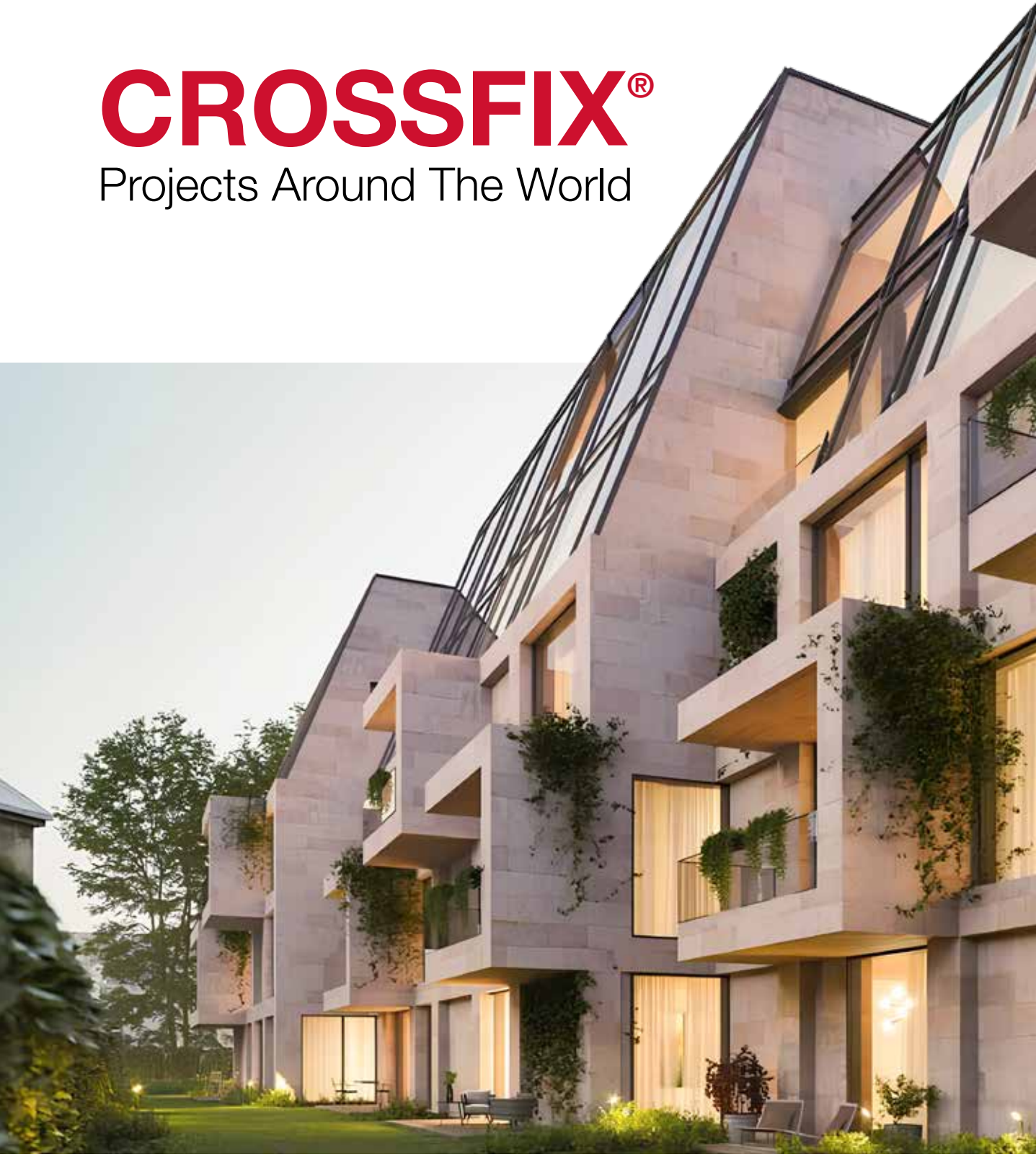
CROSSFIX®

Projects Around The World



EJOT®

EJOT®

...in some parts of the world it is called a ‘rainscreen system’, in other parts it is called a ‘rear ventilated facade’. Two different terms that mean the same thing: a facade system that has been tried and tested all over the world for hundreds of years.

Dear reader,
on the following pages you will find selected rainscreen projects around the world that have been realized with EJOT. For the sake of simplicity, we use the term ‘Rainscreen System’ in this book.

We hope you enjoy reading.

Project management in construction industry: Challenges and trends

Project management in construction industry has changed significantly in recent years. Traditional project management usually follows a linear approach in which tasks are processed sequentially. In comparison, agile project management allows for more flexibility and adaptability. It is based on iterative cycles in which the project objective is gradually realized. Agile methods such as Scrum or Kanban are increasingly being used in the construction industry in order to react more quickly to changes and detect errors at an early stage. Manufacturing companies must also face up to this change in project management in order to maintain their place in the project.

