BIM ANALYSIS AND INTEROPERABILITY

This year our team returned for the next instalment of our popular interactive Faculty sessions, with an update on some of the latest features related to interoperability and learnings from some of our customers as part of our BIM series.

Looking more closely at the BIM enabled analysis workflow and the benefits it can offer your projects, we provided insight into what exactly is required for successful integration between popular drawing tools and the IESVE, how you can make this work efficiently, and the benefits to your projects once you’ve mastered this. Joined by Jean Carriere of Trailloop, Zahid Ashraf and Ross Thompson of CBG Consultants, Raffaele De Angelis of Buro Happold and Chien Harriman of Buro Happold, they each presented an independent case study highlighting their experiences of BIM interoperability with IESVE.

INTEROPERABILITY SUCCESS STORIES

Integrating Performance Analysis into the heart of the design process, IES offers an unrivalled interoperability with other CAD design and analysis tools.

Trailloop
“The ability to interoperate seamlessly between both Revit and the Virtual Environment allows you to leverage the best of both applications in a shared BIM environment. By constructing building geometries and storing data in Revit, you’re able to increase your productivity by work-sharing large models and then effectively exchanging that information with the VE for energy simulation. This workflow allows you continuously improve the building design from the insights of the energy simulation, while avoiding much of the rework that would otherwise be required without a BIM integration. Moving towards a shared BIM environment allows you to connect your energy modelling to the design team at large to create synergy through collaboration.”

Jean Carriere Trailloop

IES interoperability allows us to:
- Generate Many Geometrical Shapes
- Auto-Determine Interior Walls
- Pre-populate the design with templates
- Create Exterior and Interior Constructions
- Modify Schedules
- Modify the Lighting Power Density
- Modify the Number of People

CBG Consultants
Thrayle House
Large Apartment Blocks in Brixton
- IESVE interoperability presented opportunities including, the integration between software, quicker modelling time, better IES knowledge for the BIM team and the transference of data i.e. room names.
- The model was previously built in sketchup and IESVE was used for overheating analysis for which the IES solar analysis tool proved very useful to CBG.
- In summary CBG successfully exported the building shell which could then be easily partitioned in ModelIT.

Thomas Gainsborough School in Sudbury Suffolk
- Interoperability Challenges: import error, segmented rooms, distinguishing between windows and louvers.
- Learning: Ensuring correct project phase in ‘energy settings’, deleting room separators resolved segmentation, room bounding elements i.e. Columns needed review.
- The model was previously built in ModelIT and the IESVE was used to perform carbon emissions and overheating calculations.
- The link between IES and Revit worked well.
HLM were tasked with using BIM Archicad software and IESVE to assess the ability of its design to meet performance targets set out in The London Plan for a large residential development. These included achieving a 35% reduction on Part L Carbon Emissions, without having to rely on renewable energy sources or carbon offset payments. To achieve this target the firm had to develop a robust integrated design strategy.

Using the IESVE IFC export function HLM were able to export their design model seamlessly from Graphisoft Archicad into the IESVE to perform the required calculations. Using the Tabular Room Edit function they were able to set up a robust link between different design packages, ensuring they wouldn’t have to double up on effort by re-inputting geometry data etc.

HLM focussed on Passive Building Fabric Efficiency and Low/Zero Carbon Systems. To do this it compared the use of the Standard Assessment Procedure (SAP) versus the use of Dynamic Simulation Modelling. The DSM method proved to be the most efficient and the most effective way to drive and verify integrated solutions and meet compliance with the London Plan targets. Also, in a direct comparison, DSM calculation showed an averaged space heating requirement of 6.5 kWh/m².y, corresponding to 80% less than what calculated with SAP. Having this more detailed understanding of the energy patterns allowed HLM to work with its Building Services Design Consultants MTT to design significantly more efficient and appropriate environmental control systems.

HLM’s integrated design strategies included the following elements:
1. Passive design
2. Whole house MechVent w/ Heat Recovery
3. Integrated Winter Gardens
4. Indoor Environmental Quality/Controls
5. Community System – CHP

Using IESVE to perform DSM gave HLM a much more comprehensive picture of the integration of different design solutions. It also provided an exact understanding of the local conditions and performance allowing for responsive design and efficient allocation of resources e.g. adding insulation or solar control only where necessary and effective. The key consideration is that this methodology demonstrates that the performance of the whole system is considerably higher than the cumulative performances of the single parts.

To meet stringent performance target of 35% reduction on Part L 2013 Carbon Emissions, HLM used IESVE as part of an Integrated BIM enabled process.
BIM 4
ANALYSIS

Embodied carbon and Capital Cost are highlights from the government's mission statement to reduce waste in the construction and operation of our built environment. The introduction of BIM Level 2 will act as an enabler to allow this goal to be achieved and it is widely perceived that this will just be the start of savings and increased efficiency within the industry.

As a result, the inclusion of a client's sustainability aspiration as key building performance metrics defined at the outset are crucial for project and ultimately the building's success. The VE is a tool that can assist in achieving and demonstrating these targets from project outset through to operation, thus leveraging the building information.

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<td>Services, Philosophy, Outline planning, Prelim P&amp;L, BREEAM/CfSH</td>
<td>Services, layout &amp; zoning Energy, carbon &amp; cost</td>
<td>Coordinated design, site layouts, GI's, services &amp; controls strategies, cost plan schedules</td>
<td>AS built model, Soft landings, Performance metrics</td>
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**VE 2014 FEATURE PACK 2: WHAT'S NEW?**
- New gbXML export function allowing bi-directional workflow
- Geometry & constructions initially supported
- Additional work in healing geometry from IFC/IFC MB
- New 'ABC' method:
  A. Import & tidy
  B. If fail extrude from floor  
  • Creates windows  
  • Create doors
  C. If fail import as shade
- Additional support to match Revit U-Values

**BENEFITS**
- Import any Revit or other gbXML or IFC model into the VE for analysis
- Quantify, Optimise and Verify your building for all types of building performance KPI's
- Use one VE model throughout entire building lifecycle to inform decisions
- Increase workflow efficiency

Ref: Department for Business Innovation and Skills (BIS) & Local Government Model BIM Process Map Cabinet Office
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