



Your Total Solution Partner

Expertise in Coatings & Specialty Glass
Concept Through Production
Designing for Manufacturability
Single-Point Accountability
Innovation for Years to Come

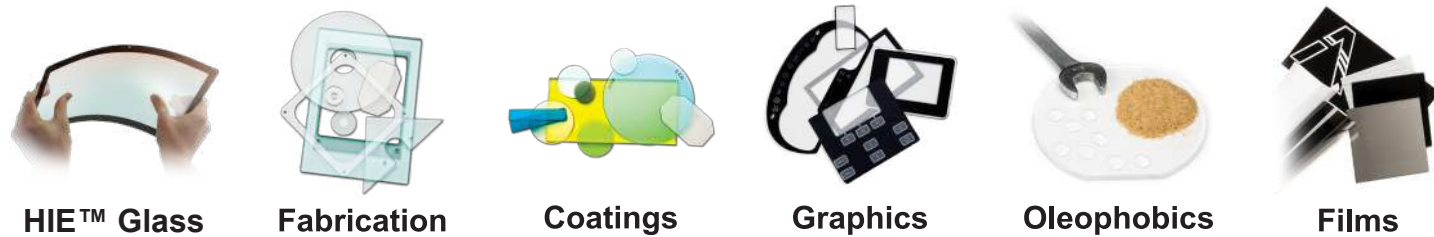
We Are Abrisa Technologies



Abrisa Technologies is a leading US based Photonics company providing custom thin film coated and fabricated technology glass and ready-to-install photonic assemblies from our nearly 125,000 sq. ft. manufacturing facilities. We partner with you, our customer, from concept through production, delivering custom designed solutions to meet your application-specific requirements as well as the best in fitness-for-use performance and volume manufacturability.

Our customers serve many markets including Micro-Opto Electronics, Imaging and Sensing, Industrial Automation, Defense and Avionics, Semiconductor and Display all of which are enabled by Photonics technology. Abrisa Technologies offers expertise as well as an ever-growing suite of capabilities in optical thin film coating and technology glass to support our customer's evolving market and innovation needs.

Manufacturing Capabilities



Abrisa Technologies broad scope of design and manufacturing capabilities, vertical integration and single-point accountability allows you to put your trust in one company for supply chain simplicity, convenience, reduced cost of ownership and delivery of consistent and reliable product every time.

- Float & Specialty HIE™ Glasses in mm to meter Sizes
- Fabrication for Shape & Features to Your Specific Needs
- Chemical or Heat Strengthening for Damage Resistance
- Coatings for Filtering, Throughput, Reflection, Conductivity
- Screen Printing for Electrical Connectivity, Branding & Displays
- Value-Added Assembly Films, Chemistry, ID Marking
- Total Solution Product Verification & Certification

Your Total Solution Partner

Abrisa Technologies customers are experts and leaders in their industries and best at defining the market challenges they face. Not all customers choose to focus on the photonic technology their systems and devices employ, that's where Abrisa Technologies excels. As a customer centric company, we listen to our customers' wholistic needs. As your Total Solution Partner, we offer a unique suite of specialized expertise, volume manufacturing experience, vertically integrated capabilities and services to fulfill our customers' photonic technology requirements, now and into the future. It begins with understanding our customer's market challenges, applications and collaborating with them from concept to production, every step of the way. Customers know they can rely on Abrisa Technologies as their Total Solution Partner for:

- Expertise in Both Optical Coatings & Glass Technology
- Manufacturable Solutions Optimized for Fitness-for-Use
- Over 40 Years of Experience for Consistent Volume Manufacturing
- Unique & Integrated Capabilities for Ready-to-Install Solutions
- Program, Inventory Management & Other Commercial Services
- Innovation & Production Needs, Now & for Years to Come





Specialty & Technical Glass

It all starts with the basic element, the glass. Our extensive knowledge of glass substrates and our expertise in glass properties makes Abrisa Technologies uniquely qualified to provide the best glass for optimum performance. Our solutions engineers find you the best matches for your application, volume and budget needs.

