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Block VIII: Geometric models of singular structures, Parameterization of structure models.

Title: Geometric Models. A Revit Tutorial.

1 – Aims.

The aims of this training are as follows:

- Getting general information about Revit.
- To have knowledge about modeling of single geometric structures with this program.
- Creating a model of a single architectural structure.

2 - Learning methodology.

The teacher will give an explanation about the general structure of Revit for 10 minutes.

Students will read this tutorial and watch the videos.

Students will create their own parametric models by following the steps shown in the videos.

Each student will write a report to evaluate the success of the application.

3 - Tutorial duration.

The application described in this tutorial will be performed in a computer classroom.

It will take 3 lesson hours.

4 – Necessary teaching recourses

A computer room with computers with internet access is required.

Required software: Revit

Required equipment: Pcs sufficient for the number of students.

5 – Contents & tutorial.

5.1 – Introduction.

In the field of BIM, a number of tools related to modeling such as Revit, Allplan, Vectorworks, Archicad, Solibri, Rhino-Grasshopper, BricsCAD are used. Among these tools, some prominent features of Revit are as follows:

- There are many add-ons for Revit, which has a wide range of users.
- With its visual coding software called Dynamo, it offers more advanced modeling and automated commands.
- The software, which allows different users to work on a single file at the same time, offers options on working together.
- Building models are created with the help of objects called 'family', so drawings and models can be made quickly.
- Many companies in the construction industry produce family models that correspond to their products and offer them to users free of charge.

Due to these benefits it provides, Revit is used in this study.

5.2 - Modelling process

Modeling of a single geometric structure will be carried out in three steps:

1. First, by entering the necessary parameters in Revit, the axes, columns, walls and floors of the building are created (Explained in Video 1).
2. Afterwards, the foundation, roof, doors and windows are created (Explained in Video 2).
3. Finally, stairs and railings are created and furnishing elements are placed (Explained in Video 3).



5.3 – Application Scope

The use of Revit is becoming very popular in BIM-related studies.

Revit allows people from different professions such as architects, civil engineers, mechanical engineers, interior architects to work together on a single file. Therefore, it can be used by all architects and engineers involved in the modeling and implementation of a building.

5.4 - Tips before modelling

1. Do not forget to set your unit of measurement in the “Project units” section.
2. You can use “load family” to load different types of columns, windows, doors, furnishings etc.
3. If necessary, you can use different elements by downloading them from the internet.
4. When your model is finished, you can transfer it to a different program or print out plans, sections, etc.

5.5 - What is the RFA format?

Formats supported by Revit:

Revit Master Formats: RVT, RFA, RTE, RFT.

CAD Formats: DGN, DWF, DWG, DXF, IFC, SAT, and SKP.

Picture Formats: BMP, PNG, JPG, JPEG, and TIF.

Other Formats: ODBC, HTML, TXT, and gbXML.



RTE (template) files and RVT (project) files from Revit's main formats are real Revit projects. The difference between the two is that the template is used to start a new project. When you click Save, you will not be allowed to overwrite the template file, but will be prompted to enter a new filename and location.

RFA (family) files and RFT (family template) files are family files that can be loaded into a project or saved externally. Family template files are used to start a new family from scratch, and family files are often used to switch families between projects. These RFA files can usually be enclosed in a three-dimensional scene and are classified as data files containing one or more 3D models saved using the Revit Family Editor.

5.6 - What is Revit?

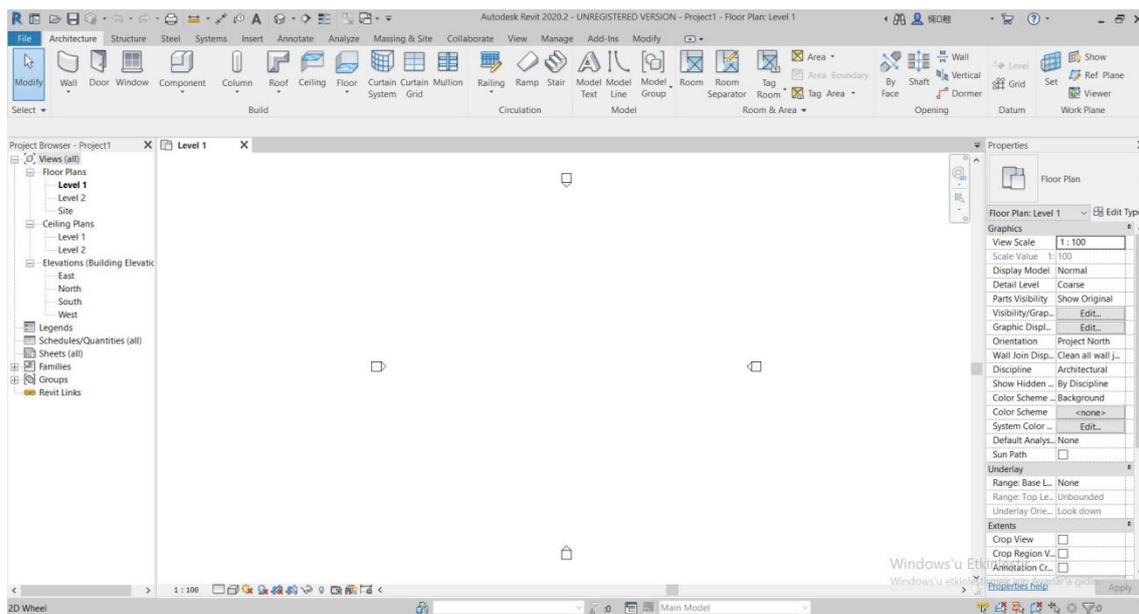
Revit is a parametric modeling tool. In general terms, when we make a drawing, all the drawings, model and installation of this structure can be created simultaneously.

