

## **Brief Report on Academic Research Visit to Dubai and Abu Dhabi (UAE) in Dec. 2012**

Date: 5<sup>th</sup> ~ 10<sup>th</sup> December, 2012

Main theme: Fire Safety for Facades from International Viewpoint

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### **1. Academic Research visit Overview**

#### **(1) Purpose:**

It is internationally often the case that sandwich panels or exterior insulation are installed onto the exterior façade of tall buildings for such reasons as energy saving or aesthetic purposes for architectural planning. But when such exterior facades include combustible materials such as foamed plastics materials, there is potential danger for massive fire propagation along the façade wall due to the seamless combustion of materials situated in the façade wall system, especially once it gets ignited at some point on the façade surface. In this context, presently in Japan it is being developed to standardize the Japanese façade test as JIS (Japanese Industrial Standard). Whilst in UAE (United Arab Emirates), as there has been technically no severe regulation upon combustible facades, they have encountered many cases of massive façade fires on skyscrapers, which would be informative reference to façade fire research in Japan. Therefore in this academic visit to UAE, team members successfully met with local building authorities both in Emirates of Dubai and Abu Dhabi for information exchange on façade fire protection and code, with whom team members successfully agreed to collaboratively organize small in-house seminar on fire safety for façades at Dubai hopefully in February 2013. Furthermore, they made fruitful discussion with British façade fire expert in Dubai regarding the past fire façade test already performed and also next façade fire test conforming to BS 8414-1 at Dubai branch office of EXOVA (originally from the UK) hopefully in February 2013.

#### **(2) Members:** (the first three members are funded by TUS; the last member funded by Mitsubishi Inc.)

- Prof. Shinichi Sugahara, Director of Center for Fire Science and Technology, RIST, TUS, Japan.
- Dr. Hideki Yoshioka, Senior Researcher, National Institute for Land and Infrastructure Management (NILIM), Japan.
- Mr. Tatsuo Ando, Engineer, Member of CBRD, Mitsubishi Plastics Inc., Japan.
- Mr. Moritaka Sakurai, Marketing Manager, Mitsubishi Plastics Inc., Japan; in charge of Middle East. (Hereinafter, members above shall be called as visiting team in this written documentation.)

#### **(3) Schedule Activities:**

Date	Items	Location
5 Dec. 2012	Travel	Tokyo(Narita) → Dubai
6 Dec. 2012	Meeting	Dubai Civil Defence, Ministry of Interior, UAE.
7 Dec. 2012	Site survey	Façade Fire at Tamweel Tower, Dubai.
8 Dec. 2012	Site survey	Construction site and building in Dubai and Abu Dhabi.
9 Dec. 2012	Meetings	Department of Municipal Affairs, Emirate of Abu Dhabi. EXOVA Warringtonfire Middle East, Dubai.
10 Dec. 2012	Travel	Dubai → Tokyo(Narita)

## **2. Activities:**

### **(1) Meeting at Dubai Civil Defence, Ministry of Interior, UAE**

It was honour of visiting team to have opportunity of meeting with Major Jamal Ahmed Ibrahim, Director of Preventive Safety Department at Dubai Civil Defence, Ministry of Interior, UAE, in which visiting team leader Prof. Shin'ichi Sugahara kindly explained the major purpose of this visit, which was kindly welcomed by Major Ibrahim with warm hospitality. Thereafter, presentation on façade fire protection with respect to sandwich panels, was kindly performed by Mr. Tatsuo Ando from Mitsubishi Inc.(Picture-1), to which productive discussion was made by all the participants including Mr. Pramod Challa, Chief of Engineering from General Head Quarters-Dubai, Ministry of Interior. With regard to the kind opinion of Chief Engr. Challa, fire performance of combustible core material of sandwich panel assembly should be investigated on material level prior to performing façade-type of fire tests, which is not exactly identical with general situation and opinions especially in the western countries. Naturally, each position has both its own merit and demerit, therefore it is essential to continue discussion for achieving both public safety and realistic compromise in each local context. At the same time, latest situation of Façade fire tests and research situation in Japan was kindly introduced by Dr. H. Yoshioka of NILIM, whilst system and fire performance ALPOLIC sandwich panels was kindly reviewed by Mr. M. Sakurai of Mitsubishi, Inc. Last but not least, both Prof. S. Sugahara and Engr. P. Challa reached an agreement of collaboratively organizing in-house seminar on fire performance of combustible façades, hopefully in February 2013 from the viewpoint of urban building fire disaster mitigation for high-rise buildings both in Japan and UAE.

