

The Business View from Edmund Optics

Photonics Market Blossoms in the Heart of Europe

Optical innovations are spurred by the growing market in Germany.

By **Thomas Kessler** and **John Cleather**

With its reputation for efficient manufacturing, technical innovation, and product development, Europe has emerged as a leader in the global photonics market. Sitting at Europe's heart, Germany is home to many of the industry's major players and is pushing the boundaries in several applications. Energy, imaging, metrology, and life sciences are major photonics applications now, with others such as automotive on the rise.

A survey by market analyst Optech Consulting estimated that the total sales generated by German companies with optical technologies in 2008 were a staggering €23.1 billion. Of this, more than half comes from energy, imaging and metrology, and medical and life sciences.

Energy and inspection markets

In energy technology, Germany has the largest end market for photovoltaic (PV) cells worldwide today and is a major developer. According to Optech Consulting, 23% of Germany's 2008 optical market — over €5.3 billion — was related to energy technology, with government subsidies a major driver. While China has the number one company supplying PV cells, five of the top 10 companies are German. Even the lone US-based company on the top-10 list — First Solar — has a major production site in Germany.

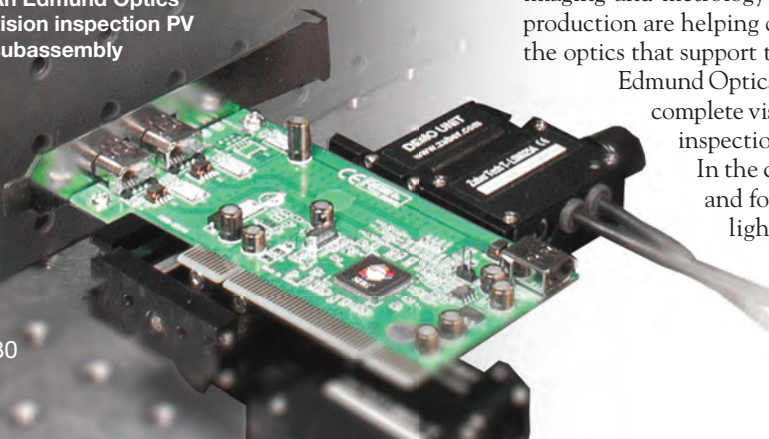
Silicon remains the dominating technology in today's PV market and is certainly the focus in Germany. Other countries are investing in new technologies such as concentrator photovoltaics (CPV), which uses optics to focus sunlight onto a small area.

There is little doubt that CPV will become increasingly important as time progresses. Behind closed doors, established silicon players will certainly be researching CPV, but for now silicon reigns.

The next-largest optical market in Germany, at 18% or €4.2 billion, is imaging and metrology using machine vision. Industries such as PV cell production are helping drive new development in both vision systems and the optics that support those systems.

Edmund Optics works with vision-integration partners who design complete vision systems to define the cameras and lenses used for inspection in bulk- and thin-film silicon PV-cell fabrication. In the case of CPV, EO supplies components for collecting and focusing solar energy, including concentrator lenses, light pipes, and mirrors. Additionally, innovations such as EO's micro video lenses now support high throughput automation.

An Edmund Optics vision inspection PV subassembly



Biotech and medical

Germany, France, Spain, Italy, and other countries in western Europe are taking leading roles in the third largest optical market in the Optech survey, biotechnology. Germany, by itself, has created an optics market worth €3.5 billion for medical technology and life sciences.

A major application for a large, fast-growing biotech company is biomolecular analysis based on fluorescence measurements. Achieving high-precision, quantitative measurement in this application typically requires a pair of filters, one for the excitation path and one for the detection path. Both filters need to be cutting edge in terms of transmission, spectral profile accuracy, and blocking performance. Edmund Optics' advanced plasma reactive sputtering coating technology is making generations of such optical filters less custom and more routine.

A good example of a medical application driving optical innovation is the DNA blood analyser, which works with a drop of blood and a specific reagent on a glass slide. The sample absorbs a particular wavelength of light or emits a telltale fluorescence that flags the presence of a specific disease. These systems require a significant number of high-precision optical elements, including filters to pinpoint a narrow excitation or emission wavelength and lenses to focus light from a laser or lamp onto a sample.

Another medical application with increasing traction is intra-oral cameras for dental professionals wanting to automate the manufacture of dental inlays. The camera replaces the conventional process of taking a dental imprint and manually forming the inlay with a 3D intra-oral imaging technique. The new technique directly transfers the recorded image into electronic vector data that feeds into a CNC machining system and automatically generates the inlay.

Auto and academic

While such medical, imaging, and energy applications currently represent the majority of the optics market, there are many other growing applications that demand optical innovation. For example, machine vision systems using advanced telecentric lenses play a significant role in automating car manufacturing. Innovative optics are also being integrated into cars as a value-add for features such as driver-assistance systems with lane-departure warnings, optical-distance measurement, and road-sign recognition. (See Road to the Future, SPIE Newsroom, spie.org/autos)

Such features are appearing in many new cars

and represent a growing opportunity to companies across the breadth of the optics market. Not only do these driver-assistance systems require optical components such as lenses, prisms, and filters, they also require cameras and image-processing software. Like many other optical manufacturers and suppliers, Edmund Optics has partnered with automotive market suppliers and is optimistic about this market going forward.

Edmund Optics has found that the academic market across Europe is also very important. It is, in fact, the largest single market that EO addresses. Further, EO believes that this market will not see saturation any time soon. A shortage of skilled young engineers across the continent is prompting continued further investment in the academic area. The resource at stake is human capital, and governments across Europe will continue to invest in high-level, technical education. ■

The aging population in many European nations is a factor in the growth of biotechnology.



—Thomas Kessler is executive vice president, Global Sales at Edmund Optics and is based in the company's Karlsruhe, Germany, office. His PhD in physics is from J.W. Goethe-Universität in Frankfurt/Main.



—John Cleather has been managing director of the UK office since its inception.



EO grows with EU

The importance of optics in European industry, especially Germany, has prompted Edmund Optics to increase its decade-long presence in Europe. Starting with offices in the UK, the company has since expanded into Germany and Italy to support its catalogue-based business.

As a supplier of stock and custom components, EO is providing the optical elements that enable many of the products and technologies that are fueling growth today.

The photovoltaic, imaging and machine vision, and biotechnology markets are the major markets today and academic investments ensure that new markets will continually be on the rise.

Industry perspectives at Photonics West

Executives from several top optics companies will give their perspectives on the international optics and photonics market at an industry event 26 January at SPIE Photonics West in San Francisco. Tom Hausken of Strategies Unlimited will moderate.

Confirmed panel members are:

- Robert Edmund, Edmund Optics
- Kenneth Kaufmann, Hamamatsu Corp.
- Timothy Morris, TRUMPF Inc.
- Stuart Schoenmann, CVI Melles Griot
- Mark Sobey, Coherent
- Dennis Werth, Newport Corp.

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