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Engineering



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PURPOSE STATEMENT:

1863 saw the introduction of steam engine. This system had great influence to the lives of ancient people, starting from Britain and then later to the whole world. The steam engine is a machine that had positively affected the industrial revolution in many ways. It helped mankind in several important fields such as Mining, Coal extracting and Transportation as well. In my report I will write about the invention of the steam engine by Boulton & Watt and how it was developed through time. The report starts with an introduction then flows down to explain the development process and then the results of steam engine innovation. The report will also give detailed explanation as to why Britain was the main country of the innovation.

INTRODUCTION

Many historians like Lewis Mumford forwarded details that industrial revolution have its origin in early and middle Stone Age. In the period between 1760 -1850, the early man had advanced in textile and agriculture. These two sectors thrived so well and hence brought the need for expansion. More energy was required to move the textile machines. Agricultural sector also needed better and efficient tools to use in preparation of gardens. Prior to 1760, most of the textile work occurred at home and the participant mainly in used manual labor. This was strenuous. Many of these textile stages were performed by children. The processes of production in the textile industry were many and disorganized. All these greatly slowed down the production because of the lower age of mechanization. Amidst this confusion steam engine was invented to help give help to the textile

machines, which were manually operated before. All the sectors rose up to the occasions that took place during this industrial revolution.

The first attempt to develop the steam engine was recorded in 1863 when Thomas Savery invented a water pump. This was later followed with various inventions and improvements that later improved on the working of this pioneer Water pump.

WORLD BEFORE STEAM ENGINE

Before 1760, a lot textile work occurred at home and the participant mainly in used manual labor. This was strenuous. Many of these textile stages were performed by children. The processes of production in the textile industry were many and disorganized. All these greatly slowed down the production because of the lower age of mechanization. Amidst this confusion steam engine was invented to help give help to the textile machines, which were manually operated before. All the sectors rose up to the occasions that took place during this industrial revolution.

The main source of labor during these ancient days was manual. This included both human and animal power. The farms were always tilled using ox plough. This was very slow and tedious. Many times the farm produce got spoilt because of lack of good transport network. All these made the world thirsty for a better source of energy. This propelled inventors to develop the steam engine.

STEAM ENGINE

Steam power is evidently the biggest asset of industrial revolution. This is because many inventions needed some source of power to drive their equipments. Steam power was the most used form of energy to drive their equipments. The famous steam power is a brain Child of James Watts but before watts put up his mind to this great work, two gentle men namely Thomas Savery and Thomas Newcomen had tried to come up with the first steam power. Watts came up with an idea of using gun making concepts to improve on the efficiency of the first engine by Newcomen.

Industrial revolution is characterized by exchange of ideas and technologies. James watts literally fashioned John Wilkins's device and used it to bore a large cylinder that He used for his equipment steam engineering actually shared the whole lifestyle of humanity during the industrial revolution. Many improvements were seen both in manufacturing, transport, textile and agricultural industries. Even though steam power was greatly used during their time of industrial revolution, other ancient innovators always preferred wind power and water power to drive their equipment. Others at the same time still used horse power and even worse of all, man power.

WHAT PROMPTED THE INVENTION OF STEAM ENGINE

Many factors prompted the invention of the steam engine and other systems during the industrial revolution. One of the most influential causes was the Agricultural revolution of 18th century. This agricultural revolution led to significant increase in food production and hence food security. This aided in solving the basic need of food . With this, British could feed more of its population at lower prices and with less labor. Food security meant that most

of the British population did not use a lot of money in buying food, but instead used the money to buy industrially manufactured goods. This good market base was a great motivation to industrialists to work hard into creating new ideas. Rapid growth of population is a further catalyst to the expansion of industrial revolution. Second half of the 18th century provided a pool of labor supply for the new factories of the emerging British industry.

Enough capital was another factor for industrial revolution. British had a ready supply of money to invest and expand their new machines and factories that housed them. More capital also streamed in from the well established cottage industry. The flexible credit facilities made it easy for industrialists to get money to drive their inventions (2: 51-53).

Capital alone is not enough. Industrial revolutionists were people of great desire and motivation. They were fascinated by wealth and commerce. Such a great and potential human resource is very important for industrial revolution.

