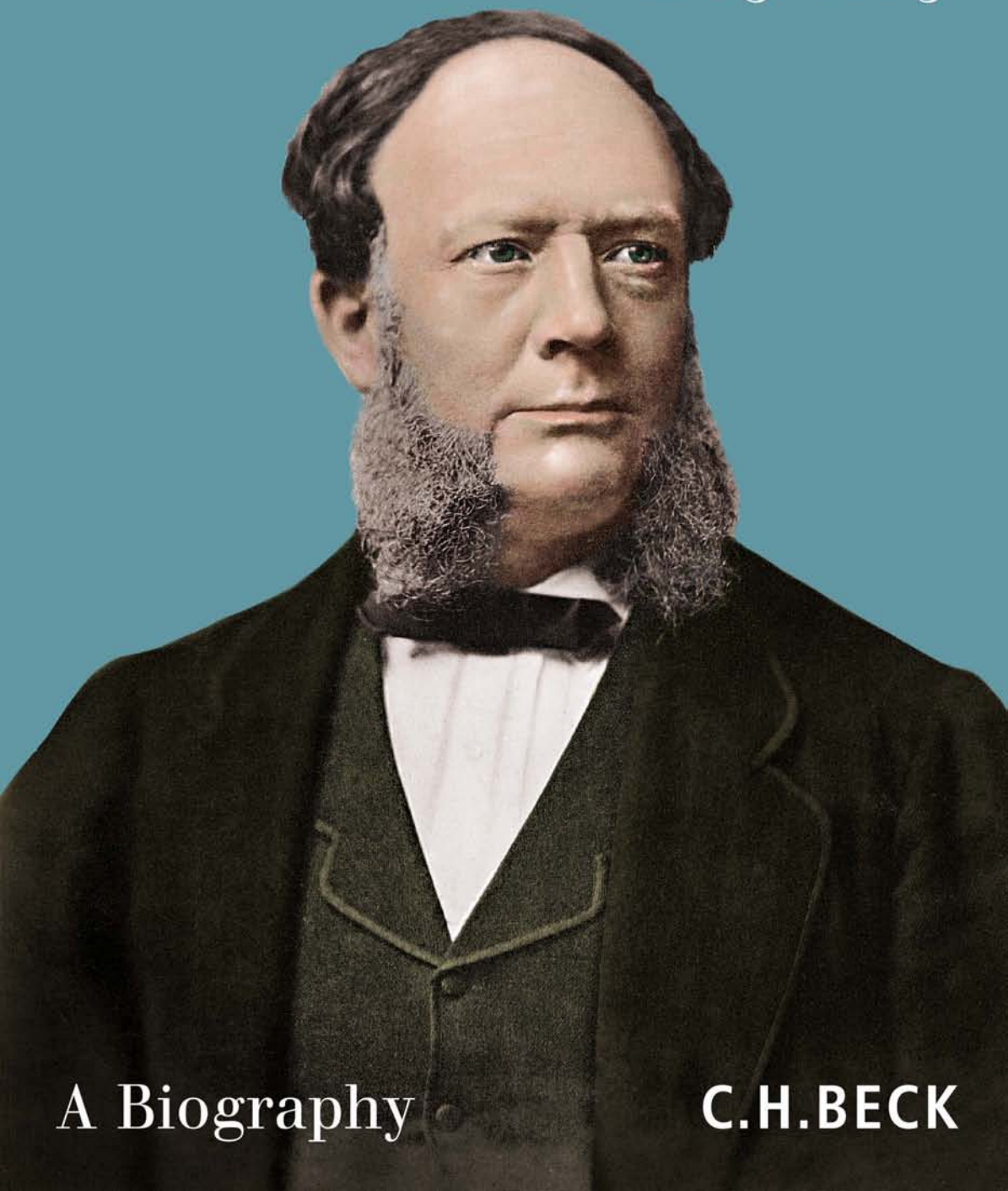


Wolfgang König

SIR WILLIAM SIEMENS

1823–1883



A Biography

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Contents

7	Introduction
	Chapter 1
15	Background, Youth, and Education
	The Siemens family and Werner's influence 15 – The mechanical engineer 20
	Chapter 2
23	Off to England
	An inventor's precarious existence 25 – Emigration, marriage, naturalization 30
	Chapter 3
39	The Siemens Business in England
	Werner's communicator 39 – The Siemens companies 47 – Life plans in conflict 51 – Globalization via telegraph cable 55
	Chapter 4
79	A Citizen of the World in Germany and England
	Family and lifestyle 81 – Technical and scientific associations 84 – Personal networks 103
	<i>Scientific communities 104 – Investors and business partners 110 – The German Expat Community 113</i>
	Views on politics and society 118 – <i>The German Question 119 – Science, religion, and society 125</i>

