
Renzo Piano

Mobile structure for
Sulphur Extraction

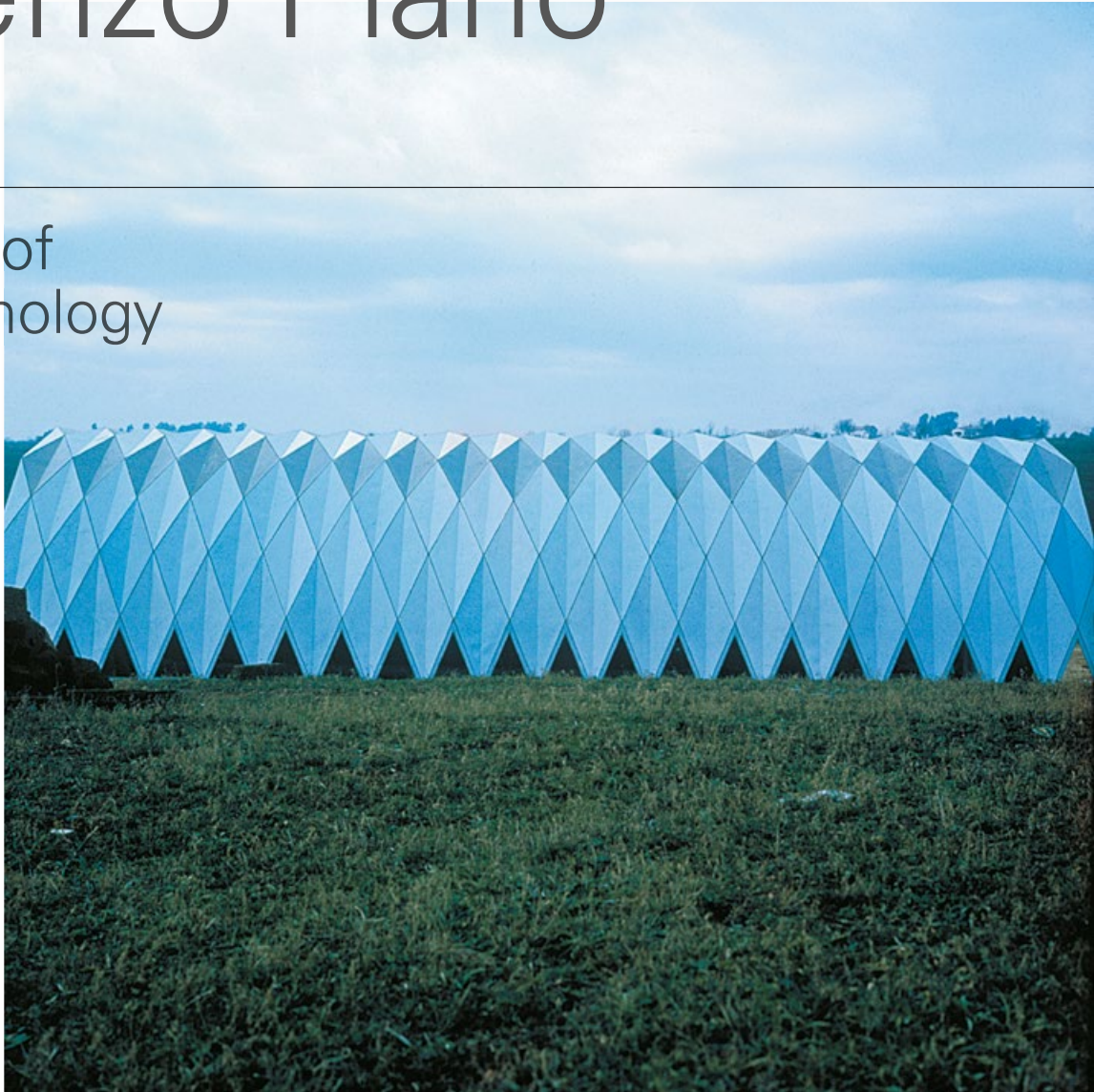
Pomezia, Rome

1966

Lozenge-shaped panels (some of them translucent) stiffened by a central crease and downturned edges form both the structure and cladding of this vaulted shelter that was moved by dismantling panels at one end and remounting them at the other – an early fusion of elegant frugality and straightforward functionality.

Renzo Piano

Poet of
Technology



The architecture of the Renzo Piano Building Workshop (RPBW) is renowned internationally for the formal refinement of its components and detailing as well as for its sensitive responses to context, both in terms of its physical surroundings and local construction traditions. But, as architectural author and Piano specialist **Peter Buchanan** reminds us, the central concern of the practice remains focused on the original core impetus of expanding the bounds of what technology and materials can achieve.

