INSIDE: 1 WTC Report—Was Prismatic Glass Ever Viable?

Free Fall
Broken Railings Raise Questions about Tempered Glass

Also Inside:
The Fall USGlass Confidence Report
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Coming Together As One... To Bring You Endless Possibilities

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features

28 Some Good, Some Bad
The results of our first-ever confidence index show distinct differences across the country in glazing backlog and economic improvement.

32 A Tale of Three Cities—And Lots of Broken Glass
The consumer press has had a field day with multiple tempered glass railing breakages in Toronto, Seattle and Austin, Texas. Glass suppliers have nervously watched on, wondering how the negative publicity may affect consumer interest in glass railings.

42 Special Investigative Report: The 1 WTC Podium Wall
When the Port Authority announced it would not use prismatic glass on 1 World Trade Center’s podium wall, the industry debated whether it was ever a viable alternative. Yet some companies say they could have supplied the prismatic glass for 1 WTC after all.

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A worker removes the tempered glass panels at the W Austin Hotel In Austin, Texas, After several lites fell from condo balconies in June, the hotel replaced all of its railings with laminated glass. Turn to page 32 for more.

Photo: Bailey Edwards, Status Properties
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Dynamic glazing, although reveled by many as the next step in efficient glazing, has been installed in only a small number of projects. What do you think is the next step toward expanding the use of dynamic glazing?

- Mandated use from building and/or energy codes
- Partnerships with primary glass manufacturers
- Increased awareness by architects
- Lower prices for dynamic glazing products

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Gauging Confidence

As anyone who has been in this industry for a while knows, getting your hands on good industry research is not easy. And when you do, it is almost always proprietary information that isn’t shared readily.

And as anyone who has been in this industry a while also knows, getting a sense of how its major players feel about the future—a consumer confidence index for the glass industry, if you will—has not existed until now.

Last spring, USGlass magazine commissioned Keytech North America to create a confidence index for the industry. The idea was to develop a measure of how various segments of the glass industry view the future and how much confidence they have in it. Keytech has spent the past several months developing such an index for USGlass. It will appear in these pages on a regular basis beginning with this issue (see related story on page 28). USGlass has commissioned Keytech to provide this research in five market segments on a semi-annual basis, beginning with contract glaziers. Indices for retailers, manufacturers and fabricators also are planned. We also plan to track changes and trends over time.

It is our hope to provide the glass industry, and its suppliers and customers, with a look at how the various market segments are approaching the future. For contract glaziers, the USGlass Contract Glazier Confidence Index was developed after extensive research focused on five major areas:

- **Measure one:** Anticipated backlog change during the next six months;
- **Measure two:** Anticipated changes in number of employees in the next six months;
- **Measure three:** Overall confidence in the construction industry during the next six months;
- **Measure four:** Anticipated purchases of equipment and machinery in the near future; and
- **Measure five:** Anticipated change in profit margins during the next six months.

A look at the results, available on page 28, show an industry very much in flux, with wide variations depending on geography.

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This month’s issue also contains two detailed investigative reports. The first, by editor Megan Headley, delves into the “controversy” surrounding the incidents of glass breakage that seems to be increasing in balconies. I am not so convinced there is a higher incidence of such breakage; I am convinced there is a higher incidence of reporting of such incidents. And the question of cause—nickel sulfide vs. improper design or installation vs. under-engineering—has been around for more than 30 years. Megan’s report begins on page 32.

The second article, titled “Could They or Couldn’t They?” by contributing editor Tara Taftera appears on page 42. It attempts to answer the question of whether or not the prismatic glass specified for 1 World Trade Center could have been made. It details the rise and fall of the use of prismatic glass on the podium wall of the building. The article explains much of the behind-the-scenes intrigue that went on as prismatic glass was specified on, then off, the wall.

Both editors attempt to answer the questions about what went wrong. One thing is for sure: there is enough finger-pointing going on to send a man around the globe. We hope all three features prove enlightening for you.
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Getting Tempered Glass Orders Right the First Time

by Paul Bieber

Let’s go over a couple of questions I recently received.

Question: Lately, I can’t seem to get glass tempered correctly from my fabricators. Even though fabricators seem to be slow, they can’t get my orders right and delivered on time. What can I do? —Ed K.

Dear Ed,

Thanks for your note. You are not alone in this feeling. I have talked with many shop owners and most feel the same way. It seems that with pricing so low, most fabricators have reduced their labor force to bare bones, often keeping the lowest paid workers, and you get what you pay for. Those fabricators that are spending are investing in automation. While glass may be processed quickly, qualified people are not doing final inspections. If a computer scanner says the piece is okay, it must be.

I am guessing you have tried other vendors with the same results. So, what can you do?

• Understand fully your fabricator’s tolerance levels. You may be expecting glass that is a higher quality than they can produce. All fabricators will meet the ASTM C1048 specs, but some do a better job. Compare their written spec sheets. Some fabricators will be better for high volume work, while others specialize in furniture quality. Know which ones to give your orders.

• Tempered glass has distortion based on the direction going into the oven. Specify if the roller wave should be parallel with the height or width. If the glass height is larger than the oven’s width, the glass can only be tempered in one direction.

• Order heat strengthened (HS) glass even when you don’t need to meet codes. HS glass cools slower than fully tempered and develops less warp.

• Try to avoid long, skinny pieces of tempered. They always come out looking poorly. The largest ratio for good glass should be 12:1, length to width.

• Thin glass warps more than thick. A ⅛-inch glass will give you a better looking piece than ⅜-inch, and so forth up the thickness chart.

• Ground or polished edge glass will always look better than seamed edges. It is worth the extra cost.

• Heat treating glass with soft-coat low-E is an art. Make sure your vendor is certified by the float manufacturer to treat its low-E products.

• Tempered laminated glass is a pain-in-the-neck to produce. Order heat strengthened laminated whenever you can.

• Make sure your purchase order and drawings can easily be read. The most common mistakes are misinterpretations from your order.

• Avoid calling in orders. Use fax or email to prevent misunderstandings. Try to order once or twice a day. If you send in ten separate orders during the day, your chance of messing it up is higher. However, faxing patterns changes the size. Don’t do it; mail or deliver the pattern. Each time you copy a template, the size will change slightly. This builds up after a while.

• Don’t make patterns out of materials that shrink, tear or wrinkle. Specify clearly on the pattern where the cut line is. It is always better to lay out your shapes using math than sending a pattern. A 62-inch circle will always be just fine, but if you send in a pattern, and the paper is curled slightly, you may get a 61 ¾-inch circle that matches your pattern.

• Clearly specify how you want your glass shipped. Is it to be shrink-wrapped? Crated? With logo or without? If you don’t specify, the fabricator will use their default, which may not be what you want.

• Don’t promise your customers a certain day for installation until you have the glass in hand and inspected. This shouldn’t have to be the case, but it is the best plan. Nothing wastes time and customer goodwill more than going to a jobsite, unwrapping the glass and finding a hole in the wrong place.

Question: Are the Mets going to win the World Series? —Phil B.

Dear Phil,

Of course they are. It is just hard predicting which year.

Author’s Note: Please send your questions about business issues to paulbaseball@msn.com, call me at 603/242-3521, or fax to 603/242-3527. Whether it is an ethical, legal or accounting question send me a note. If you want advice on marketing or a business plan, help with an employee situation or succession planning, I’ll help you get the answers.

the author

Paul Bieber has 30 years in the glass industry, including 21 years as the executive vice president of Floral Glass in Hauppauge, N.Y., from which he retired in 2005. Read his blog every Tuesday at www.usglassmag.com.
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GANAPerspectives

The Backbone of GANA Success

GANA Thanks Its Volunteer Leaders

by William Yanek

For the Glass Association of North America (GANA), success is not found in one person, one committee or one division. Instead, it is found in each and every volunteer leader that lends his or her expertise to the association for the betterment of our industry. In recognition of that strong commitment to the association and industry, GANA staff and elected leadership would like to thank our volunteers.

In 2011, GANA members have produced glass informational bulletins (GIB) titled Use of Laminated Glass in Glass Railing Systems, Proper Procedures for Receiving, Storage and Transportation of Flat Glass Mirrors and Installation Techniques Designed to Prolong the Life of Flat Glass Mirrors, along with documents such as General Guidelines for Screen Printing on Flat Glass and Mirrors: Handle with Extreme Care. Our members also have played a large role in energy issues, along with hosting premier educational events for peers and customers.

Additionally, GANA volunteer leaders aggressively advocated on behalf of the glass and glazing industry at international, national and state level forums.

Join me in expressing your appreciation to GANA’s volunteer leaders at your next opportunity. Our industry significantly benefits from their dedication and hard work.

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continued on page 12

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William Yanek is the GANA executive vice president.

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Due to the complex nature of the curtain wall treatments, Oldcastle BuildingEnvelope™ first designed and engineered the systems, then tested their performance using 3-D simulation programs, allowing the design team to ensure that key performance metrics were achieved.
Façade design begins in the early concept phase, in which it may be difficult to conduct detailed engineering analyses of the impacts on heating, cooling and lighting systems. But even rough early assessments can help designers take steps toward balancing daylighting, thermal performance and comfort considerations. To facilitate such assessments, Lawrence Berkeley National Laboratory (LBNL) and the University of Minnesota have developed online resources that designers can use to identify promising façade designs and quantify the energy and comfort impacts quickly. These resources include the Façade Design Tool (FDT) and the Commercial Fenestration (COMFEN) energy simulation software.

The FDT is available free of charge on the recently updated Windows for High-Performance Commercial Buildings website, www.commercialwindows.org. This website, hosted by LBNL and the University of Minnesota, is a comprehensive resource for performance data on the energy-efficiency, interior environment and technical considerations that influence window design decisions. The FDT gives designers the means to compare design strategies for glazing, window area and shading quickly without the need for detailed input. Annual energy use, lighting strategies and HVAC design. To supplement the quantitative assessments, the website also offers qualitative background information on relevant performance considerations, design guidance, codes and standards, as well as case studies.

**Getting the Data**

The FDT uses pre-simulated data for 17 cities that has been generated with the COMFEN schematic design and simulation tool, available for free download on http://windows.lbl.gov/ software/comfen/comfen.html. COMFEN is more versatile than the FDT. It provides in-depth data and thus supplements the quick insights that designers can gain by starting their analysis with the online tool. COMFEN enables the architect or designer to do “what-if” scenarios on specific façade, lighting and shading designs with the EnergyPlus simulation engine. Because COMFEN focuses on a specific zone within a building, it requires only limited input and allows its users to focus on the energy, daylighting and comfort impact of fenestration options without having to model entire buildings.

COMFEN also offers glazing contractors a tool for communicating the impact of glazing choices to their customers. It presents the simulation results in easily accessible graphics that help to visualize the benefits of glazing and shading choices.

**Early Insight**

The FDT and COMFEN provide early information on how different façade and daylighting choices may impact energy use and occupants. Even though these early insights do not substitute for in-depth modeling, they allow early assessments of façade performance and facilitate integrated design considerations during conceptual design and design development.

**The authors**

**Nils Petermann** is a program manager at the Alliance to Save Energy and a partner in the Efficient Windows Collaborative.

**Kerry Haglund** is a senior research fellow at the Center for Sustainable Building Research at the University of Minnesota.
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**Company News**

**Binswanger Returns to Its Roots as Glass Retailer, Installer**

Binswanger Glass has endured a number of changes since the sale of former parent company Vitro America in June (see August 2011 USGlass, page 16), but the biggest change may be that Binswanger has returned to its roots as a glass retailer and installation company, says Arturo Carrillo, who’s been named president of Binswanger. Carrillo served as president and chief executive officer of the former Vitro America (now part of the newly formed Trulite Glass & Aluminum) prior to the sale of the company to Sun Capital Partners.

“Binswanger, for the first time in many years, is independent of a fabricator. It is its own stand-alone legal entity with its own stand-alone management,” Carrillo says. “With this acquisition Binswanger comes back to its original roots, so we’re pretty excited to run Binswanger in an independent manner and continue to be a successful and long-term company.”

Among the recent changes has been the consolidation of several branches. According to Carrillo, only a small percentage of the company’s stores across the United States were affected.

“We have consolidated a few facilities—not many, about 5 percent of locations,” Carrillo says. “That already has happened for the most part. Most consolidations we are going to do already happened.”

