

Thornton Tomasetti

Building Solutions



2006
Annual Report

Thornton Tomasetti provides building engineering services to clients worldwide on projects of all sizes and complexity — from the tallest towers and the longest spans to structures requiring innovative engineering design and materials. Our clients include architects, property owners, developers, and others who serve the construction industry.

We provide two complementary services: structural design and building technology services, which include investigations, cladding design, and repair and renovations. Engineering a diverse range of buildings allows us to understand failures from the inside out as well as the constructability of repairs. Insights gained from our investigations continually enhance the quality of our designs.

Our 550 engineers, architects, and support professionals are committed to creating the best building solutions through technical ingenuity, pursuit of excellence, and responsiveness to client needs.

Services

Structural Engineering
Building Evaluation
and Rehabilitation
Forensics and Advanced Analytics
Integrated Modeling
Exterior Wall Consulting
Historic Preservation
Multidisciplinary Design

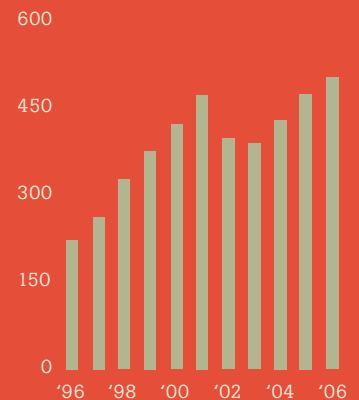
Offices

Boston, Massachusetts
Chicago, Illinois
Dallas, Texas
Fort Lauderdale, Florida
Irvine, California
Kansas City, Missouri
Los Angeles, California
New Haven, Connecticut
Newark, New Jersey
New York, New York
Philadelphia, Pennsylvania
Washington, D.C.

Hong Kong
London
Moscow
Shanghai

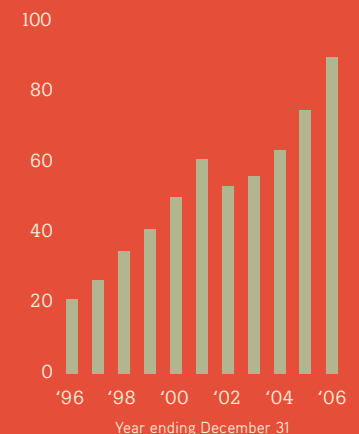
Employees

(Based on single payroll during year)



Revenue

(dollars, in millions)



Chairman's Message

Richard L. Tomasetti, P.E., Hon. AIA

We are fortunate to have had another successful year of growth and increased profitability thanks to the vision of our clients, who provide us with a steady stream of compelling design and engineering challenges.

Society today is demanding a broader technical literacy, stimulating more innovative methods of communication between engineers, architects, their clients, and the public. Modern 3-D visualization and analysis techniques have spurred a new level of creativity and collaboration among the numerous disciplines contributing to the design and construction process. We use these new technologies to provide the most innovative and cost-effective designs for our clients. In meeting these challenges, we are thankful for the commitment and continuing professional advancement of our staff.

Our goal, as ever, is to anticipate our clients' needs, and provide engineering and design excellence in every aspect of our work.



Richard L. Tomasetti and Daniel A. Cuoco

President's Message

Daniel A. Cuoco, P.E.

Since our founding 50 years ago, Thornton Tomasetti has grown steadily in a controlled and strategic manner to provide the best service for our clients and to offer career opportunities for our people limited only by their talent and ambition.

Today, with more than 500 people working in 16 offices, we occupy a unique position in our industry — a leader in both structural design and forensics. We have designed some of the world's tallest buildings, and investigated some of recent history's worst disasters.

Financially, Thornton Tomasetti is a consistently solid performer. Except for one year — when our revenue dipped after 9/11 — we have achieved continuous growth in revenue for 17 years, since 1990.

In 2006, global expansion in the construction industry fueled growth in both our revenue and global presence. We expanded our international opportunities with the opening of our London office, and added to our established presence in Moscow, Hong Kong, and Shanghai. In the United States, where we have 12 offices, Kansas City, Los Angeles, and New York moved to new facilities in 2006 to accommodate expanded services. More than half our people are now located outside New York.

A bull market can be challenging for professional service firms, which sometimes balloon on the upswing and contract on the down. Our disciplined and managed plan for growth preserves our stability, our flexibility to anticipate client needs, and our cultivation of the next generation of engineering leaders.

One of our challenges in the coming year is to further improve the quality of life and career opportunities for all our employees. We are accomplishing this through a wide range of career and leadership development activities, including our in-house seminar series, tuition reimbursement, mentoring programs, and international exchange programs. Our goals are to build on Thornton Tomasetti's reputation and to continue to attract and retain the most creative and resourceful people. We will be seeking the input of our employees and our clients in our drive toward this goal in 2007. It is the best way I can think of to begin the next 50 years.

Featured Projects

Big, small, tall, round or square — our projects cover a huge range in scale and building type. Here is a sampling of the more than 2,000 projects we worked on in 2006.

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Santa Ana, California

4 Federation Tower

Moscow

6 108 North State Street

Chicago

7 Futian Shangri-La Hotel Complex

Shenzhen, China

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Washington, D.C.

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Los Angeles

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Wilmington, Delaware

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New Orleans

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Philadelphia

15 West Palm City Center

West Palm Beach, Florida

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New York

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Lake Forest, Illinois

Metapolis

Hwasung, South Korea

Taikoo Hui Development

Guangzhou, China

People

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Our success is due to the people of the Thornton Tomasetti community. In these pages we explore their stories, accomplishments, and dedication.

After years of public debate, when a referendum finally approved plans for the tallest building in Orange County, California — the 37-story, 491-foot One Broadway Plaza in Santa Ana — Thornton Tomasetti Project Engineer Payam Khashaee knew the project would get more than the usual notice.

"The building is a lightning rod for attention," said Khashaee, who is based in the Irvine office. "Because it will be a landmark, the owner pushed for the best possible design." This translated into Khashaee and team developing many engineering options.

"As Lev Zetlin advised," Khashaee recalled, quoting the founder of Thornton Tomasetti, "when you go into a client meeting, bring lots of options and let the client choose."

