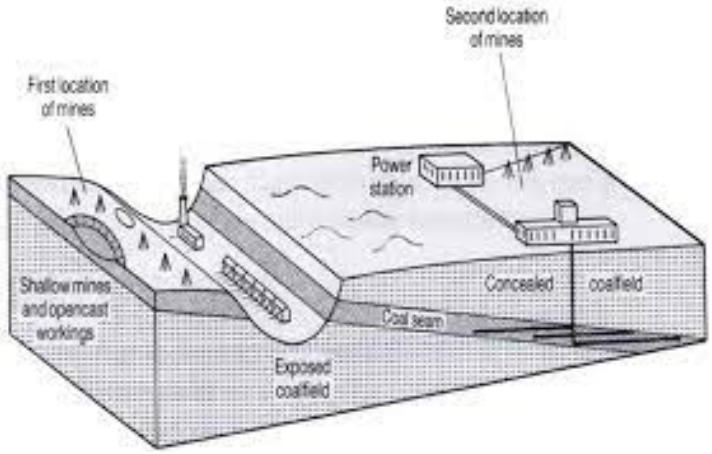
FACTORS AFFECTING THE LOCATION OF AN IRONWORKS
1820

COAL

Coking coal is needed in large quantities in 1820 to charge the blast furnace which makes the pig iron. As much as 6 tonnes of coal is needed to make about 2 tonnes of iron ore into one tonne of iron.
Good quality coking coal is available at the coalfield shown on the map. In 1820, however, we do not have the technology to mine coal on the concealed coalfield, only on the exposed coalfield where coal is found at or near the surface. This coal is bulky and will be difficult and expensive to transport any distance.
The diagram below shows a cross section of the exposed and concealed coalfields.



IRON ORE

Iron ore is a rock containing a proportion of iron and it is also needed in large quantities to charge the blast furnace. Iron ore is found within the coal measures and is called black band iron ore. This iron ore has an iron content of about 50%. In other words half of the iron ore is actually iron and the other half is waste rock. The heat of the blast furnace is used to smelt the iron out of the ore and leave the waste slag. Much less iron ore is needed than coke in the inefficient blast furnaces of 1820. Remember only the exposed coalfield can be mined for both coal and black band iron ore.

TRANSPORT

Transport is very slow and inefficient in1820 and you will not want to transport the raw materials or the finished iron products very far. The only viable method for transporting the bulky raw materials like coal and iron ore needed for an ironworks is by water. The navigable waterways, rivers and canals are shown on the map. A site near these waterways that offer cheap transport is best.

FACTORS AFFECTING THE LOCATION OF AN IRON AND STEEL WORKS 1920

COAL

The coking coal in the exposed coalfield is now all but exhausted, and very little good quality coking coal is left to be mined. However, we now have the skill and technology to mine the coal in the concealed coalfield which may be many metres below the surface. Coal mining is therefore moving towards the coast from the exposed to the concealed coalfield.
Coking coal is not as important to the iron and steel industry in 1920 as it now only takes about 3 tonnes of coal to make 1 tonnes of steel.

IRON ORE

The black band iron ore found within the coal measure rocks is now exhausted. A large new iron ore field has been discovered near site D. This is a phosphoric iron ore that could not be used safely until after 1879 when Gilchrist and Thomas invented the basic lining process.
This iron ore is very close to the surface and can be mined cheaply by open cast methods. It is, however, a very poor quality or low grade iron ore having an iron content of only around 20%. This makes it very expensive to transport before smelting as 80% of the material carried would be rock waste. Sites on or near the new iron ore field are best.

TRANSPORT

Waterways are still a very cheap way to transport bulky raw materials such as coal and iron ore, and finished steel products. However, rivers and canals are very slow methods of transport and should not be used for longer distances.
A dense network of railways now exists linking all the major centres on the map (A-E). Rail is an efficient, fast and relatively cheap way of transporting bulky goods. Steel is sold all over the country but increasing amounts are now exported.

INDUSTRIAL INERTIA

Once an industry has been built at a particular site It is very expensive to move elsewhere. At the existing site money is already invested in plant and machinery (fixed capital), and there will be a skilled labour force. Industrial inertia is the force that tends to make industries such as steel stay at their original sites. Therefore towns and centres that already have an iron and steel industry will keep that industry long after the factors that brought it there have declined in importance. Iron and steel plants will already exist at sites B and C.

