

# From Silica to Siding

## Glass Fabrication and Glazing Educational Conference Covered the Gamut of Glass Knowledge

Megan Headley, Ellen Rogers, Drew Vass and Debra Levy all contributed to this report

**T**he Glass Fabrication and Glazing Educational Conference seminars opened to full crowds at the Monte Carlo in Las Vegas this April. The event, sponsored by the Glass Association of North America (GANA), was designed to educate individuals who have fewer than five years of experience in the industry.

As there's always something new to learn, the conference featured two joint sessions each day that provided information on glass handling, glass production and trends in glass usage. To start in the beginning, from the trends pushing glass usage, through production and installation, read on. But if your interests are more specific, choose your own track: fabrication information is below or skip ahead for more on glazing education.

### Give an Architect A Lite and He's Going to Want It Coated ...

Glass, glass and more glass. While that might describe the overall theme of the conference, it also describes one of the trends Don McCann of Viracon pointed out in his seminar "Changing Trends in Glass Uses."

"We're starting to see more floor to ceiling glass," McCann said. And on that glass, architects are demanding high-performance coatings. He noted that more hybrid materials are being used to get the best of all performance features, from high visible light transmittance (VLT) to low U-values and more.

High VLT in particular has become much in demand. And, McCann said, "That's one of the hardest things to get an architect off of." Not to persuade architects away from letting in more light—but educating them about what high VLT really means in a building and how a combination of coatings can create a room that has lots of visibility and is still comfortable.

In addition, McCann said that he has seen more architects push for low U-values, which he expects will be obtained through more demand for gas filling in insulating glass units. "Gas filling is going to start becoming more important," he said.

Laminated glass also is still growing, McCann said, for hurricane-resis-

tant and security applications, as well as acoustics.

What's driving these trends? Among several factors is the biggest trend of all, the focus on energy. As McCann noted, the costs of energy continue to rise. "When you start looking at building applications, buildings tend to be one of the higher consumers of electricity as well as natural gas."

So how to meet the demand for these trends? Well, glass fabricators were in attendance to learn just that—the ins and outs of handling and creating value-added glass.

### Floating Through the Basics

Wayne Boor of Pittsburgh-based PPG Industries opened the joint session about 4,000 years ago, so to speak; his presentation on "Float Glass Technology" began with background on the discovery of glass. Speeding quickly through the production of sheet glass in the early 20<sup>th</sup> century to plate glass to float glass in 1959, Boor moved onto discussing the technology used today to create the basic material used by each member of his audience.

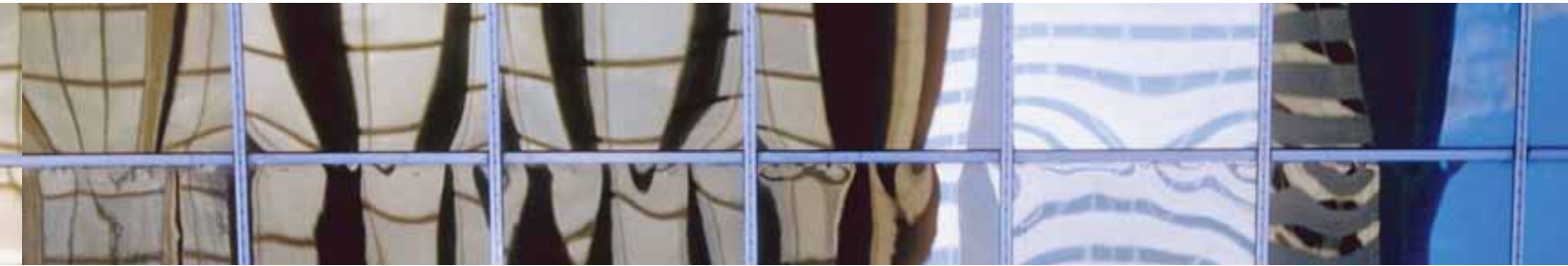
One point he reviewed—particularly notable when surrounded by the flashiness of Las Vegas—was how to add color to glass substrates.

"We learn to make different colors everyday," Boor said, "and that is market-driven."

As Boor noted, iron, in all glass, creates the green tint. Cobalt is added to create what he described as "true blue," while selenium creates "more of a brown glass." Combinations of the latter two create shades of gray. He further explained to the audience that



Attendees asked questions of the conferences' many knowledgeable speakers.



low-iron glass means just that, removing as much iron as possible, and to do so requires a special sand with low levels of iron.

