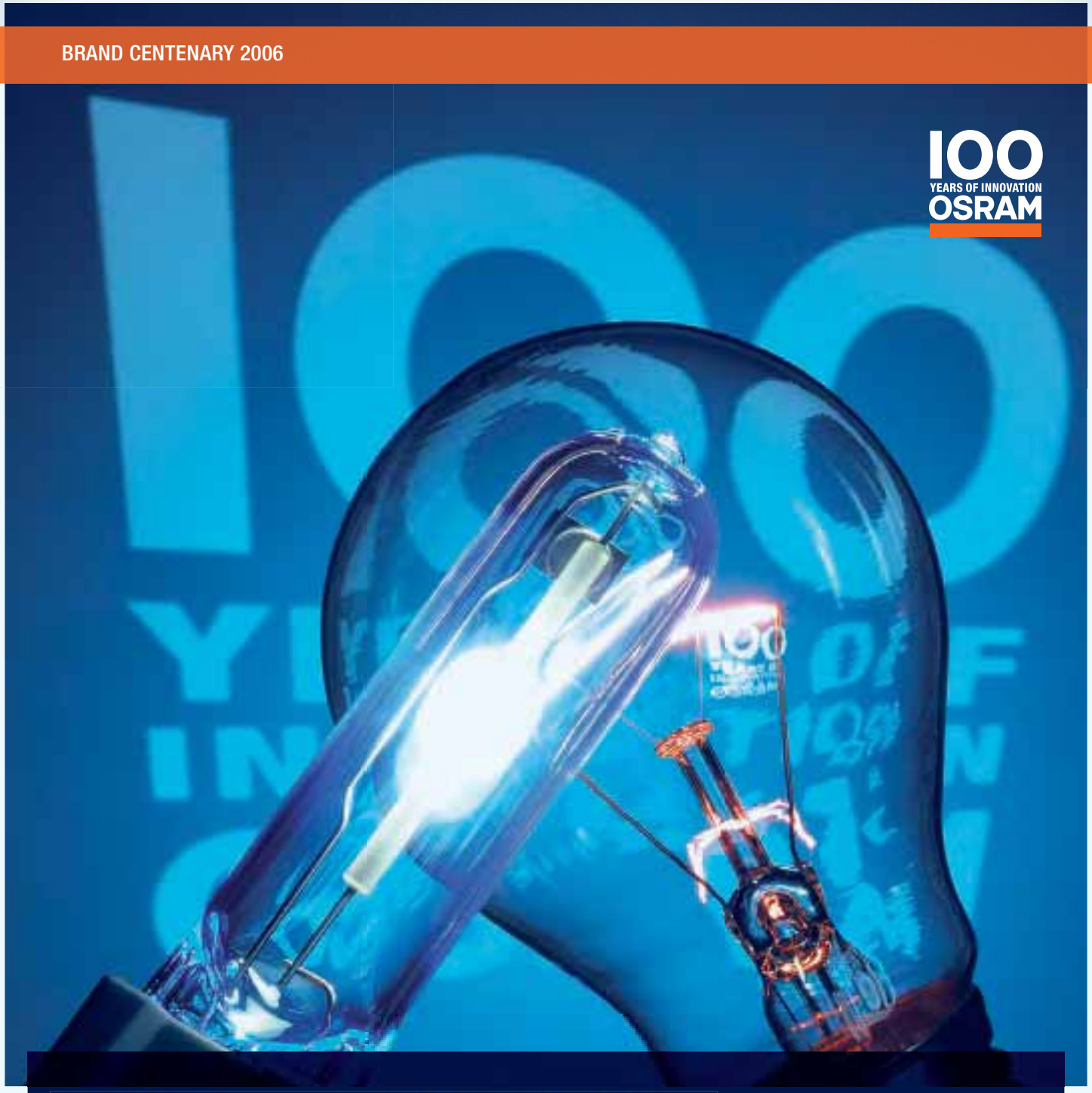

100 years of OSRAM – Light has a name

SEE THE WORLD IN A NEW LIGHT OSRAM


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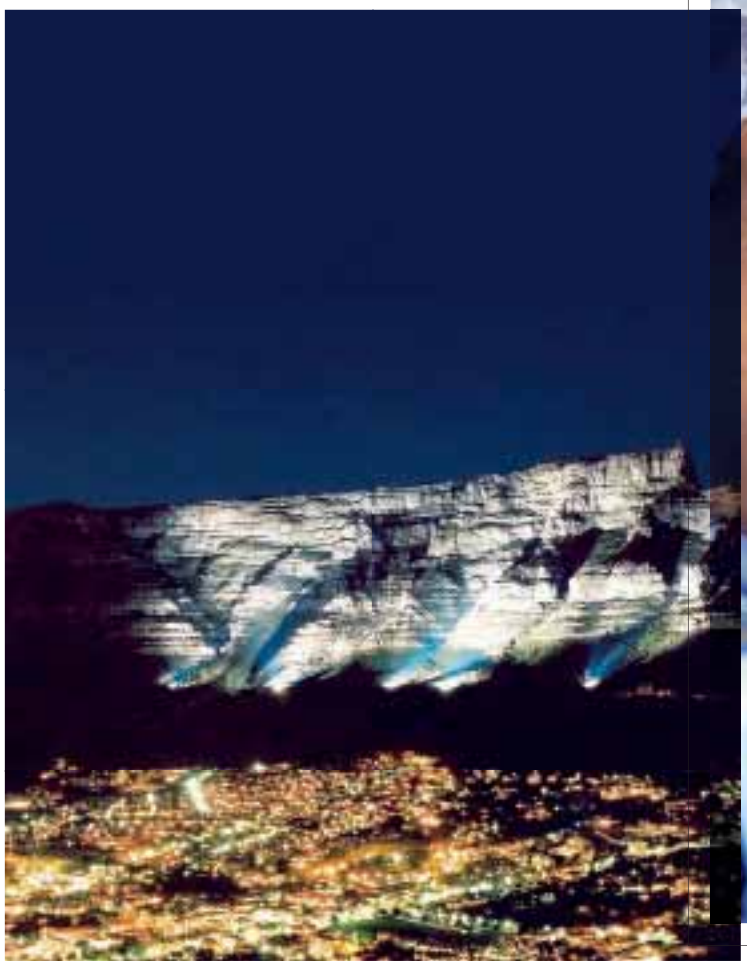
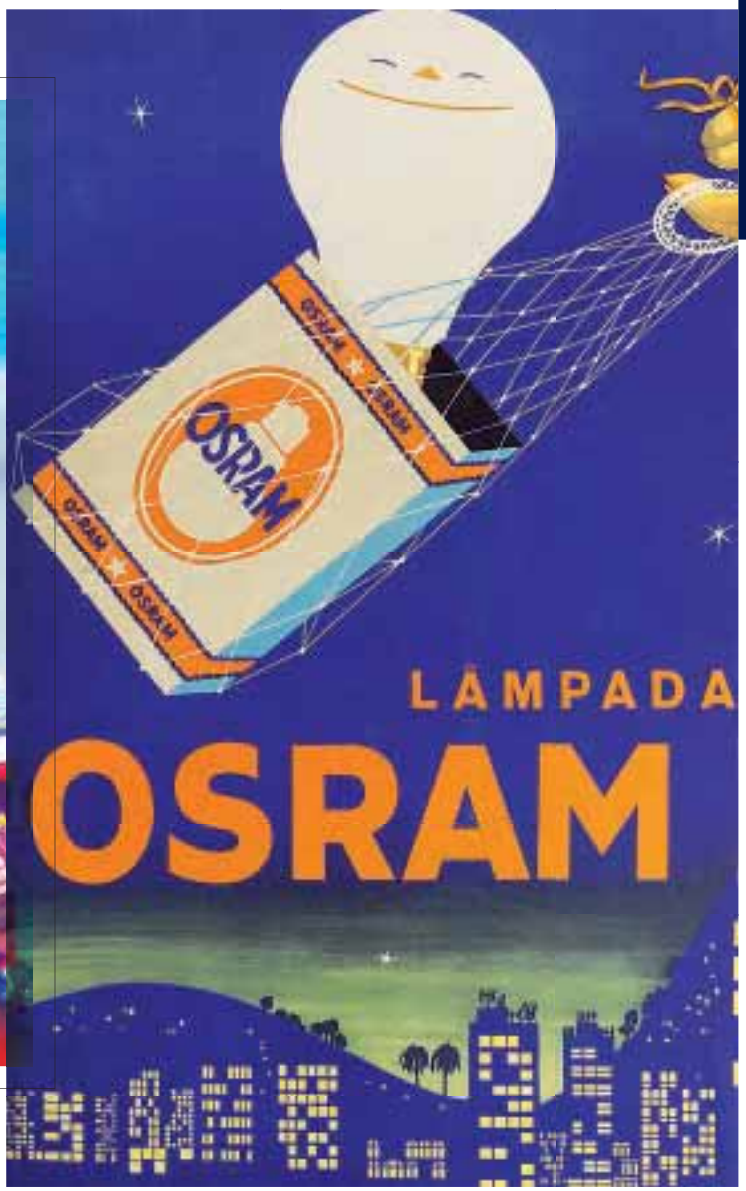




CONTENTS

The world in a new light

A big name, a strong brand celebrated its birthday in 2006. OSRAM became 100 years old. A century in which OSRAM has developed from a German light bulb manufacturer into a global high-tech company in the lighting sector. Today OSRAM not only has customers in 150 countries, it is active in all walks of life.

"Who would have thought it 100 years ago?" This is the slogan under which OSRAM is celebrated its brand centenary in 2006. Here we see the senior management team. From left to right: Johannes Närger (Finance), Claus Regitz (Technology), Martin Goetzeler (President & CEO), Charlie Jerabek (President of OSRAM SYLVANIA), Dr. Kurt Gerl (Sales and HR).*

OSRAM light sources are everywhere. To give just a few examples, they are used for general lighting in homes, in stadiums, in airports and in the tallest buildings in the world, for vehicle lighting in headlights and indicator lights, in sensors for parking systems and in infra-red night vision equipment, in traffic lights and in aircraft and trains, for backlighting displays in mobile phones, for cinema projection and for special applications such as endoscopy, silicon wafer cleaning in the semiconductor industry and the purification of drinking water with UV light. Who would have thought it 100 years ago?

1906: The brand is registered at the German Imperial Patent Office

On April 17, 1906 the OSRAM brand was registered as a trademark for “electrical incandescent and arc lamps” by Auer-Gesellschaft (Deutsche Gasglühlicht-Anstalt) at the Imperial Patent Office in Berlin. Auer-Gesellschaft, together with AEG and Siemens & Halske, founded OSRAM G.m.b.H. & KG. It started operating in 1919.

The picture mark appeared in the same year. In its original form it showed a long-wire lamp typical of the times with its characteristic exhaust point at the top of the bulb. In 1921 it was stylised for the first time. From 1926 the lamp took on its now familiar shape. The OSRAM oval is protected in the three colours of orange, white and blue.

There have been various aesthetic changes over the years (for the major changes in the development of the OSRAM trademark see page 22).

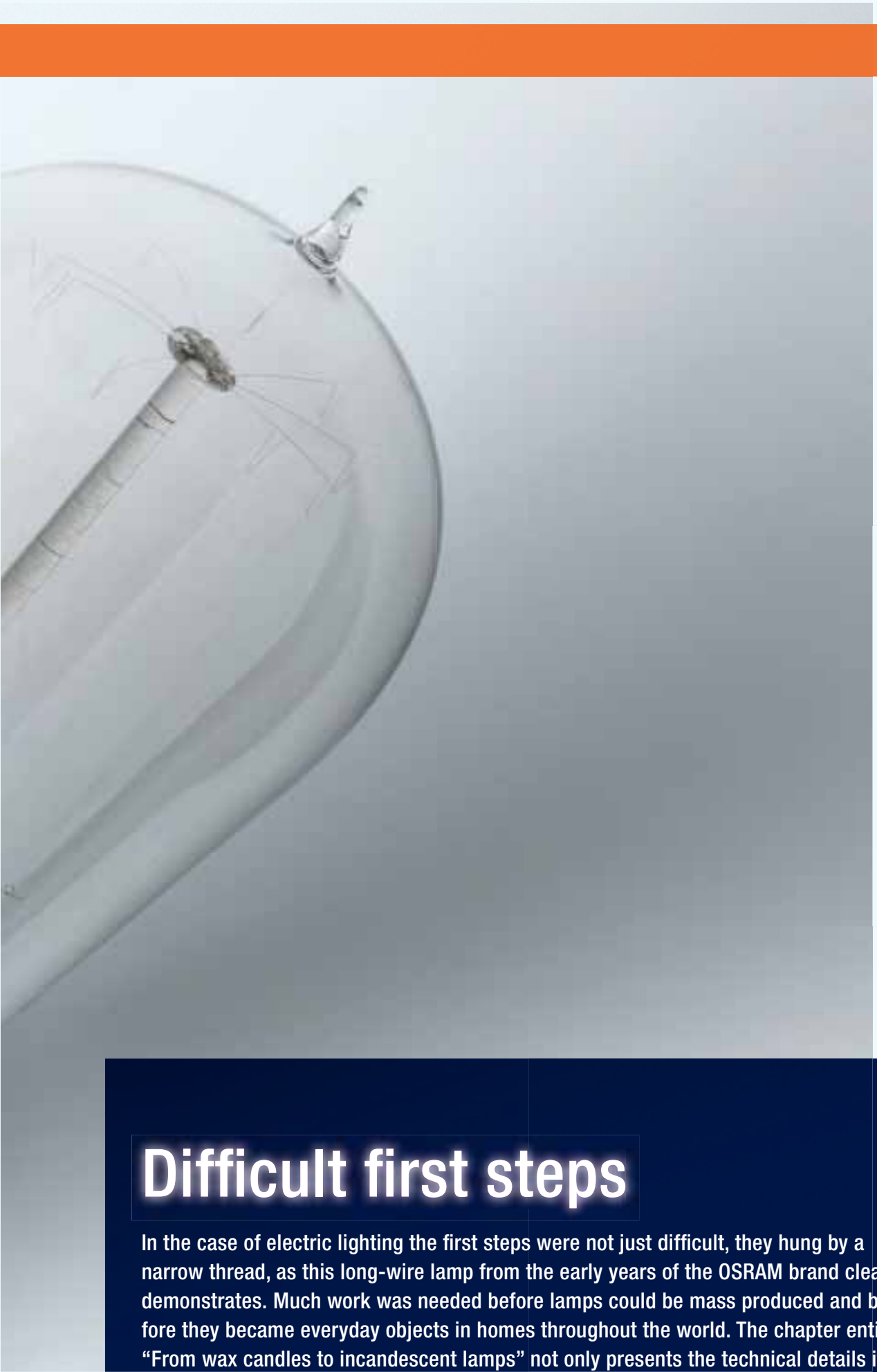
Today: a symbol of light and good ideas

The most obvious revamp came in 2001 when the stylised lamp was rotated through 180 degrees. Today the OSRAM logo is a symbol not only for light but also for good ideas. It stands for OSRAM’s brand core – our passion for intelligent light.

The light bulb in OSRAM’s picture mark, first stylised in 1921, is not only a universal symbol for light it also represents good ideas.

The OSRAM brand has shaped the lighting industry with a series of innovative products (see the overview of major innovations on page 100). The XBO® cinema projection lamp which, like the HMI® lamp, was awarded a technical OSCAR®, is just one of the innovations of which OSRAM is rightly proud.

More than 40,000 people worldwide are now working at full pace on the milestones for the coming years and decades – for a strong OSRAM brand as it enters its second century.



Difficult first steps

In the case of electric lighting the first steps were not just difficult, they hung by a narrow thread, as this long-wire lamp from the early years of the OSRAM brand clearly demonstrates. Much work was needed before lamps could be mass produced and before they became everyday objects in homes throughout the world. The chapter entitled “From wax candles to incandescent lamps” not only presents the technical details it also looks at the people who made it all possible.

From wax candles to incandescent lamps

This was a major breakthrough. So what was needed for such an important development? It was certainly not a single leap but a series of small steps. The fascinating story of the journey from a flickering naked flame to the safe and constantly available light of the light bulb would not have been possible without the many minor and major inventions, the set-backs and the triumphs.

Thomas Alva Edison conducted a number of failed experiments before he produced the first carbon filament light bulb (above). The same is true of the German mechanical engineer Heinrich Goebel who demonstrated a practical incandescent lamp some years beforehand.

"I wouldn't know what better invention there could be than lights that burn without having to be cleaned." Johann Wolfgang von Goethe expressed the frustrations of his contemporaries in about 1800. Around the same time, Count Rumford established in an experiment that the lighting power of a candle is reduced from 100 to 16 percent in just half an hour unless the wick is continually cut or "cleaned". People had to tend a light just as they would tend a fire. It needed constant supervision.

To a certain extent, gaslight – which appeared around 1826 – fulfilled the desire for greater convenience. This was the start of the industrialisation of lighting. English companies opened the first gas facilities in Hanover and Berlin. In September 1826 there were 1798 gas lanterns in use. Gaslight was available at any time. It was described as bright and blinding white. By comparison, previous light sources were little more than a weak red shimmer.

But not everyone liked the new light. People feared being poisoned, explosions were a constant risk, and it consumed oxygen. The temperature in closed rooms became unbearable. In the balconies of theatres the heat was so fierce that members of the audience would feel sick or even pass out.

Incandescent gaslight – the end of the flame

In 1886 the Austrian chemist and engineer Auer von Welsbach discovered incandescent gas light. He heated a mantel made of zirconium oxide and lanthanum oxide with a bunsen burner until it glowed white. The new incandescent gaslight was much brighter and used less gas. But this was not the ultimate goal. Gas lighting had had its day.

The real goal for scientist and engineers was to produce light with electricity. This was the way forwards. But it was a long journey before an enclosed incandescent lamp was invented.

Arc light

In 1808 the English chemist Humphrey Davy presented the arc light. Davy explained how it came about: "When pieces of charcoal about an inch long and one-sixth of an inch in diameter were brought near each other (within the thirtieth or fortieth of an inch), a bright spark was produced … and, by withdrawing the points from each other, a constant discharge took place through the heated air, in a space equal to at least four inches, producing a most brilliant ascending arch of light."

The light was produced not by the electric arc (arch as Davy called it) but mainly by the carbon electrodes being brought to white heat by the discharge. The arc light is really incandescent light, but at the same time it is light from combustion as the carbon particles burn in the surrounding air. The open arc light consumes the electrodes, as the candle consumes its wax.

It was not long before electric light was used for street lighting.

The Jablochkoff candle, named after its Russian inventor and in widespread use from 1876 onwards, worked in the same way. The two carbon rods stood parallel to one another and were insulated from one another by a layer of gypsum. Once an electric arc was produced they burned up in a few hours, with the light going out like candlelight.

It was a long time before this source of light had any practical use. There were many technical problems to be solved. In 1867 Werner von Siemens‘ generator finally succeeded in producing large amounts of current continuously. In 1879, Friederich von Hefner Alteneck, chief designer at Siemens, invented the differential arc lamp which was the first practical use of arc light.

Restricted use of arc light

As a source of light, arc light was limited to certain applications. It was used as effect lighting in theatres and as working light in factories, department stores and construction sites. It was not suitable for lighting in homes. Because of its high luminance and intensity it was simply too bright.

In 1850 the Gazette de France reported as follows on a lighting experiment in Lyons: “The Chateau of Beaujou was suddenly flooded with light as bright as the sun, and this illusion was so powerful that birds were stirred from their sleep and began to sing in the artificial daylight”. If electric light was to find its way into homes, a smaller light source had to be found, a single lamp that could be easily and safely turned on and off.

The light bulb makes its entrance

Researchers and engineers were working on just such a light source long before Edison. By 1803 after numerous experiments the English chemist and physicist Humphrey Davy had succeeded in causing a wire to glow by passing electric current through it. He used a platinum wire, which glowed for a short time and quickly extinguished. The energy source for his light was a volta battery.

The Englishman Frederick de Moleyn conducted experiments in 1841 to accommodate the wire in a glass vessel in which a partial vacuum had been created so that the wire would not burn up so quickly.

The German mechanical engineer, Heinrich Goebel, succeeded in 1854 in turning the theoretical knowledge gained in the first half of the 19th century into a practical application. Political unrest in 1848 led him to emigrate to America. Soon afterwards he opened a clockmaker’s shop in New York.

He took some very simple materials and built a working incandescent lamp. For the filament he used charred bamboo fibre. In a court case that he later brought against Edison, the court confirmed that his carbon fibre light bulb was “a truly practical light source” and that therefore 20 or 30 years before Edison he had “used and publicly demonstrated a practical light bulb”.

In fact, his invention was way ahead of its time. However he lacked the essential ingredients for lasting success. The sources of electrical energy available at the time were totally inadequate because they could not deliver continuous current. He was also unable to produce the necessary high vacuum given the technology available. Because there was no suitable pump, Goebel had to fill every lamp with mercury and then empty the mercury to get rid of the air, as was common practice for making barometers.

It was not until 1865 that a mercury pump was invented by Hermann Sprengel. An improved version of this pump as used by Edison from 1879 with great success. This was a major step forward.

The dynamo generator of Werner von Siemens

In 1866 Werner von Siemens completed work on a machine that demonstrated the principle of electrodynamics. This invention heralded a new era for electrical engineering. The dynamo generator was the key to the

practical application of electricity. Electric light could now start its triumphal march. In 1867 Werner von Siemens presented his invention at the World Fair in Paris and was made a member of the French Légion d'Honneur.

The Swan lamp

Among the many inventors who devoted themselves to the problem of electrical lighting, the Englishman Wilson Swan is also deserving of mention. He was the first person to succeed in mass producing light bulbs. In 1879 he built a carbon filament lamp in which the filament had a diameter of no less than 1 mm and therefore used considerably more current than the Edison lamp.

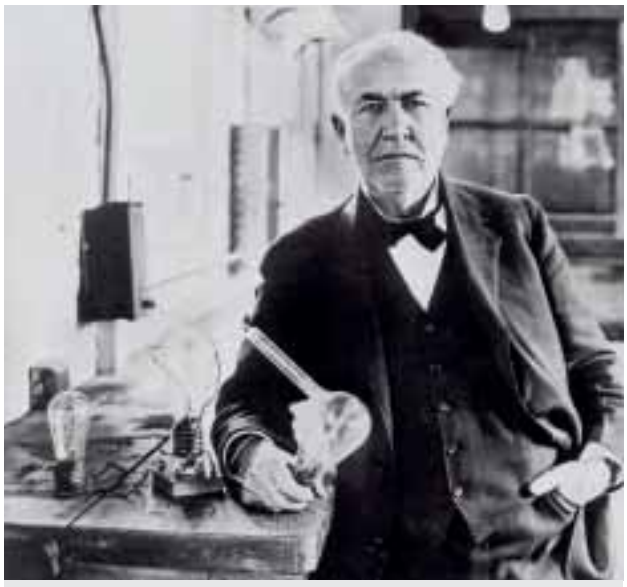
Swan founded the Swan Electric Light Company Ltd. in London, where he produced and sold his lamps, which were soon equipped with a much thinner filament. Werner von Siemens and Swan maintained business contact for some time.

Edison – an ingenious inventor and visionary entrepreneur

The great inventor, Thomas Alva Edison, also conducted research and development work in search of "the little light" that could be used anywhere. In the New York Tribune in 1878, he was reported as saying: "I let other inventors take the lead because I really did not pay much heed to electric light; but now I think I can catch them up.

I have an idea to make electric light available for all purposes, and in comparison to gas, to deliver it at a lower price. It is not a problem to divide electric current and use it in small amounts at various points. The difficulty is to find a light source which gives off a pleasant, not too strong light, and which can be ignited as easily as gas. Such a light source cannot consist of carbon rods, which burn up and must constantly be adjusted during use. Some material must be found which lights when current is sent to it, and which does not burn up. Platinum wire

With the development of the dynamo, Werner von Siemens made a major contribution to the start of the electrical age.



Thomas Alva Edison with one of his "Edison effect lamps".

gives good light when a certain current is passed through it. However, if the current is too strong, the wire melts. I want to produce something better." Edison's declared objective was to create a soft constant light that could be used anywhere.

And he succeeded. After months of hard work he was able, on October 21, 1879, to present his carbon filament lamp which was the first to burn for a long time.

In Germany, Siemens played the leading role
While Edison worked in America on the development of a usable light bulb, the Siemens and Halske Company, under Werner von Siemens and his son Wilhelm, conducted the first systematic experiments in Germany with incandescent lamps using different materials (metals, cotton fibre, cellulose, etc.). They achieved success in 1880. The Siemens and Halske light bulb factory, the oldest in Germany, grew out of their workshop in 1882.

"With incandescent light everything is now possible"
With the introduction of the electric light bulb, the dominance of the arc light was over. "With incandescent light anything is possible", said Werner von Siemens. When he opened his light bulb factory he said: "Incandescent light bulbs will in all probability triumph over all others, and give electricity a much greater sphere of application. I am now establishing light bulb production on a large scale because it will likely become common for the illumination of theatres and stages owing to the smaller risk fire."

At the World Fair of 1881 in Paris, Edison's invention caused a huge sensation. The main exhibition building was illuminated with hundreds of Edison light bulbs.

The following report appeared in France: "We usually imagine electric light as a blinding light source that hurts the eyes ... But here we have a light source which is comfortable and has been adapted to suit our living habits ... Electric light does not leave behind any residue from combustion, neither carbon dioxide nor carbon monoxide, which pollute the atmosphere, nor sulphuric acid nor ammonia, which attack paintings and fabrics. It does not raise the temperature in the room and does not cause the unpleasant and tiresome heat that is associated with gas lighting ..."

Emil Rathenau, a prominent engineer and scientist, was there at the presentation of Edison's invention and recognized that the incandescent lamp was far superior to all other existing forms of light. He saw that its possible uses were practically unlimited. With entrepreneurial foresight he recognized the special significance of the Edison lamp. He said: "Edison's invention was fascinating.

Each detail of his lighting system was so well thought out and thoroughly worked through that one would think it had been tried out in innumerable cities for many years. Neither bases, switches, fuses, lampholders nor any other objects pertaining to installation were missing, and the power supply, regulation and the circuits with feeders, service connections, electricity meters, etc. were designed with astonishing understanding and incomparable genius." While he was in Paris, Rathenau sent a telegram to Edison requesting a meeting.

The "Compagnie Continentale Edison"
Soon afterward, Rathenau began negotiations for the use of the Edison patents. In 1882, he acquired the right to these patents in Germany. In Paris, Edison founded the "Compagnie Continentale Edison". To build up practical experience of incandescent lighting and to inform the public about the new light, an academic institute was formed, known as "Edison's Electrical Lighting System". On April 19, 1883 the German Edison Company was founded, which later gave rise to AEG. Emil Rathenau thus became a pioneer in the development of incandescent lamps in Germany, alongside Werner von Siemens.

The significance of the incandescent lamp for the entire German electrical industry is indicated by the fact that one of its largest companies was initially involved exclusively in the production of lamps and later continued to produce lamps as its most important manufacturing sector up to the time that OSRAM was founded.

From the invention to the product

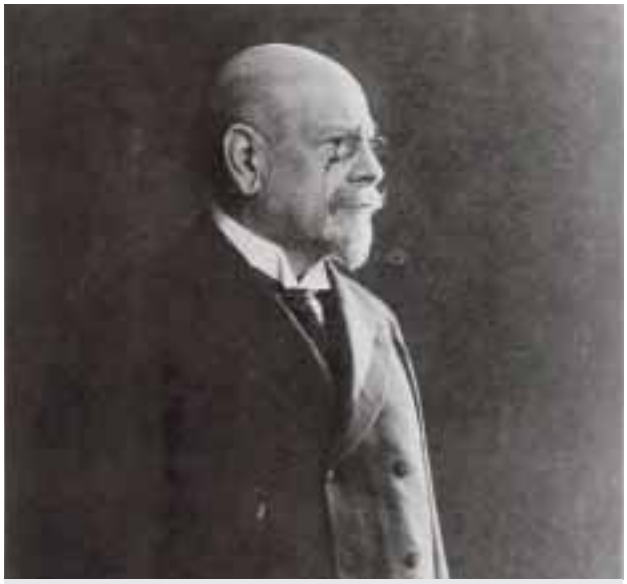
The Siemens & Halske Company was very successful in electrical lighting with carbon arc lights. The inclination was to continue in this branch of lighting.

The new incandescent lamps required large capital investment. Werner von Siemens however was not looking for a "quick fix". He had turned down an offer from Edison to take over the patents for Germany because he was confident of achieving his objective sooner through his own research and by building up his own production. However when he had been persuaded that Edison's lamp would bring success, he did not hold back his approval.

At that time Siemens & Halske were already a world-famous electrical firm that had pushed ahead electrification, and therefore industrialization, through outstanding innovations. Werner von Siemens had this to say about the competitive situation: "We are now busy manufacturing incandescent lamps, that is to say, concentrating on their production. I now have great confidence in them, since I have seen that carbon can be prepared so that it remains unchanged in a perfect vacuum, even when heated to high temperatures ..."

