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A REVIEW OF RECENT TECHNIQUES IN FACADE ENGINEERING

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ABSTRACT:

Facade Engineering is the art and science of resolving aesthetic, environmental and structural issues to achieve the effective enclosure of buildings. Specialist companies are dedicated to this niche sector of the building industry and engineers operate within technical divisions of facade manufacturing companies. The façade acts as the filter between the climate outside and the conditioned space inside.

KEYWORDS: Facade Engineering, Seismic Retrofit, Environmental Impact, Urban Landscape etc.

INTRODUCTION:

In 2003, a group of professionals established the Society of Facade engineering (SFE), in recognition of the need to regulate the industry and introduce a system of accreditation. SFE was inaugurated in 2004 as a society under The Chartered Institution for Building Services Engineers (CIBSE); supported by the Institution of Structural Engineers and The Royal Institute of British.

What is Facade Engineering??

The SFE has debated the definition of facade engineering and has agreed on the following wording: Facade Engineering is the art of resolving aesthetic, environmental and structural issues to achieve the enclosure of habitable space. Facade engineering experts work on the highest calibre projects, providing innovative solutions that meet both performance and aesthetic requirements. The facade is fundamental to the successful performance of a building and is a climate moderator that improves comfort levels for occupants. Its role is to reduce energy costs and create a healthy, secure and safe environment while significantly contributing to the architectural design of the building. The facade can amount to around 25% of the overall construction cost and is therefore seen as a potentially high-risk element in successful building delivery.

Designs should include solutions that make facades more responsive to climate. Expertise should also include building maintenance unit (BMU) consultancy services. Facade experts should collaborate with every other building design discipline including architecture, structural engineering, MEP, fire engineering, acoustics, lighting, interior design, security and sustainability. The main goal is to integrate the performance requirements of all disciplines while maintaining high sustainability standards and cost-effectiveness.

DETAILED EXAMPLE:

The China World Trade Centre consisting of a hotel and office tower and a six storey retail podium. It is currently the tallest building in Beijing, rising 80 floors above ground. The tower facade features a thermally broken, unitised curtain wall system with low emissivity insulated glazed units, shaded by full height external vertical glass fins. Because the tower tapers in as it rises, the curtain wall undulates on alternating floors to create a micro-texture to the overall facade. The external glass fins cantilever 600millimeters from the glazed facade, providing shading and housing LED lightening strips along the outer edges for night time illumination. The retail podium's signature facade is 22meters high and 100meters wide, composed of a highly transparent, yet energy efficient retail glass wall, utilising low iron, low emissivity insulated glass units. These are supported only by stainless steel cables running from ground level to the roof. This structure is the first of its kind in Beijing.

TORU TAKEUCHI, KOICHI YASUDA, MAMORU IWATA:

In this paper author has proposed the concept of integrated façade engineering approach, which considers architectural design, improvement of seismic performance of existing building with energy dissipation elements in attached facades, environmental and structural designs are combined together. This concept illustrated in this paper is applied to the aged building, for applying newly developed concept improvement in seismic performance is carried out along with some retrofit works.

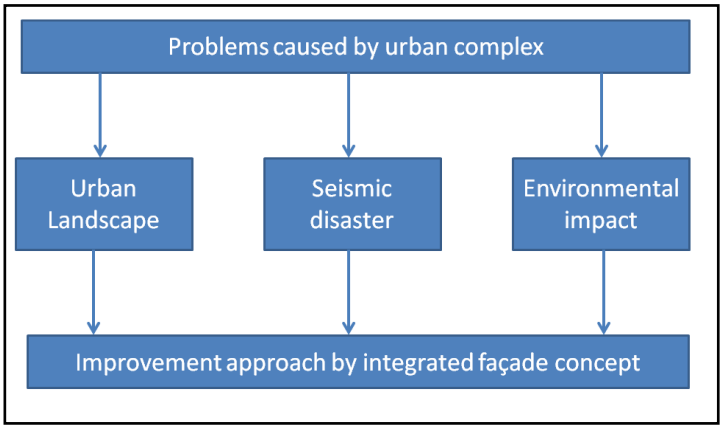

Fig. No.1. Basic concept of Integrated Façade Engineering

Author in this paper applied concept of integrated façade engineering to practical building with poor seismic performance designed in 1996, and few

improvements related to elasto-plastic energy dissipation is given consideration and few modifications are done.

T. C. PAVITT, A. G. F. GIBB:

In this paper discussion for the need of interface management within construction and façade engineering is discussed in great detail. Author in this paper has discussed the three different types of interface management, - physical, contractual, and organizational. In this paper author has discussed the interface management in construction contracting in great detail. This task is accomplished by considering the how UK procurement trends have changed from last to this decade, which has largely affect the interface management within projects. UK cladding procurement is very fragile in this paper author has tried to map the development of most critical and typical cladding system which shows the complexities of interface management. Finally in this paper author has discussed, special project funded by a UK government for design and management of window and cladding interfaces. Author has tried to explain principles of claddlSS considering the process maos, management strategy, action plans and bibliography, materials, joints, maintenance, tolerances and movement. By considering this factor enables the strategies the developed to avoid the endemic interface problems occurs mostly on construction site.

RAFAEL SACKS, ISRAEL KANER, C.M. EASTMAN AND YEON-SUK JEONG:

Building information modelling (BIM) is theoretical approach for building design and construction management which will encompass three dimensional (3D) parametric modelling, that can used for design and detailing and computer intelligible exchange of building information between construction management and design disciplines. Development of products which are supported integrated 3D parametric modelling is been used for and it is well matured technique so that it can be used of building information development and management by many of the renowned architecture and engineering firms.

The basic objective of this study is as follows

1. Identify appropriate collaboration workflows and the information requirements additionally needed to support them
2. Explore best practice for the use of 3D BIM tools in collaboration between architects and precast façade fabricators
3. Record the processes and productivity achieved in parallel 2D and 3D workflows for the same project.

QINGYAN CHEN:

In this paper overview of tools which are used for prediction of ventilation performance of commercial and residential buildings is carried out. The tools reviewed were based on mathematical modelling technique or in some cased are in small scale experimental models, multi zone network models, zone models and computational fluid dynamics (CFD) models. In this review it's been observed that analytical and empirical models have made an minimal contributions for the research in last decade. The small and full scale experimental models are used for generation of the data for validation of the numerical methods. The multi zone models were improving; they are the main tool for the prediction of ventilation performance in an whole commercial as well as residential building. The zonal models possess limited application and it could be replaced by using the coarse grid CFD models. It's been found by the author 70 percent of literature used CFD models. Author has put considerable efforts for still made for seeking more accurate and reliable models.

CONCLUSION:

The compressive review of façade engineering technique is been carried out in this paper. Many of the authors recommend using CFD modelling for prediction of heat ventilation. Author also suggest that façade engineering should taken very seriously in countries like India, where many cities are developing very fast and it requires proper façade planning.

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