SESSION 8 - RAILWAYS & OTHER INDUSTRIES

1) RAILWAYS

The North East can rightly claim the title of 'Birthplace of the Railways'.

The first recorded waggonway was built to transport coal from pits near Bedlington to Blyth in about 1608.

In 1726, a number of influential coal-owning landowners, including the Montagues, Liddells and Bowes families, had joined together to form the cartel known as the 'Grand Allies'. By the mid-18th century they had constructed a network of waggonways in North West Durham that was to develop into the Pontop and South Shields Railway (later the Bowes Railway) serving collieries around Springwell, Marley Hill and Tanfield.

The world's first railway arch, the Causey Arch, was built to carry this line in 1727.

In 1796, the first iron rails were used to replace wooden ones on the Grand Allies' waggonways, around Walker.

By 1800 self-acting inclines and stationary steam engines enabled an extensive network of waggonways to spread over ridges and hills, up to 10 miles inland from the Tyne and the Wear.

From 1813, William Hedley's steam locomotives were replacing horses at Wylam Colliery on the Tyne. During the Napoleonic Wars, vast quantities of horses were required for the army and the cost of horse-drawn transport at home escalated dramatically.

REFER TO HANDOUT ONE - TABLE 1

Hetton Colliery Railway

The young George Stephenson worked alongside William Hedley at Wylam Colliery and he was soon designing his own locomotives and working on improvements to track.

IMAGE – HETTON COLLIERY RAILWAY PLAN

Stephenson's first comprehensive railway system was constructed for the Hetton Colliery Company in 1822, the year the Company finally broke through the Magnesian Cap in East Durham to open up huge new coal reserves close to the coast.

About half the route of this railway was worked by five of Stephenson's locomotives, the rest by stationary winding engines and self-acting inclines.

The first 1½ miles from the Hetton pits was worked by locomotive

The nest 1½ miles was hauled up inclines by stationary engine

The next 2½ miles were covered by self-acting incline

The last 2 miles were locomotive hauled

The last ½ mile into Sunderland was operated by self-acting incline

The Stockton & Darlington Railway

Since 1768, plans had been regularly discussed to cut a canal that would link the collieries around Shildon and Bishop Auckland in County Durham with the rapidly growing town of Darlington and the port of Stockton-on-Tees. However, nothing materialised.

In 1818, the plan resurfaced again, along with the alternative proposal of a railway. The committee decided in favour of the railway and the Darlington Quaker businessman Edward Pease called in George Stephenson to advise.

IMAGE – STOCKTON AND DARLINGTON RAILWAY PLAN

An Act of Parliament for the building of the Stockton and Darlington Railway was passed in 1821 and the line was built rapidly, opening on 27th September 1825. The first train was hauled by Stephenson's engine 'Locomotion No. 1, preceded by the obligatory man on horseback carrying a red flag.

IMAGE – LOCOMOTION NO 1

The Stockton and Darlington line was built to carry coals, but private contractors were allowed to offer a horse-drawn passenger service along the rails.

PHOTO – MASON'S ARMS CROSSING

The vehicles stopped at convenient places, often near roadside pubs, to pick up and drop passengers. Mason's Arms Crossing and Fighting Cocks Station continued in use well into the 20th century.

To the West, the line continued beyond Darlington to the collieries at Witton park. Coal wagons from Witton Park pits were hauled by horses to the foot of Etherley Ridge, then up the ½ mile incline by stationary winding-engines and down the other side to St Helens Auckland, then horse-drawn a further 1½ miles to Brussleton Incline to be hauled up by stationary engine and lowered to Shildon, where locomotives took over for the rest of the journey to Darlington and Stockton.

In 1830 the Stockton and Darlington extended the line to a new port at Middlesbrough, which at that time consisted of only a handful of farms near marshy ground beside the Tees.

The Clarence Railway

The North East was the scene of cut-throat competition to get coal to the ports by the quickest possible route.

IMAGE – RAILWAY COLOURED PLAN

The Stockton and Darlington soon faced competition in the form of The Clarence Railway, named after the Duke of Clarence, the future King William IV, was created to challenge the Stockton and Darlington Railway.

The founders had originally supported the Stockton canal project, which would have by-passed Darlington. The Clarence Railway was intended to do the same, offering a slightly shorter route for coals than the Stockton and Darlington Railway.

The Clarence was asking for trouble, which the Stockton and Darlington provided at every opportunity. Unfortunately, the Clarence Railway did not have direct access to the coalfields, and coals had to pass over Stockton and Darlington rails for the first part of the journey, at a crippling surcharge of 2s 6d for each chaldron wagon.

In 1834, the Clarence extended its line to the newly built Port Clarence on the Tees.