In addition to time and costs, environmental compatibility and energy efficiency are playing an even larger role. Developers and investors attach great importance to sustainable solutions, while at the same time design requirements are increasing in combination with stricter safety aspects. Project managers must ensure that materials, construction methods and technologies are sustainable and minimize energy consumption, while at the same time meeting fire safety regulations and withstanding natural disasters. This requires close collaboration between architects, engineers and the companies that develop and produce the components.
Digitalization has also had a huge impact on the construction industry in recent years. Building Information Modeling (BIM) enables the creation of digital models that contain all relevant information about a construction project. IoT (Internet of Things) and digital platforms influence efficiency and communication throughout the entire construction project. From planning to execution and maintenance, all data is recorded centrally.

For us as developers of new products, this means that the digital twin of a new product is just as important as the component itself and also requires completely new skills within a project team.

Successful project management requires close collaboration between different specialist areas. Architects, engineers, contractors, suppliers and subcontractors need to work together closely and be able to speak this digital language. The ability to communicate across disciplines is therefore more important than ever - and often on a global level.

Demographic change is also transforming the course of construction projects; The shortage of skilled workers does not stop at construction sites, installation teams are becoming more international and the level of qualification of those people involved in projects is becoming increasingly diverse. The use of new technologies such as 3D printing, robotics and autonomous machines opens completely new opportunities, but at the same time also poses major challenges for us as a manufacturer of construction components. Therefore, we – who act as sparring partners for architects, real estate developers and installers in the façade sector, need to be highly flexible. Our international teams of engineers, who carry out the planning services for our customers, have to adapt to constant new changes. Design changes or optimizations to the digital twin have a direct impact on production processes, raw material procurement and stock management - and therefore on the ability to deliver. Those who are fast and have established good communication on an international level can help to shape the market. The product can no longer be viewed in isolation; close cooperation at an international level with other industries is the key to success if you want to be perceived as a competent partner.



Ronny Höhne
Director Business Development, Global RVF Business

Rainscreen facades: The most versatile and adaptive facades system in the world

Rainscreen facades have been around for quite some time. They have a rich history that dates back centuries. However, from a modern perspective they gained prominence in the UK during 1950s. At the time they were used as a cost-effective solution for rebuilding infrastructure after World War II. Furthermore, in the 1960s, Canadian architect G.K. Garden defined the principles of, what we now consider to be modern rainscreen construction (1963).

Main principles of rainscreen facades revolve mostly around a two-layered system, which consists of an outer layer (cladding) and an inner layer – moisture-resistant barrier. The gap created between those two layers allows for water drainage and ventilation. Thus, we often refer to these façade systems as rainscreen facades. Focus is on a capillary break, or the gap between two layers which prevents water from penetrating the inner wall. As the original G.K. Gardens paper published in April of 1963 says: "Water, in excess, is a key factor in most cases of deterioration of walls or wall materials and one source of this water is rain". Ventilation and evaporation of moisture, allowed by the airspace between the two layers, are the key benefits of these façade systems.

Characteristic rainscreen wall assembly

The majority of water directed toward external walls will be deflected by the cladding material or by other constructive methods. However, some precipitation water may enter the air gap through open cladding joints as well as the condensation which occurs in external walls due to temperature differences. Regardless of the water (moisture) origin, it will be effectively drained through the air gap and evaporated due to constant upwards airflow circulation in the airgap. The air trapped between the cladding and the moisture-barrier in an unobstructed air gap gets heated up due to heats sources either external (the Sun) or internal, by the natural process of convection the hot air rises creating a pressure difference between the bottom and the top of the airgap. As warm air ascends, the cooler air gets drawn in from the bottom which, again, gets heated up, rises, creates suction etc. This process continues as long as the air gap remains unobstructed and allows air to flow.

Once the main deteriorating factor, water, was successfully eliminated by smart constructive methods, other challenges remain to be solved. To effectively construct a rainscreen façade system where the external layer is detached from the load bearing wall structure, a specialized attachment system needs to be planned and designed. Rainscreen attachment system's main purpose is to overcome external influences acting on the façade and affecting rainscreen stability and safety. Often the biggest influence it must combat is the wind load. Wind loads, regardless of if positive (pressure) or negative (suction), can reach extreme levels. Especially with today's unpredictable weather patterns, winds often exceed ± 1,00 kN/m^2 (100 kg/m^2) of pressure /suction. The other standard action that acts on the rainscreen system is the vertical force – the dead load. This is the result of the combined weight of the façade cladding and the weight of the supporting attachment system. For comparison, the heaviest of cladding options commonly found on the market today, such as natural stone slabs, rarely exceed 75 kg/m^2, and most commonly various high impact-resistant composite materials are used with specific weights ranging between (only) 15 kg/m^2 and 30 kg/m^2. Aside from the actions mentioned, in some regions there are additional influences that can have an effect – seismic activity, snow loading etc. Another purpose of the attachment system is to act as an adjustable platform for fixing the facade cladding panel. Dealing with installation of perfectly flat, rigid, factory produced façade panels on the uneven and unleveled external walls can be challenging as the differences in allowed construction tolerances decrease by tenfold. Tolerances in the construction industry are generally measured in centimeters (cm), whereas when installing a rainscreen façade those same tolerances convert to millimeters. Therefore, a highly adjustable attachment system is needed to compensate.