Werner von Siemens was convinced: "My design is so different from the others that we have nothing to fear from patents ..." But soon there were some difficult and tiresome disputes about patent rights. The following is an excerpt from a letter written in 1882: "Incandescent lamp people, supported on all side by financially powerful companies, are making our lives very difficult right now. Edison is offering his lamps at a ridiculous price to put pressure on us. Under these circumstances, I have taken the production of incandescent lamps into my own hands and believe that we can do significantly better." Shortly afterwards, on February 2, 1882, he wrote: "We have now received 500 Swan lamps. Ours give out far more light."

Werner von Siemens was intent on putting a better lamp on the market. Numerous technical difficulties lay in his way. These and probably also the patent situation encouraged Siemens & Halske to take out a license on the Swan patents. This made it possible to develop incandescent lamps of a special type. The carbon filament was now made of twisted cotton thread, as in the Swan lamps. The bulb was cylindrical. The base of the Siemens lamp was very different from that of the Swan lamp.



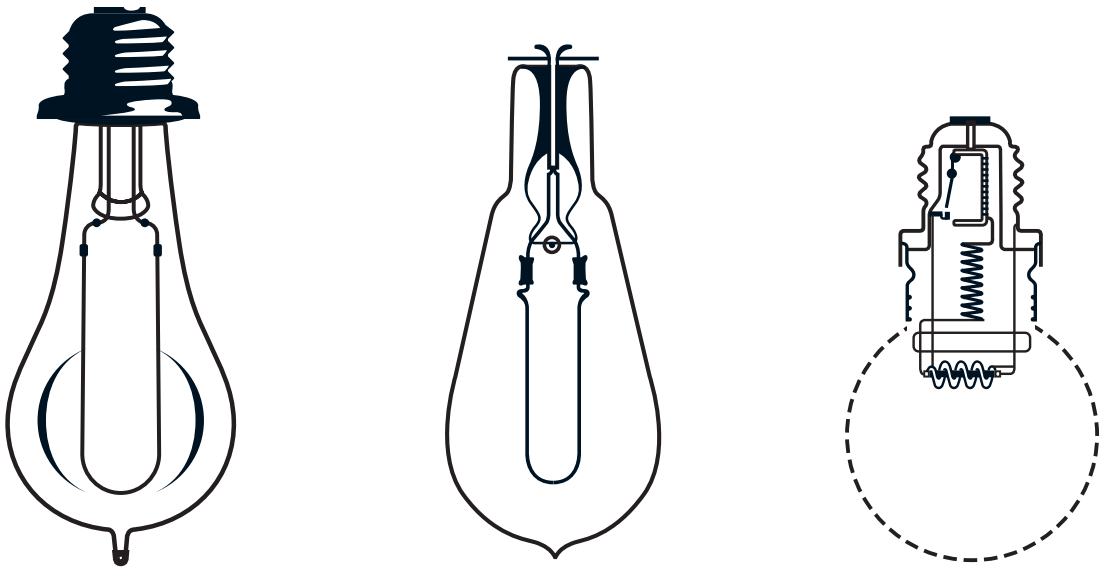
Emil Rathenau, the founder of the Deutsche Edison-Gesellschaft, which changed its name in 1887 to the Allgemeine Electrizitäts-Gesellschaft.

A lighting experiment in Berlin‘s city hall brought admiration. In a lecture to an electrical engineering association on November 29, 1882 von Hefner-Alteneck had this to say about various experiments for producing good street lighting: “The experiment for illuminating a section of Kochstrasse with incandescent lamps from S & H will shortly be followed by a new one using the excellent lamps from Gebr. Siemens & Co. which will consume more electricity and each provide the equivalent light of some 130 normal candles (corresponding to a 100 W light bulb). The effect will be the same as that of the Siemens regenerative gas lights in Leipzigerstrasse.”

Standardisation and photometry

The introduction of the incandescent light on a large scale meant that binding technical data had to be specified. Von Hefner-Alteneck occupied himself with these questions early on. He had already alluded to the shortcomings of the standard lamp used for measuring light in 1883, and in January 1884 had demonstrated a lamp of his own design at the Electrotechnical Society. This “amyl acetate” lamp, the light from which corresponded to the unit of luminous flux, was named the “Hefner Lamp”, as proposed by the Physikalisch-Technische Reichsanstalt.

In 1898 it was introduced as the unit of luminous flux for Germany and provided the basis for photometric measurements in Germany and in other countries. It is worth pointing out that the Physikalisch-Technische Reichsanstalt was a foundation set up by Werner von Siemens. Its first chairman was the physicist, doctor and physiologist Hermann von Helmholtz.



Not a continual development but one of important advances. From left to right: The Edison lamp (1879), the Siemens carbon fibre lamp (1882) and the Nernst lamp (1898).

Cooperation between Siemens & Halske and the Deutsche Edison-Gesellschaft

On August 28, 1883 it was publicly announced that the Deutsche Edison-Gesellschaft (German Edison Company) and S&H alone had the right to produce incandescent lamps and to install lighting systems in Germany in accordance with the Edison patent. Siemens & Halske had taken out a license on the Edison patents and had signed a manufacturing agreement with Deutsche Edison-Gesellschaft (DEG) and a price agreement at the same time. Siemens was a founding member of DEG.

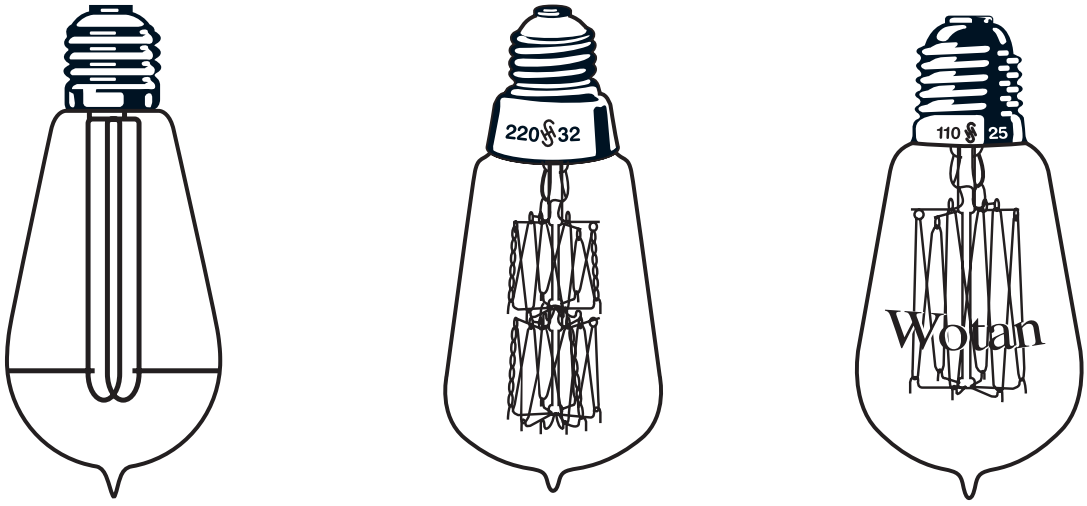
In 1886 S&H acquired the rights to the Edison patents for Germany, Austria and Russia from the Compagnie Continentale in Paris. S&H was then obliged to refrain from all suits against these patents and to cooperate in defence of them. With the acquisition of the licences, all legal relationships with the French and American Edison companies were annulled. The territorial restriction of the Edison Company to Germany was also lifted. Now the company could expand its activities throughout the world.

DEG becomes AEG

The company expanded its activities to all areas of electrical engineering. To reflect this expansion DEG changed its name to “Allgemeine Electrizitäts-Gesellschaft” (AEG). This was the name by which it became famous throughout the world. The AEG trademark was first used in 1898.

The Nernst lamp

The search continued for better technology for producing electric light. In 1898 a new development appeared, the



From left to right: The Auer or osmium lamp (1902), the Tantalum lamp (1905) and the Wotan lamp (1910).

patent of the German chemist, physicist and Nobel prize winner, Professor Walther Nernst.

He designed a lamp containing a rod made from a mixture of incombustible oxides. It was an improvement on the carbon filament lamp because it only used 2 watts per Hefner candle, as opposed to the 3.5 watts of the carbon filament lamp. Its luminous efficacy was 5.8 lm/W compared with 3.2 lm/W for the carbon filament lamp. The light from the Nernst lamp was uniform and almost white. Its drawback was that it needed a lengthy warm-up period before it could conduct electric current. It had to reach a temperature of about 800 degrees for this to happen.

There were a number of secondary problems to be solved before the Nernst lamp could be manufactured in large quantities. The lamp did however enjoy market success for several years. It was not further developed because the refractory metals – firstly osmium then tantalum and later tungsten – were soon being used for the filament.

The lamp factory of the Allgemeine Electrizitäts-Gesellschaft (AEG) in Berlin Moabit, Sickingenstrasse.

The Nernst lamp had been superseded. Even though its success was short-lived it deserves recognition as a masterpiece in the technical application of the physics of incandescent lighting and a milestone in the development of the light bulb.

The quest for improvements

S&H has been manufacturing light bulbs in Berlin since 1881. Werner von Siemens had set up a major production site there for carbon filament lamps. Up to then, lamps were manufactured here under the Edison patents using bamboo fibres.

Because bamboo gave the engineers a lot of trouble, they looked for a material which would make it easier to produce filaments of uniform round cross-section. It was important to use filaments of exceptional precision suitable for the relevant voltages, even for mass production.

Renowned scientists such as Maxim, Swan and Weston worked on the problem. Hermann Remané, who started working for S&H in 1882 and later moved to with Auer, was heavily involved in the experiments to improve the carbon filament.

Booming demand leads to increased production

Lamp production at S&H expanded at such a rate that the existing floor space was soon inadequate. In 1886 the decision was made to build a new factory in Charlottenstrasse, and work began in 1888. Production grew steadily. Not only did the German market have to be served, but exports also increased. In 1895, planning started on a new building for another lamp works. In 1899 this factory in Helmholtzstrasse in Charlottenburg, which was not yet part of Berlin, was ready to start production.

Incandescent light with carbon filaments had conquered many areas of the economy. But electric light was not yet cheap enough for use in the home.

The development of the metal filament lamp
After development ceased on the Nernst lamp, progress was made on metal filament lamps at the beginning of the 20th century, leading to osmium and tantalum lamps, and then to the present-day tungsten lamps.

Nernst had shown that there was no need to rely solely on carbon. Other materials, known as second-class conductors, could be used. These conduct electrical current only after a certain temperature has been reached.

The ingenious Austrian chemist Auer von Welsbach, who had already promoted gas lighting with the development of the gas mantel, also recognised that refractory metals could be used as the luminous material. In 1898 he succeeded in producing an osmium filament.

Now it was possible to construct a marketable incandescent lamp with a metal filament. Osmium is a very brittle material. It was not possible to draw it into thin wire. Sprayed filaments were therefore produced. It was also not possible to produce filaments thin enough to manufacture lamps for currents of 110 or 220 V. What's more, the osmium filaments were sensitive to mechanical vibration and voltage fluctuations.

The Deutsche Gasglühlicht-Aktiengesellschaft (Auer-Gesellschaft)
The manufacturer of the osmium lamp was the Deutsche Gasglühlicht-Aktiengesellschaft (Auer-Gesellschaft, DGA). The third largest producer of incandescent lamps in Germany entered the fray with the osmium lamp. When the first experimental osmium lamps were demonstrated to the shareholders of the Auer-Gesellschaft on January 23, 1901 it caused a sensation. The company had previously concerned itself mostly with the gaslight, but was now turning its attention to the development of metal filament lamps.

Production methods were refined. This work was given further impetus by Dr. Fritz Blau, a chemical engineer and private lecturer at the University of Vienna, who had been recruited by the Auer Company at the instigation of Dr. Hermann Remané. For about five years, until it was replaced by the tungsten lamp, the osmium lamp was marketed under the name of the "Auer Oslampe". In view of the high development costs and short market lifespan it was not a great economic success, but as the first metal filament lamps and the forerunner of the tungsten light it gave the Auer-Gesellschaft a significant advantage in terms of experience and know-how.

The tantalum drawing process
The search went on for materials that could be heated to higher temperatures than carbon without evaporating too quickly. With enthusiastic backing from Werner von Siemens, and after tireless and costly experimentation, Dr. Werner Bolton and Dr. Otto Feuerlein succeeded in finding a suitable material – tantalum.

The metal filament lamp appeared at the start of the 20th century – initially the osmium lamp, then the tantalum lamp and finally the tungsten lamp of today.

The tantalum lamp was the first with drawn metal wire. The wire could now be drawn so thinly that lamps could be produced for 110 and 220 V. It was certainly difficult for the almost one meter long tantalum wire, which was needed for a 50 candle high-voltage lamp, to be accommodated in the lamp and mounted in the glass bulb.A stable mounting could only be achieved by arranging the filament in a zig-zag pattern between the holding rings. The wires also had to be protected from touching one another by a central support. However because every holder dissipates heat, thereby cooling the filament, this large number of holders meant there was a loss of efficiency.

Refining the tantalum drawing process took a long time. Numerous patents were taken out with regard to tantalum extraction and the production of tantalum wire. Tantalum lamps were also produced in America by the General Electric Lamp Company. American companies took license rights from S&H for this purpose. They obtained the wire from Berlin. The technical success of the tantalum lamp soon brought economic benefits.

Bolton's laboratory – a focus for technical developments

Bolton's physics laboratory at S&H was the heart and soul of lamp manufacture. Various people who worked in the laboratory went on to take up prominent positions in the OSRAM company. In 1904 Dr. Marcello Pirani became Bolton's assistant, soon taking on a management role. As a young physicist, Dr. Alfred R. Meyer was associated with this laboratory. A large number of highly regarded scientific papers in applied and pure physics were published by Pirani, Meyer, Hans Kreusler and others, providing ample evidence of the dynamic nature of this period of major discoveries in the field of electric light.

Tungsten wins the race

After the Austrians Alexander Just and Franz Hanaman demonstrated in 1904 that tungsten was also suitable as

This postcard shows workers leaving the Auer factory in Berlin at the end of the day.

A preference share in the Deutsche Gasglühlicht-Aktiengesellschaft (Auer-Gesellschaft).

a filament for electric lamps, the DGA, which had acquired the patents, began to develop a tungsten lamp. The lawyer, Felix Kallmann, the commercial director of the DGA, showed outstanding economic foresight and technical understanding in supporting Blau and Remané's experiments with tungsten. The two men had the advantage of having worked on the development of osmium. As early as 1905, they were able to deliver the first batch of lamps to the Physikalisch-Technische Reichsanstalt for durability tests. Blau and Remané had developed the tungsten filament lamp. The Auer Company was the first to market them.

The technology of the tungsten filament lamp

Tungsten has a melting point of 3,410 degrees Celsius. To all intents and purposes it cannot be melted because there is no furnace that can withstand such temperatures. Untreated tungsten is brittle and cannot be bent or stretched. After much experimentation it was decided to use tungsten in powder form and combine it with a bonding agent. The resultant paste could then be extruded to produce filaments. These filaments were then sintered and annealed in a series of processes. Finally, after completely removing the bonding agent, what was left were filaments of pure tungsten.

At 7.9 lm/W the tungsten filament lamp had a better luminous efficacy than the osmium lamp and the tantalum lamp. However it was afflicted with all the inherent failings of metal filament lamps. Whereas the carbon filament lamp achieved a luminous efficacy of some 3 to 4 lumens per watt, the first tungsten lamp produced almost eight lumens per watt. Because the tungsten has a much lower electrical resistance than carbon, the wires for the same light output had to be made much considerably thinner and longer.

Tungsten is still used today, 100 years later, for the filaments in ordinary light bulbs. This shows just how significant the development of the tungsten lamp was to the history of lighting.


für SCHEINWERFER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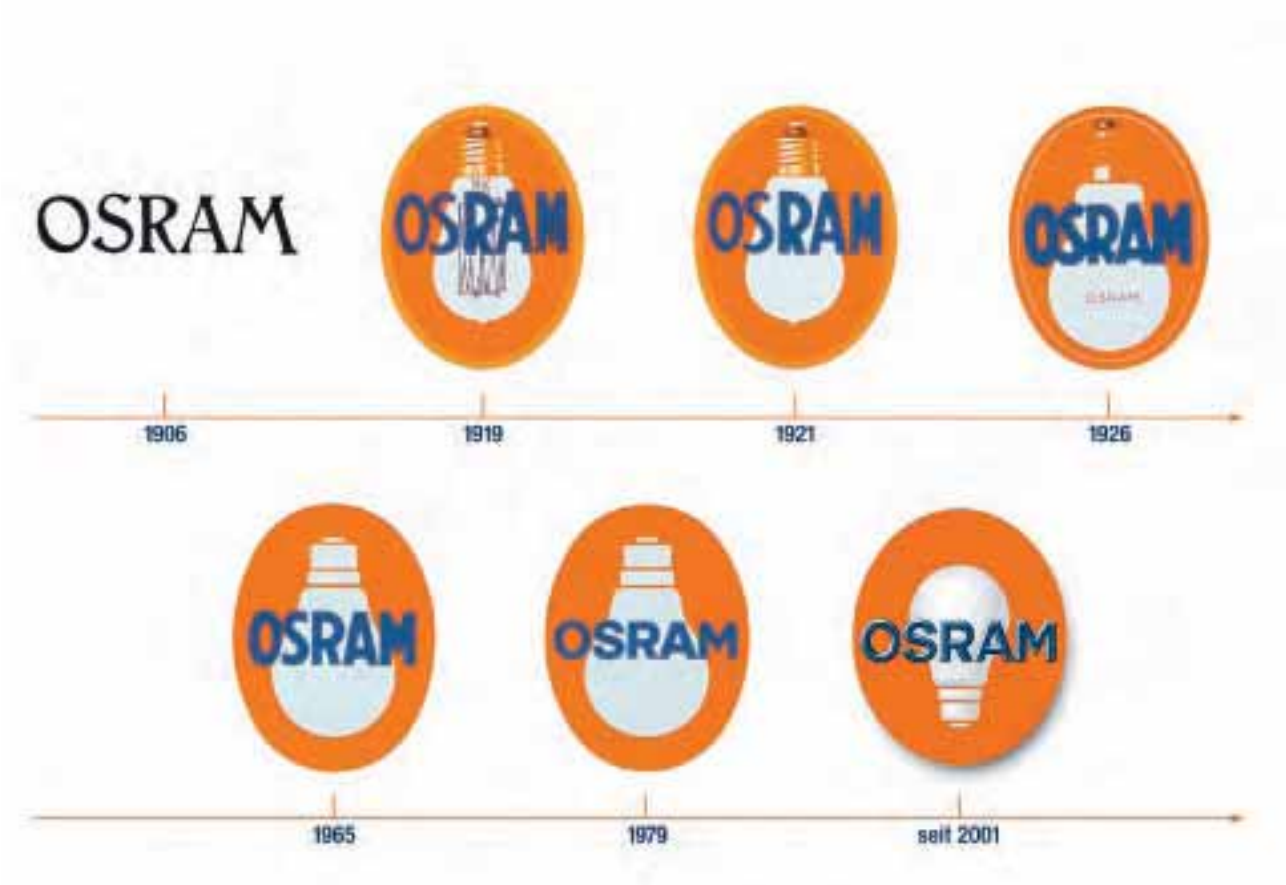
Beachten Sie freundlichst diesen kleinen Hi

A global trademark is born

This chapter tells of the birth of the OSRAM brand and charts the development of the company up to 1945, an extraordinary period in which major technical achievements are interwoven with historical events. A time of ground-breaking inventions and a time of dreadful wars, political confusion and social upheaval.

The birth of the OSRAM brand and development in the company up to 1945

The first decade of the 20th century saw many companies invent product names from the initial letters of words. Good examples include OSRAM (of course), haribo from Hans Riegel in Bonn and Milka chocolate from the German for milk and cocoa.



But even a strong trademark will change in the course of 100 years. In addition to the word logo of 1906 the OSRAM picture mark was registered in 1919. In 2001 the stylised light bulb in the picture mark was rotated through 180 degrees. Today it is a symbol not only for light but also for good ideas – and for OSRAM's passion for intelligent light.

The Auer osmium lamp was marketed for a short while as the “Auer-Oslampe”. The decision was taken to look for a new name. The name had to be neutral and offer adequate trademark protection.

The name chosen was OSRAM because it referred to the materials used for the filament – first osmium and later wolfram (tungsten).

The chemical engineer Fritz Blau is credited with inventing the name OSRAM. A brand that would gain global recognition was born. On march 10, 1906, OSRAM was registered as a trademark for “electrical incandescent and arc light lamps” with the German Imperial Patent Office and on April 17, 1906 recorded as number 86,924 in the Trademark Directory at the Patent Office.

AEG marketed their tungsten lamps as “AEG metal filament lamps”. S&H chose the name “Wotan lamps” for its metal filament lamps. This was a contraction of wolfram and tantalum. They superseded the carbon filament lamp because they had a higher luminous efficacy. Business was expected to boom.

Large factories had to be built. Major investment was required. The Koppel und Co. bank in Berlin recognised the industrial and economic significance of the new lamp and had confidence in its future, despite the risk.

On March 15, 1907, Auer moved into its new factory in Rotherstrasse in Berlin. Its size was the talk of all Berlin. Within just a few years it was producing 100,000 lamps a day.

Cooperation with the Electric Company USA (GE)
In 1906 the new tungsten lamp was demonstrated to a delegation from the General Electric Company of New York. Soon afterwards Auer and GE signed a patent licence agreement for tungsten filament lamps and a know-how exchange agreement for lamps with extruded metal filaments. The agreement gave GE the exclusive patent rights for America. This was the start of friendly cooperation between DGA and GE.


OSRAM

VORSTEHENDES WARENZEICHEN IST AUF GRUND DES GESETZES ZUM SCHUTZ DER WARENBEZEICHNUNGEN VOM 12 MAI 1894 UND DES GESETZES ZUR AUSFÜHRUNG DER REVIDIERTEN PARISER ÜBEREINKUNFT ZUM SCHUTZE DES GEWERBLICHEN EIGENTUMS VOM 14. MÄRZ 1903 WIE UMSTEHEND ANGEGEBEN, IN DIE ZEICHENROLLE EINGETRAGEN.

BERLIN, DEN [illegible]

DER PRÄSIDENT
DES KAISERLICHEN PATENTAMTS

The certificate from the German Imperial Patent Office for the registration of the OSRAM trademark on April 17, 1906 for “electrical inc and arc light lamps”.

The tungsten drawing process
In 1909, Dr. William David Coolidge of the General Electric Company in America subjected tungsten rods to mechanical and thermal treatment involving hammer pressing and sintering. This made the rods so pliable that they could be drawn through diamond nozzles into fine wire.

As a show of gratitude for help given in setting up the American tungsten lamp factory, the Americans gave DGA the rights to use their drawing process and the associated patents. A patent exchange agreement was signed. This was then extended to cover the entire incandescent lamp sector.

Joint development work
The first tungsten filament lamps needed further improvement. The small amount of gas that remained behind after pumping had an adverse effect on lamp life. The answer was to introduce what are known as “getters”.

These substances have the ability to bind residual gases so that the vaporised tungsten is converted into a colourless compound that absorbs very little light, reducing the loss of light that would otherwise occur during the life of the lamp.

In Germany this development work was undertaken by Dr. Franz Skaupy of Auer and Dr. Ernst Friedrich of AEG.

The Patent Interest Association of 1911
Each of the three German incandescent lamp manufacturers had a know-how exchange agreement with the General Electric Company, with the result that since 1910 technical developments at all three companies had been going in the same direction.

On March 15,1911 the “Patent Interest Association for Incandescent Lamps” was formed by the three Berlin companies and GE.

There were no provisions for know-how exchange relating to the manufacturing methods between the German companies but from this time onward the methods used in the three companies and those used in GE ran along the same lines under the patent and know-how exchange agreements. The agreements did not contain and commercial arrangements so that competition between the companies was not jeopardised. AEG had overall responsibility for the association.

The interest association meant that it was possible to mount robust defences of the patents held by the three companies. Licences were granted to other incandescent lamp companies. The licence fees received enabled research work to be intensified. It was therefore possible to invest in the further development of incandescent lamps. For the companies involved the patent association was a stepping stone to even closer cooperation in the future.

OSRAM Fábrica de Lamparas in Madrid, Spain was founded in 1914 by the Deutsche Gasglühlicht-Aktiengesellschaft with the involvement of Siemens and AEG.

Joint activities in Germany and abroad
In subsequent years, cooperation among the three major German incandescent lamp manufacturers was not restricted to lamp technologies and the joint development of methods of manufacture. Even before the first world war the management of the companies were aware of the competitive advantage that a concentration of their powers, at all levels including economic, would give the young German lighting industry on the international stage.

In 1914 the first joint company was founded on an equal footing. The company was OSRAM Fábrica de Lámparas, Madrid, in which S&H, AEG and Auer were involved.

In the same year, S&H and Auer made plans to produce tungsten lamps in Russia. The outbreak of the first world war put an end to these plans however.

In 1917 there was a joint arrangement at least in Germany. The three companies acquired a significant shareholding in Wolfram Lampen AG in Augsburg.

Foreign shareholdings of DGA and brand rights
The Deutsche Gasglühlicht-AG marketed the OSRAM trademark by establishing companies outside Germany. The OSRAM trademark had been registered in England as long ago as April 1906. In 1907, production of tungsten lamps began in Wolfram Metal Filament Ltd. in London.

The company had been founded jointly by the British General Electric Company G.E.C., DGA (Auer-Gesellschaft) and Just und Hanamann. When it moved into a new factory in 1909 it traded under the name of OSRAM Robertson Company Ltd.

During the first world war, German property in Great Britain was confiscated. The company was transferred in 1916 to the British G.E.C. under the name of OSRAM Company Ltd.

The Treaty of Versailles, signed on June 28, 1919 sealed the loss of the foreign property and patent rights of German companies. The brand rights of DGA in OSRAM in England had already been lost before the OSRAM company was founded in 1919.

Rights to the OSRAM name in Great Britain, its former colonies and the Commonwealth remained in the possession of the British GEC until 1986.

In France the Fabrique de La Lampe OSRAM S.A. had been established in Paris. This company, together with brand rights, was also confiscated as enemy property during the first world war.

High luminous intensity thanks to filler gases
1913 saw a major technical advance in incandescent lamp design. In the research laboratories of GE, Dr. Irving Langmuir of GE, together with Dr. Ernst Friederich, Dr. Karl Mey and Dr. Richard Jacoby at AEG, discovered the conditions that had to be met to reduce heat dissipation from gas-filled lamps to a minimum.

Up to then, the air had been removed from the bulb because the filament material would otherwise have been oxidised by the oxygen in the air. Now it would be possible to use a filler gas to reduce the rate at which the filament material vaporised.

With the invention of the gas filling, which alongside the invention of the tungsten drawing process can be considered the most significant advance in lamp technology, the incandescent lamp could proceed from being a small electrical light source to a source of incredibly high intensity, superseding the previously dominant arc lamp in all but a few specialist applications.

Lamp production and marketing under one roof
Towards the end of the first world war, Siemens & Halske, AEG and Auer took the decision to combine their forces and produce and market incandescent lamps under a single company.

Following the death of Emil Rathenau, AEG was headed by his highly talented son Dr. Walther Rathenau. In charge of S&H was Carl Friedrich von Siemens, the son of the founder and an industrial giant in his own right. The two men saw real benefits in the merger.

The establishment of OSRAM G.m.b.H. KG
The Deutsche Gasglühlicht-AG (Auer-Gesellschaft), owner of the OSRAM trademark, hived off light bulb manufacture from the company in November 1918 and founded OSRAM Werke GmbH.

The majority shareholder in DGA and therefore the chief partner in OSRAM Werke GmbH was the Berlin bankers Leopold Koppel.

OSRAM Werke GmbH was converted into a Kommanditgesellschaft (limited partnership), with DGA as the limited partner. AEG and Siemens & Halske became limited partners of OSRAM G.m.b.H. KG only on February 5, 1920 and brought their light bulb factories and shareholdings in other light bulb factories with them.

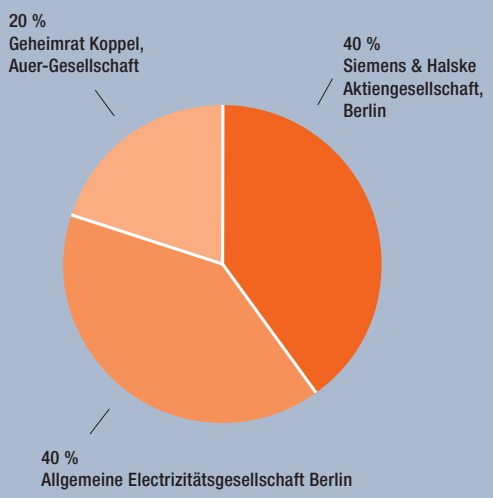
The start of the business year was retrospectively set as July 1, 1919.

Dr. William Meinhardt was appointed managing director. His sound advice was instrumental in bringing together the most important manufacturers of incandescent lamps in Germany.

Also on the managing board were Hermann Schlüpmann from Auer, Dr. Ernst Salomon from AEG, and Dr. Otto Feuerlein and Christian Jensen from S&H.

The article of agreement for the company describes the purpose of the merger in sober language: “The purpose of the company is to manufacture and market means of illumination using electrical energy with the exception of arc lamps in which an arc of light is maintained between two or more electrodes by offsetting the continuous combustion of the electrodes by mechanical replenishment, in particular the continuation of the light bulb factories of the Auergesellschaft, the Allgemeine Electrizitäts-Gesellschaft and the Siemens & Halske Aktiengesellschaft with the trademarks OSRAM, WOTAN, AEG and S&H and the acquisition of or participation in enterprises with the same or similar purposes.”

