

" One cannot invent a city. The basis of our concept comes from the city of the past, which, with its social density and mixture functions, has a homogeneity arising from a limitation of materials and techniques over the centuries. The modern city is not a pastiche, but draws on to the past for its foundations while keeping its modernity through the use of all the technology at our disposal, discipline in the use of materials and the expression of a modern way of thinking. " Renzo Piano

Debis Headquarters Building, Berlin, Germany Renzo Piano Building Workshop

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The Debis Headquarter Building is a landmark of the Postdamer Platz urban redevelopment project in Berlin. This Renzo Piano Building Workshop project expands over six hundred thousand square meters, becoming one of the largest commercial building projects in the world. The key design principles that stood at the basis of this project were to minimize energy use and pollution, promote the use of natural daylight and use of natural cooling and ventilation systems, by combining high tech architecture with traditional materials such as terra cotta.

The Debis Tower completes an arc of buildings along Alte Postdamerstrasse, and stands out from the rest of the buildings by its height and characteristic appearance of terra cotta and glass. The Debis Tower reinvents the image of the skyscraper. It replaces the typical North American sealed glass box, with a "*generous civic architecture of terracotta and glass*"ⁱ. Piano develops a double curtain wall operating system, a combination of transparent and opaque surfaces that responds to the exterior environment and the personal needs of the occupants. The natural cooling/heating system "*reduces primary energy consumption by 50% compared with normally air-conditioned buildings*"ⁱⁱ. The Debis Tower presents an innovative energy-conserving building design, a good example of environmentally progressive architecture celebrating craft and technology.

Piano develops a technologically sophisticated, highly effective curtain wall operating system. The building curtain wall offers considerable advantages in terms of the conservation of energy, day lighting, user control and comfort. It combines traditional materials and principles (terra cotta and natural ventilation) with innovative technology (pivoting panels with sensor control). South, East and West facades, that have high solar exposure as well as the facades of the interior atrium are highly detailed and show environmentally advanced solutions in curtain wall design. Operable glass panelsⁱⁱⁱ supported by two axes that hold the glass blades and truss rods that activate their openings, are placed 27 inches outside an inner wall of operable glass windows. The outer glass panels open up to a 70-degree angle of rotation, they reflect light differently depending on the angle that they are pivoted at and allow for warm weather ventilation. They are controlled by sensors that are programmed to open during the night and ventilate the heat accumulated during the day. The shutters allow cooling breezes to enter the building, making air-conditioning supplementary and not mandatory. The mechanical system operates only when the temperature drops below 5 °C or exceeds 20°C. The building achieves natural ventilation for around 60% of the year. The maintenance platforms between the two skins act as horizontal sunshades. The combination of the double skin wall and shading devices is extremely effective in reducing the heat penetration during the summer and produces a greenhouse effect during the winter. The heat gain in the winter is maximized by the exposed concrete at the outer edges of the floors; it absorbs the excess heat with its thermal mass properties during the day and radiates it back at night.

Another type of shading device used by Piano and specified as a requirement for the rest of the buildings in the Postdamer Platz is terra cotta cladding^{iv}. The terra cotta used by Piano is a type of ceramics made from a mixture of different clays and powdered stone. It is unglazed and can adopt different colour pigments. The shading panels are composed of rod like elements, fastened into receptors cast into vertical mullions. The cladding is attached to the substructure through galvanized-metal fittings. Panel edges are

unsealed allowing for ventilation between the glass and terra cotta layer. An extra layer of shading is composed of terra-cotta sunscreen rods that appear to be the movable blades of a partially closed shutter. The ceramic material has been successfully applied as cladding to the other buildings on site, using the approach Piano took, as screens and panels. The colours range from the ochre yellow of the Debis tower, to grayish red and sunny yellow.

