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UBL ICETD
2013

The Second International Conference on Engineering and Technology Development

2nd ICETD 2013

27, 28, 29 August 2013, Bandar Lampung, Indonesia

PROCEEDINGS

In Cooperations With :

APTIKOM

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Hosted by :
Faculty of Engineering and Faculty of Computer Science,
Bandar Lampung University (UBL), Indonesia

2nd ICETD 2013

The Second International Conference On Engineering And Technology Development

28 -30 January 2013
Bandar Lampung University (UBL)
Lampung, Indonesia

PROCEEDINGS

Organized by:

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PREFACE

The Activities of the International Conference is in line and very appropriate with the vision and mission of Bandar Lampung University (UBL) to promote training and education as well as research in these areas.

On behalf of the Second International Conference on Engineering and Technology Development (2nd ICETD 2013) organizing committee, we are very pleased with the very good response especially from the keynote speaker and from the participans. It is noteworthy to point out that about 80 technical papers were received for this conference.

The participants of the conference come from many well known universities, among others : University Kebangsaan Malaysia – Malaysia, APTIKOM – Indonesia, Institut Teknologi sepuluh November – Indonesia, Surya Institute – Indonesia, International Islamic University – Malaysia, STMIK Mitra Lampung – lampung, Bandung Institut of Technology – Bandung, Lecture of The Malahayati University, B2TP – BPPT Researcher – lampung, Starch Technology Center – Lampung, Universitas Islam Indonesia – Indonesia, Politeknik Negeri Malang – Malang,University of Kitakyushu – Japan, Gadjah Mada University – Indonesia, Universitas Malahayati – Lampung, Lampung University – lampung, Starch Technology Center – Lampung, Universitas Riau – Riau, Hasanuddin University – Indonesia, Diponegoro University – Indonesia, King Abdulaziz University – Saudi Arabia, Parahyangan Catholic University – Indonesia , National Taiwan University– Taiwan, Surakarta Christian University – Indonesia, Sugijapranata Catholic University – Indonesia, Semarang University – Indonesia, University of Brawijaya – Indonesia, PPKIA Tarakanita Rahmawati – Indonesia, Kyushu University, Fukuoka – Japan, Science and Technology Beijing – China, Institut Teknologi Sepuluh Nopember – Surabaya, Researcher of Starch Technology Center, Universitas Muhammadiyah Metro – Metro, National University of Malaysia – Malaysia.

I would like to express my deepest gratitude to the International Advisory Board members, sponsor and also to all keynote speakers and all participants. I am also gratefull to all organizing committee and all of the reviewers who contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector of Bandar Lampung University (UBL) who give us endless support to these activities, so that the conference can be administrated on time

Bandar Lampung, 29 August 2013-08-26

Mustofa Usman, Ph.D
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GLASS TECHNOLOGY IN NATURAL LIGHT GLASSES ON APERTURE ELEMENT IN THE ARCHITECTURE WORLD

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Abstract :*The glass is formed by element which during the time without you realize possible there are at your house backyard or your environment work. Glass material spread over above island in earth. This matter become in the world of architecture nusantara if we do not exploring existence of glass. In the west technological till in this time continue explored how in a moment wait glass to substitution element of especial structure (which during the time only exploiting concrete and steel in the world of construction). This article only small explanation about glass from some important note pursuant to source of reference representing, in meaning glass material from the aspect of look into light natural at aperture element in the world of architecture. In this article, writer try to present synchronized simple explanation but about history attendance of glass started only as decorator till the part of construction. Writer present very famous aperture element buttonhole in architecture world, colaboration with glass material by presenting some environmental effect and into illumination systems innovation to load light natural maximally which framed in glass till attend again explore in architecture world*

1. GLASS IN TIME

Solar as a world lighting energy source is a life energy in the built environmental, which is provide simple information to the earth inhabitants, day or night. This basic principle gives humans inspiring to natural lighting penetrating into the dwelling through a gap that has been planning in aperture forms. Aperture is one element of building design which is open purposely on the wall or building vertical side and is usually prepared for the penetration of natural lighting and air flow through building. In the architectural history showed that the aperture elements had a close relationship with the function (meaning), which allowed air flows (meaning cold) and penetrate the lighting inside (meaning hot). The aperture placement of window form specially treated (architectural detail), which is still found in the realization of past relics of medieval church (the Baroque era) and single building from the 18th century in European.