Reflecting his background and personality, Renzo Piano's architecture is centred on making and experiment, the latter largely exploring technologies of making. Initially narrowly focused, his range of design concerns progressively expanded out from these over the decades. Yet throughout he has been obsessed with pushing materials and construction techniques, old as well as new, to unprecedented extremes, as well as with 'lightness and transparency', his oft-repeated mantra. As we shall see, though, lightness refers to more than mere physical weight, and transparency to more than being able to see through things.

Born into a family of builders in the densely knit industrial and port city of Genoa, a favourite outing during his boyhood in the post-Second World War years was to accompany his contractor father to construction sites. He enjoyed the docks too, particularly watching airborne goods being craned off and onto ships. And he spent happy hours beneath the washing lines on the roof of the family home, using drying sheets as suspended canopies, as delighted by their soft curves as by their sunlit luminosity. The resonances with the architecture to come are obvious.



Renzo Piano

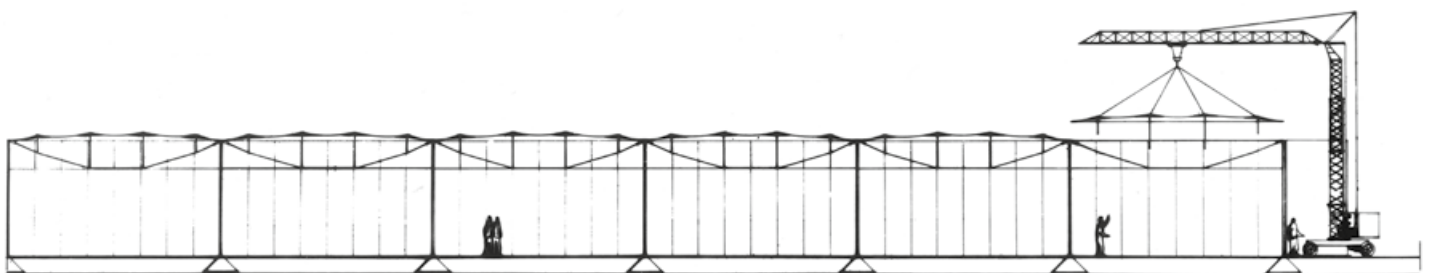
Factory

Genoa, Italy

Late 1960s

top: Rooftop view showing how panels rise at their centres to meet a circular plate bolted to the head of the supporting prop below and are creased for stiffness.

bottom: Each square structural bay, defined by slender posts rising from footings sitting directly on the ground, was roofed by 16 panels craned in together with props dangling from their centres to then be secured to a web of tension ties.



Renzo Piano Building
Workshop (RPBW)

IBM Travelling Pavilion

Rome

1983–6

top: The mobile pavilion was assembled from demountable half-arch trusses, with laminated wood chords and a three-dimensional web of polycarbonate tetrahedral that were pinned at apex and base and abutted at gutters to form an elongated transparent vault whose every component was clearly articulated and displayed.

bottom: The transparency, along with the warmth of all the wood, softened the impact of the modularly faceted forms so that the pavilion settled easily into place in verdant sites against historic buildings, such as here beside the Castel Sant'Angelo in Rome.



Early Works for Industry

Piano was cripplingly shy and insecure as a boy and young man, and had to prove himself privately against objective measures. With his early buildings – industrial shelters commissioned and built by his father during the latter half of the 1960s – he did this by devising structures that spanned a maximum distance or enclosed the largest volume using a minimum weight of materials (objectively measurable criteria) to fulfil another early goal: creating spaces unobstructed by internal supports. With all these he pioneered his characteristic trait of assembling buildings from purpose-made ‘pieces’ specific to that building and intrinsic to its identity.

Unlike a building, the ‘piece’ is small enough to be prototyped, tested and progressively refined in form and performance. Some early structures were vaults, and the ‘pieces’ simple lozenge-shaped panels of materials such as glass fibre whose downturned edges stiffened the panels and allowed them to be simply bolted together. By unbolting those at one end and re-bolting them to the other, the vault could move, as did that at a sulphur extraction works. But some vaults were atypical in Piano’s development, with a single ‘piece’ as both structure and enclosure.

More typical were industrial sheds where the weather-excluding roof panels were propped from a cable suspended between posts. The panels, again of fibreglass, were shaped to both stiffen the thin material and ease the transfer of structural forces between the vertical rods and the horizontal portions of the panels. Separation of structure and enclosure, and the seeming simplicity and refinement of the jointing elements, all heralded Piano’s future.

This phase of Piano’s career climaxed with the Italian Industry Pavilion at the 1970 Osaka world’s fair, a square building framed from steel bars with roof and walls of square polyester panels supported on suspension ties from external masts. The thin panels were again stiffened by their shape and, in what became a Piano trademark, the jointing elements were understatedly elegant. An impressed visitor was Richard Rogers, with whom he formed the architectural partnership (Piano & Rogers, 1971–7) that won the Pompidou Centre competition, launching both to international fame.