FACTORS AFFECTING THE LOCATION OF AN IRON AND STEEL WORKS 2000

COAL

Call is even less important to the modern steel industry as it now only takes around 0.6 tonne of coke to make 1 tonne of steel. The coke is now added to the iron ore and the limestone in an ore preparation plant. Here the sintering process combines the 3 elements at a temperature of 1000 C to produce granules that are charged into the blast furnace.
Almost all the coking coal is now imported from countries such as the USA through the deep water port and terminal at E. It can, however, be moved quickly, cheaply and efficiently by the rail system that links all the main centres.

IRON ORE

The low grade iron ore found near D is now exhausted. The iron ore used in the blast furnaces is now imported from China and Brazil in large ore carriers through the deep water port at E. This is high grade iron ore with a high % iron content that bears the cost of transport and can also be moved cheaply and efficiently to all the centres by rail.

TRANSPORT

The rail network still exists linking the main centres A-E shown on the map. It is still a fast and efficient way for transporting bulk supplies of raw materials and finished products relatively cheaply.
Nowadays most raw materials for the steel industry are imported from abroad. Large ocean going ore and coal carriers transport large volumes of raw materials and the size of the vessels allows it to be done cheaply through economies of scale.
A large deep water ore and coal terminal has been built at E. The deep water allows very large vessels to be used to import the raw materials. Many finished steel products are now exported through the deep water port.

INDUSTRIAL INERTIA

It is still cheaper to expand on an existing site than build from scratch on a new one. The fixed capital of existing sinter plants, blast furnaces, steel making capacity and finishing mills, and the skilled local labour force make existing sites attractive.
Existing sites will also benefit from industrial agglomeration as subsidiary industries will have set up in the local area. The steel industry will have established links with these firms, again lowering costs.
Scrap steel is used in increasingly large quantities in modern Basic Oxygen Steelmaking plants. This makes existing centres even more attractive as more scrap steel will be available. Steel centres exist at D and to a lesser extent B and C.

FACTORS AFFECTING THE LOCATION OF AN IRON AND STEEL WORKS
21st CENTURY : LATEST CONSIDERATIONS

RAW MATERIALS

Coal and iron ore are not mined to any great extent in the UK now. The major coking coal exporters are Australia, Indonesia, Russia and the USA, the main producers are China and India. The major iron ore producers are Australia, Brazil, China and India.

TRANSPORT

Large ocean going coal and ore carriers can transport the bulky raw materials cheaply all over the world. Coastal sites are best as they cut transshipment costs. Within any country waterways and rail are used.

INDUSTRIAL INERTIA

All the same industrial inertia factors still apply and existing sites are preferred to new 'greenfield' sites. At this stage, however, steel plants are found both in the UK (Developed world) as well as in the Newly Industrialising Countries (NIC's).
Problems in the post-industrial countries such as the UK are caused by the diseconomies of agglomeration. Years of industrial growth and concentration of that growth have led to problems of congestion, pollution, high land and labour costs and environmental pressures. This is causing the de-industrialisation of these post-modern nations and a move to the Tertiary and Quaternary sectors at the expense of manufacturing.

NEW INTERNATIONAL DIVISION OF LABOUR (NIDL)

Post-industrial nations such as the UK are moving away from the secondary sector as more employment is concentrated in the tertiary and quaternary sectors. Trans-national corporations often owned in the developed world are moving their production capacity to NIC's and New Emerging Economies (NEE's) where production costs, especially labour, are lower. Some developing nations attract this development by offering tax incentives and export processing zones which further lower costs.

OWNERSHIP

Unlike most Trans-national Corporations many of the main steel making companies have their homes in NEE's and NIC's. Top steel producing companies are generally located in countries such as China, India and South Korea. They have their head offices, research and development, and most of the manufacturing capacity in the home country, but have invested in steelmaking around the world. The works at Scunthorpe until recently were owned by Tata Steel, an Indian company, and have now been bought by a Chinese company. You may feel that, with a contracting market for steel, money is best invested in India or China.