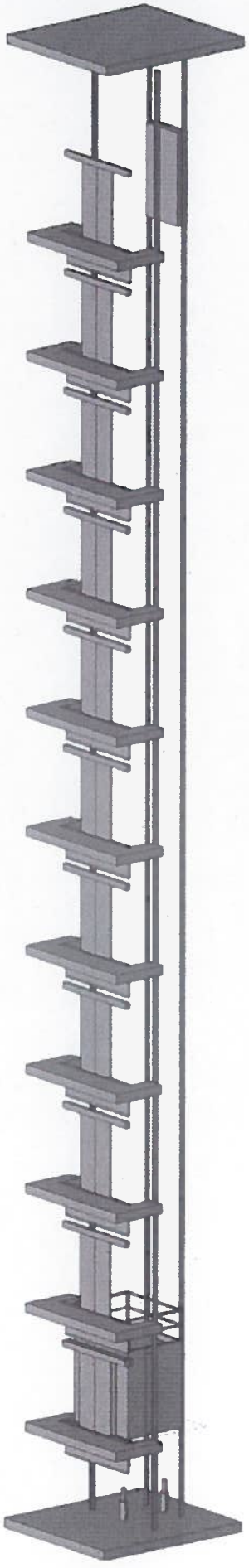


Taking Vertical Transportation Design to the next level....

by Chris Manning, Tony O'Malley and Piotr Smolenski – Lerch Bates Ltd.

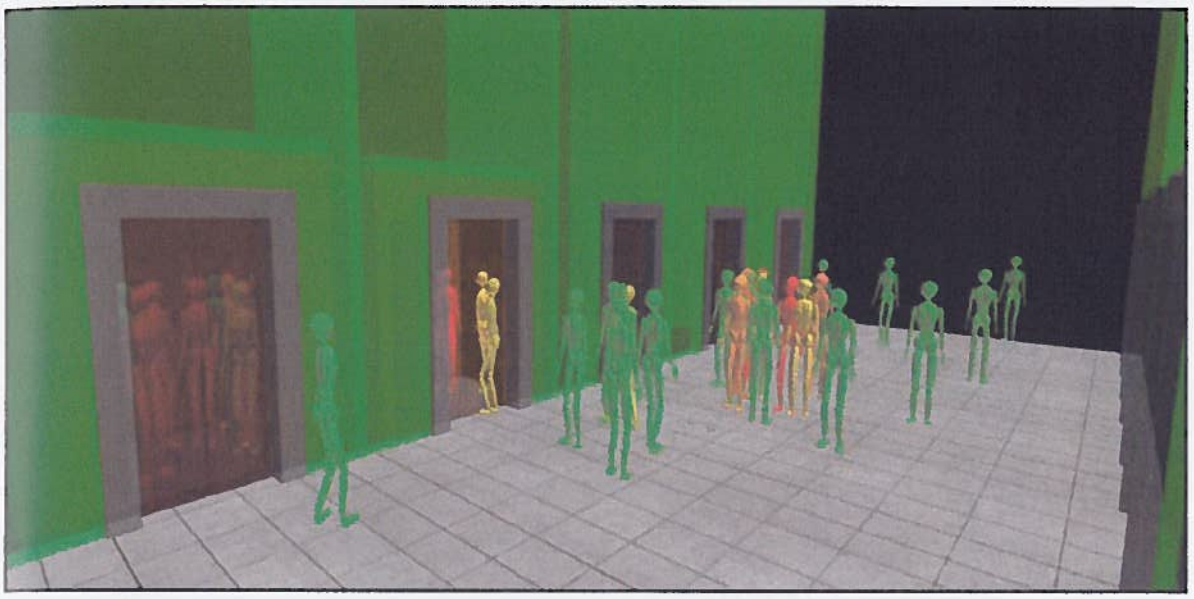
Over the last few years there has been a steady increase in the use of Building Information Modelling (BIM) by the architectural community. BIM is the process of generating and managing building data that can be used in the design, costing, procurement, construction and maintenance phases throughout the life cycle of the building.

Increasingly, architects and developers have been requesting us to produce our designs with sophisticated 3D modelling tools such as Autodesk REVIT and so, in order not only to keep pace with the BIM revolution but get ahead of the game, this year we officially introduced Autodesk REVIT MEP as our preferred design tool of choice. This required an intense programme of training for our design engineers and, following a steep learning curve, we are very excited by the potential benefits of this approach coupled with new simulation and visualisation software developed in association with Kingston University over the past three years.

Whilst most of the major manufacturers already have or are in the process of providing BIM versions of their lift products, unless the developer is to choose which manufacturer is to be adopted for the project in advance, these have limited value to architects and consultants. Therefore, as well as training on the new 3-D systems we have, for some considerable time, been conducting development work "in house" converting generic 2-D lift layout plans and component details into our new "generic" 3-D lift BIM.

Traditionally, during the early concept and schematic design phases of a project, 2D CAD drawings are issued between consultants and architects for design co-ordination purposes which creates untold checking, cross-checking and red-lining of drawings, resulting in numerous drawing revisions. This is a time consuming process for the design teams involved and can easily lengthen design programmes.

With BIM, a single model of the building is produced and can be passed between the consultants, client and project team. When each discipline combines their relevant information into the model the design co-ordination and cross-checking process is carried out automatically by means of clash detection tools within the software so as to ensure the design is fully co-ordinated.