By the 1840s, the Clarence Railway was struggling with another player in South West Durham bearing the splendid name of The Great North of England, Clarence and Hartlepool Junction Railway, which was formed to expand the small fishing harbour at Hartlepool to create a port for shipping coal from South West Durham.

The Clarence line gained support in its fight for survival from yet another railway, the Stockton and Hartlepool.

There was also intense competition to provide bigger and better port facilities to attract the lucrative coal trade.

PHOTO – HARTLEPOOL WEST DOCK

In 1844 the Hartlepool West Harbour and Dock Co. began building a new harbour between Hartlepool and Seaton Carew, which soon outgrew the older harbour at Hartlepool.

The Hartlepool West Harbour and Dock Co., the Clarence Railway and the Stockton and Hartlepool Railway all merged in 1853.

Meanwhile, Lord Londonderry had built an ambitious new harbour at Seaham to ship coals from his pits around Penshaw. The project was completed in 1831, and was described at the time as 'visionary and absurd'!

PHOTO –SEAHAM HARBOUR

Londonderry was attempting to break the near monopoly of Sunderland as the coal port for County Durham.

The harbour at Sunderland was served by the Durham and Sunderland Railway, which had been set up in 1834 as an entirely rope-hauled line because of the hilly terrain it traversed. It was still being worked by stationary engines as late as 1855.

IMAGE – RAILWAYS COLOURED MAP

Unlike the fashionable passenger railways of the South of England, these colliery railways were built for practical commercial reasons by practical businessmen.

There were few frills, as illustrated by a report on the opening of the new building at Hendon Station on the Durham and Sunderland Railway in 1858: **"The old building has never been much admired for its architecture, nor for its convenience and accommodation, but it was erected by plain men, with plain notions, who liked better to pocket money than to expend it in beautifying their property."**

The Stanhope & Tyne Railway

The first public line to serve Tyneside was the Stanhope and Tyne Railroad, which connected the collieries of North West Durham with the port of South Shields.

The Newcastle Journal reported the railway's first shipment of Medomsley Colliery coals from South Shields, on the collier "Sally", on 13th September 1834: **"The rejoicings and ceremonies commenced at day-break, by the discharge of a great number of carronades, placed on the banks of the Tyne and on the heights in the neighbourhood. At the same time as merry tune pealed from the bells of the parish church. One of the wagons was lowered into the Sally amidst deafening cheers from the immense multitude, the firing of cannon, the ringing of church bells and the waving of handkerchiefs by the ladies."**

The Stanhope and Tyne was built on the way-leave system, by which the company was charged by the various landowners for the privilege of laying tracks across their estates, and also paid a toll for each wagon, or chaldron that passed over the rails.

The first part of the route across the moors from Stanhope cost the company £25 per mile per year, but the way-leave negotiated at the eastern end rose to £300 per mile.

The excessive amounts paid out for way-leaves resulted in the Company's bankruptcy in 1841and its lines were taken over by the Pontop and South Shields Railway.

Passenger Railway Lines

The first railway line to be built across England was the Newcastle and Carlisle, which obtained its Act of Parliament in 1829 and was completed in 1838.

IMAGE – NEWCASTLE AND CARLISLE RAILWAY

On the first day of operating throughout the route from Newcastle to Carlisle, thirteen trains carried a total of 3,500 passengers. The return journey took 16 hours during which time the passengers, who were travelling in open carriages, were soaked to the skin.

The first public railway in Northumberland to obtain an Act of Parliament, in 1811, was the Berwick & Kelso Railway. However, no progress took place and the plans were finally abandoned in the 1830s.

PHOTO – NORTH SUNDERLAND RAILWAY

The last railway to be built in the county was the North Sunderland Light Railway, which ran from the main line at Chathill to Seahouses. It was opened in 1898 and was known locally as the 'Daisy Picker Line' because it was said that the trains moved so slowly that passengers travelling for a day out at the seaside could get off and pick flowers then jump back on the train!

The Main Line Railway

MAP – NORTH EAST RAILWAY NETWORK

In the North East, uniquely in England, the maze of private and public colliery railways formed the framework for the main line railway.

To the south of our area, George Hudson's Great North of England Railway linked Darlington with York.

The Durham Junction Railway was created in 1834 to divert coal traffic from central Durham to the Tyne, rather than to Hartlepool.

In places, parts of the Stanhope and Tyne, Pontop and South Shields and the Brandling Railways were used for through traffic.

It was this network of colliery lines that provided the nucleus for the Newcastle and Darlington Junction Railway, that was formed in 1842 to create a main line passenger railway through the region.

Traffic began working in 1844 and in 1846 the expanding railway was renamed the York and Newcastle.

Meanwhile, in 1845, the Newcastle and Berwick Railway was formed to build a main line north through Northumberland.

