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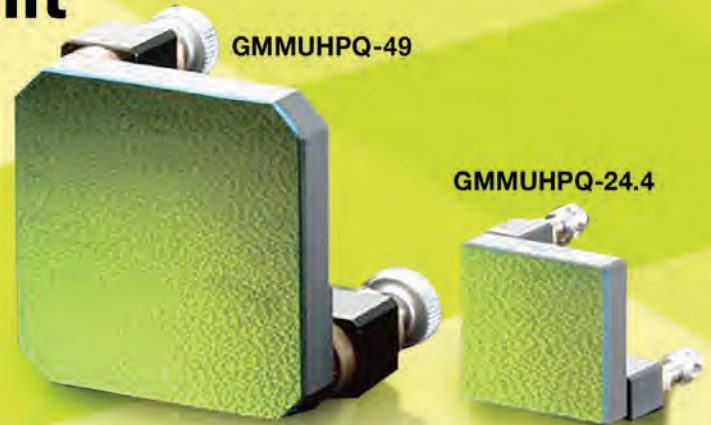
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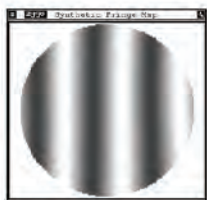
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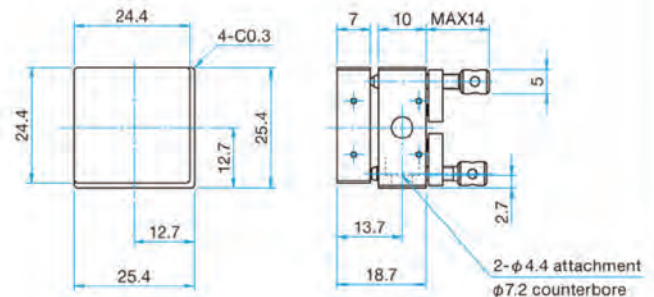
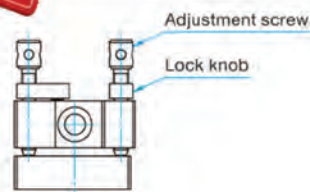
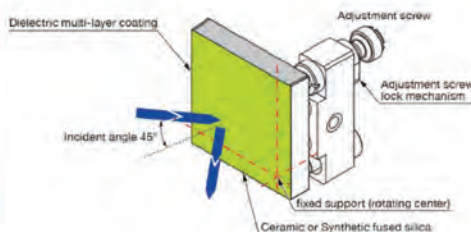
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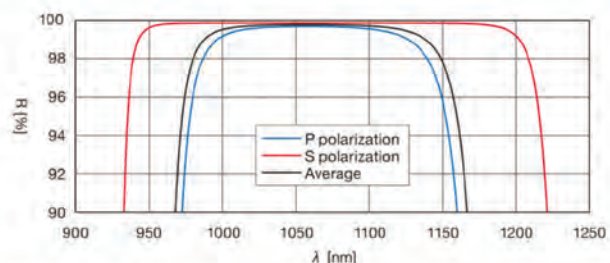
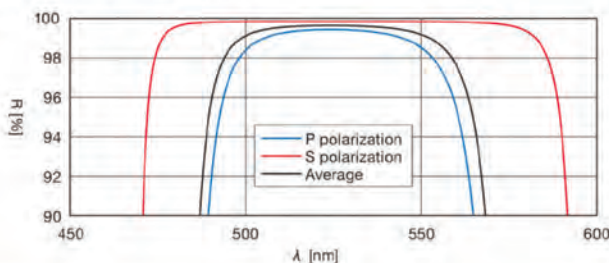
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European Research Council splashes €4m on photonics projects

Two grants have been awarded to biological imaging and laser material research projects in Germany.

The European Research Council, which supports research projects across Europe in order to “promote visionary projects and to develop new interdisciplinary fields of knowledge” has announced that two new photonics-related projects are to benefit from funding totaling €4 million.

Biomedical imaging

Prof. Vasilis Ntziachristos, Director of the Institute of Biological and Medical Imaging (IBMI) at Helmholtz Zentrum München has been awarded one of the ERC’s most prestigious scientific awards, an Advanced Grant, worth a total of €2.49 million over the next five years.



Source: Astrid Eckert & Andreas Heddergott, TU München

Prof. Vasilis Ntziachristos.

