Next Active Facades

TU Delft, International Facade Masters, June 2012

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NEXT ACTIVE FACADE

Title: Detailed application of NEXT Active Facade.

Delft, June 28th 2010

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Preface

This thesis is performed as the finalization of the master degree of the master Building Technology – track Façade Design – at the faculty of Architecture. The topic is about the NEXT Active façade and its detailed application. This final report is the result of the master thesis. The graduation project started in Nov 2011 and included a broad literature study on the background of decentralized systems. The concept of decentralized climate system is comparatively new but it is widely becoming popular especially in Western Europe. This report unfolds the concept of NEXT Active facade with respect to the application of the system in aa given condition. The project has been very challenging and in the end quite satisfying for me and forms a nice ending of my study period in Delft.

I would like to thank Roger Cremer from Alcoa, Piet Brosens from TROX and Bertus van den Brink from Somfy for their time and input for this research. As a part of my thesis I conducted Architects interviews. I would like to thank Arie Bergsma (Partner at GAAGA Teacher / researcher at TU Delft), Frank Schnater (Owner at RSW Architecten, lecturer and staff member at TU Delft), Chris de Weijer (Director, DP6 Architects, Delft), Robert Platje(Architect at SPEE Architecten, Rotterdam) and Joost Heijnis (Architect at CEPEZED) for their valuable time and knowledge inputs for my research.

Finally, the completion of this thesis would have been impossible without the help of my dedicated mentors so special thanks to Tillmann Klein and Eric van de Ham.
Enjoy reading!

Harshad Shitole
28th of June 2012, Delft, The Netherlands

CONTENT

Subject Title: Detailed Application for the **NEXT active facade** concept.

2. Introduction :

Building envelope and building services have a very big influence on the building comfort. Both of them combine to 40-50% of building cost. In some cases it really makes sense to combine those two depending on the use and type of the building. In past few years the concept of Decentralised Ventilation System (DVS) is becoming popular specially in western Europe because of the flexibility it provides when it comes to spacial planing inside the building as compared to the conventional centralised solutions. Post 2000 more than 50 buildings have been realized in Western Europe. With new trends in façade there is demand for additional modern systems to be added like heat recovery units, which makes already complex building element more complex.

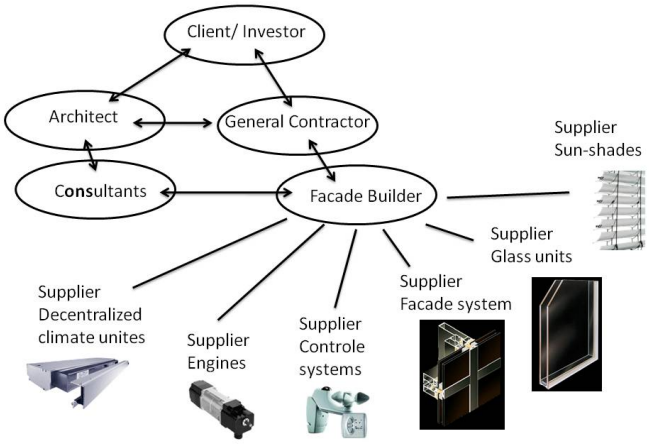
There are already some examples of systemised/customized products like

1. E2 Façade prototype by Schuco,
2. 2 Degree system by Schuco
3. 'Smart Box' by Cepezed Architects, Energy Research Centre of the Netherlands (ECN), TNO Bouw & Ondergrond,
4. 'TEmotion' by Hydrobuilding systems,
5. Integrated façade for 'Capricorn house' by Schossing and Gatermann.
6. RADIX building in Wageningen by DP6 Architects

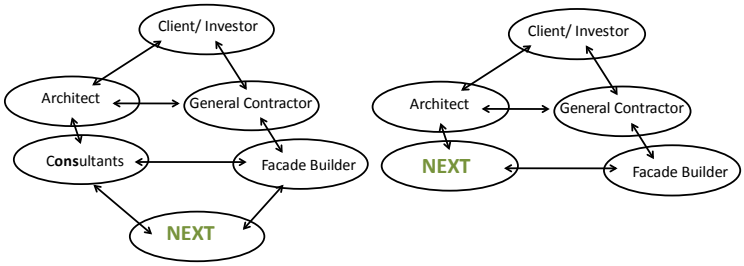
There are certain disadvantages of these systemised solutions like limited design possibilities, high maintenance cost, complex control system and different systemised solutions need to be applied for different types of buildings and as these units are quite delicate the cooling load at night is very limited.
Compared to the automobile industry where no. of cars are manufactured with the system which are optimised and tested for n no. of times, in the building industry where façade solutions for each and every building needs to be different but the system still has to be reliable which is a big problem. Complex systems in buildings are always a hassle which leads to complex control systems. To overcome this problem we need special solutions like specialised software to control the services like cooling, lighting, sun shading etc. which will make these decentralised solutions more efficient and acceptable in the future. (Reference - Somfy)

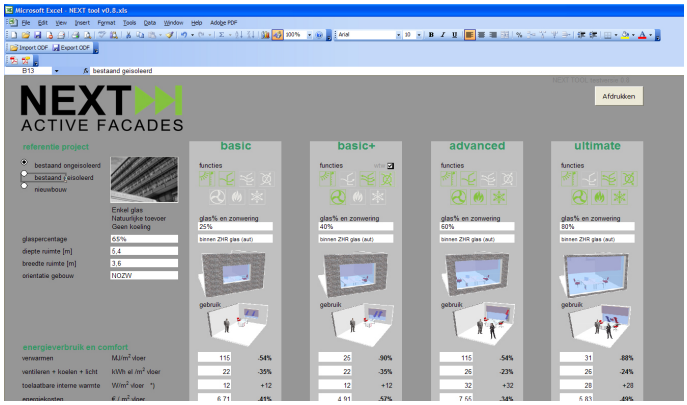
Concept 'NEXT' Façade :