In 1847 the two main line companies were joined to make the York, Newcastle and Berwick Railway.

The North Eastern Railway was formed in 1854 from the Leeds and Northern, the York and North Midland, and the York, Newcastle and Berwick Railways.

During the next seventy or so, the NER ate up a succession of smaller railways to become one of the big four companies in Britain by 1923, when it became the London and North Eastern Railway.

2) PORTS AND HARBOURS

The maintenance and improvement of harbours were important factors in the increase in trade by sea and the expansion of shipbuilding in the North East.

From a very early date, Sunderland appreciated the importance of regular harbour improvements.

In 1717, the Wear Commissioners were established and, from 1752 they employed a full-time harbour engineer. Improvements were funded by a levy on all shipments of coals from the Wear.

In 1817, 7000 ships used the Port of Sunderland and one million tons of coal was exported.

IMAGE – SUNDERLAND HARBOUR circa 1823

The situation of the Tyne was very different. The Town and County of Newcastle controlled the Tyne from the river-mouth upstream to a point west of Newcastle itself. In

Although Newcastle had been one of England's greatest ports since the Middle Ages, little had been done to improve the dangerous and inconvenient conditions on the river.

IMAGE – OLD TYNE BRIDGE 1771

In the 18th century £1 million per year was earned from dues charged on shipping using the Port, but less than one third of that amount was spent on maintenance of the channels and port facilities.

During the 1830s and 1840s other port authorities such as Hartlepool, Blyth and Amble were making major improvements and new harbours like Seaham and Middlesbrough were being built to compete with the Wear and the Tyne, particularly in the export of coal.

The threat from these new and improved ports encouraged the borough councils that were created at Gateshead in 1835, Tynemouth in 1849 and South Shields in 1850 to combine in a fierce attack on Newcastle's monopoly of the River Tyne and in 1850, an Act of Parliament passed control of the Port of Tyne from the Town of Newcastle to the Tyne Improvement Commission, to the great advantage of all those who used it.

In 1863, the value of North East products shipped out of all of its ports had risen to £18,207,764. Coal represented 36.3% of this trade, metals 20.2% metals; 12.4% was shipping tonnage; 10.5% engines and machinery and 8.6% chemicals; with the rest being mainly glass and clay products, textiles and leather goods.

3) SHIPBUILDING

The first half of the 19th century

Until the mid-19th century, shipbuilding enterprises were small. Only a handful of yards in the North East employed more than 50 men.

Francis Hurry's Shipyard at Howdon-on-Tyne was an exception. Established in 1758, by 1800 it had grown to a size and complexity completely unknown in other North East yards. There were slipways for building four vessels at once and a dry dock that could accommodate two ships, 800 feet of quayside, a ropery, sail-making lofts and other ancillary facilities.

The success of the yard was founded on orders from the Royal Navy during the wars with France. When orders from the Admiralty slumped in 1806, Hurry was bankrupted. Successful British naval actions had resulted in the capture of sufficient French and Spanish vessels to fulfil their needs without building new warships.

The example of Hurry's Yard shows the cyclical nature of the shipbuilding industry throughout its history. Peaks of production included the years 1819, 1825, 1840 and 1847. There were troughs in 1822, 1829, 1835 and 1843/4.

Until 1800, the Tyne built far more ships than the Wear.

In 1790, 12,500 tons were built on the Tyne and only 4,000 tons on the Wear. Newcastle was the third largest shipbuilding port after London and Liverpool. Sunderland was fifth.

However, by the early 19th century, the situation was changing in favour of the Wear. Sunderland became the UK's major port for building commercial vessels.

In 1820, 11% of UK new tonnage was built on the Wear, by 1832 this had risen to 27%.. Between 1820 and 1832, the Tyne built only 43% of the amount of tonnage built on the Wear.

The supremacy of the North East in shipbuilding had become firmly established by 1843, when 43% of the total UK tonnage was launched from yards on the Tyne, Wear and Tees.

Shipbuilding was a major employer.

In the 1841 census one in five Wearside lads under the age of 20 were recorded as being shipwrights.

However, this heavy reliance on such a cyclical industry caused devastation during recessions. During the 1840s, at least 40 Wearside shipyards failed. Two thirds of the shipbuilding workforce had been laid off.

A contemporary observer remarked: **"It was a sad sight to see so many yards idle. The tall cranes standing for which no purchasers could be found, whilst others had been taken down and removed to the merchants' premises to save the rent of the yards. Saw pits were pulled up and devastation reigned supreme where a busy hive had been."**

In February 1843, there were 31 empty shops in Sunderland's High Street.

Shipbuilding on the Wear

There were marked differences between the way shipbuilding was conducted on the Tyne and the Wear.