Some of these have been positive moves, he says. “We’re moving a few other branches to better and bigger locations,” he says. “We’re able to use part of the [capital from] the acquisition to re-negotiate with our landlords and that’s what led to the consolidation to new facilities, [moving to] facilities that were in better parts of town, etc.”

He adds, “It’s not a change of business strategy—it’s more of an ability to negotiate with landlords and come up with a better footprint.”

In response to industry speculation that Binswanger could be sold again in the near future, Carrillo says, “Binswanger has been a long-standing company. It’s been around for [more than] 100 years and it has a lot of long-term [leaders] running it.” He adds, “Over the last 100 years it has been owned by different people; now it’s owned by Sun Capital and Sun Capital intends to run it as a successful company. Will they sell it in the future? It’s probable. But would this affect the employees? It wouldn’t.”

He adds, “It’s an interesting discussion, but for the day-to-day operations it should be an irrelevant question.”

Meanwhile, Binswanger parent Trulite Glass & Aluminum Solutions in Tamarac, Fla., has begun to close facilities; it announced earlier this year that it would consolidate sites to reduce overlapping footprints. Among the sites that has closed is the former ACI Products facility in Farmers Branch, Texas. According to an August 15 letter to the Texas Workforce Commission, an announcement the termination of employment of 46 workers at its fabrication facility in Farmers Branch, Texas.

**Saint-Gobain Acquires Solar Gard Specialty Films**

Saint-Gobain has acquired Brussels-based Bekaert’s Specialty Films business, which operates under the name Solar Gard Specialty Films. Aurora, Ohio-based Saint-Gobain Performance Plastics Corp., part of the Saint-Gobain Group, will now run Solar Gard Specialty Films.

The transaction covers production facilities in San Diego; Zulte, Belgium; and Suzhou, China; the operations under development in China; and all sales and service centers worldwide. The deal involves all employees currently working in Solar Gard Specialty Films.

Bekaert acquired the Specialty Films business in 2001. While the business continued to grow, technological synergies within Bekaert have proven to be limited over time. The Saint-Gobain group sees significant product and market synergies for Solar Gard with its Innovative Materials businesses, including Performance Plastics and Flat Glass.

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Total Security Doubles Manufacturing Capabilities, Adds Staff

Total Security Solutions of Fowlerville, Mich., has doubled its facility to 24,000 square feet and invested more than $80,000 in new equipment. The company also hired four people to its manufacturing and installation teams, and plans to add additional sales staff in the coming months.

To meet client demands for a one-stop manufacturer, the company added new equipment to its wood shop and welding area, as well as a new water jet cutting system, vertical panel saw and metal presses.

“Increased manufacturing capabilities aren’t valuable without increased packing and shipping capabilities,” says Jim Richards, president of Total Security. “Total Security Solutions took a holistic approach to its expansion, and, as a result, is primed for sustained business growth.”

WinTec Forms Security Glass Solutions

WinTec Protective Systems Inc. in Houston, a subsidiary of Medina International Holdings Inc. in Corona, Calif., has formed a new subsidiary, Security Glass Solutions Inc. Security Glass Solutions will market its products for commercial and residential buildings, airports and large hotel buildings throughout the world.

Security Glass Solutions will offer various glass solutions for smash and grab in the commercial business market, residential building glass doors, windows, panel and protection from terrorism bomb blast attacks and hurricane protection, says Robert Doeherty, president.

Foremost Opens Midwest Facility

Smiles at the grand opening from (l to r) Jim Jankauskis, product manager, shower doors, Foremost Groups; Dave Bruce, EVP Foremost Groups; John Bathurst, plant manager; Bob Kermelewicz, EVP Foremost Groups; and Hobart Mayor Brian Snedecor.

East Hanover, N.J.-based Foremost Groups has celebrated the grand opening of its new manufacturing and distribution center in Hobart, Ind. The facility will serve as the distribution center and showroom for Foremost branded products that include its new product offering, Foremost Shower Enclosures. Company representatives report that the majority of this full line of shower and bath enclosures also will be produced at the new manufacturing facility.

The location includes a 50,000-square-foot warehouse, distribution and manufacturing facility and a 2,000-square-foot regional showroom.

Southern Stretch Moves its Pennsylvania Location

Southern Stretch Forming in Denton, Texas, has moved its Pennsylvania location from Zelienople to Butler. The new leased location is 13,000 square feet in area with an additional 6,000 square feet available for future growth.

The new shop houses three stretch form presses ranging from 17 to 30 tons, and a 26- by 8- by 8-foot oven for tempering and annealing aluminum, all moved from the Zelienople location. The company doesn’t plan to add any new lines in the next six months, says Charles Michie, marketing director. However, the new location has added two new additional people in staff.

“The new location gives us room for growth and more inside area, which will prevent slowdowns that can occur during winter weather,” Michie says.

Matodi USA is representing Intermac machinery and Diamut tooling in the glass industry throughout most areas of North America. Matodi USA is a recently founded company in Greensboro, N.C., led by Jack Van Meerbeeck as president.

Matodi USA and PPG Industries’ industrial coatings business announced that YKK AP America Inc. in Dublin, Ga., has been accredited as a premier member of the PPG/CAP Certified Applicator Program®. YKK AP is certified to apply both liquid and powder DURANAR® coatings to aluminum architectural components. Western Window Systems in Phoenix has launched a new website, www.westernwindowsystems.com. The new site continues to evolve daily with product updates, the latest news from the company, a twitter feed, photos of recently completed projects and more.
2012 IBC Changes Designed to Make Fire-Rated Glazing Specification Easier

For the first time, the 2012 International Building Code (IBC) has provided a guide advising where to use fire-protective versus fire-resistive glazing in door, window and wall assemblies. The revised Chapter 7 tables now clearly address size limits and appropriate fire-rated glazing (FRG) applications in interior and exterior walls, and exit enclosures and passageways. The new tables help professionals specify where to use fire-protective versus fire-resistive glazing in FRG assemblies, and avoid the misuse of FRG products for end-uses prohibited by the IBC.

These provisions are not new, says Diana San Diego, director of marketing at SAFTI FIRST in San Francisco. Rather, “These are … a clarification of the 2006 and 2009 editions of the IBC,” she explains. “Even though the new tables will not be adopted locally until jurisdictions accept the 2012 IBC, they are useful today in understanding the 2006 and 2009 IBC glazing requirements.”

The requirements contained in the new tables have been in effect since the 2006 IBC, and conform to what NFPA 80 provided in the 1999 and 2007 NFPA 80 editions, which are incorporated by reference in the 2012 IBC.

“This will benefit architects immensely as they select the correct fire-rated glass product for their application,” San Diego says. “This helps glaziers, too, because they can have a better understanding of the types of fire-rated glass products that they are installing.”

Devin Bowman, national sales manager at Technical Glass Products in Snoqualmie, Wash., agrees. “For fire-rated glass manufacturers and suppliers, the updated tables help clarify use of materials,” he says. “Depending on how they promoted their products, this could require changes in product literature to be consistent with the latest codes. Manufacturers and suppliers will also need to use the new marking system, but that is a relatively straightforward change.”

Architects, specifiers and glaziers need to be aware of the new fire-rated glass code clarifications as their local jurisdictions adopt them, Bowman says. “As with past codes, there’s often a lag as cities, counties and states switch from their current codes to the latest version, but it’s necessary to know what’s coming.”

NFPA 257 Close to Finishing 2012 Updates

The National Fire Protection Association (NFPA) Technical Committee is close to releasing a 2012 edition of NFPA 257, Standard on Fire Test for Window and Glass Block Assemblies. There are really only two substantive changes, says Thomas S. Zaremba, partner at Roetzel & Andress in Toledo, Ohio. The first modifies section 4.1.2, which dealt with furnace temperature at the start of the test. The 2007 edition of the standard required the temperature inside the furnace at the beginning of the test to be ambient. That has been changed because the temperature of a cold furnace at the start of a fire test is not significant, Zaremba explains.

“What is significant is the temperature of the test laboratory where the specimens are located before the test,” he says. Accordingly, this section will now read: “At the start of the fire test, the ambient laboratory air temperature shall be in the range between 50-90 degrees F.”

The second substantive change will delete section 4.3.4 from the 2012 edition. That section addresses “neutral pressure” testing, and since all codes now require testing under positive pressure, this section is no longer necessary.
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New ASTM Standard for Glass and Glazing Systems Published

ASTM F2912-11, Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings, was published August 11. The specification covers exterior windows, glazed curtainwalls, glazing panels in doors and other glazed protective systems used in buildings that may be subject to intentional or accidental explosions.

“ASTM F 2912 was created to provide guidance to those interested in incorporating bomb-blast resistance into their facilities when they don’t have the benefit of a government specified mandate for performance,” says Julia Schimmelpenninck, global applications manager of advanced interlayers, a division of Solutia Inc. in Springfield, Mass. “It is structured to ensure the critical parameters for blast design are communicated in the specification: load, duration, protection/hazard level, this ensures a more rapid translation of product configurations for quotes and delivery. The publication of this specification is hoped to demystify blast resistance to some extent and make it a much more common consideration for commercial and industrial facilities.”

The specification addresses only glazing and glazing systems, and does not address the structural integrity and functionality of door assemblies. It assumes that the designer has verified that other structural elements have been adequately designed to resist the anticipated air-blast pressures.

The specification was designed for all glazing, glazing systems and glazing retrofit systems. It does not determine the assessment of a facility nor acceptable hazard ratings. Threat and risk assessment shall have already been performed and the acceptable hazard rating defined.

The specification will be under a 5-year review cycle.

He adds, “It’s crucial to pay attention to glass size limits, and to understand where ‘fire-protection’ and ‘fire-resistance’ rated products are allowed. Fire protection glazing defends against the spread of flames and smoke, while fire resistance glazing also blocks heat transfer. This is a critical distinction as the higher level of protection is necessary in certain instances such as exit passageways and for fire walls and fire barriers.”

The same marking system for fire resistance- and fire protection-rated glazing also was included in the 2012 edition of National Fire Protection Association 101, the Life Safety Code, says Thomas S. Zaremba, an industry consultant and partner for Roetzel & Andress in Toledo, Ohio.

There is significant value to having this marking system in place in the codes, Zaremba says. “First, from the perspective of fire-rated glazing manufacturers, the users of fire-rated glazing and the building code officials, it enables all of them to identify directly from the label found on the glazing in the field exactly what fire tests the glass has been subjected to. Second … through the new marking system, the table now shows exactly how fire-rated glazing must be marked in virtually every applications where fire-rated glazing is required.”

Given the increased level of certainty that these provisions provide in assuring that the right fire-rated glazing is being used in the right application, “it should be easier for fire-rated glazing manufacturers to provide the specific applications for their inventories of different types of fire-rated glazings; easier for specifiers to incorporate fire-rated glazing into their construction plans and drawings; easier for installers to identify from the label the right glass for the right applications in the field; and easier for building code officials to determine that the right glass has in fact been installed in the right applications,” Zaremba says.

The new code also simplifies the fire-rated glazing label scheme by reducing the number of markings describing where the glass can be used and which tests it has passed, Bowman says. Marks now include ‘W’ for fire-resistance-rated glazing meeting wall assembly criteria; ‘OH’ for glass meeting fire window assembly criteria, including the hose stream test; ‘D’ for glass meeting fire door assembly criteria; ‘H’ for glass meeting the fire door assembly hose stream test; and ‘T’ for glazing meeting temperature rise criteria. As before, a two- or three-digit number shows the fire rating in minutes.

Another important change in the 2012 IBC is clarification in Section 703.4 that automatic sprinklers are not allowed during fire-rated materials testing. Fire ratings for glass and other building materials must be earned based on their own performance, and not as protected by supplemental systems. “This provides an additional margin of safety for building occupants in the event sprinklers fail during a real-world fire,” Bowman says.

At its next meeting, the ICC’s Code Technology Committee is planning to review the changes made to the fire-rated glazing provisions in the 2012 IBC meeting to determine whether any additional changes may be required. “Perhaps using a single table for both fire-rated windows and fire-rated doors in the IBC will be considered for the 2015 edition of the IBC,” Zaremba says.
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Energy Efficiency, Sustainability Are Focus of Façades Design Conference

The 2nd Façades Design & Delivery Conference was filled with several examples of best practices and projects, attendees say. The conference, organized by IQPC and co-sponsored by USGlass magazine, took place September 7-9 in Los Angeles.

