tech|buzz

ELECTRONIC PACKAGING

SCHOTT
glass made of ideas

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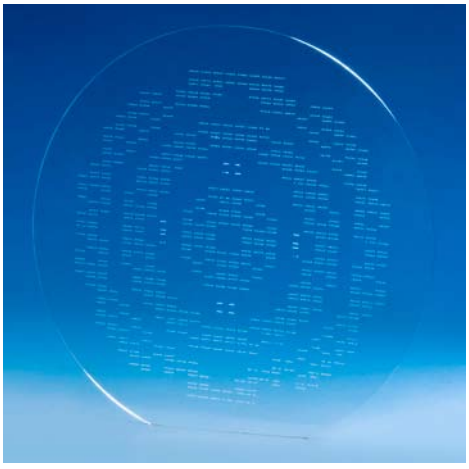
HermeS® can help to miniaturize MEMS devices by more than 80%*

Hermetic packages protect sensitive electronic and mechanical components of micro-electro-mechanical systems (MEMS) against environmental influences, while at the same time, allow electric signals to pass through. Due to these functional requirements, existing packaging designs face several challenges. It is difficult to reduce the size of the packaging while having to maintain the hermeticity of the seal and thus the efficiency of the device.

To overcome these challenges, NEC SCHOTT Components Corporation developed a new technology for manufacturing, a glass substrate with embedded fine vias called SCHOTT HermeS® (derived from "hermetic substrates"). In-house experts continually enhance the specifications of HermeS® : With thinner electrodes (φ100µm→φ80µm), shorter electrode pitch (250µm→200µm) and thinner wafers (500µm→350µm), an overall reduction of more than 80%* in the final size of the device (e.g. sensors) can be achieved by using HermeS®.

CONTENT



Traditionally, silicon wafers are employed in applications such as sensors, switches and actuators for digital cameras and notebook computers. As silicon wafers are first diced into smaller elements, then packaged and sealed individually, the packaging step contributes significantly to the cost. SCHOTT HermeS®, on the other hand, has fine vias embedded in the glass substrate that can be used to join directly with the MEMS on the silicon wafers. The combined part is then diced into smaller elements. In this way, glass-to-metal feedthroughs can be manufactured using a one-step process and then be connected with thousands of MEMS during a second step

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– an ideal prerequisite for cost-effective mass production. Customers can hence achieve wafer-level packaging (WLP).

HermeS® is made with high-quality, colorless glass material and is ideal for use in optical devices such as telecommunication, image sensors and liquid crystal devices. Visual internal inspections can also be performed on the MEMS after packaging. In addition, it can be adjusted using laser light due to the transparent quality of glass. This would not be possible with metal housings.

NEC SCHOTT offers HermeS® made with BOROFLOAT® 33 and D263T glass types. "BOROFLOAT® 33 is a low alkaline borosilicate glass with an average thermal expansion coefficient close to that of silicon, which allows for easy joining," explains Yutaka Onezawa, Manager of R&D/New Business of the Glass-to-Metal Sealing Division at NEC SCHOTT. "We have received several requests for HermeS® with other glass types. This is because different thermal expansion coefficients would be required when forming devices through, for example, metallization on a substrate without performing anodic bonding with silicon. Hence, we are pleased to announce that HermeS® is now also available with D263T glass."

The company is equipped for the mass production of 4-inch and 6-inch wafers, and will be ready for 8-inch wafers. In addition, NEC SCHOTT has established partnerships with several foundries to offer to customers seeking a complete package that includes metalization, cavity and hole-forming.

*Internal estimation

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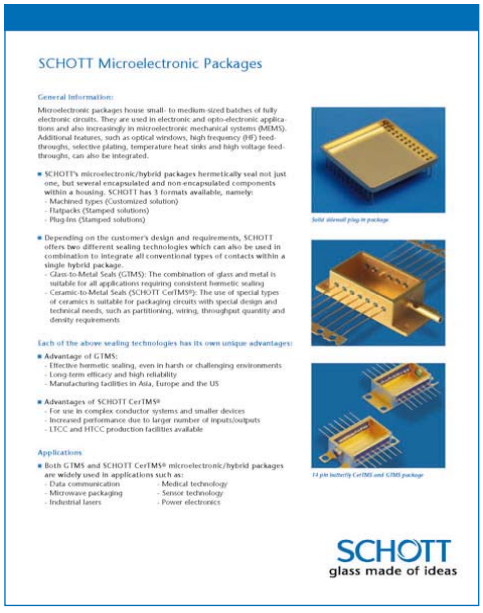
▶ For more information, please refer to http://www.schott.com/epackaging/english/auto/others/hermes.html

▶ For customers in the US, please refer to http://www.us.schott.com/epackaging/english/auto/others/hermes.html



▶ For customers in the US, please refer to http://www.us.schott.com/epackaging/english/download/index.html

SCHOTT Microelectronic Packages – New Datasheet!