External thermal insulation is another common element to the rainscreen system. Depending on the location and the specific project requirements, this element can vary in size, or not be needed at all. Nevertheless, if installed the external insulation product needs to meet certain criteria. Increased thermal performance of the building is not the only benefit they bring. If the right materials are chosen, they also provide benefits in noise reduction, add to fire safety as the material must be non-combustible. They should also be “breathable” to allow for the condensate buildup in the external wall of the building to exit into the air gap where it will get evaporated, leaving external walls always dry. And they must be water repellent to avoid losing their properties when exposed to moisture. For these reasons a most common choice for external insulation material is a mineral wool board.

Last, but not the least element of the standard rainscreen system is the façade cladding. This is the element that brings aesthetical value to each project. Design versatility is the main reason why rainscreen facades’ popularity has only been rising with time. Various materials allow architects to express their creativity by combining different shapes, sizes, colors, and textures which enhance the visual appeal of their projects and contribute to contemporary architectural styles. Constant advancements and innovations in material sciences continuously provide new materials for cladding options with enhanced performances whereas standard, natural materials contribute to overall building sustainability. Another benefit is integration with technology where smart rainscreens can incorporate different sensors for real-time monitoring, solar panel modules for renewable energy production or even living walls for combating increasing heat levels in crowded city centers.



CROSSFIX®
The revolution in rainscreen facade constructions

The CROSSFIX® substructure was developed to meet the requirements of architects, builders and manufacturers who place great emphasis on sustainability, environmental protection, flexibility and the highest safety requirements.

Stainless steel has long since replaced aluminum in terms of economic and ecological considerations, especially in terms of CO_2 reduction and physical material properties.

In addition, the stainless steel CROSSFIX® brackets have a high load-bearing capacity so that, compared to other systems on the market, fewer anchoring points per square metre can be assumed for specific projects. As a result, CROSSFIX® offers not only significant material savings for our customers, but also, incidentally, a reduction in installation time.

In terms of fire safety CROSSFIX® is also a top performer, because stainless steel meets the highest fire protection requirements.





Apollo Nivy

Sustainable office building in Slovakian capital

In the heart of Slovakia's capital city, Bratislava, the modern Nové Nivy district has been taking shape since 2017. This innovative project encompasses a state-of-the-art transportation infrastructure with office and commercial buildings, green spaces and recreational facilities. At the centre of this district stands the Apollo Nivy office building, whose facade is anchored in place by CROSSFIX® brackets from EJOT.

The building as an experience

The Apollo Nivy project was not solely focused on its function as an office building. It embraced the philosophy that 'Just as home is not just a place where you sleep, work is also not just an office,' the boundaries between work and life are becoming blurred. The office building itself is designed to be an immersive experience. Behind its window-rich facade, it houses nearly 48,000 square metres of office space spread across eight floors. The interior design incorporates ample wood, organic shapes, lush greenery, water features and abundant natural light, creating a seamless transition between the indoor and outdoor environments in many parts of the structure. Central themes of naturalness and well-being are prominently featured throughout the building, as the planners of Apollo Nivy firmly believe that only healthy and content employees can deliver outstanding results. The focus extends beyond the physical workspace, placing significant emphasis on enhancing the human experience within the space and all associated elements. This encompasses improvements in air quality, access to water, optimal lighting conditions, a connection with nature, facilitation of physical activity, and much more. As a fundamental principle, the Nové Nivy site prioritises bicycle traffic over cars. Consequently, the Apollo Nivy building is seamlessly integrated into the cycling infrastructure with direct access to the cycle path network. Additionally, it features a dedicated bicycle centre on the ground floor, capable of accommodating 200 bicycles and complete with a service area, bicycle cleaning facilities and showers for commuting cyclists.

Apollo Nivy
Bratislava, Slovakia





Sustainable building certification

The Apollo Nivy project is actively pursuing the prestigious “WELL Platinum” and “BREEAM Outstanding” certifications, which are awarded to exceptionally sustainable and energy-efficient buildings. To meet the criteria, a solution that combines energy efficiency with flexibility in fastening the ALUCOBOND® facade panels was essential. The architects swiftly opted for the CROSSFIX® substructure system from EJOT for several reasons. This system, constructed using stainless steel, not only minimises thermal bridges, resulting in significantly improved U-values compared to aluminum brackets, but also boasts a considerably higher load-bearing capacity. This reduces the quantity of brackets required, offering further advantages in terms of energy efficiency and the overall carbon footprint of the building materials used.

