

Optical components...

Design + performance + logistics support + quality assurance

Optical components are key to the success of many applications. By providing a full range of Photonic products, BFi OPTiLAS has the knowledge of the whole value added chain and can help customers to select the best component for their specific application.

Custom optics

Production of optics according to customer specific drawings. Custom design and tolerances to best fit the application including opto-mechanical sub-assemblies. European-wide presence, manufacturer qualification process and strong manufacturer relationships.



Standard components

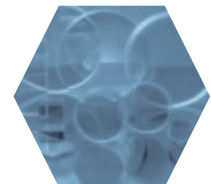
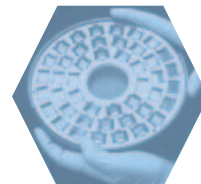
Catalogue components from stock or to customers' schedule. From single piece to large quantities, from UV – FIR, 193 nm – 10.6 μm . X-Ray optics, crystals and laser rods also available.

Optical devices and systems

Standard opto-mechanical assemblies and custom-design. F-Theta lenses, telecentric objectives and beam expanders for a broad range of lasers and light sources. Benefit from BFi OPTiLAS' expertise in the design and production of custom optical products.

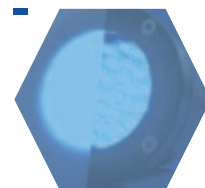
European Distribution Center

BFi OPTiLAS offers both local logistic and service support in each European country and a centralised pan-European hub and application / service lab. The European Distribution Centre is located in Dietzenbach, Germany, and covers an area of 2000 m². More than 6000 different products are stored and can be sent anywhere in Europe within 48 hours.



Technical support - calibration center - quality assurance

BFi OPTiLAS' technical support includes full service (installation, repair and calibration) for most products in the field of Imaging, Spectroscopy, Test & Measurement and Lasers. Depending on the products, Optical components are tested according to ISO10110.



... for optical applications

Light management - shaping - generation - measurement - use

Applications for optics are growing and photonics is a key technology of the 21st century. The wide variety of applications requires detailed knowledge of the manufacturing technologies and the influence of all parameters on the product performance. Teamwork in partnership between manufacturer, BFI OPTILAS sales and service teams and customer is a basic requirement for a successful long-term cooperation

Industrial fabrication & process technology

Laser technology

Optical standard ISO10110

High surface quality

High damage threshold

Precision polished surfaces

UV to NIR

Medical technology/life sciences

Defense and Safety

Quality documentation

X-Rays and UV optics

Custom coatings

Special filters

Information & Communication technology

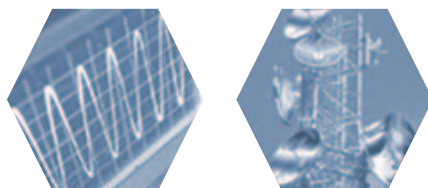
Data transfer

Low cost production

Bare pressed technology

Plastic optics

Micro optics



Lighting and energy

LED technology

High volume production capabilities

Custom diffusers, reflectors

Our optical product range ...

Standard optics



An advantage of standard optics are short lead times. Standard optics can be ordered as substrates, and combined with custom coatings. After the market launch of a product it can be changed to a series production to reduce cost.

Spherical lenses – cylindrical lenses – multi-element lenses – windows – prisms – mirrors – beam splitters – filters – etalons – polarisers – beam expanders – high energy laser diodes – interferometer accessories – optical materials



400 product ranges, approx. 400,000 parts - constant quality – lead time 2 – 3 weeks

CO2 optics – special materials IR – FIR

All forms of lenses – CO2 – F-Theta lenses – reflectors – standard windows – Brewster windows – output couplers – beam splitters – cylindrical lenses

Focal length 100 – 5,600 mm – diameter 5 – 200 mm – custom designs & coatings

Znse – ZnS – GaAs – Ge – Amtir – Si - Molybden - IG - KBr - NaCl - KC – Cu



OEM optics

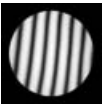


The basic production of optical components is generally done with standard technologies. Finishing and coating, as well as quality control have to be done with modern production technologies. A production process focused on customers' needs is required for optimal price/performance.