Microelectronic packages house small- to medium-sized batches of fully electronic circuits. They are used in electronic and opto-electronic applications and also increasingly in microelectronic mechanical systems (MEMS).

There are two different sealing technologies possible, which can also be used in combination to integrate all conventional types of contacts within a single hybrid package. These are glass-to-metal sealing (GTMS) and ceramic-to-metal sealing (SCHOTT CerTMS®)

For more information, please refer to the new "SCHOTT Microelectronic Packages" information sheet. Alternatively, you could also contact us directly at any of our competence centers near you.

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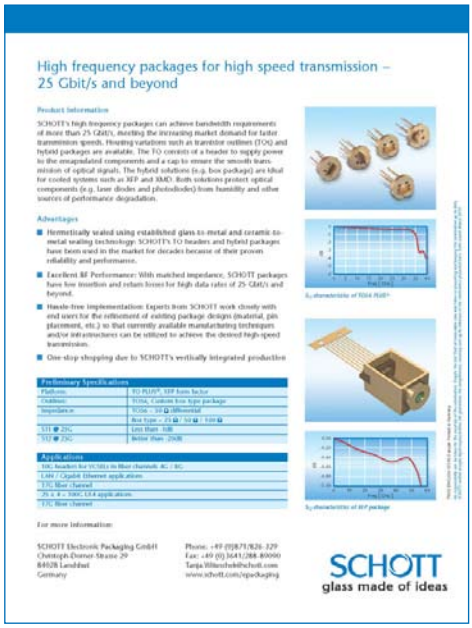
Customers Worldwide Can Now Buy HTCC, LTCC and GTMS Housings from One Source

SCHOTT Electronic Packaging has more than 10 years of experience in the area of High Temperature Cofired Ceramics (HTCC). Now, SCHOTT has transferred its HTCC manufacturing line from Japan to Landshut in Germany. The German facility also houses one of the company's development and manufacturing centers for hermetic feedthroughs and housings based on glass-to-metal sealing technology. In addition, SCHOTT will be expanding its product line in the area of Low Temperature Cofired Ceramics (LTCC) through a long-term agreement on cooperation with VIA electronic.

"We are proud of our reputation as an extremely agile and knowledgeable development partner who has a lot of expertise in the area of microsystems technology," says Franz Bechtold, Managing Director of VIA electronic. "Our relationship with SCHOTT now enables us access to a global sales network and industrial manufacturing capacities. This will allow us to support our customers much more effectively on everything from prototypes to serial production," he adds.



Quality control of the preliminary products ("greensheets") for manufacturing multilayer ceramics.

Protection for complex systems in the smallest of spaces

Hermetic housings are needed to provide long-term protection against undesirable influences, such as moisture, for electronic and opto-electronic components. Metallic conductor rods are held into place in the housings with melted glass to produce glass-to-metal sealed (GTMS) gas-tight packages. With multilayer ceramics, the feedthrough is integrated into the package of layers and soldered into metallic parts (ceramic-to-metal seals, CerTMS®). In addition, optical interfaces, for instance lenses and windows, and special materials that allow for the heat to dissipate can also be integrated.

Full ceramic and ceramic-to-metal housings allow for higher number of conductors to be connected together in a complex manner inside the smallest possible spaces. These are indispensable when it comes to miniaturizing devices for high-frequency applications.

VIA electronic

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▶ For more information, please refer to the new High and Low Temperature Cofired Ceramic Housings datasheet.

▶ For customers in the US, please refer here.

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Breakthrough with Transistor Outline that Accommodate 25 Gbit/s

SCHOTT Electronic Packaging has launched a high frequency Transistor Outline (TO) with enhanced performance for high-speed data rates of 25 Gbit/s.