### **(2) Site survey in UAE (Façade Fire at Tamweel Tower, building and construction-site using sandwich panels):**

#### **• Façade Fire at Tamweel Tower:**

At an early hour of early Sunday 18<sup>th</sup> November 2012, there happened massive façade fire at Tamweel Tower in Dubai's Jumeirah Lake Towers, primarily due to the continuous combustion of sandwich panels which include combustible elements as core material. This is one of the large façade fires there in UAE, and causes public awareness even more intensively, which could gear up for accelerating the regulation upon combustible facades. When visiting team performed site survey on 7<sup>th</sup> December 2012, fire-affected facades were not repaired yet (Pictures-2~4), and residents were still continuously out of the building due to safety reason dispersing each convenient place temporarily as refuge. At that time, as initial place of fire origin and path of fire propagation over facades, there were two major opinions, first of which is that fire started at the top of tower and fire propagated downwards over facades, and another of which is that fire started at the middle height position of tower and propagated upwards over facades, and on the day of site survey of visiting team, there was no official conclusion announced. Furthermore, many automobiles parked near to the bottom of tower, were ignited by heating of façade fire, and on the day of site survey, the parking lot was still restricted to enter for safety reason.

- **Building and construction-site using sandwich panels:**

In UAE, especially at Dubai and Abu Dhabi, many new tall buildings are being constructed year after year, and in this context, sandwich panels are often used as exterior finish primarily because of easy construction and aesthetic surface. But one concern is fire performance especially when core material is too much combustible such as PE without fire retardant care. And in this concern, sandwich panels exported from Japan such as Alpolic from Mitsubishi, has competitive quality from the fire safety viewpoint because of core material of PE fire retarded with aluminum hydroxide (Pictures-5~6). These days, less expensive type of sandwich panels including combustible core materials are gradually adopted due to the cost, but as site-surveyed above, there is great potential of massive façade fire with such combustible sandwich panels, therefore, it is essential to manage proper evaluation system of fire safety for facades and building code system, which is the common interest in Japan, UAE, and the rest of the world.

**(3) Meeting at Department of Municipal Affairs, Emirate of Abu Dhabi:**

At Department of Municipal Affairs, Emirate of Abu Dhabi, visiting team successfully made discussion and information exchange on building codes with following respected figures: Ms. Fatma M. Amer, PE, Advisor – Building Code & Construction, and, Mr. Matthew Plumbridge, Consultant - Environmental and Sustainability Planning. In this fruitful discussion, visiting team from Tokyo and respected figures of Abu Dhabi, exchanged firstly the present situation of building fire code on combustible façades and then the possible future direction in both countries. Another excellent presentation on information of façade fire protection in the world was performed by Mr. Ando. According to the kind information of Advisor Ms. Fatma, Abu Dhabi building code will plan to refer to the contents from IBC (International Building Code) from the US in the near future, in which combustible façade walls shall be fire-tested by NFPA 285, American Façade-Test. Her viewpoint on façade fire protection is based on façade test of assembly on the whole instead of each material fire property, which is identical with general view in most western countries. And local challenge is, according to her, is to control the reality after organizing the proper building code, by such as proper implementation and law enforcement. Furthermore, she kindly mentioned the planning of referring to not only NFPA 285 in the US but also other types of façade fire tests in the world, such as BS 8414-1 in the UK, and even the possibility of including Japanese façade test after it is completes as JIS standard next year of 2013 by Dr. H. Yoshioka and his domestic team members. And also, Ms. Fatma and Prof. Sugahara successfully reached an agreement of the possibility of collaboratively joining the in-house seminar on façade fire protection at Dubai in February 2013 for effective information exchange. Also, Mr. Sakurai of Mitsubishi and Mr. Ravi Kumar of ETA Windows actively participated in the discussion.