131	Chapter 5 Clusters of Technical Innovation The regenerative principle 132 – Energy and the environment 141 – Electrical engineering 151 – Iron and steel 157
169	Chapter 6 Scientific Studies of the Sun
173	Chapter 7 A Summation William and his brothers 173 <i>Werner and William</i> 173 – <i>Carl and William</i> 178 – <i>Friedrich and William</i> 179 The engineer and scientist 182 – The entrepreneur 191
195	Chapter 8 Legacy
203	Between Striving for Innovation and a Family Firm – A Conclusion
205	Appendix Notes 207 – Wilhelm Siemens: List of Writings 239 – Sources and Literature 247 <i>Archives</i> 247 – <i>Journals</i> 247 – <i>Bibliography</i> 248 Illustration Credits 257 – Index of Names 259 – Index of Places and Subjects 263

Foreword

If Sir William Siemens and his brothers were alive today, it would be fascinating to know what their priorities would be as they made business decisions in the world as we know it today. This biography gives some insights into how, with the life stories of these technical pioneers as the backdrop, solutions can be found for the challenges of our time – for instance, climate change – and how to take advantage of the opportunities of the digital industrial revolution. For these visionary and relentless entrepreneurs par excellence, Industry 4.0 would surely be a focal point.

The company that bears the Siemens name today has changed dramatically over the 170 years since the young William Siemens first traveled to London as an apprentice to successfully sell his brother's patent for an electroplating technique. One thing that has not changed is the focus on innovation, which is now and has always been part of the company's DNA.

There are other similarities. The globalization of the Siemens business began from its very inception with Werner von Siemens in Germany, Carl in Russia, and William in Great Britain. The Siemens brothers were always looking beyond their immediate environment, thinking big and following opportunities wherever they arose. The incredible feat of engineering, business acumen, and confidence that accompanied the laying of the first submarine telegraph cables around the world is awe-inspiring.

What may be more surprising to some, although not to engineers like myself, is the catalog of failures that run through these illustrious careers. William Siemens and his brothers learned from their mistakes. There were times when William was so unsuccessful that he went hungry; and others when the UK business was doing better than the business in Germany and they helped each other out. It has only recently become fashionable in business to draw attention to failure, learn from it, and not fear it.

Collaboration is another consistent theme that comes through. William spent an inordinate amount of time and effort networking with fellow en-

gineers, institutions, societies, and clubs and asking advice from his peers as well as his brothers. Every project that was undertaken involved local partners, and investors, and by the time William was knighted by Queen Victoria, a few months before his death in 1883, he was well known and highly regarded as part of the British engineering establishment.

So why do I think William Siemens would be busy focused on climate-change solutions today? Well, he was worrying about energy efficiency in the mid-1840's, working on combining steam engines with a regenerator to reduce the need for fuel. He was designing water meters to combat waste and equipping the first London Underground trains with a heat exchanger so they could run on that energy source while underground, without creating pollution. The parallels with today's engineering challenges are clear. Imagine what he'd be doing with the Internet of Things!

And yet, for the Siemens brothers, there was always more to it than just the technical solution. Their company had a purpose – and still does to this day: to improve people's lives and to create caring environments that serve society.

Carl Ennis

CEO, Siemens Great Britain and Ireland

Introduction

The Industrial Revolution began in Great Britain in the decades before and after 1800. It launched an upheaval with historic, worldwide consequences over the course of the century, spreading first to other countries and eventually spanning the entire globe. Industry displaced agriculture as the leading economic sector. Many people moved from the countryside to urban areas. Production shifted from small workshops to factories that were equipped with a system of powered processing machines. The capital goods and consumer goods rationally produced at these factories brought greater prosperity to a broad population – at least in the medium to long term.

The nineteenth century also saw a revolution in transportation and communications. Railroads expanded traffic by land – for freight transport, business trips, and tourism. On the sea, steamships initiated a new phase of globalization. Cargo shipping grew and became more predictable. Electric telegraphy made it possible, for the first time, to communicate almost instantaneously across long distances. The phenomenon began with telegraph lines laid overland; but in the second half of the century, transoceanic cables already connected every continent.