“The primary theme is really energy-efficient façades using techniques and solutions from around the world,” says Udi Paret, vice president of business development for Pythagoras Solar. About 70 people attended the conference, says Mic Patterson, director of strategic development at Enclos Corp. He noted that the tightly honed attendance is deliberate. “It’s a very focused group, and they want to keep it close-knit and hands-on,” he says.

“The need for open and honest dialog is important when a conference like this is held,” adds John Rovi of Curtain Wall Design & Consulting Inc. “There were two occasions to exchange ideas between the panel and audience, to talk through some of these issues.”

Paret noted that the attendees shared a “genuine interest and desire to drive towards more energy-efficient façades and net-zero-energy buildings. This created an environment of open and effective discussion.”

This conference has successfully picked up on where the first conference left off, Patterson adds. “I’m seeing things emerge and become trends, like shading systems, building integrated photovoltaics (BIPV), new photovoltaic (PV) products and rationalization of complex façade geometries. BIPV is coming on slowly. Electrochromic glass seems to be moving fast, with some significant improvements in cost and availability imminent. Energy efficiency is increasingly about energy balance—daylighting and solar gain. A new version of COMFEN by LBNL is proving to be a robust front end conceptual design tool for architects and façade designers (see page 16). There also has been more dialogue on double-skin façades and project delivery.”

Integrated project delivery was a major topic of discussion, says Allen Davidson, architectural products manager at W&W Glass LLC. “Architects are looking for façades to be integrated in project delivery,” he says. “A lot of projects have been discussed, [with] their architectural challenges, such as the Sea-Tac central terminal, the Guggenheim and the Anaheim Regional Transportation Intermodal Center. Energy-efficient innovations in Europe also [was] a topic of discussion.”

Energy Star® Ratings Now Available for Multifamily Buildings

Officials at the U.S. Environmental Protection Agency (EPA) announced August 30 that new multifamily high-rise residential buildings are now eligible to qualify for an Energy Star rating.

“This is a very significant milestone for the Energy Star program and a welcome one for promoting the use of Energy Star-qualified fenestration,” says Jeffrey Inks, vice president of code and regulatory affairs for the Window & Door Manufacturers Association. “It’s also extremely important to promoting energy-efficient retrofits of existing construction.”

While high-rise multifamily is only 5 percent of the U.S. residential market, there is still a large chunk of carbon to be captured, says Arlene Z. Stewart, president of AZS Consulting Inc. “Since most units only have one exterior side to the building envelope, in actuality, they are 27-percent less efficient than single family on a per unit basis,” she says.

An important fact to keep in mind regarding this program is that given high-rise buildings designed for multifamily occupancy are constructed with commercial fenestration products, this new Energy Star certification applies to the building itself and not the products used to clad the building, says Mike Turner, vice president of marketing of YKK AP America Inc. “This is a common specification error that appears on commercial buildings when greater energy efficiency is desired. Buildings seeking this certification will need to incorporate commercial products that perform at least 15-percent better than code,” he says.

To qualify for Energy Star, new or substantially rehabilitated multifamily high-rise buildings must meet energy-efficiency guidelines set by the EPA and be designed to be at least 15-percent more energy-efficient than buildings that meet the ASHRAE energy use standard.

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Solar Watch

Solar Experts Tell Industry Members to Jump Aboard the BIPV Train

Fabricators and contract glaziers were urged to take on photovoltaic (PV) installations during a recent seminar on building integrated photovoltaics (BIPV). Approximately 150 people, including 60 students from Georgia Institute of Technology of Atlanta and Southern Polytechnic State University of Marietta, Ga., attended the third annual solar seminar, “Building Integrated Photovoltaics: It’s Not the Future, It’s the Now,” on September 14, the last day of GlassBuild.

“The glass and glazing industry is about to see BIPV gain traction. The Department of Energy (DOE) said BIPV can generate half the electricity used in this country,” began moderator Richard Voreis, chief executive officer of Consulting Collaborative in Texas.

The global PV market more than doubled in 2010, with Europe accounting for more than 80 percent, according to Voreis. “The U.S. will become the third largest supplier of PV after Germany and Italy,” he said. “Currently, the U.S. has 5 percent of the world PV market, projected to increase to 12 percent by 2015 … The fastest growing state in PV capacity is New Jersey.”

Most of the states are expected to reach grid parity—the point at which PV electricity is equal to or cheaper than grid power—by 2015, Voreis said. The DOE’s goal is to make all new commercial buildings net-zero by 2025.

The growth of the U.S. PV market is reflected in the growth of First Solar of Tempe, Ariz., Voreis said. “It was number seven in the world’s top 100 fastest growing companies list,” he said. The glass industry needs to get a slice of the BIPV pie, as well, Voreis added.

And that should not be complicated, according to panelist Rick Hamlin, executive vice president and national estimating director of Trainor Glass in Farmers Branch, Texas. “Think of PV as glass with wires,” Hamlin said. “BIPV is the best fit for contract glaziers. It’s just a new market using the same trades. It’s additional revenue on existing projects, and builds value with customer base.”

BIPV is simply solar cells in glass laminates and integrated in building structures, added Eddie Bugg, director of Sustainable Solutions at Kawneer Co. in Norcross, Ga. To get on board the BIPV train, he advised listeners to target early adopters. “Find architects and/or developers who recognize and are leveraging federal and local grants, and using the technology in their building integration.” Be very selective on who you are working with, he added. “Start to learn by doing. Don’t wait for someone else to learn and teach you, because then you’re two to three iterations behind.”

Understand the customer’s level of commitment and funding for BIPV early, Bugg added. “Focus on those who are serious about BIPV and understand what it is and is not. Work with a full-service architectural aluminum systems supplier that can tailor a solution and help you with the order. BIPV is expensive, budgets are not infinite, so be careful with the ‘traditional’ mark-ups. Ensure specs are tight and clearly understood by all.”

Most importantly, “recognize BIPV is an exercise in optimizing coordination of trade (architectural, electrical and glazing system design). We need collaboration of the module suppliers, frame manufacturers, glaziers, electrical contractors and installers. That collaboration will drive cost down,” Bugg said.

Brendan Dillon, director of product marketing at Pythagoras Solar in San Mateo, Calif., agreed. “We need curtain-wall manufacturers and architects, engineers, contractors to work in close collaboration. We need visionary clients out there to share the risk with us. Predicting the cost is a challenge, so you
need a partner that can help you create the economics of it.”

In order to be used more widely, BIPV has to replace an existing building material on the building, Dillon said. “To do that, we have to improve the energy efficiency of the building, produce electricity in a meaningful way and appeal to the architects and engineers so they feel good standing behind it.” Leverage existing trades and construction techniques, and take advantage of current tax incentives, he said. “You can take a 30-percent tax credit for a curtainwall that you might be building. BIPV systems cost more in the front end, but should pay back in less than five years.” But as long as BIPV is considered an add-on, it won’t be used as much as it could be, said Vikram Sami, sustainable design analyst at Perkins+Will Architects. “Thinking holistically is important.” Matt Koch, senior research engineer for the Texas Center for Applied Technology, agreed. “BIPV should not be an afterthought,” he said. “Installation tends to be less costly if done as part of initial construction rather than as retrofit, but it’s still an economic puzzle game.”

“The key word in BIPV is ‘integrated,’” summarized Steve Coonen, a PV industry consultant in Grass Valley, Calif. That said, “Ninety percent of the grid connected BIPV schematic is putting the glass in. The rest is the inverter. It really is not rocket science. So, don’t be afraid. A PV cell is simply two sheets of glass with EVA in the middle.” “The electricians have beat our pants off when it comes to installing PV,” Coonen added. “It’s glass first and foremost, so, you all should be installing it. The 30-percent tax write-off is good until 2016, so make use of it.”
Some Good, Some Bad
How Contract Glaziers Feel About the Future Depends on Where They Work

by Lyle R. Hill

When USGlass magazine approached us about creating a way to measure contract glaziers' confidence in the future, we set about to test and develop research which, when merged together through algorithm, could provide such a measure. (For more information on the USGlass Contract Glazier Confidence Index, see page 6 of this issue).

Keytech surveyed contract glaziers on a variety of topics. I was overwhelmed by not only the high number of responses but also by the passion expressed in their comments.

The five indices included here are important for a variety of reasons, among them the noticeable differences in the results by region. What's striking as well is the great schism between the opinions of those in coastal states versus inland ones. We plan to provide updated numbers and trends analysis on a regular basis. Thanks to all who participated.

### Regions by State

<table>
<thead>
<tr>
<th>Region</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>ME, NH, VT, MA, RI, CT</td>
</tr>
<tr>
<td>Mid Atlantic</td>
<td>NY, NJ, PA</td>
</tr>
<tr>
<td>East North Central</td>
<td>OH, IN, IL, MI, WI</td>
</tr>
<tr>
<td>West North Central</td>
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<tr>
<td>Delmarva</td>
<td>DE, MD, DC, VA, WV</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>NC, SC, GA, FL</td>
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<tr>
<td>East South Central</td>
<td>KY, TN, AL, MS</td>
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<tr>
<td>West South Central</td>
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<tr>
<td>Mountain</td>
<td>MT, ID, WY, CO, NM, AZ, UT, NV</td>
</tr>
<tr>
<td>Pacific</td>
<td>AK, WA, OR, CA, HI</td>
</tr>
</tbody>
</table>

### Measure 1: Backlog Change
In the past six months, what direction has your backlog "under contract" taken?

<table>
<thead>
<tr>
<th>Region</th>
<th>Backlog is up more than 10%</th>
<th>Backlog is up between 1% - 10%</th>
<th>Backlog is about even</th>
<th>Backlog is down by 1% - 10%</th>
<th>Backlog is down by more than 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>18%</td>
<td>28%</td>
<td>18%</td>
<td>11%</td>
<td>25%</td>
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<tr>
<td>Mid Atlantic</td>
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<td>East North Central</td>
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<td>Delmarva</td>
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<td>South Atlantic</td>
<td>19%</td>
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<tr>
<td>East South Central</td>
<td>16%</td>
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<tr>
<td>West South Central</td>
<td>12%</td>
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<td>Mountain</td>
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<tr>
<td>Pacific</td>
<td>17%</td>
<td>14%</td>
<td>17%</td>
<td>19%</td>
<td>33%</td>
</tr>
</tbody>
</table>

**Total**

- **31%** Backlog is down by more than 10%
- **15%** Backlog is down by 1% - 10%
- **19%** Backlog is up between 1% - 10%
- **16%** Backlog is up more than 10%
- **19%** Backlog is about even
Measure 2: Employee Hires  
During the next six months, my company will most likely do the following:

<table>
<thead>
<tr>
<th>Region</th>
<th>Experience an increase in total number of employees</th>
<th>Stay at or about its current level of employees</th>
<th>Experience a decrease in total number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>29%</td>
<td>53%</td>
<td>18%</td>
</tr>
<tr>
<td>Mid Atlantic</td>
<td>23%</td>
<td>62%</td>
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<td>East North Central</td>
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<tr>
<td>Mountain</td>
<td>12%</td>
<td>63%</td>
<td>25%</td>
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<tr>
<td>Pacific</td>
<td>26%</td>
<td>59%</td>
<td>15%</td>
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</tbody>
</table>

Total:
- 20% Experience a decrease in total number of employees
- 19% Experience an increase in total number of employees
- 61% Stay at or about its current level of employees.

Measure 3: Contract Glazing Confidence  
When I look to the immediate future (6-12 months) I have the following view of the construction industry and how it will impact my business:

<table>
<thead>
<tr>
<th>Region</th>
<th>I see strong economic improvement</th>
<th>I see slow but steady economic improvement</th>
<th>I see no change</th>
<th>I see a slight decline and am concerned about the immediate future</th>
<th>I see continuing decline and am truly worried about the future</th>
</tr>
</thead>
<tbody>
<tr>
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<td>7%</td>
<td>50%</td>
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Total:
- 16% I see continuing decline and am truly worried about the future
- 40% I see slow but steady economic improvement
- 22% I see a slight decline and am concerned about the immediate future
- 20% I see no change

continued on page 30
Some Good, Some Bad  
continued from page 29

Measure 4: Near-Future Purchases
Over the next 6 - 12 months my company will most likely do the following (select as many as apply):

<table>
<thead>
<tr>
<th>New England</th>
<th>Purchase office equipment such as computers, plotters or software</th>
<th>Purchase shop fabricating equipment such as saws, CNC machines or polishers</th>
<th>Purchase field equipment such as trucks, rigging or scaffolding</th>
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Total

51% Purchase office equipment such as computers, plotters or software
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49% Purchase field equipment such as trucks, rigging or scaffolding

Total equals more than 100 percent because multiple answers to this question were permitted.