Versatile facade design

The architectural vision for the facade of the Apollo Nivy building involved diverse elements, including varying heights for the horizontal stripes of the facade panels and a dynamic arrangement of projecting and recessed features. This approach was made possible by leveraging the extensive product variety offered by the CROSSFIX® system. To securely attach the facade, brackets with lengths of 260 mm and the system’s longest dimension of 400 mm were used at Apollo Nivy. These brackets, known for their exceptional load-bearing capacity, were optimally utilized for cost-effectiveness. Following the principle of ‘everything from a single supplier,’ CROSSFIX® brackets are reliably anchored in the substrate using SDF facade anchors. EJOT VARIO screws were used to connect the support profiles to the brackets, offering versatility for both sliding and fixed point connections. The captive pre-assembled sliding washer with a buffer zone prevents excessive pre-stressing forces during the connection, ensuring a constant low contact pressure and avoiding the stick-slip effect, thanks to the special fine pitch thread.

Everything from one source

The system concept extends behind the scenes at EJOT, where products are finely tuned to complement each other. Moreover, EJOT operates with close collaboration across borders, as customer support and engagement with planners and architects were handled by EJOT SLOVAKIA, with support from EJOT colleagues in Austria and Croatia during the project planning phase. While customers have a single point of contact, they benefit from the collective expertise of an entire company with numerous specialists in various domains. This is the hallmark of EJOT.








APOLLO



The challenges with modern facade substrates

Hollow bricks for monolithic exterior walls, ETICS renovations and modular building.

One of the beauties of rainscreen facades is that almost endless variations are possible. Usually a big plus for architects, when it comes to materials, shapes and colors, but also a challenge when it comes to the high variety of substrates, the facades need to be anchored to. Hollow bricks, originally intended for monolithic walls provide very little anchoring resistance, limiting the capacity of the entire system and not utilizing the full abilities of the components used. Creating solutions to use multiple anchors per bracket while maintaining the required anchor distance is an important element to remain economically viable.

The renovation of existing ETICS systems, using a rainscreen facade is an interesting option. To avoid the need for a removal of the current façade, optional connection plates allow the direct assembly to the existing wall. The anchoring itself is performed to the actual substrate beneath. This allows for an economical installation and significant waste reduction.

Modular construction companies produce modules in a factory environment, to later be efficiently assembled on-site. The load bearing steel, timber or hybrid structures provide the anchoring base for the rainscreen facade. The challenging part is the fire protection boards in between the anchoring base and the wall bracket. This distance anchoring is an uncommon application for the anchoring products available. The difference being an extraordinary bending moment on the anchors. A smart concept for the calculation of the acting forces, together with extensive testing of the component combinations is needed to be able to provide dependable anchoring solutions for the entire range of applications.

Being a system supplier includes taking on those challenges, creating dependable while economical solutions.



Michael Pitz
International Technical Manager CROSSFIX®

BIPV & Green Facades

A rainscreen facade offers a broad range of possibilities for architects to exercise their creativity and design freedom, along with long life and easy maintenance. Today's façade cladding materials are constantly evolving and improving, but modern façades don't just have to be aesthetically beautiful, they can also be beneficial to our environment.

Let's take a closer look at two increasingly popular types of rainscreen facades.

Building-integrated photovoltaic panels, so-called BIPVs, are now indistinguishable from other high-quality and aesthetic materials. In addition to the well-known benefits of ventilated facades, they also provide their owner with a local source of electricity production that can be used locally, for example, to cool the building in the summer months, for heating, hot water or to sell surplus electricity to neighbours or energy providers. Furthermore, some of the technologies used do not require the panels to be ideally oriented towards the sun, as this is not possible on the facade of the building, but they produce electricity even when the sky is shaded or cloudy.

Another category of relatively new building cladding solutions is Green Facades or Living Walls. Climate change, causing more and more frequent extreme weather with very high temperatures, is making life in cities with conventional facades increasingly unbearable. That is why some European cities already require that new buildings must have part of their street-facing facade area green. However, green does not mean painting with green paint but using green living plants, which, in addition to their unique aesthetics, improve the microclimate of the streets by humidifying the surrounding air and lowering its temperature by up to several degrees Celsius. At the same time, they provide a natural refuge for insects and small birds, thus contributing to biodiversity.

These two new types of cladding further increase the demands on the supporting substructure of the rainscreen facade, such as fire protection in the case of BIPV façades or high load-bearing capacity and perfect corrosion resistance in the case of green façades, as the irrigated pots together with the live plants reach a weight capacity of up to 100 kg/m^2.

