Projection Display
Laser and Light Management Solutions
Oerlikon – living high technology

Oerlikon is among the world’s most successful industrial high-tech companies focusing on machine and systems engineering.

Oerlikon stands for leading industrial solutions and cutting-edge technology in textile production, thin film coating, propulsion, precision and vacuum technology. As a company with Swiss roots, a 100-year tradition and over 19,000 employees at 170 locations in 35 countries, Oerlikon has evolved into a global player today. The group is ranked first or second in each of its respective markets.

Oerlikon Group

**Coating**
- Balzers Coating
- Solar

**Vacuum**
- Leybold Vacuum

**Textile**
- Barmag
- Neumag
- Saurer
- Schlafhorst
- Textile Components

**Drive Systems**
- Graziano Drive Systems
- Fairfield Drive Systems

**Components**
- Optics
- Space
- Solutions
- Assembly Equipment
Oerlikon Optics is reshaping the world of key optical technologies, and its continuous rollout of innovations is making everyday life easier. Its optical components and laser systems, supplied from a single source, help customers achieve the crucial edge they need to maintain their competitiveness.

For more than 60 years Oerlikon Optics (formerly Unaxis Optics) has been producing coated optical components and subassemblies with outstanding properties for a diverse set of industries incorporating optics and photonics. Optics is a globally recognized technical leader in optical components for fast-growing markets and has comprehensive know-how in optical thin films, glass processing, and lithography. Additional services such as optical design and complete assembly support its customers’ ever increasing demands for full production solutions. Its newly developed laser-based light sources also offer enormous opportunities. Optics has extended its core competencies, reshaping the market for front and rear projection displays and showing the future direction of laser projections systems.

Following integration of the U.K. laser specialist Exitech in late 2006, Oerlikon Optics has now also become a global leader in the supply of laser processing systems for industrial microfabrication based on laser ablation.

Optics offers turnkey manufacturing solutions across a broad range of applications using both direct write and mask projection techniques. With know-how developed over 20 years for processing of polymers, glass, metals and ceramics in bulk or thin film form, Optics is the ideal partner in a broad range of fields including medical, photonics, sensors, semiconductor packaging, photovoltaics, and general micromachining.

The powerful global sales and service network of the whole group enables Oerlikon Optics to accept the challenge of meeting customers’ most exacting demands – worldwide. This is being achieved through a carefully targeted expansion of the sales and service infrastructure. Optics has its own local production sites for modules and components in Balzers, Liechtenstein; Golden, Colorado (USA); and Shanghai, China. The production sites for laser systems are located in Oxford, England, and in Krailling, Germany.
Builders of microdisplay projector systems know all too well the growing expectations of their customers when it comes to image quality, reliability, and cost. Oerlikon Optics understands these expectations and offers customers total solutions to light management for microdisplay applications.

For 60 years, Oerlikon Optics has developed its expertise in thin-film coating processes and equipment. Our internally-developed sputter process continues to provide the most-environmentally-stable coated optics on the market today.

No matter what microdisplay technology is being designed, Oerlikon Optics has the appropriate light-management component that can easily and rapidly be customized to the needs of our customer. We pride ourselves in rapid prototyping so our customers can bring their products to market quickly.

Some customers require more integration from Oerlikon to meet their supply-chain needs. We offer the ability to integrate our thin-film components into sub-assemblies or the complete light-engine manufacturing. Our customers can provide build-to-print products for Oerlikon Optics to assemble, or we can offer our own light-engine design services.

The consumer electronics market requires cost innovation and improved reliability. Oerlikon Optics continues to meet these challenges with its high-volume China operation and its Swiss-quality heritage.
Thin Film Components for Microdisplays

ColorWheel™
ColorWheel™ is used for sequential color management in multimedia projection systems such as DLP®. All ColorWheel™ designs are optimized to each market segment in terms of speed, size, and cost. Our assembly processes use custom developed motors to reduce noise and increase life time. Oerlikon Optics’ Color Filters are sputtered, highly stable filters to ensure the best color quality in projected images. Oerlikon Optics worked with Texas Instruments to develop the first BrilliantColor™ ColorWheel™.