Khashaee and team presented 15 structural systems for evaluation of architectural aesthetics, tenant functionality, and structural benefits. Collaborating with the New York office, the team also prepared four options for floor vibration control.

The design selected has a concrete core and a steel frame that wraps around the perimeter. "When the price of concrete went up," Khashaee said, "the client asked 'What if we just used steel?' so we quickly re-examined that option."

"I'm proudest of the efficiency of our work," Khashaee said. "Weekly meetings led to excellent coordination between the architect, contractor and engineers. Everyone trusted our recommendations for minimizing construction complexity. And trust is the essential ingredient in any successful project."

Owner: Caribou Industries

Architect: Carrier Johnson

General Contractor: Hensel Phelps Construction Company

On a clear day you can see L.A.: At 37 stories, One Broadway Plaza will be the tallest building in Orange County, California.

The tall team: Payam Khashaee with clients Tim Thomas, design manager with Hensel Phelps Construction Company (center), and Gary Hipolite, architect with Carrier Johnson.



At 1,168 feet, the Federation Tower will be Europe's tallest building and the centerpiece of the \$11-billion Moscow International Business Center.

The project — a mixed-use complex of two curved glass-clad towers, a five-star hotel, offices, and luxury condominiums — will be Russia's first commercial high-rise to utilize high-strength concrete.

The structural design of the towers is complicated by stacking commercial, hotel, and residential uses. "The hotel is in the middle of the taller tower," said Leonid Zborovsky, Thornton Tomasetti principal in charge of the project. "This requires a wholesale shift of the column layout, which above the hotel has to be shifted back. That's not easy."

The firm is also consulting on curtain wall design, fabrication, and installation. Dudley McFarquhar, senior associate and cladding specialist in the Dallas office, advised the fabricator on the especially

Part of the Federation Tower engineering team: from left, Brad Malmsten, Leonid Zborovsky, Ed Bloom, and Maria Karamanou.



Maria Karamanou

Half dressed: Tower B began taking on its signature appearance in December 2006.

challenging glazing and cladding issues. "Virtually every side is curved," he noted, "and the roof has multiple slopes. It's tough enough cladding a square glass building nearly as high as the Empire State Building; it's even tougher to clad a high-rise triangle with curved sides."

In addition to the engineering challenges, the international composition of the team meant working across languages and cultural differences. "It's like the United Nations," said Ed Bloom, the Thornton

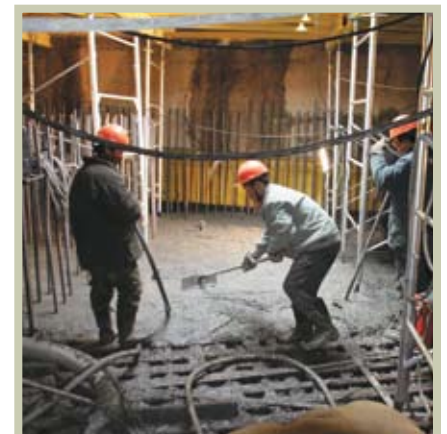
Tomasetti associate who heads the curtain wall consulting team in Moscow. "It's a huge team divided by language but united by the goals of the project." The owner and developer is Russian, the architect is German, the structural engineer and construction management are American, the concrete team is from Turkey and China, and the curtain wall contractor is Chinese. "It might be in Russia," said Brad Malmsten, Thornton Tomasetti senior project engineer for structural design, "but it's really a world building."

Owner/Developer: Mirax Group

Architect: NPS Tchoban Voss

Construction Manager: Turner International

Foundation team: The Chinese crew installs the concrete foundation mat for Tower A.



Axel Wuttke





At 354 meters (1,168 feet), the Federation Tower will be the tallest building in Europe, with the spire reaching 448 meters (1,478 feet). The entire complex will contain 423,000 square meters (4.5 million square feet) of mixed-use space.

Courtesy Mirax Group

Undeveloped real estate in any thriving city center usually doesn't lie fallow for long. But in the case of 108 North State Street in downtown Chicago, government and developers struggled for years to come to agreement on what should grace this highly visible block. Complicating matters, the property was above a planned subway station and two tunnels, an added engineering challenge, and the site had height restrictions, making it less economic for developers.

Finally, after several failed attempts, ground was broken in 2005 for a mixed-use development that includes a new home for the local CBS affiliate, residences, and retail stores.

"Everybody in Chicago knew Block 37 as a vacant lot," said Mark Koenigs, senior engineer, "and no one believed anything could succeed there. Now people see it's really going to happen and want to know what's going to be built there."

Block 37, future tense: Rendering of the corner of State and Washington streets, showing the retail podium in front, the office tower (rear left) and the future residential tower rising from the podium (rear right). Occupancy begins in 2008.

What's happening, in Koenigs' words, is a mixed-use facility "wedged into a tangle of engineering challenges." The tight construction schedule requires up-down construction methods, excavating downward simultaneously as the building goes up. The different uses have different space requirements, and so different engineering solutions. Because the project involved multiple architects, column spacings and story heights vary, yet had to work together. It helps that other Thornton Tomasetti colleagues are working on other parts of the project — Project Engineer Suzanne Provanzana on the retail section and Senior Project Engineer Nick Steele on the 17-story media tower.

Overall, because so many different pieces have to work together and provide for open, columnless spaces, engineering the structure is like "building around a complex, three-dimensional maze," Mark said. "You have to be creative in transferring loads and fulfilling the architects' vision."

"If anything," Mark said, "it's like a whole career of challenges wrapped up in a single project."



Block 37 team: Suzanne Provanzana, Mark Koenigs, and Nick Steele lead the engineering design for the mixed-use development in the heart of Chicago.

Developers: The Mills Corporation, Joseph Freed and Associates, Golub & Company, Chicago Transit Authority

Architects: Gensler, Perkins + Will, Solomon Cordwell Buenz, Goettsch Partners

General Contractor: W.E. O'Neil Construction Co.



Courtesy Gensler

The flagship Shangri-La Hotel complex in the Shenzhen central business district is among a collection of five-star hotels being developed across China that incorporate retail and commercial space.

