41 Cooper Square

A double wall of glass and perforated stainless steel conveys Cooper Union's commitment to forward-thinking education.

THE EAST VILLAGE HAS LONG been an in-your-face kind of neighborhood, where people let you know what they're all about whether you like it or not. Thom Mayne of architecture firm Morphosis took this legacy into account when designing The Cooper Union's newest building—a 175,000-square-foot facility containing studios, classrooms, and laboratories for the institution's art, architecture, and engineering programs. To convey the school's commitment to free, forward-thinking education, the architect clad the structure's warped geometry in a high-tech double wall of glass and perforated stainless steel panels. While the extra cost associated with double walls often makes them infeasible, the digitally integrated design process worked out by Morphosis in collaboration with construction manager Sciame and subcontractors W&W Glass and A. Zahner Co. streamlined delivery and kept the system within the budget, putting the building in the running to earn Platinum LEED certification—a first for an academic laboratory in New York City.

Located on the east side of Third Avenue between 6th and 7th streets, the facility is a vertical campus designed to foster cross collaboration between The Cooper Union's three disciplines. A sky-lit central atrium reaching the structure's full 11-story height illuminates a 20-foot-wide stair that ascends four floors to a student lounge that acts as the facility's social hub. The classrooms themselves are designed to be reconfigurable to meet the needs of the school's different disciplines. This flexibility was also built into the cladding system, whose two layers—one a weather barrier of glass, the other an aesthetic face of stainless steel—can adapt to environmental conditions and the position of the sun. "The perforated metal skin is operable and contributes to the

heating and cooling of the interior," explains Andrea Tzvetkov, project architect for Morphosis. "It is closed during the summer when the sun is beating down, and open during the winter to let in the sun's warmth."

Fabricated out of 304 stainless steel sheet, the metal panels were given an angel hair finish whose random grit lines conceal the scuffs and scrapes that can accumulate over time. The perforation holes are 1/8-inch diameter and cover between 50 percent and 90 percent of the panels, maintaining views through the exterior wall whether it is open or closed while at the same time reducing glare enough to make it easy to use a computer even when the sun is hitting the building full force. The panels are 2 feet by 6 feet and are affixed with stainless steel screws three at a time to aluminum frames. These unitized panel sections connect back to the slab edge through an engineered clipping system of aluminum extrusions. For the most part the metal panels are set 1 foot away from the inner glass wall, but on the west facade this distance increases by as much as 10 to 12 feet where the panels swoop out to animate the building face and form a canopy above the entrance. Electric actuators wired back to a centralized control unit operate the outer wall, and a software program tunes the facade to the season and the sun's position.

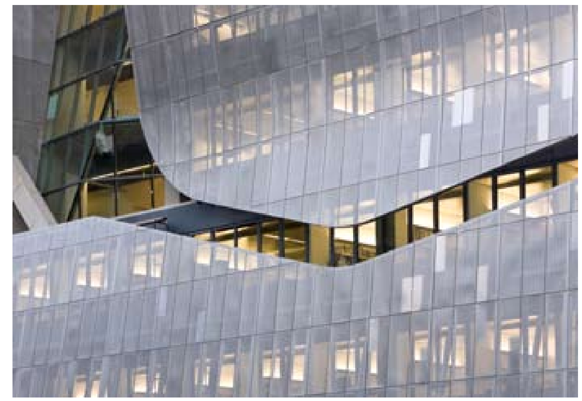
Except in a few places where the metal face pulls back to reveal all-glass sections, the building's inner wall is made up of an off-the-shelf window wall system. Spanning between the floor slabs, the system includes a black-painted spandrel unit that rises 3 1/2 feet from the floor, and a 6-foot-high vision unit. The exposed glass areas are curtain walls that were structurally glazed in the field on unitized shop assembled frames. Almost all of the project's exterior glass is Viracon VNE1-63, which has a low-e coated 1/4-inch outer lite, 1/2-inch air space, and 1/4-inch inner lite. An exterior stair tower features Viracon's 9/16-inch HS/HS Laminated glass with a cool white interlayer.

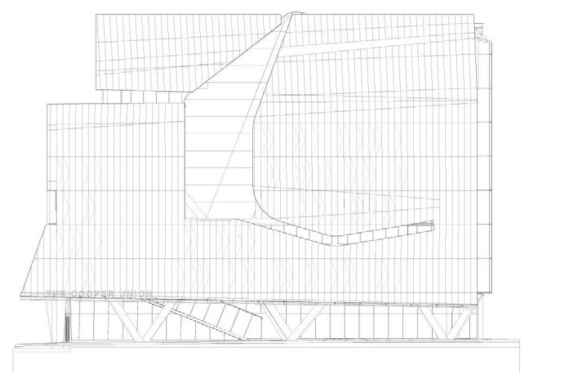
Traditional facade systems combine two purposes: functional and aesthetic. According to Tzvetkov, the efficiency of the

