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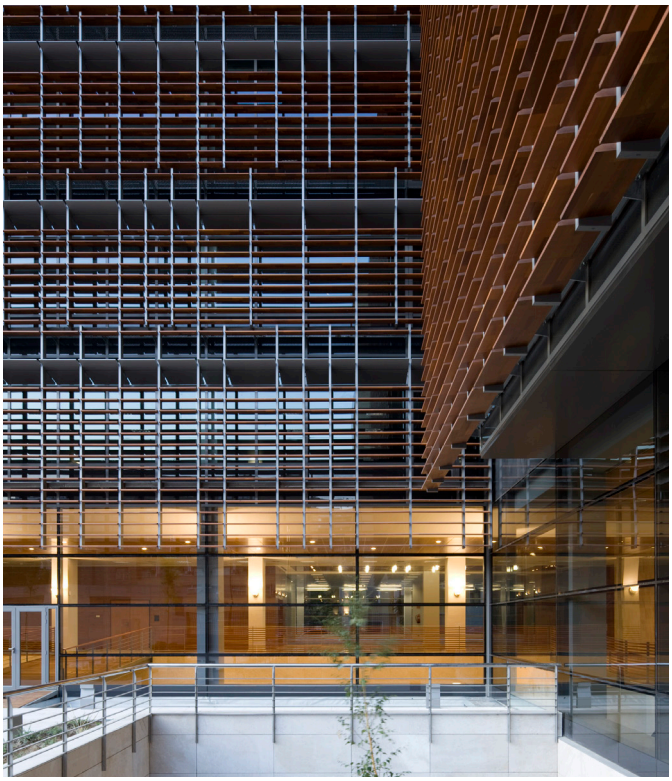
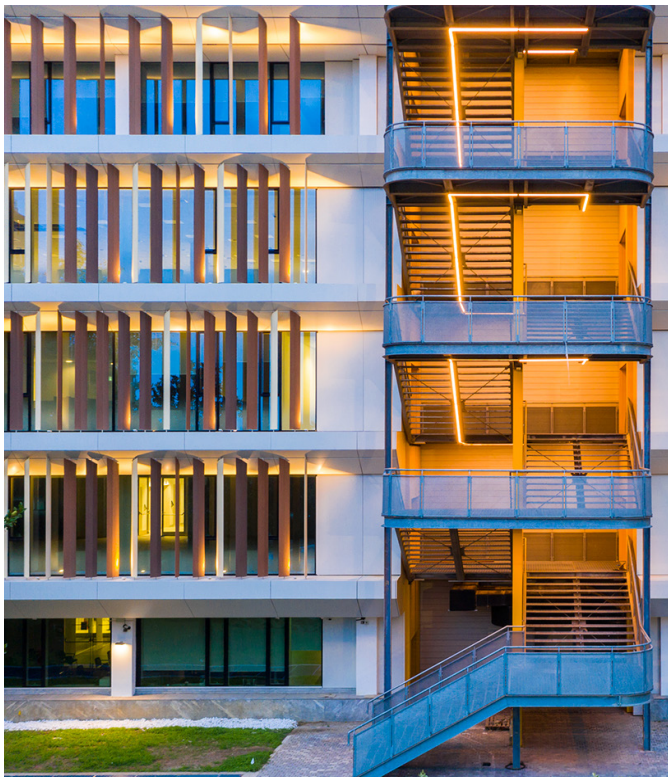
FOCUS TOPIC: A HOLISTIC APPROACH TO HIGH-QUALITY FACADE DESIGN





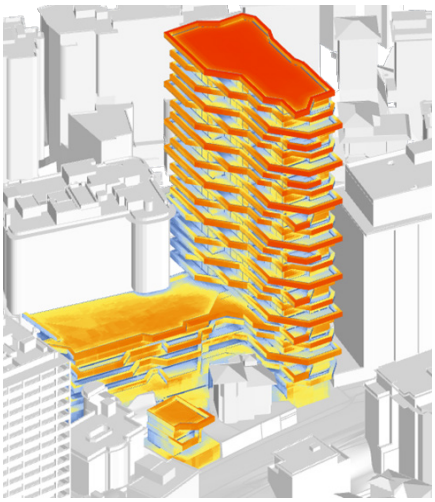
FOCUS TOPIC

A HOLISTIC APPROACH TO HIGH-QUALITY FACADE DESIGN

In the intricate dance of architectural design, the facade plays a pivotal role, serving as a canvas that reflects the building's character and the architect's vision. The creation of a high-quality facade is a symphony of art and science, where every note must harmonize to produce a masterpiece. It begins with a holistic design approach, where the facade is not an afterthought but a central piece of the architectural puzzle. This approach demands a convergence of expertise from various fields, ensuring that the facade meets the structural, acoustic, thermal, daylight, fire, and sustainability requirements. Engineering prowess, together with advanced calculations, and Finite Element Method (FEM) programs, allow to predict and enhance the building's performance, ensuring compliance with codes and certifications, to maximize quality and durability.