“The greatest pleasure,” said C.T. Tam of the Thornton Tomasetti Hong Kong office, “was the teamwork with the project manager.” The original floor plan called for a butterfly shape. “It was beautiful,” Tam said, “but not quite constructible to a height of 180 meters (594 feet) — or constructible only at huge cost and with drastic modification to the architecture. To go that high and stand up, you need a symmetrical shape, like a circle, square, or triangle.” Working with the project manager, he and the team redeveloped the plan into a squarish scheme with improved structural efficiency that more easily met Chinese seismic code — a consideration crucial to the tight development schedule.

The other notable challenge was the gradual curve of the outside walls of the hotel, like the taper of a bullet. Achieving this shape required designing bent concrete columns. “We do this all the time in steel,” said Associate Steve Zuo, “but it’s not so common in concrete. It meant a little extra step to stabilize the columns with beams pulling inward.”

Plan review: Steve Zuo, left, and Ling-en Hsiao in New York worked with C.T. Tam in Hong Kong on the design of the Shangri-La complex in Shenzhen.



“In a project of this scale, there are hundreds of engineering details that make a difference,” Tam said. “We enjoyed a good rapport with the client and project manager and that allowed us to firm up those details quickly.”

Developer: Shangri-La Hotels and Resorts
Architect: Wong & Tung International, Ltd.
Structural Engineers: Canwest Consultants Ltd./ Thornton Tomasetti
General Contractor: China State Construction Engineering Corporation

Shangri-La: The two-million-square-foot complex, including a 90-foot long-span in the ballroom, will provide space for 550 guests. The development includes two 100-meter office towers and a 180-meter hotel tower. Our work focused on the hotel. Occupancy is due to begin in late 2007.



Just as 2-D computer drawing programs replaced the drafting table two decades ago, the current innovation is 3-D computer modeling of building designs. Called building information modeling (BIM), it allows easily manipulated 3-D models of a building, from columns and beams to details of steel connections.

The immediate benefit is shortened project time. In the case of the 41,000-seat Nationals Ballpark, BIM enhanced the project's fast-track schedule, by speeding delivery of the structural design by more than four months. Ordering the steel took place three months earlier than usual.

"BIM allows you to build and interact with a realistic visual model of the building," said Jeff D'Andrea, project engineer. "For the first time, everyone can easily visualize what is happening. As a result, what was once a chain of events, in sequence, is now a web of interactions, with all parties collaborating."

For those who worked on the project, D'Andrea said, it was "an opportunity for everyone — architect, engineer, fabricator, detailer, and erector — to have a seat at the table to help optimize the design from the start. For example, the fabricator might say 'If you do the connections this way it will flow through our shop faster.'"

The Tekla Structures software allowed the model to be transferred directly to the fabricator without any interim steps. Connection detailing and changes due to

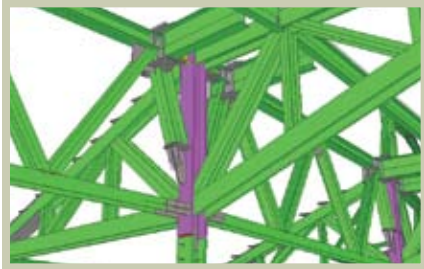
the evolution of the design were made in the paperless BIM model and downloaded directly to the fabricator's shop, leading to significant time savings. Thornton Tomasetti's work was led by the Washington, D.C. office, with modeling done in the Kansas City office.

"Because of this experience," D'Andrea said, "everyone saw the power of teamwork, in place of just focusing on their own aspect of the project. I think there's no going back once you start working this way."

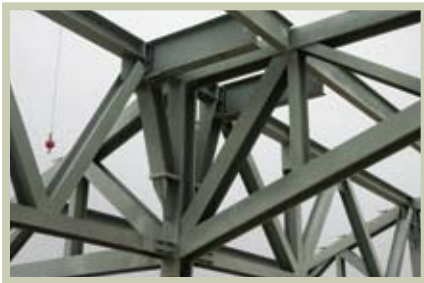
Owner: DC Sports & Entertainment Commission
Architect: HOK Sport/Devroux & Purnell Architects
General Contractor: Clark/Hunt/Smoot Joint Venture
Structural Engineers: ReStit Designers, Inc., and Thornton Tomasetti Joint Venture



Courtesy HOK Sport/Devroux & Purnell Architects



Faster, better: Building information modeling allowed Jeff D'Andrea's engineering design team to reduce structural design time by more than four months.



Wayne Stocks

Model and reality: Fast-tracking the engineering design of a large-scale stadium project (below) is enabled by building information modeling like this Tekla Structures 3D model (top) used in developing the structural design (above).



For **Daniel Traub**, senior project engineer in the Thornton Tomasetti Irvine, California office, the challenge — and the joy — of engineering the new Children's Museum of Los Angeles was developing a structural aesthetic that matched the architect's vision.



Courtesy agps architecture

Wedge of the future: The Children's Museum of Los Angeles taking shape (below) and in schematic (above), showing the flood channel (the reversed-S element) that crosses under Foothills Boulevard in the San Fernando Valley, California.

"When you look at the building's unique, sloping wedge shape and serrated concrete walls, you know right away this is different from most buildings, and from most museums," Traub said. The architect wanted the structure exposed so it is part of the visitor's experience.

"I work on a lot of buildings in which the most important thing is design efficiency —the bottomline cost," Traub said. "Here, because the architect included the structure as part of the design, the structure needs to be aesthetic as well as efficient." In addition, California codes require that the building accommodate the stresses of a highly active seismic zone. So the structural design needed to be resilient as well as beautiful and efficient.

All of this required extensive iteration with the architect to synchronize the design and the structure for the 60,000-square-foot facility. "Usually, we focus on beam size and constructability," Traub

said. "Here, we also had to take into account where connections are located, and the shape and position of the plates that connect them. If a client ever asks, 'Do you know how to design connections so they look nice?', this would be a perfect case study to show."

Inside out: Daniel Traub of Thornton Tomasetti, left, and Mark Motonaga of agps architecture developed an approach that exposes the structure as part of the architectural design.