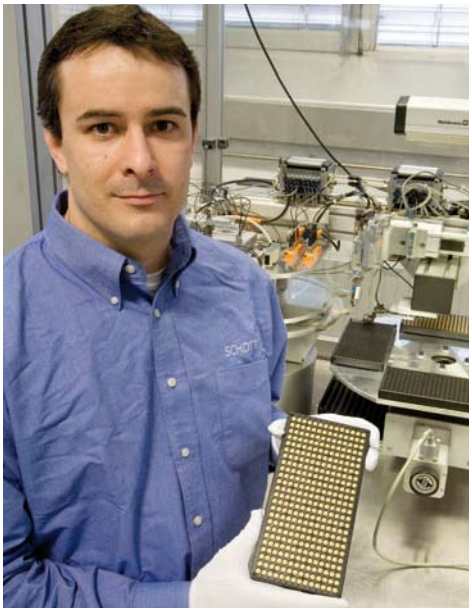
▶ For more information, please refer to our new High Frequency Packages for 25Gbit/s and Beyond datasheet.

▶ For customers in the US, please refer here.

The TO PLUS®, when deployed in multiples, provides the opportunity for TO-based products to support 100G Ethernet. The TO PLUS® package will also enable end users to keep their costs in check by utilizing existing assembly and manufacturing infrastructure.

"SCHOTT prides itself in offering the most advanced and innovative electronic packaging to its customers," said Robert Hettler, Head of Research & Development for SCHOTT's Opto-electronics Product Division. "Our TO PLUS breakthrough not only achieves high performance rates, but its straightforward design will also help end users keep costs under control."

TO headers have been used in the market for several decades due to their proven reliability and performance. The TO PLUS® header line utilizes the same technology to deliver the same kind of reliability. With matched impedance, the headers



Martin Wittmann holding a tray of TO 56 PLUS®

are able to achieve low insertion and return losses for high data rates of 25 Gbit/s. As this enhancement is achieved with only a combination of glass, pins and placement, a TO PLUS® can be built from any existing outline of TO headers, such as TO46, TO56, etc. This allows end users to utilize the same mating optical caps and manufacturing techniques and infrastructure.

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AREVA's Supplier Audit (ASME NQA-1) for Large-scale Nuclear Electrical Penetrations Completed

Safety is of utmost importance in the nuclear industry. Suppliers are therefore required to comply with the highest standards, such as the Nuclear Quality Assurance NQA-1 issued by the American Society of Mechanical Engineers (ASME). This is recognized globally as a world-class quality standard for nuclear facility applications. SCHOTT Electronic Packaging has completed the ASME NQA-1 certification by its customer AREVA. This means that SCHOTT is authorized to supply its hermetic penetrations for nuclear power plants in the U.S. and beyond.

EPA serve as the feedthroughs for power, control, and instrumentation cables into the containment structures of nuclear power plants. With its compression glass-to-metal sealed EPA, SCHOTT offers a unique technology that ensures reliable hermeticity and pressure resistance. Due to the inorganic, non-aging glass seal, these EPAs offer an unlimited lifetime for the pressure barriers.

"We have been working together with SCHOTT for many years," says Heiner Dornburg, Director Electrical Systems Projects at AREVA NP in Erlangen, Germany. "Now, that the NQA-1 supplier audit has been completed, we are looking forward to continuing this cooperation in the U.S. and other countries. Besides being very satisfied with their solutions, we can count on high-quality services by experienced application engineers and this is of great benefit."

"Quality and superior technology have always been the keys to success," says Thomas Fink, General Manager of the Nuclear Safety Division at SCHOTT Electronic Packaging in Landshut, ▶

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Germany. “We manufacture according to KTA 3403 and IEEE317, our quality management system complies with ISO 9001, IAEA 50-C-Q and many others. This obviously contributed toward our extremely good performance in the NQA-1 supplier audit at first go,” he adds.

Since 1962, SCHOTT has delivered more than 12,000 EPAs that have been installed in about 100 nuclear power plants. They are still performing to specification without any maintenance whatsoever after more than 40 years in service. Nuclear power plants in Europe, South America, and Asia, as well as Japan’s nuclear powered ship “NS Mutsu” and Astute Class submarines by BAE Systems have also been equipped with EPAs from SCHOTT.

