



2019

4th UNDERGRADUATE SEMINAR 2019 BUILT ENVIRONMENT & TECHNOLOGY

 \bigcirc



ACULTY OF ARCHITECTURE, PLANNING & SURVEYING UNIVERSITI TEKNOLOGI MARA PERAK BRANCH SERI ISKANDAR CAMPUS

organised by

THE STUDY OF CURTAIN WALL PANELING INSTALLATION IN MALAYSIA

Nur Anis Asneeda binti Mohamed¹ and Norehan Mohd Noor²

¹² Department of Building Surveying, Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, 32610 Seri Iskandar, Perak *Email: anis_asneeda@yahoo.com*¹

Abstract:

Façade gives the building an exquisite design which distinguishes the building form each other. Nowadays, Curtain wall systems a commonly used for modern buildings, and it becomes a major investment in construction. Compared to reinforced concrete structure, curtain wall systems are new technology in the construction industry. This research focus on the type and analysis of suitable curtain wall, maintenance and their life span for high rise building. The curtain wall systems nowadays, even the simpler types are far more sophisticate products than their early counterparts, through many of experience and development have eliminated the major difficulties of the pioneering designs, resulting the better products.

Keywords:

Curtain Wall; Paneling installation; Malaysian climatic.

1.0 INTRODUCTION

Nowadays, many new and modern high-rise buildings in Ipoh, Perak, that are used curtain wall systems as enclosure external wall. The expression "curtain wall" drives from the idea of thin, lightweight, nonburnable exterior wall panel, containing glass in-fills. These panels are suspended like curtains from the structural frame of the building, from floor to floor, to provide an enclosure for human activities. Curtain wall gives an arrangement of outside appearances for structures of the building in Ipoh, Perak. They could be either constructed at the job site, or prefabricated in factory lines (Allen and Lano, 2004). Curtain walls are planned, made and introduced to oppose being presented to the unsafe weathering specialists, for example, precipitation, the sun oriented radiation and wind (R.L. Quirouette, 1982)(Chew et al , M.Y.L. Chew, S.S. Tan, 2004). The curtain wall systems are one of the implementations of industrialized Building System (IBS) through Construction Industry Transformation Programed (CITP 2016-2010) Policies. It is one of the innovative systems in Industrialized Building System (IBS).

2.0 LITERATURE REVIEW

Curtain wall gives an arrangement of outside appearances for structures of the building in Ipoh, Perak. They could be either constructed at the job site, or prefabricated in factory lines(Allen and Lano, 2004). Curtain walls are planned, made and introduced to oppose being presented to the unsafe weathering specialists, for example, precipitation, sun oriented radiation and wind(R.L. Quirouette, 1982). The curtain wall systems are one of the implementations of industrialized Building System (IBS) Through Construction Industry Transformation programmer (CITP 2016-2010) Policies. It is one of the innovative systems in industrialized Building System (IBS).

Most of this development is realized in the construction of high-rise buildings, which utilize various forms of curtain walls as enclosure systems. A high-rise building is a structure that has more than ten stories and is fitted with systems for vertical transportation (Chan Y. Ching, 2008). An architect faced with a variety type of curtain wall system options which should consider several performance as criteria to ensure the selection of an optimal system (Hassanain, 1996).

However, there are several problems faced by implementing the curtain wall systems. One of it is related with the performance criteria that affect the process of evaluating and choosing of curtain wall systems

itself. Leakage is one of performance criteria the effect the selection of the type of curtain wall systems. This is because, air infiltration through the curtain wall system results in de-regulating air velocities inside the building, which results in discomfort during both the summer and winter sessions (Straube, 2001). Air leaks contribute to waste air conditioned, thus increasing heating and cooling costs (Sanders, 2006). Moreover, air leaks could facilitate the condensation of moisture vapor inside the wall hence the growth of molds and consequently indoor air quality problems.

For instance, performance criteria that affect the process of evaluating and choosing of curtain wall systems is wind forces. This requirement would be easily met in low-rise buildings. However, in high-rise buildings with metal and glass curtain wall system, resistance of the maximum wind forces would require necessitate the design and installation of framing members and opaque segments with different structural properties, in addition to the installation of glazing panels with different thickness (U. Ganguli and R.L. Quirouette, 1987).

In Malaysia, an Asian state located just north of the equator, the climate is equatorial, hot, humid and rainy throughout the year. Temperatures are high and stable, with a slight decrease between November and January, when highs drop to 29/30 °C (84/86 °F), at least in the north, and a slight increase (which, however, is felt because of the high humidity) between March and August, when highs hover around 32/33 °C (90/91 °F) and lows around 23/25 °C (73/77 °F). Rainfall is abundant and frequent throughout the year, in fact, it is difficult to find an area where it is lower than 2,000 millimeters (79 inches) per year, or a month when it is lower than 100 mm (4 in); however, it is possible to find periods when it is not too high, although they are not the same everywhere.

