SCHOTT Aviation

Designed for comfort & safety
All systems are set for a safer future. Anyone who boards an Airbus or a Boeing airplane immediately comes into contact with products from SCHOTT, either directly or indirectly. Innovative lighting inside the cabins creates futuristic design effects. LED reading lights provide passengers with pleasant lighting conditions.

Optoelectronic components are responsible for ensuring maximum security onboard. Notably, hermetic packaging sees to it that sensitive electronic devices continue to function properly, even with severe changes in temperatures and pressure levels.

With SCHOTT as the copilot. SCHOTT is an international technology group that has been developing and manufacturing specialized materials, components and systems to improve how people live and work for nearly 125 years. Our main markets include aviation, architecture, automotive, electronics, optics, household appliances and the pharmaceutical industries as well as solar energy.

Our objective is to contribute to the success of our customers with our products and services. With 16,700 employees working in manufacturing sites and sales offices located in 41 countries, SCHOTT is close to its customers in all the major markets. True to its technology focus, SCHOTT is a qualified supplier to the automotive industry and a certified supplier to the aviation industry, as well.
The power of synergy effects. SCHOTT offers a portfolio of materials and components to improve the precision and performance of aircraft devices for optical and electronic applications. In addition to its technological competences, SCHOTT has broad expertise in lighting and architectural design and thus can offer customized design concepts for aircraft interiors. Intensive technology transfer from other design- or safety-oriented application areas or industries, such as interior lighting design and automotive electronics, help to spark new concepts and innovations. One success leads to another.

SCHOTT has been a reliable partner and solution provider to the aviation industry for many years. SCHOTT LED and fiber optic lighting products have pioneered markets; for example, in-seat aviation reading lights were introduced in 1994. SCHOTT currently offers the aviation and transportation industry innovative and high-quality designs, quick turnaround sampling and cutting-edge illumination solutions, even for special environments such as aircraft interiors.

Today, SCHOTT is one of the world’s leading suppliers of optical materials and components, as well as electronic housings and has supplied such products for aircraft for more than three decades.
The numbers of passengers, the size of the planes as well as the competition in the airline industry are increasing steadily. Low ticket pricing is no longer an effective strategy for airlines to distinguish themselves from their competitors.

But it’s a different story inside the plane: creative solutions can offer significant improvements for in-flight comfort. Technologies such as fiber optics and LEDs for decorative and comfort lighting broaden the range of design elements for aircraft interiors. High quality materials are equipped with touch-and-feel surfaces and intelligent functions that provide information or create privacy.

A wide range of design elements allows any adaption of In-Seat Reading Lights for individual interior concepts.

What SCHOTT has to offer

- Together with our customers we develop individual room- and light-concepts for tomorrow’s aircraft cabin and provide complete solutions.
- Sophisticated lighting systems create a synthesis between functionality and design with focus on comfort, design and high safety standards.
- Completely new atmospheres can be created onboard with fiber optic and LED lighting solutions – everything from a subtle “starry sky” effect in the cabin ceiling to complex daylight simulations.
- Light raises passengers’ comfort and safety by accentuating contours and providing guidance through the cabin.
Comfort, service, state-of-the-art technology and special custom designs help an airline to stand out against the competition.

SCHOTT offers a number of outstanding solutions to satisfy today's passengers’ wants: Privacy or HLC Smart Glass™ for a more private atmosphere. Reading lights to provide more comfort for passengers as they read while in their seats. Contour and safety lights for navigation help passengers to move around in the cabin more safely. Invisible projection HoloPro™ and fibre optic datacom systems for entertainment and info-tainment onboard. All these innovative solutions help to augment the number of passengers by increasing their comfort and safety while traveling.

Design elements complete cabin concepts and provide a new sense of comfort and well-being for those who spend time onboard.

Privacy can be created by individual In-Seat Reading Lights and materials that become translucent at the touch of a button.

LED upwash lights support mood lighting scenarios such as sunrises or sundowns, as well as fiber optic sidelight elements that have a linear side-emitting effect.

SCHOTT HoloPro™ is a transparent projection medium: A special film is laminated between two sheets of our anti-reflective glass SCHOTT AMIRAN®, giving it special properties. Viewers can look at it and look through it at the same time.