All these high demands on the substructure are met by the EJOT CROSSFIX® system and its suitability for safe and sustainable construction is confirmed by the ETA, PHI, EPD and LEED certification.



Pavel Sniegon
International Business Development Manager CROSSFIX®



Green Not Grey

Facade greening of the ENNI administration building

In Moers on the Lower Rhine, the new administration building of ENNI Stadt & Service Niederrhein AöR, which was constructed in 2021, is a flagship project in terms of green façades. With an area measuring 600 square metres, the east façade is the largest vertical garden in Germany to date (as of May 2022). The greenery consists of some 56,000 plants held in place by the CROSSFIX® substructure system. The green façade with its colourful interplay of over 30 different flowering shrubs and grasses impressively demonstrates the huge potential that this type of façade design has to offer – both in terms of visual and ecological aspects as well as other positive aspects for the use of the building.

Advantages of a green façade

There is a long list of arguments in favour of green façades. The green spaces capture harmful substances and help to sustainably improve the climate. In urban areas in particular, in which no new planting is feasible due to a lack of space, a vertical green façade offers a flexible option to build green spaces. In summer, vertical greening provides shade for the façade, keeping the interior pleasantly cool, while in winter, it has a heat-insulating effect. In addition, it has a positive effect on sound insulation. The plants absorb noise and provide habitats for small animals and important beneficial insects, which are scarce in city centres. The green façade not only offers advantages from an ecological point of view. The flexible design possibilities for façades are almost endless.



ENNI
Moers, Germany

System for wall-mounted greening

One common option way of creating a green façade is to use wall-mounted greenery, also known as a living wall, which consists of individual plant materials. A system of this type was used at ENNI in Moers. The advantage of these systems is that the plant pockets are delivered to the construction site pre-planted, and so immediately fulfil the design objectives. App-controlled, state-of-the-art sensor and irrigation technology ensures that the plants receive the care they need at all times. This ecologically valuable high-tech façade requires a robust substructure that satisfies all requirements in terms of building physics, structural integrity, fire protection and compatibility. The CROSSFIX® substructure system is the ideal choice for the installation of wall-mounted greenery. It is made of stainless steel so is extremely low in thermal bridges, has a high load-bearing capacity, is highly fire-resistant and can be used with maximum flexibility thanks to its unique bracket geometry. This enables a wide range of design options and optimum adaptation to structural conditions, such as projections or wall apertures.




enni.
Unternehmensgruppe




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Legero
Graz, Austria





Continuous improvement in the pre-dimensioning process: Use of AI

Structural analysis of façade projects is becoming increasingly complex, especially when handling projects worldwide. Guidelines and laws, environmental influences as well as design requirements of our customers are broadly diversified.

At the same time, we are dealing with a significant increase in the materials used to clad façades. From heavy marble to lightweight HPL panels, from high-tech photovoltaic panels to living façades covered with plants, including an irrigation system.

Our engineering teams around the world have to consider all these parameters for every project inquiry.

Of course, our engineers do not replace the local structural engineer, who knows the overall parameters of a project and takes them into account in his considerations. However, we aim to support the work of the architect and structural engineer in the best possible way by preparing the structural calculations, preliminary measurements, calculation methods and costings for them. This way, they can use them directly for their work. We always strive to offer our customers with the best possible setup and ensure the best possible optimization of the required components.

To meet all these requirements, to be able to incorporate constantly changing regulations and to take short-termed change requests into account, we at EJOT have decided to develop our own calculation software. This enables us to cope with all these parameters. This program has since become the heart of our daily work. Adapted with the power of artificial intelligence (AI), this technology gives us the ability to prepare structural calculations of highly complex projects on the one hand, but also to carry out initial cost estimates for our customers quickly and economically on the other.

Simultaneously, this global database enables us to consolidate and evaluate empirical values from thousands of projects worldwide - a treasure trove of experience that benefits our customers and partners likewise.





127 House
Park City (Utah), USA

Architectural work in practice

My work in my Atelier strives to enrich the built environment and enhance the communities we inhabit through innovative and visionary design. My approach aims to transform occupants' lives by providing sustainable, resilient, and health-promoting spaces.

Through my examination of design, development, and construction processes particularly in the United States, I have identified a significant obstacle: the often fragmented communication between architects, engineers, contractors, and other stakeholders. My work deliberately bridges this gap, allowing me to integrate research findings and experimental knowledge into practical, high-performance, and award-winning buildings. This integration fosters architecture that is not only aesthetically compelling but also ecologically, socially, and economically resilient.

My designs embrace the Genius Loci and are deeply attuned to the regional context of the Intermountain West or any other project location. This involves analyzing and evolving domestic architecture to resonate with contemporary architectural language while employing refined regional construction methods as a response to our local communities. My multicultural background and international experience, including work in Germany and China, further enrich my approach, enabling me to address contemporary challenges with innovative solutions that promote a healthier, more equitable, and socially just built environment.