Design/construction tolerances supplier choice logistic/quality

Prism – sapphire components – CaF2/MgF2 optics – scan mirrors – precision aspheres – free form optics – cylindrical lenses – diameter up to 500 mm – ball lenses – substrates – unfinished goods – eyepieces – Axikon lenses – MRF technology – diamond turning technology

Quality control



Interferometer, spectrometer (VUV-IR)
Measurement of focal length, radii,
MTF polarisation, laser damage
threshold Quality inspection/certificates
according to MIL; DIN 3140; ISO 10110

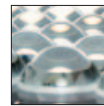
UV optics

120 nm - 355 nm



Micro optics

Conventional



Moulded optics

Plastic – glass



X-Rays optics are also available on request.	Surface Figure: to lambda/20	Conventional moulded:	3/ 5(2); 4/ 3' 5/ 3x0,16 Tolerances: 0.5-0.1 mm Form error: 2 - 5 %; 10 nm RMS
VUV broadband coating 120 nm - 266 nm	Alignment 4/: offset < 0.001 mm		Precision moulded:
VUV Coating for Filter 121.6 - 320 nm	Surface quality 5/1 x 0.006 (ISO10110)		
Nd:YAG multilayer coatings starting at 266 nm	Diameter < 0.5 mm, diameter-thickness tolerance < +/- 0,002 mm		

Single piece prototype production small series production series/mass production

... for your application

Laser components Nd:YAG - CO2 - Fibre - Diodes - Excimer - Ti:Sapphire - Femtosecond

In order to specify laser optics, details about laser type, application and operating conditions are needed. For instance, surface quality is essential to provide a high laser damage threshold. BFI OPTILAS, your laser specialist for 35 years, guarantees constant quality of delivery.

Requested coating + precision polished surface + surface quality + homogeneous material + quality control = repeatable quality

Laser crystals

Length up to 250 mm, diameter 80 – 100 mm

Nd:YAG - Nd:YLF - Ti:Sa - Yb:YAG ...

Non-linear

BBO - LBO - KTP - KDP - KD*P - LiNbO3 - KTA ...

Laser safety goggles & Safety curtains

Support and guidance

Safety according to DIN

Safety goggles for spectacle wearers



Damage threshold specifications

UV

193 nm > 2 J/cm², 20ns, 20 Hz

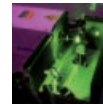
266 nm, 355 nm > 5 J/cm², 10ns, 10 Hz

1064nm, 20ns, 20Hz

AR Coating1 > 40J/cm²

AR Coating2 > 10 J/cm²

HR Coatings > 10 J/cm²



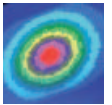
Surface specification

According to MIL or ISO10110

Roughness < 2 Å

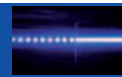
3/ 0,05 (0,05) / λ / 20 @633nm

5/ 3x0,016 / S-D10-5



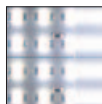
Laser protection windows – output couplers – dielectric mirrors – broadband mirrors – beam splitting mirrors – High energy beamsplitter – etalons – scan mirrors – laser rods

Light Shaping Diffuser ®



Shaping and homogenization of any light source

Light Shaping Diffusers (LSDs) homogenise and shape any light source with a much higher transmission than other technologies. LSDs can be combined with optical lenses, filters or prisms. For custom requirements and series production LSDs can be injection moulded. High temperature options are also available.

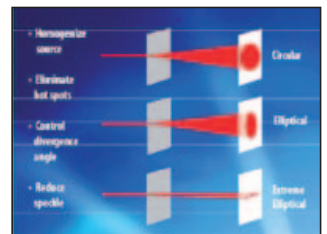
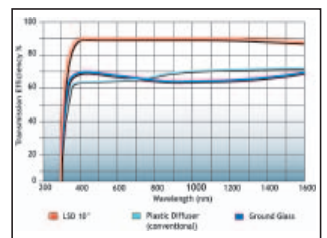


LED-Technology

Main application

All uses of LEDs – laser technology – automotive engineering – medical technology – bar code readers – night vision cameras – machine vision – display technology – signal lighting – outdoor lighting

Diffuser angle (FWHM)	circular : 0.2° - 80° elliptical : 0.2° - 95° custom shape	Substrates	BK7, B270 Polycarbonate Polyester Acrylic
Angle tolerances	<1° : +/- 0,5° >1° : < 10° : +/- 1° >10° : +/- 10°	Sizes	Sheets up to 20" x 20" Films up to 1500 ft Injection moulded parts
Transmission	88 – 92 % @ 365 – 1600 nm	Temperature range	-30° C – 100 °C @ 40 hrs
Refractive Index	PC: 1.586 PE: 1.640 Acrylic: 1.494	Laser damage threshold @ 1064 nm, 10 ns pulse	Glas: 8.1 J/cm ² PC: 0.22 J/cm ² PE: 0.2 J/cm ² Acrylic: 0.17 J/cm ²



Light Shaping Diffusers can improve many parameters of the light source including: light direction, glare limitation, homogenous brightness dispersion and maximum transmission. Only one part is used, so less space is needed. The diffuser can also be applied directly on to an existing optical component (e.g. condenser lens).

