

**INSIDE:** Preview of GANA's Building Envelope Conference

# USGlass<sup>®</sup> METAL & GLAZING

THE MAGAZINE OF RECORD FOR ARCHITECTURAL GLASS INDUSTRY LEADERS

VOLUME 45, ISSUE 2 FEBRUARY 2010



## Room to Improve?

### Industry Eyes Retrofit Opportunities

Free  
Subscription Form  
on Page 62

Also Inside:

- A Journey From Glass Fabricator to Envelope Supplier
- Countdown to BEC
- Previewing Glass Expo Midwest™ '10



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[february 2010]

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## features



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Photo courtesy of Vos Glass Inc.





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- Back in Beijing**

*The Chinese Ceramic Society's China Glass 2010 is set to take place at the new China International Exhibition Center in Beijing, June 4-7.*

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### Online Survey

Speak out and tell us what you think with our online reader poll. Read the articles inside the issue and then cast your votes on-line. This month's question:

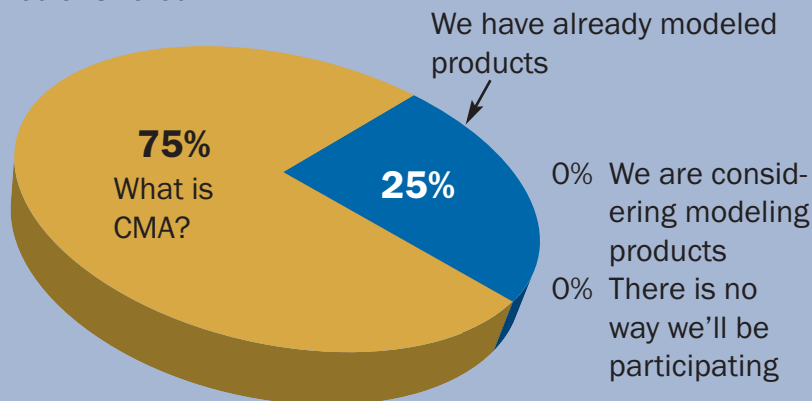
**The retrofit market is one area where glazing installers are looking for increases in projects (turn to page 20 for more). What's the best way for installers to promote to building owners the benefits of retrofitting their property?**

- ☐ Promote energy efficient upgrades' long-term cost savings
- ☐ Promote safety issues caused by products not up to current codes
- ☐ Promote cost savings caused by energy-efficient upgrades
- ☐ Promote market value of "green" properties

### January Survey Results

**We asked: Will your company be modeling its products for the National Fenestration Rating Council's CMA libraries?**

You answered:



## WeBlogs

Read weekly updates via [www.USGNN.com](http://www.USGNN.com).



Monday - Let's Be Clear

**Megan Headley**  
Editor,  
USGlass Magazine



Tuesday - USGlass & Paul

**Paul Bieber**  
Online editor,  
[www.usgnn.com](http://www.usgnn.com)



Wednesday - Field Notes

**Chuck Knickerbocker**  
Curtainwall Manager,  
Technical Glass Products



Wednesday - The Entrepreneur's Corner

**Pete Chojnacki**  
President, FabTech LLC



Thursday - From the Fabricator

**Max Perilstein**  
Vice president of  
marketing, Arch  
Aluminum & Glass



Friday - Arlene on Energy

**Arlene Z. Stewart**  
President, AZS  
Consulting Inc.



Friday - Legal Ease

**Rick Kalson**  
Attorney, Babst, Calland,  
Clements and Zomnir



On Occasion - deBLOG

**Debra Levy**  
Publisher,  
USGlass Magazine

Visit our online discussion boards at [www.usglassmag.com/phpBB2](http://www.usglassmag.com/phpBB2) to ask questions and share experiences about business and life in the glass industry.

## PEOPLE ARE TALKING

“Oldcastle Glass® partnered with our design team to engineer a 420,000 square foot building envelope for Canada’s RBC Centre.”

— Joshua Chaiken, AIA, Senior Associate Principal, Kohn Pedersen Fox Associates



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# Issue@Hand



## Snow Job

If you live on the East Coast between Philadelphia and Caroline County, Va., you can stop reading here, because you lived it. In those areas and our own D.C. suburb of Stafford, Va., we received all-time record-breaking, massive amounts of snow just one week ago. At right, you can see a picture of my backyard. What is most notable about it is that the fence in the photo is six feet high. That should give you an idea of the amount of white stuff with which we were left to deal.



**This was the view of my backyard. Though it looks about 18 inches high, the fence in the distance on the right is actually six feet tall.**

Now to those of you who deal with this type of snow-fall all the time and are chuckling,

I have just one thing to say: of course you are chuckling, you deal with this all the time. You have things like high-powered plows and Caterpillars. We have to call out the National Guard. Your schools maybe open an hour or two late. Ours closed Friday, February 5, and 11 days later they were still closed due to the snow. Our offices were closed for four days because you couldn't get here from anywhere.

I learned a bunch of things from the snow. I learned that, even though it is beautiful and is generally good for the glass business, there really can be an event that brings too much of a good thing. I learned that the ancient Greeks were right and their dictum "nothing in excess" holds true today.

But the most important thing I learned from the snow was something I already knew. I'm writing this on Sunday, February 14, Valentine's Day, and beginning at 9 a.m. this morning a team of the absolute best people in the world you could work with descended on our offices to put this issue to bed. Because of their efforts, you should get it toward the end of the month as you normally do. What the snow taught me, reminded me really, was how in the end it all comes down to people. People make or break a company. And I feel fortunate I get to work with some of the most professional, dedicated people around. There's more to this story, but that will have to wait until next month.

*Two other quick notes:* On page 15 you'll see news that USGlass magazine has been named a finalist in the prestigious Jesse Neal Awards—the Pulitzer Prize of business-to-business journalism. We are honored to be one of only three finalists in the "best feature article category." Congratulations to editor Megan Headley and author Tara Taffera.

I also hope to see you at Glass Expo Midwest '10 in Chicago next month. It should be a great event and even includes a tour of the famed "Ledge" in Chicago. For more details see page 38.

—Deb

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## GANAPerspectives

# GANA Recognizes Its Leaders

## Volunteers Provide Invaluable Resources

by Bill Yanek

**A**ssociations are only as strong as the volunteer leadership that supports its causes. At the Glass Association of North America (GANA), we have more than 60 committees, subcommittees and task groups that work to provide quality, industry-specific technical and educational tools for the glass and glazing industry. Within these groups are more than 500 active volunteers providing their time and expertise to enhance the knowledge GANA provides to the construction industry.

During 2009 the association published updates to the *GANA Laminated Glazing Reference Manual* and the *GANA Fabrication, Erection and Glazing Hours Manual*. GANA also revised and published ten technical informational bulletins, participated in ongoing discussions with the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), formed a strong Energy committee and created the structure for code advocacy under the GANA umbrella.

I ask that everyone join me in expressing your appreciation to GANA's volunteer leaders at the next opportunity you have. Our industry significantly benefits from their dedication and hard work.

GANA's Volunteer Leaders:

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- Jeff Nixon, Glass Coatings and Concepts LLC - Product Color and Durability subcommittee chair
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- Greg Saroka, Goldray Industries - Technical committee chair
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- Geoff Weinstock, Schilling Graphics Inc. - Printing on Glass task group chair

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- Mandy Marxen, Gardner Glass Co. - Mirrors: Handle with Extreme Care task group chair, Website committee chair

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- Kevin Olah, Guardian Industries Corp. - Vehicular subcommittee chair
- Doug Penn, United Glass Corp. - Fully Tempered Heavy Glass Door Manual task group chair
- Mike Rupert, PPG Industries Inc. - Construction subcommittee chair
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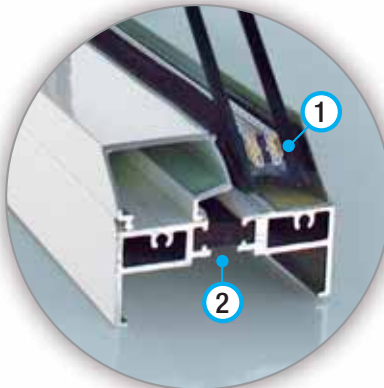
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- Stanley Yee, The Façade Group - Energy committee chair ■

## the author



**Bill Yanek** is GANA's executive vice president. Mr Yanek's opinions are solely his own and not necessarily those of this magazine.

## NewsNow

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# Arch Aluminum & Glass Emerges from Bankruptcy Protection

**A**rch Aluminum & Glass Co Inc. in Tamarac, Fla., announced that it has emerged from Chapter 11 bankruptcy protection following the asset purchase by Arch Glass Acquisition Corp., an affiliate of the investment firm Sun Capital. Arch filed a voluntary petition for Chapter 11 reorganization in November 2009 (see December 2009 *USGlass*, page 16).

"We are excited to be exiting from the bankruptcy process and we look forward to the next chapter in the history of Arch," says Leon Silverstein, Arch's president and chief executive officer. "We are extremely grateful to our customers who stood by us and our vendors who supported us throughout the process. There's no question this is a challenging economic environment, but Arch is now stronger to be

able to provide the best products, quality and service to the glass and glazing industry. We feel it is important that we treat our customers as one of our most important assets. We know in today's climate our own customers might need that same help and understanding that we received. Loyalty and relationship still exist in business today and we are an example of that."

The agreement cited a price tag for the purchased assets of just under \$59 million. Earlier court documents had indicated that the asset sale was expected to "generate nearly \$62.0 million of value."

Signing the contract as purchaser was Aaron P. Wolfe, listed as vice president of Arch Aluminum & Glass Enterprises Inc., a Delaware Corp. Wolfe is listed as a principal of Sun Capital Partners on that firm's website.

Wolfe commented on the sale, "Arch has been known as an industry leader providing high quality service and a comprehensive product offering of fabricated glass for the architectural industry and aluminum for the architectural industry. The Silverstein family has done a terrific job growing the business over the years, and we believe that our experience in similar building and construction product sectors will further enhance the position of Arch."

"We are delighted with our agreement to be acquired by an affiliate of Sun Capital," says Silverstein. "We have known the firm for many years, and their financial and operating expertise, spanning more than 100 portfolio companies over the past 15 years, will bring added value to our organization as we begin a new chapter in our history."

It's difficult to overlook one obvious connection between the two firms. Also listed on Sun Capital's website is Mark Kuchenrither, vice president of operations. Kuchenrither served as chief financial officer of Arch Aluminum & Glass from September 2003 through June 2007, before joining Sun Capital.

## International Aluminum Receives Court Approval of First Day Motions

International Aluminum Corp. (IAC), parent company of U.S. Aluminum, received approval of all of its requested motions at its "first day" hearing on January 6, 2010, regarding its Chapter 11 filing (see January 2010 *USGlass*, page 16). Court documents show that the company received approval to, among other things, pay pre-petition insurance obligations, employee wages, salaries, health benefits

## Zeledyne to Exit Commercial Glass Production

**T**ulsa, Okla.-based Zeledyne announced on January 27 that it would exit the commercial glass business this spring. The company will stop shipping its architectural glass products by the end of June.

"The continuing difficulties in the economy have led to a significant decrease in our commercial glass business and we have decided to exit this business," commented Robert Price, Zeledyne chairperson, in a statement.

Company spokesperson Della DiPietro said the move is effective March 28.

"The construction industry has taken a big hit and we had a significant loss of revenue last year, and we, as many in the market, expect that the severely depressed construction industry will continue to suffer in the future," DiPietro told *USGlass*.

The company's automotive business will not be affected by the closing of the commercial line. "That plant has fabrication operations for automotive glass and those will continue," DiPietro said. "The plant's not shutting down."

Zeledyne purchased the Ford Motor Co. Automotive Components Holdings (ACH) glass business, including its Versalux brand architectural glass product, in April 2008.

*continued on page 12*



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## NewsNow

continued

and other employee obligations during its restructuring under Chapter 11. The company also was provided authority to continue to honor its current customer programs, including warranties. The company will continue to have access to its cash and is authorized to pay ordinary course post-petition expenses without seeking court approval.

According to court documents, the Restructuring Support Agreement provides for the debtors' financial restructuring to be effected through its reorganization plan. The required supporting holders, which together hold more than 72 percent in principal amount, and more than 50 percent in number of claims in respect of the outstanding debt under the pre-petition agreements have, along with the administrative agent, agreed to support the plan. At press time, the debtors were soliciting acceptances of the reorganiza-

tion plan from holders of credit agreement claims, which will allow the plan to be approved by the bankruptcy court.

The plan says that allowed general unsecured claims "will be satisfied in full through a distribution on account of the allowed general unsecured claims and a gift from the senior lenders on or after the effective date in the ordinary course of business. The debtors expect to be able to continue to pay all trade creditors who continue to provide normal trade credit terms in the ordinary course of business, subject to any required bankruptcy court approval."

Employees also are expected to be unaffected; in fact, the plan calls for an incentive program designed to motivate senior management "to continue efforts to foster and promote the long-term growth and performance of Reorganized IAC. Pursuant to the Management Incen-

tive Plan, key members of senior management will be entitled to receive one time retention or transaction payments, which, in the aggregate, will range between \$250,000 and \$650,000 depending on certain milestones being achieved."

Regarding its subsidiaries, the plan notes that the reorganized debtors may, among other things "cause any or all of the Debtors to be merged into one or more of the Reorganized Debtors or any of their affiliates, dissolved or otherwise consolidated, cause the transfer of assets between or among the Reorganized Debtors or any of their affiliates, or engage in any other transaction in furtherance of the Plan ..."

Further details will be available upon approval of the reorganization plan this month. Check [www.usgmn.com](http://www.usgmn.com) for the latest updates.

