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CPD Article

Published on 12 February 2021 16:35

Detailing, New Challenge on Façade Building Construction

Key Learning outcomes

- Overview of façade projects on a new era and challenges
- The importance of detailing on a façade project
- Advantages of weatherproofing design
- Application on a project case study

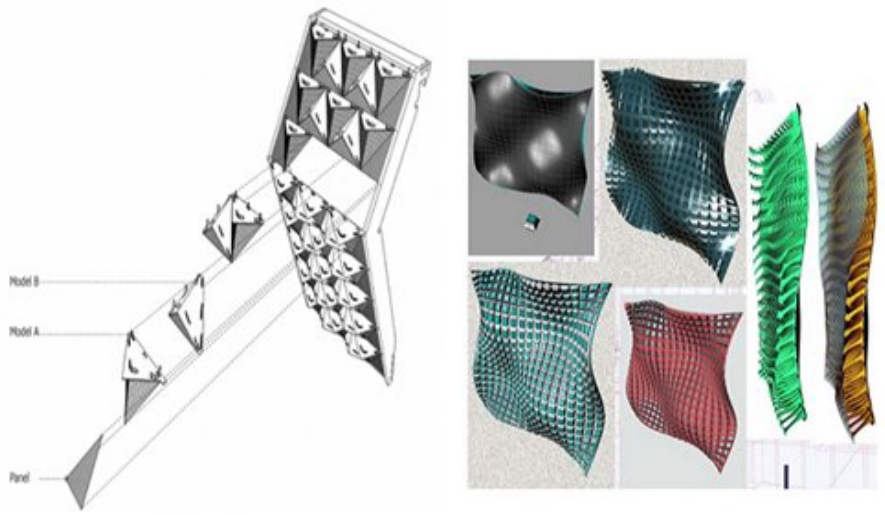
The facade industry has evolved immensely in the last years in terms of complexity and new modern technology has been made available to fulfill the new building requirements. This technology made creating different façade geometries possible that, otherwise, wouldn't be conceivable. This advancements in the industry require professional, accurate and detailed facade design.

Nowadays through automated design (parametric and algorithmic) and digital modelling, it is possible to have a complete facade 3D model on conceptual phase that will be detailed (cladding, glass, structural connections, HVAC, etc.) and tested before construction starts. The beginning of robotization and 3D printing is also part of this facade evolution and they will play an important role in this new era.

1.0 Importance of detailing

The functionality, durability and stability of each project element depends on the accuracy and quality of the detailing during the analysis and design phase. Therefore, to achieve the expected quality in a facade project, detailing is more than ever essential to the quality of the project.

Detailing of the design model requires an interactive process developed by different team members, architects, engineers and manufacturers linked together in a constantly updated model with design information under an evolving Design & Build process.



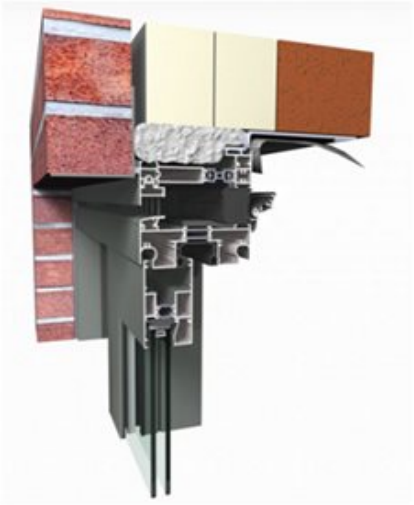
Parametric Design & Digital Fabrication – Rhino & Revit

2.0 Each project is a different challenge

The outputs of the detail design offer the opportunity to eliminate any possible discrepancies, errors and predict the building performance with accuracy (Airtightness, Solar Radiation, Energy Efficiency, etc.).
Weatherproofing design is equally complex and standard solutions that cover all facade applications are rare.

If all project elements were studied in detail the advantages would be immeasurable and we could predict and solve any air, water and vapour issues in advance at drawing board. Below are some of the most important advantages inherent to weatherproofing design:

- Predict weather triggered sealing issues between interfaces, curtain wall fixings, steel joints, facade perforations, rainscreen cladding fixing and its irregular shapes;
- Define the exact product/solution for each location where all the project constraints were taken into consideration;
- Predict compatibility problems between different materials;
- Guarantee the design performance during the building life span;
- Increase the off-site fabrication works, improving the quality of the end product;
- Turn the application clearer for all parties involved. Highlight and anticipate the most difficult works that require special attention allowing, in advance, to produce detailed project documents (Method Statements, Application 3D Drawings, Specifications).