High Ion-Exchange (HIE™) Aluminosilicates

- Asahi Dragontrail™
- Corning® Gorilla® Glass
- SCHOTT Xensation™ Cover Glass
- SCHOTT AS 87 Ultra-Thin

Soda-Lime Float Glass

- Clear, Tinted, & "Colorless" Low Iron
- Non-Glare with Optional AR on 1 or 2 Sides
- Patterned Glass for Lighting Control
- Chemically Strengthened or Heat Tempered

Borosilicate Based Glass

- SCHOTT Borofloat® - Low CTE & Chemically Resistant
- SCHOTT Supermax® - Low CTE, Rolled Borosilicate
- SCHOTT D263® T eco - Thin, Clear, Low Alkaline
- Ultra-Thin Alkali-Free 0.1 to 0.2mm

Quartz/Fused Silica

- Corning® 7980 Fused Silica
- GE 124 Fused Quartz

Filter Glass

- Color Glass Filters
- Heat Absorbing Filters
- Neutral Density Glass & Grey Glass

Other and Specialty Glass

Non Alkaline Glass

- Asahi EN-A1 Glass
- Corning® Eagle XG® LCD Glass
- SCHOTT AF 32 Glass

Thermal, Condensation and Solar Management Glass

- Low-E Glass UV, IR Inhibitor - Pyrolytic on Soda Lime
- Low-E TECCLAR Condensation Control - Pyrolytic on Soda-Lime
- SCHOTT Robax® - Glass/Ceramic High Heat Resistance
- UV/IR Block Solar Heat Reduction – Coating on Soda-Lime

Other

- Laminated Glass - Safety Glass
- SCHOTT Superwhite B270® Flat Glass
- White Light Diffusion Glass
- X-RAY Lead Glass



Custom Glass Fabrication

Abrisa Technologies provides custom flat glass components from small singulated wafer components to large multi meter sized protective glass solutions for display, instrument and sensor array panels. Fabrication can be as simple as water jet cutting or as sophisticated as CNC machined and shaped parts with precision registered features suitable for airtight seals, precision controls mounting, and much more. Fabrication services are available on any of our 0.1mm to several inch thick glass, ceramic and specialty technology glass solutions.

Cutting

- Waterjet
- Scribe Cutting
- Hand Cutting
- Precision XY Sawing (Slicer)
- Wafer Dicing
- Ultra-Thin Glass Cutting

Machining

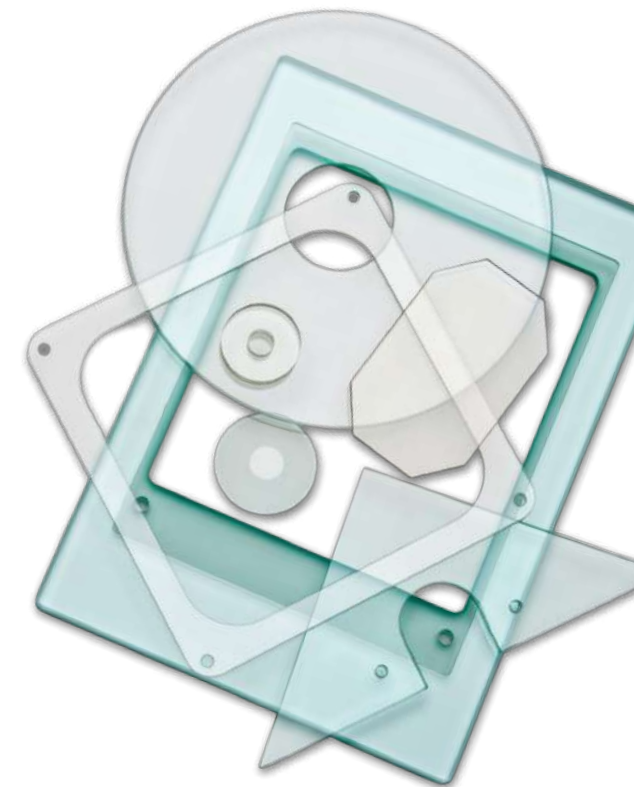
- CNC Processing
- Shaping & Circle Grinding
- Notching & Slotting
- Grooving
- Step Surfacing & Countersinking
- Drilling (Holes & Tapers)

Edge Finishing

- Angled & Multi-Level Bevels
- Seaming
- Corner Dubbing
- RADIUS CORNERS
- Circle & Flat Grinding
- Pencil & Polished Edging

Special Options

- Laser Marking
- Sandblast (Patterns & Logos)
- Clean Room (Special Packaging)
- Protective Films
- Automated, Ultrasonic Washing