Daniel Traub

Owner: Children's Museum of Los Angeles
Architect: agps architecture
General Contractor: Matt Construction

A \$12-million educational and capital expansion program

at Saint Edmond's Academy is changing the face of the Catholic boy's school, a fixture of the Wilmington community since 1959. Ground was broken in 2005 for an addition to the middle school, allowing the addition of grades K-3, construction of a field house, a chapel, science lab, and band room.

"If anything describes this project, I would say it's 'variation'," said Daniel Greenfield, the Thornton Tomasetti project engineer overseeing the structural design. "The architect designed a lot of variability into the architectural styling," he said, "even the topography varies up to 10 feet." As a result, engineering for the new facilities involved a column

layout that allowed for limited orthogonal columns and grids. "The challenge," Greenfield said, "was getting our steel to fit just right into the architect's design."

A 76-foot span of the field house roof was built using steel bowstring joists. Narrow beams were necessary in several places to accommodate the wall dimensions.

The most unusual part of the project? "I'd say it was the train lobby," Greenfield said. A donor to the project is a model railroad enthusiast, so a 600-square-foot section of the lobby was designed to hold a model railroad setup. "I think everyone enjoys that," he added, "not just the kids."

Owner: Saint Edmond's Academy
Architect: Anderson Brown Higley Associates
General Contractor: Whiting Turner



A new school: Additions to the St. Edmond's Academy, engineered by Daniel Greenfield, allowed expansion of the school to grades K-3.



Courtesy Anderson Brown Higley Associates

Flying into New Orleans, what Lee Fritz remembers are the blue tarpaulins covering the roofs of damaged buildings, still unrepaired six months after Hurricane Katrina. They stretched to the horizon in every direction.

"Once you are on the ground," Fritz said, "it's not only the areal extent of damage that's striking, but the degree of destruction — it's truly staggering."

Fritz, an engineer in the Chicago office, was on a team of 18 Thornton Tomasetti architects and engineers from four offices who converged for six intensive weeks in New Orleans. Working for a major insurance carrier, they assessed damage from wind, wind-driven rain,

and vandalism to 25 buildings at a New Orleans university. The tools of the team were simple: notepads, cameras, flashlights, and tape measures. During 15-hour days, they systematically evaluated the scope of damage for each building and developed repair estimates. Efforts were made at all levels to minimize disruption to university operations. The women's dorms, for example, which were occupied at the time, were surveyed by female Thornton Tomasetti engineers and architects on the team.

The final report for the client contained more than 12,800 pages with 20,000 photographs and was "almost this high" said Associate Wolfgang Werner, waving his hand two feet above a tabletop.

The work focused on determining the extent and nature of damage after repairs had already been undertaken. The team also interviewed people who had been on the scene during the storm and its

aftermath, or who were involved with the repairs. "What we do is detective work," said Fritz. "We study all the evidence, try to reconstruct what happened, and make the most tenable conclusion about the cause and nature of damage sustained."

In the end, their greatest satisfaction was to contribute to the recovery of the city. "Ultimately, our work leads to insurance claims being settled," Werner said, "and they have to be settled for progress to be made."



What we do is detective work: Lee Fritz (above) joined other members of the Thornton Tomasetti investigation team (left) who assessed damage from Hurricane Katrina.

“We study all the evidence, try to reconstruct what happened, and make the most tenable conclusion about the cause and nature of damage sustained.”



Wolfgang Werner

What wind does: H.B. Warner surveys wind damage to the roof of the Louisiana Superdome. Most of the roof membrane was blown away, leaving the insulation (yellow) behind.

Tools of the trade: Prepared for a day of assessing Katrina damage are, from left, H.B. Warner, John Knezevich, Wolfgang Werner, and Gary Storm.



John Knezevich

Can you see Chicago?: Towering 58 stories above street level, the Comcast Center in Philadelphia will be the tallest building between New York and Chicago. It will provide 1.4 million square feet of commercial and retail space, including the headquarters for Comcast. Occupancy is due to begin at the end of 2007.



Courtesy Robert A.M. Stern Architects

At just under 1,000 feet, the Comcast Center will be not only the tallest building between New York and Chicago, it will also reflect engineering and design lessons Thornton Tomasetti learned after leading the assessment of the 9/11 collapse of the World Trade Center towers.

“It’s too soon to say if our engineering on this project will become a new safety standard for skyscrapers,” said Stephan Eisenreich, project engineer based in our Newark office. “But we have developed some innovative ideas to enhance building safety and constructability.”

Elevators, sprinklers, communications systems, and stairwells are encased in a massive concrete core that stretches the full height of the building. Stairwells are 10 inches wider than code to allow for easier evacuation. And because the building footprint is small and the core relatively slim, the exterior walls are thicker than usual — 54 inches thick up to the 20th floor — to minimize flexing due to wind stress.

In addition to integrating new safety designs, the building has expansive open public spaces, which needed to be designed without columns.

“When you walk into the building, you enter a nine-story glass winter garden, leading to a three-story lobby and atrium that’s 90 feet across — without a column in sight,” Eisenreich said. A grand staircase in the lobby connects with the subway. “From an engineering standpoint,” Eisenreich said, “eliminating columns in the entry area meant we had to figure out how to carry the whole building weight across a 90-foot span.” The solution called for a ten-story high Vierendeel truss, a kind of box-shaped truss with rigid joints that eliminates the need for diagonals. In addition, a “tuned

liquid-column mass damper” — a 300,000-gallon reservoir of water — will be installed near the top of the building to increase the comfort of the building occupants by limiting its movement from wind.

Owner/Developer: Liberty Property Trust

Design Architect: Robert A.M. Stern Architects

Production Architect: Kendall/Heaton Associates Inc.

Construction Manager: L.F. Driscoll Co.



Stephan Eisenreich, project engineer for the Comcast Center.

Rising core: The concrete core of the Comcast tower shows the narrow dimensions of the site.



Stephan Eisenreich

When the city of West Palm Beach

outgrew its venerable city hall, it pulled out all the stops in planning the replacement landmark building. Although only a quarter million square feet, the new complex includes city hall offices, an auditorium, a museum, and the city library.