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## CompanyNews

# CRL Expands in U.S. and Overseas with Acquisition, New Facility

**L**os Angeles-based C.R. Laurence Co. Inc. has acquired Tajima Corp. USA. Tajima, also in Los Angeles, has been supplying design, engineering and manufacturing services to the architectural metals industry in the United States for more than 20 years.

"We are proud of the fact that all the employees of Tajima will be joining CRL as Tajima's operations are consolidated with our existing Los Angeles architectural metals and manufacturing operations," says Lloyd Talbert, president of CRL. "Yuval (AI) Eini, the president of Tajima will be joining CRL as director of sales and engineering in our



**CRL's new facility in Germany will allow the company to stock more inventory overseas.**

architectural metals group. AI will join Armando Rodriguez, the CRL brand

manager of architectural metals, in continuing the process of developing the market for these products. In addition to the current CRL and Tajima product offerings, there are many additional products and services planned for launch later this year."

In addition to the acquisition of Tajima, CRL has completed an agreement with Pacific Door Closer Inc. to become the exclusive manufacturer and distributor of balanced doors developed by Wikk Industries (which Pacific Door Closer purchased in 2008). CRL will begin production and distribution of this line in the spring of 2010.

In addition to these acquisitions, the company also is expanding overseas with the opening of a new 36,000-square-foot facility in Ilsfeld, Germany. Formerly located in Bad Wimpfen, the new location brings the products and services closer to Stuttgart.

"This is an important segment of our European strategy," says Donald E. Friese, chairperson and chief executive officer. "We want to offer our European customers the same wide range of products we currently provide North America and Australia. We also plan to present our 'rapid customization' process to the

## Tri City Glass & Door Announces Recent Acquisition

**T**ri City Glass & Door in Appleton, Wis., announced that it purchased Oldcastle Glass Green Bay on December 28, 2009. According to the announcement, the acquisition increases Tri City's sales by 50 percent and brought its employee base to almost 100 people. The company says it will continue to offer the same level of quality and service that customers have grown accustomed to from both companies.

Chuck Bender, president of Tri City Glass & Door, says that the decision to purchase the operations was a good investment for his business.

"We had been looking for a new venture and saw this as a viable option," Bender says. "The capabilities of the two companies were very much in line, as we both focus on aluminum and glass fabrication and distribution for the commercial, retail and residential markets ..."

Bender explains that Tri City Glass & Door is focused on servicing the state of Wisconsin, and at this time there are no plans to expand that reach.

"I think we can now do an even better job of serving our same markets and areas," Bender says.

In explaining his business strategy Bender says his company simply does "the opposite of what others do and that has worked well for us."

He adds, "The economic downturn will not last forever and we all need to continue to invest in the future and not focus on the past."

► [www.tricityglass.com](http://www.tricityglass.com)



European market, providing customers with products built to their specifications, with lead times similar to 'off-the-shelf' products. As we move forward, we plan to focus a great deal on Europe as an opportunity for growth."

The new facility will enable CRL to stock a much larger inventory of products for European customers, and also will feature new shipping equipment and computer systems.

► [www.crlaurence.com](http://www.crlaurence.com)

## Atrium Companies File for Voluntary Chapter 11

Dallas-based Atrium Cos. Inc., parent company of Atrium Windows and Doors and Champion Window Inc., and others, filed for Chapter 11 on January 20 in the U.S. Bankruptcy Court for the District of Delaware. Likewise, its Canadian subsidiary initiated reorganization proceedings under the Companies' Creditors Arrangement Act (CCAA) in the Ontario Superior Court of Justice in Toronto.

Though Atrium and its subsidiaries have filed for bankruptcy, company officials announced at the time that the filing is part of an agreement they reached with more than two-thirds of their senior secured lenders to reduce its outstanding debt by more than \$350 million, or more than 50 percent of its existing debt, through a "pre-negotiated" restructuring of its balance sheet.

The company lists between 5,001 and 10,000 creditors; estimated assets between \$100,000,001 and \$5 million; and estimated liabilities between \$500,000,001 and \$1 billion in its official Chapter 11 filing. A number of the company's creditors holding the 50 largest unsecured claims are suppliers within the glass and glazing industry.

## USGlass Magazine Named Finalist in Prestigious Neal Awards

USGlass magazine's article "Millions Spent, Nothing Gained," written by contributing editor Tara Taffera (see April 2009 USGlass, page 30), has been named a finalist in the prestigious American Business Media's (ABM) 56<sup>th</sup> Annual Jesse H. Neal National Business Journalism Awards.

Taffera's article was one of 700 entries submitted for the awards, and was one of just three to rank in the finals for the Best Single Article category for publications that have less than \$3 million in gross advertising/circulation revenue.

"We are thrilled beyond words to be a finalist in the Neal competition—long known as the 'Pulitzer Prize' of business-to-business journalism," says Debra Levy, president of Key Communications Inc., which publishes USGlass. "Tara did an incredible job of investigative journalism to shine a light on a very sensitive subject. The report resulted in stories in the *Wall Street Journal*, *New York Times* and ABC News, among others. It also led to a call by one U.S. Senator for a congressional investigation and was cited in the case being argued about glass tariffs. We have always believed in the importance of fair, accurate and unbiased journalism and it's nice to see these efforts recognized."

"While this recognition from our peers in the publishing industry is very gratifying indeed, it is made even more so by the flood of feedback we received from our readers on the value of this article," adds Megan Headley, editor of USGlass.

"It is an honor for our magazine to be recognized in this way," says Taffera. "Our staff does a great job every day to bring stories of importance to our readers. That often means digging deep into stories others don't want to tell and our readers compliment all of our editors for those efforts."

Award finalists will be honored during the Neal Awards luncheon in New York City next month.



Some of those listed include: Cardinal Glass (\$814,810); Mikron (\$492,612); Amesbury Group (\$237,119); PPG (\$235,347); Royal Window and Door Profiles (\$224,675); Truth Hardware (\$139,441); and H.B. Fuller (\$82,723).

According to the company statement, Atrium intends to complete the restructuring process in approximately three to four months. Atrium and each of its subsidiaries intend to operate as usual during the debt restructuring process, and existing management will remain in place. The company does not anticipate any layoffs or facility closings as a result of the debt restructuring, and plans to continue to pay all employee

wages and benefits in the normal and ordinary course. Suppliers will be paid under normal terms for goods and services provided after the filing date of January 20.

"The balance sheet restructuring will substantially reduce our outstanding debt and put Atrium in a much stronger financial position to grow our business over the long term," says Gregory T. Faherty, president and chief executive officer. "We have already done the hard work of lowering our cost structure and reducing excess capacity in light of the difficult environment under which we have been operating for more than three years."

► [www.atrium.com](http://www.atrium.com)

# HardwareFocus

## product news

### Marks USA Offers New Auto-Reverse Mortise Lock

MARKS USA in Amityville, N.Y., has introduced a new auto-reverse feature on its patent-pending 5 series mortise lock, enabling the installer to reverse the handing of the

lockset without removing the cover. It can go from left hand to right hand and not compromise the position of the internal lock parts in five simple steps.

The grade 1 mortise locks are BHMA-certified and meet ANSI specifications. The mortise locks are through-bolted for proper alignment and ease of installation, have self-adjusting spindles and independent lever support springs. The

locks are available with an ever-increasing variety of hardware.

▶▶ [www.marksusa.com](http://www.marksusa.com)

### Sargent Displays New Expressions of Elegance

Seven elegant new lever designs from New Haven, Conn.-based SARGENT provide an expanded selection combining beauty and code compliance. These decorative levers offer more options for facilities requiring levers that return to within 1/2-inch of the door.

The full collection includes 30 distinctive designs and 13 finishes. The new options allow for a complete architectural hardware design continuum for every application, including mortise and tubular locks, electromechanical and access control locks, exit devices and master key systems.

▶▶ [www.studiocollection.com](http://www.studiocollection.com)

## company news

### Security Lock Distributors Tests Customer Knowledge

Security Lock Distributors (SLD) in Westwood, Mass., has launched a "Did you know...?" campaign to increase awareness of the full range of door hardware solutions it offers. The campaign emphasizes the fact that SLD has more than 2.1 million SKU's in stock and is the country's largest stocking distributor for mechanical and electromechanical door hardware. The company provides Internet commerce tools, 24/7 online quoting, ordering and tracking, live chat service, a customer support staff with more than 300 combined years of hardware service and the largest online library of technical documents.

▶▶ [www.seclock.com](http://www.seclock.com)

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# SolarWatch

## company news

# Cardinal Solar Technologies Awarded \$7.7 Million Tax Credit

**C**ardinal Solar Technologies (ST) in Spring Green, Wis., a fully owned subsidiary of Cardinal Glass Industries, has been awarded a \$7.7 million tax credit under President Obama's stimulus plan in order to re-tool its Northfield, Minn., facility. The credit is available upon the facility's progression from residential door and window coating operations to production of thin film coatings for use in the manufacturing of solar modules.

Andy Jensen, vice president/general manager of Cardinal ST, explains that the process of earning the tax credit began when the company completed and submitted a formal 48C tax credit application in October 2009. The tax credit is part of the American Recov-

ery and Reinvestment Act, which is focused on building a robust domestic manufacturing capacity to supply clean and renewable energy projects with American-made parts and equipment.

Cardinal's research and development team spent the past three years developing thin film coatings to be used by solar module manufacturers. These thin film coatings (transparent conductive oxide, anti-reflective and low maintenance photocatalytic) will be tailored to specific customer module requirements to optimize their energy production.

"Once our thin film development work is completed, it will take us approximately six months to re-tool our Northfield coating operation," Jensen says.

He adds that Cardinal's large area thin film coating process enables the company's solar thin films to be engineered to match customer requirements while maintaining a low cost.

At this time, Jensen says the company "will be maintaining the current staffing levels, but with the expected growth in the solar industry over the next couple years we are optimistic that the Northfield operation will benefit from that growth."

He says they do not have any plans at this time to open additional solar facilities, but it is something that could be considered in the future.

"As one of the world's leading technology companies in glass and thin film coatings we are ready to react to the opportunities that the solar industry will bring to the United States over the next several years," Jensen says. "We believe that the stimulus plan will be one significant step to encourage renewable energy projects in the United States and will drive demand for our solar customer's products."

► [www.cardinalst.com](http://www.cardinalst.com)

## research news

### New Energy Achieves Transparency in Electricity-Generating Windows

New Energy Technologies Inc. in Burtonsville, Md., currently developing SolarWindow™ technologies capable of generating electricity on glass windows, announced on January 4 that researchers have overcome a significant scientific hurdle in creating clear solar glass. By replacing a visibility-blocking solid metal component with environmentally friendly, non-metallic, transparent compounds it has created a first-of-its kind see-through glass.

"Metal materials block visibility, and are arguably the most important hindrance to developing a commercially viable solar glass window product," says Meetesh V. Patel, president and chief executive officer. "We have successfully replaced the metal contact component ... with non-metallic compounds and, in so doing, achieved significantly greater transparency, a key factor in advancing our technology along the commercial product development path."

To-date, one of the biggest obstacles faced by researchers developing the technology has been the presence of metal, an opaque material that blocks all visibility and prevents light from passing through glass. Eliminating metal has proved especially challenging since the metal component acts as the negative 'polar contact,' an important function in collecting the electricity generated from solar cells on the surface of the glass. The new compounds now function as the negative polar contact and collect electricity from the window.

► [www.newenergytechnologiesinc.com](http://www.newenergytechnologiesinc.com)

## product news

### SynergX Systems Inspect Photovoltaic Glass

SynergX Technologies Inc. in Laval, Quebec, is offering glass scan systems to provide solar glass and panel manufacturers with yield management and a quality control solution for the inspection of both continuous and cut sheets of clear and patterned glass. High-resolution cameras provide accurate detection, sizing and classification of defects, including open and closed bubbles, black and white stones, scratches and edge defects.

► [www.synergx.ca](http://www.synergx.ca)





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# Room for Improvement

**While New Construction Stalls,  
Suppliers Take a New Look at Retrofits**

by Megan Headley

When this former office building became empty, a rehab—including window replacement—turned the old space into a new hotel.

Photo courtesy of Builders Architectural.





Photo courtesy of SAFTI FIRST.

**During a renovation intended to improve the aesthetics of North Layton Junior High in Layton, Utah, the school ended up improving the safety features by installing fire-rated glazing.**

**A**s new commercial construction churns through its forecasted slump in 2010, the commercial glass industry is taking a closer look at ways to capitalize on opportunities in the retrofit market.

"It is a trend that is just getting started," comments Rick De La Guardia, president of DLG Engineering Inc. in Miami. "I have worked on, and have seen, numerous condominiums and commercial buildings do a complete retrofit of their outdated windows and doors to more energy-efficient and safer products."

Robin Randall, vice president of marketing for TRACO in Cranberry Township, Pa., is watching that trend take off as well. "We have seen an increase in retrofit projects, in large part due to the decline in new construction."

Still, others say this growing trend might not be growing fast enough to re-

ally help buoy installers searching for work.

"The retrofit market right now is in the dumps with financing on the private sector side," says Tom Johnson, executive vice president of the glazing contractor Burgess-Snyder Industries in Virginia Beach, Va. "On the state level I think cities are in somewhat of a squeeze and we have not seen much retrofit work hit the streets. Most of the work we've seen has been new construction."

He adds, "I've worked with architects on some condominium projects that are desperately in need of door and window work as part of their overall renovation, but they're strapped to get loans as well. There are a limited number of projects I think that are going to be available to us this year. I'm not too optimistic that this year is going to be as good as last year."

"The downturn has affected nearly every aspect of the market. Renovation projects would have to significantly increase in order to offset the losses in other commercial segments," adds Jeff Griffiths, director of business development at SAFTI FIRST Fire Rated Glazing Solutions. However, he acknowledges, "An increased emphasis on energy performance improvements, the need to align older buildings with today's technological needs and the ability to tap into equity for funding are all important factors that could cushion the blow to the renovation market segment."