All these developments originated in Great Britain. As the 19th century progressed, industrialization transformed other countries as well, including Germany. These successor countries in the industrialization process worked hard to inaugurate a technology transfer and learn from the British example. Travel to the British Isles for education – and sometimes for industrial espionage – was standard practice for countries catching up in industrialization. The nations on the European continent were the first to draw even with the United Kingdom in new technologies, including electric telegraphy. And the family firm founded by Werner von Siemens around mid-century thus developed telegraphic sets and systems that could vie with British products in quality.

Werner von Siemens involved his family in building up the company.



William Siemens, around 1880

Werner, Carl, and William Siemens constituted a “league of siblings,”¹ headed by Werner, who largely set the course for the Siemens companies in the 19th century. It was Werner who clearly defined the triumvirate’s tone. But his brothers Carl and William both played significant roles as well in Siemens’ evolution into a global player – Carl in building up the Russian business and William in taking care of the English side. Business in England soon became especially important, because the United Kingdom was where the submarine cables that significantly advanced the process of globalization were designed and produced.

Werner’s younger brother Wilhelm was raised in Germany, but chose the United Kingdom as his new home, became a British subject, and adopted the name William. In the text that follows, we refer to him as Wilhelm for the period when he lived in Germany, and William once he emigrated to England. He viewed himself entirely as a member of the Siemens league of siblings, but more than the other brothers, he injected his own personal interests into their joint ventures. He represented the Siemens companies in England, but also operated as an independent engineer, scientist, and entrepreneur. Those efforts did not proceed entirely free from conflict with his brothers, especially Werner. The early literature

about Siemens characterized William as “eccentric, obstinate, unpredictable,”² with an “ill-tempered irritability,”³ a “type tending to the choleric.”⁴ Those characterizations stand in stunning contrast to the perceptions of his English contemporaries.⁵ It is probably no mistake to treat this discrepancy as the product of differing national and commercial views of William’s work.

William wanted to push Siemens’ English business forward as much as possible. Working from England, he believed, offered the opportunity to make Siemens the world’s leading telegraphy company. But his brothers Werner and Carl – not to mention their business partner Johann Georg Halske, who headed production in Berlin – were unwilling to back this high-risk strategy. In the years following, William made an effort to delegate at least some of his tasks at Siemens Brothers, the English part of the company, though without entirely abandoning his commitment to the family firm.

William Siemens was a highly qualified and highly respected mechanical engineer for whom telegraphy was just one interesting field among many. And in fact, telegraphy gradually lagged behind mechanical engineering and metallurgy as a focus of interest for him. In these two fields, he achieved noteworthy successes. Although he did not achieve his own goals, he made a crucial contribution toward a new steelmaking process, named the Siemens-Martin process after him and a French steelmaking family. This became the world’s most significant steelmaking process for an entire century. William’s technical and scientific achievements, as well as his personal charm, opened the door for him to take on influential positions in the English engineering world and in science.

The present biography concludes a trilogy on the founding generation of the Siemens firm – Werner, Carl, and William. It deals with a man who in many regards does not fit the standard image of a Siemens brother: a German who became an Englishman; a mechanical engineer, not an electrical engineer; an engineer and scientist who worked in a wide range of fields; a liberal who opposed Prussian triumphalism; and an independent personality who did not shy away from conflict, whether within the business or the family.

Above and beyond exploring his personality, William’s biography also opens up the opportunity to compare England and Germany in terms of political environment, state of engineering, and corporate culture. The letters between Werner and William often include hints from each that the other should come spend a certain amount of time in London or Berlin to get a better understanding of the conditions for building up a business there.

Siemens' activities in England have benefited from an extensive, engaging treatment in the literature. The long-established work of Richard Ehrenberg (1906) is still indispensable. Ehrenberg's study provides numerous sources, and thus has documentary status as well. J.D. Scott (1958) offers an overall history of Siemens Brothers, developed from the company's files. Sigfrid von Weiher's history of the Siemens plants in England (1990) is well-referenced with sources but suffers from Weiher's unconditional adoption of Werner's Berlin point of view. Werner's autobiography, *Recollections*, is a valuable source for the characterization of William in particular. Lutz's biography of Carl von Siemens (2016) and Bähr's of Werner von Siemens (2017) reflect the current status of research, and both also explore relations among the brothers.