The shares in 1919



When OSRAM G.m.b.H. KG was founded the name of the brand became the name of the company. Why did the three largest light bulb manufacturers agree on the name OSRAM?

A decision had to be made as to which of the three brand names brought into OSRAM G.m.b.H. KG, namely OSRAM, AEG and WOTAN, was to be used as the future uniform brand name. Of the three German brand names for lamps, OSRAM enjoyed the greatest recognition outside Germany, whereas WOTAN was more at home in Germany. The AEG and WOTAN brands were to be used only in those countries in which the OSRAM trademark had been confiscated under the Treaty of Versailles.

OSRAM saw itself as a company that had overcome ruinous competition thanks to the merger of the light bulb factories of AEG, Siemens & Halske and the Deutsche Gasglühlicht-AG and was now able to build on its newfound strength. In 1922 a high-quality brochure entitled "OSRAM G.m.b.H. Kommanditgesellschaft Berlin O 17" was published.

This showed the offices and factories in Germany and abroad to give "an idea of the size, importance and capabilities of OSRAM G.m.b.H. Kommanditgesellschaft." It was the largest European light bulb manufacturer.

The brochure of 1922 presented OSRAM as a company that encompassed all the stages of production, from raw materials through components to finished products and, through its research institute, provided a constant stream of ideas for the further development of electric light. This all gave rise to a heightened awareness of quality within the company and this in turn was communicated to customers by the OSRAM word logo.

Berlin – the place of birth of the lamp industry
OSRAM was founded in Berlin as that is where all three companies had their headquarters. Berlin was the home of the electrical and lamp industries.

The merger of the three German light bulb manufacturers was the logical consequence of the developments in society and the economy that had been made possible since 1900 by the "new industry" of electricity. Now it was important to turn technical discoveries into economic reality. In the fledgling electrical industry, the technical progress made by a company correlated exactly with its economic health. This dependence on a succession of new technologies still holds true for OSRAM today.

Berlin composer Paul Lincke was so enthusiastic about the new electric light that he wrote the biggest hit of his life about it – "Glow worm". He sang the praises of the light bulb, and all of Berlin sang along. The new lamps promised a better quality of life for everyone.

1919, the year in which OSRAM was born, was a difficult year for Germany. Here are just some of the head-

The main office building in the birthplace of OSRAM, Berlin "O.17", at Ehrenbergstrasse 11–14.

lines in the Berlin papers: "General strike and rebellion by the Spartakus union in Berlin", "Rosa Luxemburg and Karl Liebknecht murdered", "The Peace Treat of Versailles signed". In August 1919, Germany's first democratic constitution, the Weimar Constitution, came into force.

Reorganisation and concentration of strength
The most important tasks facing William Meinhardt, then chairman of the new OSRAM company, were to create a corporate organisation, generate inner strength and unity and build on these for the future. All the links that had existed before the war now had to be forged again.

The merger had ended competition among the three German companies. Now OSRAM could apply all its strength and resources to achieving technical improvements in its lamps and rationalising its manufacture.

The structure of OSRAM G.m.b.H. KG:

Main factories in Berlin:
Works D (light bulb factory of the old Auer-Gesellschaft)
Works S (light bulb factory of S&H AG)
Works A (light bulb factory of AEG)
Research Company for Electric Tubes
(as the agency for OSRAM research)

Expansion of production
The vertical structure of the company was determined by the take-over, merger and establishment of departments that dealt with the production of semi-finished goods for lamp manufacture, such as glass tubes, glass bulbs, filaments, bases and even paper and packaging.

The horizontal structure came about through the expansion of existing works, by establishing new offices and factories abroad, by taking over existing light bulb factories and finally by acquiring shareholdings.

The manufacture of glass and the supply of coal for electricity and gas under OSRAM control
Large-scale manufacture of light bulbs meant that the production of glass, filaments and machines had to be under the direct control of the company.

The bulb factory of the Vereinigte Lausitzer Glaswerke, VLG, was added to the company's factories as early as 1919. It was known as Works W.

Tschöpelner Werke AG, Neutschöpeln/ Oberlausitz was acquired. This company mined brown coal. The Lausitz glass works was headed by General Director

Glass-blowing for the light bulbs at the glass works was hot and sweaty work.

Vinzenz Krebs, an outstanding specialist in glass production, and his engineering expert Friedrich Weckerle.

The OSRAM glass works built up an excellent reputation in the industry. In 1922, Prof. Georg Gehlhoff took over as head of VLG. In February 1923 he set up a glass technology laboratory to improve glass production to meet the increasing requirements that technical advances were placing on this material that was so important to the manufacture of light bulbs.

The acquisition of the licence to use the Danner tube drawing patents in 1922 enabled glass tubes and glass rods for manufacturing light bulbs to be machine fabricated. Compared with the manual method, this not only reduced production costs it also significantly improved the quality.

The first automatic tube drawing machine was put into operation in the spring of 1923, and the second soon followed. the works were continually expanded with new furnaces and machinery. Annual production in Weisswasser was around 100 million bulbs and 1,000 tonnes of glass tubes. At times there were more than 2,000 people working there.

The machine glass works in Siemensstadt
The capacity for bulb production in Weisswasser was limited. There were simply not enough glass blowers. OSRAM also wanted to relocate the important prematerials sector of bulb production closer to the Berlin lamp works.

After the licence for the Westlake patents was acquired a machine glass works was built in Siemensstadt in 1926/27. Production started in January 1927. This fully automatic plant for mass producing light bulbs was the first of this type on the continent and was continually expanded over the following years.

Attached to the machine glass works was a large well equipped glass technology laboratory where research was carried out with the aim of improving the quality of the glass.

Rationalisation brings mass production
As soon as the powerful Ivanhoe bulb blowing machines were available the glass works were equipped with them. With the launch of the frosted bulb in 1929 the glass works had new tasks to perform. Two linear tractor machines were set up to rationalise the frosting process.

The high-pressure mercury lamp was introduced in the early 1930s. Now quartz tubes were needed in large quantities. As the usual method of manual production was too imprecise and too expensive, a great deal of time and effort went into developing a quartz tube drawing machine at the glass works. This machine enabled quartz tubes to be produced automatically in sufficient quantity and excellent quality.

Base soldering was particularly labour-intensive.

The manufacture of bases for light bulbs
Before the merger, the bases needed for the lamps were largely obtained from outside suppliers. Only Works A, the former AEG factory, had been involved right from the start with the mass production of bases. The entire base production capacity was now concentrated in this factory and steadily expanded.

When Works B was constructed in 1937 in Berlin-Wedding on the site of the former Bergmann electricity works, base manufacture was moved here. The factory was equipped with the latest high-performance machines.

The cardboard factory
OSRAM wanted to make itself independent of outside suppliers in the production of packaging. In 1930 the manufacture of packaging material was concentrated in Works S. The entire demand for cardboard, boxes and paper-based reflectors was covered.

Combining departments for the manufacture of filaments the wire works was set up in Works D as a result of the merging in 1924/25 of all the departments in the main works that were involved in the manufacture of wire.

Efforts were then made in cooperation with the research department to improve the quality of the wire. Engineers succeeded in gaining greater and greater control over the structure of tungsten wire and the structural changes that occur in the wire during the production process and during operation of the lamp. The development path led from thorated tungsten wire (i.e. combined with thorium) to special crystal wire. This is heated tungsten wire (in filament form) that forms small crystals at a temperature of 1,200 to 2,000 degrees Celsius.

Testing the lamps before they are shipped from the factory has always been important. At the start of the 1920s this was an extremely time-consuming manual task.

OSRAM fabricated the different types of wire required for the manufacture of lamps and radio tubes so economically and in such large quantities that OSRAM wire goods became a considerable sales success. Many light bulb and radio tube manufacturers in Germany and abroad placed orders for OSRAM wire.

Research and development

Right from the start, the founding companies saw research and development as the key to safeguarding the long-term future of the light bulb industry. All three companies had R&D facilities in addition to the factories.

The Auer-Gesellschaft went even further. To enable the researchers to work undisturbed the company established laboratories that were both physically and organisationally separate from the factory. In 1916 it founded the Studiengesellschaft für elektrische Leuchtröhren mbH with the aim of conducting research into the application of light produced by gas discharge. Even then the company had rightly identified that gas discharge was a means of producing light with high luminous efficacy.

Manual dexterity and incredible accuracy were needed to produce diamond nozzles for the tungsten wire drawing process.

The expression “gas discharge” comes from the discovery that electric current can flow not only through a metal but also, under certain conditions, through a gas such as air.

The discovery was made as long ago as 1600 by William Gilbert, physician to Queen Elisabeth I. He noticed that an electrically charged capacitor was “discharged” when it was placed in the vicinity of a flame.

In the first fluorescent tubes, electric current was conducted by molecule gases, mainly nitrogen or carbon dioxide. This was not particularly economical but it was pretty and decorative. The large number of possible gases and metal vapours gave researchers great hope that some at least could be used for producing light, and indeed many were used in actual applications.

The task of the Studiengesellschaft was therefore to promote the development of the light bulb and to continue work on producing light from gas discharges.

Pioneering work extends to fringe areas

The Studiengesellschaft achieved notable successes not only in the field of lamp technology but also in various other areas not directly connected with lighting. In 1923, for example, scientists at OSRAM discovered a special hard metal as part of their search for a material that was less expensive than diamonds for drawing the extremely hard tungsten.

Manufactured under the later name of “Widia” (a contraction from the German for “like diamond”) by Krupp as the licensee, it was used with great success throughout the world. The invention of limiting semiconductor resistors, marketed under the name of “Urdox”, is also a result of research work at OSRAM.

1937 saw the invention of an automatic machine for drawing large quantities of high-quality quartz tubes needed for high-pressure mercury lamps. OSRAM also

developed a number of completely new processes in the field of analytical chemistry.

The development department
In 1926 the Factory Experimentation Department (FVA) was set up in Works D. Its job was to conduct experiments in machine development. This department was later greatly expanded, ultimately being renamed the development department. The department was responsible for a physics laboratory, the machine works with its large design office, the experimental lamp factory and a training facility. Here too, this was a merger of the previously separate departments in the different factories for designing and developing new machines and models.

This department essentially handled the development of new fabrication methods, the design and construction of new machines, the development of new lamp types and testing of the company's own lamps and the lamps of other companies. The numerous and extensive patents that OSRAM possessed with regard to light bulb manufacturing machinery, the improvement of bulb blowing machines and the Danner tube drawing machines, testify to the considerable achievements of this department.

Tested brand quality
Right from the start, the manufacture of lamps at OSRAM has been subject to strict quality controls. From 1922 onwards, random samples of lamps have been taken from all the works and subjected to testing. From 1925, an independent central testing department in Works S was set up. This was responsible for testing the lamps manufactured in OSRAM factories in Germany and abroad. Apart from testing OSRAM's own lamps it also tested lamps from other manufacturers for comparison purposes.

The quality of the lamps was determined by photometric measurements carried out at the start of operation and during operation. Constant reporting by the lamp testing centre provided important information on the quality of OSRAM products and made an essential contribution to improving the quality.

The sales organisation in Germany
One of the purposes of merging the three companies was to create a unified sales organisation for OSRAM products. A decentralised sales organisation was set up. Branch offices were established in Frankfurt, Leipzig, Dresden, Stuttgart, Stettin, Cologne, Breslau, Munich, Essen, Magdeburg, Mannheim, Berlin, Hamburg, Königsberg, Hanover and Nuremberg.

The thinking behind the decision to conduct sales through these branch offices was that this would establish good close contact with customers. It would also be possible to identify fluctuations in demand more quickly, and a high level of customer support would boost confidence in the company.

Sales companies abroad
In the 1920s, sales support centres were founded in the form of companies, in some cases with the aid of foreign capital. Offices were set up in Zurich, Vienna, Oslo, Copenhagen, Milan, Stockholm, Bucharest, Helsingfors, Amsterdam, Riga, Shanghai, Brussels, London and Rio de Janeiro. Together with other manufacturer, sales companies were established in Argentina and Mexico.

International activities
In the early years after the merger OSRAM succeeded in founding new subsidiaries abroad and acquiring companies and shareholdings.

Associated companies in Germany and abroad
The following associated companies existed at the time of the merger or were either established or acquired in subsequent years:

OSRAM Fábrica de Lámparas, Madrid 1914;
Nordisk Glødelampe Industrie AS, Copenhagen since 1915;
Radium Elektrizitätsgesellschaft mbH, Wipperfürth, since 1917;
Wolfram Lampen Aktiengesellschaft, Augsburg, since 1918;
OSRAM Aktiengesellschaft, Prague, since 1920;
Drammens Lampenfabrik AS, Drammen, since 1920;
Glühlampenwerk Aarau AG in Aarau, since 1924;
Licht AG, Vereinigte Glühlampenwerke, Goldau, since 1924;
Vertex Elektrowerke Ges.m.b.H., since 1921;
or OSRAM Österreichische Glühlampenfabrik GmbH Vienna, since 1931;
Polska Zaroska OSRAM Sp. Akc., Warsaw, since 1922;
Aktiengesellschaft für Elektrizitäts-Industrie Hamburg (Agelindus) for light bulb leasing and illuminated advertising, since 1922; or Agelindus AG, since 1931; the illuminated advertising business was transferred in 1931 to the newly founded OSRAM-Philips Neon AG (Ophinag);
OSRAM Argentina S.A.C.I., Buenos Aires, since 1935;
OSRAM Griechische Glühlampenfabrik AG, Athens, since 1938;
Glühlampenfabrik Winterthur AG, since 1939.

The policy of being represented by associated companies abroad grew from the realisation that in the aftermath of the first world war there was a trend in most countries towards “national industries” with trademark rights being granted by way of protection. Exports of OSRAM products, however, were seriously hindered by import restrictions and customs difficulties. Owning factories and offices abroad therefore was the best way to ensure that the OSRAM brand was given due prominence.

Standardisation

Right from the start it was clear that the light bulb would not remain the only source or electric light. There were so many areas of application to be served by new types of lamp. There was also much research needed to identify different ways of generating light and providing illumination. The most important task was to standardise the products. Quality specifications were drafted with the aim of achieving optimum quality at economical cost. By focusing on a restricted number of lamp types it was possible to manufacture each type in large quantities on high-performance machines.

The standard light bulb series

In 1923, some years before America, the company had the idea of introducing a “standard series” so that the demand for modern lighting could be met by as few types as possible. A series of six lamps was developed with graded luminous intensities. The standard series was re-graded by wattage as part of an international agreement.

The launch of the fully rounded light bulb on April 1, 1924 coincided with the decision to use this now familiar bulb shape for all OSRAM lamps. Now the lamp types had the same size for all the usual voltages. Even the internal design of the lamps differed very little for the various voltages.

The world light bulb agreement (Phoebus agreement)

Soon after OSRAM was founded its chairman, Dr. William Meinhardt, made it his mission not only to unite the German light bulb industry but also to achieve international cooperation among similar companies. His aim was to build bridges and make connections to bring the world’s leading companies closer together. The conditions for

such a move were favourable. Preparatory negotiations lasted many years until finally in 1924 Dr. Meinhardt's initiative bore fruit in the form of the "General Patent and Development Agreement". A company called Phoebus S.A. was founded under Swiss law. Its highest decision-making body was the general assembly. The chairman of the administrative board (supervisory board) was Dr. Meinhardt.

This "world light bulb agreement" was on e of the most far-reaching international agreements. It included the most prominent manufacturing companies in the world, with the exception of those in the USA and Canada (through with their agreement) as direct members.

Representing Europe were OSRAM from Germany, Philips from Holland, G.E.C. from the UK, the Compagnie des Lampes from France, Kremenezky from Austria, Tungsram from Hungary, the Società Edison Clerici from Italy and companies from Spain. Swedish and Swiss companies provided a representative together with medium-size German light bulb manufacturers. The initial agreement was set to run for ten years but it was extended in view of its success. It was nullified in 1940 because of the war.

To maintain the effectiveness of the agreement it was necessary to set up a streamlined organisation. The arrangements were generously adapted to suit the purpose of the agreement.

Paragraph 1 of the world light bulb agreement:
"The purpose and intent of this agreement is to secure the cooperation of all the parties to the agreement, to ensure that their production capacities for manufacturing lamps are properly exploited, to safeguard and maintain a uniformly high quality standard, to improve profitability in the distribution of sales, to increase the effectiveness of electric lighting and to increase the use of electric light for the benefit of users."

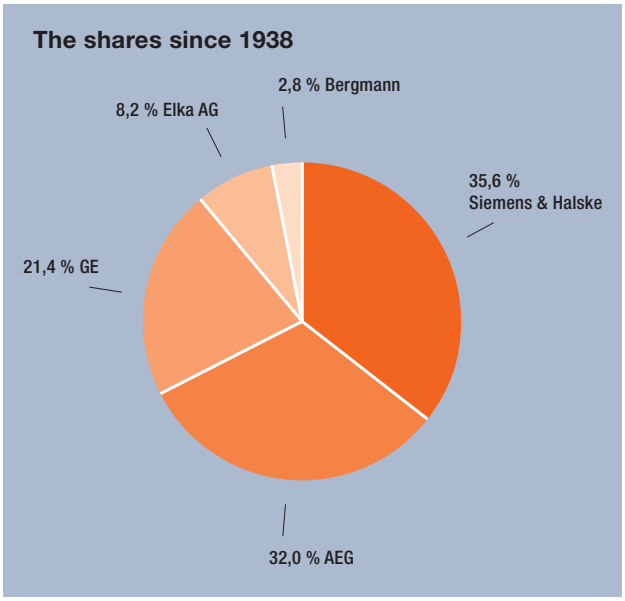
The agreement related to all electric light bulbs used for illumination, heating or medical purposes. Arc lamps, neon lamps, x-ray lamps and radio tubes were excluded. If, during the course of the agreement, new light sources of general importance were developed they could be included in the agreement. This applied later to fluorescent lamps.

Compliance with the declared purpose of the agreement was achieved by means of a far-reaching patent and know-how exchange arrangements, typing and standardisation of the lamps, safeguarding of market shares for each member, reporting of all sales to the administration company and auditing of these sales, strict quality checks at a central testing laboratory set up precisely for this purpose, agreement on the terms and conditions of contracts and education of consumers in the economical use of light.

Changes in shareholdings from 1929 to 1938
On June 30 ,1929, International General Electric (GE), USA, became a shareholder of OSRAM G.m.b.H. KG. It took over a 16% share from AEG. The shares in OSRAM G.m.b.H. KG were two sixths each for AEG and Siemens and one sixth each for GE and the Koppel Group, the legal successor of the DGA (Auer-Gesellschaft).

After the death of the Jewish banker Leopold Koppel in 1933 his shares passed to his son Albert Leopold Koppel and his two daughters Else and Gertrude Klotz. The daughters moved to Switzerland on the death of their father.

In 1938 the 16% share was sold for 30 million Reichsmarks to the Elektrische Licht und Kraftanlagen AG, in which Siemens was a shareholder. The American GE agreed to the transaction because the other OSRAM shareholders were participating in the sale by increasing their shares. The shares went 50% to the Elektrische Licht-und Kraftanlagen AG and 50% to the previous shareholders, which also include Bergmann AG.



The sale of the Koppel shares, meant that the Koppel Group, which in 1919 had brought the OSRAM works of the DGA (Auer-Gesellschaft) and the OSRAM brand into the company and had founded the OSRAM company, was no longer a shareholder.

William Meinhardt, the architect of the founding of OSRAM, had had to leave the managing board of OSRAM G.m.b.H. KG together with other Jewish board members in 1933 under pressure from the National Socialists. He emigrated in 1933 to England.

Innovations up to the second world war

The light bulb was improved by filler gases and the development of coiled-coil filaments. The original single-coil wire was now coiled again. This means that the filament system inside the lamp was miniaturised. The luminous efficacy of the lamp was increased. These improvements and the launch of the coiled-coil lamp at the start of 1934 more or less signalled the end of product developments in the ordinary light bulb.

VITALUX® lamps were highly versatile – which is reflected in the variety of subject matter in the advertisements.

BILUX® dual-filament headlight lamps
Experiments were conducted in cooperation with Bosch for developing and using automotive lamps. In 1925 this work resulted in the launch of the first BILUX® lamp. This was followed by the automotive spotlight lamp (12 V, 25 W) with coiled-coil filament.

Lamps for photographic, cinematic and therapeutic purposes
1927 saw development work completed on the cinema lamp with built-in reflector, the NITRAPHOT® lamp and the VITALUX® lamp with its UV-transparent glass bulb with mercury burner.

Linestra – the incandescent lamp in tubular form
The LINESTRA® lamp was launched in 1932 and soon became popular for its warm friendly light.

Mechanisation of lamp production
From the start of the 1920s more intensive efforts were made to mechanise lamp production. Up to then, the individual components of light bulbs had mostly been made by hand in large factories, with all the problems of internal logistics between the various rooms.

Gas discharge lamps – the third stage of innovation
At the same time, preparations were being made for the next major innovation, the gas discharge lamp. Its development history in fact goes back right to the start of the 20th century when the first high-pressure quartz burner and gas discharge advertising tubes. These were mostly low-pressure inert gas discharges in tubes filled with neon, for example, an inert gas that produces a red light under discharge conditions.

The terms ”neon lamp” and “neon light” for fluorescent lamps harks back to these origins. Gas discharge lamps of this type could not be connected to the mains supply however. A device that limited the current needed to be connected between the mains supply and the lamp. The aim was to adapt these light sources to suit the prevailing power supply conditions and the lighting requirements. This development work was undertaken by the Studiengesellschaft für Elektrische Beleuchtung.

Research into gas discharge lamp intensified during the 1920s. Advertising tubes and arc discharges forms the starting point for new light sources.

A major break-through came with the use of oxide electrodes that enabled discharge lamps to be operated without high voltages. In 1930 the first reports appeared on the pioneering results achieved in the OSRAM laboratories under the direction of Professor Pirani, such as the first high-pressure mercury discharge lamps and low-pressure sodium lamps which managed to produce luminous efficacy values of 50 to 70 lm/W, much higher than the values attained by the best incandescent lamps. Economically viable light sources had been found but the quality of their light was not yet satisfactory.

As far as high-pressure mercury discharge was concerned the quartz tube drawing process invented by OSRAM in 1937 was of major significance. It was later taken up by all competitors and ranks as one of the most important innovations in the field of lamp materials.

At the same time, work was also being carried out on low-pressure mercury discharges and phosphors, so that by the start of the 1930s the time was right for the third innovation in the form of fluorescent lamps, with the intense involvement of OSRAM.

The war and its aftermath interrupted this work for a long time. It was not until the second half of the 1940s that work on these lamps was started again. Like carbon filament lamps and later tungsten lamps, the fluorescent lamp soon dominated the lighting sector.

It is worth noting however that even today the fluorescent lamp has not succeeded in ousting the incandescent lamp altogether. The incandescent lamp continues to dominate the private household market. During the war and particularly afterwards, the OSRAM laboratories continued to work intensively on high-pressure discharge lamps, underlining OSRAM's leading position on the world market.

The halogen cycle heralds a further round of innovation

Even the incandescent lamp still had considerable potential for further innovation. This was evident when at the end of the 1950s General Electric succeeded in producing a halogen cycle. Once again, an innovative product followed a technological breakthrough.

There is an OSRAM patent application from 1925 that proposes using volatile halogen compounds in incandescent lamps. However at the time this invention could not be implemented. A marketable product came much later.

Lamps for cinema and aviation

In 1928 the 10,000 W lamp was launched. The inspiration came from filming for the cinema and from aviation. 1928 also witnessed the launch of the point-source lamp. Two years later came the 50,000 W lamp. The high-pressure mercury lamp and the sodium lamp were also added to the production programme – yet another major step forwards. In August 1930, Ehrenbergstrasse in Berlin was the first street to have sodium lamps.

The first fluorescent lamp unveiled in 1937

It is difficult to pinpoint the date when the fluorescent lamp was invented. The idea for the lamp goes as far back as 1867 when the Frenchman A. E. Becquerel described the principle of the fluorescent lamp. In 1927 the German engineers Friedrich Mayer, Hans Spanner and Edmund Germer described a low-voltage fluorescent lamp in a patent application. At this time OSRAM was also experimenting with these lamps, but initially they were intended only for advertising purposes.

From a very early stage, lamps for cinemas were an important part of the product range.

The first generation of electric Christmas tree lights – as atmospheric and pretty then as they are today.

Different phosphors were used to create different colour effects. At the World Fair in Paris in 1937, OSRAM was the first company to present high-voltage fluorescent tubes, known as “SUPERLUX” tubes, and was awarded a Gold Medal for them.

One year later, on April 1, 1938, the first fluorescent lamps in the form that we know today were demonstrated at the World Fairs in New York and San Francisco by General Electric (GE). This day is generally taken to be the birthday of the fluorescent lamp.

They were marketed by OSRAM in small numbers in 1940, but generally for illuminating subterranean munitions factories. It was not until after the war that product, process and machine development resumed. OSRAM’s first fluorescent lamp factory was built in Augsburg in 1960. Production began in August 1961.

Consumer information right from the start
The OSRAM “light house”, a fascinating art nouveau building opened on the Warsaw Bridge on January 19, 1925, became a landmark in east Berlin. It was dedicated to educating consumers about the possibilities of electric light and demonstrating technical achievements in the field of lighting. It soon gained an international reputation.

The present-day OSRAM light studios, which have been set up in all OSRAM subsidiaries, both national and international, are very much in this tradition. They provide all users, both commercial and private, with information on the latest innovative products and on the efficiency and effectiveness of the various light sources.

The brand and advertising, 1919–1937
The newspapers and journals of the 1920s and 1930s show a wide variety of advertisements and the juxtaposition of the word and picture logos. In 1920, OSRAM advertised in Velhagen & Klasing’s monthly journals with a picture of a light bulb but without the OSRAM oval and with the separate profile of the gas-filled OSRAM AZO lamp. The OSRAM lettering had obviously not yet been defined.

“Better light with OSRAM lamps” was the slogan used for advertising campaigns in 1915 and 1925. These campaigns used aesthetic motifs to advertising good light and good performance at work, the right shop window lighting, comfortable light in living rooms and greater safety with good lighting at the workplace. The BILUX® dual-filament lamp developed in 1925 provided both high beam and dipped beam.

The picture of an open-top sports car with bright headlights was used in 1929 to advertise OSRAM BILUX® lamps. The BILUX® lamp made OSRAM a world famous brand on the automotive lighting market. In the mid 1930s, with the development of the coiled-coil filament OSRAM managed to achieve a significant increase in the amount of light produced by a light bulb. The product was called the OSRAM D lamp. The slogan on

BILUX® dual-filament headlight lamps have been around since 1925. They provide high beam and dipped beam from a single light source.

a poster of the time translates as: “Inexpensive light – OSRAM-D.”

The in-house journal “OSRAM-Nachrichten” reported in 1937 on the “eye trademark” which was being publicised in a major advertising campaign. The eye trademark shows a pupil encircled by the slogan “Your eyes also need better light”. Occasionally the pupil was replaced by the OSRAM picture logo. The advertising campaign appeared in 28 languages. OSRAM advertisements in around 1000 newspapers showed the eye trademark, reaching millions of potential customers. Retailers were offered appropriate advertising material.

The OSRAM advertising campaign of 1937/38 focused on improvements in workplace lighting. Information to retailers read as follows: “The focus in the coming months will be the campaign by the “Beauty of Work” office, namely Good Light – Good Work, which we shall be supporting with extensive advertising measures to the best of our ability with the slogan ‘Your eyes also need better light’.”

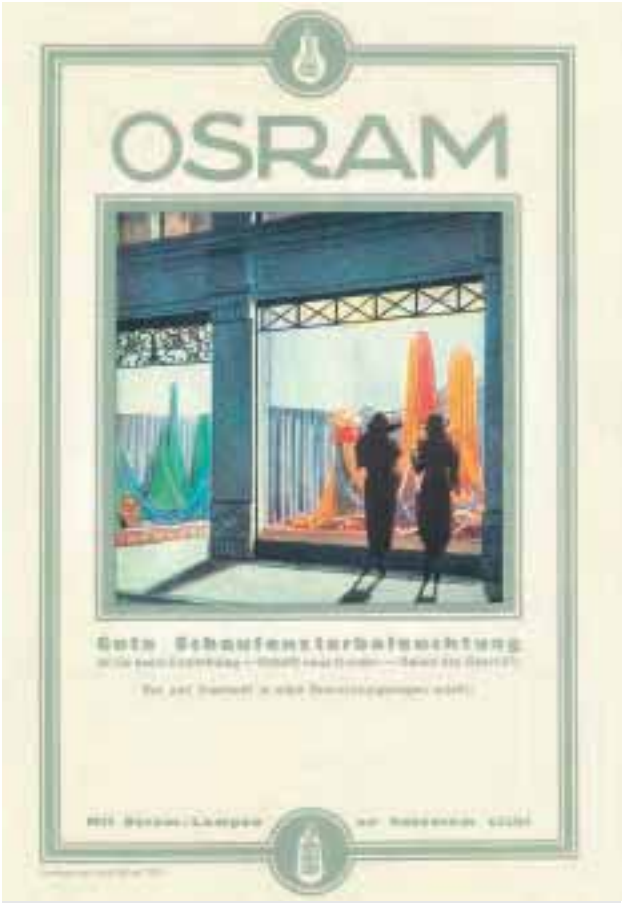
The campaign therefore had advertising and educational functions. It gave information on the history of electric light and encouraged retailers to go to Berlin for training in the OSRAM “light house”. The OSRAM lighting catalogue was issued to local energy companies and retailers as an advertising brochure. It addressed end consumers, providing examples of good lighting in the home. With its VITALUX® lamp, OSRAM promised healthy light for all the family and therefore targeted health-conscious customers.

