ASHRAE UK Midlands Section

Hosted by
BIRMINGHAM CITY University

Presentations include:

TIAN GREEN BUILDING SIMULATION

EQUA.

EnSimS Energy Simulation Solutions Ltd.

DesignBuilder

IES INTEGRATED ENVIRONMENTAL SOLUTIONS

Bentley Advancing Infrastructure

sefaira

ASHRAE Distinguished Lecturer
M. Dennis Knight
PE FASHRAE
Whole Building Systems, LLC

Wednesday, 17 May 2017, 9:00 - 18:00

Millennium Point Auditorium, Curzon Street, Birmingham, B4 7XG, United Kingdom

Advances in Building Simulation and BIM

One-day seminar incorporating an ASHRAE Distinguished Lecture by Dennis Knight

Date:	Wednesday, 17 May 2017
Venue:	Millennium Point Auditorium
	Birmingham City University
	Curzon Street, Birmingham, B4 7XG
	(Map: https://goo.gl/Mqor6E)
Booking:	Book your tickets at https://goo.gl/vvdLBJ
Contact:	ashrae.ukml@gmail.com

Programme

09:00 - 09:30 **Registration and refreshments**

09:30 - 09:35 **Welcome by Prof. Lubo Jankovic**
Birmingham City University Zero Carbon Lab

09:35 - 10:20 **The Latest Advances in Sefaira**
Andrew Corney, Sefaira UK Ltd

10:20 - 11:05 **The Latest Advances in AECOSim/Hevacomp**
Paul Demetriou, Bentley Systems International Ltd

11:05 - 11:30 **Coffee break**

11:30 - 12:15 **The Latest Advances in IES VE 2017**
Cormac Glynn, Integrated Environmental Solutions Ltd

12:15 - 13:00 **The Latest Advances in IDA ICE**
Per Sahlin & Christoph Morbitzer, EQUA Simulation AB

13:00 - 14:00 **Lunch**

14:00 - 14:45 **The Latest Advances in DesignBuilder**
David Cocking, DesignBuilder Software Ltd

14:45 - 15:30 **The Latest Advances in BIM HVACTool**
Thomas Tian & Dirk Weiß, Tian Building Engineering UG

15:30 - 16:00 **Coffee break**

16:00 - 16:45 **The Latest Advances in JEA Optimisation Engine**
Yi Zhang & Lubo Jankovic, Energy Simulation Solutions Ltd

16:45 - 17:45 **ASHRAE Distinguished Lecture:**
Integrated Building Design and Building Information
M Dennis Knight, Whole Building Systems LLC

17:45 - 18:00 **Closing remarks by Edward Murphy**
President of the ASHRAE UK Midlands Section

ASHRAE Distinguished Lecture
Integrated Building Design and Building Information

M. Dennis Knight, ASHRAE Distinguished Lecturer
Whole Building Systems, LLC

Mr. Knight's lecture will focus on the Integrated Building Design (IBD) process and Building Information Modeling (BIM) tools applied to the Project Delivery processes including team building, project management, stakeholder responsibilities, early collaboration, better decision making, documentation methods and the use of technologies like BIM to improve the built environment. The presentation will provide brief introductions to ASHRAE Applications Handbook Chapter 57, "Integrated Building Design," the ASHRAE "Introduction to BIM" publication, and the newly released NIBS National BIM Guide for Owners (NBGO) and will discuss how leveraging the power of BIM and simulation tools for early phase design analysis, and how to apply these tools and processes to help design, construct, operate and maintain better buildings. Mr. Knight will also briefly discuss the upcoming 2017 ASHRAE Building Performance Analysis specialty conference (formerly the Energy Modeling Conference) and touch on some lessons learned from the previous 5 conferences.

M. Dennis Knight, PE, FASHRAE
Whole Building Systems, LLC

Mr. M. Dennis Knight has 43 years of experience providing engineering, design and construction related services within the building industry. Active at the local, state and national levels with various agencies and professional societies, he works to help develop sustainable, integrated building design, building performance simulation and building information modeling guidelines. As a member of ASHRAE, Mr. Knight is the immediate past Chairman of the BIM Multi-disciplinary Task Group (MTG) and is the

former Chair of Technical Committee (TC) 7.1 "Integrated Building Design." He currently serves on the ASHRAE Board of Directors as a Director at Large and as the vice-chair of the buildingSMART Alliance (bSa) Board of Directors. In addition, he has served on ASHRAE Standards Committee and serves as the Chair of the ASHRAE 2017 Building Performance Analysis Specialty Conference. Mr. Knight is a co-author of the National BIM Guide for Owners that was published by the National Institute of Building Sciences (NIBS). The work was awarded the 2017 NIBS Honor Award in January 2017.