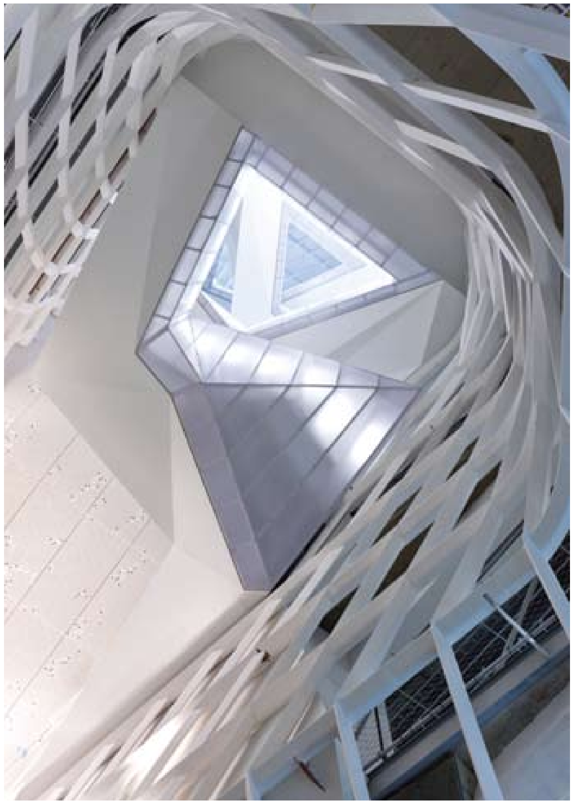
Previous spread: Iwan Baan; top: John Hill; center and bottom: A. Zahner Co.

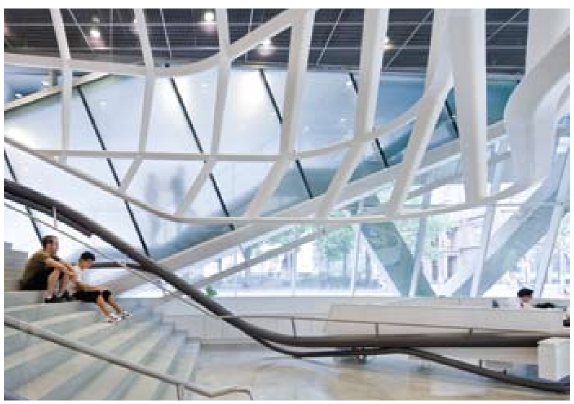
Top and center: Iwan Baan; bottom: Morphosis

Previous spread Clad in a double wall of glass and an operable metal skin, The Cooper Union's new academic building creates a new face for the school's renowned design curriculum.
Facing, top The school as seen from Third Avenue below 6th Street.
Facing, center Electric actuators are wired to a centralized control unit to operate the outer wall, which is controlled by software that monitors the season and the sun's position.
Facing, below Perforation holes are 1/8-inch diameter, covering between 50 and 90 percent of the panels to reduce glare yet maintain views.
Right A transparent facade at street level is a symbolic gesture inviting the public into the space.
Center The 2-by-6-foot panels are welded to aluminum frames set 1 foot away from the glass wall, except on the west facade where they project from the facade as much as 12 feet above the building's main entrance.
Below A schematic of the west facade.









