

ES11118

Explorative Design and Computational Engineering for the Built Environment

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Learning Objectives

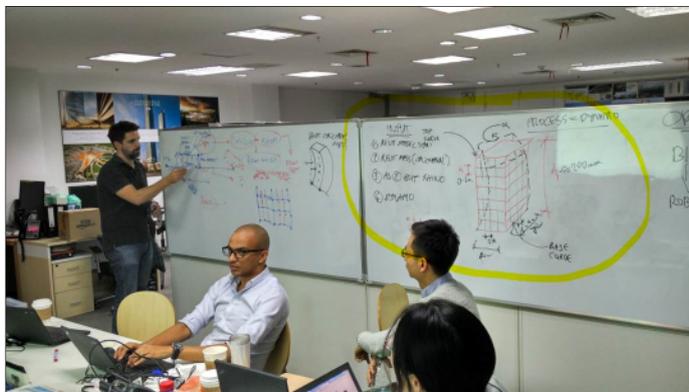
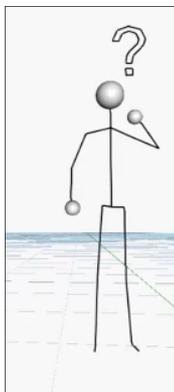
- Discover how technology can be used for rapid design exploration
- Discover how visual programming tools such as Dynamo and Grasshopper can be used to link data sets for rapid simulation
- Appreciate the potential for collaborative computational design using Dynamo and Revit
- Appreciate the power and flexibility of Robot Structural Analysis software's API

Description

The technology and tools for computational design in the built environment have never been more powerful or progressive. To complement their specific discipline knowledge, the current and next generation of designers and engineers entering the global workforce are armed with skills ranging from sketching to programming to Building Information Modeling (BIM). As buildings have grown in complexity so too has the power and ubiquity of simulation tools used by different specialist disciplines, with information and processes getting more disconnected up until data is transferred to a common format for delivery. It is time to shift focus away from data toward the spaces between the data. By extrapolating recent innovations in structural engineering processes—such as real-time feedback and gesture-based simulation using Robot Structural Analysis software—we will explore the possibilities of multidisciplinary building simulation using visual programming applications such as Dynamo software to control Revit software and other packages.

Your AU Experts

Rob is an Associate Director at BuroHappold Engineering, currently leading a team in their Beijing office. Rob has worked at BuroHappold for over 10 years, and in various markets and offices (UK, US, China and the Middle East), leveraging BIM on projects as far as possible to deliver design a range of building projects.



Discover how technology can be used for rapid design exploration

Analytical tools for engineering are now well developed, and building solutions can be simulated very quickly to test the relative merits of different options, or to validate a sketch design. We will look at a couple of examples where software is used to help validate a design or to help develop it directly.