Measure 5: Margin Change
Current market conditions have forced my company to react in the following manner:

<table>
<thead>
<tr>
<th>New England</th>
<th>We have not altered our approach from a pricing/mark-up standpoint</th>
<th>We have had to reduce our mark-ups to remain competitive</th>
<th>We have had to take work at or below our costs to keep people working</th>
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Total

11% We have had to take work at or below our costs to keep people working
66% We have had to reduce our mark-ups to remain competitive
22% We have not altered our approach from a pricing/mark-up standpoint
1% Other

Some Good, Some Bad  
continued from page 29

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A rash of spontaneous glass breakages at condos across Toronto this summer led the consumer press to point to the “dangers” of glass buildings. Skeptical glass suppliers, meanwhile, have pointed to the dangers of sourcing overseas materials.

Are Railing Breakages Giving Tempered Glass a Bad Name?

by Megan Headley
On August 17, Lanterra Developments issued a statement in reference to the glass breakage that had been plaguing its properties in Toronto throughout the summer. The statement came after a fifth lite of glass from a condominium balcony fell—this time from 29 stories up and hitting a pedestrian below.

The unfortunate woman on Bay Street suffered only a minor injury according to local news reports, but enough was enough for the developer and the city. “Because our first priority is the safety of the public and our residents, we have taken the following actions,” Lanterra wrote in a statement issued to the press. “Lanterra Developments has … stipulated that the tempered glass on these balconies will be replaced with a laminated glass. . . .”

That’s three properties worth of glass balcony retrofits, with the decision made even before the engineering firm brought in to investigate the breakages could determine the problem.

In its statement, Lanterra noted: “The advantage of utilizing laminated glass is that in combination with using the latest available railing technologies, these laminated panels retain their structure in the event of a fracture and stay in place on the balcony should any breakage occur . . . Effective immediately all of our projects in development will make similar use of laminated glass designs.”

However, as one glass supplier commented to USGlass on the condition that they remain unidentified for fear of losing customers: “They are still dodging the key issues of the tempered failures. Was it heat soak-specified or not? Was it heat soak delivered or not? [In other words], was it a developer/architect failure or a supplier failure?”

As the consumer press has begun to report additional breakages—causing several developers to replace tempered lites with laminated glass in an effort to curb further negative publicity—the answer to that question has become increasingly more important to the North American glass industry.

SEARCHING THE SPECS

Three of Lanterra’s properties have been affected by glass breakages, according to local news reports. One Bedford at Bloor, a 32-story tower in Toronto designed by KPMB Architects, was completed in 2009. KPMB’s website notes that the north tower features projecting sandblasted glass horizontal balconies. KPMB also designed the TIFF Bell Lightbox, which has reported glass breakage from its condominium tower this summer as well.

Lanterra’s Murano condominium has towers located on 37 Grosvenor St. and 38 Grenville St., both of which were completed in 2009. The two-tower, glass-encased condo was designed by architectsAlliance. The complex was named after the island of Murano, in reference to the artwork on the podium curtainwall that portrays the glass artistry of that island.

Toro Aluminum Railings, an 11-year-old manufacturer of balcony guard railings, has handled the glass replacements for Lanterra. The company fabricated and installed the balcony on the Murano’s south tower, while another now out-of-business company handled the other towers’ balconies (Lanterra would not provide the name of that company). According to a statement Toro issued on August 19, the railing manufacturer “supports the installation of heat-treated laminated glass balcony railings.” According to the technical data listed in its website, the company mandates for its railings: “All glass to be 6 mm (1/4-inch) tempered in compliance with CAN/CGSB-12.1-M90.”

However, representatives of Toro Aluminum would not return USGlass’ requests for comment as to whether it has promoted heat-treating tempered glass in the past. And neither Toro, Lanterra nor the architects involved on these projects would answer the most asked question: who supplied the glass?

“It’s a sticky situation,” says one glass supplier who asked not to be named in connection with this article. “The developer and the contractors are in damage control. The developer is trying to avoid the perception that this is only a

The only reason there is a perception that tempered glass is getting a bad name is because the [consumer] press covering the current Toronto story have yet to draw the distinction between domestically produced tempered glass, and those products that come from China . . .

—Bernard Lax, Pulp Studio Inc.

continued on page 34

Temper, Temper

Follow the QR code to view this USGlass archived article on managing the problems inherent in tempered glass.
Broken Glass
continued from page 33

symptom of other shoddy construction practices and that other parts of the building(s) are sub-standard.”

Without answers from the parties involved, the glass industry has drawn its own conclusions.

“CREATIVE PURCHASING”
The Toronto developer gained a publicity reprieve of sorts on September 1 when, for the third time, a glass balcony at the Four Seasons Hotel and Private Residences in Seattle shattered.

According to local news reports, that property is following the suit of other developers and removing the tempered glass from every balcony.

Neither the Four Seasons management nor the general contractor on the project, Lease Crutcher Lewis, would respond to USGlass’ requests for comment. However, in October 2008, a year before this hotel-condo project’s completion, a Business Excellence profile of the general contractor, which referenced the Four Seasons Hotel. The profile offers insight into the contractor’s approach to materials: “Materials such as casework and curtain wall [sic] can be procured from China at 20–30 percent below what’s locally available,” it says. The article goes on to quote the company’s Jeff Cleator: “When the owner applies for construction financing, he wants to eliminate budget uncertainty, so we’ve gotten more creative with purchasing. In some cases we will purchase and store materials ourselves and then assign those contracts to the appropriate subcontractors after the traditional bidding period.”

It’s a perspective that has left many North American glass suppliers nodding knowingly.

“The only reason there is a perception that tempered glass is getting a bad name is because the [consumer] press covering the current Toronto [and Seattle] story have yet to draw the distinction between domestically produced tempered glass, and those products that come from China (assuming this material came from there),” says Bernard Lax, chief executive officer of Pulp Studio Inc. in Los Angeles, who has no knowledge of the suppliers involved.

Many domestic suppliers are drawing that same conclusion.

A CRITICAL DISTINCTION
It’s a distinction that glass and railing suppliers unconnected with these specific projects are urging their customers to recognize.

“I believe there is a lot more scrutiny and consistency with ingredients that go into making glass by North American float glass manufacturers, so I feel far more comfortable with glass produced domestically,” says Bob Lawrence, president of Craftsman Fabricated Glass in Houston.

That’s one point on which most North American railing suppliers seem to agree.

“Make sure that your glass is coming from a source that can be trusted,” emphasizes Brant List, a sales consultant for Q-Railing USA.

“It’s all about the glass. It’s all about knowing your supplier and knowing what’s in your glass,” added another railing fabricator who asked not to be named for this article for fear of losing customers.

“[It] does have a lot to do with glass sourcing,” agrees Tony Leto, executive vice president of sales and marketing for The Wagner Companies in Butler, Wis. “Most domestic manufacturers of glass have become pretty good at making sure that their glass doesn’t have the nickel sulfide inclusions [impurities in glass that can cause spontaneous breakage], but if people are using imported glass, they have to be a little bit more aware and insist on that heat soaking to make sure there’s no imperfections in there.”

Andrew Chatfield, director of architectural glass systems for The Wagner Companies, points out that “there are regulations and standards for break testing on glass. If you talk to anybody who tempers glass, they will tell you that every so often they have to run a sample through and they have to break it and there’s a set criteria for how that glass breaks, how many pieces per
square inch of fractured pieces of glass there are.” He notes that customers need to be educated to ask for testing and certifications.

When the suppliers in these cases become public, perhaps these comments will change. But perhaps not. As Lax points out, glass breakages are not new. They’re just heavily reported at this time, possibly causing more consumers to view the material with a nervous eye.

“Chinese tempered glass has had numerous project failures around the country, and not just in exterior glass,” Lax says. “I can only assume that many of these are related to nickel sulfide inclusions. It took our domestic industry decades to remove this element from their production facilities and I image it will take decades before the Chinese industry can insure the same. In the meantime, if I were a building owner I would require all the glass I purchased from China be heat soaked in the United States to insure the quality before installing it.”

THE LAMINATED SOLUTION

Both the Toronto developer and the Four Seasons have remained mum on the glass supplier. But, when it comes to the tempered versus laminated railing debate, does it matter? “Given recent publicity I have recently been recommending that laminated heat-strengthened glass be offered as the smart alternative for the [railing] applications,” Lawrence says. “Is replacing everything with laminated the right answer?” asks the unidentified glass supplier quoted earlier. He answers that question with another question: “Why is the developer running away from tempered, which is common enough and works continued on page 36

The W Austin Hotel closed for 11 days to assess the cause of its balcony breakages, before removing all the tempered lites.
What’s more important when my kids crash into that balcony glass: keeping my kids on the balcony or making sure the pieces of broken tempered glass pebbled up safely when they fall to their deaths?

—Rob Botman, Glassopolis

well when it's specified and fabricated well? Perhaps they are avoiding tempered to pin the blame on tempered, rather than on their sourcing of tempered.

Rob Botman, general manager of Glassopolis in Toronto (unconnected to the projects mentioned), offers an alternative view, one that isn’t looking down where the glass is falling—after all, the point of using tempered glass in these applications is that if it does break it’s not in large shards that will cause serious injury—but up at the balconies where this glass is meant to protect building occupants.

"Remember that tempered glass is designed for safety, not strength," Botman says. "It passes impact-safety tests if the glass pebbles when it’s broken. Laminated, on the other hand, passes the same tests if it keeps the broken glass in place. As a parent with small kids, if I was living in a condo with a glass balcony 40 stories up, I’d prefer laminated over tempered. What’s more important when my kids crash into that balcony glass: keeping my kids on the balcony or making sure the pieces of broken tempered glass pebbled up safely when they fall to their deaths?"

For his part, Botman says, “I’d like to see more laminated balcony glass.” Still, others point out that tempered glass is typically specified in these applications over laminated glass for one reason: cost.

"It’s obviously a cost issue," Leto says. "One of the things that often is said is, ‘well, it met code.’ People have to realize that the building codes are considered minimum standards for safety. As minimum standards, that means you always can do better. And in certain situations, the minimum standards are not enough; when you’re dealing with a safety issue in a high-rise you may want to exceed the minimum standard and go with something that’s less likely to fail."

While that one railing fabricator earlier emphasized “it’s all about the glass,” that too is a point of contention. Some say it’s all about the installation.

In fact, that same unidentified fabricator who points out “it’s all about the glass," says that company does its own installation to ensure that its products meet code requirements.

Others say it’s not all about the glass; it’s about how the metal touches the glass.

"The thing you have to be aware of is the edge contact," Leto says. He theorizes that this may have played a role in another much-reported case of glass railing breakages.

SOUTHERN EXPOSURE

For the W Austin Hotel in Austin, the problems began on the pool deck. On June 10, two lites of glass fell from the balconies of south-facing condos on floors 24 and 25, crashing down and injuring four people on the pool deck below.

Weeks later, three more lites fell. Following the latter incident, which caused minimal damage to cars but, fortunately, no injuries, the property owners issued a statement saying "that one glass panel on the 31st floor was broken and that the resulting falling debris broke panels on the 29th and 22nd floors.”

According to the financial statement filed by hotel owner Stratus Properties Inc., the breakage caused the hotel to close for 11 days while it investigated the problem. Even before the investigation conducted by Curtain Wall Design & Consulting (CDC) in Dallas was complete, the property owners made the “decision to replace every balcony glass panel on the building” with laminated glass.

Preventing Breakages

In its September online survey, USGlass asked readers to select the solution they feel is the best way to prevent glass railing breakage. The results are pictured here. To take next month’s survey, visit www.usglassmag.com.
FROM THE REPORT

The W Austin Hotel, which opened December 2010, was designed by Andersson-Wise Architects. Featuring highly reflective windows, a press release on the architect's website notes that the tower's primary facades are oriented north-south, with differing apertures composed to control daylight, heat gain and energy use. It adds that the south façade features "generous, deeply-recessed balconies."