Renzo Piano Building
Workshop (RPBW)

The Menil Collection

Houston, Texas

1986

opposite bottom: The over-sailing roof reveals the trusses, assembled from bolted-together units of cast ductile iron, supporting the glass roof propped above them and the ferrocement, light-diffusing blades below them, all of which are above external walls framed in steel I-sections and clad in the same grey clapboarding as the surrounding bungalows in the background.

Renzo Piano

Italian Industry Pavilion

Expo '70

Osaka, Japan

1970

Construction view shows how the structure was assembled from slender I-beams taking compressive forces and tension ties, the latter also bracing the centres of the polyester cladding panels, to create a pavilion of striking material economy.



Piano & Rogers: The Pompidou Centre

Wishing to explore innovative steel structures, engineers Arup paid the architects to design the Pompidou entry. Again it is a clear-span structure, described by engineer Peter Rice as ‘a large loose-fit frame where anything could happen’. But instead of a suspension system, the solution consists of huge trusses whose ends bear on gerberettes,¹ bone-like elements pinned to the columns and acting as levers, projecting out to ties tensioned downwards. Thus the vast central spaces are flanked by narrower ones between the columns and ties for circulation and services. Although a mechanistic solution, it is also, as with much Piano design, somewhat Vitalist, with a skeleton of bones and sinew and servicing viscera outside the glazed skin.

The Pompidou (1978) climaxes an architectural era as much as it opens a new one. Although a triumph, Piano recognised its limitations, referring to it later as ‘a young man’s building’ and ‘an act of loutish bravado’.² Needing to rethink and expand his design approach, he entered the most experimental phase of his career in partnership with Rice (Piano & Rice, 1977–81) who remained his key collaborator until Rice’s premature death in 1992.

Piano & Rice: Technical and Social Experiment

Piano and Rice shared a creative creed: that the lingering spark of discovery is what people subliminally respond to in works that expand the bounds of technical possibility. Both also sought new potentials in traditional materials and techniques, as well as in pushing newer ones to unprecedented limits or exploiting the latest of these. A key issue was to determine the right balance for each building, place and time between local, traditional materials and leading-edge imported ones. Such concerns, and the resultant broad palette of materials, marked Piano’s buildings as very different to conventional High-Tech with its dogmatic commitment to ‘the technological imperative’ and ‘technology transfer’.³

Explorations undertaken by Piano & Rice included two prototypical vehicles (1978–80). A car for Fiat had a strong structural frame (the stresses within which were more easily analysable than was usual at the time) with body panels glued to it, an approach now widely used. And a multi-purpose





Renzo Piano Building
Workshop (RPBW)

Beyeler Foundation

Riehen, Switzerland

1997

A crepuscular view of a portion of the end elevation of the gallery – that first encountered on approach – reveals the elements, or ‘pieces’, from which it is assembled, yet also, for reasons of decorum, recalls the porticoed front of a traditional museum.

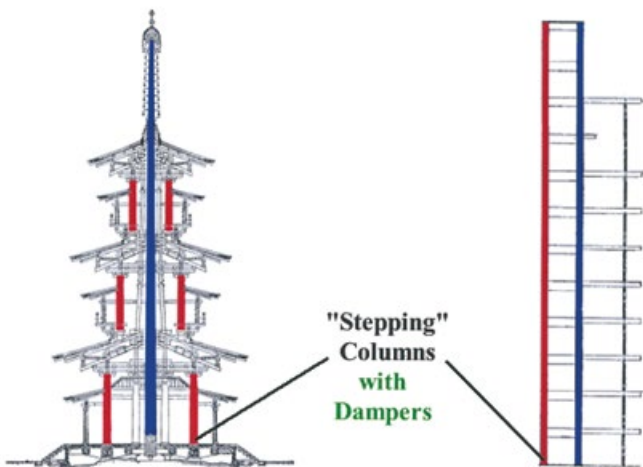
Renzo Piano Building
Workshop (RPBW)

Maison Hermès

Tokyo

2001

bottom: To limit the lateral seismic forces entering the tall narrow structure, and so lessen the swaying of the suspended skin of brittle glass blocks, Arup engineers borrowed a trick from historic pagodas, fixing only the central (blue) columns into the earth and allowing some damped vertical movement in the rear (red) columns.



vehicle for developing countries had a concrete flat-bed chassis-cum-load platform to which various configurations of body panels could be attached along with the mechanical components. Another project was a set of television programmes (1979) exploring how historic communities and craftsmen collaborated using simple tools to erect even such virtuoso structures as Gothic cathedrals.