Prof. Ntziachristos pioneered the field of opto-acoustic tomography, a non-invasive imaging technique and his research focuses on the continuous improvement of the modality and its clinical translation. He said there is “immense potential” in the technology to be developed in project PREMSOT (Precision Multi-Spectral Optoacoustic Tomography for Discovery Diagnosis and Intervention).

The technology is expected to enable precise, non-invasive 3D deep tissue imaging by utilizing weak laser pulses to slightly heat the targeted region in the body. As a consequence, the tissue briefly expands and generates ultrasound waves, which are detected by appropriate sensors and converted into three-dimensional images.

This technique allows direct long-term patient monitoring without exposure

to radiation or a contrast medium. “The technology has already demonstrated initial success in determining metastatic disease in melanoma patients,” said Prof. Ntziachristos. “Thanks to the MSOT technology, detection of this cancer type could now be achieved earlier without the need for biopsies or surgery.” Additional clinical MSOT studies in various fields of application including breast and thyroid cancer as well as peripheral atherosclerosis are currently underway.

Live monitoring of drug action

MSOT can also be applied to monitor or assess drug distribution or oxygen saturation in tissues, both identified as unmet clinical needs by the clinical end users. With the grant money approved for PREMSOT, Prof. Ntziachristos’ team will develop a low-cost, portable device for human use. In the future, this imaging platform may be used during surgery or in diagnostics to assess pathophysiological parameters in real time and to monitor treatment efficacy.

From a technical point of view, Prof. Ntziachristos and his team intend to further improve the sensitivity of the technology in order to reliably visualize inflammation as well as metabolic and neurologic parameters. PREMSOT is funded within the EU framework Horizon 2020 as one of the 277 projects selected from a total of approximately 2,000 submissions.

A new laser based on transition metal dichalcogenides

Building more powerful computers, solar cells or lasers are the objectives of many research groups around the globe. Among them, Dr. Christian Schneider, from Julius-Maximilians-Universität (JMU) Würzburg, Germany, is studying promising materials for novel lasers and quantum light sources. The ERC has recently awarded him €1.5 million to further develop his work.

For the past five years or so, the scientific community has focused on the material class of transition metal dichalcogenides. These materials are typically made of molybdenum or tungsten, for example, complemented with sulphur, selenium or tellurium. Dr. Schneider believes these materials are interesting for a number



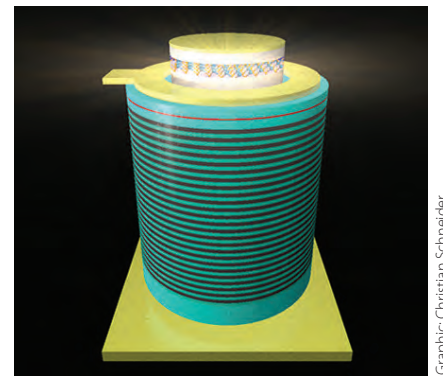
Photo: Robert Emmerich

Dr. Christian Schneider in an optical laboratory of the Würzburg Physics department.

of reasons: “They are reasonably priced, relatively easy to prepare in extremely thin and stable layers that consist of a single layer of atoms, and they have semiconducting properties – making them an ideal material for optoelectronics,” he said.

“We want to find out to what extent the materials are suitable for optoelectronics and quantum photonics, and in particular for investigating novel laser-like light sources,” he said. The ERC Starting grant will be used to fund his unLiMIt2D project, allowing Schneider to add two doctoral students and one postdoc to his team.

Dr. Schneider added, “We will try to build a laser-like prototype. The aim is to develop not a standard laser, but a polariton laser that may consume much less energy. Such devices are maybe even more interesting from a fundamental point of view, since they share many similarities with Bose-Einstein condensates in solid state.”



Graphic: Christian Schneider

Schneider’s research could ultimately lead to a novel laser based on transition metal dichalcogenides.

The Würzburg physicists have already built a polariton laser in an international project which they first presented in Nature in 2013. The coming years will show whether polariton lasers can also be implemented on the basis of transition metal dichalcogenides.

About the Author

Matthew Peach is a contributing editor to optics.org.

<http://optics.org/news/7/4/45>

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Businesses and project managers of all types are under constant pressure to launch products on-time and on-budget, and sometimes a much more compelling technical argument is needed to delay production than to continue.

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Make Optikos® IQ Lab™ services part of your quality assurance model

"Post-mortem" reports on failed projects consistently indicate that insufficient testing or a lack of confidence in test data allowed flawed optics to be deployed undetected. Unfortunately, when optical systems fail, there is not typically a straightforward fix "after-the-fact."

