

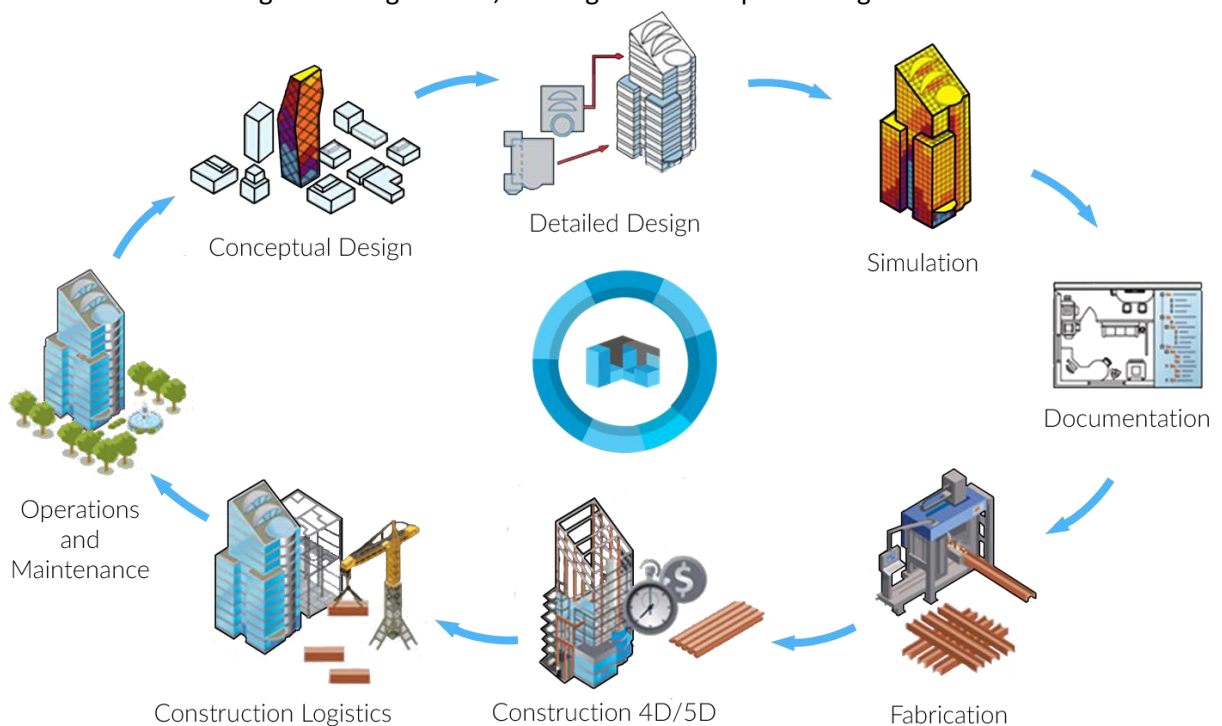


Parametric BIM Design

Introduction

Building Information Modelling (BIM) refers to an intelligent, model-based process that provides insight for creating and managing building and infrastructure projects faster, more economically, and with lesser environmental impact.

BIM is useful to any construction project during the entire lifecycle of the building. The building lifecycle can be visualized through the image below, starting from conceptual design:



The building information generated at the earliest stages, i.e. during the design phase ends up being used during as well as after the building has been constructed.

Being able to effectively manage this information throughout the projects is what is shaping the future of the construction industry. Accessing this information leads to optimized designs, lesser costs, and more environment friendly.

The Problem

Design is one of the fundamental aspects of any building. Design may encompass a wide variety of trades, including but not limited to Architectural, Structural, various building services, environmental design etc.

For many years design has formed the basis from which one can differentiate between a good construction project and a great one. There are various parameters which control the aspects of design. They may be things like aesthetics and ambience and may be more scientific in terms of innovative use of materials, structural stability or maintenance free building services design.