Intelligent light sources to drive fiber optic applications complete the range of components for interior lighting systems.

SCHOTT offers a multitude of reading lights based on fiber optic or LED technologies, as well as the combination of the two.
When it comes to processing data and performing control and diagnostic functions inside an airplane, there is really just one underlying objective: completely reliable transmission of the highest possible data rates via optical data transmission. This calls for sophisticated computer architectures with high-speed networks onboard, necessitating the use of high-speed electronic packages, as well as optical glass fibers in high-speed networks. This enables data transmission rates that are many times higher than those of electric cables and conventional packaging technologies.

In addition to the aviation industry’s key requirements of reducing weight and increasing safety measures, there is also the need for more data to be transferred at a faster rate. However, data can only be transferred at high speeds, if all of the components involved are designed for operation at high frequencies. This phenomenon is also evident for diagnostic systems used by pilots, as well as for the information and entertainment systems and internet services used by airline passengers. Reliability is a key issue, since airline electronics are exposed to demanding environments. Thus, hermetic packages designed for higher frequencies that house the respective optical signal transmitting and receiving units are required.
Transistor Outline packages protect sensitive signal transmitting and receiving electronic units.

Subassembly of optical signal transmitting and receiving units

Open transceiver: Assembly of signal transmitting/receiving units

Application example shows the use of a transceiver in a server rack and in an aircraft seat for the high-speed data transmission of modern inflight entertainment systems.

Fiber optical cables enable high-speed data rates for modern communication and diagnostic networks.

Microelectronic packages for high-speed applications

Gbits high frequency TO PLUS® packages

What SCHOTT has to offer

- SCHOTT is one of the world’s leading suppliers of hermetic packages for data and telecommunication applications.
- Our hermetic packages are based on glass-to-metal and ceramic-to-metal sealing technology that ensures reliable, long-term protection of electronic components, even in harsh environmental surroundings.
- The thin and highly flexible multicore fiber optic data cables are easy to install and resistant to chemical media, humidity and variations in temperature. They are tested according to aviation standards.
- SCHOTT packages are water-, humidity- and gas-tight. The materials used are non-flammable and do not produce hazardous fumes.
- The packages can withstand pressures of up to 4500 bar and are tested with temperature shocks of -65°C (-85°F) up to +150°C (+302°F) for 15 cycles.
- Miniaturization of packages by using smaller pin pitch sizes (e.g. our 2-pin feedthrough with a diameter of 1.2 mm or 0.05 inch) or ceramic feed-throughs.
- To reduce the weight of components, we offer advanced lightweight materials, like aluminum and titanium.
- Our packages provide low loss and low interference transmission of high frequency signals (digital or analog).
- Due to the low rate of non-metal parts (ceramic/ glass) that are used for the packaging, our packages provide EMC/EMI shielding.
Fuel tank sensors measure the fuel levels directly within the tank. Sensor systems within fuel tanks are exposed to kerosene as well as temperature fluctuations, and thus need to be protected hermetically.

Proximity sensors help to increase the safety of an aircraft e.g. by controlling whether any outside door is closed properly. Since proximity sensors are often placed in difficult environments, their performance must be ensured by protecting them adequately.

Transceivers are signal transmitting and data receiving units that are a vital part of any data communication network. TO Packages house optical signal transmitting/receiving electronic units that need to be protected from humidity and other negative influences.

Highly flexible fiber optic bundles driven by LED light sources enable each design of starry skies in the cabin and offer an additional atmospheric design element.

To support the individual comfort for passengers in the upper classes on board, we provide a wide range of highly sophisticated design-orientated LED Reading Lights.

Gyroscope position measurement: Gyroscopes made of ZERODUR®, the zero expansion glass ceramic from SCHOTT, is the element of the inertial reference for precise position measurement in any aircraft.

Proximity sensors help to increase the safety of an aircraft by controlling whether the landing gear is retracted completely. Since proximity sensors are often placed in difficult environments, their performance must be ensured by protecting them adequately.

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In harsh environments, it is absolutely vital that relays are hermetically sealed.