For example, discovering a stray light issue in production can mean both optical and mechanical design corrections—typically very costly to implement at this late stage.

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Edmund Optics launches startUP program to help new optics firms

Program provides fledgling photonics companies with engineering, product, and marketing expertise and cut-price kit.

Diverse optical components developer Edmund Optics has announced the launch of its startUP initiative, an integrated, customizable program that provides optics and photonics startups with assistance during their development. startUP members can benefit from a wide range of services including the company's

design, and manufacturing engineers to supplement their in-house resources. In addition, 24-hour technical support is available via phone, email and online chat, adds the Barrington, NJ-headquartered firm.

Participating companies can also benefit from "instant discounts" on all Edmund Optics

EO's Modify Stock Optics service is an ideal option, especially during the proof-of-concept or prototyping phase, for startups looking for affordable, custom, small volume manufacturing of optical components with a two-to-three week lead time."

Since many new companies begin at the university or incubator level, startUP is an extension of EO's existing Educational Award program, which promotes innovative research in optics and photonics. Kirsten Bjork-Jones, Director of Global Marketing Communications, comments, "With nearly 75 years of direct marketing experience, Edmund Optics knows what young companies must do to get their technology in front of the right audience and drive demand. We can help get startups noticed."

'Techspec' lenses

The company has also announced the launch of its Techspec UC Series fixed focal length lenses. These are designed to work with all smaller-format camera sensors and optimized for machine vision working distances and resolution requirements. The company says the ultra-compact lenses are suitable for a wide range of applications including factory automation, inspection and biomedical instrumentation.

Designed for pixels that are $\leq 2.2\mu\text{m}$, the Techspec UC lenses provide high levels of resolution ($>200\text{ lp/mm}$) across the sensor. The RoHS-compliant lenses are available in five focal lengths from 4 mm through 25 mm. Although the lenses are optimized for 1/2.5 in sensors, a number of focal lengths support sensors up to 1/1.8 in. Techspec UC lenses are compatible with all standard C-mount cameras to facilitate integration, and feature locking iris and focus adjustment with recessed set screws to prevent unintentional lens adjustments.

<http://optics.org/news/7/5/8>

The graphic features the 'startUP' logo in black and yellow, with a yellow arrow pointing up through the 'U'. Below the logo are six benefits, each preceded by a green checkmark:

- Reduce Expense
- Leverage Our Network
- Grow with You
- Engineering Expertise
- Evaluation Samples
- Get Noticed

At the bottom, there is a blue starburst containing the text 'NEW PROGRAM!' and a yellow button with the text 'APPLY NOW!'.

startUP offers access to Edmund's multidisciplinary engineering team.

engineering expertise, discounted pricing on products, and marketing support.

"For years Edmund Optics has worked closely with young companies, often in life sciences, and now because of the dramatic growth in startups and incubators, we see the need to develop an official program to help these companies grow their businesses – on their own terms and at their own pace," said Andrew Lynch, Senior Manager of Inside Sales. "Whether they're just starting to build a prototype, want a small manufacturing run, or are ramping up to full production, startUP can provide engineering, technical and purchasing solutions tailored to each unique situation."

startUP provides companies with access to Edmund's multidisciplinary engineering team. Program members can collaborate with more than 250 optical, mechanical,

products. The launch statement says, "Once companies move beyond the prototyping phase, they will continue to receive volume pricing with typical discounts of 10-20%.



Focused on machine vision: EO's new range of lenses.

Sponsored Editorial

Femtosecond optics

Altechna

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At Altechna we specialize not only in laser optics but also in femtosecond optics. Since the very beginning of the company in 1996 we have accumulated a large deal of experience helping our customers to tame sub-picosecond pulses.

The market for femtosecond optics has grown over the decades since the introduction of first sub-picosecond lasers in 1990s but it still remains quite small compared to longer pulse or CW lasers and all the optics available for such lasers. Conventional optics and coatings will inevitably end up by either distorting the temporal characteristics of the pulse, being damaged by high peak power of the pulse, or both.

Optical materials possess a specific quality when the phase velocity of light inside the material dependent on the frequency (or wavelength), or equivalently when the group velocity depends on the frequency. This is called chromatic dispersion or group-velocity dispersion (GVD). The latter is measured in units of s^2/m or fs^2/mm . It's most convenient to define GVD for optical materials (glasses, fibers etc) in order to evaluate how much your pulse will stretch or compress by using different thickness/length of material. For optical components an alternative measure called the group delay dispersion (GDD) is used. GDD characterizes dispersion for the optical whole component without the need to take thickness/length into consideration.