Realizing my projects through a comprehensive design-build process provides valuable insights into executing complex projects, including effective communication and negotiation with clients, jurisdictions, manufacturers, and contractors. This approach allows for ongoing observation and analysis of building performance, testing aspects such as occupancy, functionality, and feasibility in real-world settings. The data gathered informs my future creative work and educational endeavors, reinforcing my commitment to advancing the quality of the built environment.

The 127 Haus project exemplifies these principles. Located at a challenging 2,800 meters elevation on a north-facing slope in Park City, Utah, this multi-generational, 750 m2 home for a large family is currently under construction. Like my previous residential projects, the goal is to achieve site-net-zero energy performance, a challenge compounded by the area's extreme roof snow load, which does not allow for a conventional roof-mounted photovoltaic (PV) system.

In response, I explored several solutions and discovered a façade-integrated PV panel by the German manufacturer Avancis, initially tested for elevations up to 2,000 meters. This system, which blends seamlessly with the building's exterior, then had to be certified for high elevations up to 3,000 meters by the German TÜV and listed by Underwriters Laboratories for the U.S. market. This allows the panels to function as an integral part of the 127 Haus façade while maintaining aesthetic integrity.

Additionally, the project led to the development of a customized aluminum mounting system using the EJOT CROSSFIX® system. This system accommodates dimensional adjustments in all directions to reconcile the broader tolerances of Utah's wood frame construction with the precise requirements of the PV system. In these projects, my role extends well beyond traditional architectural responsibilities; I coordinate the efforts of panel and subsystem manufacturers, engineers, and general contractors to ensure the high performance and healthy indoor environment of the building.

The insights gained from this extreme-location case study will inform future projects in more moderate settings, ensuring consistent performance, comfort, and indoor environmental quality.



Jörg Rügemer
Founder, Principal,
Atelier Jörg Rügemer

Studenski Dom
Dubrovnik, Croatia







Fire scenario in a rainscreen system

When dealing with fire scenario, the biggest benefit of a rainscreen facade – the ventilation gap, becomes our biggest nemesis. Rear ventilated area is an empty space of air between the external insulation material (or external wall) and the back side of façade panel. This area allows for an unobstructed airflow which occurs due to heating of air captured behind the panel (external or internal influence), the hot air rises and exits the façade airgap on the top. This creates suction on the bottom which then draws in new, fresh, and cold air from below, that (again) heats up and rises. Thus, creating a "chimney effect" behind the cladding.

However, when fire is introduced to the system, this chimney effect becomes detrimental to the building's safety and safety of its occupants. According to testing, if fire enters the rear ventilated gap its spread is increased to up to 8 m/min due to the chimney effect. This is enough to spread to the floor above the initial fire source and ignite it, creating additional fire sources.

When designing and installing rainscreen façade systems, we deal with Constructional fire protection. This includes following building codes, standards, and protocols (i.e., DIN 4102-20, ÖNORM B 3800-5, NFPA 285, BS 8414), including cavity barriers and fire stops and correctly choosing materials which are to be installed with satisfactory reaction-to-fire properties that are non-combustible and do not facilitate fire spread. This "rule" is equally important for all elements of the rainscreen façade system – façade cladding, insulation, and subframe elements.

When speaking of stainless steel in a subframe attachment system, the main benefits are its reaction to fire compared to other widely used materials like aluminum or carbon steel. Compared to standardly used aluminum alloys, stainless steel has over two times higher melting point – 1450 °C. At temperatures of 650 °C, where a standardly used aluminum alloy would melt, stainless steel retains at 55% of its initial strength. Compared to carbon steel which has the same melting point, stainless steel retains higher modules of elasticity at temperatures exceeding 200 °C and strengths at temperatures higher than 500 °C.



Nikola Hulina
International Business Development Manager CROSSFIX®


EJOT

Health Center
Adice, Serbia







LE 225
Dijon, France

Smart Tower
Graz, Austria



Parametric Architecture

Introducing Building Information Modeling (BIM)

Benefits of BIM in facade design

The application of BIM technology resulted in the evolution of facade design engineering. BIM-based facade design feature brought several advantages to the architecture of a building. BIM enables parametric facade design by changing all the elements of the facade into functional variables or algorithms. Different building designs get achieved by modifying these facade algorithms in BIM. BIM parametric design gives real attributes of facade components parametric simulation, calculation, and relevant data statistics. The virtual facade components also get geometrical parameters such as component material, thermal performance, cost, weight, installation number, etc. Based on different parameters, Facade parametric design performs several calculations and statistical analysis for modeling. Other parameters like energy conservation, layout, and evacuation are also analyzed and prioritized in the model to get an appropriate facade design. BIM uses a different level of detail (LOD) to define the accuracy of modeled building elements. For facade design, LOD 400 ensures the facade design applicability for plant fabrication.