With the advent of software and computing tools there has been a breakthrough in terms of how we can control these parameters. Now, it is becoming easier and easier to build digital scale models of structures, subject them to realistic environmental conditions and visualize different design options.

The base of this subject is parametric modelling.

The term parametric refers to the relationships among all elements of the model that enable coordination and change management. These relationships are created either automatically by the software or by you as you work.

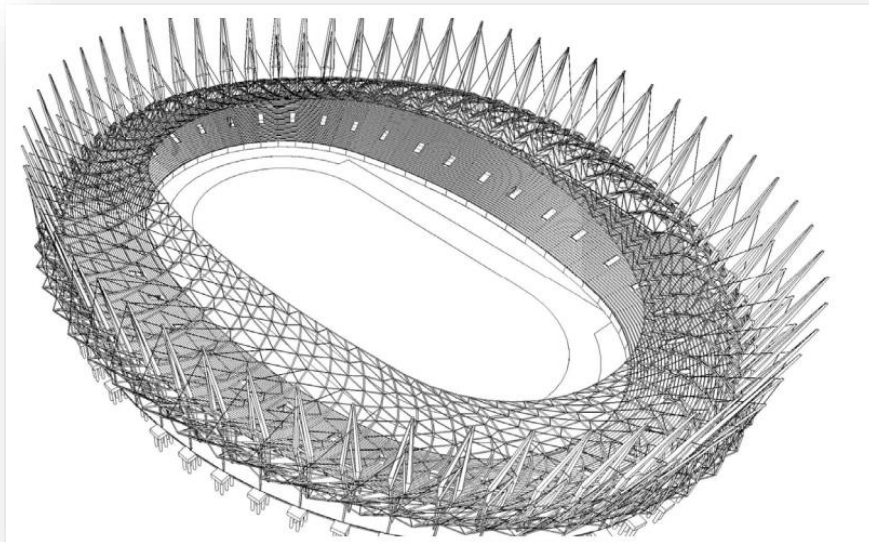
In mathematics and mechanical CAD, the numbers or characteristics that define these kinds of relationships are called parameters; hence, the operation of the software is parametric. This capability delivers the fundamental coordination and productivity benefits of BIM: change anything at any time anywhere in the project, and it is coordinated through the entire project.



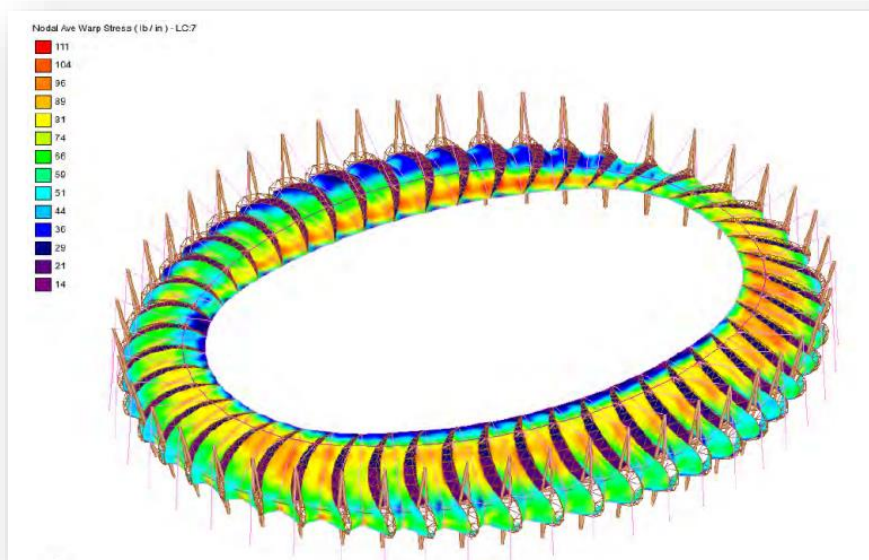
Students need to decide on using parametric CAD or BIM based software and develop 3D parametric models. These models can be building structures, specific building components like facades, structural members, building services like HVAC and mechanical systems etc. The students are free to choose their own subject model, irrespective of discipline and only limited by their creativity.