Aperture style and construct has progressed design and opinion inside, but the basic purposes function serves as ventilation and lighting. Aperture is always available in design process to encounter climate challenges, up to extreme situation in the external environment. Type of material used is the primary of aperture form exploration. In the beginning, aperture element coating was a thin board (wood), and sheets of mica, until discovery of glass material was very fantastic and surprising in finishing architectural products (Derk Phillips, 2004)

History notes that glass material was founded firstly at 3000 BC in Egypt and has been used as a decorative object inside artifacts (jewelry). However, glass material progress has been known in Roman Era which is formed by bronze elements. In this era, the glass material had owned by certainly people. In the Medieval, glass material has been grown even in small sheets form (stained glass), but manufacturing system has begun to reach government built environment.

Overtime, in the 17th century, British period entered industrial revolution era, glass manufacturing has

entered a phase of mass-produced in the form of larger sheets. But glass was being a construction part has been detected at the end of 19th century in England through the greenhouse pilot project as an embryo of modern building. Claudius Loudon (1783-1843) and Joseph Paxton (1803-1865) were pioneered of the greenhouse embryo. Claudius Loudon was a holtikultur worker while Joseph Paxton was landscaping expert and exterior layout. Essentially, the greenhouse was a nurseries and plant maintenance activities that intended for agriculture or garden. The greenhouse project was intended to climate design and lighting fit of plant needs. Indirectly, they have founded that the ideal of greenhouse pattern was combination of glass and iron. This ideas was the perfect beginning process of the material expected, customized form and construction selected properly, which could be 1st functioned as a load-bearing structural element in terms of aesthetic and material exploration endlessly. Currently, glass is element materials indeed of architect ideas.

In 1930, a transition to modern architecture, England as wholes pioneer industrial countries, with various approaches and method had formed a research and design group, where the glass element has been allowed as building structure support. In facts, glass was a easily broken material and will be injured the user inside building. By the various method and composites materials, 80% of glass materials had been produced by the groups. Amazingly, they had designed a curved glass, which was intended to be placed on the building corner to fulfill expression desire and architectural imagination had been channeled. Freedom of expression of the architecture world had begun by glass technology to create freedom image between outside and inside the world, explored indefinitely. Freedom of expression progress until this day, which is expressing the realization (form) where almost all high-rise buildings in major cities utilizing glass as the structure for vertical side. This situation analyzed that high rise building utilized natural lighting as possible to minimize artificial lighting energy need. *'It is inevitable that artificial light must become the primary light source where efficiency of vision is combined with an economic analysis of building function. Natural lighting is becoming a luxury'. (*Rasmussen, 1964).

2. GLASS AND ENVIRONMENTAL FACTS

By the 1960s a professor (Prof. Alex Hardy) of architecture stated that the first decision an architect had to make when planning a new building was the level of light and the nature of the electric light source to achieve this.4 . . . daylight was to be disregarded as a functional source. This led to windowless factories, and even windowless schools, the ultimate idiocy. It was even mooted that buildings could be heated by the means of lighting, leading to artificial lighting being used at all times of day, even when the heat generated had to be wasted, by dispersal.. (Derk Phillips, 2004). This was not a stupid statement, when environmental issues were mentioned that greenhouse was the main cause of atmosphere depleting of the earth. So that, the architects were competed to leaving the glass elements in its design. Glass material is considered the main caused of built environment due to rflection of glass surface. Indeed, the studies results indicated that greenhouse emissions is one of global warming factors. But this is not the reason for the architects to leave behind the glass element design.