Open public space is a theme in the design. A sweeping spiral staircase links the first and second floors, and the auditorium has a 63-foot clear span. "In a building that has detailed architectural features, for each there is a corresponding engineering design feature," said Corey Guo, engineer on the project. Windows, for example, have

City Center: The 65-foot dome on top of the West Palm City Center complements the vaulted ceiling of the library, at left.

varying width, so the engineering had to accommodate these variations both structurally and to allow the passage of services.

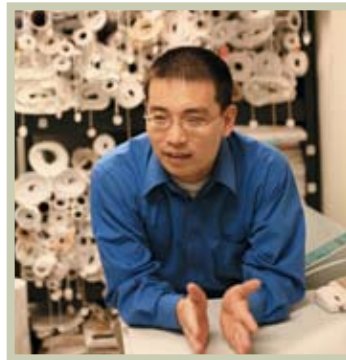
"This is a very detailed project because of the use of high-quality materials and the architect's artistic approach," said Hien Nguyen, CAD modeler. "I worked closely with the engineers and architects to ensure that the drawings recognized every element."

With such an important building, said Kim Lin, senior associate on the project, public scrutiny was a constant part of the work. "It underscored that an engineer's life is more than tension limits and connectors," she said. "Relationships and project management are just as important."

Owner: City of West Palm Beach

Architect: Song & Associates, Inc.

General Contractor: Catalfumo Construction, Ltd.



City Center team: From left, Corey Guo, Kim Lin, and Hien Nguyen.

Courtesy Song & Associates



When architect Renzo Piano conceived the new headquarters for The New York Times, he envisioned reflecting the “intrinsic link between the newspaper and the city.” This translated into a visually transparent building filled with natural light, almost “an inside that is outside” with abundant public spaces on the lower floors.

Piano’s vision integrated exposed steel into the design, like an exoskeleton. For Jeff Callow, Thornton Tomasetti project engineer, this meant working with architects RPBW and FXFOWLE to ensure that connections and structures are aesthetic as well as functional.



On top: Jeff Callow and the 300-foot mast of The New York Times building.

and movements. The exposed members will be subjected to large temperature fluctuations, from subzero temperatures in the winter to well over 140° F in the summer. This huge range can translate into significant differential deflections of adjacent columns, which are minimized by interconnecting the columns with a series of trusses. In addition, the top of the building features a 300-foot steel pipe mast with connections specially designed to accommodate fatigue.

“The greatest satisfaction of working on this building was working with clients who want an innovative building for the next 100 years,” Callow said. “They wanted to be educated on every aspect of the building design. The design team was challenged to come up with interesting and innovative solutions — and it doesn’t get any better than that.”



Engineering revealed: Abundant glass cladding, with exposed steel integrated into the design, gives The New York Times building lightness and transparency. Occupancy of the 1.6-million-square-foot headquarters is due to begin in 2007.

“An engineer’s work is usually measured in terms of cost,” Callow said. “Here, because the major building elements are exposed steel, our work was also measured in terms of how it looks, from the elegance of the connection details down to the orientation of the bolts.”

Because the columns are outside the building enclosure, interior beams penetrate the building façade into the columns. This creates an engineering challenge in dealing with thermal stresses

Owners/Developers: The New York Times Company, ING Real Estate, and Forest City Ratner Companies

Architects: Renzo Piano Building Workshop in collaboration with FXFOWLE Architects

Construction Managers: AMEC — Core & Shell, Turner Construction — New York, and Times Company Interiors

A new home: Nearly all of The New York Times' 3,000 employees, now in offices around the city, will relocate in 2007 to the new headquarters on the West Side. The Times will occupy about half of the 52 floors, with the remainder leased as offices and retail space.



Courtesy The New York Times Company/Forest City Ratner Companies/Renzo Piano Building Workshop/FXFWLE 2001 Artefactory



Walter Payton Center

Lake Forest, Illinois

March up the arch: Ken Maschke probes for sources of leaks on the roof of the Chicago Bears' indoor training center (below). Repairs involved removing as much dry rot as possible, replacing damaged areas with new wood sections and steel plating, then reroofing the structure without fabric sections. In all, 39,000 square feet — nearly one acre — of rotted or damaged plywood roofing was removed and replaced.

"It's remarkable how great it looks — considering all the surgery, and how much material was replaced," Maschke said. The credit, he said, goes to the architect for figuring out how to stain and paint the repaired sections so they blend into the background.

Owner: Chicago Bears Football Club

Architect: Goettsch Partners

General Contractor: Barton Malow Construction





Metapolis

Hwasung, South Korea

Metapolis metropolis: One of the largest mixed-use developments under construction in South Korea, Metapolis will open for occupancy in 2008. For engineers Sunho Shim (above left) and Hi Sun Choi, the most significant engineering challenge was meeting both safety and serviceability requirements — controlling overall building drift and wind-induced accelerations at higher floors — to conform with Korean building codes. The engineering team developed a lateral load-resisting system consisting of a reinforced concrete core and a perimeter belt wall, to provide overall building stiffness efficiently and economically.

Owner: Metapolis, Inc.

Architect: Kunwon

General Contractor: POSCO Engineering & Construction Co.

Local Architect: Guangzhou Design Institute

Structural Engineers: Guangzhou Design Institute/
Thornton Tomasetti

Taikoo Hui Development

Guangzhou, China

Taikoo team: Steve Zuo and Ling-en Hsiao (page 7) collaborated with C.T. Tam and colleagues in Hong Kong on the development of Taikoo Hui, a 4.8-million-square-foot project in Guangzhou, China, with two hotels, a 1,200-seat theater, a cultural center, a retail podium, and two office towers. “For me,” Zuo said, “the biggest challenge, other than the massive size of the development, is the convergence of different structural systems in one project. Different functions layer on top of one another, with many spaces that have to be free of columns.” The solution was not obvious. “The best brains from three offices spent all Christmas thinking about how to solve this problem,” Tam said, “and by New Year’s we had a solution that could meet Chinese seismic code, satisfy the architect and client, and was constructible.”

Developers: Taikoo Hui (Guangzhou) Development Co. Ltd. ; Swire Properties Ltd.

Design Architect: Arquitectonica



Courtesy Arquitectonica

Rapid Response to Disaster

Washington, D.C.