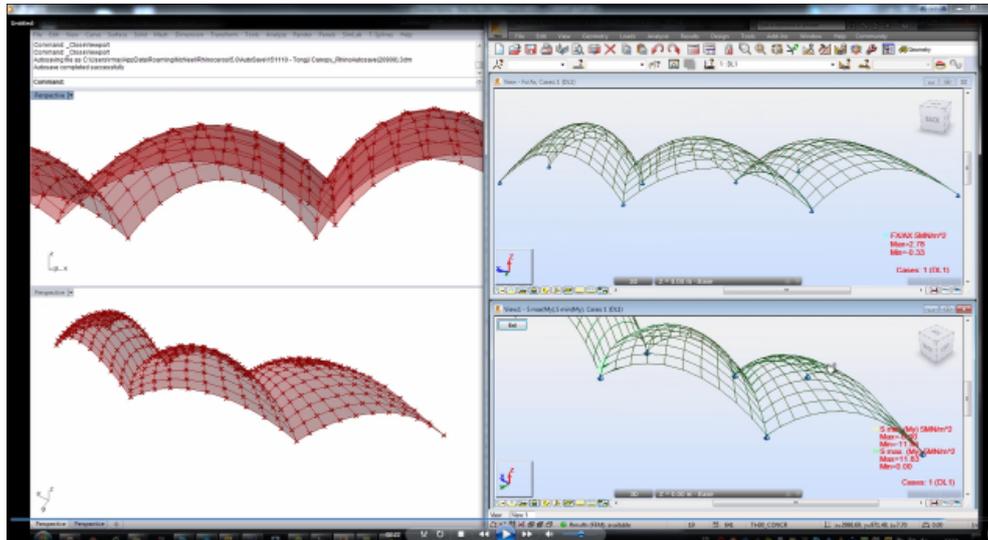


FIGURE 1: TONGJI UNIVERSITY CANOPY FORM FINDING AND FE VALIDATION

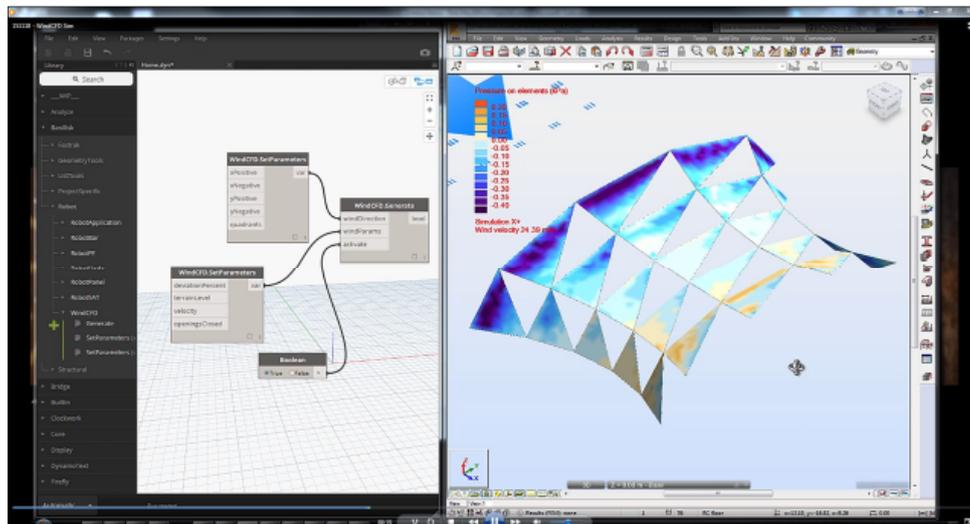


FIGURE 2: BASILISK TEST PROJECT – WIND CFD LOADING IN ROBOT DRIVEN BY DYNAMO

Discover how visual programming tools such as Dynamo and Grasshopper can be used to link data sets for rapid simulation

We will revisit a couple of projects touched upon last year for an update on their process, and also how processes can now better be linked together through technologies like Flux.

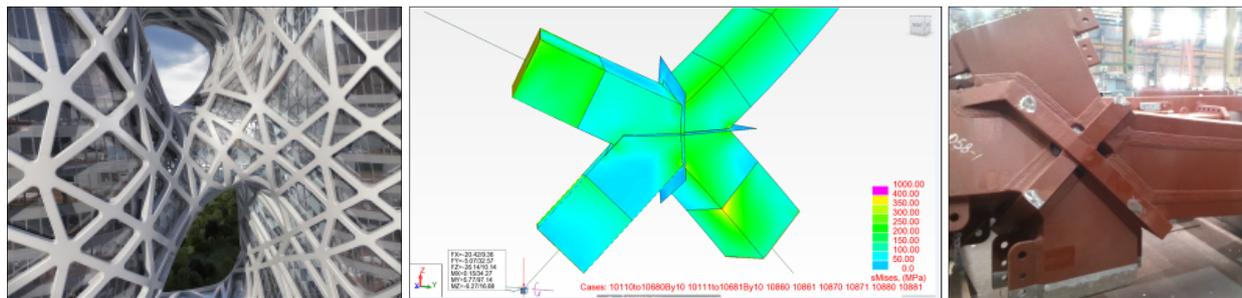


FIGURE 2: PROJECT UPDATE – CITY OF DREAMS HOTEL IN MACAU

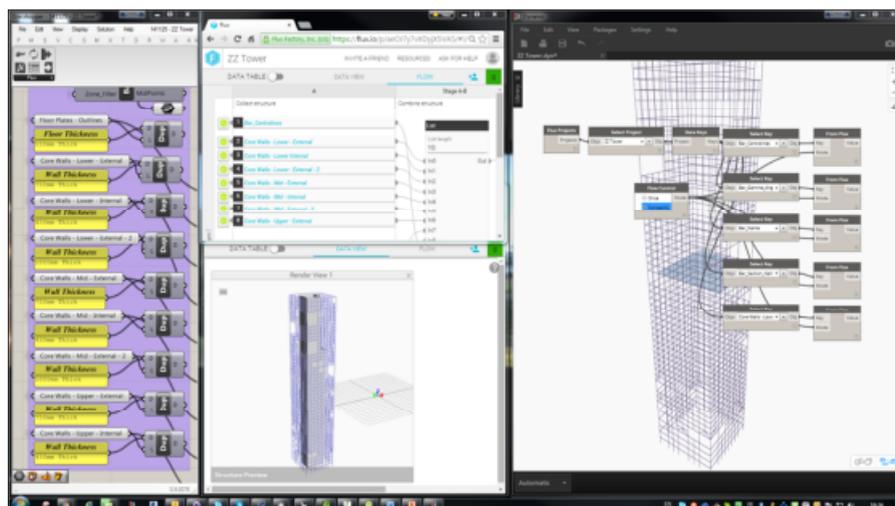


FIGURE 3: LINKING PARAMETRIC DESIGN THROUGH FLUX

Appreciate the potential for collaborative computational design using Dynamo and Revit

Parametric design processes are often divorced from the main branch of a project workflow – due to the nature of the software or the process. For example, a geometry nerd may spend a lot of time in Rhino and Grasshopper, developing an amazing scripted solution to a complex geometric problem, as a parallel process to the development of the BIM model (or 2D drawings). Using Dynamo in Revit-plugin mode, develop entire parametric geometries based on and linked to the drawings.