OSRAM in the second world war

The second world war began with the invasion of Poland by German troops on September 1, 1939. To organise the lamp market during the war, the Ministry of Economic Affairs in the Third Reich founded the “Electric Lamp Community” in 1942 comprising all the lamp manufacturers and wholesalers. The Community issued market regulations. The number of lamp types was reduced. During this time, OSRAM was also manufacturing black-out lamps.

The Electric Lamp Community safeguards supply

The outbreak of the second world war effectively brought an end to the Phoebus cartel. In its place came the Electric Lamp Community. The new cartel was created in 1942 to organise the market for Germany and its allies.



OSRAM advertising for shop window lighting, 1925: even then, OSRAM lamps were displaying merchandise in a better light.

The chairman was Dr. Heinrich Freiberger. The Community brought together all the lamp manufacturers and wholesalers, and issued market regulations.

In cooperation with the various technical committees and groupings set up as a result of the war, the number of different types of lamp was drastically reduced.

This led to more economical operation and better use of materials. The result was that throughout the entire war there was no need to ration light bulbs. OSRAM played a leading role in the various committees of the Electric Lamp Community.

Export business during the war
Even during the war, OSRAM managed to continue exporting its products. Products were shipped overseas for as long as that was possible. OSRAM lamps were still being exported to Brazil in 1941. Later in the war, overseas customers were supplied from factories in Italy. Russia was supplied by OSRAM via Iran until war was declared. Syria was supplied right up until its was occupied by Allied forces. These are just some of the many examples.

Sales offices bombed out – but OSRAM still gets supplies through
The decentralised sales organisation had been a tremendous success in the years leading up to the war. The events of the war, in particular the lack of manpower, forced OSRAM to make changes in its sales arrangements. All the administrative tasks for warehousing and dispatch were centralised in Berlin. As the air raids got worse the central stores had to be moved out of Berlin to Altheide, Euskirchen and later Heidenheim. In 1943, the branch offices in Hamburg and Hanover were destroyed. In 1945, those in Munich, Dresden, Nuremberg and Mannheim were bombed. Offices in Stettin, Königsberg, Essen, Frankfurt and Cologne also suffered serious damage.

Employment of forced labour
In common with almost all German companies, OSRAM made use of forced labour during the second world war. For humanitarian reason a fund was set up in May 1999 for former workers of OSRAM KG who had been recruited for forced labour. As part of the Siemens Group, OSRAM is also involved in the “Remembrance, Responsibility and Future” foundation set up to help these workers.

Relocating eastwards
From 1942 onwards it was necessary to relocate machinery and parts of production:

Relocations due to the war

Ohlau: Parts of pygmy and automotive lamps
Brieg an der Oder: : Large sections of pygmy lamp production
Nieder- und Oberoderwitz: Parts of tungsten and molybdenum manufacture, the research institute, the experimental factory and automatic quartz tube production
Dresden, Felsenkeller: Parts of the Berlin tungsten and molybdenum manufacturing capacity
Graslitz: Half of the Berlin Photometric Laboratory, a fabrication facility of the research institute and part of the mechanical engineering workshop of the experimental factory
Zwickau: Two groups for manufacturing GLS lamps
Plauen: Fabrication of automotive lamps, large Nitra lamps, stabilisers, glow lamps and other special lamps and the tungsten acid and graphite department of the wire works
Treuen, Vogtland: Machines for producing power leads and urdox resistors
Hirschberg: Two Danner lines for manufacturing glass tubes, some small bulb blowing machines and

the only fluorescent lamp group that OSRAM possessed at the time
Soest, Glühlampenfabrik Merkur: light bulb factory: Three groups of GLS lamps
Molsheim, Neolux AG: One light bulb group
Weißwasser: Six light bulb groups

Soon it was clear however that the eastern part of Germany would be lost. Now it was a question of moving all the material back again. As late as March 1945, 120 railway wagons were readied for their journey in Weisswasser. These were to be sent to safety in the west. They never reached their destination. After an exhaustive series of searches after the war at least some of the machinery was found.

The end of the war

The headquarters of the OSRAM company was in Berlin, and that is where some of the factories were also located. Augsburg was another major centre. Repeated air raids had badly damaged the factories in Berlin and Augsburg. Works S in Helmholtzstrasse in Berlin had suffered most damage. Two night-time raids in November 1943 caused so much destruction that production was impaired for along time afterwards.

The Berlin Works B in Wedding and Works D, OSRAM's largest factory on the Warsaw Bridge, had to cut production time and again. The factory in Augsburg shut down almost entirely for several months in 1944 because of bomb damage. Only the basement rooms were fit to continue work.

Constant air raids in the last months of the war caused serious damage to the glass works in Berlin. In the street by street fighting that took place in the final few weeks of the war, however, Works B and the glass works were spared further major damage.

Occupation of Works D

On April 22 and 23, 1945 the Russians occupied Works D. A few days later all the other Berlin works had been occupied. Some time later there was an unexplained fire at Works D that destroyed much of the site including the administrative building. The research institute and the experimental factory were also victims of the fire. Valuable archive material and the OSRAM museum were wiped out.

On July 4 the western powers began to take control of their sectors in Berlin. There was just two months to clear out the West Berlin offices and factories. A 1949 report by the German Statistical Office stated that 90% of all machinery at OSRAM had been dismantled. West Berlin companies were able to get back into production much later than companies in West Germany, which put them at a serious disadvantage on both the domestic and foreign markets.

OSRAM also produced black-out lamps during the war.

OSRAM starts up again

By the end of the 1950s the Federal Republic of Germany had developed into one of the strongest economies in the world. From the mid 1950s purchasing power increased as the cost of living stagnated, which means that people had more disposable income. The German people went on a spending spree, buying everything from furniture to cars, from holidays to electrical goods. The economic wonder was in full swing – and OSRAM was very much part of it.

Reconstruction, expansion and recovery under our own steam

Many companies suffered greatly after the Second World War. But many had it easier than OSRAM. OSRAM had to deal not only with the almost total loss of its production equipment, it suffered the loss of its research and development facilities. To make matters worse, its headquarters had been in Berlin, which was soon to suffer from the blockade.

The slogan "OSRAM – As bright as day" captured the mood of the times. The dark days were behind us. This slogan, which was coined in 1949, increased awareness of the OSRAM brand considerably. It can still be seen in Munich, lighting the skyline at the famous Stachus square.

OSRAM bounces back
The company's losses at the end of the Second World War were considerable: almost total loss of production equipment and research and development facilities, and loss of all property outside Germany. Patent agreements and know-how transfer agreements were null and void. All that was left was a faithful and experienced band of employees.

They numbered just a few hundred in Berlin. They began to salvage what was left in the factories and using some pretty primitive methods, including hand finishing, started manufacturing lamps. They even reconditioned old fluorescent lamps.

The last workday for OSRAM in the Second World War in Berlin was April 21, 1945. The first post-war invoice carries the date July 12, 1945. Social benefits were first paid out on September 13, 1945. By December 31, 1945 OSRAM's workforce had expanded to about 1,000 people.

Reconstruction in the west began in Heidenheim
One of the first shipments of production machinery from Berlin to the west was found, after much searching, on a railway siding in Regensburg. These machines were used to equip the factory in Herbrechtingen and the temporary factory in Neheim.

Glass production was at a very low ebb as the factory in Weisswasser in Lausitz region was no longer available. With the aid of some bulb blowing machines based on MAN designs, the production of glass bulbs started up again in a facility leased from Glaswerke Ruhr-AG in Essen and at the mirror glass works in Mitterteich. Reconstruction of the Berlin glass works began in July 1946.

The town of Heidenheim, where Lamp Warehouse South was located, became the gathering point for employees of the OSRAM companies in the west after the war. A supply of lamps had been shipped there during the war, and this provided the basis for renewed activity. Heidenheim is not far from the Herbrechtingen factory.

Heidenheim becomes the second headquarters
With the insular nature of Berlin causing such problems for OSRAM the executive board decided to make Heidenheim the company's second headquarters after Berlin.

Destruction of OSRAM Works S in Berlin 1945. OSRAM lost almost all its production equipment and research and development facilities in the war.

The Neustadt glass work
For certain lamps, special bulbs were required, blown by mouth by qualified glass blowers. OSRAM had lost this facility together with its factories in the east. On May 25, 1946, a site for this aspect of production was set up in Neustadt/Waldnaab with an initial workforce of 25.

Construction and expansion of factories in Berlin and the west
In the first years after the war OSRAM concentrated on expanding the Berlin works and the factory in Herbrechtingen, and on building the new glass works in Augsburg. Fluorescent lamp production was built up in Berlin, Essen and Mannheim so that production was sited where consumption was at its highest.

The works had to be equipped as quickly as possible with new and improved machinery. Even before the war, OSRAM had developed all its special machines for manufacturing lamps and had built most of them itself. Now a new design office and the company's own machine works were set up in Berlin.

Special machines for fluorescent lamps played an important role in the company's plans. During the war, development of fluorescent lamps was stopped on the orders of the government as it was not considered essential to the war effort. Now OSRAM had much ground to catch up on other lamp manufacturers.

Resumption of research and development
The research laboratories in the 'Studiengesellschaft für elektrische Beleuchtung' (Electrical Lighting Research Institute) were completely dismantled. The large workforce was scattered to all four corners.

OSRAM took up research work again as soon as possible, mainly in the field of solid state physics, gas discharge, metallurgy and the chemistry and technology of glass, in order to create a new platform for develop-

An ordinary light bulb was perfectly adequate for the home – larger sizes were in demand for studio applications, such as the spotlight lamp on the left.

After the war, facilities had to be set up again for blowing special bulbs by mouth. A factory was set up in Neustadt/Waldnaab with an initial workforce of 25.

ment and production, play a full part in lamp manufacture and become legally capable once again of entering into contracts.

The few remaining workers in Berlin began in Works S, as Works D on the Warsaw Bridge had been lost. Small research facilities were set up in West Germany, dotted all round the country – in Arnsburg, Braunschweig, Bargteheide, Ladenburg, Heidelberg, and Moosbach.

As early as 1946, scientists in Berlin were able to resume their work under extremely difficult conditions in very cramped premises. Young scientists were recruited. Stocks of equipment were built up. It was not until 1954 that the small laboratories scattered throughout the Federal Republic of Germany could be amalgamated in the new research building in Augsburg.

Because of the lack of resources and workers, the institute restricted itself initially to specific research designed to catch up with the latest developments that had been interrupted by the war but had continued outside Germany.

This was particularly the case with gas discharge. Ground-breaking research had produced the sodium lamp, the high-pressure mercury lamp, the mixed light lamp and the Ultravitalux lamp.

Now work resumed on the fluorescent lamp and the xenon high-pressure lamp. Within a relatively short time the gap in development work in fluorescent lamps due to the war had been closed. The first fluorescent lamp was manufactured in January 1946.

In October 1949 the one millionth fluorescent lamp left the factory. OSRAM took a leading role in xenon high-pressure lamps, which are used in stage and television lighting, in colour matching, in cinema projection and in the graphic arts.

The patent department
Research and development work was supported by the patent department, which provided a comprehensive overview of the state of the art by processing all the relevant patent documentation. This farsighted work by the previous generation has meant that OSRAM can operate from a secure platform of international trademark rights. OSRAM was able to gain key positions in patent law.

Market competition
It took a great deal of effort to win back the market share that had been lost. Whereas OSRAM was not in a position immediately after the war to supply any products and the various sales offices had nothing to offer except for a few salvaged stocks of lamps, OSRAM's competitors had suffered almost no losses as a result of the war. And on the receptive German market they opened up a new front with factories and distribution centres in West Germany.

With so many different demands confronting the executive board of OSRAM, it was extraordinarily difficult to plan for systematic expansion. All challenges came at the same time and with great urgency. The quality of the lamps and components had to be improved and raised to a high standard. In just a very short time, production lines had to be set up, a competitive sales structure had to be created and an economical administration had to be established.

"OSRAM – As bright as day"
The efforts of the sales department to regain the former position on the market were energetically supported by the new advertising department from 1949 onwards.

It was at this time that the slogan “OSRAM – hell wie der lichte Tag” (OSRAM – As bright as day) was coined. On October 5, 1953 the OSRAM promotional film entitled “OSRAM – hell wie der lichte Tag” was premiered in the headquarters in Berlin.

The slogan struck a chord with the German public as it encapsulated the situation at the time in Germany. Everyone was pulling together for a better life after the dark days when the economy collapsed. The bright light of freedom promised a new start. Houses, streets and shops gradually became bright again. The slogan “OSRAM – As bright as day” increased awareness of the OSRAM brand considerably.

Exports

The export market had changed considerably during the war and in the years afterwards. Demand for electric lamps had grown enormously. Production had to keep up. National production facilities had been established in many countries so that these countries could satisfy their demand from their own manufacturing base, or at least attempt to do so. Domestic production was protected by high tariffs. Strict import laws and lack of foreign currency proved a particular hindrance to activity abroad.

What hit OSRAM especially hard was the loss of its foreign subsidiaries because this removed its support for exports. Nevertheless by 1947 OSRAM had managed to obtain orders from England, France, Holland, Norway, Sweden and Switzerland.

2500 types of lamp by 1952

When production started up again in 1945, there were 25 types of lamps being produced. By 1952, after the introduction of special lamps, gas discharge lamps and krypton lamps, there were 2500 models in the company’s portfolio. That number grew further in the following years until for economic reasons standard production models were systematically reduced.

The 1948 Berlin blockade

Industry in Berlin barely got back on its feet when Berlin was suddenly blockaded by the Soviet army of occupation. Industry, which had just begun to repair the damage that bombing and looting had left behind, was suddenly cut off from supplies of energy and raw materials.

The situation was particularly serious as Berlin possessed no raw materials or energy sources of its own. It had stockpiles of food that would last 36 days and coal that would last 45 days.

On June 26, 1948, the Americans began the largest airborne shipment of supplies in history. It was to become known as the „airlift“ and was a joint undertaking of the three western occupying forces. From Frankfurt, along the only open air corridor, all the essentials for day-to-day living – food and clothing, raw materials and even machinery – were flown into Berlin.

At the height of the airlift, there were as many as 1200 flights into Berlin every day. A plane took off or landed every 90 seconds. Up to 13,000 tonnes of material were flown in daily. No city had ever been supplied from the air for more than a few days. The Allies kept the air corridor open for a full year.

It is hard to believe how expensive the undertaking was. Every tonne of coal, which sold for $21, cost $150 to transport. The cost of the raw materials alone to maintain production of essential goods was phenomenal?

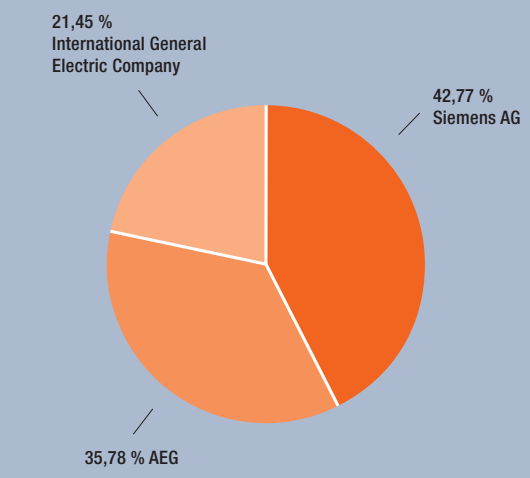
For OSRAM, which had suffered such severe damage in the war, the Berlin blockade threatened its very existence. Although production continued under indescribably difficult circumstances and the company succeeded in sending its products by air West Germany, once again it was put at a competitive disadvantage.

In 1949 the company headquarters were registered in the western sector of Berlin. Since it was first established OSRAM had had its headquarters in the eastern part of the city. With Berlin now divided, the administration set up in Works S. The initial workforce there numbered 36.

A new legal business form

Since 1954 OSRAM has had a second headquarters in Munich. To avoid legal and fiscal complications, the OSRAM GmbH Kommanditgesellschaft was converted into a GmbH (limited liability company) on July 1, 1956. Its official name was now "OSRAM GmbH Berlin/Munich". The Heidenheim location was closed.

Shares since 1956



The OSRAM brand after the war

The significance of the brand for the company's reconstruction is highlighted in the brochure entitled "OSRAM 1945–1955 10 years of reconstruction and expansion":

"Of great significance to the revival of the company after 1945 was the proud tradition associated with the name of the company and with the trademark OSRAM that has remained the same for almost half a century. Apart of the commitment, motivation and experience of our workforce, the name of OSRAM was almost the only asset that survived the destruction. As a notional value it was not to be found in any balance sheet and could not be expressed in monetary terms but it was a valuable basis for trust and therefore an extraordinarily powerful tool in the company's recovery.

The OSRAM brand was the symbol under which our employees banded together in hope and trust as the situation became almost hopeless and the Berlin electrical industry seemed destined to failure. Our reputation produced the necessary response among suppliers and customers in Germany and abroad, and later when the company was in a position to think beyond Germany's borders it made it easier for us to gain a foothold on the world market and gradually regain our former prominent position."

And further on it reads: "In conclusion we can say that the good reputation that OSRAM Berlin enjoyed throughout the world before the war was instrumental in making it easier for the company to build up its foreign business again because thee was a basis of trust right from the start."

Packaging as an advertising medium
One of the most important advertising media was and still is the product packaging itself. OSRAM has had its own cardboard factory since 1930. In the brochure entitled “Essential information on a world brand” from 1954 there was an entire chapter devoted to the question “Why we are retaining our packaging”.

Since the OSRAM factories were first established after the first world war all OSRAM products have been marketed in the same familiar packaging: a white cardboard box with an orange oval, orange stripes and blue lettering for the brand name.

Over time, retailers and consumers came to associate the external appearance of our packaging automatically with the high quality of its contents. Our characteristic packaging therefore greatly helped OSRAM lamps become synonymous with quality throughout the world.

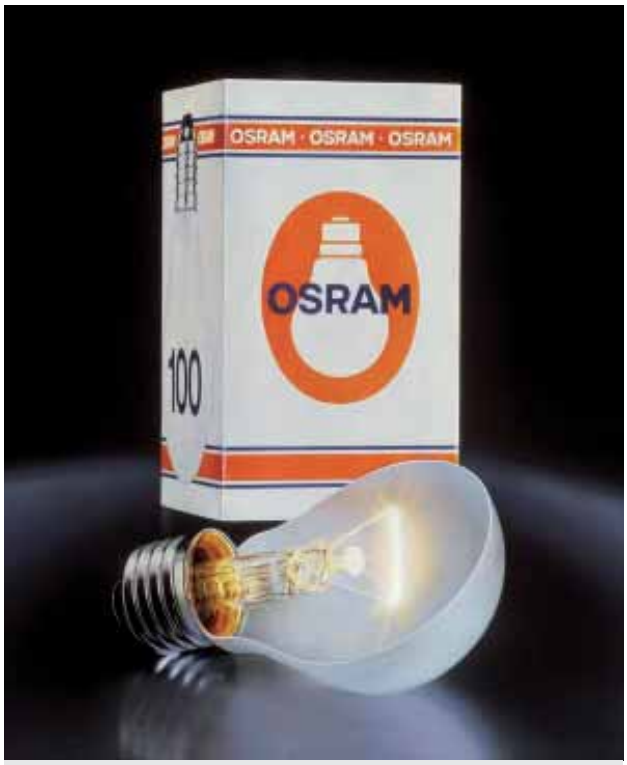
Even in those countries in which the OSRAM name was confiscated as a consequence of the war and we had to use secondary brand names such as OSA, NERON and WOTAN, the unmistakeable look of the packaging was a clear indication of the high quality of the light sources.

Instant recognition of the OSRAM packaging by retailers and consumers, the clear distinction from packaging of other lamp manufacturers and the emphasis on the concept of “light” through the sparing use of colour and a light-coloured cardboard box were the reasons why OSRAM was reluctant to make any major changes to its packaging. It is an expression of our objective to supply the best quality.

Resumption of international relations
Ever since it was founded, OSRAM has belonged to international scientific bodies such as the Commission International de l‘Eclairage (CIE), which was established in 1913 in Berlin, and the International Electricity Commission (IEC). In view of its scientific and engineering achievements it has always a voice that demanded to be heard. These worldwide contacts were valuable for research and development at OSRAM, as was the exchange of ideas with universities and lighting institutes in Germany.

The scientist, Dr. Alfred Meyer, devoted himself during his tenure as chairman of OSRAM shortly after the second world war to restoring the broken relationships with international scientific bodies.

Regaining the foreign subsidiaries
Regaining OSRAM’s foreign subsidiaries proved to be



The recognition value of the brand and the packaging from 1954 is still appreciated today. The orange band and the oval picture logo continue to be the dominant design elements.

very difficult. Long and intense negotiations were necessary. The managing board, under Dr. Heinrich Freiberger, needed a lot of patience and diplomacy to achieve their objectives.

As part of the return of German property from 1952 to 1955, shareholdings in the production company in Winterthur, Switzerland and the sales company in Zurich were regained. In France, the particularly important support centre in Molsheim, Alsace was acquired. OSRAM also managed to acquire the Fanal lamp factory in Brussels.

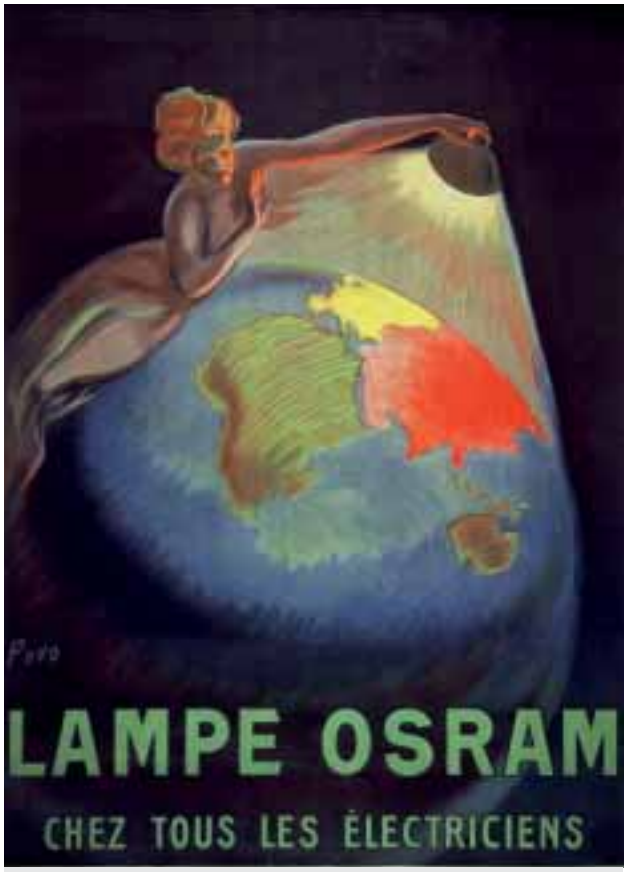
Long and hard negotiations were needed for OSRAM to regain its name and trademark rights in France that had been lost in the first world war. It was not until 1962 that it succeeded in doing so. In 1955 the earlier shareholding in the Greek lamp factory in Athens was recovered.

Relations with Italy had not totally broken down. There was an invention and know-how exchange agreement with OSRAM Edison Clerici.

Even during the war, Dr. Aldo Busch, a leading entrepreneur in the Italian lamp industry, had proved to be helpful at an international level. His efforts to promote German-Italian cooperation in the lighting industry found expression in OSRAM Societa Riunite, Milan taking a shareholding in Lampade Elettriche Radio S.p.A., Turin in 1958. On the occasion of the merger Dr. Busch was made chairman of both companies.

OSRAM had been selling lamps in Sweden since 1921 with the slogan “OSRAM det lysande världsmärket”. It was not until 1958 that OSRAM regained its shareholding in Stockholm. The oldest and most traditional associated company, OSRAM Fábrica de Lámparas Madrid, which was established in 1914, was not regained until 1961. In the same year OSRAM also acquired Enae of Lisbon. The shareholding in OSRAM AS Copenhagen, which was taken up in 1962, was converted into a majority shareholding in 1967.

Outside Europe, OSRAM lost its shareholdings in Mexico, Chile, China and Argentina as a result of the second world war. In South America, OSRAM’s first opportunity to become active again was in Brazil. OSRAM do Brasil was set up in São Paulo in 1955. Initially, production was resumed in temporary factory premises. In 1961/62, production moved to an impressive new purpose-built factory.



OSRAM did not regain its name and trademark rights in France that had been lost in the first world war until 1962.

Erich Rösler, then managing director of OSRAM Argentina, remembers how difficult it was to reacquire the company: "The factory was confiscated. Cut off from the homeland, we had nothing." After 1946, he was able to work on a small scale as a general agent for Argentina and Uruguay.

Erich Rösler was not averse to delivering products for his customers on his bicycle. In this way he was able to maintain valuable contacts. Slowly but surely he built up the Argentinian support centre again. Finally, in the autumn of 1958, the managing board was able to buy back the former OSRAM works. Erich Rösler became the first post-war managing director.

In 1967 a number of associated companies were set up. These were OSRAM Centroamericana S.A. in San Salvador, Neron Lamps London, OY OSRAM AB Helsinki and Compañía Eléctrica Mexicana A.A. de C.V. in Naucalpan. The machinery in most of the factories outside Germany had not been added to or modernised during the war. There was no capital for investment. In many cases OSRAM had to invest great large of money right away to equip these companies to face growing competition.

Expansion of production in West Germany, 1951–1967
With Berlin little more than an island, the managing board was forced to expand the factories and offices in the Federal Republic of Germany. In 1951 the assets of Wolfram Lampen AG were taken over as Works A in Augsburg.

The works in Augsburg and Herbrechtingen were rapidly expanded. Works A had a workforce of 960 producing general lighting service (GLS) lamps up to 100 W and Vacublitz lamps.

At the Herbrechtingen works, 1620 employees produced special lamps, particularly miniature and pygmy lamps. 510 workers at the Augsburg glass works produced normal glass bulbs and special hand-blown glass bulbs and also applied the internal coatings on the bulbs.

Also in Augsburg was a fluorescent lamp works with state-of-the-art production lines and double-coating equipment. In 1965, the first mechanised production line for fluorescent 40/65 W fluorescent lamps was put into operation. It had a rated output of 1500 lamps per hour.

The fluorescent lamp works employed 390 people. A department for designing and developing machinery was set up in the lamp storage facility in Augsburg.

In Schwabmünchen a new phosphor works producing chemical products in powder form was set up in 1960 and employed 170 people. On the same site, construction of a wire production plant started in 1964 and went into operation one year later with 240 employees.

Another new factory was that in Eichstätt, a modem production facility built in 1967 for halogen and xenon lamps with 350 employees.

With its production facilities in Schwabmünchen and Eichstätt, OSRAM GmbH made a considerable contribution to improving the infrastructure in these sparsely industrialised parts of Bavaria. Another reason for settling there was that there was a reliable local workforce available at a time when the first signs of a shortage of labour were becoming apparent.

European cooperation in bulb production
Growing pressure on prices led to the realisation that the manufacture of glass bulbs for lamps had to be rationalised. Because only large-scale production is profitable, the European Company for the Production and Sale of Lamp Components was set up jointly with European lamp manufacturers in Lommel, Belgium.

Glass bulbs have been produced there on ribbon machines since 1967. To get an idea of the available production capacity, 400 to 500 million glass bulbs can be produced each year on a single ribbon machine.

OSRAM headquarters in Munich
The managing board came to the conclusion that Heidenheim was not an appropriate long-term location as the second company headquarters after Berlin and decided on Munich instead. In April 1954, OSRAM moved into rented offices in Windenmacherstrasse 6 in the centre of Munich but these premises soon proved to be too small.

The search for a suitable site for a new building was difficult. During 1962 the decision was taken to construct an imposing building with open-plan offices and later to concentrate all the research and development activities not directly associated with the manufacturing works in an adjacent building on the same site.

Architects set to work in the same year. In the winter of 1965, the administration moved into the new OSRAM headquarters in Hellabrunnerstrasse in the south of the Bavarian capital.

Clear structure and timeless design
Architecturally, the OSRAM headquarters is one of the most significant office buildings of the post-war period in Munich. The façade is characterised by clarity and transparency. Inside, much of the authentic 60s style is still in evidence. The building was designed by the architect and structural engineer Walter Henn. For Europe at that time it was an innovative design based on the American open-plan office concept.

The entrance lobby is also impressive for its generous proportions. Full-length curtain lighting along the windows is part of the company's identity. The building has exuded clarity and timelessness for more than 40 years now.

The Munich research and development centre
On the occasion of OSRAM's 50th anniversary the company opened its new research and development centre in Munich to the public. OSRAM's R&D activities are concentrated in this central location. In his address, Dr. Bernhard Plettner, then chairman of the supervisory board of OSRAM, proudly pointed out that "the new research and development centre, which cost around 20 million DM, had been financed by OSRAM entirely from its own resources, a fact which should not be taken for granted."