LightTunnel™
LightTunnel™ enhances light uniformity with minimum light loss, and is up to 50% shorter than an integrator rod, displays less dust sensitivity, and reduces flickering. Oerlikon Optics applies the patented Silflex™ coating on the internal surfaces of the LightTunnel™, but can also offer dielectric coated surfaces (Deflex™). For our customers’ convenience Oerlikon Optics holds a license from 3M on systems with LightTunnels™.

Silflex™/Deflex™/Alflex™
Silflex™/Deflex™ folding mirrors provide a straightforward method for increasing the luminous output of projectors. The proprietary Silflex™ coating design provides unique environmental stability, and reflectivity of more than 98% over the entire visible spectrum. Unlike competitive products, Silflex™ produces virtually no color shift and is almost independent of polarization and angle of incidence. If environmental stability under very harsh conditions is a concern, we have enhanced our product portfolio with Deflex™ (a dielectric mirror coating) and Alflex™ (an aluminum coating which can be optimized for narrow band with an s- or p-polarization).

1 ColorWheel™
2 LightTunnel™
3 Silflex™/Deflex™/Alflex™
UV-Guard™
White light arc lamps produce UV and IR radiation that can damage microdisplay panels, polarizing foils and other components used in projection display systems. Oerlikon Optics UV-Guard™ filters block these wavelength ranges of the lamp’s spectrum while providing excellent transmission for visible light. Manufactured with Oerlikon’ patented sputter coating process, UV-Guard™ filters provide the highest degree of spectral stability, both at high operating temperatures and under varying environmental conditions. UV-Guard™ filters withstand the highest light flux levels from high power UHP and Xenon arc lamps and do not affect colors of the transmitted visible light.

Dichroic Mirrors/Filters
Dichroic filters/mirrors meet very narrow spectral band edge tolerances, highest degree of spectral stability and very low residual optical absorption loss. The dichroic filters/mirrors are produced with a patented sputtering deposition process, providing very dense filter coatings with excellent optical and mechanical stability, both at higher operating temperatures and under varying environmental conditions.

LED ColorDichroics™
High brightness LED sources are increasingly used as novel light sources in rear projection TV and other projection display applications. LED ColorDichroics™ are used to merge the separate color light from the LEDs into one single beam illuminating the microdisplay devices. LED ColorDichroics™ are specifically optimized for random polarized light emitted from LEDs, providing high transmission and reflection in the respective wavelength ranges of the LED colors.
Thin Film Components for Microdisplays

**ColorWedge™**
When standard dichroic filters/mirrors are used to separate light into different color beams in HTPS and LCOS architectures, unavoidable spectral shifts of the dichroic coatings may result in noticeable color non-uniformity in projected images. ColorWedge™ dichroic filters/mirrors consist of a customized gradient type coating to compensate for the color non-uniformity, resulting in superior color images of projection display systems. ColorWedge™ dichroics are produced with the same sputtering deposition technology as the standard dichroic filters/mirrors and bear all superior quality features of sputtered dichroic filters.

**LightGate™**
LightGate™ – the total internal reflection (TIR) prism from Oerlikon Optics – is used to separate the illumination and imaging path in DLP® based light engines, particularly for rear projection TVs. It enables on-axis illumination, short back focal length and compact designs. The LightGate™ is characterized by high performance AR coatings, superior quality of blackening and a tightly controlled air gap. Oerlikon also offers LightGate™ Reversed, a reverse TIR (R-TIR) using various types of high index glasses.

