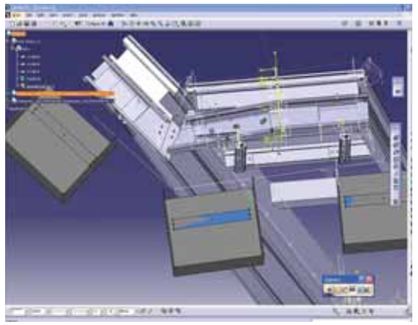
IAC/INTERACTIVECORP
HEADQUARTERS
NEW YORK

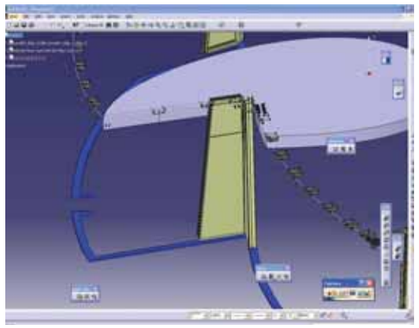
Gehry-designed Building Inspires an Innovative Curtain Wall System

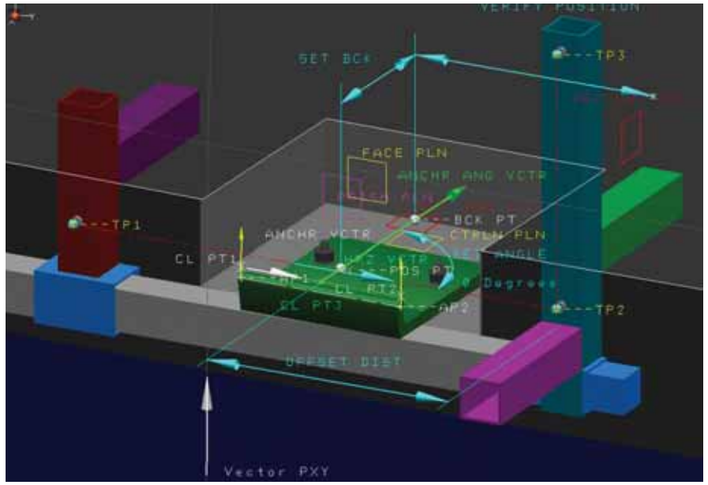
One glance at a building by Frank Gehry is enough to reveal it as a spectacular feat of engineering. Twisting forms, irregular and organic geometries, and impossibly delicate protrusions are all features shared by the structures that have made Gehry famous. From Los Angeles' Walt Disney Concert Hall and Chicago's Jay Pritzker Pavilion to his groundbreaking Guggenheim Museum in Bilbao, Spain, Gehry has long proven himself a dedicated friend of metals—both in structural systems and in cladding. Despite being glazed with a graduated pattern of pure white ceramic frit instead of his signature metals, Frank O. Gehry Architects' most recent building—the New York headquarters for IAC/InterActiveCorp (IAC)—continues this trend and owes its unique, curving sail-like facade to a sophisticated aluminum-framed curtain wall system designed to accommodate panels of different shapes and sizes with an innovative bracketing and installation system.

Despite the design's seemingly rigorous demands of the curtain wall, the cladding system's underlying structure is far from complicated. "The complexity of this project lies in the geometry of the building. The curtain wall is actually quite simple," explains Alberto De Gobbi, president of Permasteelisa, the internationally known curtain wall and cladding firm that has worked with Frank Gehry's office on a number of projects. Before fabrication, Permasteelisa had to make sure that the design would be structurally feasible, which required collaborating closely with the architects on a centralized 3D master model. Gehry's office worked on the building massing while Permasteelisa engineered the cladding system, both teams checking in regularly to ensure that the project could be built. "Gehry is really flexible; he understands the limitations of manufacturing and installation," says De Gobbi.

The designers first used the model to check that the aluminum-frame curtain wall would withstand tolerances from all angles, as the various extrusions and irregular angles of the building's exterior placed tension on the structure in many directions. Permasteelisa decided to use male and female joining that would allow movement both







PREVIOUS Of the 1,450 curtain wall units, 1,150 are unique.

