



MATERIAL SCIENCE

BY JOHN COMAZZI



SEEYOND ENCLOSURE

Mobile, organically shaped office partition/meeting pod with programmable LED lighting

SEEYOND



Architecturally notable buildings and interiors often come in complex shapes and materials. Their boundary-pushing designers often come to Minnesota to work with specialists in innovative framing techniques and material fabrication.

I recently shared a meal with Neil Meredith, a former colleague of mine who now works for Gehry Technologies, an offshoot of Frank Gehry's architecture practice. Neil was in the Twin Cities on business to meet with a variety of companies that specialize in innovative fabrication technologies and material assemblies. Gehry Technologies is a consulting firm that provides integrated design solutions and project delivery assistance to architects, engineers, and contractors working on complex projects—

buildings, for example, with dramatically curved facades or interior walls. Over dinner, Neil explained that Minnesota is a hotbed of material manufacturers and fabricators that help to make these complex buildings possible.

The more Neil spoke, the more I realized there was something unique about the development of these firms in Minnesota. First and foremost, they have all been willing to take risks and engage with designers working on unconventional projects, and this in turn has forced them to rethink their own approaches to design and project delivery. Second, many have made significant breakthroughs by transforming rather ordinary materials and building systems in extraordinary ways.

These companies, it turns out, are quietly revolutionizing the role of materials research, fabrication, project delivery, and construction sequencing for architects and builders alike. And while many of these firms have deep roots in Minnesota's manufacturing base, they represent an altogether different breed of fabrication shop than those of the first generation of manufacturing.

Eager to gain a competitive edge among their peers in an increasingly dynamic global building industry, Minnesota-based companies such as M.G. McGrath, Spantek, Radius Track Corporation, Enclos, Permasteelisa Group, and Liberty Diversified International have developed new

and innovative applications of their original product lines, or have created new product lines and processes altogether. All have retooled their operations to integrate digital technologies and parametric design into their production cycles. (Parametric modeling streamlines design and fabrication by embedding quantitative and qualitative information in the digital model so that the information is automatically updated when changes are made to any of the digital components.)

In many ways, this new generation of fabricators is getting out ahead of designers by anticipating their needs before they arise. In fact, many of these companies consult with architects earlier in the project timeline than ever before, or even have designers on staff, to help direct research and development.

RYAN FRENCH

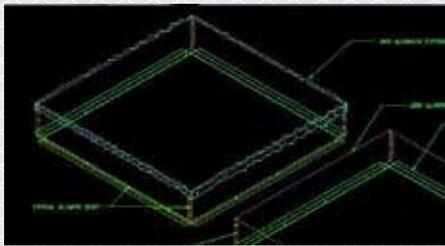


WALKER ART CENTER EXPANSION
Herzog & de Meuron Architekten
Minneapolis, Minnesota, 2005
Expanded aluminum by Spantek;
aluminum framing and fabrication
of the expanded aluminum panels
by M.G. McGrath

FEATURED FABRICATOR

M.G. McGrath

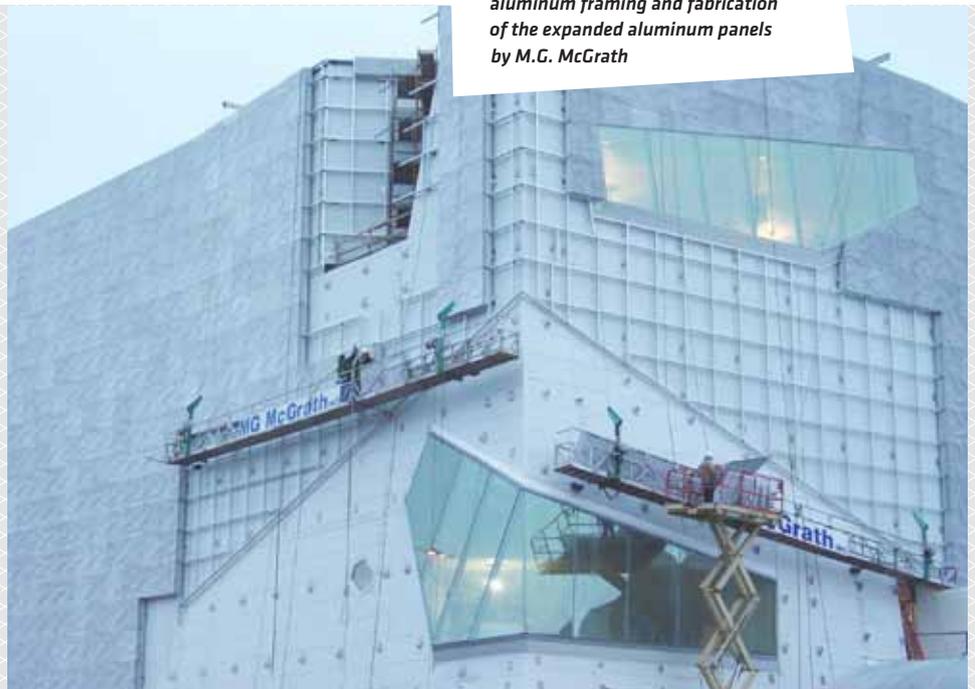
Founded in 1985, this Maplewood-based sheet-metal company specializes in fabrication, installation, and distribution of numerous custom metal types and finishes for a wide range of architectural projects.