**HELF™ Polarizing Beamsplitters**
Projection systems based on reflective light valves are driving the need for advanced polarizing beamsplitter (PBS) cubes. Oerlikon Optics has accepted the challenge and introduced a product providing high extinction at low f-numbers. Now a broadband PBS (RGB) cube is available, as well as one optimized for the individual red, green and blue color channels and a red-green combined (RG).
Cold Light Reflectors
Cold Light Reflectors reflect light while passing infrared light through the reflector. Using optimized production methods, we uniformly coat a variety of reflector shapes from spherical to deep, aspherical reflectors. For Projection Display or Lighting applications, Oerlikon Cold Light Reflectors are the central component of an effective heat management system.

Lids for Microdisplays
The optical performance of a microdisplay depends highly on the quality of its cover glass. It is not only an outstanding spectral performance of the Anti-Reflection Coating — state-of-the-art defect levels and excellent cosmetics of the glass surface play an important role. Oerlikon Optics has extended these capabilities to substrates up to 200 mm rounds to support Wafer Level Packaging requirements — including chrome apertures and features for ease of assembly of the lid to the sensor.

Plastic Optics
Oerlikon Optics offers customized coating solutions and components using all the major optical plastics. Plastic enables new optical design methods, including:
- Cost savings due to reduced part counts and lower assembly time
- Aberration correction using aspheric lenses
- Integration of mechanical features with color correction surfaces (e.g., snap-in mounting features with Kinoforms)
- Diffractive surfaces for beam shaping of laser applications
- Significant cost economies over glass for high volume production.
Oerlikon Laser Modules for Illumination

Laser illumination for visual displays. Be it rear projection televisions, cinemas, embedded projectors, LCD backlights or front projectors, the benefit of using laser sources for illumination are many. Expanded color gamut, maximized etendue efficiency, lower power consumption and increased lifetime are only a few of the advantages of using Oerlikon Laser Modules. Available in different power levels to suit customer specific applications.
**OLM™ 3000**
For high-power applications the OLM™ 3000 provides greater than 3W optical output in red @ 615.25 nm, green @ 532.5 nm and blue @ 465 nm to suit the most demanding applications in rear projection television, high brightness front and cinema projections, and other high power applications.

**OLM™ 100**
For embedded and accessory applications the OLM™ 100 provides up to 100 mW of RGB output. Low power consumption and reduced volume make this module perfect for applications where ultimate size reduction is necessary. Available in single- and dual-beam versions to support multiple optical architectures.
Oerlikon Optics specializes in opto-mechanical assemblies that integrate Oerlikon components into sub-assemblies and final systems.

Opto-mechanical assemblies range from low-volume, highly-specialized applications for military and aerospace to high-volume, consumer-electronics sub-systems. Oerlikon can provide assembly services based on in-house designs or serve as a build-to-print partner for any size project. Emphasis on a lowest total cost solution is a key component of our assembly service and, combined with our vast experience in opto-mechanical assemblies, this makes Oerlikon Optics the ultimate “one-stop-shop” solution provider to customers.
At Oerlikon Optics, we provide a complete range of products and services for any optics need. We can supply all required optical components and assemblies as well as engineering assistance. Having a fast, flexible and reliable supplier for all your needs reduces your risk and gives you peace of mind.

Optical Components
Our optical components are manufactured in state-of-the-art cleanrooms with vacuum-deposition or sputter systems to minimize costs and optimize performance. A large variety of backend processes supports our product portfolio.

Customized Thin Film Designs
Through partnerships and cooperation, we can innovate with you. Our engineers work with clients to provide customized thin films and components which match your needs.

Worldwide Production Facilities
Oerlikon Optics has a global sales network and manufacturing facilities in Europe (Balzers, Liechtenstein), the US (Golden, Colorado) and Asia (Shanghai, China).

Balzers: Highly sophisticated optical solutions for technology leadership, divisional R&D, new product platform development, coating process engineering, and optical components production.

Golden: Rapid prototyping for the Projection Display markets, subassembly development, production, and optical components for the US market.