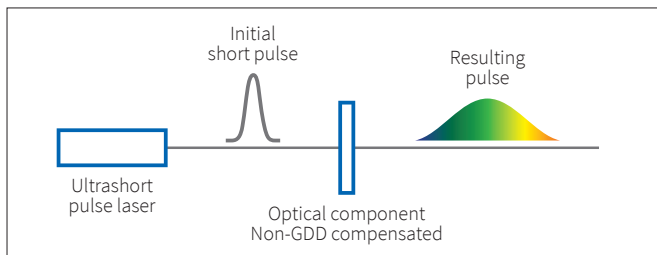


Figure 1. Schematic representation of ultrashort pulse spreading after a non-GDD compensated optical component is introduced to the setup.

GDD is usually an unwanted effect because stretched ultrashort pulse will lose it's two main properties: it will no longer be ultrashort and it's peak power will distribute withint the stretched pulse (please refer to figure 1). Usually, the only case where pulse stretching is a sought-after effect is in ultrashort pulse amplifiers which stretches the pulse, amplifies it and compresses it again.

Ultrafast optics – what is out there?

As mentioned in the very beginning of this article, femtosecond optics market is not so big compared to market for longer pulse or CW optics. Nevertheless, there are a few solutions out there to deal with femtosecond pulses.

Altechna offers the following optical components to deal with most activities related to ultrashort phenomena.

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 - b. Ultrafast thin film polarizers
 - c. Watt Pilot - Motorized Attenuator, Ultrafast Version
 - d. Reflective beam expander
3. Compensating stretched pulse:
 - a. Gires-Tournois Interferometer (GTI) mirrors
4. Stretching the pulse
 - a. Brewster angle dispersing prisms

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Industrial laser markets 'to grow by 6.6% to 2020'

Analyst BCC Research says growth follows innovation, especially in fiber lasers.

The industrial laser industry is vibrant, robust and growing. It has even grown during years when the global economy has not. These are some of the conclusions of a new market report from BCC Research, which reveals that evolving technology should continue to drive this global market, "especially within fiber laser submarkets".

The global market for industrial lasers is projected to grow from \$4.6 billion in 2015 to \$6.3 billion in 2020, reflecting a five-year compound annual growth rate of 6.6%. Consumer electronics industry as a segment should grow from nearly \$1.5 billion in 2015 to \$2 billion in 2020, demonstrating a five-year CAGR of 6.1% as the largest end-use industry. Construction industry, the second-largest segment, should total almost \$1.2 billion in 2020 with a five-year CAGR of 6.4%.

The upward trend outlined in the BCC report concurs generally with another recent industrial laser market assessment by Swiss analyst Optech Consulting, reported by optics.org in March 2016, although the BCC assessment does not comment on currency exchange factors (as did Optech) which can change a positive growth picture to the opposite effect, depending on relative currency values in this export-focused market place.

According to the \$5985, 141-page report from BCC, major factors spurring market demand include a greater focus on product quality and production efficiency: "Many companies are expected to invest heavily in R&D to provide better end-user solutions. A rising demand for three-dimensional imaging additive manufacturing should bolster global demand, as well," the report states.

Considering territories, the Asia-Pacific region should remain the largest global market for industrial lasers, says the