The students need a model that can flex as various model parameters are altered. Various use cases may be:

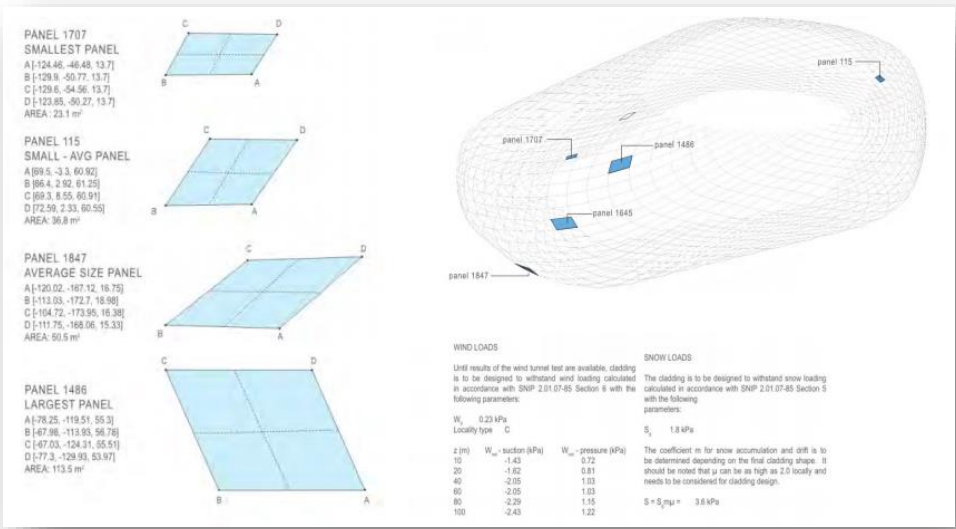
- Model generation



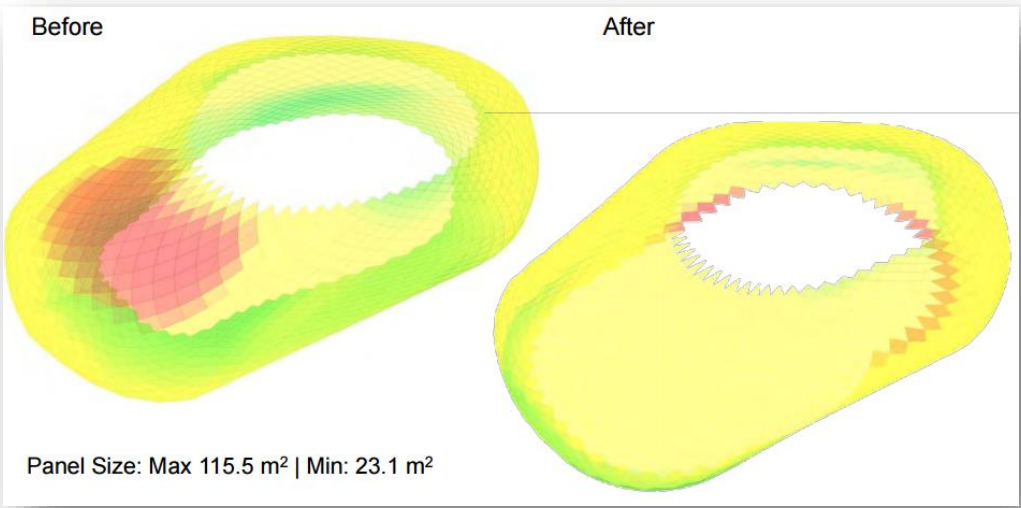
- Analysis



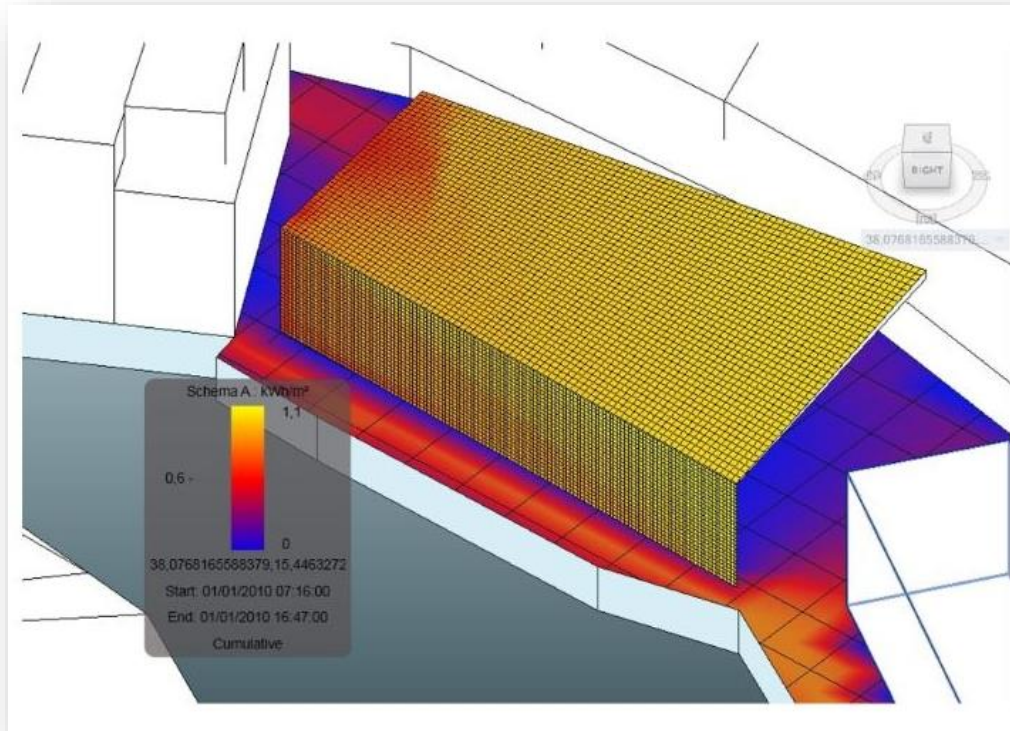
- Quantification



- Optimization



- Sustainability



Suggested software

The students can choose suitable platforms for their work from the ones mentioned below (or they may choose any other as well, which may not be included in this list)

- Revit
Autodesk Revit is building information modeling software for architects, structural engineers, MEP engineers, designers and contractors. It allows users to design a building and structure and its components in 3D, annotate the model with 2D drafting elements, and access building information from the building model's database.
- Rhinoceros
Rhinoceros is a CAD software based on the NURBS mathematical model, which focuses on producing mathematically precise representation of curves and freeform surfaces in computer graphics (as opposed to polygon mesh-based applications).
- Dynamo BIM
Dynamo extends building information modeling with the data and logic environment of a graphical algorithm editor.
- Grasshopper

Suggested links to visit

- <http://dynamobim.org/>
- <https://knowledge.autodesk.com/support/revit-products/getting-started/caas/CloudHelp/cloudhelp/2016/ENU/Revit-Model/files/GUID-1AA9B2DC-C08B-458E-BA93-C72C109D61C8-htm.html>
- <https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/CloudHelp/cloudhelp/2015/ENU/Revit-Model/files/GUID-6E0ECA27-AF40-4B1D-9E0B-1DE5FBB45F2-htm.html>
- <http://thedevelopinthebim.blogspot.in/2013/11/geodesic-spheres-in-revit-adaptive.html>
- <http://vasshaug.net/tag/adaptive-components/>
- <https://knowledge.autodesk.com/support/revit-products/getting-started/caas/CloudHelp/cloudhelp/2014/ENU/Revit/files/GUID-71F2C8EE-2A90-4076-A6C7-702082566DDF-htm.html>

For any clarifications or if you have any doubts, please drop a mail on contact@techtute.co.in with Parametric BIM – Apogee 2016 as the subject line.