Professionally Dennis is a practicing engineer and the founder and an owner of Charleston, SC based Whole Building Systems, LLC, offering consulting engineering, commissioning and design assistance services to the AECO industry. His vision for Whole Building Systems is to assist owners, architects, contractors and facility management professionals to adopt new tools and process improvement strategies that will result in the design, construction, operations and maintenance of high performance building that meet the triple bottom line. Mr. Knight frequently lectures in the US and abroad on high performance building tools and technology and has authored numerous publications and white papers on a variety of technical topics. He has developed curriculum and teaches on BIM, Integrated Building Design, Life Cycle Cost Analysis, ASHRAE 90.1 and IECC energy code compliance, energy management for historic structures in hot and humid climates, and energy modeling and commissioning of energy using systems.

This Lecture is brought to you by the **American Society of Heating, Refrigerating and Air-Conditioning Engineers**. Founded in 1894, ASHRAE is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 55,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today. More information can be found at www.ashrae.org/news.

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The Latest Advances in Sefaira

Andrew Corney
Sefaira UK Ltd

This presentation focuses on designing naturally ventilated buildings using **Sefaira**, including a new TM52 calculation workflow. It would look at:

- Using Free Area calculations to get a window openings for a natural ventilation design on track
- Using thermal comfort calculations to optimise the window sizes and opening types, envelope properties like shading and window controls, to get a natural ventilation solution that complies with operative temperature and TM52 calculations.
- Optimising energy use of mixed mode systems by considering the above in conjunction with different HVAC system types
- Using Sefaira and SketchUp (or Revit) to do the above workflow in a day rather than weeks!
- How to use the same model to get preliminary HVAC sizing for Stage 2 pricing.

A live demonstration of Sefaira's functionality will be performed as part of the talk.

The Latest Advances in AECOSim/Hevacomp

Paul Demetriou
Bentley Systems International Ltd

AECOsim applications include AECOsim Energy Simulator and AECOsim Building Designer. AECOsim Energy Simulator, Bentley's energy analysis application, enables you to easily simulate and analyze building mechanical systems, environmental conditions, and energy performance so you can increase sustainability and reduce energy consumption. AECOsim Building Designer, Bentley's building design application, enables multi-discipline teams to explore design alternatives and quickly deliver buildings that are more energy efficient thought its BIM advancements. It is a single multi-discipline BIM authoring tool.

Hevacomp applications include Hevacomp Mechanical Designer, Hevacomp Dynamic Simulation, and Hevacomp Electrical Design. With Hevacomp applications, you can create energy efficient buildings by predicting accurate real-world performances, conduct building energy analysis with one of the industry-standard simulation engines and check for UK Part L compliance checking and produce EPCs.

The presentation will be focused on a creating an ASM (Analytical Space Model) from the BIM architectural model and performing Energy Simulations.

Advances in Building Simulation using the IES Virtual Environment 2017

Cormac Glynn
Integrated Environmental Solutions Ltd

The **IES Virtual Environment** (IESVE) is a powerful, in-depth suite of building performance analysis tools. It allows the design and operation of comfortable buildings that consume significantly less energy. Whether working on a new build or renovation project, the VE allows designers to test different options, identify best passive solutions, compare low-carbon & renewable technologies, and draw conclusions on energy use, CO2 emissions, occupant comfort, and much more.

There are various tools in the suite; each designed to provide sustainable analysis at levels suitable for different design team members and design stages. All utilise our Apache dynamic thermal simulation engine, and an integrated central data model, which has direct links to SketchUp, Revit®, Vectorworks and gbXML, IFC & dxf imports. VE for Engineers and VE for Architects are the two packages available within the Virtual Environment.

The latest release, VE 2017 includes 25 major new features and many additional enhancements that our current users will find very useful. In particular, the presentation will look at

- Hone - an optimisation tool that allows you to find the optimal building design whilst saving time and cost
- Parametric Tool – the independent tool that allows you to run parametric studies referencing VE models
- Python Scripting - enables the user to leverage the full power of python within the Virtual Environment. Users can customise, automate and define workflows to reduce time spent producing results

Users of the IESVE include Architects, Engineers, BIM Managers, Sustainability Managers, BREEAM & LEED APs, HVAC Consultants, Environmental Engineer, and anyone in the sustainability design field and their varying roles.