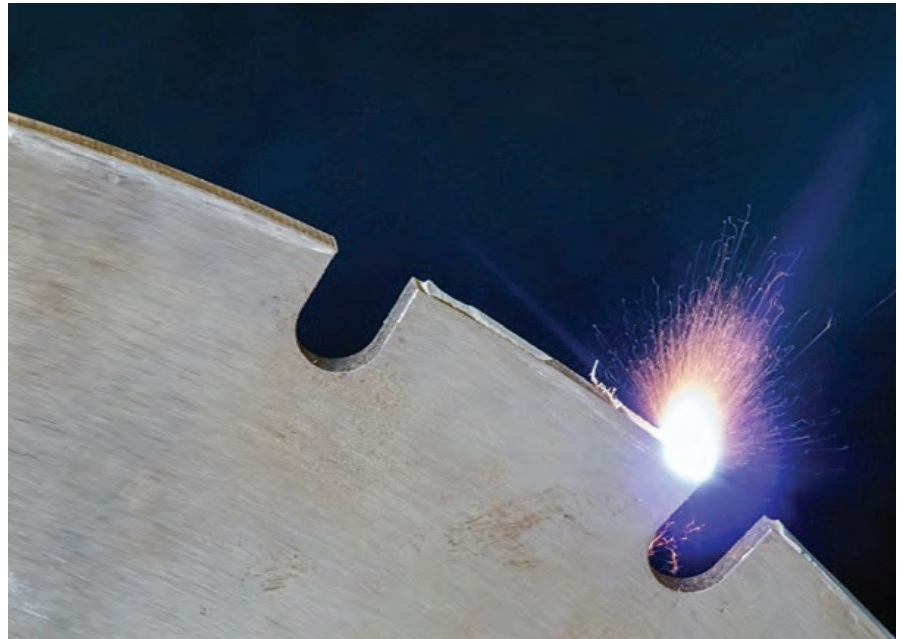


Photo: Laser Centrum Hannover

Innovation is driving industrial laser sales, says BCC.

report. "With numerous upcoming business entities and a growing focus on automation, the market should see substantial growth in major markets such as China, Japan and South Korea."

Fiber lasers

Unlike older industrial tool industries, the industrial laser industry is still evolving. Although carbon dioxide lasers and neodymium-YAG lasers are most often used, the markets for fiber lasers and disk lasers should experience significant growth during the forecast period, BCC has determined: "The fiber lasers market, particularly, should see impressive growth, spurred by demand for its high-output power and compact size. Their reliability should also drive growth."

"Fiber lasers provide high peak power and nanosecond pulses, which enable effective marking and engraving. They also provide cleaner cut edges at faster cutting speeds," says BCC Research analyst Sinha Gaurav.

"The lower cost fiber laser ownership is also boosting global demand. The market, valued at \$1.1 billion in 2014, should reach

nearly \$1.9 billion by 2020, growing at a five-year CAGR of 8.5%."

The report entitled *Lasers for Industrial Applications: Global Markets* analyzes the industry by technology, type, and by end-user application. It also examines emerging applications, trends, pricing considerations, R&D, government regulations, and competitive technologies. Analyses of global market drivers and trends, with data from 2014, 2015, and projections of CAGRs through 2020 also are provided.

It was authored by Sinha G. Gaurav, who holds an MBA in finance from ICFAI Business School, Hyderabad, India, and a degree in electrical engineering from Rajasthan University. His primary focus is in the electronic, semiconductor, photonic, chemical and communications markets. Gaurav has researched various technology markets for several years, including electronics, semiconductors, chemicals, photonics and information technology.

<http://optics.org/news/7/5/20>

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'Progressive' lens boom drives European spectacles market

Turnover in key markets of continental Europe up to €17 billion as consumers take a liking to individualized designs.

The trend towards so-called "progressive" lenses with customized optical features helped boost consumer spending on spectacles across continental Europe last year.

According to market research firm GfK, that increased adoption saw the market for corrective glasses, contact lenses, sunglasses and frames in the four key

This positive trend was seen across all product sectors, GfK said, with spending on contact lenses (including care products) up 2.3 per cent, frames up 6.5 per cent, and sunglasses recovering from a decline in 2014 to record growth of 7 per cent. But crucially the spectacle lenses sector, which accounts for 58 per cent of the overall market, was up nearly 8 per cent in 2015.



Photo: Luxottica.

Field of view: Italy-headquartered Luxottica is among the companies benefiting from the trend towards customized, or "progressive" spectacle lenses. Analyst firm GfK reckons that spending on these types of vision correction lenses has grown by more than 30% in Germany and France in the past year.

European markets of Italy, France, Spain and Germany grew 7 per cent in 2015, to reach more than €17 billion.

The analyst company said that while all countries and sectors grew in size, the boom was led by double-digit growth in Spain and Germany, with demand for more advanced vision correction technologies appearing to fuel the rise.

"This strong increase is based on a robust unit sales growth of 5.8 per cent and an increase in the average selling price of 1.8 per cent," reported Till Herzog, senior business group manager of optics research at GfK. "The price trend was caused by a rise in the number of higher quality lenses sold in the European spectacle market."

Progressive lenses in demand

GfK's analysis of sales data by lens type showed that sales of progressive lenses – which are marketed as being "tailored" to the individual – increased across nearly all markets, with sales in Germany and France growing at a remarkable 30 per cent.

Sales of ultra-thin, but more expensive, high-refractive-index spectacle lenses also increased, driving up overall average selling prices.