While retrofit revenues for Minneapolis-based Apogee Enterprises historically have been about 25 percent, Russ Huffer, chairperson and chief executive officer, has said this may change

*continued on page 22*

# Room for Improvement

continued from page 21

This building was revived with replacement windows, new steel structures and balconies.

Photos courtesy of Builders Architectural

with the right incentives.

"If the government were to put retrofit incentives in place it could grow," he says. "There is no question that retrofit can significantly change the energy performance of older buildings."

Already, Huffer says, he is seeing increased interest as a result of "stimulus projects." He adds, "We've also seen interest from non-government projects, but many of these projects are not moving ahead with the difficulty in obtaining financing."

Mark Meshulam, executive vice president of Builders Architectural in Deerfield, Ill., agrees that the retrofit work might not be there now—but now is precisely the time to prepare for work in this segment.

"Right now there's been such a huge decrease in all kinds of work that it's hard to say," Meshulam says. He adds, "I believe that the fastest part of our industry's market to return will be rehab, first in the public sector, then the private sector."

## Seeking Incentives

Despite dour predictions for 2010, Associated General Contractors of America chief executive officer Stephen Sandherr tried to spin a silver lining out of the gray cloud hanging over commercial construction during a recent forecast he pointed out that low costs of

materials and labor provide good deals for municipalities to begin a construction project.

"As new federal producer price index figures ... make clear, construction material costs are at multi-year lows, which is why places like Maryland's Montgomery County are moving forward with aggressive capital plans despite tight budgets. They know they're getting good deals for construction now and that if they wait, these projects will only cost more."

Sandherr added that the association was contacting Congressional and administration leaders to urge them to invest in construction activity. "If they act now, they can save taxpayers millions on construction costs while immediately boosting employment and economic activity," he said.

While glass products may not be among those discounted materials, it is an incentive that could get the ball rolling on some renovation projects that require less of an overall investment than new construction—particularly when suppliers and installers help to explain how glass products ultimately can offer huge cost savings.

According to a report published by McGraw Hill Construction in October 2009 entitled "Green Building Retrofit

& Renovation," the downturn is encouraging adoption of energy-efficient practices in renovation projects as suppliers promote the long-term money-saving benefits of energy-efficient products. The report further states that *all* owners surveyed reported using more energy-efficient lighting or natural daylighting in their green retrofit and renovation projects. In other words, building owners looking to retrofit know improvements in glass will have a big return on investment. So how to get the other owners to consider replacing their inefficient windows?

"It is always important to explain how replacing products can improve the performance of the units and consequently the overall structure dramatically," Randall says. She adds, "We have



“Many of these projects are not moving ahead with the difficulty in obtaining financing.”

—Russell Huffer, Apogee



2008 and the relatively low costs of many renovation projects. Instead, building owners are looking to alternative financing measures such as the services of an energy service company (ESCO). ESCOs, the report explains, finance the upfront cost of the retrofit and take a percentage of the savings achieved.

Meshulam advises glass industry professionals to promote their energy—and cost—benefits based on a three-pronged approach by addressing: tax benefits available to help with the immediate costs, longer-term energy savings and the existing data that documents the enhanced market value of properties with green upgrades.

“That can be quite persuasive. There’s data out there that indicates that the cost to retrofit windows can be recouped to a very great extent by the increased market value of the property,” Meshulam says. “A formula that puts all of those things together can create a persuasive message.”

Huffer cites similar data. “Often when monolithic glass is replaced, there are huge energy savings to be achieved, as well as increases in comfort and productivity for employees with the improved energy efficiency and greater use of daylighting. The improvements also increase the value of the building and can lead to increased lease rates for building owners,” he says.

With regard to those tax benefits in Meshulam’s first prong, Sandherr cited the stimulus bill as another bright spot for contractors. “The approximately \$135 billion in construction funds included in last year’s package are now beginning to have a measurable, but

limited, impact on the construction industry,” he said.

The American Recovery and Reinvestment Act (ARRA) set aside \$750 million for updating federal buildings and United States courthouses for energy efficiency and \$4.5 billion toward converting GSA facilities to high-performance green buildings.

Still, Huffer says, “The stimulus projects are a positive for the market but are impacting a fraction of the total capacity that is available.”

### Higher Learning

In addition to federal buildings, educational institutions are making the most of government assistance. According to the McGraw Hill report, the sectors with the largest green retrofit opportunity are education and office—approximately 50 percent of all retrofit activity.

Information from the U.S. Department of Energy states that funds are available for financing energy efficiency and renewable energy measures in public and private non-profit schools. Schools, school districts and higher education institutions are advised to work with state or local energy offices to develop energy conservation strategies. And in a news release issued on November 23, 2009, the National Institute of Building Sciences explained that the federal government’s Qualified School Construction Bond (QSCB) program, created by the ARRA, provide tax credits, in lieu of interest paid by the state or district, to bondholders as a more efficient source of funding. The states and districts that issue the bonds will be responsible only for paying back the principal, making it possible for them to purchase land, build new buildings and/or renovate existing buildings at a

noticed an increased requirement for energy-efficient products in all segments of the fenestration industry.”

Promoting the cost-saving benefits of glass and related products can only help increase those requirements. Suppliers more than ever before are promoting the energy-efficient properties of their products—and with good reason, as that McGraw Hill report also predicts green building renovations to jump from 5 to 9 percent of the market to 20 to 30 percent in just five years. That jump may start sooner rather than later as less than 20 percent of building owners surveyed indicated that they used bank loans to finance green retrofit and renovation projects. The report attributes this in part to the tightening of credit that has occurred since the fall of

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## Room for Improvement

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savings of up to 50 percent (visit [www.edfacilities.org/school-modernization/](http://www.edfacilities.org/school-modernization/) for more information).

School districts seem to be taking advantage of these incentives. TRACO's projects are a good example of school demand for energy-efficiency; when asked about retrofits projects to which it has recently supplied, a very exclusive list is offered ranging from Slippery Rock Elementary to the University of Detroit, and all education points in between.

Diana San Diego, director of marketing of SAFTI FIRST in San Francisco, also sees this playing out. "We are seeing a lot of school renovation work going on—and it seems that school districts are taking this opportunity to upgrade the glazing. This includes eliminating the old wired glass to a fire and safety product, making windows more energy-efficient, increasing the amount of glazing to maximize daylighting or expanding artificial light, etc."

But as San Diego cautions, while energy efficiency upgrades may be the motivation, as with any renovation new products are being brought into to meet existing codes.

"Safety and technology can be two important reasons to renovate," adds Griffiths. "Existing conditions can be considered unsafe based on current code requirements. Technological advancements, whether they may be a result of electronic media or energy efficiency, for example, can drive the need to upgrade older facilities."

### Rolling with the Punches

De La Guardia currently is assisting in the retrofit of an historic building in Miami, the Vizcaya Museum and Gardens, to provide a flood-resistant storefront system. As he's learned, renovation projects can become more extensive than originally planned to meet existing codes.

"There have been several code changes in recent years that will affect

**"We're going after what's out there in the commercial market, be it retrofit or new construction."**

**—Tom Johnson, Burgess-Snyder Industries**

this," he says. "If you have an old [building] and it's not properly designed to today's code you may not have an issue solely with the doors and windows, but you might have an issue with a structure that wasn't designed to transfer the loads from the windows and doors."

Installers need to be sure that they're looking at all of the existing codes and are updating not simply for energy properties or aesthetics, but safety as well—and need to be sure that the existing structure can support today's new products.

Randall notes that other often-overlooked considerations include integrating the new door or window system with existing building envelope systems.

"The goal is always to improve the total performance of the doors and windows using the most innovative technology to improve air, water, thermal and structural performance," she says. "This contributes to the overall performance of the building envelope."

Griffiths adds, "Tying into existing waterproofing materials and methodologies can be tricky and requires having a wider range of experience and knowledge."

New technologies, in addition to updated codes, can affect the way a retrofit project is installed. "The biggest trend that I'm seeing with replacement and even new construction is the use of expandable foams in the space between the edge of the window and the building substrate," Meshulam comments. "We never saw that before about two

years ago, and now it seems like almost every job has it. That will help the energy performance in terms of making the surfaces feel warmer and it also isolates the edge of the window from cold air that might be in the wall cavity."

Another not-to-be-overlooked consideration remains aesthetics, particularly in historic buildings.

"There is the challenge of maintaining the current aesthetics/historical look of the building with the new energy-efficient systems," Huffer says.

Randall adds, "Depending upon the era of the building, often times retrofit projects require the aesthetics of the building to match or be similar to the existing condition."

### Gaining Retrofit Experience

Companies with experience in renovation projects certainly will have an easier time capitalizing on these opportunities, and installers may want to seek out suppliers that promote renovation-specific products.

"You have to be experienced with retrofit projects to be able provide solutions and provide products that maximize performance," Randall says.

In the end, though this market may help some companies create new opportunities, right now it's still an overall smaller market feeding a large number of competitors.

As Johnson says, "We're going after what's out there in the commercial market, be it retrofit or new construction. I do believe this is going to be a down year for all of us. I don't see as many projects, so with the available work that's going to be out there for the many firms that are going to be chasing it, it's going to be pretty competitive. We have a backlog, but I think by the end of the year we'll be wishing we had a larger one."

In those cases, the most that can be done is to lay the groundwork for jobs early in the recovery cycle.

"The idea is to create a clear value



proposition for the customer,” Meshulam says. “It’s not going to cause people who don’t have money to spend it. But if those messages can be hammered out now, then when the economy starts to loosen up there should be some pent-up demand. If the [architects and building owners] have been educated during this interim period as to the benefits, they might move quicker. They might already have figured out who they want to work with—whoever’s providing that information now.” ■

## the author



**Megan Headley** is the editor of USGlass.

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# Countdown to BEC

## Glazing Contractors Prepare for GANA's 2010 Conference

### SCHEDULE AT A GLANCE

*Schedule is tentative and subject to change.*

#### Saturday, March 27, 2010

- 7:00 a.m.-9:00 p.m. Registration Desk
- 7:00 a.m.-5:00 p.m. Task Group Room
- 3:30 p.m.-5:30 p.m. BEC Technical Committee Meeting
- 7:00 p.m. - 9:00 p.m. Glass Week/BEC Conference Joint Reception  
*Sponsored by Kawneer Co. Inc.*

#### Sunday, March 28, 2010

- 7:00 a.m.-8:00 p.m. Registration Desk
- 7:00 a.m.-5:00 p.m. Task Group Room
- 7:00 a.m.-6:00 p.m. Internet Café  
*Sponsored by Dow Corning Corp.*
- 7:00 a.m.-8:00 a.m. Breakfast
- 8:00 a.m.-4:20 p.m. BEC General Session

If you've attended the Building Envelope Contractors (BEC) Conference in the past, there may be just one question on your mind: will there be a top 10 countdown this year?

Because if you've been to the event, sponsored by the Glass Association of North America (GANA), in the past, you already know that the educational offerings will be top-notch and the topics covered will be timely. (And you likely know that new BEC chairperson Henry Taylor of Kawneer Co. is more than up to the task of moderating an event that last year kept attendees riveted to the edges of stadium-style seats.)

If you're a first time attendee, you should know that this event geared toward glazing contractors is so informative that even after the annual "beer break" sponsored by W&W Glass the seats remain full.

This year GANA is preparing to kick-off another BEC Conference, March 27-29, at the Paris Hotel in Las Vegas. The event comes at the close of GANA's Glass Week and the Insulating Glass Manufacturer's Alliance Annual Meeting (*see January 2010 USGlass, page 46, for related story*).

Event organizers have broken the schedule into three topics: the industry; products; and contract glazing. Take a look for yourself, and then visit [www.glassweek.com](http://www.glassweek.com) for more information or to register to attend. ■



## THE INDUSTRY

Sunday, March 28, 2010

8:00 a.m.- 8:45 a.m.	State of the Glass and Glazing Industry	<i>presented by Hugo Lara, Vitro Vidrio Plano S.A. De C.V.</i>
8:45 a.m.-8:50 a.m.	Take 5: Edgetech IG	<i>presented by Joe Erb</i>
8:50 a.m.-9:45 a.m.	Energy and Code Update: How Are They Affecting Your Business?	<i>presented by Dr. Tom Culp, Birch Point Consulting and Bill Yanek, Glass Association of North America</i>
9:45 a.m.-9:50 a.m.	Take 5: Technoform	<i>presented by Mark Silverberg</i>
9:50 a.m.-10:15 a.m.	Communications Break	<i>Sponsored by Saflex</i>
10:15 a.m. - 11:00 a.m.	Construction Economic Outlook	<i>presented by Bill Greiner, Scout Investment Advisors</i>
11:00 a.m.-11:05 a.m.	Take 5: Advanced Architectural Glass from Guardian	<i>presented by Chris Dolan</i>
11:05 a.m.-11:35 a.m.	Sell Yourself First, Your Company Second, Your Product/Service Third	<i>presented by John Rovi, Curtainwall Design &amp; Consulting</i>
11:35 a.m.-11:40 a.m.	Take 5: LinEI Signature	<i>presented by George Petzen</i>
11:40 a.m.-12:10 p.m.	Recruiting and Evaluating Key Staff Hires for the Future	<i>presented by Mike McArdle, Mica Enterprises</i>
11:50 a.m. - 1:00 p.m.	Lunch	<i>Sponsored by Vitro America, Inc.</i>