Compression glass-to-metal sealed feedthroughs consist of a metal housing, a glass sealant, and metal conductors. The preassembled component is heated up to a temperature at which the glass melts to the metal. During the cooling process, the metal housing contracts to a much greater extent than the glass does. This compression creates a highly pressure-resistant and hermetically sealed unit that ensures the highest safety level.

Attenuation measurement of fiber optical penetrations for pressurized water reactors (PWR) and boiling water reactors (BWR).

▶ For more information, please refer to http://www.schott.com/epackaging/english/lft/power_plants.html

▶ For customers in the US, please refer to http://www.us.schott.com/epackaging/english/lft/power_plants.html

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▶ For customers in the US, please refer to http://www.us.schott.com/epackaging/english/download/index.html

Housings for High Heat Load Applications – New Datasheet!

High power lasers, often found in medical and industrial applications, require high power input and generate high levels of heat. Hence, materials used in the encapsulation of the laser must be capable of carrying high current levels to support the functioning of the laser and have high thermal conductivity so as to dissipate heat quickly.

SCHOTT offers a variety of laser packages, including a 9-mm TO header for high power laser applications. This stamped TO header, which is available in two standard designs, is a straightfoward packaging option. Customers can, thereby, utilize accessible manufacturing infrastructure to achieve economies of scale.

Please refer to the new information sheet “Housings for High Heat Load Applications” for more information. Alternatively, you could also contact us directly at any of our competence centers near you.

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Feedthroughs for Sensor Applications - New Datasheet!

Glass-to-metal sealed (GTMS) feedthroughs protect various kinds of sensors from aggressive chemicals and extreme temperature conditions. The feedthroughs can provide absolute hermeticity to avoid electronic failure due to harsh environments (e.g. oils). The design (e.g. pin count, layout and materials) of the feedthroughs can be customized according to the requirements of the end applications. Similarly, the manufacturing process can also be individually adjusted to meet individual customer requirements.

To find out more about SCHOTT's feedthroughs for sensor applications, please refer to the new information sheet "Glass-to-metal Sealed Feedthroughs for Sensor Applications".

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▶ For customers in the US, please refer to http://www.us.schott.com/epackaging/english/download/index.html

NEC SCHOTT Corporate Brochure - Updated!

The NEC SCHOTT Components Corporation company brochure has been recently updated with the latest product information and improved readability.

NEC SCHOTT is a joint venture company, established in September 2000, between SCHOTT in Germany and NEC in Japan. Located in Minakuchi (Japan), NEC SCHOTT's main business lies in the development, production and sale of electronic components such as glass-to-metal seals, thermal cutoffs and special glass materials.

The dual language document, available in English and Japanese or Chinese and Japanese, provides a broad overview about the organization as well as a clear and concise description about its product offerings and current application areas. For a copy of this brochure, please visit www.nec-schott.co.jp/english or contact us directly at any of our competence centers near you.

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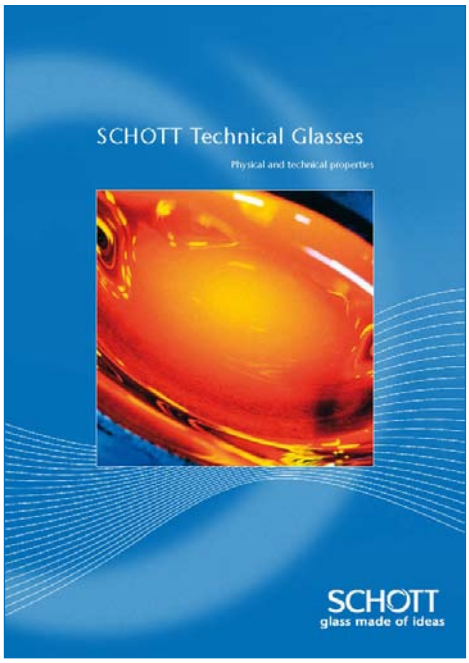

Updated Technical Glass Handbook – New Glass Data and Information about Solid Oxide Fuel Cells

SCHOTT's Technical Glass Handbook is among one of our most frequently downloaded reference materials. To further improve its usefulness to the readers, the Handbook was updated with the most recent information about our new glass types and sizes. In addition, our technical experts have documented our latest product development for solid oxide fuel cells (SOFC) in Chapter 7.

You could download the Technical Glass Handbook from this link, or please feel free to contact us directly.

