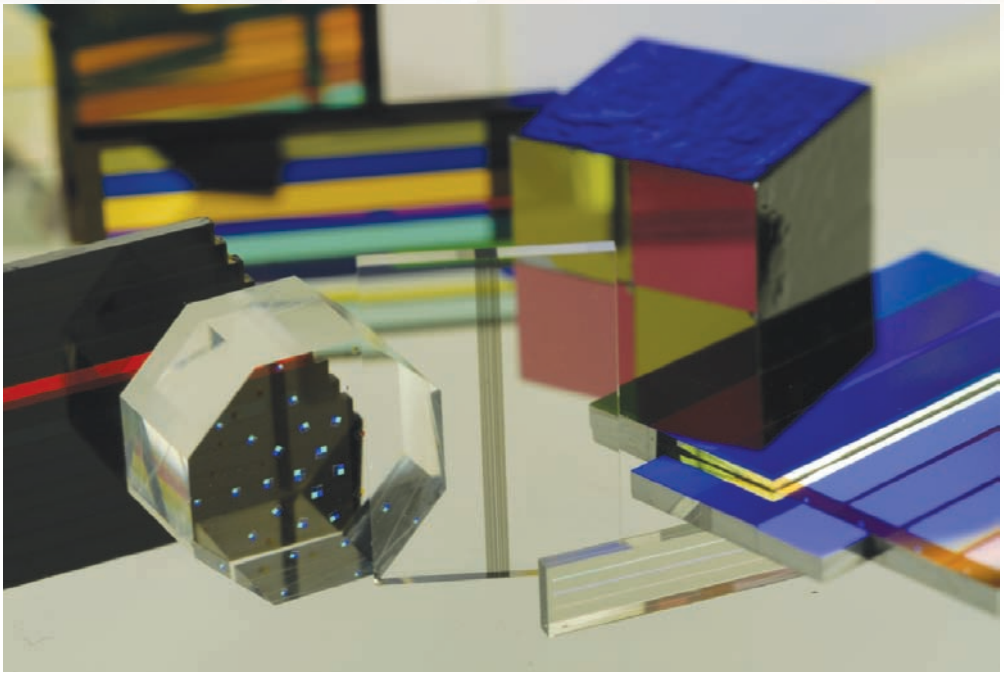
BARR ASSOCIATES, INC., WORLD LEADER IN CUSTOM, PRECISION THIN FILM COATINGS AND OPTICAL FILTERS



BARR'S UNMATCHED HERITAGE IN THE OPTICAL FILTER INDUSTRY

Edgar Barr, who founded Barr Associates, was a pioneer in the field of Optical Thin Films Technology, having started a thin films coating laboratory at Polaroid Corporation in the 1940's. He established Barr Associates in 1971 to provide a source of optical bandpass filters for the scientific community, which was in need of high performance filters at moderate cost. Ed enjoyed working closely with his customers to optimize filter performance and to achieve their cost goals. His legacy continues today in Barr's business model which has, as one of its key objectives, **to offer simple solutions to complex problems through the establishment of strong customer relationships.**

Barr has come a long way since these earlier times to become **the world leader as a provider of differentiated, precision thin film coating solutions and optical filters**. With 70 coating deposition chambers, Barr deploys the widest range of optical coating technologies in the industry. Our broad manufacturing capabilities and capacities allow us to process all customer orders with agility including both high volume production jobs as well as short-run prototype work. Barr's customers represent leading innovators associated with a diversity of markets and applications.

BARR COMMITMENT

A hallmark of Barr's reputation is the commitment to our customers' success. At Barr we understand that the optical

coatings and thin film components which we supply often **represent key enabling technologies in our customers' applications**. We have learned that **we can best help our customers to succeed by supplying optical thin film components which have been custom-designed and manufactured to afford optimum performance in their applications**. Establishing strong relationships with our customers is very important to us, and we have placed the highest priority on maintaining them, despite the economic business cycles experienced by the diverse industries we serve.

BARR'S TECHNICAL STRENGTH

Every Barr customer receives the **added value of Barr's base of experience in the design and manufacture of precision optical filters, which has spanned over 37 years**. We have a successful track record of producing filters over the broad spectral range from the ultraviolet through the far infrared. Custom optical filters from Barr are offered in a variety of shapes and sizes and are supplied to a diversity of existing and emerging markets and photonic-based applications. Some of these include: Spectroscopy, Environmental Monitoring, Color Measurement, Color Correction, Thermal Imaging, Gas Detection, Clinical/Analytical/Medical Instrumentation, Safety & Security, Optical Detectors, Machine Vision, Lasercom, Threat Warning, Night Vision, Laser Rangefinders & Designators, Laser-based Applications (including High Energy Laser), Scientific Research, Astronomy, Defense, Aerospace, Civil Space, and Telecommunications. Barr also serves selected applications requiring precision thin films whose key properties are non-optical in nature, such as thin films for selected MEMS applications.

