PPG Aerospace
Transparencies

TRANSPARENCY BULLETIN

SUMMER 2009

ALTEOS™ INTERACTIVE WINDOW SYSTEMS

For Passenger-Cabin Windows

Create a cabin that is attractive, efficient and comfortable for the ultimate travel experience with *Alteos* interactive window systems by PPG Aerospace – Transparencies.

Designed to replace conventional plastic pull-down shades, *Alteos* interactive window systems afford operating efficiencies while putting passengers in control of their environment. The world's first electrochromic window shades for commercial aircraft passenger cabins, these advanced systems switch from a bright clear state to a totally dark state or a comfortable intermediate level all at the touch of a button. Passengers can enjoy expansive views from their seats without annoying glare for a feeling of openness in the cabin. Or they can darken the window system at their seat to keep light out.

Alteos interactive window systems are self-contained with no moving parts and lightweight, making them easy to maintain. An electronically dimmable panel is installed between the inboard dust cover and outboard structural cabin window system. A window-seat control allows the passenger to activate the system and change the amount of visible light transmitted to maximize it, minimize it or select an intermediate setting. Passengers see only a stylish window and control button.

With *Alteos* interactive window systems, keeping the cabin comfortable is easy. Ultraviolet and infrared radiation transmission are reduced, lowering the heat load inside the cabin and enhancing the operating efficiency of the aircraft's heating, ventilating and air conditioning system. If desired, the interactive devices can be linked via the onboard network to allow for flight crew override and continuous monitoring of system performance.

Should a power loss occur, the window systems default to a clear state to maintain maximum light transmittance, ensuring compliance with aviation standards.

Benefits of *Alteos* Interactive Window Systems

- Based on electrochromic technology by Gentex Corp., proven in more than 100 million devices in the field
- Time-tested chemistry and durable device construction designed to perform more than 70,000 darken/bleach cycles
- Widest available light transmission range through an electrochromic panel
- Color neutral throughout transmission range
- High vision clarity at all light transmittance levels
- Operation across typical flight temperature ranges
- Low-voltage DC operation
- Default to clear state on loss of power
- Complete ultraviolet blocking

Electrochromic Technology

The PPG interactive window systems use electrochromic technology by Gentex Corp., recognized worldwide as the leader in electronic devices for automotive applications.

Electrochromic technology uses electricity to change the color of and light transmission through a transparent medium (very thin films, gels, etc.) that is typically sandwiched between two thin glass plies. The electric current passes across transparent conductive coatings on the inner-facing surfaces of the glass, causing a chemical reaction to occur in the electrochromic medium. This chemical reaction causes the electrochromic medium to change opacity.

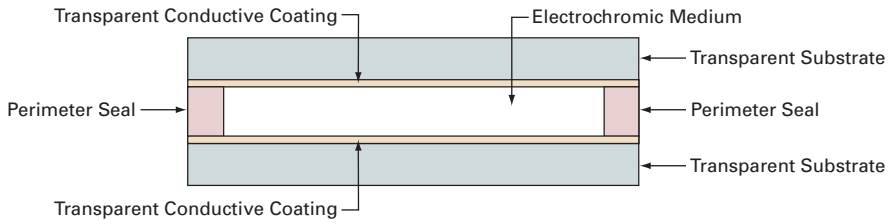
The Gentex electrochromic technology utilizes gel as the electrochromic medium. Applying a small electrical voltage across the gel causes it to darken, while removing the voltage allows the gel to return to its natural transparent state. The voltage can be precisely controlled and adjusted in small increments to allow intermediate states of light transmittance to be selected.

The PPG-Gentex Advantage

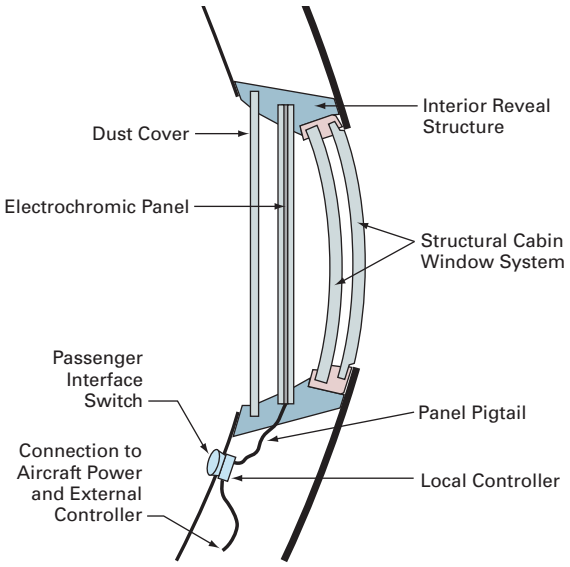
The unique PPG-Gentex relationship affords aircraft manufacturers and operators with the most advanced technology and product support.

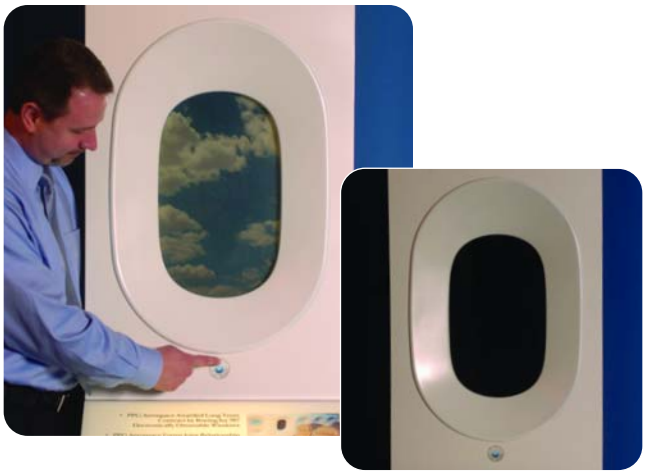
ALTEOS™ INTERACTIVE WINDOW SYSTEMS

Electrochromic Panel Cross Section



Interactive Window System Arrangement





Alteos interactive window systems can be set to a brighter clear state, shown at left, a totally dark state, shown at right, or a comfortable intermediate setting.

PPG brings unparalleled expertise in the design and supply of aircraft transparencies — from understanding the requirements for a transparency operating in an aircraft environment, to successfully launching products that incorporate new technologies, to providing customers with unparalleled technical and field support via the PPG Aerospace worldwide Application Support Center network.

Gentex is recognized as the technological leader in electrochromics globally, and brings more than 20 years of experience in shipping its high-quality electronic products to the automotive industry.

Summary

PPG works closely with Gentex and aircraft OEM organizations to design and develop *Alteos* interactive window systems that meet the demanding requirements for aircraft service. These innovative systems can be designed as a key component of complete cabin-window assemblies for installation and operational efficiencies.

Aircraft manufacturers and operators can expect to receive the same high level of service and support that PPG currently provides with its extensive line of products for the aerospace industry.

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