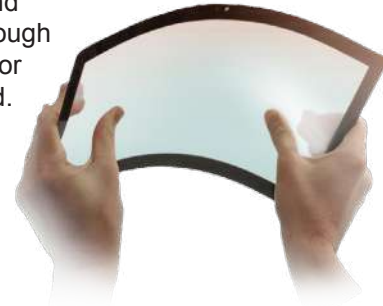
Glass Strengthening

Standard Glass Chemical Strengthening

Abrisa Technologies' chemical strengthening process toughens soda-lime, float and other borosilicate based glasses while keeping optical distortion to a minimum through a sodium and potassium ion exchange in a salt bath. Glass can be strengthened for 8 to 16 hours depending on the balance of hardness and bending strength desired. Popular for displays, portable devices, defense and avionics instrumentation.



- Enhanced Break and Damage Resistance
- Small mm Sizes for Sensors, Large 46" for Displays
- Best for Glass 0.03 to 3.0mm Thickness



Standard Glass Heat Tempering

Tempering brings glass to its softening point of 600°C and then rapidly cools it to create high surface compression of at least 10,000 psi or 69 MPa. The process makes the glass stronger and safer than annealed or untreated glass and makes it less likely to break through thermal shock.



- Thicknesses from 3.0mm to 19.0mm
- Max Size of 29" x 33"
- Small Dice Part Break Pattern for Safety

Property	Heat Tempering Change	Heat Strengthening Change	Chemical Strengthening Change (8 hours)	Chemical Strengthening Change (16 hours)
Impact Resistance*	5 to 6x	N/A	3 to 4x	4 to 5x
Bending Strength*	4 to 5x	2x	3.5x	2.5 to 3x
Resistance to Temperature*	4x	2.5x	1.8 to 2.5x	1.8 to 2.5x
Vickers Hardness*	N/A	N/A	1.4x	1.4x
Maximum Temperature*	243°C	230°C	300°C	300°C
Compressive Stress at Surface**	>69MPa	24MPa to 69MPa	Avg >165MPa	Avg >325MPa

*Relative increase over annealed glass. 5x means 5 times greater.
 **As measured by FSM 6000 measurement tool.

HIE™ Thin Aluminosilicate Glass Strengthening

Abrisa Technologies combines High Ion-Exchange or HIE™ chemical strengthening with high native strength aluminosilicate technology glass to produce solutions with 6-8x the strength of standard float glass. The HIE™ process and special materials afford the OEM reduced thickness to support low profile devices and reduced weight for portability while delivering protection with a high modulus of rupture and superior scratch and damage resistance.



- Asahi Dragontrail™, Corning® Gorilla® Glass 3, SCHOTT Xensation & AS 87
- Displays, Scanners, Touchpads, Windows
- Strong, Lightweight & Thin (0.1 to 2.0mm)
- Impact, Scratch & Bend Resistant
- Resistant to Temperature Changes



Precision Thin Film Coatings

Abrisa Technologies' ZC&R Coatings for Optics delivers unique precision thin film coating solutions on fabricated glass, wafers, filter glass and other materials of our or customer supply. Our design engineers work closely with customers to understand both the application and their business needs so that our solutions not only meet optical performance needs but include considerations for "fitness for use" and of course, economies of scale. Coated solutions are offered from 200nm in the UV to 20 microns in the far infrared.

Anti-Reflective & Sunlight Readable

- Photopic & Oleophobic AR for Displays
- Narrowband V-Coat for Lasers & Scanners
- Broadband UV, VIS, NIR, SWIR AR for Imaging
- Wide Angle 0-52° AR for LIDAR & Sensors

UV, Solar & Heat Management

- UV/IR Blocking, Hot & Cold Mirrors
- Blacklite™ UV Transmitting

Beam Splitter & Partial Transmitters

- Standard, Polarizing, Non-Polarizing, Hybrid
- Partial Transmitters for Security, Hidden LCD
- Neutral Density & Dark Mirrors

Wavelength Selective & Color

- Long Wave & Short Wave Pass
- Band Pass & Notch
- Dichroics, RGB, CYM, Color Correction

Bio/Chemical Compatible & Protective

- Autoclaveable for Medical & Dental
- Selective & Absorptive for Bio/Chemical Sensing
- Chemically Compatible for Bonding or Processing
- UV Transmissive for Curing or Fluorescence