“Low-iron glass is really becoming popular in the solar and photovoltaic industry,” Boor said, adding, “they would like us to have no iron.” Of course, as he noted, “I think it’s impossible because you’re going to have some impurities no matter what you do.”

### Cut Down to Size

In addition to learning some of the basics of altering glass itself, attendees learned a little about properly “altering” glass through cutting. In a session covering “Automated Glass Cutting and Edging Techniques,” Chuck Beatty of Edgeworks Inc. stressed the importance of the cutting process in glass manufacturing. Beatty went as far as saying the cutting process is what ultimately determines long-term success for glass processing companies.

“If you cut glass well, everything else is easier,” he explained.

He offered a number of suggestions for a successful cutting process, including the importance of matching the proper cutting wheel to a particular process and product.

“I prefer to think of the cutting wheels like the tires on your car,” he explained. Just as you would select a certain tire for a particular driving condition, Beatty suggests matching cutting wheels to a particular product.

Beatty also urged processors to consider the benefits of cleaning glass prior to the cutting process.

“The problem is most people don’t wash,” he said. “And the cutting environment is dusty and dirty.”

Beatty said cleaning also helps maintain temperature, which he describes as the number-one enemy in glass cutting.

“Glass doesn’t like to be expanded,” he explained. “When you’re processing glass, the greatest enemy is heat. Your ability to manage heat during the process will ensure that the end product is strong.”

### Hands Off That Coating

Exercising caution is good advice for cutting as well as dealing with the high-performing coatings that McCann mentioned are much in style. “The more things you keep away from the coating, the less problems you’ll have,” Jeff Haberer of Cardinal IG said during his session about handling coated glass. “It’s commonsense.”

For instance, keep individual lites from scratching one another during the handling process. Keep coated surfaces away from conveyor rollers and harp rack separators. Even, Haberer advised, keep fingers away from the coating. And when it comes to handling that glass, be sure to use some type of clean, soft glove; touch only the edges; and handle only one lite at a time.

There’s no way to keep the glass from being handled and touched at all; it’s just a matter of doing it carefully.

For washing, for example, Haberer suggested adjusting the tip of the brushes so that they are barely in contact with the glass. “Just brush off the surface, you don’t want it scrubbing



Pilkington's Chris Barry discussed the hows and whys of glass breakage.

there ... with low-E coatings you can damage if you scrub too much.”

### Cleanliness is Next to Successfulness

The topic is of such importance that Bob Lang of Billco Mfg. Inc. provided information on “Understanding and Maintaining a Glass Washer.”

Among the tips Lang provided was this reminder: “If the inside of the glass washer is dirty, it can’t produce clean glass.”

He reminded his audience that maintenance of these washing machines is critical to getting the best performance from the equipment and, by extension, the glass product going through it. “I can’t stress enough that the cleanliness of the glass coming out of washer is directly related to how well the washer is maintained.”

His suggested maintenance schedule starts with the first week of operation (during which operators are recom-

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**Edgeworks' Chuck Beatty discussed the importance of the glass cutting process.**

mended to tighten fasteners, grease the entire machine and perform proper motor rotations), on through weekly maintenance (cleaning tanks and removable screens, checking air filters and sparingly greasing pinch roll bearings) and, ultimately, a 500-hour check-up (for inspecting brushes and rolls and cleaning all rolls, checking brush adjustment, checking belt and chain condition and adjustment, etc.).

### Tensed and Shattered

What about the defects you can't see until it's too late? Chris Barry of Pilkington took the podium to discuss "Why Glass Sometimes Breaks."

Essentially, he explained, glass breaks when an applied load exceeds the strength of the glass. The real question is: when a break occurs, was the load too great or was the glass too weak?

To begin to answer that question, Barry noted, means asking how strong glass is, and that's where the problems begin. "We don't really know," he said. "We know how strong it might be."

For example, in taking 1,000 samples

lites and applying force, by the time 9,000 psi was reached, eight lites still hadn't broken. In other words, the breaking point for each lite was reached at a different point.

There are a couple of common causes of breakage, however: tensile stress (including bending, thermal stress and NiS inclusion and expansion), impact and crushing. To determine what might be the cause, fractographics can be used to examine the break—if there's enough time and money and all the broken pieces are still available, Barry added.

### Layered Lites

As McCann mentioned, laminated glass is still growing, and plenty of sessions were on tap to help fabricators meet that demand. To start with, Matt Cowles from Solutia talked about prepressing and autoclaving. He began by discussing storing and handling the PVB roll, and stressed the importance of moisture control, saying the product should be stored at a temperature range of 40 to 50 degrees Fahrenheit. He also recommended the rolls be used in a first-in/first-out order. "Partially used rolls should be re-packaged and stored," Cowles said. In addition, he described PVB as being like a "sticky sponge" as it will pick up anything it touches. "So avoid contact with dirt, lint, water, etc."