NEXT system is not a product but an idea. It is an open system or a tool box like desktop computers with several modules we can choose from depending on the requirement of the building or client. So with the help of this toolbox we can have almost any solution with or even without the services depending on the requirements. In the most advanced form NEXT Active Façades a decentralized system, each user allows the climate on his / her work as needed to control via the PC. Once a workstation is unoccupied, the system can instantly switch to the optimum 'power mode'. Many of the times in the process, different parties (contractors, sub-contractors and suppliers) who are involved take responsibility of only there product/ services. So the communication between these different parties is usually a problem. Clients ofcourse want one party to take up all the responsibility.



NEXT promises exactly the same. NEXT can be the desired one point contact when it comes to system supply or facade building. For that NEXT need to come early in the picture, so that it can advise Architects or facade consultants at very beginning of developing concepts. The best possible scenario will be NEXT taking all the responsibility of consulting and contracting with only one point of contact which will make the whole complex construction process very simple.





The communication program written by Eric van den Ham is 1st step in communicating.

Problem statement :

As NEXT Active facade is still just an idea there are still a lot of problems which need to be solved. First of which is the information flow between the players involved and the stakeholder's responsibilities. The unique selling point of NEXT Active facade is its one point contact for Architects and Clients/Developers. Which means NEXT team will take all the responsibility from consulting Architects to system supplying to facade building, which is quite a complex management issue for which the information flow and responsibilities of all the players involved need to be sorted out after analysing their roles in facade building process.

The second thing which need to be addressed is the actual construction of the system. NEXT need to figure out the details of the system and its connection with the building for different configurations of the embedded functional systems.

There has been a number of service integrated facade products available in market, for example- Schuco, Smartbox system etc. but these systems are not adapted in commercial market. One of the reason can be the conservative approach of the building industry, also because the high level of technicalities in these products scare off Architects. Even if Architects get convinced to use these products in their projects, there aren't enough convincing decision making tools available to convince the clients/ developers, as clients and developers do not want to do the huge initial investments for decentralise solutions instead of centralised solutions if they are not sure about the payback in terms of money/ energy saving in future considering the lifespan of the building.

Scope of study :

After extensive 1st discussion in a meeting with Tillmann Klein and Eric van den Ham we came to conclusion that there could be three different direction of study.

Possible Topics -

1. Information Flow / stakeholder's responsibility

- Understanding the design process for standard and new integrated concepts
- Architects opinion on the system.
- Making different design cases
- Interview with the parties involved
- Conclusion - how it should work? Who to hire? How to communicate? Stakeholders responsibilities/ expectations?

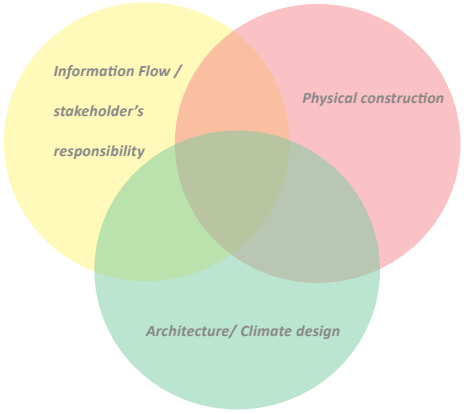
2. Physical construction

- Architects/facade builders opinion on the system
- Finding out limitations of the system
- Using existing casestudies finding out typical problems in construction which are different every time.
- Making different design cases
- Rough estimate of the concept and detail design
- Use case study of existing building and redesign it with NEXT system
- Prepare detail design (Drawings/ calculations)
- Conclusion – Advise to the product development

3. Architecture and Climate design

- Testing the tool to deeper level.
- Getting initial group of solutions from the tool and then start designing in detail.
- Decision matrix - which component needed for which type of building.
- Extensive calculation and finding the limit of the concept.
- Architect's reaction on having a tool box
- Conclusion – Advantages of NEXT system to the standard process of façade building.

Even we chalked out three different Areas of study many of the tasks would over lap with each other such as knowing the opinion of Architect and players involved, getting reaction to the toolbox, understanding the conventional and integrated design process. So finally we decided to focus on one topic but having some overview of others.



Research objective :

- To understand the pros and cons of the state of the art systems.
- To understand the whole concept behind NEXT Active facade system and enhance it in terms of integration of services and flexibility of design.
- To examine the practical applicability of the NEXT system.

Main research question :

How can the concept of NEXT Active Facade as a design flexible solution can be practically applied to given conditions?

Sub question :

1. What are the pros and cons of existing systemized decentralized solutions available in the market?
2. What are the the Architects expectations and openions from NEXT Active facade?
3. What are the technical hurdles in application of NEXT Active facade?
4. Where it needs more product development to make it a better system?

Structure of study :

1. Understanding the design process for standard and new integrated concepts by taking industry inputs.
2. Exploring the NEXT system/ toolbox and finding out the limitations
3. Architect's reaction on NEXT concept and the tool box.
4. Study of different existing buildings which use decentralised ventilation system and finding out the typical construction problems.
5. Understanding the need of the Market.
6. Use case studies of existing building and redesign it with NEXT system.
7. Prepare detail design (Drawings/ calculations)
8. Energy performance study.
9. Conclusion - Advantages or disadvantages of NEXT over standard façade and advice for further product development.
10. Advise to NEXT for further product development.

Deliverable :

1. Redesign of 2 case studies / Drawings / calculations
2. Advises for the further product development or research.