The relevant biographical literature on William is limited to a work by William Pole, published in English in 1888 and in a German translation in 1890.⁶ Pole, a friend and colleague of William's, was asked by the family to prepare the biography after William's death. He examined letters and records that in some cases are no longer available.⁷ He sought information from William's relatives, colleagues, and friends, and from institutions where William had been a member. Most notably, Pole contacted William's long-standing private secretary, Edward F. Bamber, the secretaries of the Institution of Civil Engineers and the Society of Arts, brother Werner, William's wife Anne, and his adopted son Alexander Siemens as well as his friends Frederick Joseph Bramwell, William Thomson, William Henry Barlow, and Edward A. Cowper. Pole's work is indispensable because it offers the most extensive collection of information about William and reprints important sources. But in the light of today's historiographical criteria, it has a number of weaknesses. Although Pole attempts to situate William's life amid the general development of technology and electrical engineering, even that limited perspective amounts to more of a chronology than a portrayal that provides real context.

This biography of William Siemens is based on numerous sources from a wide variety of collections. Two of these, however, are of particular importance. The first key group is William's letters to family members, held in the Corporate Archives of the Siemens Historical Institute. Among others, these include 2,236 letters between William and Werner, and 580 between William and his younger brother Friedrich, who worked with William for a number of years and logged his own achievements in the energy-saving fabrication of glass.⁸ As a general rule, William's letters are terser than his brothers'.⁹ And in many cases they deal with details of tech-

nical innovations. A bundle of letters that the English Electric Company acquired in 1953 from a cousin of William's wife Anne and then edited¹⁰ is a valuable supplement to this collection of sources. This collection of letters is in no particular order; it appears to have come about more or less by chance. Various English, German, and Swiss archives and libraries possess a limited number of other letters from William.

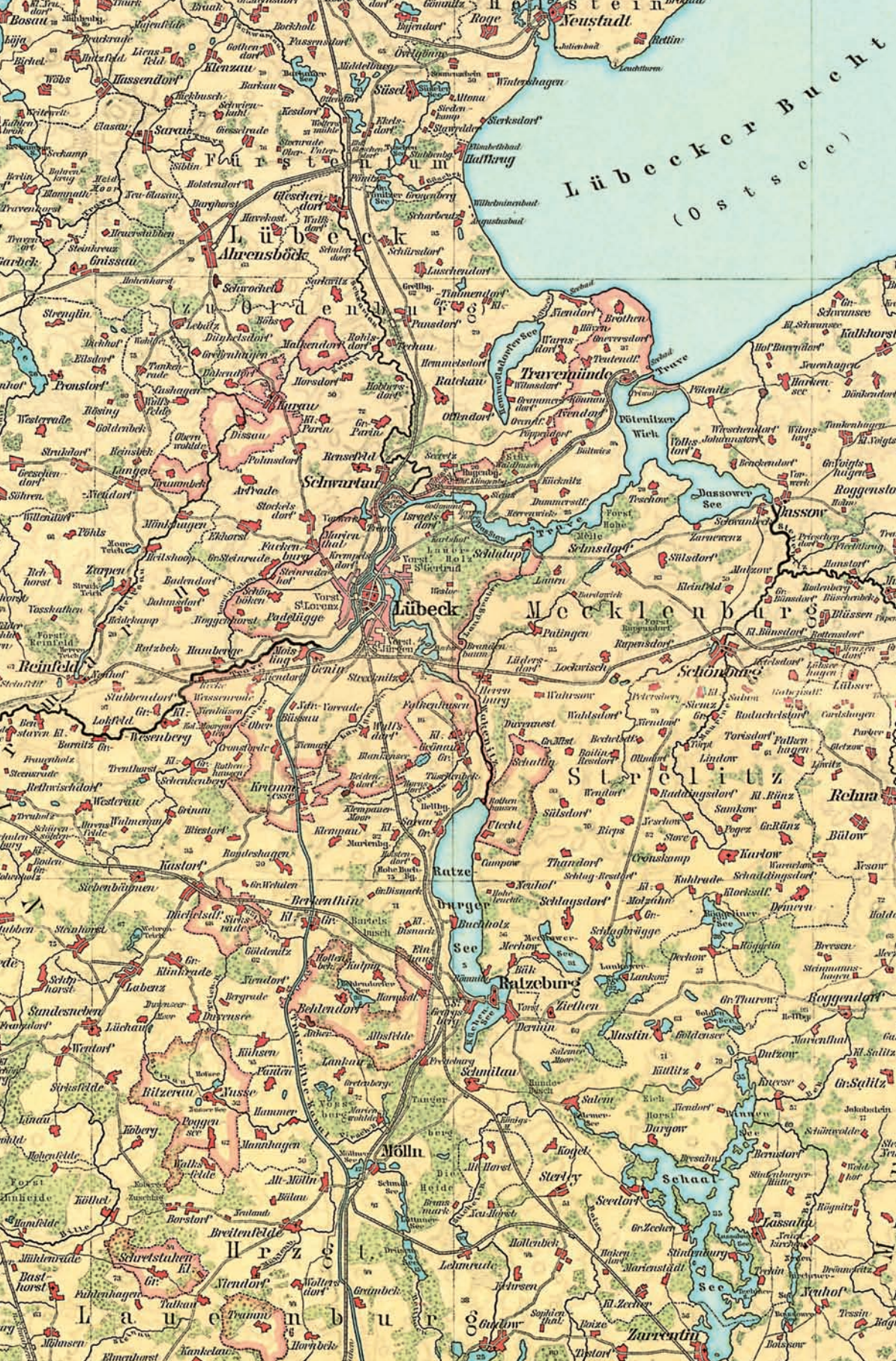
The second important resource is William's own publications. By far the majority of his English-language publications is available in an exemplary edition prepared by his private secretary, Bamber.¹¹ A number of works were translated into German; some articles appeared in German only. This biography includes a list of William's writings, particularly in the interest of presenting a complete compilation of his publications in German, something that had not previously been done. It should also be mentioned that William's work with technical and scientific associations was investigated in part through those associations' historical descriptions and in part from their journals. William's letters, his technical and scientific publications, and the association journals are the reason why William's innovations occupy so much space in this biography. By contrast, because of the status of the sources, the portrayal of William as a businessman and private person is afforded less attention.

