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Virtual Realities

If you dream it, they can build it—experts from leading high-tech firms discuss the intersection of technology, sustainability, and design

By Matt Alderton

The world is full of buildings that defy imagination. The Atomium in Brussels, though built in 1958, looks like a giant 21st-century atom. BMW's new architectural showroom in Munich features a glass double-cone structure and a floating roof that would make Sir Isaac Newton go cross-eyed. And, in Singapore, the Marina Bay Sands "SkyPark" is longer than the Eiffel Tower is tall; perched atop three hotel towers, it looks as if it could slip off its pedestal at any moment—but magically it doesn't.

In the Roman age, architects used technology to build aqueducts. In the industrial age, they used it to fabricate steel and erect skyscrapers. And today? We at gb&d asked three tech-savvy executives how they're using technology in the digital age to collaborate, create, and conserve.

- Anthony Birchler** of *A. Zahner Co.*
- Faisal Noor** of *James Law Cybertecture*
- Nader Tehrani** of *NADAAA*

<Click on the names to jump throughout the article. Companies link to their websites>



PROJECT/ ART GALLERY OF ALBERTA
YEAR/ 2010
LOCATION/ EDMONTON, AB
TYPE/ GALLERY

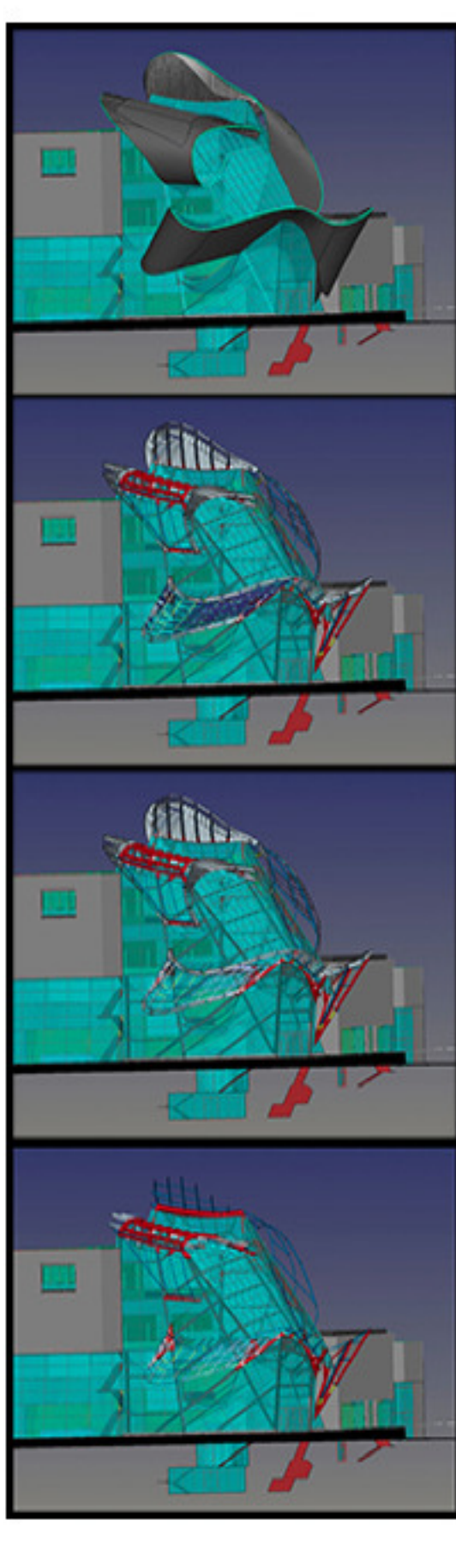
A. ZAHNER CO.

For A. Zahner Co., the engineering and fabrication company known for its glass- and metalwork—including, for instance, on the famed facade of Seattle's Experience Music Project—technology is a vehicle for innovation. "Our clients are architects, designers, and artists," says Anthony Birchler, vice president of engineering/sales. "They're the ones who are always going to be pushing the boundaries, and we're right next to them pushing."