IES INTEGRATED ENVIRONMENTAL SOLUTIONS

The Latest Advances in IDA ICE

Per Sahlin and Christoph Morbitzer
EQUA Simulation AB

There is much talk about "the Gap" – and for good reason. Most studies that compare computed with actual building performance show alarming discrepancies. Until a few years ago, this situation prevailed also in Sweden. However, since 2007, an outcome based building code has been in force. Energy use in new buildings must be monitored and a building becomes legal after two years of actual operation below permitted energy levels. The code has quickly fostered a sound modelling culture. Today, new buildings are sometimes sold with energy guarantees that are solely based on simulation results. Although the key to trustworthy predictions lie in modelling culture, software also plays a role. When measurements from real buildings are compared with simulations, focus often falls on the details of HVAC and controls.

IDA Indoor Climate and Energy is different from other tools since it is based on a general-purpose simulation method. Any detail of equipment and controls can be modelled along with the building itself.

IDA ICE is the prevalent building simulation tool used in Scandinavia, Germany and Switzerland. Although it provides unique generality, flexibility and transparency, it is also quite easy to use, with user interfaces of successively increasing complexity.

Key features of IDA ICE will be illustrated on full-scale as well as on simpler examples: IFC based BIM import, automatic plant model generation, control systems, hybrid natural ventilation and access to real product data.

EQUA.

The Latest Advances in DesignBuilder

David Cocking
DesignBuilder Software Ltd

DesignBuilder provides advanced building performance simulation tools that minimise modelling time and maximise productivity. From BIM to fully-integrated performance analysis including: energy and comfort, HVAC, daylighting, cost, design optimisation, CFD, and certification for EPCs, Building Regulations, BREEAM, LEED etc. Its high-productivity tools are quick and easy to learn and use.

This presentation describes how optimisation can be used in a simulation tool to aid the design of new and refurbished buildings, using rigorous cost-benefit analysis to identify the best combinations of building fabric and M&E systems. Optimisation uses genetic algorithms to efficiently search for and identify designs that best meet design objectives i.e. solutions that provide the best "trade-off" between cost, energy consumption and comfort. The genetic algorithms mimic natural evolution, using a "survival of the fittest" process to identify the best solutions much more efficiently and quickly than would be possible using traditional parametric or manual iterative simulation methods. Optimisation can be used at both early and detailed stages of the design process and is the perfect simulation tool to do the "proper" design analysis necessary to minimise the energy consumption and life cycle costs in building construction and refurbishment projects.

The Latest Advances in BIM HVACTool

Thomas Tian and Dirk Weiß
Tian Building Engineering UG

BIM HVACTool is a comprehensive BIM-centric concept-to-detail tool for sustainable building design. It offers a wide range of simulation capabilities, including whole building energy performance (EnergyPlus and NANDRAD), indoor and urban-scale airflow analyses (OpenFOAM), Daylighting (Radiance), Sunpath/Shadow/Insolation, Wind-driven Rain, Fire&Smoke analyses (FDS), and more. Its CFD and ETTV modules have been accepted by the Building and Construction Authority (BCA), Singapore, for Green Mark Certification Submissions.

BIM HVACTool's modern graphical user interface offers best in class 3D editing and visualization facilities that works directly on BIM models (IFC). In this presentation, the developers will demonstrate the workflow of importing and editing IFC models from a BIM server, setting up different simulation analyses, and visualising results. The new modelling technologies including NANDRAD from Technical University of Dresden will be discussed, too.

The Latest Advances in JEA Optimisation Engine

Yi Zhang and Lubo Jankovic
Energy Simulation Solutions Ltd

Energy Simulation Solutions Ltd provides professional solutions to meet the increasing demand for energy simulations in the built environment through technological innovations. Its expertise in building simulation, optimisation and online services technology are stemmed from over 15 years of academic research and development. The jEPlus Simulation Service (**JESS**) is one of first online simulation platforms on the market. It is available as a fast, reliable and simple to use cloud computing service, also as a pre-configured high performance computing appliance, known as the ENSIMS Simulation Station series.

The **JEA Optimisation Engine** is a complete redesign of the core functions of the popular jEPlus+EA tool using the Software as a Service (SaaS) model. It provides a robust and versatile optimisation and data service that can be integrated with any simulation software. The specially developed algorithms allow on-the-fly control of the optimisation process, interactive search, multi-dimensional data exploration, and collaboration between different professionals and users. In this presentation, the key features of JEA will be demonstrated, and the potential applications illustrated with a retrofitting project.