This book begins chronologically and adheres to that organizational principle up to the founding of Siemens Brothers in 1865. What then follows is a systematically organized structure that addresses earlier events as well. A rather long chapter is dedicated to William's positioning between England and Germany. It concerns his private environment, his scientific and business relations, and his political views. Another chapter discusses his technical and scientific work, with particular attention on the successes and failures of his innovations, together with the associated causes.

Finally, some aspects of his life that had hitherto been given only cursory attention are summarized and assessed. This includes William's relationships with the other two members of the fraternal triumvirate, Werner and Carl. Friedrich is also included in this sketch, because he maintained especially close working relations with William for a time. The chapters on William as an engineer and scientist, and on William as a businessman, characterize his work and his plans for his life. The work concludes with responses to his death and assessments by his friends and colleagues.

This biography is based on material from a great many archives and libraries. I have met with friendly support everywhere and would like to take this opportunity to warmly thank everyone involved. I especially want

to thank the Siemens Historical Institute, which assisted with this work in many different ways. It was especially helpful that Johannes von Karczewski, Ewald Blocher, and Frank Wittendorfer were willing to discuss the interim results of this work with me. Those conversations provided me with a great many ideas. None of this changes the fact that, in the end, I alone am responsible for this portrayal. I owe a final debt of gratitude to Benjamin Gruber, who supported me as a student assistant and prepared the index.



The Siemens family and Werner's influence

Wilhelm Siemens was born on April 4, 1823, the seventh child of Christian Ferdinand Siemens (1787–1840) and Eleonore Siemens (1792–1839), née Deichmann.¹ The family had a total of 14 children – 11 sons and three daughters – although four of them died very young. The father leased and managed an agricultural estate – essentially, a large farm – in the Kingdom of Hanover. The year of Wilhelm's birth, 1823, was an especially turbulent one for the family. The Napoleonic Wars and the subsequent agrarian crisis had plunged the leased farm into economic trouble, and the father finally had to give it up. He sought a new property, and found one in Menzendorf near Lübeck, in the Archduchy of Mecklenburg-Strelitz, one of Germany's tiny semi-independent states. Wilhelm was born in the transitional period between the leases on the two farms.

Wilhelm thus grew up on an agricultural estate in Mecklenburg. We know little about his earliest childhood. The nearest school was far away, so from 1829 onward Christian Ferdinand hired tutors. The first of these is recalled warmly in the family records; the second, rather less so. The first suffered from depression and committed suicide after a year. The second died after two years. After that, the family again had to rely on the schools in the area to educate their children.

