MEDIA-ICT

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& HIS TEAM AT CLOUD 9

MEDIA-ICT is located in the 22@Barcelona district, a new science and technology quarter that occupies 200 hectares in Barcelona's former industrial heartland of Poblenou. As Barcelona's main economic motor for over 100 years, Poblenou has been regenerated into a new urban zone to promote collaboration and synergies between the university, technology and business. 22@ Barcelona district has been identified as a new centre of European excellence in new technologies, such as audio-visual, ICT, biosciences and energy sectors. The district will create up to 3,200,000 square metres of new, flexible and unique technological spaces for innovative companies, as well as 400,000 square metres of new land for installations, 4,000 government-protected flats and 75,000 square metres of green areas that will ensure the urban and environmental quality of the new economic centre of Barcelona.

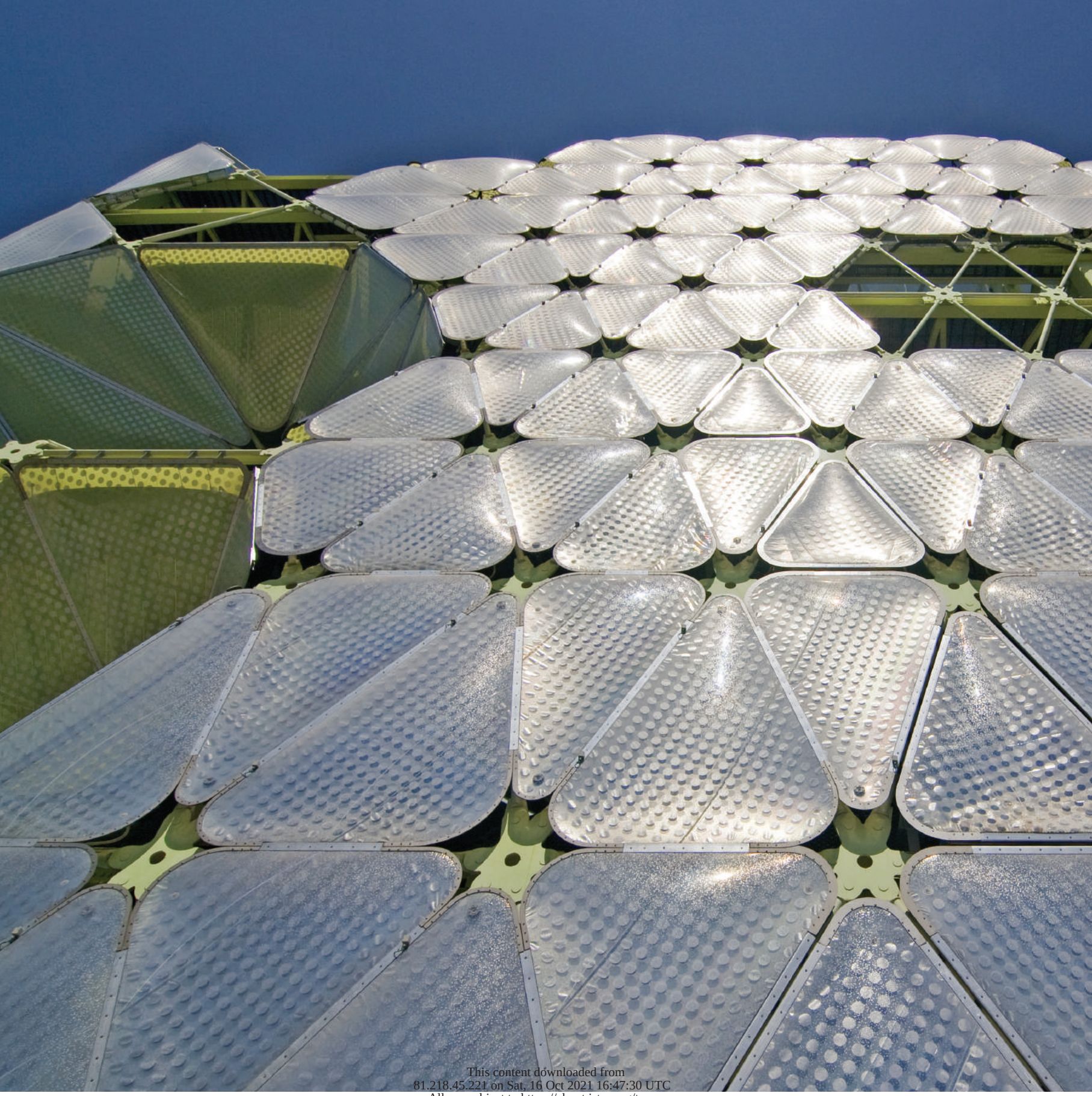
MEDIA-ICT is a communications and interaction hub for businesses and institutions specialising in the world of information and communication technologies (ICTs), as well as for the media and audio-visual sectors. The project was designed by architects CLOUD 9, and structural engineers BOMA S.L., AGUSTÍ OBIOL. The programme for the building consists of:

