

Transport, Travel & Trade

Horse-Power to Steam-Power

The first wagonway appeared in 1604 on a two miles stretch, designed to transport coal for onward shipment by barge along the River Trent. Horses hauled the wooden wagons along flanged wooden rails. It was a precarious operation, especially when faced with an incline. Cast-iron wheels appeared in 1734 but the breakthrough was iron rails, pioneered in 1767 by Richard Reynolds of Coalbrookdale. He was able to reduce friction, thereby increasing loads but this method of transport, whilst reliable, was cumbersome and limited.

The Duke of Devonshire inspired contemporaries with his Worsley to Manchester canal opened in 1761 for the transport of coal. The public were captivated by the Barton aqueduct upon which coal barges floated gently, high above the River Irwell. He soon opened a new route from Manchester to Liverpool. The late 18th century and early 19th was the golden age for canal building, making the biggest imprint on the landscape since Roman times. Benefits seemed impressive.

A horse could carry one eighth of a ton on a pack and haul five eighths of a ton in a wagon on a soft road, but could pull 50 tons in a barge on a canal. The transport of raw materials and food was vastly more productive, especially for the burgeoning towns. The network expanded rapidly to over 2,000 miles, relying on horse-drawn wagonways for access, but horse-drawn barges were slow and ponderous, able only to travel at walking pace with limited routes. Then there the locks. The 29 miles along the Worcester & Birmingham Canal passed through 58 locks and 4 single-lane tunnels that meant huge bottlenecks. This slow conveyance was exceeded only by the Stratford Canal with 36 locks in a mere 13 miles.

Roads held sway, apart from the transport of bulky minerals, with goods transported along toll roads on Macadam surfaces, far quicker and vital for perishable and fragile goods. Innovation was much needed and came soon in the form of steam. Richard Trevithick led the way in 1803 with his inventing the first high pressure steam engine, the same year the Surrey Iron Railway was formed, the first rail company. Using horse-drawn wagons, it ran for 9 miles between Croydon and Wandsworth. In 1812 the Middleton Railway, Leeds, was the world's first commercial railway using steam locomotion. Likewise, the horse-drawn Oystermouth Railway at Swansea, opening in 1807, was the first passenger service but ceased when a new turnpike road opened in 1820.

The major advance came on 27th September 1825 with the opening of a line from Stockton to Darlington. For dramatic effect, a horseman rode ahead announcing in Latin, "the private danger is the public good." George Stephenson not only convinced wealthy wool merchant Edward Pease but Parliament and a travelling public. A train of wagons was arranged and carried 450 invited dignitaries at a speed of 15 mph (24km), a transport revolution. Engineers were keen to assess the best type of steam engine which led to the Rainhill Trials in 1825 on a short stretch of flat track. The incentive was the sum of £500 to the winner. Only six locomotives were on show and of these three were ruled out. The clear winner was the Rocket, achieving an average speed of 13 mph and a top speed of 29.1 mph.

The most momentous event in the entire history of the railways took place on 15 September 1830 with the official opening of the Liverpool to Manchester line. Dignitaries included the Prime Minister, Arthur Wellesley, Duke of Wellington, and William Huskisson, Secretary of

State for War and the Colonies, Leader of the House of Commons and MP for Liverpool. At the head of the eight train procession was George Stephenson's Northumberland with the Rocket taking part also. After 17 of the 35 miles journey a stop was made at Newton-in-the Willows. Despite being requested to stay in his carriage, William Huskisson felt compelled to approach the Duke of Wellington, possibly in an act of reconciliation following an earlier disagreement.

Unbeknown to Huskisson, the Rocket steamed along the adjacent track on which he was standing. "An engine is approaching. Take care gentlemen." The warning was lost on the wind, or euphoria of the occasion. Huskisson panicked and clung for dear life to the Duke's door. On impact a leg was badly mangled and he was rushed to Eccles in a train driver by George Stephenson. A plea to cancel the event was rejected as thousands were waiting at Manchester. Huskisson died at 9 pm that night, having already made his will.