The Siemens children's parents were not simple farmers. They were educated and set store on educating their boys well. Christian Ferdinand had attended an academic secondary school, or *Gymnasium*, and university. His letters contained educational advice for his children. For example, he urged Wilhelm to acquire the ability to speak and write German well.² The

Left: Northern Germany, around 1850



Tenant house in Menzendorf, 1910

elder brothers, Werner (1816–1892) and Hans (1818–1867), were sent to a well-known *Gymnasium* in Lübeck. Both left the school before earning a diploma – possibly for economic reasons. That may also be a reason why Wilhelm did not go to a *Gymnasium*, and instead – like his younger brothers Carl (1829–1906) and Friedrich (1826–1904) – attended a private, practically oriented school, a *Realschule*, in Lübeck. This was in part also because the parents acceded to their sons’ preferences, which leaned more toward business and science than ancient languages. In those days, the “Gross’heim-sche Realschule” that Wilhelm attended was a mercantile and commercial school for boys.³ It emphasized modern languages – English and French – as well as arithmetic and natural history. Wilhelm left school in 1838, at the age of 15; his education was probably roughly that of a *Mittlere Reife* from a German school today, which is equivalent to a high school diploma without qualification for university study.

Wilhelm stayed with relatives in Lübeck. Being away from his parents’ farm was probably good for his development because family and financial difficulties were piling up at home. Christian Ferdinand was having a hard time keeping the farm in the black. Mother Eleonore, weakened from bearing so many children, fell ill and died in 1839 at the age of 47. Christian Ferdinand too suffered from poor health, as well as the strain of the family finances. He survived his wife only by one year.

Lübeck, around 1850



Thus, at age 17 Wilhelm, like his siblings, became an orphan. Relatives and acquaintances became guardians. Werner, seven years older, was growing into the function of a mentor and teacher. In this large family, the older children, especially Werner, helped take care of the younger ones. Werner's personal interests were quite explicitly directed to science, technology, and math. But the family's funds were insufficient to finance a proposed course of studies at Berlin's Bauakademie. Instead – after completing his military service in Magdeburg – Werner decided to attend the Army's Artillery and Engineering School in Berlin. The knowledge he accumulated there between 1835 and 1838 was certainly comparable to that of a degreed engineer. In 1838 he returned to Magdeburg as an artillery lieutenant.

On completing secondary school in 1838, Wilhelm needed to choose an occupation. The family contemplated an apprenticeship with one of his mother's relatives at a bank in Cologne. But under Werner's influence, they ultimately chose an engineering career for Wilhelm and sent him, at the age of 15, to the Trade and Commerce School in Magdeburg. This was not an engineering school, but a combination of general education and training program for workers in the trades and commerce. The emphasis was on "realistic" subjects: languages, mathematics, and sciences, relating to what would be needed in an occupation later. In the three years leading up to 1841, the time during which Wilhelm attended the school, the curriculum led to a kind of secondary school diploma, which was needed for further education in a trade.⁴ The school's equipment and quality left something to be desired. Looking back, Wilhelm himself spoke of a "limited education."⁵

In Magdeburg, Wilhelm lived for a time with Werner.⁶ Werner helped his younger brother with mathematics and gave him copious other advice.



William Siemens, around 1850



Werner von Siemens, around 1842

Werner's influence must have been especially strong in the period from 1838 until the mid-1840s, when Wilhelm settled in England. Wilhelm was between the ages of 15 and 22; Werner was nearly seven years older. The two had similar intellectual interests, but Werner had already completed his training; Wilhelm was just beginning, and he benefited from his brother's knowledge. Werner played a significant role in decisions on Wilhelm's career: attending the Trade and Commerce School in Magdeburg, study at the university in Göttingen – which we will discuss in more detail below – apprenticeship at a machine factory, and travel to England. He also acquainted Wilhelm with his inventions. Werner's activity as an inventor was founded on his interest in technology and science, but he was also trying to supplement his officer's salary to keep the family afloat. Wilhelm probably saw Werner not just as an elder brother, but as a mentor, teacher, engineer, and scientist – in other words, a role model in many different ways.

