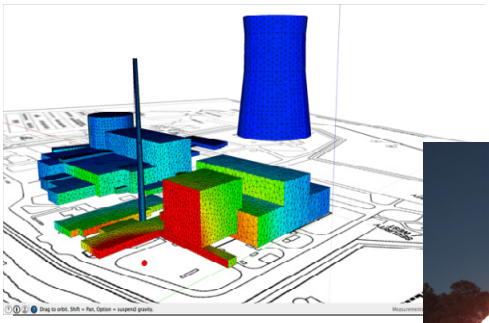
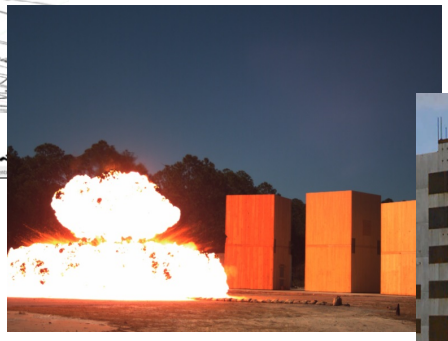
POZNAN UNIVERSITY OF TECHNOLOGY

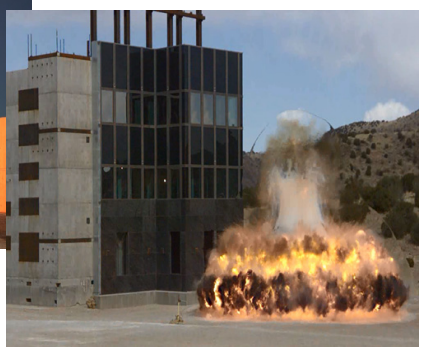
K&C Karagozian & Case

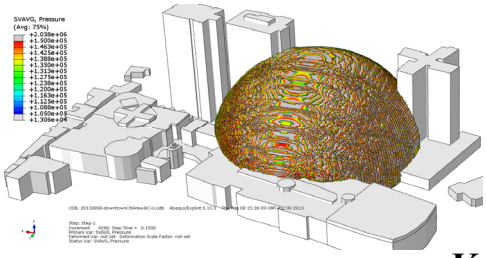
A Two-day Short Course:

Blast Effect Analysis and Design









Jointly Offered by:

Karagozian & Case, Inc., USA
&
Poznan University of Technology, Poland

16 - 17 AUGUST 2018

Mechatronics Biomechanics and Nanoengineering Centre
ul. Jana Pawla II 24, 61-138 Poznań,
Poznan University of Technology, Poland

A Two-day Short Course: Blast Effect Analysis and Design

Background

Protecting people and infrastructures from the terrorism threats is currently one of the most challenging problems. Engineers are now often quizzed with blast-related hazards, risks and protection methods by the societies they serve. Protective technologies have been developing for combatting with this kind of challenge by assessment of vulnerability and survivability of buildings and their occupants, characterizing blast effects, quantifying structural response, and blast mitigation techniques. This technology may involve explosive tests of model structures, computational modeling of structural response under blast loads, evaluation of existing buildings, and development of engineering tools. In last two decades, engineers made much efforts on resisting progressive collapse of buildings, mitigation of debris hazard from glazing and wall, and perimeter protection for mitigate blast effects. This short course integrates fundamental techniques and basic theory on characterizing blast loading and its effects on buildings, explosive test data for structural components and systems, computational techniques in simulation dynamic response under blast and impact loading, and design methodology of blast resistance for both new structures and retrofitting existing structures. This is an extensive introduction to engineers and researchers for dealing with blast and shock effects in various engineering fields.

Who should attend

This workshop is designed for:

- Professional engineers and consultants, who involve in blast and impact resistant designs for antiterrorism protection for buildings and infrastructures.
- Researchers and graduate students, who are interested in blast/impact effects analysis and high-fidelity physics-based (HFPB) modeling for dynamic responses of structural and mechanical systems.
- Government officers, who are the decision makers in choosing qualified consultants, selecting appropriate protective measures and reviewing protective designs and solutions from consultants.
- Architects, estate developers and security managers, who are interested in threat and vulnerability assessment and protective technologies for antiterrorism protection of buildings and infrastructures.
- Material and products developers, who are interested in developing new protective products and solutions or expending their existing materials and products for applications in protective engineering.