Less than four hours after American Airlines Flight 77 crashed into the Pentagon on September 11, 2001, Mark Tamaro was onsite to begin a seven-day rescue and recovery mission as part of the Montgomery County, Maryland Urban Search and Rescue team. He and fellow volunteers make up one of 29 teams nationwide organized by the Federal Emergency Management Agency (FEMA).

A member of the Montgomery County team since 1998, Tamaro serves as a structural specialist, providing first responders to disasters with rapid structural assessments of buildings to determine if collapsed structures appear safe to enter, the design of temporary shoring where needed, assistance in removal of partially failed structures, and monitoring of structures for stability.

While it was the altruism that first drew Tamaro to this work, he said, “there is a technical and professional curiosity that gets satisfied. You can learn an awful lot from the behavior of a compromised structure about how to build a better one.”

Jon Tung also volunteers as a structural specialist on an Urban Search and Rescue team in Fairfax County, Virginia that responds to domestic emergencies through FEMA and internationally through

Earthquake aftermath: Jon Tung (foreground left, back to camera) supported rescue efforts after the 2004 Bam, Iran earthquake, making rapid assessments of collapsed or partially-failed buildings, designing bracing, and monitoring building conditions.



Courtesy Virginia Task Force One

the U.S. Agency for International Development/Office of Foreign Disaster Assistance. A native of Taiwan, his first deployment was to his home country following an earthquake in 1999.

Since then Tung has also deployed to Iran following the December 2003 earthquake that killed 26,000 people; to Indonesia, where 280,000 perished following the December 2004 earthquake and tsunami; and to numerous hurricane scenes on the U.S. East Coast.

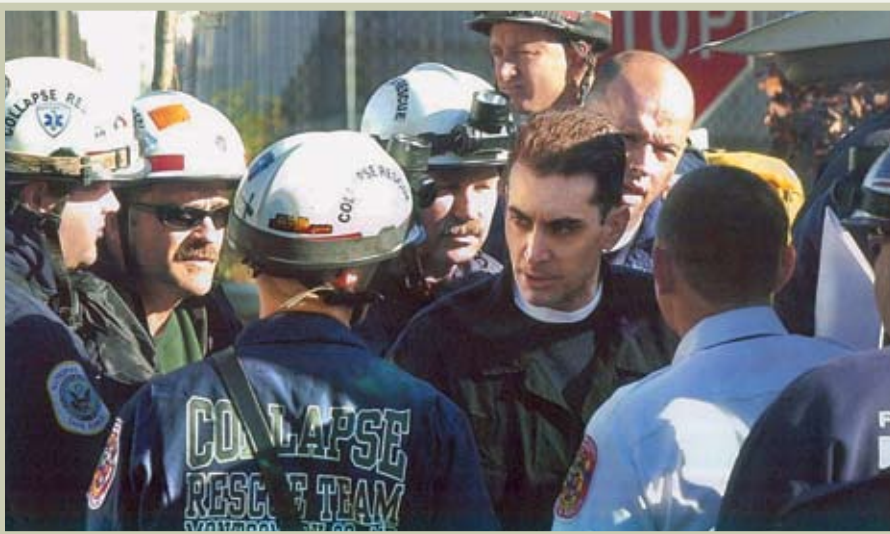
Urban Assembly School of Design and Construction

New York

Having met after school with students in the ACE Mentor Program for four years, Erin Pesant said she was eager to get into the classroom. When Richard Tomasetti, who had helped develop the Urban Assembly School of Design and Construction (UASDC) in Manhattan, approached her in 2005 about tutoring at the new high school, she readily accepted.

“With ACE, you meet students in your office or the offices of colleagues – and that’s great,” Pesant said. “What UASDC has afforded me is a broader perspective on what they’re learning all day and how they are learning it: I’m right there.”

Through its partner, Urban Assembly, a not-for-profit group that supports the creation of small college-prep high schools, UASDC opened on West 50th Street in the fall of 2004, and is dedicated to educating students with an interest in architectural design and the built environment. As part of UASDC’s curriculum, students are offered a weekly “design seminar” featuring regular visits from outside professionals such as Pesant, Lisa Davey, Patrick Healy, and Kryz Wodzicki of Thornton Tomasetti’s New York office.



Courtesy Daniel Gross/The Gazette

On the scene: Disaster response is part of the continuing efforts of many Thornton Tomasetti professionals. Mark Tamaro, center, volunteers with local FEMA rescuers, here at the collapse of a parking garage in Bethesda, Maryland.

Every week, after a lecture the class of 20 to 30 students breaks into small groups and is assigned tasks such as constructing models based on lecture topics — a skyscraper, bridge, or museum. Pesant said the pros drop in on each group while they're building and try to explain in greater depth what they're constructing — for example, a particular type of bridge — and what is special about it.

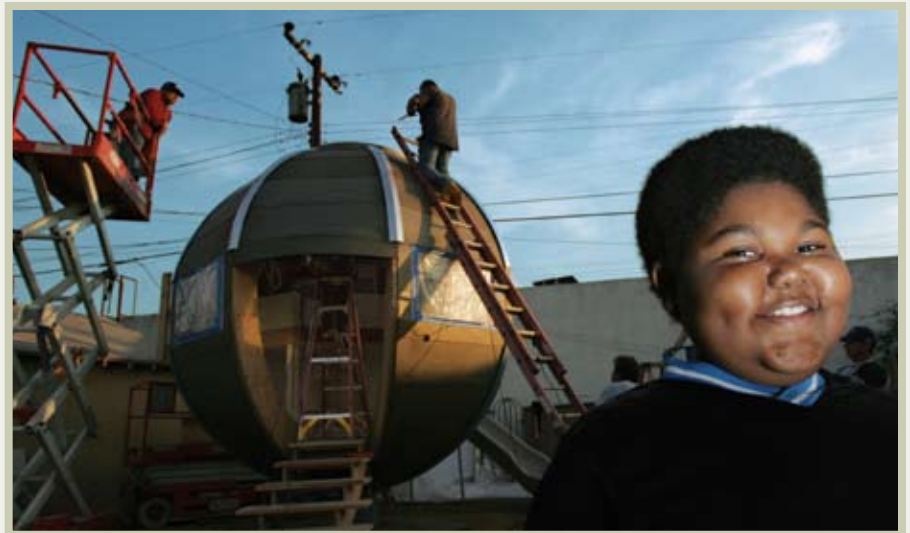
"I think the value we add is that we offer a real-life perspective on what they are learning in school," added Davey. "They get to meet people who do this for a living. People who help them understand whether they want to go into this field, get a feel for it."