IMAGES PROVIDED BY M.G. MCGRATH



MARK LASALLE, M.G. MCGRATH





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Robert Siegel Architects
 Calais, Maine, 2009
*Expanded aluminum by Spantek;
 aluminum framing and fabrication
 of the expanded aluminum panels
 by M.G. McGrath*

Risk and Reward

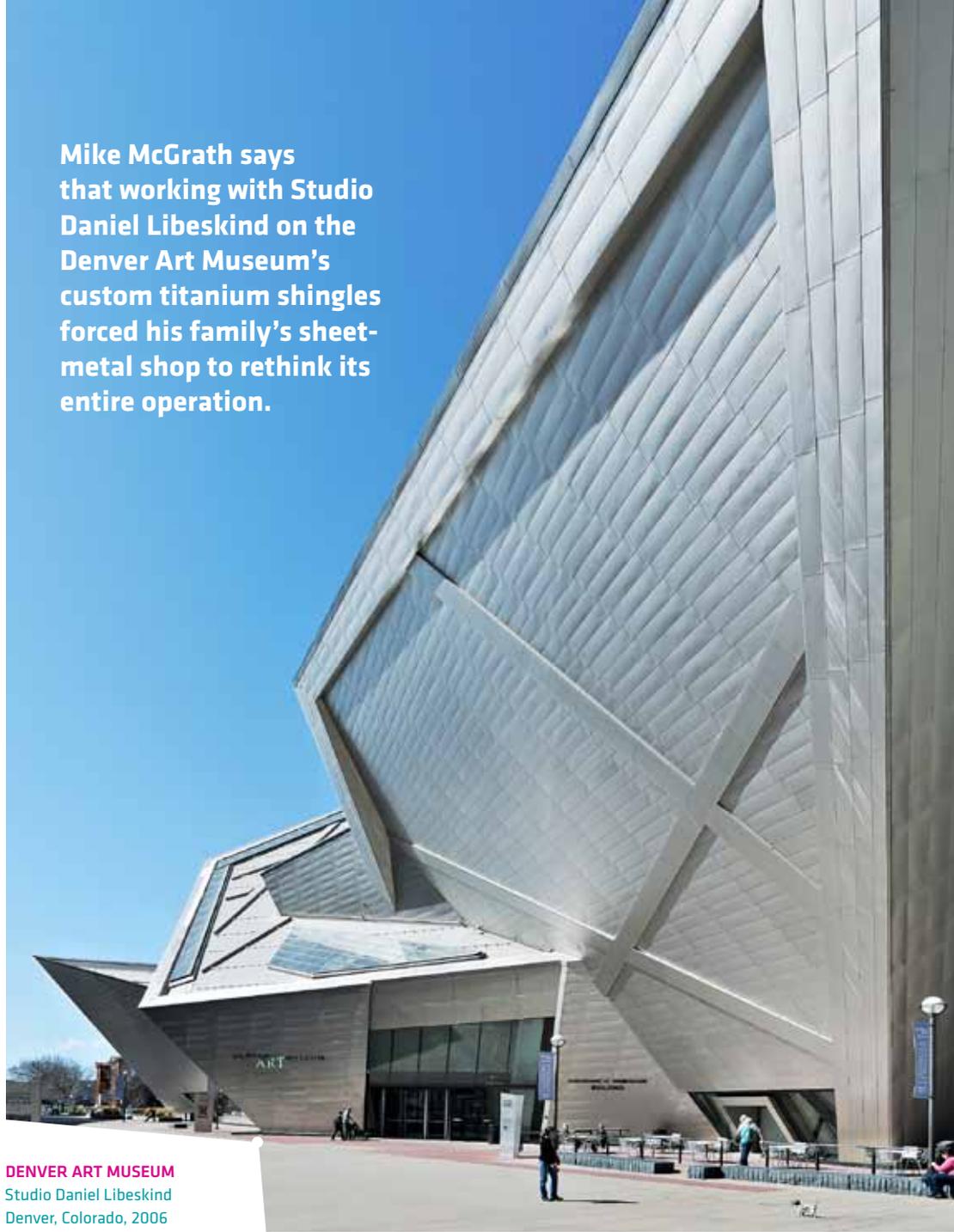
These firms are not simply providing easier, faster, and less expensive solutions for traditional design and construction challenges (although they do that, too). Rather, they are showing that investing in research pays off in not only new approaches to design and construction but an expansion in the scope of their practices. By taking this ambitious tack, they have been able to transform the core of their operations while anticipating, if not outpacing, the aspirations of the designers and architects with whom they work.