Inside the OSRAM headquarters in Munich much of the authentic 60s style is still in evidence.

The then chairman of the managing board, Prof. Albert Prinzing, explained its purpose: “The new research building is a present to ourselves. It is our way of saying thank-you to the researchers who have made important contributions in the past to progress in lighting technology, and at the same time we are giving our young team a generously proportioned space in which they can continue their work unhindered in the great research and development tradition of our company.”

Nine per cent of all OSRAM employees at that time worked in research and development. Six per cent of OSRAM’s sales was invested in lighting technology and innovative products. The 1980s was “harvest time”.

The halogen cycle provides a boost to innovation
There is an OSRAM patent application from 1925 that proposes using volatile halogen compounds in incandescent lamps. However at the time this invention could not be implemented.

At the end of the 1950s General Electric succeeded in producing a halogen cycle. Once again, an innovative product followed a technological breakthrough.

The halogen cycle prevents vaporised tungsten from the filament being deposited on the glass bulb, which is what happens with ordinary life bulbs in the course of their life. The tungsten and halogen combine and the tungsten is re-deposited on the filament. Halogen lamps provide a spectrum that closely resembles that of sunlight.

Their advantages over ordinary light bulbs include longer life, greater intensity and better colour rendering. Incandescent halogen lamps with tungsten filaments opened up new areas of application, such as halogen projection lamps, halogen automotive lamps and decorative lamps. In 1967 the new factory at Eichstätt started producing tungsten-halogen lamps and xenon lamps.

Technology sets the pace of investment
In 1970 it was obvious that halogen light would be a runaway success. “Halogen lamps will open up new opportunities for ‘playing with light’”, said Professor Albert Prinzing when he announced at a press conference that the OSRAM Eichstätt works would be expanded with a further building covering a total of 3,450 square metres.

Eichstätt had proved to be such a good production site for special high-quality lamps that the managing boards decided to produce further special lamps there. He also let it be known that workers for the factory would come mostly from the Eichstätt area.

Metal halide lamps
In metal halide lamps, the addition of metal iodides or iodides of the rare earths leads to much improved colour rendering and increased luminous efficacy. The POWERSTAR® HQI metal halide lamp was launched in 1968.

It is used to highlight displays in shop windows and shop interiors, as prestige general lighting, at exhibitions and in museums, for architecture lighting and as work lighting for demanding industrial activities. POWERSTAR® HQI became one of the most successful metal halide lamps in the world.

“Berlin is worth the risk”
This was the sentiment when the decision was taken to construct a new large lamp factory at the OSRAM site in Nonnendammallee in Berlin-Siemensstadt. The Süddeutsche Zeitung newspaper called the project a “realistic help for Berlin” because a prime objective was to create valuable jobs in the city. At a press conference, Prof. Albert Prinzing call this commitment to Berlin a continuation or a broad investment policy that had been started years before by his predecessor Dr. Heinrich Freiberger.

The OSRAM glassworks in Berlin was expanded in 1971/72 with a six million DM investment, becoming the most advanced glass tubing plant in Europe.

Political stability encourages entrepreneurial risk
At the time the building was being erected, the four powers concluded their treaty on Berlin. In it, the Soviet Union recognised the presence of the western powers. That meant a little more security for Berlin and a better opportunity chances for industrial activity.

The new gas discharge lamp works WS-B was the successor to the old S works. More than 50 million DM were invested. The rebuilt floor area was 25,000 m^2. The new factory was the equivalent of three football stadiums. The total volume was 280,000 m^3. The new industrial complex was ideal for introducing further systemisation in the workflows.

This was an important so that data processing could be used on a greater scale. Factory planning was based on the philosophy that the entire production flow from the raw materials to the end product would take place under one roof.

Project planning began in 1969/70. Building work started in the spring of 1970 and was completed by the end of 1971. Production began in 1972. The move to the new factory was completed by the start of 1974. Now the manufacture of fluorescent lamps and high-intensity discharge lamps was concentrated here.

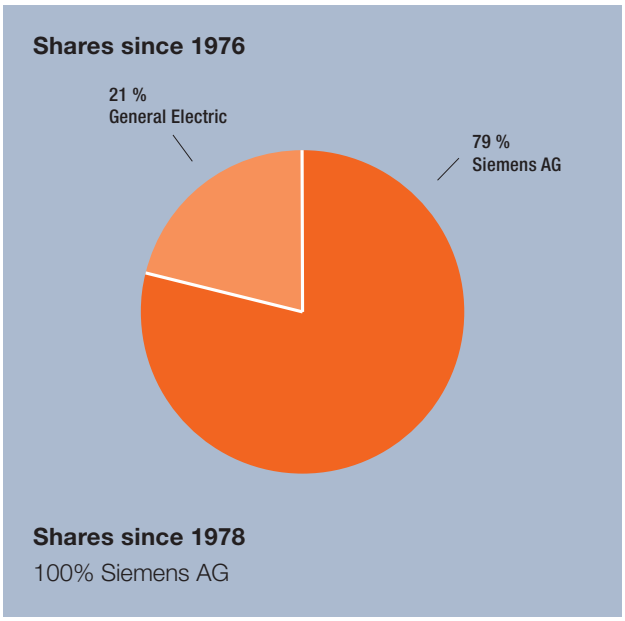
OSRAM becomes a wholly owned subsidiary of Siemens
From 1973 onward there was speculation in the press as to whether General Electric as the largest lamp manufacturer in the world would take over as the majority shareholder. Indeed, there were a number of meetings over a long period of time between the three shareholders, General Electric, Siemens and AEG. The reasoning behind this was that a universal lamp manufacturer such as OSRAM would need to be on a multinational footing to safeguard its future.

Compared with ordinary light bulbs, halogen lamps have longer lives, greater luminous intensity and better colour rendering. Shown here is the HALOSTAR STARLITE®.

The POWERSTAR® HQI® lamp became one of the most successful metal halide lamps in the world. Today, POWERSTAR® lamps are also available with innovative ceramic arc tubes.

1974 was the worst year for OSRAM since the second world war. For the first time in 20 years the decision was taken not to pay a dividend so the company could be strengthened. Planned investments were completed despite the difficult economic situation the company was in. For example, OSRAM once again emphasised its commitment to Berlin by creating a training centre.

In January 1976 an important decision was taken that would shape the future of the company. AEG-Telefunken's shares in OSRAM were taken over by Siemens AG. Siemens then held 79% of OSRAM's capital stock. The remaining 21% was acquired by Siemens from GE in 1978.



Recovery under our own steam

The company was still in the red however. "OSRAM has to recover under its own steam", said Helmut Plettner, chairman of OSRAM's managing board and ordered "drastic treatment". Up to 1973, the company's strategy had been essentially to build up production capacity and to supply manufactured goods. Now its corporate objectives were consistent rationalisation, gradual modernisation, personnel streamlining and the quest for innovative competitive products. It was clear that the key to success lay in research and development. This is where the companies resources were concentrated.

A foot in the door in the USA

Another major decision was taken in November 1978. OSRAM acquired the shares of the Kallmorgen Corporation in the Macbeth Sale Corporation in Newburgh, New York. A business relationship with the corporation had been in place for 20 years. The Macbeth Sales Corporation had a sales agreement for XBO®, HBO® and later HMI® lamps in the USA.The purpose of acquiring these shares was to expand the volume and spectrum of sales on the US market. At the time, Helmut Plettner said "Up to now, this important market has been almost the sole domain of American manufacturers. We have managed to gain an overview of the market structure and are confident that that our high technical standard, for example with HQI® lamps, will give us a good chance of success on the largest lamp market on earth."

Investing in the future

On the occasion of a corporate conference in March 1983, Helmut Plettner stated that in just five years OSRAM had invested 600 million DM in securing the future of the company. 336 million DM was spent on plant and equipment and 259 million DM on research and development. The investments placed the company in a leading position in many aspects of machine technology.

Central warehouse in Berlin

One of these pioneering investments was the central warehouse in Berlin at the Spandau works site which was opened in 1981. Warehousing costs were reduced considerably. The central warehouse is used for dispatching place for semi-finished and finished products to meet customer orders both in Germany and abroad.

Five new sites opened abroad
OSRAM continued its multinational activities. Production was expanded in South Africa. A fluorescent lamp factory was built. New sites were opened in Tokyo, Singapore, Helsinki, the Netherlands and the USA.

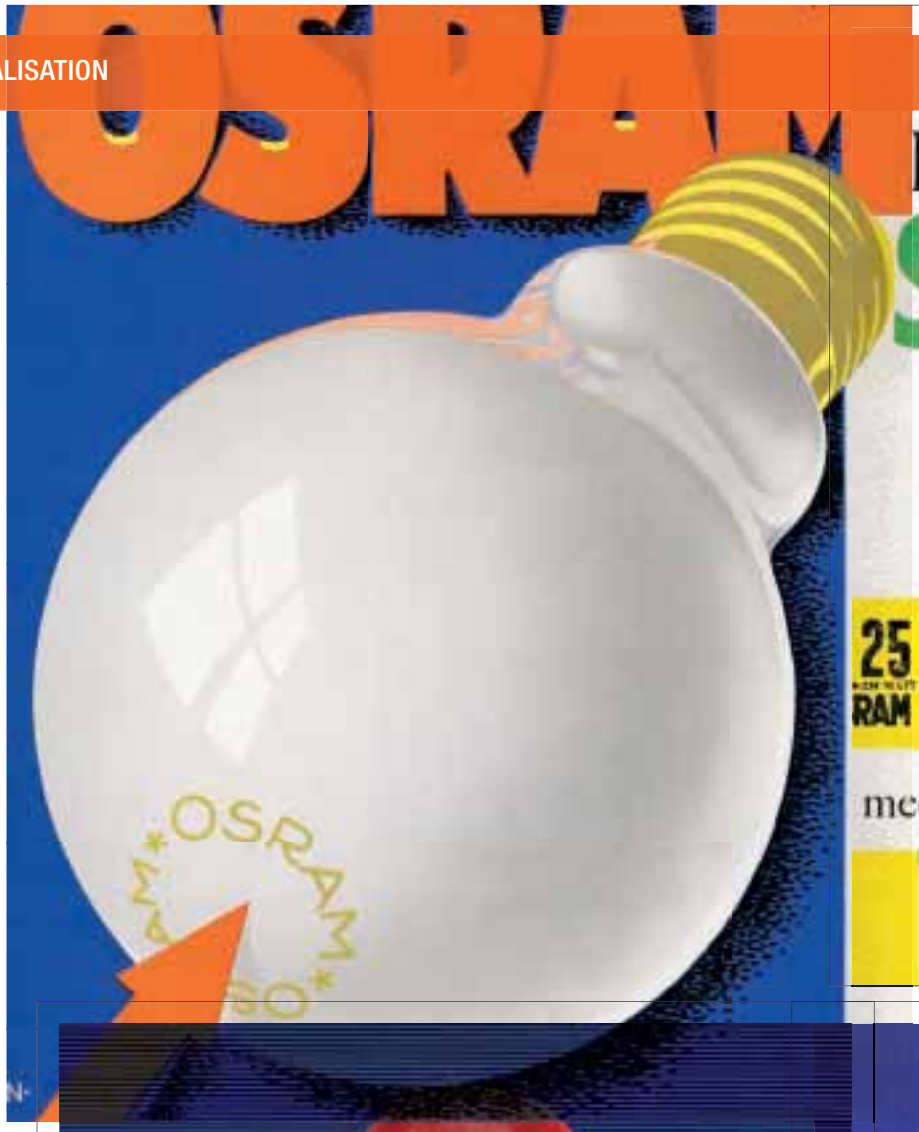
Berlin Spandau – the centre for high-quality discharge lamps
The Berlin B works in the Wedding district is a beautiful old industrial building. The manufacture of lamps started there in 1906 by the Bergmann company. The lamps were produced mostly by hand, as that was the only way at the time. Rationalisation, mechanisation and air conditioning all soon reached the limits that the old brick building would allow. In 1936 parts of the old factory were replaced by a new building. At the time, consideration was given to locating the factory in Spandau. Spandau was not chosen because Wedding was the industrial district of Berlin and the traffic infrastructure in Spandau was not adequate.

The new discharge lamps, which the market needed quickly and in large numbers, led to a reorganisation of the production sites in Berlin-Spandau and Berlin-Wedding. Augsburg was included in the plans. The managing board decided to erect a new building at the Spandau works, and to expand this factory as a production site for incandescent lamps and in particular for high-quality discharge lamps.

The products manufactured in the Spandau works included HTI® and HQI® metal halide lamps, NAV® lamps, HBO® mercury short-arc lamps, HMI® lamps for film, TV and stage and XBO® lamps for cinema projection. This strengthened OSRAM's commitment to Berlin, particularly as lamps and production capacity was brought to Berlin from other western European locations.

Production of such demanding lamp types calls for modern dust-free facilities. A two-storey factory with a floor area of 8,200 square metres was therefore built. There was also room for further expansion of 20,000 square metres. The site on Nonnendammallee already accommodated the OSRAM glass works and the new factory from 1979. In 1982 the high-rack storage facility for semi-finished and finished products was added. As part of this reorganisation, low-pressure discharge lamps were relocated from Spandau to Augsburg.

World market leader in cinema lamps: OSRAM received an OSCAR® for the XBO® cinema projection lamp in 1983 (see also page 76). In 1954 it was used for commercial film projection for the first time.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OSRAM throughout the world

Why is it so important for a company such as OSRAM to have a global presence? Because lamps are needed throughout the world. And because increasing globalisation made this possible. Just how important and right these measures were in the 1960s, 70s and 80s has been confirmed by the successor to internationalisation, namely the globalisation of recent years.

Expansion abroad

Way back in the 1920s OSRAM set up its first sales support centres, and just a few years after the company was founded it established offices in European countries, Rio de Janeiro and Shanghai. Globalisation was intensified from the 1960s onward. OSRAM expanded its international presence – with growing success.

One of the lamp warehouses.

From 1965 to 1970, sales of the associated companies more than doubled. Prof. Dr. Prinzing commented as follows on this growth: “We have embarked on a path that will give even greater significance to our associated companies. I would like to thank my predecessor Dr. Heinrich Freiberger for all his hard work in winning back the OSRAM companies and thereby creating the basis for further activity.”

OSRAM in southern Europe and South America: a lamp factory for “Mezzogiorno”
The centres for lamp manufacture by OSRAM Società Riunite OSRAM Edison-Clerici (OEC) were Milan and Treviso. Milan was also the location of the administration and central warehouse. The “Europe Works” for automotive lamp production in Treviso has been operating since 1968. It supplies automotive lamps, pygmy lamps and starters.

In Borgomanero in the Piedmont region, OEC owned a factory producing machines and accessories for lamp manufacture. The Milan production centre was expanded significantly in 1972. When people speak of “Mezzogiorno” they mean southern Italy. That is where major Italian companies have set up operations. Under the name of OSRAM SUD, OSRAM set up a new factory in Bari where fluorescent lamps and high-pressure lamps have been produced since 1972.

OSRAM Athens – the oldest light bulb company in Greece
In 1972, the Greek company, OSRAM Anonymos Elliniki Etairia Ilektrikon Lamptiron, concentrated production, administration and warehousing in a new building in the Kato Petronala quarter of Athens.

OSRAM Athens is the oldest light bulb company in Greece. In addition to meeting its economic targets it made a cultural contribution in promoting technical know-how among young Greeks. OSRAM has established an exhibition room in the Eugenidic Foundation to inform young people about “a better life with the right light”.

Expansion of OSRAM do Brasil
At the start of the 1970s, Brazil made a concerted and successful effort to promote the development of its economy. That prompted OSRAM to expand its factory in Osasco near São Paulo still further. The three largest investments in 1971 were the construction of a quartz production line for manufacturing the burners for high-pressure and mixed-light lamps. Machines from Eichstätt were shipped to Brazil to manufacture the burners.

Sadokin do Nordeste S.A.
In order to expand its activities on the gigantic south American continent, OSRAM do Brasil acquired a majority shareholding in SADOKIN DO NORDESTE S. A. at the end of January 1973. The company is located 2500 kilometres from São Paulo in the port of Recife. The acquisition of this majority shareholding strengthened OSRAM’s position in Brazil because OSRAM now had a presence in the north east of the country. A new warehouse was built for the prematerials.

Booming demand for lamps in Argentina
In the 1970 the “land of beef and wheat” turned itself into one of the leading industrial countries in South America. Despite inflation, there was a real boom in the demand for lamps in 1970.

For OSRAM Argentina this was the signal to take increase production. OSRAM owned a site on the outskirts of Buenos Aires. A new building was constructed there to house production and warehousing facilities. The administration moved to a new prestigious location in the Avenida Nueve de Julio in the Argentinian capital.

From 1970 onwards, LESA (Lámpadas Especiales Sociedad Anónima), a small automotive lamp company based in Córdoba, was wholly owned by OSRAM.

A lamp factory for Ecuador
In November 1972, OSRAM del Ecuador started producing lamps after a lengthy period of preparation. The small factory was particularly significant because OSRAM was the only manufacturer of lamps in the South American country. Initially, general lighting service (GLS) lamps from 15 to 200 W were produced to cover demand in the country itself.

Back in Mexico after a gap of thirty years
On January 1, 1972 the Mexican Compañía Eléctrica Mexicana S.A. de C.V. was renamed OSRAM S.A. de C.V. At the same time, the main incandescent lamps, the most important pygmy and decorative lamps and mercury high-pressure lamps, which had been marketed under the FAROLITO brand, were now marketed under the OSRAM name. After 30 years OSRAM was now back in Mexico selling lamps manufactured in the country.

OSRAM Corporation USA
The OSRAM subsidiary in the USA was also expanded at this time. In 1987 the OSRAM Corporation in Montgomery set up a supply centre to cover the entire country.

There were regional warehouses in Los Angeles, Chicago and Dallas.

Factory in Ecuador.

Since 1984 the production centre in Maybrook has been manufacturing compact fluorescent lamps, among other products. Construction of an administration building for OSRAM Corporation USA stared in autumn 1987. The aim was to accommodate the administration, sales, service and technical customer support departments there.

After 65 years the OSRAM brand can be used again in the UK and Commonwealth

March 19, 1986 is an important date in the history of OSRAM. That was when Helmut Plettner was able to tell the press that difficult negotiations stretching back more than twenty years had finally ended in success. OSRAM had regained the rights to the trademark in the United Kingdom, the Commonwealth and all former British colonies. To understand the significance of this for OSRAM, here is a little retrospective.

After the OSRAM trademark was registered in Germany in 1906 by Auer it was registered in England in April of the same year. One year later, on October 18, the Wolfram (Tungsten) Metal Filament Lamp Works Ltd. was founded in England.

Auer had a shareholding in this company. In 1908 the "OSRAM" trademark in England passed from Auer to the

Light bulb production lines in South America.

Wolfram (Tungsten) Metal Filament Lamp Works. In 1910 the company changed its name to the OSRAM Lamp Works Ltd.

And the trademark was taken over by the OSRAM Lamp Works Ltd. In 1915 is was transferred from the OSRAM Lamp Works Ltd. to OSRAM Robertson Lamp Works Ltd.

In 1919, when the three major German lighting manufacturers were merged to form OSRAM GmbH, the trademark was lost in England. It was transferred to GEC by the alien property administrator. Now it was possible for this English company to conduct business under the OSRAM name in the UK and other Commonwealth countries.

OSRAM on the other hand had to sell its lamps under the WOTAN® name in all GEC's "home" markets. "WOTAN®" was still a protected name from the time when Siemens was manufacturing light bulbs. It was a contraction of Wolfram and Tantalum.

The inscription on the rock behind the headquarters in Munich commemorates the transfer of the remaining 51% of OSRAM-GEC and the change of name to OSRAM Ltd.

In 1962 the OSRAM General Electric Company Ltd. was founded in England. In subsequent years OSRAM had to use secondary brand names in the United Kingdom and Commonwealth.

All the negotiations that had taken place since the end of the second world war had been fruitless. It was entirely consistent therefore that OSRAM – relatively late – in 1967 founded WOTAN Lamps Ltd., London so that it could be active again on this major market under a brand name of its own.

After around 70 years this "split personality" came to an end. The following agreements were reached in 1986 with GEC: "OSRAM GmbH shall acquire from the General Electric Company plc, London, (GEC) a 49 percent shareholding in OSRAM-GEC Limited, Wembley (Great Britain). The other 51% shall be retained by GEC. OSRAM-GEC has taken over all lamp and luminaire activities of GEC in Great Britain."

The significant shareholding of OSRAM GmbH in OSRAM-GEC enabled the considerable technological advances and product innovations of the German OSRAM GmbH to be exploited on the British market and the overseas markets of GEC. OSRAM GmbH had also regained the rights to the OSRAM trademark in the United Kingdom, the Commonwealth and all former British colonies.

These rights had been transferred during the first world war to a predecessor of the present-day GEC. The takeover of OSRAM-GEC involved a sales volume of around 200 million DM and a workforce of around 2,900. Shareholdings were also acquired at the same time in manufacturers of glass bulbs for producing GLS lamps, fluorescent lamps and other prematerials needed for manufacturing lamps.

In 1990, OSRAM acquired the remaining 51% of OSRAM-GEC from GEC and changed the name of the company to OSRAM Ltd.

To commemorate the event an inscribed plaque was set in a rock on the north side of the OSRAM administration building in Munich.

OSRAM Netherlands – expansion of a prestige site
There had been a local company in the Netherlands since 1981, first in an office block in Alphen an der Rijn. Then the market was served by a small but highly specialised team. They succeeded in launching high-tech products on the Dutch market. In 1984 a prestige building with its own high-rack storage facility was opened in Alphen.

New building for OSRAM Winterthur
OSRAM Winterthur is one of the most traditional among all the associated companies. In 1912 a small factory was set up in Zurich by the Auer to manufacture gas mantles. Auer also sold OSRAM lamps.

When, in 1914, seven cantons in north east Switzerland joined forces to create an electricity production and distribution organisation the conditions were ideal for electric light to go from strength to strength. In 1918 the Swiss Auer company established its own light bulb manufacturing facility. In 1939 the first fluorescent lamp was launched in Switzerland.

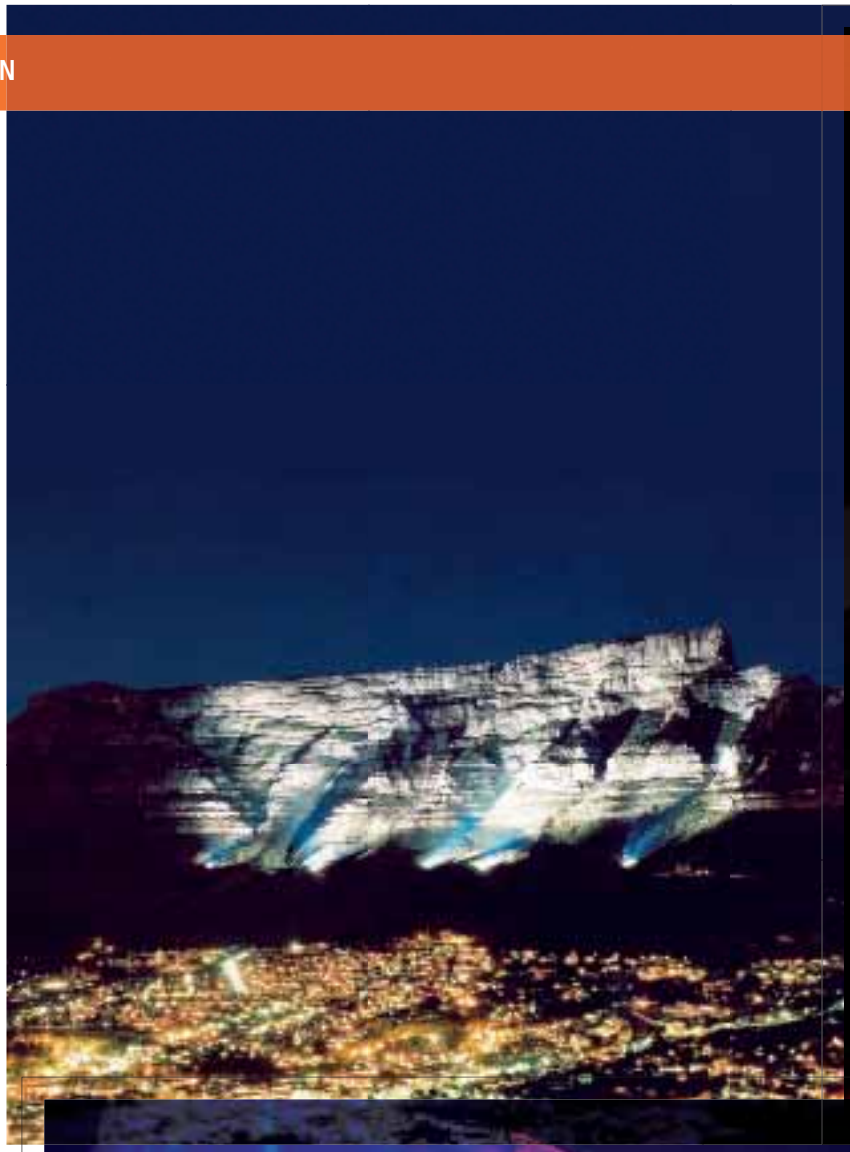
In 1973, OSRAM AG in Zurich and the Winterthur light bulb factory merged to form OSRAM AG Winterthur. In 1976/77, production of incandescent and fluorescent lamps ceased. Ever since, all the lamps for the Swiss market have come from production sites around the world.

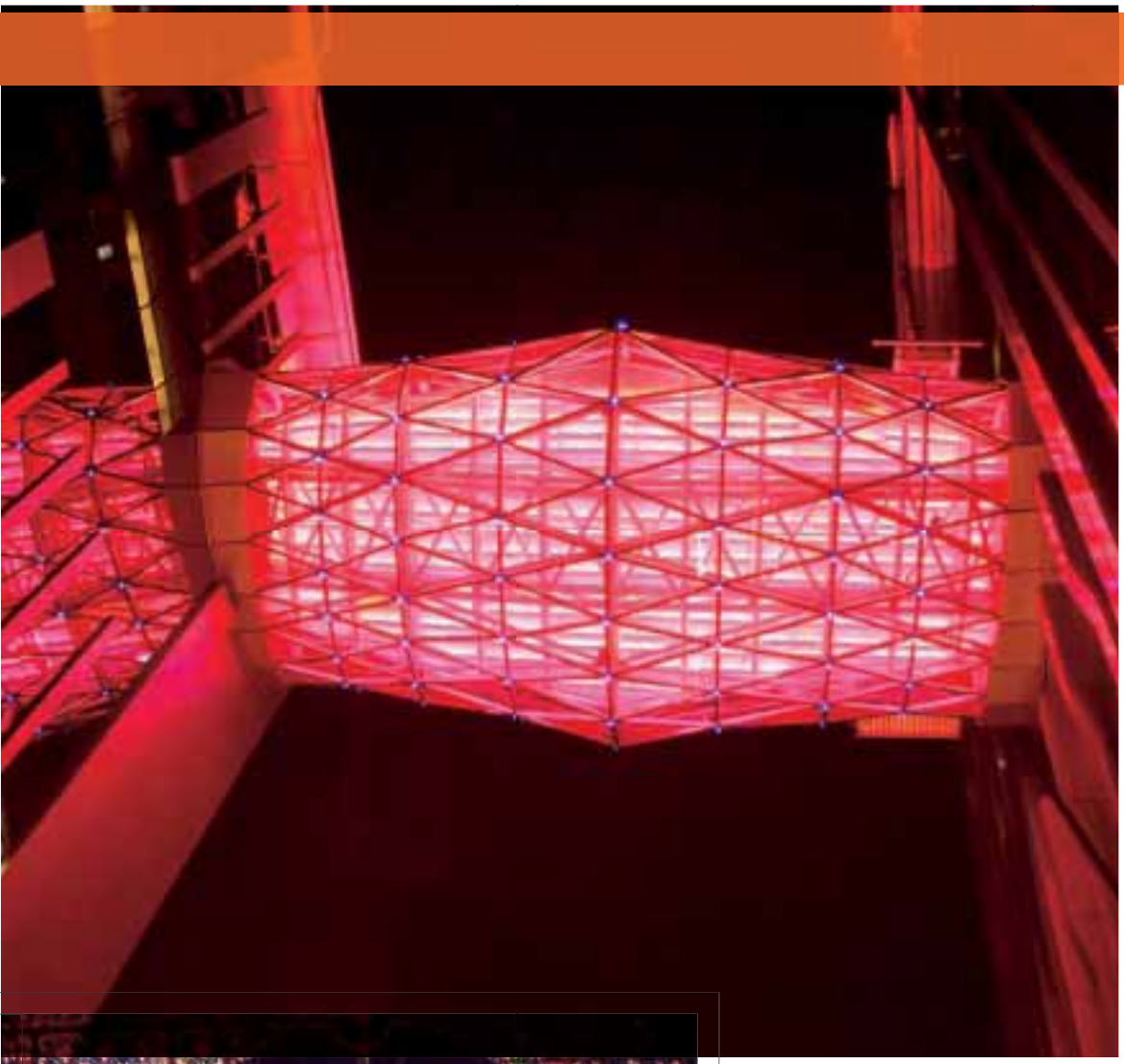
In early June 1988, OSRAM Winterthur AG moved into a new office and warehouse building. The three-storey office building has a floor area of 450 square metres. A light studio has been set up in the basement. The top floors accommodate senior management, the sales department and the administration department. The building also incorporates a storage facility with a floor area of 2600 square metres.