Defense & IR Control

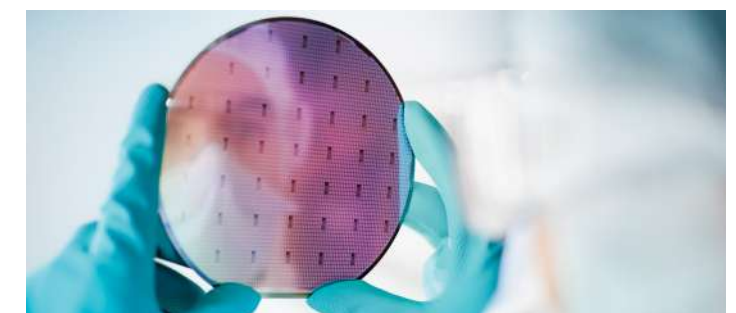
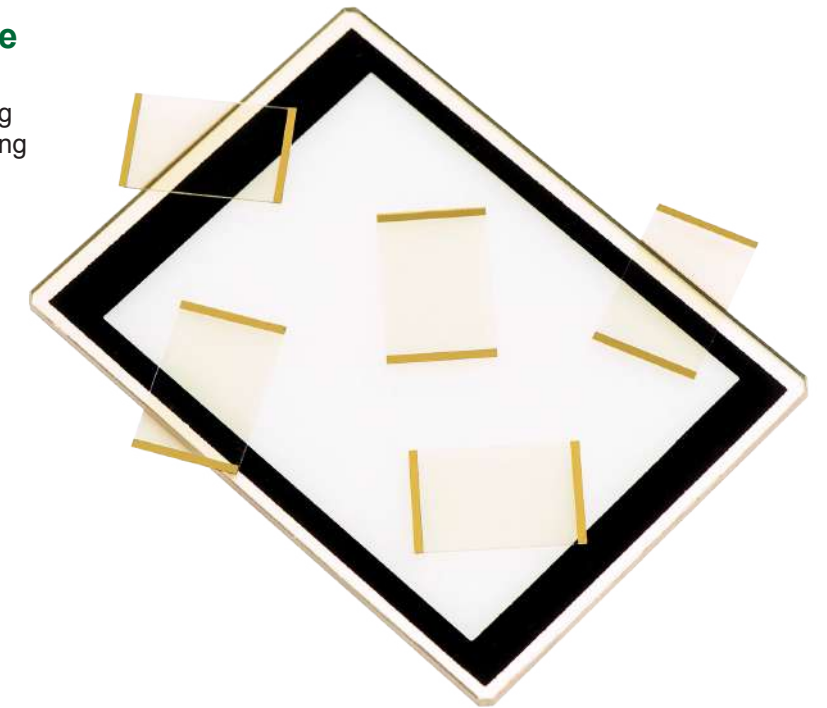
- Hot & Cold Mirror Filters
- Infrared (IR) Defense - Covert
- Blackeye, Covert, Semi-Covert & SWP

Mirror, Metallic & Bus Bar

- Gold, Silver, Aluminum, Enhanced Aluminum
- All Dielectric – Laser, Select & Broadband
- Bus Bars – CrNiAu, Ag Epoxy, Ag Frit

Transparent Conductive (ITO/IMITO)

- Heater & Anti-Fog
- EMI Shielding
- LC Electro-Optic Switching & Filtering





Robust Screen Printed Graphics

Screen Printing

Abrisa Technologies offers screen printed graphic solutions to meet aesthetic expectations for color matched branding, feature resolution and cosmetics as well as functional needs for transmission, scratch resistance, adhesion, temperature, chemical and corrosion resistance. Printing is performed in a class 1000 or 10000 cleanroom on semi and fully automated printers.

- Full Flood, Edge Printing, Dead Front & Large Format
- Polyester, Epoxy, Frit/Ceramic Inks for Every Environment
- Multi-Color CIE/PMS Matched Inks for Custom Logos
- Complex Machining & Graphics Registration
- Feature Resolution Down to 0.005" (0.127mm)



Extra-Large 84" Format HI-OD™ Screen Printing

HI-OD™ Extra Large 84" format screen printing on Abrisa Technologies custom fabricated glass supports larger "framed" and branded viewing areas for use on retail and commercial digital signage, gaming tables, in home entertainment and other large format displays.