After completing school in Magdeburg, Wilhelm moved on in 1841 to the University of Göttingen. Some such study had already been under discussion in 1839.⁷ Göttingen was the home of Wilhelm's older sister Mathilde (1814–1878), who had married a chemist, Carl Himly (1811–1885), in 1838. Himly taught at the university as a *Privatdozent*, similar to an adjunct professor today. In 1842 he and his wife moved to Kiel, where he was initially an associate professor, receiving a full professorship in 1846. Over the de-

Mathilde and Carl Himly,
around 1840



acades to come, Himly would maintain not just family connections with the Siemens brothers, but scientific and business relations as well, although these came to little. Wilhelm lived at the Himlys' home during his studies; extensive correspondence and numerous visits back and forth are evidence that Wilhelm maintained an especially close relationship with his sister Mathilde Himly all his life.

Between May 1841 and March 1842, Wilhelm registered for a diverse potpourri of subjects, emphasizing science but enriched through mathematics, physical geography, and technology.⁸ He heard Friedrich Wöhler (1800–1882) lecture in theoretical chemistry, Himly on applied chemistry and physics, and *Privatdozent* Moritz Stern (1807–1882) on higher mathematics. He also assisted physicist Wilhelm Weber (1804–1891) at his observatory. Weber had experimented with telegraphy in Göttingen in 1833. In 1837 he was stripped of his university position because he was a member of the Göttingen Seven, a group of liberal professors who protested against abolishing or altering the constitution of the Kingdom of Hanover. Werner intervened in his brother's studies, declaring physics and mathematics more important than chemistry and obliging Wilhelm to study drafting and to teach himself mechanical engineering.⁹ During his time in Göttingen, Wilhelm probably acquired a broad, though superficial, understanding of the fundamentals of science. This was reportedly documented in a report card with good evaluations.¹⁰



The Göttingen University Library, copper engraving, late 18th century

The mechanical engineer

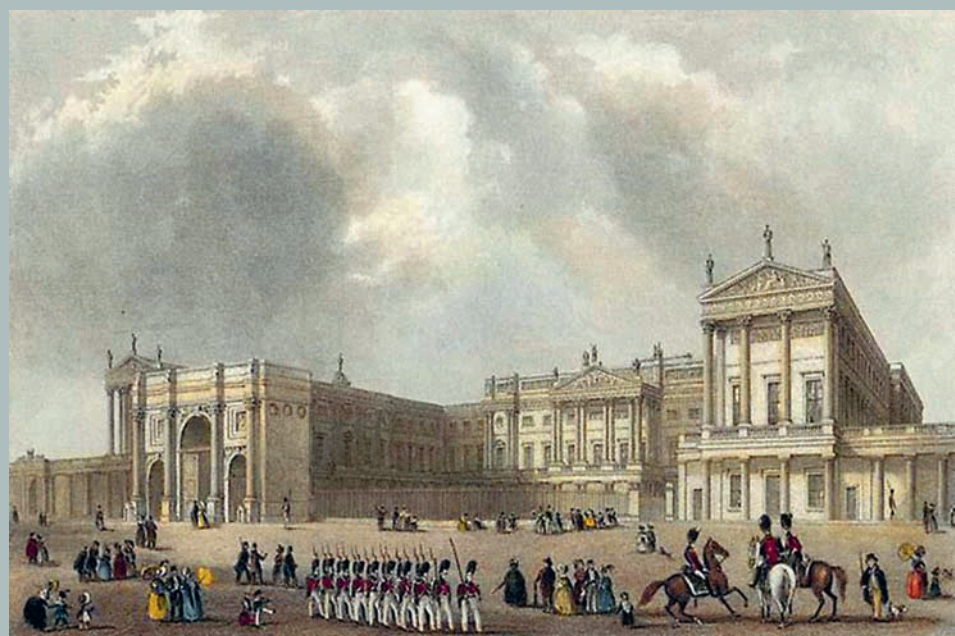
On leaving the university in Göttingen, Wilhelm had a satisfactory general education emphasizing modern languages, mathematics, and the natural sciences. He may well have acquired some slight insight into technical fields. What was unusual about his attendance at the university was its brevity, though presumably it at least taught him how to follow a scientific approach. Such a training background did not entitle him to call himself an engineer.¹¹ The vast majority of German engineers in those days were trained by practice. They had learned at a machine factory, proved themselves there, and gathered further experience at other companies – preferably including in England, which in those days was by far the most advanced industrialized country. Budding engineers were expected to enrich their knowledge with self-study, in some cases with the aid of evening courses in technology and science. The polytechnic schools founded in the early 19th century – forerunners of today’s technical universities – were attended only by a minority, and those graduates were more likely to go into government service than into industry.