Shanghai: High volume production for the worldwide market with cost and quality leadership.

Opto-mechanical Assemblies
Oerlikon Optics provides opto-mechanical and subassembly services to the Microdisplay market from all manufacturing sites, assuring high value solutions for any volume.

Engineering and Rapid Prototyping
Whatever your engineering need, our R&D scientists and engineers can support you in competitively manufacturing your products from project inception to volume production in record time.

Design-Assist Services
Oerlikon Optics’ design-assist team, specialized in opto-mechanical design, offers custom designed solutions. This service includes options such as co-design, design for manufacturability and entirely new designs.

1 Infocus LP120 Front Projector
2 SlimTV™ (16:9 RPTV)
3 ImageActuator™
4 HD6 Light Engine
Whether your system architecture uses LCD, DLP®, or LCOS Microdisplay and lamp, LED, or laser illumination, Oerlikon Optics will provide you with customized components for your color-management system. (DLP® is a registered trademark of Texas Instruments Inc.)

**Schematic of DLP® LED projector**
1. LED Source
2. Plastic Collector Lens
3. LED ColorDichroics™
4. Silflex™/Deflex™ Mirror
5. Illumination Optics
6. DMD™ (Digital Micromirror Device™)
7. Projection Lens

**Schematic of DLP® RPTV light engine**
1. Lamp with Cold Light Reflector
2. UV-Guard™ Filter
3. Illumination Optics
4. ColorWheel™
5. LightTunnel™
6. Silflex™/Deflex™ Mirror
7. LightGate™
8. DMD™ (Digital Micromirror Device™)
9. Projection Lens

**Schematic of DLP® front projector**
1. Lamp with Cold Light Reflector
2. UV-Guard™ Filter
3. Illumination Optics
4. ColorWheel™
5. LightTunnel™
6. Silflex™/Deflex™ Mirror
7. DMD™ (Digital Micromirror Device™)
8. Projection Lens
Schematic of LCD projector
1 Lamp with Cold Light Reflector
2 UV-Guard™ Filters
3 Polarization Conversion
4 Dichroic Filter/Mirror
5 ColorWedge™ Dichroic
6 Silflex™/Alflex™ Mirrors
7 Trim Filters
8 HTPS tLCD Panels
9 X-Cube Prism
10 Projection Lens

Schematic of LCOS RPTV light engine
1 Lamp with Cold Light Reflector
2 UV-Guard™ Filter
3 Polarization Conversion
4 Dichroic Filters/Mirrors
5 Alflex™/Silflex™ Mirrors
6 ColorWedge™ Dichroic
7 Trim Filters
8 HELF™ Polarizing Beamsplitters
9 LCOS Panels
10 X-Cube Prism
11 Projection Lens

Schematic of DLP® Laser-TV Projector with OLM™
1 OLM™ Oerlikon Laser Module
2 Diffractive Beam Shapers
3 Dichroic Mirrors
4 Silflex™/Deflex™ Mirror
5 Illumination Optics
6 DMD™ (Digital Micromirror Device™)
7 Projection Lens
Oerlikon Optics
Worldwide network

Modules and Components

Europe
OC Oerlikon Balzers Ltd., Optics
P.O. Box 1000
LI-9496 Balzers
sales.optics@oerlikon.com
T +423 388 4444
F +423 388 5405

USA
Oerlikon Optics USA Inc.
16080 Table Mountain Parkway
Suite 100, Golden, CO 80403
sales.optics.go@oerlikon.com
T +1 303 273 9700
F +1 303 273 2995

Asia
Oerlikon (Shanghai) Co., Ltd.
33# Building, No.76 Fu Te Dong San Road
Waigaoqiao Free Trade Zone
Pudong, Shanghai 200131, P.R. China
sales.optics.sh@oerlikon.com
T +86 21 5057 4646
F +86 21 5057 4643

www.oerlikon.com/optics