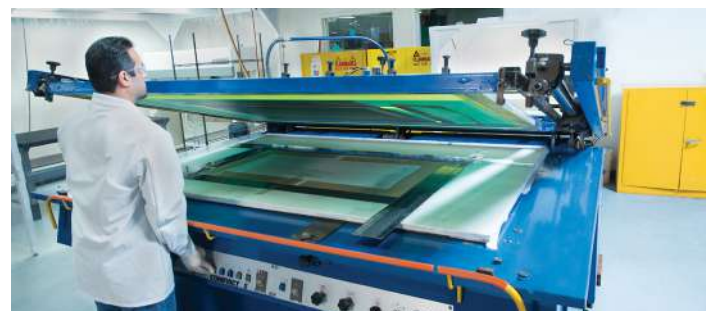
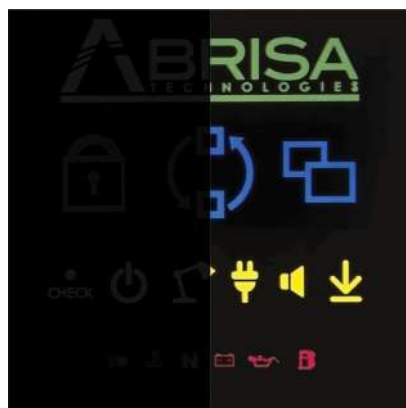
- Multi-Layer Process for Low Profile "Pinhole Free" Opacity
- "Halo-Free" Appearance after Bonding
- Black or White Matte or Gloss Finish
- Proprietary Epoxy Ink Formulations
- Custom Design Elements & Logos



Dead Front "Hidden Icon" Printing

Dead Front screen printing is used on human interface and control panels where seamless aesthetics are desired and backlighting is used to call attention to icons and alpha numerics as required. Dead Front panels can be found on instruments, appliances, kiosks, displays, vehicle cabins, cockpits and more.

- 5-10% Backlighting Throughput
- Survives Acetone Rub Test & Temperatures to 400°F
- Meets Class 4B, 5B Crosshatch Razor Scribe
- Meets Adhesion Standards of ASTM D3359



Ready-to-Install Value-Added Services

Abrisa Technologies compliments its suite of coating and glass fabrication manufacturing capabilities with the convenience of additional Value-Added Services and the cost savings of our Single-Point Accountability. Complete a solution with laser marking for identification and tracking, add safety or optical films, oleo/hydrophobic properties, install gaskets, then have it delivered to your production line in protective, multi-pack, or cleanroom packaging ready-to-install.

Laser Marking

Abrisa Technologies offers in-house CO₂ laser marking of select uncoated and coated products. Parts can be marked with non-removable identification and LOT tracking information without any added profile or chemistry to worry about.

- Edge & Face Printing
- Alpha-Numerics 2.8 mm to 7.1 mm High
- Human Readable & Non-Removeable
- Options – 3 Fonts, Branding



Oleo/Hydrophobic Solutions

Hydrophobic and oleophobic solutions by Abrisa Technologies help to reduce cleaning time and fingerprint visibility, enhance scratch resistance and prolong clarity in outdoor environments. Ideal for high traffic scanners, touch screens or outdoor camera and sensor windows.

- "Steel Wool" Abrasion Resistant Options
- Outdoor UV & Weather Resistant Options
- 1-Sided, 2-Sided, Masked & Coated Solutions
- Customer Furnished Chemistries Applied



Optical & Safety Films

Optical performance, safety and aesthetic features are sometimes best accomplished with the incorporation of films applied as part of a Total Solution. Abrisa Technologies offers in-house custom film patterning and application services.

- Custom Film Pattern Generation
- UV, IR, VIS, Transparent & Blocking Films
- Aesthetic Films – Metallic, Tint/Color, Branding
- Safety, Damage Resistance, Anti-Fog, Security



Mounting Tape & Gaskets

Abrisa Technologies offers convenient Total Solution services for the application of mounting tapes and gaskets to coated, screen printed and fabricated optical components. Ideal when parts need to be mounted, installed into brackets or require an environmental seal.