Revit is a "family" based program. For example, it defines a column as a column, not as an object, and behaves in accordance with those properties.

Revit defines a holistic process starting with the first design drawing, from model to quantity. Thus, a change made in a revision situation is automatically updated in all drawings and models.

A free trial version or student licensed product can be downloaded via the website below:

<https://www.autodesk.com.tr/products/revit/overview>



Revit Interface

Revit's simple and understandable interface also shows similarities with other modeling programs and offers an easy modeling opportunity to the user.

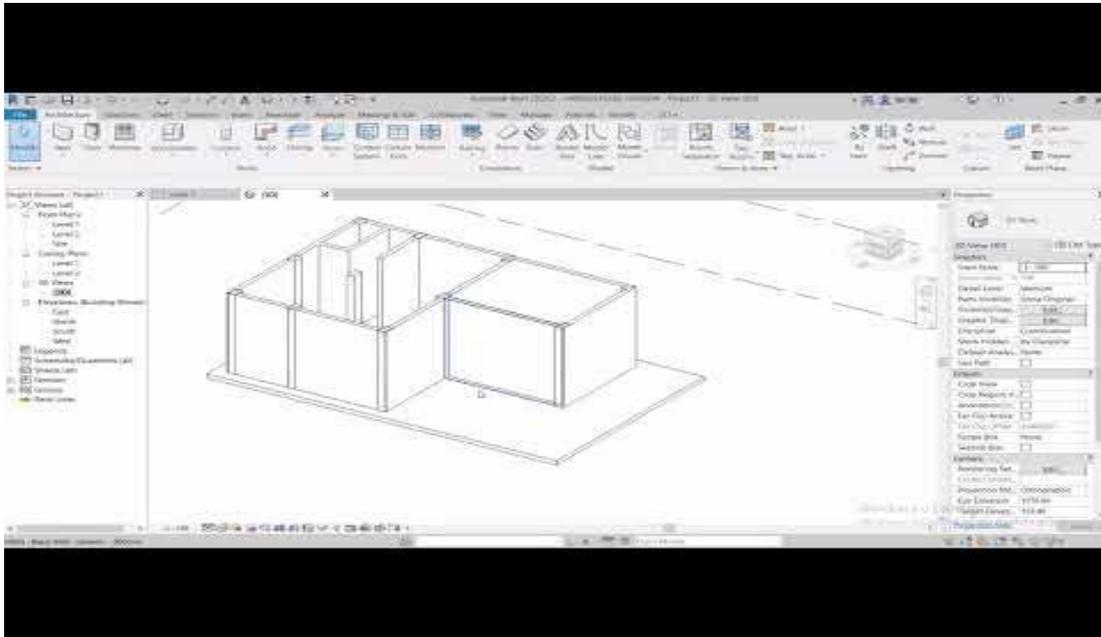
It is also possible to transfer a drawing made in a different program to Revit.

5.7 - Video

- This tutorial will show a 3 step example video on how to make a parametric model of an original and comprehensive single geometric structure with the Revit program. With these videos, the student will be able to start from scratch and develop a structure in Revit.
- Starting from the basic commands in Revit, the components of a single geometric structure will be displayed in order.
- Students are also expected to create their own parametric structures by following these videos.

