

Glass Pioneer with Charisma

Otto Schott (1851 – 1935) is regarded as the founder of modern glass science and glass technology. December 17, 2001 was the 150th anniversary of his birth.

► Schott was one of the important scientists, technologists and industrialists of his time. With his fundamental research into the composition and properties of glass, the development of new types of special glass and new manufacturing processes, he introduced radical changes to the world of glass.

In 1884 he founded the “Glastechnisches Laboratorium Schott & Genossen” (Schott & Associates Glass Technology Laboratory) with Ernst Abbe and Carl and Roderich Zeiss. This laboratory was the forerunner of the present-day Schott Jenaer Glas GmbH, Schott Glas (Mainz) and the Schott Group.

Linked with glass from the beginning

It was fairly obvious that Otto Schott was closely linked with glass while still a chemistry and mineralogy student. As the son of a window-glass maker, he came into contact with glass at a very early age, and later wrote his doctoral thesis in 1875 on “Contributions to the Theory and Practice of Glass Manufacture”.



At that time only two simple types of glass were known: soda-lime glass and lead glass. They were quite suitable for drinking glasses, bottles and windows, but not for special technical applications. In addition, glass manufacture was still based almost exclusively on the experience of traditional glassmaking families. Before Schott, only a few had attempted to apply the scientific research of glass.

Successful fundamental research

In 1879, in his hometown of Witten in Westphalia, Schott began to carry out fundamental research into the glass-forming behavior of a very wide range of chemical elements. He sent some of his first samples of glass to the physicist Ernst Abbe in Jena, who some years earlier had developed the theory of optical imaging and was meanwhile part owner of the Carl Zeiss

“In the history of glass making, one name will always shine: Otto Schott.”

William E. S. Turner, English glass technologist and Founding President of the International Commission on Glass (ICG), 1935

Optical Workshop. It was a stroke of luck for Abbe and Zeiss. They recognized in Schott the glass chemist who would be able to develop better optical glasses, which they so urgently needed for their microscopes.

Abbe asked Schott to come to Jena. Bit by bit, the “Glass Doctor” came to the realization that by using the appropriate chemical composition, it was possible to produce glasses with precisely defined properties. Contemporaries thought that Schott could “look right into the heart of glass”.



Otto Schott's life's work:
Jenaer Glaswerk Schott & Gen. in 1925.

Using the “Jena casting process” Otto Schott produced large size optical glass blanks – for objectives in refractor telescopes and mirror blanks for reflecting telescopes.



Otto Schott with his family, around 1895.

In 1884 Schott went into business with his cutting edge knowledge. The Schott & Associates Glass Technology Laboratory, which started with 11 workers, would quickly achieve a worldwide reputation.

Efficient special glasses

In the early years, the company's founder concentrated on the development and manufacture of new and better quality optical glasses. By using barium oxide, boric acid and fluoride additives, he was successful in expanding their bandwidth as regards refraction behavior and dispersion. The new glasses gave the optical industry a powerful development boost.

Otto Schott now transferred his positive experience with boric acid to technical glasses.

"As a fundamental scientist and venturesome industrialist, Otto Schott is still an impressive role-model today. He would still be successful in today's times."

Dr. Leopold von Heimendahl, Chairman of the Schott Glas Board of Management

In this way he developed borosilicate glass, which is notable for its extreme heat and thermal shock resistance, as well as its chemical resistance. He used the new type of glass to make thermometer glass (from 1891), laboratory glassware (from 1893), lamp cylinders for gas lighting (from 1894), tubing for pharmaceutical ampoules and vials (from 1911) and "Jenaer Glas" brand household glassware (from 1918). Schott's special glasses were a boost for science and many areas of industry.

Glass Technology Laboratory changed within the space of a few years into a major industrial concern. Almost all Schott's products enjoyed worldwide demand. By 1900, exports accounted for 50 percent of sales.

Innovative technologies

Otto Schott did not confine himself to developing new special glasses, rather he was very innovative where new production technologies were concerned. In conjunction with the company's entry into large-scale optics, he invented a method of pot-casting optical glasses in 1894. This enabled him to successfully produce optical disks up to 1.4 meters in diameter, which were used as objectives in refractor telescopes. These beginnings led to the development of the centrifugal casting technique, which Otto Schott's successors used nearly 100 years later to manufacture the world's largest mirror blanks for a reflecting telescope, 8.2 meters in diameter and cast in one piece.

Schott was also the first special glass manufacturer to introduce tank melting. In so doing he created the prerequisites for continuous melting operations and the subsequent introduction of automated production processes in 1911.

A traditional company with future prospects

When Otto Schott retired from his management role in 1926 at the age of 75, the company he had founded enjoyed a worldwide reputation and employed more than 1,500 people. He probably never could have imagined at that time that it would develop into an international technological corporation with 20,000 employees at 98 companies generating annual sales of €2 billion. ◀

Industrialist with social responsibility

From the beginning, Otto Schott laid great value on the personal well-being of his employees. Influenced by Ernst Abbe's socio-political ideas, he agreed to adopt the same corporate policy as the Zeiss factory. Following the death of Carl Zeiss, Ernst Abbe drafted the Carl-Zeiss-Stiftung (Foundation) in 1889. This statute safeguarded the existence of the Zeiss and Schott companies, independent of shareholder interests. Furthermore, the Carl-Zeiss-Stiftung ensured the corporation's employees a high degree of long-term social and economic security. In 1891, Abbe transferred his shares in the business to the Carl-Zeiss-Stiftung, and encouraged Zeiss' heir Roderich to do the same. Meanwhile, Schott made a contractual promise to transfer his shareholding to the foundation after his death. In fact, Schott fulfilled this promise in 1919, 16 years before his death. It was for this reason that Abbe once described Schott as "in a sense, a co-founder of the Carl-Zeiss-Stiftung".

Based on the statute of the Carl-Zeiss-Stiftung, which was published in 1896, the employees of the foundation companies Zeiss and Schott received social benefits that were quite unique at that time. They included increased protection against wrongful dismissal, sick pay, paid leave, profit sharing, a company pension scheme and the right to a works council.



With the mass production of heat and thermal shock resistant cylinders for the Auer incandescent gas lamp, the Glass Technology Laboratory grew into an industrial concern.