2.1 Curtain Wall issue

The problem of installing or selecting curtain wall were related with the performance criteria and the life cycle of the curtain walls. For the wind forces, this requirement would be easily met in low-rise buildings. However, in high-rise buildings with metal and glass curtain wall system, resistance of the maximum wind forces would require necessitate the design and installation of framing members and opaque segments with different structural properties, in addition to the installation of glazing panels with different thickness (u. Ganguli, 1986). The water on the face of a building is often driven by wind at high velocities and high air pressures, not just in a downward direction, but in every direction, even upward" (Allen and Lano, 2004).

Water in form of rain is probably the most persistent cause of potential trouble. As wind-driven rain, it can enter very small openings and may move within the wall and appear on the indoor face far its point of entrance. In the form of vapour it can penetrate microscopic pores, will condense upon cooling and if trapped within wall can cause serious damage that may long remain undetected. (R.L. Quirouette, 1982)

Therefore, it is of utmost importance that the curtain wall system is designed and installed to be leakfree as failure to do so will ultimately result in expensive repairs, or even replacement of the system (Solinski, 1999). For the curtain wall life cycle, the environmental impact of the materialization and the operation can reduce the actual life span of the curtain wall if no maintenance was carried out. The expected service life of a product is crucial for the decision making of the materials used, the construction techniques, the maintenance and the end-of-life, parameters that form its total environmental impact, and as such must be seriously taken into consideration during the design phase.

3.0 METHODOLOGY

The data were collected from primary sources using quantitative method which gained from questionnaire surveys. The respondents for this research are the owner or occupants and maintenance person of that building to get the data.

Secondary data for this research were obtained from information on previous paper, journals, literature review and the internet regarding the assessment of choosing suitable curtain wall. Nowadays by using internet all the related information can be found easily, some articles, journals and texts can be found

through the internet services. By using this way, it easier for us to find all relevant information and it save our time.

4.0 ANALYSIS AND FINDINGS

Most of the building users think that the curtain wall are suitable with Malaysia climatic and can be applied to high rise building in Ipoh, Perak. Malaysia climatic usually high humidity around 32/33 °C (90/91 °F) and lows around 23/25 °C (73/77 °F).



Figure 1: Respondent are from 60% maintenance staff and 40% building users

Table 1: Statistics of the maintenance for the curtain wall at high rise building	in I	poh, Pei	rak
---	------	----------	-----

NO.	TYPE OF MAINTENANCE	PERCENTAGE (%)
1	Check on proper maintenance schedule	18
2	Check and recognize all curtain wall paneling is function properly	15
3	Check on defect	16
4	Check of safety to building user when applied curtain wall	17
5	Visual inspection on curtain wall	20
6	Check on stainless steel bracket and curtain wall frames	14

Based on findings, most of the respondents recommend to carry out maintenance by conducting visual inspection on the curtain wall which is 20%. Meanwhile, lowest response is 14% which is check on stainless steel bracket and curtain wall frames.

5.0 CONCLUSION

It can be concluded that the building need to check on visual inspection frequently on the curtain wall to identify if there is any defect occur to the curtain wall such as crack that caused by wind force especially when it comes to high rise building. The curtain wall also suitable for in Malaysia as the highest temperature is 33 °C which not too hot to applied curtain walls.

REFERENCES

Allen and Lano. (2004). Fundamentals of Building Construction. John Wiley & Sons.

- C.Heesbeen. (2010). Materializing the life cycle of the facade. *Guidlelines for Aluminium Constructors*.
- Chan Y. Ching. (2008). The effect of the top and bottom wall temperatres on the laminar natural convection in an air-filled square cavity. *International Journal of Heat and Mass Transfer*, 49(1), 11–12.
- Chew et al , M.Y.L. Chew, S.S. Tan, K. H. K. (2004). Building Maintainability-Review of State of the Art. *Architectural Engineering*, *10*(3), 80–87.

Ebbert, T. (2010). Refurbishment strategies for th technical improvement of office facade. *TU Delft*.

- Hassanain, A.-H. (1996). Effects of Faulty Design and Construction on Building Maintenance. *Performance of Constructed Facilities*, 10(4), 171.
- Hunton, DAT; Martin, O. (1987). curtain wall engineering. *Institution of Engineers, Australia, 1,* 88–92.