At the end of the design seminar, students present their work to UASDC's industry partners as well as other engineering and architecture companies. "Be tough, the teachers tell us," said Pesant, "because it's important that students develop communications skills and the confidence to present ideas."

In 2006, Pesant, Davey, and Wodzicki were among those UASDC invited to help develop a professional internship program.

"We'll have our first graduates in 2008," Davey said. "Four years after that, some of these students may become our new hires. I'd like to think I've touched the lives of a few high schoolers, that I helped point them toward this profession."

Lesson plan: Preparing for a weekly design seminar at the UASDC are, from left, Lisa Davey, Patrick Healy, Krys Wodzicki, and Erin Pesant.



Stefano Paltera

Fulfilling a dream: Joshua Bailey with the playhouse that Chris Kahanek and other volunteers designed and built.

Building Dreams

Los Angeles

What does Thornton Tomasetti Senior Engineer Chris Kahanek have in common with Mariah Carey and Penny Marshall?

They were each contributors to the 2006 Make-A-Wish Foundation of Greater Los Angeles, for which Kahanek engineered a spherical fort designed by his roommate, Joel Webb of RTKL Associates, for wish child Joshua Bailey, a nine-year-old battling leukemia.

When Webb's ball-on-a-stick design, meant to mimic a spaceship, was chosen by Joshua for his dream playhouse, Kahanek was called in. "You don't normally use that kind of material this way," he said, referring to the laminated plywood ribs covered by royal blue sheet metal, which needed to curve down and connect with a narrow steel post. "I had to estimate certain material properties and build a complete 3-D model." Kahanek had to pay close attention to the two-ton structure's concrete foundation to ensure its stability on the soft soil behind Bailey's South Central Los Angeles home.

"I doubt many playhouses have a complete set of calculations backing up their structures," Kahanek said. When the one-

month buildout was complete, the curtain that had kept the structure hidden from Joshua was finally drawn back. "The first thing Joshua did was run inside," Kahanek said. "You should have seen his face."

Actors in the Office

Chicago

When Jill Thiel is not juggling phone calls, faxes, and proposals as an executive assistant in the Thornton Tomasetti Chicago office, she's belting out song and dance numbers in Chicago's vibrant theatre scene. In fact, it was her stage work that brought her to her day job in 2006.

After rehearsal one night for a Theatre-Hikes production of *Heidi*, a musical adaptation of the classic Swiss orphan story, Thiel met Managing Principal Joseph Burns, who had come to pick up his 12-year-old son John, also an actor.

"We got to talking and Joe asked what I did for a living," Thiel said. "I told him I was an executive assistant, but looking for a new job. He said he was looking for an assistant, and before I knew it, right in the middle of tech week [the busy last few days before opening], I was interviewing."

Woman of the Year

New York

For her 25 years of contributions to the field of engineering in the New York real estate industry, Aine Brazil was honored as 2006 Woman of the Year by New York Women Executives in Real Estate at the organization's annual fundraising dinner.

WX, as the organization is known, is an invitation-only association of senior-level women in commercial real estate in New York, including owners, developers, brokers, architects, engineers, bankers, and lawyers. Its mission is to promote the advancement of women in the field. In receiving the honor, Brazil joins a roster of other women executives including Mary Ann Tighe, CEO of CB Richard Ellis; Tara Stacom, executive vice president of Cushman & Wakefield; and Marilyn Jordan Taylor, chairwoman of Skidmore, Owings & Merrill.

"As a structural engineer, to be recognized by the broader real estate industry is a special honor," said Brazil. "The best part of the evening was seeing all those familiar faces of so many great clients, contractors, and colleagues with whom I have had the pleasure of working over the past 25 years."

At the dinner, Brazil was cited as one of the most celebrated structural engineers in the nation, and the most prominent woman in her field. Her noted engineering contributions to real estate development include 731 Lexington Avenue (The

Bloomberg Building/Beacon Court) for Vornado, 5 Times Square for Boston Properties, and 15 Metrotech in Brooklyn for Forest City Ratner. WX also highlighted her service to numerous professional organizations, her work as an adjunct professor at Princeton and Columbia universities and Manhattan College, and her guest lectures at Cornell and Yale universities.

Historic Preservation

New York

When Eric Hammarberg got to the tip of the needle on the Chrysler Building in New York City — a point at which the spire is four feet wide, accessible only by rope, and about 1,000 feet above the ground — the first thing he did was look down.

"You have to," he said. "I guess that's the difference between people who are afraid of heights and people who aren't."

Hammarberg's projects, like the Chrysler Building façade restoration he helped complete in 2003 and the ongoing conversion/restoration of the Williamsburgh Savings Bank in Brooklyn, tend to be tall buildings, and sometimes, he explained, "a rope is the only way to swing in and do an inspection."

Such was the case at 55 Liberty Street in Manhattan, a building with terra-cotta cladding and ornamentation, as well as a very tall, steeply pitched roof with a large overhanging cornice that defied scaffolding. Hammarberg did the inspection hanging from a rope 250 feet up. The rush, he said, was similar to what he gets from his favorite pasttime — mountain bike racing.

"I won't say I'm an adrenaline junkie," he said, "but in some ways, rappelling on the outside of a tall building is not too different from bike racing through the woods."

Bob Kornfeld, a registered architect, has spent 25 years as a landmarks advocate and historian. He has explored aqueduct



Mike Laundry, left, and Jill Thiel

Thiel's other acting highlights include a cellblock girl in the musical *Chicago*, Lola in *Damn Yankees*, a part in a soon-to-be-aired local television pilot, and a role in a local cable commercial playing a woman with bad credit who gets whacked in the face with an inflatable bat by a character named Creditor-the-Clown. "My friends like to watch that scene in slow motion," she said.

Mike Laundry is another Thornton Tomasetti employee with acting ambitions — but his are focused on improvisation.