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▶ For customers in the US, please refer to http://www.us.schott.com/epackaging/english/download/index.html

Safety Upgrade at Hungarian Nuclear Power Plant with Glass-to-metal Sealed Electrical Penetration Assemblies

Hungary's only Nuclear Power Plant (NPP) located in Paks plays a significant role in the country's economy. The NPP, which houses four nuclear reactor units, accounts for more than 40 percent of the energy that the nation consumes. According to the International Atomic Energy Agency (IAEA), Paks NPP has an operational safety record on par with the best in the world. To raise this to an even higher level, 347 Electrical Penetration Assemblies (EPA) have been replaced. The new EPAs manufactured by VISOLA Ltd. ensure the highest safety thanks to the glass-to-metal sealed feedthroughs from SCHOTT Electronic Packaging GmbH.

All four units of the power plant that were put into service between 1982 and 1987 are constantly being modernized. This effort has certainly paid off: IAEA awarded Paks the highest scores for its safety performance.

"The Soviet designed VVER-440 type, V-213 model, second generation pressurized water reactors are still functioning reliably. This can be attributed to the skilled maintenance work and a series of measures implemented for improving the level of safety," says Mr. István Mittler, Communication Director for Paks NPP Ltd. "However, in addition to the reconstruction of the reactor protection system, a lot of obsolete equipment had to be either replaced or refurbished," he adds.

Safety upgrade to enable extension of service lifetime

As agreed to with the IAEA, the Hungarian government decided to upgrade the infrastructure of the NPP even further. The goal is to lay the foundation for an extended service life of 20 years, in addition to its original 30 years of operation. This means that several of the NPP's components need to be replaced, especially safety-critical parts like the Electrical Penetration Assemblies (EPAs), which were insulated with plastic that has since aged. EPAs that contain glass-to-metal sealed feedthroughs offered the ideal solution.

"We prefer these products over other imported EPAs because they combine reliable feedthroughs with gamma screening and other constructional components required by our power plant," explains Mr. Géza Pekárik, Technical Director of Paks NPP Ltd. "The quality management system of both suppliers also passed our qualification standard. There was no defective product in the shipments and no failure occurred during operation."

Glass-to-metal sealed penetrations with gamma screening

"We developed a complete family of EPAs based on these reliable glass-to-metal sealed feedthroughs that are equipped with gamma screening in order to be able to meet the rigid requirements of the VVER-440 type reactors at Paks NPP," says Dr. Endre Zelenyánszki, Managing Director of VISOLA Ltd. "The development of the design, manufacturing technology ▶

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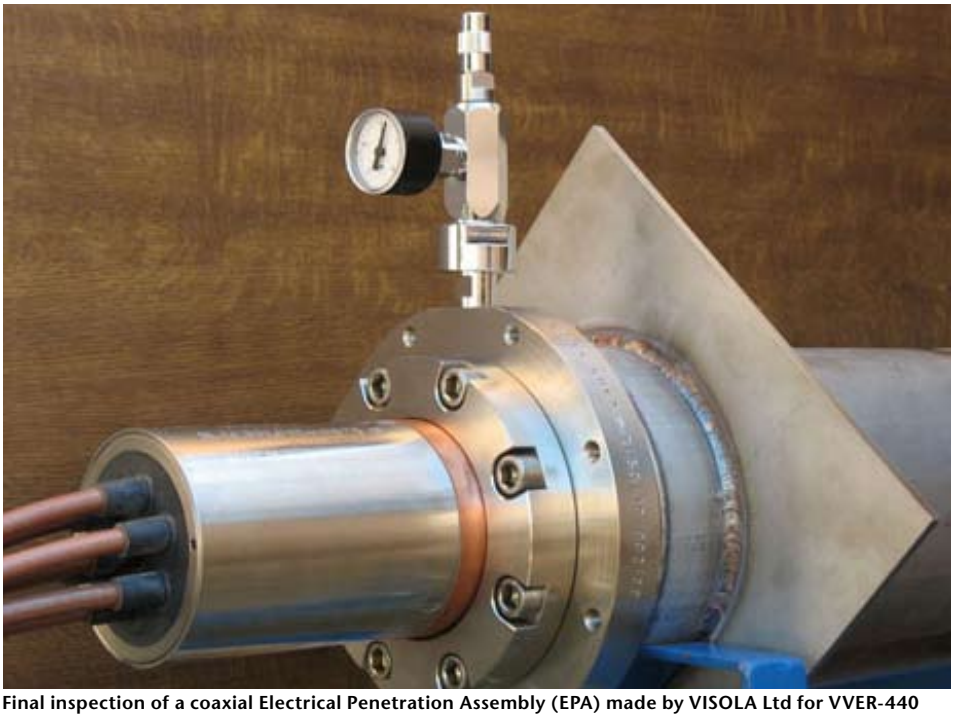
and quality assurance system took four years. Domestic research laboratories were also involved in the testing of the design and qualification of the products," adds Mr. Habib Naderi, Technical Adviser for VISOLA Ltd.