A June 11 CDC preliminary investigation report shows an etched label on one glass panel had the name of China's Xinyi Glass (XYG). The company has North American operations in Richmond, B.C. The logo notes that the glass was safety tempered in compliance with ANSI Z97 and CPSC 16 CFR. Representatives at XYG declined to comment.

U.S. Railing in Tampa, Fla., a subsidiary of Custom Components, served as the balcony railing system designer, fabricator and installer on the project. The company directed media inquiries to Stratus, which released a statement from chief executive officer Beau Armstrong.

"A thorough investigation of this incident continues with numerous engineers and experts to ensure this work is done as safely as possible," Armstrong stated.

CDC's report on the initial incident stated: "In an effort to locate the initial source of possible falling debris, we have confirmed that a pattern of damage does exist emanating partially from the slab edge at level 27 directly above the failed units. Based on our initial observation of this area, it appears that high strength grout applied to the slab edge has been dislodged adjacent to a post tension cable head location. The high strength grout appears to have fallen onto the top edge of the glass unit at level 25. Cementicious debris collected on levels 25, 24 and the pool deck is consistent with the missing grout on level 27."

With recent reports of glass breakages, many fabricators are recommending laminated glass for railing installations.

continued on page 38
In its conclusions and recommendations, CDC’s report said, “due to the location of the point-supported glass in-fill panels any falling debris could likely damage the top edge of glass, causing catastrophic failure.”

As Leto says, “I think people need to be reminded that glass edges are extremely susceptible to damage from impact.”

This case certainly provides a vivid reminder. Leto continues, “We’re very big on pushing the idea of having a top rail on glass if that’s the glass balustrade railing. Now, that might have simply been an in-fill panel with an exposed edge, but exposed edges are very susceptible to breakage, even under minor contact.”

It’s a caution that may come too late, as frameless railings that allow for an unobstructed view only continue to grow in popularity.

“A lot of people are going for the ¾-inch glass without a cap rail, so they don’t have anything obstructing their view; it’s just a glass panel,” List says. He continues, “A lot of people are telling me, ‘well we’re going to use ½-inch and we don’t want to use a cap rail.’” List notes that building codes differ by locality, but, “the rule of thumb is anything over ¾-inch glass with soft
edges does not require a cap rail. 

“We are seeing a greater demand for glass railings in general, mainly because of this desire in residential as well as commercial to have this unrestricted view. So there’s a lot of push to include glass wherever they can so they can have an invisible railing,” Leto agrees. “Our warning as always, though, is that there are a lot of misconceptions that you can do that without a top rail, and doing without a top rail is very risky for many reasons.”

WATCHING THE EDGE

But there are other delicate points of contact that can lead to spontaneous breakage such as seen at the W Austin. “They were dealing with a building that was southern exposure in Austin, Texas, in the summer. So more than likely everything expanded and eventually, as the glass edges hit some metal somewhere, it would have just exploded,” Leto suggests.

He continues, “You have to be aware of where the edges of that glass are going to possibly contact metals. There are a couple of places where that could have happened: the holes through the glass where the clips attach, if that material moved and there wasn’t a proper buffer in there, it could have broken. Or if the outside edges of the glass expanded enough to hit a post or other solid contact, that could have caused fracturing.”

It’s an installation factor that is occasionally overlooked, Chatfield agrees. “If you’re drilling a hole through the glass then you want to make sure that obviously ... the metal screw or whatever is going through the hole is isolated from the inside edge of the hole. A lot of people tend to forget that little piece of plastic grommet that goes in the hole, and wonder what that is and throw it away. Then of course as all the glass expands, there’s differential expansion between the metal and the glass,” Chatfield says.

He adds, “Everyone knows the building site is never exactly correctly to drawing as far as dimensions are concerned. Tolerances are unbelievably important and the consideration of tolerances when you actually fabricate something is important. We realize it with railings, the way we do things, because we now have products that allow for thermal expansion, mechanical movement within the system. That’s unbelievably important, because obviously metal moves, and if it’s on the south face it’s going to move a lot more than it’s going to move if it’s on the north face or on the east face.”

continued on page 40
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AN OPPORTUNITY
During the summer, as consumer newspapers reported on glass falling from the skies, glass suppliers and railing manufacturers looked on nervously. But with the negative publicity comes an opportunity for the glass industry to educate designers and developers that they don’t have to give up those sweeping views— but they have to embrace those glass railings wisely.

As Chatfield points out, “There seems to be more instances [of breakages] in Canada and I think that’s probably because they’ve had an explosion in condo construction certainly in the Toronto vicinity.”

“It is not uncommon for a builder and developer to hire an architect for his expertise and then ignore his advice and conventional wisdom in an effort to save money. Now that the truth comes out they have to spend a lot more to fix a problem they helped create,” Lax adds.

“Developers who buy exterior glass from offshore and do nothing to test and guarantee its quality should all be shaking in their boots … They should always remember it was the low bid that built the Titanic and be proactive about the money they spend when it comes to issues of public safety.”

Being able to lay these instances before designers, and explain the importance of using a knowledgeable supplier and certified products to prevent problems, could help savvy railing and glass suppliers.

Chatfield, who hails from the United Kingdom, says that glass use is embraced more slowly in the United States than in Europe. “I think we’re moving faster now, but certainly where we use glass in the building is still far removed from where we use it in Europe,” he says. “I think some of it has to do with logistics in the United States but also it’s a matter of people feeling comfortable with using the material.”

Obviously, increasing the use of glass in a multitude of applications is the industry’s collective goal, and educating specifiers on glass’ safety properties may help in realizing that goal.

“That’s what makes these recent cases critical,” Leto adds, “because that only breeds the fear that glass isn’t an appropriate option. It’s not that it isn’t an appropriate option; you just have to take proper precautions and engineer properly to make it work.”

Megan Headley is the editor of USGlass. She can be reached at mheadley@glass.com or follow her on Twitter @USGlass.
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One World Trade Center (WTC). It was supposed to be a jewel rising from the dust of the former WTC towers. The architect envisioned cladding the base of the building in light itself. Light refracted and sent dancing by millions of prisms cut into the glass. Light that would belie the dark history of what was once referred to as The Freedom Tower. The world, and most especially the glass industry, watched eagerly as the plans for this unique building unfolded.

And then suddenly, after years of preparation, it was announced in May 2011 that prismatic glass would not clad 1 WTC after all. The rainbows could not be made. Or could they?

The decision has industry experts questioning whether those in charge—the Port Authority of New York and New Jersey (PANYNJ), along with SOM architects and Tishman Construction—made a wise decision when they collectively abandoned the concept of prismatic glass (see June 2011 USGlass, page 12). Perhaps the PANYNJ should have ceased its contract with the fabricator that reportedly had problems creating the complex prismatic glass panels. The parties involved may have had other options available to them that, until now, have gone unreported. Is prismatic glass a viable solution for buildings such as the WTC? Experts have differing opinions.

First, a definition of prismatic glass

Why the Glass on the 1 WTC Podium Won't Create Rainbows

by Tara Taffer
from a few who have worked with the product. “Prismatic glass has been cut and highly polished to the degree that it breaks white light into a full spectrum of colors,” says Kenneth von Roenn Jr., president/director of design for Architectural Glass Art Inc. in Louisville, Ky.

Nathan Munz, managing director of Glassform, an Australia-based fabricator, believes there are various levels of definition for this term, depending on the specifier’s design and performance requirements.

“The most basic [definition] would only require that the glass has facets, which give it a number of surfaces at an angle to the plane of the glass (as a prism has),” he explains.

A Quick Refresher

The original design for the podium wall of 1 WTC was to cover the concrete base with prismatic glass (for the original investigative article detailing the WTC construction, see April 2009 USGlass, page 30). According to the SOM website, “The podium wall base is 186 feet tall and its cladding is being designed to create a dynamic, shimmering surface that animates the experience of the building at ground level” (for more on the original design see the website in the box above).

The contract for the installation of the podium wall was awarded to Solera/DCM Erectors, based in New York. DCM hired a subcontractor, Zetian Systems Inc., based in Las Vegas, to perform design assist services, fabrication and delivery. Zetian awarded PPG Industries, based in Pittsburgh, the glass contract. PPG was to supply its Starphire ultra-clear, low-iron glass to Zetian. Zetian, in turn, had contracted Sanxin Glass in Shenzhen, China, to fabricate the Starphire glass into the prismatic panels. (For more on Zetian and its role in the project, see May 2011 USGlass, page 35.)

But in May it seemed the plan fell apart. “As design moved to the testing phase, it became clear that the prismatic glass simply had too many technical problems to overcome and at a budget that was not cost-effective. We have been finalizing a design that will be far more practical while being both distinctive and magnificent,” John Kelly, a spokesman for the PANYNJ, told The New York Times in May (The Port Authority would not return calls from USGlass).

The article also stated that the new façade is likely to be made of more tra-
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Where Was the Mock-Up?
Several companies contacted for this article wondered whether or not a full-scale mock-up of the 1 WTC podium wall had ever been produced.

“I’m surprised they didn’t say ‘let’s make a full-size mock-up,’” says Bob Brown of Robert L Brown and Associates LLC. “A lot of times with something unique like this they make some full-sized prototypes. On very unusual jobs they do this pretty regularly.”

John Barber, former president of Barber Glass Industries Inc., says when he was originally involved in development work for the project, and when he was told by a senior partner of SOM that if he met the price required he would receive a formal letter of intent, he developed a full-size panel. The sample he produced was 44 by 156 inches, which he says characterized the full panel which was to be 48 by 158 inches in size.

“They never came to look at it,” says Barber. “I still have large samples in my office. Most importantly, we never received the letter of intent.”

SOM did not respond to USGlass’ questions regarding whether or not a mock-up was produced.

PPG’s Rob Struble says he doesn’t know if a mock-up was produced, but adds, “PPG recommends a mock-up on all commercial projects—it’s part of our standard design guidelines. However, where PPG sits in the contract chain, we can’t require it.”

Why It Won’t Work
Bob Brown of Robert L Brown and Associates LLC has been in the industry for 51 years and is well-known as a tempering expert. The industry consultant says he was contacted approximately a year ago by the “principals involved” when “they were experiencing problems fabricating the glass.”

“The problems they experienced were breakage and in laminating it,” Brown says. “The panels were so deformed after tempering they couldn’t laminate it.” He explains why, to his knowledge, it wouldn’t work—no matter the fabricator.

Brown says the problem lies in taking 1-inch Starphire glass, in 160- by 48-inch panels, and putting it on a flat surface and “machining it.” In this case, the machining involves using an abrasive cutting device to create some pattern on the surface of the glass. The thick glass is also prone to spontaneous breakage during the tempering process, says Brown, who adds that heat-strengthened 1-inch-thick glass would present the same set of challenges.

“I have tempered 1-inch-thick glass,” says Brown. “The problem wasn’t heating it; the problem was waiting long enough for it to cool. That has to be closely controlled. If it cools too fast it gets too high of a stress level. Almost anything would cause it to rupture.

“You have major problems in ensuring the temper is stable after the surface deformation that occurs during and after tempering,” Brown continues. “You also have problems in meeting the stress limits. Even if you had the thin part of the glass meet those limits the thick part would exceed that.”

And even if the thick glass didn’t rupture during tempering, machining the glass would create a new set of problems.

“The machining would likely be done with industrial diamonds,” Brown says. “They may also be polishing those grooves. When they cut deep grooves they have created micro-fissures and the polishing is an attempt to minimize the damage. That is what consultants will tell you is causing a weak spot if you don’t get it nicely dressed around the cut. Those are micro-fissures or flaws on edges or surfaces.”

But he has other misgivings as well.

“My concern is how to put that glass on any holding device,” Brown says. “For holding or supporting the glass during the surface modification, the table or frame in which it is placed must be very level and stable [minimal flexure].

Large sheets of float glass weigh a great deal … and though rigid at normal temperatures, it will flex under its own weight when not completely and fully supported. This would make machining the exposed surface an inaccurate procedure. If the machining is intended to create deep channels (grooves) in the glass surface, the variation in such grooving could cause uneven depths of grooves and subsequently cause a control problem for tempering in both the heating and cooling cycles. Such problems would be exposed with breakage, bowing and poorly tempered products.”