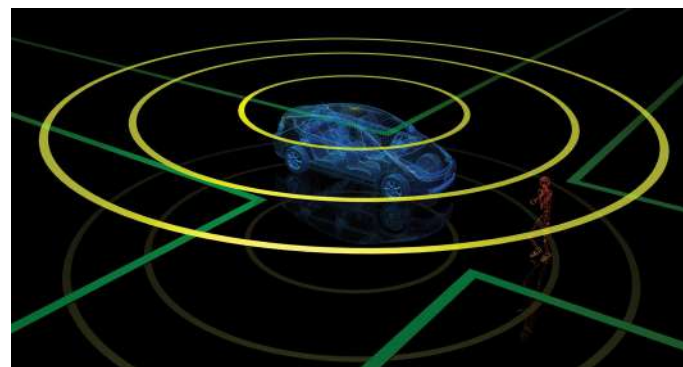
- Value-Added Application Services
- Mounting, Sealing, Damage Resistance
- Supply Chain Managed or Customer Furnished
- Single-Point Accountability – Ready-to-Install





The Markets We Serve

Imaging/Sensors - Security/Threat, LIDAR (Autonomous), Traffic



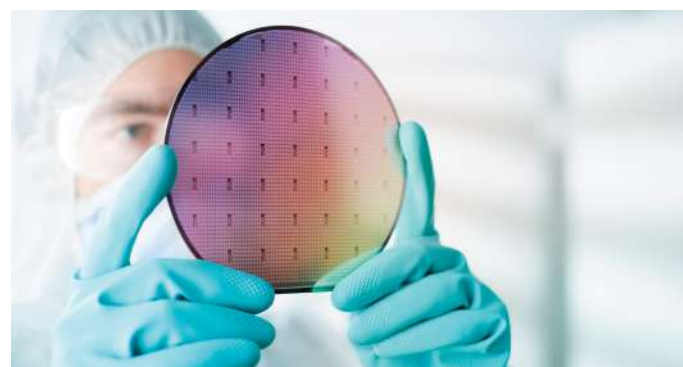
- Wide Angle 0-52° Image Sensor Windows
- Broad Spectrum Windows - UV/VIS, VIS/NIR, SWIR
- Damage Resistant HIE™ Technology Glass
- Dead Front Graphics Control Panels
- Oleo/Hydrophobic Cleanable Solutions

Industrial - 3D Printing, Machine Vision, Process Control



- Laser Scanning Mirrors & Windows
- Bandpass & Contrast Enhancement Filters
- Low Expansion 3D Printing Build Platforms
- UV Transmissive Coatings for Curing
- Ultra-Thin Touch Panel Glass

Micro-Opto/Semiconductor - Wafer Components, Process Tools



- Transparent Conductive Coatings (ITO/IMITO)
- Anti-Reflective, Metallic, Filter & Dichroic Coatings
- Wafers, Coatings, Bus Bars, Dicing
- Protective & Epoxy Compatible Coatings
- Cleanroom Protocol, Ultrasonic Cleaning



The Markets We Serve

Display - Digital, Immersive & Interactive Displays



- Damage Resistant HIE™ Aluminosilicates
- Hidden LCD Mirrors, Dead Front Graphics
- Sunlight Readable Coatings & UV/IR Blockers
- Near-to-Eye Display Partial Transmitters
- Ultra-Thin, Lightweight & Flexible Glass

Defense/Avionics - Controls, Targeting, Threat Detection, Simulation



- EMI Shielding (ITO) Enhancement Glass
- SWP, Covert, Blackout, Signal Selective Filters
- Non-Glare (NG) & Damage Resistant HIE™ Glass
- HUD/HMD Beam Splitters, Scanning Mirrors
- Anti-Fog (ITO) Heated Transparencies

Medical/Dental/Bio - 3D Imaging, Surgical, Biosensors



- Bio/Chemical Compatible Components
- Autoclaveable Mirrors & Windows
- Heated Biocompatible Sample Windows
- Wavelength Selective Filters
- AR, Filter & Sensor Coatings



Glass Fabrication



Coating Deposition



CNC Machining



Strengthening - Chemical & Heat



Screen Printing of Graphics



Abrisa Technologies is a globally recognized company that combines expertise in both fabricated technology glass and optical thin film coatings with volume manufacturing and engineering capabilities to deliver Total Solutions with excellent performance, fitness-for-use, and economies of scale.

Abrisa Technologies is comprised of two USA based facilities, Abrisa Industrial Glass, a fabrication facility in Santa Paula, CA and ZC&R Coatings for Optics facility in Torrance, CA, which together produce solutions from simple fabricated and strengthened glass components, to more sophisticated ready-to-install optically coated, electronically enabled, and branded sub-assemblies.

Our facilities serve a variety of industries and markets as: Micro-electronics, Defense and Avionics, Display, Industrial Automation, Optical Sensors and Imaging, Photonics, Medical/Dental, Life Science Analytics, and more.



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