AUTODESK UNIVERSITY

AS500109

Generative Design Using Dynamo for Multifamily Residential

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Learning Objectives

- Discover workflows in Dynamo for producing efficient multifamily design options.
- Learn how to implement similar automation processes to minimize downtime.
- Discover innovative design solutions for custom site conditions.

Description

Housing has always been the largest sector of the U.S. economy. With increasing competition among architecture firms, designers need to figure out the most efficient options for their designs. Generative design that relies on the principles "generate, evaluate, and evolve" can help designers achieve seemingly limitless options within a short period—a task that is impossible for humans alone. In this class we'll discuss the impact of generative design, using Dynamo scripts for multifamily residential design. Find out how you can use Dynamo scripts to drive efficiency in ways that benefit your architecture firm.

Speaker(s)

Ramya Palani is a Customer Success Specialist – BIM Collaborate Pro at Autodesk. During the time of recording, she was a BIM specialist at Perlman Architects. She comes with almost 3+ years of vivid design practice. 8+ years of practice in BIM Revit software, involved in the complete design process. Expert at modelling LOD 500, model coordination, generative design and troubleshooting. Skilled in 3ds max, Grasshopper, Rhino, Adobe Suite Photoshop, InDesign, Illustrator, Lumion, and Enscape. Recognized for blending boundaries of Architecture and technology.

Harish Palani is a student pursuing his graduate degree in Architecture and a licenced architect from India. 6+ years of practice in BIM Revit software, involved in the complete design process. Good at working with challenging modules and creating adaptive components, generative design, and interactive use of the interface. Skilled in Rhino, Grasshopper, Lumion, Twinmotion, Enscape, V-ray, Adobe Photoshop, Illustrator, InDesign, Animate, 3ds max, and CFD. Recognized for identifying and resolving issues through design as a medium of expression.

Introduction

AEC Industry has transformed all the way from hand drafting, to CAD, incorporating excel, visualizing CAD, collaborating, sharing, detecting clashes - heading successfully towards digital twining. However, Generative Design is still not abundantly used in professional workflow. Even if it is used, it's either for small automation or for conceptual stage. The cons are that it involves industrial knowledge along with lot of coding knowledge. Also, as of now, these are exclusive either it is office specific or city specific. This generative design for multifamily housing is a humble effort put together with our industrial knowledge, limited coding knowledge and a lot of enthusiasm.

OBJECTIVE & GOALS

The objective here is to introduce generative design in "multifamily" field. There are few projects done on this realm already; but either those are inaccessible or made into a software itself. This makes it default either for purchasing or mastering or even to know about it.
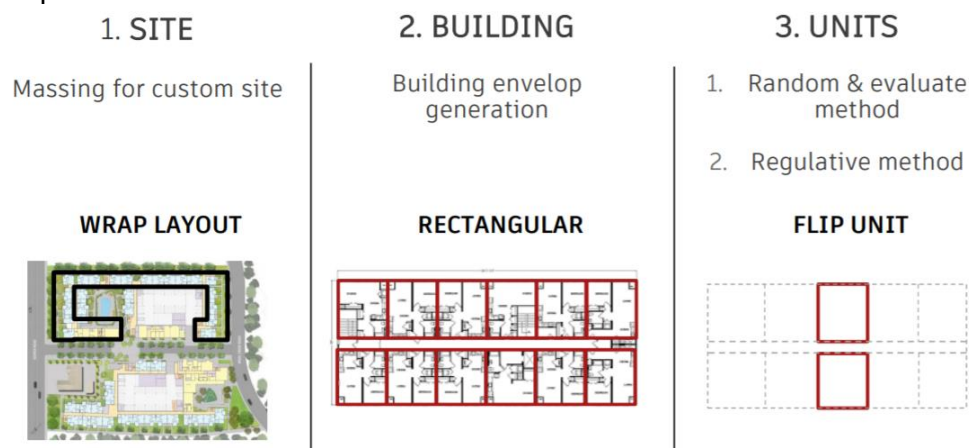The objective for project is
1. To identify the workflow to produce multi-family design options.
2. Implement similar automation process to minimize downtime.
3. Discover innovative design solution for custom site condition.
The goals of the project is
1. To explore design options for custom site, building, and units.
2. To understand how generative technology can in multifamily design.
3. To understand the pros and cons of using generative design.

DESIGN SCOPE

The design scope of project is limited to generating options for custom site, building envelop and the units. Units being the small and major factor of a multifamily – we are proposing two idea of how Units can be generated: Random method & regulative method. There are many types of construction. But the scope of this project is limited to a wrap site layout, rectangular building and a flip unit. The project has the potential to be expanded or customized to Podium, Slab, Walk up and Tower construction.

BASICS OF GENERATIVE DESIGN

Generative design is like a mathematical formula; where one will have inputs, formula and output; except we'll have multiple inputs and "n" number of outputs for all possible iterations of input. Generative design also has a filtering way, where 1000's of options are proportionately reduced to 10-20 (as per requirement). After which the designer, will be able to chose the best ones manually.

The project deals with stages of the process for all the situation – Custom site, building envelope and units. The stages are as follows.

Stage 1 - INPUT:
The initial idea will be the input – which can either be from:
>   1. Revit
>   2. Line inputs
>   3. or Both.

Stage 2 – PROGRAM:
The design restrictions are formulated in Dynamo in the form of algorithms and codes.

Stage 3 – OUTPUT:
Finally, "n" number of solutions are formed using Generative Design, where it can be filtered as well.

Stage 4 – SELECTION:
However, Manual selection of design after filtering is required.