

THE EFFECTS OF BLAST ON REINFORCED CONCRETE BUILDINGS (8TH RUN)

Terrorism has become a serious threat in the world. This threat cannot be ignored. The main terrorist weapon is a bomb made from high explosives, with civilian buildings being a common target. Terrorists usually want to create chaos and maximize casualties.

A growing emphasis is therefore being placed on anti-terrorism protection of civilian buildings. In Singapore, it has been recognized that iconic structures as well as structures where mass congregation is likely, may be 'soft targets' for attack. Thus blast provisions are now an integral part of the design of major civilian facilities, e.g. hospitals, large hotels, shopping centres, stadia etc. In addition, buildings housing critical infrastructure, e.g. electrical sub-stations, are other likely targets.

Course Objective

This course discusses the effects of blast on civilian, rather than military, structures. The latest forms of structural and glazing protection are discussed.

In practical design, extensive use of software is usually made. However, this course covers design principles with appropriate reference to the SS EN 1992 series on Design of Concrete Structures.

Hand-calculations are emphasized so that a 'feel' for the likely behavior of the structure under blast loading is obtained. Although the course covers only RC buildings, as these are the most common in Singapore, the principles can easily be extended to structural steel buildings.

Target Audience

The course is targeted towards civil/structural engineers working on the design of civilian buildings in Singapore.

	Course Details	
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Date: 18 Jun 2019 (Tuesday)

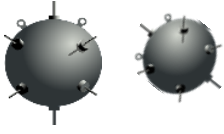
TIME: 9.00AM – 5.15PM (1 Day)

CPD: 7 PDU / 6 STU (Structural)

Fees: \$299.60 (IES Member) \$353.10 (Non Member)

Venue: IES Academy @ Jurong East / 80 Jurong East St 21, #04-10
Devan Nair Institute, Singapore 609607





Course Outline

1	Introduction to Blast	Nature of blast; blast parameters; importance of stand-off
2	Case Studies	Ronan Point; Alfred Murrah Building; Khobar Towers; US Embassies in Tanzania and Kenya; WTC; Pentagon
3	Local Effects on RC Structures	Brisance; Contact explosion
4	Global Effects on RC Structures	Concrete structures and blast; Cantilevers; Columns; Slabs; Beams; Shear walls; SDOF model
5	Derivations	
6	Worked Example	Cantilever wall design
7	Progressive Collapse Resistance	Statically Determinate vs Indeterminate; Catenary Action; Vierendeel Action
8	Façade Design	Façade Walls; Glazing types; Laminated glass under blast; Energy Absorbing Units; State-of-the art of blast resistant glazing

Trainer's CV

Er Dr. Niall MacAlevey is the founder of the firm Shamrock Consultants, and is a registered Professional Engineer in Singapore. After graduating from University College Dublin, Ireland in 1987, and completing his M.Sc. degree in "Concrete Structures" at Imperial College, London, he completed his Ph.D degree at the Nanyang Technological University in 1997 on "The Strengthening of Concrete Structures". Later, he joined the academic staff there. He obtained a PGDipTHE (Post-Graduate Diploma in Teaching in Higher Education) from the National Institute of Education in 2001. He has worked for a number of consulting engineering firms, and specialist prestressing subcontractors in London, Cambridge, Hong Kong and Singapore. He is the former Chief Structural Engineer at Beth-El (Asia Pacific) Pte. Ltd, a company specializes in anti-terrorism solutions for buildings.



He is the author of four books: Structural Engineering Failures-lessons for design, Preliminary Design of High-Rise Buildings in Non-seismic Regions, Design of Reinforced Concrete Buildings to Resist Blast and Prestressed Concrete in Buildings. All books are available from Amazon.com.