Sunderland shipbuilding was based on speculative building, rather than contract work. A yard would build several small merchant ships or colliers were built, and buyers could purchase them "off the peg" – "We mak' 'em - you tak' 'em." as Sunderland shipbuilders said at the time – the origin of today's "Mackems".

A number of factors led to production costs being lower on the Wear than elsewhere, at £9 per ton compared with £15 per ton on the Thames:

Firstly, there was open entry to the shipbuilding trade: Unlike many ports, such as Liverpool, there were no barriers to ambitious young craftsmen wanting to set up their own business on the Wear.

Secondly, little capital investment was needed: Land for shipyards on the Wear was usually rented and not purchased, as the yards were often temporary and existing to build only two or three ships. Only half the yards on the Wear lasted two years or more, a third only one year. Although most were short-lived, some of these so-called "carpenters' yards", such as Havelock's and Laing's, survived and grew to become major firms by the end of the 19th century.

Thirdly, although the yards were mostly short-lived, they were usually larger than those on the Tyne: As the ships were not made for specific orders, one of two smaller vessels could usually be constructed simultaneously alongside a larger one, resulting in more economical use of timber and other materials. The shipyard workers were employed on piece rate, which led to even greater efficiency.

Fourthly, timber was available cheaply as it was brought in as return-cargo on Wear-bound vessels. Because the shipbuilders required large quantities of timber, competition among merchants kept prices low.

Finally, most of the ships built on the Wear were bought by local owners, which allowed the yards to be sensitive to the current market.

During the 1830s and the early 1840s the growth of the coal trade and the general increase in economic activity generated a shipbuilding boom.

In 1830, Lloyds Register recorded that Sunderland was **"the most important shipbuilding centre in the country, nearly equalling as regards number and tonnage of ships built all the other ports together."** In 1857, it was described as **"emphatically the first shipbuilding port in the world**".

IMAGE – WEAR SHIPYARDS MAP

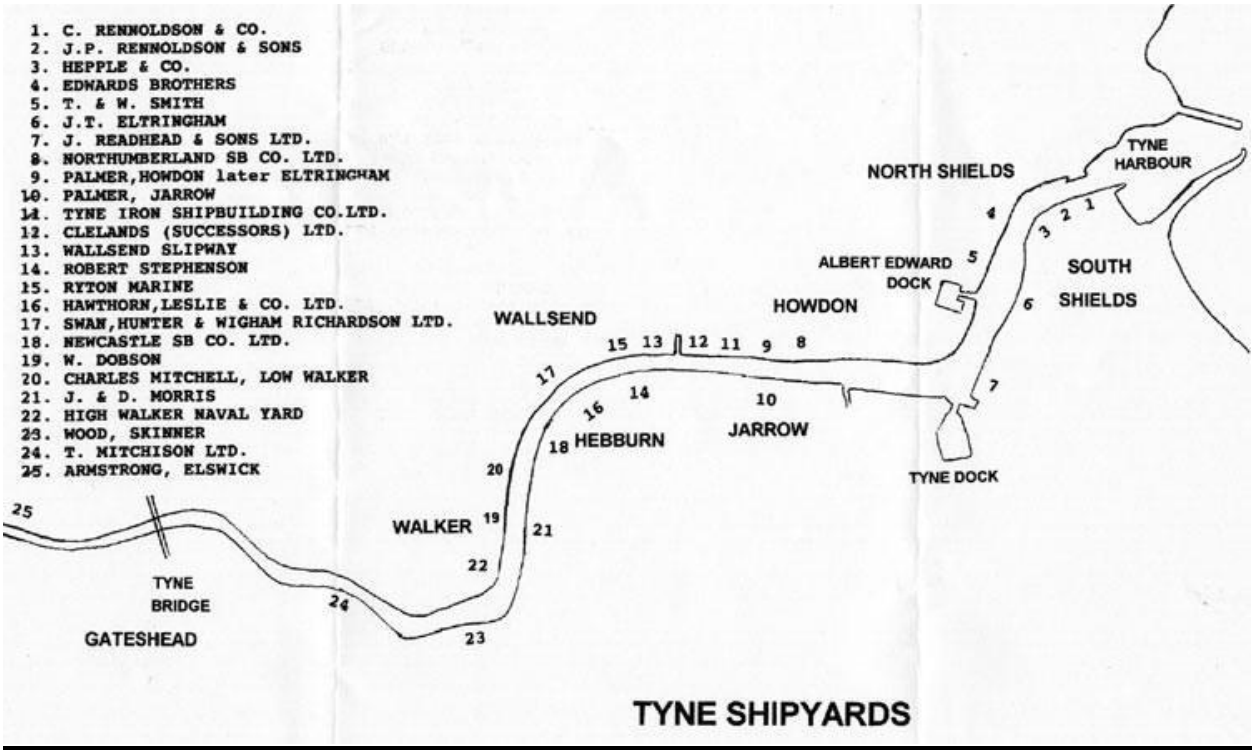
Despite the number of vessels being built on the Wear, the small-scale characteristics of the Wearside ship-yards lasted well into the 1860s and the narrowness of the River Wear made it unsuitable for launching the largest iron ships.

