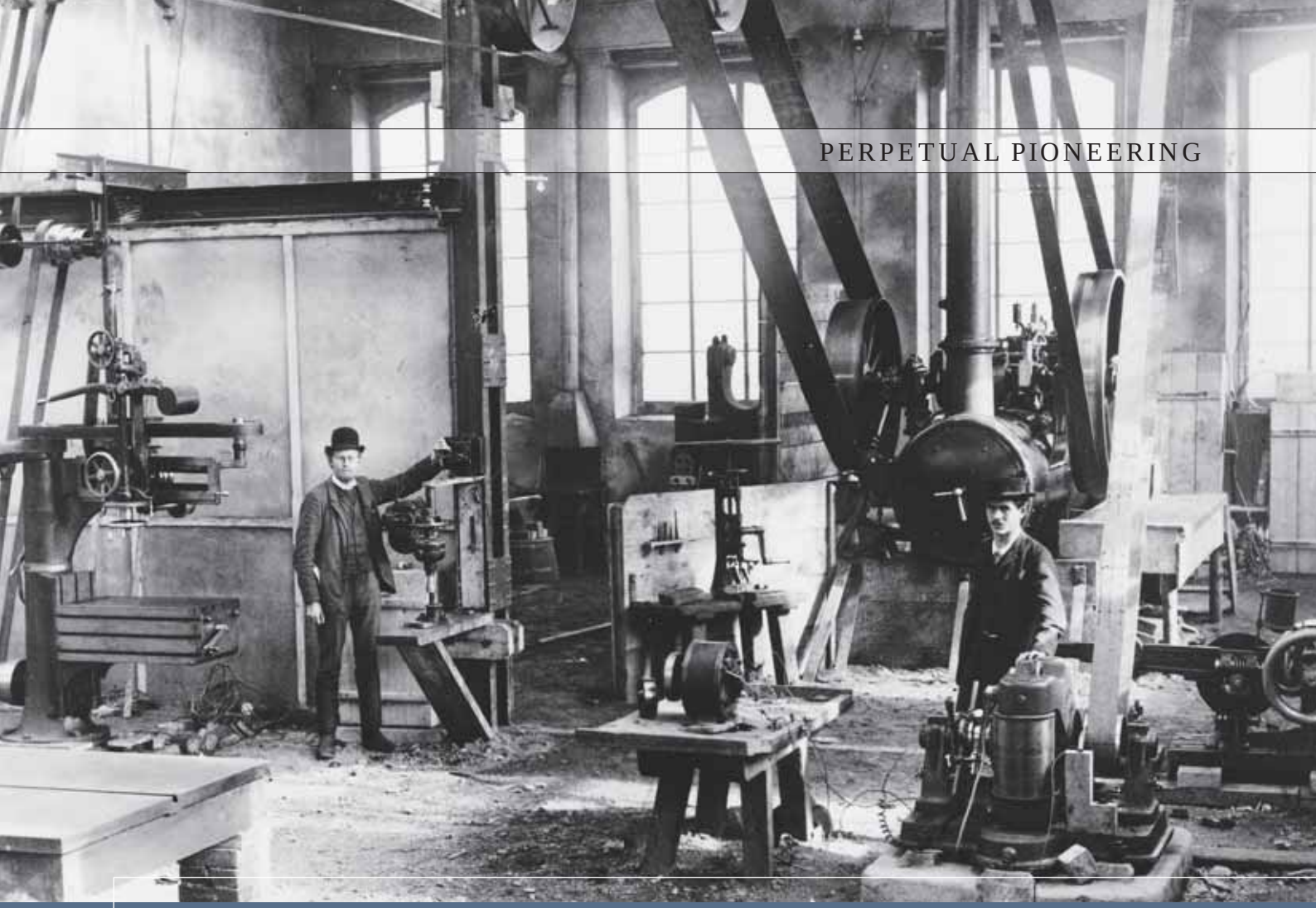


Perpetual pioneering

Nils Leffler

ABB was formed a century after the foundation of its two parent companies. During these 100 years the electrification of nations changed the industrial world dramatically pioneered by a handful of companies founded in the late 19th century. However, the theoretical foundation of modern electrical technology was laid in the 18th century by scientists such as Franklin, Faraday, Ampere, Volta and Ohm. By 1830 telegraphy was introduced as a low voltage application of this energy form. Low voltage applications were also the basis for company formation during the following 50 years. The world saw lighting become a reality – initially outdoors only – using the arc lamp. With Thomas A Edison's electrical bulb (1878–79) indoor usage became possible. One of the few low voltage companies of the day that in 1880–1890 added high voltage products to its portfolio was Siemens & Halske. For most others the dynamo and lighting systems remained their core competence and branching out into the risky area of high voltage applications was not attractive. Instead, it was left to new company formations to embark on this high energy venture.

These companies were often founded by engineers and based on new patents or innovations. Companies in the USA and Germany quickly took the lead in this new industry.

Westinghouse Electric and Manufacturing Company was formed in 1884 to build electrical machines. It soon became the leading supplier of AC based transmission. The consolidation of several Edison companies combined with the merger with Thomson-Houston formed General Electric in 1892. In Germany, Siemens became successful in both the low and high voltage area. Edison's German operation became known as AEG from 1887 onwards. By pioneering work in the field of three phase alternating current it established itself as a major international contender.