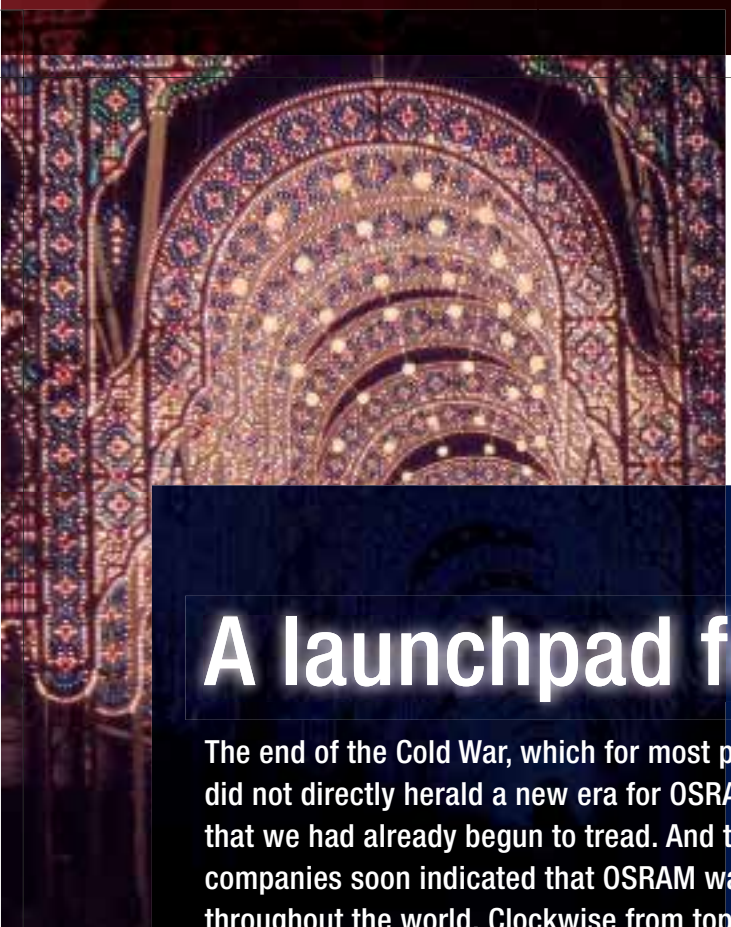
High-tech lamps for Korea
At the end of 1988 the “joint venture” lamp factory of OSRAM Sungsan (now OSRAM Korea Co. Ltd.) started production in Panwol, 40 kilometres south of Seoul. The aim of the joint venture was to launch modern energy-saving lamps and the latest lamp technology in Korea and to own one of the largest and most advanced lamp factories in the country.

OSRAM’s objective was to become the market leader particularly in the energy-saving lamp sector in Korea. The production portfolio included OSRAM DULUX® S and D lamps, automotive lamps, halogen lamps and NAV lamps.

There had been a local company in the Netherlands since 1981. In 2004 the local companies for the Netherlands and Belgium merged to form OSRAM Benelux.







A launchpad for the future

The end of the Cold War, which for most people today means the fall of the Berlin Wall, did not directly herald a new era for OSRAM. It just made it easier to follow the paths that we had already begun to tread. And the map of support centres and local OSRAM companies soon indicated that OSRAM was engaging in a series of exciting projects throughout the world. Clockwise from top left: South Africa, Chile, Japan and Switzerland.

OSRAM becomes a global lighting company

The end of the 1980s was a time of enormous political and economic change. It was also a spur for OSRAM to make changes of its own and to embrace greater internationalisation. Some elements were retained and improved, some were started from scratch, but always with the aim of becoming a global lighting company.

After liberalisation and globalisation in the Eastern European countries OSRAM was able to strengthen its presence here. Today, the National Theatre in Budapest is lit by OSRAM lamps, and OSRAM also supplied the majority of the stage lighting and LED stair lighting.

A time of change

The fall of the Berliner wall on November 9, 1989 was a symbolic event of global magnitude. With the signing of the unification agreement between the Federal Republic of Germany and the German Democratic Republic and of the Two-Plus-Four Agreement, Germany was once again unified. Suddenly more than 80 million people came under the currency zone of the Deutsche Mark (DM). Negotiations began regarding the acquisition of the former OSRAM factory, the NARVA lamp works in East Berlin. Nostalgia dictated that the purchase should go ahead. However the long-term corporate strategy spoke against it. It was clear that the factory was not economically viable and that the purchase would not have strengthened the OSRAM company.

The collapse of the Soviet Union signalled the end of the communist system and the start of liberalisation and globalisation. For OSRAM it was an opportunity to open sales offices in Eastern bloc countries and to relocate high-wage production to the Czech Republic and Slovakia.

In the Maastricht Agreement, which can into force on November 1,1993, the member states of the European Union resolved to create the European Economic and Monetary Union and to introduce the euro on January 1, 1999. The euro was eventually adopted as the common currency of 12 member states on January 1, 2002. The creation of the community markets was a major contribution to the formation of the internal market. The result is universal protection in all member states of the European Union. OSRAM trademarks are registered in the European Union as community trademarks.

In just a decade the internet has revolutionised the way in which business is conducted – financial markets, commerce and technology. Internet-based business between manufacturers and customers is now a permanent feature. The manufacture of chips from semiconductor materials for the computer industry gave rise to new companies, such as Infineon which had its roots in the Siemens group and was later listed in its own right on the stock market. Semiconductor technology was also the platform for the invention and development of entirely new light sources. In only a few years, business with light emitting diodes (LEDs) became a strategically important factor for OSRAM as it entered the 21st century.

Energy crises place a great burden on national economies. Energy savings, environmental protection and sustainability in the use of resources have therefore gained in significance worldwide. The proportion of electricity consumed by light is about 20% of total electrical energy consumption.

OSRAM is helping save electricity with energy-saving compact fluorescent lamps and electronic control gear for fluorescent lamps. Energy-saving lamps consume up to 80% less electricity than ordinary light bulbs for the same amount of light.

OSRAM has met the challenges of continual falls in prices and intense competition on the lighting market with rationalisation, increased productivity and reduced costs. The aim is to ensure that the company as a whole remains on a healthy footing for a long time to come. Against this background the company pressed ahead with highly mechanised production in modern OSRAM factories. This led to a situation in which traditional but small-scale European production sites, which had been part of OSRAM for many years, such as the Fábrica de Lámparas in Madrid, founded in 1914, and the factories in Milan, Stockholm, Lisbon and Athens had to be closed.

OSRAM in the land of the rising sun

By the end of the 1980s the general consensus was that OSRAM had to have a presence in Japan if it was

to have any credibility as an international company. After a long series of negotiations the joint venture agreement with Mitsubishi Electronic Corporation Tokyo was duly signed in July 1988.The two companies agreed to establish two Japanese subsidiaries. One focussed on the development and production of lamps, the other on the marketing of light sources already in the portfolios of the two parent companies.

The activities of OSRAM Tokyo in the general illumination and photographic lamps markets were transferred to the joint venture. The company began operations on April 1, 1989 in the 70th anniversary year of the founding of OSRAM. The new OSRAM MELCO factory in Kakegawa was officially opened on January 22,1992.

This was a state-of-the-art two-storey building with a floor space of 17,000 m^2 for manufacturing T8 fluorescent lamps, compact fluorescent lamps and high-intensity discharge lamps. A three-story office building and a new central warehouse we also constructed.

Expansion in North America:
SYLVANIA* North American Lighting
On August 6, 1992 the managing board reported that, subject to the approval the relevant antitrust authorities,

A year of negotiations was needed before an agreement was reached for the purchase of "SYLVANIA North American Lighting", the second largest lighting manufacturer in North America. Dr. Wolf-Dieter Bopst (2nd from right) and Heinz-Peter Mohr (far right) together with two representatives of GTE Corporation at the signing of the agreement on August 24, 1992.

OSRAM had signed an agreement with GTE Corporation of Stamford, Connecticut for the purchase of the North American lighting company. OSRAM acquired the second largest lighting manufacturer in North America, known as “SYLVANIA*”, together with all its activities in the USA, Canada and Puerto Rico.

This had been preceded by one year of tough negotiations. The official date for the acquisition was January 29, 1993. “A perfect fit” – OSRAM SYLVANIA*, as shown at the entrance to the OSRAM headquarters in Munich, was born.

SYLVANIA* North American Lighting recorded sales of around 1.256 billion US dollars in 1991. SYLVANIA* was number two on the lamp market in the USA after General Electric. In Canada SYLVANIA* was market leader. The company produced the entire range of GLS, fluorescent, high-intensity discharge and automotive lamps and associated prematerials in its factories.

OSRAM took over 29 factories, 22 of which were in the north-eastern USA, four in Puerto Rico and three in Canada. At the time of the take-over, SYLVANIA* employed 13,000 people. OSRAM consciously restricted itself to the acquisition of the North American lighting business of SYLVANIA*. For antitrust reasons, the SYLVANIA* businesses in Europe and the Far East were not acquired. This SYLVANIA* Lighting International B.V. was taken over by a consortium of international investors.

For OSRAM the acquisition of SYLVANIA* North American Lighting was the crucial leap into the leading group on the world lighting market that had previously been dominated by Philips and General Electric. OSRAM’s share of the world lighting market rose from 14% to more than 20% and OSRAM became the new number two on this market. Sales by volume rocketed by 70%, increasing from three to 5.5 billion DM. At the start of 1995 the number of OSRAM employees worldwide stood at around 26,500.

Dr. Wolf-Dieter Bopst, President and CEO, addressed the challenge for the future: “Our aim is to combine the strengths of SYLVANIA* and OSRAM and to create a company that will continue to operate with greater efficiency and success wordwide. The skills of the two companies complement each other perfectly in this respect.

SYLVANIA*’s traditional strength in research, and OSRAM’s renowned superiority in the development of new products; OSRAM’s excellent production methods and SYLVANIA’s rich experience in sales and marketing; OSRAM’s leading role in energy-saving products and SYLVANIA*’s strength in automotive lamps and prematerials.” Integration and restructuring of OSRAM SYLVANIA* was completed successfully with combined forces.

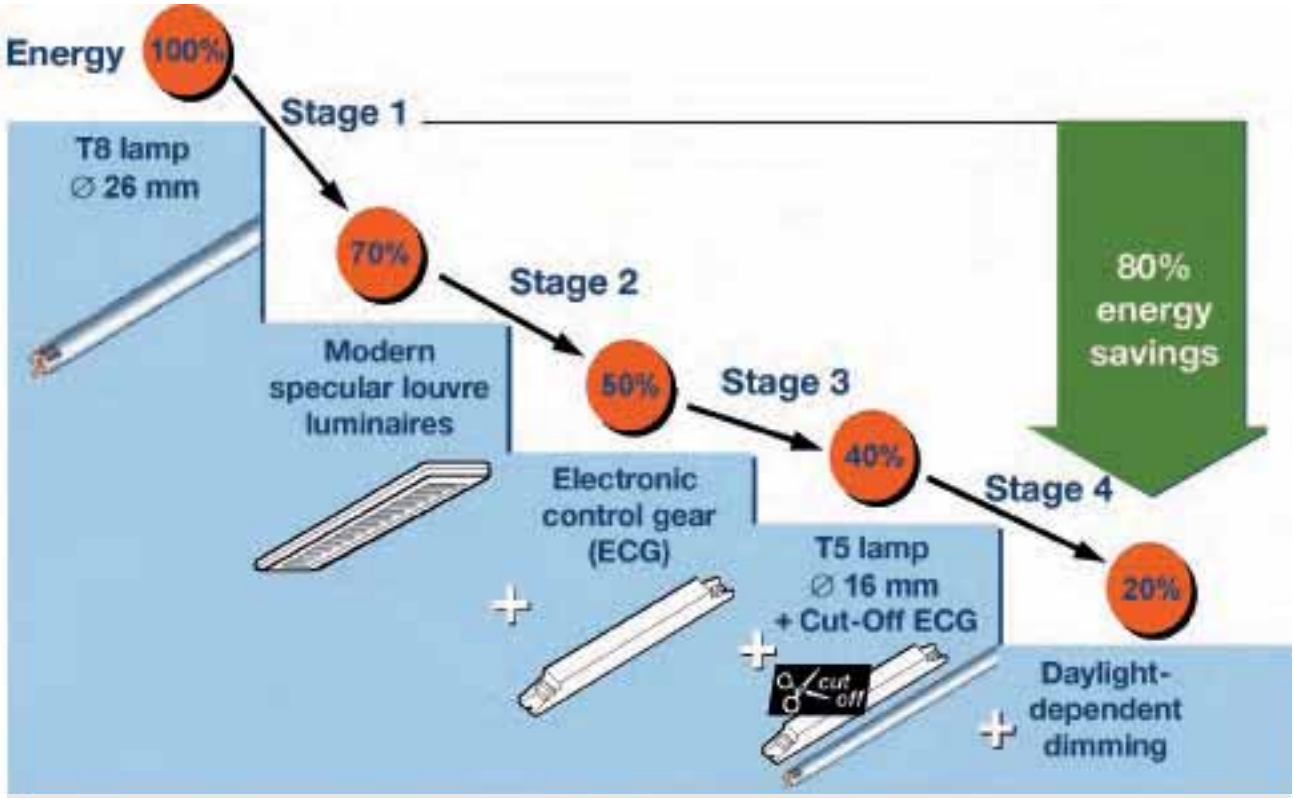
This process is evident in the research sector and in the company-wide divisional organisation with global responsibilities. OSRAM decided to retain the well-known SYLVANIA* brand in North America for most product sectors. The new company was given the name OSRAM SYLVANIA*.

One of the consequences of the acquisition of SYLVANIA* was that the previous unilateral dependence of the company on the economic well-being or otherwise of the Federal Republic of Germany and European markets was now a thing of the past. The acquisition reduced the Germany proportion of world sales in 1993/94 from 28% to 15%, the proportion of products manufactured in Germany fell from 65% to 33% and the number of German employees as a proportion of the total number fell from 57% to 30%. World sales reached 5450 billion DM. In other words, with 85 percent of sales being achieved outside Germany, OSRAM was now truly a global lighting company.

Research and development go global

As a result of the company's global presence, research and development was also organised on a global scale in the same way as the other divisions with the acquisition of SYLVANIA* in 1993. This involved the research centre in Beverly, Massachusetts in the USA, the R&D activities in Munich and the many development sites in the factories, such as Kakegawa in Japan. The company's enhanced presence in North America enabled it to cooperate on a global scale with major research facilities such as the University of Wisconsin, USA and the renowned Los Alamos National Laboratory in New Mexico, USA.

OSRAM has achieved great research success in all lamp sectors, notably low-pressure technology in 1992 which enabled halogen lamps to be used without protective shields without violating IEC regulations, IRC technology for halogen lamps in 1996 which produced energy savings of around 30% for the same amount of light, and Halopin, the smallest mains voltage halogen lamp in the world when it was launched in 2000. As for fluorescent lamps, improved methods of applying the phosphor layer and the development of suitable electronic control gear resulted in a record luminous efficacy of 110 lumen/watt.



With intelligent lamps and lighting systems energy savings of up to 80% can be achieved compared with traditional lamps.

Appropriate electronic control gear enabled the tube diameter of fluorescent lamps to be reduced to 16 mm (T5 type), which in turn led to new luminaire designs. The thinnest fluorescent lamp for general lighting purposes with a diameter of 7 mm was launched in 1995. The objective of reducing the mercury dosing in tubular fluorescent lamps and compact fluorescent lamps to the absolute minimum demanded by the physics of the lamps, whether in pill form or in metal strips, was achieved in 2004 thanks to progress in manufacturing techniques.

The ENDURA® lamp, which was showcased for the first time in 1998 in Hanover, and the PLANON® lamp launched in 2000 in Frankfurt were completely new innovations in terms of their technology and their outward appearance. The two lamps have three special features in common: they have a hitherto unrivalled lifespan, can be operated only with appropriate electronic control gear and will function properly even at extreme temperatures from -40 to +50 °C, depending on the control gear used. ENDURA® lamps – marketed in the USA as ICETRON™ lamps – are low-pressure discharge lamps in a closed ring format with no electrodes.

Energy is supplied from outside by means of a magnetic field. With its luminous flux of 12,000 lumen for the 150 W version and lifespan of 60,000 hours (equivalent to around seven years in constant operation) it outperforms everything achieved by previous fluorescent lamps. It is therefore ideal for public buildings where access is difficult and long operating times are needed. Today it is one of the highlights of the World Cup underground station at Fröttmaning near Munich.

PLANON® is different from all previous forms of light source in that its is virtually two-dimensional" – less than 10 mm thick. Filled with the inert gas xenon and operated by pulsed high frequency from electronic control gear, the Planon lamp is not as bright as conventional fluorescent lamps but has an impressive lifespan of around 100,000 hours and contains no mercury.

Light from semiconductors – fundamental new light sources

In the case of LEDs (light emitting diodes), light is produced not by heating a tungsten filament, by gas discharge or by exciting a phosphor layer but by the flow of electrons in a semiconductor material. By the start of the 1990s it was clear that at first LEDs would oust tiny incandescent lamps from their customary applications, such as display lights in dashboards, household appliances, electrical equipment and rear bicycle lights. With a lifespan of up to 100,000 hours, their tiny size, low energy requirements and resistance to shocks and vibrations, LEDs are superior to conventional light sources in many respects.

In 1999 OSRAM presented a complete range of LEDs through its joint venture: infrared components, power

In 2003 OSRAM received the coveted Archi-Tech award in the USA. PLANON® lighting systems have been integrated in the façade of the headquarters of the telecommunications company KPN in Rotterdam.

lasers, displays and light emitting diodes. In the words of Dr. Bopst, President and CEO: “Light emitting diodes, particularly the white LEDs, are opening up entirely new market opportunities, including general lighting in the medium term. The opto semiconductor market will be an important cornerstone for the future of OSRAM.” By 2002, OSRAM had advanced to number 2 on the world LED market behind Nichia of Japan.

Innovation – the key to the future

“As bright as day” was the vision of the future according to Dr. Bopst on the occasion of the official opening of the new Lighting Research Center on September 19, 1995 at OSRAM SYLVANIA* in Beverly, Massachusetts USA, where research work would be successfully conducted as a continuation of the excellent tradition of SYLVANIA*.

This was an important step toward safeguarding the company’s technical competence on the international lighting market and reducing dependence on the know-how of others. Research and development in the USA, Japan and Germany, in some cases at production centres for specific product groups, ensured that new products were ready for and compatible with the market much sooner than would otherwise have been the case.

In the halogen sector, low-pressure technology, which removed the risk of halogen lamps bursting because of the internal pressure, and the use of UV-filtering glass for the bulb helped halogen lamps achieve further market penetration in 1992. The safety glass that had previously been essential on halogen luminaires was now no longer needed. There was new freedom for product designers and interior architects. With the growing importance of electronics in the control gear sector, among others, the benefits of in-house development in this area were all the more apparent. The path to becoming a system supplier of “lamps and control gear from a single source” opened up.

It was the special properties of electronic control gear (ECG) that enabled the diameter of fluorescent lamp tubes to be reduced even further. Indeed, the COLORSTAR DSXT 80 sodium-xenon lamp, one of the first mercury-free high-pressure discharge lamps which was developed in 1993, would only work with electronic control gear. The first OSRAM high-pressure discharge lamp for car headlights was launched in 1991 under the name of XENARC®. XENARC® was a huge success on the European market.

Markets and divisions

As a global company, OSRAM organised its business into six divisions (another, LED Systems was created in 2005, see chapter 7):

- General Lighting
- Automotive Lighting
- Ballasts and Luminaires
- Display/Optic (special lamps)
- Precision Materials & Components
- Opto-Semiconductors

General Lighting

Whereas Photo/Optic (renamed as Display/Optic in 2004), Ballasts and Luminaires and Automotive have been organised as divisions since 1988, 1990 and 1994 respectively because of their specific products and customers, the General Lighting division was set up in 1996 following the example set by OSRAM SYLVANIA*. A uniform organisational form had therefore been achieved across the entire company. Understandably, the General Lighting division accounts for the largest share of sales in the company.

This is because of the wide range of applications, from private homes and commercial premises to street and stadium lighting. Halogen lamps with their brilliant light meet a broad spectrum of design and lighting requirements. Energy-saving compact fluorescent lamps have

achieved high growth rates thanks to their many different types, electronic control gear, compact design and impressive economy.

The Automotive division goes international
Automotive business has been run since April 1994 as a division at OSRAM and at OSRAM SYLVANIA* and has taken account of the special nature of the products and customers (exclusively the automobile industry) and increasing globalisation. OSRAM SYLVANIA* has its own automobile headlight manufacturing facility for the North American market. The launch of the D1 gas discharge lamp for car headlights in 1991 heralded the start of a new technology and, as events would later prove, a durable innovation that would sweep first through Europe and, after a little delay, gradually conquer the USA. The luminous efficacy and luminance of the D1 lamp and its successor the XENARC® D2S, which was launched in 1994, were two to three times greater than halogen lamps which in 1994 still dominated the headlight market with a share of over 90 percent.

OSRAM SYLVANIA* agreed a joint venture with the renowned French automotive supplier Valeo for vehicle headlights in North America, thereby strengthening its market position still further. OSRAM responded to the fact that all the major car manufacturers were multinational companies by organising Automotive as a worldwide division in 1997 under management based in the USA.

Electronic control gear – OSRAM moves into systems
OSRAM developed more and more lamps and matching control gear under one roof and supplied market-ready systems. The company became a systems supplier – it was a logical move.

A good example of this is the new generation of “slimline” 16 mm T5 fluorescent lamps launched in 1995. Both the FH lamp with its impressive luminous efficacy (106 lumen/W) and the high-intensity FQ lamp launched in 1996 are operated exclusively with electronic control gear. The same applies to the 7 mm diameter FM lamps and for the continually extended OSRAM DULUX® series which would not have been possible without their integrated electronic control gear.

The Photo/Optic division focuses on special high-tech lamps
The Photo/Optic division – set up in 1988 and renamed as Display/Optic in 2004 – is defined not so much by the volume of its sales (2006: 4% of the world sales of OSRAM) as by the applications and technical sophistication of its products: film studios, cinema projection, video projection, semiconductor manufacture, surgery, airfield lighting and lighthouses. Whereas in 1994 conventional products and halogen lamps dominated, over the following years xenon and metal halide lamps gained in importance. HBO® lamps had to meet extremely stringent precision and quality requirements for the semiconductor industry.

With the advent of video projection at the start of the 1990s, the Photo/Optic division benefited from strong

To become a system supplier, OSRAM had to develop lamps and matching control gear under one roof and provide market-ready systems.

growth in video projection lamps that were “tailored” on request to suit the needs of customers. In contrast to other OSRAM products, the products from the Photo/Optic division were mostly small series lamps with high performances that presented special development and production challenges. The cinema boom which started in the mid 1990s produced major successes in these applications. The OSCARS® for the XBO® and HMI® lamps in 1983 and 1987 were by no means the first awards in this sector. It is worth mentioning here that all the Photo/Optic products were now being marketed worldwide under the OSRAM brand.

Photo/Optic becomes Display/Optic

To achieve closer contact with customers the oldest division, Photo/Optic, was renamed and reorganised as Display/Optic in 2004. It was restructured on a worldwide scale not as before by technologies but by areas of application. The Display/Optic division is divided into four Global Business Units (GBUs): Display Systems, Entertainment, Cinema and Semiconductor & Medical.

Given the short-lived nature of many of the products it is important to identify trends and customer requirements at an early stage and react promptly. Products are often developed in close contact with customers in what are known as design-in projects.

A legend turns 50

The undisputed star of film lamps, the XBO®, a xenon short-arc lamp, received a coveted OSCAR® in 1983 by the Academy of Motion Picture Arts and Sciences™. In 2004 it could look proudly back on 50 years of achievement.

Ballasts and Luminaires

As early as the start of the 1980s it became clear that electronic components would one day be the components of choice for the control gear essential for operating discharge lamps and would completely oust conventional ballasts. Thanks to continual reductions in the price of electronic components, their various technical properties and not least their weight and volume advantages they quickly established themselves on all fronts. Electronic control gear conquered virtually all areas of application, replacing conventional transformers for low-voltage halogen lamps and conventional ballasts for discharge lamps.

Energy savings and longer lamp life came more to the fore as environmental benefits as OSRAM took advantage of its ability to develop its own ECGs and supply customers with perfectly matched systems comprising control gear and lamps. The strategy was to provide “the right control gear for the lamps from other divisions”, a strategy that has proved successful over the years. BL has been setting the pace for other divisions, particularly General Lighting, in that for years it has shown the market a number of potential applications for new lamps and ECGs in a series of exemplary sample luminaires.

Arnold Schwarzenegger presents an OSCAR® in 1983 to OSRAM for the XBO xenon short-arc lamp.

Precision Materials & Components

A look back at the history of lamp developments shows that suitable raw materials have provided the springboard for advances in lamp technology. Almost from the very start of the lamp industry the major lamp manufacturers produced the necessary prematerials in their own factories: normal glass for standard products such as incandescent and fluorescent lamps (which up to about 35 years ago was produced from rock crystal); glass from special quartz sand for halogen lamps and high-intensity discharge lamps; lead glass, which has been gradually replaced by lead-free glass since the end of the 1990s for environmental protection reasons for the internals of incandescent and fluorescent lamps; and tungsten and molybdenum wire and phosphors.

In October 1999 all 18 prematerials factories in the USA and Germany were placed under common international management by the PM&C division (Precision Materials and Components). Although sales by the division at the time amounted to only 11% of world sales (2005: 7%), the importance of the division came from the technological platform it provided for the lamp divisions. It extensive know-how allows other industries such as the chemical, machine tool, automotive and electrical industries to be supplied with its special products.

In the year 2000 OSRAM acquired HMZ in Bruntál, Czech Republic, a manufacturer of tungsten powder and other fine chemicals for various purposes including medical applications. The latter did not fit in OSRAM's manufacturing spectrum and was therefore sold in 2004. To reduce the cost pressure, production involving high labour costs such as the manufacture of filaments and fine wire made from tungsten and molybdenum was relocated from Germany and the USA to Bruntál. In Germany this affected the Schwabmünchen works and the filament production facility in the historic B Works. OSRAM closed the historic Wedding site and in Berlin concentrated on high-tech lamp production in Spandau.

In 2001 the organisation of the divisions was further adjusted to take account of continuing globalisation. FO (now DO) and BL (Ballasts and Luminaires) became world divisions with management based in Germany. The Opto Semiconductors division (OSRAM Opto Semiconductors) with its headquarters in Regensburg and the PMC division (Precision Materials & Components) with its headquarters in the USA were launched. The General Lighting division, which generated more than half of all sales, was split into various business units: incandescent lamps, halogen lamps, compact fluorescent lamps, fluorescent lamps and high-intensity discharge lamps. The aim was to improve customer focus.

Quartz tubes – seen here at our production site in Exeter, USA – are used not only for producing lamps. Semiconductor manufacturers also appreciate them for their stability and high thermal rating.

New business unit: Ultraviolet and Infrared Lamps
On October 1, 2003 the new UV/IR business unit was set up at Radium Lampenwerk GmbH, a subsidiary of OSRAM. It is responsible worldwide for all activities relating to ultraviolet and infrared lamps – development, production, marketing and sales. UV high-pressure and low-pressure lamps and excimer UV lamps are needed for medical, technical and scientific applications. Infrared lamps for producing heat are used for example in the wellness sector, animal husbandry and drying processes for paper manufacture. There are many possible applications, ranging from tanning to the polymerisation of plastics, including water purification, an environmentally friendly method because there is no need to add any chemicals such as chlorine to the water.

OSRAM Opto-Semiconductors: a high-tech company
OSRAM Opto Semiconductors GmbH develops and manufactures opto-electronic components for the illumination, sensor and visualisation sectors. There was an unmistakeable trend that started during the 1990s for miniature lamps and pygmy lamps to be replaced by light emitting diodes, notably in car dashboards and instrument displays. It was clear that one day the classic pygmy lamps would be consigned to history.

There was an opportunity to take over the LED division, which belonged at the time to Infineon in Regensburg, from the parent company Siemens. On January 1, 1999 the takeover was completed with a 51% majority share. The Siemens subsidiary Infineon initially retained a 49% share. OSRAM was then in a position to supply semiconductor light sources for all areas of application.

The LED activities were distributed among the headquarters in Regensburg (research, development, optical chip fabrication, administration and sales) and the two sites in Penang and Malacca, Malaysia. The company was renamed OSRAM Opto Semiconductors GmbH & Co. OHG. In August 2001 OSRAM acquired the remaining 49% of the LED business from Infineon Technologies. In the same year the foundation stone was laid for the first construction phase for a chip factory for OSRAM Opto Semiconductors in Burgweinting near Regensburg. In Malaysia, production was moved from the Infineon location in Malacca to Penang.