In 1854, the Wear produced about one third of the national output of shipping tonnage, compared with the Tyne's 8%. By 1870, the failure to change from wood to iron meant that output on the Wear had fallen to only about one fifth of the UK total.

Shipbuilding on the Tyne

By 1900, the Tyne had overtaken the Wear and was launching 300,000 tons of shipping per year compared to 250,000 tons on the Wear.

IMAGE – TYNE SHIPYARDS MAP



Though shipyards on the Wear were building more tonnage for most of the 19th century, it was the firms on the Tyne that showed the most interest in experimenting and innovation. This led to them gradually gaining the dominant position by the end of the 19th century.

While the Wear continued to rely on traditional ship-building skills, the Tyne was quicker to adopt the building of iron-hulled and steam-driven ships.

Tyneside was the birthplace of engineers like George and Robert Stephenson and Robert and William Hawthorn, who rapidly developed expertise in the design of steam engines and skills in metal-working that were equally applicable to railways or to ships.

In 1839, the North East's first iron ship, a small passenger steamer called "The Star", was built at Marshall's Yard in South Shields. She was followed two years later by the region's first iron-built, twin-screwed vessel, the "S.S. Bedlington" which was a train ferry intended to carry loaded coal trucks. Though technologically advanced, the "Bedlington" proved a commercial failure.

IMAGE - "JOHN BOWES" COLLIER

In 1852, the world's first successful iron steam-collier, "John Bowes", was launched from Charles Mark Palmer's Yard at Jarrow. Within a few years, whole fleets of steam-colliers had been built to open up an international export market for Northumbrian coal.

It took some time for iron steamships to completely rule the waves.

Of all the vessels registered in the UK in 1860, 6,876 were sailing ships and only 447 were steamers.

IMAGE – CLIPPER "TORRENS"

The last full-rigged passenger clipper ever built, the "Torrens", was launched by Laing's of Sunderland in 1875.

The works carried out by the Tyne Improvement Commission in the second half of the 19th century resulted in the Tyne gaining dominance over the Wear where the narrowness of the river was an increasing disadvantage as vessels became larger.

Larger yards were being established on the Tyne, such as Andrew Leslie at Hebburn and Charles Mitchell at Wallsend (1853), and Wigham Richardson's Neptune Yard at Walker (1860).

These new Tyneside firms brought skilled workers from the Clyde, experienced in building iron steam-ships. In the second half of the 19th century, the Tyne overtook the Clyde and the Thames in the building of iron ships.

IMAGE – "GLUCKHAUF"

Advances later in the 19th century demonstrated the Tyne's pre-eminence in marine engineering. In 1886, the world's first steam-powered oil tanker, the "Glückauf "was built by Armstrong and Mitchell. Within 20 years, 200 steam oil tankers had been built in the North East, 96 of them by Armstrong's.

IMAGE – "TURBINIA"

A new age was ushered in by the launching at Wallsend in 1894 of "Turbinia", the first turbine driven vessel. Equipped with steam-turbine engines designed by Charles Parsons, she was the fastest ship in the world at the time and made a spectacular appearance at Queen Victoria's Diamond Jubilee Review of the Fleet at Spithead in 1897. Turbinia is now on display at the Discovery Museum in Newcastle.

Not only were Tyneside yards quicker to adopt new methods of shipbuilding, but many of the firms were swift to realise the benefits of merging specialist expertise to create world-class companies that would meet modern needs.

Classic examples were the amalgamation in 1883 of Armstrong's engineering and armaments works at Elswick with Mitchell's ship-yard at Wallsend, and Hawthorn's famous marine engineering business with Leslie's Hebburn ship-yard.

Many companies specialised in particular types of vessels, working closely with shipping owners to ensure repeat orders. A joke circulated on Tyneside that Palmer's Yard built iron colliers by the mile and then chopped off the length required by the customer!

The growth of international trade and the race to built naval fleets in the last half of the 19th century created a vast demand for North-East built vessels. Yards on the Tyne and Wear no longer had to depend on local buyers.

In 1892, shipyards in the United Kingdom yards launched 81.7% of all world tonnage and 41.9% of that world tonnage was built in the North East.

4) LEAD PRODUCTION

The rapid expansion of towns, the development of railways, gas and water mains, and the increasing demand for manufactured goods of all kinds created new markets for the industries of the North East.