Defined beam shaping + high transmission + avoiding of shadow and Moirée effects

Your European Partner ...

Filters and Reflectors UV - Visible - NIR - CO2



The growing markets of laser technology, biotechnology, light & display technology increasingly need optical filters with custom specifications. An optical filter can include more than 20 different specifications. BFi OPTiLAS supplies filters from low cost to high end. All filters can be provided with single quality certification and mechanical mount.

Main applications

Medical instruments, gas analysis
DNA analysis, telecommunication,
fluorescence analysis, film projection,
light technology, lighting microscopy,
monitoring systems, thermometer.

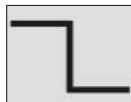
Transmission filter



**Biomedical
Fluorescence
Laserline**

Spectral characteristics of transmission filters and interference filters are the result of many dielectric layers. An optimal specification requires detailed knowledge about the filter application.

Edge Filter



**Long wave pass
Short wave pass
Heat control**

Main features of edge filters: sharp edges, with high blocking and high transmission. Stable temperature and constant incidence angle are important parameters.

Notch Filter



**Fluorescence
Laserblocking
Raman**

Notch filters give a maximum blocking (OD>6) at a given wavelength (e. g. a laserline) and high transmission (> 90 %) on either side. These filters are extremely resistant to environmental conditions.

Neutral Density Filter



**Standard Filter
Linear variable
Circular variable**

Neutral Density Filters are used for light reduction within the whole visible spectral range (400 – 700 nm). Neutral Density Filter are also appropriate for low power laser applications. They can be produced as absorption or interference filters.

Colour Glass Filter



**Violet, green,
yellow, orange,
neutral, blue
Heat absorption**

Colour Glass Filters are absorption filters, i. e. absorption will be done through the filter material. These filters work independently from the incidence angle. High flatness and homogenous material are important quality characteristics for absorption homogeneity.

Reflectors



**Parabolic
Spherical
Elliptical
Hot Mirrors**

Requirements for optical reflectors are a long life time and low costs. Producing an optimal reflector requires a good understanding of the design, production and coating processes. Main applications are: Lighting systems, film projection, vision systems, event lighting, and medical.

Quality features

High Transmission
Long life time
Short edges
High blocking
Extremely narrow bandwidth
Shape accuracy
Temperature stability
Resistance against environmental conditions

Quality standard

MIL-STD-810C; MIL-F-48616
MIL-C-48497A; MIL-STD-13508
MIL-C-675

Quality assurance/equipment

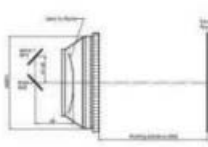
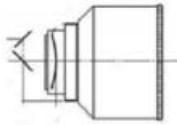
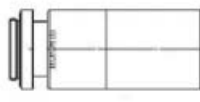
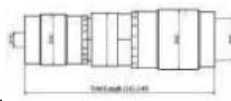
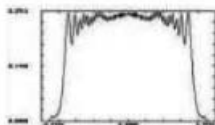
Perkin Elmer 900 ; Varian-Cary 300

**Perfect filter design – appropriate specification – choice of adequate manufacturer =
quality and cost optimized purchasing**

Components and Systems



Integration of mechanical assembly and optical components requires specific know-how: Production, appropriate joining and cleaning of all parts, specific optical and mechanical parts measurement. Only qualified optics designer are able to calculate the most efficient – performance, price, stability, sensitivity to environment ... - optical systems.