Awakening and drawing on a similar collaborative spirit, a brilliant project from this period was the mobile UNESCO Neighbourhood Workshop, first deployed in Otranto, Italy, in 1979. UNESCO sought a strategy to conserve whole historic towns, rather than individual buildings, without displacing the residents. The approach devised combined the use of high-tech equipment for accurate surveys of existing conditions along with simple tools (developed by Piano and Rice) easily usable by local craftsmen, empowering them rather than rendering them obsolete. Aerial surveys, for instance, involved towing a helium balloon with a motor-driven camera slung below. And in place of standardised industrial components, pipe-bending equipment was used to tailor-make light trusses to exact size to prop historic floors and roofs while residents remained in place.

Renzo Piano Building Workshop: Technology and Place

The project that returned what was now the Renzo Piano Building Workshop (RPBW) to international attention was the IBM Travelling Pavilion (1983–6). This was a demountable series of three-pinned arch trusses, with chords of laminated wood spars and a three-dimensional, weather-excluding ‘web’ of polycarbonate pyramids, all connected by supremely elegant joints of cast aluminium. With its liberal use of wood, including the sensually shaped spars, this combined elegance and warmth to great popular acclaim. For Rice, a major headache was resolving the very different rates of expansion of the various materials, which he eventually solved (seemingly effortlessly) with spacer-bolts taking up the movement.

Shortly after, The Menil Collection in Houston (1986) marked the start of Piano’s mature career in combining technological innovation with respect for local context and

culture. The characteristic ‘piece’ here is a truss-cum-light-diffusing element. This fuses bone-like components of ductile iron (a material from the auto industry) with shapely sun-excluding and light-diffusing blades of ferrocement (from boat building). These have formal affinities with furniture by Charles and Ray Eames, the supporting steel frame is deliberately derived from buildings by Craig Ellwood, and the cladding is the same grey-painted clapboard as on the surrounding suburban bungalows. The building thus marries the transfer of leading-edge technology with America’s two vernacular building traditions: the steel frame and the clapboard-clad balloon frame.

Here the ferrocement blades seem to float on the light flooding through them, proving that for Piano lightness is not just a technicality, but also about aesthetic and empathic responses. In addition, all structural and technical elements are revealed, so the building is transparent in the sense too that it is easily ‘read’ and understood, and the ‘pieces’ are purposively shaped to those ends. So, just as materials and forms relate the building to local context along with aspects of American architectural culture generally, lightness and transparency go beyond the display of virtuoso technique to also engage users in terms of aesthetics and comprehension.

Piano later went further, assembling buildings from multiple smaller elements, progressively peeled away to reveal each layer of ‘pieces’. With the over-sailing eaves of the Beyeler Foundation museum (1997) in Riehen, Switzerland, ‘pieces’ drop away until only individual glass panels reach out to float on the air like an eagle’s wing-tip feathers. And he continues to push traditional techniques to new extremes, such as the local stone arches (the widest spanning ever) of the Padre Pio Pilgrimage Church (2004) in San Giovanni Rotondo, Puglia, as made technically and economically feasible by the computer – for analysis, precision stone-cutting and checking for invisible flaws.

His hallmark, unparalleled skill at combining innovative technology with local elements, or the evocation of them, is beautifully demonstrated at Maison Hermès in Tokyo (2001). To ride out earthquakes, and inspired by traditional pagodas, only a central column row of the tall, narrow structure is anchored in the ground, and the others can pull free somewhat. Slender interior columns (between ball joints hidden in floor and ceiling) take only axial loads in spaces startlingly similar to those of Japanese tradition. This illusion is reinforced by the shoji screen-like outer skin of huge glass blocks – four times the area of normal ones, and each subtly different (another technical feat). These glass blocks are flexibly sealed to suspension rods so the whole skin ripples slightly during tremors, while at night the whole building shines like a huge Japanese lantern.

Thus Piano remains committed to experiment and innovation, but discerningly so for his ends are evocatively poetic as well as technical. Pointing out a distinction some miss, he is wont to say: ‘For me, technology is like a bus; I only get on if it is going in the direction I want.’²⁴ ▢

The glistening skin of extra-large glass blocks enveloping the flagship luxury goods shop evokes the preciousness of the merchandise inside and also glows at night to resemble a gigantic Japanese lantern.

Notes

1. Named after 19th-century German engineer Heinrich Gerber who invented the beam/cantilever solution for bridges.
2. Peter Buchanan, *Renzo Piano Building Workshop – Complete Works: Volume 1*, Phaidon (London), 1993.

3. Some British architects and writers of the time argued for a creative obligation to use the most advanced materials and techniques (the technological imperative), especially those adapted from other high-tech industries (technology transfer).
4. As remembered by the author.