“Manufacturers and fabricators have so much expertise to offer designers throughout the design process,” says HGA project architect John Cook, FAIA, who has worked with Spantek and M.G. McGrath on several projects. “I find it absolutely fascinating to visit a shop when mockups are in production and to see all of the processes in play to find solutions to the challenges of fabrication and construction. The knowledge flows in both directions, and we take the lessons learned from one project into the next.”

As a result of their research and investment in new technologies and applications, all of the companies interviewed for this article have seen an increase in their projects and product lines over the past two decades, and all foresee even more. Furthermore, their willingness to innovate and take risks has led to collaborations with some of the world’s most celebrated architects, including Frank Gehry, Herzog & de Meuron, Daniel Libeskind, Sejima and Nishizawa, and Moshe Safdie.

Mike McGrath, president of M.G. McGrath, Inc., says that working with Herzog & de Meuron and HGA on the Walker Art Center’s anodized

Mike McGrath says that working with Studio Daniel Libeskind on the Denver Art Museum’s custom titanium shingles forced his family’s sheet-metal shop to rethink its entire operation.



DENVER ART MUSEUM
 Studio Daniel Libeskind
 Denver, Colorado, 2006
*Custom titanium shingles
 by M.G. McGrath*

expanded aluminum panels, and with Studio Daniel Libeskind on the Denver Art Museum’s custom titanium shingles, forced his family’s sheet-metal shop to rethink its entire operation. “The needs and the interests we were seeing were in the areas of complex geometries and mass customization, so we made new hardware and software purchases and retooled the technology in our shop to talk between machines,” he explains. “This entailed significant allocations of time and resources and required us to hire a lot of new

people to run the machines, write the software scripts, and forge new partnerships with firms like Gehry Technologies.”

Ordinary to Extraordinary

Some innovations in design and project delivery, such as the ones implemented by M.G. McGrath, come at great expense. Others come by pushing rather ordinary materials and processes to new and extraordinary ends. Architect Chuck Mears, FAIA, founder and chief design officer of Radius Track Corporation, took the latter route in 1996 while operating a construction company



PHOTOS PROVIDED BY RADIUS TRACK



FEATURED FABRICATOR

Radius Track Corporation

This Minneapolis firm knows “the art and science of simplifying the curve.” Its offerings include BIM and 3D modeling services, custom curved framing, tools for forming curved studs and track, and hand-bendable framing materials.