Like coal, lead had been mined in the region since Roman times.

The lead-producing area was geographically much smaller than the North East coalfield. It was located in the North Pennines and the western upland parts of Teesdale and Weardale.

The industry involved a number of processes as well as the mining of the lead-ore itself. Sulphur had to be removed, the ore was crushed to remove the rock, and smelting separated the lead from the galena in the ore.

PHOTO – KILLHOPE LEAD MINING MUSEUM

The late 18th century saw a massive increase in demand for lead for piping in domestic homes, and in the manufacture of glass, paint and other industrial processes. By 1800, the region was probably producing 50% of the total world output of lead.

Quaker families were major investors in the lead industry. The Quaker-owned he London Lead Company started its operations in Teesdale 1753 when it took a lease on a mine at Newbiggin in and later a smelting mill at Eggleston.

In 1815 the company moved its headquarters to Middleton-in-Teesdale.

Because of its Quaker principles, the Company provided decent living conditions for its workers, who worked in appalling conditions mining and processing the lead ore.

They built new company houses. Newtown as this part of Middleton became known was described by a contemporary writer**: "It consists of several uniform rows of neat and convenient cottages, situated in a spacious garden, a portion of which was appropriated to each dwelling. As vacancies occur, they place their most deserving workmen, thus combining general utility with the reward of personal merit. The first occupiers took possession of their new abodes in May 1824, accompanied by bands of music, etc.'.**

Each house had a pigsty at the back and there were taps for piped water at convenient points in the streets.

The Company encouraged education and provided a library for the workers and a school for their children aged 6 to 12 years (14 for girls), at a cost of 1d per week. A company doctor was paid for from a social fund supported by contributions from the men's wages and the workers were encouraged to form a cooperative association which operated a full grocery and drapery service, a butchery, blacksmith and coal depot..

Lead-mining remained prosperous until the middle of the 19th century, with buoyant prices and increasing demand.

However, the industry suffered a catastrophic decline from the 1870s, in the face of cheap foreign imports. The price of lead dropped from £30 a ton to £12 and the industry was virtually dead by 1900. The London Lead Company slowly scaled down its mining enterprise and it was finally wound up in 1905. Its mines were sold to the Vieille Montagne Company who worked them for zinc until the Second World War.

5) IRON AND STEEL PRODUCTION

The growth of the North East iron and steel industry took place in four main phases:

IMAGE – BISHOPWEARMOUTH IRONWORKS circa 1830

Until 1835 the industry was concentrated around Tyneside, and was involved mainly in the later stages of manufacture, such as rolling-mills and forges, using imported pig-iron.

PHOTO – RIDSDALE IRONWORKS RUINS

Between 1836 and 1843, new blast furnaces were established in Northumberland, at Redesdale and Hareshaw on the North Tyne moors, and local pig-iron production increased greatly..

IMAGE – CONSETT IRONWORKS circa 1851

Expansion in the later 1840s was nearly all in Wesr Durham. 22 furnaces were built around Witton Park, Consett, Crook Hall, Tow Law and Wolsingham in Weardale, At the same time, only 3 new furnaces were built in Northumberland.

The new iron companies were much larger than those that has been established in the 1830s and their arrival made huge changes to local communities. For example, Tow Law comprised only a single farm in 1841, but by 1851 the success of the iron works had increased the population to over 2,000.

IMAGE – BOLCKOW AND VAUGHAN FOUNDRY 1846

The early 1850s was a period of low iron prices. However, readily available local supplies of iron ore and coal, plus the development of the region's harbours gave the North East a competitive edge.

New development of the industry was focussed on Teesside, where the main seam of Cleveland iron ore began to be exploited from 1850.

By 1854, there were 9 smelting works and 29 blast furnaces on Teesside, producing cheap, low-grade ironstone and iron products.

By 1861, Teesside was producing 11% of the national output of iron. This had increased to 19% by 1871. By that time, Middlesbrough was known as "Ironopolis".

Steelmaking became a major industry with the introduction of the Bessemer process, but Cleveland iron ore was found to be unsuitable and ore had to be imported to Teesside and Tyneside from Spain. The situation changed in 1879 when Sidney Gilchrist-Thomas pioneered a new process of making steel which was first adopted at Eston Steelworks. The Cleveland ironstone industry was saved and steel-making was revolutionised throughout the world.

The Cleveland Ironstone industry peaked in 1885 when some 10,000 miners working in 40 local pits were producing over six million tons of ironstone a year.

By 1901, in less than 100 years, the population of Middlesbrough has risen from 25 to 91,302.

6) CHEMICALS

PHOTO – GATESHEAD CHEMICAL WORKS 1907

Tyneside was the centre of the UK chemicals industry in the mid 19th century.