Another facade that receives special attention is the internal facade of the atrium. The atrium is a 28m high, 14m wide, open space that runs through the middle of the building, and divides the office spaces with a public, exhibition space. It is a monumental space, referred to by Piano as "the canyon" because of its narrowness for a height of 28 m. This is the public space of the building and it accommodates the Mercedes auto showroom, along with exhibition spaces and a restaurant. The facade is clad with blades that are tilted upwards, in order to secure the privacy in the offices, and to deflect views upwards, towards the glass ceiling. The blades are painted white in order to intensify the natural light that is captured inside this space. The blades also direct air downwards. The wall section through the interior wall system shows a high range of filtering applied to the glass for glaze control and smoke control. Although the atrium takes over a large amount of the ground office space, it lowers the consumption of lighting and ventilation. The atrium introduces a gentle environment. It *"seems to have a city inside, along with natural elements such as light and winds."*^v

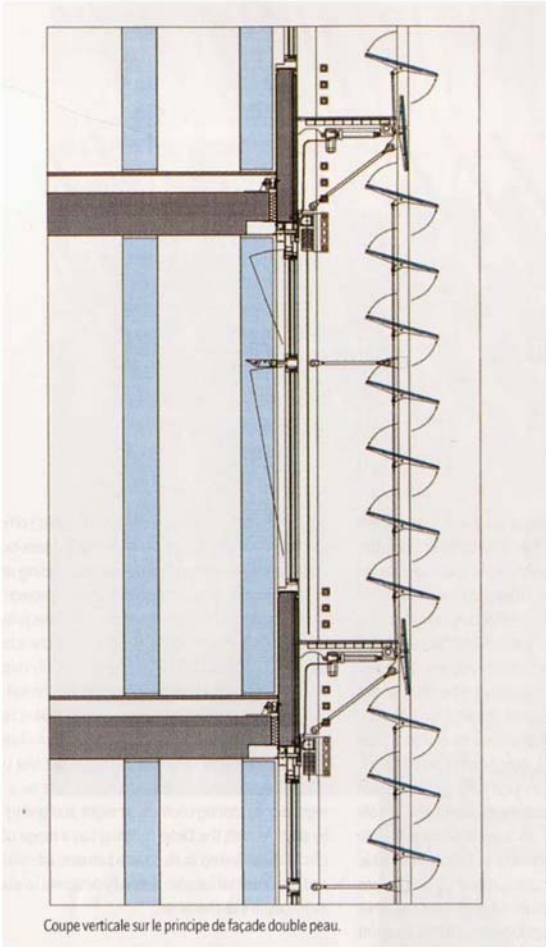
The Rooftop is another intensely designed surface in the Debis Tower. It is a *"landscape of glass and greenery"*^{vi}, with its alternating glazing panels (above the atrium) and planted parts. A graywater cooling system runs over the low-rise section of the roof, cooling water to a temperature of 18°C. Graywater is used for watering the gardens and flushing the toilets, this reducing the drinking water supply consumption by 20000 cubic meters. The excess of water fills the pond that surrounds the building. The rainwater is gathered by cisterns and brought down by gravity to the pond through planted banks that act as filters. A cistern situated under the platz completes the cycle by collecting the water at the end of the circuit. The established network of ponds are meant to establish a

"natural and symbolic link with Landwehrkanal that marks the southern bound sector and the Tiergarten park"^{vii}. The Debis Headquarters building as well as the rest of the project draws a close connection to the natural environment it is set in. *"It is of a city of voids, a city filled with nature, invaded by water. The new role of nature is the boldest and at the same time the most fascinating element of the project. Instead of the division created by humanity, we have substituted vegetation and water, as new linking and hinging elements."*^{viii}

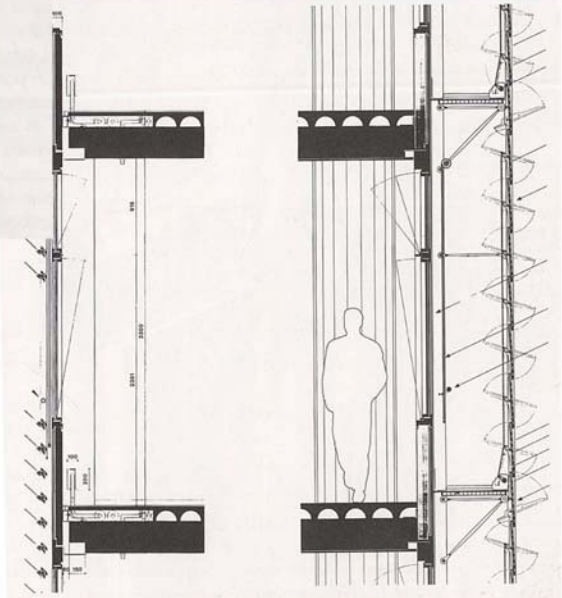
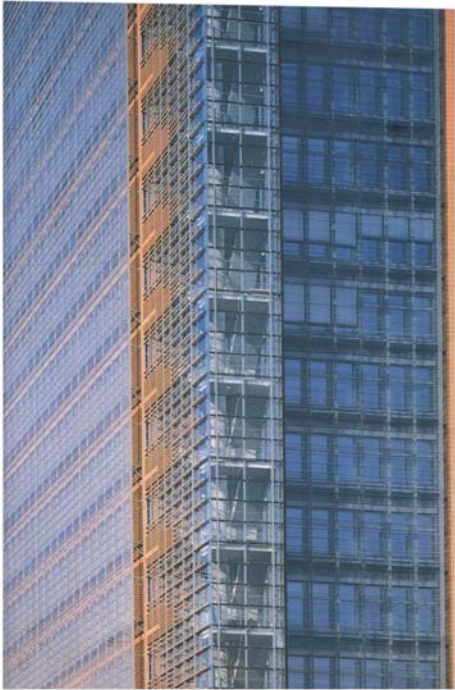
Energy is supplied to the building by a local electric utility specially designed for the entire Postdamer Platz. *"Waste heat will be distributed by pipe to heat or cool the buildings by the absorption method."*^{ix}

