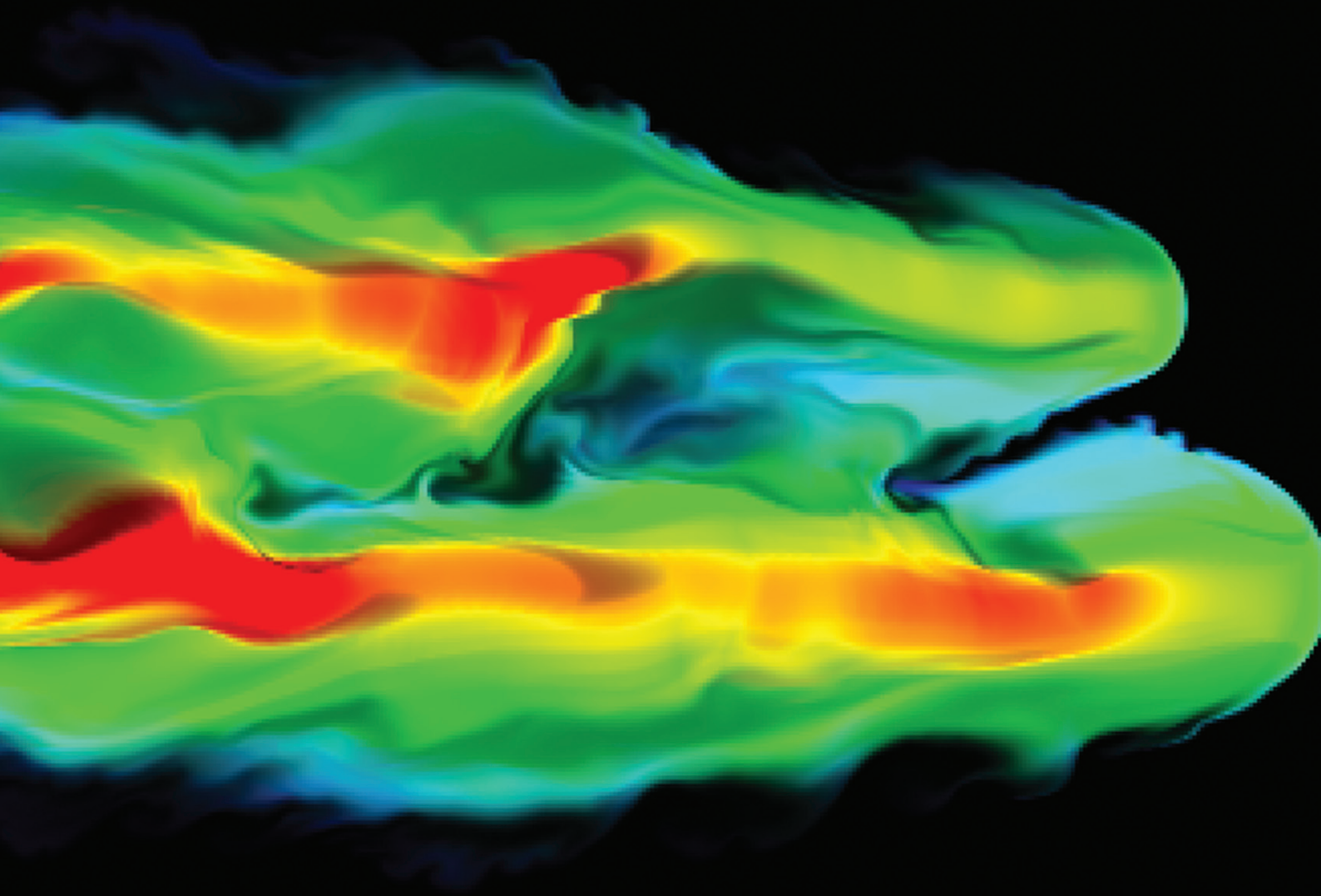
AUTODESK **UNIVERSITY** 2013

Design Computation Symposium

December 4, 2013 | 8:00 a.m.–11:30 a.m. | The Venetian Hotel, Las Vegas, Nevada



Design Computation Symposium AU 2013

Wednesday, December 4, 8:00 a.m.–11:30 a.m.
The Venetian/Palazzo Congress Center, Level 3, Lido 3101

Session 1 | 8:00 a.m.–9:30 a.m.