## THE PRODUCTS

1:00 p.m.-1:30 p.m.	Electronically Tintable Glass in Building Envelopes – A Project Showcase	<i>presented by Dr. Helen Sanders, SAGE Electrochromics Inc.</i>
1:30 p.m.-1:35 p.m.	Take 5: Glass of the Future – Today	<i>presented by Roger Watson, Saint-Gobain</i>
1:35 p.m.-2:15 p.m.	Building Information Modeling (BIM) – Significance and Trends to Track BIM Software Company	<i>presented by Will Ikerd, Raymond L. Goodson Jr. Inc.</i>
2:15 p.m.-2:20 p.m.	Take 5: Curtain Wall Design & Consulting	<i>presented by John Rovi</i>
2:20 p.m.-2:50 p.m.	The Future of High Thermal Performance Fenestration	<i>presented by Mark Silverberg and Albert Stankus of Technoform Glass Insulation NA Inc.</i>
2:50 p.m.-2:55 p.m.	Take 5: Tubelite Inc.	<i>presenter TBA</i>
2:55 p.m.-3:25 p.m.	Communications Break-Beer Break	<i>Sponsored by W&amp;W Glass</i>
3:20 p.m.-3:50 p.m.	Adaptive Glazing – Sunlight Responsive Thermochromic (SRT) Window System: Lower Energy Use, Enhanced Daylighting and Solar Heat Gain Reduction	<i>presented by Fred Millett, Pleotint</i>
3:50 p.m.-3:55 p.m.	Take 5: ICD High Performance Coatings	<i>presented by Kris Vockler</i>
3:55 p.m.-4:20 p.m.	Net Zero Building	<i>presented by Russ Huffer, Apogee Enterprises Inc.</i>
6:00 p.m.-8:00 p.m.	Networking Reception	<i>Sponsored by Viracon</i>

Monday, March 29, 2010

7:00 a.m.-5:00 p.m.	Registration Desk	
7:00 a.m.-5:00 p.m.	Task Group Room	
7:00 a.m.-12:00 p.m.	Internet Café	<i>Sponsored by Dow Corning Corp.</i>
7:00 a.m.-8:00 a.m.	Breakfast	
8:00 a.m.-12:15 p.m.	BEC General Session	

## CONTRACT GLAZING

8:00 a.m.-8:30 a.m.	Training and Developing Your Staff for the Future	<i>presented by Mike McArdle, Mica Enterprises</i>
8:30 a.m.-8:35 a.m.	Take 5: SageGlass® Electronically Tintable Glass	<i>presented by Dr. Helen Sanders</i>
8:35 a.m.-9:20 a.m.	Renovating a Façade: Case Study	<i>presented TBA</i>
9:20 a.m.-9:25 a.m.	Take 5: SAFTI FIRST™ Fire Rated Glazing Solutions	<i>presented by Jeff Griffiths</i>
9:25 a.m.-10:15 a.m.	Properly Documenting Your Defense of a Worker's Compensation Claim and other Legal Disputes	<i>presented by Richard Kalson, Esq., Babst, Calland, Clements &amp; Zomnir, P.C.</i>
10:15 a.m.-10:20 a.m.	Take 5: Tremco Inc.	<i>presented by Ellen Zerucha</i>
10:20 a.m.-10:45 a.m.	Communications Break	
10:45 a.m.-11:30 a.m.	Getting Paid When the Project Goes Broke	<i>presented by Joseph J. Devine, Esq., and Richard Barkasy, Esq. and Schnader Harrison Segal &amp; Lewis LLP</i>
11:30 a.m.-11:35 a.m.	Take 5: Next Generation SOLARBAN Glass: Product Development at PPG	<i>presented by Glenn Miner</i>
11:35 a.m.-12:15 p.m.	Tips to Work on Window Replacement Jobs	<i>presented by Dave Hewitt, EFCO Corp.</i>
1:00 p.m.-6:00 p.m.	Golf Tournament	



# Supplier

## One Supplier's Shift in Project Delivery

by Megan Headley

Photo courtesy of Cadillac Fairview.

**T**ed Hathaway, chief executive officer of Oldcastle Glass, in Santa Monica, Calif., wants to know what's happened to the construction industry.

"If you look at the relative labor productivity of building construction versus non-farm manufacturing, the construction industry has the legacy of being the least productive industry over the last 30 years," the Santa Monica, Calif.-based executive says. "And the architectural community is trying to re-

think why that has happened."

He continues, "The design-bid build was an early, normative process; the notion was that you went out and bid out the facets of the building to get the lowest cost but then, as the process unfolds, you discover that you have brought in a plethora of suppliers that don't have aligned interests. So you have a glass supplier that is working with a curtain-wall supplier that is working with a skylight supplier that is working with an operable window supplier and you have

several different suppliers—each of which has their own vested interest."

An integrated project delivery (IPD) is an approach that the American Institute of Architects says integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimize efficiency of design, fabrication and construction. Oldcastle Glass is aiming to deliver just that.

"It's a major, major rethinking of how buildings have been built," Hathaway says of this construction trend.

“The construction industry has the legacy of being the least productive industry over the last 30 years.”

Hathaway has been positioning his company as an integrated supplier for architects since its acquisition of Southwest Aluminum Systems in 2003. Since then, the company has moved beyond the definition of a typical "glass fabricator" and has evolved into a building envelope supplier.

"For many years now we've acquired and been providing products and services that are well beyond the definition of a glass fabricator," Hathaway says. "The products we engineer today are vastly different from anyone in our space—there's no one else in our marketplace that has the breadth and the depth of building envelope products. And no one else has the ability to engineer those products as an integrated system."

The Royal Bank of Canada (RBC) Centre is one such example of Oldcastle Glass' IPD approach.

According to architects Kohn Pedersen Fox Associates (KPF), the design of the RBC Centre reflects the reinvention of Canada's largest, and one of its oldest, banking institutions. The 43-story tower, with 24,000-square-foot



floor plates, rises from a 10-story podium, which is articulated by horizontal fins and holds 48,000-square-foot floor plates. The architect says the glazed form of the tower responds directly to its north-south orientation and corner location with a shield-like glass volume on the east-facing Simcoe Street façade. The volume sets back and angles in to mark the building's main entrance, giving the tower a distinctive profile. Floor-to-ceiling windows enhance daylighting, while sun-shading devices and automated blinds tied to exterior light sensors maximize efficiencies and minimize operating expenses.

Oldcastle Glass designed, engineered and supplied the building envelope, including 420,000 square feet of custom curtainwall, solar control glass for upper floors and sound-resistant laminated glass for the lower floors.

"[RBC] represents all of our own systems. We designed the system with state-of-the-art energy efficiency and provided the architectural glass in an integrated building envelope solution. You have 442,000 square feet of architectural glass and we supplied a complete turnkey system," Hathaway says.

"We designed, engineered, fabricated and assembled it," says Mary Carol Witry, president of Oldcastle Glass Engineered Products.

## About the Centre

Oldcastle Glass was awarded a contract for the project in early 2007.

"This is the first major office tower in the city's core in more than a decade," Witry explains. "The way Toronto is spread out they didn't have to build large boxes in a condensed space."

From the beginning, the company worked closely on design with KPF in New York and the architects of record, Bregman + Herman Architects in Toronto.

"We partnered with KPF and functioned as a part of their team," Witry says. "From design and engineering to

## Collaborating with Columbia University on Promoting Construction Collaboration

At its core, the idea of integrated project delivery (IPD) is about increased collaboration among all parties involved in a building's construction.

"The trend is clearly to have more collaboration, more partnering," says Ted Hathaway, chief executive officer of Oldcastle Glass, headquartered in Santa Monica, Calif. "IPD is an effort to try and get the suppliers and the parties that are involved in constructing a building to work more cooperatively and more intelligently."

While Oldcastle Glass' movement toward IPD certainly makes the company stand out for potential architectural clients, the building envelope supplier is taking the concept of collaboration so central to IPD to another level.

"We are underwriting a three-year research grant with Columbia's University's Graduate School of Architecture, Planning and Preservation (GSAPP) for a program called the Columbia Building Intelligence Project," Hathaway explains. "We've committed substantial research funds to the university to explore this conundrum of why construction is so inherently inefficient."

According to information from GSAPP, the Columbia Building Intelligence Project is a three-year pilot project designed to explore new collaborative relationships that have the potential to transform the building industry. Each year, the project brings together leading experts from various sectors of the industry to uncover key questions and problems, some of which will be addressed in the Integrated Design Studio (IDS). The IDS breaks down the traditional model of studio education by having three studios team up in a dedicated space to explore the complexities of a design problem, with each studio taking a part of the building problem before eventually integrating the full scope of work with the other two studios.

"It is a collaboration between Oldcastle Glass and GSAPP to really bring the best minds from around the world to study and ask the question 'why is the construction industry so inefficient?'" Hathaway says.

For more information on the Columbia Building Intelligence Project, visit [www.arch.columbia.edu/c-bip](http://www.arch.columbia.edu/c-bip).

testing and assembly we worked with them through the entire process."

Following the design phase, Oldcastle Glass' Toronto-based Engineered Products facility coordinated and handled the engineering side of the project, as it specializes in high-end, highly engineered buildings.

Witry says that the company supplied 442,000-square feet of glass products, including 6,800 unitized frames, for the 43-story building. Glass units measuring up to 5 by 11 feet featured PPG Industries' Solarban 70, with thermal warm-edge spacers and argon gas. The energy-efficient units helped contribute to the LEED Gold NC rating that the building targeted.

The company's scope also included

sunscreens, operable vents, skylights, louvers, canopies, soffits and doors.

The tower's bottom 24 floors required security glazing, which Witry says, "required bigger and thicker framing members, massive anchors and laminated glass."

According to Witry, those high-security systems brought the only unforeseen challenge. "The lower 24 floors were changed very late in the game from standard to high security so we needed to adjust right in the middle of our shop drawing phase and make sure we still hit the same project schedule and that nothing slipped. We had to do a massive re-

*continued on page 30*

# Supplier

continued from page 29

Photo courtesy of Cadillac Fairview.



The RBC Centre is one example of integrated project delivery.

design to accommodate the high security. We were behind the gun to make sure we maintained the same project schedule.”

## An Integrated Approach

While the project is fairly standard, the supply chain was anything but. Witry indicates that its shift from glass fabricator to building envelope supplier has given her company a bigger role in the early design stages.

“We have evolved from glass fabricator to partner in the design process; we provide solutions and ensure that our building envelope products work together so that the architect’s vision is realized, the schedule is met and the owner is proud of the completed building,” Witry says.

She adds, “With supplying the building envelope, you’re really part of the

process. You’re a solution provider and you have input and you can help the project get completed on time. When you’re a material supplier you’re basically just reacting to what somebody is asking for.”

It’s a total solution that Witry says architects respond to. “Architects value the ability to partner with one company on the entire building envelope and get all their questions answered and their design fulfilled,” she says.

Hathaway agrees.

“As we have evolved and transitioned from a glass fabricator to a supplier of integrated building envelope solutions, people see us as a more desirable supplier and partner,” he says. “I think people are interested in partnering with us and developing strategic alliances that are positive for both parties.” ■

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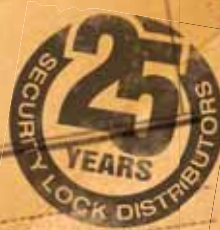
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# Glass Works in Healing the Economy

## Hospital Work Keeps Contract Glazier Busy

by Megan Headley

**W**ithin its industry, the Van Andel Institute (VAI) in Grand Rapids, Mich., seems made to take on challenges. Among other things, the medical research and education facility is dedicated to finding the molecular origins of cancer and other diseases.

The slightly less lofty goal of installing the complicated glass portions of the \$170 million, 240,000-square-foot facility expansion provided its own share of industry challenges.

The first phase of the VAI, built in 1998, was designed in part to resemble the falling water of the Grand River that flows in the distance. Phase II, completed in December 2009, clearly put a prominence in connecting the interior and exterior and making the most of natural daylighting, even while ensuring energy efficiency.

For the Phase II expansion, Rafael Viñoly of Rafael Vinoly Architects PC in New York, the lead architect on both phases, aimed to fulfill his vision for the glass walls, windows and interior elements. Viñoly designed three areas in particular—the Café curtainwall, the “Angel” wall and the CEO conference room—to emphasize the landscape and views of Grand Rapids.

“Glass is the most prominent and creatively utilized building element in the expansion,” says Steve Heacock, Van Andel Institute CAO and chief counsel.

Vos Glass Inc., a Grand Rapids, Mich.-based glazing company, was chosen by VAI to carry out this vision, by compiling a team to provide the unique glass features required by the architect and meeting the installation challenges as well.

“During the design development phase, as well as the construction phase, Vos Glass provided advice, comments, shop drawings, submittals, suggestions and information on systems and components of various aspects of the glazing trade to the [general] contractor and architect,” says Linda Vos-Graham, president of Vos Glass. That didn’t make the final project any less challenging.

“The logistics and installations on this project were challenging,” explains Ken Graham, project manager on the VAI glass installation and vice president of Vos Glass. “We committed ourselves to staying true to the architect’s models.”





Because of the prominent use of glass throughout the Van Andel Institute, the glass fabricators had to emphasize energy efficiency.

## The Café's Curtainwall

A unique segmented window wall, measuring 140 by 66 feet, now provides abundant natural light to the cafeteria. To get to that point, a great deal of coordination was needed.

First, a Kawneer 5500 aluminum framing system was installed to create 130 individually-framed fenestration openings, each measuring 42 by 200 inches. Surrounding each exterior opening, the glaziers installed a continuous vertical and horizontal projection, measuring 30 inches by 12 feet, created a unique architectural feature as well as a sun control component. A fully engineered substructure also was built to create attachment locations for the projection's cladding.

To create the intended profiles, or "fins," 1/8-inch-thick sheet aluminum was break-formed and post-painted with a Kynar finish. A Kawneer 7500 Isoweb aluminum framing system closed the endwalls. The fins were fabricated and installed by Accuform Industries of Grand Rapids, with supervision by Vos Glass, while Erie Architectural Products of Novi, Mich., fabricated the lion's share of Kawneer curtainwall components throughout the facility. Statre Corp. in Troy, Mich., supplied Vos Glass with Viracon 2-inch triple lite, "clear" inboard, argon-filled, heat-strengthened insulating glass units (IGUs), which provide a high thermal performance while maximizing natural light transmission. The framing and glass were cantilevered on each end of the wall opening to give the appearance that the glass and frame hang from the building.