Partners

The Workshop is jointly offered by Karagozian & Case, Inc., USA, and Poznan University of Technology, Poland.

Introduction to the Speakers

- **Dr. Shengrui Lan, Principal Scientist, Karagozian & Case Inc., USA**

Dr. Lan has 25 years' experience in structural engineering, focusing on finite element analyses of structures under static, dynamic, blast and impact loads. He has performed numerous high-fidelity physics based (HFPB) finite element analyses for blast and impact effects on various protective structures/systems for evaluating their blast/impact resistance and determining their design parameters. His HFPB models have been validated by many full-scale blast field tests and vehicle crash tests.

Dr. Lan has managed/involved numerous projects in blast effects analysis and design for blast protection of airport facilities, blast mitigation retrofits of office buildings including perimeter protection, window upgrade, column retrofit, progressive collapse mitigation and internal explosion isolation. He has been a key member in developing a series of anti-ram devices for DOS K4 to K12 ratings and a K50 anti-ram wall, which passed the vehicle crash tests.

He authored over 50 papers and reports related to blast and impact effects analysis/design and structural engineering and HFPB simulations of various system response.

He offered this short course in UK, Australia, Singapore, France, China and USA.

- **Dr. Piotr W. Sielicki, Assistant Professor at Poznan University of Technology, Faculty of Civil and Environmental Engineering, Head of Explosive Safety Group**

His primary research interest is in damage mechanics of civil engineering structures, particularly theoretical modelling, numerical simulation of material behavior and experimental correlation. Dr. Sielicki's research has been performed on developing numerical models and codes that aim at simulating explosions of condensed and gaseous charges and structural damage of obstacles. It includes complex city geometries, civil engineering structures and vehicles. He develops his experience in many research and commercial projects during numerous actual field tests which focus on blast loading. He has authored several patent applications related to blast resistant systems.

Short Course Program

Session	Title/Theme	Elements	Time
Day 1			
A1:1	Introduction	• Overview: the state-of-the-arts in protective technology/engineering • Introduction to threats scenarios, vulnerability and mitigation methodology • Protective plan and design for buildings/infrastructures • Basis of blast loading characterization • Basis of blast effects analysis (BEA) and assessment • Blast tests data for various structural components and systems	75 minutes
A1:2	Blast loads & engineering tools (Part 1)	• Blast loads on structures – categories, waveform, burst scenarios, influence factors, confined explosion, etc. • Blast loads calculation – UFC charts and CFD simulations comparison in different burst scenarios • Blast loads interaction with structures • Blast loading scenarios for designing of the structural walls • Contact charge effects on structural components • CONWEP blast loading, ABAQUS Explicit (working with real example of the steel plate under blast loading)	75 minutes
A1:3	Blast loads & engineering tools (Part 2)	• Engineering tools for calculating blast loads and predicting blast effects. • UFC 3-340-02: dynamic increase factors, SDOF charts, P-I tools for predicting building response • SDOF method: shape function, resistance function, stiffness versus mass, ductility, algorithm • PI-curves and range to effects charts for blast effects assessments. • Safety zone assessment in- and out-side the civil engineering structures and open areas • K&C and other design/assessment FRT (fast running tools)	60 minutes
Lunch			
A1:4	Blast-resistant Design - Steel	• Blast-resistant design concepts: Resilient and Resistant Design • Design Process Pertaining to Achieving Blast Resistance • Blast tests: large bomb at large standoff, car bomb to steel columns, close-in blast to steel sections; contact charge to steel deck. • HFPB Analysis of steel columns and comparison with test data. • Protective design and retrofit concepts for steel members.	90 minutes
A1:5	Blast-resistant Design - RC	• RC column/wall response under blast loads – failure modes from laboratory and blast field tests • SDOF model vs HFPB model and their capability • New design verses retrofit design for enhancing blast resistance • Performance versus Prescriptive Design Paradigms • Conclusions, Design Philosophy	90 minutes
End of first day.			