"Glass-to-metal sealed penetrations provide pass-through for power, control and instrumentation cables to the thousands of instruments, control panels, electric motors and many other electric and electronic devices in a nuclear power plant," explains Dr. Oliver Fritz, at Technology Expert from SCHOTT Electronic Packaging. "They maintain the pressure boundary integrity of the containment structure for periods well in excess of the 60 years design lifetime and enhance the safety levels of the nuclear reactor," he concludes.

"The installed EPAs will definitely be able to meet the requirements of the extended service time," Mr. Pekárik says. "Uninterrupted operation of the existing four units over the next two decades will also serve as proof of concept for the construction of new reactors. According to the plan currently under preparation, two new units are to go into operation between 2020 and 2025 and thus provide the cornerstone for the national strategy on minimizing risks with respect to the country's power supply," he concludes.



Final inspection of a coaxial Electrical Penetration Assembly (EPA) made by VISOLA Ltd for VVER-440 type PWR of Paks NPP. Source: VISOLA

For more information: http://visola.hu/en

▶ **For more information, please refer to http://www.schott.com/epackaging/english/lft/power_plants.html**

▶ **For customers in the US, please refer to http://www.us.schott.com/epackaging/english/lft/power_plants.html**

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Hermetically Sealed Feedthroughs for Batteries – New Datasheet!

Batteries are increasingly used as an independent source of power for applications such as industrial and safety engineering. Due to the harsh and often inaccessible environmental conditions, hermetically sealing the battery ensures that they perform efficiently and reliably, throughout its service lifetime.

SCHOTT leverages on its in-house glass type development expertise and proven glass-to-metal sealing (GTMS) technology to offer custom-made battery endseals. Supported by more than 15 years of product-in-field technical data, players of the battery industry trust the superior quality of these products.

For more information, please refer to the new SCHOTT hermetic battery endseals information sheet. Alternatively, you could also contact us directly at any of our competence centers near you.

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Kaizen Further Enhances Product Quality and Shortens Lead-times

During the 2009 global economic crisis, SCHOTT Electronic Packaging (EP) carried out a Kaizen training program at its Landshut facility. Taking advantage of this period, a cross-department project team with members from research and development, quality management, production and logistics coordinated the exercise for 260 workers as well as 26 line managers and engineers.

Process improvement has been part of SCHOTT's philosophy since its foundation in 1884, and it continues to keep itself current by benchmarking and reviewing new business practices. Kaizen, made popular in the last decades, has proven to be a very useful tool. It is a system of improvement based on making little changes on a regular basis: always improving productivity, safety and effectiveness while reducing waste. It involves setting standards and then continually improving those standards. To support the higher standards Kaizen also involves providing the training, materials and supervision that is needed for employees to achieve the higher standards and maintain their ability to meet those standards on an on-going basis.

All production teams in Landshut are now directly involved in such a continuous improvement process on a daily basis, contributing towards enhancing key performance indicators such as quality and lead-time. The achievements are beneficial to the employees, the company and, of course, the customers.

The production of optical TO caps, for example, was optimized in this way. The team reviewed the entire production process and examined all factors including materials, machines, measuring and processing methods. The team concluded that the quality of the product and the production yield could be improved by several percentage points with the use of a new eco glass type and other minor measures.

The continuous improvement process has been applied in all product segments of SCHOTT Electronic Packaging, ranging from Electrical Penetration Assemblies to glass-to-metal and ceramic-to-metal sealed housings and glass powders. The "Special Supplier Award" by BAE Systems and the "Best Supporting Partner Award" by Wuhan Telecommunication Devices (WTD) show that this dedication to quality pays off.

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