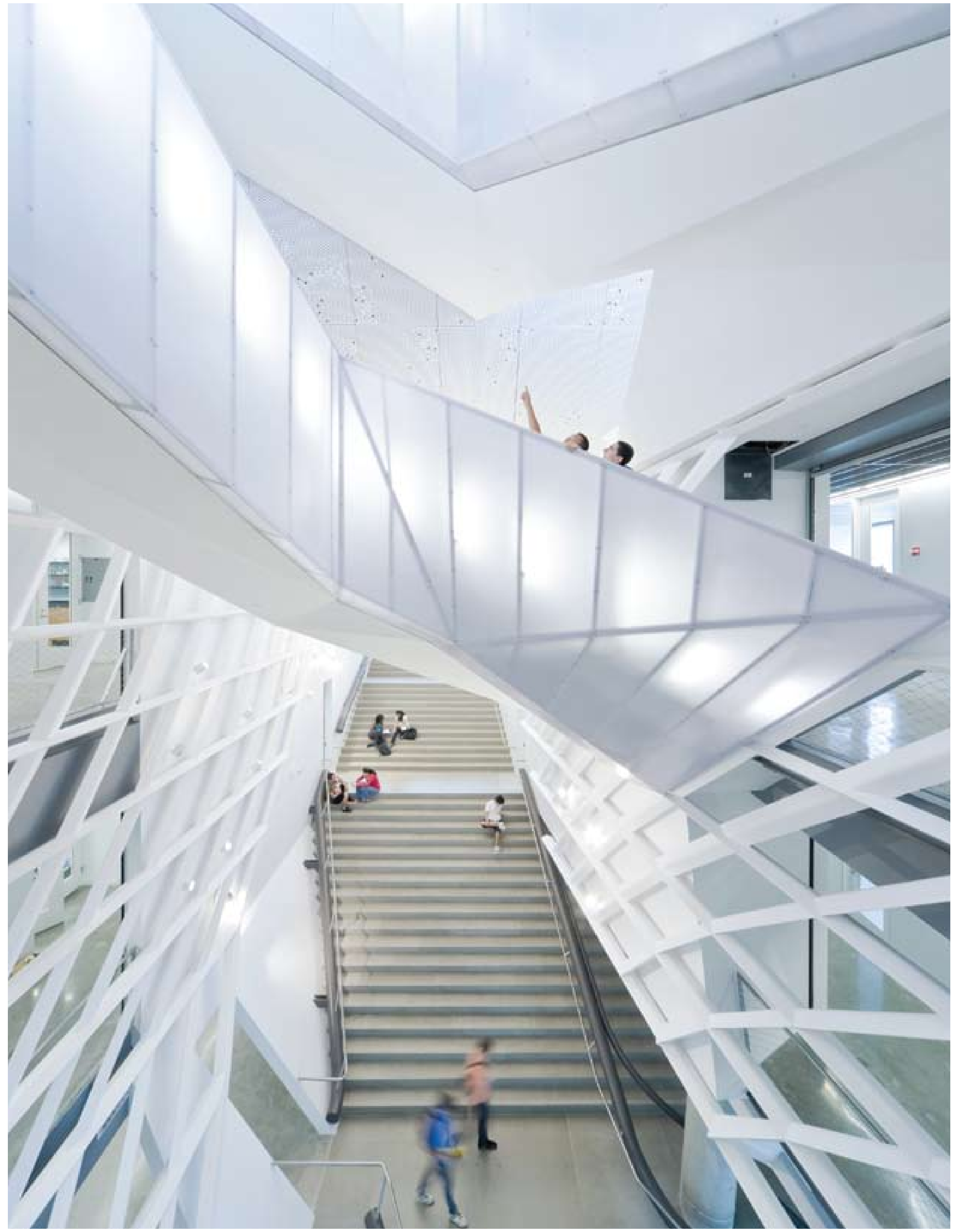
double wall system comes from separating these purposes and isolating the problems associated with each. Because the inner wall is not responsible for the looks of the building the designers were able to choose the most affordable product capable of doing the job. This freed the team up to get innovative on the design of the outer wall without worrying about performance. “That is the beauty of the double skin system,” he says. “Also, if you designate more functions to the exterior layer, such as sun shading, you're getting extra performance for the money you're investing.”

On the north, east, and west faces the metal panels were installed from the inside of the building first, then the window wall was erected behind it. Only on the west face, where the outer facade reaches as much as 12 feet from the slab edge, was a crane necessary to pick the metal panels into place. A crane was also used to install the curtain wall units because their large sizes and complex geometries made them difficult to handle from inside the structure.

The digitally integrated design process used on The Cooper Union project brought all of the project's players together early in the process. The wall's components were outlined on the computer and sent to manufacturers who turned them into shop drawings. These then came back to the design team for accuracy checks. Through this method the team was able to keep the cost of double wall system down to about 10 percent of the overall budget, while at the same time reducing energy consumption by an impressive 30 to 35 percent. In Tzvetkov's understated words: “That's pretty good.” M

Left A 20-foot-wide stair rises through the building's eleven-story central atrium. Seventy-five percent of the building's regularly occupied space is lit by daylight.
Left, above A curving lattice surrounds the stair. Sky bridges cross the atrium to connect lounges, seminar rooms, and other informal spaces that overlook the space.
Facing A social gathering place in and of itself, the stair rises four stories to a double-height student lounge.

This spread: Iwan Baan



Above A digitally integrated design process kept the facade system within budget. The school is expected to be the city's first academic laboratory to gain LEED Platinum certification.

Below, left Meeting areas and lounges are organized around the atrium.
Below, right The operable stainless steel panels reduce heat gain in the summer and insulate the building in the winter.

Top: Joseph David; left: Iwan Baan

Above An open-air terrace wraps the northwest side of the building.

Iwan Baan

"If you designate more functions to the exterior layer, such as sun shading, you're getting extra performance for the money you're investing."

Andrea Tzvetkov, Morphosis

41 COOPER SQUARE

Location: **41 Cooper Square, New York, NY**
Owner: **The Cooper Union for the Advancement of Science and Art**, *New York, NY*
Architect: **Morphosis Architects**, *New York, NY*
Associate Architect: **Gruzen Samton Architects**, *New York, NY*
Structural Engineers: **John A. Martin & Associates, Inc.**, *Los Angeles, CA*; **Goldstein Associates Consulting Engineers**, *New York, NY*
Mechanical Engineers: **IBE Consulting Engineers**, *Sherman Oaks, CA*; **Syska Henessy Group, Inc.**, *New York, NY*
Construction Manager: **F.J. Sciame Constriction Co.**, *New York, NY*
Structural Steel Erector: **FMB Steel**, *Harrison, NJ*
Miscellaneous Iron Fabricators and Erectors: **Post Road Iron Works**, *Greenwich, CT*
Architectural Metal Erector: **FMB Steel**, *Harrison, NJ*
Curtain Wall Erector: **W&W Glass**, *Nanuet, NY*