"Chicago is the improv capital of the world," he said, noting that stars Mike Myers and Chris Farley, like Laundry, graduated from the Improv Olympic, and that legends Bill Murray, John Belushi, and Gilda Radner came out of Second City, where (like Thiel) he's studied.

In 2006, his colleagues got to hear (rather than see) him in an office spoof called *The Temp*, in which he supplied the voice for a Styrofoam cup gossiping about workers who were busy gossiping about other workers. "It was pretty funny," he said. "I think they liked it."



Steve Friedman © 2006

Managing Principal Aine Brazil

tunnels and ruined buildings, authored reports and testified at countless hearings, starting with an effort to preserve his native Riverdale, New York, now a designated historic district. He wrote the National Register nomination for the Jerome Park Reservoir in the Bronx, part of the Croton Aqueduct system, and is vice president of The Friends of the Old Croton Aqueduct. For 10 years he was chairman of the Landmarks Task Force of the Bronx Borough President's Office.



Charlotte Fahn

Historic Bronx: Bob Kornfeld, center, leads a walking tour past the Eighth Regiment (Kingsbridge) Armory, a Bronx landmark built in 1912-1917 in the abandoned east basin of the Jerome Park Reservoir. He has given numerous public lectures and walking tours.

A day at the office: Architect and historic preservation specialist Eric Hammarberg performs a hands-on — and feet-on — inspection of the Chrysler Building in New York.



Courtesy George W. Cole/Universal Steeplejack

Visiting Instructors

Washington, D.C.

When The Catholic University of America (CUA) had a “structure” problem, Charles Thornton, who knew the dean, called on Zach Kates to help him fix it.

“I was a relatively new engineer and I’d never taught before,” Kates said of his first semester as an adjunct professor at CUA, in 2002. “But they had a hole in their architecture program and Charlie [Thornton] said the best way to learn presentation skills is through teaching — so I jumped in.”

Twice a week, for the next three years, Kates taught steel and concrete design to a class of about 80 undergraduate architecture students. He brought current Thornton Tomasetti projects to life through in-class presentations and visits to local project sites. Along the way, he enlisted the help of colleagues Jeff D’Andrea and Calvin Austin, who also saw the opportunity to hone their presentation skills. D’Andrea helped the students gain a physical understanding of structures through building bridges with toothpicks that were load-tested to



Teachers: Thornton Tomasetti engineers share the teaching load at Catholic University in Washington, D.C. From left, Calvin Austin, Matt Horne, and Zach Kates.

determine which could hold the most weight yet weighed the least. Eventually, in 2005, Kates passed the torch to Austin and Matt Horne.

They now teach alternating sections: Horne offers concrete design and mechanics and materials, while Austin teaches steel design and statics; they split a section on loads and structural systems.

Horne said a highlight was when the first round of teaching evaluations came back for him and Austin. “Calvin and I had really high reviews. It was great to know we were reaching them... that this wasn’t a great experience just for us.”

ACE Mentoring

Chicago

The Chicago affiliate of the ACE Mentor Program, which guides inner-city high schoolers toward professions in architecture, construction, and engineering, was named Affiliate of the Year in 2006.

“We must be doing something right,” said Carol Moy, associate in the Chicago office, who cofounded the chapter in 2000. “We come up with great ideas for activities, our mentors are well trained, and we’re able to grant substantial scholarship awards to encourage students to pursue college programs and careers in the industry.”

The after-school program teams high school juniors and seniors with multi-disciplinary mentoring squads comprising

Naval reserve: Steve Petracek, from the Kansas City office, provided engineering support in Kuwait in 2006.

professional engineers, architects, and construction managers. Students engage in hands-on activities, office tours, field trips, and an original design project from concept through drawing and presentation stages.

Other ACE mentors from the Thornton Tomasetti Chicago office include Geoff Dauksas, Lee Fritz, Lauren Hunt, Azila Aziz, and Hao-Jan Wong. Also involved in their local ACE affiliates are Thornton Tomasetti staff in New York, Newark, New Haven, Washington, D.C., Philadelphia, Fort Lauderdale, Dallas, Kansas City and Irvine.

LCDR Sharon Vaninger, CEC USN



Active Duty

Kansas City, Missouri

A member of the United States Navy Reserve for six years, Steve Petracek was called to active duty as a lieutenant in August 2006. He was stationed in Kuwait where he served as a project manager, overseeing construction to support operations in Iraq and Afghanistan. He helped develop an access control point and a pier fender pile system, which absorbs the impact of a berthing vessel.

"Through joint meetings I run with the Kuwaiti Navy," Petracek wrote via e-mail, "I have met some wonderful people and been lucky enough to work with Kuwaitis." He added, "I feel pretty safe. There is no doubt that terrorists are here and watching everything we do. But we never travel alone and are always armed."

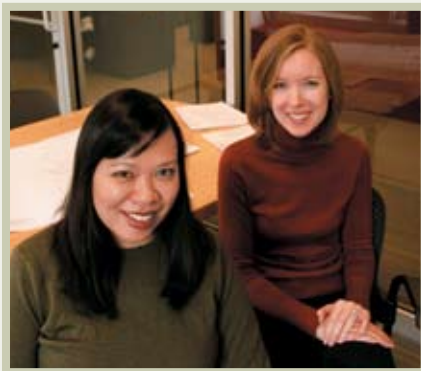
What did he miss most? "Spending time with my family," he said. "I have missed seven months of my kids growing up — and at ages two and seven that is a lot of their lives."

Petracek returned home in April of 2007 and is resuming leadership of projects such as construction of the Tulsa Arena and the new Meadowlands Stadium in New Jersey.

AIA Award

New York

In October, Richard Tomasetti, chairman and cofounder, was honored as the first consulting engineer to receive the American Institute of Architects New York Chapter Award for outstanding contributions to architecture and engineering. The award noted that in his 35 years of experience as a structural engineer, Tomasetti has "fostered collaboration in the greater design community."



Mentors: Carol Moy, left, and Suzanne Provanzana cofounded the Chicago ACE chapter in 2000.

ACE at work: Chicago ACE mentor Geoff Dauksas, right, with students Emy Monzon and Darrell Evans.



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