Introduction: Matt Jezyk [Autodesk]

This year's theme is "Computational BIM" and will explore how advanced firms are bridging the gap between Computational Design and Building Information Modeling. We have seen the development of different specializations inside firms and would like to explore the bridges and points of interconnection between the two. There are three areas of interest under this theme:

- Incorporating performance-based design, simulation and analysis.
- Digital fabrication and other modifications to streamline the construction process.
- Lastly, leveraging sensor data both for post-occupancy study and as an input into the design process.

We are proud to host this event at Autodesk University and will have senior leadership from Autodesk say a few words at the opening and closing.

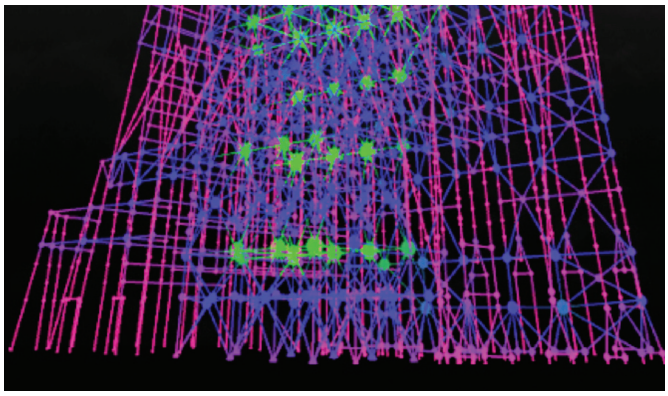
During the presentations, please tweet your questions to "#AUDesignComp" and we will have the speakers answer them at the end of the session.

BIM Analytics

Jonatan Schumacher [Thornton Tomasetti]

Traditional BIM and analysis tools prevent fast-paced collaborative design. Without a standard information exchange platform, creating a reliable parametric model, and exchanging information amongst the various collaborators takes time and effort. Even more, this process is considerably slowed by geometric complexity.

To streamline design development, we have established custom workflows and data schemas. Our approach enables the architect, engineer and fabricator to collaboratively explore a large range of options at the early design stage.



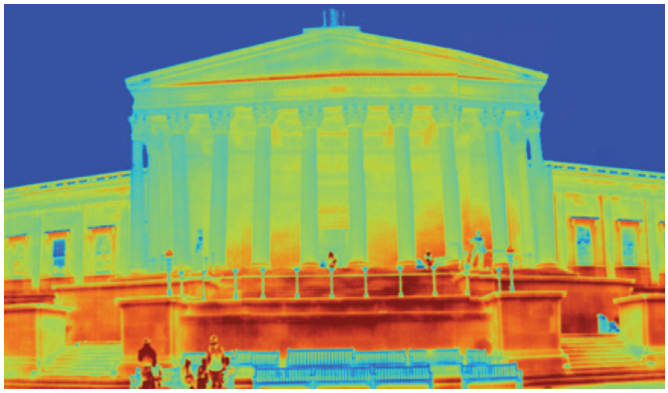
■ *The BIM interoperability suite TTX. Image courtesy of Thornton Tomasetti*

This presentation showcases the execution of integrated design-optimization techniques on a number of recent multidisciplinary projects. It will also highlight TTX, the new BIM interoperability and analytics standard developed by Thornton Tomasetti's Advanced Computational Modeling team.

Predicted vs Actual: Getting Real About Building Energy Performance

Greig Paterson [Aedas R&D]

