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Visgard®

Exceptional Clarity, Premium Anti-Fog Durability

Anti-Fog Bathroom Mirror Application Case Study

Executive Summary

Fogless Bathroom Routine

Bathroom fog forms small droplets of water when the cool air on the mirror surface interacts with the warm water from a shower, it gases up from the humidity and becomes steam reducing visibility. While you can wipe the mirror down, the fog usually returns. In the residential bath and commercial hotel and spa industries, safety and convenience are vital to providing more enjoyable shaving and beauty preparations. Seeing clearly while getting ready during your grooming routine is essential. Fog-free mirrors ensure a safer, more comfortable grooming experience in extreme humidity.

Growing Application Use

According to various market research reports published in 2021, the global fogless mirror market is expected to have a compound annual growth rate (CAGR) of more than 6% from 2021 to 2028. Influencing factors include increased demand and capital investment in new décor and bath utilities resulting from rising disposable income among emerging countries. Technology innovation that improves clear reflection with advancements in LED lighting and fogless features which enhance the bathroom experience, especially in commercial gyms and hotel settings. Increased disposable income fueling the demand for such luxuries. The recovery of travel and tourism also impacts trends for adoption of fogless mirrors in spas, salons and resorts. Household application is expected to reach 58%, while commercial use is forecasted at 42% of the fogless mirror market growth through 2028, nearly \$788 million in revenues.

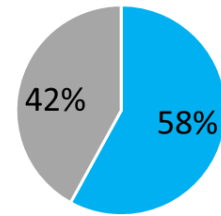
Emerging Technologies—Smart Mirrors

Smart mirrors will gain traction as technology advances and price becomes more affordable. All the same applications available in a smart phone have made their way into the mirror glass, with the digital display hidden underneath. This technology includes android-based interactive smart mirrors that can communicate with you. Smart mirrors can have all types of HD display technologies integrated such as Bluetooth, WIFI, built in speakers, microphones, cameras, web browsing, weather apps, television, touch, and voice activation such as Alexa embedded to live stream music. Additional conveniences include anti-fog humidity control for a better and safer grooming experience to self-cleaning features for easy maintenance. You can even track your weight and skin moisture needs at your fingertips. All this technology will bring the digital future to every bathroom.

Anti-fog Mirror Alternatives

There are several anti-fog solutions available in the marketplace for mirrors. Anti-fog mirrors with a hot water reservoir prevent moisture from condensing, prohibiting the formation of water droplets or fog on the surface—here you have to monitor the reservoir to make sure it has the proper amount of water. Anti-fog mirrors equipped with heating elements that warm glass prevent condensation with hardwired electricity and require power resources, a costly utility alternative, especially in the hospitality industry with a lot of rooms to service. You can apply dish soap, shaving cream, or DIY (Do-It-Yourself) concoctions, but these are temporary fixes which require constant application.

Markets



■ Household ■ Commercial

Million Insights Fogless Mirror Market 2021 -2028

Finally anti-fog coatings and coated film on mirrors offer a permanent cost-effective environmentally sustainable anti-fog barrier solution that does not require additional energy resources and physical maintenance. Anti-fog coatings can be applied to mirrors during OEM fabrication. Anti-fog coated films are economical, easy to install as an aftermarket upgrade and are available in a large variety of sizes.

Economical Anti-fog Solution

The anti-fog function on bathroom mirrors has long been a consideration for many companies in the bathroom products market. Prior to anti-fog coatings and film becoming an option, heated mirrors were the typical solution to manage surface condensation. The issue with electrical solutions is that the equipment is expensive, and it requires hard wiring the mirror in the bathroom. Customers want a lower cost upgrade renovation solution. FSI Coating Technologies (FSICT) is the best choice for adding anti-fog function to mirrors, we offer premium, high-performance permanent chemical and scratch resistant anti-fog in the form of film or liquid coatings.

How our Anti-Fog Technology Works

FSICT anti-fog coatings and pre-cured coated films provide an invisible layer of permanent, water-washable, anti-fog to plastics, polyester (PET) films, and glass surfaces. Our hydrophilic-coated anti-fog film improves the visual clarity on mirrors and windows by preventing condensation, causing moisture to spread into an even layer so it will not form single mist droplets, often referred to as wetting. Since our coatings and films are not available to consumers, they offer manufacturers a competitive advantage over temporary commercial and home recipe anti-fog sprays and gels.

Visgard Anti-Fog Liquid Coatings and Coated Films

FSICT is one of the only manufacturers of both high-performance anti-fog liquid coatings and coated films. FSICT provides premium hydrophilic, abrasion and chemical resistant Visgard anti-fog coatings and film for all high humidity bathroom applications. Both are available with or without self-adhesive backing for easy installation. These coatings and coated film can be applied to mirrors and shower doors, will not yellow when exposed to sunlight, and can be cleaned with common household glass cleaners.

Exceptional Optical Quality, Adhesion and Performance

Whether liquid coating or film is selected, **optical clarity** is the most important aspect of adding anti-fog function to mirror glass. FSICT film can be applied with a pressure laminator without developing defects during the process. When laminated properly, the clarity will not draw the user's attention to additional material on the mirror. For liquid coating applications, FSICT has developed a surface treatment that creates a permanent bond between our anti-fog coating and the mirror surface. We have worked with some of the most well known machine and equipment companies in the industry to create a process for surface treating and coating mirrors with permanent anti-fog.

Our **permanent water washable** anti-fog coatings can be washed repeatedly without losing anti-fog performance. In fact, our anti-fog has retained its performance under intense washing tests conducted by our customers on coated and laminated mirrors. While our **highly durable** anti-fog coatings are softer than glass, they can be cleaned with commercial glass cleaners and soft paper towels without marring the surface. Visgard® coatings and films continue to maintain adhesion in the highest levels of humidity. We are confident that bathroom mirrors will retain their anti-fog performance through the product's lifetime.