When preparing the glass, Cowles said to avoid mismatched glass and when washing the glass, water temperature should be 120 to 140 degrees Fahrenheit. "Cleaning the water tank thoroughly once a week will also help the way it works to provide consistency," he added.

The condition of the clean room also is critical. Humidity should be 20 to 35 percent and temperature should be 55 to 72 degrees Fahrenheit. "Cleanliness is imperative," Cowles added, and sug-

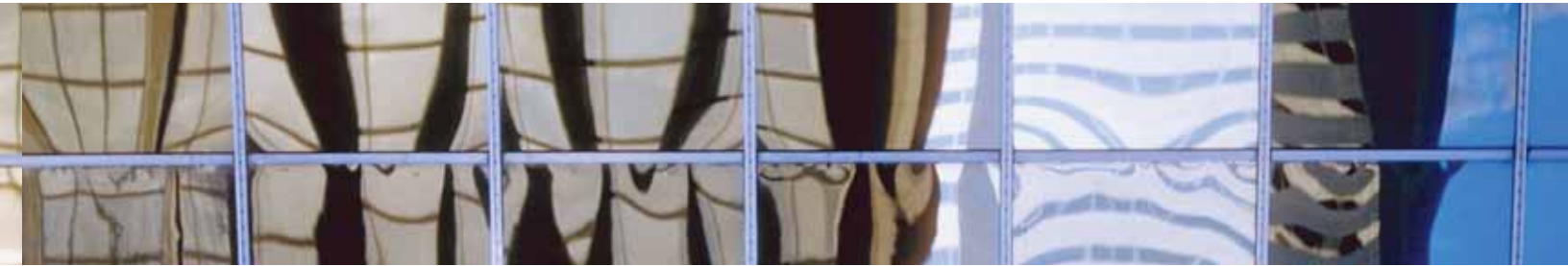
gested the use of a double-door entry to keep the factory environment out of the clean room. "Also, use tacky mats at the entry door to keep fibrous materials out of the clean room," he said, adding that clean room clothing also needs to be considered. "You need something that won't leave debris, lint, etc. Those are all enemies of the process."

Troubleshooting laminated glass production was the next topic of discussion. Ron Hull from DuPont talked about how companies can improve their yields, reduce costs and improve quality and customer satisfaction through troubleshooting.

"Troubleshooting is one way to get lean," said Hull, who cited Six Sigma as one particular troubleshooting process. "Since the economy has slowed down [there's been more] interest in improving yields, quality, etc., as people now have time to focus on being lean."

Hull also talked about common laminating defects and problems. One problem is PVB blocking, which occurs when the PVB sticks to itself. It's typically caused when the storage temperature is too warm, when the rolls are wound too tightly or if the rolls are too old. To keep this from happening, Hull suggested that storage temperatures be kept cool and that the laminator has a supplier unwind and wind the roll properly. Finding bubbles in the laminate was another problem he discussed. The bubbles, Hull said, are actually gas pockets in the interlayer material or between the glass and the interlayer. "Basically, inadequate de-airing," he said. Bubbles can be caused from a surface pattern that is too smooth or rough; from caliper/thickness variations; from stretching the PVB; and also if the PVB temperature is too high or too low.

While the use of PVB may be the most common interlayer in use for laminated glass production, it's not the only



one available. Michael Burriss from Cytec Industries gave a presentation about ultraviolet (UV) liquid laminating. He explained that by exposing liquid resin to UV light it changes into a polymer that, in the case of laminated glass, serves as the solid interlayer. He said it takes 20 minutes for the glass to cure fully, and that the UV lights are controlled for a consistent cure. He added that the process consumed a minimal amount of energy: 7 kilowatts. In addition, Burriss said UV-cured laminated glass meets the same safety tests as PVB laminated glass (CPSC 16 CFR

1201, category I and II; and ANSI Z97.1), so the products can be used wherever safety glazing is required.

Mark Gold of Solutia covered the why, what and how of laminated glass quality control testing.

“Why test?” asked Gold, “Because we have to; it’s the right thing to do,” he explained, for regulatory and code requirements, as well as protection against liability. “Also, it’s just plain, good business.”

He discussed different types of tests that can be done to laminated glass, such as the boil and bake tests. When

boil testing, Gold said, look for bubbles, trapped air, air penetration, de-lamination, contamination and optical distortion. With the bake test, which Gold described as a step up from the boil test, he recommended laminators get a good oven. “Have the right equipment and obtain, read and understand all of the test procedures,” he said.