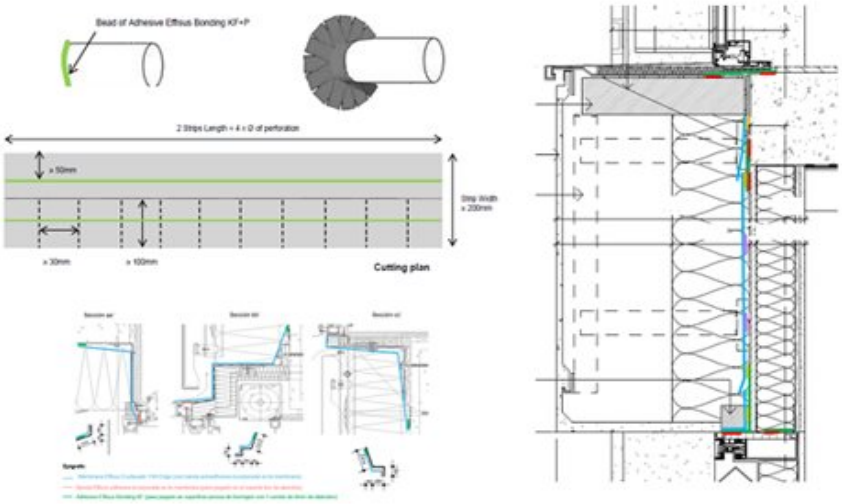


Façade Drawing Examples

3.0 Weatherproofing design from the beginning

To accomplish the above it is imperative that the weatherproofing design starts on the conceptual stage of the building design and goes deeper into details on a later design stage. Synergy between conceptual and detail design is vital to a successful building.

At present, the Design & Construction process is changing on facade building projects. Previously, the contractor and manufacturer were mainly getting involved only in the tender stage of the project. Presently, it is common practice that both parties are invited to develop a solution within budget and schedule before tender stage. This change allowed that all the process after tender was speed up, more detailed, more accurate and more predictable.
In conclusion, detailing is becoming essential nowadays and, in the end, it is turning the process less costly and within the project time frame.



Project drawings and detailing examples

4.0 Case studies: Royal Wharf & Gresham Street

For both of these case studies, initially all the project requirements, concept drawings and specifications were collected and studied in detail. Also, at this stage, project goals for Weatherproofing Design were defined: wind, water, vapor and air permeance.

In addition to the technical specs, other relevant technical subject was discussed: Fire.

Later all the project interfaces between aluminium, concrete slabs, rainscreen cladding and curtain wall were reviewed in detail. A list of all materials involved on these locations was made for further compatibility technical assessment. At this stage, meetings and conference calls were done in order to clarify every detail and clearly understand every project.

Following this stage, a concept design was presented with 3 alternative options for the main products. In parallel, a comparison chart was made to highlight the pros and cons of each solution.
After overcoming this phase, the detail design begun. All product samples that were to be in contact with weatherproofing products were collected in order to do further compatibility tests in a lab-controlled environment, simulating the end use conditions (adhesion, cohesion and climate chamber).

At the same time, interfaces between curtain walls, rainscreen cladding and concrete super structure were being detailed. The same was done for the membranes, including fixing, overlaps and connections between them.

After getting all the compatibility test results, the full picture was clear. Based on the information provided by the results, all the accessories were designed in detail (adhesives, sealants, water/air/vapor sealing tapes, facade perforation sealing solutions, etc.).

All design details were shared, discussed and approved between the Facade contractor, Main contractor, Architect and Weatherproofing Design/Production Team. This has to be the standard procedure in facade project design and its advantages are easily proven.

After solution approval and advancing into the project execution, three main actions were considered:

a) Project Method Statements – Method of Installation;
b) Project Specifications;
c) Project Documents for Site Training.

All the aspects related with delivery schedule, site conditions (application temperatures, humidity, rain, wind, etc.) were taken into consideration.

During construction, several technical site trainings and site inspections were made in order to confirm that the design details were being respected and if there was any project modification, it would be replaced by a new one properly executed. This is considered a mandatory quality procedure to attest the durability, stability and efficiency of the final project.

Royal Wharf & Gresham Street Projects, London

5.0 Conclusion

Considering the above case studies, it becomes easy to understand the importance of detailing when it comes to facade design. Weatherproofing detailing must run through the entire project schedule, starting in the conceptual design stage and going all the way to site installation. The project outputs are considerably valuable and allows for a much better building in terms of quality, bringing costs down and turning construction errors less common and much more controlled.

The documents produced by this whole procedure help architects, designers and contractors to control the quality of the project and installation of products.
The procedure covered in this document will, for sure, become standard practice in the new era of facade projects. Involving all parties from an early stage brings considerable advantages to the project and will turn the building into a better end product.

Membrane installation at site