

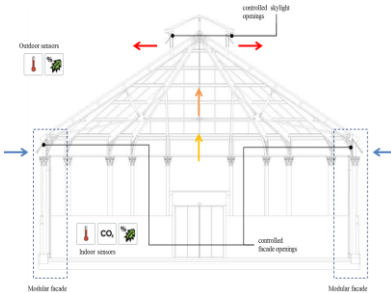


ES_Valladolid_Mercado del Val		
<p>Image 01: Building before renovation ©LLANOS & URDIAÍN Arquitectos</p>	<p>Image 02: Render of the building after renovation ©LLANOS & URDIAÍN Arquitectos</p>	<p>Image 03: Stack natural ventilation concept ©LLANOS & URDIAÍN Arquitectos</p>
		
		
Building Specifications		
Address	Calle Sandoval, 47003 Valladolid, Spain	
Building Category	Retail building	
Year of Construction	1882, refurbishment started in 2015	
Special Qualities	Historical building, integration of thermal, daylighting and ventilation functions in the facade	
Location	41° northern latitude, 4° eastern longitude. Located in urban area. The building complex is surrounded by other same size buildings to the east, west, south and north.	
Climate	Csb (Mild with cool, dry summer, no month with average temperature of warmest months are over 22°C, four months with average temperatures over 10°C)	
Vent. Cooling Site Design Elements (Solar Site Design and Wind Exposure Design, Evaporative Effects from Plants or Water)		
No intervention on site design possible since the ventilative cooling strategy is applied as retrofit solution and the building is located in the city center.		
Vent. Cooling Architectural Design Elements (Form, Morphology, Envelope, Construction & Material)		
<p>Form: Consists of a long rectangular 2 storey building placed along east/west direction. The building shape has high potential for exploiting stack effect ventilation by integrating openings in the facade and using the existing skylight openings located at the height of 10 m above ground level where air can exhaust.</p> <p>Morphology: The building consists of an underground floor and a ground floor. Its floor plan is a rectangle of 112 meters long and 20 meters wide, with chamfered corners. The ground floor is a big open space with market stalls ideal for natural ventilation.</p> <p>Envelope: The refurbishment project emphasizes the old iron structure by using a glazed façade made by modular façade elements which goal is to facilitate thermal, daylighting and ventilational functions, being responsive when internal and external loads change</p> <p>Construction & Material: Glass and steel structure building</p>		
Vent. Cooling Technical Components (Airflow Guiding Components, Airflow Enhancing Components, Passive Cooling Components)		
Natural ventilation is applied by 24 automated bottom hung windows (1.72 m width x 0.78 m height) on the east facade and 24 on the west facade and by 12 automated top hung skylight windows (opening inwards)(3.63 m width x 0.56 m height) on the east side and 12 on the west side.		

IEA EBC Annex 62 Ventilative Cooling

Actuators, Sensors and Control Strategies
<p>Chain actuators enable vents opening up to a 35° angle</p> <p>6 temperature sensors distributed within the indoor space to control the automated ventilation.</p> <p>Opening modulation according to indoor-outdoor temperature difference. Façade and skylights openings are grouped into 6 groups and controlled according to the nearest temperature sensor. In case of rain or outdoor heat all openings are closed and mechanical ventilation and cooling system is turned on.</p> <p>The automatically controlled openings and sensors are connected to an integrated building energy management system.</p>
Building Energy Systems (Heating, Ventilation, Cooling, Electricity)
<p>Full air HVAC system</p> <p>Hybrid ventilation with both mechanical ventilation and automatic natural window ventilation</p> <p>No information about electricity available</p>
Building Ownership and Building Facility Management Structures
<p>Municipality of Valladolid is the owner of the building, and the consortium of Mercado del Val is the user.</p> <p>Architect: LLANOS & URDIAÍN Arquitectos</p>
Aknowledgements
<p>The refurbishment of Mercado del Val has received funding from the European Community Seventh Framework Programme (FP7/2007-2013) under grant agreement n. 608678</p>
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