The total workforce in the country was 6,326, of which 3,067 were employed on Tyneside in 24 factories producing mainly alkali and soda crystals.

Technical developments had left Tyneside behind by the 1870s and competition from Europe was expanding.

The United Alkali Company was formed in 1891, later to be renamed Imperial Chemical Industries (ICI). By 1914, the chemicals industry had migrated to Teesside, to exploit the local mineral reserves.

7) POTTERY

IMAGE - POTTERY

Pottery was another major local industry.

In the late 1860s, the potteries of Sunderland employed 3,000 workers and there were 13 potteries on Tyneside employing a further 1,200 workers.

However, the industry was badly affected by foreign competition towards the end of the 19th century.

8) GLASS-MAKING

The North East was also in the forefront of glass-making.

In 1763, Sir Francis Blake Delaval granted to his brother Thomas, through a private Act of Parliament, four and a quarter acres of land at Hartley for a "glass manufactory".

Thomas had travelled in Germany and brought back many new ideas to his native Northumberland. He set up the glassworks at his own expense.

All the necessary materials were readily to hand locally – black clay from Seaton Links, sea sand, kelp and coal. The only imports needed were cullet, which was refuse glass needed to replenish the crucible, and ashes which were brought to Hartley as ballast on empty incoming ships.

IMAGE – HARTLEY GLASSWORKS 1890

The first glass house was 200ft long by 52ft wide and the walls were 36ft high. The cones of the factory were a prominent feature in the landscape from miles around.

German craftsmen were brought from Hanover Trained workers from Hanover to teach the local workers.

The factory's 24 glass-blowers were soon producing 10,000 bottles a month.

Additional glass-houses were built, and the factory's six cones were each given individual names - Gallagan; Bias; Charlotte; Hartley; Waterford and Success.

The bottles were transported from the factory on the high ground to the harbour below using one of the country's first underground railways. The tunnels were used as air-raid shelters during World War Two.

The light coloured local sand proved excellent for making window glass and, in 1767, one of the glass houses was converted into a broad-glass manufactory.

The bulk of the products of the glassworks were traded with Messrs Harrison and Broughton of London.

Towards the end of the 18th century, the Royal Hartley Bottleworks at Seaton Sluice was the largest bottle manufacturer in the United Kingdom, producing one million seven hundred and forty thousand bottles a year. Its six giant cones dominated the landscape. Each cone was given a name; Gallagan; Bias; Charlotte; Hartley; Waterford and Success.

In the mid-19th century, 40% of UK glass production came from factories in the North East.

The world's first incandescent electric light bulb was blown at Lemington on Tyneside in 1879, an invention of a Sunderland man, Joseph Swan.

However, by the 1870s competition from Belgium and technological improvements by Pilkingtons at St. Helens hit the North East glass-making industry badly.

Even the Royal Hartley Bottle-works was in decline, and the factory closed in 1871.

The following year, the last shipment of Hartley bottles left Seaton Sluice on the 'Unity of Boston', bound for the Channel Islands and the bottleworks, with its distinctive six cones was finally demolished in 1897.

Glass-making in the North East was virtually dead by 1900/

9) Vertical Integration

By the third quarter of the 19th century, the region was home to several of the country's most comprehensive examples of vertical integration of industrial activities.

The Consett Iron Company was the UK's biggest producer of ship plates, and every element of the process was owned by the firm, from the coal and iron ore mines, to the shipping, the iron-works and the manufacture of the finished products.

The growth of Charles Mark Palmer's enterprises is a classic example of vertical integration.

Palmer was a principal partner and manager of the 16 collieries of John Bowes and Partners. In 1852, the revolutionary steam-collier "John Bowes" was launched from Palmer's ship-yard at Jarrow. This guaranteed Palmer and his associates a substantial slice of the London coal trade and his shipyards were soon producing iron-hulled steam-driven colliers by the dozen.

In the 1840s, Jarrow was just a small village. Within 50 years, the population exceeded 40,000, most of whom depended for their livelihood on Palmer's collieries, shipyards, ironworks and mills. By 1857, Palmer had constructed four blast furnaces at Walker and had purchased the Mulgrave Iron Ore Company to exploit the recently opened-up Cleveland iron ore deposits.

PHOTO – PORT MULGRAVE

In that year, the first iron-ore was shipped out from the new harbour Palmer had built at Port Mulgrave, near Whitby.

Now the coal from Bowes and Partners collieries could be transported to London by Palmer's steam colliers and they returned via Port Mulgrave ,where they loaded iron ore for use in Palmer's blast furnaces at Jarrow.