The most advanced optical chip factory in the world
In April 2003, the most advanced optical chip factory in the world was opened in Burgweinting near Regensburg. After a construction period of just 21 months, the first phase of the OSRAM factory, covering an area of 36,000 m², was opened. Total investment was around 120 million euros. In his speech at the official opening, Dr. Wolf-Dieter Bopst praised the chip factory as “an important milestone in our journey from a classic light bulb manufacturer to a high-tech company in the lighting industry”. The second phase was officially opened in 2005.

Over the following years the range of products and the areas of application were expanded, in automotive light-

The most advanced optical chip factory in the world is located in Burgweinting near Regensburg. For OSRAM its construction was a milestone in its transition to a high-tech company in the lighting industry.

ing and general lighting. The rapid technical advance culminated in 2004 with the Dragon LED. It has a life of 50,000 hours and a luminous efficacy of 40 lumen/watt. The development of white diodes presented a particular challenge. White LEDs are used for backlighting displays in mobile phones and dashboards. Today, there are LEDs such as OSTAR® that have a life of up to 50,000 hours.

The next challenge was the development of self-luminous organic light emitting diodes (OLEDs). Organic materials – or plastics – enable self-luminous and extremely low-profile displays to be produced. In 2003, OSRAM entered the market with such displays under the name of PICTIVA®. They are produced in Penang, Malaysia.

Machine centres in Germany, Slovakia and the USA
Mechanical engineering for lamp production has been one of the core competences of OSRAM since the mid 1920s. The decision to maintain and modernise OSRAM's mechanical engineering facilities so that it became "one of the core elements of the company" (Dr. Bopst) in 1986 was of pioneering strategic importance.

The Machine Centre develops and builds the special machines needed in the company for producing lamps and prematerials. In some cases the products of other specialist machine manufacturers are used. Over the years there has been a continual reduction in the number of relevant machine manufacturers, including famous names such as Falma and Montena in Switzerland.

With increasing globalisation, access to low-wage countries and the rapid pace of innovation the objectives and significance of OSRAM's own machine development and manufacturing facilities have changed. The machine factory in Nové Zámky, Slovakia, has been continually expanded since it was taken over in 1995 and now supplies OSRAM worldwide. In appropriate cases the Machine Centre is involved in the purchase of machines and – without divulging valuable know-how to third parties – in the adaptation of these machines to meet OSRAM's standards. The advantages of retaining in-house competence in the machine sector are paramount in cases where new production methods, technological expertise and appropriate cooperation with product development are important and high levels of confidentiality – in whatever sector – have to be maintained. Products such as ceramic HCI® lamps, D1 high-pressure discharge lamps for car headlights and mains voltage halogen lamps can no longer be manufactured using conventional technology.

The latest methods such as laser engineering, optoelectronics and electronic process control are being used to ensure the required precision even with materials that are difficult to process. The extremely strict requirements relating to the reduction of the mercury content were met by appropriate modifications to the machinery in the years after 2000.

By tightly bundling research and development activities with machine design and production the company has succeeded in reducing innovation time to a minimum. Improvement systems such as Total Productivity Management have been introduced in the factories and these have led to improvements in machine design and operation.

Despite all the automation, technical competence depends on the availability of well trained employees. The training centres that have been set up at many locations, such as Foshan in China, Sonepat in India, Nové Zámky in Slovakia and several German factories, have played an important role in ensure high levels of training. The Machine Centre with its sites in Augsburg in Germany, Nové Zámky in Slovakia and EDO (Equipment Development Operations) at OSRAM SYLVANIA* in the USA is responsible for machine operations in all factories throughout the world.

All change at the factories

With increasing mechanisation, production was concentrated at just a few sites, preferably at just one. This applied mainly to light bulbs and standard fluorescent lamps. There was an appreciable drop in prices, particularly for classic products, and an associated increase in pressure on costs. Costs reductions were achieved by extending machine operating times where necessary to seven days a week and, where possible, 24 hours a day, combined with appropriate shift work.

Today, the factories in Germany are highly automated and extremely efficient. Working time models are highly flexible. However the company constantly has to review its manufacturing costs, particularly for new investments. “We need even greater flexibility so that we can react faster to changes in the market and customer requirements. Only if we can continue to make our manufacturing costs competitive will Germany continue to be a production centre for our innovative high-tech products”, said Dr. Bopst, President and CEO.

Environmental protection

OSRAM takes a holistic approach to environmental protection, starting from the development of new products. Certain substances that are harmful to the environment are avoided altogether. An important aspect of all new products is the efficient use of energy, not only at the production stage but also during operation. And when OSRAM lamps come to the end of their life they must be recyclable.

As long ago as 1981 OSRAM made an important contribution to environmental protection with the development of a machine to separate and recycle the materials from old fluorescent lamps. The focus was not so much on disposal but on cutting down on waste and making the best possible use of all resources. This ties in perfectly with the Kyoto Agreement signed in 1997 to reduce CO_2 emissions by various means including energy savings.

Another award for OSRAM: OSRAM SYLVANIA received the ENERGY STAR® from the US Environmental Protection Agency for its ecological products.

Work started back in 1999 on extensive modernisation of the factory in Sonepat, not far from New Delhi, which had been acquired only the year before.

Without doubt, the greatest contribution to energy savings was made by compact fluorescent lamps, also known as energy savers. The most notable public presentation of an OSRAM DULUX® was made in 1994 by none other than Bill Clinton, the then President of the United States of America. He said: "A healthy economy and a healthy environment go hand in hand. In the long term we cannot achieve the one without the other." OSRAM showed that it was serious about environmental protection with its ECO audits started in 1999 in the German factories and also in Treviso in Italy and Molsheim in France.

These measures were costly but rewarding, and official recognition soon followed.

Examples:

2003	Siemens Environment Award for the OSRAM factory in Foshan, China
2003	Environment Award from the city of Regensburg for particularly ecological use of energy at the new OSRAM Opto Semiconductor factory in Burgweinting, Regensburg
2003–2005	OSRAM and OSRAM SYLVANIA*: "Lighting Manufacturer of the Year" for ecological products (award presented by the US Environmental Protection Agency)

From Brussels: WEEE

This abbreviation stands for Waste Electrical and Electronic Equipment and is an EU directive published in early 2003 and which has been in force since August 2005. Under the WEEE directive, lamp manufacturers are obliged to take over the disposal of privately used discharge lamps throughout the EU. This means that a fully operational return system has to be set up and lamps covered by the directive have to be recycled. The directive affects a variety of OSRAM products, notably fluorescent lamps, energy-saving lamps and high-intensity discharge lamps.

The purpose of the EU directive is to promote environmentally friendly product development, safeguard natural resources, achieve high recycling quotas and set limit values for harmful substances that are as low as possible.

OSRAM is fully involved in the implementation of the EU WEEE directive for lamps and has brought its considerable know-how to bear

Expansion in Asia: new factory in Foshan

To take advantage of the size and importance of the Chinese market, OSRAM entered a joint venture with Foshan Lighting in 1995 in Foshan near the city of Canton, now Guangzhou.

Since then, the gifts from the Chinese partners – two impressive lion sculptures – have guarded the main entrance to OSRAM's headquarters in Munich. The following is an extract from OSRAM News in December 1995: "Lions have now moved into the site at headquarters. Fortunately they are made of stone. Originally the site on which OSRAM's headquarters now stands was earmarked as an extension to Munich zoo. It was precisely here that that a lion house was to be built." In the same year the foundation stone was laid for a new factory in Foshan that would have enough space for in-house development, expanded fabrication, warehousing and the necessary offices.

Lamp production in Foshan has been continually expanded in the years since. ECG production in Panyu, which OSRAM took over from Siemens, had already reached the impressive landmark of 100 million units. In August 2004 OSRAM took over a minority shareholding

in the Felco company, the second largest lamp manufacturer in China and also located in Foshan. Today, OSRAM has more than 7000 employees in China.

OSRAM factories in India

The objective of having local production of the most common lamps in the Indian subcontinent could not be achieved with the 1994 joint venture to manufacture compact fluorescent lamps with Surya Roshni, one of the largest local lamp manufacturers in private ownership. The pressure to have local manufacture came from the uniquely high import duties. Work started back in 1999 on extensive modernisation of the ECE factory in Sonepat, not far from New Delhi, which had been acquired in October 1998

The glass works and fluorescent lamp production facility were equipped with more modern machinery and a compact lamp production line was transferred from Bari, Italy; equipment for the above-mentioned joint venture was added later.

In the 2005 fiscal year the OSRAM works in Sonepat became the fourth company in India and the seventh worldwide to be awarded four-fold certification for an integrated management system, comprising environmental protection (ISO 14001), quality (ISO 9001), health and safety (OHSAS 18001) and social responsibility (SA 8000).

Expansion in eastern Europe

The purchase of the Tesla factory in Nové Zámky, Slovakia, was completed on October 1, 1995. Primarily, the intention was to manufacture lamps with sales volumes that were high enough that for economical operation to be possible without a high level of mecha-

To take advantage of the size and importance of the Chinese market, OSRAM entered a joint venture with Foshan Lighting in 1995. Lamp production has been continually expanded in the years since. In 2003 the Siemens Environmental Award was presented to the OSRAM factory in Foshan, near Guangzhou.

nisation. The existing mechanical engineering activities however soon proved to be a good opportunity to produce spare parts and later entire machines.

In 2000 OSRAM had the chance to acquire HMZ in Bruntál, Czech Republic, a manufacturer of tungsten powder and other fine chemicals.

Sales companies in Warsaw, Poland and Budapest in Hungary and a sales support centre in Vietnam had been added in 1995.

OSRAM is the first international lamp manufacturer with a factory in Russia

In September 1999 a sales support office was set up in Moscow. The aim of having OSRAM's own production facilities in the country, however, was achieved a few years later. On December 30, 2003 the wait was over. The contract came into force on January 1, 2004.

OSRAM took over around 90 percent of the shares in the SVET lamp company in Smolensk in Russia (Svet is the Russian word for light). The 2,000 employees at SVET produce fluorescent lamps and starters. The tubes are manufactured in the company's own glass works. Sales amounted to around 12 million euros. OSRAM therefore became the first international lamp manufacturer to operate a factory in Russia.

Expansion in South America

OSRAM Mexico experienced significant growth in the 1990s and achieved a higher market share than all its competitors. In Mexico, business went so well that the factory and warehouse in the Naucalpan district of Mexico City was bursting at the seams.

The factory and administration building were relocated to larger premises in Tepotzotlan, Mexico City when a good opportunity arose to acquire a former textile factory. Production moved to the "new" premises in 1996.

With the establishment of the North American Free Trade Area (NAFTA) in 1994, to which Canada, the USA and Mexico belong, OSRAM Mexico was then ideal as a low-wage site for OSRAM SYLVANIA*. When the new factory was complete in 1996, labour-intensive lamp manufacture could be gradually moved from the USA to Mexico, particularly as Mexico could offer an almost inexhaustible supply of labour. Over the following years new sites in Mexico were added for producing prematerials, which could no longer be done in the USA for cost reasons.

The history of OSRAM in Ecuador has been much more serene. The factory built in the 1960s in Guayaquil is still there, producing light bulbs.

For OSRAM do Brasil, the largest subsidiary in Latin America, the 1990s was a decade associated with

On January 1, 2004 OSRAM took over around 90 percent of the shares in the SVET lamp company in Smolensk in Russia, making it the first international lighting company to operate a factory in Russia.

numerous changes, some highly significant. On the one hand, the company could be satisfied with the healthy increases in sales and other successes on the market, but the liberalisation of the country's import policy had bitter consequences for production from at least 1993. Production of automotive lamps such as BILUX®, halogen and glass-base lamps gradually had to be relinquished in the early 1990s.

The same applied after 1994 to the prematerials factories that had been set up around 20 years earlier. However the production equipment for wires, filaments and quartz tubes were soon being reused in Europe.

In 1999 there were the first signs of an economic crisis in particular in Brazil and Argentina. When Brazil was hit in 2001 by an unexpected energy crisis – low rainfall had reduced the output of the massive hydro-electric power stations that generated the majority of Brazil's electricity – production of light bulbs and fluorescent lamps had to be restricted. Energy-saving lamps were suddenly in huge demand. It was not until 2004 that the economy slowly started to pick up again.

For the sake of completeness, mention must also be made here of Chile. In view of the economic upturn a sales company was set up there in 2000.

75 years of OSRAM Molsheim

Founded in 1927, the company was not allowed to bear the name of OSRAM; instead it was called Neolux. The rights to the brand name of OSRAM had been lost in the First World War. On July 1, 1965 the company was officially renamed OSRAM S.A.R.L. Over the past few years mass production of light bulbs has been concentrated in Molsheim; there is also a "pack factory" that deals with a wide range of customer requirements.

OSRAM's most advanced warehouse was officially opened to mark this anniversary. This distribution service centre has space for 54,000 pallets and by 2005 was supplying no fewer than nine European countries. It is worth mentioning here that as a symbol of Franco-German relations Dr. Bopst, President and CEO of OSRAM, was made a Knight of the French Legion d'Honneur.

New standards in quality thanks to Total Quality Management

At the start of the 1990, OSRAM committed itself to Total Quality Management (TQM). Up to then, the term "quality" had generally been applied only to products; under TQM all the activities of a company have to be subjected to critical evaluation in accordance with a set of principles to determine potential for improvement. Employees and managers were now more intensely involved.

From 1995 onwards, all the factories in Europe and the USA were certified one by one to ISO 9000 and subjected to external audits at regular intervals, a procedure that is essential to meet the requirements of many customers, most notably the automobile industry.

From Japan came a drive to adopt TPM (Total Productivity Management), a method of identifying and utilising potential for improvement. What is new here is that anyone, even people at the lowest level of responsibility, can and should document weaknesses and have a right to have them rectified. TPM has been introduced over the years in all the factories and is a further element in the quest for lower costs and higher productivity, helping to safeguard manufacturing sites even in high-wage countries such as Germany.

Employees and the labour market

Up to the end of the 1980s it had been possible to offset increases in costs, due for example to rising personnel costs, through rationalisation and mechanisation, as already mentioned a number of times above.

The fall of the Iron Curtain in 1990 brought with it the first opportunity to relocate to low-wage countries. In Europe these were the former eastern bloc countries. When there were no further options for appropriate cost-cutting measures to offsetting the continuing fall in prices the only possible course of action was to look to low-wage countries. The fact that despite everything the number of employees in Germany rose slightly to more than 8,700 in 2005 indicates that the efforts involved by everyone concerned were considerable. Innovations remained crucial to OSRAM's strategy however.

To emphasise the importance of the outstanding performance and inventiveness of the employees to the future of the company, ten employees from Germany and abroad were awarded the OSRAM Star for the first time in December 1992. By 2005, management had rewarded around 150 employees from the "world of OSRAM" for their exceptional achievements.

Since 1996 there has been an Innovation Award for special inventions. This is presented each year to an employee or team for particularly innovative projects.

The OSRAM Star has been awarded since 1992 – for exceptional achievements and inventiveness by OSRAM employees.

Light of the future

In 1906 the OSRAM brand was born; in 1919 the company was founded – and in 2006 OSRAM is a high-tech enterprise in the lighting sector. In Berlin, the city of OSRAM's birth, for example, discharge lamps with ceramic arc tubes are now being manufactured in clean-room conditions. The centenary gave the company the opportunity not only to look back but also take stock and present a vision of the future, which is what the OSRAM CEO did at the annual press conference.

Looking ahead

Who would have thought it 100 years ago? This was the catch-phrase under which the OSRAM brand celebrated its 100th birthday. This was not just one day but a succession of events and opportunities throughout the year. In looking back we always find ourselves thinking also of the future – a future that will be at least as successful for the company in the next hundred years.

The automotive industry is using LED light as a major element in vehicle design. By 2010 the first approved models with LED headlights will be on the roads. There are already concept cars with these headlights, such as the Maserati Birdcage 75th which is equipped with OSRAM OSTAR® high-intensity LEDs.

At the end of April 2005 an era came to an end at OSRAM – the “Bopst era”. “Mr. Osram”, as the Frankfurter Allgemeine once dubbed him, succeeded in taking OSRAM from a lamp manufacturer with 16,000 employees in 1991 to an innovative lighting company, a global player with more than 38,000 employees.

Under Bopst’s management, OSRAM doubled its market share between 1991 and 2004 to around 19 percent, increased sales to 4.2 billion euros and almost tripled profits to more than 10 percent. From the moment he took office, Bopst focused on placing the company on an international footing and expanding its portfolio.

Innovation, Globalisation and Cost-Management – this is the platform on which his successor Martin Goetzeler and the senior management team will continue to build. Martin Goetzeler moved from Siemens to OSRAM in 1999 and has worked in Italy, in the UK as head of the regional company and, up to 2004, at OSRAM SYLVANIA* as CFO. He took over the “rudder” from Wolf-Dieter Bopst on May 1, 2005.

In his speech at the press conference on November 24, 2005, Martin Goetzeler started with the following introduction:

“Who would have thought it 100 years ago? Who would have thought 100 years ago that UV light could be used to disinfect water? Who would have thought 100 years ago that light could turn one room into hundreds of room? Or that light could hide operation scars? And who would have thought that lamps and electronic control gear could turn the outside of a football stadium into a spectacle of light?

Next year, the OSRAM brand will celebrate its 100th birthday. It was registered at the German Imperial Patent Office in Berlin on April 17, 1906. The stylised light bulb in our picture logo is a symbol not only for light but also for good ideas – and for our passion for intelligent light.

It dates back to 1919, the year in which the OSRAM company was founded. Over the years it has undergone various slight modifications, and in 2001 it was even turned upside down. The good old light bulb shape is still in use – now also for energy-saving lamps and brilliant halogen lamps.

In the last six months I have travelled throughout Germany and on almost every continent to meet employees and customers. I am now familiar with almost every one of our 49 factories throughout the world. For me it was always fascinating to see the enthusiasm behind our research and development work and our production of high-tech lamps, electronic control gear and opto semiconductors. And I am proud of the commitment shown by our employees in producing new lighting solutions for our customers. Always with the aim of creating better light for a better quality of life.”

One year later in his speech of the press conference on November 23, 2006, Martin Goetzeler emphasises the importance of innovation for our brand history again**.

OSRAM researchers in the Automotive division have developed the JOULE™ LED system which has been launched initially on the American market.

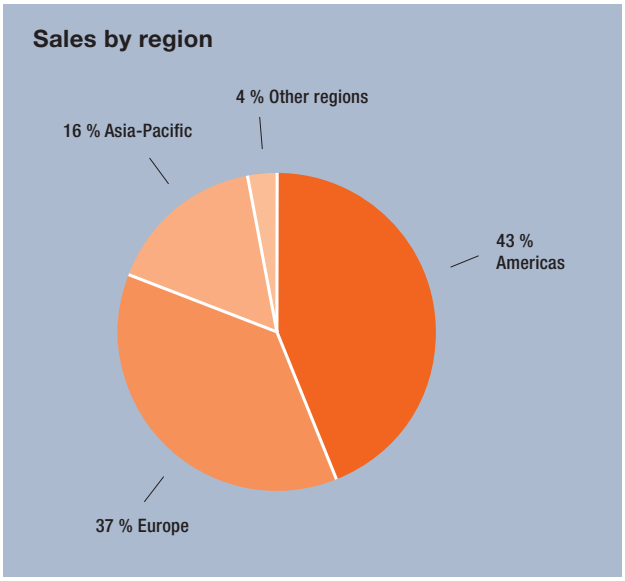
“Innovative lighting solutions are opening up new approaches in all walks of life, including art. The over 700,000 high-performance LED in our SEVEN SCREENS in front of our headquarter in Munich are controlled via optical waveguides from a central computer – each pixel in the display can reproduce any of 16 million different colours. Twice a year we shall be inviting young artists to create works of art on this digital platform. I have been heavily involved myself in this project because we want to use it to make the general public aware of the fascinating possibilities that new light sources can offer – and show that the OSRAM brand today still stands for innovation, as it did 100 years ago.

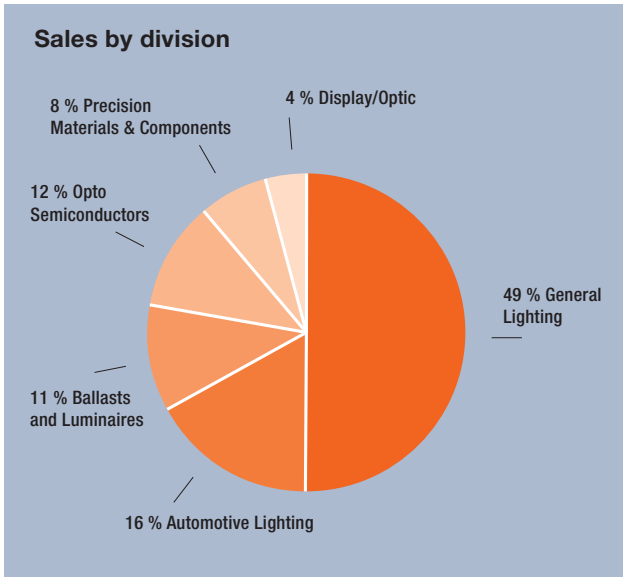
We would like to present not only the financial facts and figures but also outline our strategy for shaping the lighting market over the next few years and decades.

This is the first time we are presenting our financial statement in this new “team format” so before we start I should like to introduce you to our team. Dr. Kurt Gerl has been with OSRAM since 1988 and has headed up the General Lighting division for the past 10 years. On the Senior Management team Dr Gerl is responsible for sales and was appointed Executive Vice President Human Resources last January. Johannes Närger returned to OSRAM – after five years at Siemens – as CFO. Previously he had worked for us for several years in management functions in Germany and the USA. And finally Claus Regitz, who was appointed Chief Technical Officer in April. He is a real “home grown” talent – he has been working for 20 years at OSRAM most recently as Chief Production Officer at OSRAM Opto Semiconductors.

Let’s now take a look at some facts and figures for our fiscal year 2006 (10/1/2005–9/30/2006). We can say right now that it was a successful year. We achieved a further increase in sales and profits, embarked on further restructuring and invested heavily in the products and projects of the future.

OSRAM recorded a nominal increase in our world sales year on year of 6% to 4.6 billion euros. With a positive





currency effect of 2% this equates to adjusted growth of 4%. We have achieved double-figure volume growth in particular in products based on electronics, in other words in electronic control gear and opto semiconductors (the latter now account for 12% of total sales, compared with 11% in the previous year). At this stage I'd like to present some of the product highlights from this sector:

• With the POWERTRONIC® PTi electronic control gear we have made a major advance in the integrated control of high-intensity discharge lamps. PTi is an impressive 40 percent smaller than its predecessor and much in demand for shop lighting.
• Our high-brightness OSTAR LED was developed for applications in general lighting. You may have noticed the bright spotlights in the foyer before you came in here – they are equipped with LEDs, including our Ostar. At 420 lumen, a single module is as bright as a 20 W halogen lamp. The Ostar Projection LED is now market-ready e.g. for mini projection systems and head-up displays.
• We are proud of our latest ambient light sensor. OSRAM Opto Semiconductors is the first semiconductor manufacturer to succeed in producing a sensor that precisely matches the sensitivity curve of the human eye. Our sensor enables the brightness of displays for example to be adjusted more precisely than before and headlights to be switched on and off automatically, all on the basis of ambient light conditions. It is suitable for switching headlights on and off automatically and for adjusting the brightness of displays and other such components depending on ambient light levels. And because the display is only lit when necessary it's not only easier on the eye, it's also easier on the batteries in mobile devices.

And now to our business developments worldwide. We posted increased sales in all regions. We achieved particularly good growth in the BRIC states – Brazil, Russia, India and China – especially in China. We'll look at the regions one by one.

The Americas remain our largest market at EUR 2.0 billion (+8%) and contribute 43% to our worldwide business. In

In 2004 OSRAM acquired SVET, Russia's largest fluorescent lamp manufacturer. Priorities here include product quality, modernising the production facilities and the environmental aspect.

Thanks to more than 25,000 fluorescent lamps and 12,000 ECGs from OSRAM installed in Siteco luminaires, the Allianz Arena in Munich looks splendid in white, blue or red light

the NAFTA states of USA, Canada and Mexico we grew by 7% to EUR 1.8 billion. In North America, sustainable light sources are becoming more and more important, and we are particularly successful here with our energy-saving lamps and systems. For the fourth time in a row, OSRAM SYLVANIA* was named “ENERGY STAR Partner of the Year” by the US Environmental Protection Agency. We also recorded positive developments in South America – above all in Brazil and Argentina.

Employees in the USA have invented an exciting new consumer product by the name of Dot-it. This is a small mobile light that can be used anywhere. It is equipped with three LEDs and three replaceable batteries and can be attached to almost anything by its adhesive strips. We have already sold millions of Dot-its throughout the world – including Germany.

This product has had an excellent “side-effect” in that it has given the OSRAM brand a fresh look. It has clearly strengthened the brand even though most of our business is B2B and end consumer business accounts for less than 20% of sales.

4ArXS HSD metal halide lamps of the new UL type (Ultra-Longlife) have an impressive life of 6000 hours. They have been used to highlight the remarkable roof of the Sony Center in Berlin.

Sales in Europe contribute 37% to global business. The increase in sales is thanks largely to innovative products and growth in Eastern Europe where sales showed double-figure growth rates. In Germany, Europe’s largest lighting market, there has been something of an economic revival – sales rose by 4% to EUR 543 million (previous year EUR 521 million). Germany still accounts for 12% of our world business.

Business in Asia/Pacific, where we increased our sales by 7% to EUR 736 million, contributes 16% to world business. We achieved double-figure growth rates in various countries including India, Indonesia and – as mentioned before – China. The market for video projection lamps, for which our customers are mainly in Taiwan and Japan, started recovering since the middle of 2006 after a slump that lasted almost one and a half years. We have managed to achieve significant successes here above all with our innovative Unishape technology.

So far, OSRAM is the only company in the world to have developed this technology so that it is now market-ready. In this system the lamp is operated by control gear according to the image content, leading to much improved colour rendering and contrast.

Since the year 2000 OSRAM has increased its proportion of sales in Asia/Pacific from 9% to 16%. By 2015 we are looking to generate one third of our sales here, to match the one third in Europe and one third in the USA. This does not mean however that the absolute volume of sales in Europe and the USA will fall! Quite the contrary. We expect further potential for profitable growth, particularly in innovative products. All that will happen is that the percentage shares of world sales will shift from Europe and the USA in favour of Asia.

At last year's press conference I announced our strengthened presence in the growth regions of Asia and Eastern Europe as one of the highlights for the 2006 and 2007 fiscal years. So what have we accomplished in 2006?

First let us consider Asia:
• This year we are even closer to our customers now that we have set up our new cross-regional Asia organisation with its headquarters in Hong Kong. The aim in particular is to accelerate local product launches, coordinate regional marketing activities and to improve support for international customers in Asia. The proximity to our facilities in Foshan and Panyu means that synergy effects can be utilized. This relates above all to products that are tailored to the specific needs of the Asian market.
• Closer contact with customers was also the reason for relocating the headquarters of the Ballasts and Luminaires Division to Hong Kong and the Display Systems Business Unit to Japan – both moves were completed in 2006, as announced.

The PURITEC® UV system disinfects drinking water economically and without the use of chemicals. The unit emits ultraviolet radiation at a wavelength that kills bacteria and viruses.

• These measures have enabled us to create a regional network covering the Asian countries.
• And we have also further increased the OSRAM workforce in Asia as a proportion of our global workforce: from 29% in the 2005 fiscal year to 33% in the fiscal year just ended. In China alone we now employ more than 8,000 people.

We have also significantly strengthened our presence in the growth region of Eastern Europe:
• For example, we have established new subsidiaries and sales offices in Albania, Kazakhstan, Macedonia, Moldavia, Byelorus and the Baltic states, and additional sales office in Russia.
• At SVET in Russia, the factory in Smolensk that we acquired in 2004, we have been modernising and rationalising the plant throughout. We have also had notable successes in environmental protection.

The number of employees rose during the period under review by 5%, passing 40,000 worldwide for the first time. The principal reason is the major expansion of production and sales activities in Asia/Pacific and Eastern Europe and an associated increase in the number of employees of 17% and 10% respectively compared with the previous year. In Germany, the number of employees remained stable at 8,817 (previous year 8,756).

And now to group profits. In the 2006 fiscal year, this increased from EUR 465 to 481 million, in other words by 3%. Our group profit margin is now 10.5% (previous year 10.8%) and within the target corridor prescribed by the parent company Siemens. We achieved this high earnings level despite
• rises in energy and metal costs,
• continual restructuring,
• continued high upfront investments for innovations, particularly in the Opto Semiconductors division and for high-intensity discharge lamps
• and increased outlay for our expansion in the growth regions.

Strength in innovative products and strict cost management were the reasons for this continued high level of performance. This is something we shall continue to promote. We are constantly working to improve processes and productivity worldwide. In the last fiscal year alone, more than 200 design-to-cost programmes and more than 1,000 other productivity programmes were either started or completed.

The cash balance overall was EUR 414 million and therefore still at a high level – despite increased property, plant and equipment and financial assets. The big sellers and earners worldwide were and remain our innovative products. They account for around 40 percent of our business. Against this background we again increased our investment in property, plant and equipment and our expenditure on research and development.

At 508 metres, "Taipeh 101" is the tallest structure in the world. Osram was chosen as a system supplier to provide the lighting equipment.