In the case of any design modifications, the BIM reflects those modifications across the whole model and updates all the appropriate plans, elevations, sections and even materials scheduling. This helps all disciplines working on the project to reduce the risk of human error in the early stages of the design process as the information is not being continually revised and re-issued, thus improving the overall design documentation productivity and efficiency.

As the design progresses through the concept, schematic, and design development phases, the early design work is retained within the system and can be saved as separate phases in the model. Therefore, if required, by filtering the views in the model, a history of the design development process is available for review by any party.

BIM software, such as REVIT, is user friendly in that it helps in importing, exporting and linking project details in widely accepted industry formats such as: DGN, DWG, CNC, DXF, etc. Therefore, you can easily co-ordinate the design with both the architect and other consultants.

However, BIM is not just used as a design tool. The key to BIM is not just the visual model, but the database of information that sits behind it. This enables different organisations working on the same project, but using different design software to store and retrieve information in a consistent, shared format.

For example, BIM can be used for cost analysis by quantity surveyors by extracting quantities from the model and pricing the work. Once each component (or family) is tagged or type coded it has a classification, which can be linked to specification clauses to generate full building part specifications. Following this, the main contractor could even begin to sequence the work so as to ensure control on site with proper manning and resources (4D). Also, using quantity extraction programmes, a priced bill of quantities can be linked back to the model, and any changes are updated in both places (5D). If all of the above has been carried out, then the final 3D model should be a true replica of the actual building.
Some of the many benefits of a BIM solution include:

- Savings on project design and coordination time.
- Visualising helps the owner see what they will be getting, thus reducing the need for change orders etc during construction.
- Better design quality, better performing building (systems co-ordination, engineering analysis).
- Scheduling (4D) and costing (5D) are fully integrated with a BIM, which will help owners' decision making processes based on accurate information.
- Efficient handover (data exchange for operations/maintenance).
- BIM supports design investigation by letting architectural designers study multiple design alternatives simultaneously within a single model.
- Construction documents are generated more easily, allowing architects to spend more time on the building design.

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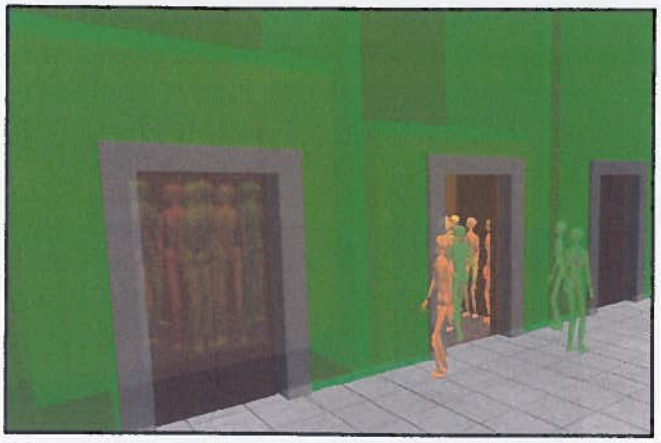

- Production of well co-ordinated documentation.
- Faster building systems co-ordination (space reservation, clash detection).
- Design prototypes (space arrangements, assemblies, materials).
- Allows model checkers to assist with quality control.
- Analysis of space, lighting, energy, structures.
- Drawing production quality (flexible, exploits automation, better co-ordinated).
- Design exploration/interrogation (data rich visual models).

As already mentioned, three years of investment and development work in association with Kingston University has resulted in an innovative lift traffic analysis tool that can be accessed via the internet. **Adsimulo** allows users not only to simulate the traffic performance of lifts within a building, viewing a passenger simulation in 3D, but also allows the exporting of our "generic" BIM for the selected design. This generic BIM file comes in the form of industry standard *.ifc files, which are compatible with Autodesk Revit, Autodesk 3D, Autodesk Navisworks and indeed any other software capable of reading *.ifc files.

Users are able to view the 3D simulations via a "downloadable" custom viewer. They can watch the lobby traffic build up at certain key floors as well as move around inside the building, viewing the lift core, lifts and any floor covered by the simulation. Users can also record a video of any part of their simulation for future presentation. As the virtual passengers change colour dependent upon how long they have waited the user can easily see if the lift service is responding adequately to the projected demands. If there are too many passengers queuing in lobbies, looking at their watches and "glowing red" this is not a good sign!

It is simple however to go back and change variables such as the speed, capacity, number or arrangement of lifts to improve the service until it has been "fine-tuned" to match the design criteria. The application also produces an estimate of floor space taken in the building, so the relative space efficiency of different designs can be compared and contrasted. The performance of the lift services may also be documented using easy to follow graphs and tables so that the user can capture the necessary design reports confirming that the key traffic performance design criteria e.g. 5-minute Handling Capacity and Average Waiting Times, Time to Destination, etc., have been met.

Once the simulated traffic performance is acceptable and the design layout meets the architect's requirements you can click on another button and receive the "generic" *. ifc file for the selected design.

Adsimulo, with its visualisation capability and "generic" output BIM together, puts Lerch Bates at the "leading edge" of this technology and gives us a set of design tools that dramatically speeds up the design process and means we can deliver a complete solution to our clients faster and more accurately than ever before.