Insights Carl Zeiss

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1. WELCOME TO CARL ZEISS

Thank you for taking an interest in our company, its products and its services.

Carl Zeiss is an innovative technology leader in the fields of optics, precision engineering and electronic visualization. Time and time again, we set new, pioneering standards in sophisticated technology for recognizing, experiencing, measuring, analyzing, structuring and processing a wide spectrum of objects. With professional optics for demanding applications not only in research, medicine, industry - but also for use in leisure activities.

2. FACTS AND FIGURES

Carl Zeiss

Carl Zeiss, founded in Jena in 1846 as a workshop for precision mechanics and optics, is now an international technology leader. The headquarters of the Carl Zeiss Group and Carl Zeiss, which controls and coordinates the company's global activities, is Oberkochen, Germany. This is also the base from which most of the company's business groups are managed: Consumer Optics, Medical Systems, Opto-Electronic Systems, Semiconductor Technology and Industrial Metrology.

Jena is the second core location of the Carl Zeiss Group. Carl Zeiss Jena GmbH, 100% subsidiary of Carl Zeiss, bears the responsibility for the business groups Microscopy and Opto-Electronic Systems and for a large percentage of the associated activities.

The Carl Zeiss Group

Carl Zeiss Group is managed by the company Carl Zeiss which is a member of the Carl Zeiss Stiftung. It offers a wide spectrum of high-quality products, electronics and precision engineering to partners and customers on an international basis.

The Carl Zeiss Stiftung

As the sole owner of Carl Zeiss, Oberkochen, and Schott Glaswerke, Mainz, the Carl Zeiss Stiftung (Carl Zeiss Foundation) is an independent entity. It has no private or state owners and is not financed by any outside capital. The companies must themselves earn the capital they require to safeguard their future existence and to ensure their ongoing growth.

The Status of the Carl Zeiss Stiftung form the corporate constitution of the foundation itself and of the two companies contained in it.

The foundation's goals and objectives include: safeguarding the economic base of the two foundation enterprises; the promotion of science and technology; the cultivation of precision technology, and of optics and glass technology in particular.

Table 1. Carl Zeiss worldwide: Approx. 40 sales companies outside Germany, over 100 agencies and 15 production centers

	Carl Zeiss Group	**Carl Zeiss Stiftung**
Sales in DM millions	2560	5100
Employees	over 12000	over 28000
% of sales outside Germany	over 70	over 70

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*The author selected the text from the brochure " Insights" , published by Carl Zeiss in 1996

3. BUSINESS GROUPS AND PRODUCT SPECTRUM

Business Groups and Divisions	**Product Spectrum**
Consumer Optics	
Ophthalmic Products	Eyeglass lenses, special visual aids, systems for vision testing and eyeglass fitting
Eyeglass Frames	Eyeglass frames, sunglasses
Contact Lenses	Contact lenses
Binoculars	Binoculars, riflescopes
Camera Lenses	Camera and movie lenses
Industrial Metrology	
Bridge-type Measuring Machines	Bridge-type coordinate measuring machines
Horizontal-arm Measuring Machine	Horizontal-arm coordinate measuring machines
	Optical metrology
Microscope	
Microscopes	Upright and inverted light microscopes, microscope systems, stereo microscopes, laser scanning microscopes
Histology	Microtomes, cryostats, tissue processors, automatic stainers
Medical Systems	
Surgical Instruments	Surgical microscopes, examination microscopes, colposcopes, documentation systems
Ophthalmology	Fundus cameras, slit lamps, refractometers, perimeters, tonometers, image archiving systems, keratometers, phoropters, ophthalmic lasers
Semiconductor Technology	
Semiconductor Optics	Microlithography systems, High-resolution optical systems for wafer steppers
Opto-Electronic Systems	
Consulting and Engineering	Complete equipment for laboratories, doctor’s offices, hospitals and institutes
Planetaria	Planetaria
Photogrammetry	Photogrammetric systems, special aerial survey systems
Defense Optics	Optronic components, systems for remote sensing, infrared and thermal image technology
Surveying Instruments	Levels, digital levels, electronic and recording total stations, DOS computerized total stations, electronic theodolites, GPS receivers and software
Astronomical Instruments/Space Technology	Astronomical telescopes, optical systems and payloads for space missions
Opto-Electronic Modules	OEM products, e.g. optical components, spectral sensors, length and angle measuring systems, lenses for image processing
Joint Ventures	
LEO Electron Microscopy Ltd.	Transmission, filter transmission and scanning electron microscopes
ZEO Zeiss-Eltro Optronic GmbH	Optronic systems, infrared thermal image and other recognition systems