Britain had a rich supply of natural resources like minerals (coal and iron ore) needed in the manufacturing process. This means that raw materials were easily obtained and hence were used to develop steel and other parts of the steam engine. The need for transportation was evident in Britain many farmers were often stranded with their goods because of long distances to the market place. This was a drive to the invention of steam powered train. Further more, the construction of roads and bridges over rivers was a great motivation to the expansion of steam powered trains in the entire region.

Political stability was another boost for this industrial revolution. The empires provided peace and stability to the industrialization. Many are the incentives that were also given to these hard workers. Last but not least, a supply of markets gave Britain a ready market and outlet for their manufactured goods. In the course of eighteenth century wars and conquests, Great Britain has vast colonial empire at the expense of its rivals like Dutch and Britain. The well developed merchant marine and oversea markets all coupled together, gave the industrialists great motivation into inventions.

PROCESS OF STEAM ENGINE INVENTION

History has it that Watts was the individual behind the invention of steam engine. But the truth is that Watts only picked up from the work of his predecessors. Industrial revolution is characterized by exchange of ideas and technologies. James watts literally fashioned John Wilkins's device and used it to bore a large cylinder that He used for his equipment steam engineering actually shared the whole lifestyle of humanity during the industrial revolution. The original steam engine was made using iron and the system produced energy after burning coal in the cylinder (1: 26-32).

As long as there is life on earth, changes will always be part and parcel of existence. Many improvements were seen both in manufacturing, transport, textile and agricultural industries. Even though steam power was greatly used during their time of industrial revolution, other ancient innovators always preferred wind power and water power to drive their equipment. Others at the same time still used horse power and even worse of all, man power. This was many years before steam power could be thought of.

Ancient days had great collaborations. Scientist of the past borrowed technology from one another . Thomas Savery made the first attempt to use steam power in 1698. This pioneer experiment however failed. More tails were made by Thomas Newcomen in the year 1719 and this was successful. More people in the process of coming up with inventions and at some moments, claims of ownership was a real issue. This led to the sharing of patents between Thomas Newkomen and his associates in Britain.

The original version of Newcomen’s engine used the technology of piston and cylinder and its steam was kept just above the atmospheric pressure. This technology further condensed the steam by the cold water which was initially injected into the steam space to produce a partial vacuum. The download of the pressure, was then differentiated between vacuum and atmosphere on the other side of the piston. Newcomen made greater contributions with time and his steam engine swept throughout the Great Britain and the rest of the world. Most of his Engines were used in mines for draining the deeps. The machines powered by Mendeleev’s steam engine were wide and large. This required more sophisticated equipments. By the time of his death, most of Newcomen’s engines had been sold in many places all over the world. In 1722, some coal mines in Hungary, Austria and Sweden enjoyed sufficient power supply from Newcomen’s steam Engine. This enabled the expansion of other sectors of the economy like textile, manufacture and mining industries.

IMPROVEMENTS OF THE STEAM ENGINE

The demands of technology in all sectors created a lot of pressure to inventors. This made people like Watts, Newcomen and Trevithick to work so hard. After the death of Mendeleev, another aggressive innovator called James Watt picked up the mantle. Mr. James incorporated a series of changes on the original version of steam engine. He made the low steam pressure to drive the top of piston instead of the atmosphere. This resulted into more constant temperature being achieved in the cylinder. This boosted in the engine efficiency since it no longer relied on the atmospheric conditions. The coal costs were cut down by a great margin as a result of this improvement by James Watt

Further improvements saw development of the engine into a double acting rotary type in which it could independently move the rotary of a mill or machine. Watts and Boulton joined together earlier and their combined force resulted into development of better and commercially accepted steam engines. By 1800, their firm had managed to produce steam engines accumulating to 496 engines, with 164 driving reciprocating pumps, 308 on mill machinery, 23 serving in blast furnaces and other arenas (3: 57-59). More countries were already receiving the shocks of technology from Britain.

Every stage of improvement came with modification of at least on element of the existing steam engine. An earlier version of steam engine used was the beam engine. This system was initially built using bricks or stone parts but with time, various designs of self contained portative engines were developed. Richard Trevithick is another American engineer who made great contributions towards the development of steam engine. He assisted in the construction of higher pressure non-condensing steam engine (2: 74-80).

