



SUPERIOR GRATINGS, SPECTROGRAPHS AND SPECTROMETERS IMPROVE QUALITY OF UV-VIS ANALYSIS

HEADWALL ADVANTAGES

Original Master Holographic Grating:

- Each grating is an original piece unmarred by replication processes. This ensures consistent application performance from one piece to the next, and from one order to the next.

Low Stray Light:

- Headwall's original holographic diffraction gratings are made using precise laser interference patterns that typically yield stray light figures better than 10^{-3} .

Aberration-Corrected:

- Keystone and Smile distortion yield poor spectral and spatial purity.
- Headwall's concentric optical layout and aberration-corrected gratings minimize these artifacts, resulting in excellent spectral and spatial resolution from edge to edge within the desired field of view.

All-Reflective Design:

- Headwall's design approach is all-reflective using gratings and mirrors. By comparison, transmissive optical layouts increase unwanted stray light.

Optical Design & Vertical Integration:

- Headwall has more than 40 years experience producing gratings and spectral engines for OEM applications. This experience translates into consistent quality and rapid turnaround of prototypes and production-volume orders.

THE ADVANTAGES OF PARTNERSHIP

GRATINGS

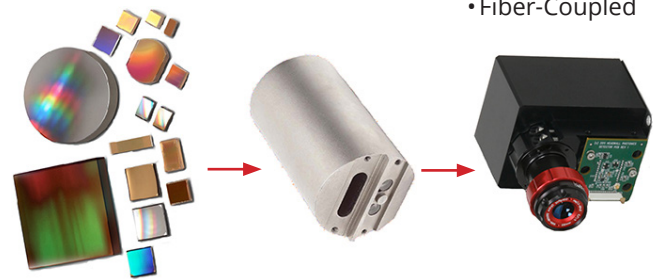
- Holographic
- Diamond Turned

SPECTROGRAPHS

- Single-Channel
- Dual-Channel
- Multi-Channel

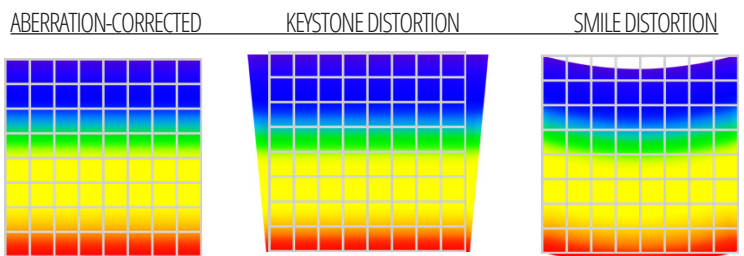
SPECTROMETERS

- UV-VIS
- NIR - SWIR
- 2-D Imaging
- Fiber-Coupled



Headwall's products are designed and manufactured under ISO 9001:2015 certified processes. Dedicated production work cells, in-line production, and supply-chain surveillance result in low RMAs. Optical design and manufacturing expertise allow for vertical integration of optical components through complete, integrated spectral imaging solutions.

THE ADVANTAGES OF ABERRATION-CORRECTION



↑
Diffracted slit image is square on focal plane array

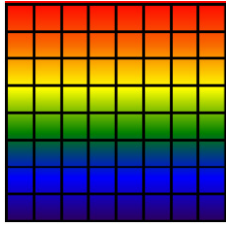
- SUPERIOR PERFORMANCE
- NO DISTORTION

↙ ↘
Distortion at Focal Plane leads to poor performance

MINIMIZING STRAY LIGHT

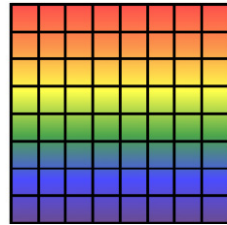
NO STRAY LIGHT:

Diffracted slit image is crisp on focal plane.

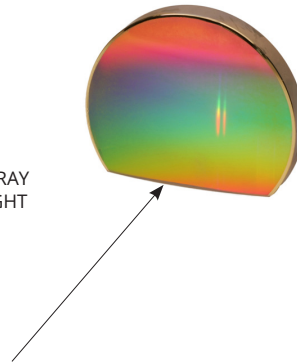


STRAY LIGHT:

Unintended light reaches focal plane, adding erroneous signal to detector array



STRAY LIGHT



ORIGINAL HOLOGRAPHIC GRATINGS:
LESS STRAY LIGHT, SUPERIOR PERFORMANCE

RULED GRATINGS

Ruled gratings are mechanically generated, which results in tool marks on the grating itself. These tool marks scatter light and thus higher stray light specifications.

PRISMS

With changes in temperature, the index of refraction and wavelength dispersion also change. Also, the multiple surfaces of a prism increase the amount of scatter and thus worsen stray light specifications.

REPLICATED GRATINGS

Replicated gratings are made from a 'master' (or 'original') grating. However, the replication process degrades the master, which results in a transfer of these errors to the copies made from that master.

APPLICATIONS

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- BIOLOGICAL
- COLOR
- PATTERN

INSTRUMENTATION

- FLUORESCENCE
- SPECTROPHOTOMETERS
- COLORIMETERS

APPLICATION EXAMPLE: HYPERSPECTRAL FLUOROPHORE IMAGING

UNFILTERED HYPERSPECTRAL FLUOROPHORE IMAGING (UHFI)

It is common practice for bio and medical researchers to stain tissue samples, excite the samples with various lasers or UV sources, then view fluorophore emissions through channel filters. Care must be taken to select fluorophores without overlapping emission spectra (as shown to the right). If multiple emissions occur within a given channel, information can be lost due to a lack of discrimination within the channel. In the figure below, UHFI spectra, each derived from a single image pixel, demonstrates the ability to separate overlapping emissions with Headwall's Hyperspectral Fluorophore Imaging System.

Hyperspectral imaging combines imaging and spectroscopy. Every spatial pixel in a hyperspectral image has an entire spectrum; therefore, unique spectral signatures can produce image contrast rather than the intensity within a fixed bandwidth. This powerful feature allows hyperspectral imaging to separate the signal from fluorophores with overlapping emission spectra. Therefore, hyperspectral imaging can simultaneously distinguish a virtually unlimited number of fluorophores.

