Better, faster and cheaper energy facades

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Better, faster and cheaper energy facades – how to optimize renovation through an industrialized process?

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INTRODUCTION

The main goal of the project ´Better, Cheaper and Faster energy façade renovations´ of the social housing blocks from the montage period 1960 – 1976 is to create an industrial platform which can fulfill and create an advanced and highly industrialized architecture and process for energy renovation of facades and to secure future for at least a volume of 16.000 dwellings in Denmark.
A large number of the housing blocks from the period have a bad reputation both seen from a social, technical and aesthetical point of view. Cause these aspects the blocks have already been renovated at least once and to prevent a bad second renovation a great deal of efforts from the owners have been obtained into the innovation project. Owners are social housing associations, which base their decisions about renovations on tenant's democracy – which means that all changes related to design and rent have to be agreed by the tenants. This means that a building renovation always has to optimize aesthetics, functions and benefits to be affordable.

OBJECTIVES

The owner had expectations of an overall industrial solution, which can be talked about in the following headlines: the developed solutions is intended to be used for the specific building typology, offer for 16.000 social dwelling to use the results, important to measure the effect of the renovations, lifting the competences of industrial solutions in relation to digital use and pushing a further development of quality and productivity.

What were the demands from building program in order to push the contractors?
Design and construction: Architecture, construction, energy/insolation, environmental sustainability, quality, functionality and flexibility.
Optimization: product, process and project optimization, building physical production, economical sustainability, product optimization and creating value, estimated future effects.
Innovation: learning and knowledge sharing, organization and communication and dissimilation.

This means that all 3 main aspects had to be fulfilled with a good score to be selected as a contractor for the mini tender at the building sites. The 3 above listed demands represent 50%, 30% and 20% of the quality and functional judgment.

METHODS

Through the development of the program an interdisciplinary group has been working with the complexity of the defined objectives, this gives a multidisciplinary approach to the competition program.

Comparable research analysis to other projects:
Cause several persons in the steering group had experiences from actual optimized renovations they brought their experiences into the building program.

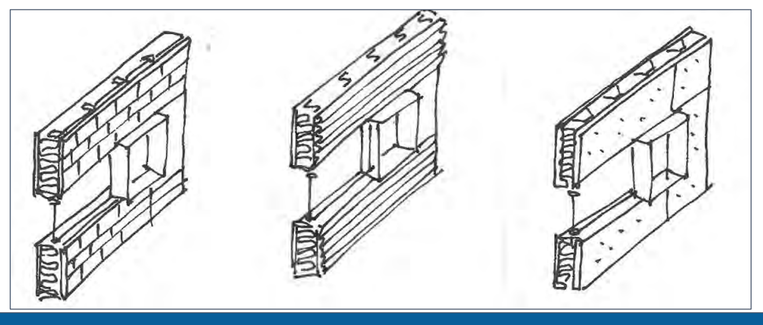
Discussions on the level of industrialized building process:
Through the whole planning process all needed experiences from Norden and Austria were brought into the program and discussions on how to qualify the industrialization process and the level of energy performance and how to demand the highest level of system delivery as possible.

Literature studies:
Through recent years several publications are published about a very high level of "new industrialization" and "mass customization" in Denmark.

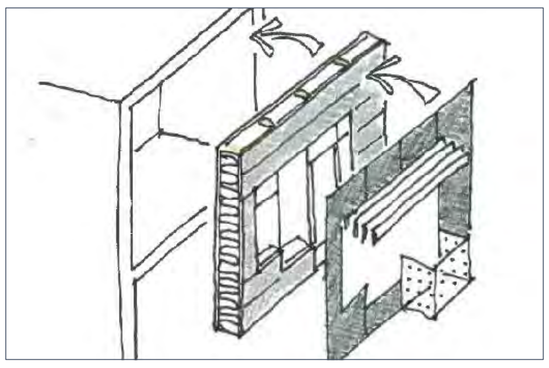
Reflections through comparable initiatives from Austria.

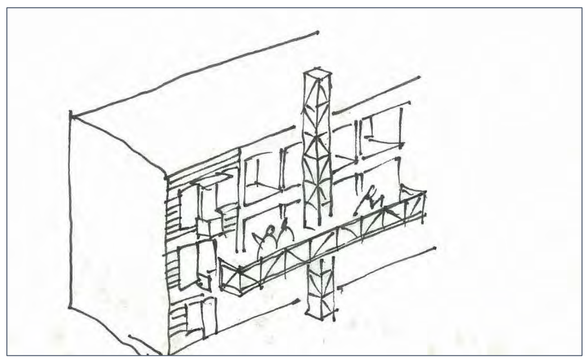
RESULTS

The competition have shown that clients and building owners can push the contractors through their tender: the entrepreneurs had formed multidisciplinary teams containing architects, engineers, subcontractors as production firms delivered their material and were judged. The judgment of the competition showed different levels in the delivered material, but all teams had worked hard in integrated delivery groups, they had forced their thinking and results to a very high standard, both architectural expression, the way the energy demand were fulfilled, the industrial production and the logistic level both at production place and at montage at site, which were very promising for an optimized and innovative change of the traditional way of retrofitting the segment.



3 ways of organizing the industrialized project condition were chosen. One contractor presented an industrial platform from which client and consultants can choose light weight elements basically made from wood or steel, and final façade interface in both lightweight materials as wood and plate, but also heavy materials as high strengthened concrete and glass. Even concrete elements were proposed. Another contractor proposed a fully high industrialized and detailed building system with many levels of energy solutions and a very vibrant architecture and the third contractor were especially qualified cause of top tuned industrial and logistic handling the building process.





All 3 proposals had a new and innovative way of threating the architectural expression with respect to the original concrete element façade. Results concerning systems for ventilation had all possibilities from separate to central solutions and pipes built in the façade elements to minimize trouble of tenants. Finally it was shown that the actual disturbing the tenants under the building process can be brought down to 1-2 days, which means that people can be staying in their flats under the retrofitting period. This saves trouble and time and money for all involved in the building case.
The optimization of the building process – from producing elements, transport, montage and the final last layer of cladding.

3 PROJECT EXAMPLES

Enemærke – entr./garden

Friis Poulsen entr./garden

MT Højgaard entr./garden

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SUSTAINABLE RENOVATION

The research project Sustainable Renovation search the challenge of the current and possible architectural renovation of the Danish suburbs which were designed in the period 1945 to 1973. The project takes the starting point in the perspectives of the energy optimization and the industrialized building of housing. The research field is focused at single family houses and the social housing blocks and spreads the discussion of architecture from architectural heritage to energy efficiency and from architectural quality to sustainability.
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