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This invention resulted into the construction of a combined engine unit for the boiler and the engine. More locomotives were then manufactured from this new development. It made it possible for the use of system on mobile and flexible environments like roads, rails and in water bodies. Today's locomotives are indeed an improvement of the old systems (4: 59-60).

Technological advancements have come with the second industrial revolution and further more into high-tech generation. Today's locomotives move at fast speeds of up to 300 km per hour on the roads. This is a big contrast to the first locomotive whose speed was 1 km/h. Coal was the main source of energy in the past. Today better forms of energy sources have been discovered. These range from, electricity, geothermal, bio-fuel and biogas, and of late nuclear energy. The systems today are also lighter and can perform a lot more functions compared to the ancient days.

The coming together of Boulton and Watts created a lot of changes in the era of industrial revolution. These two people improved the condenser of the former engines. Their first test engine was built in Soho where the two innovators tried to the ideal of craftsmen of the time. These improvements were so positive, enabling a reduction of fuel consumption by 75% (2: 81-84). This aspect of reduced fuel consumption was so good and many more people installed steam engines in their premises to help them in various works.

BRITAIN

Industrial revolution started in the European region and then later spread in the world. Britain as a country, embraced industrial revolution with a lot of

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might. Competing states include its chief rival France and Germany. Many factors aided in the success of industrial revolution in Britain, some of which have been discussed above. Agricultural revolution acted as a pace setter to the industrial revolution. With this, many people had enough food and their living standards were averagely good (8: 120-122). This boosted industrialization since a lot of money was left unspent, and this was in turn used to purchase technological goods. Any invention automatically succeeds whenever there is enough market. This was a real opportunity for many innovations to come up.

The expanded and developed agricultural environment also boosted industrialization since technologically advanced methods were introduced. A lot of equipments were developed from steel and iron. Markets were further available in Britain as a result of the well developed cottage industry. This created a demand for industrial products like steam powered textile machine among the rest. Many conflicts resulted into wars during these ancient days. These wars were to the advantage of Britain since they were fought overseas. This reduced extreme effects of territorial conquest in Britain. This meant that the home environment was peaceful in Britain, while its neighbors were very busy fighting one another (1: 22-23).

Geographical positioning of Britain has contributed a lot to the industrial revolution. This island niche, which is separated from the mainland, plays a big role in isolating this country from the main land. Another factor for the expanded development of industrial revolution in Britain is availability of resources. Britain had iron, lead, limestone and local availability of coal.

These provided cheap raw materials for the development of stream powered engines.

Many innovators were given sufficient support by the Britain government. Although there were small restrictions, they always had space to air their views and they also received maximum supply of capital and incentives to boost their projects. This was a great encouragement to the inventors.

USES OF STEAM POWERED ENGINE

Industrial revolution of the 16th century is a bed rock to many technological developments of today. The invention of steam powered engine resulted into radical transformation in all the aspects of the economy: ranging from social, economical, political, manufacturing, and agricultural sector (8: 122-124).

The steam engine to power farm equipments like ploughs. This was enabled creation of more efficient tools for tilling the land and also faster technology for handling the produced food stuffs.

Steam engine was a great step to the transport sector. This system was used in steam powered trains, water ships, and other locomotives. Many people benefited from this especially in the agricultural sector. Farmers used trains to take their produce to storage houses and far markets. People in other areas of profession also use the trains to reach their work stations. Examples are teachers and medical experts. More lands were also reached as a result of easy transport. This resulted to expansion of agricultural land and production of more food products.

Steam engines were always used to power vessels for drawing water from bore holes. This was used many times by farmers who irrigate their land. Another use of these engines was in the mines. They were used to power vessels for draining the deep in mines. Steam engines were also used in rain factories to give energy to crush the grains and make flour. Steal mills also used the steam engines in their processing and purification. The engine was also used to power equipments for lifting malts, and also for stirring vats.

CONCLUSION

Steam engine was the most important form of invention during the industrial revolution. This was an answer to the demand for a better form of energy. The engine enabled easy transportation of human beings, farm produce and other industrial products. The original versions however had to be improved so as to give better services. These are versions that used low energy and occupied less space. Further improvements resulted into the technological products that are evident today.

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