Brown is not the only one who has concerns about the use of prismatic glass on 1 WTC. Stanley Joehlin of the consulting company S.W. Joehlin Inc. is highly regarded in the industry for his tempering expertise and experience. In fact, he says, “Someone called me a few years ago when [Sanxin] got into trouble [on this job] and I said I wasn’t interested in going to China.” But he does have some thoughts on the prismatic glass option.

“Even if it would be possible to machine the glass and then polish the surface, without micro-cracks (which is next to impossible), you may be able to heat it uniformly if you left it in a very cool furnace,” says Joehlin. “However the longer heating time required can be expected to degrade the optical quality.”

“To temper a piece like that, I won’t
say it can't be done, but to uniformly heat and cool and keep it flat is almost beyond present technology—unless a company has a technique I am not aware of. . . ."

Von Roenn Jr. agrees that the problem lies in the tempering.

"If someone can figure out how to temper it differently that would be wonderful," he says. "I don't know enough to say if that was possible or not. But when I first heard what they were trying to do [at 1 WTC] I never thought they could temper it successfully. You can strengthen the glass but you would never pass the necessary tests because the glass wouldn't shatter in small enough pieces."

Like Brown, Von Roenn Jr. says machining offers another set of problems. "There was no way they could ever have gotten a uniform tempering of the glass with the process of polished V-grooves," he says.

**Alternative Number One**

For each person who says prismatic glass this thick can't be made there are others who say emphatically that it can. At least two companies claim they have developed a process in which prismatic glass could be fabricated successfully. Both say they could have done it for 1 WTC—and both say they were in talks with SOM and the PANYNJ while Sanxin was attempting to fabricate the glass in China. One such company is a familiar name to those following the story.

Canada's Barber Glass Industries was the company named in the original specification and spent millions in development work to create the prismatic glass. (For more on Barber's initial involvement, see April 2009 USGlass, page 30.) It is important to note, however, that Barber Glass Industries' fabrication arm is no more, as the 127-year-old company was placed into receivership on November 10, 2010. Former president John Barber's wife, Susan, was successful in buying back the installation arm, and Barber himself assists in the management of the company. He also serves as a consultant for industry fabricators. Despite the widely known fact that he lacked access to a fabrication plant, Barber says he received a call in March 2011 from Nicole Driscoll at SOM who inquired again about Barber's ability to fabricate the glass. Barber says he even went so far as to look for a plant and equipment to rent to fabricate the glass mock-ups.

Even before the call from Driscoll, Barber says he was aware that talks about choosing an alternative supplier had started again. In March 2011, Charles Flashburg of Johnson Screens told Barber that they were contacted via the parties involved as well. In the early stages of development, before the contract was awarded to Zetian, Barber was going to work with Johnson Screens, which would have provided the back-up screen that would hold the prismatic glass to the face of the building. (Johnson Screens did not return requests for comment at press time.)

"Both my company and Johnson Screens had an excellent grasp of the requirements and both had expended an excessive amount of capital to develop the product," Barber says.

Why did SOM come back to Barber years after the contract was awarded to Sanxin?
Could They or Couldn’t They?
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cause of the exposed edge, which would require extra care in the product’s handling and installation. He pointed out, however, that like any other product that is new on the market, it requires time and effort to work out all the installation and handling techniques.

Barber was willing to produce several full-size mock-ups for the PANYNJ as requested. He had proposed making four full-size panels and destroying two of them to demonstrate how the glass would react if broken or overstressed. At that time, Barber gave SOM and the Port Authority a price of $796,000 to provide them with the required mock-ups.

“SOM was told not to continue its efforts on this design,” Barber says.

“I proposed that we could manufacture the prototypes in the timelines they required with no issues,” he says. “PPG was willing to provide me with the glass required. But let’s face it: With the current status of my company I don’t have a whole lot of bargaining chips.”

SOM may have been willing to take a chance, but Barber speculates it was the PANYNJ who “kiboshed” the idea. “I had lost my credibility in the eyes of many,” he says. “But, I’m still one of the most knowledgeable fabricators in the world.”

What about the concerns of consultants such as Brown regarding the tempering process?

“It all has to do with the tempering process,” agrees Barber “and [Sanxin] hadn’t figured out the cooling process. It is not tempered under a regular manufacturing process. At the end of the day we were able to temper it. Under a normal 19-mil tempering recipe you would heat the glass for 15 minutes—this product was cooked for 45 minutes, then cooled very strategically.”

Barber adds, “That’s where the magic happened. The glass stayed red hot for a period of time.”

Barber did create a full-sized panel early in 2009 during the initial development work (see box, page 44) but adds that since that time he had developed many improvements in the manufacturing of the product, many of which were made during the manufacture of the Westwater project.

“We improved the way we fabricated the glass involving the use of water to assist in the elimination of micro-fractures on the surface of the glass,” Barber says. Brown says the use of water or coolants could minimize the problem of micro-fissures or flaws on the edge of the glass.

“But it’s not just water—it’s the use of water along with the very sophisticated machine tools and numerous equipment modifications,” Barber adds. “Micro-fractures are a big issue in any fabrication of glass.”

Alternative Number Two

Barber is not alone in his belief that prismatic glass is a viable option.

Several time zones away in Australia, another fabricator, Glassform, was perfecting a way to fabricate prismatic glass. The company was established in 1985 and Munz has 35 years of experience in the glass industry.

Munz says that Glassform, along with Barber Glass, was named as an approved fabricator for the prismatic glass in the original specification for the podium wall.

“We were named in the original specification and a gentleman at Tishman promised to put us in touch with the parties involved but we never heard and we went on with our lives,” Munz says.

Things changed in May 2010 when Munz says he received a call from a representative of Solera/DCM who was concerned about the Chinese fabricator’s inability to supply the prismatic glass.

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Things changed in May 2010 when Munz says he received a call from a representative of Solera/DCM who was concerned about the Chinese fabricator’s inability to supply the prismatic glass.

“From my knowledge of how the glass was going to be fabricated, I knew there was no way that what they were doing would work,” Munz says.

But he was convinced his company could produce the glass, so he developed a new approach to fabricating glass that would satisfy the aesthetic requirements that architect David Childs had designed—including the ability to generate rainbows.

“In order to produce the glass that was designed by Childs for 1 WTC, we needed to produce a quality of flatness without ripples,” Munz says. “The zigzag shape has to have a certain quality. Our sample shows our glass is a true prismatic glass.”

To produce the sample Munz says he used PPG Starphire glass that he had in his plant. He adds that Glassform’s solution for the prismatic glass does not require 1-inch-thick glass to be used, so the sample used a thinner PPG Starphire glass.

So how does Glassform’s method overcome the challenges pointed out by experts?

“I learned that the Chinese were machining the glass with a peripheral V-shaped wheel that will leave ripples on the glass surface,” Munz says. “You cannot get a splay of color without very flat surfaces on the prism.” He explains that the V is the shape of the edge of the wheel, which grinds the surface to form the V in the glass, but that his method uses a different type of wheel.

“The reason our prismatic glass has a surface finish that is flat and without any ripples is indeed the method of machining used. I believe that all other attempts involved machining the glass in a manner that could never

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achieve the necessary finish to generate rainbows from sunlight—in David Childs’s words, ‘splays of color.’”

In addition, Munz says Glassform’s design solution avoids the tempering and laminating problems arising from other approaches, which are likely to have prevented the successful fabrication of the final product.

Munz is keeping additional information about the product proprietary, saying only that Glassform “figured out how to manufacture prismatic glass panels with the aesthetic and structural properties necessary to satisfy the requirements of SOM’s design for the 1 WTC façade.”

A Jaw-Dropping Meeting

Two months after the phone call from DCM/Solera, on July 23, 2010, Munz traveled to New York City with a sample. Confident he could produce the desired glass, he was ready to meet with representatives from Tishman, SOM, DCM/Solera and the Port Authority—but the meeting never took place.

Munz wanted all the parties to sign a confidentiality agreement and says only DCM/Solera would comply. So he went back to Australia, but didn’t give up hope and went to work on another sample—one this one 4 by 2 feet in size. He flew back to New York City in October 2010 but this time, he says, neither Tishman nor SOM would meet with him.

Munz says the project manager, Ken Lewis, eventually agreed to meet. Also present, Munz says, were key members of the design team. Munz did not request the signing of a confidentiality agreement at this meeting as he had already submitted a patent application to the U.S. Patent and Trademark Office.

“The sun was streaming through the window, hit the glass and it was like rainbows everywhere and their jaws hit the floor,” Munz recalls. “They loved it aesthetically, and it would also work structurally.”

Munz says he was asked to leave the sample so it could be shown to others and he complied. “When I came back the following week to confirm a second meeting as agreed at the end of the previous meeting they stone-walled,” Munz says. “Subsequently a meeting with the design team was arranged on the basis that it was not for the purposes of 1 WTC but to discuss potential uses of the Glassform prismatic solution in other future SOM projects.”

And what about that sample? “It was shown to other SOM architects, and the written feedback I received [privately] from one was, ‘This is the best sample that has ever been produced for this installation. Everyone I spoke to here agreed … Since this sample proved to be so beautiful, it would seem that quite a few people are uncomfortable with how this situation has evolved.’”

And at least one other person saw the Glassform solution as a valid one. Leon Jacob, glass consultant with Jacob & Associates Pty Ltd., based in Sydney, Australia, says he was engaged as a consultant by the PANYNJ to undertake specific tasks related to the prismatic glass façade of 1 WTC.

“I am bound by confidentiality not to disclose details of my engagement,” he says. “I can, however, comment that, after it became evident that the contracted source of the prismatic glass panels was unable to supply, I advised Tishman Construction and SOM Architects that I was aware of the Glassform solution for the fabrication of the prismatic glass and that I believed it was the only solution available which satisfied the aesthetic and the structural requirements, and was able to be fabricated and supplied.”

Placing Blame, Money Wasted

Though Tishman Construction has remained relatively quiet on these issues both Barber and Munz contend Tishman did not facilitate constructive communication on the project.

“Tishman was controlling the process and blocked access at every point,” Munz says. “They didn’t want Glassform’s prismatic glass considered and they blocked access to the architect.”

“And at least one other person saw the Glassform solution as a valid one. Leon Jacob, glass consultant with Jacob & Associates Pty Ltd., based in Sydney, Australia, says he was engaged as a consultant by the PANYNJ to undertake specific tasks related to the prismatic glass façade of 1 WTC. “I am bound by confidentiality not to disclose details of my engagement,” he says. “I can, however, comment that, after it became evident that the contracted source of the prismatic glass panels was unable to supply, I advised Tishman Construction and SOM Architects that I was aware of the Glassform solution for the fabrication of the prismatic glass and that I believed it was the only solution available which satisfied the aesthetic and the structural requirements, and was able to be fabricated and supplied.”

The letter, dated April 4, 2011, also stated: “It appears that the prismatic concept for the 1 WTC podium façade is now being abandoned on the grounds that it is not able to be supplied. This is simply untrue.”

According to Munz, when Plate received the letter he instructed a representative of Tishman to call Munz on behalf of the Port Authority to say: “The owners have decided to abandon the prismatic glass concept for the 1 WTC façade.”

Since the parties aren’t revealing why prismatic glass was abandoned many have drawn their own conclusions—and most of those have to do with cost.

“My first guess is the cost concern,” Brown says. “I’m referring to Donald Trump’s concept of going to China because ‘it’s cheaper there than it is here’” (see November 2010 USGlass, page 42).

Ten million dollars had already been spent on the prismatic glass portion of the project. PPG’s Rob Struble also confirms that PPG did produce...
the specified Starphire glass, some of which was shipped to China and the remainder of which is sitting in a warehouse.

“It is a shame they spent that much money without testing it first,” von Roenn says.

Consider Kelly’s earlier comment: “As design moved to the testing phase, it became clear that the prismatic glass simply had too many technical problems to overcome and at a budget that was not cost-effective.” But Munz says he could have produced the glass cost-effectively.

“We can use any glass,” he says. “One of the differences in our approach is we don’t need glass that runs thick. We could use ½-inch-thick and that reduces costs.”