The next step on Wilhelm’s path to becoming an engineer was an apprenticeship at a machine factory. As a “belated Christmas present,” Werner found a place for his protégé at the Stollberg’sche Maschinenfabrik



Oil painting by Joseph Huber-Feldkirch, steam boilersmiths in machine construction, 1891/92

in Magdeburg in March 1842.¹² This was a well-known company that made a wide range of products, including steam engines – what might be called the supreme specialty in mechanical engineering in those days. An arrangement made at the factory illustrates the form of knowledge transfer that was customary at the time: Wilhelm taught theory to the chief engineer's son, and the engineer – as Werner had desired – instructed Wilhelm in the fine points of mechanical drawing and design. Wilhelm gave evidence of his ambitions as an inventor and designer while still in Magdeburg by trying to improve how speed was regulated in steam engines. All in all, he remained at the factory for nearly two years, until the end of 1843, even though by that point Magdeburg had come to seem very provincial to him.¹³ He had completed his training as a mechanical engineer in Germany, and the certificate he earned placed particular emphasis on his ability as a draftsman.



In 1842 Werner had developed an electroplating method by which thin coatings of gold, silver, or copper could be applied to less precious metals.¹ The technique was used to produce splendid-looking yet affordable art objects and utensils, including busts, goblets, and other vessels. The centers of the electroplating industry were Paris and Birmingham, with companies like Christofle and Elkington, Mason & Co. The basic idea for the new method came from Werner; his brother-in-law Himly and brother Wilhelm suggested improvements and ideas for marketing.²

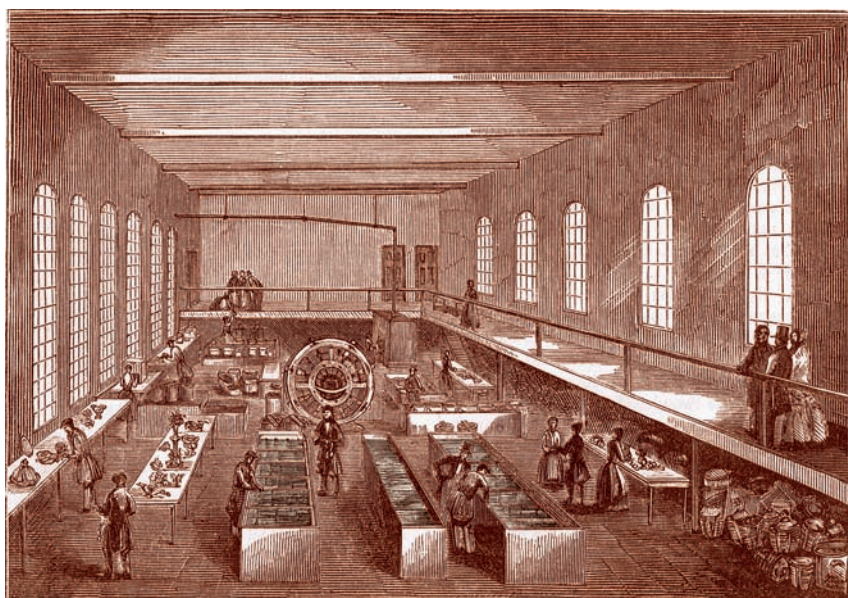
With this process in his luggage, the 20-year-old Wilhelm headed off for England in February 1843. The trip was intended to help market the technique, but it also fulfilled Wilhelm's "yearning desire to see England."³ Yet even while en route, he was able to sell a license for copper-coating window glazing bars to a Hamburg fabricator. In England – after some difficulties – he obtained a patent for the method, in which he applied a new kind of power source.⁴ Wilhelm's master stroke was to sell the technique to George Richard Elkington (1801–1865) and Josiah Mason (1795–1881), the two owners of the Birmingham-based electroplating market leader.⁵ While it is true that the two businessmen were not entirely convinced of the novelty of the Siemens invention, they were impressed with the practical results that Wilhelm presented. They ultimately paid Wilhelm 1,600 pounds sterling: As Werner said, a "colossal sum, which put an end for some time to our financial difficulties."⁶ The success led their sister Mathilde to dub Wilhelm her "golden brother."⁷

The two brothers felt their inventive efforts were adequately rewarded by this sales success. They were thus not so upset by the fact that the invention hardly proved to be of practical significance.⁸ Elkington, Mason & Co.

Left: Buckingham Palace, around 1835



London, Trafalgar Square, around 1865



The Elkington, Mason & Co. electroplating plant in Birmingham, undated