EDMONTON INTERNATIONAL AIRPORT CONTROL TOWER
 Gehry Technologies
 Edmonton, Alberta, Canada, 2012
Facade framework components by Radius Track Corporation

WEISMAN ART MUSEUM EXPANSION
 Gehry Partners
 Minneapolis, Minnesota, 2011
Stainless-steel panels (left two canopies and bridge skirt below) by M.G. McGrath

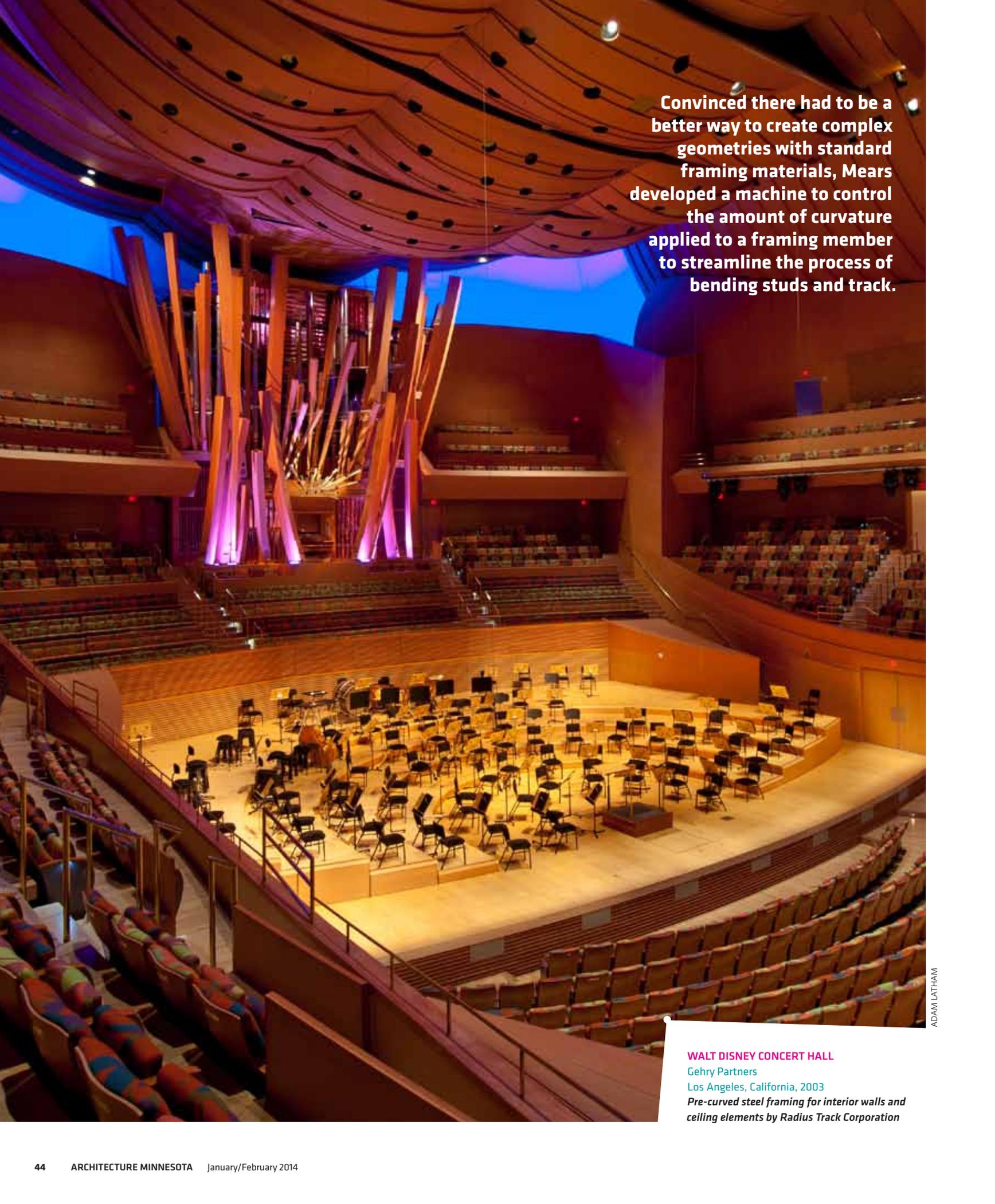


RADIUS TRACK



NEW WORLD SYMPHONY
 Gehry Partners
 Miami, Florida, 2011
Interior framing materials by Radius Track Corporation

RIK SIERRA, COURTESY OF WEISMAN ART MUSEUM



Convinced there had to be a better way to create complex geometries with standard framing materials, Mears developed a machine to control the amount of curvature applied to a framing member to streamline the process of bending studs and track.