The design of the Debis Tower reflects Renzo Piano's approach on the entire Postdamer Platz project. It is a highly elaborate project that redefines the standards for office building design, in a larger urban context. Both on the big scale of the project and on the smaller scale of the Debis Tower, Piano managed to address a series of cultural, environmental, and urban issues. His organic approach on high tech architecture enabled him to use sophisticated technology in combination with traditional materials, in order to find most energy conserving solutions for his building. The manager of the Debis Tower views the project as *"a prototype for future corporate real estate endeavors"*^x The Debis Tower can indeed be viewed as an outstanding example for future high rise developments. It would be highly appropriate in North America, in terms of conservation of energy, daylighting, natural ventilation, user comfort and control. The solar control panels would be appropriate in any hot climates, along with the terra-cotta panels. The highly customized curtain walls address however the issue of cost. However, on the long term, their efficiency leads to reduction in energy consumption and reduction in energy cost.

Picture # 1 Double Curtain Wall



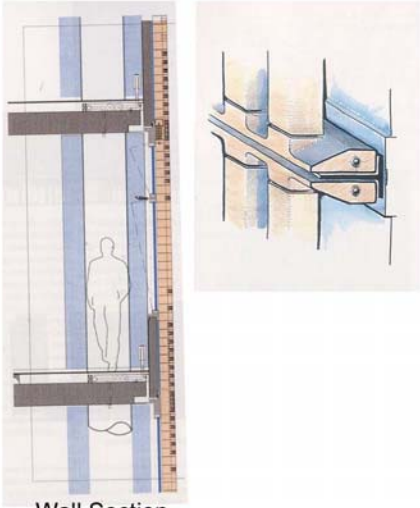
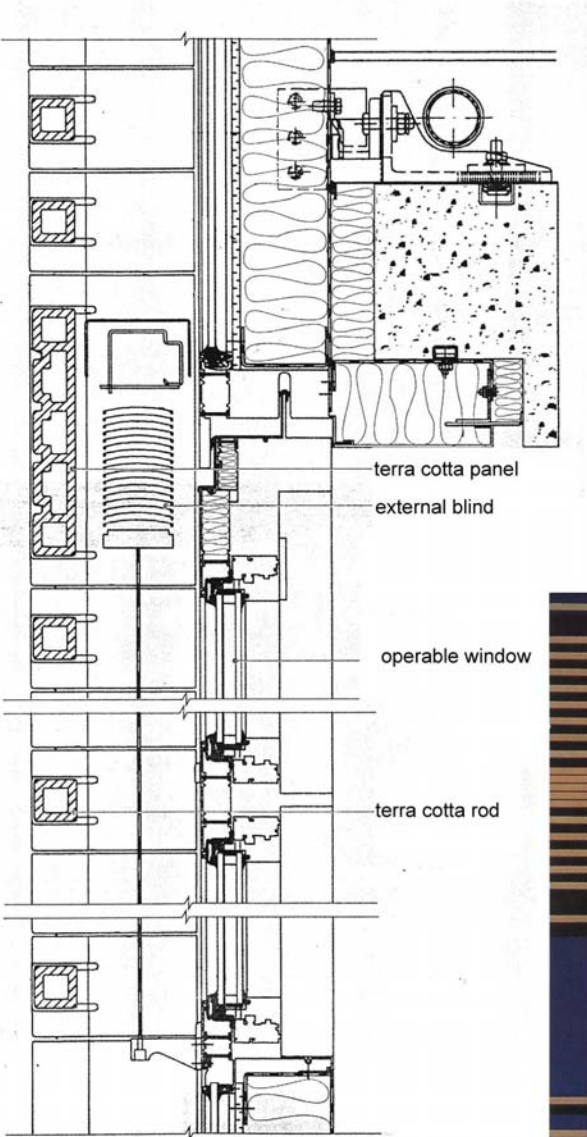
Vertical Section through double skin



