - T \text{ inches}$$

Where A is the “gauge” as described by Outram in 1799.

B is the actual gauge

C is the distance between the holes in the sleeper blocks and also the “track” of the wheel centres.

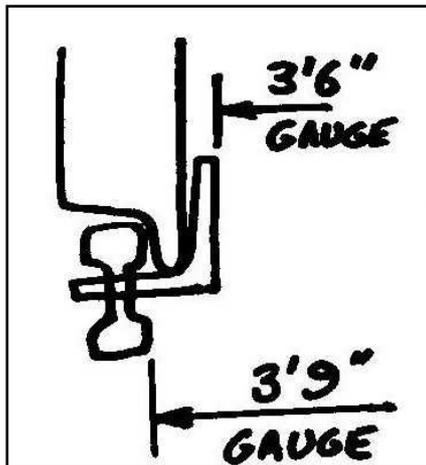
D is the distance between the wheels that contact the rails

And T is the thickness of the wheels (1½ inches was usual)

For the two gauges that Outram refers to the actual figures are:

Gauge	A	B	C	D
Narrow	3 ft 7 in	3 ft 6 in	3 ft 10 in	3ft 8½ in
Standard	4 ft 3 in	4 ft 2 in	4 ft 6 in	4 ft 4½ in

These figures also make sense of the later gauge of the Butterley Gangroad, when it was re-laid with edge rails. The new gauge was said to be to allow a smooth transition^x, it would have been possible to continue to use old sidings once the main line had been re-laid for locomotives.



The gauge is quoted as 3 ft 9 in or 3 ft 10 in. If the plateway gauge (B) was 3 ft 7 in, then a gap of 1 – 1.5 inches was available each side for the flanges of the wheels.

Further confirmation is that Ripley’s book on the Peak Forest Tramway, which survived in situ much later, records the distance between the plateway flanges as 4ft 2 in^{xi}.

On 17th September 2011 Roger Wood led a walk in the “Autumn Footprints” programme to look at the route of a Outram tramway that ran from the

Nutbrook Canal to collieries at West Hallam. He mentioned that after many years exploring the route he had found an original plateway track gauge, which he still owns. It was designed to fit between the upright flanges. It was broken but the centre part of the casting has survived and the distance from this to the remaining gauge face is 25 inches, i.e. half of 50 inches. This is final and absolute confirmation of the Outram plateway gauges.

This analysis leaves the question of why did Mark Fryer get his measurements wrong? Stone blocks do drift over time and his quoted dimensions are a consistent 2 inches “too wide”. Maybe he measured remaining rails in the colliery area that had taken a battering. We can only guess.

It will be worth making further investigations where stone blocks remain in situ and also measuring the remaining wagons.

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- ⁱ “Stone Blocks and Iron Rails”, Bertram Baxter, David and Charles 1966, page 56.
- ⁱⁱ “The Crich Mineral Railways”, Dowie, Tramway Museum Society 1976, page 6.
- ⁱⁱⁱ “The Little Eaton Gangway”, D.Ripley, Oakwood Press 1973, page 8.
- ^{iv} “Some Chapters in the History of Denby”, Mark Fryar 1934, page 119.
- ^v “The Butterley Company 1790-1830”, Philip Riden, Derbyshire Record Society, 1990, pages 57 and 65.
- ^{vi} Quoted in “Stone Blocks and Iron Rails”, Bertram Baxter, David and Charles 1966, page 49.
- ^{vii} REPORT: Little Eaton & Denby Gangway 25th July 2009, published on the Internet, anon.
- ^{viii} “The Belper and Morley Park (or Denby Colliery) Tramroad”, Peter Stevenson, Derbyshire Miscellany, Autumn 1973.
- ^{ix} “The Little Eaton Gangway”, D.Ripley, Oakwood Press 1973, page 9.
- ^x “The Crich Mineral Railways”, Dowie, Tramway Museum Society 1976, page 8.
- ^{xi} “The Peak Forest Tramway”, D.Ripley, Oakwood Press 1972, page 6.