In 1863, "The Engineer" reported this view of the Tyne at Jarrow**: "Though the picture is a very dark one, still, in its way, there is no river in the world which presents such a wonderful picture of manufacturing industry as the Tyne. Everything around – houses, workshops, the wharves and the river itself – is blackened in a blackness that would be scarcely believed possible, even in the grimy districts of the Black Country itself, while the countless chimney stacks risen into the air in all directions, pouring forth dense volumes of white smoke from the chemical alkali works, or the black smoke from the foundries, which as they mix make regular stratifications in the air, almost thick enough to keep out the sunlight. No matter where they turn the view is all the same - it is steam, fire and smoke in every direction for miles, with occasionally a background still more hideous overall."**

Palmer's shipyards were so large that in that same year of 1863 he was able to launch four ships simultaneously, the "John McIntyre" and "SS No 1" for the Japanese government on the north bank, and the "Europa" and the "Latona" from the south bank..

Palmer's operation was so efficient that, on 19th December 1864, the "SS Despatch" was launched, towed upstream, fitted with engines at Hawthorn's works, returning to Jarrow the following day under her own steam.

PHOTO – PALMER'S SHIPBUILDING AND IRON COMPANY

By 1887, visitors to Jarrow were able to see coal and iron put ashore at the west end of the town, then proceeding through blast furnaces and rolling mills to the marine engineering works and shipbuilding slips at the east end.

Lord Armstrong

1900 saw the death of another great North East industrialist, William, First Lord Armstrong.

IMAGE – PORTRAIT OF LORD ARMSTRONG

He was an engineering genius.

In 1847 he founded his works at Elswick on the Tyne to produce hydraulic equipment, cranes and bridges..

IMAGE – ARMSTRONG GUN

In the 1850s, he moved into armaments manufacture by inventing the world's first breech-loading rifled artillery piece. The "Armstrong Gun" was tested on the moors in Redesdale, not far from Rothbury where Armstrong had buyilt his country mansion at Cragside.

IMAGE – ARMSTRONG GUN TESTING IN REDESDALE

At the time, Cragside House was known as the "{alace of a modern magician", because of all the gadgets Armstrong had installed, including hydraulic lifts, automatic roasting spits in the kitchens, central heating and a Turkish bath. The house was the first in the world to be lit bv hydro-electricity, powered by turbines in the grounds of the House and using incandescent light bulbs invented by his friend, Joseph Swan from Sunderland.

IMAGE – SWAN LIGHTBULB

In 1882, Armstrong's merged with the shipbuilding firm of Charles Mitchell to form Armstrong Mitchell & Company.

By that time the Elswick works extended for over a mile along the bank of the River Tyne.

IMAGE – ARMSTRONG'S ELSWICK WORKS 1898

In 1897, Armstrong Mitchell merged again with the engineering firm of Joseph Whitworth and the company expanded into the manufacture of cars and trucks in 1902, An "aerial department" was formed n 1913, which became the Armstrong Whitworth Aircraft subsidiary in 1920.

Finally, in 1927, the company merged with Vickers Limited to form Vickers-Armstrongs.

10) Decline

The 19th century had seen the North East at the height of its industrial importance.

TABLE - PEAKS OF NORTH EAST INDUSTRY

Lead	**1800**	**50% of world production**
Glass	**1850**	**40% of UK production**
Chemicals	**1860**	**50% of UK production**
Ship tonnage	**1892**	**42% of world production**
Coal	**1900**	**25% of UK production**

However, Armstrong's death in 1900 signalled the beginning of the decline of North East industry.

The North East was reliant on a small number of heavy industries – coal mining, shipbuilding, engineering, iron and steel-working, and chemical production on Teesside.

Such a large enterprises were dependent on a buoyant demand for their products, which was not to last.

In 1933, the "John Bowes", the collier which had been the foundation of Mark Palmer's success, foundered in a storm. It was perhaps an omen for the times because Palmer's Company collapsed in the same year as a consequence of the Great Depression. Thousands of men were thrown out of work in and around the company town of Jarrow.

One by one, the great icons of North East industry died.

The massive Consett Steelworks shut down its furnaces in 1980 and centuries of ship-building on the Tyne ceased with the closure of Swan Hunter's yard in 1993.

The final shift in the North East's last coal mine at Ellington ended in 2005 and the once-mighty Vickers Armstrong factory at Elswick, Britain's last manufacturer of armoured vehicles, closed in 2013.

Even the manufacture of chemicals on Teesside is now a mere shadow of the once-great industry that created the town of Middlesbrough early in the reign of Queen Victoria.

From great Anglo-Saxon kingdom to devastated frontierland, from haunt of cattle-thieving reivers to a mecca for agricultural improvers and powerhouse of the industrial revolution.

By the early 20th century, the North East was in decline again.

Who knows what the next 900 years may hold?