For weight reduction and increasing security reasons, multicore optical data cables are already developed for on-board databus solutions.
**DAYLIGHT SIMULATION**

Ultra-flat panels driven by LEDs or backlighted opaque surfaces in the ceiling simulate daylight atmosphere in the cabin. Ultra-flat panels and OPALIKA surfaces provide diffuse lighting and simulate daylight atmosphere in the cabin.

**RADAR PACKAGES**

Electronic radar devices are part of the radar units of anti-collision systems which help to increase overall safety mechanisms for aircrafts. Vacuum-tight packages protect the radar devices from humidity and other disrupting conditions.

**HOLOPRO™**

The patented HOLOPRO™ technology makes it possible to project images or movies onto anti-reflective glass during both daylight or night-time, otherwise the material is transparent.

**UPWASHLIGHTS**

Moodlighting will be created through the latest generation of LED technology with the capability of endless length and highest homogeneity and intensity.

**CONTOUR LIGHTS**

Side emitting fiber optics are used to create a unique, linear, homogeneous illumination with flammability proven material. RGB LED light sources enable the application to create light scenarios within the cabin.

**EMERGENCY LIGHTS**

The combination of LED and side emitting fibers enable cabin designers to use the floor path marking system as an additional design object, rather than a purely functional emergency system.

**IN-SEAT READING LIGHTS**

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The patented HOLOPRO™ technology makes it possible to project images or movies onto anti-reflective glass during both daylight or night-time, otherwise the material is transparent.

**LC SMARTGLASS™**

Simply turning on the power switch changes the LC SMARTGLASS™ from translucent white into a visually transparent display and offers creative design options, as well as private spheres on demand.

**LIGHTPOINTS™**

LightPoints™ offer the unique ability to allow LEDs to float and glow inside glass and the power supply elements are invisible. By triggering the single LEDs, an informative aspect can be added to the application.

**RADAR PACKAGES**

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**SPECIAL HEAD UP DISPLAYS**

Semi-reflecting instrument glass produced and assembled by SCHOTT enables the projection of the instrument data to the cockpit window. Supporting the look of surroundings and all flight data at the same time, SHUD is a key element to touch down under difficult weather conditions.

**GLASS BASINS**

Glass wash basins for elegant sanitary facilities. Different shapes and colors are possible according to customer specifications. For safety reasons, all basins are, of course, thermally tempered.

**GALLEY APPLICATIONS**

Glass ceramic cooktop and fiber optic lighting components that fulfill special thermal requirements allow for various applications from cooking to cooking in challenging environments.

**HERMETIC CONNECTORS FOR HYDRAULIC PUMPS**

Hydraulic pumps are needed to operate an aircraft’s landing gear. Hermetic connectors can be used to feed through electricity into the hydraulic pumps system.

**DC/DC CONVERTER PACKAGES**

DC/DC converters convert aircraft voltage that is generated in the engines to any required voltages of the final electronic devices, e.g. cockpit instruments. Hermetic packages for DC/DC converters protect the electronic device from harsh environments.

**TECHNICAL GLASS, FILTERS AND COMPONENTS**

Coated technical glass and filters from SCHOTT used as contrast enhancement filters, night vision filters, anti demist-covers guarantee a perfect view and protection of instruments, enabling precise vision under challenging circumstances. With tactile screens made of SCHOTT technical glass, functionality and design are being combined in the cockpit using a specific glass substrate with a conductive ITO coating.
Electronic components and sensors are often exposed to harsh environmental conditions inside an aircraft. Depending on the location of an electronic component or sensor, extreme temperatures, oil, humidity or vibrations are common examples of these conditions. In particular, prevalent temperature fluctuations can lead to condensation in various locations, and sensitive electronic components and sensors must be protected from condensation water.

Similar to other vehicles in the transportation sector, airplanes are increasingly utilizing sensors as well as other electronic systems for all types of diagnostic situations are being used to enhance its safety features. For instance, proximity sensors are used to monitor the proper closing and opening of aircraft doors and landing gear.

Miniaturization and weight reduction of electronic components are other key trends. Here it is important that existing and additional electronic equipment takes up as little space and adds as little weight as possible. Therefore, the use of lightweight materials is becoming increasingly popular.
For over six decades, SCHOTT, a world leader in this area, has been designing and co-developing hermetic packages with customers for the long-term protection of sensitive electronic components.

