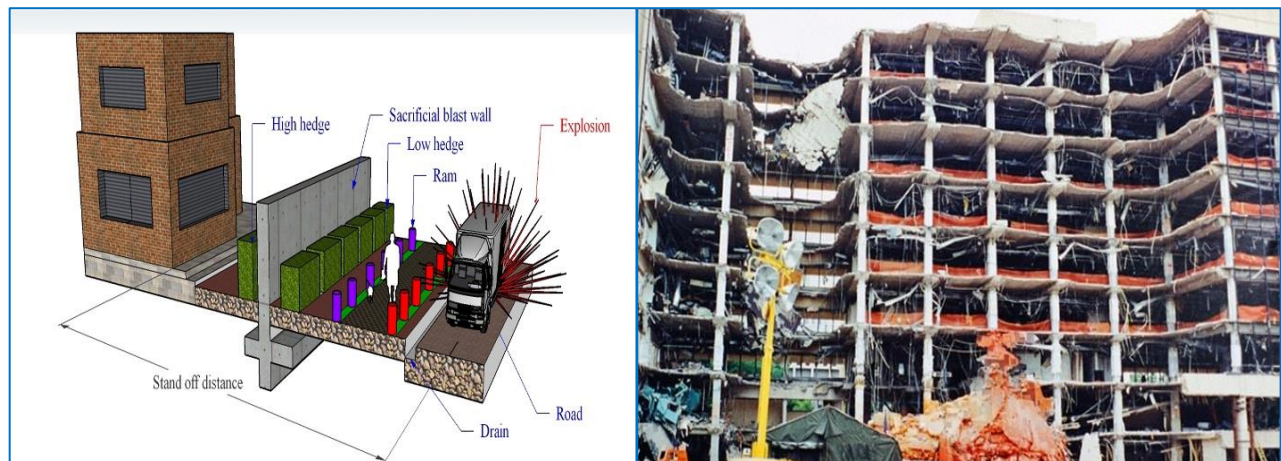




SC090: Blast Resistant Structural Design

Training Description:

This intensive training course is designed to provide participants with a detailed and up-to-date overview of blast resistant structure design. It will help the participants to understand and recognize the dynamics of blast threats and their effects on structures with special emphasis on the fundamental concepts and methodologies of the practical techniques and the latest state-of the-art developments in material property characterization and analytical methods.

Further, the course will also discuss the different types of devices that can cause an air blast capable of destroying property and causing fatalities; the different types of explosives; the earthquake versus blast design and blast software; the importance of blast risk assessment and mitigation; the dynamic phenomena induced by the blast shock wave on structures; and the natural vibratory characteristics of structures and their response to environmental inputs.

During this highly-interactive course, participants will learn the protective technology, design philosophy, planning and methodology; the explosion effects and characteristic of pressure impulse diagrams; the impact of dynamic response and good window glazing; the significant of progressive collapse; the critical infrastructure protection and comprehensive protective design approach; and the method of structural connection, multi hazard protection design and other aids.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Apply and gain an in-depth knowledge on blast resistant and resilient design
- ✓ Discuss the different types of devices that can cause an air blast capable of destroying property and causing fatalities
- ✓ Describe the different types of explosives including explosion, earthquake versus blast design and blast software
- ✓ Recognize the importance of blast risk assessment and mitigation
- ✓ Explain the dynamic phenomena induced by the blast shock wave on structures
- ✓ Gain a basic knowledge of natural vibratory characteristics of structures and their response to environmental inputs
- ✓ Employ protective technology and apply design philosophy, planning and methodology
- ✓ Identify the explosion effects and characteristic of pressure impulse diagrams
- ✓ Discuss the behaviour of structure elements and the load of structures
- ✓ Analyze the impact of dynamic response and employ good window glazing
- ✓ Explain the significant of progressive collapse as well as the critical infrastructure protection and comprehensive protective design approach
- ✓ Implement the method of structural connection, multi hazard protection design and other aids

Training Designed for:

This course is intended for professional engineers and analysts in the oil, petrochemical, civil, mechanical and power generation industries as well as architects, aerospace and defense engineering professionals, security managers and researcher.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction
 - Explosive Types, Explosions, Earthquake versus Blast Design, CONWEP Software, BlastX Software
- ❖ Protective Technology
 - Planning, Design Philosophy, Methodology, Blast/barrier Walls, Threat and Risk Assessment, Loads Definition
- ❖ Explosion Effects
 - HE-Induced Ground Shock, Blast Wave Phenomena, Fragmentation, Fire, Chemical, Bacteriological and Radiological Environments, Cube Root Scaling
- ❖ Pressure Impulse (P-I) Diagrams
 - Characteristics of P-I Diagrams, Analytical Solutions, Numerical Approach Dynamic Analysis Approach, Applications
- ❖ Recap

DAY TWO:

- ❖ Behaviour of Structural Elements
 - Material Properties of Steel and Concrete, Flexural Resistance, Shear Resistance, Tensile and Compression Members
 - Distance from Explosion and Dynamic Loads, Principal Reinforcement, Cylinders, Arches, Domes, Shear Walls, Frames, Natural periods of Vibration, Practical Damage and Response Limits, Failure criteria, Advanced Considerations, Application to Structural Design, Examples and Applications
- ❖ Loads on Structures
 - Wall and Roof Loading, Pressure Fill Through Opening, Internal Explosions, Softwares
- ❖ Video Presentation
 - “Flexborough Disaster”
- ❖ Recap

DAY THREE:

- ❖ Dynamic Response
 - Introduction, Single-Degree-of-Freedom (SDOF) Analysis, Multiple Degree-of-Freedom (MDOF) Analysis, Continuous Systems
 - Intermediate and Advanced Computational Approaches, Validation Requirements for Computational Capabilities, Practical Computational Support for Protective Design and

- Analysis, Dynamic Structural Model, Application Examples of SDOF and P-I Computational Approaches, Summary, Examples and applications
- ❖ **Window Glazing**
 - Hazards, HAZL Software, WinDas Software, Retrofits
- ❖ **Recap**

DAY FOUR:

- ❖ **Progressive Collapse**
 - Background, Progressive Collapse of Different Types of Structures, Guidelines, Examples and Case Studies
- ❖ **Critical Infrastructure Protection**
 - Introduction, Background, Critical Infrastructure Systems and Their Assessment, Protective Methodologies, Applications and Examples
- ❖ **Comprehensive Protective Design Approach**
 - Introduction, Protection approaches and measures, Planning and design assumptions, Architectural and functional considerations, Load considerations, Structural system behavior, Other safety considerations
- ❖ **Video Presentation**
 - "CSB Safety Videos Compilation"
- ❖ **Recap**

DAY FIVE:

- ❖ **Structural Connections**
 - Background, Load Transfer Pathways, Openings and Interfaces, Internal Shock and Pressure, Mitigation Methods
- ❖ **Multi-Hazard Protective Design**
 - Development and Implementation of Effective Protective Technology
- ❖ **Other Design Aids**
 - TM5-1300, Unified Facilities Criteria, Future Trends, Other Safety Considerations
- ❖ **Course Conclusion**
- ❖ **POST-TEST and EVALUATION**

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

Aisha Relativo - Training & Career Development Manager

aisha@cmc-me.com / training@cmc-me.com

Tel.: +971 2 665 3945 or +971 2 643 6653 | Mob.: +971 52 2954615