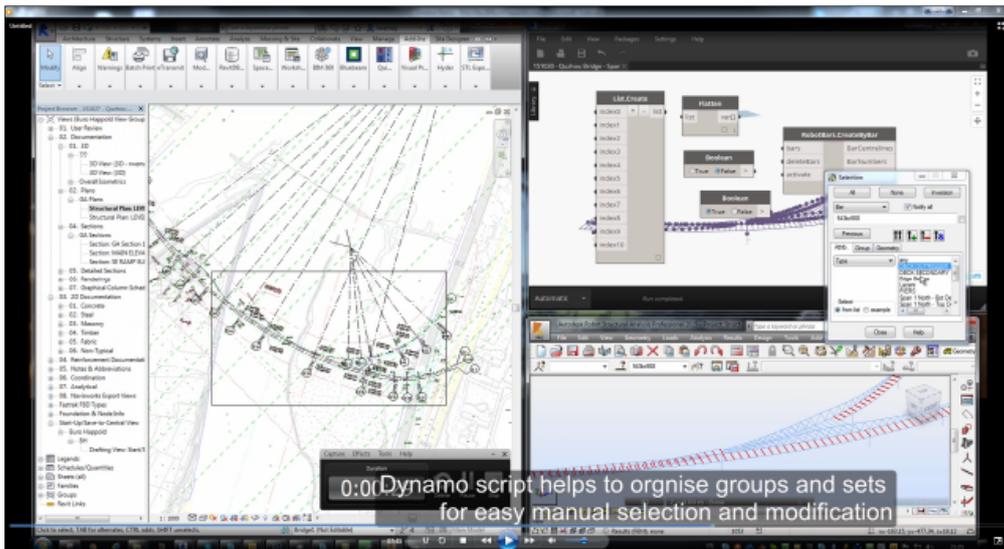


FIGURE 4: QUZOU BRIDGE CONCEPT DESIGN – LINKING REVIT TO SIMULATION PARAMETRICALLY

Appreciate the power and flexibility of Robot Structural Analysis software’s API

Introducing the #HumanDynamo – software API’s (application programmable interface or similar variant) are the backbone of interoperability and what makes most of the information presented here possible. Commercial tools are incredibly powerful as the software developers are able to guess how users behave, but what de-limits this potential, is the ability to rewrite parts of the software or process to suit your own behavior. Here we introduce #HumanDynamo as an example of what is possible in terms of connecting applications locally and through the cloud, in real time.

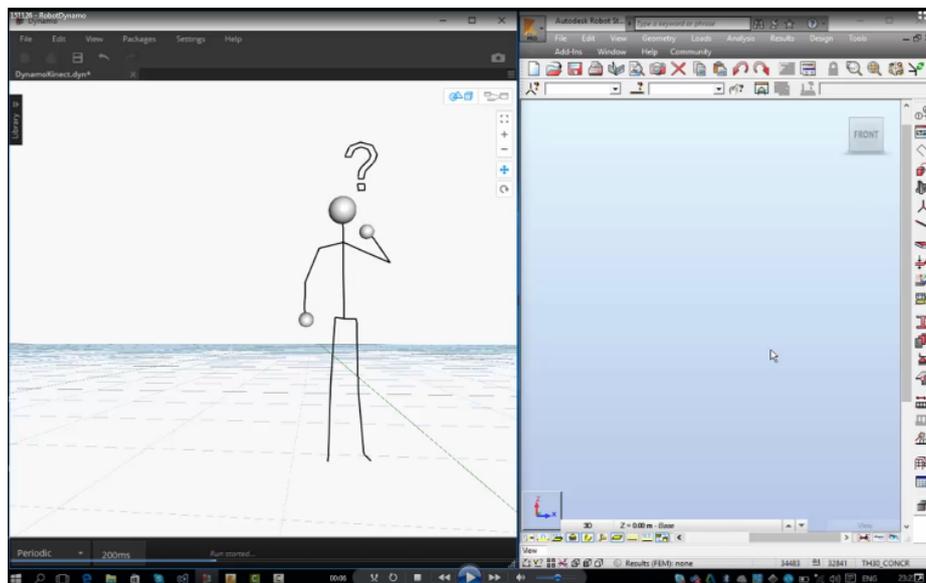


FIGURE 5: INTRODUCING #HUMANDYNAMO