Barber can’t help but think what would have happened if the parties involved had used his company as the original fabricator.

“They had their sights set on saving money,” says Barber. “I was told $8 million was the number we had to sharpen our pencil on. So now two years and millions of dollars later, we are left with a total redesign and a stock of 1-inch glass that will never be used. How much did they save? They put their trust in a company that could not make the product.”

“They can’t afford to have any more egg on their face,” Brown adds. “From that standpoint, they can’t afford to do it.”

**What’s Next for Prismatic Glass?**

While it seems prismatic glass won’t be used on 1 WTC, will it be used in similar projects in the future?

Can fabricators overcome the technical problems?

Brown gave a litany of reasons the prismatic glass wouldn’t work due to tempering and machining problems. That being said, he sees one way the prismatic glass could be a workable solution for future projects.

“If a company is using chemical tempering, then laminating, it could work,” he says. “It would be a costly process and a patience-testing process,” and one, he added, that only might possibly work over a cycle of multiple hours.

While Joehlin doesn’t claim to be a

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“To temper a piece like that, I won’t say it can’t be done, but to uniformly heat and cool and keep it flat is almost beyond present technology. Unless a company has a technique I am not aware of ....”

—Stanley Joehlin, glass consultant

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chemical tempering expert, he says chemical tempering doesn't offer the right break patterns that are needed to create a safety break pattern for prismatic glass.

"It's the high central tension that is used to produce the break pattern," he says. "If you had a piece like that shatter in a storm I don't know how it would break."

And if it did work he says there are other difficulties at play. "With that variation in the thickness of the glass, I don't know of anyone in the world that has a chemically tempered tank close to the size that would be needed."

Barber says chemical tempering is not a good option. "This process alters the molecular movement in the surface of glass," he says. "The chemical process can be easily destroyed, and would not lend itself to this type of install. We entertained the idea right from the beginning but once we investigated it further we never pursued it."

Munz remains mum on whether or not he uses chemical tempering in his process. "As I previously advised, we prefer not to publish details of our solution at this time," he says. Others say they would have used a completely different solution.

"We would have laminated prismatic glass using a technique we have called Prismalite," von Roenne says. "This is a name we use to describe our technique for laminating prismatic glass pieces to plate glass. It is typically used for applications that have natural light so that the prisms break up the light into spectral colors."

While representatives of fabrication companies talk about how they "would have done it," Brown says he's glad he didn't have to attempt it.

"I'm sure glad I didn't have to do it," he says. "Someone [plural] overreached in trying to make fully tempered panels of this shape and surface configuration."

But Munz says he is absolutely certain this glass will be installed on other buildings and he is now making large-scale samples. He also is talking to architects in Australia to use the product on a smaller scale.

"Just a few architects are aware of it," Munz says. "Early next year I will have a supply available … There is no question in my mind we could have supplied it to 1 WTC on time."

"Every time it goes up on a building people will say 'that could have been on 1 WTC,'" he says. Jacob adds, "I think the concept was brilliant and it could have been a magical building in terms of Childs' approach and they could have had it."
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Architectural Gem: Glazing Shines in New Opera House

Sing a Song of Glass
For years just the word “opera house” was likely to conjure up images of Sydney’s famous architectural structure, with its sweeping peaks and pearly façade. Now, a newly constructed venue, featuring glass as a significant design detail, may also stake its claim as an architectural opera house gem.

Spanning 70,000 square meters and costing approximately $215 billion USD (1.38 billion RMB), the Guangzhou Opera House in Guangzhou, China, is located at the heart of the city’s cultural development. Designed by Zaha Hadid Architects, the structure’s twin-boulder design was created to enhance the city by opening it to the Pearl River, as well as unifying the adjacent cultural buildings.

The design of the opera house evolved from the concepts of a natural landscape and the interplay between architecture and nature. In particular, it was also influenced by river valleys, and the way in which they are transformed by erosion.

“In Chinese culture, certain analogical thinking makes sense and the idea of pebbles and rocks on the banks of a stream is actually very meaningful for a project located next to the Pearl River,” says Zaha Hadid, the firm's founding partner. “As designers, this is more of a technique for us to articulate the relationship of an object within a landscape; describing how the design is informed by its context. So when designing the building, we were not thinking so much of metaphor, but more in terms of analogy—the landscape analogy—where features of a natural landscape are expressed within the architecture.”

The use of glazing also played a significant part in the design of the opera house. For example, fold lines that include glass help define territories and zones within the structure that allow natural light to penetrate deep into the building.

“Tessellated triangular glass sections emphasize the crystalline nature of the design and open up the public areas of the opera house,” says Hadid.

KGE Engineering in Zhuhai, China, part of China Architectural Engineering, was awarded the contract to undertake the design, engineering, fabrication and installation of the building envelope, including the glass curtainwall, glass wall, stone cladding, and roof waterproofing system. The project spanned a total area of 323,000 square feet. Glass was supplied by China Southern Glass.

According to Zaha Hadid’s team in China, “One of the significant challenges in designing the glazing was the complex geometry of the building envelope, where triangular glazed units were flush-fitted over various angles and around corners. There were also surface configurations to consider whereby laminated glazing [was used] on all inward inclinations.”

The architects also note that “the envelope is one of the largest asymmetrical structures of its kind,” and “a variety of technological solutions, from computer design to fabrication and installation” were used in order to create it.

Zaha Hadid’s work on the Guangzhou Opera House began in 2002 when the firm took part in an architectural competition and was selected to design the project. The schematic design phase began in October 2004 and groundbreaking was in January 2005. The project was completed last year and the first performance in the new opera house was in May 2010.

Speaking of her work in China, Hadid adds, “The dynamism of China’s development is breathtaking; throughout the entire country, you can sense the enthusiasm, ambition, and boundless energy of the upcoming generation. It is a very rewarding experience to see the completed opera house and I am very grateful to the city of Guangzhou.”

She adds, “There are very few places in the world today where architects can find such forward looking, enthusiastic clients with such passion for innovation . . . . The design of the opera house reflects China’s rich cultural history, but also the remarkable future China will play on a worldwide stage.”
doors and windows
Kawneer Expands Hurricane-Impact Resistant Offering

Kawneer Co. Inc., an Alcoa business in Norcross, Ga., reports that new configurations of its 8400TL IsoLock® horizontal sliding window and AA®3350 IsoPort™ single-hung window have been tested successfully for hurricane-impact resistance according to the standards set forth in the Florida Building Code and ASTM impact and cycle protocols and test standards.

The 8400TL IsoLock® horizontal sliding window offers security in a 4-inch-deep frame. Suitable for heavy-duty applications, the window is performance tested for large and small missile impact (Zone 4, Level D) and has been tested to meet a design pressure of 90 psf.

The AA®3350 IsoPort™ single-hung window is available with a 3 ½-inch frame depth and utilizes a polyamide thermal break for strong thermal performance. Also performance tested for large and small missile impact (Zone 3, Level D), it has been tested to meet a design pressure of 50 psf.

shower doors
CRL Shower Features Clarvista Glass by PPG

C.R. Laurence Co. in Los Angeles has unveiled a new shower door display featuring Clarvista™ glass by PPG Industries of Pittsburgh. The manufacturer says the Clarvista glass for shower doors and bath enclosures, with regular maintenance, looks new longer than other shower glass products. The glass is made with a coating that seals the glass surface, enabling it to resist corrosion caused by heat, humidity, soap and household cleaning products. Clarvista glass is available with Starphire ultra-clear or conventional clear glass.

Pilkington’s New Products Shine

Toledo, Ohio-based Pilkington has introduced a new line of gold tinted solar control glass products: Eclipse™ Gold and Eclipse™ Sunset Gold. The new products balance good daylight transmittance with solar and glare control.

Viracon to Decrease Frequency of Least Requested Coatings

Viracon in Owatonna, Minn., is decreasing the frequency of its least requested current coating runs. The most requested coatings, such as the VUE, VE, VRE, and VNE coating lines, will continue to run on a weekly basis. Effective January 1, 2012, the company’s less requested coatings will begin running on a quarterly or annual basis.

“Viracon is known for offering the widest range of choices for architects and that will still clearly be the case,” says Kelly Schuller, senior vice president of sales and marketing. “However, 95 percent of our production is concentrated on a reasonably short list of coatings … While we will continue to support replacements for any Viracon-originated coating over our 40-plus year history, our oldest coatings will only be available at predefined times during the year. This will free up more coating capacity for new product development.”

In addition to changing the frequency of some Viracon coating runs, the company will also discontinue its Guardian replacement glass coatings program, and will make a final run of the coatings in the fourth quarter of 2011 to address any remaining customer needs.

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**metal products**

**Airolite Releases Finishes and Colors Brochure**

In the updated 4-page brochure from Airolite Co. in Schofield, Wis., customers can find details on the standard coatings and finishes available for application to its architectural louvers, grilles, screens and sun controls. Color chips for acrylic enamel, standard fluoropolymer and pearlescent mica fluoropolymer coatings are featured.

New to the brochure are references to the solar reflectivity index values for each color selection. These values help determine the reflectance index for architectural shading devices used to reduce heat islands as defined under LEED Sustainable Sites Credit 7.1—Heat Island Effect—Nonroof.  

**www.airolite.com**

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**interlayer**

**SEFAR® Offers A Vision in Glass**

SEFAR® Architecture in Depew, N.Y., has debuted Vision, a metal-coated precision fabric interlayer that can be laminated within glass to create unique designs in exterior glass facades, windows and interior partition wall systems.

Vision utilizes metal-coated fabrics with various apertures to create depth and a reflective quality without overwhelming glare. On exterior facades, the fabrics deliver brilliant light refraction and add unique dimension, without impeding views from the building interior. The end result is an often iridescent glass façade in a variety of rich color tones.

With a material density of up to 27 threads per centimeter, Vision’s metal coatings deliver significantly more facets for light reflection and interaction with its environment than any other interlayer or metal mesh product. Vision fabrics are printable with UV-stabilized inks to produce Pantone colors, patterns and other design effects. The range of materials can be single- or double-sided to produce the desired effect.

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continued on page 58
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Beta Max Offers a Lift with Leo

Beta Max Inc. in Melbourne, Fla., offers its Leo Series of electric utility portable hoists. The Leo Series, which includes the Leo and the Leo XXL, offers glazing contractors a number of speed settings that make lifting delicate materials easier and safer.

All Leo hoists are equipped with a push button pendant and upper limit switch assembly, enabling secure and easy up and down movement that instantly stops when the upper limit switch is activated. The heavy-duty Leo XXL can accommodate a maximum payload of 2,000 pounds and can travel up to 400 feet. The hoist is available in two models, a standard drum holding 220 feet of cable or an extra long drum that allows for 400 feet of operational lifting height.

YKK’s 35H Adds Options

The Model 35H entrance system from YKK AP America in Austell, Ga., has been enhanced with additional high-performance glazing options. The durable hurricane-impact and blast mitigation entrance system is now able to accept 1-inch laminated insulating glass. The upgraded Model 35H entrance system received Florida Statewide Product Approval. It now provides a redesigned glazing pocket, as well as wet and dry glaze options. When glazed with standard 1-inch insulating glass units with a center-of-glass U-factor of 0.29, the total system achieves a U-factor of 0.78.
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obituaries

**Donald Francis McNabb Dies**

Donald Francis McNabb, 80, of Mulberry, Fla., died August 26 in Palm Terrace in Lakeland, Fla. He was the owner of Penn Allen Glass Co. in Allentown, Pa., and Berks Lehigh Glass in Allentown from 1979 to 1995. He started work at Penn Allen Glass right after graduating from Allentown High School in 1948, and took ownership in 1979. He served as the president and chairman of the board until his retirement in 1995.

Active in the glass industry’s professional associations, McNabb served as chairman of the National Glaziers Apprenticeship Fund from 1979 to 1987, treasurer and vice president of the Flat Glass Marketing Association from 1988 to 1991 and on the board of directors of the National Glass Association from 1991 to 1993. He also served as the first president of the Glass Association of North America from 1994 to 1996.

**Steve O’Neill of Dorma CDC Passes Away**

Steve O’Neill of Dorma-Carolina Door Controls (CDC) passed away in his home on August 19 after a three-year battle with pancreatic cancer. He was 51.