Transparent glass efffect was not a reason why the architects had chosed such elements as here and there impressionas, but as a guide in low cost energy policy concept. The scientist and glass material researcher indicate the ability of research engineering (technology) how to reduce the greenhouse emissions effects. Essentially, the technology already translated into double skin façade concept for highrise building. The function of outer skin as

glass structure layer serves to absorb heat from natural lighting and converted into energy for his own purposes (self service energy). The second skin prepared to receive indoor lighting, while the unneeded lighting will be reflected back into the outer skin that converted into energy. Recycle concept of natural lighting penetration results from the sun between the outer skin and second skin was a brilliant ideas in solving current energy problems. The problems faced not to be translated from perspectives variety, both micro (material element of the glass itself) and macro (the natural environmet man effort to reduce the greenhouse effect) for the earth survival. This concept was already in the early 1960. Norman Foster revealed that nearly 70% of energy was absorbed in the earth for construction and infrastructure development activities. Architectural masterpiece designed by Norman Foster always insert transparent elements in a dynamic and elegant impressions. *'It is inevitable that artificial light must become the primary light source where efficiency of vision is combined with an economic analysis of building function. Natural lighting is becoming a luxury.' (Lighting in Architectural Design. McGraw-Hill.1964. Pub.USA* dalam Derk Phillips, 2004).

3. GLASS ON APERTURE ELEMENTS

At the beginning, aperture elements was designed purposely and building available. Aperture elements usually prepared to accept daylight penetration and in and out air flow through the building freely. Architectural products insert glass as aperture layers. Before the glass used as a coating element materials, aperture was presented in the building in directly open with external atmosphere. The implied a radical turn over ventilation and natural lighting penetration cannot be controlled. In the Medieval, coated wood aperture were installed into building interior, and designed in terms of lighting and natural ventilation. Glass material has supported building construction and aperture elements into a new era in terms of coating. Glass materials had been explored in design and construction. Based on placement, aperture elements can be divided into two types, vertical apertures and horizontal apertures. Vertical apertures were designed to expect the natural lighting through building side. Range of penetration of natural lighting depends on the level of ceiling limits which aperture elements were placed on the wall and interior layout. If the building was designed by low ceilings, the range of penetration lighting into the room was minimum and conversely.

The placement of aperture elements was in the roof of the building elements known as roof light. Roof light, produces natural lighting penetration is expected to be maximal into the middle of the room. Application of the roof light concept has attracted roof light lighting into building farther than the windows. The situation was the inspiration in the innovation form, such as the placement of aperture elements, known as roof light. The presence of roof light, produces natural lighting penetration was expected to be maximum into middle of room. Application of the roof light concept has attracted lighting through the building farther than window on the side of buildings. Progress illustration of horizontal aperture was resulted a lot of types and design in order to place aperture elements of building for aesthetics benefits for centuries.

Aperture verticals are very popular at 14th century, until get special treatment in placement to golden age of European hemisphere in the 18th century, when aperture Georgian with amazing details had received attention grounded. Form of arch aperture, which inserted with each ornament interval, have presented simple and logically a structural solution. This become inspired and progress in architecture world for centuries.

Illustration below describes three different approaches in the aperture

concerned. The left building indicated that vertical aperture which is solved traditionally by glass layer on the aperture. While the middle building, indicated horizontal aperture, which each floor expressed of an essential elements. The right building indicated progress movement of aperture, the aperture has been external cladding, which occupied the façade globally by utilizing glass technolog

Three buildings on London's Embankment ((Derk Phillips, 2004)

The third buildings have parade expressing the form of aperture progress. This is not an architect fashion, when it become less in capacity natural lighting forward a perfect design.

4. KEYNOTE

Aperture is the important elements inside architectural style. Coating glass material in aperture elements was not architectural style, but human survive, technology, and function that created a new style along architectural history. Aperture resulted from impression while someone in visiting your home, and the architect will consider the elements of the various aspects for aperture elements because it related to the shape of building closely.

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