Prior to installation, a full-size 40- by

40-foot mock-up was constructed and tested for air and water infiltration at Architectural Testing Inc. in York, Pa. With minor adjustments made and all tests passed, Vos Glass began the installation process during the fall of 2008. The Michigan winter is its own challenge, and led to the construction of a fully heated and enclosed scaffolding system to protect the workers and materials from the elements

## The Angel Wall

The "Angel" wall, so called because VAI's angel logo ultimately was applied to the glass, began with a 36- by 36-foot steel frame. The challenge for Vos Glass was not simply to install the glass—but to find and purchase it.

Vos Glass ultimately called in Mexico-based Cristacurva, one of only a few glass fabricators capable of fabricating

*continued on page 36*



**Finding a glass proved more of a challenge than installing it in this application.**

## Health Care Remains Bright Spot Amid Bleak Nonresidential Predictions

The American Institute of Architects' (AIA) recently released "Consensus Construction Forecast" projects that 2010 will be another weak year for nonresidential construction, but improvements later in the year in the institutional sector will lead an overall nonresidential recovery in 2011.

"Health care, in particular, is forecast to show only a modest decline after suffering through a weak year in 2009," says AIA chief economist Kermit Baker, PhD, Hon. AIA, in the report. "The uncertainty surrounding health care reform has limited investment in some health care sectors, which likely will free up once this issue is resolved."

Glass fabricators and installers around the country have looked to the healthcare sector, as well as areas such as educational facilities and government buildings, for new construction work. Vos Glass in Grand Rapids, Mich., is one such glazing contractor. Having just completed the Van Andel Institute, a medical research facility, the glazing contractor is about to embark on the glass and glazing work for the Michigan Street Development Tower 35 project, a medical office.

However, Linda Vos-Graham, president of Vos Glass, says, "Most of the reported projects for the West Michigan 'medical mile' are now complete or nearing completion."

Still, even the AIA report indicates that in 2010 healthcare is simply the least "bad" option, predicting a 0.3-percent decrease in spending on healthcare, followed by a 2.5-percent increase in 2011.

"West Michigan, and Michigan in general, is feeling the impact of a weakened economy," Vos-Graham says. "All areas of construction are down, with perhaps the exception of road construction. Obtaining work will be challenging in the next year or two."

## Glass Work continued from page 35

the project's custom 9- by 9-foot triple-pane, heat-strengthened IGUs, some with bent glass, and all with a specified U-value of 0.18.

"We were not familiar with Cristacurva," Vos-Graham says. "We were led to them by the architect. Vos Glass and a team of professionals representing the owner, the Institute and the contractor traveled to Guadalajara, Mexico, to consult with the supplier, inspect production methods and products, and coordinate the safe delivery of the specialized product."

The four-sided IGUs were structurally glazed directly to the structural support steel. A stainless steel plate system, designed by the building envelope engineers at Wheaton & Sprague in Stow, Ohio, was used to create a closer tolerance for installation than the steel structure alone offered, while additional hidden fasteners aided in supporting the IGUs during installation.

Installation of the IGUs—each of which weighed more than 1,500 pounds—required some special tools. A hydraulic platform scaffolding system was used to ensure the glaziers worked safely. Special glazing suction cups and a power crane also were needed due to the weight of the units. Woods Powr-Grip Co. assisted in the power cup section to meet the needs of this project and ensure installation safety.

### The CEO Conference Room

Vos Glass calls the CEO conference room the jewel in the overall design of the building. The 40- by 36-foot semicircular conference room is comprised of full-height glass—66 by 151 inches—on three sides. The glass is bent to match the radius of the room while also leaning out at a 7-degree angle—creating two different radii and a very unique structure.

The specifications for the CEO conference room called for a U-value equaling 0.18. The 2 ½-inch-thick, triple pane, low-iron laminated IGUs featuring high performance coatings went through several mock-ups before the best solution was determined.

The challenge, Vos-Graham says, was that "we needed to meet a performance requirement of a 0.18 U-value using a clear glass that was bent and met the architect aesthetic requirements."

The support design underwent a change as well. The original design called for the glass to be unsupported vertically, creating a complete wall of glass. However, final engineering analysis required that solid, vertical, custom, stainless steel tees be used to support wind loads. The glass units were captured at the head and sill with a custom-designed stainless steel channel system. The final result is a 300-degree panoramic view, 120 feet above Grand Rapids.

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**A focus on glass inside and out created a feeling of transparency throughout the Van Andel Institute.**

## A Look Inside

While capturing the exterior views was the primary goal for the architect, glass was specified throughout the interior as well. Vos Glass also installed 10,000 square feet of glass entrances and ½-inch floor-to-ceiling glass partition walls. Interior rooms on the third and sixth floors maximize natural light transmission with transom areas. Custom Kawneer frames with two pieces of ½-inch-thick glass create a 4-inch airspace as well as a high STC rating for the working environment.

Custom glass handrail systems with bent radius glass were installed on the second and third floors, while on the exterior of the sixth floor CEO conference room balcony, the company installed ¾-inch custom glass handrails. Privacy film separated sections of the expansion from Phase 1 sections. Fire-rated glazing installed at most fire-rated doors and smoke baffle glazing at open stairwell locations completed the job. All told, it took more than a year and led the building to a LEED-NC Platinum certification.

"A construction project of this magnitude requires a specialized team of highly skilled and knowledgeable people," says Vos-Graham. She adds, "We hope our glazing offers an inspiring environment for all the Institute scientists and staff to work." ■

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# A New Glass Expo Midwest™

## 2010 Event Prepares New Features for New Audiences

by Megan Headley

If you've attended Glass Expo Midwest™ in the past, you may think you know what's in store for attendees this year, March 16-17, at the Renaissance Schaumburg Hotel & Convention Center in Schaumburg, Ill. But the 16<sup>th</sup> edition of this regional trade show—co-sponsored by USGlass Magazine and the Illinois Glazing Association, the Michigan, Ohio, Minnesota, Indiana and Wisconsin Glass Associations, Detroit Glass Dealers Association and the Association of Glazing Contractors—has a host of surprises, including a greatly expanded seminar line-up.

### Schedule At A Glance

#### Tuesday, March 16

7:30 a.m. - 8 p.m.

Registration

7:30 a.m.

Coffee Break

sponsored by JLM Wholesale

8 a.m.-12 p.m.

Seminars and Workshops

12 p.m.-1 p.m.

Lunch on Your Own

1-3 p.m.

Seminars & Workshops

3-8 p.m.

Glass Expo Midwest™

6-8 p.m.

St. Patrick's Day Cocktail Party on Show Floor

#### Wednesday, March 17

7:30 a.m.-3 p.m.

Registration

8:15 a.m.

Coffee Break

sponsored by JLM Wholesale

8:30 a.m.-3 p.m.

Seminars & Workshops

10 a.m.-3 p.m.

Glass Expo Midwest™

3 p.m.

"Chicago's Amazing Glazing Sites" Group Tour

### Expanding Its Reach

The annual Midwestern trade show typically attracts between 800 to 1,200 attendees, according to show organizers, and its expanded programs for architects and door and window manufacturers, among others, are expected to draw in new attendees.

In the past, the event has focused on providing Midwesterners with a regional resource for education and networking. With air travel becoming more problematic and expensive—and budgets tightening—the Expo has been promoted as a convenient alternative to national events in destination cities such as Las Vegas. However, this event in the heart of the country is now reaching nationally to provide a whole new audience with a springtime opportunity for networking and education. The expanded event is aiming to help attendees learn about the latest industry trends and services; improve profitability; get tips and instruction on how to improve business; and gain one-on-one time with exhibitors.



**Despite its growth, attendees will still find one-on-one time with national exhibitors at the Glass Expo Midwest™.**

### Study Time

While the show overall has been expanded, one might say that this year's seminar line-up in the architectural glass track continues on its path of hosting in-depth presentations on cutting-edge topics. This year attendees can gain extra insight into trends such as building information modeling; building integrated photovoltaics; and energy codes and LEED.

For a hands-on presentation, Dan Kolthoff and Chris Miller of Rockford (More Than) Auto Glass will demonstrate "Proper Application of Shower Doors, Mirrors and More." Glass companies looking for more business-oriented planning should attend a talk by the ever-insightful Michael Collins of Jordan, Knauff and Co. on "Economic Trends — Riding the Ebb and Flow."

Ludek Cerny of MTH Industries has worked on his share of "neat and unique projects" (see October 2009 USGlass, page 40) and in a session titled just that he will share a behind-the-scenes look at some of those projects—and tips for attaining such jobs. After Cerny's presentation, attendees may have a particular interest in seeing unique projects up-close, and that's just what the event will offer in its group tour of "Chicago's Amazing Glazing Sites." (See page 39 for more.)

In addition, attendees will be treated to a special session on "How to Manage All Ages - From Youth to Golden Ages," as presented by Marilyn Moats Kennedy of Career Strategies and author of *Office Politics: Seizing Power/Wielding Clout*.

According to Kennedy, the four age groups in the workplace now differ on such important points as what community means, what participation means, the role of management, employer/employee loyalty, telecommuting, technical competence and what





## GLASS EXPO MIDWEST 2010™

### One-of-a-Kind Glazing in Chicago

The Willis Tower's All-Glass Ledge is one of the places that will be visited during a tour of some of Chicago's famous architectural sites that will be offered to attendees of Glass Expo Midwest™ 2010.



The group tour will take place March 17, 2010, leaving the registration desk at 3 p.m., taking in other well-known Chicago glazing sites and wrapping up at 6 p.m., for a tour of The Ledge. Ludek Cerny, vice president of glazing contractor MTH Industries in Hillside, Ill., will moderate the tour. The cost is \$20 per person and does include transportation. Space is limited and will be on a first-come, first-served basis. Pre-registration is required.

**This year's Glass Expo Midwest™ features an expanded seminar line-up, with sessions dedicated to various segments of the industry.**

constitutes a good day's work. Kennedy also will share tips in communicating the same message in ways that each group understands and responds to.

### New Offerings

Among the new resources at this year's event is an Architect's Educational Forum scheduled for March 17. The forum, which is open to architects only, will provide architects with continuing education unit courses (and will provide a new audience for expo exhibitors). Topics include:

- How Structural Silicone Spacers Con-

tribute to Sustainable Window Design - presented by Edgetech I.G.;

- Sustainable Glazing Systems and the LEED® Green Building Rating System - presented by YKK AP;
- Glass for the Next Generation - sponsored by J.E. Berkowitz; and
- Coated Glass - presented by the Glass Association of North America.

In addition, USGlass sister publication *Door and Window Manufacturer (DWM)* magazine will be helping door and window manufacturing profes-

*continued on page 40*

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**GLASS EXPO**  
MIDWEST 2010™*Continued from page 39*

sionals to celebrate “Fenestration Day.” On March 16, **DWM** will host a complete day of fenestration-focused seminars, including:

- Specific Steps to Take Toward Being Green - sponsored by Truseal;
- Avoiding “Green” Liability Issues;
- Lobbying Your Legislators;
- Department of Energy to Reveal Latest Updates - sponsored by PPG Industries;
- How Window Manufacturers Can Overcome the Challenges of Today’s Market - sponsored by WTS Paradigm; and

- Learn How the Lead Paint Regulations Will Affect You and Your Dealers – sponsored by Lawrence Industries.

**Walking the Trade Show Floor**

Exhibitors will be offering information on a diverse group of products this year. Equipment suppliers such as Quattrolifts can be found alongside software supplier GTS and glass transportation manufacturer F. Barkow. Fabricators such as Prelco and GlasSource will have products as well as services on display, as will hardware suppliers such as Quality Hardware, JLM Wholesale and C.R. Laurence. Metal and glass suppliers such as Taco Metals, YKK AP, Castle Metal, Petersen Aluminum, ACM Panelworx, Morse Industries and many others also can be found.

Quality exhibitors have been a sta-

ple at past events, but Glass Expo Midwest has made several additions in this area as well. For example, a new “Get Green” product and service area is a one-stop display of exhibitors’ green product literature.

Attendees already hard at work planning their St. Patrick Day festivities may be interested to know that event organizers have already got it covered. On March 16 at 6 p.m. attendees and exhibitors will be treated to a pre-St. Patrick’s Day cocktail party on the show floor. Visitors can raise a glass, listen to a rousing Irish band (featuring one of the glass industry’s own) and chat with colleagues.

Organizers are further enticing attendees with the promise of door prizes to be given away every other hour on the trade show floor. Of course, with the additions to this year’s event, attendees already seem set to win. ■

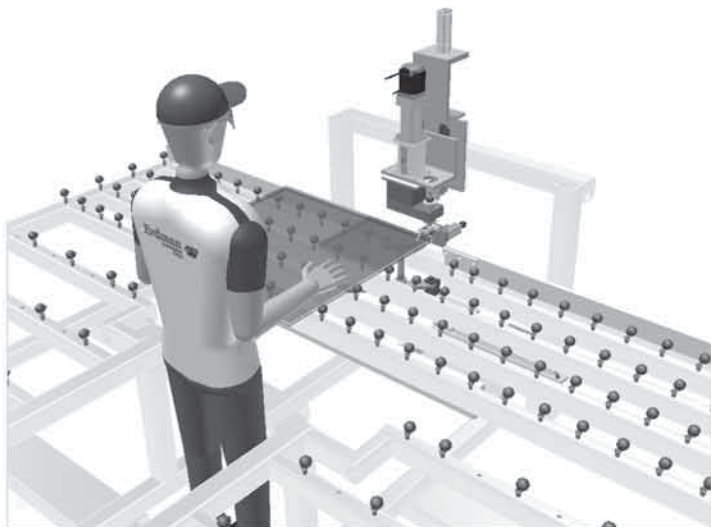
**More Information?**

For more information, and to register, visit [www.glassexpomidwest.com](http://www.glassexpomidwest.com). Admission is free to **USGlass** readers, with the exception of non-exhibiting industry suppliers.