Session	Title/Theme	Elements	Time
Day 2			
A2:1	Progressive Collapse	• Definition & histories; Issues in current standards & practices • Overview of UFC 4-023-03, July 2009 Occupancy category Tie force / Alternate path / Enhanced local Resistance Linear static / nonlinear static / nonlinear dynamic procedures • Analysis examples of progressive collapse • Other modes in building collapse • Criteria used in progressive collapse analysis • Performance based design • New generation analysis tools • Test data on progressive collapse	90 minutes
A2:2	HFPB models, use and theory	• Introduction to high-fidelity physics-based (HFPB) modeling • Material models for blast effects: concrete, steel, soil, polymers • Validation & verifications of HFPB models • Modeling blast effects response of steel structures • Modeling blast effects response of reinforced concrete structures • Calculation/simulation examples • Presentation of the background of actual experiments including the preparation of the tests and the results (movies, graphs)	120 minutes
Lunch			
A2:3	Windows / Façade response and retrofit	• Glazing hazards – history review • Blast response of windows, glazing facade • Test data and retrofit methods • Cable net catcher system • Fabric catcher system • Full scale blast test of curtain wall and its design	90 minutes
A2:4	Perimeter Protection	• Standards for vehicle barriers (UK BSI PAS 68/69 vs ASTM F2656) • Design, simulation, and installation of vehicle barriers • Full-scale vehicle crushing tests • Blast wall design and blast loading reduction • Blast/ballistic resistant screen • Protection from wall debris	90 minutes
End of Workshop.			

Organizational Details

Date

Thursday 16 August to Friday 17 August 2018

Location

Mechatronics Biomechanics and Nanoengineering Centre

ul. Jana Pawla II 24, 61-138 Poznań, Poznan University of Technology, Poland

Contacts

Ms. Katarzyna Ciesielczyk or Shengrui Lan or Piotr Sielicki

E-mails: icps5@put.edu.pl or lan@kcse.com or piotr.sielicki@put.edu.pl;

Registration Deadline

July 31, 2018

Registration Fees

- Normal registration – 650 Euro per person
- University Students (Student ID required on registration) – 450 Euro per person
- Group registration from the same institution (3 or more) – 450 Euro per person

Payments

Please fill the registration form on next page with payment method

Go to http://icps5.put.edu.pl/node/42

Cancellation of payments

Up to two weeks before the event: full refund except for the credit charge; up to one week before: 50%. Non-attendance will not receive a refund. Cancellation must be in writing to the Course Administrator in advance.

Cancellation by the University

The University reserves the right to cancel the course 10 days before if there are not sufficient delegates registered.

Food

Lunches will be provided on each day with breaks for tea and coffee in the morning and afternoon.

Accommodation

Delegates are asked to make their own arrangements for overnight accommodation. There are a number of hotels close to the University. For students we can also organize accommodation in the dormitory. Please contact the Course Administrator for further details. accommodation in the dormitory. Please contact the Course Administrator for further details.

A Two-day Short Course: BLAST EFFECT ANALYSIS AND DESIGN

Course booking form

2 days: 16-17 August 2018

Please reserve me a place on the above course

Title. Name

Organisation

Address

Post Code

Telephone Contact (Work)

Telephone Contact (Mobile)

Email address

Preferred method of payment

☐ Invoice to my organisation

Please invoice the following contact person & dept.

☐ Bank Transfer

Account holder: Society Poligrodzianie

Account number/IBAN : PL 39 1540 1056 2001 8312 9885 0001

BIC/SWIFT: EBOSPLPWXXX

Signature Date

Other Information.

Please delete where appropriate.

I will / will not require vegetarian meals (or other please state).

I will / will not need special facilities for a disability (please give details)

Please send me details about accommodation close to the venue.

☐

The course will be held on the Poznan University of Technology and location maps will be sent to delegates three weeks before the event.

For assistance, please contact:
Course Administrator:
Ms. Katarzyna Ciesielszyk Mechatronics Biomechanics and Nanoengineering Centre,
61-138 Poznań, ul. Jana Pawla II 24
Poznan University of Technology,
POLAND

e-mail booking: icps5@put.edu.pl