

# **BLAENAVON AND THE 'GILCHRIST-THOMAS' PROCESS**

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## **The Bessemer Converter**

Sir Henry Bessemer (1813-98), experimenting with Blaenavon pig iron during the 1850s, developed a process, which allowed for the bulk conversion of pig iron into steel. The Bessemer converter, which was completed in 1856, revolutionised the production of steel. It was soon discovered, however, that most of the world's iron ore contained high levels of phosphorus, thereby producing brittle steel. Consequently many steelworks had to import expensive non-phosphoric ores in order to meet the high demand for the metal.

## **The Challenge**

The problem of removing phosphorus from the Bessemer process vexed chemists for many years. In 1870 a tutor at Birkbeck College, Dr. George Chaloner, posed the challenge that 'the man who eliminates phosphorus by means of the Bessemer converter will make his fortune'. Attending the class was a young amateur scientist named Sidney Gilchrist Thomas (1850-85). Thomas was a Metropolitan Police Court clerk, who attended evening classes in order to pursue his passion for chemistry. Thomas, inspired by the challenge, resolved to solve the problem of the Bessemer converter and engaged in a series of experiments.



## **Experiments in Blaenavon**

Thomas's cousin, Percy Carlyle Gilchrist (1851-1935), was appointed as analytical chemist at Blaenavon in 1876. On weekends from 1877, Sidney Gilchrist Thomas travelled to Blaenavon from London to work with his cousin, at their own cost, on secret experiments. The general manager of the Blaenavon Company, Edward Pritchard Martin (1844-1910), eventually became aware of the cousins' work and purchased a share in the patent. A small Bessemer converter was provided by the Blaenavon Company, allowing for larger scale tests.

The young men developed a special lining for Bessemer converters, which absorbed the unwanted phosphorus. Sidney Gilchrist Thomas announced the success of the experiments at a meeting of the Iron and Steel Institute in London, during March 1878. In a subsequent scientific paper, entitled 'The Elimination of Phosphorus in the Bessemer Converter', he paid tribute to the assistance he and his cousin had received from the Blaenavon Company.

The claim of success was initially received with a degree of suspicion or incredulity. Few scientists could believe that a young amateur could solve such a problem. Further experiments to refine the process were made at a steelworks in Middlesbrough and the Gilchrist-Thomas process was completed in 1879. News of the success spread and soon foreign steel manufacturers were competing for the patent rights.

## International Significance

Andrew Carnegie (1835-1919), the Scottish-born American industrialist, invested some \$250,000 for the right to use the process in the United States, and remarked that:

'These two young men, Thomas and Gilchrist of Blaenavon, did more for Britain's greatness than all the Kings and Queens put together. Moses struck the rock and brought forth water. They struck the useless phosphoric ore and transformed it into steel... a far greater miracle'.

The Gilchrist-Thomas process had a huge effect on the development of the steel industries of Europe and America. By 1882 fourteen ironworks in Great Britain, France, Belgium, Germany, Russia and the Habsburg Empire had invested in the new process.

Blaenavon was given the right to use the Gilchrist-Thomas method without paying royalties but Blaenavon and other steelworks in south Wales actually suffered due to the discovery. Increasing competition from more efficient foreign steelworks meant that profits declined and it became expensive to compete. Gradually south Wales specialised in the production of coal rather than steel, ushering in a new era of Welsh industrial history.

## Legacy

Sidney Gilchrist Thomas's discovery brought him wealth but it cost him his health. Thomas possessed a frail constitution and the effects of his experiments damaged his lungs. He died in Paris on the 1st of February 1885, aged just 34 years. An obelisk, commemorating the work of Gilchrist and Thomas, was unveiled outside the Forge side works in 1960 and now stands in the grounds of the [Blaenavon Ironworks](#).