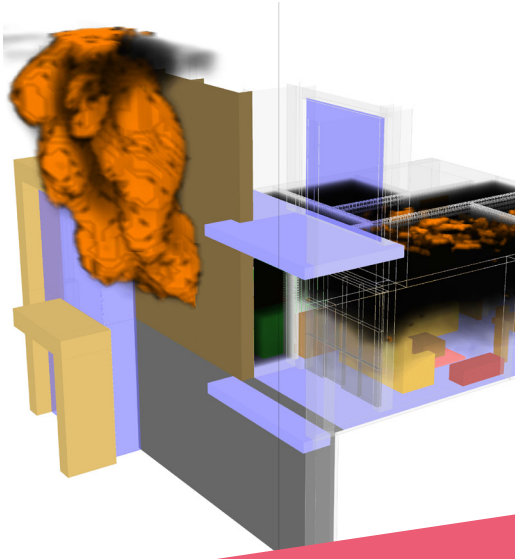
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Protective Technology Research Centre, School of Civil and Environmental Engineering

BCA ACADEMY

PERFORMANCE-BASED DESIGN FOR FIRE SAFETY - Fire Spread and Structural Fire Resistance



Introduction

The spread of fire can be minimised by sub-dividing buildings into a number compartments made of fire-resisting construction materials. It is important to understand how these construction materials behave under high heat so that a good fire resistance enclosure can be designed.

Objective

This workshop aims to provide participants an understanding of ways to minimise the risk of fire spread within a building by the concept of fire enclosure, fire severity assessment and performance-based design building structures.

Learning Outcome

At the end of the course, participants should be able to:

a) Understand the performance-based design and prescriptive requirement of fire resistance and compartmentation

b) Learn the different stages of fire development and traveling fire methodology

c) Know the analytical tools of performance-based fire severity assessment

d) Discuss the properties of structural materials and effects of heat on these materials

Course Outline

Enclosure Fire Development

Introduction and Design Consideration
- Performance based design
- UK and Singapore perspective
- Prescriptive requirement of fire resistance and compartmentation

Fire Development
- Localized, pre- and post-flashover
- Standard, typical and experimental fire curves
- Analytical tools – zone models and field models
- Parametric fire curve

External Fire Spread
- External wall construction
- Unprotected area
- Example

Travelling Fire
- Typical fire scenarios
- Travelling fire methodology

Fire Severity Assessment and Structural Performance in Fire

Thermal Transfer Assessment
- 1-D / 2-D heat transfer analysis
- Convective and radiative heat consideration
- Simplified heat transfer in steel structures
- Case study

Performance-based Fire Severity Assessment
- Equivalent Time of Fire Exposure (EN1991:Part 1.2)
- Parametric fire & effect on structural elements
- Estimating fire resistance requirement using Parametric fire curve
- Risk Consideration
- Eurocode and UK perspective
- Case study

Thermal and Structural Response – Steel & Composite structures
- EN 1993:Part 1.2, EN 1995:Part 1.2
- Strength Retention factor, design temperature, limiting temperature
- Load ratio approach
- Case study

Thermal and Structural Response – Concrete structures
- EN 1992:Part 1.2
- Strength retention, effect of concrete cover
- Load ratio approach
- Case study

Trainer Profile

DR TIMOTHY LIU obtained his PhD from the University of Manchester, and subsequently lectured in the same university. He has conducted researches in structural design and structure fire engineering, and has written a few publications on these topics. The primary interest of his research is the development of a finite element package for the assessment of performance of structures in fire.

Being an independent fire consultant, Dr Liu provides fire safety strategy and conducts fire engineering design for many high profile projects, in terms of project value and/or innovation. With his vast experience and familiarity with British Standard, European and NFPA design codes, Dr Liu has been invited to work in many projects in worldwide, including high-speed rail tunnels in Taiwan, casino in Macau, and indoor ski slope of UAE. Many of these involved specific smoke control system for the various purposes from occupant protection to property protection.

Dr Liu is the principal author of some fire engineering computer software such as TRAD (building radiation) and CAFÉ (general fire engineering application). These software have been used widely by many fire consultants and regulatory bodies in the UK, Canada, including Singapore.

DETAILS

Date: 26 & 27 August 2019

Time: 9.00am to 6.00pm
(Registration starts at 8.30am)

Venue: BCA Academy

Fee (inclusive of GST): S$850.00

Refreshments will be provided.

In keeping with our green and sustainable practices, course notes will be available in e-format.

CPD POINTS

PEB: Pending

SCDF (For Fire Safety Engineers): **12 CPE Hours**

TARGET AUDIENCE

- Architects
- Design Engineers
- Fire Safety Engineers
- Mechanical Engineers

To register, log on to our Online StoreFront (OSF) at: *https://eservices.bcaa.edu.sg/registration/#/login or scan QRcode and search for course code* ***78051***