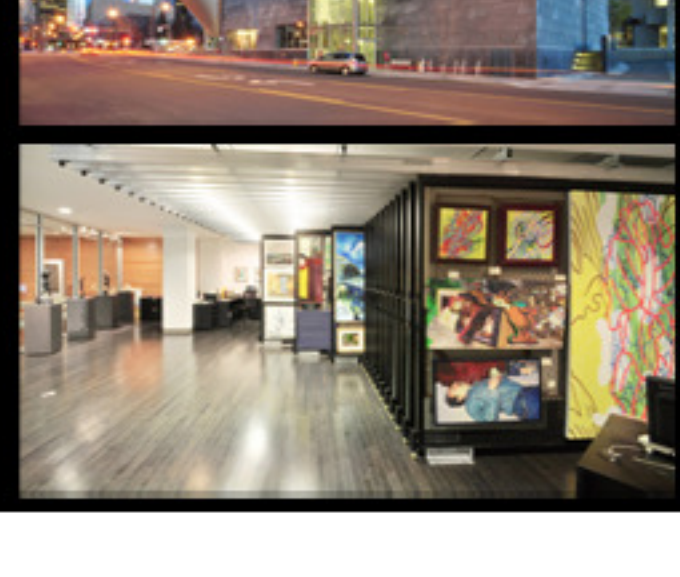
According to Birchler, the No. 1 technology that's pushing boundaries in architecture and engineering is collaborative 3-D modeling. "We had a WebEx meeting the other day," he says. "We were here in Kansas City, and we had people in Austria, Italy, Germany, and New York. We were speaking three different languages: German, Italian, and English. However, we had a shared model that we were all looking at in real time. It's a common language for the team. Maybe you didn't know what someone was saying, but you saw them working on the model, and you understood what they were doing. That's huge."

The third dimension is equally useful during installation. "A lot of our sites are extremely complex, so you have to know where the steel or concrete is," Birchler says. "What we often do is take a digital scan of the building to find out where things actually reside compared to where they should be. In the long run, that actually makes a much better building because everyone's now accountable."

When it designed the Fairmont Pacific Rim in Vancouver, BC, Zahner used 3-D modeling to virtually design a cutting-edge stainless-steel facade on which it etched, using a series of perforated holes in the metal, the image of an old-growth cedar forest. The 3-D model allowed the client to preview the image on the front end, and it allowed Zahner to save time, money, and materials on the back end. "Because everything is digitally defined, we can nail down exactly how much material we need," Birchler says. "It allows us to order less material, which saves energy because you don't have to produce the raw material to begin with."



WINTER'S ADVERSARY. Designed for the northern climate, the ribbon's exterior swoops contain glycol loops that melt the copious amounts of snow that fall during Edmonton winters, reducing the building's structural load. The steel element also is paneled with Zahner's proprietary stainless-steel Angel Hair surface, which nearly eliminates harsh glare from the sun and keeps the interior cool. And, 3-D modeling software allowed the Borealis to be produced with minimal scrap-metal waste, all of which was recycled. What once was a 1960s Brutalist structure is now an architectural landmark of the city's core.



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PROJECT/ THE CAPITAL
YEAR/ 2012
LOCATION/ MUMBAI, INDIA
TYPE/ OFFICE