## Glazing Education

While the glass fabricators were learning the ins and outs of their industry in one conference room, glazing contractors were next door learning

## Applying the Glass Fab Knowledge to Today’s Biggest Trend

**A**s Don McCann of Viracon pointed out in his seminar “Changing Trends in Glass Uses,” the focus on energy is among the big drivers for the various trends in glass fabrication today. Energy efficiency is part-and-parcel of today’s green movement, a movement to which the glass industry is very much contributing.

“GANA also ramped up its ‘green’ educational offerings, which were among the most heavily attended sessions of the conference,” commented Bill Yanek, GANA’s executive director. Among those offerings was a presentation from Henry Taylor of Kawneer on “How the Glass Industry Can Contribute to LEED and Green Building.”

Focusing on sustainability was Taylor’s first suggestion. “We have the technology to make these buildings last—let’s go ahead and do that.” According to Taylor, the goal had been to produce buildings that last 25 to 30



**Henry Taylor discussed how the glass industry can contribute to green building.**

years, but new technology is driving manufacturers to create products that last as long as possible to limit the impact on the environment. Now it’s not unusual to aim for a building that will last without problems for 60 or 70 years.

Hand-in-hand with sustainability and making materials last is the renewed focus on using recycled content. He explained that programs such as the U.S. Green Building Council’s LEED system are looking

for materials that use pre-consumer recycled material (which has not yet gone out into the field and been used) as well as post-industrial recycled content.

Recycling is a concept that’s been around for a while but has renewed importance today. But among the “trendiest” ways in which glass is contributing to green today is through photovoltaics (PV) or solar cells.

“We’re seeing a lot of opportunities in spandrel areas ... to use PV,” Taylor said. Slope glazing is another application

where these products are gaining in popularity, and replacing such products as sunshades and patterned glass that help create shading. According to Taylor, PV is popular in these applications since these opaque products not only cut down on heat but also create energy.

A member of the audience asked if Taylor thought the limited size availability of PV panels is a reason the technology is not more often specified by architects. Taylor noted that most architects are aware that there aren’t many size options yet since it’s a new (but growing) technology and don’t mind working with what’s available. He did note, however, that it may take more motivation than simple green consciousness to further promote the use of these environmentally friendly products.

“To get this moving at a much faster pace the government is going to have to step in to get the momentum going,” Taylor said.

Some small such efforts are already being used. “When it comes to photovoltaic, the government will give a 50-percent tax credit to an owner for [using] photovoltaic in a building,” he said.

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### All of the Tour, None of the Walking

One of the highlights of the Glass Fabrication and Glazing Educational Conference was the riding and walking tour through Las Vegas. Greg Carney, technical director of the Glass Association of North America (GANA), led about 40 conference attendees through the city to view some of the most exciting examples of glass work in this always-exciting city. You can check out some of the highlights yourself by visiting [www.usglassmag.com](http://www.usglassmag.com) and clicking on the GANA Walking Tour Slideshow.

how to get involved in the earliest stages of glass installation, starting with design. Denise Beneke from San Antonio's Marmon Mok Architecture had those attending the contract glazing session oohing and aahing with her presentation about Google™ Sketch-Up. She provided a few project examples that her company had completed, as well as animations and other design details.

"You can use it for anything," Beneke said. She also took the crowd through a demonstration of using the 3D design tool, and left the crowd impressed with how quick and easy it can be to not only create a structure but also to change out components.

### Check Please

John Heinaman, owner of Heinaman Contract Glazing in Las Vegas, provided an overview of many of the major issues contract glaziers must watch for on the job.

"Would you know what the tolerances that adjoining trades will be held to?" he asked. "This is a big, big problem. You need to know the tolerances of other trades or you can end up not being able to fit in the openings with glass that.

Keeping details documented was another point Heinaman stressed.

"In our business we really can't over-document things. It's not possible. But we have to do it on all jobs," he said. "You can't document well on a big job and not do it on the little ones. That's not a wise practice. You can get sloppy. You should have policies and procedures in place on how you do things."

Heinaman also discussed the importance of safety procedures for the company in general and on each job.

"Is a safety plan a requirement?" he asked rhetorically. "It sure should be. I have had very few cases where I haven't been asked for one. If you have a large project, you should have a safety plan just for that job. This is usually accomplished by taking your standard safety program and customizing it."

Heinaman added that most insurance companies are willing to send a representative to the jobsite.