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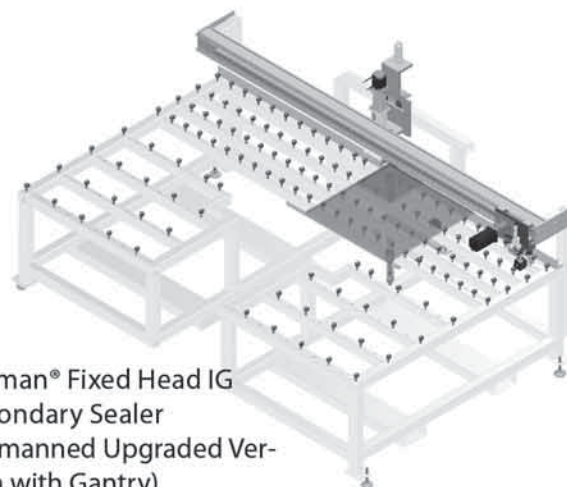
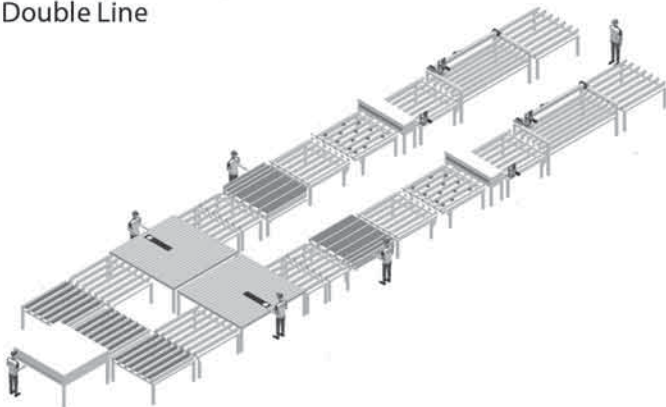
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# Coloring Outside the Lines

## Designers Embrace Glass as a Way to Add Color to Their Projects

**Ellen Rogers**

Editor of *Decorative Glass* magazine.

Some people choose to live surrounded by colorfully decorated furnishings and accessories; some people choose to buy one car over another because of an eye-catching color; other people say they work more or less productively as a result of the colors with which they are surrounded. Yes, color can have a profound influence on our lives. According to the Alexandria, Va.-based Color Marketing Group:

- Color increases brand recognition by up to 80 percent;
- Color improves readership as much as 40 percent;
- Color accelerates learning from 55 to 78 percent;

- Color increases comprehension by 73 percent;
- Color ads are read up to 42 percent more than similar ads in black and white; and
- Color can be up to 85 percent of the reason people decide to buy.

With so much to be said about the use of color, many designers have embraced using it in their designs.

"Color is something that is in our lifestyles, everywhere you go," says Doug Purcell, principal interior designer with New York-based Cannon Design. Purcell says much of the work he does is within institutional environments including healthcare settings, colleges and universities as well as research and sports facilities. However, he has seen design elements, traditionally used in hospitality settings, move into institutional projects as well.

"You get an amalgamation of what

our home lifestyles are like and we're bringing that influence into institutional work. Plus, there's a whole generation of people who are not afraid of intense color. It's part of our culture and I think something people respond to in a positive way," Purcell adds.

### Why Color?

From elevator walls and lobbies to reception desks and other furniture pieces, designers say they often work with glass as a way to bring color into the project's surroundings.

Designer Belinda Bennett of the Bennett Design Group in Houston says in the past people did not always think about using glass as a medium in the design tool kit, but they do now.

"I think glass has become a more creative option thanks to all the graphics that can be added to it," says Bennett. "Now that the technology is there and the prices have become a bit more af-

In residential applications, colorful, coated glass products are being used to create different furniture pieces, including tables and countertops.





**“Now that the technology is there and the prices have become a bit more affordable the glass can stay in the project rather than being eliminated at the last minute because did not make budget.”**

**—Belinda Bennett, Bennett Design Group**

fordable the glass can stay in the project rather than being eliminated at the last minute because it did not make budget.”

As one way of adding color to her projects, Bennett says she likes to use a lot of clear glass embedded with colored items.

“I lean more toward glass as a textural or element of interest, but I also continue to look at things that are sandwiched between the glass, which also adds a color element even though the glass itself is not completely colored,” says Bennett. These items can include everything from dried flowers, bamboo, grass, even intricate beadings and tapestry materials. Bennett says the same effect can also be achieved with acrylic, though with glass the result is clearer and the colors more vibrant.

“When our budgets allow, clients prefer glass over acrylic,” Bennett adds.

According to Purcell, there are also many benefits.

“It’s a high-impact surface and requires very little maintenance,” he says. “Glass can be an alternate to many different materials and gives a different aesthetic while also being a high-impact material.”

Purcell explains that he often uses glass to add color because it can help achieve the project’s total design concept.

“These are usually very large panels and the whole aesthetic that you are trying to achieve is based on a coloration of that space,” says Purcell. “[Using glass in this way] allows it to become one of those controlling elements.”

Alexandra Guinan, a founding partner of GlassKote USA in Bridgeport, Conn., says the nature of color is also a reason such products are specified.

“As humans, our emotions are influenced by color and studies have been done in the medical field that show color does impact [behavior],” Guinan

says. “With the introduction of color to glass it has become an aesthetic feature that can be expanded to incorporate other materials that are used in an environment.”

Mandy Marxen, vice president of marketing for Dreamwalls Color Glass in North Wilkesboro, N.C., adds, “I think designers are always looking for ways to get more light into a room and this surface encourages that and brings flat walls to life. It’s a step above paint; this has a life because of the reflectivity and so a red becomes more saturated and vibrant. It’s not a static glass at all.”

### Vibrant Details

To accommodate the different styles and creativity of different designers, there are many ways to add color with glass. Coated glass and backpainted glass products, for example, are increasingly popular. Such products are often used in kitchens and bathrooms as backsplashes and countertops. In commercial applications they are used as wall claddings, reception and transaction desks and other types of furniture.

“I think glass gives a very clean line, modern aesthetic and I think there is a trend toward that in North America,” says Guinan. “We are seeing acceptance across the board now where 15-20 years ago people were intimidated by using it as it was something very foreign. Now people want to use it in as many areas as they can.”

Marxen adds, “This is a product that has been available worldwide longer than it has been in the United States and I think U.S. interior designers are excited now that they do not have to import this product.”

Tommy Huskey, chief executive officer with Dreamwalls, says another reason coated and backpainted glass products are becoming more popular is because

they are being produced on a high-quality basis. As an example, he says his company’s products are made using a low-iron glass, which allows color to be transmitted through the glass as the exact same color it is applied to be.

“If we had to paint normal green glass, there would not be as much color consistency so the fact that the ultra clear glass is available is a huge step forward,” says Huskey.

Another popular feature is the aspect of color itself.

“You can get any color on glass and it looks just as the designer expects it to look and it gives the glass dimension and reflectivity,” adds Huskey.

Guinan adds, “When you paint your wall [the color] will wear down over time, but colored glass has the ability to look good for a longer term.”

In addition to color, Bennett says images, patterns and texture in glass can also bring color into the design environment.

“We use a lot of glass that has been etched with graphics or patterns. I think manufacturers are starting to merge with well-known textile designers and graphic designers and are marketing [those products] to the architectural and design community,” explains Bennett.

Technologies are also available through which the designs and images can be printed onto an interlayer material and then laminated into the glass.

“I’ve seen that, but have not yet had the opportunity to utilize it,” says Bennett. “It’s very intriguing and we probably will be utilizing it at some point. It’s a very viable way to add color.”

Backlighting the glass can also create a color effect.

“Illuminating the glass can give a dramatic, three dimensional effect to the wall,” says Purcell.

*continued on page 44*

## Coloring Outside the Lines

continued from page 43



In residential settings, bathrooms are popular rooms for colorful glass, such as this one, which features the Dreamwalls glass product.

While the aesthetics and low-maintenance features are important, many are also looking for “green” elements.

“A lot is happening in terms of the environmental impact we’re having on the planet,” says Guinan. “For example, there are wood species that will become extinct, so we are looking at creating a type of finish that looks like wood, but will be on glass. I think we need to be mindful of the environment and look to innovate and get a quality product out there.”

Huskey adds, “These products can also help earn LEED credits and we have guidelines we go through when talking to [architects and designers] about them.”

### Questions and Answers

As with anything new, both designers and suppliers say it’s not unusual for clients to have some concerns over using colored glass products.

“We have to convince them that it’s been around a long time [used frequently in other countries] and has a great track record,” says Purcell.

Bennett agrees.

“Because we do a lot of [work] in very public places, clients always want to

know how it will be maintained or if it will scratch off or break easily,” she says. “As designers, we think about codes and the applications first and a lot of times glass is a good solution because it’s durable and cleanable and it can take some abuse.”

Codes also have to be taken into consideration, particularly if the glass is used in a safety glazing application, which would require it to be laminated or tempered.

But even before answering the questions of how the glass will perform and be maintained, an even bigger concern must be addressed: cost.

“Cost is always a concern and a factor you have to deal with and sometimes [the glass] gets value engineered out of a job,” says Purcell. “It’s like using any type of expensive material—sometimes the project just can’t afford it.”

Bennett agrees that the budget can be challenging, but says it’s all dependent on the owners and the design elements they want the most.

“[Owners] have to make the budget decisions, so it’s up to the designer to convey the importance of certain elements in the project and then it’s up to the owners to decide which elements they want to keep,” says Bennett. “A lot of times there are trade-offs, especially with a small project where, for example, lighting is more important because the room has no windows.

That’s when glass can be viewed as an art piece or it can be looked at as a major element. It can go either way.”

The question of how the product is installed may also be a concern.

“It’s really no different than installing a mirror,” says Huskey, whose company first began as a mirror manufacturer.

“This is another way to help our industry generate more revenue and grow the business. It seems as though the mirror industry has basically been stuck in the bathroom. This [type of product] allows us to get into another important room in the house [the kitchen] and it helps the installer get into another important

room in the house. The benefits will trickle down through the industry as the interest builds up,” he says.

### A Step Ahead

As the demand for colorful, architectural decorative glass grows, suppliers say a continued focus on education will be critical, especially as more and more companies venture into creating their own new products. Industry experts warn that as new products are developed proper research and planning are necessary.

“I think one big issue is educating the architects and designers in the difference in painted glass and coated glass, as paint does not bond to glass,” says Guinan. “Glass is an unusual substrate and the primary difference in paint versus a coating is that with the coating ... there is a chemistry occurring that creates the bond and the durability and track record,” says Guinan. “Warranty is also important. So the bottom line is, when you create a product, what is behind it? Has it been tested and are there warranties and how long has it been around?”

Marxen agrees. “We don’t want it to become a fad that everyone is trying to get into because that will lead to problems. We want to be sure that the quality is strong and durable so it has the long life we want it to have.”

“I hope that if companies start making it they won’t take shortcuts. With this technology it’s not something you go out and buy and start making the next day—it’s not that easy,” says Huskey, who adds that the possibility of increased competition does not bother him. “Right now, I think we are so focused on demand creation that we don’t see competition as a bad thing. We want people to get excited about an industry that’s not very exciting right now. We feel like we’re helping the market grow. The bigger threat,” he adds, “is resistance to change. We have to encourage stepping out of the box and staying on our toes.” 





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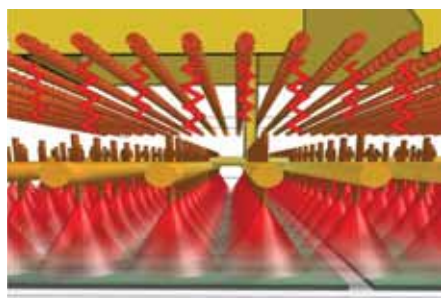
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# ShowCase

## machinery and equipment

### Glaston Helps Fabricators Add Capabilities

Finland-based Glaston has developed a number of solutions to help fabricators move into new application areas, such as low-E glass production, simply by upgrading their existing machinery. Among its offerings are the SuperE™ high speed convection system, which helps fabricators reach



high optical glass quality and high low-E tempering capacity for 0.04 soft coatings. It processes all temperable pyrolytic and soft-coated glass types with relative ease, and features balanced heat transfer and fast cycle times. In addition, the CGS™ coated

## services

### Vitro America™ Glass Systems Now Available in BIM

Vitro America in Memphis, Tenn., is now offering building information modeling (BIM) data on a range of its glass systems. Architects, specifiers, glaziers and others can access its library of BIM objects through the ARCAT® website at [www.arcat.com](http://www.arcat.com).

BIM product models are available for the company's Envision™ glass systems, including all-glass entrances; sliding, stacking, and clad doors; glass walls; handrail systems; and shower enclosures. The company will continue to add other architectural products to its library of BIM models. Users can access its BIM models in a range of file formats, including Autodesk® Revit®, Google™ SketchUp and Bentley Architecture.

▶▶ [www.vitroamerica.com](http://www.vitroamerica.com)

glass system uses profiled air flow by incorporating a focused convection system lengthwise between all upper heating elements. It provides thermally stable glass sheet, and features high optical quality and flexibility for both low-E and traditional glass. The company also offers a low-E kit for VX machines, DE machines and lines to replace the upper belts with softer ones to protect the sensitive low-E coating. Cylindrical brushes keep the belts constantly clean.