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REGISTRATION FORM

THE EFFECTS OF BLAST ON REINFORCED CONCRETE BUILDINGS – 8th RUN			
Date:	18 Jun 2019 , Tuesday		
Time:	9.00am to 5.15pm		
Duration:	1 Day		
Venue:	IES Academy@Jurong East 80 Jurong East Street 21 #04-10 Devan Nair Institute S(609607)		
Course Fee:	\$299.60 (IES Members); \$353.10 (Non Members)		
CPD Programme:	7 PDU (Confirmed) / 6 STU (Structural)		
Course Coordinator:	Jessie Tan (Ms) Contact: 6461 1250 / Email: jessie.tan@iesnet.org.sg		
Closing Date for Registration:	11 Jun 2019 or till class is full (whichever comes first)		
Participant's Details:			
Name:		NRIC/FIN:	
Company:		Designation:	
Address:			
		Postal Code:	
Office No:		Mobile:	Fax:
Email: <i>(for sending of confirmation)</i>			
Please indicate:	<input type="checkbox"/> IES Member No:	<input type="checkbox"/> Non Member	<input type="checkbox"/> RTO/RE/PE No:
	<input type="checkbox"/> Sponsored by Company	<input type="checkbox"/> Special Meal Request ~ Vegetarian (no egg, garlic and onion)	
Contact Person (eg: HR/Accounts Department, if sponsored)			
Name:		Designation:	
Office No:		Mobile:	Fax:
Email:			
Address: <i>(for mailing of invoices & receipts)</i>			
Payment:	Cash/Nets/Cheque No:	Amount:	
<ul style="list-style-type: none"> ➤ Cheque to be made payable to 'ENGINEERS SINGAPORE PTE LTD' ➤ Course fee is inclusive of 7% GST, course material, one Halal lunch and light refreshments for 2 tea-breaks ➤ Certificate of Attendance will be issued to participants with 100% attendance 			
Acceptance of Terms & Conditions for Registration of IES Academy Courses / Events			
I agree to abide to the Terms & Conditions for Registration of IES Academy courses and events.			
Name:			
Signature:		Date:	

TERMS & CONDITIONS FOR COURSE REGISTRATION

Registration

Any registration, whether online, fax or by email, will be based on a first-come-first-served basis and will only be confirmed upon receipt of full payment by Engineers Singapore Pte Ltd unless otherwise invoice to company.

All registrations must be submitted with duly completed registration form.

Closing Date & Payment

The closing date of the event will be 1 week prior to event commencement date. Cheques should be crossed 'A/C payee only' and made payable to 'ENGINEERS SINGAPORE PTE LTD', with the Date of event, Title of The Event and participants' name indicated clearly on the back of the cheque, and post to:

Attn: Jessie Tan
IES Academy@Jurong East
80 Jurong East Street 21 #04-10
Devan Nair Institute for Employment & Employability
Singapore 609607

Confirmation of Registration

Confirmation of registration will be given at least one week before the commencement date of event via email. If you do not receive the said confirmation email, you are required to contact IES Academy at general admin immediately at 6463 9211 (office).

IESA reserves the right to allow only confirmed and paid registrants to attend the Event.

Withdrawals/Refunds of Fees

Written notice at least 1 week in advance before the commencement of the event

Full course fee shall be refunded subjected to 4.5% transaction charge

➤ NO refund otherwise.

No-show of participant would not be accepted as a valid reason for withdrawal/refund.

One time replacement is allowed only if written notice is received by us at least 1 week before the commencement of the event. However, when an IES member is replaced by a non-member, the participant has to pay the difference in the relevant fees.

Cancellation/Postponement

Changes in Venue, Dates, Time and Speakers for the Events can occur due to unforeseen circumstances. IESA reserves the full rights to cancel or postpone the Event under such circumstances without prior reasons. Every effort, however, will be made to inform the participants or contact person of any cancellation or postponement.

Fees will be refunded in FULL if any Event is cancelled by IESA.

SkillsFuture Credit (SFC) "All Singaporeans aged 25 and above can use their \$500 SkillsFuture Credit from the government to pay for a wide range of approved skills-related courses. Visit the SkillsFuture Credit website (www.skillsfuture.sg/credit) to choose from the courses available on the SkillsFuture Credit course directory."

Please visit [HERE](#) for more information on SFC & UTAP claim.

Personal Data Protection Act

By registration, you consent to the processing by Institution of Engineers, Singapore of personal data, including your sensitive personal data as defined in the Data Protection Act 2014 for the proper purposes of Institution of Engineers, Singapore (IES). You undertake to observe the provisions of the Data Protection Act 2014 in relation to any personal data you may hold and process as a Members of Institution of Engineers, Singapore, and you agree to indemnify Institution of Engineers, Singapore from liability for any claims or damages that may arise from the processing of this data. For more information kindly refer to: www.ies.org.sg/PDPA.

Enquiries

For further enquiries, please contact IESA general office at Tel: 6463 9211.