1. Information and Communications Technology Centre (ICT): a 'hub' facility available to both the general public and businesses developed in conjunction with the Barcelona Digital Foundation.

2. The MEDIA-ICT (Incubator): a facility that offers infrastructure, development and financial support for entrepreneurs in the media sector.

3. The MEDIA-ICT (Landing and Accel Programme): a facility that offers development space and services for international business initiatives that wish to establish a base in Barcelona and to participate in the system of Catalan innovation.

4. ICT Technological Centre: a training facility that offers mechanisms for the incorporation, use and application of ICTs so that businesses and institutions can increase their productivity and competitiveness within the digital economy.



1: Featuring a reactive ETFE skin, this 'intelligent' building regulates energy through daylight and occupancy sensing.

2: Elevation view of the transparent building skin.

3–4: Development of network lattice.

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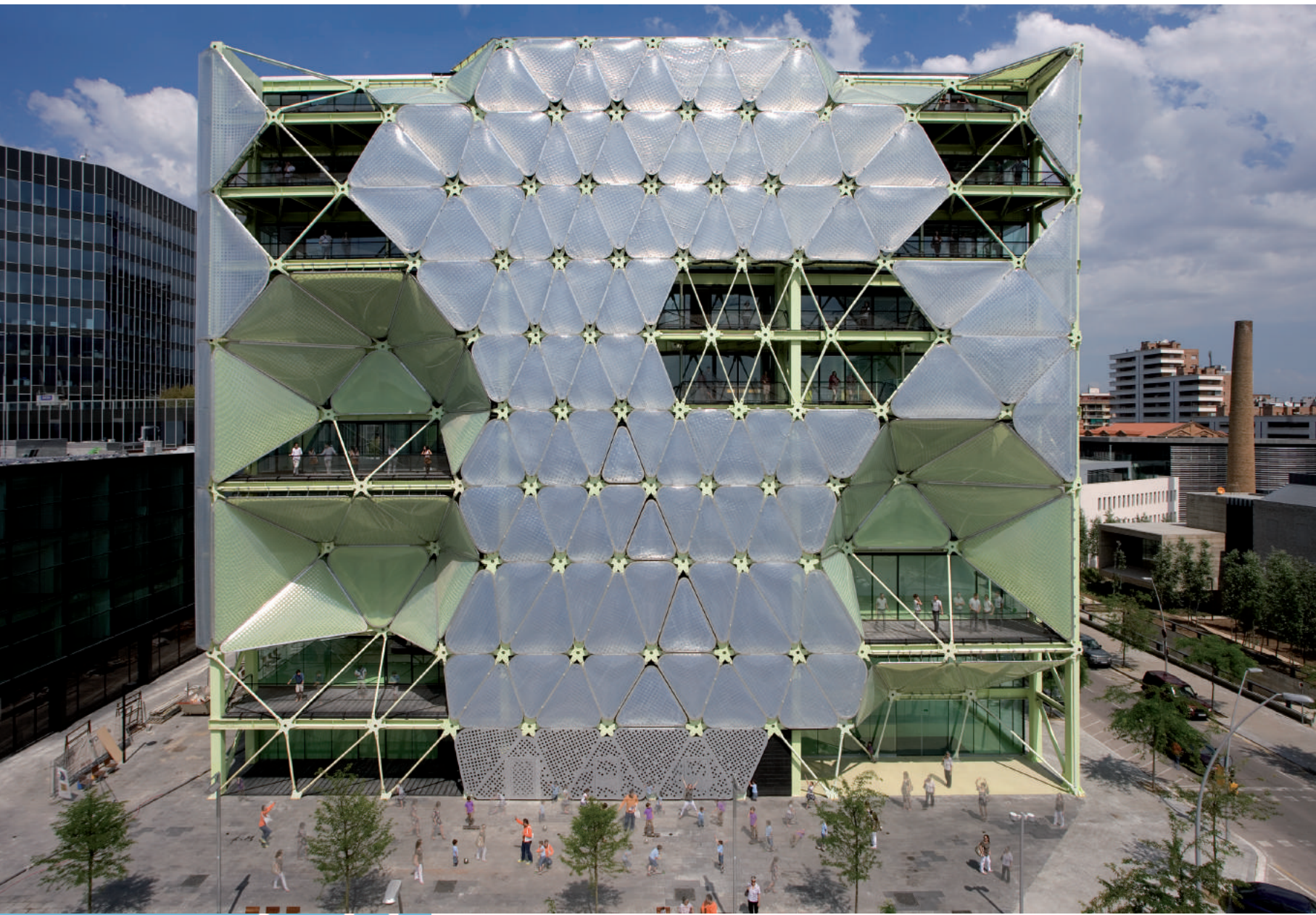