▶▶ [www.glaston.net](http://www.glaston.net)

### Somaca Introduces New Vertical Closed Top Washer

The Sommer & Maca Machinery Division of C.R. Laurence Co. Inc. in Los Angeles has introduced its newest 70-inch vertical closed top glass washer—



the SM70V—suitable for general glass cleaning. Using power driven conveyors in all sections, it easily moves multiple or large glass lites through the process at speeds up to 14.7 feet per minute. It can clean and dry glass up to 70 inches tall and ½-inch-thick in one pass. The washer features 100-percent recirculating wash and rinse compartments with low-E brushes as standard.

The final spray rinse also is 100 percent recirculated through a cartridge filter, reducing total water usage. Fluorescent lights on the outlet conveyor aide glass inspection. The drying blower is housed in a filtered sound reducing enclosure. The compact washer is 51 inches deep and 198 inches wide and built from corrosion-resistant stainless steel.

▶▶ [www.somaca.com](http://www.somaca.com)

*continued on page 48*

## metal

### Perforated Panel and Wire Cloth Provide Attractive Building Additions

Los Angeles-based C.R. Laurence Co. Inc. (CRL) now is manufacturing and distributing a wide variety of perforated panel and architectural wire cloth systems for exterior and interior building enhancements. These systems can transform a building's façade, while also offering protection from the sun.

The perforated panels are available in steel, galvanized steel, stainless steel and aluminum. Panel finishes of mill, powder paint, and KYNAR® cover almost any color selection. Stock sheets in various thicknesses are available, and the company can custom-fabricate panels.

The wire cloth systems also can be effectively used on interiors for ceilings, wall paneling and railing infills. It's available in several meshes to cover a wide variety of applications.

▶▶ [www.crlaurence.com](http://www.crlaurence.com)







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## ShowCase

continued

glass

### PPG Sample Kits, White Papers, Help Architects Make Decisions

Pittsburgh-based PPG Industries has a new sample kit featuring its Pacifica and Solarblue glasses, its two newest blue-tinted glasses. In addition to their uncoated versions, Pacifica glass is shown with Vista-cool subtly reflective and Solarcool reflective coatings, and Solarblue glass is shown with a Solarcool coating.



Dark-blue Pacifica glass has VLT of 38 percent and a SHGC of 0.35 when combined with clear glass in a 1-inch insulating glass unit. The result is a LSG ratio of 1.07.

With a VLT of 50 percent and a SHGC of 0.49, the sky blue Solarblue has an LSG ratio of 1.03 in a clear, 1-inch insulating glass unit.

In addition, PPG has published two white papers. One details how its paint, glass and coatings can help building projects earn green certifications; the other helps architects, building owners and others evaluate and compare extrusion coatings warranties from coating suppliers.

▶▶ [www.ppgideascape.com](http://www.ppgideascape.com)

### Grenzebach Automates High-Speed Float Glass Stacking

Grenzebach Corp. in Newnan, Ga., in conjunction with Siemens Industry Inc. of Alpharetta, Ga., is developing a new line of glass-handling equipment with integrated controls systems to provide a fully automated solution to the handling of finished float glass. The first piece is the company's new High-Speed Stacker, which it reports currently is the only device that can stack glass sheets in less than a one-second cycle. The robot-assisted float glass stacker reaches its speed from quickly forming sub-packs of glass and achieves its flexibility by stacking the sub-packs with a robot.

The system's six-axis robots are capable of correcting stacking alignment and creating precise glass stacks. The robots have a payload capacity of up to 220 pounds and also feature integrated energy supply systems to reduce floor space.



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## trucks and transportation MyGlassTruck Launches Options for Sprinter's Glass Vans

MyGlassTruck.com, a division of De-mountable Concepts Inc. in Glassboro, N.J., has released new optional equipment and features for its value line of aluminum glass carriers for Sprinter cargo vans to make delivering and installing glass easier and more efficient for glaziers using the vehicle. Among the new options is a base model roof rack designed to be installed without the need for drilling holes in the vehicle. Fabricated from aluminum or stainless steel, it has three sturdy cross-members with vertical end posts to support ladders and other items during transport.

A full-length welded stainless-steel roof rack conveniently transports ladders, stock lengths of extrusion and other glazing supplies above the roof. It features full-length side rails and is available in an extended model for additional storage above the cab.

An optional interior fold-down glass cutting table offers a level, and protected, work surface at the jobsite. Interior glass carrying racks mounted inside the Sprinter's cargo bay protect glass from the elements and increase the amount of glass that can be transported per trip.

► [www.myglasstruck.com](http://www.myglasstruck.com)

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# NewsMakers

## obituaries

### Viracon Sales Representative Robert (Mitch) McQueen Dies

Robert Mitchell (Mitch) McQueen, an architectural sales representative with Owatonna, Minn.-based Viracon, passed away from a heart attack on January 25 at the age of 47. McQueen worked closely with Viracon clients throughout the Southeastern United States.

"Mitch worked in the glass industry for many years, and he was an important part of our team. Our thoughts and prayers go out to his family and friends during this difficult time," says Garret Henson, director of sales at Viracon.

McQueen is survived by his son Dylan, parents Pete and Gwen McQueen, brother Greg, and nieces Amanda and Rachel.

## new hires

### EFCO Welcomes New Director of Storefront and Sales Agency

EFCO in Monett, Mo., has announced the hire of **James Bateman** as director of storefront. Bateman brings with him 25 years of experience in all aspects of storefront sales, product development and operations to this new position. He will be responsible for EFCO's storefront business including its service center operations.



**James Bateman**

EFCO also has added a new sales agency for Florida in Fenestration Specialties LLC. **Harry Argyros** is the president of Fenestration Specialties. Argyros has several years of industry

experience and his agency will represent EFCO in Central, North and South Florida including the Orlando, Jacksonville and Ft. Lauderdale/Miami markets.

### Tubelite Hires Sales, Engineer Managers

Tubelite Inc. in Walker, Mich., has hired **Mike Nicklas** as a national sales manager. Nicklas will work in close collaboration with the company's client development managers, marketing, client services and engineering staff. Before joining Tubelite, Nicklas served as the architectural sales and



**Michael Nicklas**

*continued on page 52*

## Three coatings. ONE machine.

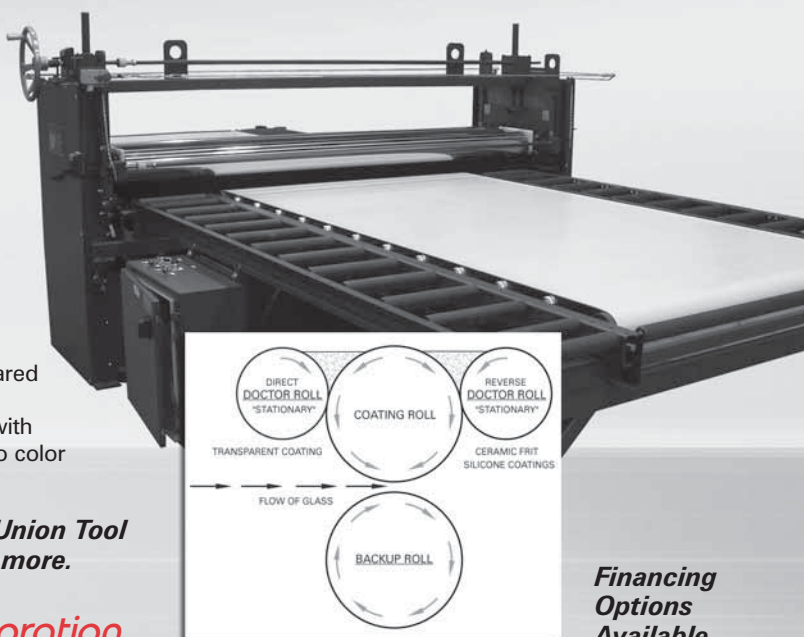
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# Hole-y COW!

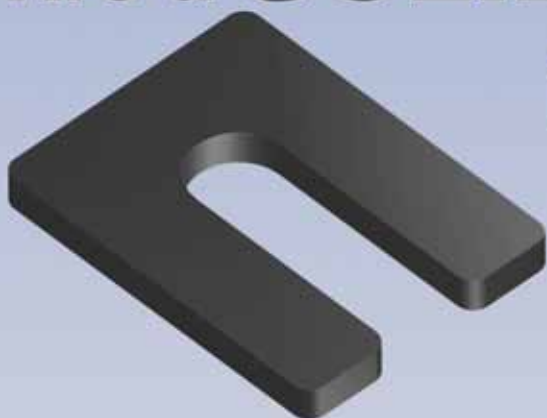
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## NewsMakers

continued



**Steve Wilkening**

marketing manager at J.E. Berkowitz L.P.

In addition, Tubelite has hired **Steve Wilkening** as an engineering manager helping to expand the

company's architectural aluminum products nationwide. He draws from a 25-year career in engineering fenestration, entrances and related building products, most recently as the vice president of engineering for Caldwell Manufacturing.

## Schmidt to Represent Erdman's IG Machines

Erdman Automation in Princeton, Minn., has named **Michael Schmidt** as its new IG machine sales specialist. In his new role, Schmidt will focus on expanding the company's IG equipment offerings for commercial and residential applications.



**Michael Schmidt**

In addition to managing a glass fabricating facility for several years, Schmidt also previously spent several years applying process solutions and equipment sales for Lisec America Inc.

## Texas Tempered Glass Has a New VP of Operations

Texas Tempered Glass Inc. (TTG) in Houston has hired **Bob Larson** as its vice president of operations. Larson brings 26 years of experience in glass fabrication to TTG. He joins the company after 19 years at Craftsman Fabricated Glass Ltd. where he served as vice president of sales and marketing.



**Bob Larson**

## promotions

### C.R. Laurence Promotes Lara

Los Angeles-based C.R. Laurence Co. Inc. (CRL) has promoted **Dora Lara** to the position of Spanish business manager. As such, she will spearhead efforts to translate the company's website and computer files, as well as other materials, to Spanish.



**Dora Lara**

Lara has worked for more than three years as a trainer/translator in the company's human resources department, where she translated the company's marketing media into Spanish. She also supported the company's overall training program. ■



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ELL01



ELL05



ELL02



ELL04



## Envision Table Assembly



Lower Assemblies

Upper Assemblies



Middle Assemblies



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[datebook]

## Reviews & Previews

### MIT Hosts Conference on Glass and Glazing

Technology & Conservation, the MIT Department of Architecture's Building Technology Program and the Boston Society of Architects/AIA's Historic Resources Committee is hosting a conference and training program on glass and glazing. "Glass & Glazing in the 21<sup>st</sup> Century" will focus on developments in architectural glasses for structural, energy saving and decorative uses in new building facades, envelopes and monuments, as well as their application in the restoration and upgrading of existing structures.

All of the sessions are designed to offer attendees insights into the performance of glass and glazing in the outdoor environment and the appropriate selection, specification, use and maintenance of glass materials for existing and new buildings and artistic works.

This 2-day conference will be held March 20-21, 2010, on the MIT campus in Cambridge, Mass. The conference will be followed on March 22, 2010, by an optional stained glass program. Registration is on a first-come, first-served basis.

Among the topics to be discussed are: the basic material properties of glass; the role of thermal, mechanical, structural and chemical properties on performance and durability; the effects of environmental conditions; how these material characteristics and interactions need to be considered in specifying glass for new designs and for restoration/preservation projects; and new developments in manufacturing and fabrication operations and in construction techniques.

The conference speakers include more than 25 noted speakers. Among them, James Carpenter of James Carpenter Design Associates Inc. will present on "The Structure of Transparency: Light in the Public Realm;" David A. Wennekamp, project executive for Ipswich Bay Glass Co. will offer an "Installer's Viewpoint;" Christopher Barry of Pilkington will speak on "Manufacturing Developments and Fabrication Techniques/Limitations;" Viracón's Don McCann's will present on "Coatings on Glass and Fritting;" and Stephen Selkowitz of Lawrence Berkeley National Laboratory will talk about "Energy and Sustainability Aspects of Glass/Glazing: Realistic Expectations."

► [committees.architects.org/hrc](http://committees.architects.org/hrc)



[datebook]

## Up&Coming

### NORTH AMERICAN EVENTS

#### March 1-5, 2010

**Blast-Resistant and Anti-Terrorism Design**  
Sponsored by Protection Engineering Consultants.  
Drury Inn & Suites.  
San Antonio, Texas.  
Contact: Protection Engineering at 512-380-1988 x305.

#### March 16-17, 2010

**Glass Expo Midwest™ '10**  
Sponsored by USGlass Magazine.  
Renaissance Schaumburg Hotel and Convention Center.  
Chicago.  
Contact: USGlass magazine at 540/720-5584.

#### March 20-21, 2010

**Glass and Glazing in the 21st Century**  
Organized by Technology & Conservation, the MIT Department of Architecture's Building Technology Program and the Boston Society of Architects Historic Resources Committee.  
MIT.  
Cambridge, Mass.  
Contact: Susan Schur at 617/623-4488.

#### March 24-28, 2010

**Glass Week**  
Sponsored by the Glass Association of North America (GANA) and the Insulating Glass Manufacturers Alliance (IGMA).  
Paris Las Vegas.  
Las Vegas.  
Contact: GANA at 785/271-0208.

#### March 28-30, 2010

**BEC Conference**  
Sponsored by GANA.  
Paris Las Vegas.  
Las Vegas.  
Contact: GANA at 785/271-0208.

#### April 15-16, 2010

**Glass TEXpo 2010™**  
Sponsored by USGlass Magazine.  
El Tropicano Holiday Inn Riverwalk.  
San Antonio, Texas.  
Contact: USGlass at 540/720-5584.

#### April 21, 2010

**Glass Expo 2010**  
Sponsored by the Mid-Atlantic Glass Association.  
Martin's Crosswinds.  
Greenbelt, Md.  
Contact: Maureen Heavner at 301/831-8338.