BIM-based 3D virtual design

The 3D virtual facade design in BIM helps communicate the design data and information to other project members. BIM's 3D visualization gives a detailed facade design description of facade structure joints such as facade panel edge, corner, hole, junction, and beam bottom flashing and trim. BIM helps generate the multi-view of sectional drawings and axonometric drawings of curtain walls automatically through the entity components data. Any changes made in the facade component design get automatically updated. It saves from the task of updating plan, elevation, and sections. BIM Visualization and its correlative feature improves communication, work efficiency of the design team, and solves discrepancies among the design team for a better facade design quality.

Parametric design modification

In BIM-based parametric modeling, designs get automatically modified. It is due to the corresponding relation between the parameters and controlled sizes of the model. BIM allows the geometric model of facade fabrication gets changed to building components with real attributes. When parameters of the geometric model are changed, building components get modified accordingly. The use of building components with real attributes helps to create a parametric curtain wall component library.

Change in facade modeling process with BIM

BIM technology changed the facade modeling process to meet the demand of increasing complexity in facade designing and fabrication. Few changes brought by the technology in the facade designing process are:

- facade models instead of drawings

Compared to the traditional manufacturing of facade panels, a high degree of customization is required for the facade panel units. There are different facade designs for separate projects and also several facade panels in a single project. Therefore, the introduction of BIM technology-initiated facade models instead of drawings for designing.

The conversion of 2D drawings to 3D fabrication models avoids data loss. It accurately transfers the facade design data into numerical control machine tools used for facade fabrication. BIM facade models improve the building quality, and automatic digital facade fabrication reduces the wastage of materials. Model-based design delivery is one of the most important means of industrialization of the architectural envelope industry. As façade fabrication is mostly customized in plants, design and fabrication are closely combined. Compared with traditional manufacturing, façade panel units enjoy a higher degree of customization, which is reflected by not only different designs for different projects but also different façade panels even in a project, so fast and flexible production is needed.

Apparently, mass production based on standardization and regularization of façade panel units is not the mainstream direction of industrialization of façade design engineering. However, BIM-based design delivery can help avoid information loss during the transformation of two-dimensional design to three-dimensional fabrication model, and accurately transfer the façade design data to the numerical control machine tools, directly used for façade fabrication.



Therefore, the complete, accurate transfer of design data and automatic digital fabrication can not only improve building quality, but also reduce the huge waste arising from the design to different fabrication steps, which may be the industrialization development trend of the future architectural envelop industry.

Virtual assembly of centralized facade panels

BIM supports unitized facade fabrication, the virtual assembly of centralized facade panels. Since it gets performed in workshops, the builders at the site require knowledge of facade panels (for different façades and different floor heights) for their right positioning. Once a detailed BIM facade design gets developed, the facade components like unit panels, keel frames, and irregular profiles are given unique codes according to data planning. Then the facade model of the entire building is assembled using the material list. The material list assigns a unique number to each component that gets extracted from the BIM model. BIM creates information about fabrication, transportation, installation direction, and sequence in the facade panel. This data helps in the virtual assembly of the facade panel, resulting in multi-operational construction planning, installation sequencing, and improving its quality.

Unconventional structures making use of parametric facade design

The parametric features of BIM support the facade engineers and architectures in handling complex structures. By supporting facade designing, fabrication, and installation, BIM-created beautiful and unconventional building structures. These are some of the unconventional structures with extraordinary facade design.



Hotel Keight
Opatija, Croatia





Teampool
Seekirchen am Wallersee, Austria







The crucial role of planning and design in rainscreen facades

In the dynamic realm of architecture and construction, meticulous planning and thoughtful design are the bedrocks of successful projects. Among the myriad architectural elements, the rainscreen facade emerges as a multifaceted system that seamlessly integrates aesthetics, functionality, and performance. This article delves into the indispensable role of planning and design at every stage of the rainscreen facade process.

Understanding the Rainscreen Facade

The rainscreen facade, also known as the ventilated facade, is a layered cladding system designed to shield buildings from external elements while enhancing their visual appeal. It comprises two primary layers:

The Outer Skin (Rainscreen):

This layer is exposed to rain, wind, and sunlight. Architects meticulously plan its appearance, materiality, and integration with the building's overall design. Key considerations include aesthetics, energy efficiency, and weather resistance.

The Inner Layer (Insulation and/or Air Barrier):

Positioned beneath the rainscreen, this layer provides thermal insulation and prevents air infiltration, thereby contributing significantly to the building's energy performance and occupant comfort.