Expenses on research and development rose by 7% to EUR 239 million. For OSRAM as a whole, R&D expenses amounted to 5.2% of sales last year; for opto semiconductors it was around 13%.

In addition to inorganic light emitting diodes (LEDs), which are based on crystalline structures, we also focus on organic light emitting diodes (OLEDs). The term "organic" refers to the material used in the construction of these light sources. This may be polymers or small molecules. We are have strengthened our efforts on OLEDs for general lighting and added around 40 employees to our research and development department in Regensburg since 2005. OLEDs will open up entirely new areas of application because they are economical, flat, transparent, flexible and extremely thin. Their active layer is less than 500 nanometres thick – that is about one hundredth of the diameter of a human hair. In contrast to LEDs, which are point light sources, OLEDs are two-dimensional. First we expect to see applications such as self-luminous emergency and information signs – in places as diverse as stairs and aircraft. Indoor lighting will also undergo a revolution, with OLEDs being used as decorative elements and as diffused lighting covering the entire ceiling to mimic natural sunlight. And looking even further into the future there will come a day when OLEDs will be used as transparent illuminated room dividers or even as OLED curtains.

What are the challenges that OSRAM will be facing together with others as part of the "BMBF Initiative OLED 2015" that was presented in September? Material research programmes are targeting lifespan, brightness and

efficiency. Another challenge is to find processes that will enable large-area OLED light sources to be manufactured in reliable quality and uniformity. The greatest challenge will be to develop mass production methods to ensure cost-effective manufacture. OLEDs will only ever become a widespread light source if the price is right.

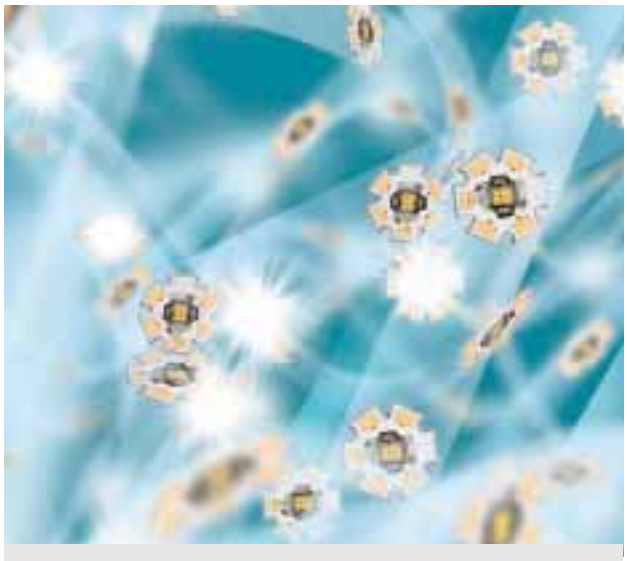
As far as lamps and lamp systems are concerned our particular focus is on high-intensity discharge. These high-tech lamps involve a flash of light in a gas-filed glass or ceramic tubes. They are used in sports arenas, swimming pools, factories and airports and for professional shop window lighting and film projection. The benefits of these high-performance lamps include high luminous efficacy, very good colour rendering and long life.

In addition to expenditure on R&D, we have also increased our capital expenditures by 3% to EUR 296 million (previous year EUR 286 million). Despite all the expansion in growth markets, German manufacture continues to be of great importance to us – as the main site for manufacturing our innovative products. In the fiscal year just ended, EUR 152 million was invested in Germany, that is half of all investment in property, plant and equipment. In the past five year we have invested a total of EUR 700 million in capital expenditures for our German sites.

In the period under review there was particularly high investment in expanding capacity for high-intensity discharge lamps in Berlin and for LED production in Regensburg. In view of the high demand for LEDs we need more space right now and are therefore expanding our existing opto chip factory in Regensburg and our production facilities in Malaysia.

Now let's look forward to 2007. In the current fiscal year we intend to achieve good volume growth, specifically in innovative products. We are anticipating continued high earnings. We shall keep to our long-term strategy of energetically promoting innovations and globalizing the business – while practising strict cost management. In the years to come our focus will continue to be on the growth regions of Asia and Eastern Europe and on innovative products. The focus will continue to be on high-intensity discharge lamps and opto semiconductors and on further expanding our activities in LED systems. OSRAM will be strengthening its presence in the growth market of Asia with a second factory in India. We also see energy-saving products as an important contribution toward climate protection and as central innovation and growth drivers.

To expand our presence in the growth market of Asia, OSRAM has taken the decision to build a second factory in India that will be located nearby the existing factory in Sonepat, around 50 km north of New Delhi. The 700+ employees in Sonepat are producing light bulbs, fluorescent lamps and energy-saving lamps for the Indian



OSTAR® Lighting and Golden DRAGON®: white LEDs from Osram can be used in many areas of general lighting.

market. Energy savers and other sustainable products will be the focus of the new factory. In India there is enormous demand for energy-saving lighting solutions – and in private homes energy-saving lamps are being used more and more instead of ordinary light bulbs. We intend participating forcefully in this growth and expanding local production. From the current perspective, the investment over the medium term will be EUR 10 to 15 million. Work on building the new factory is due to start in the first half of 2007. I must emphasise here and now that our presence in the growth regions will play an important role in securing jobs in Germany.

Responsible use of resources, avoidance of pollutants and the promotion of energy-efficient products are and

Almost on the other side of the globe from our headquarters in Munich, HQI®, HMI®, compact fluorescent lamps and fluorescent lamps from OSRAM light up the Baitarek, Kazakhstan's symbol of independence.

will remain major strategic factors in product development for OSRAM. Light accounts for around 20% of global power consumption. Energy-efficient lighting is therefore enormously important as far as climate protection is concerned.

According to our analyses it should be possible to save around 320 million MWh of electricity and therefore around 160 million tonnes of CO2 emissions each year throughout the world in the fluorescent lamp sector alone by replacing conventional systems with intelligent energy-saving systems. This corresponds to the annual CO2 emissions from all vehicles in Germany. End consumers can also make a contribution, for a modest initial outlay, by using energy-saving lamps. These lamps consume up to 80 percent less electricity than ordinary light bulbs so they save money in the long run. You see – for OSRAM, sustainable products not only help protect the climate they also act as central innovation and growth drivers.

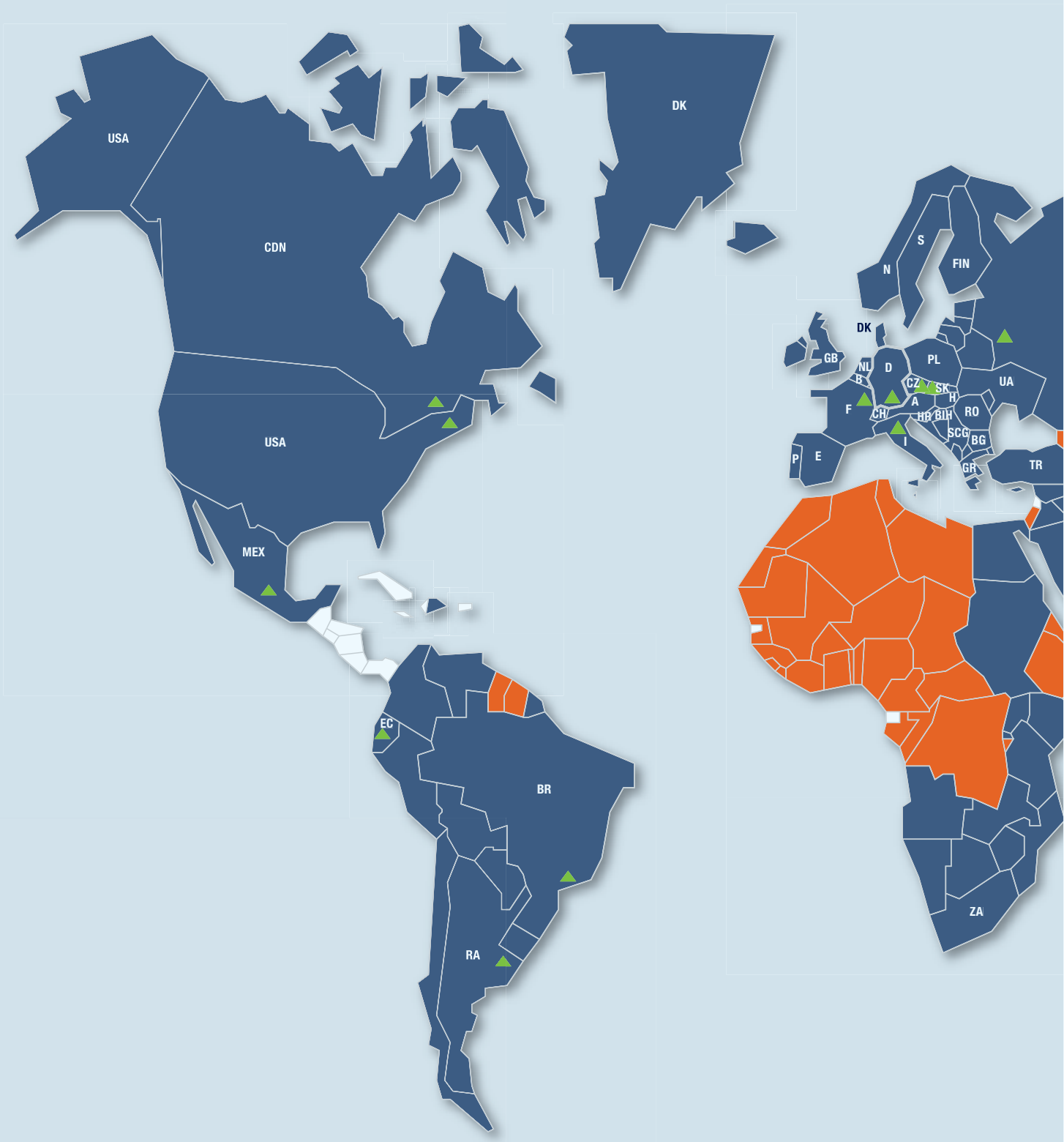
At this point I would like to present two new energy-saving lamps. OSRAM is bringing flexibility to energy-saving light with its infinitely dimmable OSRAM Dulux EL DIM compact fluorescent lamp. The integrated dimming function provides variable light for individual lighting and the possibility of even greater savings in electricity. It has an average life of 15,000 hours. This world first, which incidentally contains around 250 electronic components, will be available in the shops in the spring.

Another innovation is a solar powered energy-saving lamp that we are in the process of launching. The OSRAM Dulux Solar Vario can be used wherever power comes not from an ac supply but from solar systems, batteries or generators – it is therefore ideal for use in developing countries. A special feature of our lamp is that it can be switched from 11 to 6 W if for example less solar power is available or if several units have to be operated from one battery.

100 years of innovation – this was the motto for OSRAM's centenary celebrations in 2006. For us, the next 100 years will also be a challenge. This is because the lighting market is changing – not least because of the growing importance of the markets in Asia and Eastern Europe, the gradual penetration of lighting solutions based on opto semiconductors and increasing global competition, particularly with Asian companies.

Against this background it is crucial for us to invest in growth areas – technological and regional – and to continue with strict cost management. Our aim is for OSRAM to take advantage of the opportunities that this change offers, as it has done in the past, and to shape the lighting market in the next 100 years. We intend strengthening our market position still further, achieve good profitability and offer jobs with long-term prospects throughout the world."

ANNEX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OSRAM customers in around 150 countries.*

71 subsidiaries and sales offices for 110 countries

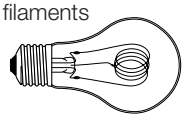
39 countries supported by local agents or OSRAM GmbH, Munich

49 production plants in 18 countries

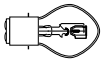
* Fiscal year 2006

OSRAM has been setting milestones in lighting technology

1910
Incandescent lamps with tungsten filaments

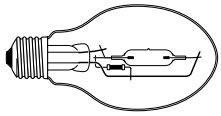


1925
BILUX® dual-filament headlight lamps

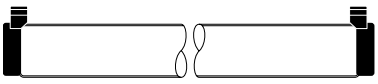


1931
Low-pressure sodium lamps

1933
High-pressure mercury vapour lamps

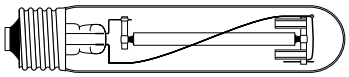


1936
Fluorescent lamps

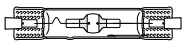


1954
XBO® high-pressure xenon lamps

1968
VIALOX® NAV Standard high-pressure sodium lamps

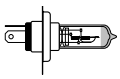


1968
POWERSTAR® HQI® metal halide lamps



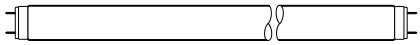
1970
HMI® METALLOGEN® lamps

1971
BILUX® H4 dual-filament halogen headlight lamps



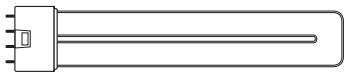
1973
HALOSTAR® low-voltage tungsten-halogen lamps

1979
LUMILUX® fluorescent lamps



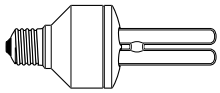
1980
QUICKTRONIC® DE LUXE ECG

1982
OSRAM DULUX® L compact fluorescent lamps

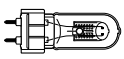


1984
DECOSTAR® low-voltage tungsten-halogen lamps with dichroic reflectors

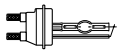
1985
OSRAM DULUX® EL compact fluorescent lamps



1987
POWERSTAR® HQI®-T metal halide lamps

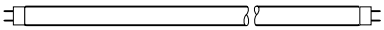


1991
D1 gas discharge lamps

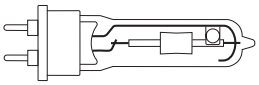


1993
FM mini fluorescent lamps

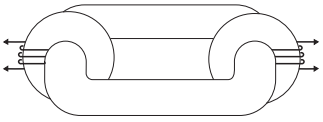
1995
T5 high-efficiency fluorescent lamps



1996
POWERSTAR® HCI® metal halide lamps with ceramic arc tubes

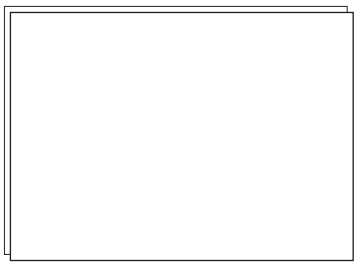


1997
ENDURA® electrode-lesshigh-performance fluorescent lamps

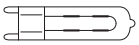


1998
DECOSTAR® IRC halogen energy-saving lamps

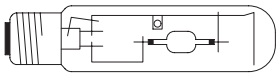
1998
OSRAM PLANON® Two-dimensional mercury-free discharge lamps



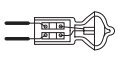
1999
HALOPIN®, the smallest mains voltage halogen lamps



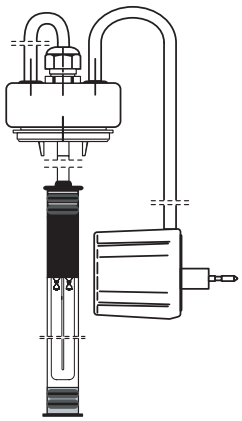
2002
POWERBALL® HCI®-T metal halide lamps with round ceramic arc tubes



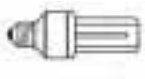
2004
MINISTAR®, the smallest halogen reflector lamp in the world



2005
PURITEC®drinking water disinfectionsystem



2006
DULUX® EL DIM, dimmable energy saving lamp



Highlights in OSRAM's history

1854
The watchmaker Heinrich Goebel encloses a charred strip of bamboo in a glass bulb from which all the air has been evacuated. He connects the bulb to a battery and uses this lamp to light his workshop in New York. His carbon fibre lamp is considered to be the first truly usable incandescent lamp. Heinrich Goebel trained as a mechanical engineer in Germany and emigrated to the USA after the 1848 revolution.

1879
Thomas Alva Edison develops the light bulb so that it can be produced on an industrial scale. He introduces the screw base to provide electrical contact. This is still used to this day and still bears his name. Like Goebel, he uses a carbon fibre as the filament.

1880/1882
In Germany, Werner von Siemens and his son Wilhelm conduct the first successful experiments in 1880 with incandescent lamps using different materials (metals, cotton fibre, cellulose, etc.). The Siemens and Halske light bulb factory, the oldest in Germany, grows out of their workshop in 1882.

Birth of the OSRAM brand

1901
The Austrian chemist Auer von Welsbach develops the Oslamp with a filament made of Osmium. After only a few years, osmium is replaced by the more stable metal tungsten. Tungsten has the highest melting point of any metal. The use of tungsten increases the luminous efficacy and life of incandescent lamps.

1906
OSRAM is registered as a trademark by Auer von Welsbach (Auer-Gesellschaft) at the German Imperial Patent Office. The name is taken from the names of the two metals – first osmium and later wolfram (the alternative name for tungsten).

1910
Incandescent lamps with tungsten filaments. The manufacture of very thin wire enables the filament to be wound a number of times, leading to more light. Siemens produces incandescent lamps with filaments made from tungsten (wolfram) and tantalum under the Wotan brand.

Founding of OSRAM GmbH KG, Berlin

1919
Deutsche Gasglühlicht AG (Auer-Gesellschaft), Siemens & Halske and AEG agree to merge their lamp production facilities in Berlin and found OSRAM Werke GmbH KG, Berlin on July 1,1919. Dr. William Meinhardt is appointed Managing Director of OSRAM. In 1929, the year of global economic depression, International General Electric of America takes a shareholding in OSRAM. In 1978, Siemens becomes the sole shareholder in OSRAM GmbH.

1919
Launch of the picture logo which, after various modifications, still stands for OSRAM. Today, the stylised lamp in our picture logo is a symbol not only for lighting but also for good ideas – and for OSRAM's passion for intelligent light.

20s
Establishment of sales support centres in the form of companies, e.g. offices in Zürich, Vienna, Oslo, Copenhagen, Milan, Stockholm, Bucharest, Helsingfors, Amsterdam, Riga, Shanghai, Brussels, London and Rio de Janeiro.

1922
OSRAM founds the subsidiary Wolfram-Lampen AG in Augsburg (with a shareholding of 92%). The factory has an annual output of three million lamps. Establishment of the OSRAM pension funds for workers and salaried staff.

1924
Launch of the fully rounded incandescent lamp. All OSRAM lamps have the familiar uniform bulb shape.

1925
Launch of the Bilux dual-filament headlight lamp, pro-

viding full beam and dipped beam from a single light source. The Bilux lamp is one of the most internationally successful and familiar of all OSRAM products.

Gas discharge lamps – the most efficient light source

1931
Launch of the first low-pressure sodium lamp. It is based on the patent for the sodium tubes of the OSRAM researchers Pirani and Reger from 1929. The gas discharge lamps with a luminous efficacy of 50 to 70 lumen/watt set new standards in artificial light. In Berlin the first low-pressure sodium lamps are used for street lighting

1933
Development of the high-pressure mercury vapour lamp. It is mainly used for lighting in industry and commerce.

1936
Launch of the fluorescent lamp. OSRAM is awarded a Gold Medal at the World Fair in Paris in 1937 for the Superlux high-voltage fluorescent lamp.

1936/37
OSRAM sets up a central plant for producing incandescent lamps at the site of Bergmann Elektricitäts AG in Berlin-Wedding, which is acquired in 1935. The result is one of the first and largest industrial complexes in Berlin.

1939–1945
During the Second World War numerous production sites were relocated from Berlin to cities in the eastern part of Germany. As a consequence of the Second World War, OSRAM is dispossessed of its production sites in east Berlin and in the Soviet occupied zone, and loses all its foreign subsidiaries and brand rights.

1948
Berlin blockade: The US air force supplies Berlin with food and goods. OSRAM products valued at DM 19.7 million are airlifted to the West. The company's headquarters, which had been in east Berlin since the company was founded in 1919, are relocated in 1949 to West Berlin.

OSRAM – as bright as day

1949
"OSRAM – hell wie der lichte Tag". This claim is the basis of the worldwide familiarity of the OSRAM brand since the 1950s.

1954
Establishment of a second headquarters in Munich. Launch of the XBO xenon high-pressure lamp, which is used for stage and TV lighting, cinema projection and graphic trades.

1956
OSRAM GmbH Kommanditgesellschaft is converted on July 1, 1956 into a limited company and is renamed as "OSRAM GmbH Berlin/Munich". The shareholders are Siemens Aktiengesellschaft, AEG and International General Electric Company (USA).

1965
Official opening of the OSRAM administration building in Munich.

1967
Errichtung des OSRAM-Werkes Eichstätt für die Fertigung
Establishment of the OSRAM factory in Eichstätt for the manufacture of halogen and xenon lamps. The factory develops into the most important site for the manufacture of special lamps such as IRC lamps. As long ago as 1949, OSRAM registered a patent for tungsten-halogen and discharge lamps. The halogen cycle has a self-cleaning effect on the lamp and therefore helps the lamp last longer, produce a more intense light and offer good colour rendering.

1968
Launch of the Powerstar HQI high-pressure metal halide lamp. These extremely bright lamps are used to illuminate the largest sports stadiums in the world, such as the Olympic Stadiums in Munich, Lillehammer (Norway) and Seoul (Korea).

1971
Launch of the Bilux halogen headlight lamp.
They are brighter than ordinary lamps so drivers can see and be seen better, making the roads much safer

1971/72
The Four-Power Agreement secures the political future of Berlin as an investment location. The OSRAM glass works in Berlin is updated making it the most advanced tubular glass factory in Europe.

1973
Launch of low-voltage tungsten-halogen lamps.
Halogen reflector lamps provide focused directional accent lighting. They are ideal for directional lighting and as point light sources for illuminating pictures, for example.

1973/74
The oil crisis, economic crisis and cheap imports from state-run countries make 1974 the worst for OSRAM since the second World War. The renovation of old production facilities, strict cost management and continual investment in research during the 1980s lead the company out of the crisis.

1976/78
Siemens AG takes over the shareholding of AEG Telefunken, lifting its own shareholding in OSRAM to 79%. With the acquisition of the 21% shareholding of International General Electric in 1978, Siemens AG becomes the sole shareholder in OSRAM GmbH.

1980
The launch of the Quicktronic ECG heralds the start of the success story of electronic control gear that is still going on today. They reduce the power consumption of fluorescent lamps, and ensure excellent quality of flicker-free light with no humming noise.

Energy-saving lamp for the home

1985
With the launch of the OSRAM Dulux EL energy-saving lamp, OSRAM pioneers energy-saving lamps for the home. OSRAM is the first manufacturer to integrate the electronic control gear (ECG) in the base of an energy-saving lamp. Energy-saving lamps are compact fluorescent lamps made with thin double or triple-turn tubes. They offer electricity savings of 80% and have a much longer life than ordinary light bulbs. Today they are available in the familiar shape of an ordinary light bulb.

1986
Re-acquisition of rights to the OSRAM trademark in the United Kingdom and Commonwealth countries with the founding of OSRAM-G.E.C. (General Electric Company) Ltd. In 1990 OSRAM acquired a 51% shareholding in G.E.C and changed the name of the company to OSRAM Ltd. From 1945 to 1986, OSRAM had to trade in the United Kingdom and the Commonwealth under a secondary brand.

1983/1987
OSCAR® for OSRAM. XBO (1983) and HMI (1987) lamps for film and television are awarded a Hollywood OSCAR®. Since 1928 OSRAM has been producing lamps for stage lighting, film work and cinema projection.

1989
The joint venture between OSRAM and Mitsubishi opens up the Japanese market for OSRAM.

1991
D1 gas discharge lamp for cars. The launch of xenon light is a quantum leap in lighting technology. Xenon headlights have an extended beam, provide a more intense light and consume less power.

OSRAM SYLVANIA – growth in North America

1993
OSRAM acquires SYLVANIA North American Lighting, the second largest lamp manufacturer in North America with all its business interests in the USA, Canada and Puerto Rico. OSRAM becomes the largest manufacturer of automotive lamps.

1995
Start of the manufacturing and marketing joint venture in Foshan (China). Since then, two Chinese lion statues

are standing outside the OSRAM's Munich headquarters to bring luck.

1997
Start of production of energy-saving halogen lamps with an IRC bulb coating at the Eichstätt works. The infra-red coating brings energy savings of up to 45 percent.

1998
High-tech lamps: Endura – the high-performance fluorescent lamp without electrodes and the Planon flat lamp for backlighting flat screens and displays. Development of photo-optic lamps for effect lighting, stage lighting and projection systems, such as video and beamers

1999
OSRAM produces the smallest mains voltage halogen lamp in the world, the Halopin. It enables designers to create small decorative luminaires without transformers. In 2003, the even smaller Halopin Compact is launched.

Mercury-free discharge lamps –
a vision turned reality

2000
OSRAM develops mercury-free systems for discharge lamps and lead-free glass for general lighting.
OSRAM already offers mercury-free discharge lamps in the form of Planon lamps. Now come Xeradex lamps which provide high-energy UV radiation for purifying water and disinfecting surfaces. The Linex lamp system offers "turbo-charged" light for photocopiers and scanners. All the OSRAM production sites throughout the world are ISO certified.

The light source of the future –
light emitting diodes from semiconductor material

2001–2003
OSRAM builds the world`s most advanced factory for light emitting diodes (LEDs) in Regensburg (Burgweinting). Opto semiconductors are among OSRAM's most innovative products. They convert electricity directly into coloured light using a semiconductor chip. LEDs generate more light with less energy and last between 20,000 and 100,000 hours. LED lighting is now all around us, from dashboard backlighting to mobile phone displays.

2002
OSRAM Opto Semiconductors develops organic light emitting diodes (OLEDs) made from self-luminous plastics for displays in cars, mobile phones and household appliances, ready for mass production. OLEDs offer high levels of contrast and are suitable for video applications. They are easier to read than previous liquid crystal displays.

2004
OSRAM present the world's smallest low-voltage halogen reflector lamp, the Ministar. What is special about this lamp is that its reflector is not attached outside the lamp but is integrated in the lamp. This gives luminaire manufacturers enormous freedom of design.

2005
Puritec water purification system: At the heart of this system is a UVC lamp that is inserted in the water container. The unit emits ultraviolet radiation at a wavelength that kills bacteria and viruses.

2006
Six chips give OSRAM OSTAR® Lighting a brilliant presence at the Light+Building fair. It achieves 420 lm (28 lm/W) with a lens and 300 lm (20 lm/W) without a lens, in each case at an operating current of 700 mA. Its hexagonal shape allows for high packing densities and enables multiple LEDs to be combined like a mosaic to create large areas of light or patterns of flexible design.

April 17, 2006
The OSRAM brand is 100 years old. OSRAM has over 40,000 employees and manufactures in 49 production plants in 18 countries throughout the world.

The Chairmen of the Managing Board

1919–1933
Dr. William Meinhardt
Born August 29, 1872
Died May 31, 1955

1933–1939
Privy Councillor Hermann Schlüpmann
Born August 29, 1872
Died February 15, 1949

1939–1940
Privy Councillor Dr. Erich Klien
Born April 22, 1881
Died September 16, 1940

1940–1945
Dr. Herbert Rohrer
Born June 3, 1901
Died July 13, 1991

1950–1953
C. O. Rothweiler
Born February 1, 1885
Date of death unknown.

1953–1957
Senator h. c. Dr. Dr. Alfred Meyer
Born June 4, 1888
Died December 11, 1968

1957–1967
Senator h. c. Dr.-Ing. Heinrich Freiberger
Born August 21, 1900
Died September 9, 1990

1968–1975
Prof. Dr. Albert Prinzing
Born February 17, 1911
Died July 21, 1993

1976–1991
Senator h. c. Helmut Plettner
Born January 10, 1925
Died February 9, 1992

1991–2005
Dr. Wolf-Dieter Bopst
Born October 3, 1939

seit 2005
Martin Goetzeler
Born May 11, 1962

*** Note on use of the name SYLVANIA:**
OSRAM holds the worldwide rights to use the name SYLVANIA for automotive lamps and precision materials and components. In the general lighting product sector, OSRAM holds the rights to the name SYLVANIA in the United States, Canada and Mexico, while SLI, Europe, holds the rights for all other countries.

**** Note on speech by Martin Goetzeler (page 89–97):**
This text contains forward-looking statements and information – that is, statements related to future, not past, events. These statements may be identified by words as "expects", "anticipates", "intends", "plans", "believes", "seeks", "estimates", "will" or words of similar meaning. Such statements are based on our current expectations and certain assumptions, and are, therefore, subject to certain risks and uncertainties. A variety of factors, many of which are beyond OSRAM's control, affect its operations, performance, business strategy and results and could cause the actual results, performance or achievements of OSRAM worldwide to be materially different from any future results, performance or achievements that may be expressed or implied by such forward-looking statements. For us, particular uncertainties arise, among others, from changes in general economic and business conditions, changes in currency exchange rates and interest rates, introduction of competing products or technologies by other companies, lack of acceptance of new products or services by customers targeted by OSRAM worldwide, changes in business strategy and various other factors. More detailed information about certain of these factors is contained in Siemens' filings with the SEC, which are available on the Siemens web site, www.siemens.com and on the SEC's web site, www.sec.gov. Should one or more of these risks or uncertainties materialize, or should underlying assumptions prove incorrect, actual results may vary materially from those described in the relevant forward-looking statement as anticipated, believed, estimated, expected, intended, planned or projected. OSRAM does not intend or assume any obligation to update or revise these forward-looking statements in light of developments which differ from those anticipated.

Imprint

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