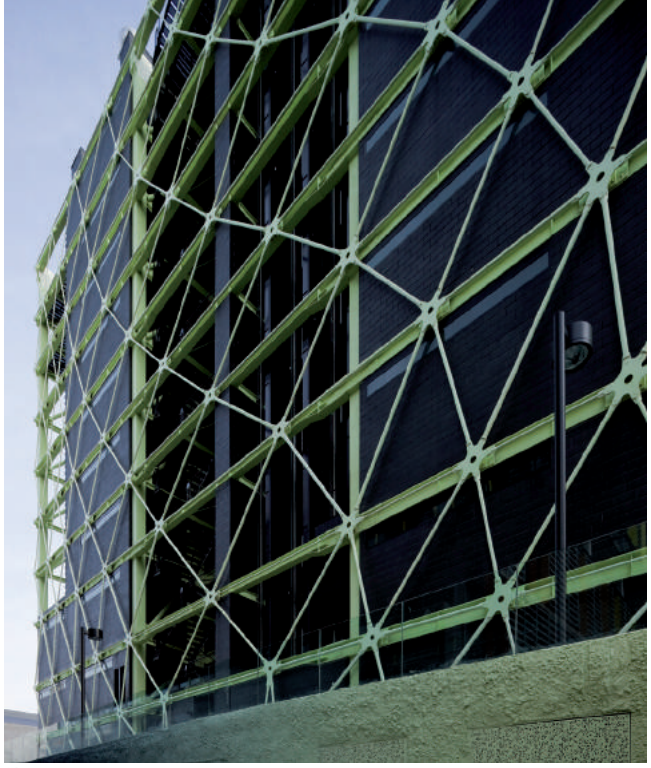

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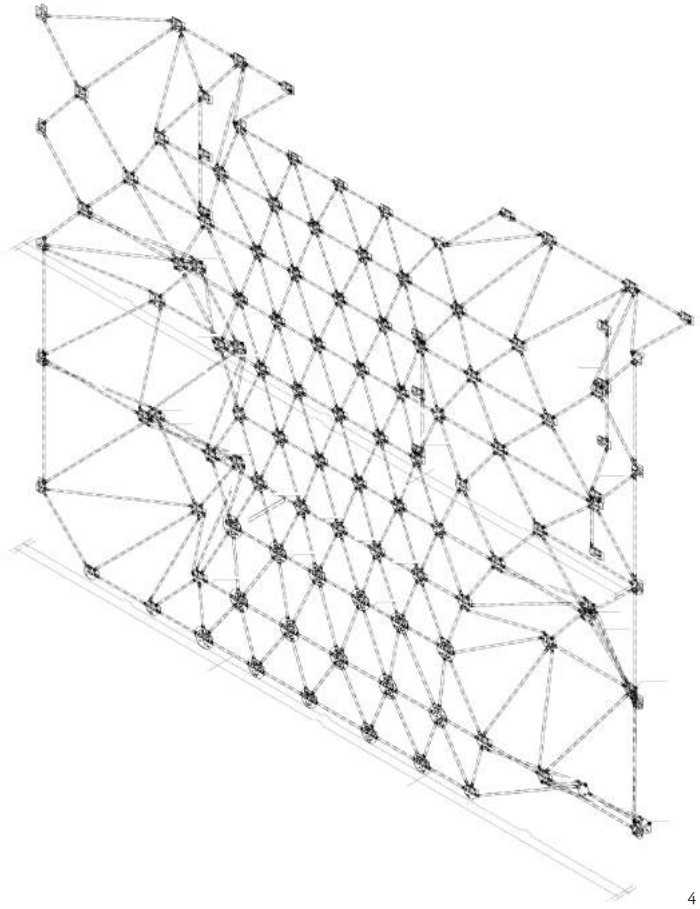