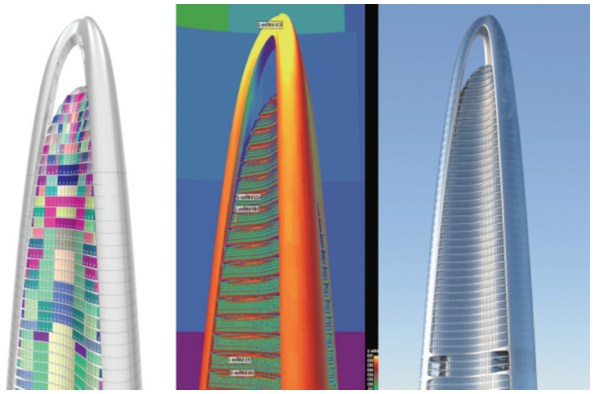
Gathering data to understand the world around us is an ever growing field of research in this information age. To utilise the power of data within the building design community, Aedas have led the development of CarbonBuzz: an online RIBA/CIBSE platform that encourages professionals to volunteer energy performance and building characteristics data from the design stages through to operation. The platform has shown that monitored energy consumption figures of buildings in operation often far exceed the values predicted during design. Post occupancy evaluations have shown that procurement and operational issues are often to blame for much of this 'performance gap'. In order to feed these factors back into the design process, Aedas have been involved in the creation of user-friendly design tools that provide designers with more realistic predictions.



■ *Thermal Image of UCL's Main Building, London, UK. Image courtesy of Aedas*

Form Follows Performance

Juan Betancur, Anthony Viola [Adrian Smith + Gordon Gill]

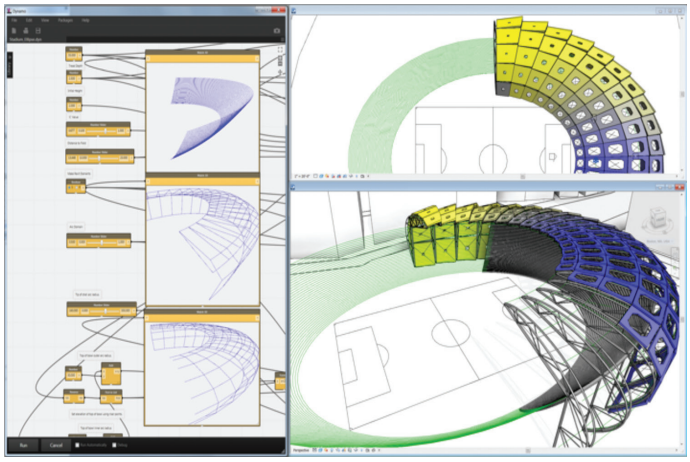


■ *Wuhan Greenland Center studies. Image courtesy of Adrian Smith + Gordon Gill Architecture.*

All high-performance buildings, from supertall towers to large-scale urban master plans, are optimized through a variety of performance criteria such as geometric optimization, programmatic efficiency, and the reduction of materials, embodied carbon and energy. These sometimes disparate parameters require us to rigorously test and negotiate our designs against a set of performance goals and measures. The projects discussed in this presentation will explore the many computational tools employed at Adrian Smith + Gordon Gill Architecture that augment our multidisciplinary design teams, allowing them to generate, visualize and act on data generated through an iterative and performance-based design methodology.

Parameter Values – Computational Outcomes and Building Business Models

Phil Bernstein [Autodesk]



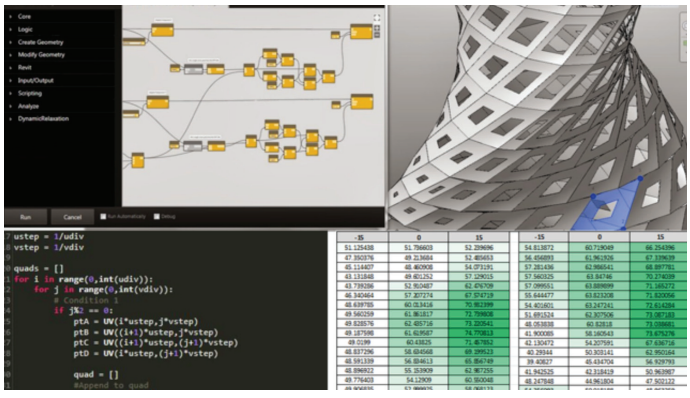
■ *Using Dynamo to embed Computational Design more deeply into design practice. Image courtesy of Autodesk.*

As representational technologies are further empowered by computation, formal, technical and performative possibilities emerge for design practice. While the early implications of such approaches have focused on the generation and justification of formal expression, there are potentially wider impacts on the structure and business models of design practice and the underlying fundamentals of value delivery for professionals. This talk will examine these potentials and examine approaches by which computational design can be extrapolated to redefine design methodology and results.