Our hermetic packages and feedthroughs are based on glass-to-metal and ceramic to-metal sealing technologies and have been used for many years in avionics and other demanding safety related applications, such as reliable packages for automotive airbag igniters.

- SCHOTT packages are water-, humidity- and gas-tight. The materials used are non-flammable and do not produce hazardous fumes.

- The packages can withstand pressures of up to 4500 bar and are tested with temperature shocks of -65°C (-85°F) up to +150°C (+302°F) for 15 cycles.

- Miniaturization of packages by using smaller pin pitch sizes (e.g. our 2-pin feedthrough with a diameter of 1.2 mm or 0.05 inch) or ceramic feedthroughs.

- To reduce the weight of components, we offer advanced lightweight materials, like aluminum and titanium.

What SCHOTT has to offer

- A | Customized glass-to-metal sealed package for sensors
- B | Package for DC/DC converters
- C | Hermetic relays with glass-to-metal sealed feedthroughs
Precise presentation of information in the cockpit is absolutely vital for safe air travel. Here, obtaining an excellent view of the flight-related information and the environment plays an evermore important role. Providing better viewing of the instruments and controls and projecting flight-related information into the viewing field of the pilot makes takeoff, landing and flying a lot easier, even under the most difficult conditions. For these functions, special filter glasses or coated glass components are essential.

Today, there are at least three gyroscopes in every airplane and they are located in areas that are not visible to the passengers or the crew. Gyroscopes are another essential part of navigation. They make it possible to determine the precise location of an airplane through permanently measuring the 3-D-position of the aircraft, and they guarantee the highest degree of safety. Gyroscopes face challenging demands with respect to temperature and pressure resistance, whereby a material with a zero coefficient of thermal expansion is needed.

Reliability and precision of flight data is a key requirement for safe flying and will certainly gain importance as air traffic increases rapidly around the world.
SCHOTT is one of the leading suppliers of optical components that enable precise presentation of flight-related data as the basis for safe flying.

We provide ZERODUR® zero expansion glass ceramic, filter glasses and optical components and sub-assembled parts from a single source.

Technical glass and filter glass, either coated or made of colored glass are used as contrast enhancement filters or night vision filters. They guarantee a perfect view and protection of instruments enabling precise vision under challenging circumstances.

Special Head Up Displays (SHUD), made with semi-reflecting instrument glass and assembled by SCHOTT, enable a view of the surroundings while simultaneously supplying flight data, whereby the instrument data is projected onto the cockpit window. This plays a key role in the safe landing of the aircraft, even in difficult weather conditions.

Gyroscope bodies made from ZERODUR® zero expansion glass ceramic are the key elements of the inertial reference for precise position measurement in any aircraft.

What SCHOTT has to offer

A | Coated or colored filter glass guarantees a perfect view.

B | Gyroscope measuring devices enable precise determination of height and position.

C | Special Head Up Displays (SHUD) project the controls onto the windshield.
Innovations are crucial to growth and value creation. Because the aviation industry is and always has been on the cutting edge of technology, SCHOTT has been a natural partner for technically advanced projects for more than 20 years. The numerous innovations that are state-of-the-art inside each plane today is a testament to SCHOTT’s expertise in the area of aviation-related research and development.

The figures speak for themselves. The work of our scientists and engineers represents the basis of our company’s future success. SCHOTT makes research and development its top priority. SCHOTT’s focus on R&D leads to an annual new product rate of more than 30% on average. More than 600 highly qualified employees all over the world work on developing new materials, technologies, new products and processes.
The future of aviation has already begun. At research centers in Mainz (Germany) and Duryea, Pennsylvania (US) as well as in the various application centers and development labs operated by the business units worldwide, the focus of development is on the following areas:

- New and improved glasses and glass ceramics
- Materials with new optical, chemical and mechanical properties
- Melting and molding processes
- Coating technologies
- Photovoltaics and solar thermal technologies
- Fiber optic components
- Glass-to-metal sealing (GTMS) and ceramic-to-metal sealing (CerTMS) technologies

In Research and Development, SCHOTT cooperates with many partners worldwide, including universities, research institutes and commercial enterprises.