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We are experiencing a digital revolution. Between 1850 and 1950, factories whose technological and structural advances created work spaces, such as Saulnier's Menier Chocolate Factory at Noisel-sur-Marne, (1871–1872), Esders Sewing Machines Factory in Paris (1919) and Berhens AEG Turbines Factory Berlin (1908), were the cathedrals of architecture. Now, in the information era, architecture has to be a technological platform, in which bits, connectivity, new materials and nanotechnology are more important than old materials. We are living in an electronic, immaterial world, in which what is important is the network's design, not its physical size.

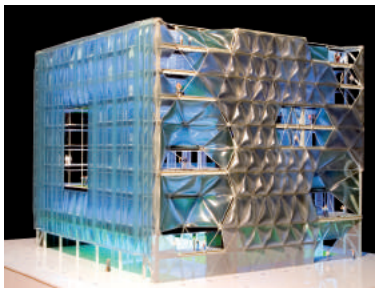
MEDIA-ICT is digital architecture, constructed using CAD/CAM digital processes. Its facade does not represent industrial, series construction: instead it evolves and represents digital construction, the construction of information. It consists of a primary steel structure, composed of four rigid, braced frames, 14.25 metres apart. The frame type consists of steel 'Fink' beams made of seven- and eight-section forged-metal girders. Each frame has a support beam that transfers their load to 'galleries', the rigid support centres. Each of these elements defines a space with a different structural density:

· Zero density: a clear-span ground floor space of 36 x 44 metres.

· Low density: maximum flexibility office floors with minimal interruption, provided by traction optimising structure, making it possible to divide different uses and different users

· High density: galleries. Large structural beams define smaller and more inflexible spaces that correspond to centres of communication, installation supports, bathrooms, roof terraces and courtyards.

Using 2,500 square metres of ethylene tetra fluoro ethylene (ETFE) cladding, MEDIA-ICT will enable energy savings of 20 per cent and will score 42 points of the maximum 57 points envisaged by the decree on environmental criteria and energy eco-efficiency for buildings.



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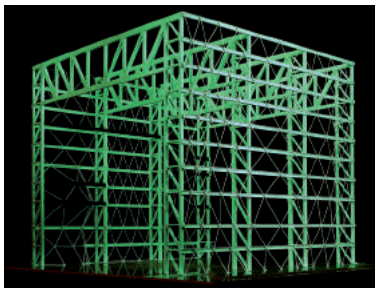

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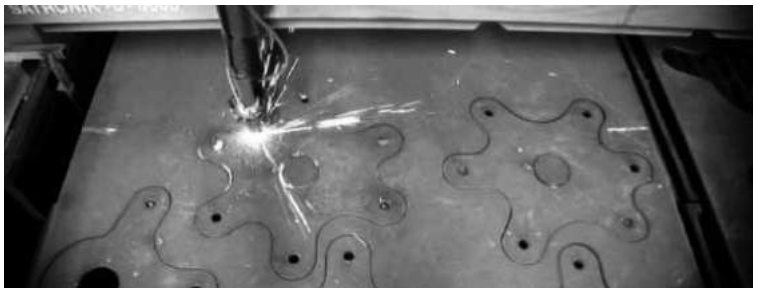