4. MILESTONES IN THE HISTORY OF CARL ZEISS

The Early Years

1846 Carl Zeiss sets up a workshop for precision mechanics and optics in Jena
1847 Production microscopes
1866 Beginning of cooperation between Ernst Abbe and Carl Zeiss
1872 Abbe´s theory of microscope image formation leads to fundamentally improved microscopes
1884 Foundation of the subsequent Jenaer Glaswerke Schott and Genossen by Otto Schott, Ernst Abbe, Carl Zeiss and Roderich Zeiss
1889 Creation of the Carl Zeiss Stiftung (Carl Zeiss Foundation) by Ernst Abbe
1891 Ernst Abbe makes the Carl Zeiss Stiftung the sole owner of the Zeiss works

Enforced Partition

1945 Partial destruction of the Jena works in the war; US troops take 126 management staff and scientists to their occupation zone
1946 The " Optische Werke Oberkochen" - subsequently to become " Carl Zeiss" - continues the operations of the foundation enterprise in the West
1948 Expropriation of the Zeiss and Schott works belong to the Carl Zeiss Stiftung in Jena; Zeiss works become a state-owned enterprise: VEB Carl Zeiss JENA
1949 The government of the state Baden-Wuerttemberg makes Heidenheim the legal domicile of the Carl Zeiss Stiftung; with the political partition of Germany, the factories in Jena and Oberkochen go their own separate ways
1965 VEB Carl Zeiss JENA becomes the leading enterprise in the precision mechanical and optical industry in the Germany Democratic Republic; the process of forming a "combine" commences
1971 Signing of the London Agreement governing the use of names and trademarks containing the component "Zeiss"

Reunited

1990 The political change in the Germany Democratic Republic also spells a change in the relations between the Zeiss enterprises in the East and West; in Biebelried, the enterprises declare their intention to fuse under the umbrella of Carl Zeiss Stiftung
1991 Basic agreement between the trust body responsible for privatization of East German industry (Treuhandanstalt), Baden-Wuerttemberg and Thuringia, Jenoptik GmbH, Carl Zeiss, Jenaer Glaswerk GmbH and Schott Glaswerke: this stipulates that the Carl Zeiss Stiftung will be domiciled in Jena and Heidenheim
1995 Carl Zeiss, Oberkochen, acquires the shares held by Jenoptik GmbH (company of the state of Thuringia) in Carl Zeiss Jena GmbH
1996 The enterprise Carl Zeiss celebrates its 150th anniversary

5. HIGHLIGHTS FROM MORE THAN 150 YEARS

1872 Ernst Abbe´s research results allow the production of mathematically calculated microscope optics for the very first time
1894 Binocular prismatic telescope with increased objective separation
1902 Pioneering development in the field of camera lenses: **Tessar** â , the "eagle eye"
1908 Experimental setup for fluorescence microscope
1908 Telescopic eyeglasses for wearers with extreme myopia
1911 Large ophthalmoscope for reflection-free observation of the fundus of the eye
1912 **Puntal** â , eyeglass lenses - identical imaging over a large range of vision for the first time
1923 Demonstration of the first projection planetarium (Model I)
1935 Topogon - first wide-angle lens for photogrammetric photography
1935 Coating technique for reducing reflections on glass surfaces (Carl Zeiss T* coating: patented in 1936)
1936 First prototype of phase contrast microscope
1950 **Ni** â 2 automatic level
1953 The advent of microsurvey with **OPMI** â , surgical microscopes
1957 Xenon photocoagulator, the world's first instrument to use light as a surgical tool, making it a forerunner of ophthalmic lasers
1968 **Reg Elta** â recording electro-optical tachometer
1969 First pocket binoculars (8 x 20); housing made of glass-reinforced plastic
1973 The first high-precision 3D coordinate measuring machine: **UMM 500**