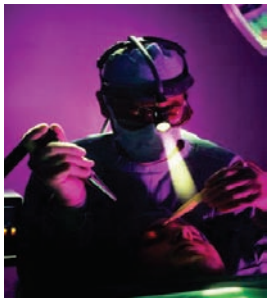
Barr's broad range of coating deposition technologies affords customers flexibility and a large number of design options to achieve the best optical filter solution while meeting their cost goals. Barr's offers many different high performance filter types including patterned filters, filter arrays, ultra-high reflectors and low loss coatings for laser applications, filters with steep edge or passband slopes, multi-band filters, and ultra-narrow bandpass filters, filters made with durable hard oxide coatings, image-quality filters, and filters with exceptionally high signal-to-noise characteristics owing to high transmission and deep out-of-band blocking.

PARTNERSHIP APPROACH TO WORKING WITH OUR CUSTOMERS

When a new request for a custom optical filter or thin film coating is received at Barr, it is assigned to a Product Engineering team best suited to address the customer's needs. This design team interacts closely with the customer throughout the course of the filter development and manufacture and the interaction continues even after the filter is shipped. **Barr's partnership approach to doing business has enabled us to serve as an extension of our customers' design and engineering resources, in a collaborative effort, to arrive at the best thin film solution**.

BARR OPTICAL FILTERS AND COATINGS – SOME KEY APPLICATIONS AND PROGRAMS

Barr's breadth and depth of competencies in Precision Thin Film Coatings allow us to serve a wide diversity of Markets and Applications



COMMERCIAL

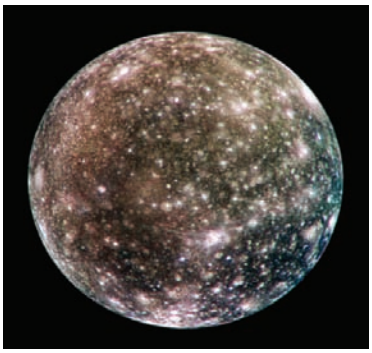
- Clinical/Analytical Instrumentation
- Medical Instruments
- Spectroscopy
  - Fluorescence
  - Raman
  - Absorption
  - FT-based
- Hazard & Environmental Monitoring
- Thermal Imaging
- Machine Vision
- Metrology
- Optical Detectors
- Telecommunications

DEFENSE

- Night Vision
- Threat Warning
- FLIR
- Surveillance/Recon
- Targeting
- SeeSpot
- Precision-Guided Munitions
- Lasercom
- High Profile U.S. Defense Programs
  - Airborne Laser (ABL)
  - High Energy Laser (HELLADS)

SPACE

- Participation in over 100 Space Programs
  - Hubble Space Telescope
  - James Webb Space Telescope
  - Mars Missions
  - Spitzer Space Telescope
  - Cassini (Saturn)
  - Galileo (Jupiter)
  - Earth Observation Satellites



SCIENCE & ASTRONOMY

- Filters for LIDAR applications
- High Profile Ground-based Astronomy Programs
  - HALE-BOPP Comet Filter Set
  - NIRSPEC Camera Filter Set
  - Sloan Digital Sky Survey (SDSS)
  - PAN-STARRS
- Filters for Amateur Astronomy
  - Custom UBVRI, JHKLM Filters
  - H-alpha, O-III Filters

REPRESENTATIVE CUSTOM OPTICAL FILTER AND COATING TYPES FROM BARR

Coatings capabilities extend from 200nm in the Ultraviolet through 40+ microns in the Far Infrared.

- Ultra-narrow Bandpass, Narrow Bandpass, Wide Bandpass
- Steep Edge/Laser Rejection
- Laser Bandpass
- Dual Band, Multi-Band
- Dielectric and Enhanced Metallic High Reflectors (99.99%)
- Optical Coatings – Laser Damage Threshold
- Heat Mirrors, Cold Mirrors
- Rugate Single-line, and Multi-line Notch Filters
- BBAR, V-Coat AR,
- Shortpass and Longpass
- Filters with Extended Transmission or Blocking Ranges
- EX, EM, Dichroic B/S for Fluorescence Applications
- Beamsplitters including ones with Low Polarization Splitting
- Gain Flattening
- Color Correction
- Solderable Metal
- Transparent/Conductive (such as ITO coatings)
- Neutral Density
- Dark Mirror
- Linear Variable
- Filter Array
- Induced Transmission Filters
- Image Quality Filters, Filters with Controlled Wavefront Characteristics
- Patterned Filters

OTHER IN-HOUSE CAPABILITES:

- Advanced Coating Deposition Processes: IBS, e-beam/IAD, Magnetron Sputtering, PVD
- In-house Environmental Durablility Testing to MIL-Stds.
- In-house Precision Sawing, Dicing, Grinding, Coring, Polishing
- Comprehensive Spectral Test Capabilities
- Interferometric Test Capabilities including measurements at 1064nm, up to 12” diameter, variable angle S & P Polarization
- Micro-assembly
- Photolithography
- Surface Profilometry
- Optical Inspection, Microscopy, CCD-based Optical Comparator

BARR ASSOCIATES, INC.

Relationships Through Technical Excellence and Integrity

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