Global Sales and Support

Since our inception in 1986, we have been the leaders in producing high quality anti-fog coatings. FSICT is a unique anti-fog coating technology pioneer because we can produce both liquid and film solutions. We also provide technical support so customers can incorporate our coatings and films into their products. FSICT works with each individual account to determine which solution is most appropriate and provides consultative services included in the product cost.



Benefits — Value Proposition

- Economical and sustainable anti-fog solution
- Exceptional optical clarity
- Superior anti-fog surface bond adhesion
- Outstanding product durability even under harsh and extreme temperatures
- Permanent water washable anti-fog liquid coatings and coated film options
- Lamination application process free of defects



What our customers say about Visgard® anti-fog coatings

Trends

There is always competition in the market to match your competitor's offerings. Now that anti-fog mirrors are becoming more commonplace, we are receiving an increase of inquiries. We expect that demand will continue to grow as the anti-fog offering becomes more commonly sought out by architects, contractors, and homeowners alike.

Technology Challenges

Electric mirrors are more expensive to operate in high humidity regions such as Asia Pacific, especially in hotels concerned with operating margins. The biggest challenge for anti-fog coating and film application will occur at the manufacturer's site. Whether coating or film is being used, there is a significant capital investment that needs to occur. FSICT coating solutions are best suited to application in a manufacturing environment. The film can be applied on-site, but it requires a clean environment and a trained film installation professional. However, once the coating or film is applied to the mirror, there are no additional costs.

Decision Process

When FSICT begins working with a potential client we will first review current capabilities with the client together to determine which anti-fog solution (coatings or coating film) will be most appropriate. Once on board, FSICT continues to provide global consultative training and support.

Most important reason for selecting us as a supplier?

FSICT is an innovative and reliable supplier offering a unique set of features and benefits. We constantly strive for on-time delivery and work with customers to plan and forecast inventories accordingly. We also ensure the quality of our products and constantly review inventory to ensure that the customer receives full support in production for smoother application processing.

Results and Recommendations

The biggest business impact—Visgard offers is a good return on investment to grow your business with a competitive edge. Adding the anti-fog function to mirrors has proven to be a great way for mirror companies to differentiate themselves from their competitors in the marketplace. Adding abrasion and chemical resistance, and anti-fog technology to a common product like a mirror has grown sales and developed market demand that did not exist prior to the addition of these innovative features.



Fog-Free Bathroom Mirrors For Convenient & Safe Grooming Routines

Industry-Leading Durability & Performance

Customized Anti-Coating System Solution

Since 1986, FSI Coating Technologies has been an innovative pioneer in the development of anti-fog coating specification solutions implemented by a global team of highly skilled scientific and technical staff. One customer reached out to FSICT for industry expertise to create a customized optically clear, scratch and chemical resistant, water-washable permanent anti-fog coating. The coating had to meet a host of requirements, industry leading durability and performance properties including good adhesion, scratch and chemical resistance, outstanding and consistent anti-fog performance, coupled with energy efficient sustainability. Our liquid coating and coated film applications are suitable to both bathroom mirrors and shower doors for a variety of substrates from glass, polycarbonate, acrylic to PET film and sheet.

Liquid Coating & Coated Film System requirements:

- Optical clarity
- Abrasion, chemical, and impact resistance
- High-performance anti-fog in extreme temperature and humidity conditions
- Best-In-Class water-sheeting anti-fog properties
- Water washable (permanent)
- Passes EN-166: 2001 for Anti-Fog (N-mark), Falling Sand Abrasion (K-mark) & UV Resistance
- Primer-free adhesion to Polycarbonate
- Hydrophilic and thermo-formability
- Will not yellow when exposed to sunlight
- Multiple coating applications (spin, dip, flow, spin, spray etc.)
- Wet and dry application compatible
- Extensive global technical support, from prototype to manufacturing implementation



Conclusion

FSI Coating Technologies was chosen for their long history of premium anti-fog and abrasion resistant coatings used by the world’s most luxurious and respected brands—and developed to meet unique industry demanding specifications. FSICT consistently and rapidly adapts to a multitude of prototype testing, under tight product development time frames. Delivering high-performance durability, and superior coating adhesion, along with a complete line of thermal and UV-cure spin coating equipment to automate and streamline the coating application process.

Best-In-Class Coating Solution Features

FSI Coating Technologies coatings and coated films are trusted by the world’s most prestigious brands used in the **Olympics to NASA**. Multi-purpose and versatile coatings suitable for dip, flow, roll-to-roll, spin, and spray application on acrylic, PMMA, PC, specialty polymers, glass (with primer), and other plastic substrates.

- Thermoformable flexibility qualities for creating complex shapes
- Superior abrasion, chemical, fog, impact, and scratch resistance
- Increased surface smoothness, water repellent
- Exceptional optical clarity, permanent water-washable anti-fog
- Ultraviolet ray stability
- Thermal and UV-Cure coating, environmentally sustainable low VOC and water-based primer options
- Lowered production costs, easy to use one coat application, and long service life deliver outstanding value

Visit our parent company **SDC Technologies** website at sdctech.com to learn more about additional liquid hard coatings features available such as weatherability, anti-reflective compatibility, index matching, UV-resistance as well as primer-free, solvent-free and solvent-based coating options. Additionally, SDC’s subsidiary **COTEC GmbH** at cotec-gmbh.com also offers oleophobic and hydrophobic coating solutions.



For More Information

Founded in 1986, FSI Coating Technologies, Inc. has a global support and distribution network in the Americas, Asia, and Europe. To find out how Visgard® can improve the performance of your products and enhance your competitive edge visit:

fsicti.com



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