Creating a Rail System

The first step was to set up a company, provide capital and get permission from Parliament. This required MP "advocates" as opposition by owners of canals and toll roads was inevitable. The Duke of Wellington feared that railways "would encourage lower classes to move about" and the Headmaster of Eton point blank refused a station within three miles of his school. Patronage, influence and money oiled the wheels. Next came finding a surveyor and engineer to plan the route and calculate gradients. A test in 1833 showed a locomotive pulling 67 tons on the level but it could draw only 15 tons on an incline of 1 in 100, and was immobile on 1 in 12.

Peter Lecount, assistant engineer to Robert Stephenson, was a man of ingenious calculations and compared the London-Birmingham Railway with the Great Pyramid. He calculated the labour expended on the Great Pyramid was the equivalent of lifting and laying 15.7 million cubic feet of stone. Herodotus estimated it took 100,000 men 20 years, so imagine 25 million cubic feet lifted and laid by 20,000 men in less than 5 years. Railways were built by men using picks, shovels and gunpowder. Even though a mechanical digger was available in 1843, the cost proved prohibitive, and the logistics of transport difficult.

Chat Moss had to be overcome on the Liverpool to Manchester line. Resting only on clay and quicksand, solid ground was eventually reached 35ft down. George Stephenson floated a line across the moss by trial and error. Embankment after embankment sank until hurdles of heather and brushwood were laid, followed by sand, earth and gravel, and finally cinders until he had a sufficiently firm track. A technically clever solution required back-breaking labour.

The engineer was responsible for routes, specifying works, superintending construction and ensuring his specifications were adhered to. The company then invited tenders based on per mile laid. Quoting was precarious as rock was costly to move and there were embankments, cuttings and viaducts to consider. The two main contractors, Thomas Brassey and Samuel Morton Peto, became millionaires by modern standards, helped by laying a 29 miles section of track in the Crimea.

For each section of line, the main contractor appointed agents who used sub-contractors for a section, cutting or embankment. They hired gangers (foremen) to supervise work on a daily basis. The gangers then employed navvies. The contractor provided tools, labour & materials and constructed all foundations, shafts, culverts drains and roads as well, as

scaffolding and pumps. The navvies might be paid a daily rate or piece-work per foot, or another measure. They often formed themselves into "BUTTY-GANGS" of about 10 to 12 men who completed a section for a specific price.

Morton Peto, a strict Baptist, employed navvies himself and supervised them through agents and sub-agents. He was unusual in that his men were paid every Saturday in cash. Peto did not use the truck system or give his men beer. When bankrupted in the great financial crash of 1866 he was employing 30,000 navvies. All lost their jobs but many prospered in better times, such as George Wythens who worked on the Dorchester to Maiden Newton line. He estimated £18,000 for a section. On consulting his wife they upped it to £20,000, but then considered the risks and competition. They slept on a bid of £40,000. Next day it was upped to £80,000 on a whim and was still the lowest bid. The couple made a fortune.

Gunpowder was used when it came to rock, ideally in one discharge. On the route from Folkestone to Dover a mass of chalk, 300 ft wide and 70 ft. deep, had to be moved. 19,000 lbs of gunpowder was planted. When it was fired no enormous bang or flash resulted, but flying debris scattered over 15 acres testified to the force.

Barrows were wheeled up planks, laid up the sides of cuttings, and a rope attached. It passed through a pulley at the top and was attached to a horse, and the belt of the operator. When laden, a signal was given simultaneously to the horse driver and man balancing his barrow to tip his load. If a horse slipped, or a man lost balance on a muddy plank, he had to tip his barrow one side and jump the other for dear life.

Tunnelling was highly dangerous with men in peril from their own explosions, breathing foul air, made worse by 12 hour shifts night and day, in all weather. The shafts, 8ft -10ft wide and up to 60 ft deep, were bored by a machine called a gin, powered by a horse. Men, lowered into buckets, dug from both ends of the borehole, working in a fug, lit only by candles, until both entrances were reached.

Viaducts and bridges were built by skilled men using local materials, mostly brick or millstone grit near the Pennines, avoiding the cost of transporting long distances. The additional cost of these structures could be defrayed. The company had to buy only the land on which the viaduct stood. The arches underneath could be let for tenements, shops and warehouses, or for use as a night shelter for the homeless.

Life Of A Railway Navvy

Early railway navvies gained experience building canals, toll roads and sea walls. They were mainly from Yorkshire, Lancashire, Scotland and Ireland with a smattering from Lincolnshire. In 1846, Thomas Carlyle described these navvies as "sunk three-fold deeper in brutality by the threefold wages they are getting." Life was uncompromising but rewarding.