#### May 11-14, 2010

**Construct 2010**  
Sponsored by Hanley Wood Exhibitions.  
Pennsylvania Convention Center.  
Philadelphia.  
Contact: Show organizers at 866/920-0208.

#### June 6-9, 2010

**AAMA National Summer Conference**  
Sponsored by AAMA.  
Oak Brook Hills Marriott Resort.  
Chicago.  
Contact: AAMA at 847/303-5664.

#### June 10-12, 2010

**AIA Annual Convention**  
Sponsored by the American Institute of Architects (AIA).  
Miami Beach Convention Center.  
Miami.  
Contact: AIA at 800/242-3837.

#### July 13-15, 2010

**Intersolar North America**  
Organized by Solar Promotion International GmbH.  
Moscone Center West.  
San Francisco.  
Contact: Mirko Wutzler at 415/248-1257.

### INTERNATIONAL EVENTS

#### March 24-27, 2010

**Fensterbau/frontale 2010**  
Organized by NürnbergMesse GmbH.  
Exhibition Centre Nuremberg.  
Nürnberg, Germany.  
Contact: Show organizers at 49 (0) 9 11. 86 06-0.

#### May 6-8, 2010

**Glass South America**  
Sponsored by Nielsen Business Media.  
Transamerica Expo Center.  
Sao Paulo, Brazil.  
Contact: Show organizers at 55 11 4613-2003.

**Send your events to editor**  
Megan Headley at  
mheadley@glass.com



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*continued on page 58*

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## theBusiness

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in this country over the past 30 years was not impacted by anyone as much as it was impacted by Joe Kellman.

**Burping The Alphabet:** Most of the people who responded to the article about my grandson Ryan were grandparents themselves. And a special thank you to those who shared a funny grandchild story of their own. And, by the way, while I am not against a little fabrication when I'm putting an article together, the story about Ryan and burping the alphabet is based on an actual occurrence. After his story came out, I took a little heat from his sister Sydney as well as a couple of my other grandkids who now want stories of their own. I may have created a monster here. Oh, and by the way, for Christmas Ryan received a ballpoint pen with a built-in recording of a man burping the alphabet ... and yes, the man struggles with the "W" just

as Ryan would have predicted. Apparently Santa Claus reads USGlass.

**Strategic Alliance ... helping to settle a bet:** Okay, under normal circumstances I would not do this but because I'm told that there is a lot of money riding on this and that two old friends are not speaking to each other until this is resolved, here is the information they are looking for: In February of 1994, I wrote an article that described a strategic alliance as follows ... "Let's suppose that you have a can of soup but no can opener. Someone you know, maybe even a competitor, has an opener but no soup. At some point, hunger takes over and even though you might not normally deal with each other, you each have something the other can use and needs. Ultimately, you form a strategic alliance, make a deal to cooperate for

the mutual benefit of both, sell the soup and opener to the highest bidder and order yourself a nice large pizza."

**THANK YOU:** Thank you so much for letting me ramble on a bit here. And, again, if I don't always answer an e-mail as thoroughly as someone might like, it might be because my day job is a little demanding right now. But please always know that the comments are appreciated. And lastly, I wish you all well in these very demanding and troublesome economic times. Hang in there! ■

## the author



**Lyle R. Hill** is president of MTH Industries of Chicago. Mr. Hill's opinions are solely his own and not necessarily those of this magazine.

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## theBusiness

# Some Answers ... Some Explanations

by Lyle R. Hill

**A**s hard as I try, I don't always get to answer people who call or, as most do, send an e-mail commenting about something I've written or been credited with saying. I always try hard to thank people for making contact but usually I can't spend as much time as I'd like to fully answer those very nice people who make contact. Not that all of them are nice mind you. Every now and then I get a real zinger. Some people are just way too sensitive. But I sometimes feel guilty when I don't fully respond or answer someone who has taken the time and made an effort to make contact with me.

So now ... right now ... I am going to answer or respond to a number of individuals who have contacted me about the same basic topic during the past several weeks. This allows me to respond to a whole bunch of people at once and provides me with a cleaner conscience with respect to my obligations to those people kind enough to read and react to my monthly offerings. Okay ... so here we go!

**The Newt Gingrich Article:** This article (which dealt with an invitation to come to Washington D.C.—where I was promised not to be treated like a cow—and receive an award while spending time sharing my ideas with Newt on how to turn the economy around) created an inordinate amount of contacts. It was particularly interesting that responses to this article followed

partisan lines. Democrats loved it and some told me that they had shared it

with others of a similar persuasion. On the other hand, a couple of Republicans really took me to task for making fun of a truly "Great American Statesman." One told me that he had actually sent a copy of the article to Newt himself! By the way, I'm an Independent ... I was simply trying to point out the absurdity of the offer. But here's the real beauty in this one. I actually got a follow-up letter from Newt and Callista ... I presume that Callista is the current Mrs. Gingrich ... asking me to join them in yet another dinner where the legacy of Ronald Reagan would be remembered and honored. I loved Ronald Reagan. He was one of my favorite cowboys. I think he was in the Twenty Mule Team thing when I was a kid. If I could have afforded it, I would have gone to this one. Oh well.

**Johnny "The Mooch" Rago & Jungle Jim Bruney:** Both are doing well and thank you to those who have asked about them. The "Mooch" was in a terrible accident more than a year ago but is slowly recovering and it won't be too much longer until he is out and about once again terrorizing the citizenry of greater Chicagoland. There were a lot of rumors floating around about his accident, but it was not ... and here I quote the "Mooch" himself ... "like some premeditated thing where some bozos was trying to even up some kinda score or something. Nobody but me would be stupid enough to mess with somebody like me." As for Jungle Jim, he is currently in the government's witness protection program and recently told me that he has enjoyed getting out of Chicago and taking up residence in a log cabin on the east end of Main Street in Estes Park, Colo. If anyone is interested he drives a 2006 red Impala with license plate number TK 8594.

**Joe Kellman's Passing:** I was amazed at the number of people I heard from after the Joe Kellman article appeared. Many were former employees to whom I hadn't talked in many years. I could go for hours telling very true Joe Kellman stories but those stories have the greatest impact on those who knew him best. He really was bigger than life and he meant a great deal to me personally and professionally. He and his wife Lou Anne attended each one of my kid's weddings and perhaps the one that I most appreciated him attending was Patrick and Renee's. He wasn't in the best of health at the time and traveled by limousine from Chicago to Waukesha, Wis., to attend the event. He made it through the ceremony but couldn't get through the reception and spent the night in Waukesha. I told him how much it meant to me that he had gone to such lengths to be there. As only Joe Kellman could do, he gave me a slap and said "What, are you crazy? I never did like you but I think you got nice kids."

I was also particularly impressed with the variety of people who showed up for the public viewing at the Kellman Community Center in Chicago's very tough Lawndale neighborhood. There were politicians he'd help get elected and former convicts for whom he'd found jobs going through the same line paying their final respects. And believe me when I say that the auto glass industry



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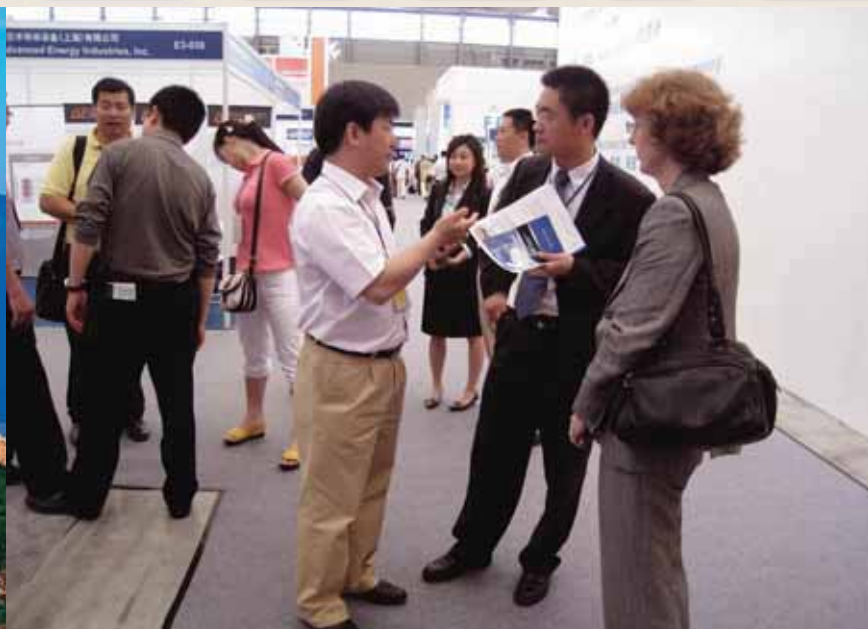
## Back to Beijing

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# Back in Beijing

## China Glass 2010 is Set for June

**M**aybe this is the year to try something a little different. Maybe look for the deal on new equipment and machinery; maybe tour another company's facility to get a new perspective. Maybe this is the year to attend China Glass. The Chinese Ceramic Society is welcoming attendees from around the world to Beijing June 4-7 for the 21<sup>st</sup> edition of China Glass.

### What to See at the Expo

China Glass alternates annually between Beijing and Shanghai, but each year draws in international crowds. Last year's event featured 836 exhibitors from 23 countries, and attracted 43,277 attendees from 92 countries.

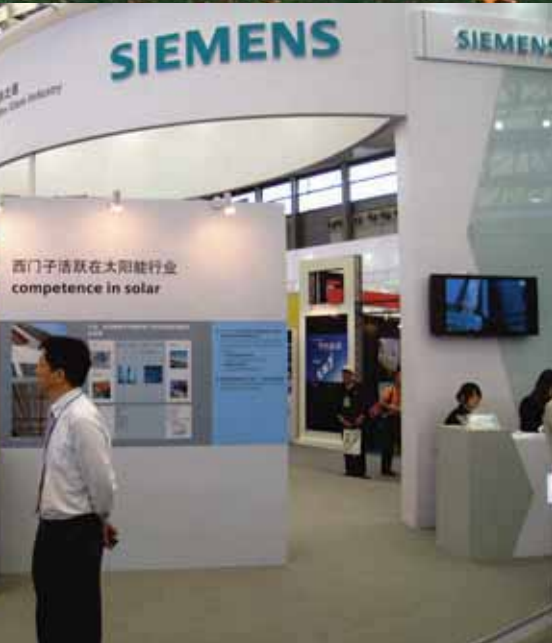
If you've attended in the past you won't recognize this year's venue; the new China International Exhibition Center opened just last year (maps and

directions to the new center are available at [www.ciec-expo.com](http://www.ciec-expo.com) as well as on the official China Glass website). Organizers report that they're very excited about the new venue's proximity to the airport. The show will occupy four halls in the new space.

This year, China Glass will still focus on solar/photovoltaic glass manufacturing and new energy saving glass technologies, in addition to other seg-







### Share Your Trip!

Have you already booked your flight to Beijing for China Glass 2010? Let us know!

E-mail [mheadley@glass.com](mailto:mheadley@glass.com) with your thoughts on and stories from the expo. Don't forget to pack your camera!

### More Information?

To learn more about China Glass 2010, and to register, visit [www.chinaglass-expo.com](http://www.chinaglass-expo.com).

ments of the architectural, automotive and industrial glass industry.

Exhibitors will have on display a range of products from finished architectural and decorative glass to fenestration and hardware fittings, as well as automotive and industrial glass products. The event also encompasses production line machinery and technology, as well as equipment for processing glass products—cutting, grinding, beveling, polishing, drilling, tempering, laminating, coating, insulating, mirror-making, sand-blasting and processing of doors and windows.

And once again, photovoltaic (PV) glass, modules, components and the machinery for processing it all, will be among the highlights.

### Going Green with GPD

In addition, attendees can arrive early for GPD China 2010, to be held in Beijing on June 2-3, just before China Glass 2010. The theme is being developed along the lines of “Going Green with Glass” to highlight the potential of glass as a key element in energy-efficient building solutions. Conference papers are still being accepted through this month, so be sure to look for more information on this noteworthy conference in future issues of **USGlass**. You can also visit [www.gpd.fi](http://www.gpd.fi) for more information, and to register.

### Enjoying Beijing

For first-time visitors to China, Beijing is a perfect introduction to this country's remarkable history and culture. It's here that visitors will have the opportunity to view the world's largest urban space area, Tiananmen Square, which is able to hold up to a million people. Here too you can visit the Forbidden City, or Imperial Palace, that was the center of the Chinese empire for nearly five hundred years. And Beijing provides a perfect entry point

### North American Exhibitors

When you find yourself at China Glass overwhelmed by new products, foreign language and jet lag, come by the U.S. Pavilion to discuss with colleagues your impressions of the event as compared to those more familiar trade shows back home. Among the U.S. exhibitors are the following:

- Applied Materials
- Eclipse – Combustion Tec
- Glassline Corp.
- Glasstech Inc.
- Henry F. Teichmann Inc.
- Merkle International Inc.
- M.H. Detrick Co.
- Process Materials Inc.
- Ramsey Products Corp.
- Soleras LTD
- Strutz International Inc.
- Toledo Engineering Co. Inc.

to the Great Wall, which the *Insight City Guide: Beijing* calls the pinnacle of 2,000 years of wall building (and you thought your projects dragged on forever!).

This guidebook also suggests a number of tasty treats during a networking lunch or dinner, starting with the city's signature dish, Peking Duck. It also suggests sampling snacks such as jiaozi (meat and vegetable filled pasta) and baozi (steamed buns filled with vegetables and mincemeat), or enjoying a Mongolian hotpot (combing fondue-style cooking with unlimited meat and vegetable). In Beijing you can try food originating from all over China, letting you tour the country gastronomically without venturing far from the expo center (although more Western fare also is common).

If you need help booking a room or want to plan your way around town, check out the expo site at [www.chinaglass-expo.com](http://www.chinaglass-expo.com). ■