Prada epicenter, New York

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1. & 2. (right) The Broadway entrance: the original cast iron façade was retained while the interior of the store was completely re-worked.

Introduction

In the late 1990s, as part of its strategy to protect brand image, Prada, the international fashion house based in Milan, Italy, began to rethink the traditional design format of its retail stores. The strategy, later developed with the chosen architects, came to include the idea that some Prada stores should break away from the traditional model to become 'epicenters' - a reflection of the house's cutting edge products.

These new stores, located in some of the world's trend-setting shopping districts, would sport a dynamic, exciting design and accommodate the latest that technology had to offer, all to enhance and support the shopping and customer service experience. Prada chose New York, Los Angeles, San Francisco, and Tokyo as the locations, and Office of Metropolitan Architecture led by Rem Koolhaas (Rotterdam, Netherlands) as design architect for the USA stores and Herzog & de Meuron (Basle, Switzerland) to design the Tokyo store. While the New York store would be Koolhaas' first retail space, he had long been considering the meaning of shopping in the contemporary urban environment[1,2] and the Prada experiment promised to be an ideal testing-ground for his theories.

Prada decided to locate the New York store in the trendy, downtown neighbourhood of SoHo, already home to outlets of many of the world's fashion elite, and eventually negotiated a lease in a prominent 19th century, cast iron façade, landmarked (listed) building on Broadway at Prince Street. The new store would have 24 000ft^2 (2230m^2) including the street level and cellar, and be the full depth of the city block.

The rest of the New York design team was then brought on board. Architecture Research Office (ARO), New York, was appointed as architect-of-record responsible for the detailed drawings and implementation phase of the project. Arup was asked to participate in the engineering consultant selection process and was awarded the mechanical, electrical, plumbing, fire protection and emergency lighting system design work.

For projects in Los Angeles and San Francisco, Arup's offices there provided structural, mechanical, electrical, plumbing and fire protection system design, and for the Tokyo store Arup Lighting worked closely with Herzog & de Meuron.

Store features

The defining feature of the store is the 'wave', a curving floor that swoops from street level to basement, creating a large volume space and giving shoppers an unencumbered route to the product display areas of the cellar.

Made of zebrawood, the wave functions as flooring, display unit, bleacher seating, and architectural element. During shop opening hours part of this space is for shoe display and fitting, but at other times it can become a performance area, with patrons replacing shoes in the bleacher seating and a retractable stage emerging on the facing side.

3. The wave unites the street level with the cellar. Some shoppers observe from upstairs (street level), while others visit the shoe display on the bleacher portion of the wave (cellar level). The hanging volumes above contain merchandise and audiovisual equipment.

Prada's technology requirement was to support and enhance 21st century shopping. The fitting rooms, for example, are entered through doors with *Privalite* glass that transforms from transparent to opaque at the flick of a switch. Once inside, the lighting is customer-controlled via a dimmer, and the fitting rooms are also equipped with IT features designed to excite. A 'magic mirror' - really a series of cameras and plasma screens - records customers trying on their selections, so that they can see themselves from the front, back and side, with instant replay, if necessary. Upon customers' requests, Prada will store these images electronically for use in future shopping experiences, even online. Also in the fitting room, shoppers can scan product codes for additional product information.

4 left: Shoppers use the wave steps to move between street level and the double and single height basement spaces.

5 above: The wave's steps double as bleacher seating for 'stage' events on the opposite side, and merchandise display.

6 below: The movable, hanging volumes allow many space configurations. The crane system track and the cable raceways can be seen in the polycarbonate ceiling.

One of the store's dramatic features is a series of aluminum mesh cages suspended from the ceiling. Imitating the upside-down skyline of a hanging city, these include hanging bars, shelving, and space for merchandise display, all fully wired for lighting, audiovisual, and IT. And they move: the mobile displays are designed to provide flexibility of floor space and can be aggregated to an area less than 25% of the total floor area. The 'handbag lift', a cylindrical glass elevator, provides access to the 'cellar level'. The cab contains a display of Prada handbags, enabling patrons to browse while on board.

7. The dressing-room walls contain a range of IT equipment, all locally lit and cooled, to enhance the shopping experience.

8 right: The movable (manual) display units in the basement display area operate like storage compact shelving, allowing different configurations. Walkways cut into the shelving units allow shoppers to pass through the space.