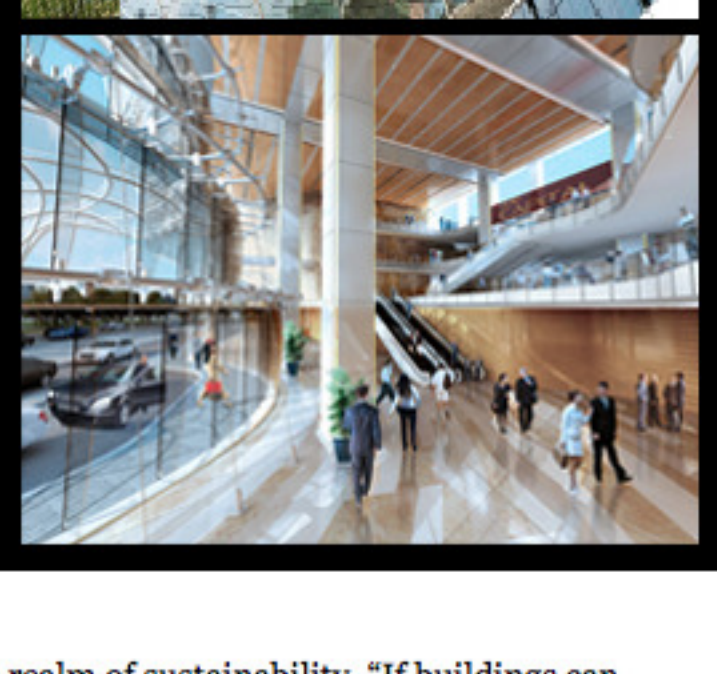
James Law Cybertecture

At the office of James Law Cybertecture, a single tagline—"Innovating the fabric of mankind"—fuels virtually every project in the firm's portfolio, each one possessing a fusion of technology and design that the firm calls "cybertecture." "Technology has helped the designer envision the built environment far more than before and push new forms to greater heights," CEO Faisal Noor says. "What it currently lacks, though, is the ability to empower the end-user's life more actively, in spatial experience and practical comfort. That's where cybertecture comes in, to activate the spaces and forms with technology so as to empower the end-user. We believe that the future will allude to a new built environment where the actual fabric itself is active and reactive to the user rather than just [being] a floor or wall or ceiling."

James Law Cybertecture's approach to technology is evident in projects such as the Pad in Dubai, UAE, a residential tower in which 230 "intelligent" apartments offer features such as virtual views, which are real-time video feeds projected onto the walls from any of 62 global destinations; rotating rooms that facilitate views on either side of the waterfront building; reactive music and lighting that respond to tenants' moods; and bathrooms that monitor tenants' weight, fat content, temperature, and blood pressure.

Using technology to transform buildings into such holistic environments also has enormous potential in the realm of sustainability. "If buildings can ... evolve with technology, making them more than just spatial boxes but actual spatial environments where the fabric reacts actively and passively to the conditions, then there is progression in design," Noor says. "This calls for taking what's in stock and enhancing their use further, such as the systems we have used using solar and water harvesting systems—tied in with cogeneration systems—to actively make the building function as a machine to both serve and sustain habitation."

ONLINE VALET. The stepped-in, glazed façade on the building's western exposure is one of the project's most distinct features. Another is its smart parking system, which has been designed to increase efficiency.



THE SKY LOBBY. A brightly lit three-level lobby with lush vegetation and large waterfalls contributes to the cooling of the building. The Capital's design is raising the profile of Mumbai's new office buildings.



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PROJECT/ HINMAN RESEARCH BUILDING
YEAR/ 2011
LOCATION/ ATLANTA, GA
TYPE/ EDUCATIONAL

NADAAA

At NADAAA, the new firm of well-known architect and educator Nader Tehrani, technology informs not only design but also design processes. "Digital fabrication has enabled mass customization," Tehrani says. "If modernity produced mass production—the ability to produce high volumes through

repetition—what is interesting now is how digital construction enables a greater level of customization with the same level of efficiency. ... Within this context, digital fabrication enables architects to integrate their design practices with engineering practices. So you no longer design alone. You are harnessing your collaborative efforts to integrate a complex web of relationships between things that are conventionally understood to be disaggregated in separate realms of the building."

NADAAA's Helios House, a stunning, eco-friendly BP gas station in Los Angeles, was built using a design-build fabricator to create several prefabricated components off-site, which were later assembled on-site. It is a project that used digital fabrication to simultaneously achieve customization and integration, and the result was not only high-tech but also sustainable.



Digital fabrication enables architects to integrate their design practices with engineering practices. So you no longer design alone.

—NADER TEHRANI, FOUNDRING PRINCIPAL, NADAAA

"Traditionally, the way one is taught in school, one goes from a diagram and then develops the building details at the tail end of the process," Tehrani says. "We turn this process upside-down. We're dealing with problems of value engineering from day one because we understand that if you make smart choices from the beginning, they leverage different possibilities of savings, of efficiency, and ultimately of pleasure."

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DESIGNING FOR FUNCTION. The open floor plan of the space, which was designed to achieve LEED Gold certification, offers an array of uses while a suspended mezzanine offers another layer of functional space to the high bay. One unique element of the space is its mesh-covered, bent-steel-plate staircases, which lead to offices on the upper level.