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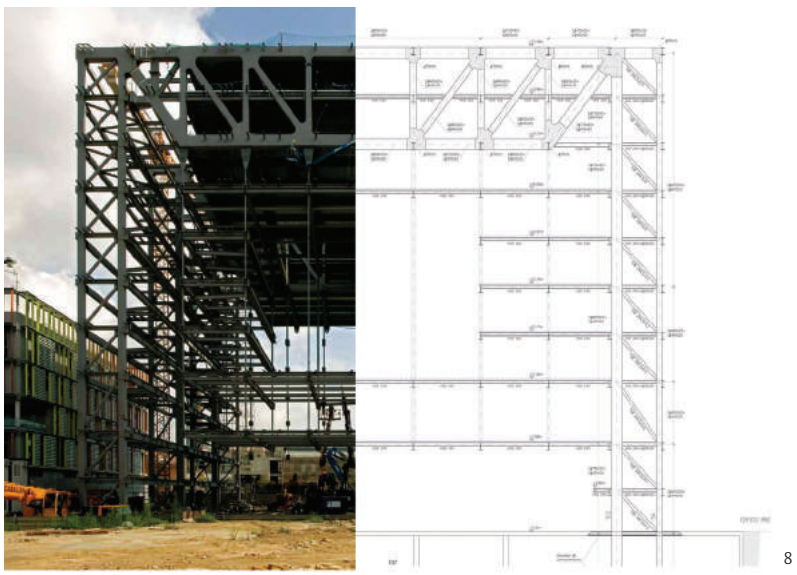

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5–6: Scale models.

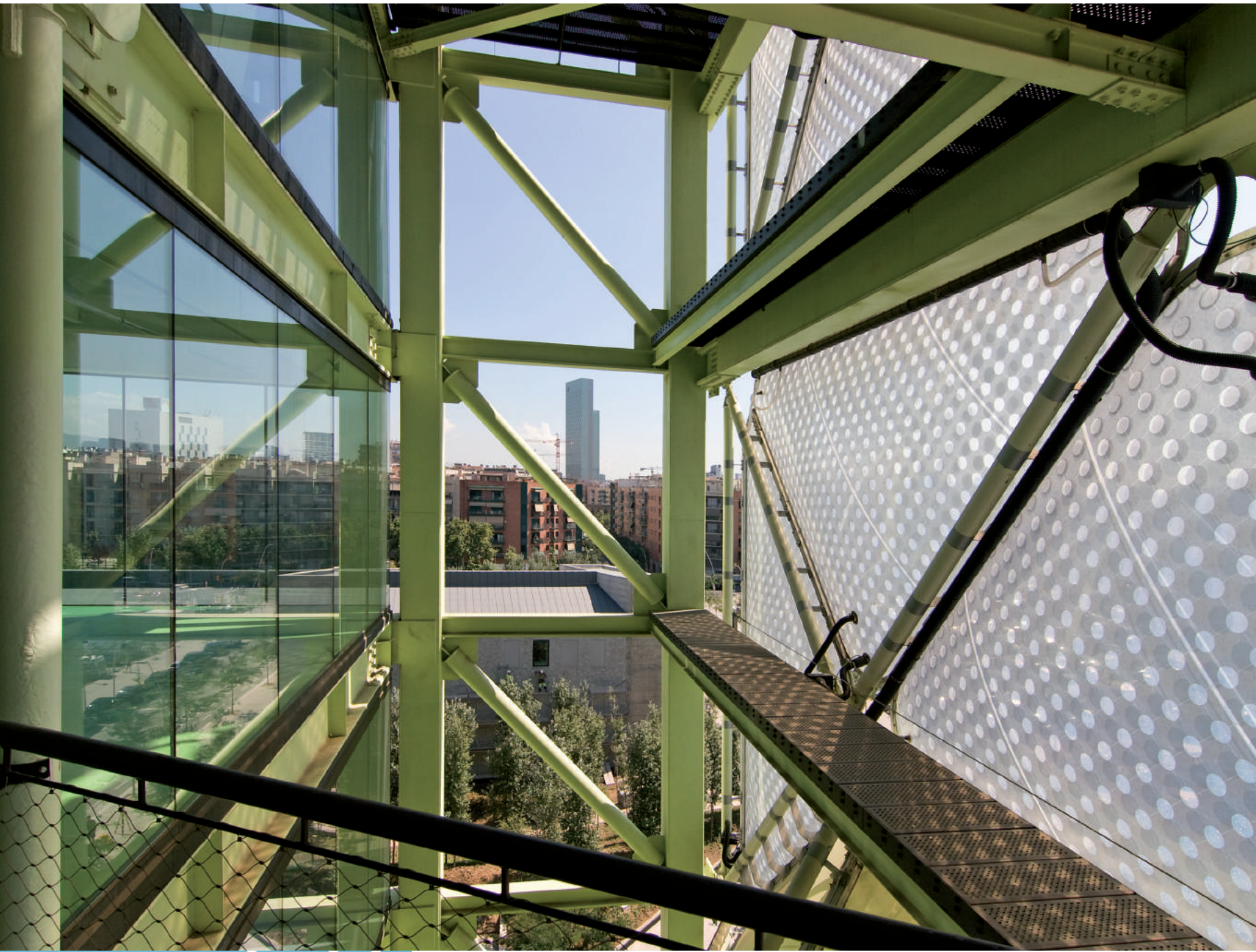
7: Digital fabrication of steel elements.