Session 2 | 10:00 a.m.–11:30 a.m.

Information-Based Ideation & Iterative BIM

Nathan Miller, Daniel Davis [CASE]



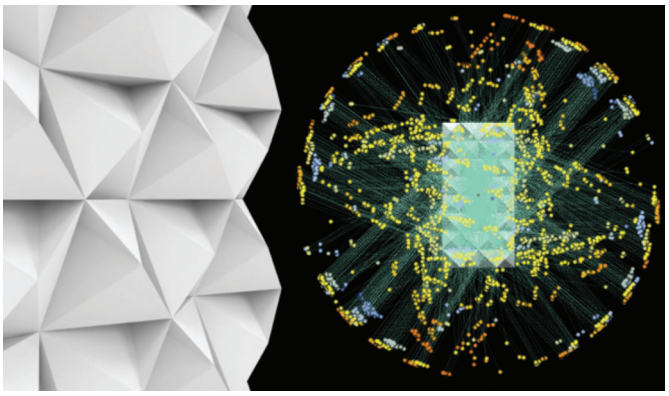
■ *Using Visual Programming, Scripting and Excel data to drive the Revit model. Image courtesy of CASE.*

A review of BIM-related marketing diagrams is telling of the ideals of contemporary information-driven processes. The successful use case is assumed to be a streamlined, linear design process where uncertainty is removed through progressive stages of development beginning with conceptual design and ending with documentation. Meanwhile, the advent of Computational Design has offered a fundamentally different engagement with information-based technologies based on iteration, exploration, and customization. In this presentation we explore a series of case studies which suggest that computational design methods offer a way to augment BIM resulting in a more agile design development process connecting together multiple software and stakeholder interests. In doing so, the process of utilizing information becomes technology much more cyclic, open ended, and in line with contemporary research on design thinking.

Design Process Under Development

Scott Crawford [LMN Architects]

LMNts prototypes novel tools, workflows, and design approaches within LMN Architects which leverage the use of computation. The usefulness of these efforts is as much dependent on the quality of work produced as it is an openness and understanding from the project teams. This presentation will describe the various ways computation has been deployed as an integral piece of LMN's design process, highlighting the successes, difficulties, and changing behaviors that have been encountered along the way.



Raytracing simulation of acoustic scattering from a surface. Image courtesy of LMN.

Concept to Reality: Leveraging a Parametric Model for Constructability

Jeff Vaglio [Enclos Studio]

Parametric modeling is often thought of as a tool to assist in the development of complex geometries in architectural practice. When a project transitions from design into the hands of specialty subcontractors and fabricators to bring to realization, parametric modeling can be used to resolve complexity throughout the engineering, fabrication and build phases. This case study outlines the maturation of parametric tools for the design, engineering, fabrication and installation of a free-form double-curved cable structure that forms a solar reflector shell that bounces overhead daylight deep into the public realm of a transit hub. All facets of the project – from concept to estimating to simulation to fabrication to installation – relied on a common database of geometry work-point controls and were executed with limited non-parametric modeling. This presentation highlights the successful collaborations involved, hurdles encountered in delivery and the complex realities when digital information hits the jobsite.

Installation of the Sky Reflector-Net at Fulton St. Transit Station. Image courtesy of Enclos.

It's All About Particles

Enric Ruiz-Geli [Cloud 9]

The Design Competition Symposium is pleased to welcome keynote speaker Enric Ruiz Geli. As he shares a lecture titled "It's all about particles", Enric will explain his concept of architecture through some projects that he developed with his office Cloud 9. Buildings like "Villa Nurbs", "Once…a wave", the "Hotel Prestige Forest" or "elBulli Foundation" have a total digital background that allows the architect to conceive and produce the building avoiding traditional constraints. Beside this important fact, Enric understands the environment as particles conformed by different chemical elements (Co2, Ho2…), and faces every project trying to unfold an architectonical answer through this idea of particles, that becomes not only a visualisation tool but also and especially a production tool.

The Media-ICT building in Barcelona, Spain. Image courtesy of Cloud 9.