WALT DISNEY CONCERT HALL

Gehry Partners

Los Angeles, California, 2003

Pre-curved steel framing for interior walls and ceiling elements by Radius Track Corporation

ADAM LATHAM

specializing in commercial interiors. The firm had been commissioned to develop a curve-filled expansion of an Atlanta restaurant in time for the Summer Olympics that year, and Mears knew that “cutting and strapping straight steel stud and track members to make them into curvilinear forms” would jeopardize the project’s tight schedule.

Convinced there had to be a better way to create complex geometries with standard framing materials, he developed his own machine to control the amount of curvature applied to a framing member to streamline the process of bending studs and track. After a bit of experimenting, tinkering, and testing with his new machine, Mears was able to

produce, with great precision, all of the custom parts needed to frame the entire space in only three days. His new bending machine worked, and it was easy to use at the job site. In addition to generating precisely curved stud and track, it reduced construction debris compared to the traditional snip-and-strap method.

Before the project started, Mears applied for a patent on his machine design, and within months Radius Track was advertising new products and services to roll, crimp, and bend steel track and stud into simple arcs or compound custom shapes. The firm went on to design and supply framing materials for such complex projects

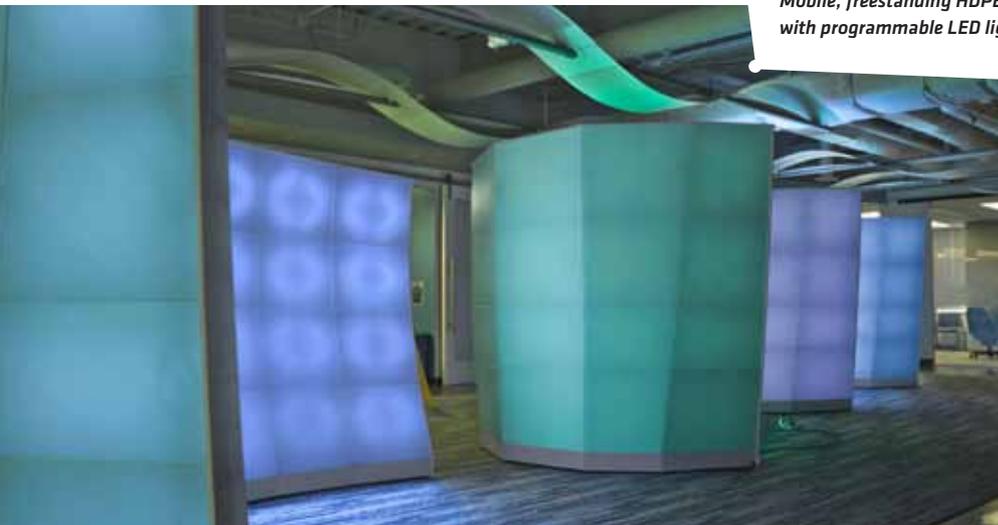
as Walt Disney Concert Hall in Los Angeles and New World Symphony in Miami, both designed by Frank Gehry. More recently, it produced components of the facade framework for the new Edmonton International Airport Control Tower, in cooperation with Gehry Technologies. In many ways, Radius Track offers architects and designers the tools to rethink and rework the Euclidian geometries and dimensional constraints that define many of our most common building materials.

Spantek and Liberty Diversified International (LDI) offer similar case studies in the rich opportunities that come from rethinking and reworking common industrial materials and processes. Spantek, which supplied the expanded aluminum for the Walker Art Center addition, worked closely with that project’s designers to create the material properties that would give the panels a proper balance of structural fitness and visual effects. This was one of the first applications of a Spantek product as a finished architectural material, and it led to numerous other architectural commissions.

Fueled by the entrepreneurial spirit of its chairman and CEO, Mike Fiterman (grandson of the company’s founder, Jack Fiterman), LDI took a chance on an innovative use of corrugated high-density polyethylene (HDPE), the same material used to make the U.S. Postal Service’s ubiquitous white plastic mail bins. Collaborating with product designers and inventors Jonas Hauptman, Walter Zesk, and Paul James, the company reworked the

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SEEYOND WALL
Mobile, freestanding HDPE walls with programmable LED lighting



SEEYOND

FEATURED FABRICATOR

Seeyond
A Liberty Diversified International (LDI) company based in Minneapolis, Seeyond designs, manufactures, and installs self-structuring walls, ceilings, and enclosures composed of blocks of corrugated high-density polyethylene (HDPE).



IMAGES PROVIDED BY SEEYOND