Attention to detail is paramount in facade design, where every element must be considered for its impact on the building's lifecycle. Maintenance and constructability are not mere checkboxes but critical factors that influence the facade's longevity and functionality. Facade designers must envision the building in its entirety, anticipating the needs and challenges that may arise throughout its existence. This foresight allows for a design that is not only close to the design intent but is also practical, avoiding costly and time-consuming alterations during the construction phase. And from this point of view, the maximization of prefabrication is a winning weapon.

Talking about emerging trends, as Facade Engineers, we witness a renewed commitment to sustainability and the usage of recycled materials. Reducing embodied carbon content and adopting a circular design attitude is a great way to have a green approach for the project, however, operational carbon impact is not less important, and for this reason, new methods are being harnessed to create facades that are not static but dynamic, adapting to their surroundings and the needs of the occupants. Adaptive facade systems exemplify this trend, with their ability to respond to environmental stimuli, thereby optimizing the internal environment and reducing energy consumption. An example should be a facade MEP integration study, to connect the skin to the heart, the lungs, and all the vital organs of the building.



New materials and finishings are facing the market, helping us to follow the above-mentioned purposes. For example, photocatalytic finishing on facade materials offers several advantages, including self-cleaning properties, air purification, and reduced maintenance costs. The application of titanium dioxide coatings, for instance, can significantly facilitate cleaning operations by decomposing organic pollutants on the surface, thus maintaining the aesthetic and functional qualities of the facade over time. Moreover, these coatings can help reduce pollution levels by breaking down harmful nitrogen oxides present in the atmosphere, improving urban air quality.

A well-designed facade can inspire, engage, and elevate the human experience, making it a critical aspect of any architectural endeavor. As we look to the future, the facade will undoubtedly continue to be a focal point of innovation, where the boundaries of design and performance are pushed, and new possibilities are explored. It is in this exploration that the true art of architecture is revealed, and its impact is felt not just in the buildings we create but in the lives that are touched by them, together with the surrounding environment. The facade, therefore, is more than a feature; it is a declaration of intent, a reflection of the times, and a bridge between the past and the future of architectural design.

text courtesy of Matteo Cipollini and Andrea Piantanida - Façade Department – Esa Engineering

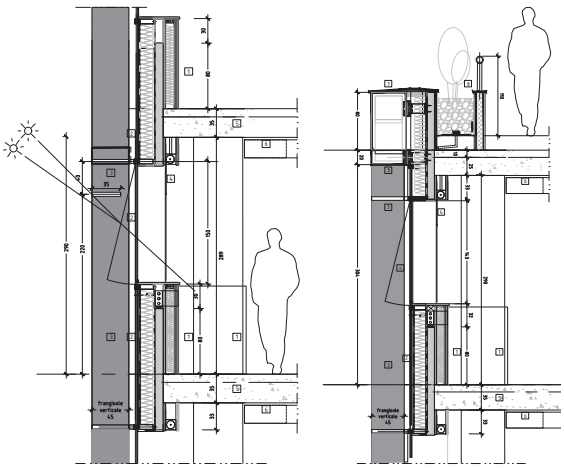
ESA Engineering is a multidisciplinary engineering company, based in Italy with 9 global offices, that offers a wide range of building construction services in the area of engineering and architecture internationally. With 30 years of experience and more than 400 professionals, ESA operates on all market fronts in increasingly transversal sectors, in the context of residential, commercial, or industrial buildings, belonging to the public and private sectors.
D2U (PERSPECTIVE Italy) and ESA are currently developing two important projects together.

CALDERA OFFICE CAMPUS, GREEN BUILDING

Milan, Italy

Update of the existing building's aesthetics and efficiency

Designed by: PERSPECTIVE Italy
Client: Generali Real Estate
Function: Office
Area: 13 800 m^2
Status: designed in 2023



PERSPECTIVE Italy has been invited to an architectural competition by Generali Real Estate to identify an innovative solution to enhance the image and performance of the Green building, built in the 80's Caldera office campus in northern Milan. The design solution has the double target to update the building aesthetics while also increasing its efficiency in terms of user comfort, energy, and environmental sustainability. The whole civil and MEP requalification project aims to obtain a Class A energy and LEED Gold certification while revitalizing the building's real estate value on the market.

