Provisional Programme

Professor Gordon Andrews, University of Leeds
will deliver all presentations on Monday and Tuesday unless stated otherwise.

Monday 12 March 2018
FIRE, FLAMMABILITY AND EXPLOSIONS
Course Director: Professor Gordon Andrews
08.30 Registration
09.00 Fundamentals and stoichiometry
10.00 Coffee
10.15 Flammability limits
Flammability limits and theories for gases, mists and dusts, influence of T&P. Flash point and vapour pressure. Fuel tank explosions – the TWA flight 800 1996.
12.15 Lunch
13.00 Controlling explosion risks in enclosures
14.00 Flame arrestors and explosion isolation barriers
Jef Snoeys, Fike Corporation
15.00 Tea
15.15 Laminar and turbulent combustion
Laminar burning velocities and flame speeds. Spherical vessel explosions in closed vessels, the K_G and K_st reactivity parameters. Spherical explosion flame propagation theory. Self-acceleration of laminar propagating flames into cellular flames and then turbulent flames. The implications for K_G as a function of vessel volume.
17.30 End of day one
19.00 Course dinner

Tuesday 13 March 2018
CHARACTERISATION OF GAS AND DUST EXPLOSIONS VENT AND SUPPRESSION PROTECTION DESIGN
Course Director: Professor Gordon Andrews
08.45 Registration
09.00 Dust explosion characteristics and the influence of dust size distribution
10.30 Coffee
10.45 Industrial explosion suppressions systems
Jef Snoeys, Fike Corporation
12.15 Lunch
13.00 Gas explosion venting theory and design standards
14.30 Flameless explosion venting – product, performance, vent system design examples and case studies
Jef Snoeys, Fike Corporation
15.15 Tea
15.30 Vent Ducts, Large L/D venting and Interconnected Vessel Explosions
17.00 End of day two
Wednesday 24 March 2018

VAPOUR CLOUD EXPLOSIONS
Course Director: Dr Roth Phylaktou

08.45 Registration
09.00 Managing explosion risks
   Overview of the regulatory framework and the general approaches to explosion risk
   assessment and management including handling source terms and uncertainties in data and
   methods' DNV GL
   The regulatory framework dealing with regulators and uncertainties with the calculations.
10.30 Coffee
10.45 Important parameters in turbulent explosions
   Dr Roth Phylaktou, University of Leeds
   Identification of important variables in terms of both fundamental properties and of the
   system physical and chemical properties (overall geometry, blockage ratio, flow velocity,
   mixture reactivity, pressure loss, ignition position etc.) Turbulent combustion regime
   diagrams.
11.45 Important parameters in turbulent explosions (Cont.)
   Dr Roth Phylaktou, University of Leeds
   Calculations of maximum flame speeds and overpressures after accelerations through an
   obstacle field.
12.45 Lunch
13.45 Flame acceleration and transition to detonation
   Dr Roth Phylaktou, University of Leeds
   Phenomenological model of turbulent flame acceleration process; shock wave formation,
   auto ignition and explosive transition to detonation; steady state and overdriven detonations.
14.45 The role of large scale experiments in explaining vapour cloud explosions
   Mike Johnson, DNV GL
   Mechanisms of pressure generation in vapour cloud explosions and how they have allowed
   major incidents to be explained.
15.35 Tea
15.50 Explosion mitigation by general area water deluge
   Mike Johnson, DNV GL
   Droplet size, spray water content and distribution, nozzle supply pressure, foaming agent,
   mitigation mechanisms, effectiveness criteria, uncertainties.
17.00 End of day three

Thursday 15 March 2018

BLAST PREDICTION AND BLAST RESPONSE
Course Director: Dr Roth Phylaktou

08.45 Registration
09.00 Blast loading identification and blast effects on structures
   Dr Stephen Burley, The University of Manchester
10.15 Coffee
10.35 Review of explosion simulation methods
   Dr Roth Phylaktou, University of Leeds
   Methods, available models, validation requirements. (TNT equivalence and Multi-Energy
   methods in some detail)
12.00 Lunch
13.00 The Congestion Assessment Method (CAM)
   Dr Jonathan Puttock, Cranford Hazards Research Ltd, formerly Shell Research Ltd
13.40 A phenomenological model (SCOPE) - details and use in exceedance calculations
   Dr Jonathan Puttock, Cranford Hazards Research Ltd, formerly Shell Research Ltd
   Description, capabilities, validation, limitations; its use, with several thousand runs, to derive
   reliable statistical assessment of explosion overpressure risk.
14.20 Tea
14.35 EXSIM and PDRFoam
   Dr Jonathan Puttock, Cranford Hazards Research Ltd, formerly Shell Research Ltd
15.15 LNG Explosion Hazards
   Dr Ian Cowan, Atkins
16.15 Experimental scaling
Dr Roth Phylaktou, University of Leeds
Extrapolating small scale tests to full scale hazard assessment, comparative assessment of scaling of explosions on the basis of different turbulent combustion models, MERGE project.

17.00 Example problems - some simple calculations illustrating the significance of parameter

17.30 End of day four

Friday 16 March 2018
EXPLOSION ASSESSMENT: CAPABILITY, VALIDATION, LIMITATIONS AND APPLICATION OF CFD
Course Director: Dr Roth Phylaktou

08.45 Registration
09.00 Barrier methods for explosion control
Professor Vincent Tam, University of Warwick
Review of current control methods and exploration of barrier methods in detail.

09.45 Explosion model evaluation
Professor Vincent Tam, University of Warwick
Covers, among others, the de facto standard method for evaluation of models.

10.15 Coffee
10.30 Simplified flammable gas volume methods for gas explosion modelling from pressurized gas release
Professor Vincent Tam, University of Warwick
Examine assumptions and validity of a range of source term modelling.

11.00 Buncefield Incidence 2005 - Explosion mechanism
Professor Vincent Tam, University of Warwick

11.45 FLACS
Chris Coffey, GexCon

12.30 An overall review and concluding remarks
Professor Derek Bradley, University of Leeds
A summary of current knowledge, major areas of uncertainty and future research.

13.15 Lunch

14.00 Example problems – demonstration of CFD modelling exercises
Chris Coffey, GexCon

15.30 End of day five and course