It took a year's work to turn a labourer into a navvy. A few brought their wives; most brought other women but first they had to obtain work. A Mrs. Garnett told the tale of an old navvy in a lodging house in Nottingham in 1895. He had walked 186 miles in 7 days from Llanelli to Nottingham "on the tramp." Aged 68, his feet were raw. The navvy expected to start work the next morning.

Navvies worked and lived together and built their own homes out of stone, brick or mud with timber roofs and tiles, or even tarpaulins. A shanty had bunks from floor to ceiling along one wall. At one end was a rough dresser with several cups, basins and bowls; along the other a

double row of rough cupboards and a fireplace. In one corner there was a copper with a fire underneath. Over the copper dangled pieces of string and at the top of each string was a piece of wood with nicks and scratches to identify the owner. At the other end, in the boiling water, was each man's dinner wrapped in cloth.

Often shanties were tunnelled into a bank. The back and part of the sides of the hut would be solid earth with a roof built of spare timbers. On the Hawick branch of the North British Line, 20 to 30 men slept in huts 28ft x 12 ft, sleeping 2 or 3 to a bed with no segregation. Men with wives or womenfolk, and sometimes children, shared a shanty with single men.

Some men would sell their shovels for cider and one man traded his wife for a day for beer. Another navvy claimed to have worked for 21 years and had never been sober for a week. Another bragged he had saved £212 and spent all of it on drink. On the Kettering to Manton Line it was estimated that 312,000 gallons of beer and 5,200 gallons of spirits were drunk at a cost of £36,000. A railway historian in 1852 calculated that a sum equal to £1,000 per mile had been spent on booze while building the railways.

The truck system was widely adopted but was abused by employers. Men were usually paid monthly. Not given to saving, they lived on credit. If earning 5/- per day, at the end of the day a navvy would be given a ticket of nominal value 5/-, to be exchanged only at the truck shop. Goods were inferior with watered beer, fatty bacon and rank butter but Hobson's choice! Prices were usually higher and weights lower, and expect commission up to 10% to be deducted, so 5/- was only worth 4/6.

Riots were not uncommon. At Penrith an Irish navvy was told by an English ganger to use a shovel, not a pick. He refused. National feelings inflamed, the English majority attacked the Irish encampment, drove the men away and wrecked their huts, leaving women and children destitute. The next day, with 500 reinforcements, the Irish marched on the English who had decanted to Shap to do likewise. The day after, 2,000 English navvies invaded Penrith but the Irish had fled, except for a dozen men found in a lodging house. Order was restored when the Westmorland Yeomanry arrived but the riots spread to Kendal and then Scotland.

In 1847 near Bathampton there was a smaller riot in which an off-duty policeman was killed. A navvy was put on trial but evidence was inconclusive. The jury returned a verdict of "guilty of being a party concerned, but we have no evidence of his having given the fatal blow." The judge asked, "involved in what?" The reply was "in the murder." The judge ruled "If he was there, with others, having a common object to prevent the peace officer from putting an end to the fight, that amounts to the crime of murder." The jury was sent away to reconsider and, unsurprisingly, returned with a verdict of guilty. Perry, the accused, was sentenced to death.

Even though working in often dangerous conditions, navvies did not always heed advice. A surgeon visited the 3 miles long Woodhead tunnel, between Manchester and Sheffield, 3 times per week. More than half of all males and females had syphilis. He noted 23 cases of compound fracture including 2 skulls, 74 cases of simple fractures and dislocations and 140 burns from blasts. In one, a man lost both eyes, another half a foot and one burned half his face, head and right arm. These were in addition 400 minor accidents. In all, 32 men were killed - a greater proportion than at Waterloo.

In 1846 Edwin Chadwick proposed that, before granting permission for a railway, a company should accept responsibility for housing navvies and dependants. fixing a rent, and education

of children with healthcare of all. He read a paper to the Manchester Statistical Society, had 2,000 copies printed and sent them to all MPs, the Lords and press. A House of Commons Committee was set up and recommended abolition of the truck system and instituting employer liability if accidents occurred as a result of negligence or dereliction of duty.