The old glazed continuous ribbon window will be replaced by a new curtain wall and an external shading system. The curtain wall system shall be composed of opaque and transparent modular panels and steel/aluminum frames. Each building structural module is composed of a large central fixed glass and two lateral openable windows. In order to achieve the expected performance within the given limited budget a double glazing with a solar factor of $g<0.30$ is used to reduce thermal gain. Horizontal string courses aesthetically break the monotony of the curtain wall while giving a sense of scale to the building, these are made of coated aluminum panels with mineral rock wool panels to ensure continuous thermal insulation. Overall, a prefabricated modular facade allows for a faster construction and future dismantling process on site reducing project costs and complying with DNSH concept.

The external shading system is made of green colored aluminum louvres along the perimeter of the building and horizontally at the 4th and 6th floors, integrated with two vertical louvers along the south and west fronts. The blind part of the glazed facade will be treated with a shaded glass similar to the transparent portions up to the level of the glazed windows at 110 cm. to conceal the existing blind prefab panels (to be maintained for budget reasons) and hiding the „ribbon-like horizontal" effect.

The project envisages the predisposition of internal blind screens for further regulation of internal spaces as per day, time, and usage.

Designed by: PERSPECTIVE Belgium, in collaboration with RAU
Client: Vandemoortele nv
Area: ca. 5 100 m2
Function: Office HQ & Food experience center
Status: Completed

VANDEMOORTELE
Ghent, Belgium

The new headquarter and food experience center Vandemoortele in Gent facilitates two main branches of Vandemoortele - administrational areas and core business areas.
The overall façade concept results in a balanced symbiosis of a rational, vitreous façade and a wooden atrium, which reveals the heart of Vandemoortele. Just like a good recipe consists of a harmonious combination of ingredients, the new food experience centre consists of a stimulating combination of different materials and shapes.

Sustainability
The compact and efficient shape of the building offers an optimized ratio between building volume and building surface.
Consequently heat losses through the facade are reduced to a minimum. The compact footprint of the 4-story-building also creates less sealed surfaces on the plot and gives room for green areas. This has a positive effect on the micro climate and prevents the surrounding from overheating.

Designing with the sun
The transparent curtain wall facing, skylights in the atrium and numerous openings in the interior facade bring a maximum amount of daylight into the building and therefore reduce the demand of artificial light. Furthermore a circular economic system is introduced that facilitates ‘light as a service’, which also saves a considerable amount of energy costs.
In order to prevent the building from heating, the sun shades in the façade are optimized in depth and height according to the orientation of the building and the sun’s angle of incidence. This means keeps the warm summer sun outside and brings the mild winter sun inside supporting the heating/cooling system.

Flexibility through Modularity
The general construction approach is defined by the goal to reach a ‘remountable’ building. Therefor all chosen material connections are realized as ‘dry’ connections, which allow easy disassembling of the different components. Consequently the building can be seen as a ‘material deposit’ which consists of a documented composition of different materials. All materials will have their “passport” and are documented in the BIM models. This creates a value for all materials used in the building and gives opportunity to reuse these materials in the future. In addition the efficient building grid of 1,80m provides column free office wings and thus enables a flexible building layout. The regular 1,80m grid also allows the use of standardized components.

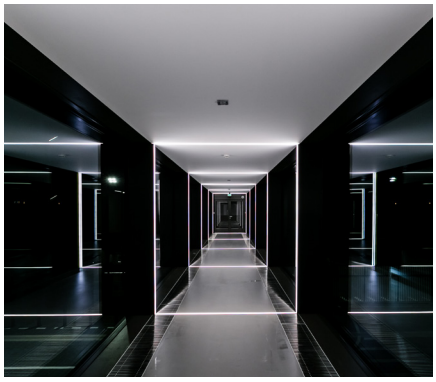
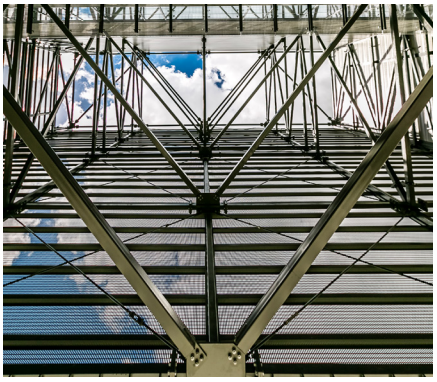
Healthy working environment
The new Food experience center will offer a modern, healthy working environment for its employees. Several visual connections to the surrounding green areas and the lively atrium with its interaction zones, create an inspiring, diverse work atmosphere. The connection between the common areas and the main routes stimulate social interaction encouraging interdisciplinary encounters. Furthermore employees are offered a wide range of diverse working places which respond to the needs of different working manners, following the New Way of Working insights.