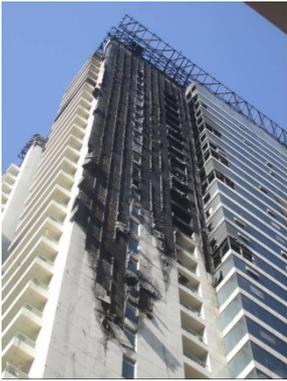
**(4) Meeting at EXOVA Warrington Fire, Middle East, Dubai:**

At EXOVA Warringtonfire Middle East, Dubai, visiting team successfully made meeting and discussion on past and future façade fire tests with Mr. Andy Dean originally from the UK, Business Development Manager in charge of Middle East. Firstly, discussion was made on the façade-fire test very recently performed (Picture-7~8) for the purpose of demonstration for authorities in UAE, with specimens partially

supplied by Mitsubishi Inc. In this context, some concern on the installation of specimens and heating strength regarding the past façade-test modified from BS 8414-1, was pointed out by Dr. Yoshioka from fire research viewpoint, which was kindly approved by Mr. Dean as expert in façade fire tests originally from Warrington fire UK. Therefore, they agreed to seek the possibility of collaboratively performing other installation of façade tests conforming to BS 8414-1 instead of making any modification for demonstrative purpose. In this possible additional façade tests, two major different specimens are sandwich panel with the core material of fire-retardant PE with aluminum hydroxide, and sandwich panel with the core material of only non-treated PE without any fire-retardant care, for the propose of investigating the difference between the two types of specimens. This test plan was kindly advised by Prof. Sugahara and Dr. Yoshioka, and will be coordinated by Mr. Ando and Mr. Sakurai, always contacting with expert Mr. Andy Dean. When all the relevant situation is resolved by concerned parties, two façade fire tests will be performed in February 2013 at almost the same time as in-house seminar in Dubai for information exchange. Last but not least, as per the invitation made by Dr. Yoshioka, it was agreed by Mr. Dean for him to kindly join the aforementioned in-house seminar and to make his own presentation regarding façade tests in the UK.



Picture-1 Meeting at Ministry of Interior, UAE.



Picture-2 Façade Fire at Tamweel Tower.



Picture-3 Façade Fire at Tamweel Tower.



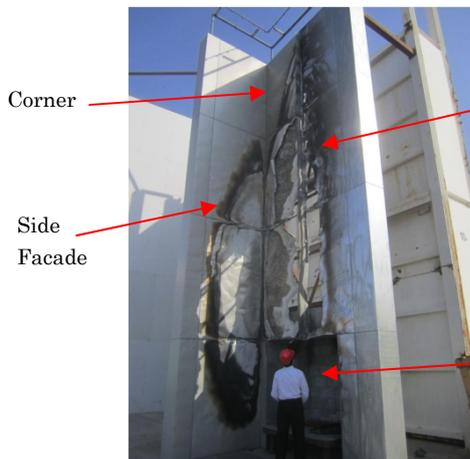
Picture-4 Fire-affected Car Park in front of Tamweel Tower.



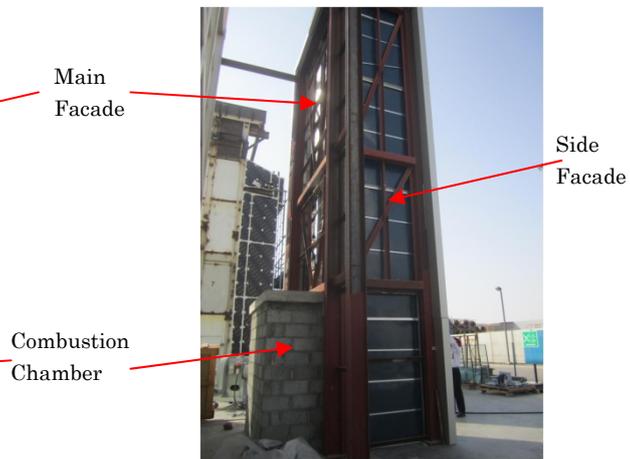
Picture-5 Example of Alpolic Sandwich Panels Used as Exterior Façade Frame of Aldar Headquarters Building in Abu Dhabi.



Picture-6 Construction-site in Dubai, Installation of Alpolic sandwich panels.



Picture-7 “Front-view” of BS 8414-1 British Façade-Test Apparatus, and Specimens from Mitsubishi installed.



Picture-8 “Rear-view” of BS 8414-1 Combustion Chamber at Bottom, and Side Façade at right side.

**Acknowledgments:**

Sincere appreciation is expressed herewith to all concerned in UAE for kind hospitality, and to Ms. Hirata, RIST, TUS for administrative support.