PERPETUAL PIONEERING

The reasons for the formation of larger entities lay not only in the internationalization of the business, but also in the scale of the investments required to construct and develop the electrical infrastructure for transmission and distribution of electricity to industry and homes. The ease with which electricity can be transformed into other energy forms such as heat, light and rotational and linear motions, combined with its ability to be transported over some distances with only minor losses, made it the driver of industrialization. Early electrical power applications were focused on transportation (street cars) and industrial applications in metallurgy and electro-chemical processes. Early distribution systems were based on direct current which permitted the source and the sink to be separated by a few kilometres at the most because of the rapidly increasing power losses over longer distances. Higher voltage levels reduced the losses but generators and electrical machines were not able to use these voltage levels. The technology promoted the development of small generating units close to the consumers, which soon proved impractical and inefficient.

Alternating current can be transmitted at high voltage levels with low losses over long distances. It could be transformed in both directions, hence it could be generated and consumed as low voltage while transmitted as high voltage. Towards the end of the 1880ies, no practically useful AC motor had seen the light and high voltage technology was considered dangerous and difficult. Roughly at the same time in the 1890ies several developers realised that three phase AC was the solution. The very first transmission line for three phase AC was the Lauffen-Frankfurt link in Germany – 175 km long, 30,000 volts – inaugurated August 24, 1891.

ABB Review and its predecessor journals have covered electrification and its practical implementation in industrial applications since the early 20th century.

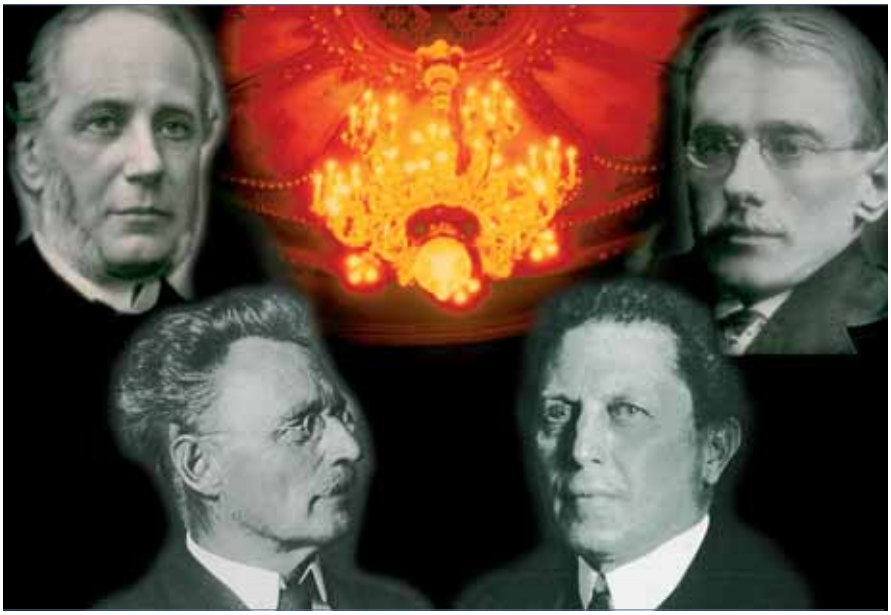
The flood gates were now opened for rapid expansion of electrically powered industrial applications. The technology allowed the use of centrally located generators, the connection of networks of different voltage levels, and the smooth transformation of electricity to suitable voltage levels. Engineers, meanwhile, had learned to calculate the performance and material usage of equipment more accurately and precisely. Electrical machines for many different applications were being constructed and safety was improved with breakers and switchgears.

Switzerland with a small home market, established itself surprisingly early as a leading producer of high voltage equipment through the companies Oerlikon, 1882 and Brown Boveri (later BBC), 1891. Actually the two young engineers Charles E. Brown and Walter Boveri worked and met at Oerlikon, where they gained their early experience. They soon decided to establish their new company in Baden, where it rapidly grew into a substantial employer with a broad portfolio of electro-technical products and systems.

In Sweden, at this time, several international companies, among them AEG and Siemens, were involved in the electrification of the country. The only local company to make a larger impact was ASEA. This was formed in 1890 in Västeras, but its roots trace back to 1883, when its two parent companies were established. The inventor Jonas Wenström and the industrialist Ludvig Fredlund were the key figures in the formation of the new enterprise. Just as the portfolio of BBC, ASEA's included turbine generators and converters; electrical equipment for transmission and distribution such as transformers, breakers and switches; rotating electrical machines etc.

ABB Review and its predecessor journals have covered electrification and its practical implementation in industrial applications since the early 20th century. A look into the archives discovers a fascinating development of key products and solutions, which still today remain crucial for ABB's market success. This series will commence with a review of the history of the breaker, a key component in many electrical installations.

Ludvig Fredlund (1830–1891) and Jonas Wenström (1855–1893), above
Charles E. Brown (1863–1924) and Walter Boveri (1865–1924), below



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