BEYOND DATA CENTER
Poznan, Poland

Designed by: PERSPECTIVE Poland
Client: Beyond.pl
Area: ca. 17 500 m2

Function: Data Center & Office HQ
Status: Completed




The data center (DC) consists of two objects: a technological building and a functionally associated office building. DC was located in a corner of a quarter of messy development, which forced the search for solutions that set a new direction for special development. Thanks to well-thought-out architectural solutions, none of the buildings dominates the designed layout, despite their vastly different dimensions.

The technological building includes server rooms, generators rooms, fuel tanks, electrical rooms, transformer stations and cooling systems rooms. During the design process, emphasis was placed on aesthetics, which, despite the fact that numerous installations had to be embedded in the structure, resulted in a compact, aesthetic form and an attractive façade composition. The curtain façade of technological made of perforated sheet, fixed on steel substructure, covers the main elevations made in BSO technology. It encloses the building in a uniform rectangular shape, which does not create an aggressive dominant. Niches in the facade provide access to technological rooms and their numerical description highlights the „digital" nature of the project. The curtain elevation exceeds the roof cover by more than 9 m, being a visual, acoustic and equipotential shield of the technological building.

An integral part of the complex is the office building connected to the technological building with two overhead connectors and an underground tunnel. The building's shape, through the created facade divisions and differentiation of used materials, reflects the function inside the building. The façade shows a clear division into five modules that give it an ordered character. Each of the cubes contains two open office spaces, hidden behind a curtain façade with vertical aluminum profiles, that serves as solar and visual protection. The facade made of vertical aluminum profiles brings to mind the elements of a processor cooling system and the unique form of code written in it highlights the „digital" nature of the project. Within the office space there are creative work spaces, conference rooms, social annexes and connectors which provide communication between working groups. On the ground floor there is a two-story entrance hall, a guardhouse, service and administration rooms, meeting rooms and a dining room with kitchen facilities. In the immediate vicinity of the dining room there is a garden, which thanks to the use of glazed walls, creates a common space for dining, allowing for integration, rest and work in the fresh air. During the design process PERSPECTIVE Poland applied solutions that exceeded the basic standards for such buildings. Thanks to creation of spaces of varied function and form, employees are provided with the opportunity to work in groups and individually, both in dedicated office spaces and in support spaces such as creative rooms, social spaces, the canteen or the garden.

Energy saving & sustainability

- Data center with PUE 1.1 energy efficiency ratio.
- Intelligent comfort ventilation system based on detection of CO2 concentration
- Object not connected to external heat sources, fully uses heat from servers.
- Innovative solutions for the storage of electricity. Diesel rotary UPS instead of classic battery packs.

Awards

Data Center 2 Beyond.pl was awarded with the title of **BRYŁA ROKU 2016** in the internet poll, conducted by the bryla.pl portal and has won the **FAÇADE OF THE YEAR 2016** competition in the non-residential building category, organized by Baumit.

HACIENDA ZARAGOZA
Madrid, Spain

Designed by: PERSPECTIVE Spain
Client: Department of Treasury in Zaragoza
Function: Offices & Public administration
Area: ca. 27 000 m²
Status: Completed

A wooden facade protection

PERSPECTIVE Madrid projected the 27.000 sqm site of the Department of Treasury in Zaragoza, whose facade is the most important feature for climate response. The complex is a set of four to eight stories high buildings connected between them, and oriented in a southeast-northwest direction, located in a city with extreme weather in hot summers and cold winters.

The office spaces were provided with large glazed facades, so the issue was to control solar gains and high internal loads to reduce energy consumption

The building glazing was shaded as much as possible in order to reduce direct solar gains most of the year while, at the same time, improve natural illumination , so the lighting loads were reduced while maintaining high visual comfort for the occupants. A double layer façade was implemented. The exterior layer consisted of wooden horizontal louvers running along the facade, at a fixed distance between them, and vertical fins from roof to ground floor. This set of louvers and fins, would shade the glazing most of the time specially during the most critical times of the day and of the year, also in the most difficult orientations.

In addition, a light shelf was implemented. This devise was designed with a proper angle and bright surface to introduce natural light deep into the space . The combination of both slats and light shelves reduced the solar gains through glazing as well as the electricity consumption, thus reducing the lighting loads and consequently HVAC consumption. Maintenance of either the slats or the light shelf is facilitated by a platform placed in between both layers in every floor. The red cedar louvers were certified as coming from a Cultivated Forest.