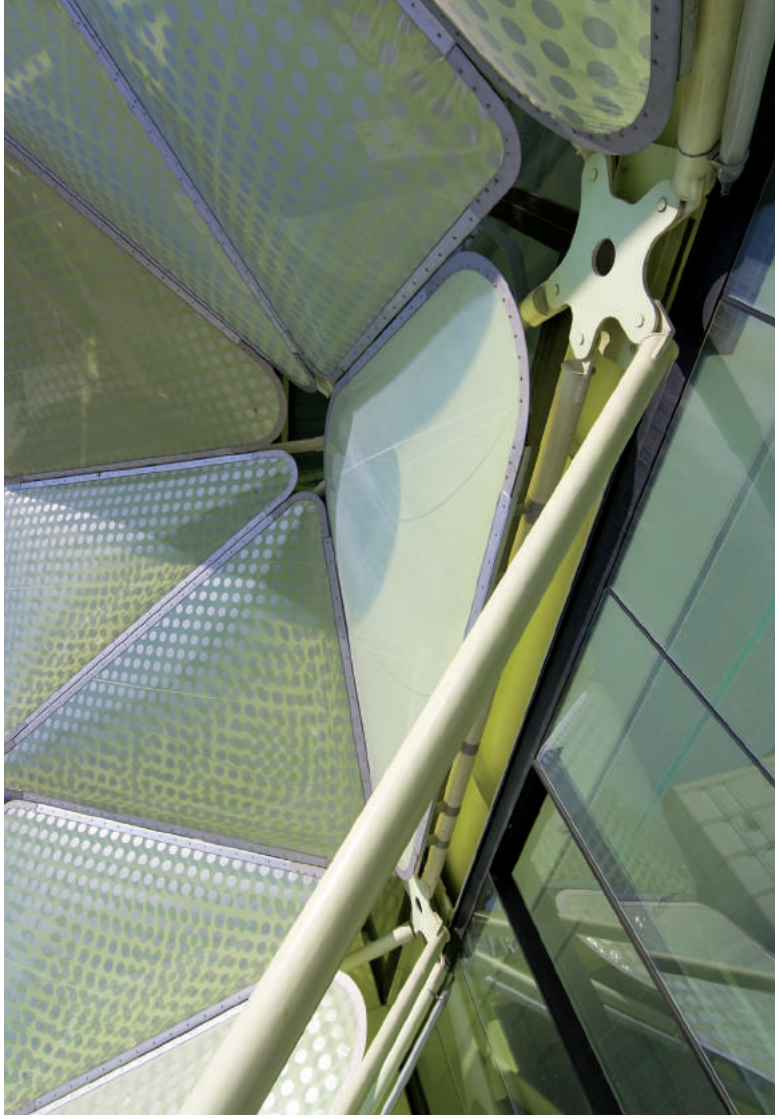
8: Main metal structural frame consisting of four large porticoes, from which the floor structures hang, leaving the entry/ground level free of any structural features.

9: The cushions on the east-facing Sancho de Àvila facade incorporate a pneumatic light-control system. The positive/negative printed design on the membranes produce an opaque surface when overlapped.

