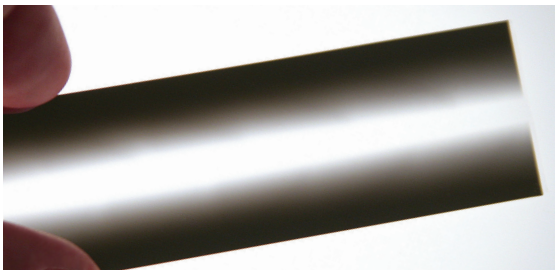
Linear Apodizing Filters

Inserting a customizable linear apodizing filter eliminates undesirable intensity variations

Linear Apodizing filter,
Dark in center

$$D = \frac{e^{-(\frac{R}{a})^2}}{e^{-(\frac{x}{a})^2}}$$



Linear Apodizing filter,
Clear in center

$$D = e^{-(\frac{x}{a})^2}$$

DESCRIPTION:

The Linear Apodizing filters are used to eliminate undesirable intensity variations in optical systems such as in spectrometers. Inserting a Linear Apodizing filter in front of a detector can be used as a soft slit to reduce diffraction patterns, eliminate detector saturation and obtain a uniform light intensity to the detector.

Linear Apodizing filters are customizable density gradient filters that have constant density in one direction and variable neutral density filter in the other direction.

Linear Apodizing Filters come in two configurations:

Dark in center:
The Linear apodizing filter function decreases in density linearly from a dark center, where light is usually at its peak intensity, to the outside edge, where it can become completely transparent.

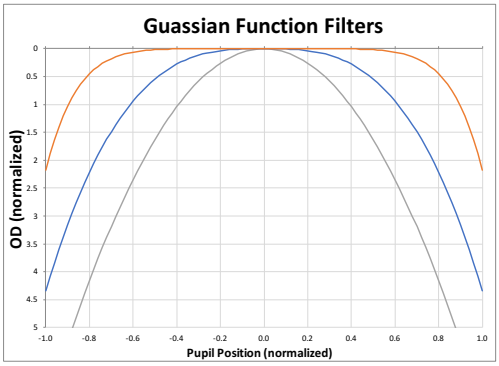
Clear in center:
The Linear apodizing filter function increases in density linearly from a clear or light center to a darker outside edge.

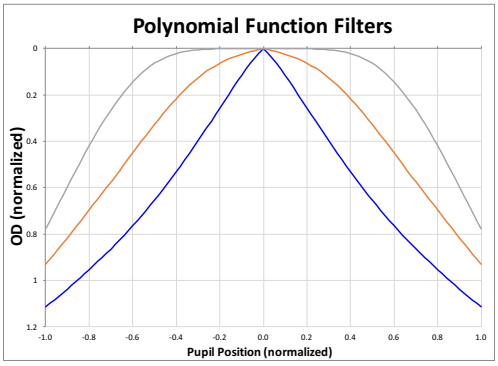
APPLICATIONS:

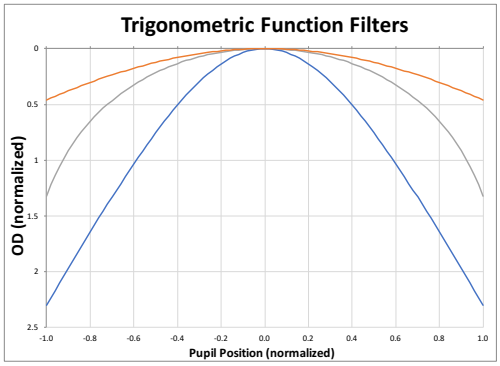
- Entertainment: to make light distribution uneven for cosmetic applications.
- Imaging: to break up diffraction patterns by the introduction of soft edges.
- Industrial: to eliminate detector saturation that occurs in automatic welding machines.
- Military: to eliminate IR detector saturation in ground-to-air and air-to-air missiles.
- Photography: to create soft edges in photos & reduce over exposed areas.
- Scientific: used as a variable phase plate when the gradient coating material has the same index of refraction as the substrate.
- Semiconductor: used in exposing systems to obtain perfect illumination distribution.

Contact us to see how we can help your system achieve the highest levels of performance of your application. We will assist you in specifying the Linear Apodizer filter to your needs.

The distribution functions can be defined by either density (D) or transmission (T). These functions can range from a simple linear equation to much more complex algebraic, exponential, or geometric functions as shown below:







Examples of Custom Linear Apodizing density gradients

TYPICAL SPECIFICATIONS (CUSTOM OPTIONS AVAILABLE):

Property	Value
Substrate Materials:	BK-7 or other substrate materials
Dimensions:	25mm x 50mm and custom sizes
Optical Density Gradient:	0.04 - 1, 2, 3, 4 or 5 ±5% of max OD
Surface Quality:	80-50 Scratch & Dig
Clear Aperture (CA):	90% without AR coating
Transmitted Wavefront Error:	< 2 Waves Per 25mm
Wavelength Calibration:	510nm, or 2500nm, or depending on substrate
Wavelength:	UV-far IR
Parallelism:	< 3 Arc Minutes
Environmental/Durability:	MIL-PRF-13830B, MIL-C-48497A, MIL-C-675C, or similar
Laser Damage Threshold:	<30 W/cm^2 CW, typical Not recommended for Pulse Laser Use

KEY FILTER BENEFITS:

- Density gradients can be customized to suit any application (transmission functions also available).
- Transmittance & optical density are continuously varying.
- Can be applied to different substrate types.
- Used in broadband applications.
- A wide range of materials can be used to tune the reflection and absorption.
- The coating can be applied to substrate size from a few millimeters to over 6”.
- Environmentally durable.
- Prototype to production volumes.

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