Ventilation and sunscren detail drawings of facade

Picture #2 - Terracotta Cladding

-drawings and assembly of components

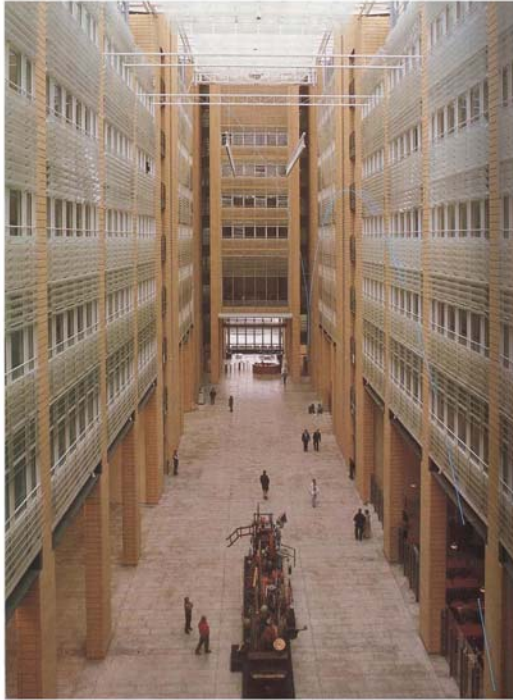


Wall Section

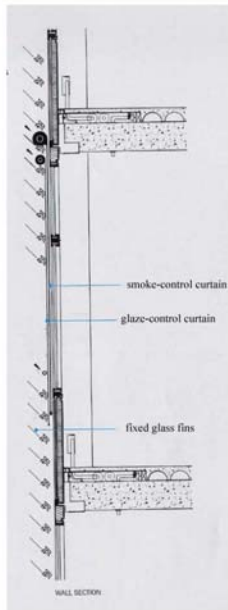
Wall Section Detail



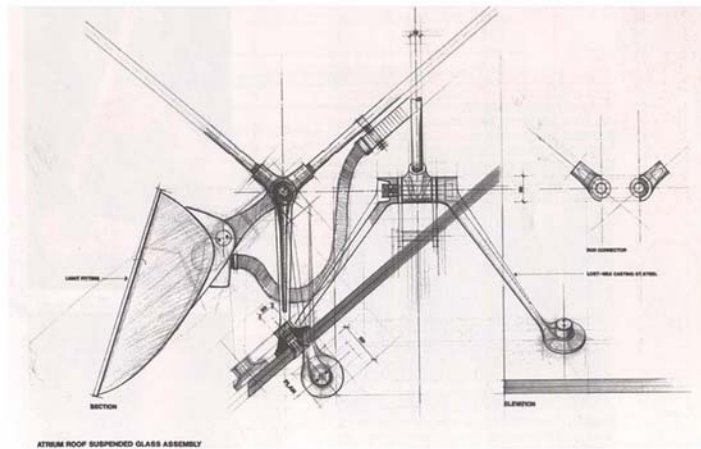
Picture # 3 Atrium



Detail of the movable louvers for natural lighting and natural ventilation of the atrium ceiling



Wall Section



Detail drawing of the louver

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- ⁱ The Architectural Review: Piano at Postdamer Platz
ⁱⁱ Ibid
ⁱⁱⁱ Picture Index - #1 *Double Curtain Wall*
^{iv} Picture Index - #2-*Terra Cotta Cladding*
^v Space Modulator: A typical European-style high rise
^{vi} Architecture d’Aujourd’hui: Vertus du compromis Secteur Daimler Benz, Potsdamer Platz
^{vii} Ibid.
^{viii} A+U: architecture and urbanism: Postdamer Platz Reconstruction
^{ix} Architectural Record: “A striking presence on the Berlin skyline, the Debis Tower, by the Renzo Piano Building Workshop, revives the skyscraper”
^x Ibid.

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