The advantages of ETFE, in this instance, provided a solar filter and facade with a thickness of 200 µm, an ultraviolet coefficient of 85 per cent and density of 350 g/square metre. It is also auto-combustible and its elasticity could be exploited for geometric form-finding. Furthermore, it is anti-adherent, which prevents it from becoming dirty and requiring cleaning maintenance. At the same time, it does not lose its characteristics of elasticity, transparency or strength over time. The ETFE cladding on MEDIA-ICT is inflatable, with up to three air chambers. This not only improves thermal insulation, but also makes it possible to create shade by means of the pneumatic system. The first layer is transparent, the second (middle) and third layers have a reverse pattern design that, when inflated and joined together, create shade or, in other words, a single opaque layer. When the second and third layers are joined, creating shade, the inflatable section only has one air chamber.

In this way, it is possible to manage an entire facade simply by the movement of air. This is not done with industrial mechanisms, but with air management, which has very favourable and energy-economic results. According to the solar study, the north-east facade (known as the Roc Boronat Facade) receives around three hours of sun per day during the morning, and it does not require a system of external solar protection. Instead, we are applying internal protection based on screen-type blinds. The Sancho de Àvila facade (south-east) receives an average of six hours of sunshine a day, requiring an external solar system based on a double layer of cladding that is regulated, domotic structurally light, with low energy consumption and great illumination efficiency.





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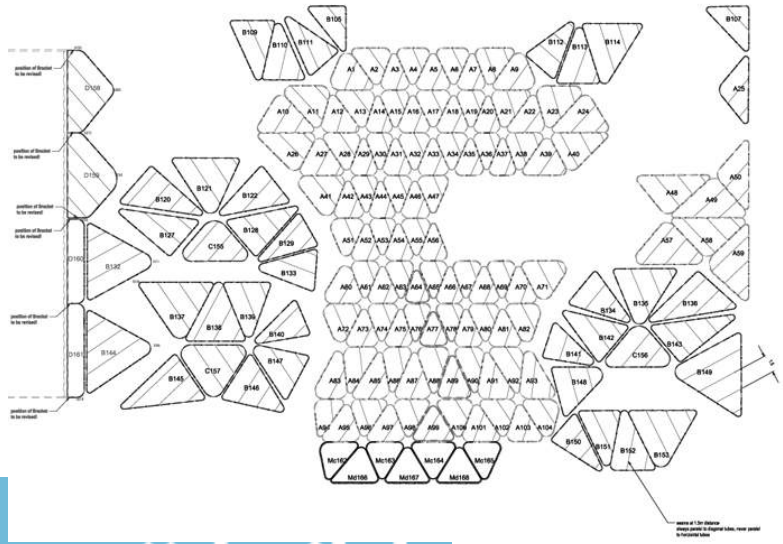

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The solution is an exterior 'film' of material with a variable ETFE solar filter in Diaphragm configuration, constructed with three layers of ETFE, with constant pressure and variable circulation of air between the chambers. The CAC Facade (south-west) also receives an average of six hours of sunshine a day. For this reason, thanks to the powerful heat energy that enters, the suggested solution is the so-called lenticular solution, based on two layers of ETFE, filled with nitrogen. In this case, we use the air density of its particles in order to create a solar filter. This is a mechanism created following exhaustive research, that represents a very low economic cost with respect to the project, accounting for 5 per cent of the total. We are in an area of ICT innovation, where energy management is the most important objective. For this reason, the theme of the MEDIA-ICT building is how architecture creates a new balance with the digital use of energy.

Augmenting the air density of the ETFE cushions with nitrogen particles, the G-factor of the building goes from 0.35 to 0.19. The system activates itself automatically with a temperature sensor network. At this point, it performs and regulates the solar energy with a filter in the facade, which combines a nitrogen particle system with air from the ETFEs and creates a cloud that protects the building's interior.

10: With their triangular shape, the cushions on the Sancho de Àvila facade reflect off and expose the structure underneath.

11: Layout of all the cushions on the Sancho de Àvila facade.

12: Within the @22 district in Barcelona the Media-ICT building hosts a hybrid programme ranging from an incubator for young companies to spaces for large corporations.

13: The brace in the light well illustrates the various structural densities at work – a transition from the large beams to low-density tension elements.