THIS PAGE A centralized 3D computer model was used to cut the curtain wall shapes and locate the system's brackets.

OPPOSITE The curving facade resembles sails on the Hudson River.

vertically and horizontally that was necessary given the twists and tilts in many of the glass panels, which, according to De Gobbi, would have a significant effect on the shape of the building with any movement. Each panel was individually specified on the master model, then the data was transferred directly to an automated fabrication process that cut the metal and glass to match the model. In the end, of 1,450 curtain wall units, 1,150 are unique. Each unit contain three sheets of glass, two are laminated and the third is separated by an insulated air space and is tempered. An extruded aluminum frame structures each unit, with most units requiring two vertical and four horizontal members. The glass and aluminum units were crated and shipped to the site, still flat.

Rather than use a traditional, and costly, heating method to form the glass into twisting curtain wall panels, they were bent on site during installation, a process called cold-warping. "The trick of the whole process is that the panels can bend and be forced into specific shapes," said associate architect Maria Smith of Adamson Architects. Bending each unit of glass on site was especially difficult because they are double-glazed. "Each panel is 3/8 of an inch thick, with a 1/2-inch airspace in between," says De Gobbi. "When you bend the unit, the perimeter seal, which is made of silicon, is put under stress. So we had to specially design each seal with the glass fabricator." In fabrication, the glass was produced flat, with double glazing done after coating and fritting. The flat glass was then assembled with the aluminum frame—which comprises several different extrusions. According to De Gobbi, the fabricators couldn't use one typical set of male/female joints, but rather six custom-designed vertical sets to join the irregular geometries and

allow for thousands of different extrusion types. The mullions are mostly between 7 and 8 inches deep, though some are slightly larger.

In order to attach the wall to the building, Permasteelisa had to design a special anchoring system that would accommodate construction tolerances and conduct a rigorous survey of the structure to perfectly place each bracket. This was important as the curtain wall system is quite rigid. "While the structure of the building can vary plus-or-minus 1 inch in all directions, the curtain wall could only move 1/8 of an inch," said De Gobbi. Permasteelisa's survey team used the master computer model to determine the exact location for each anchor. X, Y, and Z coordinates taken from the model were located on the structure through triangulation, using sophisticated surveying equip-ment hooked up to the 3D model. This allowed the installers to replicate the positions of the idealized model perfectly, and the special design of the curtain wall clips allowed them to be manipulated into final position. Three pieces of aluminum, bolted with 3/8-inch bolts, form each bracket, attaching to the floor slab of the structure of the building and to the curtain wall unit. Two vertical members and one attached horizontal member together allow each anchor point to move both up and down and right and left. A central piece bolted to the floor slab adjusts the bracket forward and backward. The brackets, which together measure just under a cubic foot, can thus move in three-dimensional space until they match the model's coordinates. In total there are 1,779 brackets, and given the precision and complexity of their installation, teams of surveyors were only able to locate about 15 per day. This time-consuming task was necessary, as it enabled the tilts and angles of the extrusions that are so central to the design.

TOP Installation of the curtain wall's anchoring system

BOTTOM A machine gauges wind deflection in a mock-up of the wall.

OPPOSITE During installation workers inserted three corners of the panels into the brackets and then bent the final corner into place.

TOP: © PERMASTEELISA CLADDING TECHNOLOGIES L.P.; BOTTOM: © ERIC LEVIN/IAC

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Due to all of this advanced preparation work, once on site the ornamental ironworkers were able to install each unit easily, bending them as required in order to achieve the sail-like appearance of the exterior. Each panel could be bent up to three degrees, says Smith, and the installers did this by inserting three corners of the panels into the brackets and then bending the final corner into place. "The design team for the curtain wall did a great job," says Chuck Comartin, Smith's partner at Adamson Associates. "Because of the design of the building, Permasteelisa came up with a system that they can use elsewhere." While challenging design may lead to innovative solutions, it was also the orchestration between the designers, manufacturers, and installers that brought IAC's new headquarters to a successful completion, and a new icon to Manhattan's West Side. ■

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