1982 Laser scan microscope - a quantum leap in microscopy
1983 **Gradal** â **HS**, progressive lenses provide identical visual conditions for both eyes in all directions
1984 The dawn of a new era in electron microscope: **EM 902** with electron energy filter
1986 A new generation of microscopes - the "pyramids" with infinity optics (ICS) and " system integrated" design (SI)
1986 Fixed star projector incorporating the fiber principle for planetarium projectors
1988 **CARAT** technology for the elimination of thermal influences in high-precision measuring centers
1989 3.5 m New Technology Telescope (NTT) of the European Space Observatory; first large telescope with active optics
1990 ROSAT X-ray satellite - the world's smoothest mirrors
1990 20 x 60 binoculars with mechanical image stabilization; elimination of effects of hand tremor allows free-hand observation without a tripod at a magnification of 20x
1992 Navigated neurosurgery with the **MKM** multicoordinate manipulator: high-precision brain surgery with an "electronic pilot"
1994 First GPS receiver **GePos** â **RS 12**, from Carl Zeiss for use in surveying
1995 ISOPHOT photopolarimeter for the infrared satellite ISO: "operating temperature approximately - 270 °C
1995 **ScanMax** â - computer-aided measuring machine for shopfloor use
1996 SILEX experiment with telescope from Carl Zeiss: investigation of optical telecommunication in outer space
1996 New lenses for semiconductor fabrication make 256 Mbit chips possible
1997 The world's largest ring laser gyroscope for measuring the earth's rotation is put into operation

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News

Light Slows Down to Speed of a Car

Researchers at the Rowland Institute for Science in the US have slowed light down to 17 m/s -20 million times slower than its speed in a vacuum.

Lene Vestergaard Haus has exploited a quantum effect called "electromagnetically induced transparency" to reduce the speed in a gas of ultra-cold sodium atoms by coupling a laser to a transition state between two hyperfine states. He found that this slowed down a probe laser beam, which was travelling at right angles to the coupling laser.

Center for NanoScience in Mü nchen

Die Ludwig-Maximiliams-Universität hat ein Zentrum fü r Nanostrukturforschung, das "Center for NanoScience CeNS" gegrü ndet. CeNS soll die traditionellen Grenzen zwischen Physik, Chemie, Biologie und Medizin ü berschreiten und vor allem junge Wissenschaftler ermutigen, sich in interdisziplinä ren Projekten zu Profilieren.

Harvard Grü ndet Nanotechnologiezentrum

Die Harvard Universität will in den nächsten fü nf Jahren bis zu 200 Mio. $ zum Bau von fü nf interdisziplinä ren Forschungseinrichtungen ausgeben, daunter ein Zentrum fü r Nanotechnologie, das zuerst fertiggestellt werden soll. Dazu wird ein 4500 Quadratmeter grosses und 30 Mio. $ teuers Gebäude mit speziellen Reinräumen und vibrationsfreien Labors gehö ren. Hier werden Physiker, Chemiker und Ingenieure Strukturen im Nanometerbereich herstellen und untersuchen sowie neue Abbildungsverfahren entwickeln. Zu den mö glichen Forschungsgebieten zählen die Produktion winziger elektronischer und mechanischer Bauteile nanoskaliger Materialien aus Kohlenstoffnanorö hren sowie die Untersuchung von Zellstrukturen und Proteinen. Harvard kann sich solche kostspieligen Project leisten: Die Stiftunsgelder der Universität haben sich seit 1994 auf ü ber 13 Mrd. $ verdoppelt.

(Dr. Hexin Wang, Carl Zeiss Lithos GmbH)