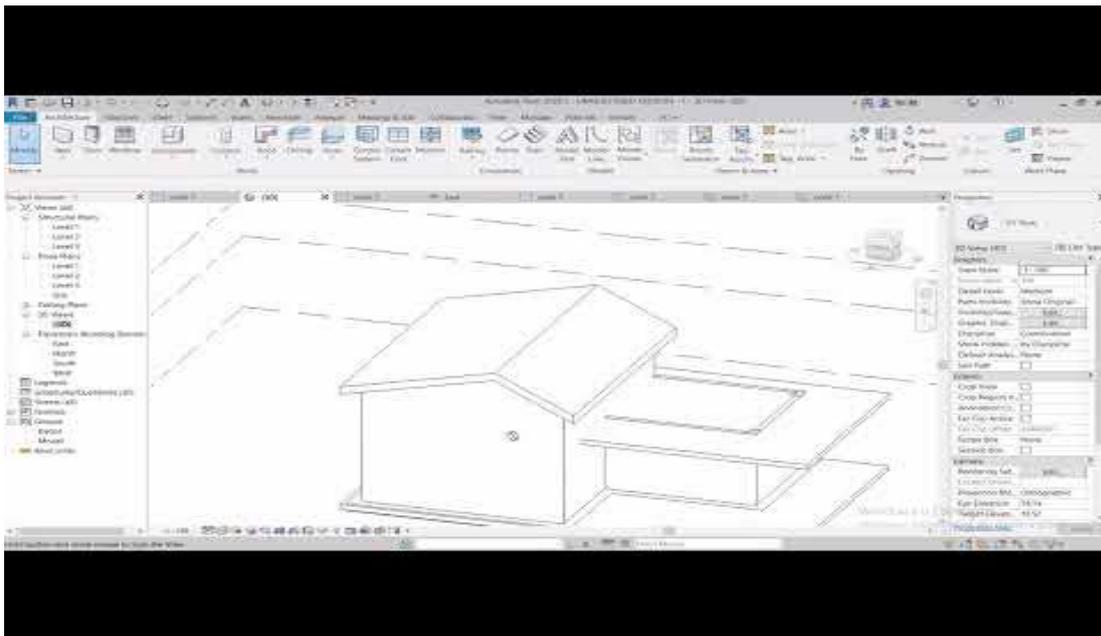
Video 1 (Axles / Columns / Wall / Floor)

<https://www.youtube.com/watch?v=sitmmKQa3nA>



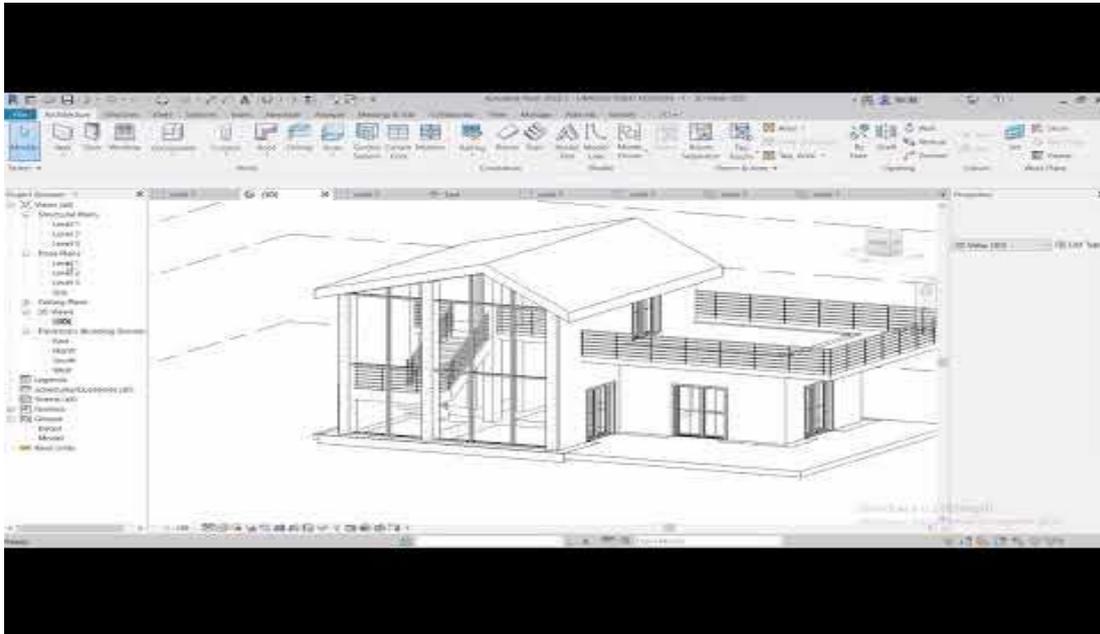
Video 2 (Foundation / Roof / Door / Window)

<https://www.youtube.com/watch?v=uwhDbqIC7R4>



Video 3 (Stair / Railing / Furnishing)

<https://www.youtube.com/watch?v=upWX3oTA9lg>

**6 - Deliverables**

In order to evaluate the success of the application, students will write a report of maximum 3 pages.

In this report, the student will explain the steps taken in practice, the difficulties encountered and the decisions taken. The report will contain the visuals of the single geometric model made.

7- What we have learned

- Revit interface
- To create the axes, columns, walls, floors, foundation and roof of a single geometric structure and to place the door, window, staircase, railing and furnishing elements with Revit.
- The ability to edit the elements we have placed and add elements that do not already exist.



8 – Files to use in this tutorial

Furnishing elements in RFA format

Quick tip: On the Internet there are many free furnishing elements in RFA format for download.