Engineering constraints

In the 1980s, the building was renovated and converted to commercial space. Systems for hot water, chilled water, smoke purge, outside air supply, perimeter heating, fire alarm, and fire protection were installed at that time. Arup worked within the constraints of these existing systems, and the additional constraint of sharing those systems with the other tenants, including a residence and the Guggenheim Museum's SoHo Annex, who required 24 hours per day operations. All reworking of the base building systems had to be carried out without disruption to the existing tenants.

Electrical systems

Realizing the goals of the design required a complex electrical system to serve the ambitious lighting, audiovisual, IT, stage, and even mobile crane systems packed into the store. It comprises a 1200 amp distribution switchboard and multiple separate panels for lighting, audiovisual equipment, data equipment, mechanical loads, etc. The distribution system feeds over 450 branch circuits and uses over 8000ft (2440m) of wiring raceways for power, audiovisual, IT, and security systems wiring. These raceways, located above a translucent polycarbonate ceiling finish, were carefully sized and routed as they would be a visible feature of the store's ceiling-scape.

The Prada epicenter is brightly lit, probably more than most NYC stores. The initial electric demand for the design was 20W/ft^2 (215W/m^2) but this was scaled back to 14W/ft^2 (150W/m^2) after taking cost (a newly reinforced service would have been needed), schedule, and building space conditions into consideration. Designers employed approximately 80 luminaire types with various voltages, integral/remote ballasts, and transformers for each. Eight dimming panels, each with an associated automatic transfer switch, transfer approximately 15% of the retail store lighting to emergency power to provide emergency lighting.

The mobile merchandise displays - 17 hanging volumes at street level and six floor track-mounted units in the cellar - posed their own unique set of challenges. The hanging volumes on the main floor use laser-guided, industrial grade, motorized cranes for mobility (designed and built by Mannesman Dematic).

Each hanging volume is self-contained for lighting, power, audiovisual, and IT, with power derived from four 208V, three-phase overhead busways on the first floor, via power collectors that move with the displays. Lighting is radio-controlled, whilst the audiovisual and IT controls are wireless. The cellar displays are simpler, as they are manually moved. They derive power for lighting and audiovisual from an overhead, single-phase, three-wire bus system.

'Prada, the international fashion house based in Milan, located their new New York store in the trendy downtown neighbourhood of SoHo.'

Mechanical systems

These high electrical demands create high interior cooling loads. The mechanical system designed by Arup provides 200 tons of cooling using a combination of air handlers, fan coils, and computer room air-conditioning units. New and existing air-handling units, seven in total and distributed as space and duct routes permit, provide a total of 63 000ft^3/min (30m^3/sec) to the occupied parts of the store. The lighting control rooms, IT control room, and backstage audiovisual system control room are all independently air-conditioned.

The movable volumes create 'blockages' for air distribution and, given the large air volumes being moved through the space, create the potential for draughts in certain areas while others remain stagnant. The high level, sidewall air supply is designed to allow supply locations to be manually adjusted to the changing (pre-set) positions of the hanging displays. Furthermore, the air distribution system for the main space is designed for a noise level that is low for a retail space but required for the space's other function as a performance venue.

The uninsulated cast iron and single-glazed façade had a history of interior condensation – and even the formation of interior icicles - in the winter. To avoid this in the new use, Arup included low-level trench heating and high level forced air façade heating in the design. Additionally, the building's landmarked status meant that the existing double doors leading to the streets at both ends of the store could not be replaced. Entrance vestibules (which would have provided some protection from freezing New York winter draughts) were avoided in the design, for fear they would disrupt easy customer access. The constant customer traffic means that these doors are often open. Whilst exclusion of draughts is impossible, glass panel handrails at one side and the peak of the 'wave' at the other help to break them up and keep much of them from falling into the bleacher seating of the wave.

On both the cellar and street levels, much of the lighting is mounted behind either vertical or horizontal polycarbonate panels, with some light fixtures and audiovisual equipment built into fully concealed pockets in the walls and ceilings. Various combinations of supply and extract air and local cooling units were used to ensure all the heat from those devices is vented from these pockets. Ceiling voids are used as general return air plenums to remove the heat.