"It's wise for you to have them come and inspect your job. It could reduce the likelihood of an accident, could also reduce your mod rate and increase your bottom line," he added. "Don't assume anything. Inspect all safety equipment. You might say 'well, gosh,

of course we would do that.' But I have heard of instances where no one checked the swing stage for frayed wires and to make sure that it's attached to something at the top of a building. You want to check it yourself. If you have to go to the edge of the building even for a moment, you must be tied off. That could be the moment you trip and over the side you go."

### Getting Closure

"Make project closeout a celebration of the building's completion," advised Merry Wirth from Sierra Glass & Mirror Inc. in Las Vegas who discussed the project closeout chapter from the GANA *Project Managers Reference Manual*. Her presentation focused on the importance of communication throughout the job. She also suggested everyone begin a project with the end in mind.

"Know from the start what's expected of you," Wirth said. "The least expensive way to correct a mistake is not at the end; it's before it happens."

One specific area she covered was operational training.

"Don't be a dictator," she advised, "but work as a team." She reminded her audience that when they are passing the project over to the customer they need to take the time to explain to them how they need to take care of the building.

Another discussion point was having a lien waiver.

"Anything that reduces your liability is always a good thing," said Wirth, who suggested each company have one dedicated person on-hand who understands and documents waivers that are coming in and out. On a final note, she stressed that in project closeouts documentation is critical and encouraged everyone to keep organized all of the documents related to the job, including both paper and computer files, drawings and e-mails.

## Making the Code

For individuals interested in learning more about how to meet energy codes, Patrick Musseig of Azon USA explained how the THERM and Window software programs can be used to find total product U-factors, determine whether a product will meet energy codes and look at how changing out components can affect the U-factor.

Rob Hitchcock from Lawrence Berkeley National Laboratory followed with a discussion about COMFEN software, which is used to provide a whole building calculation. Version 1 of COMFEN, which was launched last fall, provides specific design guidance on commercial buildings and facades.

"The focus is on energy consumption and demand, visual and thermal comfort and CO<sub>2</sub> emissions," said Hitchcock, explaining that the software tool is under continual development. "We're working on the second version and looking ahead to version three and beyond." He said they would be looking into ways to enhance the glazing, framing and shading selections.

Mike Gainey, also of Azon USA, gave a presentation about the improvement of thermal performance in structural aluminum windows. He posed the question, "What does a thermal barrier do?" The answer: "It interrupts the heat transfer from hot to cold." Gainey talked about the energy performance levels of using thermal barrier systems and how they can help greatly reduce energy costs and usage. He explained the window systems can be made more energy-efficient not only through the use of a thermal barrier as part of the aluminum frame, but also through the use of a warm-edge spacer in the insulating glass unit.

"The benefits are overall U-factor



**Bill Lingnell of Lingnell Consulting Services, was one of several speakers focusing on insulating glass units.**

improvement," Gainey said, adding that the key goal is also to minimize condensation as much as possible.

## From Codes to Certification

And speaking of energy, Max Perilstein from Arch Aluminum & Glass gave an update on the National Fenestration Rating Council's (NFRC) Component Modeling Approach (CMA) program development, providing a "past, present and future" look (see *June 2008 USGlass*, page 14, for more on CMA). He talked about the history behind the program's inception, explaining that in 2002 NFRC decided to look into rating products within "untouched markets," including commercial fenestration.

Perilstein said it's not that he's opposed to the program itself. "A whole system calculation is a great design tool," he said. "But it all goes downhill being attached to the certification and rating aspect [because of the costs involved]."

In addition, Perilstein talked to his audience of contract glaziers about how they specifically would be affected by the CMA program.

"You will have to pay for performance, pay for the test labs, the certification ... all of this will have to go into your bids and your quotes. You will have to supply rated materials for the jobs and you will have to pay for it," said Perilstein. "[The NFRC] does not understand what you do already."

Perilstein said a CMA prototype will be going through testing in May and June this year, with more testing to come in October. A six-month pilot launch is planned for January 2009, with a full release scheduled for August of 2009.

In ending his presentation, Perilstein encouraged industry members to speak up and get involved. "It's been a challenge to get people to come to the NFRC meetings," he said.

That's a challenge GANA hasn't faced. As executive director Bill Yanek noted, "GlassFab delivered on its goal of providing top-notch glazing education to industry newcomers and veterans alike. GANA is always striving to make its meetings better, and GlassFab 2008 was no exception." ■

## See For Yourself

Couldn't make it to the show? Then tune into USGlass magazine's exclusive video coverage of this event.

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