Britain On The Move

Following opening of the Manchester to Liverpool line in 1830, the floodgates opened and by the end of the decade enormous swathes were ripped apart and consumed to make way for tracks and railway infrastructure, allowing towns and cities to expand at an extraordinary rate with goods now transported quickly, and at a fraction of the cost. The birth of the railways heralded the age of mass transportation for work, leisure and pleasure and the acquisition of possessions people could only dream of. Wedgewood bone china soon made an appearance in affluent areas of major towns and cities. By 1845 over 2,000 miles of track had been laid and, by 1854, had tripled to 6,000 miles, a year that saw 92 million passenger journeys. Whilst passenger traffic accelerated rapidly, the conveyance of goods by rail saw an even greater growth.

Publisher William Henry Smith, the son of news vendors, saw the potential of this form of mass transportation. Rail travellers had idle time so what better than something to read, rather than gaze aimlessly out of a carriage window, or indulge in polite conversation with fellow passengers, and what better location than a bustling railway station stall for selling newspapers, magazines and books. The first news-stand opened at Euston station in 1848. W H Smith was born, changing forever the buying habits of a public yearning to read the works of highly popular novelists.

Charles Dickens, Jane Austen and, later, Thomas Hardy, were firm favourites, but anything too racy was banned. Books priced at one or two shillings were now within reach of those with a modicum of disposable income. Literacy rates increased as people took to the trains en masse, encouraged too by Thomas Cook, a former Baptist preacher from Derby. In 1841 Cook offered cheap day excursions to the seaside and other popular attractions, setting fares deliberately low at a quarter of the price of ordinary fares. The guarantee was a packed train with happy passengers, intent on a good time and eager to experience and enjoy places and attractions they could only dream of. Memories would last a lifetime. What a transformation in public mobility, and a burst of sunshine into otherwise gloomy lives. The pace of change was intense and unrelenting. By the early 1850s Britain had the densest rail network in a world that seemed chaotic and bewildering.

On one August 'wakes week' day, 200,000 happy souls left Manchester for the delights of the seaside as six companies competed for passengers and their business. Railway pioneer and business magnate, George Hudson, resorted to dirty tricks to stifle competition, even altering train schedules to suit his own whims and those of his wife. Demand seemed insatiable. In the summer of 1845 pandemonium erupted as 20,000 speculators, many investing beyond their means, tried to get on the bandwagon lured by the prospect of a 10% return on their investment. Amidst collective hysteria, and corruption, rail costs were rising and a mountain of debt was about to erupt. In 1847 The Times reported the 'great bubble of wealth bursts' as people tried to ditch worthless shares. There was even a run on the Bank of England.

On 10 May 1866, a fateful Black Friday, banks, businesses and railways folded as the country plunged into recession. The cycle of boom and bust had entered the economic vocabulary, though a stoical British public felt confident the railway system would survive. It did as, until arrival of the omnibus and motor car, this was the essential lifeblood of a nation on the move. By 1873 total employees on the railways had increased to 275,000, over five times the 47,000 employed in 1847. William Henry Smith had it right. There was also a future with respectable jobs almost guaranteed from generation to generation. Railways were a major contributor to employment, the economy and a better life for many as the century progressed.

The railways inspired a huge cultural revolution in the way people lived and worked and what they ate and how middle classes spent their money, from shining Sheffield cutlery to mouth watering chocolate from Bourneville. No matter most people could afford third class only. Families could enjoy days out. Many saved in 'going-off clubs' for organised 'wakes week' holidays to Blackpool, Morecombe, Southport, Bridlington, Scarborough and other resorts. Wakes weeks were staggered in the summer months, from Burnley in early July to Oldham in early September, to avoid an avalanche of people descending on resorts.

Professor Hawke contends that by 1865 the British economy had increased by 10% thanks to the railways, bringing more opportunity to work in other towns, as well on the railways, more leisure options, given greater mobility, and a massive increase in freight as well as distribution. Goods could be transported much more quickly than the canal system and cheaper too, especially bulky raw materials and perishables. No longer did the farmers of Lincolnshire herd 200,000 sheep to London, a journey of over 100 miles that took a week. New suburbs began to appear and new towns as the railways created new markets for homes, consumers, and commuters too, helped by the Metropolitan Railway that reached Harrow in 1880. The railways transformed and revolutionised Victorian society.