The former salesman for Dorma-CDC, an active member of the Mid-Atlantic Glass Association, was the consummate family man who enjoyed vacationing with his wife Susanne and their five children, according to the association. He especially appreciated time at the beach, boating and fishing, and golf and skiing.

births

Rich Porayko, marketing consultant for Hartung Glass Industries, Agalite, Holcam and Lami Glass Products, and his wife Tricia recently welcomed their newborn son, Levi Hayden. Levi was born August 10, and was 9 pounds 3 ounces.

new hires

Kendall Baker and Mike Castleberry have joined Monett, Miss.-based WinTech’s Engineering Group. Baker comes to WinTech as senior designer, bringing with him 25 years of experience from Monett-based EFCO’s application and design groups.

Castelberry joins the company’s technical services, and comes with more than 15 years’ experience in the window industry, including time at EFCO and Boyd Windows. He has extensive knowledge of the technical side of the business including testing and blast window design.

Amesbury has named Patrick Junker director of sales and marketing, commercial. He brings more than 25 years of fenestration experience to this position, having worked most recently for G-U Hardware—and with Amesbury from 1989 to 1999.

Finland-based Glaston has appointed Mika Laitinen as vice president of global procurement. He has 20 years of experience working in various sourcing positions in international companies. Prior to Glaston, Laitinen worked as chief procurement officer at CPS Color Group Ltd. in Finland.

YKK AP America in Austell, Ga., has hired Kevin Haynes as brand manager for its ProTek hurricane impact and blast mitigation fenestration products. Haynes has more than 25 years of industry experience, most recently as the national architectural products sales manager for Vitro Architectural Products.

promotions

After 20 years with Trainor Glass Co., Brian Clark has been named as the company’s new president. Clark succeeds Tom Trainor, who remains with the company as chief financial officer.

SAFTI FIRST in San Francisco named Tim Nass vice president of national sales. Nass joined the company in 2009 as the national sales manager, bringing more than 15 years of experience in the architectural glazing industry.

John Crowe has been appointed as president and chief executive officer of both Saint-Gobain Corp. in Valley Forge, Pa., Saint-Gobain’s North American holding company, and CertainTeed Corp., also in Valley Forge. Crowe will oversee North American businesses and chair the executive committee. He has more than 30 years of experience in the company’s innovative materials businesses, most recently as president of the global abrasives business.
Eric Dean is a tradesman—one who traded a flannel shirt for a suit when he was appointed general secretary of the International Association of Bridge, Structural, Ornamental and Reinforcing Ironworkers by General President Walter Wise earlier this year.

“I am a fourth-generation ironworker,” says Dean, who adds, “I just don’t forget that I am a working man who happened to assume a leadership position with the Ironworkers.”

Dean says while his roots may be in Ornamental, Architectural and Miscellaneous Metals, the opportunity to work with all facets of the Ironworkers is a great one. He took the time to talk with USGlass about his new role.

USG: You were recently appointed general secretary; what does this position entail?

ED: Constitutionally I am the officer just below the general president. And I attend to all contract matters; all communication to and from the International goes through my office to the members and the local unions and then any communication we receive from employers, members, requests for information ... my office is responsible for that. My office also oversees collective bargaining, bylaw changes, elections, etc. And I still handle the Architectural Ornamental affairs for the International. That’s the capacity I came with so I am currently doing double duty.

USG: What will be your greatest personal challenges in this new role?

ED: Our general president set a goal to double our market share—twice as many members and twice as many contractors we work with—within a ten-year span. [We] will do that through aggressive training and top-down and bottom-up organizing.

USG: What formal training is available for ironworkers?

ED: ... Since 1999 a third or a quarter of our training is geared toward the architectural metals/glass and glazing industry. We’ve developed a full spectrum of textbooks and hands-on training units that we’ve implemented in more than 100 of our training sites.

USG: What is the average number of ironworkers working now compared to before the recession? How are you helping your out-of-work members?

ED: The average number varies area to area based on specific work, but I can say in my own local we’re probably working a little less than 55 percent of the 2008 hours. So while we have many members unemployed, we also have many members working short weeks and we call those under-employed. We’re helping them out with everything from food banks to extending health insurance coverage [as] a lot of people ... are at the tail end of their insurance coverage or unemployment. Each local union in each region deals with it slightly differently and then as a parent organization we’re looking at any way we can provide assistance.

USG: There has always been concern that unions provide workers to companies that are fly-by-night and that the “quality” companies are then forced to make up for it. How would you respond to that?

ED: ... There are some contractors that lack the experience, depth and professionalism of others, but the union can’t be the measuring stick as to whether a person is a sound businessperson. We try and offer a level playing field from the standardized skill levels of our workers. We believe we have a pool of skilled workers that contractors can draw from. We’re willing to work with anyone who is the successful bidder on a contract and offer our pool of skilled workers; oftentimes we cannot control management decisions. But the contractors [with which we work] have to have some kind of track record ... they are a licensed, bonded contractor that has some kind of workers compensation, a business track record or bonding capacity.

USG: There seem to be a fair number of jurisdictional squabbles between the glaziers unions and ironworkers unions; how do you respond to those who say this is a very unhealthy situation?

ED: It’s unhealthy if we bring those disputes to the jobsite. Often we have a mechanism where we keep our disputes away from the contractor and off the site. And there is a jurisdictional board that hears both sides and often makes a decision, but there have been few [disputes] lately.

USG: Is there anything you’d like our readers and the industry to know?

ED: I am proud of the Ironworkers’ accomplishments within the industry. I am proud of our training curriculum from a theory side and a practical side and our engagement of the contractors’ ability to mobilize and work throughout the United States and Canada—whenever they call we’re at a beck and call to the employer and we continue to raise the bar [on] training.
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I certify that the above statements made by me are correct and complete.

Debra Levy, Publisher

Win-Door Set for Nov. 15-17 in Toronto

Interested in learning about the latest door and window products? Fenestration Canada (formerly the Canadian Window and Door Manufacturers Association) is hosting Win-Door North America, November 15-17 in Toronto. Products from more than 150 exhibitors will be on display at the Metro Toronto Convention Center, including machinery, hardware, systems, sealants, testing and technology and a new product showcase.

In addition to show floor demos and product introductions, attendees can listen in on a number of educational seminars. On Wednesday, November 16, attendees can take part in “Ask the Inspectors: Forum on Code Changes.” As new building codes roll out across the country, manufacturers, dealers and installers will be required to meet a host of new requirements in areas such as labeling of products for air, water, structural and U-values. Each region in Canada has its own requirements, as specified in the Canadian Supplement of the North American Fenestration Standards, making understanding these regulations crucially important. Jeff Baker, technical consultant for Fenestration Canada, will lead the presentation and discuss these important issues with a panel of building inspectors drawn from locations across a range of Canadian provinces. On Thursday, November 17, Baker will present new code changes with a focus on exterior doors.

Also on November 16, Bill Lingnell, technical consultant to the Insulating Glass Manufacturers Alliance (IGMA) and an expert in glass and architectural products, will join IGMA’s executive director, Margaret Webb, for an hour of candid, straight talk about insulating glass. What are the best spacer bars? What is the most effective cavity width? Coatings: hard coat or soft coat and on which surface? Fade resistance: Can you really believe manufacturers’ advertising? Gas-fill options and the best ways to prevent gas loss. Sound reduction: How do laminated glass and triple glazing help? All of these questions and more will be answered in this seminar. An “Ask the Expert” question and answer period will also take place.

Be sure to stop by and visit USGlass sister publication DWM Magazine in booth 1216.
**Up & Coming**

**NORTH AMERICAN EVENTS**

**2011**

**October 17-20, 2011**
GANA Fall Conference

**November 15-17, 2011**
Win-Door North America

**December 7-8, 2011**
Performance of Insulating Glass Units Seminar
Sponsored by the Insulating Glass Manufacturers Alliance (IGMA). TBA. Vancouver, B.C. Contact: IGMA at 613/233-1510.

**2012**

**January 31-February 4, 2012**
IGMA’s 2012 Annual Conference
Sponsored by IGMA. Tempe Mission Hills. Tempe, Ariz. Contact: IGMA at 613/233-1510.

**February 20-24, 2012**
GANA Annual Conference

**February 26-29, 2012**
AAMA 75th Annual Conference

**April 2-4, 2012**
BEST Conference 3

**April 12-13, 2012**
Glass TEXpo™ 2012

**June 10-13, 2012**
AAMA National Summer Conference
Sponsored by AAMA. Marriott Oak Brook Hills. Chicago. Contact: AAMA at 847/303-5664.

**September 11-14, 2012**
CONSTRUCT 2012
Sponsored by the Construction Specifications Institute. TBA. Phoenix. Contact: Show organizers at 972/536-6429.

**INTERNATIONAL EVENTS**

**2011**

**November 23-25, 2011**
Glasstech Asia 2011

**2012**

**October 23-26, 2012**
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To see the full event schedule, visit, www.usglassmag.com/events.
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2:00 p.m. - 3:00 p.m.
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3:00 p.m. - 8:00 p.m.
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Friday, April 13, 2012
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Registration Open
9:00 a.m. - 10:30 a.m.
TGA Awards Breakfast
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Seminars & Workshops
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* Schedule tentative and subject to change.

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Maybe This is The Problem

by Lyle R. Hill

I own a small home in the western suburbs of Chicago that I rent out to a very lovely couple that I have known for some time. It’s a comfortable, cozy place in a quiet little neighborhood and while I drive by it every so often just to make sure it’s still there, I haven’t been inside the place in years. The tenants maintain it as if it was theirs and I have no reason to persuade them to look at it differently. I have the property insured by the same company that insures my home and one of my cars. All my policies have been purchased through the same local agency for almost 30 years. I have never had a claim … neither home nor auto … during this period. I would think that I am an insurance agent’s dream. I met my agent once, many years ago, but all my dealings since have been with others who work for him.

Two weeks ago I received my policy renewal notice for the rental property. The premium amount looked high to me so I pulled out the renewal notice from last year to see how much it had changed. Then I pulled out the notices from the preceding four years to see what the trend had been. Not surprisingly, the premium had gone up every year and the average increase over the 5-year period was not quite 5 percent.

The housing market in greater Chicagoland has been a disaster for the past couple of years. With only a few exceptions, home values have declined in most communities in and around the city. The home values in the area where my little rental property sits have declined too, although not as badly as in other places. So I called my agent’s office and complained. The polite women on the other end of the line listened to my grousing and promised to see if something could be done on my behalf. As soon as I hung up from her, I started to shop around a bit to see if it was time for a change.

By the time I realized that the rates for my insurance coverage were competitive. Yes, I could have gotten a little better pricing, but I am with a highly respected firm and the savings would have been insignificant in the scheme of things. So, when the agency called back and offered a modest discount, I thanked them and quickly mailed in my payment.

It is my impression that the insurance industry is well managed, understands the marketplace and has historically been profitable in spite of economic ups and downs and occasional natural disasters that no doubt cost them a great deal of money. If necessary, they will drop certain lines of business or raise prices as needed to assure their financial viability. They seem to know what they are doing and react in professional, logical ways and, while I might not always like their prices, I respect them as an industry.

While looking for some old documents recently, I stumbled across some price schedules for various glass products that dated as far back as 1970 … that’s right, 41 years ago! Portions of these schedules are shown above. The chart on the top is from 1970 and the bottom one is from 1984. So if we were buying a 32” x 78” (a common commercial doorlite size) piece of ¼” clear tempered in 1970 it would have cost us $27.38. Fourteen years later in 1984 it would have been $27.73 (a whopping 35 cents more). This represents a 1.2-percent price increase over a 14-year period of time. But here is the scary part: there are places in the country today where you can buy it for what it was going for in 1984 and, if you buy more than a few at a time, you can get it at the 1970 price. And this is just one of many similar examples.

For sure, there have been technological developments, foreign competition and manufacturing efficiency gains during the past 40 years. But there have also been labor, fuel, insurance, tax and energy cost increases. And it just does not seem possible or realistic that after 40 years prices would not have risen by some reasonable and justifiable amount. I personally think this is an industry-wide problem and not just for the tempered glass suppliers either. Perhaps, as has been suggested before, the glass industry’s biggest problem is … the glass industry itself!

Are these price charts from 1970 and 1984, respectively … or from 2011?

The chart on the top is from 1970 and the bottom one is from 1984.

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the author

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