INNOVATION SQUARE APARTMENTS
Tallaght, Dublin, Ireland

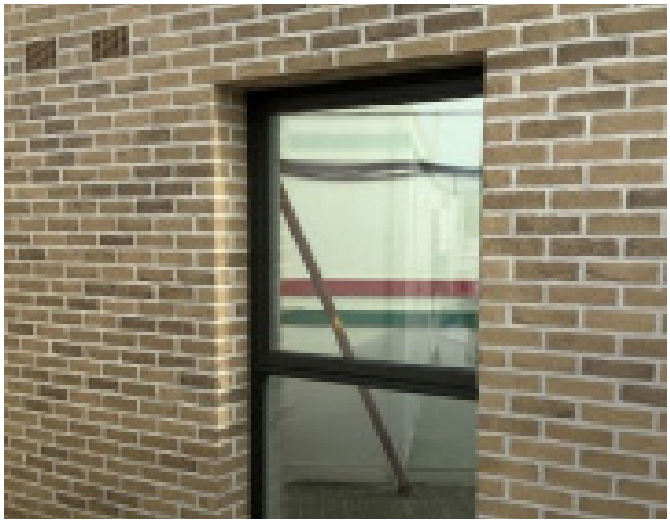
Designed by: PERSPECTIVE Ireland
Client: South Dublin County Council
Function: 133 apartments
Status: Under construction

PERSPECTIVE Representative in Ireland, COADY Architects, were engaged by South Dublin County Council (local authority) to design and deliver a residential scheme for the affordable rental market in the Dublin suburb of Tallaght.

This new residential development forms part of a wider masterplan of South Dublin County Council lands that includes a new urban square, innovation hub and school. Innovation Square Apartments will consist of the construction of 133 affordable apartments for the rental market and a community facility in three blocks ranging from three to eight stories connected to the Tallaght District Heating Scheme.

The Tallaght District Heating Scheme uses excess heat from a local Data Centre via highly insulated pipes delivering low-carbon heat for space heating and hot water within the apartments. The scheme delivers sustainable homes in an efficient high quality vibrant architectural response to contribute to rejuvenation of the wider area.

The use of precast architectural wall panels has largely contributed to an expediated construction programme on site. The brick finished wall panels from first floor to roof level were manufactured off site and delivered with windows installed and ready for internal wall linings to be applied with a high thermal performance. Pre-finished architectural wall panels not only benefitted the construction programme, but also reduced safety risks on site, eliminating the need for scaffolding use and providing secure working areas as the construction progressed to the upper floors. The precast architectural wall panel is comprised of a 200mm thick structural concrete inner leaf and an 80mm non-structural external concrete leaf faced with cut bricks. 200mm of non-combustible insulation is sandwiched between the two leafs and tied together with wall ties of low thermal conductivity. Once lifted into place, the panels are connected vertically and horizontally with a steel rod between abutting structural leafs which are filled with grout once linked or tied together.



VASEN 3
Stockholm
Sweden

Designed by: PERSPECTIVE Sweden
Client: Micasa
Area: ca. 8 300 m2
Function:
Apartments for senior tenants
Status: Under construction

Vasen 3 is located in Stockholm and was constructed in the early 1970s. The building was originally designed as an apartment hotel for retirees, but it has been used as a senior residence, care and nursing home, and temporary housing – and parts have been converted for other purposes over the years. The property is to be renovated and converted into 87 new apartments for senior tenants. The renovations will encompass approximately 8,300 square meters in total.

The project is a collaborative contract, with Micasa as the client and Skanska as the contractor. PERSPECTIVE Sweden have redesigned the layouts into larger apartments with modern dimensions, meeting enhanced accessibility standards. Together with structural and installation consultants efficient solutions have been developed for structural adaptations and energy-efficient new technical installations.The renovation will be characterized by a high degree of reuse. PERSPECTIVE Sweden has led an inventory of reusable parts in collaboration with Micasa. Material from other properties will also be reused.

A key part of the renovation is to reduce energy consumption, with a significant portion of the effort focusing on additional insulation of the facade, window replacement, and new roof insulation. The building will also be equipped with energy-efficient installations and a new solar panel system on the roof.

Vasen 3 is a listed building regarding the exterior, making the building permit approval conditional on the facade's appearance being preserved. This requires careful detailing of material joints and connections to retain the facade's expression while meeting modern moisture management requirements in eaves, plinth, around balconies as well as careful placement of new windows.

Construction work started in spring 2024 and is planned to be completed autumn 2025.

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