	λ	Focal Length	Scan Field		
F-Theta Scan Objectives	10,6 μm	60 mm to 560 mm	35 x 35 mm bis 400 x 400 mm		F-Theta Scan Objectives are built for laser systems with X-Y scan mirrors. Main applications are engraving and marking systems. Optics are usually made from ZnSe (IR + VIS) or GaAs (IR), double or triple elements.
	355 nm 532 nm 1064 nm	100 mm to 810 mm	70 x 70 mm bis 500 x 500 mm		
Telecentric Objectives	10,6 μm	100 mm to 140 mm	43 x 43 mm to 70 x 70 mm		Telecentric scan lenses display a focused beam perpendicular to the image plane, independent from the beam position in the scan field.
	266 nm 355 nm 532 nm 1064 nm	52 mm to 254 mm	18 x 18 mm to 140 x 140 mm		
Beam-Expander fixed series	10,6 μm	1,5 to 8x	10-13 / 15-30		The most popular beam expander (Galilean type) consists of a negative (input) and a positive (output) lens. The beam expansion factor of a Gaussian beam depends on the laser beam parameter and the position of the applied optical lenses.
	355 nm 532 nm 1064 nm	3 bis 10x	10 / 20-34		
Beam-Expander adjustable	10,6 μm	2 to 10x	10-15 / 15-35		
	355 nm 532 nm 1064 nm	1,5 to 20x 2 to 8x zoom	6 / 23-30 10 / 30		
Adjustable Divergence	10,6 μm	2 to 6x 2 to 8x zoom	10 / 28 10 / 36		
Beamshaper	355 nm 532 nm 1064 nm 10,6 μm	Conversion of Gaussian beam into a Top hat profile	4,6 / 8		Beamshapers usually change a Gaussian beam profile into a top hat profile. The output beam is collimated. After that additional lenses can be applied to shape the beam.

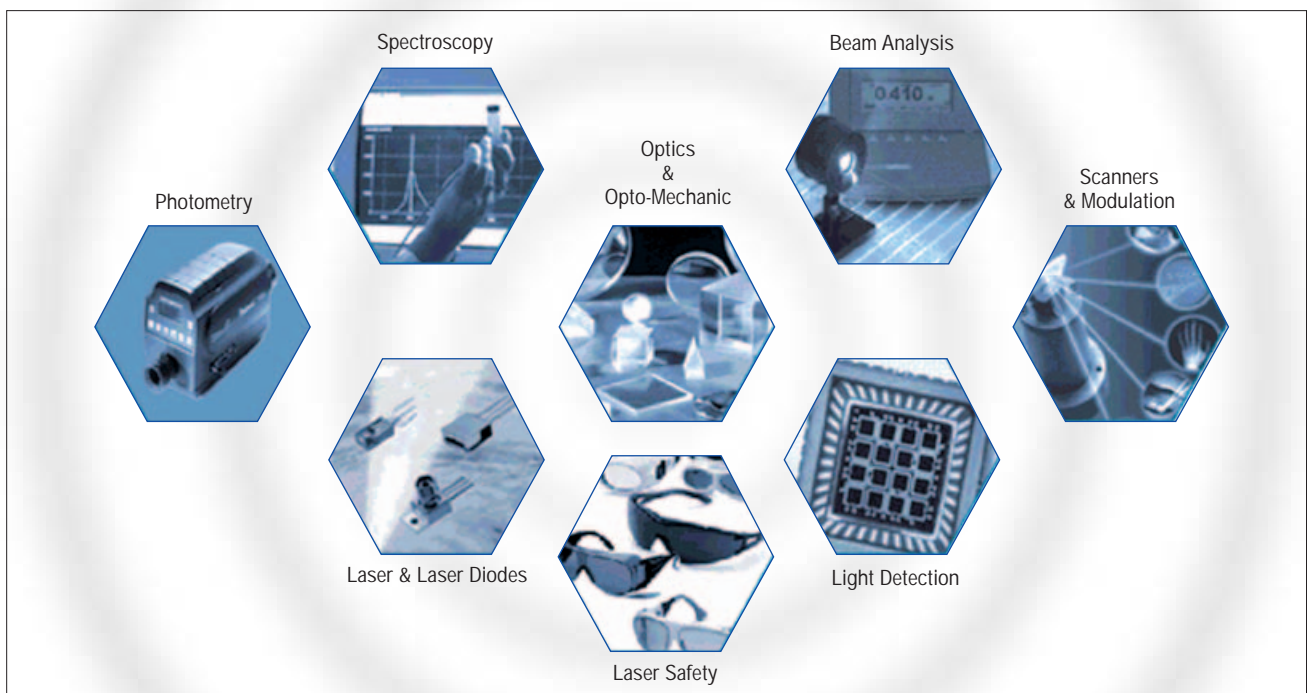
Beam combiner - IR camera objectives - scan objectives – beam expanders - oculars – mechanical components for optics: adapters, mirror mounts, adjustment devices, accessories for interferometers

4 Standard items from stock

4 Production within 4 – 6 weeks

Rework or replacement

Visit our Web site www.bfioptilas.com



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