The Flow of the Rainscreen Facade Process

Conceptual Design: At the outset, architects and designers collaborate to conceptualize the rainscreen facade. This phase involves defining the facade's visual character, texture, and color, ensuring the rainscreen's role in weather protection and thermal performance, and harmonizing the facade with the overall architectural vision. Here, the dialogue between form and function begins, setting the stage for a facade that is both beautiful and robust.



Detailed Design and Planning:

Translating concepts into detailed plans is crucial. Architects create precise drawings and specifications, finalize material selection (such as metal, glass, or composite panels), ensure structural calculations for load-bearing capacity and safety, and integrate the rainscreen system with other building components like HVAC, plumbing, and electrical systems. This phase transforms visionary ideas into actionable blueprints.

Production Plans and Material Procurement:

Efficient production and material management are critical at this stage. Manufacturers produce rainscreen panels, brackets, and fasteners, while timely sourcing of high-quality materials within budget constraints is ensured. Effective supply chain management facilitates seamless logistics and delivery, ensuring that every component meets the specified standards.

Installation Preparation and Execution:

Before installation begins, thorough groundwork is essential, including site preparation, substrate evaluation, and waterproofing. During installation, the meticulous placement of rainscreen panels according to design ensures proper alignment and attachment, preventing water infiltration and thermal bridging. Regular quality control checks maintain adherence to design specifications.

The Inescapable Significance of Planning

Planning is unavoidable for several critical reasons. Detailed planning prevents cost overruns and financial surprises, ensures timely material procurement, facilitates efficient supply chain logistics, and maintains high-quality installation to preserve the facade's integrity.

In summary, the rainscreen facade exemplifies how meticulous planning and design, from conceptualization to execution, create resilient and visually appealing structures. Collaboration among architects, engineers, and builders is essential to achieving excellence in every raindrop-defying detail. The interplay of innovative design and strategic planning transforms architectural visions into enduring realities.

Volume 21

Leeds, United Kingdom





The Municipal Civil Court
Zagreb, Croatia



Residential and Care Home
Hopfgarten, Austria



Tec Center
Bad Laasphe, Germany



Prestigious apartment building in Vilnius

Construction of a prestigious multi-apartment residential building, located on Algirdo St. 3 In Vilnius, is currently in progress. Facade insulation using the EJOT "CROSSFIX®" system for rainscreen facade. This is currently the largest project of the EJOT group.

The size of this facade is about 4200 m². The object is complex, requiring a lot of effort from all the participants in the process. From the very beginning, specific requirements were set for this object, because to integrate it into the surrounding environment, it was necessary to choose a natural stone fi nish. The selected stone slabs weigh about 50 kg/m². Also, the architect's prompt was that the fasteners should not be visible, and the customer rejected the method of fastening the glued panels. Due to the high weight of the extension system the frame became denser, which increased the calculated heat loss through the frame structure. This had influence on enhancing the thickness of the system up to 35 cm, because Lithuania has high requirements for the energy classes of buildings.

Because of these specific requirements, competitors no longer had suitable offers. Before the project had been finally approved, EJOT specialists had to visit the facility many times. They had to perform pull out tests from 4 different foundations (subconstruction), install a demonstration stand with natural finish on the building facade, and solve other technical issues.

When designing energy-efficient buildings, priority is given to its proper insulation and sealing. If the technology of rainscreen facade is chosen, aluminum fasteners become a problem when calculating energy efficiency and assessing possible heat losses. From now on, more efficient systems can be used.

EJOT ensures the quality of this system by supplying all system components and providing all necessary information to installers.

The property Algirdo St. 3 in Vilnius is the biggest CROSSFIX® project in Europe so far. This shows how important supporting our customers through engineering services, especially when it comes to large-scale projects. Structural calculations, U-value calculations, installation plans and project details can be submitted. This kind of cooperation is requested by clients in case of particularly complex buildings.



Algirdo 3
Vilnius, Lithuania

CROSSFIX® Architectural Line Mockup Set

Mockups are an indispensable tool for architects and other stakeholders to visualize designs and solutions. They offer a realistic perspective on the planned solution and can help to understand technical solutions and facilitate decisions.

With our CROSSFIX® architectural line mockup set, we illustrate the various substructures of the system. The four individual mockups show the single-layer and double-layer solutions including various claddings. With our two-layer structure, with the vertical arrangement of the primary profiles and the horizontal arrangement of the secondary profiles, it is possible to change the cladding as required. It is possible to switch between a transparent polycarbonate panel, which is suitable for presenting the individual system components, and other panels made of HPL, fiber cement, ceramic, natural stone and a solar panel. This makes it possible to present the various cladding materials, in addition to our project references, to the various stakeholders and highlight the wide range of possible applications.

Please reach out to us if you would like to discover more about our CROSSFIX® architectural line mockup set.

To learn more about CROSSFIX®, you can contact us at any time at info@ejot.com or visit our website *www.ejot.com/construction*



Fabian Lückel
International Process Manager CROSSFIX®



EJOT®