Other Prada projects

Beyond New York, a new Prada epicenter in San Francisco is planned and designed, and Arup also continues to work on another Prada store in Beverly Hills, California. The scope of services includes the structural, electrical, mechanical and plumbing engineering design of this three storey-plus-basement, 22 000ft^2 (2040m^2) store on Rodeo Drive, of which 18 000ft^2 (1670m^2) is column-free retail space. A steel and glass vierendeel truss roof spans 50ft (15.2m). The main spatial design feature is the 'hill' stair/display form, the inverse of the New York store's 'wave'. Taking advantage of the local climate, the ground floor will open across the entire width of the building, with an 'air curtain' providing climatic separation between interior and exterior. A wall panel will rise out of the basement at night to secure the building. Brand + Allen Architects, Inc, is Arup's client and Architect of Record for both projects, with OMA as design architect for both. In New York, Arup is working with Herzog & de Meuron and Architecture Research Office on the design of a new 15 000ft^2 (1400m^2) multi-media exhibition space for Fondazione Prada, on the ground floor and basement of Prada's US headquarters building, on the west side of midtown Manhattan.

9. **San Francisco:** a 10-storey flagship store providing 37 000ft^2 (3440m^2) of retail and office space with a unique structural system of base isolation and perforated steel shear panels to resist lateral forces.

10. **Beverley Hills:** The lateral system provides column-free spaces on each of the 46ft (14m) wide floors and has a steel vierendeel truss roof diaphragm. The building began construction in January 2003.

Fire protection

Arup also designed the fire protection for this project. One challenge came from the movable volumes, as their design was not initially compatible with standard sprinkler system design. To remedy this, the hanging volumes were lowered slightly, to provide code clearances for the sprinkler heads. The design of the cages themselves was modified to include highly perforated tops and bottoms, allowing water to fall through them. The 'handbag lift' is also fitted with a grating top to allow adequate sprinkler coverage. Consideration was given to sprinkler configuration, in view of the fact that the sprinkler system is permanent while the moveable volume locations are not, and Arup used additional sprinkler heads to 'triangulate' each of the moving volumes.

Additional fire safety measures include an automatic power disconnect to the cages and the Privalite fitting room doors in case of a fire alarm.

Conclusion

After an intense design and construction period of almost 24 months, the store opened to the public on 14 December 2001.

The engineering systems were successfully commissioned and since the opening have performed well throughout the first full seasonal cycle of operation.

Shopper traffic is high, and shoppers seem to delight in the space, both its architectural elements and its high tech wizardry. Critical acclaim has been forthcoming as well. Just two days after the opening, *The New York Times'* architecture critic Herbert Muschamp sang its praises in a review 'Forget the shoes, Prada's new store stocks ideas'. Such diverse publications as *Architectural Record* and *Forbes*, and the technology website *CNET.com* followed - examples of coverage that has gone beyond the architecture and fashion spheres to reach travel, financial, and technology publications as well. The store has become the meeting place that Prada and Koolhaas strove for, the epicenter surpassing the merely commercial to become a public space and a destination as well.

References

(1) KOOLHAAS, R, *et al, Editors*. Projects for Prada, Part 1, Fondazione Prada, 2001.

(2) KOOLHAAS, R, *et al, Editors*. Project on the City 2: Harvard Design School Guide to Shopping, Taschen, 2002.

'Forget the shoes, Prada's new store stocks ideas': Herbert Muschamp, New York Times architecture critic

Credits

Owner:
Prada

Architects:
Office of Metropolitan Architecture / Architecture Research Office

Structural engineers:
Leslie E. Robertson Associates

MEP and fire engineers:
Arup Irina Bulbin, Ash Chawla, Arkady Fishman, Tania Flavia, Gregory Giammalvo, Jonathan Griffiths, Tom Grimard, Hillary Lobo, John Miller, Raymond Quinn, Joel Ramos, Anatoliy Shleyger, Marina Solovchuk, William Stevenson, Gina Wall

Audiovisual:
Shem Milsom Wiklie

Display systems:
OMA

Wallpaper:
2x4

Materials research and development:
OMA, Panelite, Werkplaats de Rijk, Collaborative

Lighting:
Kugler Tillotson Associates

Elevator:
OMA, Chimetal, Selcom, Edgett Williams Consulting, Thyssen Krupp, Iros

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