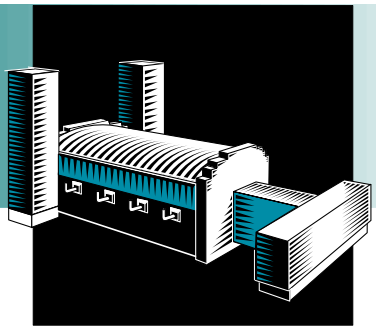
GLASS
Project Fact Sheet



On-Line Chemical Vapor Deposition of Coatings on Float Glass

Benefits

- Potential savings of up to 1.4 x 10^{12} Btu/yr when coated panes are installed in place of clear glass windows
- Decreased ultraviolet transmittance compared to regular glass (as much as 33 percent)
- Improved process productivity because of the speed and higher throughput of on-line deposition compared to batch coating

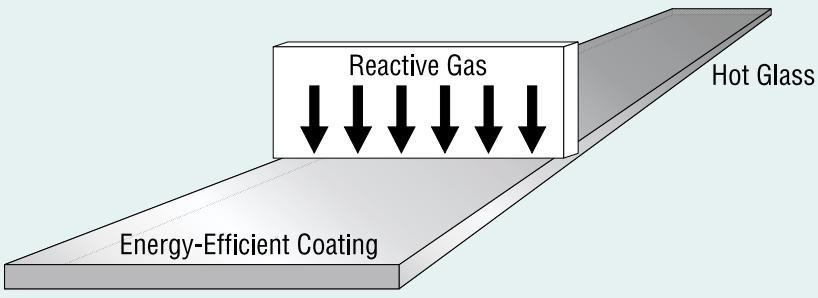
Applications

Using flat glass enhanced by this improved, on-line CVD coating process in U.S. commercial and residential sectors will result in dramatically decreased energy use and loss. This technology also has potential applications in the automotive industry.

High-Performance Coatings Will Increase the Energy Efficiency of Float Glass

North American production of flat glass for residential and commercial construction exceeds 2.6 million tons annually. However, most of the glass produced has relatively low insulating capabilities and is therefore not energy efficient. Sandia National Laboratories and Libbey-Owens-Ford are developing an on-line, chemical vapor deposition (CVD) process for applying new, optically transparent coatings with improved insulating capabilities to architectural glass. This continuous, on-line CVD process will reduce process energy use while increasing product yield and energy efficiency, offering the glass industry a cost-effective coating alternative to the current low-temperature, batch mode approach.

On-Line Chemical Vapor Deposition Process



Continuous, on-line deposition is faster than traditional batch coating and will increase product yield.

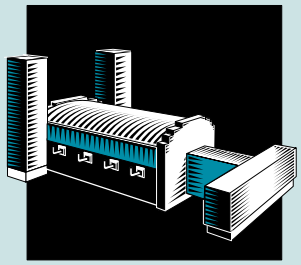
Project Description

Goal: Develop an improved, on-line method of applying advanced, optically transparent coatings to flat glass in order to produce a product with improved insulating capabilities.

Researchers are exploring the physical and chemical characteristics necessary to optimize and control CVD processes, in which gases flow over the hot glass in the float bath, forming a solid coating on the surface of the glass. The higher temperatures (650° C) and faster glass ribbon speed (15 m/min) of on-line CVD make it more efficient than current off-line processes, which require additional process energy, must be run in batch mode, and exhibit weaker coating adhesion.

Progress and Milestones

- Established a Cooperative Research and Development Agreement (CRADA) between Sandia National Laboratories and Libbey-Owens-Ford in 1996
- Developed an on-line database (www.ca.sandia.gov/CRF/Research/Applied/ThermoKinData/) of thermodynamic and kinetic properties useful for modeling high-temperature reactions in glass coating processes
- Developed experimental and analytical techniques for probing high-temperature atmospheres in float-bath glass manufacturing
- Measured kinetics of chemical reactions that occur during float glass coating operations
- Developed an on-line sensor for monitoring process gases
- Discovered anomalous chemical behavior of organometallic precursors that may affect both float glass coating and electronic materials processing applications
- Conducted sensor tests in full-scale float glass plant in 1999



Project Partners

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