"Certain product features have also had significant impact on the overall market value," noted GfK. "The final value of monofocal lenses was influenced by sales of refraction index lenses and lens coating,

while for progressive lenses 'individual' features from customization had an even greater impact."

Not surprisingly, GfK's data also revealed that there is a much higher share of progressive lenses sold in combination with high-end frames.

Examples of the kinds of "tailored" lenses being sold are Zeiss' Precision Pure and Precision Plus models, available through Luxottica's laboratory services and claimed to offer a 40 per cent larger field of view than conventional designs. Luxottica customers can also buy glasses featuring progressive lenses made by Hoya.

Intelligent eyewear

Italy-headquartered and NYSE-listed Luxottica, which owns the brands Oakley and Ray-Ban along with a string of well-known retail chains, reported earlier this month that its sales had risen by some 17 per cent to more than €9 billion in 2015 – partly the result of currency effects.

The company says that eyewear is a "structurally growing industry", with demographic changes including the ageing population in its favor, as well as the growing demand for premium products.

In an investor call to discuss the 2015 results, Luxottica CEO Massimo Vian said that he expected the eyewear business to grow at a compound rate of 3 per cent over the next few years. That might not sound particularly rapid, but Vian added: "We see 500 million more people needing eye correction and wanting to see better in the next five years."

What the company described as the "premiumization" of eyewear is a key factor in developed economies, with options like the Hoya and Zeiss customized lenses part of that growing trend.

Luxottica is also involved in the 'I-SEE' European Commission-funded project to develop intelligent eyewear fitted with sensors, and later this year at the Olympic Games in Brazil its Oakley division will launch new "Radar Pace" smart glasses – the result of a collaboration with Intel.

"It is a voice-controlled coaching system that you have in front of your eyes," said Vian, pointing out that the high-tech kit, presented by Intel at the CES show in Las Vegas, does not project images through the lenses "yet".

<http://optics.org/news/7/3/30>

Jenoptik's revenue and earnings up in first quarter 2016

Revenue rises 8.5% to €158.2 million, with defense leading sector growth at 27%.

Jenoptik Group has reported improved business performance based on the financial results of its first quarter of 2016. Growth was observed in all of the company's segments.

President & CEO Michael Mertin commented, "In an environment characterized by economic uncertainty, we have benefited from our interdisciplinary expertise and

All of the group's segments saw growth, with noticeably strong demand in the defense technology, information and communications technology, semiconductor equipment and automotive markets. Territory-wise, revenue was boosted in Germany, Europe and Asia-Pacific.

At €9.8 million, the operating result grew at a

The financial result, at minus €2.1 million, was below last year's equivalent of €1.1 million, which was primarily driven by currency exchange rate gains from the valuation of financial assets. Due to the absence of currency effects and despite lower interest expenses the group achieved earnings of €7.7 million (€9.8 million).

Segment performance

In the first quarter, the Optics & Life Science segment started off on a solid footing with revenue and earnings at prior-year levels together with a considerably improved order intake. At €52.2 million, revenue was 1.7% up on Q1 2015. Income from operations was at the same level as in the prior year, at €5.2 million. The company commented, "This encouraging growth predominantly originated in the Healthcare & Industry division. The order backlog as of the end of March 2016 was worth €75.7 million."

Revenue in the Mobility segment was slightly up on the prior year, at €52.1 million, and the Automotive division also saw good growth. Revenue in the Defense & Civil Systems segment, totaling €54.4 million, was 27.4% above the prior-year figure of €42.7 million. This development was predominantly due to a good start to the year in the areas of energy and sensor systems, the company said.

Following the positive development of business as scheduled in the first quarter of 2016, the Jenoptik Executive Board confirmed the guidance it published in March. For 2016, it expects group revenue of between €680 and €700 million. Earnings are anticipated to show a moderate rise and the margin is expected in the range of 9.0 and 9.5%.

<http://optics.org/news/7/5/21>




Photo: optical manufacturing in Jena (C) Jenoptik.

Jenoptik benefiting from "interdisciplinary expertise and internationalisation".

increasing internationalization, as well as from differing demand cycles. Our solid financial footing will all continue to help us generate sustainably profitable growth."

In the first three months of 2016, revenue rose 8.5% to €158.2 million (€145.8 million).

faster rate than revenue, by 11.7% (prior year €8.7 million) as a result of improved gross profit combined with lower functional costs. The margin in the first quarter increased from 6.0% in 2015 to 6.2%. Earnings were up 5% to €16.7 million (€15.8 million).



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